BUILDING THE NETWORK AS A PLATFORM FOR INTEGRATED SOLUTIONS AND SERVICE INNOVATION IN THE TRANSITION TO THE NEXT GENERATION OF TELECOMMUNICATIONS: THE CASE OF BT

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A Thesis Submitted in Partial Fulfilment of Requirements for Degree of Doctor of Philosophy

SPRU: Science and Technology Policy Research
University of Sussex

September 2009

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Acknowledgements

The doctorate journey is a long and personal project. In that respect, this project had many stakeholders. Several people supported this initiative and made the journey possible. I thank my wife, Neide, who has been with me along this journey: my gratitude for her support, sponsorship and companionship. I thank my parents, Hiyoshi and Tiyoko, and my older sister, Márcia, for their support not only in this, but in many other undertakings in my life. I also thank my parents-in-law, Kaoro and Kazuko, for their kindness and generosity. I am grateful to Prof. Dario Eduardo Amaral Dergint and Prof. Kazuo Hatakeyama, from UTFPR for their guidance and friendship, which inspired me to do this doctorate.

I would also like to express my special gratitude to the following people and institutions who have, in conjunction with the family and friends listed above, provided me with invaluable support during the doctorate journey:

- Ed Steinmueller, my supervisor for most of the doctorate. He provided me with the inspiration (and perspiration) to persist with this journey and to attempt to learn what a critical scholar is. I may not have learned this yet, but it is not his fault.
- Andy Davies, who set me off on this journey as my first supervisor in SPRU.
- Martin Meyer, who supported me at many important moments.
- Friends and colleagues who were part of the 'therapy' group, which helped me to cope with the burdens of the journey and also to enjoy the experience.
- The support staff from SPRU, especially Janet French and Carmen Long.
- The academic staff from SPRU. I learned everything that I expected and more from them as a student and as a lecturer.
- Programme Alβan, the European Union Programme of High Level Scholarships for Latin America, scholarship no. E04D046140BR: without this scholarship, my doctorate would not have been possible.

The end of the doctorate marks the start of a new phase. The repercussions are yet to be seen and experienced, but the lenses to see the world seem to be more focused. Success and failure are like two sides of the same coin, where success can turn into future failure and failure can lead to future success.

UNIVERSITY OF SUSSEX

Carlos Eduardo Yamasaki Sato Doctor of Philosophy

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SUMMARY

This thesis investigates the development of capabilities by incumbent telecommunications operators in the context of the transition to the Next Generation Network (NGN). In particular, it examines the case of BT in the UK, as a large-scale first mover in this transition. The research is based on recent developments in the telecommunications industry, and the empirical evidence was obtained through documentary analysis and a large number of interviews.

Using the resource-based view (RBV) as a foundation, the wider theoretical contribution of this thesis lies in the proposition that integrated solutions are constructed through the combination of platform strategy, project business and service innovation. A unique contribution is to consider the customer/user perspective, as the traditional literature on integrated solutions relies heavily on the supplier perspective. Another specific contribution is in the integration of two aspects of the platform strategy that are usually treated separately in the literature: (i) the reusability of components and sub-systems; and (ii) the openness of the platform to external actors in order to drive innovation in the industry.

The empirical evidence points to the development of the following approaches by BT: (i) the deployment of the network as a platform, integrating both aspects mentioned above; (ii) the adoption of a customer-centric approach which resulted in the establishment of a new business unit, BT Global Services (BTGS), that required the development of stronger capabilities in integrated solutions, especially in professional services (i.e. consultancy, project management and systems integration); (iii) the use of the term 'open innovation' as a management injunction within BT in order to coordinate several initiatives which bring together internal and external collaborators and resources to innovate in services.

The above approaches, however, have not changed BT's core capability in the provision of network/infrastructure services. The challenge is to connect BT's platform to their customers' networks and to shape long-term relationships to enhance the profitability of the integrated solutions. Finally, the findings suggest that the platform and customer-centric strategies may not be enough (or even be the right ones) for the survival and growth in the long-term future of BT in the telecommunications industry. This is evidenced by the recent failure (as of 2008) of BTGS to provide professional services profitably.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

3GPP	3rd Generation Partnership Project
AA	The Automobile Association
API	Application Program Interface
ATM	Asynchronous Transfer Mode
BcN	Broadband convergence Network
BOT	Build-Operate-Transfer
BT21CN	BT 21st Century Network
BTGS	BT Global Services
C&SI	Consulting & Systems Integration
C&W	Cable & Wireless
CAPEX	Capital Expenditure
CD-ROM	Compact Disk Read-Only Memory
CEMEA	Central and Eastern Europe, the Middle East and Africa
CEO	Chief Executive Officer
CoPS	Complex Products and Systems
COTS	Commercial Off-The-Shelf
CPE	Customer Premise Equipment
CRM	Customer Relationship Management
CTO	Chief Technology Officer
DoD	Department of Defense
DT	Deutsche Telekom
DVD	Digital Versatile Disc or Digital Video Disc
ETSI	European Telecommunications Standards Institute
EvoTAM	Evolutionary Test Access Matrix
FP	Foundational Premises
FT	France Telecom
GDL	Goods-Dominant Logic
GE	General Electric
IBM	International Business Machines
ICT	Information and Communication Technologies
IEC	International Electrotechnical Commission
IEE	Institution of Electrical Engineers
IN	Intelligent Network
IP	Internet Protocol
IPVPN	Internet Protocol Virtual Private Network
IS	Integrated Solutions
ISDN	Integrated Services Digital Network
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
IT	Information Technology
ITIL	Information Technology Infrastructure Library

ITT	Invitation To Tender
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
LAN	Local Area Network
LRNI	Land Registers of Northern Ireland
M&A	Merger & Acquisition
MIT	Massachusetts Institute of Technology
MPLS	Multi-Protocol Label Switching
MSAN	Multi-Service Access Node
NGN	Next Generation Network
NHS	National Health Service
NTT	Nippon Telegraph and Telephone
NVP	New Venture Partners
OECD	Organisation for Economic Co-operation and Development
OFCOM	Office of Communications
OPEX	Operational Expenditure
OSS	Operational and Support System
PC	Personal Computer
PDA	Personal Digital Assistant
PDH	Plesiochronous Digital Hierarchy
PMBoK	Project Management Body of Knowledge
PMI	Project Management Institute
PSTN	Public Switched Telephone Network
PTT	Public Telephone and Telegraph
QoS	Quality of Service
R&D	Research & Development
RBV	Resource-Based View
RENA	Resonant Communication Network Architecture
RFP	Request For Proposal
SDH	Synchronous Digital Hierarchy
SDK	Software Development Kit
SDL	Service-Dominant Logic
SME	Small and Medium Enterprise
TCP	Transmission Control Protocol
TGN	Telekom Global Network
VoIP	Voice over Internet Protocol
WAN	Wide Area Network

LIST OF FIGURES

LIST OF TABLES

1. Introduction

1.1 Background

This thesis is concerned with the business renewal and growth of the incumbent telecom operators after the downturn in the telecommunications industry at the beginning of the 21st Century. It investigates how these incumbent telecommunications operators have been reorganising themselves in order to remain competitive in the face of declining revenues of traditional services, fierce competition, major technological change, and the financial difficulties following the burst of the financial bubble in telecommunication and Internet related company evaluations that occurred at the beginning of the 2000's. It also investigates how these traditional telecommunications operators are changing and developing their capabilities in order to remain competitive. In particular, this thesis is concerned with the capabilities development and innovation processes of incumbent telecommunication operators (such as BT, Deutsche Telekom and France Telecom) to create and deliver new services in the course of large scale adoption of Internet Protocol (IP) as the core of their networks, migrating their infrastructure and transitioning to the IP NGN (Next Generation Network).[1] The analysis takes into account the industrial level and narrows down to the specific case of BT in the UK, as a significant representative of the transition to NGN.

The problem and focus of this research are represented in Figure 1.1:

[1] For this research, NGN is viewed as 'a multi-service network based on IP technology' (OECD, 2005, p. 7). It is based on the premise that voice, video and data services are digitalized and transported using packet-switching technology based on the Internet Protocol (IP).

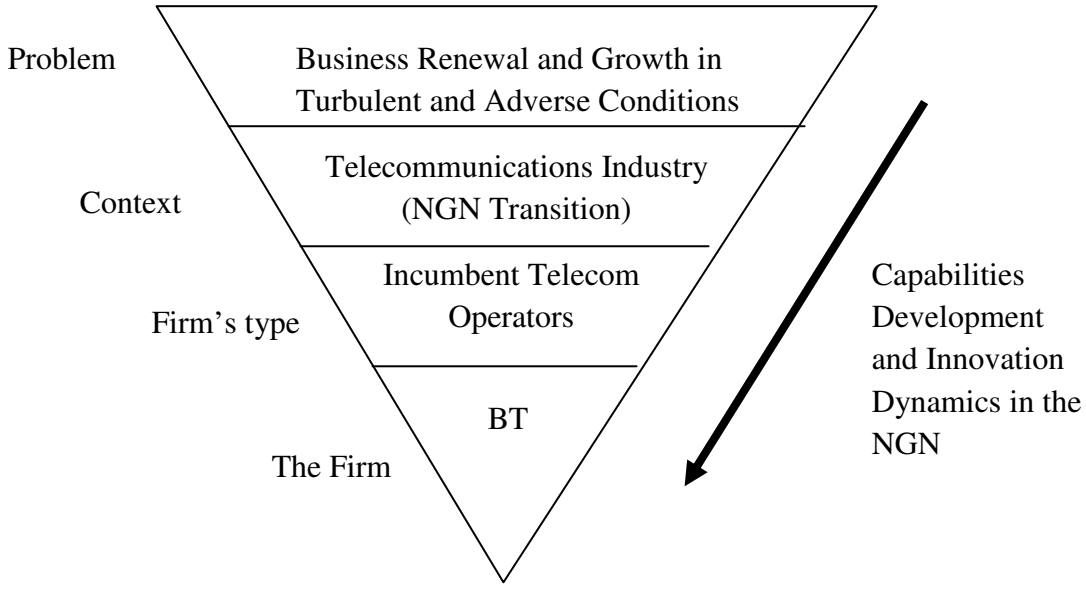

Figure 1.1 – From the Problem to the Focus of the Research
Source: Author's elaboration

During the 1980s and 1990s, network technologies including ISDN (Integrated Services Digital Network) and ATM (Asynchronous Transfer Mode) competed with IP (Internet Protocol) for dominance in multimedia applications and in other applications involving high signal bandwidth rather than (single) voice telecommunication signals. By the second half of the 1990s, there was still doubt about the capabilities of IP to handle packet transmission priority for real-time applications and to support billing and security issues (Mansell and Steinmueller, 2000). At this time, IP technology has been largely diffused by the growth of the Public Internet[2] and it was extensively used in Local Area Networks/Wide Area Networks (LAN/WAN) for data transmission, especially for non-real time applications, where a session does not need to be established. However, during this period, the telecommunications industry began to experiment with IP in real time (voice) applications and the first commercial application of voice over IP (VoIP) was launched in 1995 by an Israeli company called VocalTec (Intertangent, 2004), demonstrating the potential of IP technology for voice transmission and real-time applications. As a pioneer, VocalTec launched the Internet Phone Software, which allowed PC-to-PC voice communication over the public

[2] The start of the Public Internet can be considered, for example, when the National Science Foundation (NSF) initiative in the USA, NSFNET, was shut down in April 1995, allowing for profit firms to run the backbone of the Internet. Further account of this transition to Public Internet can be found in Gorman and Malecki (2000) and Rogers (1998).

Internet. IP technology evolved within suppliers of telecommunications equipment and by 2005 many incumbent telecommunications operators were deploying or had announced plans to deploy the IP technology as part of their transition to NGN initiative to replace their traditional networks, known as PSTN (Public Switched Telephone Network).[3]

After the downturn, large incumbent telecom operators in Europe (e.g. BT, Deutsche Telekom and France Telecom) accumulated huge debts as a result of a) their attempts to expand internationally and b) their purchases of mobile spectrum licences.[4] Such high levels of debt combined with decreasing revenues from traditional voice services demanded new approaches for such firms to keep growing and sustaining a reasonable level of profitability. This undesirable situation called for change. The question was (and has ever since been) how to remain competitive in this turbulent environment (Fransman, 2007). The period from 2002 to 2005 could be seen as a period of significant uncertainty in the telecom industry in general, and for the incumbent telecom operators in particular.

The situation of BT, Deutsche Telekom and France Telecom was in general very similar in terms of high levels of debt and market constraints. However they took different approaches due to differences in their home markets and styles of management. Among the three operators, BT seems to have taken the most drastic decisions to recover from the unfavourable financial situation they were in regarding their debts and their ability to grow through increasing their income. BT sold its mobile business in 2001 while DT and FT retained theirs.[5] BT also decided to renew its infrastructure, establishing a major programme called BT 21st Century Network (BT21CN)[6] while DT and FT agreed with the underlying changes that BT was propagating in the industry (through BT21CN), but

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3 Examples of such NGN initiatives are Deutsche Telekom's TGN (Telekom Global Network), NTT's RENA (Resonant Communication Network Architecture), Korea Telecom's BcN (Broadband convergence Network) and BT's 21st Century Network (BT 21CN). Further information can be found in OECD (2005).

4 An account of the telecom bust can be found in Fransman (2002b). Regarding the level of debt, BT had £27.9 billion of debt at 31st March 2001 (BT, 2001, p. 30-31); Deutsche Telecom had € 67 billion in 2001 (DT, 2001, p. U4); and France Telecom debt was about € 64.9 billion in 2001 (FT, 2001, p. 88) and € 68 billion by the end of 2002.

5 mmO2, BT's mobile unit, was divested on 19th November 2001 (BT, 2002, p. 9). T-Mobile is the mobile unit of Deutsche Telekom (see, for example, Deutsche Telekomn's Annual Report 2001 (DT, 2001)). Orange is the mobile unit of France Telecom (see, for example, France Telecom's Annual Report 2001 (FT, 2001)).

6 BT issued a press release on 09th June 2004 announcing its plan to build BT 21CN.

proceeded at a slower pace.[7] BT21CN represents the transition of BT's traditional telecommunications network (based on several technologies such as Plesiochronous Digital Hierarchy (PDH), Synchronous Digital Hierarchy (SDH) and Asynchronous Transfer Mode (ATM)) to a new network based on the so-called Internet Protocol (IP)/Multi-Protocol Label Switching (MPLS) technology.[8] This change in the technology of the core network enables the incumbent telecom operators to be more flexible in the delivery of new services. Such flexibility in services is to a certain extent already enjoyed by Internet-based firms (such as Google, Yahoo, or Skype) as they have employed IP technology since their inception.

This new network based on the IP/MPLS technology is called NGN (Next Generation Network).[9] IP is not a new technology though, since it has been deployed in the Internet sector for a long time (since the 1970's) and is widely used in, for example, local area networks (LANs). The novelty is that IP technology, in conjunction with MPLS, has been developing in terms of QoS (Quality of Service) in such a way that it has become possible to deploy it not only for data services, but also in the transmission of real-time services, including voice and video, with superior benefits compared to competing technologies, like ATM (Asynchronous Transfer Mode). In mid 2004, the ITU-T (International Telecommunication Union – Telecommunication Standardisation Sector), the telecommunications standardisation body based in Geneva, created a focus group dedicated to standardising the architecture and protocols of the NGN.[10]

Along with the emergence of the IP technology as the basis of a robust platform for converged services (integrating voice, video and data services in a single network), the competitive environment of communications has been changing in the first decade of the 21st century, with fixed and mobile operators, Internet-related firms (such as Skype, Google and Yahoo), cable TV operators and smaller communications providers all competing for customers (and frequently the same customers). The idea that voice,

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7 Interview with BT Senior General Manager, November 2005; interview with Deutsche Telecom Project Manager, November 2005; interview with France Telecom Technical Manager, November 2005.

8 It is not the aim of this research to elaborate on such technologies, but a historical perspective on network synchronisation involving PDH, SDH and ATM can be found in Bregni (1998). More technical information about the application of MPLS in IP networks can be found in Awduche (1999).

9 The expression Next Generation Network (NGN) is now widely used by official institutions like the ITU-T and the OECD's Directorate for Science, Technology and Industry (see, for example, OECD (2005).

10 More information is available on http://www.itu.int/ITU-T/ngn/fgngn/ (accessed on 13th October 2008).

video and data services could share the same Internet Protocol (IP), which is widely used in the public Internet, is driving convergence of services and contributed to the choice of the traditional telecommunications industry (represented by telecom incumbents such as BT, Deutsche Telekom and France Telecom) to adopt the IP as 'the' technology of choice to build their Next Generation Networks (NGN).[11] By 2005, major incumbent telecommunications operators had announced plans to migrate to the Next Generation Network (NGN), an all-IP platform that enables the delivery of a whole range of new multimedia services, besides the voice-only services.[12]

The technological convergence is a consequence of digitalising all forms of information into bit streams and having a common standard, i.e. IP. Based on a common protocol and platform, interactions among services defined internally to the firm and in collaboration with external parties are increasingly possible, since the interfaces are open to a certain extent. Fewer barriers to interact both internally and externally make it possible to develop new services in novel ways, and new communication capabilities will almost inevitably emerge. Voice, video and data can all be digitalised and can now follow the same IP (Internet Protocol) that runs the public Internet, which is widely available and adopted. This technological convergence leads to changes in the boundaries of the market in the way that firms from particular segments of the market, once bounded and limited by their technological capabilities, can now offer services to other segments and markets.[13] Thus, there is now an information and communications market, where the telecommunication operators (fixed and mobile), cable TV, satellite and Internet firms are increasingly competing for the same customer. The usual distinction is between the business and the residential customer, where the former demands more robust services to improve the productivity and performance of their respective business, and the latter is more related to entertainment and convenience at home and on the move. Convergence is also happening in devices, for example, in mobile phones, where more functionality (based on voice, video and data services) is being aggregated in a single device. What integrates the voice, video and data services

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11 An overview of NGN standards and architecture, including the role of IP (Internet Protocol) can be found in Lee and Knight (2005), Carugi et al. (2005), and Knightson et al. (2005).

12 See, for example, OECD (2005).

13 Technological convergence has been long referred to. For example, Mansell (1993) recollects that convergence started in late 1940s and early 1950s with analog ue technology. Mansell and Steinmueller (2000) discuss convergence in the late 1990s, when ATM, ISDN and IP were competing with each other. A discussion of the impact of the technological convergence in an all-IP world can be found in Jordan (2009).

is the application and content of the service. Brand also seems to be increasingly important as the point of reference for products and services, to such a degree that services may be converging around brands in the future.[14]

The present situation (2009) of the telecommunications industry is a result of various technologies being developed independently and reaching a point where they started to interact with each other and diffuse in their adjacent markets. In other words, different technological trajectories are overlapping at the services level. The fixed-line voice service is the most traditional one, with more than 100 years of history. More recently, in the 1990's, mobile communications has gained rapid acceptance in the market and began during the 2000's to take significant market from the fixed-line service. The cable TV industry, once related only to broadcasting TV (video) channels, is now offering broadband and voice service as well. Internet Service Provider firms, once perceived by firms and the general public as offering unreliable services, have been evolving and are now starting to compete with telecom giants by offering voice and multimedia services. The emergence of Skype in 2003 and its subsequent purchase by e-Bay in 2005 raised the perception that low cost *and* good quality long distance voice calls are possible.[15] The Internet is usually regarded as having a marginal place in the market for robust telecommunications services. Nonetheless, it has had a major influence in the evolution of the telecom industry since the mid 1990s. As previously noted, the Internet Protocol (IP), supports the network infrastructure and the efforts to upgrade the speed of packet transfer referred to as broadband[16] and World Wide Web (web portal) which have been changing the perception of services by customers. Combining lower cost, convenience and good enough quality for new interesting services, the Internet is changing sharply the way traditional telecommunication operators conduct their business and deal with innovation.[17]

The move to NGN represents the transformation of not only the infrastructure but also the business of incumbent telecom operators. The NGN provides more capabilities for

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14 Interview with BT Senior Sales Manager, March 2006.

15 An account of the initial impact of Skype and its purchase by e-Bay can be found in Economist (2005).

16 The definition of broadband in this research follows the one found in OECD's report (see Paltridge (2001), where the downstream speed is a minimum 256 kbps for 'always-on' service. The term broadband in this context is usually used to differentiate from the dial-up access with speed in the order of 10ths of kbps (e.g. 56 kbps). In 2009 it is common to find downstream speed of 2 Mbps or more.

17 An initial discussion about the impact of the Internet on the traditional telecom operators can be found in Noam (1998).

them to deliver new services. It became ever more apparent to incumbent telecom operators that the aim of the new architecture being proposed is to decouple the infrastructure from the services layer.[18] This is a telecommunications industry version of the architecture already practiced in the computer industry: the decoupling of the network/infrastructure (hardware/operating system) from services (application software) means that every time a new application is introduced it is not necessary to change significantly the infrastructure (hardware/operating system). This reflects the concept of platform (and its reusability), where the network becomes the platform to deliver new services developed by the operator itself and in collaboration with other service providers. The incumbent telecom operators are now trying to implement this vision.

Research Background

The research underlying this thesis began in 2004. As explained in more detail in Chapter 3 (Research Methodology), the research was based upon a variant of participant observation in which my previous background as a telecommunication engineer and manager allowed me to be recognised by people in the industry as a fellow engineer rather than a social science researcher.[19] In seeking an understanding of telecommunication industry developments by attending trade conferences and interviewing specialists, it became apparent that the major issue for companies was the fundamental change needed within the industry and the organisations, namely the traditional telecommunication operators, in order to cope with the shifting competitive environment. More particularly, the fundamental change was concerned with the development of a more flexible infrastructure, and with the rethinking of the innovation processes to create and deliver new services. This change can be translated into a new dominant logic where the customer and the service delivered to the customer are the centre of business practices. The question was not whether incumbent telecom operators needed to change their infrastructure and their innovation processes in services, but how to make these changes in an uncertain and competitive environment carrying a huge

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[18] A discussion about the NGN architecture can be found in Knightson et al. (2005) and Lee and Knight (2005).

[19] The participant observation was variant in the sense that, although I was attending conferences as I normally did in my previous job, I was not employed by any of those firms, which helped me 'to retain some critical subjectivity about the situation' (Maylor and Blackmon, 2005, p. 236). Thus, the research objectives and the participants' objectives were not co-determined, and had a high level of independence. On the other hand, the participants may be less willing to cooperate or may give less information than expected. I address these issues and how I tried to avoid or overcome them in chapter 3.

legacy system.[20] All firms were ultimately aiming to do their activities better, cheaper and faster. This is the 'quality, cost and time' triangle that can be seen in general business and, in particular, in the project management environment.[21] The main themes identified during the field research were project management and platform strategy at the infrastructure and organisational levels (examined in more detail in Chapter 5 and Chapter 6); and new product/service and solutions development, involving the incumbent telecommunication operator's capability to innovate in services (examined in more detail in Chapter 7 and Chapter 8). What has also been important in this context of change is the role of integration, or more completely, system integration and who takes the responsibility for it: the supplier and/or the customer (examined in more detail in Chapter 5 and Chapter 7). This leads to the issue of providing value to (and with) customers, and a shift (in some instances) from providing isolated products and services to providing solutions. This is usually referred to as the move towards 'integrated solutions' (Davies, 2003b), and it is aimed at better satisfying customer's business and operational needs and wants (Davies, 2003b, 2004, Davies and Hobday, 2005), providing value (to both customer and supplier) in an integrated way.

Projects, the means to create these solutions in this context, are used as a way to implement strategies, and incumbent telecom operators may choose to establish megaprojects (multibillion pound projects) or smaller distributed projects depending on their strategy regarding speed of implementation. A distinctive example is BT, which chose to establish the BT 21CN as the umbrella project to make the transformation to an all-IP network within five years, starting in 2004, switching off the old network (called PSTN – Public Switched Telephone Network) after investing around £ 10 billion.[22]

In order to do things better, cheaper and faster, incumbent telecom operators need to have a different process for product/service creation and development underpinned by the new infrastructure. Smith and Reinertsen (1998), Cooper (2001) and Meyer (2007b), from the product development literature, and Doz and Kosonen (2008), from the strategic management literature, emphasise the 'faster' approach of development, since it is necessary to decrease the time-to-market to deliver new products and services to enhance competitiveness. Telecommunications operators, as service companies, are

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[20] Interview with Deutsche Telekom Technical Manager, March 2005; interview with Lucent Technical Manager, March 2005; interview with Nortel Senior Technical Manager, March 2005.

[21] The triangle of time, cost and quality for project management is found in the traditional literature of project management such as Kerzner (2006).

[22] BT issued a press release on 09th June 2004 announcing its plan to build BT21CN.

users of technology and may eventually produce new technology as a consequence of interacting with existing technologies (Fransman, 2002b). Telecom operators, in addition to assuring that their hardware infrastructure is robust, are increasingly reliant on software development in order to innovate in services (Carugi et al., 2005, Cochennec, 2002, Darling and Sauvage, 2005, Reeve et al., 2005). Thus, developing software for creative services and applications (decoupled from the network) is becoming a great challenge for incumbent telecommunications operators. Accompanying these developments are the cultural issues involved in changing from the established practices of the traditional network (PSTN) to new practices for the new network (NGN).[23]

Integration or system integration also plays a major role in this transformation or change (Crane, 2005). The process of system integration is analysed in BT21CN from the user perspective, as telecom operators are predominantly users, not producers of equipment and systems used in their network. Theoretically the same equipment and systems are available to all incumbent telecommunication operators (the available choices depending on their strategy, network design and purchase power). The way incumbent telecom operators design and implement their networks, choosing equipment, systems and their suppliers may have a significant influence in their cost base and the business models they are capable of pursuing. Thus, the success of each telecom operator depends more on how well they use the technology they choose in their particular context as well as how well such telecom operators negotiate with equipment and system suppliers since such systems and equipment are often still being developed and are, in any case, customisable. This context is closely related to the policy/regulation environment facing a particular company, the legacy systems they own, the competitive environment they face and how willing they are to migrate (depending also on their financial constraints) to new hardware and software configurations, and also the particular characteristics of the customer and market segment which they are seeking to or willing to approach (choices that are influenced by deregulation and globalisation).

Convergence has been a major issue on the evolution of the telecommunications infrastructure since the end of the 1980s (see, for example, Mansell and Steinmueller (2000), Thatcher (1999), Blackman (1998) and Mansell (1993)). The emphasis in this

[23] Interview with Deutsche Telekom Technical Manager, March 2005; interview with Fujitsu Senior General Manager, March 2006; interview with Ericsson General Manager, March 2006.

earlier literature is on the role of technological convergence in the unification of the infrastructure. Recent developments in the Internet Protocol (IP) established it as the common networking technology which allows the convergence of integrated voice, video and data applications; and a large broadband 'pipe' where service can flow through an standard and open interface (WWW – World Wide Web) that is increasingly spreading throughout the world (Hart et al., 1992, Clegg, 1996, Rutkowski, 2000, Melody, 2000, Fransman, 2002b, Maeda et al., 2006, Engel, 2007, Jordan, 2009). This interface created a portal where users can relate to technology, network and suppliers of services in a more interactive and on-demand way. It leads to a more horizontal integration of the network, where 'over time there has been a blurring of traditional customer segment boundaries, which has led to customer requirements for multiple services that transcend an organisation's internal partitions' (Levy, 2005, p. 49). This convergence and more horizontal integration of the network may also lead the incumbent telecom operators to be more 'open', not only in the sense of lowering or eliminating the barriers of internal partitions, but also by looking more actively for external partnerships in order to deal with a wider range of customer requirements. So, the issue for the telecom operators (and this is a direct influence of the Internet, its infrastructure and practices/business models) is how, and to what extent, to become more 'open'. In this process of becoming more open, innovation becomes more important, as the requirement of revenue and profit growth remains. The 'triangle' of lower cost, faster time to market (for new services) and better quality (customer experience) also remains. The slower innovation processes of the past are no longer adequate to preserve market position. Operators need to deliver better and cheaper products and services in 'faster' ways and this can be reduced to the need of making things better and/or differently, which can be translated into innovation initiatives.

1.2 Research Questions

As explained in Section 1.1, after the downturn in 2001/2002, the incumbent telecom operators have been facing a competitive environment (represented by the declining of revenues of traditional voice services, and the convergence of technologies and markets) and financial constraints (i.e. high debt levels). As a response to this turbulent environment and high level of uncertainty, the telecommunications industry achieved an unprecedented agreement on the adoption of IP/MPLS technology to be the de facto standard to renew its network for the delivery of new services. Incumbent

telecommunications operators have been forced to rethink their infrastructure and innovation processes for new services. Furthermore, Mansell and Steinmueller (2000), referring to the transformation of the infrastructure supporting the information society, argue that 'the process of convergence between information and communication technologies creates opportunities for defining new advanced telecommunication capabilities and services' (p. 98). Within this context, the main research question refers to the capabilities development and changes in innovation processes associated with the transition to and operationalisation of the NGN, more specifically during its planning and initial implementation phases:

(1) How has the initial phase of the transition (planning and initial implementation) to the Next Generation Network affected the capabilities of incumbent telecom operators to innovate in services?

(1.1)What are the capabilities that incumbent telecom operators have been developing during the planning and initial implementation of the Next Generation Network in order to build it and make it effectively operational?

(1.2)What have been the immediate impacts of the transition to Next Generation Network on the innovation processes of incumbent telecom operators?

This research question is informed by the framework in Figure 1.2, which was conceived in the early stages of the research as a result of pilot interviews. It represents the technological change in the infrastructure (adoption of IP/MPLS and deployment of the NGN); the capabilities development as a mediator between the infrastructure and the service level; and the ICT-based service innovation where value can be co-created by customers and incumbent telecommunications operators.

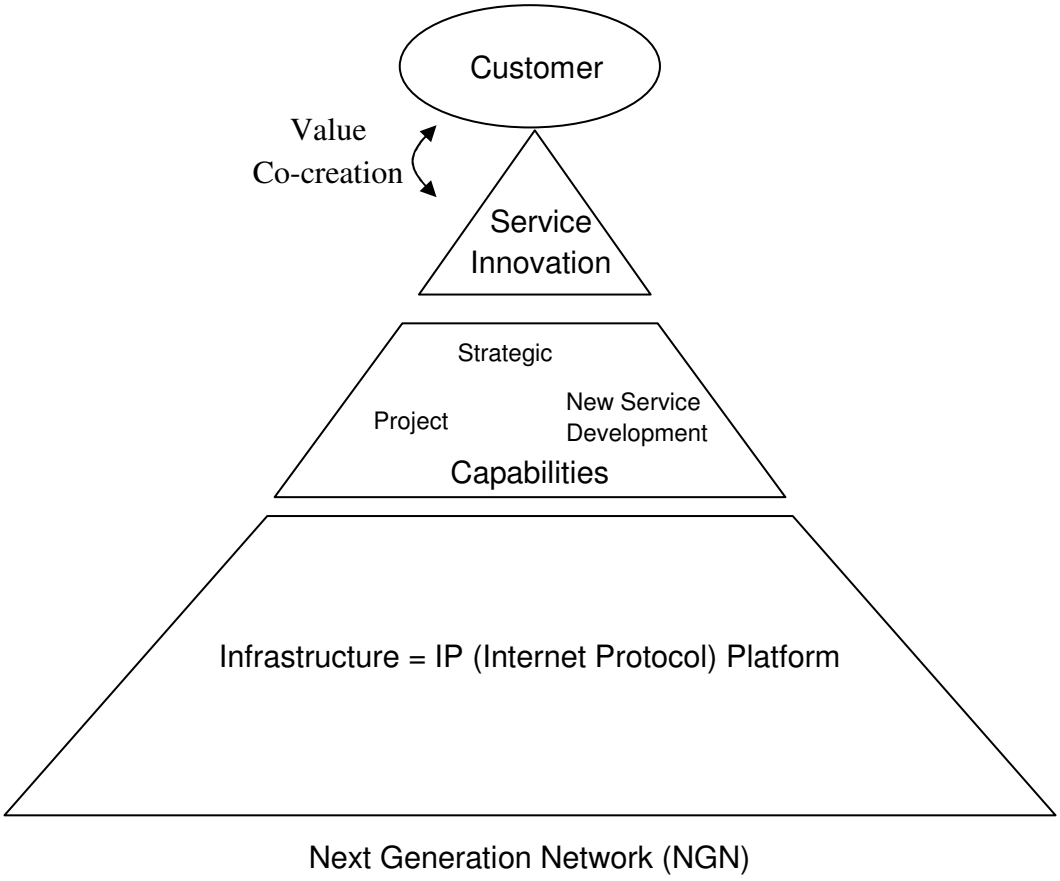

Figure 1.2 – Basic Framework Emerged from the Analysis of the Telecom Industry[24]
Source: Author's elaboration

1.3 Boundaries of the Thesis

This thesis is primarily concerned with the telecommunications industry, particularly with the role played by the incumbent telecommunications operators. The focus is on European operators in developed countries (such as BT, Deutsche Telekom and France Telecom) where the transition to NGN seems to be more advanced compared to the USA and Japan.[25] There are two levels of analysis, i.e. industrial and firm level. The industrial level is mostly explored in Chapter 4, and the firm level in Chapters 5 to 8, which focus on BT. This operator seems to be acting faster than others in Europe, and it appears to be experiencing challenges earlier than others. The analysis takes the perspective of the incumbent telecom operator as user of capital goods/complex systems in order to build its infrastructure (the NGN) and as a provider of integrated solutions through their global services and systems business units.

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[24] This framework is elaborated in Chapter 4.

[25] According to initial interviews and further investigation on the status of the NGN plans of various incumbent operators.

Although BT is mostly a fixed line voice operation as it sold its mobile business in 2001 to reduce its debts (BT, 2002), the architecture of its NGN includes mobility features and adopts standards from the mobile domain (like the 3GPP – 3rd Generation Partnership Project). The main point of the NGN is the deployment of IP/MPLS in the core network, which is supposed to be shared by fixed and mobile networks.[26] Thus, the principles discussed in this research for capabilities and service innovation may be applied to mobile operators as well, although they are not the main focus in this research.

The reason for choosing incumbent telecom operators (and in particular BT) is because a major objective of this research is to explore business renewal, i.e. how a traditional business transforms itself from an old to a new way of doing business. Thus new entrants and smaller operators that did not have a monopolistic history in the past are not the focus of this research, although they are considered for comparative purposes at several points in the research.

1.4 Areas of Investigation

This thesis aims to make an empirical contribution to the problem of survivability and growth of incumbent telecommunications operators as they face fierce competition (especially from Internet-based firms), financial difficulties (e.g. the bubble burst in 2001/2002) and technological change (i.e. the emergence of Internet Protocol (IP) as the technology of choice for packet-switched networks and convergent services).

The primary themes of the empirical investigation are defined by the responses to the emergence of the Next Generation Network (NGN). The NGN is being materialized by the planning and initial implementation of leading incumbent telecommunications operators, most notably BT in the UK (as a first mover in the deployment of a large infrastructure change).

The themes, which are reviewed in Chapter 2, are: integrated solutions, platform strategy, project business and service innovation. As noted in the previous paragraph, each of these themes can be seen as part of the response to the NGN. In order to change its infrastructure, BT is making extensive use of the platform strategy and project business in its major project BT 21st Century Network (BT21CN). In order to innovate in services, BT is also extensively using integrated solutions, underpinned by the

[26] FMC (Fixed-Mobile Convergence) is an ongoing trend in the telecom industry.

platform strategy and project business to meet the needs of large customers through BT Global Services (BTGS). Although high expectations were placed on BTGS's contributions to offsetting the declining revenues from the fixed-line business, recent accounts (as of 2008) indicate that the move to integrated solutions have not been enough nor have they been properly implemented to achieve growth targets.

For the collection and analysis of the empirical data, the frameworks of Figure 2.10 and Figure 2.11 (see Chapter 2) were employed. These figures show how the main themes are related, and how the three underlying logics,[27] technological, organisational and customer, are used to structure this thesis and to answer the research question. The findings can be grouped in three parts, following the three layers (i.e. infrastructure, capabilities and service) of the framework of Figure 1.2: (i) the network as a platform; (ii) the capabilities for the transition to NGN; and (iii) service-dominant logic and open innovation to co-create value. These three findings are elaborated on a preliminary basis as follows.

1.4.1 The Network as a Platform

There are two different perspectives of platform in the literature: the internal and the external. The internal perspective on the NGN platform is derived from engineering and concerns the reuse of sub-systems, processes and interfaces. From this perspective, a predominant aim is to decrease cost and shorten the time-to-market, an aim similar to the one that inspired late 20th century changes in the automotive industry (cf. Meyer and Lehnerd (1997), Muffato (1999) and Meyer (2007b)). The external perspective is the concept of using platform to drive external innovation. The product becomes a 'reference' in the market for other firms to develop new products and services, i.e. to innovate. The firm opens up the platform interfaces and builds an ecosystem of firms that use it. This perspective is inspired by the IT industry and firms like Intel and Microsoft (cf. Gawer and Cusumano (2002)). This second perspective is related to the adoption of the concept of platform where external collaboration is thought to be key to the competitive edge of telecom operators, not only for the construction and evolution of the infrastructure, but also for the creation and development of new services.

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[27] The term 'logics' here means the dominant perspectives from which managers look at problems in order to take decisions to maximize an organisation's performance (Kingman-Brundage et al., 1995).

The BT case combines both perspectives on platform building. BT is defining reusable components and 'capabilities' (the first perspective) *and* making them available to third parties to innovate (the second perspective). The key point is to leverage internal and external technologies and capabilities in order to benefit customers and to allow other firms and users to innovate. The aim is to leverage technologies and capabilities that can be reused and diffused into other contexts and applications.

1.4.2 The Capabilities for the Transition to NGN

At the level of the whole firm, the core capability that BT is refining in the transition to NGN is the capability to respond appropriately and quickly to customers' needs, as BT tries to develop long-term relationships with their customers. To accomplish this refinement, this thesis demonstrates how BT is extensively applying a platform approach to designing and implementing its next generation infrastructure and processes.

This core capability is underpinned by the network/infrastructure level, through the services/application level and up to the organisational processes of the company. This thesis considers a closer relationship with the customer. In employing this closer relationship, it is most important to understand that customers and suppliers are engaged in a journey to value creation. To have advanced knowledge and understanding of the evolution of customers' needs and wants over time (their journey) becomes essential (it is a core capability). It is not only a punctual understanding and satisfaction of customers' needs. It is not only about the customer experience at the present moment, but also how it connects to their future engagements, strategy and vision. It includes the capability to understand major customers more deeply through long-term relationships.

This contrasts with the approach taken by many incumbent telecom operators to expand their presence throughout the world in the 1990s, following the trends of globalisation. The underlying logic of that approach was much more biased to the supply side, based on the belief that if the telecom operators expanded their networks, customers would come. Thus, the approach centred on customers is leading to a behavioural change in the way incumbent telecom operators create, develop and deliver new services. This behavioural change towards a 'genuine' idealist model (cf. Mansell, 1993) has been emerging and evolving in the transition to NGN (planning and initial implementation

phases). However, it is not possible to affirm that this is a long lasting change of path, and whether this new path will prove reliable and robust remains to be seen.

Both BT case and related industry evidence suggest that incumbent telecom operators are assuming a platform organisation strategy in order to manage uncertainty and a turbulent environment where they need to reconcile both change and preservation. Ciborra (1996, p. 115) argued that:

> The platform [organization] is far from being a specific organizational structure, where one can recognize a new configuration of authority and communication lines. Rather it is a virtual organizing scheme, collectively shared and reproduced in action by a pool of human resources, where structure and potential for strategic action tend to coincide in highly circumstantial ways, depending upon the transitory contingencies of the market, the technology and the competitors' moves. Schematically, the platform can be regarded as a pool of schemes, arrangements and human resources.

The platform organisation involves a substantial redeployment of resources, changes in process, and changes in structure. On one hand, the platform may emphasise 'fragmentation, fuzziness and displacement as the inevitable outcome due to high environmental uncertainty and imperfections in the formal organisation', but on the other hand it rather 'should be appreciated as a necessary culture bed for experimentation and recombination, that provides the decision maker with an almost infinite variety of elements (schemes, visions, mechanisms and arrangements) to compose new temporary solutions faster and more efficiently' (Ciborra, 1996, p. 116).

The platform organisation represents a particular structure in services which seems to be appropriate to certain types of service innovation processes, where a culture for experimentation and recombination is required to create and deliver new temporary solutions faster, more effectively and efficiently. This extends Woodward's (1965) argument on the manufacturing industry, i.e. particular structures in manufacturing are appropriate for certain types of production processes. The platform strategy is an attempt of BT to reorganise itself in order to approach the uncertainty of the new services to be developed and the limitations of its internal resources and capabilities.

The development of customer-centred capabilities depends on the understanding of the context in which each customer is embedded. The example of BT21CN (further developed in Chapter 5) illustrates the network flexibility on which flexible capabilities can be built and nurtured at the service/application level in order to provide flexibility

from the customer point of view. BT21CN shows that flexibility is a capability to be nurtured within the major project, which faces a high level of uncertainty. Success factors have dimensions other than time, cost and quality issues. In the case of BTGS, beside major projects, there are smaller projects (typically lasting less than a year) which are organised to meet customers' needs, and are considered as temporary responses to local problems and conditions. This means that these projects are established to tackle short-term changes. In this case, the traditional approach of project management of managing according to the plan works well *once the problem is adequately identified and structured*, and project success is essentially measured by time, cost and quality compliance, and customer satisfaction. Flexibility is achieved as an emerging property of the set of projects undertaken by BTGS, not necessarily by any specific project, as each project is supposed to reduce the uncertainties before the execution starts. The challenge is not only in the management of each specific project, but also in the portfolio of the business projects, each one representing an integrated solution to a customer.

The BT case illustrates two distinct types of projects: BT21CN and the projects undertaken by BTGS. BT21CN is classified as a major project, where uncertainty is higher, and where the traditional ways of managing projects may not be enough. In BT21CN, project success is beyond the triple constraints of time, cost and quality. It involves other dimensions besides efficiency: impact on customer, impact on team, contribution to business success and preparation for future (cf. Shenhar and Dvir, 2007). Smaller projects undertaken by BTGS follow the traditional project management approach more closely: completing the project according to time, cost and quality/scope is highly regarded. The plan is sold to the customer. Deviations from the plan are supposed to be avoided.

One major lesson from BT21CN is regarding the pace of the project. BT was initially 'imposing' a schedule on customers to switch to BT21CN, which has not worked so well.[28] BT21CN was not respecting (at the beginning) the customer choice to switch to the new network when they decided to do so. This has been corrected along the way.[29] Thus the lesson is to let the customer decide, as far as possible, when to move, and have

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[28] Interview with BT Senior General Manager, March 2007.

[29] Ibid. Just for comparison, Telenor claimed to make the transition to NGN without 'forcing' the customer to change to the new network, but letting the customer to decide the best moment for change (from interview with Telenor Business Development Director, October 2006).

the network ready to accommodate this decision. The announcement of BT21CN was not for the customer, but for the government, councils, regulator, and suppliers. From the suppliers, BT got discounts due to a) the scale and scope of the project and b) being the first large-scale deployment in the world (the advantage of being a first mover).

Both BT21CN (as a major project) and the projects undertaken by BTGS for the delivery of integrated solutions put forward the case for merging project marketing and project management (as proposed by Cova and Salle (2005)), where the project is not confined between its starting and end date, but resources continue to be invested in the periods between one project and another involving a certain customer. This happens because customer lock-on (which occurs when 'customers want the enterprise as their sole or dominant choice' (Vandermerwe, 2003, p. 56)) becomes increasingly important for the profitability and success of the business of integrated solutions.

The BT21CN illustrates a case where the systems integration of a large project is not conducted by a prime contractor from the supplier side. There are several reasons for this, but it seems that the most important is the extent to which the user/customer benefits from the learning of the project and contributes to the success of the project.

There are two types of integration: from the supplier and user perspectives. From the supplier perspective, the integration of sub-parts implies an intention of composing a complex system, such as the one conducted by the BT21CN's suppliers, e.g. Ericsson, Cisco and others. The user perspective includes the integration with existing systems whose investment the user does not want to lose, such as in the integrated solutions deployed by BTGS.

Integrated solutions delivered by BTGS are more at the infrastructure level, preparing the ground for the convergence in services, where value will be in the applications domain. The differentiator is not in the provision of quality products and services, but in the quality of the relationship with customers, possibly re-signing long-term contracts. Another differentiator for BT when delivering integrated solutions through BTGS is the BT21CN, i.e. the scalability and flexibility of BT's underlying network which support the integrated solutions.

The investment is being made far ahead of demand (without even knowing the services the 'new' network is going to be providing), but this is only possible and (up for consideration) because the rationale behind it is that there is a business case for cost

reduction (in Operational Expenditure - OPEX). This is remarkably different from investment made in the previous period (before 2000) when incumbents acquired 3G licenses in the expectation of higher revenues (in that case, more investment would be needed, with higher capital expenditure (CAPEX) and operational expenditure (OPEX) and customers have not come as expected). The logic was that if the network was built customers would necessarily take advantage of and adopt its services.

1.4.3 Service-Dominant Logic and Open Innovation to Co-Create Value

The investigation of the transition to Next Generation Networks (NGN) represented by BT21CN revealed that, more than network transformation, there is a large impact on transforming the way BT creates and develops new business. It is also a business transformation. It affects the network, the service and application layers and forces the operators to deliver new types of services and new business models. The business of integrated solutions is '[…] a service business with a network inside, not a network that does some services'.[30]

This shift in the approach is subtle, but important to emphasise. Vargo and Lusch (2004) argue that the economy is becoming primarily based on services and that 'goods are distribution means for service provision' (p. 8). They propose that there is a significant change in the logic of conducting business from goods-centred to service-centred dominant logic. This seems to be the change that is being stimulated by the transition to NGN in the logic of BT creating and developing business related to integrated solutions.

The other parts of BT business continue to be related to the consumer market (retail) and are still based on selling goods and services (goods-dominant logic). This logic is changing, where BT and other incumbents aspire to improve the customer experience (moving to a service-dominant logic).

Thus, although BT is a services company, the service-dominant logic moves at different speeds (e.g. for integrated solutions and retail businesses) according to both customers' needs and to what BT can supply profitably as long as its resources and capabilities are evolving. The service-dominant logic may evolve at differing paces within BT, depending on the various types of business models for different customer segments. In this sense, BT Global Services (BTGS), which is BT's integrated solutions business

[30] This quote is from a presentation to market analysts given by BT's Tom Craig (President, IP Networking) on 14th September 2006 in London.

unit, is clearly based upon service-dominant logic, while BT retail still relies mostly on selling point products and services, but it seems to be evolving to service-dominant logic (SDL).

BT, like other incumbent telecom operators, has divested its equipment and systems development and production units, and relied upon external innovation to a great extent. In particular, BT decided to take a market approach in the procurement of its equipment and systems for its network (Fransman, 1994). This makes BT less R&D-intensive, i.e. it has a lower ratio of R&D expenditure to total sales. Thus in the context of a service firm with low-intensity R&D, in order to support innovation in services BT had already coproduced many initiatives with external collaborators. BT has adopted the open innovation approach as a framework to coordinate the various initiatives in innovation (e.g. cooperation with universities and technology search operations) which have been occurring in sometimes fragmented ways. This framework contributes to changing the behaviour of BT towards increased collaboration with, and openness towards, external parties in the creation and development of new services.

1.5 Organisation of the Thesis

This thesis is composed of nine chapters as follows: besides this introductory chapter, Chapter 2 (Theoretical Framework) provides a critical literature review, positions this research within the existing literature, and identifies the main concepts leading to a theoretical framework, shown in Figure 2.11, for the collection and analysis of the empirical data. Chapter 3 discusses the research methodology, and Chapter 4 focuses on a discussion of the telecommunications industry, providing a framework for the analysis of BT case. Thus, the rationale for the structure of Chapters 5 to 8 took into consideration Figure 4.1 (in Chapter 4), informed by the theoretical framework of Figure 2.11. The infrastructure issue (see Figure 4.1), associated with technological logic (Figure 2.10), is mostly discussed in Chapter 5 through the analysis of BT21CN. The capabilities issue (see Figure 4.1), associated with organisational logic (see Figure 2.10), is mostly discussed in Chapter 6 through the analysis of BTGS. Service innovation and value co-creation with customers (see Figure 4.1), associated with customer logic (see Figure 2.10), are mostly discussed in Chapter 7 (through the analysis of various integrated solutions undertaken by BTGS with major customers) and Chapter 8 (through the analysis of the changes in the innovation processes within BT,

especially the application of open innovation approaches). Chapter 9 concludes the thesis. The description of each chapter is elaborated below.

Chapter 2 (Theoretical Framework) reviews the literature on integrated solutions, supported by the platform strategy, project business, and service innovation. All these theories are underpinned by the resource-based view of the firm.

Chapter 3 (The Research Methodology) explains the research design and the qualitative methodology used, based on an inductive approach, using interviews, documentary data and attending presentations in trade conferences and other events.

Chapter 4 (The Evolution of the Telecommunications Industry and BT: Towards the Demand-Led Idealist Model) makes an account of the telecommunications industry and BT especially in the period of the mid 1990s until 2002, highlighting changes experienced up to the downturn in the early 2000's, as the antecedents of BT's transition to NGN. It highlights the dominant logic of expansion into international markets and adopting new technologies and licenses without proper consideration of the real demand from customers. The period after the downturn (2002 and onwards) is the focus of this research and of the following chapters.

Chapter 4 also provides a discussion of the telecom industry (the part of it more concerned with the incumbent operators) moving towards the platform strategy and service-dominant logic. It aims to discuss and build the framework composed by infrastructure, capabilities, service and customer. The aim is not to make a 'static' (or historical only) recollection of the evolution of telecom industry, but to argue that, although the incumbent telecom operators have been considered as service firms since their inception, services were considered as compartmentalised products (goods), and recently the so-called service logic has become dominant at the expense of the goods dominant logic. At industry level, this has been promoting a shift from the supply-led strategic model to the demand-led idealist model (cf. Mansell, 1993). Furthermore, an appropriate way to deploy the service-dominant logic is through platform strategy. Technology and market convergence lead to highlight the *confluence of factors* which is making possible the realisation of service logic. Confluence of factors means timely integration of systems, and some of these systems depend on factors that are not under the direct control of the main actors who benefit from them.

Chapter 4 also deals with the evolution of technology, organisation and customer logic at the industry level, reaching the stage where the service logic (as opposed to the goods logic) is becoming more dominant. The objective is to show how the timely confluence of factors is allowing (or making increasingly possible) the service dominant logic to thrive in the business of the incumbent telecom operators. In particular, it deals with the adoption of IP protocol in the backbone (winning the race with ATM, Frame relay and other competing technologies), using the concept of platform, and changing significantly the way incumbent telecommunication operators perceive their services (introducing the customer-centred approach and service-dominant logic).

Chapter 5 (The Network as a Platform: The Case of BT21CN) analyses the case of BT21CN and how the network is becoming a platform for internal and external innovation. It also shows BT21CN as a major programme (or project) and explores the topic of integrated solution from the user perspective. It shows that BT21CN is an example of integrated solution of integrated solutions, where the user/customer is responsible for the integration (not the supplier as usually found in the Complex Products and Systems (CoPS) literature). Besides that, it discusses the argument put forward by Davies (2004), who contends that firms with a base in services are moving not only downstream, but also upstream (integrating products) in their portfolio of services. This chapter shows that there is another alternative explanation that does not invalidate that given by Davies (2004), but it may give an alternative guidance for practitioners. Integrated solutions offered by BTGS use equipment and systems from suppliers like Cisco who are also providers of the integrated solutions that BT purchase to build its own infrastructure. Thus, instead of the debate of moving up or downstream, it can be argued that 'service-dominant logic' is moving downstream, and firms located further downstream in the value stream are adopting the service-dominant logic if it makes sense and is feasible for them. However, it is not realistic to consider that service-dominant logic will be appropriate for all firms at the same time, so many firms will continue with the goods-dominant logic. Chapter 5 deals mostly with infrastructure change, as part of the technological logic. The theory employed comes from integrated solutions, project business and platform strategy literatures.

Chapter 6 (Organising for Integrated Solutions: The Case of BT Global Services) elaborates on the development of capabilities for firms moving to a customer-centric organisation/market-oriented firm. It shows the challenges of implementing the platform

strategy through repeatable solutions in this type of business. The theory employed in this chapter is that of capabilities, with a focus on the capabilities of moving to integrated solutions business, customer-centric organisations and market-oriented firms. This chapter deals with BTGS, which is the BT business unit responsible for commercialising the so-called 'Networked IT Services'. Networked IT Services are an instance of convergence (network + IT + services) and of integrated solutions (when instantiated within a customer). This chapter discusses mostly the organisational issues in terms of capabilities that BT has developed to deliver integrated solutions. Also, it discusses the business model involved and the characteristics of firms that are needed (as integrated solutions are not suitable for all types of business). The literature on integrated solutions has already explored this issue, for example Davies (2003b) through case studies. This chapter not only contributes with another case study which is comparable to the ones already undertaken, but also aims to verify to what extent such capabilities are similar or different to the ones proposed by Davies (2003b).

Chapter 7 (Capabilities Development and Platform Strategy in Integrated Solutions) deals with the extensive variety of customers' needs and the specific capabilities that BT requires to deal with such variety. It shows the role of the customer in the business of integrated solutions, and the integration of both customers and suppliers resources in order to co-create value. One reason for this approach is to address the systematic absence of the interaction with the customer in the literature about integrated solutions. This chapter uses data gathered from 179 cases of integrated solutions delivered by BT. The aim is to explore the integration of customer and supplier resources to co-create value, elaborating on the framework proposed by Cova and Salle (2008), emphasising the integration of the supplier and customer networks in the co-creation of value. As a consequence, this chapter also deals with the innovation processes in the service/solution environment.

Chapter 8 (Service Innovation in the Converged Communications Landscape) demonstrates how BT is reshaping its service innovation processes while implementing its platform strategy for the next generation of telecommunications. One main initiative is 'Open Innovation', which is establishing a common framework from which the various innovation initiatives are being brought together to support the platform strategy and the innovation ecosystem of BT. It also shows the way BT is deploying its platform for collaboration, which is the underlying logic that seems to be gaining momentum in

the telecommunications industry. The objective of this chapter is to advance the literature on ‘open innovation’ by providing a specific case study showing how BT is using the concept of open innovation as a framework at the company level to integrate various innovation initiatives into a coherent whole.

Chapter 9 (Conclusion) recollects the main points of the research, providing answers to the research questions and summarising the main findings. It states the research limitations, and suggests future topics for research. Also it discusses the future of BT as recent performance of BTGS (as of 2008) was not according to expectations, raising doubts about BT’s strategy in pursuing integrated solutions and professional services.

2. Theoretical Framework

2.1 Introduction

This chapter builds the theoretical framework that guides the collection and analysis of the empirical data of this research. The literature that helps to explain the business renewal and growth issue of firms in this thesis concerns the integrated solutions business model (cf. Davies, 2004), particularly as it is applied to increase revenues serving the needs of large customers. Figure 2.1 depicts the building blocks underlying the concept of integrated solutions. Resource theories are the foundation. Project business (cf. Davies and Hobday, 2005, Artto and Wikstrom, 2005) and service innovation (cf. Tidd and Hull, 2003) supported by service-dominant logic (Vargo and Lusch, 2004) represent the path leading to the platform strategy, which is the overall strategy to address large customers and consumer need simultaneously, as well as achieving the aims of cost reduction, improved speed-to-market and better customer experience. Integrated solutions are the outcomes that are built using the platform. Having the Resource-Based-View (RBV) as the foundation, the concept of capabilities is further elaborated, with the project seen as an organisational capability (see, for example, Davies and Hobday (2005)).

The construct of the project is analysed using two complementary literature streams: project management and project marketing.[31] The complementarities of the two streams reside in the temporal characteristic, that is in not limiting the project between a definite beginning and a definite end (as in the traditional approach of project management) (Kerzner, 2006, Burke, 2006, PMBoK, 2004), but also considering the time before the project officially starts and after the project officially ends (this is the domain of project marketing) (Cova et al., 2002).

Also underlying the concept of integrated solution, and similarly derived from the resource-based perspective, two alternative strategic perspectives, 'goods-dominant logic' (GDL) and 'service-dominant logic' (SDL) are examined (see, for example,

[31] 'Project marketing' is not really a specialism in the field of marketing but rather in the field of project management (see, for example, Cova et al. (2002)). It takes up the problem of how projects are proposed to a limited number of potential clients or how suppliers and partners for a particular project are recruited. The use of the term marketing is justified because the processes of need analysis associated with project marketing uses some of the concepts drawn from marketing literature more generally.

Vargo and Lusch (2004)), as is the argument that a service-dominant logic better explains the context of integrated solutions.

In short, the concept of 'integrated solutions' is built by examining the management of projects involving large customers and the contest between service- and goods-dominant logic from the resource-based view (RBV) perspective. The platform strategy and its innovation mechanisms play an intermediating role: the platform is where the physical arrangements for delivering integrated solutions are made. In the context of this thesis, the construction of the platform involves a transformation of traditional firms (i.e. incumbent telecommunications operators) in order to create sustained competitiveness for their integrated solutions.

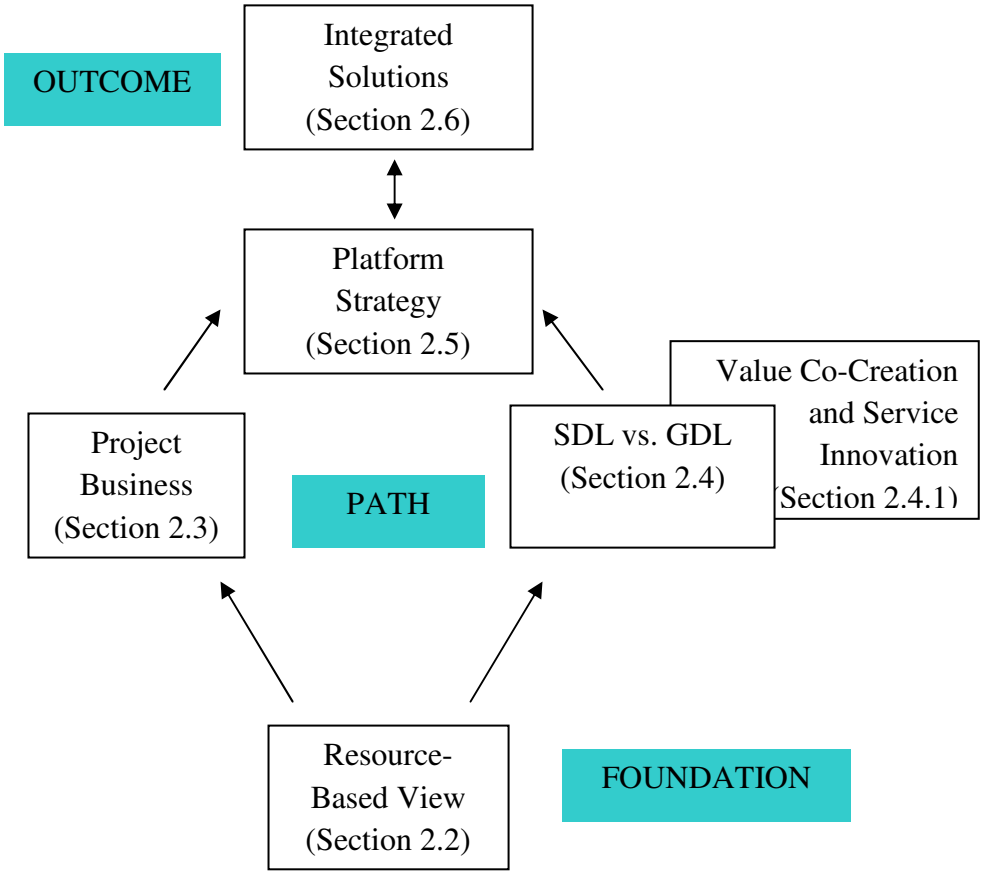

Figure 2.1 – How the Literature Review is Structured and the Various Interconnections among the Main Streams of Literature
Source: Author's elaboration

After this introduction, this chapter is structured as follows. Section 2.2 reviews the literature on the resource-based perspective, which serves as foundation for Section 2.3 and Section 2.4. Section 2.3 reviews the literature on project business, seeing a project as an organisational capability, drawing on project management and project marketing literature to support this view and its temporal complementarity. Section 2.4 examines the literature on the contention between the goods-dominant logic (GDL) and the service-dominant logic (SDL), showing how the service-dominant logic better supports the platform strategy and integrated solutions, which are discussed in Section 2.5 and Section 2.6 respectively. In Section 2.4.1, a framework is developed to examine the interaction between supplier and customer in order to co-create value and innovate in services. The platform strategy examined in Section 2.5 is used by traditional firms to remain competitive in a turbulent environment. Finally, Section 2.7 draws conclusions from the above literature, pointing out the gaps in the literature to be explored and the theoretical framework for the analysis of the empirical data.

The theoretical framework for this thesis builds on the concept of integrated solutions (approaching the contention between the so-called 'goods-dominant logic' (GDL) and 'service-dominant logic' (SDL) (Vargo and Lusch, 2004)) and platform strategy. Also important to this framework is the traditional literature on resource-based view (RBV), starting with the work of Penrose (1959) and subsequent work developing into the capabilities arena. One such important capability is the project capability identified by Davies and Hobday (2005) in the context of Complex Products and Systems (CoPS), which are defined as 'high cost, engineering-intensive products, systems, networks and constructs' (Hobday, 1998, p. 690). CoPS are usually highly customised, require skills across a variety of disciplines, and are produced in small batches or in one-off modes for business-to-business transactions and relationships (Hobday, 1998, Hobday et al., 2000, Davies and Hobday, 2005). The integration of the RBV literature with the GDL/SDL literature (from marketing) is an attempt to integrate both supplier and customer in the analysis, addressing the issue of value co-creation and service innovation. The aim of this chapter is to build a theoretical framework based on the above theories for the analysis of the transformation in the traditional telecommunications industry transitioning to the NGN and facing unprecedented competition.

2.2 From Resources to Project Capabilities

This section draws on resource-based theory to elaborate on the concept of capability and extend it to the concept of project capability (Davies and Hobday, 2005). Projects can be seen as dynamic capabilities (cf. Teece and Pisano, 1994) which act on resources and are restricted by time, cost, quality and scope (Kerzner, 2006, PMBoK, 2004). In terms of time, i.e. the issue of temporality in projects in a business environment, it is important to address both the period within the formalisation of the project (i.e. the domain of project management as in Kerzner (2006), Meredith and Mantel (2006) and Burke (2006)) and the period between projects (including the period before the start and after the finish of the project), which is the domain of the project marketing (cf. Cova et al., 2002). Project business is further elaborated in Section 2.3, which addresses the issue of temporality of projects in a business context. In addition, this section introduces the concepts of operand and operant resources (Constantin and Lusch, 2004), which is the basis for the discussion on service-dominant logic in Section 2.4.

Resources and capabilities are the foundations of the creation of superior customer value (within the firm itself) and competitive advantage (over competitors) (Barney, 1991, Peteraf, 1993, Prahalad and Hamel, 1990, Wernerfelt, 1984). Originally, Penrose (1959) took the view of the firm as a collection of productive resources. She is considered the founder of the so-called resource-based view (RBV), with a predominant 'inside-out' perspective, i.e., focusing on internal features of the firm, and not considering the external environment in her analysis. The environment was 'put on one side in order to permit concentration on the internal resources of the firm' (Penrose, 1995, p. xiii). The environment includes the customer, who is systematically absent in the analysis. This contrasts with the industry structure approach (e.g. Porter (1980)), which concentrates on the external environment factors at the industry level.

Penrose (1959, p. 24-25) argued that 'it is never *resources* themselves that are the "inputs" to the production process, but only the *services* that the resources can render'. This emphasises the intangible factors that permeate the firm's competitive advantage. In line with the resource-based view, Richardson (1972), when referring to activities performed within an industry, argued that such activities are performed by 'organisations with the appropriate capabilities, or, in other words, knowledge, experience, and skills' (p. 888). This is one of the first references to capabilities acting on resources to produce competitive advantage to the firm, and expresses the tangible

and intangible features of resources (Barney, 1991, Wernerfelt, 1984). It is not only the resources themselves that are important, but also the use of resources (in terms of services) (Penrose, 1959), and these resources are leveraged through capabilities. Previously, Zimmerman (1951) had already suggested that resources *are* not, but they *become*.

The tangibility and intangibility of resources are also categorised by Constantin and Lusch (2004) as operand and operant resources. They refer to operand resources as physical, tangible resources (e.g. raw materials, minerals, land, animal and plant life), whereas operant resources refer to those intangible ones (e.g. skills, knowledge, competences and organisational processes) that act on operand resources to produce effects. In fact, Constantin and Lusch (2004) argue that operant resources can act on operand and other operant resources, suggesting a hierarchy of resources, which was later explored Hunt (2000) and Winter (2003). Hunt (2000) considers competences or capabilities[32] as higher order resources, i.e. aggregates of basic resources.[33]

Following Penrose's work, others followed developing the concept of capabilities or competences. Prahalad and Hamel (1990) diffused the concept of core competence as a way to rethink the corporation. As firms diversified and grew in size and complexity, 'the diversified company became a large tree. […] The root system that provides nourishment, sustenance, and stability is the core competence' (Prahalad and Hamel, 1990, p. 82). They defined core competencies as 'collective learning in the organisation especially how to coordinate diverse production skills and integrate multiple streams of technologies' (p. 82) and as 'communication, involvement, and a deep commitment to working across organisational boundaries' (p.82). These definitions of core competence refer to the activities of 'integration' and 'working across organisational boundaries', which are characteristic of systems integration and project management activities (see, for example, Prencipe et al. (2003), and Davies and Hobday (2005)). Most importantly, although the firms may have a huge and diversified portfolio of projects and business, they share a few core competencies (Prahalad and Hamel, 1990). One of the drawbacks of this approach though is the difficulty of identifying such competences or capabilities in practice.

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[32] Competences and capabilities are used interchangeably in this research.

[33] A broader account of the interaction and hierarchy of resources is developed by the Actor-Network Theory (see, for example, Callon (1991), Latour (1992) and Law (1992)). This approach, however, is not the focus of this research.

However, when core competencies are too entrenched within the firm such that changes in the environment create inertia to change, core competencies can become core rigidities. Sometimes, in order to escape from this inertial situation, the top management of the firm needs to be changed (Leonard-Barton, 1992, 1995). As changes may occur faster and more frequently in a turbulent environment (Camillus and Datt, 1991, Ahmed et al., 1996, Grant, 2003, Song et al., 2005), core rigidities may become more exposed. Core rigidity may not only exist in a firm's technology, but also in the use by change-resistant managers of attitudes and actions that were successful in the past, but are not valid anymore or are counterproductive in the present. At times of transition and in changing environments when old ways of doing things need to be abandoned or replaced, core rigidities may play a significant role (Leonard-Barton, 1992).

Nelson and Winter (1982) proposed the 'routinisation' of activities within an organisation as a way to preserve the firm's organisational knowledge. More than twenty years after this point was made, it remains important to point out the issue of routines, as change tends to be a dominant topic, and it seems that routine and change are antagonistic. However, knowledge management and project management, at the same time as they deal with change, also deal with principles that do not change or change very slowly (Disterer, 2002, Love et al., 2003, Schindler and Eppler, 2003). Routines in the organisation continue to be important and they seem set to remain so. Without some stability in their processes, firms struggle to evolve (Stacey, 2003a, Jaafari, 2003).

Even when dealing with projects as one-off activities, it is possible to have gains through 'economies of repetition', where learning from one bid/proposal can be used in others. Routines used in one project can also be replicated in others (Davies and Brady, 2000). Even in a fast changing environment, routines, principles and patterns may be repeated in various contexts. It is the search for these patterns and principles in the midst of apparent disordered situations that seems to be the challenge (Stacey, 2003b, Pascale, 1990, Holland, 1995, Stacey, 1992). At times of transition and environmental changes, where the old is abandoned and the new is adopted, routines within the firm appear to undergo a major transformation. Some issues arise regarding, for example, the mechanisms used to change routines, and whether or not they are top-down, bottom-up or both (Nonaka and Takeuchi, 1995). If the search for patterns and principles is made in a systematic way, it may lead to sub-systems, interfaces and processes that can be re-

used in various projects. It may also constitute a platform as ‘a subsystem or interface that is used in more than one product, system, or service’ (Meyer, 2007b, p. 149). The platform as a strategy is further explored in Section 2.5.

An insightful difference between routines and capabilities is informed by Robertson and Langlois (1994), where they state that ‘routines’ refer to activities and processes that the firm actually does now and ‘capabilities’ refer to what the organisation may do in the future (its potential) if there is a reallocation of resources or a new combination of routines. The extension of this difference may lead to the concept of diversification, where firms can diversify into new technologies and markets, developing new capabilities (Chandler, 1990). Mass market production in a factory favours the ‘routinisation’ of the organisation (Nelson and Winter, 1982), whereas the customer-centric (or market-driven) approach (Galbraith, 2005), which is intended to give customers more freedom and choice, leads the organisation to increased flexibility and ‘capabilitization’.

Grant (1995) suggests that ‘organisational capabilities refer to a firm’s capacity to undertake a particular activity’ (p.126), linking capability with activity performed by firms. Winter (2003) links capability with routines, defining organisational capability as ‘a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organisation’s management a set of decision option for producing significant outputs of a particular type’ (p.991). Such definitions and approaches to capabilities are still very much related to internal activities, paying little attention to the external and customer environment.

Day (1994) elaborates on the capabilities of market-driven organisations and classifies them into three categories: inside-out capabilities, outside-in capabilities and spanning (linking in and out) capabilities. He also identifies two distinctive capabilities of market-driven organisations: market sensing and customer linking capabilities. In order to emphasise the interaction of the firm with the external environment, Cohen and Levinthal (1990) used the expression ‘absorptive capacity’ pointing out the necessity of firms investing in their knowledge base and being able to access and use technologies. Thus, R&D activities have not only the function of generating new technologies and knowledge, but also the function of enhancing the capacity of the firm to work with external technology and knowledge. Firms can be in a dangerous position if they do not invest in their absorptive capacity. They may become too managerial, merely

coordinating ‘conversations’ without adding any real value to the process. Thus, firms may miss the next technological discontinuity or even spend more than necessary on their own technological activities if they do not balance internal and external capabilities (Day, 1994, Tushman and Anderson, 1986b, Ehrnberg, 1995).

Teece and Pisano (1994) used the expression ‘dynamic capabilities’ to address the ‘key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organisational skills, resources, and functional competences toward changing environments’ (p. 538). They referred to the strategic dimensions of the firm as ‘organisational processes, its present position, and the paths available to it’ (p. 541). Processes can also be understood as ‘routines’, as defined by Nelson and Winter (1982), including the learning and current practices within the firm. The position refers to the relationship with customer and suppliers and its internal conditions in terms of technology and intellectual property. Paths refer to the strategic alternatives which are available to the firm and which the firm is more attracted to (Teece and Pisano, 1994). Teece et al. (1997) define dynamic capability as ‘a firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments’ (p. 516). The platform approach (Meyer and Dalal, 2002, Meyer, 2007b) facilitates the reconfiguration of competencies and capabilities. For Eisenhardt and Martin (2000), dynamic capabilities ‘include well-known organisational and strategic processes like alliancing and product development whose strategic value lies in their ability to manipulate resources into value-creating strategies’ (p. 1118). Their contribution was to identify specific processes like product development and alliancing as dynamic capabilities and link them to value-creating strategies in dynamic environments.

Teece and Pisano (1994) emphasise the strategic and functional capabilities within the firm and its ability to cope with a changing environment, and Chandler (1990) defines organisational capabilities within strategic and functional levels. Within the context of Complex Products and Systems (CoPS), Davies and Hobday (2005) build upon resource-based theory of the firm (Penrose, 1959, Wernerfelt, 1984, Barney, 1991, Peteraf, 1993) and argue that project capabilities were not adequately addressed in this stream of literature. Thus, they identify project capabilities, along with strategic and functional capabilities as shown in Figure 2.2, in order for the firm to survive and grow

in changing technologies and markets. In this sense, project capability can be assumed to be a dynamic capability.

The project is largely recognised nowadays as an appropriate organisational form to address change and to conduct business (Davies and Hobday, 2005, Kerzner, 2006, Frame, 2002, 2003). One of the reasons for the growth of projects seems to be that the customer-focused or customer-centric approach (see, for example, Galbraith (2005)) in dynamic markets is becoming a necessity in order to remain competitive. Thus project capability has acquired momentum in various instances of daily business, and in particular, in large business-to-business interactions. A project can be seen as a dynamic capability (cf. Teece and Pisano, 1994) which acts on resources to change routines (cf. Nelson and Winter, 1982) internally (e.g. within the organisation) or externally (e.g. within the customer). When changing routines externally, the project usually draws resources from various functions from within the firm in order to meet customer's needs (e.g. Pinto and Rouhiainen, 2001). Cross-functionality also happens for internal projects, as demonstrated by Wheelwright and Clark (1992) in the context of various firms (e.g. GE, Kodak and Motorola). On the other hand, projects can influence or be influenced by the firm and customer strategy (see, for example, Cleland and Ireland (2007) and Grundy and Brown (2002)). Thus, the links between strategic, functional and project capabilities, according to Figure 2.2, are well explored in the literature.

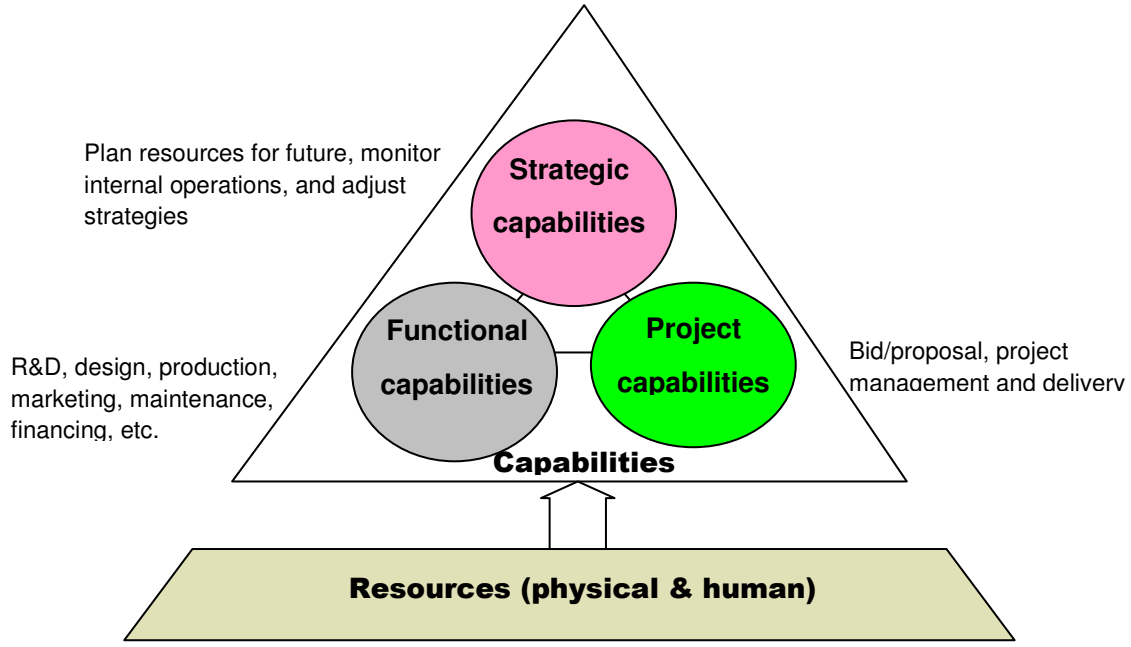

Figure 2.2 – Resources and Organisational Capabilities
Source: Davies and Hobday (2005, p.63)

However, the issue of temporality in a business context is not usually dealt with in an integrated way. Most of the literature of project management deals with the concept of 'project' as having a definite start and end date, and consider the project within this temporal limit (see, for example, Kerzner (2006), PMBoK (2004), Burke (2006), and Meredith and Mantel (2006)). Another part of the literature, called project marketing, deals with what happens between projects and in the period before the project starts and after it finishes (see, for example, Cova et al. (2002), Cova and Salle (2005) and Engwall (2003)). Section 2.3 deals with project business, taking into account that a project is an organisational capability to be considered not only within the project start and end dates, but also between projects, including the period before the start and after the finish of the project. Also, Eisenhardt and Martin (2000) suggest that 'in moderately dynamic markets, RBV is enhanced by blending its usual path-dependent strategic logic of leverage with a path-breaking strategic logic of change' (p.1118). This path-dependent and path-breaking strategic logic is further analysed in Section 2.4, with the emergence of the service-dominant logic (Vargo and Lusch, 2004), which places service and relationships as the dominant mindset in order to deliver solutions to customers through projects, and places resources as its foundation.

2.3 Project Business: Project Management and Project Marketing

From Section 2.2, as stated by Davies and Hobday (2005, p. 62), the resource-based literature does not address project capabilities as 'one of the core sets of organisational capabilities that firms need to acquire to compete in any changing business environment'. According to them, project capabilities means 'the appropriate knowledge, experience and skills necessary to perform pre-bid, bid, project and post-project activities' (p. 62-63). Their context of analysis is predominantly based on the business-to-business market, where complex products and systems (CoPS) are developed and commercialised by a large business to another large business. It is usually based on a bid process prior to the signature of a contract that officially initiates the project.

The traditional project management approach is more concerned with project execution, i.e. once a project is set-up how to best manage it. This definition of project capabilities does not contemplate other types of projects where there may not be transaction involved with an external customer like, for example, internal R&D projects (not commercialised to an external customer yet), or projects within a firm to promote organisational change (where there may not have a bid). Artto and Wikstrom (2005, p. 351) define project business as 'the part of business that relates directly or indirectly to projects, with a purpose to achieve the objective of a firm or several firms'. With this definition in mind, the focus here is on the business-to-business part of business, where large firms relate to other large firms through projects. In this context, it is important to address the temporality of projects, where it is considered not only the period within the project start and end dates (the domain of project management), but also the period between projects, when no project is under way and before the start and after the end of the project (the domain of project marketing). Usually these two streams of literature are developed separately, and the aim in this section is to build a case to integrate them and to identify opportunities for further development.

The most common definition of project is the one diffused by the Project Management Body of Knowledge published by PMI (Project Management Institute) in the USA: 'a project is a temporary endeavour undertaken to create a unique product, service, or result' (PMBoK, 2004, p.5). Temporary means that a project is supposed to have a definite beginning and a definite end, although not necessarily a short duration, as some large and complex projects can last for many years. Also, the end product, service or

result can have a long lasting existence or effect after the end of the project that created it. Uniqueness is related to the distinct features or context of the project activities and outcomes, which may be composed by repetitive elements (PMBoK, 2004). This definition of projects being temporary and unique, and the view of projects as being endeavours permeates the traditional project management literature, such as Kerzner (2006), Burke (2006), Meredith and Mantel (2006), and Cleland and Ireland (2007).

The origins of the traditional and modern project management literature date back to the large military projects in the 1940s, 50s and 60s conducted by the Department of Defense (DoD) in the USA to develop nuclear submarines like Polaris, and complex weapon systems and space missions like the Apollo Program) (Kerzner, 2006, Morris, 1994). The outcomes of those projects included complex systems, and such projects were much based on 'operations research', developing tools and techniques to manage a great number and variety of tasks using statistical methods. Also, the traditional approach is based on the rational assumption that a detailed plan needs to be produced at the outset of the project, and that the project execution needs to follow this plan. Changes or deviations to the original plan are seen as negative aspects to be avoided. This rational type of approach has been receiving much criticism lately. For example, Cicmil et al. (2006) argue that research in project management should focus not on what should be done or on the frequency or use of a particular practice, but on the project actuality, i.e. the 'complex social processes that go on at various levels of project working' (p. 675). Also, Shenhar and Dvir (2007) argue that different types of projects should be managed differently, i.e. 'one size does not fit all', criticizing the way project management is frequently portrayed, where a set of tools and practices are diffused regardless of the type of project being managed.

Further elaboration of the definition of project conceptualise it as a 'temporary organisation' (see, for example, Turner and Mueller (2003), Lundin and Soderholm (1995), Packendorff (1995), Lundin (1995), van Donk and Molloy (2008)). More specifically, Turner and Mueller (2003, p.7) define project as 'a temporary organisation to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change'. Besides considering a project as a temporary organisation, this definition considers *resources* (this is one of the reasons why the resource-based view is

considered as a theoretical foundation), *endeavour* (which is in line with the PMBoK (2004) definition) and also *uncertainty* and *integration*.

Integration can be viewed as systems integration of various sub-systems from different suppliers which may ultimately lead to *integrated* solutions, when the outcome is negotiated at the outset with the customer (Davies, 2003b). Although the Turner and Mueller (2003) definition refers to the delivery of 'beneficial objectives of change', this is still a little vague and does not include the beneficiary (e.g. the customer) as an active player in the development of the project. Seeing a project as a collection of endeavours (tasks or efforts) allowed the traditional approach to concentrate on ways to plan and control those tasks. Operational research was applied to identify, optimise and execute those tasks to achieve the objectives of the project, usually related to time, cost and quality constraints (Cicmil et al., 2006). Seeing a project as an organisation allows the emergence of soft skills to be better considered and developed, for example, culture and team work (Davies and Hobday, 2005). Also, inter-firm collaboration and integration at the level of the organisation are more clearly observed.

The definition of project capabilities by Davies and Hobday (2005), mentioned above, includes pre-bid and post-project activities, so it goes beyond the traditional definition of project as having a definite beginning and a definite end. This then is the domain of the so-called project marketing. In this stream of literature, project is defined as 'a complex transaction covering a package of products, services and work, specifically designed to create capital assets that produce benefits for a buyer over an extended period of time' (Cova et al., 2002, p.3). This definition emphasises three aspects: (i) there is a transaction represented by an exchange limited in time between a supplier and a customer; (ii) the content of exchange is a *package* composed of products, services and work, i.e., not only individual units of exchange; and (iii) there is a buyer (i.e. customer) explicitly indicated in the definition and the idea of producing benefits for this buyer (Cova et al., 2002). The context of project marketing is that of business-to-business transactions, the same as the context for delivering Complex Products and Systems (CoPS). Thus, the definition of project presented by project marketing for the purposes of this research seems to be more representative (and functional) than the definition of the traditional project management literature.

Cova and Salle (2005) suggest merging project marketing into project management as the approach to projects is becoming more strategic, long-term and customer-oriented.

In Table 2.1, they highlight six key points comparing project marketing and project management.

Table 2.1 – A Comparison between Project Management and Project Marketing

Disciplines	**Project Management**	**Project Marketing**
Key Points		
The project	Temporary organisation	Transaction
Characteristics of projects	Specific time frame and objectives	Discontinuity between one project and another
Project cycle	Begins with request for proposal	Begins outside any project opportunity
Focus of the approach	Resources are dedicated to enhance the relationship inside one project	Resources are dedicated to maintain the relationship between two projects
Stakeholders	Internal and external actors that can have a positive or detrimental effect on the project's development	Relationships between business and non-business actors in the milieu embedding the project
Project origin	Mostly given	Given or jointly constructed

Source: Cova and Salle (2005, p.358)

The six key points in Table 2.1 represent the complementary nature of the project management and project marketing approaches. Merging them would be beneficial in certain contexts, e.g. in business-to-business marketing. Brady et al. (2005, p. 360) argue that integrated solutions involve 'a different type of project which extends the traditional life cycle backwards into a pre-project phase and beyond the delivery phase into the operational phase'. This represents an instance of merging project management and project marketing within integrated solutions, which is further discussed in Section 2.6. The merging of project management and project marketing could be called a 'project business'.

The term 'project business' is used extensively in the project marketing literature. Cova et al. (2002) suggest that its main characteristics are: discontinuity, uniqueness, complexity and the extent of financial commitment. It is located in the business-to-business context, but they do not provide a clear definition of project business. On the

other hand, Artto and Wikstrom (2005) define project business as 'the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms' (p.351). With this definition, they argue that the unit of analysis is a firm, not a project, as the business of projects is connected to the overall strategy of the firm. The more strategic approach to project management (see, for example, Cleland and Ireland (2007), Dinsmore (1999) and Dietrich and Lehtonen (2005)) offers more intersections with project marketing. Also, Davies and Hobday (2005), in their project business approach, consider how 'businesses use projects to drive business strategy and innovation' (p. 4). Thus, in this scenario, the 'merging' of project marketing into project management would be useful. Customer-orientation is less present in the project management literature. A notable exception is Pinto and Rouhiainen (2001), who refer to organisational issues within the customer-based project organisation from the perspective of the executor of the project, but without considering instances of customers and their interactions in the analysis.

In the business-to-business context of this research, project business refers to the part of business that conducts projects. Considering the unit of analysis as a firm, this means that not all parts of the firm are project-based. For those parts of the firm which are project-based, Winter et al. (2006) suggest that two perspectives (among others) are relevant: (i) an organisational change perspective; and (ii) a value creation perspective. The organisational change perspective refers to the internal changes within the firm (e.g. changes in infrastructure and business processes caused by technological changes) informed by its strategy. The value creation perspective refers to the value and benefits created to both customer and firm/supplier in the process of conducting the project. The proposition is that value is not created only between the start and end dates of the project, but it is influenced by events beyond this period of time. Hence, the usefulness of merging project management and project marketing.

Value is created as a result of the cooperation between the firm/supplier and customer and their networks, i.e. value is co-created (Vargo et al., 2008). This requires a different mindset and different behaviour from firms and customers, who are each embedded in an environment where the service-dominant logic (cf. Vargo and Lusch, 2004) prevails. Coupled with the argument that businesses use projects to drive innovation (Davies and Hobday, 2005), the aim of Section 2.4 is to elaborate how the service-dominant logic and the value creation process within a customer-oriented project business may be used

to promote service innovation. Furthermore, the argument that platforms are used to drive innovation in the industry (Gawer and Cusumano, 2002) leads to the linking of the project business to the platform strategy described in Section 2.5.

2.4 Service-Dominant Logic (SDL) and Goods-Dominant Logic (GDL)

Projects can be seen from the perspective of value creation (Winter et al., 2006), and from this perspective, the relationship between the firm/supplier and customer becomes relevant. In the process of value creation, customers are more interested in solutions rather than isolated products which they need to integrate into their business by themselves (Brady et al., 2005). In order to facilitate this, suppliers offer services in the form of integrated solutions, combining their own products/goods and services with others from third party suppliers (Davies et al., 2001, Davies, 2003b, 2004). In order to manage such integrated solutions effectively, the focus of the firm/supplier is on services as the mainstream activity supported by goods/products, rather than the opposite. That is the essential nature of the service-dominant logic (SDL) when compared to the goods-dominant logic (GDL) (cf. Vargo and Lusch, 2004). This section examines the service-dominant logic as an important element of the organisational culture as a means to deliver integrated solutions through projects and to promote innovation in services through the co-creation of value between firms/suppliers and customers, and their networks.

Vargo and Lusch (2004) set the foundations for a wider discussion about the merits of a 'service-dominant logic'. The service logic has its foundations in Shostack (1977), who claims that the jargon used in marketing at that time was predominantly based on manufactured physical goods. This 'goods-dominant logic' has been prevailing for many years due to the nature of the manufacturing economy. Some of the distinguishing characteristics of the SDL and GDL are presented in Table 2.2. Central to these differences is the concept of resources, here broken into operand and operant resources. As elaborated in Section 2.2, operand resources refer to those resources which are acted upon to produce effects, and operant resources are those which act on operand resources (and other operant resources) producing effects. Operand resources are usually natural resources (e.g. land, animal life, plant life and minerals) whereas operant resources are factors of production and technology (e.g. knowledge and skills) which convert operand resources into outputs (Constantin and Lusch, 2004). Operant resources can be understood as the equivalent to what Grant (1998) and others called 'capability'.

Table 2.2 – Distinguishing the Logic of the Goods- and Service-Centred Views

	Traditional Goods-Centred Dominant Logic	**Emerging Service-Centred Dominant Logic**
Primary unit of exchange	People exchange for goods. These goods serve as primarily *operand resources.*	People exchange to acquire the benefits of specialised competences (knowledge and skills), or services. Knowledge and skills are *operant resources*.
Role of goods	Goods are *operand resources* and end products. Marketers take matter and change its form, place, time, and possession.	Goods are transmitters of *operant resources* (embedded knowledge); they are intermediate "products" that are used by other operant resources (customers) as appliances in value-creation processes.
Role of customer	The customer is the recipient of goods. Marketers do things to customers; they segment them, penetrate them, distribute them, and promote to them. The customer is an *operand resource*.	The customer is a co-producer of service. Marketing is a process of doing things in interaction with the customer. The customer is primarily an *operant resource*, only functioning occasionally as an operand resource.
Determination and meaning of value	Value is determined by the producer. It is embedded in the *operand resource* (goods) and is defined in terms of 'exchange-value'	Value is perceived and determined by the consumer on the basis of 'value-in-use'. Value results from the beneficial application of *operant resources* sometimes transmitted through *operand resources*. Firms can only make value propositions.
Firm-customer interaction	The customer is an *operand resource*. Customers are acted on to create transactions with resources.	The customer is primarily an *operant resource*. Customers are active participants in relational exchanges and coproduction.

Source of economic growth	Wealth is obtained from surplus tangible resources and goods. Wealth consists of owning, controlling, and producing *operand resources*.	Wealth is obtained through the application and exchange of specialized knowledge and skills. It represents the right to the future use of *operant resources.*

Source: Vargo and Lusch (2004, p. 7)

In SDL, physical goods are a means by which people acquire competences and services. Thus, services are the primary concern and goods (if necessary) support services. Customers take a more active role, having a relationship with the supplier, co-creating value, which is perceived by the customer not only as value-in-exchange (in a transactional mode of goods), but also as value-in-use, (Vargo et al., 2008, Vargo and Lusch, 2004, 2008). Goods- and service- centred dominant logic have the distinguishing features depicted in Table 2.3.

Table 2.3 – Distinguishing Features between Goods and Service Dominant Logic

Goods-centred dominant logic	**Service-centred dominant logic**
The purpose of economic activity is to make and distribute things that can be sold.	Identify or develop core competences, the fundamental knowledge and skills of an economic entity that represent potential competitive advantage.
To be sold, these things must be embedded with utility and value during the production and distribution processes and must offer to the consumer superior value in relation to competitors' offerings.	Identify other entities (potential customers) that could benefit from these competencies.
The firm should set all decision variables at a level that enables it to maximise the profit from the sale of output.	Cultivate relationships that involve the customers in developing customised, competitively compelling value propositions to meet specific needs.
For both maximum production control and efficiency, the good should be standardised and produced away from the market.	Gauge marketplace feedback by analysing financial performance from exchange to learn how to improve the firm's offering to customers and improve firm performance.
The good can then be inventoried until it is demanded and then delivered to the consumer at a profit.	Services are consumed as they are produced.

Source: Adapted from Vargo and Lusch (2004, p. 5)

The idea of 'service-dominant logic' put forward by Vargo and Lusch (2004) is not entirely new and has its critics. For example, Kingman-Brundage et al. (1995) had already articulated this idea, and Brown (2007) argued that SDL 'is not a new argument, however, not even in marketing' (p. 292). Moreover, Brown (2007) suggests that most marketing practitioners would prefer 'solutions-dominant logic' rather than 'service-dominant logic'. He also criticises their 'continued deification of the customer and the customer centricity, which [he believes] is a scholarly straightjacket that marketing could well do without' (p.293). Although there are several other criticisms of the SDL approach (see, for example, Rust et al. (2006)), the merit of the introduction of the SDL concept by Vargo and Lusch (2004) is in its integration of previous works and clear statements of foundational propositions that triggered further debate. Another relevant criticism is that Vargo and Lusch (2004) concentrates on the transition from goods-dominant logic (GDL) to service-dominant logic (SDL), and this last seems to be 'a single dominant logic in any individual historical epoch' (p. 293-4). In order to counteract this criticism, Brodie et al. (2006) suggested that GDL and SDL co-exists, and Kingman-Brundage et al. (1995) articulate three other 'logics' (customer, technology and organisation), which can make-up the service-dominant logic.

An important difference between GDL and SDL is in their views about value creation and co-creation. These differences are important as services can be seen as relationships which have an ongoing exchange of value (Woodruff and Flint, 2006). In Table 2.4, these differences are highlighted.

Table 2.4 – GDL vs. SDL on Value Creation

	GDL	**SDL**
Value driver	Value-in-exchange	Value-in-use or value-in-context
Creator of value	Firm, often with input from firms in a supply chain	Firm, network partners, and customers
Process of value creation	Firms embed value in 'goods' or 'services', value is 'added' by enhancing or increasing attributes	Firms propose value through market offerings, customers continue value-creation process through use
Purpose of value	Increase wealth for the firm	Increase adaptability, survivability, and system wellbeing through service

		(applied knowledge and skills) of others
Measurement of value	The amount of nominal value, price received in exchange	The adaptability and survivability of the beneficiary system.
Resources used	Primarily operand resources	Primarily operant resources, sometimes transferred by embedding them in operand resources-goods
Role of firm	Produce and distribute value	Propose and co-create value, provide service
Role of goods	Units of output, operand resources that are embedded in value	Vehicle for operant resources, enables access to benefits of firm competences
Role of customers	To 'use up' or 'destroy' value created by the firm.	Co-create value through the integration of firm-provided resources with other private and public resources.

Source: Vargo et al. (2008, p. 148)

The central difference between GDL and SDL resides in the fact that value in GDL is seen as embedded in goods and services, and produced as the output of a production line, whereas in SDL value is determined by the use and context being co-created between customer and supplier. Prahalad and Ramaswamy (2004) reinforces this difference suggesting that the locus of value creation is the interaction between firm (supplier) and customer, i.e. value is shifting to experiences. In the context of services, GDL implies that services are standardised and specified, and the relationship between the supplier and customer is relatively distant (which leads to the objectification of services). On the other hand, SDL requires more relational proximity and interaction between buyers and sellers (favouring the 'servitisation' of products) (Lindberg and Nordin, 2008).

Vargo and Lusch (2004) defined eight foundational premises (FPs), which were later updated and expanded to ten FPs in Vargo and Lusch (2008). These ten FPs are depicted in Table 2.5. FP 6 is especially important as it highlights that value is co-created between the customer and supplier(s). This fact has been gaining importance as customers (or simply users) are increasingly participating actively in shaping the service

and the experience provided by the supplier. This is particularly important in projects where the origin is jointly constructed (e.g. through a bid process) as the supplier tries to offer the best solution to satisfy customer needs. This is the scope of projects for integrated solutions.

Table 2.5 – Foundational Premises of SDL

Premise Number	**Foundational premise**
FP1	Service is the fundamental basis of exchange.
FP2	Indirect exchange masks the fundamental basis of exchange.
FP3	Goods are a distribution mechanism for service provision.
FP4	Operant resources are the fundamental source of competitive advantage.
FP5	All economies are service economies.
FP6	The customer is always a co-creator of value.
FP7	The enterprise cannot deliver value, but only offer value propositions.
FP8	A service-centered view is inherently customer oriented and relational.
FP9	All social and economic actors are resource integrators.
FP10	Value is always uniquely and phenomenologically determined by the beneficiary.

Source: Vargo and Lusch (2008, p. 7)

According to the service logic model developed by Kingman-Brundage et al. (1995), there are three core logics which set the organising principles of the service system and the experiences of customers and employees: (i) customer logic, where the main questions are ‘What is the customer trying to do, and why?’ (p. 24); (ii) technical logic, which poses the questions ‘How are service outcomes produced, and why?’ (p.25); and (iii) employee logic, which questions ‘What are employees trying to do, and why?’ (p.25). The model and its three core logics are represented in Figure 2.3.

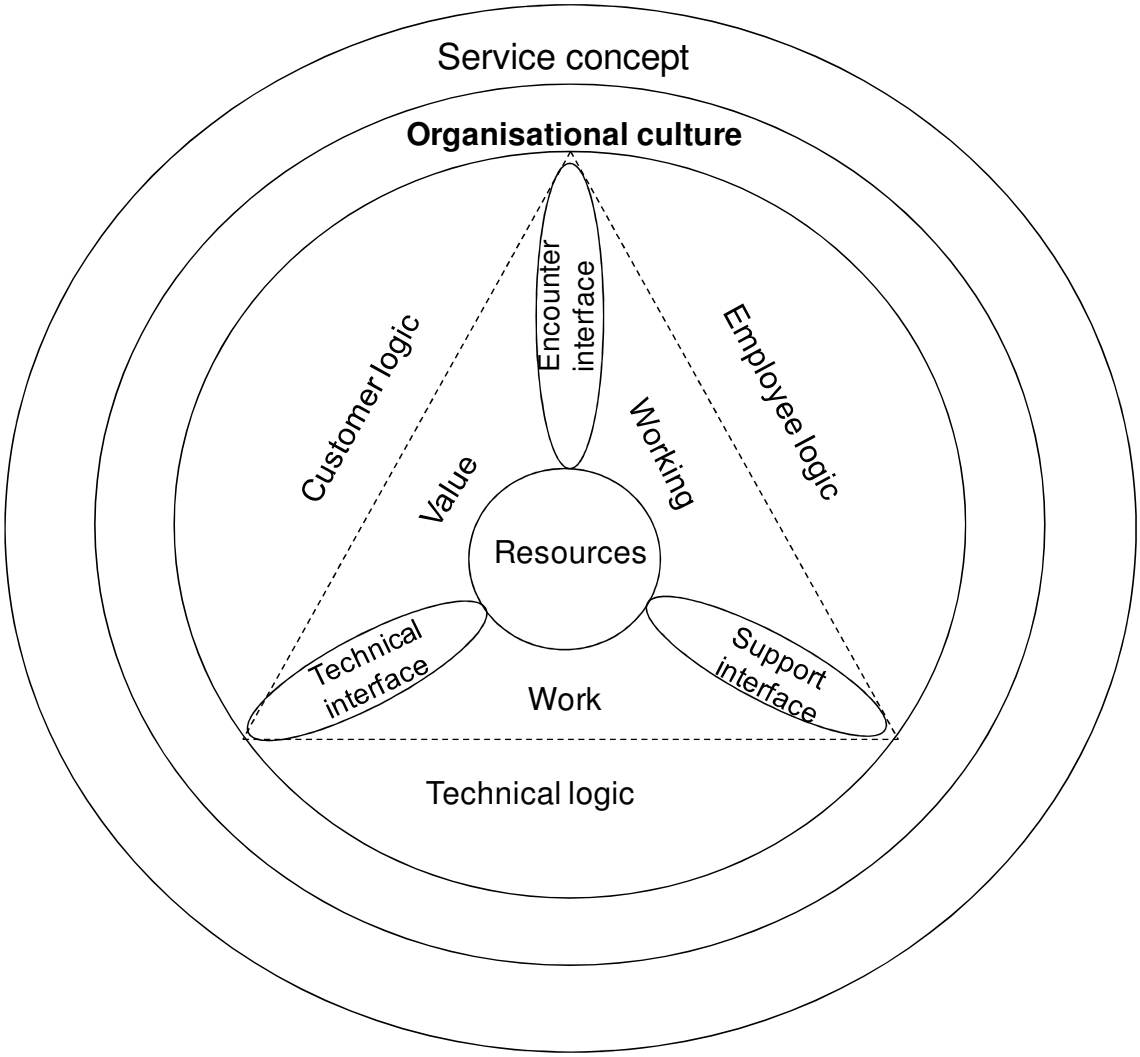

Figure 2.3 – Service Logic Model
Source: Kingman-Brundage et al. (1995, p.24)

In order to adapt to the context of industry and firm level of analysis (not employee), some of the elements of the above framework can be modified to capture the organisational level analysis of this research. Bearing this in mind, the following changes to the elements are suggested, resulting in Figure 2.4:

- The shift to a service logic involves a significant change in the organisational culture (Vargo and Lusch (2004)). A similar cultural change also applies to a project-based environment (Kerzner, 2006, Meredith and Mantel, 2006). Thus, service-dominant logic (SDL) becomes the predominant feature of organisational culture. The idea is that there is a shift in the culture from considering services as 'discrete' outputs (as in the goods-dominant logic) to a culture which considers

services as an integrated or seamless event focused on customer experience. This also leads to more cross-functional activities within the firm, which favours the project business approach as part of the organisational culture.

- Replacing 'employee logic' with 'organisational logic'. This is because Kingman-Brundage et al. (1995) refer predominantly to the individual level (employee, customer and technical logic) rather than the organisational/firm level. Organisational logic refers to organisational capabilities, which are the outcome of employee's competences combined with other resources of the firm.
- Technological instead of technical logic, for the same reason here as for the above. Technical refers to the technical tasks and technical resources to support the employee and customer. Technological goes beyond that to include technological change.
- Resources in the centre. This is to re-assert that resource-based theory is the foundation of this theoretical framework.
- Technology instead of work, and capabilities instead of working. This is to adapt to the firm level consideration of organisation in this framework.
- Front-end and back-end interface, instead of encounter and support interface. Front-end and back-end is the jargon used in the literature of customer-centric organisations (e.g. Galbraith (2005)) and integrated solutions.
- Customers include consumers (mass market) and large business customers.

The term Service concept remains as is for the moment, but it is reviewed in the sections about platform and integrated solutions (Section 2.5 and Section 2.6, respectively).

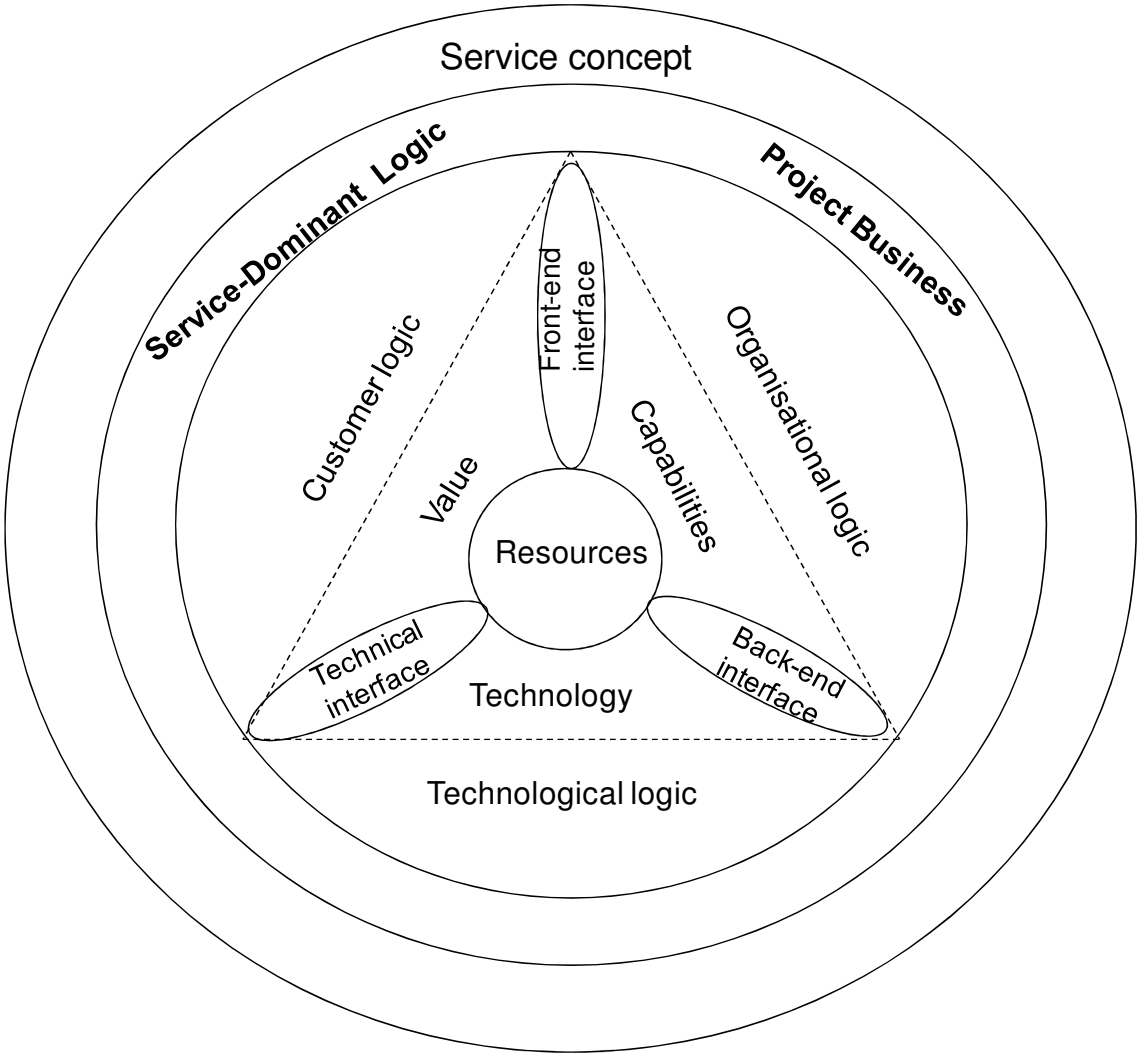

Figure 2.4 – Towards the Theoretical Framework for Data Collection and Analysis
Source: Adapted from Kingman-Brundage et al. (1995)

The service-dominant logic (SDL) and the goods-dominant logic (GDL) can be seen as two faces of the same coin, where the tension between different interests of the supplier and customer takes place. The supplier wants to provide the solution and maximise revenues and profits while the customer wants benefit from the solution and to minimise its cost. SDL is more customer-led while GDL is more supplier-led. This tension can also be seen as an extension of the old 'technology-push versus market pull', but in the context of business-to-business relationships, where large customers and suppliers interact with each other intensely through projects. As the supply side has been traditionally more powerful, the GDL has been prevailing in many sectors of the industry. However, as the service economy has been increasing (Spohrer et al., 2007),

the pendulum seems to be moving towards the SDL. The resolution to this conflict seems to be an approach based on the co-creation of value where *both* suppliers and customers' goals are balanced (Oliver, 2006). Section 2.4.1 extends the concept of value within the customer logic of Figure 2.4, exploring the value co-creation and its impact on service innovation.

2.4.1 Value Co-Creation and Service Innovation

Services can be seen as a process of mutual exchange where knowledge and skills are applied for the benefit of another entity and/or of the entity itself (Vargo and Lusch, 2004, Vargo et al., 2006, Vargo et al., 2008). Services can be deployed through processes, performances and projects, and interconnecting service systems, which are value-creation interactive configurations of resources connected with each other by value propositions (Vargo and Lusch, 2004, Vargo et al., 2006, Vargo et al., 2008) to encourage service innovation (Maglio et al., 2006). This section discusses the relevant aspects of value co-creation with the aim of elaborating a framework for investigating the mutual exchange and relationship between supplier/firm and customer, and its impact on service innovation.

New service development and new product development are supposed to have distinct characteristics as the nature of services and products are different (Fitzsimmons and Fitzsimmons, 2006). Services, compared to products (or goods), are intangible and are consumed when produced, i.e., they cannot be stored for later use (Fitzsimmons and Fitzsimmons, 2006, Johnston and Clark, 2005). There is limited knowledge on the extent to which the processes applied to new product development in manufacturing sectors can be applied to the service sector (Tidd et al., 2005). While Miles (2000) argues for the integration of service innovation and the traditional innovation studies, Spohrer et al. (2007) advocates the establishment of a distinctive 'science' of service systems. Despite these different views, research on innovation in services has been increasing since the 1990s (Vermeulen and van der Aa, 2003), focusing on organisational and management issues from the service provider perspective (see, for example, Tidd and Hull (2003)). Little research has been undertaken on integrating the

organisational and managerial aspects of the service provider and its interactions with the customer.[34]

Historically, from time to time there occurs a short period of radical innovation followed by a long period of incremental innovation, during which the new technology diffuses and the institutions adapt to it. After a sustained period of incremental innovation, another radical innovation shows up and the cycle repeats (Tushman and Anderson, 1986a, Utterback and Suarez, 1993, Freeman and Soete, 1997, Perez, 2002). It is interesting to analyse the period when the radical innovation occurs, i.e. when technological and institutional transitions take place. Damanpour (1991) makes a distinction between technical and administrative innovations, where the technical innovation refers to improved or completely new products, services and processes, and administrative innovation refers to organisational structure and administrative processes. When referring to the transition in this context it is also important to address the process of letting go of old processes that are not useful anymore. It seems that the bigger the firm and the more people who are dedicated to old processes the more difficult it is to promote change in the firm, and these old processes may even become a hindrance to change or become what Leonard-Barton (1992) calls 'core rigidity'.

During the evolutionary period of a technology, the institutions as well as the technology develop and accumulate capabilities to deal with the current evolving situation. The evolutionary process of capabilities implies solving problems in order to improve the performance of the technology and to satisfy needs and demands. However, a time may be reached when the accumulation of capabilities leads to the saturation of capabilities and an incremental effort to improve the technology does not solve the emerging and critical problems faced by customers. At this point there is fertile ground for a radical shift (Tushman and Anderson, 1986a).

Arnould et al. (2006) suggest a value creation process based on interaction between the firm and customer resources. Firm and customer have their operand and operant resources which are articulated, and the firm offers its value proposition. This is according to foundational premise 7 (FP7), 'the enterprise cannot deliver value, but only offer value propositions' (Vargo and Lusch, 2008, p. 7). Customers 'derive value-in-use

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[34] Although some authors discuss the role of customer in service innovation (e.g. Gronroos (2007)), real interactions with customers are rarely analysed in-depth, and the discussion tends to be centred around the organisational and management issues from the service provider perspective.

from the firm's package of services in ways that vary from firm intent' (Arnould et al., 2006, p. 95-96). Figure 2.5 shows the various elements under discussion in the firm and customer resource interaction. The locus of co-production (or co-creation) is the locus of control (firm, customer or joint control), temporality (as value and brands change over time), multiple firms and multiple customers (market offerings can be made by multiple firms to multiple customers, targeting customer loyalty) (Arnould et al., 2006). Another interpretation of temporality is that such a relationship is mediated through temporary projects (with start and finish dates).

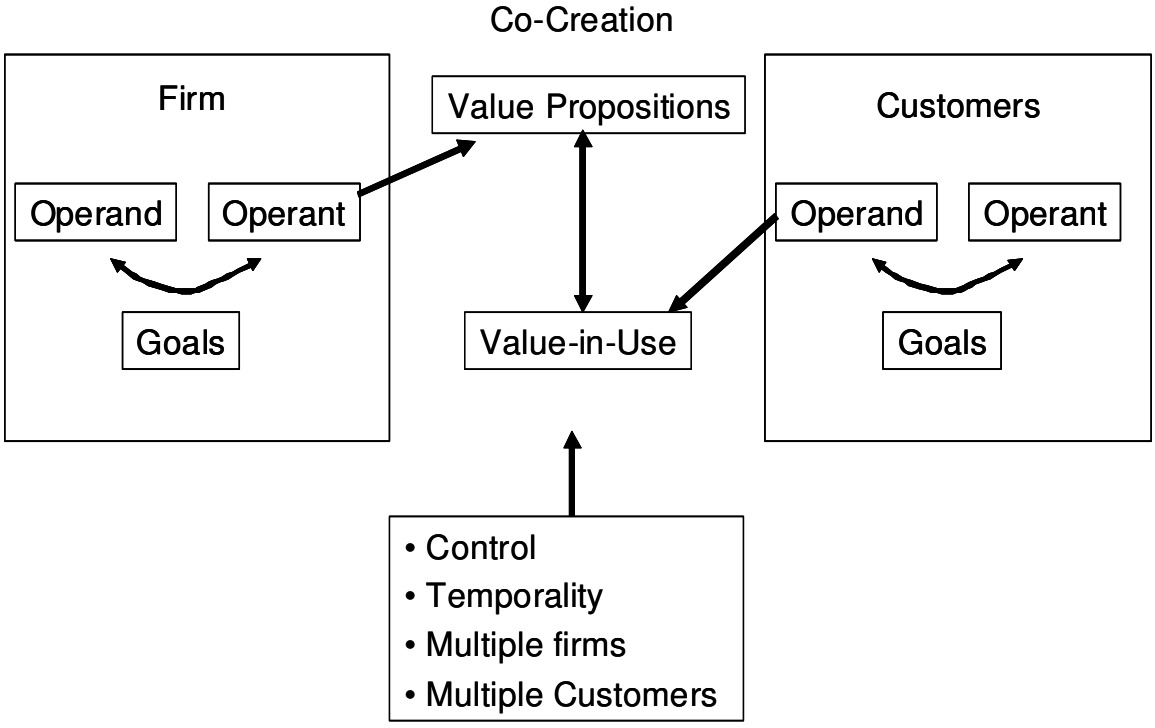

Figure 2.5 – Firm and Customer Resource Interaction
Adapted from: (Arnould et al., 2006, p. 96)

Cova and Salle (2008) suggests that co-creation of value is not limited to the customer and supplier, but also it spreads to their networks. Figure 2.6 represents this argument and reinforces the role of the customer in the co-creation of value, i.e., value is not something delivered *from* the supplier *to* the customer in a simple transactional mode (e.g. with value embedded in a tangible good), but is something that is also dependent on customer resources and on the relationship that the supplier keeps with the customer (understanding and acting on the customer's perception of the service).

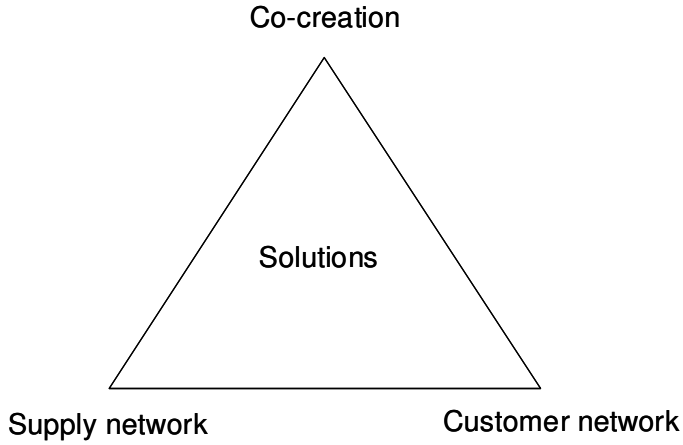

Figure 2.6 – The Three Pillars of Offering Strategies According to the S-D Logic
Source: Cova and Salle (2008, p. 271)

Figure 2.7 uses the concept of 'service system' as an arrangement of resources (including people, technology, information, etc.) connected to other systems by the application of value propositions (Spohrer et al., 2007). Service systems are interdependent in the sense that they are connected to resources of other systems in order to accomplish their processes (Vargo et al., 2008). The concepts of value-in-use, value-in-exchange and value-in-context are also represented. Service innovation is recently much concerned with the value creation as a result of the interaction and collaboration between firms (providers) and users: the co-creation of value. Value-in-use (dependent on the context of the product, service or solution) rather than value-in-exchange (dependent on point transaction between provider and customer), is argued to be turning out to be the dominant meaning of value (Vargo et al., 2008). Value-in-use implies 'the integration and application of resources in a specific context' while value-in-exchange refers to value 'embedded in firm output and captured by price' (Vargo et al., 2008, p.145). Relationships with customers and customer experience become more important than (or as important as) the quality of products and services considered as transactional outputs (Prahalad and Ramaswamy, 2004).

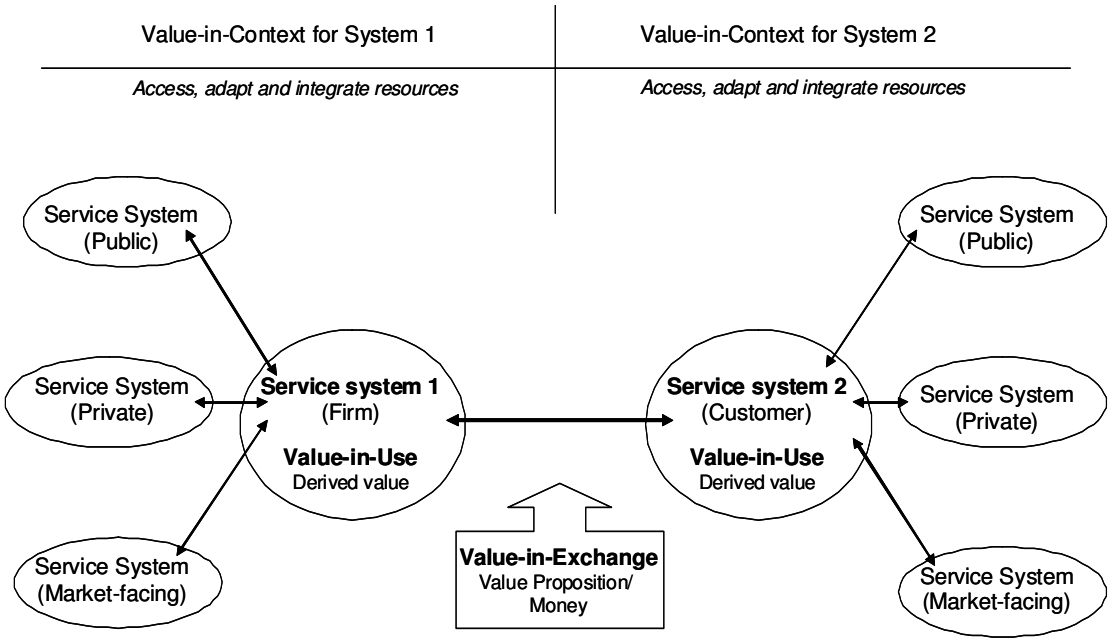

Figure 2.7 – Value Co-Creation among Service Systems
Source: Vargo et al. (2008, p.149)

Figure 2.5, Figure 2.6 and Figure 2.7 represent different aspects of the relationship between firm/supplier and customer. All three figures emphasise the aspect of value co-creation at the level of system, resource and network. Figure 2.8 shows a framework with the main aspects of value co-creation derived from those three figures.

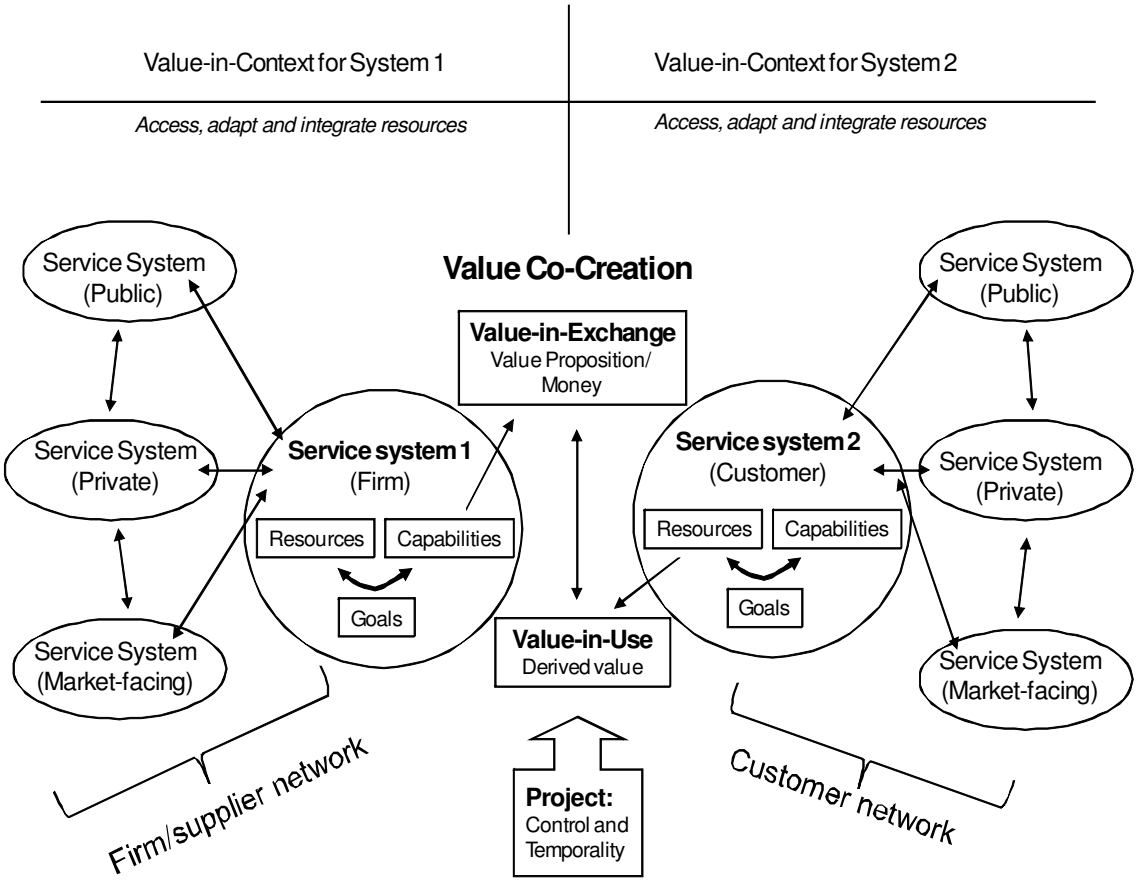

Figure 2.8 – Framework for the Analysis of Value Co-Creation between Supplier and Customer
Source: Author's elaboration based on Figure 2.5, Figure 2.6 and Figure 2.7.

The framework above recognises the importance of not only the firm/supplier and customer in the co-creation of value, but also other actors who are part of the firm/supplier and customer network, that may affect value creation. Instead of using operand and operant resources, resources are used for operand, and capabilities for operant resources in order to align with nomenclature of innovation studies (e.g. Tidd et al. (2005)). The interaction between resources and capabilities towards a goal/strategy connects with Section 2.2's discussion of resources and capabilities. From Figure 2.8, capabilities from the firm/supplier are offered to the customer (or potential customer) in the form of a value proposition (i.e. value-in-exchange, involving a price), establishing the connection between the service systems. Once the customer's resources are affected by the deployment of the value proposition through projects both customer and

firm/supplier create value-in-use or value-in-context[35]. An important point is the inclusion of the concept of project for the control and temporality features of co-creation of value. This connects with the former developments in project business in Section 2.3, where the issue of temporality in projects (i.e. the merger between project management and project marketing) was discussed. Finally, this framework is based on a service-dominant logic environment, which relates to the discussion of Section 2.4.

The next section (Section 2.5) deals with the platform strategy as a way for firms/suppliers to create value faster, having more interaction with and openness to external parties. This reinforces the importance of considering the network of relationships of both firm/suppliers and customers. Also, the platform strategy can be seen as an enabler of the service-dominant logic (discussed in Section 2.4) deployed through projects (discussed in Section 2.2 and Section 2.3), and ultimately as an enabler of integrated solutions (discussed in Section 2.6)

2.5 Platform Strategy

In Section 2.4, the service-dominant logic is portrayed as a superior logic to be embedded in the organisational culture when compared to the goods-dominant logic. However, there is a contention between SDL and GDL, and one way to approach it is to consider the notion of value co-creation, where both suppliers and customers cooperate according to their own goals and strategies. Besides the issue of changing the organisational culture through service-dominant logic and project business (see Figure 2.4), there is also the issue of creating value (in the form of products, services and solutions) faster and more cost effectively. The notion of platform seems to fulfil this need, and it will be developed as part of the service concept of Figure 2.4.

Platform is defined in the Oxford Dictionary as 'level surface raised above the surrounding ground or floor, esp one from which public speakers, performers, etc. can be seen by their audience' (Oxford, 1989, p. 946). This definition highlights an important feature of platforms: visibility to the audience. The visibility corresponds to some kind of exposure to the audience, who can be customers or users in the telecommunications industry context. Thus, the concept of platform is preferred to

[35] Vargo et al. (2008) do not differentiate explicitly value-in-use and value-in-context and they sometimes use them interchangeably. Figure 2.7 suggests that value-in-use would be the perception of value from inside the service system, and value-in-context from the outside. In the framework of Figure 2.8, no distinction between value-in-use and value-in context is done and they are used interchangeably.

system, as the latter does not highlight the visibility or exposure of the system to customers and users, in such a way that these customers and users can influence its design and the products and services derived from the platform. Interestingly, Gawer and Cusumano (2002, p. 2-3) define high-tech platform as 'an evolving system made of interdependent pieces that can each be innovated upon'. This definition seems to be still highly dependent on system and does not emphasize the visibility or exposure of the system to the 'audience'. It does however emphasise the interdependency of the various systems' parts and the evolution through innovation of each part. These are characteristics already emphasised in systems.

The concept of platform also may suggest the notion of something in transit, moving or ultimately changing: the launching platform for spaceships, for example, or the boarding platforms in train stations and airports, or petroleum platforms. Both the infrastructure and the service level depend on some degree of openness for the different actors to interact and integrate their efforts into new products and services.

This section elaborates on the concept of platform as a strategy for firms to overcome the constraints of cost, speed-to-market and customer experience *at the same time*. There are two major approaches to the platform thinking and strategy, the internally and externally focused strategy approaches for innovation.

Internal Platform-based Approach for Innovation

The internal (to the firm) approach of platform recognises 'a subsystem or interface that is used in more than one product, system, or service' (Meyer, 2007b, p. 149). This is the product platform, where the reusability of components to improve time-to-market and cost reduction in product and service development is emphasised (see, for example, Meyer (2008b), Meyer and Mugge (2001), Meyer and DeTore (2001), Tatikonda (1999) and Meyer and Dalal (2002)). This stream of literature is inspired by the automotive industry, where, for example, Meyer (2008b) shows how Honda reuses its engines in different models of cars for different market segments. It is also applicable to IT (e.g.IBM) and services industries as shown in, for example, Meyer and Mugge (2001).

The concept of platform is a 'common sense way for a firm to leverage technologies into new markets and, at the same time, reduce per-unit costs through more efficient production and procurement' (Meyer and Mugge, 2001, p. 26). Here the idea of platforms is applied to products from the supplier perspective (like IBM and SUN). The

issue of product complexity in this instance is very generic and not well defined. Usually this literature of product platform is connected to manufacturing, and thus production. This is not the case for incumbent telecom operators that have outsourced their equipment development to specialised equipment providers. Also, the reduction in per-unit cost does not explore the potential of different forms of collaboration that the Internet culture is making possible and more popular.

External Platform-based Approach for Innovation

The notion of platforms emphasises the visibility or exposure of the internal system to the external system. It also lends the idea of flux or flow in the interfaces.

Gawer and Cusumano (2002) put forward the idea of platform leadership, using examples like Intel, Cisco Systems and Microsoft. Their perspective, as well as of those from the product platform literature, is from the suppliers perspective and usually the literature does not focus on how large users build their platforms in order to deliver new services. Telecom operators now use Cisco Systems and Microsoft product and systems platforms to build their network platform. The leadership (from the suppliers' perspective) consists of establishing market standards and architectures that are eventually adopted by large users and that are continuously advanced, providing the initiator with a sustained competitive advantage against rivals.

The discussions about platform in the literature usually concentrate on the product as the unit of analysis (see, for example, van de Paal and Steinmueller (1998) and Mansell and Steinmueller (2000) for a discussion on multimedia platforms, analysing DVD and CD-ROM; Gawer (2000) about Intel's microprocessor; and Gawer and Cusumano (2002) about Intel, Cisco, Microsoft, Palm, NTT DoCoMo and Linux). The notion of platform does not scale up to the large network platforms being implemented by incumbent network operators, like BT, France Telecom and Deutsche Telekom. An exception to this rule is Gawer and Cusumano (2002), who used the example of NTT DoCoMo to illustrate how NTT is using different business models to create an environment where third parties are encouraged to develop applications for their mobile phones. This is part of the scope that this thesis intends to cover. The platform being developed is for any device (mobile and fixed phone, PC, laptop, blackberry, iPod, Palm, etc.).

It is important to take into account some characteristics of platforms in order to understand the platform-centric organisation and how platform innovation leads and facilitates service innovation in the telecom industry. Ciborra (1996, p. 115) argued that

> The platform [-centric organisation] is far from being a specific organisational structure, where one can recognise a new configuration of authority and communication lines. Rather it is a virtual organising scheme, collectively shared and reproduced in action by a pool of human resources, where structure and potential for strategic action tend to coincide in highly circumstantial ways, depending upon the transitory contingencies of the market, the technology and the competitors' moves. Schematically, the platform can be regarded as a pool of schemes, arrangements and human resources.

Firms organise differently in order to develop and implement capabilities to adopt a platform-centric organisation. The platform approach has significant implications for the way firms organise innovation in services (Meyer and DeTore, 2001). Some pitfalls when transitioning from single-product approach to platform approach are, according to Meyer and DeTore (2001):

- The lack of experience of senior executives in building platforms. These senior executives may bring with them the mindset of single and sequential product or service development. The organisation is focused on the next product or service and does not recognise the value of streams of new products and services.
- The firm is focused on a single market, and focused on the same requirements of customers for a long time, which gives room to disruptive technologies (cf. Christensen (1997)) to take over its market.
- The best people in the firm are too busy paying attention to short-term business, maintaining the existing products and services, not developing or thinking about new ones.
- Reusability is considered a good idea, but some firms think that it will be difficult for different parts of the organisation to work together.
- Platforms are considered only as technical ones, involving only engineers to decide on their architecture.
- The firm has no process to define new platforms. The project control and processes are designed for single product or service approach.

Figure 2.9 includes the platform strategy as an instance of service concept in the framework of Figure 2.4. As a service concept, the platform strategy derives its underlying principles from the 'high-variety strategy', where it is assumed that a higher variety of product or service line makes it more likely that customers will find what they are looking as they have more choices (Kahn, 1998). However, Schwartz (2004) argues that having more choice does not mean that customers will be necessarily more satisfied. Sometimes they will become more confused and/or unhappy. On the other hand, for firms to survive they must pursue the development of new products and services, and extend the high-variety strategy. Sawhney (1998) introduces the concept of 'leveraged high-variety strategies – strategies that allow firms to achieve high variety and high growth, without a corresponding increase in costs or complexity'(p. 54). Sawhney (1998) argues that the success of the leveraged high-variety strategies is '*platform thinking* – the process of identifying and exploiting commonalities among firms' offerings, target markets, and the processes for creating and delivering offerings' (italics in the original) (p. 54). The platform thinking offers an interesting strategic approach for firms to survive and grow in a turbulent environment. The platform strategy is supposed to include the totality of the firm which is pursuing the aims of reducing cost, decreasing the time-to-market of its products, services and solutions, and improving customer experience at the same time.

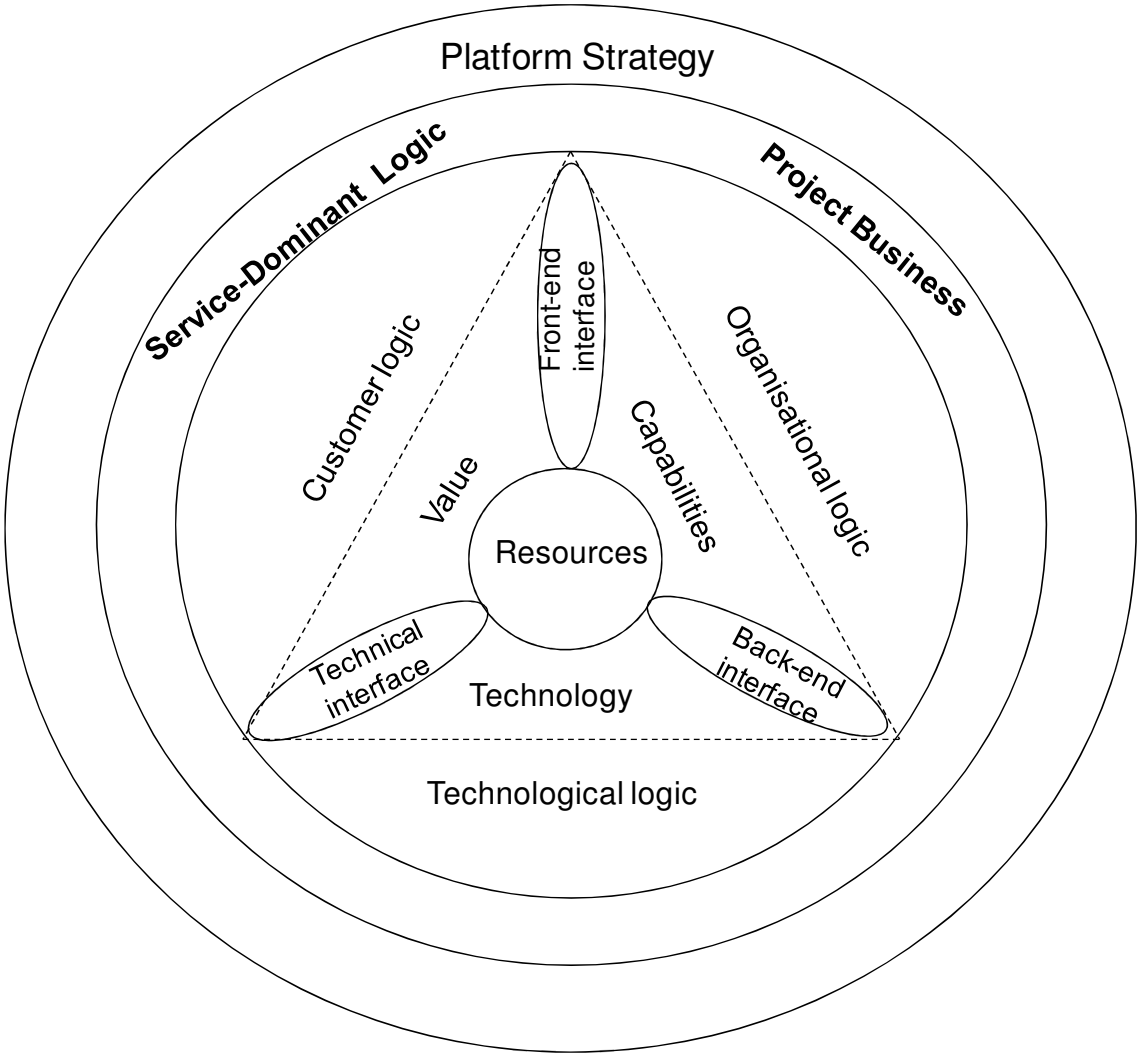

Figure 2.9 – Towards the Theoretical Framework for Data Collection and Analysis: Including Platform Strategy
Source: Adapted from Kingman-Brundage et al. (1995)

Besides being a service concept, as proposed above, the platform strategy in the business-to-business environment is based on underlying tangible systems, which are usually large and complex. In order to deliver offerings based on the platform strategy, it is reasonable to assume that such underlying tangible systems are built in such a way that they favour the platform strategy, and in many instances they themselves might be platforms (i.e. they might be built considering the principles of platform strategy). The complexity of such systems is addressed below by examining them through the medium of platform strategy.

Complex Systems as Platforms

Complex systems have been studied by several authors (Rycroft and Kash, 1999, Miller et al., 1995, Davies, 1997, Hobday, 1998, Hobday et al., 2000). The category of Complex Products and Systems (CoPS) is used to distinguish these systems from the mass production industries, such as the ones addressed in the studies of disruptive technologies. CoPS are defined as 'high cost, engineering intensive products, systems, networks and constructs' (Hobday, 1998, p. 690). Usually, they require a high variety of distinct knowledge bases, and intense user and other supplier involvement, stretching the boundaries of the organisations involved in the production and delivery of CoPS. CoPS have substantial differences from mass produced goods, such as extended life cycles (a cycle may last for decades), and long time investment cycles (meaning long sales cycles for suppliers). They are not mass produced and usually produced in small batches or through one-off projects (Hobday, 1998).

CoPS studied in the literature are usually standalone (e.g. flight simulator, as in Miller et al. (1995); or aircraft engine, as in Prencipe (2000)). But CoPS in telecommunications (e.g. routers and switches) need to be interconnected with other CoPS, forming a network and new technology CoPS may need to be interconnected with legacy CoPS. If the legacy system is to be replaced, it usually takes some time, maybe years, for that to happen. Meanwhile, the legacy and the new system need to interoperate. Davies and Hobday (2005) show how innovation is managed in the supply of CoPS. The transition to NGN is an opportunity to study the innovation management in the *adoption* of CoPS by incumbent telecommunication fixed operators.

Complex systems tend to organise themselves into layers, and as there is also a tendency to decouple services from the underlying infrastructure in the telecommunications industry (Christensen et al., 2004), the starting point is to use the layer framework composed by services and infrastructure. Services represent the information layer characterised by models, patterns and ways of informing and learning. Infrastructure means the physical support system and structure, including psychological constructs. The challenge is to determine dynamically the right ratio of information to infrastructure. Large and traditional firms may get trapped by the infrastructure, paying less attention to the flow of information, and thus lose the opportunity for real growth and survival (Sherman and Schultz, 1998, p.11). The flow of information can also be constrained by the infrastructure. The decoupling of these layers aims to hide the

complexities of the infrastructure allowing services to be more flexible, and facilitate change more easily.

Simon (1996, p. 183-184) defines a complex system as ‘one made up of a large number of parts that have many interactions’. He adds that in this type of system the whole is more than the sum of its parts in the sense that the property of the whole cannot be trivially inferred from the properties of the parts. This is sometimes called ‘emergent properties’ (Lewin, 1993). The problem is to define what ‘a large number’ is.

Gawer and Cusumano (2002, p.3) provide a very generic definition of complex products: ‘we are all surrounded by [complex products]: bicycles, cars, refrigerators, radios, computers. All consist of different interrelated components that have to fit together’. They consider mass produced goods as complex products. This definition does not capture important nuances of complexity as understood by other authors who would not find components like bicycle gears to be complex despite their having to be manufactured in a reasonably exacting way. Thus, the Gawer and Cusumano (2002) definition of complex systems/CoPS provides a more specific type of complex product than the one considered in this research. Furthermore, CoPS, such as the equipment used in telecommunications systems, can be interconnected to form networks, which in turn can be considered as platforms for the delivery of services. This relationship between complex systems/CoPS, networks and platforms has received little attention in the literature (an exception is Davies (1997)).

Complex systems can be seen as platforms prepared to be reconfigured and recombined with internal and external systems in order to address specific needs of customers. The existence of the platform itself is not enough for the solution of customer’s problems. Additional effort and risk taking is necessary to identify, integrate and deploy such platforms in an adequate and profitable way. Integrated solutions are developed in one such way in the next section.

2.6 Integrated Solutions

Section 2.4 examined the contention between the goods- and service-dominant logic, and how the service-dominant logic has been increasingly prevailing in the service economy. SDL proposes that 'goods are distribution mechanisms for service provision' (Vargo and Lusch, 2004, p. 8), and in Section 2.5 it was considered that in the business-to-business market such tangible goods are usually complex systems, which can be viewed as platforms themselves. The building of such platforms also requires project capabilities (developed in Section 2.3), and it was concluded in Section 2.5 that the mere existence of platforms is not enough, and that additional effort and risk taking is necessary, which leads to the idea of integrated solutions activities. Thus, integrated solutions leverage platforms in order to co-create value with customers, involving not only customers, but also the suppliers and customers' networks (see Figure 2.8). This section (Section 2.6) develops the concept of integrated solutions using the previous discussion as background and foundation.

Integrated solutions can be seen from many perspectives, such as the move from manufacturing to services (Wise and Baumgartner, 1999), or the solutions-based projects (e.g. turnkey solutions, global outsourcing solutions, Public-Private Partnership (PPP) and Public Finance Initiative (PFI)) (Davies and Hobday, 2005). The solutions-based projects fall into the category of large and complex projects, involving the transaction between firms (business-to-business market) and often involving the usage of Complex Products and Systems (CoPS). According to Brady et al. (2005), integrated solutions have their origins in the Build-Operate-Transfer (BOT) projects of the 1980's, further elaborated by, for example, Kumaraswamy and Zhang (2001). According to Davies (2003b), the move to integrated solutions can occur from a base in manufacturing or from a base in services. The move from a base in manufacturing is sometimes called 'servitisation' (see Vandermerwe and Rada, 1988, Slack, 2005).

Cova and Salle (2007) point out that the integrated solutions approach originated in the domain of project business. In this context, as mentioned in Section 2.5, a project involves a transaction between a buyer and a seller, so the role of customer is important. As stated in a definition of integrated solution by Brady et al. (2005) they are 'unique combinations of products and services that address a customer's specific business problems' (p. 360). The customer's specific business problems are usually associated with customers' needs and wants. Therefore the business of integrated solutions usually

starts by identifying such customers' needs and wants. Although the customer seems to be within the scope of integrated solutions, the literature on integrated solutions tend to neglect the role of the customer in the analysis (see, for example, Davies (2003b), Davies and Hobday (2005), Brady et al. (2005), Windahl and Lakemond (2006), Oliva and Kallenberg (2003), Ceci and Prencipe (2008)). This happened because these researches concentrated on the supply side and on the move to integrated solutions of those suppliers, considering issues like organisational capabilities and strategies from the perspective of the supplier (but not the customer). There are some exceptions though, for example Cova and Salle (2008), who investigate the interaction of customer and supplier to co-create value, considering a customer as a resource for the integrated solution. The integrated solution then becomes a customer solution (tailored for the customer's specific needs and wants), and Tuli et al. (2007) argue that 'customer solutions embody the new service-dominant logic' (p. 1). The new service-dominant logic is the one discussed in Section 2.4, based on Vargo and Lusch (2004). Day (2006) argues that 'the crux of Vargo and Lusch's argument is that a service perspective is superior to a goods-centred view because it emphasises solutions […]' (p.88). This also reflects why Brown (2007) suggests that most marketing practitioners may prefer to use the expression 'solutions-dominant logic' instead of 'service-dominant logic'. Thus, the interconnection of service-dominant logic and integrated solutions is made evident.

A closer look at the integrated solutions approach reveals that, although it exists to address customers' needs and wants, often the boundaries of this concept are not very clear. As many suppliers of products, seen as tangible goods, may start to offer services around those products, and as products are supposed to solve a customer problem (or satisfy a need), there might be a tendency to consider that any product sold with services associated with it (e.g. installation and maintenance) is an integrated solution. Many retailers can or will do that and they are not considered as providers of integrated solutions. Thus, virtually any selling can become an integrated solution. Some suppliers may say: 'If a customer needs a box to solve a problem, we will provide that box and the problem is solved'(Shepherd and Ahmed, 2000, p. 104), but this is far from the business of integrated solutions and the capabilities required provide such a solution. Such confusion may arise where different sizes of firms (small, medium and large) are investigated and there is no customer associated to each solution. In these cases, integrated solutions can be confused with systems selling (Davies et al., 2007). In order

to avoid this confusion, integrated solutions should be seen as involving projects instantiated with a customer involved or at least interacting, based on a jointly articulated need (with the supplier) and involving the integration of components from third parties. So, there is a need to identify a customer (specifically, a business customer) in order to be considered as an integrated solution.

This instantiation with an involved or interacting customer implies that the business of integrated solutions is managed on a customer-by-customer basis, by firms that are usually called customer-centric organisations (see, for example, Galbraith (2005)), not by measuring the performance of isolated products or services. In this type of firm, performance is measured for each customer (customer satisfaction), and not through the amount of discrete products and commercialised services. Such a business requires close relationship with the customer. That is why the role of the customer is significant in the co-creation of value between the supplier and customer. This is the view of the service-dominant logic (discussed in Section 2.4) which serves as a support for the business of integrated solution.

While integrated solutions address the customers' needs and wants, Jaworski and Kohli (2006) suggest that both customer needs/wants and firm needs/wants should be addressed. These approaches are not in conflict, as integrated solutions are usually studied from the firm/supplier perspective, considering the customer needs and wants. Thus, integrated solutions have the firm needs/wants implicit in the service being provided. This is a business model that can be very difficult for the provider to establish a business that is profitable and sustainable. IBM, for example, has experienced problems with the business of integrated solutions (Davies, 2003b).

The service-dominant logic may serve as a better explanation for Davies' (2004) value stream approach to integrated solution. He claims that service firms like C&W and WS Atkins, moving from a service base, are 'moving into integrated solutions from both upstream and downstream positions to occupy the high value space situated between manufacturing and services' (Davies and Hobday, 2005, p. 216). Another explanation would be that service providers like C&W are changing their logic into what is being called service-dominant logic (Vargo and Lusch, 2004). Although such companies have a base in services, their dominant logic was to sell services as products, i.e. as isolated goods (within the goods-dominant logic). The shift to service-dominant logic is followed by a closer interaction with the customer, trying to understand its business, and

being involved in what the customer needs and what the customer wants to do with the service at a business and strategic level. The big difference turns out to be the relationship with the customer and the systems integration that occurs in the customer's premises and which is managed by the service supplier, not by the customer (as it usually was). In this explanation, the firm does not change its position in the value stream, moving upstream or downstream (as suggested in Davies (2004, p.738)). Firms with a base in services remain in services, but change their mindset or logic about services, adopting the service-dominant logic.

Integrated solutions and systems integration are deeply interconnected. Prencipe et al. (2003, p. 1) argue that systems integration has two 'faces', as R&D has two faces according to Cohen and Levinthal (1989): (i) the internal activities to integrate inputs in order to make new products and services; and (ii) the external activities to integrate resources, skills and knowledge from other firms (i.e. not on the same payroll) in order to make even more complex products and services. Integrated solutions add one more component: the customer need. Starting with a customer need, suppliers take responsibility to design and offer a solution to meet that need. Integration, once the primary responsibility of the customer, is increasingly performed by the supplier, usually at the customer's premises. For the supplier, this has the advantages of (i) increasing the scope of the business (implying further revenue streams); (ii) reusing previous solutions, reducing costs of new deployments; and (iii) refining existing solutions and capabilities, and designing new ones that may be deployed elsewhere in attracting new customers. Although this seems advantageous for the supplier, the business of integrated solutions requires the development of new capabilities and can be very risky from a financial perspective. Among the new capabilities developed by product and service firms moving into integrated solutions business are systems integration, operational service, business consulting and financing capabilities (Brady et al., 2005). The new skills are: key account management, risk analysis and management, financial acumen, legal skills, information management and innovation management. Although not explicitly mentioned, project management also plays an important role in the traditional way of managing time, cost and quality.

Integrated solutions come as a service concept in the preliminary theoretical framework of Figure 2.3. Figure 2.10 includes integrated solutions as part of the theoretical framework for this research, pulling together, in a hierarchical manner, integrated

solutions, service-dominant logic, and the three logics of technology, organisation and customer, underpinned by resources.

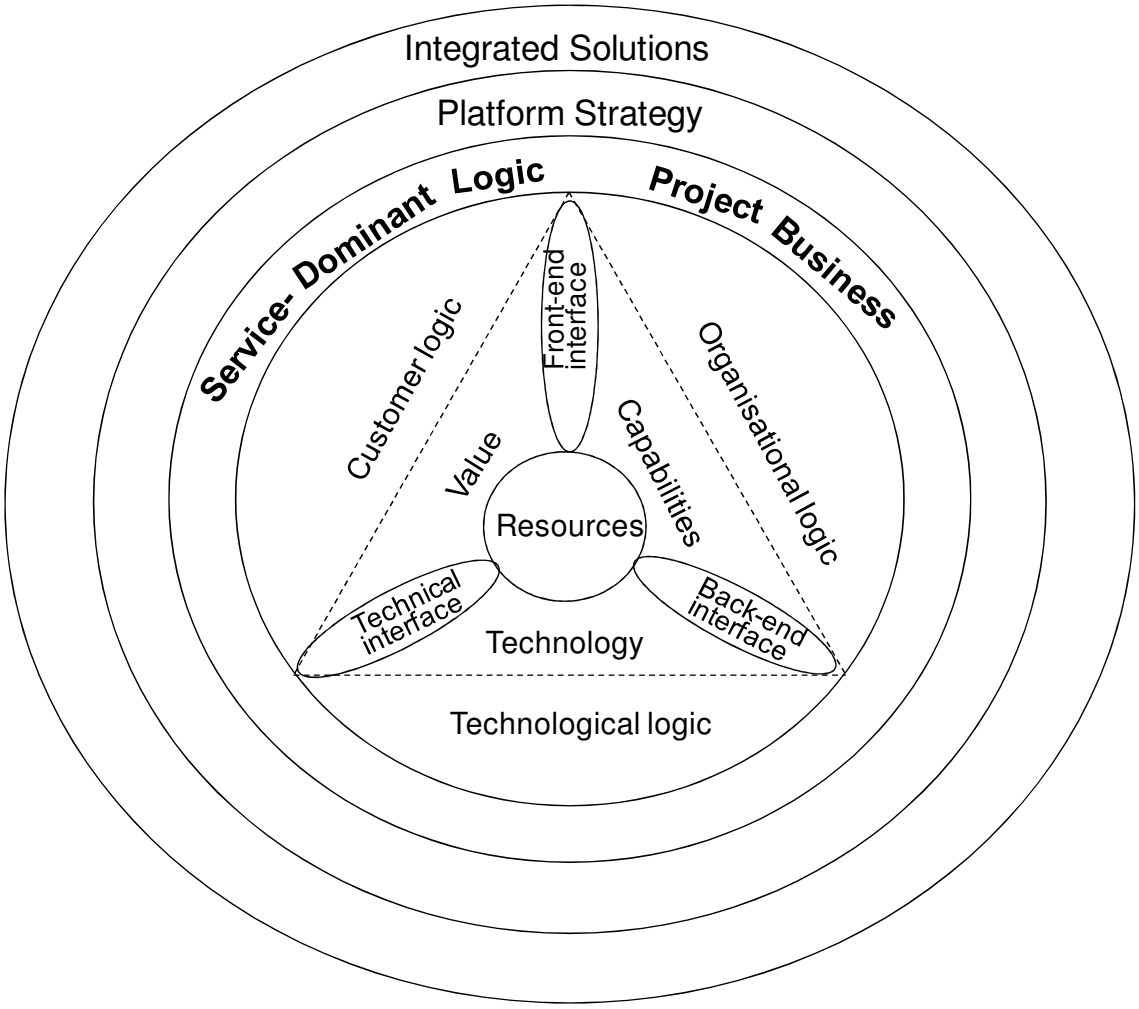

Figure 2.10 – Towards the Theoretical Framework for Data Collection and Analysis: Including Integrated Solutions
Source: Adapted from Kingman-Brundage et al. (1995)

For a better representation, Figure 2.10 is reshaped into Figure 2.11 in order to highlight the hierarchies and relationships among the main concepts involved in integrated solutions. The Resource-Based View (RBV) is the foundation, where technology, especially technology new to the context or applied in a different way, is transformed into capabilities and value to the firm and customers. Project capability is highlighted as a major component (cf. Davies and Hobday, 2005) in building the platform (e.g. as an infrastructure to telecommunications networks) and to deliver integrated solutions to customers. Project Business highlights the importance of considering not only the period between the start and finish dates of the project, but also the events before and

after. On the other hand, the Service-Dominant Logic (SDL) favours the development of a platform strategy, where goods are building blocks supporting the delivery of services. Thus, SDL, project business and platform strategy enable the delivery of integrated solutions, i.e. the delivery of value to customers through projects as services supported by platforms.

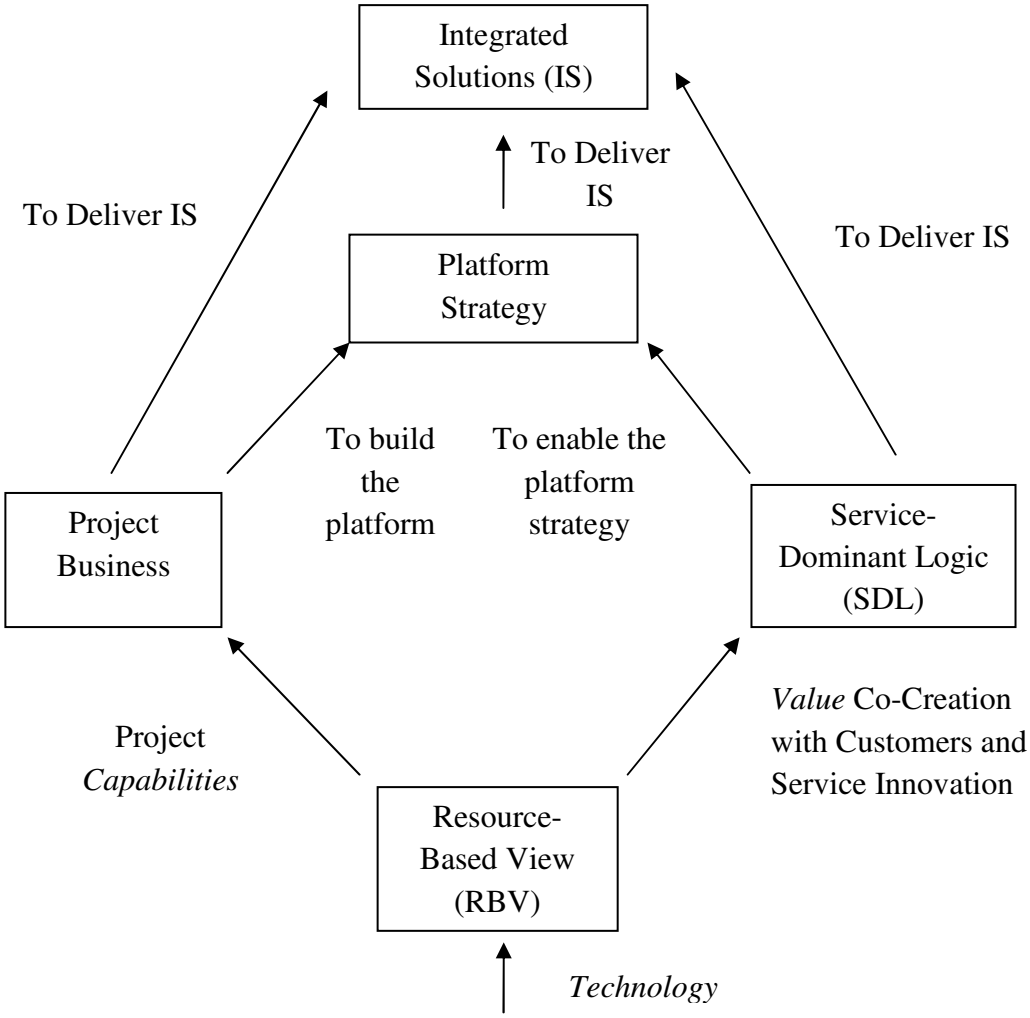

Figure 2.11 – Theoretical Framework for Data Collection and Analysis
Source: Author's elaboration

Finally, as integrated solutions deal with customer needs, firms usually have to resort to third party firms in order to complement their own solution. Thus, integrated solutions can be considered as an open business model, where value is created, captured and leveraged through the combination of internal and external resources (Chesbrough, 2006). In this context of services, another important aspect is how open the innovation

processes are in terms of collaborating with third party firms. The literature on open innovation (e.g. Chesbrough (2003)) tends to focus on producers of goods (for example, IBM, Intel and Lucent), and less on service firms. To what extent is the open innovation approach applicable to the service sector?

2.7 Conclusions

The particular contribution of this chapter is to align higher order strategies of the firm with lower level activities related to resources and to suggest interdependencies between these levels. The construct of integrated solutions is offered as a higher order service strategy, supported by platforms (rather than isolated goods and services), which can be built or further deployed (in integrated solutions) through projects acting on resources and capabilities in a service-dominant logic environment to promote service innovation.

An integrated solution underpinned by the platform strategy is the main theory chosen to explain the business renewal and growth of traditional firms. The construct of integrated solutions was explained as being based on platform strategy, project business and service-dominant logic, underpinned by resource-based theory (according to Figure 2.1). Platform strategy was defined through two approaches: (i) internal, i.e. based on the reuse of subsystems and interface to create new products, services and solutions; and (ii) external, i.e. based on establishing a product which becomes a market standard that drives innovation from third party firms. The framework for the collection and analysis of the empirical data is presented in Figure 2.10 and Figure 2.11.

In project business, the unit of analysis is the firm, not the project (Artto and Wikstrom, 2005). However, this approach might be incomplete. As project business represents part of the business, this means that not all the activities within the firm may be based on projects. Thus, it is fair to consider that the unit of analysis is part of the firm operated through projects and not the whole firm. Another important point is that such large projects (usually business-to-business projects) are highly dependent on the interaction with customers. As integrated solutions address customers' needs (and wants), it is important to include the customer in the analysis to facilitate the understanding of the nature of integrated solutions and their value creation processes.

The literature on integrated solutions usually takes the perspective of the supplier, and gives little attention to the interaction with customers to co-create value. One shortcoming of the integrated solutions approach is that the primary concern is about the

provision of integrated solutions and organisational capabilities from the equipment and systems supplier perspective, with little thought for customers or users and their needs in the analysis. This approach usually focuses on the trend of large firms to move into integrated solutions, where the customer is still seen as a passive element in the process. The service-dominant logic approach is proposed as an appropriate contextual background to deploy integrated solutions and co-create value with the customer. The framework of Figure 2.8 was proposed to address this issue of value co-creation between suppliers and customers and their respective networks in integrated solutions.

Within the platform strategy, the internal and external approaches are usually considered separately. The process usually focuses on: (i) identifying reusable subsystems or interfaces to develop a product or service; or (ii) on creating a product that becomes the 'platform' as a standard reference for other firms and users to use in order to drive innovation and develop other products and services on top of the platform. The literature lacks cases where both approaches are used and cases where the platform approach permeates the way of doing business of the whole firm, where its infrastructure/network is the platform.

As the analysis will be focused on large business-to-business undertakings, the capabilities of project management, systems integration and software development on which the development of Complex Products and Systems (CoPS) is based is useful. The following shortcomings were, however, identified: (i) not considering the user perspective (and thus not including the user/customer in the analysis); and (ii) not considering a 'networked' CoPS (interconnected with each other forming a network), as the literature usually approaches standalone products and systems.

In terms of innovation in services, integrated solutions offer a context to work with more open business models, co-creating value with customers, their networks, and third-party supplier firms. As the open innovation model is usually referred to producers of goods (with a base in manufacturing), it remains to be seen as to what extent this model is applicable to service firms (or those with a base in services).

In the pursuit of establishing the infrastructure and service layers, service firms struggle to establish platforms that will allow the development of new services. These platforms are composed by complex systems (which may cost millions of US dollars and are usually produced in small/tailored batches). These complex systems may be interconnected to constitute a network. Such a network would have interfaces for

exposure and for interaction with their users (the users can interfere in their design and in the development of new services). In this context, it is proposed that the concept of platform is used to investigate the infrastructure (as a complex system), and to make the interface with the service level, where integrated solutions are the ultimate approach for service innovation.

3. Research Methodology

3.1 Introduction

Chapter 2 aimed to define a theoretical framework to approach the problem of incumbent firms in terms of business renewal and growth in a turbulent environment when facing a major crisis. The literature review elaborated on the relevance of integrated solutions for businesses with large customers, and the platform strategy as the underlying philosophy to address the issues of cost reduction, speed-to-market and customer experience that are common to business competitiveness in such turbulent environments.

The context of 'crisis' selected is the downturn of the telecommunications industry in 2001/2002, where many incumbent telecommunications operators faced massive competition, huge amount of debt and declining revenues from their traditional voice services. The response to this 'crisis' and the subsequent uncertainty that telecom operators faced was the emergence and deployment of the Next Generation Network (NGN), an all-Internet Protocol network, which will be introduced and discussed in Chapter 4.

The transition to NGN is a recent phenomenon. NGN was legitimised and adopted by the main incumbent telecommunications operators like BT in the first half of the 2000s (OECD, 2005). BT intends to complete the transition to NGN by 2011 while others, like Deutsche Telekom and France Telecom, will supposedly take longer (completion by 2015 or later).[36] The methodology is primarily qualitative, and the data collection involved conducting interviews and collecting documentation during the period between 2005 and 2008. An important element of the data collection was attendance at trade conferences in order to interview executives, attend their presentations and gain insights which would not have been possible (or would have taken much more time) by only analysing documents. The interaction between the information obtained through interviews (as primary sources) and through documentation and presentations (as secondary sources) helped to speed up the process and deepen the understanding of the phenomenon.

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[36] Interview with BT Senior General Manager, November 2005; interview with Deutsche Telekom Project Manager, November 2005; and interview with France Telecom Technical Manager, November 2005. These different approaches were also mentioned in the interview with KT (Korea Telecom) Business Development Manager, November 2005.

This chapter is divided as follows. Section 3.2 shows the research design and strategy used to gather and analyse the data. Section 3.3 explains in more detail the process of collecting and analysing the data, and writing the case study. Section 3.4 indicates some of the drawbacks of the interview data and case study method. Finally, Section 3.5 draws some conclusions about the methodology used.

3.2 The Research Process (Design and Strategy)

It is appropriate first to re-state the research question in order to show the relationship between the research question, the theoretical framework and the thesis structure.

3.2.1 Research Design

Research Questions

As defined in Chapter 1, Section 1.2, the research question and sub-questions are:

(1) How has the initial phase of the transition (planning and initial implementation) to the Next Generation Network affected the capabilities of incumbent telecom operators to innovate in services?

(1.1) What are the capabilities that incumbent telecom operators have been developing during the planning and initial implementation of the Next Generation Network in order to build it and make it effectively operational?

(1.2) What have been the immediate impacts of the transition to Next Generation Network on the innovation processes of incumbent telecom operators?

Analytical Framework

The analytical framework developed in Chapter 2 (see Figure 2.11) and reproduced below in Figure 3.1 highlights the underlying theories of integrated solutions and platform strategy to approach the renewal and growth for the transition to Next Generation Networks of the incumbent telecommunications operators. It shows the role of project capabilities and technology in order to create value to customers through the delivery of integrated solutions.

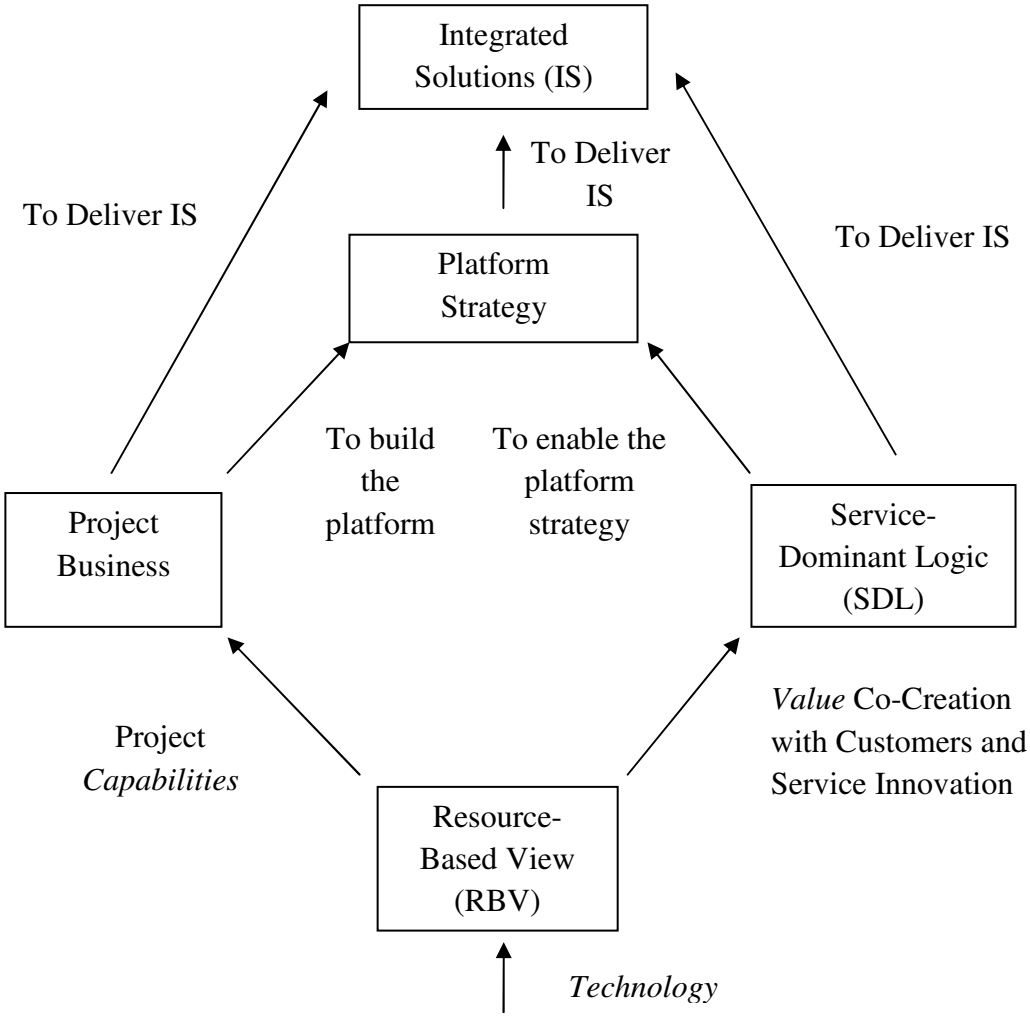

Figure 3.1 - The General Theoretical Framework for the Thesis
(for Data Collection and Analysis)
Source: Author's elaboration

Additional representations shown in Figure 2.8 and Figure 2.10 (in Chapter 2) are used as ways of organising the observations about the interactions between customer and service provider.

Units of Analysis

In order to approach the research question, the technological logic is the dominant aspect used to build Chapter 4, mostly based on the telecommunications industry, and then narrowing down to BT in the subsequent chapters. Chapter 4 also examines how the means of delivering services are changing over time as the result of the adoption of

IP/MPLS technology (and the deployment of Next Generation Networks), the major technological change that is affecting the whole telecommunications industry, not just isolated firms within the industry. Three units of analysis were chosen in order to approach the phenomenon of the transition to NGN and the capabilities development referred to in the research question: (i) the major project BT21CN; (ii) BT Global Services as a business unit; and (iii) the integrated solution projects undertaken by BT Global Services.

BT 21st Century Network (BT21CN) was chosen as the most advanced case (at the time of the research in 2005) of deployment of the Next Generation Network technological change being undertaken in the telecommunications industry by the incumbent telecom operators.[37] This choice was made at the end of stage 1 of the research as shown in Table 3.1. BT21CN is a major programme to change the infrastructure/network of BT, adopting IP on a massive scale[38]. The issue of capabilities is also analysed through the case of BT Global Services (BTGS), a BT business unit which has been gaining ground and contributing to BT's improved performance through its business of integrated solutions (called by BT 'networked IT services'). The consideration of the customer logic is addressed by analysing integrated solutions, which are represented by projects where customer and supplier interact for the deployment of the project.

The issue of capabilities is therefore analysed over different levels of the firm besides the industrial level: (i) in a major transformation project (BT21CN); (ii) in a business unit (BT Global Services - BTGS), which is having a distinctive approach during the transition to NGN; and (iii) in solutions/projects conducted by BTGS. Each of these levels is engaged with the organisational (and capabilities) logic of the framework, whereas BT21CN and the integrated solutions undertaken by BTGS reflect predominantly on the technological and customer logics, respectively.

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37 Interview with Deutsche Telekom Manager, March 2005; interview with Siemens Senior Manager, March 2005; interview with Heavy Reading Senior Analyst, June 2005; interview with Cisco Account Manager, June 2005.

38 BT issued a press release on 09th June 2004 announcing its plan to build BT21CN.

3.2.2 Observational Strategy

The background of this research is the transition to the Next Generation Network (NGN) in telecommunications. At the time this research was starting (late 2004), the concept of NGN was still stabilising. As a contemporary phenomenon, it was difficult to find quantitative data about it. The research question turned out to be more related to the capabilities that were emerging as incumbent telecommunications operators revealed their plans to migrate to NGN. Thus a qualitative research approach was preferred over a quantitative approach for the data collection, and thematic analysis was preferred over statistical analysis.

The research approach was more inductive than deductive. The theoretical starting point that was used was the literature on complex products and systems (CoPS) (e.g. Davies and Hobday (2005)), although this approach had shortcomings with respect to the nature of the systems analysed (i.e. CoPS most often considers standalone products and systems rather than interconnected systems forming a network, as is the case in this research), and such systems were not experiencing a fundamental change in their underlying technology. The literature on project management, especially for complex projects, also offered another starting theoretical point, but again this literature seemed to be limited when dealing with a context where significant technological change was occurring. Ultimately, the transition to NGN is a contemporary phenomenon, unfolding as this research was undertaken, and this suggested an inductive approach.

Furthermore, when considering a quantitative approach, the number of incumbent telecommunications operators undertaking the transition to NGN was low for the purposes of conducting a quantitative analysis. At the time of starting the research (late 2004), agreement about implementing the principles of NGN was widespread in the industry, but the strategy of implementation (i.e. when and how) varied from one operator to another. In Europe, BT, Deutsche Telekom and France Telecom took the lead to deploy NGN with different strategies. Among these three, BT decided to deploy NGN most aggressively, committing a huge amount of money (about £10 billion) over roughly five years.

Initially, data were collected from BT, Deutsche Telekom and France Telecom, as part of the observational strategy to look at large scale changes in complex systems. However, along the way, it became evident that BT was committed to make the

transition to NGN happen more quickly, while Deutsche Telekom and France Telecom would take longer. As BT is a large and complex case, it has made a major commitment to change. It is leading the other companies (hence the potential for learning and imitation from this experience), and it has moved to begin implementation in a more aggressive manner (providing an important observational opportunity to compare planning and implementation). It was therefore decided to focus on BT for the purposes of this research.

This research uses predominantly a qualitative case study design. The research question and sub-questions are approached through case analysis at project (BT21CN and the integrated solutions project conducted by BTGS) and business unit (BTGS) levels. The customer logic is approached through data collected from 179 cases of integrated solutions (at project level) delivered by BTGS, where basic quantitative analysis is also performed. These cases were provided by BT, and the information therein was supplemented by interviews. Although a qualitative case study design favours a qualitative research design, the data collection may rely on both quantitative and qualitative methods (Maylor and Blackmon, 2005), and thus both qualitative and quantitative elements are present in this research. Figure 3.2 shows the integration of both quantitative and qualitative designs within the case study design, which is used in this research.

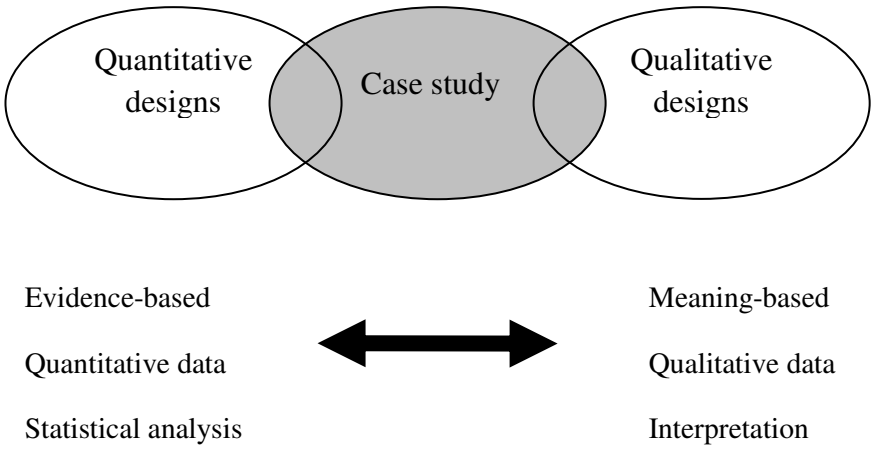

Figure 3.2 – Case Study as Research Design
Source: Maylor and Blackmon (2005, p. 251)

Along the way, empirical data suggested that a more customer-centric approach was needed. Most of the literature on innovation management (including CoPS) and project management are more concerned with the supplier's perspective, and rarely include the customer in its analysis. At this point, literature on industrial marketing and project marketing was added to the theoretical framework.

Case Study Methodology

According to Yin (1994), the case study is the preferred strategy when the events to be examined are contemporary and the relevant behaviours cannot be controlled by the researcher. Also, questions of the 'how' and 'why' type usually tend to involve case study as a research strategy (Yin, 1994). The transition to NGN is a contemporary phenomenon and the bubble burst happened around 2001-2002. Also, the research question aims at the 'how' type. For these reasons, although other approaches were considered as explained above, the case study was adopted as the preferred method for this research.

Selecting the Case

The process described below indicates the effort to approach the problem of developing capabilities from the viewpoint of applying theory in a context of technological change. This was accomplished by a careful examination of the central issue of NGN transition, leading to an empirical and inductive process that also led to the selection of BT as the best candidate for in-depth investigation.

After considering incumbent telecommunications operators in various continents (Europe, America and Asia), the decision was taken to focus on Europe. Initial interviews and participation in trade conferences (during stage 1 of Table 3.1, as mentioned before in Sub-Section 3.2.1) indicated that Europe was ahead of other continents (compared to North America/USA and Asia/Japan) in the deployment of Next Generation Networks (NGNs).[39] The main three operators (in terms of size) in Europe are BT, Deutsche Telekom (DT) and France Telecom (FT). All three operators have the same background of having overinvested in 3G licences and having a huge amount of debt by the time of the downturn, and all three were suffering from declining

[39] Interview with Siemens Senior Technical Director, March 2005; interview with DT Senior Manager, March 2005.

revenues in their traditional fixed voice services. However, BT took the decision to sell its mobile business back in 2001, a decision not taken by DT and FT.[40]

In the following years, the mobile business grew, and DT and FT could offset to a certain extent their losses in revenues in the traditional fixed voice services. That was not the case with BT, however. In an audacious move, BT announced BT 21st Century Network (BT21CN) in 2004 as a £10 billion project to build its NGN in five years, switching off its PSTN network[41]. There was a general agreement in the telecommunications market that building the NGN was really needed, but there was no agreement on the deployment strategy. DT and FT (and others like NTT) had announced that they would be converting their network to NGN, but at a slower pace (not in the five years announced by BT).[42]

As mentioned before in this section, the research was initially conducted collecting data from all three incumbent operators: BT, DT and FT. However over time (and mostly based on the first stage of the data collection represented in Table 3.1), it became apparent that (i) by trying to lead the race BT was experiencing the challenges of the transition to NGN before the other incumbent operators, as DT and FT still had the mobile business to support their overall business; (ii) BT was pointed out by many interviewees as the most advanced deployment of NGN in Europe; and (iii) collecting data from DT and FT was not proving advantageous, since they were moving at a slower pace. Thus, it was decided to focus on BT, as it was the most advanced case of the transition to NGN, and it could offer more relevant insights before events unfolded in DT and FT. Data from DT and FT were used in a few instances in order to make comparisons with BT which would not be so evident if BT was examined as a case alone, hence refining the analysis of the BT case.

The public Internet is having a major impact on the incumbent telecom operators, regarding its network architecture and business models. The transition of BT was chosen because it seems to be, at the time of this research, the most influential and radical approach in the global telecommunications market when BT21CN was

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40 mmO2, BT's mobile unit, was divested on 19th November 2001 (BT, 2002, p. 9)

41 BT issued a press release on 09th June 2004 announcing its plan to build BT21CN (BT, 2005).

42 Interview with Deutsche Telekom Project Manager, November 2005; and interview with France Telecom Technical Manager, November 2005; interview with NTT Senior General Manager, October 2005.

announced in 2004. The difference from other approaches, like Deutsche Telekom and France Telecom, is that BT is proposing a deadline to switch off the PSTN, a commitment that is not assumed by other operators.[43] BT was also chosen due to its innovation 'leadership' in the transition. Innovation 'leadership' occurs when 'firms aim at being first to market based on technological leadership' (Tidd et al., 2005, p. 121), whereas innovation 'followership' occurs when 'firms aim at being late to market, based on imitating (learning) from the experience of technological leaders' (Tidd et al., 2005, p.121). These definitions tend to be used in reference to technology suppliers, but in the context of this research the technological leadership occurs in the adoption of the technology on a large scale, where huge amount of resources are committed to its deployment.

3.2.3 Operationalising the Research Strategy

Being a recent phenomenon, an inductive approach was adopted in three stages. This is in line with what Eisenhardt (1989) calls grounded case study, where theory is built from case study research. Although the author identified some prospective literature in the beginning of the research, it was during and after the data collection that emerging literature could be identified to better explain the data and compare the findings. The research was conducted through interviews and analysis of documents such as reports, newspaper articles and official Internet websites. The reports included annual reports of suppliers and incumbent service providers, and documents of regulators. The interviews were conducted with senior managers, managers and other practitioners of incumbent telecommunications service providers and suppliers, regulators, consultants and market research analysts. An overview of the documentary and interview data used is shown in Table 3.1. The number of interviews refers to the 104 interviews that were referenced in the thesis. Appendix 2 shows the total sample of 157 interviews (including those not referenced in the thesis), and the 104 interviews cited in this thesis with their distribution according to the organisations to which the interviewees belonged.

Stage 1 was the exploration phase where the context of the research problem and incumbent operators were investigated. One of the outcomes of this phase was to narrow the options down to BT as the main case study to be developed. Stage 2 was the phase of exploitation where more information about BT and the industry was gathered addressing the research questions on the three logics of technology, organisation and

[43] Interview with BT Senior Manager, November 2005.

customer. Stage 3 served to further exploit the insights and propositions reached in phase 2 and attempted to confirm (or not) those propositions.

The interviews were conducted during the trade conferences I attended. I organised a questionnaire with several questions related to my research (see Appendix 1) and during the trade conferences I adopted the approach to make few questions very focused on the expertise of the interviewee, and wherever possible, posed the same question to many interviewees. I tried to cover all the questions in one trade conference. Then, whenever possible, I compared the answers I received with documentary data, trying to confirm (or not) the information thus obtained in the following trade conference. Dubious or ambiguous information I either discarded or considered for a discussion topic. When necessary and possible, I contacted previous interviewees again (by telephone and e-mail) for clarification or to obtain more information.

Table 3.1 – Overview of the Research Stages for the Data Collection and Empirical Sources being Used

	Stage 1: March 2005 – July 2005 (Exploration)	Stage 2: August 2005 – July 2006 (Exploitation)	Stage 3: August 2006 – May 2008 (Exploitation and Confirmation)
Objectives	• Understanding industry structure, processes and resources to deliver and build NGN; • Identifying main suppliers of NGN; • Identifying main fixed-line incumbent telecom operators building NGN; • Exploring the dynamics of capabilities development, disruption and inter-firm collaboration.	• Exploring in detail the specifics of industry change in terms of innovation and capabilities development in order to deliver and build the NGN; • Exploring in detail the dynamics of innovation and capabilities development in the transition to NGN of BT21CN, and in BTGS.	• Finalising data collection about the innovation dynamics of the transition to NGN at industry level; • Finalising the data collection about the capabilities development in BT: BT21CN and BTGS; • Resolving remaining discrepancies.
Interviews*	Interviews with suppliers, service providers, industry analysts, consultants and regulators: • 7 interviews in CEBIT 2005; • 3 interviews in VON Europe 2005; • 3 interviews in Light Reading Carrier Class Ethernet; • 1 interviews in IEE Course.	Interviews with suppliers, service providers, industry analysts, consultants and regulators: • 2 interviews in Light Reading – The Future of Telecom; • 6 interviews in Carriers World 2005; • 8 interviews in Broadband World Forum Europe 2005; • 9 interviews in ITU-T NGN Focus Group and Industry Event; • 14 interviews in CEBIT 2006; • 16 interviews in 21st Century Communications World Forum 2006.	Interviews with suppliers, service providers, industry analysts and consultants: • 3 interviews in The New Telco: Europe 2006; • 9 interviews in Broadband World Forum Europe 2006; • 5 interviews in IP Leaders 2007; • 14 interviews in C5 World Forum 2007; • 1 interview in Carrier Ethernet Expo 2007; • 3 interviews in ITU –T Kaleidoscope Academic Conference 2008.
Secondary Sources	• Annual reports; • Press releases; • Newspapers and magazine articles; • Official websites; • Trade Conference presentations.	• Annual reports; • Press releases; • Newspapers and magazine articles; • Official websites; • BT Technology Journal; • Trade Conference presentations.	• Annual reports; • Press releases; • Newspapers and magazine articles; • Official websites; • BT Technology Journal; • Trade Conference presentations.
Events involved in**	• CEBIT 2005; • VON Europe 2005; • Light Reading - The Future of Carrier Class Ethernet 2005; • The IEE Annual Course on Telecoms NGN.	• Light Reading - The Future of Telecom – Europe 2005 (07-08 Sept 2005); • Carriers World 2005; • Broadband World Forum Europe 2005; • ITU-T Focus Group on NGN 2005; • CEBIT 2006; • 21st Century Communications World Forum 2006.	• The New Telco: Europe 2006; • Broadband World Forum Europe 2006; • IP Leaders 2007; • C5 World Forum 2007; • Carrier Ethernet Expo 2007; • ITU-T Kaleidoscope Academic Conference 2008.

*Appendix 2 shows the list of firms/organisations to which interviewees belonged and the number of interviewees in each firm/organisation.

** Appendix 2 shows more details about the attended events, such as place and period in which they were held.

The transition to Next Generation Networks (NGN), in the context of incumbent telecommunications operators, represents the transformation of the traditional telecommunications network, the PSTN (Public Switched Telecommunications Network), based on circuit switching technology, to the all-IP network, the NGN. The NGN is composed of CoPS (Complex Products and Systems)[44], such as the large routers replacing the traditional switches, whose associated deployment (not production) processes are considered. And the NGN itself is considered a networked CoPS. This means that another level of systems integration among various CoPS is added, which may raise other capabilities issues not revealed when looking at systems integration and project management within CoPS.

Initially, an industry analysis is made (in Chapter 4) and then this analysis is narrowed down to the specific case of BT in the United Kingdom. The industry analysis takes into account the broader strategy and innovation issues that led to the transition to NGN, including infrastructure and services, and the specific case of BT is to address the issue of the impact of the transition to NGN on the capabilities of an incumbent telecommunications operator. The context of incumbent telecommunication operators was chosen because they are traditional firms where business renewal and growth is harder to achieve compared to new entrant operators and emerging Internet-based communications firms such as Google and Yahoo. The incumbent telecom operators come from a traditional and secular voice-only service and they are competing with other incumbent operators as well as smaller operators, new entrants, cable TV operators, satellite and Internet firms, which are also able to provide communication services.

3.3 Data Collection, Analysis and Case Study Writing

The data collection was mostly based on interviews and secondary data. The rationale behind the interviews was the following. I had a basic questionnaire[45] with the topics related to the three dimensions of the research (technology, organisation and customer) and identified the interviewees before attending the trade conferences. I targeted the interviewees depending on their areas of expertise, as described in the folders of the trade conference. I identified some other interviewees during the trade conference itself, and I was also referred to other interviewees for topics that were different from the

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[44] CoPS (Complex Products and Systems) as defined in Chapter 2.

[45] Sample questions are shown in Appendix 1.

expertise of the interviewee I initially contacted. The interviews lasted from 15 to 50 minutes, and they were not recorded due to practical reasons and the dynamic nature of the environment. I took notes of the interview immediately afterwards, writing down as many details as possible. From conference to conference I tried to refine my questions and ask different questions depending on the findings of the previous conferences, and my own research on the secondary sources up to that moment. When I approached an interviewee, I usually had a notion of what he/she was expert on (because there was a brief description of their resume in the folders of the trade conference and/or because of the theme of their presentation and/or because of their position in the booth, demonstrating a particular system or equipment in the exhibition.

I organised all the interview data according to the logics or dimensions of the theoretical framework: technology, organisation and customer. Thus, I tried to see patterns, connections and 'the whole picture' (as the interviews were supposed to show me the pieces). I separated the evidence into three basic categories: consensus (not ambiguous information or common sense), contested (ambiguous and conflicting opinions about one subject) and unknown (issues not understood or that did not make sense or that I could not understand at that moment). Using this interview framework, I followed the same procedure with the other empirical secondary data I obtained (presentations, reports, etc.), building tables and organising the material into consensus, contested and not understood categories. I then tried to connect them with the interview data and build a complete picture, bearing the research question in mind. This was refined from conference to conference, following the stages presented in Table 3.1.

In order to improve the validity of the empirical data, I used informants and documentary sources from various perspectives: not only incumbent operators, but also suppliers, regulators, market research analysts and competitive operators (new entrants, for example). I also repeated the same question or referred to the same issue with many interviewees with the aim of confirming or identifying inconsistencies.

During and after the presentations in conferences, I posed questions that were specifically relevant to my research, using the questions in Appendix 1 as guidance. After reviewing some empirical evidences, I also contacted some interviewees with specific questions and doubts. In order to refine my understanding of the main issues and to refine my questions in subsequent interviews, I used other interviews available in

the press and specialised websites like telecomtv.com and lightreading.com. I also attended many presentations about the subject in trade conferences and through 'webinars' where I had the opportunity to participate in informal conversations and to pose questions.

The methodological approach I used was based heavily on attending trade conferences and analysing secondary data in order to sharp my perceptions on the most important issues concerning the transition to NGN, and also to get contacts in the industry for interviews and to indicate other people for interviews. As pointed out by Hersent et al. (2005, p. xxxi) 'during [the telecom bubble] it seems that many manufacturers and many service providers forgot that telecommunications is a science, and more and more strategic or even technical decisions have been made based on misleading market campaigns'. They repeatedly state that 'in fact even today, almost 100% of what we read in telecom magazines or hear in telecom tradeshows is plain advertising, not only inexact technically, but too often presenting conclusions that are the exact contrary of what any sound technical analysis would lead to' (p. xxxi). Taking this into account, the marketing bias of the tradeshows I attended was evident. In this environment, there is little authentic debate or criticism and it would not have been appropriate to introduce such debate or criticism in the course of *in situ* interviews in this environment. So, my task was to reduce this 'marketing effect' and try to distil and confirm information through the use of other sources, either documentary or through interviews.

The analysis was performed simultaneously with the data collection, i.e. not only after collecting all the data. This is in line with what Dawson (2006) says when analysing qualitative data: 'the researcher might analyse as the research progresses, continually refining and reorganising in light of the emerging results' (p.112). As the case study has multiple sources of information, it is possible that data collection and analysis may overlap (Maylor and Blackmon, 2005). In this sense, for example, the analytical framework emerged as a result of the interaction between the data and the refinement of the literature in the intermediate stages of the research. The writing of the cases was also in parallel to the analysis of the data, and several papers were generated and presented to conferences in the meantime. My participation in academic conferences presenting portions of this work also helped me to refine the thesis. I also used some trade conferences to discuss with interviewees findings of the papers presented in academic conferences.

The process of data collection and analysis performed in this research can be summarised using Kolb's learning cycle (Kolb, 1985). Figure 3.3 shows four stages of the cycle (Maylor and Blackmon, 2005): (i) concrete experience, where the researcher captures data and perceives reality through feelings, memories, transcripts, etc.; (ii) reflective observation, where the researcher familiarises and refamiliarises with the data, thinks about the issues emerging from the data, and reorders and summarises the data; (iii) abstract conceptualisation, where the researcher extracts concepts (a descriptor for certain patterns) from the data; and (iv) active experimentation, where the researcher identifies patterns emerging from the data, and whether the data fits into the literature reviewed so far (this stage may be particularly important if it is necessary to redefine the literature which best fits the data).

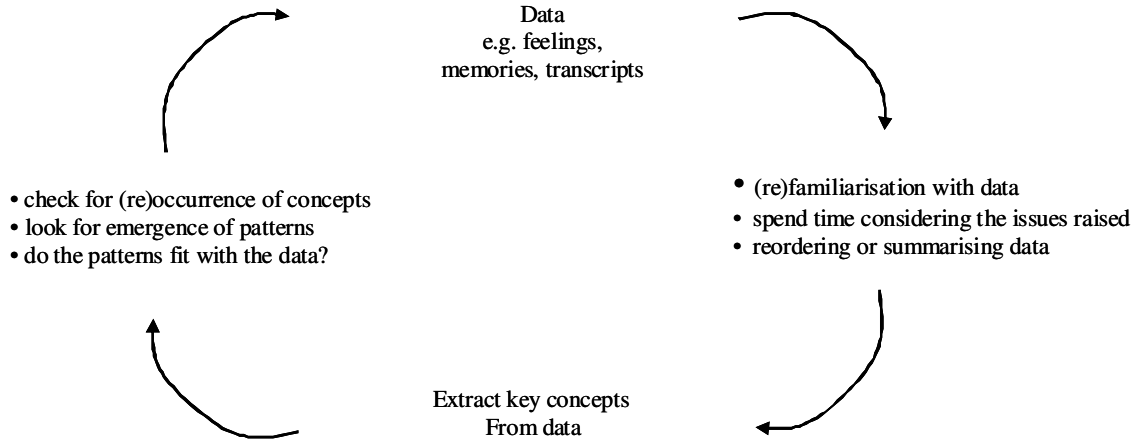

Figure 3.3 – Kolb's Learning Cycle Applied to Qualitative Data Analysis
Source: Maylor and Blackmon (2005, p. 348)

Although this process is presented as a cycle that suggests some sequential steps, in practice the research followed an interactive approach among the stages. Also, this learning cycle can be compared to the stages described in Table 3.1, where concrete experience can be mostly related to stage one (exploration), reflective observation and abstract conceptualisation to stage two (exploitation), and active experimentation to stage three (exploitation and confirmation).

3.4 Drawbacks of Interview Data and Case Study Method

This research was highly dependant on interview data, and there are obviously some limitations in its use. Interview snowballing was used in order to gain the perspectives of different interviewees. In some instances, the difficulty was to decide when to stop asking the question, if the answer raised doubts. Asking the same questions to different interviewees helped to reduce the doubt, but in some instances, it was not possible to reach a firm conclusion.

The case study method also poses the problem of generalisation. Yin (1994) suggests that case studies lead to analytical generalisation (expanding and generalising previous theories), and not to statistical generalisation (where a sample is chosen from a population and inferences are made from the sample data). This research aims then to achieve analytical (and not statistical) generalisation. As the transition to NGN is a recent (and ongoing) phenomenon, this research generates some insights and conclusions that can be generalised when other case studies (e.g. in Deutsche Telekom and France Telecom) are performed.

3.5 Conclusions

This chapter has explained the methodology used in this research. The methodology is qualitative and is based on the case study approach, where the units of analysis are: (i) BT21CN as a major project; (ii) BT Global Services as a business unit within BT; and (iii) the integrated solutions projects provided by BTGS. Multiple data sources were used in order to enhance the validity and reliability of the study (as shown in Table 3.1).

In the implementation of the observational strategy, incumbent telecommunications operators in Europe, America and Asia were considered. In the initial stage of the research (stage one of Table 3.1), it became evident through interviews with incumbent telecommunications operators and equipment suppliers that Europe was ahead in the implementation strategy of the Next Generation Network. In particular, interviewees pointed to BT21CN as the most advanced undertaking. Alongside BT21CN, a significant initiative through BTGS was set up in order to take advantage of the opportunities of convergent services and solutions to large customers favoured by the adoption of the IP/MPLS technology towards the core of the network. This way, BT21CN, BTGS (as a business unit) and the integrated solution projects undertaken by BTGS were identified as the most significant and advanced loci of investigation for the initial phase of planning and implementation of the transition to NGN, and the

capabilities associated with it. As the first major undertaking, it is expected that the insights and results from this case may be generalised and used by the other incumbent telecommunications operators who are catching up with BT.

The theoretical framework shown in Figure 3.1 guides the way the empirical data were collected and analysed, reflecting on the structure of the whole thesis. After the industry approach in Chapter 4, the subsequent chapters deal with the logics of technology (Chapter 5), organisation (Chapter 6) and customer (Chapter 7).

4. The Evolution of the Telecommunications Industry and BT: Towards the Demand-Led Idealist Model

4.1 Introduction

This chapter examines the technological change in the incumbent telecommunications operators that occurred as a result of the adoption of Internet Protocol (IP) in the backbone of the network, and how this has facilitated the decoupling of the infrastructure from the services/application layer. This development has led incumbent operators to become more flexible and to develop new capabilities in order to operate in an environment that is becoming more competitive. This examination is set in the context of the telecommunications industry, focusing on how incumbent operators in Europe are evolving a service-centred logic, which co-exists with the goods-centred logic defined in Chapter 2. The aim is to create an analytic reconstruction of the evolution of the telecommunications industry, and to argue that, although the incumbent telecom operators have been considered as service firms since their inception, services have been traditionally considered as compartmentalised products (goods).

It has been assumed that the more recent adoption of the so-called service logic allows incumbent operators to break free from the goods-centred logic, and to generate larger and different revenue streams based on integrated solutions (Wise and Baumgartner, 1999, Davies, 2003b, Vargo and Lusch, 2004). This chapter, however, argues that the dominance of service logic is still contentious. For large telecom operators such as BT, Deutsche Telekom and France Telecom, service logic has been helping to offset the declining revenues from traditional voice services (which clearly follow a goods-centred logic). However, it seems that it is premature to conclude that service logic will become dominant: both goods and service logic seems to co-exist at the level of the incumbent telecom operator, according to the differing customers, markets and needs such operators are serving.

This chapter also deals with the evolution of technology, examining the organisation and customer logics at the industry level, where it is assumed that the service logic (as opposed to the goods logic) will become more widespread in certain parts of the business of incumbent operators. The transition to Next Generation Network (NGN) appears to facilitate the move from what Mansell (1993) proposes as a strategic (or supply-led) model to what she calls an idealist (or demand-led) model of telecommunications network evolution. It is important to highlight the *confluence of*

factors that are making the realisation of the service logic (demand-led) model possible, in terms of technology and market convergence. The phrase '*confluence of factors*' refers to the *timely* integration of systems, where the state of development (and hence suitability of integration) of some of these systems (which are most often sub-systems) depend on factors that are not under the direct control of the main actors who benefit from and seek to employ them in integrated systems.

This chapter shows how the confluence of factors is making it increasingly possible for the service logic to thrive in the business of the incumbent telecom operators. For example, it deals with the adoption of IP protocol in the backbone (in which IP is winning the race with ATM, Frame relay and other competing technologies[46]), using the concepts of platform and modularity, and changing significantly the way incumbent telecom operators perceive their services: introducing the customer-centred approach and service-dominant logic.[47] Even though the incumbent telecom operators are in the service industry, the traditional perspective on services, mostly dominated by standardised and mass market services, treated them as essentially 'goods', paying less attention to the relationship and needs of the customer.

Finally, this chapter argues that, in order to be more flexible and competitive, incumbent telecom operators are redefining their strategy based on an evolving understanding of 'platforms' as a set of standards and conventions that allow other actors to produce complementary, and in some cases, competing services to those offered by the incumbent operators. The platform (and hence the incumbent operator) benefits from the availability of these additional competitive service offerings and from the complementary services produced by other companies. The platform strategy has been deployed in other domains, such as the IT and automotive industries, and is becoming more central to the telecom industry. The case of BT is used to show how the platform strategy is being applied to achieve its strategic aims, and what the implications are for the industry as a whole.

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[46] ATM (Asynchronous Transfer Mode) and Frame Relay are packet-switched technologies. By the late 1990s and beginning of the 2000s, IP (Internet Protocol), another packet-switched technology, overtook the others, being adopted even by the traditional telecommunications operators (Fransman, 2002, Hersent et al., 2005).

[47] The expression 'service-dominant logic' is used here not in absolute terms (i.e. as if the whole telecom industry is adopting the service logic as dominant), but in the sense that it is (or is becoming) dominant in certain types of business of telecom operators such as the integrated solutions.

This chapter is developed as follows. Section 4.2 shows the evolution of the telecommunications industry towards the demand-led idealist model, where customer-focus is shaped by the way incumbent telecom operators deploy their strategy. Section 4.3 examines how BT in particular has changed its strategy in order to become more customer-focused. Section 4.4 shows how the layer structure at the industry level is influencing the reorganisation of incumbent telecom operators into layers, decoupling the infrastructure from services levels, and favouring the deployment of a platform approach. Finally, Section 4.5 draws the main conclusions for this chapter.

4.2 Evolution of the Telecommunications Industry

The telecommunications industry emerged from a history of monopolistic (in most cases, at national level) supplier and buyer relationships. The history of the largely state-owned public telephone and telegraph (PTT) companies was one of long-term relationships with a reasonable and predictable market share and revenues. With the privatisation and liberalisation of the PTTs this situation changed and competition became fiercer as a new order emerged (Fransman, 2002a, Pogorel, 1994, Caby and Steinfield, 1994, Pehrsson, 1996, Fransman, 2002b, Noam, 1994). In the PTT period as well as the early period of privatisation and liberalisation, the principal focus of policy makers and regulators was on making the infrastructure available to customers, as services were mostly network services, i.e. the provision of service was intimately coupled with the network/infrastructure that delivered it. This section argues that over time, and mainly after the telecom downturn at the beginning of the 2000s, competition forced a more customer-focused approach in order to supply end-to-end solution to satisfy the specific needs of large (or business) customers, and the search for markets beyond the ones the players (suppliers and operators) were accustomed to selling and operating in.

Referring to the global telecommunication development, Mansell (1993) pointed out two contrasting models that were advocated by the beginning of the 1990s: the idealist and strategic models. The idealist model called for a demand-led industry with lower barriers for entry and exit, and with markets more open for competition and less regulated. Market power of dominant suppliers would be diminished. The strategic model called for the supply-led dominance, where the network design would be highly influenced by suppliers. Market competition would be discouraged and monopoly would prevail.

By the early 1990s, after analysing the dynamics of the United States experience in implementing the intelligent telecommunication network, Mansell (1993) concluded that 'in the United States, the characteristics of the market suggested by the Strategic model are prevailing […]' (p. 64) and that 'the forces of competition have presented themselves in accordance with the tenets of the Strategic model' (p. 65). The problem was therefore how to inform policy in order to protect public interest within this framework. During the 1990s other measures were taken in order to decrease the market power of (and monopolistic behaviour by) incumbent firms (Fransman, 2002a, 2002b). New telecom operators, the new entrants, were encouraged to enter the sector, increasing competition among carriers. The Internet, and the World Wide Web, emerged as a significant player within the communications industry, affecting significantly the relationship with customers, giving new meaning and momentum to communications services (Fransman, 2002b).

In the early 1990s there was significant debate and concern about the evolution of the 'intelligent telecommunication network', or simply the 'intelligent network' (IN). IN emerged as a consequence of the shift from analogue to digital and by the fact that telecommunications entered the domain of computers, where 'software-based computerised functionality now supports the electronic processing of digital signals' (Mansell, 1993, p. 3) of the telecommunications networks. It was then realised that the control of switches could be physically separated from the switches themselves, opening the door for new possibilities in terms of developing advanced service applications.[48] Many of the issues of that time continued to be relevant in the mid 2000s, such as (Mansell, 1993): (i) the concern of RBOCs (Regional Bell Operating Companies) to be confined to the role of bit transporters only and miss the opportunity of advanced new service applications (p. 50); (ii) the need for service-creating capability by the RBOCs to compete in the market not to become bit transporters only as mentioned in (i) and due to the failure of the AT&T break-up to promote market competition as advocated by the Idealist Model (p. 54); (iii) the independence of the services from the physical network[49] (p. 54); and (iv) the degree of openness of the intelligent telecommunication network both to intermediate and end-users (p. 51).

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[48] Interview with BT Senior Manager, November 2005.

[49] This independence was achieved with the freephone service, where it was independent from the switches owned by AT&T, as the single operator in many instances at that time (Mansell, 1993).

Mansell and Steinmueller (2000) mention the non-executed plan to create a convergent infrastructure based on the development of ISDN (Integrated Services Digital Network), based on 128 kbps channels during the late 1980s, and on 2.048 Mbps at the beginning of the 1990s. Broadband ISDN, in the 10 Mbps range, was to follow by the mid-1990s. Instead of implementing a higher performance ISDN network, the development of the infrastructure in Europe has continued 'with a combination of circuit-switched telephony, leased-line, and packet-switch networks based upon heterogeneous technical standards' (p. 100). During that time, the concept of IN (Intelligent Network) was developed, taking advantage of computer technology and software-based functionalities, and incorporating them into the telecommunications networks. The potential of IN in generating new services and increasing economic wealth started to be explored. Mansell (1993) explores the development of the IN in some developed countries and shows the ideas driving it regarding new services. It was also realised at that time that the intelligence would not need to be co-located to the switch. This feature opened up further possibilities and flexibility in terms of architecture and services.[50]

In telecommunications, after mechanical, electronic and digital switching, IP switching is supposed to be the fourth major technological innovation, where 'traditional barriers of geography and technology have faded away' (BT, 2005a). However, it is premature to assume that IP switching has completely eliminated the barriers of geography and technology as it is supposed to co-exist with legacy technologies for a long time. The transition and evolution of large and complex systems have an inherent degree of uncertainty that varies with time. At the very beginning, the uncertainty is higher, but as the system evolves it decreases to a lower level when other transitions can take place.

In 1998, IP was not yet recognised as the dominant technology, and many engineers believed that ATM (Asynchronous Transfer Mode) would be the preferred packet-switched technology for multimedia applications. At that time, the major customer experience with IP was through dial-up connections and the quality of experience was so variable that it was difficult even to classify it as 'best effort' (Hersent et al., 2005). This view is reinforced in Mansell and Steinmueller (2000, p. 127), where they provide a discussion about the data communication technologies (X.25, IP, Frame Relay and ATM) and ask if TCP/IP (Transmission Control Protocol/Internet Protocol) would be the dominant networking technology for the twenty-first century. Dalum and Villumsen

[50] Interview with BT Senior Manager, November 2005.

(2001) discuss IP and ATM as two competing protocols. From the beginning of the 21st century, IP (Internet Protocol) is becoming the common technology of telecommunications to deliver integrated services combining voice, data and video (Fransman, 2002b). It is an unprecedented agreement in the telecommunications industry over a technology.[51]

Mansell and Steinmueller (2000) use the theory of technology diffusion to illustrate the competition between ISDN (Integrated Services Digital Network) and TCP/IP, and show how network externalities influenced the diffusion process, endangering the future of ISDN. Although there were problems with IP technology regarding real-time applications and support for billing and security, more recently it is broadly accepted that IP is winning the race and becoming a consensus choice in the industry. The main lesson from this contest is that 'ignoring the diffusion process because of a belief in the technological superiority of a particular solution is a dangerous strategy' (Mansell and Steinmueller, 2000, p. 113).[52] Although ISDN may be superior in certain aspects, the pervasiveness of IP, and the persistence of some suppliers in developing it, has made IP the protocol of choice and a *de facto* standard. BT, for example, discontinued the ISDN service in 2007 (Ward, 2007). Most notably, Cisco Systems has taken a market lead in IP technology, and has expanded its market to the telecom industry, winning contracts with telecom operators, such as BT for the deployment of its BT21CN[53] (BT 21st Century Network).

In recent years (mainly after 2001), broadband connections are increasingly and common and revenues from fixed-line services are declining. This poses a challenge to the business of fixed-line voice services of telecommunication operators, and it demands the creation of new sources of revenue other than the voice-only services. Convergence has become a central issue. Historically though, the 'mirage of convergence' was envisioned by de Jonquieres (1989) as a result of the advent of the microchip and the fact that data processing and telecommunications may share the same

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51 Interview with AT&T Senior Manager, September 2005; interview with Telefónica Manager, October 2005; interview with Deutsche Telekom Manager, March 2006; and interview with BT Senior Manager, March 2006.

52 See also David and Steinmueller (1990) for an account of the ISDN movement to reach a consensus for data communication networks.

53 BT21CN is mostly discussed in Chapter 5.

digital technologies and may be united into a single information industry.[54] Mansell (1993) recollects that technical convergence had even started during the analogue times of telecommunications industry, when in the late 1940s and early 1950s new terminal equipment (such as recording devices) turned up in the market to be connected to the public network. At the time dominant operators like AT&T resisted them, arguing that such devices would damage the integrity of the network.

Since then, the journey of convergence has been evolving in a way that makes it increasingly deployable. The shift from analogue to digital switching and transmission in the 1970s and 1980s was an important step. The advent of commercially available Internet in the 1990s and the emergence of IP (Internet Protocol) as the de facto standard for multimedia (voice, video and data) services is another significant step. The evolution of IP coupled with MPLS (Muti-Protocol Label Switching)[55] technology for real-time services and its adoption by the telecom industry, most notably the incumbent telecom operators to run even its core networks in the 2000s is the most significant step to turn convergence into a reality. By the early 1990s, Mansell (1993) stated that the 'convergence of telecommunication and computing technologies is also in evidence only at the periphery of the public network and in support of advanced service applications' (p. 65). By the mid 2000s, it is possible to say that convergence has moved from the periphery and is reaching the core of the network.

According to Mansell and Steinmueller (2000), convergence is related to two ideas: the first is that all electronic communications can be seen as digital bit streams, so that voice, video and data are seen as bits; the second is that the impact on industry and the market has been such that the boundaries of fixed and mobile operators, broadcast and cable TV companies and internet service providers have become blurred. From the consumer point of view, there is an expanding range of choice for 'terminal' devices, some of which offer communication capabilities such as mobile phones, Microsoft´s Xbox 360 and Sony´s PlayStation 3 and others which are connected to telecommunications networks to download content, such as the iPod or PSP (PlayStation Portable). Ultimately they all share the same digital technology and they

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[54] Before the advent of the microchip, Pierce (1962) was already popularising the notion of convergence leading to a single information industry based on the work on information theory by Shannon (1948) and Shannon and Weaver (1949).

[55] Multi-Protocol Label Switching (MPLS) is a protocol which allows the establishment of a connection in an IP network, reducing delay and jitter, making possible real time services (including voice and video) with a good quality of service. Further information on MPLS can be found in Armitage (2000).

can be connected to PCs and to the Internet. Besides that, Internet-based firms like Skype, Yahoo and Google offer a whole range of new free or low-cost services to users that challenge the business models of the incumbent firms.

The commoditisation of voice-only services and the convergence of industries, services and networks are driving the infrastructure and services transformation by incumbent operators. More powerful consumer devices (e.g. mobile phones, iPods and PSPs) are changing consumers´ habits and expectations about communications services from service providers. Also, the broadband networks, high speed Internet and the World Wide Web are making possible many services unimaginable in the recent past. E-mails and the short message service (SMS) are being used in greater volume, and in many instances are replacing traditional telephone calls.

To address these challenges, incumbent fixed telecommunications operators are building the so-called Next Generation Network (NGN). The concept was extensively discussed in many fora in the period of 2000-2003, such as the ITU-T (International Telecommunication Union – Telecommunication Standardization Sector) and ETSI (European Telecommunications Standards Institute) (Ahmad and Kapoor, 2005). The NGN is seen as an all-IP, packet-based integrated network, where applications and services are separated from the transport network, so that voice, video and data are transformed into packet data and delivered as integrated services to the customer (OECD, 2005). NGN is expected to reduce the complexity of the network, avoiding the use of 'stove pipes', where for each service it is necessary to deploy a specific network from the backbone to the end customer. The transition to NGN represents 'the transition from yesterday's network-oriented to tomorrow's service-dedicated operations […]' (Feneyrol, 1998, p. 60-61). Ideally, services should be driving the network, which would be prepared and flexible enough to accommodate the needs of the particular services required by customers.

One aspect of convergence is in the market perspective and represents the evolution of different technological trajectories that start to 'intersect' each other. Firms evolving technologically from different starting points begin to explore adjacent opportunities. The usual categorisation of services includes video, voice and data services. Video has traditionally been the domain of broadcasters and Cable TV firms (their infrastructure is set up to deliver video mainly). Voice was the domain of telecommunications operators. Very traditional and new competitive firms both offered robust voice services. Finally,

data was the main domain of the Internet and telecom operators. However, the Internet, reached initially by dial-up connections, and with best-effort mechanisms, lacked both speed and reliability (this last feature was highly regarded by telecommunications operators because of regulatory and customer service considerations).

Network technology has long been evolving to adapt to new technologies. Four distinct areas can be identified: (i) manual switching boards; (ii) analogue/mechanical switching; (iii) digital switching; and (iv) packet-switching including Asynchronous Transfer Mode (ATM) and Internet Protocol (IP).[56] The shift from analogue to digital switching and transmission occurred in the 1970s and 1980s (Huurdeman, 2003). Packet switching emerged in the 1990s, where ISDN, ATM and IP competed with each other (Mansell and Steinmueller, 2000). The evidence from the 2000s so far suggests that IP has prevailed in the market (Fransman, 2002b). The network technology has now been evolved to place IP at the core of the network, besides the access network. This has allowed the network more flexibility to cope with the changing demands of markets and customers.

Fransman (2002b) lists three core technologies that emerged from the Internet and influenced the Telecoms Industry in its transformation into what he calls the Infocommunications Industry: (i) packet switching, (ii) Internet Protocol (IP), and (iii) the World Wide Web. To this may be added the advent of broadband. When the average telephone call shifted from 3 minutes to about 20 minutes due to the use of dial-up Internet access, BT thought about doubling or even tripling the number of switches, but the advent of broadband changed this thought.[57] The greater telecommunication channel capacity achieved with broadband was also favoured by developments in fibre optics.

From the mid-1990s, network operators tended to outsource their R&D in terms of infrastructure-related equipment, and the learning regime has been characterised since then as ‘learning to use’ rather than ‘learning to produce’ technology (Fransman, 2002b, p. 51). This could in fact be better interpreted as learning to produce technology through the use of the technology produced by the suppliers of equipment and systems. The

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[56] These four waves of innovation were addressed by Paul Reynolds, CEO of BT Wholesale in several key note speeches, including IEC 21st Century Communications World Forum on 21st February 2005, Supercomm on 06th to 09th June 2005, and FT Worlwide Communications Conference on 06th December 2005.

[57] Interview with BT Senior Manager, November 2005.

recent R&D expenditures of major network operators, BT, FT and DT show that this tendency has not changed in the recent years (after 2002).[58]

Fransman (2002b) argues that the 'engine of innovation' moved from the own R&D laboratories of network operators (in what he calls Old Telecoms Industry) to the specialist equipment suppliers. Network operators like BT tend to spend more on software-related R&D activities, as they concentrate increasingly in the creation and development of new services (BT, 2006a).

NGN and Platform Strategy

NGN involves more than network transformation; it is also about business transformation.[59] In the beginning of the 2000s, silo-based architecture was deemed to be a source of competitive disadvantage for the incumbent telecom operators in the services market. A layer-based architecture has been proposed in order to overcome this drawback.

The premise behind the layer-based architecture is that the silo-based architecture does not allow the incumbent operator to change and create services quickly. Having the capability to deliver new services quickly is supposed to be a source of competitive advantage for the incumbent telecom operators. Although this would offer customers greater choice, each of these services will still have costs associated to design, promotion, and servicing. For this reason, an interviewee argued that increased number of services might not be an adequate answer to give the incumbent telecom operators their competitive advantage.[60]

Incumbent telecommunications operators are usually recognised by their robust and reliable services. However, the aim is to grow without significantly increasing operational costs. Because the network and management processes are built to create robustness and reliability, change is difficult and expensive. Growing through the provision of increased number and different services cannot be achieved with the current network and processes for delivering new services (Reeve et al., 2005). In order

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58 The R&D expenditures remain historically below 5%, at around 2% of sales, according to recent (after 2002) Annual Reports of BT, DT and FT.

59 Interview with Deutsche Telekom Senior Manager, March 2006; interview with BT Senior Manager, March 2006; and interview with France Telekom Senior Manager, October 2006. Also interview with Alcatel Senior General Manager, March 2006; and interview with Siemens Senior Business Manager, March 2006.

60 Interview with IBM Manager, March 2007.

to change the cost structure, the telecom operators (supported by their suppliers) are trying to find ways of discovering new sources of revenues through new services while keeping operational costs down. The operational costs include not only the current costs of producing and delivering services, but also the cost of creating them. Hence, there is a desire to create an environment and processes where the cost of experimentation and the cost of failure are significantly reduced.

In order to create a cost-effective variety of services, Sawhney (1998) suggests the concept of leveraged high-variety strategies, i.e. 'strategies that allow firms to achieve high variety and high growth, without a corresponding increase in costs or complexity' (p. 54). He proposes that platform thinking is the key to these leveraged high-variety strategies, defining platform thinking as the 'process of identifying and exploiting commonalities among a firm's offerings, target markets, and the processes for creating and delivering offerings' (p. 54). This platform approach is based on the internal view of reorganising and reusing components within the network in order to build new services. This is also the view taken by Meyer (2007b, 2008b) and Meyer and Mugge (2001), which they illustrate with examples from the automotive and IT industries. Another view of the platform approach is the assumption that the firm itself is not capable of creating, effectively promoting, delivering and supporting all the relevant services in the future, so it therefore needs to open up its platform, exposing the capabilities of the network in order for third-party firms to develop new services on top of it and invest in their promotion and support. This is the view explored by Gawer and Cusumano (2002), based on developments in the IT industry (e.g. IBM, Microsoft and Intel). These two views are examined in this and the following chapters.

The transition to NGN means migrating the technology of the core network to an all-IP basis. There is a general consensus in the industry on this subjecct, although different telecom operators are considering different approaches of migration, depending on individual circumstance. In Europe, BT decided on the most radical approach in terms of speed and scope.[61]

[61] This is further examined in Chapter 5.

Integrated Solutions

The move to integrated solutions was identified by Davies et al. (2001) as 'the new economy between manufacturing and services'. They demonstrated how many manufacturing firms started offering services as well in order to meet customers' needs. Davies (2003b) also identified that the move from integrated solutions can originate from a manufacturing base (e.g. Alstom Transport, Ericsson, and Thales Training and Simulation) or from a services base (e.g. Cable&Wireless (C&W) Global Markets and WS Atkins). The case of C&W Global Markets is particularly interesting in the context of this research as it is in the telecommunications industry as a telecommunications operator. C&W Global Markets was established in 1998 to explore Internet Protocol (IP) and data services, and in 2000, it was assigned with the task of providing integrated solutions to corporate customers (Davies, 2003b). T-Systems, Deutsche Telekom's business unit, was established in January 2001 to provide customised solutions (Fransman, 2002b). France Telecom started to position itself in the business of integrated solutions to large customers when it acquired full ownership of Global One and Equant in 2000 (Fransman, 2002b).

In the same year (2000), BT restructured its business units and created Ignite, which was responsible for broadband Internet Protocol (IP) business for corporate and wholesale customers. It included BT's international solutions businesses, Syntegra and Syncordia. BT claimed that these were 'underpinned by the internet and associated technologies' and that 'these solutions are based on end-to-end managed IP networks and the provision of e-business and e-CRM (electronic customer relationship management) applications on these networks' (BT, 2000, p. 13). Later in 2003, Ignite was renamed BT Global Services to consolidate its position as provider of managed services and solutions, 'serving multi-site organisations worldwide' (BT, 2003, p. 16).

It can be seen that all the telecom operators mentioned (C&W, Deutsche Telekom, France Telecom and BT) had, by the early 2000s (2000 and 2001) reorganised themselves and created specific business units to tackle integrated solutions for large customers. This was largely due to the emergence of the Internet Protocol (IP). Through the case of BT, it can be shown that, although the business of integrated solutions started before and independently to the initiatives in NGN, the assumptions underlying the construction of the NGN reinforces the platform strategy and the business of integrated solutions.

4.3 Background of BT Transformation

During the 1990s

In the 1990s, Sir Ian Vallance, chairman of British Telecom had unveiled his vision of BT as 'the most successful worldwide telecommunications group'.[62] In the year 1999, this vision was altered to become 'the most successful worldwide communications group', as telecommunications was 'no longer sufficiently comprehensive' (BT, 1999, p. 6). During this period, with an international strategy to expand to other countries, BT participated in many mergers and acquisitions. Also, BT had to deal with many engineering and market challenges to build and shape its intelligent network. Unfortunately, this vision led to unsustainable levels of debt by the beginning of the 2000s, and the situation needed to be addressed (BT, 2001).

At the beginning of the 1990s, Mansell (1993) identified the new engineering challenges for BT: (i) uncertainty about what services to develop and deliver; (ii) the level of interaction between the user and the network; (iii) the centralization or decentralisation of network intelligence; and (iv) the degree of openness of the network to third-party operators. The uncertainty about services seems to have remained up to the 2000s, when BT started to pay more attention to the broader needs of large business customers.[63] In order to move quickly with those new services, BT decided to adopt proprietary standards, as BT thought that it would take too much time to develop a Bellcore or European standard.[64] Any attempt at standardisation would involve an overlay network. Opening the network to third-party operators was seen as a threat. The view was that if BT invested in the network, others could reap benefit from it without gains for BT (Mansell, 1993). A business model considering the notion of platform was not in consideration at that time. IBM was also working with BT to develop the API (Application Programme Interface), a piece of software installed in the Service Control Point (a node of the telecommunications network) that would make it possible for new services to be developed (through software) without knowing the complexities of the underlying physical network (hardware). This API was not eventually successful as BT

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62 There is a quote by Ian Vallance, British Telecom Chairman, in November 1989, cited in Mansell (1993, p. 110) stating that 'BT plans to become "the most successful telecoms player in the world by the end of the 1990s"'. This was also stated in BT Annual Reports in the 1990s, for example, BT (1997, p. 5) and BT (1998, p. 4).

63 Interview with BT Senior Consultant, November 2005.

64 Interview with BT Senior Manager, November 2005.

concluded that it was not vendor-independent (open), but vendor-dependent (Mansell, 1993).

The issue of openness, for example through open interfaces continues up to the present day, as it is a matter of market power and market share. Mansell (1993) suggests that, at that time, AT&T and Northern Telecom, as dominant players from the supply side, did not have much interest in open interfaces as they would decrease their market share. On the other hand, GPT and Ericsson, as suppliers with less market power, saw the development of open interfaces as an opportunity to increase market share. Throughout the 1990s there was continuous momentum towards the open interface arena with the liberalisation and privatisation of the telecom industry around the world, but the contention still remains in the 2000s. It seems that the intelligent network was an overall failure due to the excessive use of proprietary designs and solutions, which defeated the provision of interoperability of end-to-end services to customers.[65] BT, for example, chose the Delta configuration in the 1990s, where the proprietary design was chosen, and the decoupling of the intelligent network from the physical network was not realised (Mansell, 1993).

Mansell (1993) described the long-term vision for the network evolution by BT:

> The long-term vision was to provide multiple service capability using network flexibility and intelligence. The network would be centred on an optical core with fixed delivery, access to a mobile periphery and provision of end-to-end functional service management. To support new services it would be necessary to introduce centralised network control. This architecture was addressed to the need to tailor customer services to rapidly changing needs (p. 115).

This vision remains largely the same in the 2000s. With the improvement of the Internet Protocol (IP) by means of MPLS (Multi Protocol Label Switching), the optical core based on a single technology could be realised. The issue of flexibility and addressing customers' rapidly changing needs has been refined over the years. Whilst the Idealist model advocated the demand-led approach, Mansell (1993) argued that 'although network modernisation was moving ahead in the late 1980's, the company's view of customer requirements seemed vague and hardly indicative of a demand-led response' (p.117). There has been significant market power and market share to defend by some dominant suppliers which has influenced the network design and the provision of

[65] Interview with Telecom Italia Senior Manager, March 2007.

services. As the market power of such dominant suppliers was diminishing throughout the 1990s, it opened the door to a more truly customer-focused approach in the 2000s.[66]

All these events, along with developments in the adjacent areas of IT and professional (e.g. consulting) services led to the customer-focused approach of the 2000s towards: (i) platform strategy; and (ii) the business of integrated solutions which prioritise the large business customer, as has been occurring since the 1990s.[67] The following discussions show the changes in the composition of the top management and strategy of BT at the beginning of the 2000s, which enabled both the platform strategy and the customer-focused business of integrated solutions with priority for large customers.

Changing the Guard

As previously noted, under Chairman Sir Iain Vallance's leadership, until April 2001, BT's vision was 'to be the most successful worldwide communications group' (BT, 2000, p. 1). This was to be achieved by 'seizing the many opportunities open to us in the global market' (BT, 2000, p. 1). Sir Christopher Bland assumed the role of BT Chairman on 1st May 2001, arriving from BBC with the stated mission of making a 'structural and financial transformation of BT' (BT, 2001, p. 4). By 31st March 2001, the net debt had reached the unsustainable amount of £27.9 billion after the acquisitions made in that fiscal year (BT, 2001, p. 4). BT was divided by geographical criteria, BT UK and BT Worldwide until April 2000, when a new structure was established, taking into account market sector rather than geography. It created four main divisions: Ignite, for the broadband IP (Internet Protocol) business; BT Openworld, for the mass market internet business; BT Wireless, for the mobile business; and Yell, for international directories and e-commerce business (BT, 2000, p. 9). In October 2000, two new divisions were created: BT Retail and BT Wholesale. In November 2000, it was announced that BT Wireless and Yell were to be sold in order to reduce debt (BT, 2001, p. 6). In the BT Annual Report of 2001, the former stated aim 'to be the most successful worldwide communications group' has disappeared. In February 2002, Ben Verwaayen was hired as the new BT CEO (Chief Executive Officer), replacing Sir Peter Bonfield.

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66 The customer focused approach was explicitly stated by BT CEO Ben Verwaayen in BT (2002, p. 7).

67 The platform strategy for telecommunications operators was emphasised in interviews with: Lucent Senior Marketing Manager, March 2005; Marconi Technical Consultant, March 2005; Siemens Technical Manager, March 2005.

Ben Verwaayen established a strategy composed of three parts: the first was ‘passionate concern for […] customers, and a scrupulous focus on their requirements, now and in the future’; the second was ‘the pursuit of profitable growth’; and the third was ‘the delivery of Broadband Britain’, recognising broadband as ‘a critical growth opportunity’(BT, 2002, p. 7). In May 2002, Ben Verwaayen wrote that ‘after a difficult time for the company, we now need to understand our strengths better and play to those strengths’ (BT, 2002, p. 7). In other words, he was re-evaluating BT’s core capabilities and business. The former vision of being the most successful worldwide communications group led BT to expand its range of activities to unsustainable levels. Verwaayen’s work, therefore, was to re-establish BT’s focus on the customer and not on a vision of achieving global scale as a supplier in order to rival other large incumbents. About the position of BT in the market, Ben Verwaayen wrote (BT, 2002, p. 7):

> Post-privatisation, BT was the benchmark company in the telecommunications industry, not just in the UK but in Europe and globally. The bad news is that we’ve currently lost pole position. But the good news is that there’s a vacancy. No single company in this industry can confidently lay claim to that position at the moment. That’s the opportunity and challenge for us. We can become the benchmark once again. So, that’s what we’re aiming to do.

It seems that the target is still to be the ‘benchmark’, but that there is a significant cultural shift in terms of achieving that focus on ‘[customer] requirements, now and in the future’ (BT, 2002, p. 7), rather than focusing on being ‘the most successful worldwide communications group’ (BT, 2000, p. 1). The strategy established in 2002 was more focused on European customers, whereas before that the strategy was based on a ‘global success’ predicated on mergers, acquisitions and partnerships that did not necessarily reflect customer needs.

The mobile business was divested on 19 November 2001, the Yell business was sold and BT Group plc was formed, consisting of four lines of business: BT Retail, BT Wholesale, BT Ignite and BT Openworld. Other business like Japan Telecom, J-Phone and Airtel were also sold to focus on the core business and reduce debt (BT, 2002, p. 9). A possible floatation of BT Ignite was being considered in 2001 (BT, 2001, p. 8), but this did not occur. By May 2002, after becoming BT CEO, Ben Verwaayen wrote that ‘the restructuring is done; stability has been achieved’ (BT, 2002, p. 7). In the 2002 financial year (ending 31 March 2002), 89% of the BT revenues were obtained within the UK. Internationalisation was restricted to Europe in the strategy set in 2002.

Concert, the joint venture with AT&T was also sold. The seven strategic priorities for the lines of business set in 2002 were (BT, 2002, p. 8-9):

- To deliver the highest levels of customer satisfaction performance and reduce the number of dissatisfied customers each year.
- To achieve organic profitable revenue growth, while constraining capital expenditure.
- To put broadband at the heart of BT, expand the market for broadband services and create a media-enabled network.
- To provide solutions and other value-added services for multi-site corporate customers in Europe.
- To place all UK networks under a single management structure and to limit investment in legacy voice and data platforms, while migrating operations to new platforms.
- To use the strength of the BT brand to move into broadband services for consumers; and also into related markets, such as communications solutions and business mobility services for major business customers, and information and communications technology for SMEs (Small and Medium Enterprises).
- Finally, these priorities should be delivered by diverse, skilled and motivated people.

From these seven strategic priorities, two points can be highlighted. The fourth priority led BT to rename BT Ignite to BT Global Services and to become a leading provider of integrated solutions to major customers in Europe. This move to integrated solutions is explored in detail in Chapter 6. The fifth strategic priority led BT to two major initiatives: (i) BT21CN as a major project; and (ii) the open innovation model to revitalise the innovation processes within BT. As a result, the Next Generation Network, represented by BT21CN, is a network transformation to adopt IP that is needed for incumbents to compete in the world of broadband applications, where exposure of capabilities, different forms of collaboration with third parties and new business models are important.

Verwaayen commented: 'we went through a traumatic situation. […] We could do nothing. We could only pay our debts at that point'.[68] 'BT took some big decisions at that time to rapidly address its debt mountain and that created malleability within BT - an understanding that change was needed and that the old BT wasn't right anymore'.[69] It was a huge crisis in the history of BT and it may have accelerated its change process. That moment of crisis brought some 'malleability' to BT's culture and opened the mind of BT employees to a 'new BT'.[70]

Four years later, in 2005, Bross stated that 'the debt problem has been addressed, we've changed from just being a telco to also being a major supplier of ICT services, and we've also revitalised our approach to innovation'.[71] The main areas to work in telecom in this transformation are 'ICT for business, broadband, the consumer, and convergence of services where you bring things together. That's how you build innovation'.[72] ICT services seems to be a core competence of BT. The issues that have been addressed more intensively in the last years are broadband adoption in the UK and the revitalisation of the approach to innovation (due to converged services). This revitalised approach to innovation has been called 'open innovation'.[73]

It became clear that there were four main issues or challenges for the transition to Next Generation Network and BT survival in the context of rapid technological change:

- Reduction of debt, finding its strengths (core business/capabilities) and consolidating its operations. One of the strategic priorities was to consolidate BT and present it as 'One BT' to the customer. A strength that BT has been exploring during this technological change to IP is to offer networked solutions to multi-site customers, the networked IT services. This is explored in Chapters 6 and 7.
- The construction of a new infrastructure based on IP (Internet Protocol) technology. For this BT established a large and complex project: BT21CN. Here the aim is to build a network that will serve as a platform that will allow the development of new services by BT and with the collaboration of external parties. Main capabilities

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68 From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82, p.13

69 From the interview with BT CTO Matt Bross in http://networks.silicon.com/telecoms/0,39024659,39152548,00.htm accessed on 13 Dec 2005

70 Ibid.

71 Ibid.

72 From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82, p.12

73 BT named the initiative open innovation. It will be discussed in more detail in Chapter 8.

focused on here are project management and systems integration for large and complex projects (in the context of a large user of technology and complex products and systems). This is explored in Chapter 5.

- To revitalise the innovation process within BT. A new structure is put in place, where innovation is owned at the chairman level. Also, this shows how BT is reorganising its structure for innovation and establishing mechanisms to take better advantage of external innovations and integrate into BT's internal processes. It also shows how BT is using venture capital and Intellectual Property rights to foster innovation. This is explored in Chapter 8.
- Service innovation for broadband applications, where the management of creativity, user innovation and convergence of services all play a major role. Internet and broadband have been changing the perception of customers about services, and their active participation and collaboration on shaping them. Developing services from the customer perspective, taking into account the total customer experience, forces BT to establish new processes for service development, involving the customer and using multidisciplinary teams. The main capability here is software development and the main challenge lies in creating in collaboration with third party firms. The issue of the business model takes central importance, as the value of the platform will be determined by the appropriate business model for each service or package that is to be delivered through the new IP infrastructure. This will be explored in Chapter 8.

One recurrent theme in BT's transformation and quick implementation of the NGN through their BT21CN project is innovation, i.e., changing the way BT innovates: innovating innovation. Thus, innovation processes at BT are examined in Chapter 8 and the concept of 'open innovation' is used as a background to analyse the data acquired. Also the capabilities of systems integration, project management and software development, highlighted by the CoPS (Complex Products and Systems) research are examined in the context of the user of the technology, which is the case of incumbent telecommunications operators.

4.4 Industry and Firm Layers

The impact of the Internet on the Telecommunications Industry is analysed by Fransman (2002b), mostly from the perspective of the infrastructure that underpins it. The concept of layers is generally used for describing the structure of the telecommunications industry, which is shown in Table 4.1 and Table 4.2, for the Old Telecoms Industry and the so-called Infocommunicatons Industry.

Table 4.1 – Layers of the Old Telecoms Industry

Layer 3: Service layer (voice, fax, 0800 services)
Layer 2: Network layer (circuit-switched network)
Layer 1: Equipment layer (switches, transmission systems, customer premises equipment)

Source: Fransman (2002b, p. 37)

Table 4.2 – The Infocommunications Industry: a Layer Model

Layer	**Activity**	**Example companies**
VI	*Customers*	----
V	*Applications Layer*, *including contents packaging* (e.g. web design, on-line information services, broadcasting services, etc.	Bloomberg, Reuters, AOL-Time Warner, MSN, Newscorp, etc.
IV	*Navigation & Middleware Layer* (e.g. browsers, portals, search engines, directory assistance, security, electronic payment, etc.)	Yahoo, Netscape, Microsoft, Google, etc.
III	*Connectivity Layer* (e.g. Internet access, Web hosting)	IAPs and ISPs
IP interface		
II	*Network Layer* (e.g. optical fibre network, DSL local network, radio access network, Ethernet, frame relay, ISDN, ATM, etc.)	AT&T, BT, NTT, WorldCom, Qwest, Colt, Energis, C&W etc.
I	*Equipment & Software Layer* (e.g. switches, transmission equipment, routers, servers, CPE, billing software, etc.)	Nortel, Alcatel-Lucent, Cisco, Nokia-Siemens, Huawei, Fujitsu

Source: Adapted from Fransman (2002b, p. 66)

Comparing Table 4.1 and Table 4.2, three observations can be made. One is that the layer model became more complex from Table 4.1 to Table 4.2 mainly at the services level. Layers 1 and 2 of table 4.1 (the Old Telecoms Industry) remain conceptually the same, as they have fundamentally the same functions (equipment and network layers). However, the difference is that the layer on top of the network layer is increasingly becoming IP-dominant, simplifying the complexity of having various different technologies (like frame relay, ISDN and ATM). The second observation is that the scope of service has broadened as the services layer (originally only citing voice, fax and 0800 services) is split up in some other layers as a consequence of the emergence of new players, allowed by the IP technology and World Wide Web. A final observation is that the customer is becoming an increasingly important variable to be considered in services. Table 4.1 does not even mention the customer, while Table 4.2 only starts to do so.

Although 'co-evolving consumer tastes and preferences also constitute important engines of change in the Telecoms and Infocommunications Industry' (Fransman, 2002b, p. 79), the role of customer/consumer is still not well explored in the telecommunication industry literature or practice. For example, the customer is usually treated as a homogeneous entity (i.e. there is no difference between mass consumption and large corporations, although there is a tendency to refer to mass consumption when referring to customers), and there is a predominance of the supply side, with little attention paid to the role of the customer in the innovation of services. This is due to the fact that studies on service research 'tend to focus on either customer from a marketing perspective or providers from an operations perspective' and because 'disciplines tend to focus on specific sectors; marketing tends to be concerned with business-to-consumer and operations with business-to-business' (IfM and IBM, 2008, p. 9).

The layer model has had some impact on the way incumbent telecom operators are thinking about their infrastructure. They realised that the silo-based approach for services was not adequate to meet their speed-to-market, cost reduction and customer experience aims. This led the operators to rethink their network in terms of creating a layered infrastructure, which is based on reusing common network capabilities and opening interfaces for other firms to develop applications on top of the network (Levy, 2005). This is one aspect of the platform approach as advocated, for example, by Meyer and Dalal (2002) and Meyer (2007b) for the level of products. Levy (2005) is

proposing the reuse of 'common capabilities' at the level of network functionalities, not for specific products or services. In this respect, 'the network will become the platform',[74] which shows the impetus to consider platform strategies.

Despite the general lack of attention to large customers, Pogorel (1994) had already observed that 'the provision of global services to global customers is an important factor in the restructuring process' (p. 5). The last years of the telecommunications industry (2001 onwards) have seen a globalisation trend on a technology basis, i.e. IP being considering as the facto standard that permeates not only the access and local networks, but also moving into the network backbone (Fransman, 2002b). In this battle of globalised operations, there are two types of approach. The first is to consider the various operations throughout the world as a juxtaposition of activities, with multiple local networks operating according their own individual frameworks. The second is to consider one single platform, with other local operations based on the common framework (Pogorel, 1994). It seems that the second approach is gaining predominance in the telecom industry, using IP as the dominant networking technology of the single platform. As a result, the 'IP interface' in Table 4.2 is becoming the common platform on which services can be created and delivered.

According to Fransman (2002b), the evolution from the Old Telecoms Industry to the Infocommunications Industry points to the expansion of the scope of services and the increasing importance of the customer when considering new services. Customers in the telecom industry are usually characterised as the household customer and business customer. Business customers are usually classified into areas of small, medium and large business, and in terms of sources of growth in the first half of the 2000s, serving large customers seem to be paying off for the incumbent operators. However, this activity has not been straightforward, as it may take a longer time to start contributing to the profits of the firm, and it is subject to high operational risk. Similar difficulties with the business of integrated solutions are mentioned by Davies (2003b) in firms like IBM, WS Atkins and Serco. All these firms have experienced problems in making profit at some stage of their integrated solutions business, endangering its sustainable development.

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[74] This quotation is from a speech given by John Chambers, CEO of Cisco Systems, at Interop Las Vegas on 02nd May 2006. It can be found in Kerner (2006).

With the broader scope of services in the telecom industry, the increasing importance of customers, and the relationship with them to deliver services, the service-dominant logic as proposed by Vargo and Lusch (2004) seems to be becoming more relevant in certain parts of the business. Hence, to consider the service logic as dominant may not yet be the case, and may not be the case in the near future. Certain parts of the telecom business are more inclined to adopt the service-centred logic, particularly in respect to large customers. However, the retail business is still predominantly based on the goods-centre logic. Integrated solutions are not completely new in the telecom industry either. Both BT and Deutsche Telekom, for example, have acquired systems integration companies and integrated these to their own operations when the size of the business of integrated solutions seemed to be large enough for their aspirations and strategy.[75] Also, Steinmueller (1994) has identified that 'the size of investment [when it is large and several complementary investments are needed], holding other factors constant, will bias users toward turnkey systems' (p.193). The size and complementarity of investment have been making many large customers outsource their IT systems since the mid 1990s. Telecom operators, however, have recognised this as a business only later: in the late 1990s and at the beginning of 2000s. Deutsche Telekom, for example, formalised T-Systems in 2001 (DT, 2001), and BT initiated BT Global Services in 2003 (BT, 2003). From the supply side of systems and equipment, integrated solutions were recognised earlier, the most common example being IBM, whose Global Services division has been in existence since 1991 (Gerstner, 2002).

Adding to the case of the increasing relevance of the customer in service innovation in the telecom industry is the role of content within the service itself. It is not only down to the voice, video or data service, but also the specific applications being delivered. Mansell and Jenkins (1994) noted that telecommunications operators tend to concentrate on the technical issues of the service at the expense of its contents, citing the example of electronic trading and its legal implications. With the expansion of the scope of services and the advent of the World Wide Web, the issue of content has been attracting increasing attention due to the services provided through the Internet. The applications running on top of the network require increasing attention from the incumbent telecom operator in respect to their creation, development and delivery, and ultimately their

[75] Interview with BT Senior Manager, March 2006; and interview with Deutsche Telekom Senior Manager, March 2006.

business model. If the incumbent operators are to produce their own content, they can compete with, and be complementary to, Internet players such as Google and Yahoo.

This situation seems to trigger the need of telecom operators to shape capabilities to cope with this context of converging infrastructure and services, ultimately converging into the customer experience. The infrastructure, represented by the NGN, leverages the capabilities to create and deploy new services. To facilitate this process, the infrastructure tends to become decoupled from the services layer (Christensen et al., 2004).[76] The decoupling also complies with the layer structure shown in Table 4.2. The layer structure at the industry level can be mapped into the structure of incumbent telecom operators (e.g. BT), as shown in Figure 4.1.

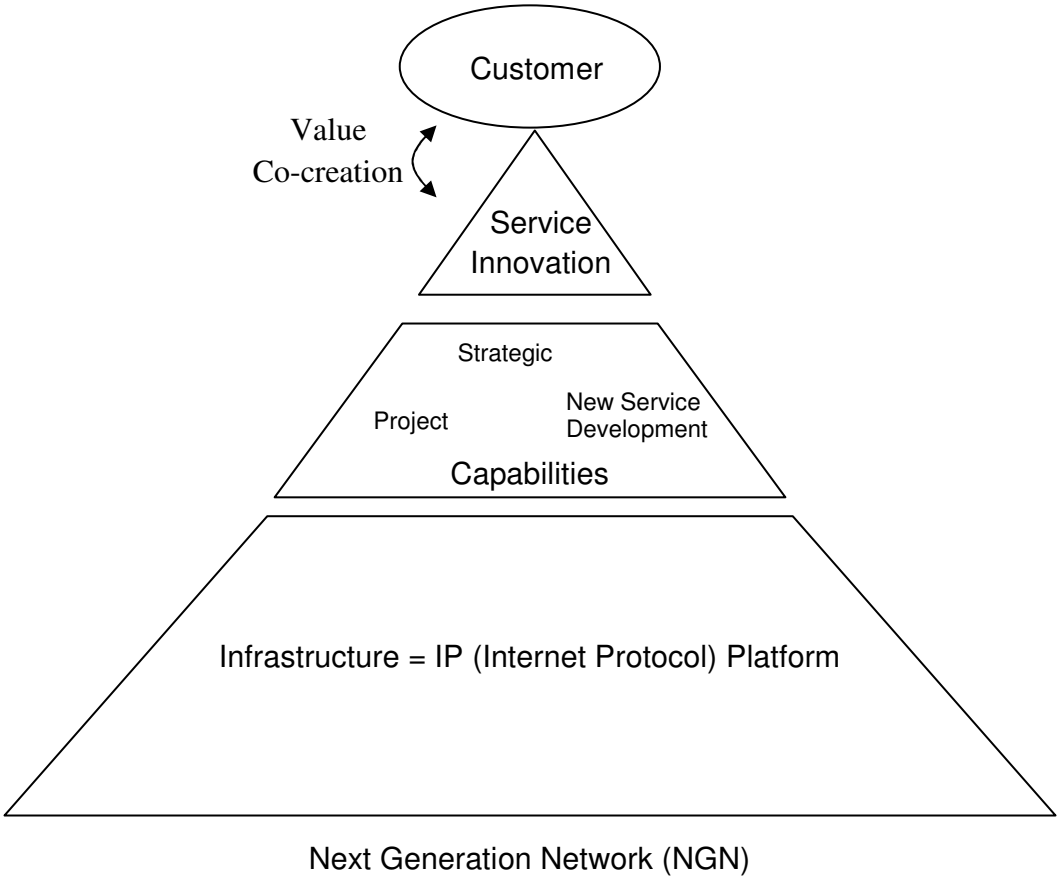

Figure 4.1 – Layered Structure of the Incumbent Telecom Operators
Source: Author's elaboration

[76] The decoupling of infrastructure from service layers was also emphasised in interviews with: Nortel Senior Manager, March 2005; Siemens Technical Director, March 2005; ECI Senior Technical Sales Engineer, March 2005; Veraz Networks Technical Director, May 2005; Alcatel Senior Manager, March 2006; Huawei Chief Engineer Manager, March 2006; ZTE Technical Director, March 2006.

With the decoupling and layer structure, changes in services do not necessarily translate into changes in the infrastructure. The decoupling facilitates the platform approach, if the network/infrastructure capabilities are organised and modularised in such a way that they can be reused in different types of services. In this context, the business-to-business type of service allows incumbent telecom operators to tap into new sources of revenues exploiting their relationship with large customers, so that value is created with the customer. The inclusion of the customer and value co-creation emphasises the shift from the strategic (supply-led) model to the idealistic (demand-led) model (cf. Mansell, 1993) and is evidenced by BT's strategic shift to a more customer-focused approach (as in BT (2002, p. 7)).

4.5 Conclusions

This chapter used a representation of the telecom industry as comprised of several layers to show how the services layer has expanded into several other layers, broadening the scope of services in the telecom industry. This has been encouraging incumbent operators in Europe to build service-oriented infrastructure, where services/applications can be decoupled from the underlying infrastructure.

The so-called NGN represents such service-oriented infrastructure. The adoption of IP into the backbone of the network, creating an all-IP network, has been allowing incumbent telecom operators to become more customer-focused with a strategy of providing a higher variety of services to customers. One way to implement this strategy is the platform approach through the reuse of components within the network, and opening up its interfaces to create new products and services with third-party enterprises.[77] Meanwhile, incumbent telecom operators such as BT, Deutsche Telekom and France Telecom, are commercialising integrated solutions for large customers, satisfying their need to build and maintain enterprise networks and interconnecting facilities spread around the world. This also complies with the internationalisation strategy of such incumbent operators.

Decoupling the infrastructure from the services layer creates opportunities in terms of new capabilities to be developed by incumbent operators in the development of new products and services. There is one part of the business (the retail business) that is still (and is supposed to continue to be) strongly related to produce excellent outputs that can

[77] The platform strategy is further examined in Chapters 5 to 7.

be exchanged with customers (usually in the mass market). This follows the goods-centred logic. On the other hand, large customers are increasingly relying on integrated solutions, not only products and services that they (the large customers) need to integrate themselves. This is the business of BT Global Services (in BT), T-Systems (in Deutsche Telekom), and Equant (in France Telecom). It follows the service-centred logic, and is based rather more on the relationship (rather than simply on pure exchange) with the customer.

At this stage it is possible to provide the main points of this research, which are used to structure the thesis and to further pursue the research questions:

- The decoupling of the infrastructure from the services layer, and the different logics that are emerging from it. The theoretical framework of Figure 2.10 of the literature review (see Chapter 2) provides such logics: technology, organisation and customer. In summary, how the technological change represented by the adoption of IP/MPLS in the core network (infrastructure) is changing the organisational capabilities of incumbent telecom operators (in particular, BT), and its relationship with customers.
- The technology logic is represented by the technological change to IP, which is not a new technology, but which has been evolving over the last few years to the point at which it is considered to be used as the main networking technology by the incumbent telecom operators (e.g. BT, DT and FT) to support their backbone networks for any service involving voice, video and data. This has a huge impact on the way services are created, managed and delivered, i.e. on the organisation.
- The organisation logic represents the capabilities that need to be created, developed and/or changed. Old ways of working, based on compartmentalised or silo-based services tend to be replaced by more cross-functional activities. IP technology reinforces this trend. In particular, the capability to deliver integrated solutions to large customers seem to be highly relevant in the period of uncertainty that the telecom industry has been facing after the downturn, especially after 2002. Cross-functional activities (e.g. project management) are also reinforced by the customer-focused approach that many incumbent operators are taking, especially in order to serve their large customers with integrated solutions.
- The customer logic calls for a customer role in the large customised projects that characterise the integrated solutions of the incumbent operators. In what

circumstances do customers help to co-create value? Additionally, what does 'service innovation' mean in this context?

The concern about decoupling services from the underlying infrastructure is not new: it was the concern of BT and other operators during the 1990s, according to Mansell (1993). At that time, the market power of dominant players and technological constraints were much higher, making it unfeasible to achieve decoupling. The transition to NGN also represents a change in the traditional mindset of investing in unique network capacities and preventing others from using them with the fear of others taking away profits that could be gained by retaining control or introducing competition that would cannibalise existing sources of profit. The concept of building the network as a platform is gaining momentum among the incumbent telecommunications operators, who look at the example of firms like Microsoft (who use the platform approach for the operating system) and Intel (who use it for the microprocessor),. The vision of having a single core (and a platform) instead of a network of networks is made possible by adopting the IP/MPLS technology as the dominant network technology within the core. Also, the transition to NGN seems to facilitate the customer-centric approach and the advancement of the idealist model (cf. Mansell, 1993).

The convergence of telecom and IT at the network infrastructure level leads to convergence in services. In terms of processes, the convergence of telecom and IT seems to be the most significant one. The World Wide Web has really transformed the way communication customers see services. The use of complex software development (complex systems) in order to organise the information inside the organisation is also becoming significant and increasingly important. In this scenario, the method of how incumbent firms collect, filter and process information under technological change (adoption of IP in the core of the network) needs to be altered. Thus, the networks of incumbent operators are becoming platforms, allowing the access of third parties in order to develop new products and services, and following the philosophy of the IT sector (e.g. Intel and Microsoft).

The central question of this research is about the capabilities to be developed by incumbent telecom operators in order to survive in the market, facing convergence, fierce competition and technological change (represented by the NGN) mainly after the bubble burst at the beginning of the 2000s. In this research I am focusing on the BT case, as it has embraced technological change in an unusual way. Also BT seems to be

taking more radical initiatives in order to stay ahead of their competitors. Thus BT, as a first and faster mover, was chosen to be the main case study from which possible generalisations could be drawn.

One answer to the question of how BT is surviving the radical technological change and competitive market provided by the adoption of IP and market convergence is provided by looking at how BT is changing the way it innovates in both infrastructure and service layers. The layer model at the industry level depicted in Table 4.2 can be translated into a layer model within the incumbent telecommunication operator (e.g. BT), where the infrastructure can be decoupled from the service provided. Mediating the infrastructure and service layers, there are the capabilities that translate network capabilities into service capabilities. The Next Generation Network (NGN) has an initial impact on the infrastructure/network with the adoption of IP into its core. This has an impact on the organisation and its capabilities which may change its relationship with customers, and which legitimises the customer-centric approach and the demand-led idealist model in the telecommunications industry. Chapter 5 examines the infrastructure/network level. Chapter 6 examines the impact on the organisation, with special focus on BT Global Services (BTGS), concentrating on business-to-business projects. Chapter 7 addresses the way the relationship with large customers is changing as a consequence of having a higher leveraged network through IP/MPLS technology. Finally, Chapter 8 discusses how BT is trying to change its service innovation processes, elaborating on the implications of this on BT organisation and on the industry as a whole.

5. The Network as a Platform: The Case of BT21CN

5.1 Introduction

Incumbent telecommunications operators, facing increasing competition and declining revenues in their traditional fixed-line voice services and further pressed by the downturn in 2001/2002, started to examine ways to change their 'modus operandi' in order to remain competitive. The Next Generation Network (NGN) was a response to this challenge at an industrial level, as examined in Chapter 4. The evolution of the IP/MPLS technology seemed to happen at the right moment to be deployed at the core of the NGN deployment.[78] The technology was available from several suppliers, although the standards were not yet mature. Historically though, BT was unaccustomed to waiting for standards to become mature in order to implement their network and services (Mansell, 1993).[79] There was (and continues to be) an execution risk, but the industry seemed to have reached an unprecedented agreement about the adoption of IP/MPLS.[80] The question was not whether to make the transition to NGN, but how to do so, and how quickly it could be done.[81] Incumbents like Deutsche Telekom and France Telecom in Europe, and NTT in Japan decided to make the transition at a slower pace compared to BT in the UK. [82] As explained in Chapter 4, BT set a time frame of five years to complete the migration, while others decided to migrate with no target date for completion, i.e. to revise implementation plans on the go.

BT's decision to migrate to NGN was organised as a project, which was called the BT 21st Century Network (BT21CN). This chapter examines this major project. As major undertakings, NGNs are designed to meet a customer's business and technical needs and they are also seen as a single and consistent network platform that enable new services at a lower cost.[83] BT21CN represents BT's effort to manage the transition to

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78 Interview with BT Senior Manager, July 2005.

79 Interview with BT Senior Manager, November 2005.

80 Interview with AT&T Senior Manager, September 2005; interview with Telefónica Manager, October 2005; interview with Deutsche Telekom Manager, March 2006; interview with BT Senior Manager, March 2006.

81 Interview with BT Senior Manager, March 2006.

82 As mentioned before, the target of DT, FT and other incumbent operators would be between 2015 and 2020 for the completion of the transition to NGN (see footnote 36). Just for comparison, smaller operators such as C&W claimed that they would be making the transition to NGN in a few years (from interview with C&W Senior General Manager, March 2006. Another smaller operator, THUS, claimed that they had already made the transition, as they were founded using IP technology (from interview with THUS Senior Business Manager, October 2006).

83 Interview with BT Senior Manager, September 2005.

NGN and it is seen as an integrated solution provided by eight preferred suppliers[84] with BT as customer, where systems integration and project management capabilities play a major role.

BT21CN is set to deploy a network seen as a platform, and its major business and technical characteristics are identified in this chapter. Platforms are seen not only as technical, but also as business constructs to achieve strategic goals. As explained in Chapter 2, Section 2.5, the concept of network platform integrates the notion of: (i) product platform (Meyer and Dalal, 2002, Meyer, 2007b), where the main characteristic is the re-use of subsystems or interfaces; and (ii) opening the interfaces to drive innovation in the industry (Gawer and Cusumano, 2002). Systems integration and project management are components of the platform capabilities that incumbent telecom operators need to develop in order to compete in the context of Next Generation Networks (NGNs).

The following sections comprise this chapter. Section 5.2 examines the background of BT21CN, where key historical events are described in order to understand the context and decisions made in undertaking this major project. Section 5.3 examines the platform attributes of the BT21CN and how it impacts the business organisation. Section 5.4 identifies systems integration as one of the major capabilities required to deploy BT21CN, which can be seen as the knitting together of the various (individual) integrated solutions provided by BT's preferred suppliers. Section 5.5 analyses project management as another major capability to deal with the complexity of BT21CN, and its impact on the organisational capabilities to develop the platform strategy. Finally, Section 5.6 draws together the final conclusions of this chapter.

5.2 Background of BT21CN

BT21CN was announced in June 2004, although its history can be traced back to 2001 when a new BT chairman was hired, Sir Christopher Bland, who came from BBC.[85] As noted previously in Chapter 4, the main problem for BT at that time was a huge debt of around £28 billion. Sir Christopher Bland prepared the company to receive new people and in 2002 a new CEO was hired, Ben Verwaayen, who arrived from Lucent

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[84] The eight preferred suppliers are: Alcatel, Lucent, Siemens, Cisco, Ciena, Ericsson, Huawei and Fujitsu. Later in 2006 Alcatel acquired Lucent, forming Alcatel-Lucent. Siemens (the carrier business, which was dedicated to telecom operators, distinct from the enterprise business) made a joint venture with Nokia in 2007, establishing Nokia Siemens Networks.

[85] Interview with BT Consultant, November 2005.

Technologies. He had previously worked for KPN (the incumbent telecom operator in the Netherlands) and ITT (a supplier of telecommunications systems). Also, a new CTO was hired, Matt Bross, who came from the US telecommunications operator Williams Communications. Ben Verwaayen seemed to have brought a more aggressive leadership style to the table in terms of doing things faster and more decisively. He also seemed to be more open to radical approaches.[86] Another characteristic was that he worked to consolidate BT. In the past, BT's business units (i.e. Ignite, BTopenworld, BT Wireless and Yell) were considered as autonomous businesses to be sold separately to the market.[87] Verwaayen's unified view of the firm was opposed to the idea that BT was effectively a conglomerate with detachable parts.[88] Market analysts suggested the break-up of BT during the debt crisis and OFCOM (Office of Communications)[89] seemed to be in favour of splitting BT into parts in order to enhance competition in the British telecommunication service market.[90]

Ben Verwaayen was completely opposed to such strategies, arguing that it is necessary to apply innovation in telecommunications end-to-end and that the break-up of BT would reduce its value and competitiveness in the market.[91] Eventually, BT agreed with OFCOM (Office of Communications) to create a new division called Openreach, a spin-off of BT Wholesale that would give equal treatment to BT Retail and other service providers.

Ben Verwaayen then worked to consolidate what remained of BT and presented 'One BT' to the market, starting even within his office, where he shared a single room with the directors, having physically removed the walls.[92] There was a time where the 'divisions' competed with each other, offering separate proposals to customers. Each division had its own profit/loss account without worrying too much about the company as a whole, or other divisions.[93] In contrast, Verwaayen seemed to be more concerned about articulating a clear vision for the overall BT corporate entity and strategy, and communicating it to customers and shareholders.[94] With Matt Bross the CTO Office

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86 Interview with BT Senior Manager, November 2005.
87 Interview with BT Senior Manager, March 2006.
88 Notable examples of conglomerates are GE and EasyGroup. Further discussion on conglomerates and unified view of the firm can be found in Doz and Kosonen (2008).
89 OFCOM (Office of Communications) is the communications regulator in the UK.
90 Interview with OFCOM Manager, July 2005.
91 Interview with BT Senior Manager, March 2006.
92 Interview with BT Consultant, November 2005.
93 Ibid.
94 Ibid.

appears to be better coordinated in terms of unifying the architecture and the approach to innovation.[95] It seems apparent that one concern of the new top management was to consolidate BT into a single organisation. As Matt Bross put it:

> To paraphrase Ben Verwaayen, the vision is for a transformation of BT from the 'schizophrenic, many-headed, behemoth' of today to a company perceived as a trusted ally in daily life. With a company the size of BT there is massive inertia holding back such a metamorphosis, therefore the biggest problem lies in actually implementing it.[96]

The fragmented condition of BT was a major concern, and the greatest challenge of BT21CN was not technological, since the technology was already available to realise the architecture. It was overcoming the inertia to implement it[97], which required changing the mindset of people from PSTN to NGN.[98] BT had set the aims of better customer experience, shorter time to market for service provision, and lower capital and operational expenditure. They soon realised that these aims could not be achieved with the current methodologies and processes (Reeve et al., 2005). As network operators can buy their systems and equipment from the same suppliers, such network operators have the same access to technology as their rivals (Fransman, 2002b). The technology being deployed in BT21CN has been deployed elsewhere or is available to other operators.[99] Therefore the differentiation and competitive edge of telecom operators like BT lies not in the technology itself, but in how they use the technology to achieve their strategic aims.

The decision to proceed with BT21CN involved some major influences that may not be easily captured if the analysis is made only after the official start of this major project in 2004. As noted before in Chapter 4, Section 4.3, the huge debt of BT at the beginning of the 2000s created some malleability for change. BT people were aware that some change (maybe radical) was needed and they were more open and willing to accept it and cooperate.[100] The new CEO was also keen to consider or adopt some radical change.[101] Coming from Lucent, he was supportive of initiatives that favoured

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95 Ibid.

96 From the interview with Matt Bross published on 04th August 2003 at http://www.opticalkeyhole.com/interviews/bt.asp (accessed on 18th August 2007)

97 Interview with BT Manager, September 2005.

98 Interview with BT Senior Manager, March 2006.

99 Interview with BT Senior Manager, October 2005.

100 Interview with BT Senior Manager, March 2006.

101 Interview with BT Senior Manager, October 2006.

standardisation and avoided proprietary solutions.[102] Everyone at that time was talking about IP anyway. It was already recognised that IP (in conjunction with MPLS) had the capability to be the common protocol for converged voice, data and video services.[103] Another factor was that the new CTO, Matt Bross, was 'excellent at putting complex things simply and selling up' to the board.[104] One interviewee said that probably 'Matt's skills, drive and charisma were a deciding factor, even though he had great support from Ben'.[105] At least for BT, it is apparent that the two newcomers in the top management positions exerted a decisive influence for radical change. Also, the debate between consolidating and splitting up BT may have been a decisive factor in Christopher Bland's choice of Ben Vervaayen, instead of promoting someone from BT to continue the break-up of the company.

At this point in history, the central issue for all incumbent telecom operators in Western Europe was the PSTN replacement. BT's switches were becoming obsolete rapidly while other operators believed that they had more time to manage the transition to NGN. In fact, no one followed BT at first, but some years later, it is possible to see France Telecom and Deutsche Telekom talking about it.[106]

To summarise, the transition to NGN by BT can be considered a radical approach in the following aspects:

- Timescale: BT defined the target of switching off the PSTN in 5 years. Other carriers, who are taking a phased approach and intend to take more time to transform completely the network from PSTN to NGN, are not making such a commitment.
- Comprehensiveness: BT's plan encompassed the whole network. Studies of radical innovation in mature firms often focus on the activities that lead to a new product, such as computerised tomography and magnetic resonance imaging (see, for example, Leifer et al. (2004)). The transformation in the context of this research is over the whole network from the core to the access points, and the end 'product' will be a network as a platform that is intended to allow more cooperation with third parties in the development of new services. Other incumbent operators, like NTT in

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102 Interview with BT Consultant, November 2005.
103 Interview with BT Manager, October 2005.
104 Interview with BT Senior Manager, March 2007.
105 Ibid.
106 Interview with BT Senior Manager, November 2005.

Japan, are trying other strategies, such as overlay networks, instead of replacing the PSTN.

- Vendor Structure: As a consequence of the radical timescale, there are eight preferred vendors working together to deliver BT21CN. These vendors are competitors in other markets and projects.[107]

The fact that BT decided to proceed with the migration at a faster pace than other incumbents in the world makes them a first mover in the scale and scope of their NGN implementation, which represents a unique opportunity to explore the NGN commercial and technological environment from which lessons for future and ongoing deployments of the same nature may be learned. It is useful to note, however, that BT is a leader among large operations rather than all telecommunications. Other smaller operators, like THUS in the UK, have claimed that they have already migrated to the all-IP NGN.[108] The commitment to this project is evident, as BT claims that it is necessary for them to switch off the PSTN network as soon as possible because the cost of running two parallel networks would be disruptive for BT operations and capabilities. BT claims that they are going to save about £1 billion per year from 2008/2009 as a result of the rationalisation of the network.[109]

The historical account above shows the influence of the renewal of the top management in BT, where external staff were hired, and internal staff were not promoted. This decreased the barriers for more radical change and it explains, in part, why the large project of BT21CN came to be seen as the key action taken to make the transition to NGN. These events happened before BT21CN officially started in 2004, and demonstrates how particular events and contextual issues lead to the formation of major projects. These events prior to the official start of the project are not usually addressed in the project management literature, but rather in the project marketing literature. Such events help to understand how the BT21CN project was shaped, the particular factors that may lead the project to success (or failure), and the decisions taken for its execution. Once BT decided to execute the project, one major issue they faced was the

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107 Interview with Ericsson Senior Manager, March 2007.

108 Interview with THUS Senior Business Manager, October 2006.

109 This claim is made in the BT press release on 09th June 2004, announcing officially the plans for BT21CN. And the claim was repeatedly propagated in trade conferences, such as the Supercomm 2005 in Chicago, on 06th June 2005 by Matt Bross, BT CTO.

choice of architecture to be adopted that would guide the transformation of the whole network.

5.3 The Role of Architectures

Telecom operators are users rather than producers or suppliers of complex products and systems (and will not have the advantages of said producers or suppliers, who have roadmaps for their products and systems, and who usually use product families to highlight their evolution or define different market niches). So, whenever a telecom operator needs to build a new network or upgrade it, the architecture and the way these systems are combined, becomes of fundamental importance. In many instances, there is operator concern when building a coherent platform through an architecture. The architecture is the 'stable intermediate form' (cf. Simon (1996)) that is used by the operators and vendors in order to deal with complexity (complex choices and decisions). Large suppliers like Ericsson, Siemens and Cisco possess their reference architectures that they try to sell on to telecom operators. Smaller telecom operators usually do not have enough resources to ask the suppliers to change their architecture. However, large operators like BT usually do have such resources.[110] BT has developed its own architecture for BT21CN and, while designing it, vendors were consulted and it became apparent that the technology required to implement the architecture was already available (Crane, 2005). With this architecture in mind, BT selected the current preferred suppliers. Potential suppliers needed to produce systems that were already compliant with the architecture or to have a clear migration path to reach such compliance. Of course, BT also required that the technological choice should be defended with a strong commercial proposal showing the whole-life cycle of the solution offered over ten years.[111]

Using the chosen architecture as a reference, BT communicated with and selected their suppliers. BT's chosen architecture divided the network into five major parts, and the suppliers were invited to submit proposals for each part.[112] During the tender process to select the eight vendors, BT disclosed the part of the architecture in which the potential supplier expressed interes, and reserved the role of integrating all the parts for itself. In

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110 Interview with Alcatel Manager, May 2005.

111 Interview with BT Senior Manager, March 2006.

112 The five parts are: access, metro, core, transmission networks and i-node. The i-node is where the 'intelligence' of the network resides (e.g. call control, network management, operation and support systems). At least two suppliers were selected for each part, except for the i-node, according to the press release issued by BT on 28th April 2005.

large projects, the total systems integration is usually the responsibility of a prime integrator from the supplier side. However, due to the scale and scope of the project, and the opportunities to gain knowledge that could be transferred to other areas, BT decided to take on the role of prime integrator itself. The architecture, in this sense, represented the tool through which BT intended to develop technological and system integration capabilities, and to understand whether the various offers from the suppliers would comply with their architecture. Hence, BT activities for BT21CN are largely concentrated on systems integration (Crane, 2005). Acquiring a competence in architectural design, BT learned how to integrate systems and equipment from various vendors. Interestingly, BT has taken the view that it will be able to sell this capability to other firms (telecom operators), and this is what they intended through internal initiatives targeting telecommunications operators in developing countries.[113]

The architecture of BT21CN is based on the principle of it being 'a single converged network carrying all services' and on 'the idea of reusable service components, so that a product designer can rapidly create and change the services BT provides' (Reeve et al., 2005, p. 13). The current situation is characterised by an 'aggregation' of networks where 'each network [is] associated with a single service and support system (customer care and billing, for example) that have been developed for each network and service by its own internal software developers' (Reeve et al., 2005, p. 11). Thus, this 'stove-pipe' or 'silo' based approach became unsustainable for the requirement of faster service provision, and a platform-based approach was proposed.

5.3.1 From Silos to Platforms

The agreement in the industry over IP (Internet Protocol) technology is an unprecedented and historical milestone in the telecommunications industry (Fransman (2002b)).[114] The industry realised that IP was mature enough to transport, besides data, real-time voice and video. The whole NGN can be considered as the 'global platform' and behind it there is an architecture that was traditionally organised through technology-service silos. The silo structure means that the service is associated with the network (infrastructure). So establishing a new service means following a strategy of either constructing a new infrastructure, or modifying the existing infrastructure in

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113 Interview with BT Senior Manager, March 2007.

114 Also confirmed from interview with AT&T Senior Manager, September 2005; interview with Telefónica Manager, October 2005; interview with Deutsche Telekom Manager, March 2006; interview with BT Senior Manager, March 2006.

significant ways. Both of these strategies are inadequate for meeting the aim of decreasing the time-to-market period for new services, and providing the flexibility and choice required by customers. Pressed by competition and declining revenues from its traditional fixed-line voice services, BT established a shorter time-to-market period for new services as a strategic objective. Thus, the IP technology provides the possibility of building an infrastructure based on a single networking technology for voice, data and video services. It can also offer communications services that are decoupled from the infrastructure, so that changes in services do not necessarily imply changes in the infrastructure.

This adoption of the platform approach[115] has had a huge impact on the operational and support systems (OSSs) for the services offered by the telecom operators, and on the architecture of BT21CN.[116] OSSs are also based on silos, as each service tended to be implemented independently from the others. This creates major problems with interoperability as most of the systems use proprietary protocols.[117] Customer's requirements have evolved. They now possess different ways of requesting resources and services from different parts of the organisation, and this blurs the boundaries of the organisation's internal divisions. For example, in the past customers bought a voice service separate from a data service, and a back office system for each one, separately. Nowadays, it is possible to click for a voice application in a PC or laptop, which makes the distinction irrelevant (Levy, 2005).

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115 The platform approach was further emphasised in interviews with: IBM Technical Director, October 2005; Siemens Senior Business Development Manager, October 2005; Huawei Technical Director, March 2006. It was also advocated by incumbent telecom operators, such as BT (from interview with BT Senior General Manager, July 2005); Belgacom (from interview with Belgacom Senior Commercial Director, September 2005); Swisscom (from interview with Swisscom Senior Programme Manager, October 2005); Deutsche Telekom (from interview with DT Technical Director, March 2006); France Telecom (from interview with FT Senior General Manager, October 2006), Telefónica (from interview with Telefónica Managing Director, October 2006); Portugal Telecom (from interview with Portugal Telecom Senior Director, October 2006).

116 Although BT made separate tender processes for the OSS and for BT21CN, they are interconnected. Some parts of the OSS (e.g. network management system) are directly related to the suppliers of BT21CN, but other parts (e.g. the billing system) are indirectly related. However, both OSS and BT21CN face the silo/platform issue.

117 Interview with BT Senior Manager, March 2007.

5.3.2 Impact of the Platform Approach on the Operational and Support System (OSS)

From the middle of the first decade of the 2000s, it has been the plan of incumbent telecommunications operators to move from silos to platforms in order to improve the time-to-market period of products and services.[118] This would simplify the architecture of the network leading to cost reductions in its upgrade and maintenance, and would make changes less difficult. Also, the Operational and Support System (OSS) is being redesigned to have an increasing number of commercial-off-the-shelf (COTS) components, an approach clearly favouring modularity (technological modularity). The OSS can be defined as the set of all components that are necessary to transform an application into a complete service (such as billing, authentication, etc.) (Reeve et al., 2005).

Each OSS system is still very proprietary in nature, having been devised to attend to specific needs at the time it was deployed. OSS systems do not follow a reference architecture because there never was such a reference architecture.[119] The architecture referred to in Section 5.3 that divided the network into five parts, for example, did not include the OSS. This part of the system was treated separately, as it offered other significant challenges at the service and applications level. Such challenges range from the system upgrade (both software and hardware), to the communication with other parts of the system supplied by other firms. For example, when implementing new services, a corresponding OSS may need to be installed and integrated with the existing system. Due to the proprietary nature of the protocols and hardware being used, any change involving upgrade or integration becomes very expensive and time consuming.[120]

Another problem with the existing OSS systems is that they are not usually part of the service. Whenever a customer wants to activate a new service, the OSS processes are run in the background, sometimes with manual intervention, and the service can take days to be activated.[121] This is in conflict with the 'total customer experience' approach that BT envisions. One of the requirements that BT has imposed on suppliers is the need to open the source code for OSS systems. This is a dramatic change from the viewpoint of suppliers, as their business model assumes a service contract where they charge for

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118 Interview with BT Manager, September 2005.
119 Interview with Ovum Senior Analyst, March 2007.
120 Interview with BT Senior Manager, March 2007.
121 Interview with BT Technical Manager, September 2005.

and carry out the adaptations made in their OSS system. With this initiative, BT has asserted more control of the changes to be made in the OSS system and (to the extent that BT can make the changes itself) supplier revenue may be lowered. However, this strategy may backfire as changes in the OSS system made by BT may have unintended consequences in other parts of the system, which may ultimately prove more costly than leaving the changes to the supplier.

There is a tendency to resolve such technical efficiency issues through the adoption of a modular approach in OSS systems. It is fair to say that the entire NGN is premised on the concepts of platform and modularity. For example, the IMS (IP Multimedia Subsystem) is a subsystem that is supposed to offer the platform to develop new services. It would correspond to the operating system (like Windows, UNIX, etc.) where new services would be developed on top of it, and the underlying hardware (infrastructure layer) would be assumed to carry out functions without specific additional instructions.

The move to NGN exemplified by BT21CN illustrates a general tendency in the telecommunications industry to use the concept of platform, not only as an engineering or technical concept, but also as a strategic one. Looking at BT's strategy of (i) cost reduction, (ii) speed-to-market, and (iii) customer choice and empowerment, it becomes evident that adopting and refining the concept of platform helps BT to reconcile those goals within its strategy. Customer choice is supposed to be supported by a more flexible and real-time OSS, which may give further options to BT in terms of business models and service delivery. This approach (to adopt and refine the platform features and capabilities) seems to be common to other telecom operators (incumbents or not) and large business organisations that intend to upgrade their networks to benefit from the robustness and flexibility of an IP/MPLS network.[122] The idea of opening up the network as a platform for third party firms to develop services, which was unpopular in the 1990s (Mansell, 1993), is becoming more and more accepted in the 2000s. This platform approach is highly influenced by the successful approaches taken in the IT industry, by Microsoft and Intel, for example (Gawer and Cusumano, 2002).

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[122] Interview with Cisco Senior Business Development Manager, September 2005; interview with Juniper, March 2006; interview with Alcatel Manager, March 2006; interview with Lucent Manager, March 2006; interview with Cirpack Manager, March 2007; interview with IBM Manager, March 2007.

Although the move towards the platform approach is a clear tendency in BT and other incumbent telecommunications provider, at this stage it is not yet clear if this approach will be ultimately successful. Incumbent telecommunications providers are trying to avoid being relegated to the role of pipe providers by creating an infrastructure that allows them to participate in the innovation of services and applications, competing and collaborating with Internet-based firms such as Google and Yahoo. Also, requirements such as opening the source code of the OSS system indicate BT's intention to increase the scope of its innovative activities. The open source demands have led to power struggles between suppliers and BT that have (so far) been resolved amicably. They may continue to be resolved if mutual benefits can be negotiated along the way. Even though it produces new tensions and conflicts, the platform approach influences and is influenced by the architecture conceptualised for BT21CN.

5.3.3 Impact of the Platform Approach on the Architecture

Henderson and Clark (1990) argue that some firms have made innovations in the architecture of their products (in the way the components are interconnected), but with the same components. Their unit of analysis is the product. In BT21CN, the innovation occurs at the network level, and the new services produced by the network are uncertain to some extent. Taking the network as the unit of analysis (not a single product or discrete system), innovation occurs at both architecture and component levels. The NGN is not a 'like-for-like' replacement of functionality, i.e., it does not simply replace the PSTN switch with an IP NGN router.[123] The architecture is modified in order to simplify it and achieve the reductions in operational expenditure that are expected after completing the transformation. According to this new architecture, BT expects to reduce the number of network elements from 100.000 to 30.000.[124] The main technological component is also being changed. The IP router is more functional and allows a greater variety of network configurations. This gives the network designer more choices when designing the architecture and configuring the network with possible implications in the reduction of operational costs and more flexible services. Thus, both architecture and components[125] are changed.

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123 Interview with Juniper Technical Manager, March 2006; interview with Telefónica Senior Technical Manager, October 2006; interview with France Telecom Senior Technical Manager, October 2006; interview with Cisco General Sales Manager, March 2007.

124 Interview with BT Senior Technical Manager, March 2006.

125 Components can be huge equipment or systems, many of them can be classified as Complex Products and Systems (CoPS) as in Davies and Hobday (2005).

The architecture and the platform approach are directly related to the characteristics of the physical infrastructure of BT21CN. BT needs to develop capabilities to build this new infrastructure, creating new company-level capabilities, and leveraging existing ones. The next section identifies the capabilities within BT21CN (and arising from BT21CN functionalities) using the concept of integrated solutions.

5.4 Integrated Solutions in the BT 21st Century Network (BT21CN)

As mentioned before in Chapter 4, Section 4.3, BT21CN is a major project that BT decided to establish in order to build its Next Generation Network (NGN). The NGN is supposed to be a network platform where both the reuse of sub-systems or interfaces and the openness to external parties for industry innovation are present. This section analyses the capabilities that must be built as a result of the architecture chosen for BT21CN from the perspective of integrated solutions being delivered by BT equipment suppliers for this specific major project. It introduces the context of systems integration in BT21CN, examining the reasons for BT to assume the role of prime integrator in the project and showing that systems integration capabilities were stretched by the complexity of BT21CN.

The BT21CN project had a conceptual stage before the execution of the project really began, where potential suppliers and BT discussed and defined their needs and conditions. In a similar fashion to projects aimed at delivering complex products and systems, the starting point was the tender process that led to the selection of preferred suppliers. BT divided the tender process into four stages:[126]

Stage 1: Pre-ITT (Invitation to Tender) from January 2003 to June 2004.

Stage 2: Formal ITT (July 2004)

Stage 3: Short listing and negotiation (July 2004 to March 2005)

Stage 4: Supplier selection (April 2005 to March 2006)

From the dates above, the first striking characteristic is that the selection of suppliers took three years and two months. In stage 1, BT conducted market research and developed the architecture for the network. A symposium was held where around 300 suppliers showed interested in the project. In stage 2, 71 suppliers were invited to tender, and they were required to offer full technical and commercial proposals within

[126] From a presentation by Andy Green, CEO of BT Global Services in 2006.

four weeks. In stage 3, suppliers entered into a phase of fierce negotiations with BT, which involved both technical and commercial considerations. It was an extensive and expensive process, where many pilot projects were run to prove the technical capabilities of the suppliers focusing on the interconnection with legacy systems and on the benefits of the BT21CN network.[127] In stage 4, once the suppliers were selected, it took over a year to negotiate the details of the contracts and sign them. In total, eight suppliers were selected: Alcatel, Siemens, Cisco, Fujitsu, Huawei, Lucent, Ciena and Ericsson. Four contracts were signed in December 2005, and the other four between January and March 2006.[128] A major surprise in the list of final suppliers was the absence of Marconi, a British supplier. A fall of about 40% in Marconi's share price immediately followed this announcement.[129] After the privatisation and liberalisation of the telecom market, this is a clear sign that 'nationality' has become far less important in the procurement process than it was in the period of the monopolistic market. The radical and pioneering announcement of the investment of £10 billion over five years allowed BT to negotiate very tight commercial conditions with suppliers. The argument was that as the suppliers were going to sell to BT, and it was the first major project in the industry, they would be 'enabled' to sell to other telecom operators, and a significant share of this added value should be offered as discounts to BT.

BT chose to divide the network into five parts and chose at least two suppliers for each part, except the I-node, which is the intelligence of the network and was granted to Ericsson alone.[130] Although the tendency would be to work with one prime contractor acting as the system integrator, no single vendor would take the risk to supply the whole network.[131] So, a considerable work of project management and systems integration needs to be done within BT. That is the reason for the creation of the BT 21st Century Network (BT21CN) transformation project.

Comparing to some other case studies and the literature in systems integration and project management for complex systems, there are differentiating features in this tender process such as, for example, the duration and stages of the bid process up to the

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127 Interview with BT Senior Technical Manager, March 2006.

128 BT issued a press release on 28th April 2005, announcing the preferred suppliers.

129 This was widely publicised in the press, such as in Wearden (2005).

130 BT issued a press release on 28 April 2005 announcing its preferred suppliers selected to build BT 21CN.

131 Interview with Sonus Senior Sales Manager, May 2005; interview with Alcatel Manager, May 2005; interview with Ericsson Senior Technical Manager, October 2005; interview with Ciena Sales Manager, March 2006.

selection of suppliers. Davies and Hobday (2005) presented the life cycle stages of a flight simulator project (civilian and military). In this case, duration for the price bid in response to RFP (Request for Proposal) was around four weeks (for the civil project) and sixteen weeks for the military. The negotiations with the buyer last around one week for the civilian and fifty-two weeks for the military projects. BT required four weeks of response time, closer to the civilian projects. However, the negotiation process lasted eight months to the selection point, and another one year and one month to negotiate and to get contracts signed. This shows that firms bidding for large projects need to have sufficient resources in order to compete for the contract over a protracted period (in the BT21CN case around one year and eight months) without gaining any income from the project during this time, and also bearing the uncertainty over winning (or being denied) the contract. These timing issues are likely to explain why only large firms ended up being selected for the later stages of the project. Although firms have only four weeks to respond to the RFP, it is important to note that their engagement with the project may have occurred much earlier. In the case of BT21CN, potential suppliers may have had up to one year to identify the opportunity and position themselves for their bid. Some smaller firms, such as Juniper Networks[132], did not appear on the suppliers list, but it was working with Siemens and Ericsson on the project. Many other suppliers fell into arrangements which involved working with the eight firms selected, as sub-contracted firms.

Although the emphasis is placed on the tender process for the suppliers' selection, it is important to mention the previous relationships that the potential suppliers had with BT before BT21CN was conceptualised. Ericsson, for example, has a long relationship with BT due to its supply of central exchanges.[133] Many of the firms are suppliers for other projects and systems within BT prior to the emergence of BT21CN. This is a clear situation where the separation of project management and project marketing (cf. Cova et al., 2002) is meaningless. The potential suppliers most likely to be successful in being chosen as preferred suppliers for this major project were those with a good track record in their relationship with BT, although previous relationships may not have been enough in order to succeed (as it was the case with Marconi).

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[132] Juniper Networks is a supplier of routers, and they usually work in partnership with other large suppliers when supplying for large projects.

[133] Interview with Light Reading Senior Analyst, June 2005.

An overview of the preferred suppliers of BT21CN is shown in Figure 5.1. It shows the preferred suppliers delivering integrated solutions to build BT21CN, and the two instances of systems integration associated: (i) at the supplier level, where they need to integrate the products and services for delivery; and (ii) at the customer (i.e. BT) level, where all the integrated solutions of several suppliers (which can be competitors in other projects) are integrated among themselves and with BT's network.

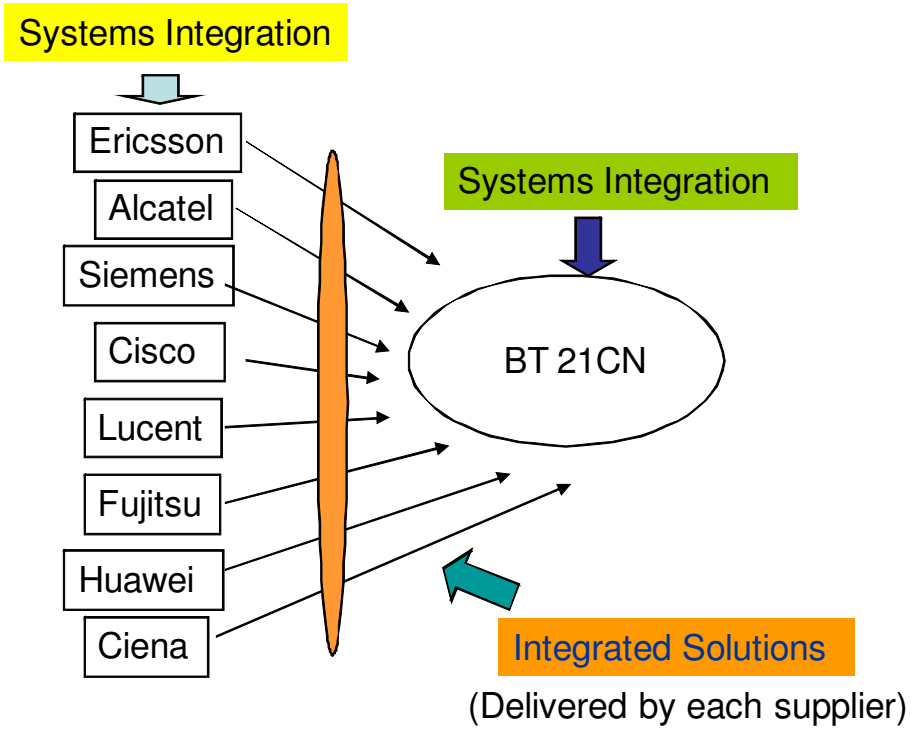

Figure 5.1 – Integrated Solutions between Two Levels of Systems Integration
Source: Author's elaboration

The first level of systems integration occurs on the supplier side, where they produce the products and associated services that will attend BT's needs for the project. This represents what Wise and Baumgartner (1999) identified as moving downstream from manufacturing to services. Although most of the telecommunications suppliers do not manufacture their products and systems anymore[134], they still as companies bear principal responsibility for the quality, robustness and inter-operability of the products with which they are identified, and to which additional services may be added. The context is similar to the one described by Wise and Baumgartner (1999) in terms of manufacturers adding services to their product portfolio and delivering integrated

[134] Telecom suppliers like Alcatel, Ericsson, Cisco etc. are usually responsible for the product or system design, but the manufacturing is outsourced to other firms like Solectron, Celestica, Jabil, and others.

solutions. From the perspective of integrated solutions, BT21CN can be considered as the systems integration of the integrated solutions delivered by BT's equipment suppliers.

Integrating the Integrated Solutions

Given the previously noted scale and complexity of BT21CN and BT's decision to be the final integrator, the first level of integration is insufficient. BT has decided not to leave the final integration to a prime contractor, but assumed the integrator role for itself. This is different from the practice of providing complex products and systems (CoPS), where usually a supplier assumes the role of prime integrator, and the customer assumes a more passive role (cf. Davies and Hobday, 2005). CoPS projects often implement large, high-value complex products and systems required by large business, institutional or government customers (Davies and Hobday, 2005). The literature on CoPS considers the projects from the equipment or system supplier perspective. BT21CN is a large and complex engineering project being ultimately integrated by the user (BT) in order to build a network as a platform, provided by various suppliers that may include CoPS in their solutions. Thus BT is in charge of the second level of systems integration, which involves integrating all the integrated solutions provided by each supplier with both themselves and its own network. Within each integrated solution, there might also be an extensive chain of suppliers led by the preferred suppliers. As identified in the research of CoPS, systems integration and project management are two highly regarded capabilities, and for BT, these capabilities are also important to build BT21CN.

One motive for BT taking on the systems integrator role was the fact that BT did not want to be a 'passive' participant of the process, mostly observing others doing the job.[135] BT wanted to be in a position to actively learn about the process of network transformation. A second reason is that as the project is budgeted at £10 billion, it would be very difficult to leave one prime integrator to assume the risks of such a role.[136] A third reason (that is somewhat controversial) is that BT, having at the start of the BT21CN project around 100,000 employees, felt it was necessary to continue providing jobs for most of them.[137] Outsourcing the role of systems integrator/prime

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135 Interview with BT Manager, March 2007.
136 Interview with Sonus Senior Manager, May 2005.
137 Ibid.

contractor would decrease the need for additional people at BT (or even reduce the justification for existing ones) and this could lead to layoffs and problems with the regulator, labour unions and government.

In order to have an idea of what the products and services provided in the integrated solutions by the suppliers are, let us consider the provision of MSAN (Multi-Service Access Node) by Fujitsu, one of the suppliers of BT21CN. MSAN is a sub-system that is usually installed in a telephone exchange and deals with various protocols that, in the past, were processed by separate equipment. The following set of activities (all linked to MSAN) illustrate the nature of servitisation (Vandermerwe and Rada, 1988, Neely, 2007), where Fujitsu (a firm based on technology/manufacturing) offers services of design, deployment and installations as well as its products/goods:[138]

- Joint Solution Design activity with BT and other Vendors;
- Testing of equipment provided by other vendors meant to be integrated with MSAN;
- Trials of Voice and Broadband HDTV (High Definition TV) MSAN functionalities;
- Transfer Engineering trials;
- Infrastructure preparation (Iron works etc);
- OSS (Operation Support System) Integration of MSAN with Element Manager;
- Deployment of MSAN (Multi-Service Access Node) equipment;
- Installation of EvoTAM Equipment. EvoTAM (Evolutionary Test Access Matrix) is a piece of equipment introduced by BT for BT21CN in order to test copper loops and to automate the migration of circuits from the old to the new network (the MSAN requires meeting copper loop technical standards to deliver services to customers connected to the network by this older infrastructure);
- Integration of sites;
- All Ports Testing;
- CPE (Customer Premise Equipment) Proving;
- Support.

[138] From a presentation by Andy Stevenson, CEO of Fujitsu UK, in 2007, in Milan.

MSAN (Multi-Service Access Node) equipment is the complex product supplied by Fujitsu. All the other activities are services leveraged by the supply of the complex product, which illustrates the integrated solution supplied by Fujitsu. This set of activities illustrates the nature of servitisation, where Fujitsu (a firm based on technology/manufacturing) offers services of design, deployment and installations alongside its products/goods.

The literature on Complex Products and Systems (CoPS) (e.g. Davies and Hobday, 2005) offer some insights into what happens on the supplier side (Ericsson, Alcatel, etc.) of BT21CN, but the analysis is limited to this one side only. In BT21CN, there is a second stage of integration, which consists of the systems integration of all integrated solutions, putting together the complex systems of those suppliers into the network. In this context of system integration of integrated solutions, two major issues were raised by the suppliers: (i) the challenges of collaborating with firms which are competitors in other projects; and (ii) the lack of a prime integrator to raise issues and coordinate their resolution, although BT was in charge of the systems integration.

According to Davies and Hobday (2005), there is usually a prime integrator for the delivery of complex systems, like nuclear submarines or infrastructure projects. This is predominantly the case when the buyer (or user) does not have any interest in learning how to build the network. Usually the buyer wants only the final product or system delivered and to be trained on how to use it. As BT does however have an interest in learning how to build the system, it is acting as the prime integrator, and negotiating directly with the eight system suppliers. Evidence of this interest in learning (and subsequently commercialising this learning) is the launch of the '21C Global Ventures' initiative in December 2006, which offers to other telecom operators the benefits from BT21CN lessons already learned.[139] The aim of this initiative is to sell the BT21CN know-how delivered by lead consultants, lead engineers, techno-economists and programme managers. The know-how includes expertise in network migration issues; network design, development and testing; network implementation and build; vendor management; and techno-economic modelling.[140] BT claims that they have knowledge and experience of what it takes to reduce operational and financial risks; of end-to-end

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139 Paul Reynolds, CEO BT Wholesale, introduced BT's 21C Global Venture at the ITU Telecom World in Hong Kong on 05th December 2006.

140 Interview with BT Senior Manager, March 2007.

innovation on people, processes and systems; of vendor capabilities and new ways of working with them; of the opportunities of industry regulation and the important benefits of standards; and of the totality of convergence (implementing and selling the concept of convergence).[141] Despite these claims, BT's capacities to assess and resolve technical issues in BT21CN were considered limited, as BT was the slowest link in the value chain.[142]

The firms selected to deploy the network are in direct competition with each other in other projects and markets.[143] It is therefore a challenge to communicate road maps and future plans related to BT21CN with vendors competing in other markets.[144] This becomes a bigger challenge as BT requested the suppliers to offer proposals looking at the whole life cost of the network over a ten-year timespan. Thus, suppliers collaborate for the benefit of their common customer (i.e. BT) in a manner that reflects back on the suppliers' reputation. It is important for the project to be a success, as the success of the project means success for the suppliers as well. As mentioned before, as this project has a high visibility worldwide, the suppliers can use it as evidence of their experience and expertise and facilitate the signing of other contracts for other telecom operators. BT tried to take advantage of this situation by requesting discounts on the prices of the proposals offered by the suppliers.[145] There is a general consensus though that if BT21CN succeeds, all involved suppliers will succeed'.[146] This then was the motivation for competitors to collaborate for the success of BT21CN.

This section (Section 5.4) examines the BT21CN as the systems integration of integrated solutions delivered by BT's suppliers. BT assumed the role of prime integrator of the preferred suppliers, where each supplier is acting as a servitised firm (Vandermerwe and Rada, 1988, Neely, 2007), i.e. moving from a base in manufacturing to offer services in order to meet customers' needs. Fujitsu was shown as an example of such a servitised firm. In order to integrate the integrated solutions of the suppliers (i.e. servitised firms) to build BT21CN, BT needs to develop its systems integration

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141 Ibid.

142 Interview with BT Senior Technical Manager, March 2007.

143 See footnote 107. Collaborating with competitors is an issue that has been debated in the telecom industry for a long time (see, for example, Mansell (1993)).

144 From a presentation by Jacqueline Hay, Managing Director of Ericsson UK, in Milan, in 2007.

145 Interview with BT Senior Manager, November 2005; interview with Cisco Senior Sales Manager, November 2005; interview with Marconi Sales Manager, March 2006; interview with Siemens Senior Sales Manager, March 2006.

146 From a presentation by Jacqueline Hay, Managing Director of Ericsson UK, in Milan, in 2007.

capabilities at a level not required before. These capabilities are examined in the next sub-section.

5.4.1 Systems Integration in BT21CN

BT21CN consists of the systems integration of the various integrated solutions provided by the preferred suppliers as shown in Figure 5.1. The telecommunications industry has already moved to vertical specialisation, where the development and implementation of complex products has been relegated to specialised equipment suppliers (Fransman, 2002b). These suppliers deliver integrated solutions, and BT needs the capabilities to integrate them through a major project.

BT21CN is not an incremental build over the existing technology and network.[147] As noted in Section 5.1, the eight vendors originally selected were Cisco, Lucent, Alcatel, Huawei, Fujitsu, Siemens, Ericsson and Ciena. As the project was being deployed, Alcatel and Lucent merged, as did the carrier business of Siemens and Nokia. Apart from Ciena, the involved vendors are all very large. It is also important to note the international diversity of vendors: Cisco, Lucent and Ciena are from the USA; Alcatel from France; Huawei from China; Fujitsu from Japan; Siemens from Germany; and Ericsson from Sweden. Six different cultures have been assembled to work together on a large scale project with strict timescales. The vendors point out their cultural differences and problems of integration as the major challenge, especially in the initial stages of the project. Time needs to be invested in order to build trust and understanding.[148]

The PSTN network being replaced is around 20 years old.[149] The processes based on it have been evolving and refining during that period. Many people are very ingrained in these processes and changing them is not only a matter of technology, but also a matter of changing people's behaviours and mindsets. Some claim that the most difficult part of BT21CN is to change people's way of working.[150] Also, there are indeed customers at the end of the network. Customers include consumers (individual households and individuals) and large corporations which can be business firms (e.g. in the bank and automotive industries) and also telecom operators and service providers. For these last

147 Interview with Ovum Senior Analyst, September 2005.
148 Interview with Ericsson Senior Manager, March 2007; interview with Huawei Senior Manager, March 2007; interview with Fujitsu Senior Manager, March 2007.
149 Interview with Ericsson Senior Manager, March 2007.
150 Interview with BT Senior Manager, November 2005.

type of customers, BT established Consult21 in order to interact with BT's large customers, setting up a process of consultation. However, some customers, when facing the possibility of change, will always say 'over my dead body'.[151] This is a very contentious and paradoxical issue for BT. It is paradoxical because one of the aims expressed in BT's strategy is to offer customer choice and empowerment. However, when imposing a deadline for customers like telecom operators and service providers to move to BT21CN, BT hurts its strategy to a certain extent.

BT's decision to be the systems integrator for this project has been proving challenging, as the suppliers claim that it has been difficult to have someone internally (within BT) recognised as systems integrator (i.e. the ultimate project manager). As BT is the sole integrator for the whole project, it seems that it is needed to have a 'person' (the project/programme manager) who is responsible at least for raising the issues and gathering the adequate parts for solving problems that may arise.[152] This person in fact seems to exist, with the role of Project Director. However, in practice, it seems that there is a lack of effectiveness (at least for the activities involved in the multi-vendor environment), where suppliers are competitors and collaborators in other projects, creating conflicting situations in terms of sharing information and working in a coordinated way for the success of the project.[153]

BT has been working in a multi-vendor environment for many years. This is because BT has been taking the market approach for a long time, as opposed to other incumbent operators, such as NTT and AT&T in the past, who relied on a small number of suppliers and worked closely with them (Fransman, 2002b). One of the core competencies of BT seems to be multi-vendor management.[154] However, one skill that it remains necessary for it to learn is to debug end-to-end services in a multi-vendor environment.[155] This is one of the NGN capabilities that operators like BT need to develop as equipment and systems become more complex, with more functionality. The suppliers do part of the multi-vendor management by themselves. However, BT had to push it further establishing laboratory system testing and field trials (further developed

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151 Interview with BT Senior Manager, October 2006.

152 Interview with Ericsson Senior Manager, March 2007; interview with Huawei Senior Manager, March 2007; interview with Fujitsu Senior Manager, March 2007.

153 Ibid.

154 Interview with BT Senior Manager, March 2006.

155 Interview with BT Manager, March 2007.

later in this section) to enforce the collaboration among suppliers and validate the solution before it is deployed in the field at the scale required.

Another challenge is the flow of knowledge from the architecture and design to the test environment for the solution validation. There seems to be an insufficient level of detail when transferring information from design to testing: 'the design community understands it, but the testing community does not'.[156] There seems to be the same type of problem when transferring knowledge from R&D to production, when the realities of manufacturing and some additional constraints of the physical environment were not considered during the design. This calls for the transfer of engineering capabilities from the design to the test stages and from testing to different vendors and BT.

The complexity of the project can be translated into the interdependency of the various sub-systems being deployed by each supplier. It is necessary for each supplier to be aware of the part they are deploying and of the end-to-end solution they are part of, and how one impacts the other.[157] This is referred to by Clegg (1990) and Morgan (1986) as 'substantial rationality', i.e. the ability to simultaneously consider the local and global issues of a particular problem. However, as technology and tasks are relatively new to the participants, technical dependencies are often obscure.[158] Those dependencies include the eight vendors and BT and also third party firms dependencies (as each vendor has an average of 30 other suppliers).[159]

Multi-Vendor Integration

Multi-vendor integration is BT's core competence,[160] and it has relied on various external suppliers in the market for many years. Fransman (2002b, p. 46) reported that BT was the first to move to external suppliers with a market approach, whereas in the USA, AT&T remained with its central laboratory concept and NTT was adopting a 'controlled competition' approach, working closely with four different suppliers as well as its own large central laboratories (e.g. Yokosuka and Musashino R&D Centres). What seems to be different with the multi-vendor integration for BT21CN is the scale and scope of the project. Suppliers are reporting that their main challenges are (i) the absence of a prime integrator; and (ii) the need to share their system/product roadmap

156 Interview with Ericsson Senior Manager, March 2007.
157 Interview with Huawei, Ericsson and Fujitsu Senior Managers, March 2007
158 Interview with Fujitsu Senior Manager, March 2007.
159 Interview with BT Senior Manager, March 2007.
160 Interview with BT Senior Manager, March 2006.

with other vendors who are competitors in different markets.[161] Also, as the project is so large, in practice there are many people 'in charge' and it is frequently very difficult to get things done.[162] In addition, the realisation has dawned that the quality of the project is limited by the quality of people you get.[163] The quality and competence of people becomes a recurrent topic, as the jobs require higher levels of cognitive skills, talent and psychological profiles.

One of the reasons why BT21CN is considered a radical and risky approach is due to the level of the immaturity of the products and systems using IP/MPLS technology for large scale implementation in the core network. Products and systems were still under development at the start of the BT21CN project, standards were immature (or non-existent) and vendors had in practice different interpretations of standards.[164] Changes in design needed to be done 'on the fly'.[165] BT decided to move fast despite the products and systems being under development and standards not being mature. That is the nature of leading projects: to operate on the edge.

The multi-vendor integration was made more difficult as vendors needed to deal with a network that had twenty years of life behind it. In the process of replacement, many problems turned up without being expected and re-planning needed to be done. As noted in Sub-Section 5.3.3, it was not a like-for-like replacement of functionality, i.e. BT21CN is about replacing the components (e.g. routers, multiplexers, which are complex products and systems themselves) and changing the way they are connected, i.e., their architecture. As mentioned before, also in Section 5.3.3, new components (e.g. IP routers with different and greater functionalities than previous telecom switches) allow simpler and more robust architectures that enhance the flexibility of the network which in turn allows more flexible services with new business models to be created.

One important aspect of the systems integration activity is that the BT21CN network design is evolving and the suppliers need to incorporate those changes in their product design in real-time. Also, all vendors needed to do some kind of development in their current products and systems to accommodate differences between vendors' solutions. The standards were not well defined by the time the network was being implemented.

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161 Interview with Ericsson, Huawei and Fujitsu Senior Managers, March 2007.
162 Interview with Fujitsu Senior Manager, March 2007.
163 Ibid.
164 Interview with BT Senior Manager, November 2005.
165 Interview with BT Senior Manager, March 2006.

This highlights the complexity of the project. Complexity is related to the uncertainties and unknown/unexpected events that occur during the project journey. Although for such mega-projects rational approaches may fail due to uncertainties, it does not mean that plans are not valuable. 'Both the glorification or rejection of planning are inadequate' (Miller and Lessard, 2000, p. 98). BT suggests though that 'highly detailed and strongly controlled programme plans are key to success'.[166] Also, BT say that they are only 'as fast as the slowest link' and that, as noted in Section 5.4, BT seems to be unfortunately the slowest link.[167]

In order to deal with the complexity of the technology and project, BT decided to establish an integration laboratory to work with the vendors, who usually do not communicate naturally with each other.[168] Although laboratory validation and field trials are normal procedures in the telecommunications industry, the large scale and scope of BT21CN required special attention and further capabilities needed to be developed.

Small within Big – The Role of Lab Validation and Field Trials

The size and complexity of the BT21CN project required a different approach for the laboratory validation and field trial in terms of organisation of resources and people, and of capabilities development. The validation of the solution of the different vendors was a challenge that involved issues like: collaboration, information sharing, standards interpretation, fault isolation, root cause analysis, rapid resolution and validation through regression.[169] These issues are not completely new in the telecom industry. What is new, however, is the scale, scope and timeframe against which this solution needs to be deployed. The validation involves:[170]

- Vendor testing: the aim here is to identify interoperability issues. Single and multi-vendor testing is done at the vendor's premises and at BT premises. This requires early collaboration and cooperation and it is fundamental that these issues are dealt with early and frequently in the process in order to avoid a cumulative slow down later.[171]

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166 Interview with BT Senior Manager, March 2007.
167 See footnote 142.
168 Interview with BT Senior General Manager, March 2007.
169 Interview with BT Technical Director, March 2007.
170 Ibid.
171 Interview with BT Manager, March 2007.

- Laboratory integration: this integration tests the total solution, involving all vendors and all systems. These are automated tests, where full-scale, intensive traffic is validated.
- Field testing: This testing is done jointly with the customers of communication providers. It is an extension of laboratory testing and it focuses on process validation. Intrusive and non-intrusive testing is also performed, taking into account real-world characteristics (that might not be relevant in the lab testing), trying to test the limits of the complete solution.
- Customer trials: this is to test an end-to-end solution, selecting real customers for it. 'A lot more learning happens when real customers are connected rather than in the laboratory no matter how thorough the lab testing is'.[172]

The testing environment seems to be overwhelming. There are eight preferred vendors trailing over thirty vendors behind them.[173] This type of global supply chain is the first that BT is undertaking in its history. This includes the migration of user applications and users; the support for future protocols and applications; and working around new and evolving standards.[174] From the validation process above, the fact is that learning occurs a lot more when there are real customers plugged into the solutions rather than in the laboratory.[175]

BT, as the prime integrator, needs to intervene and 'force' collaboration among the vendors. As one interviewee said: 'collaboration does not come naturally in this industry'.[176] It is expected that the vendors collaborate, but frequently they do not, so BT created the validation environment, including lab and field trials.[177] For the vendors the question is 'did you do your part *and* ensure end-to-end integration?'. So, each vendor needs to be concerned with their part *and* the whole at the same time and that is a significant difference from the past in terms of compartmentalised practices and mindset. Vendors need to be prepared to exercise substantial rationality.

The 'test factory' is based largely on automated capabilities. Structured methodology and processes are used and the principle is 'to learn how to fail quickly in order to learn

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172 Interview with Fujitsu Senior Manager, March 2007.
173 Interview with BT Senior General Manager, March 2007.
174 Interview with BT Senior Technical Manager, March 2007.
175 Interview with BT Senior Manager, March 2007.
176 Interview with BT Manager, March 2007.
177 Interview with BT Senior Manager, March 2007.

faster'.[178] The aspects of learning (and hence the quality of people) and building trust seem to be major concerns in the BT21CN project.

This sub-section (Sub-Section 5.4.1) highlights the systems integration capabilities used to build BT21CN and draws attention to the multi-vendor integration that requires further capabilities development in laboratory validation and field-testing. The existing systems integration capabilities were not adequate due to the scale and scope of the project. The systems integration deals with the technical issues of interconnection and interfacing of the various systems from different suppliers, and its deployment in the existing infrastructure. The aspect of project capabilities deals with the organisation of the activities in order to achieve the defined aims of deadline, budget and specification. Project capabilities are examined in the next section.

5.5 Project Capabilities: Important Aspects

BT21CN can be seen through different perspectives such as: (i) integrated solutions; and (ii) the network as a platform. Here, the focus is going to be on BT21CN as an integrated solution conducted as a major project. For this analysis, the concept of project as a temporary organisation (Turner and Mueller, 2003, Lundin, 1995, Lundin and Soderholm, 1995, Packendorff, 1995, van Donk and Molloy, 2008) is best suited. The traditional approach of project as a temporary endeavour (or a collection of temporary endevours) does not work well in an environment where complexity and uncertainty are high. Projects as organisations have the advantage of allowing higher order levels of interaction such as culture to be considered in more appropriate manners.

One major challenge of BT21CN is to cope with the complexity of the project, as both size and scope are unprecedented within BT. Large and complex projects like this are well-known in construction and other industries (see, for example, Flyvbjerg et al. (2003), Miller and Lessard (2000), and Morris and Hough (1987)).

The technology behind BT21CN, as it is not mature yet, produces much uncertainty within the project. The sheer size and scope adds to the complexity of the project. The challenge seems to be to operationalise the strategy established for the project. One interviewee says: 'We think we are doing the right thing, but there is always an

[178] Interview with BT Senior Technical Manager, March 2007.

execution risk'.[179] As in other megaprojects, risk needs to be managed against surprises that may occur as the project unfolds (Flyvbjerg et al., 2003).

Another important aspect to tackle with uncertainty is people. As BT and vendors are learning, 'the quality of people on the project is the only defence against failure'[180], and 'there are many opportunities to fail everyday'[181]. This emphasises the importance of having the right people, with a certain profile of entrepreneurship and risk-taking. As it is a long project, another major challenge of BT21CN is to keep the people motivated throughout the planned 5-year project.[182] The project becomes an organisation in itself.

In this type of large project, where uncertainty is high, priorities do change and everything seems to be a priority.[183] Under this pressure to deliver, the challenge is to maintain the focus for a long time. Some recurrent recommendations by BT are as follows:[184]

- To ensure as many parallel activities as possible. This has the downside of overwhelming people and existing processes. This is also the nature of the BT21CN project, where a phased approach was not chosen (as it seems that other incumbent operators are adopting).
- To ensure senior management engagement and sponsorship. This is a common recommendation for every major project. For BT21CN this was facilitated by the fact that the new CEO, Ben Vervaayen, was keen to implement radical change, and BT was coming from a huge debt crisis in the beginning of the 2000s.
- To engage early in the life cycle, working with vendors in an integrated way, as discussed in Sub-Section 5.4.1 for the solution validation.
- To sustain motivation. As noted earlier, the challenge is to maintain focus and motivation for a long period of time under high pressure to deliver.
- To ensure continuous innovation. This is due to the nature of the project where design, solutions and standards are co-evolving and demand changes in real-time.

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179 From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82.
180 Interview with Fujitsu Senior Manager, March 2007.
181 Interview with BT Manager, March 2007.
182 Interview with BT Senior Manager, March 2007.
183 Ibid.
184 Ibid.

- To be agile. Rapid design response and proactive thinking about new ways of working are needed.

These recommendations are not surprising and are indeed very commonly cited in other major projects. One major difference though is regarding the nature of the technology being adopted. Although IP/MPLS is not a new technology for the incumbent operator and is not a disruptive technology (cf. Christensen, 1997), the level of engagement of the user (BT) in the early life cycle may be deeper than is normally encountered in other major projects. BT has a deep interest in learning about the technology and systems implementing it as BT decided to assume the responsibility of the systems integration. Besides that, suppliers for this project are competitors in other markets, and natural competition and unnatural cooperation calls for cooperation in the early stages of the project in order to build trust.

Another aspect of the project is the change in the working processes and the establishment of new ones. In a complex project like this, usually the way of working is not wrong in itself, but it is frequently insufficient due to the scale and scope of the project.[185] Thus routines (cf. Nelson and Winter, 1982) need to be changed and reinvented and dynamic capabilities are needed at various levels of the project.

One of the challenges of a large and complex project is its planning. Some practitioners may argue that planning may not be that useful, as unexpected events will happen and make the plan outdated. Most people though agree that some degree of planning is needed. In the early stages of BT21CN, besides the fact that everything seemed to be a priority, 'all parties underestimated equipment, space and time'.[186] There were eight suppliers delivering their integrated solution for each part of the network according to BT's architecture. To a certain extent, this is not a surprising situation. There is plenty of evidence that resources are underestimated in many historical megaprojects.[187] Thus 'a dynamic scheduling is needed, as the needs of the programme changes'.[188]

This section (Section 5.5) highlights project management as one of the most important capabilities for the deployment of BT21CN. Although systems integration and project management were capabilities already existing in BT, they were in a level of

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185 Interview with BT Senior Manager, March 2007.

186 Interview with BT Senior Manager, March 2007; and interview with Ericsson Senior Manager, March 2007.

187 For some of evidences and examples, see Flyvbjerg et al. (2003).

188 Interview with BT Senior Manager, March 2007.

development that was not enough to undertake BT21CN as a major project due to its complexity. This section illustrates many aspects of the complexity that BT is facing to develop such capabilities, as there is no benchmark that BT could use as a reference. Therefore most of the capabilities development needs to be done 'on the fly', as the project evolves. The next sub-section (Sub-Section 5.5.1) examines the impact of the development of the capabilities for BT21CN on the firm as a whole.

5.5.1 Company-Level Capabilities Development through BT21CN

The success of BT21CN depends not only on BT´s capability to build the convergent network but also on what Mansell and Steinmueller (2000) call 'understanding the factors influencing the rate of market development' (p. 103) and how to address it: once the network is built, how to make the customers adopt the new services, and how BT and its ecosystem generate new services for the market and appropriate the rents. Roberts and Fusfeld (2004) point out five critical work functions for innovative projects: idea generating; entrepreneuring or championing; project leading; gatekeeping; and sponsoring or coaching. They argue that 20-30% of the work is related to those critical roles (unique skills performed by relatively few people). The other 70-80% is about technical effort based on routine problem-solving tasks. From the discussion above, in BT21CN, it seems that the roles that are missing or need improvement are mainly project leadership-based as BT is the prime integrator and suppliers are struggling with the absence of a nominated 'integrator'.[189] The other role that needs improvement is gatekeeping, for the interface between design and testing. The role of gatekeeper is being implemented in the applications level though, in the platform and collaboration with third parties approach.

During the years of the monopolistic market, the telecom operators and suppliers had long-term relationships and support from the government in order to develop technology. In recent years, technology and knowledge is widely available. In the case of telecommunications networks, interoperability and interconnection are important, so that working with open and standardised interfaces make the potential market larger for suppliers. The technology used in BT21CN is not completely new. Parts of the network

[189] Interview with Ericsson Senior Manager, March 2007.

and the technology that BT is putting together are already deployed or being deployed elsewhere in the world.[190]

The decision to be the systems integrator of BT21CN has had a major impact on BT's organisational and innovation capabilities. For example, the adoption of the IP/MPLS and the approach of building more open platforms to third party firms have implications in the way BT innovates in services. The new innovation capabilities in services are examined in Chapter 8, and the impact on BT's organisational capabilities are examined below.

5.5.2 Impact of BT21CN on BT's Organisational Capabilities

For a long time, incumbent fixed-line telecommunications operators were seen as providers of robust services involving voice communications. The ability to build and maintain networks and to provide such services is supposed to be their core competence. BT's core competence seems to remain the ability to build and maintain networks and provide services, as BT has the vision of becoming a 'Global Networked IT Services Company'.[191] In other words, the core competence is and will continue to be focused on network-based services, not on producing content. To engage with content, BT is forming partnerships. However, the period of transition offers a space to 'core rigidities' (cf. Leonard-Barton, 1992) to flourish, as new processes and institutional changes are being developed and old processes are being discontinued or reformulated. Core rigidity involves not only the change of internal processes per se, but also the people involved in them. The transition to NGN involves not only technological, but also cultural change within BT.

Routines, understood as processes inside companies, are certainly changing during a major transition like this. The real challenge is not the technology itself, but what takes time in the transition is to change the internal processes that were established in the PSTN context and which have been reinforced for many years.[192] Another interviewee said that the main challenge is to change peoples' minds, which are focused on the PSTN processes.[193] In BT´s transition to NGN, routines are being changed due to technological change, from circuit-switched PSTN base to packet-switched IP (Internet Protocol) base. These routines are related to the operation of the infrastructure.

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190 Interview with BT Senior Manager, October 2006.
191 Ibid.
192 Interview with Deutsche Telekom Manager, March 2005.
193 Interview with BT Senior Manager, November 2005.

However, the transformation of the network implies a modification of the current relationship with customers and the provision of services. Thus, routines are not only changing for internal operations, they also must change to address the interface with customers and third party firms that may use BT infrastructure to provide new services.

As old routines are discontinued, new routines are created, and these new routines are more closely related to the platform for creation of new services from third parties and from BT itself. Many new routines are being created or redesigned in order to address the creation of new services and the more intense relationship with their partners (or ecosystem). One example is the common capabilities approach (Levy, 2005), as introduced in Chapter 4, Section 4.4, where BT is identifying common elemental building blocks to be used in a variety of services, thus reducing time to market and cost to develop new services, using a platform approach.

Accelerating the Development of Organisational Capabilities through BT21CN

Taking into account the framework of strategic, functional and project capabilities proposed by Davies and Hobday (2005) and transporting it into the context of BT, these three capabilities are very strongly present in the transition to NGN and it seems that they have different intensities over time. The decision making process of the transition needs a strong strategic capability, and the decision to invest £10 billion over about five years was certainly not an easy one. Coincidentally, the announcement of BT21CN was made a few years after the top management (CEO and CTO) of BT was changed, and top managers outside BT took over. This certainly had an impact on BT´s top management dominant logic and influenced the decision to approve the BT21CN project.

The project capability is manifested through the establishment of the BT21CN Project. Davies and Hobday (2005, p. 77) point out the project as the basic unit for a firm to survive, grow and achieve its strategic objectives. As revenues from its traditional services are declining, BT is addressing, through BT21CN, its strategic objectives for survival and growth: (i) keep a relentless focus on improving customer satisfaction; (ii) put broadband at the heart of BT; (iii) create mobility services and solutions; (iv) transform the network for the twenty-first century; (v) achieve competitive advantage through cost leadership; (vi) lead the world in network-centric ICT solutions; and (vii) reinvent the traditional business, motivate people and live the BT values (BT, 2005c).

During the transition, BT needs world-class project management skills, within which communication skills are a major component.[194] BT21CN certainly moves BT to a new technology base, however it does not seem to move it to a new market base in the domestic market, as major customers being addressed are still its mainstream customers. However, the way to address these existing customers is significantly different. BT21CN makes it possible for BT to expand its market base globally from a common and robust network.

Along the road to transition, capabilities are transferred to functional departments, which will carry out the daily activities of maintaining and upgrading the network in following an evolutionary way. Projects of a smaller scale may be set up to address specific problems, but not on the same scale and scope of BT21CN. The lean operator that is expected to emerge after the BT21CN project has been implemented is due a major optimisation of BT´s functional capabilities, where BT is expected to make cost reductions in operational activities.

The BT21CN project and BT's decision to take the role of systems integrator of the integrated solutions delivered by the preferred suppliers accelerated the development of BT's organisational capabilities to address the changing communications market, thus enabling BT to respond faster and more flexibly to demands from customers. Increasing the amount of external relationships and the capability to establish and maintain those relationships seem to be more and more important as BT21CN evolves. This is a situation different from previous technological changes suffered by the incumbent fixed-line telecommunication operators, who were more focused on expanding and improving their network capacity.

In summary, the strategic, project and functional capabilities interact during the transition, but they are required with different intensities over time: at the beginning of the transition, strategic capabilities need to be strong in order to decide to make the transition and set the goals and principles of the transition strategy. Once a decision has been taken to make the transition, it is necessary to implement the strategy, and that is where project capabilities become more important or 'intense' (with BT establishing the BT21CN Project for the transition). At the final stages of the transition project, functional capabilities again become more intense, and new capabilities are transferred to existing and new functional activities. BT21CN is a project with an IP/MPLS

[194] Interview with Ovum Senior Analyst, March 2007.

network objective that is expected to be a catalyst for the organisational capabilities to be changed and/or developed. It gives the framework or the scaffolding to build the network using the platform approach.

Developing Platform Capabilities

As noted in Chapter 4, Section 4.4, in building a common platform to address the changing needs of customers, the identification and implementation of 'common capabilities' based on the reuse of generic service capabilities, such as authentication, presence, location, digital rights management, and content processing among others (Levy, 2005) is central. The platform approach is widely applied by BT in its 'Next Generation Systems Architecture – The Matrix', where the aim is to restructure BT's operational support function (Strang, 2005). Besides enabling an architecture which relies on reusable capabilities, the network is designed in such a way to open it up to third party service providers to develop new services at the application level (Darling and Sauvage, 2005). Thus, platform capabilities at the network level integrates the product platform approach (Meyer and Lehnerd, 1997, Meyer and Dalal, 2002, Meyer, 2007b), based on the reuse of subsystems and interfaces, and the platform approach to drive industry innovation, opening up the interfaces for external parties to develop new applications and services (Gawer and Cusumano, 2002). Due to the need for cross-functionality in the development of new services, platform capabilities are underpinned by systems integration and project capabilities.

5.6 Conclusions

This chapter elaborated on BT's network transformation, the so-called BT 21st Century Network (BT21CN). It is called a transformation because it has a major impact on the long-term strategy of BT, and is not merely a short-term change. It impacts on the BT's capabilities development and service innovation processes.

BT21CN represents an instance of the network as a platform, a strategy which seems to be gaining momentum in the telecom industry, influenced by the convergence not only of technologies, but also of the practices and strategies of the IT industry. BT21CN can be seen as a platform for two complementary reasons found in the literature: (i) the reuse of components (subsystems, interfaces and processes) as a way to create new products and services; and (ii) as a platform for innovation, exposing interfaces and allowing third party firms to develop new services on top of the network. Platform

capabilities incorporate both complementary aspects of the platform strategy and are underpinned by systems integration and project capabilities. Although the development of platform capabilities is a clear direction that BT is taking, the interests are still at odds. It is uncertain whether BT, its suppliers and third party collaborators are all participating in a positive sum game, effectively cooperating to a mutually beneficial goal.

In this chapter, it is shown that BT21CN represents the integration of the integrated solutions provided by the preferred suppliers of BT. BT21CN represents a first-move for the incumbent telecommunications operators in the world, and this means that BT is experiencing some of the transition problems earlier than other incumbent operators. The decision of BT to be the systems integrator of the various integrated solutions led to the higher levels of capability in the development of systems integration and project management to deal with higher levels of complexity. It also led to the acceleration of the development of BT's organisational capabilities, enriching its core competence and changing its routines from the PSTN to the NGN context.

BT21CN shows that integrated solutions may occur between two stages of systems integration: (i) within the suppliers of complex products and systems; and (ii) within the large customer (i.e. BT), who need to integrate all the integrated solutions provided by those suppliers. A distinctive characteristic of BT21CN is that the role of prime integration is played by BT (the customer) and not by one of the suppliers, compared to the prime integrators found in Davies and Hobday (2005). This has wide implications on BT's 'learning' experience, by which BT aims to commercialise the process of building NGNs to other catching-up operators and to other major customers who are migrating their networks to IP. This learning by the customer is not a common feature in other major projects, such as those set up to produce, for example, nuclear submarines, where the customer (i.e. government) does not have an interest in learning about building the nuclear submarine, and is only concerned with how to use it.

The scale and scope of BT21CN does not allow this major project to be conducted using a predominant rational or substantive rational approach. Instead, BT has organised its effort to address many of the problems as they arise rather than anticipating and solving such problems in advance. The extent to which BT is able to solve such problems depends on the quality of learning of people they bring onboard, i.e. people capable of dealing with unexpected situations and responding accordingly to them. Also, BT21CN

is an innovation process in itself that triggers other innovation processes in the various companies participating in the project.

The outcome of the BT21CN project is a new infrastructure that challenges the way BT itself works. Changes reinforce and open the path for other changes. The platform capabilities being implemented at the infrastructure level forces the development of new capabilities and changes both the way BT innovates in services and the way BT relates with its customers. The next chapter (Chapter 6) deals with the organisation of BT Global Services (BTGS) and its capabilities to deliver integrated solutions to large customers, using the platform built by the BT21CN project as an enabler of the business of integrated solutions. Chapter 7 shows how innovation occurs through integrated solutions, analysing customer-centric projects delivered by BTGS. Finally, Chapter 8 deals with how the platform strategy is combined with other service innovation initiatives for BT to cope with a more competitive and convergent environment.

6. Organising for Integrated Solutions: The Case of BT Global Services

6.1 Introduction

In Chapter 5, the technological aspects of BT21CN as a network platform were discussed. It showed the inadequacies of the silo-based approach and the subsequent adoption of platform-based approaches to build the network. It analysed BT21CN as a case of integrated solutions delivered by BT's suppliers and considered the issues arising both from BT's role as prime integrator and from the project management requirements of BT21CN. The integrated solutions which, in turn, are being integrated by BT, the user, to complete BT21CN are each individually, as well as collectively, instances of systems integration (cf. Prencipe et al., 2003) and as such this case addresses the issue that 'current research barely scratches the surface of systems integration from the user perspective' (Hobday et al., 2003, p.11). This chapter is concerned with the organisation of another part of BT's business, the delivery of integrated solutions employing ICT-based services by BT Global Services (BTGS).

The most common customer segmentation used by telecommunications operators is the division between the consumer (mass market) and the business customer. BTGS is dedicated to the delivery of integrated solutions to a particular class of business customers, large corporations that have facilities in different parts of the world. This chapter continues the examination of the platform strategy being developed by BT, addressing the case of BT Global Services (BTGS), which is devoted to working with large multinational corporations with multi-site facilities and European operations.

BTGS delivers integrated solutions based on their core competency in network design, operation and maintenance. BTGS focuses on the delivery of high value integrated solutions referred to in the industry as 'networked IT services'. This represents the convergence of three overlapping domains, namely: (i) network, in terms of the infrastructure that incumbent telecoms can provide; (ii) IT, adopting practices from the IT industry, which are the domain of firms such as IBM and HP; and (iii) services. Regarding the last domain, BT has been considered a service company from its inception. However, the nature of services is changing and including more professional

services, which are usually the domain of consulting companies such as Accenture.[195] Professional services include consulting services and are based more predominantly on deep relationship with customers, trying to articulate and satisfy their needs. Ultimately, integrated solutions can be considered an instance of convergence at the service and applications level, on top of the network convergence, which merges fixed, mobile and IT networks into a coherent system. In order to achieve service convergence, BTGS has been undertaking organisational changes in order to become more customer-oriented.

This chapter is structured as follows: Section 6.2 deals with the drivers of integrated solution and why BT has embraced this type of business for large corporations. Section 6.3 discusses the organisational changes and challenges that are necessary in order to build a customer-centric organisation to deliver integrated solutions to large customers, where integration occurs much closer to and within customers. Section 6.4 develops on the strategy, capabilities and organisational issues concerning the business of integrated solutions of BTGS. Section 6.5 integrates both BT21CN and BTGS from the integrated solutions perspectives, while Section 6.6 presents a discussion about the process of building the business of integrated solutions of BTGS, highlighting the business models and co-creation of value with customers. Finally, Section 6.7 draws together the main conclusions of this chapter.

6.2 Drivers of Integrated Solutions in BT

Integrated solutions have been attracting some attention in academic literature in recent years due to its power of generating large amounts of revenue (and hopefully profits) for large corporations in the high tech sector (Wise and Baumgartner, 1999, Oliva and Kallenberg, 2003). Examples such as Alstom Transport, Ericsson Mobile Systems, Thales Training and Simulation, WS Atkins and C&W show the deployment of integrated solutions as a business from a manufacturing (the first three firms) and from a services (the last two firms) base (Davies and Hobday, 2005). Wise and Baumgartner (1999) claim that manufacturing firms are moving downstream into services because that is where the money is, and Davies and Hobday (2005) demonstrated that not only manufacturing, but also service firms are moving to integrated solutions. This represents the servitisation (cf. Vandermerwe and Rada, 1988, Neely, 2007) not only of manufacturing, but also of service firms, which are increasingly embedding the culture of service-dominant logic (cf. Vargo and Lusch, 2004). Thus, it is interesting to

[195] Interview with BT Senior Manager, March 2006.

elaborate on what the drivers for integrated solutions are in the telecommunications industry, taking BT Global Services case as an example of a service firm. Other major operators like Deutsche Telekom and France Telecom also have this type of business in their portfolio, through T-Systems and Equant divisions respectively. The drivers identified for BTGS should be generalisable for other telecommunications operators (such as T-Systems and Equant), although this generalisation is out of the scope of this research.

The main trends that are driving BT's business of integrated solutions (represented by its networked IT services) are the following: (i) the switch to digital; (ii) globalisation, including workforce globalisation; (iii) real-time processing; and (iv) outsourcing.[196]

The switch to digital means 'the ability to digitise information and send it reliably and cheaply anywhere it needs to be: into customer's hands or into supplier's hands around the world'.[197] This means the ability to move information to the right place and at the right time. Right place means anywhere in the world where the large corporation has an office or a plant (and most of the large corporations have global operations). Right time means moving information quickly and reliably. In the most demanding cases, quickly means establishing real time sessions and real time processes such as those found in the financial services applications.

Globalisation means that firms are locating their facilities in different parts of the world due to lower labour costs or to be closer to customers, and moving information to the right place also means to the right people. This includes the globalisation of the workforce, where work is 'off shored' to countries like India and China, where the level of education is becoming higher and the longer distances involved (at least between urban centres) are becoming a lower barrier due to the development of information and communication technologies. What is emerging is an environment in which the whole organisation is run on a global basis, in real time, and therefore this organisation's concerns about reliability, quality and resilience are growing exponentially.[198] This is the environment where BT's capabilities have been developing in terms of reliability, quality and resilience of services for large businesses.

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196 From a presentation by Andy Green, CEO of BT Global Services in 2006.
197 Ibid.
198 Ibid.

Another driver and tendency identified in the last few years is outsourcing. Firms are more prone to focus on their core businesses. For them, establishing, maintaining and upgrading their IT networks is not within their area of core competence. Historically, some incumbent telcos have been managing different parts of their customers' IT networks, and at a certain point it makes sense for the customer to outsource the IT network.[199] In other cases, the customer's IT network grows in size and complexity in such a way that it does make sense to outsource to another firm that manages IT networks as a way of living. So, increasingly, customers are opting for managed services, out-tasking and outsourcing.[200]

The 'golden opportunity', as BT calls it, lies in the intersection of three domains (network, IT and services), as depicted in Figure 6.1. This figure represents much of the nature of integrated solutions within BT and other telecom operators. Network products are the traditional core competence of BT and other incumbent telecom operators. IT products are mostly accessed through partners, and professional services are a major capability that BT needs to develop in order to support the other two domains. Professional services, within the context of this research, can be defined as a knowledge-intensive type of service delivered by highly qualified professionals, which requires a high degree of customisation and intense face-to-face interaction with customers (Lowendahl, 2005, Maister, 1993). Professional services include consulting capabilities, systems integration and outsourcing. These capabilities change the nature of the relationship with customers from a predominantly transaction-based to a predominantly long-term term relationship focusing on the customers' evolving needs, wants and frustrations.

Another interesting point of Figure 6.1 is the fact that services (and in particular professional services) can be viewed as integrating the other two domains (network and IT products). This reflects the idea that BT Global Services is 'a services business with a network inside, not a network that does some services'.[201] This is what Vargo and Lusch (2004) call the service-dominant logic in contrast to the good-dominant logic, where service is the main focus of the firm and goods support services. This does not mean that the goods/product logic is not relevant anymore. It means that in this type of integrated solutions business, isolated goods and isolated services are not the ones that

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199 Interview with BT Senior Manager, March 2006.
200 From a presentation by Andy Green, CEO of BT Global Services in 2006.
201 From a presentation by Tom Craig, BTGS President, IP Networking, on 14th September 2006.

add sufficient value to the business. It is how the firm integrates or blends with other dimensions important to the customer in order to meet customer's needs and wants (possibly over time, and not only at a certain point in time) that adds value. For example, other parts of BT, such as BT Retail, still rely mostly on the provision of services as goods, although the customer experience is becoming increasingly relevant. Customer experience (for the mass market consumer as referred to by Prahalad and Ramaswamy (2004)) may be increasingly related to the service-dominant logic, as customers may consider that they are buying the experience as a service rather than the product or goods themselves. However, the need for a broader scope and relationship still resides mostly with the large customers, where the supplier (i.e. BT) needs to engage much more broadly and deeply with the customer.

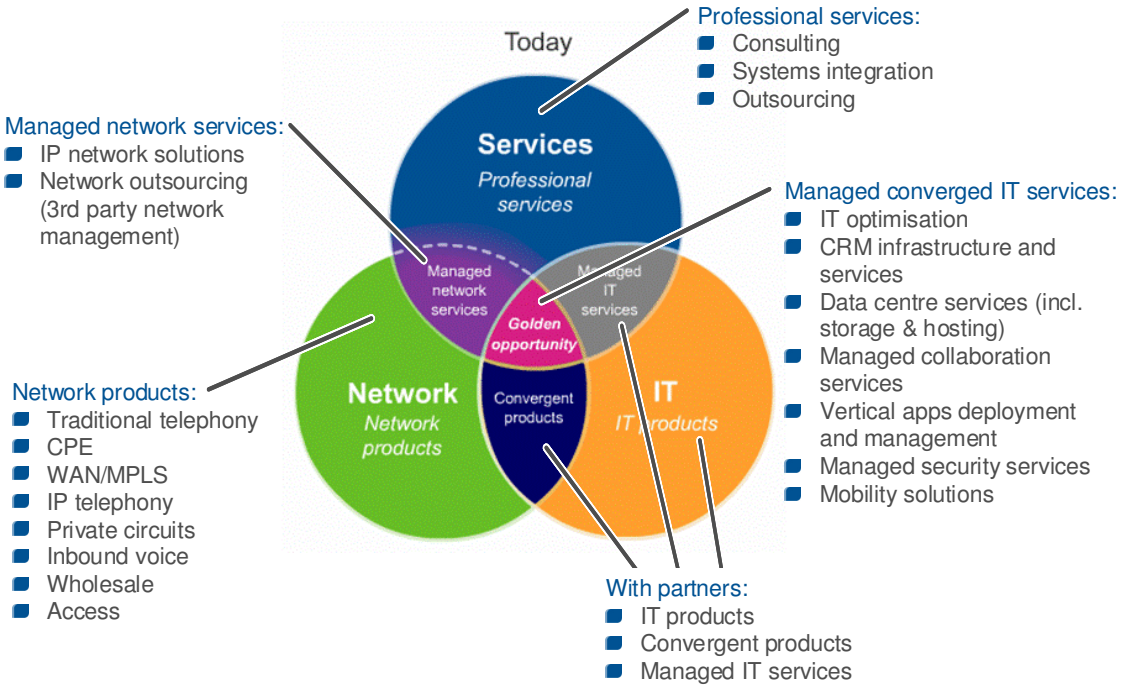

Figure 6.1 – BT's Networked IT Services Portfolio
Source: Presentation by BTGS CEO Andy Green (2006)

A centrepiece of BT's strategy is the deployment of BT21CN as a single platform that enables the delivery of new services faster and at lower cost. Chapter 5 demonstrated how BT21CN was a major project, and how systems integration and project management capabilities were playing a major role in its deployment as a platform. Section 5.4 examined BT21CN as an integrated solution provided by BT's suppliers.

This approach is later compared in Section 6.5 to the integrated solutions that BT supplies to its customers. BT21CN is a systems integration of integrated solutions that BT is receiving as a customer of the preferred suppliers (Alcatel, Lucent, Cisco, Huawei, Ericsson, Ciena, Fujitsu, and Siemens).[202]

Building a business like BTGS was not done overnight. As one BT Executive said:

> […] I have been in the company for 16 years and the evolution to create Global Services has been at least 12 or 14 years to get to where we are. We started with a business that we used to call MNS – Managed Network Services – to ask how you can add value onto customers' solutions. To build this company is not something that you can decide to. We did not wake up last week and think, 'We think there is a new opportunity. Perhaps we should be adding more value to networks'. There is an inevitability in the market. When all you are selling is capacity and bandwidth and that is your value, then it is not a great economic model. That was foreseen a very long time ago and that is why of 27,000 people, 11,000 are paid by the customer for their knowledge. It takes time.[203]

Market forces like globalisation and outsourcing have been occurring for a long time, and have motivated many telecom operators (not only BT, but also Deutsche Telekom, France Telecom, C&W and others) to establish their 'Global Services' division. Usually these divisions started as being responsible for systems integration and consulting (in some instances, by the acquisition of other firms) and were gradually consolidated into a wider global services division, with greater influence on the incumbent operators' internationalisation strategy.

This section discusses the main drivers of integrated solutions (i.e. digitalisation, globalisation, real-time processing and outsourcing) that are in the background of the transition to Next Generation Networks (NGNs), including BT21CN. These drivers affected not only how BT and other incumbent telecommunication operators conduct their business, but also how other large firms such as the telecommunications equipment suppliers (e.g. Ericsson, Alcatel, etc.) conduct their business. The next section (Section 6.3) analyses the major organisational changes and challenges that BT Global Services (BTGS) has been undertaking and facing in order to become more customer-centric. A customer-centric organisation has its business processes oriented to customers, not to products or services. The performance metrics are usually measured by the impact on customer satisfaction rather than on delivery of high volumes of products (Galbraith,

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[202] When BT signed the contract with the suppliers of BT21CN, Alcatel and Lucent, and Nokia and Siemens were separated companies. Nokia was not one of the chosen suppliers.

[203] From a presentation by Tom Craig, BTGS President, IP Networking, on 14th September 2006.

2005). The customer-centric organisation requires a different mindset towards the customer from the traditional functional organisation.

6.3 Towards a Customer-Centric Organisation at BT Global Services

Globalisation is one of the major drivers that motivated BT to reorganise its business unit BTGS in order to position global firms as their customers and potential customers. BTGS decided to focus on existing corporate relationships and build on them.[204] BTGS had the strategic aim of growing in external markets (outside the UK) and focusing on customers who had the aim of growing their market share globally. This required an engagement with the customer at the strategic level, and an organisational structure that could support this strategy. The traditional functional and fragmented organisation was not adequate for the customer-centric approach.

As BTGS matures, it becomes increasingly important to understand the customer's journey, i.e. all customer experience from the initial motivation to start the project, the customer strategy, and the intermediate events that lead to the execution of that strategy. It is not about understanding BTGS's own journey alone. Instead of product, systems or even solution selling, it becomes a matter of value selling, and this requires new skills from the front-end team which move beyond the technology to the integration between business and technology, where BTGS helps the customer to better take advantage of the technology in its business. This also requires that BTGS understands the business the customers are in.

One major problem with previous structures was that the customer had a fragmented view of BTGS. This means that different people and teams from BTGS could contact the same customer on similar (or even the same) business without any awareness of previous business between the two. The final result could be a complaint by the customer about the lack of coordination. This is illustrated by Figure 6.2, where it can be seen that the different people and groups from BTGS can come from different departments within BTGS (e.g. Global Products, Convergent Solutions, Solutions, or Consulting and Systems Integration (C&SI)), from different geographical regions (e.g. Americas, Asia Pacific, or Europe/UK), and from different companies which were acquired by BT (e.g. Albacom, Infonet, or Radianz). Ideally, the customer should have a relationship with 'One BT', and not with uncoordinated parts of it.

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[204] Interview with BT Senior Manager, September 2005.

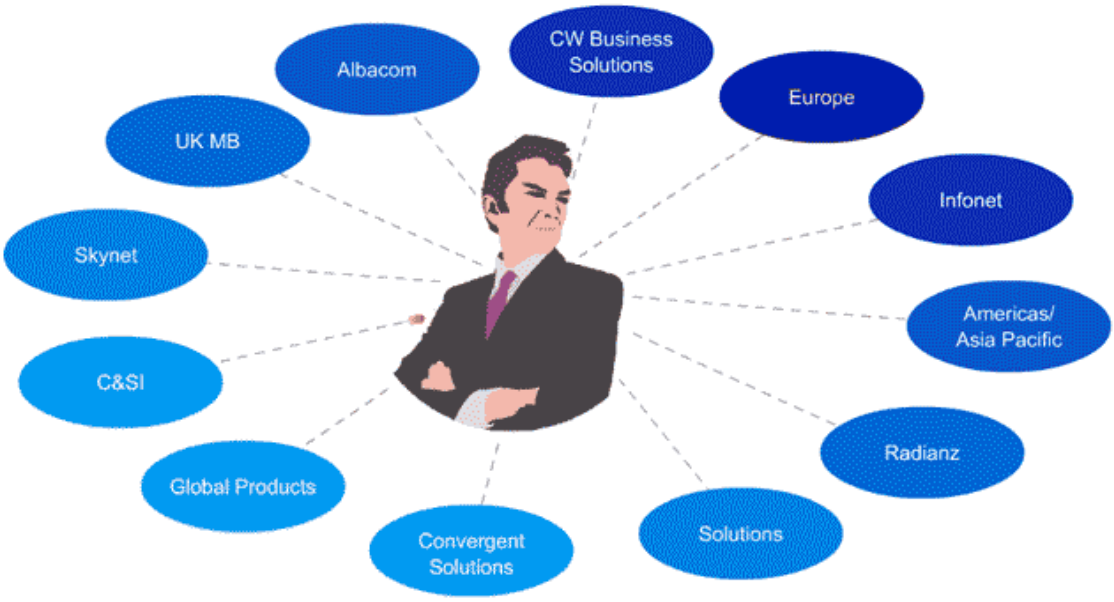

Figure 6.2 – Fragmented Organisation to Approach the Customer
Source: Presentation 'BT Global Services Update' by BTGS CEO Andy Green on 29 June 2005 to market analysts in London.

Moving on from the fragmented organisation, BTGS promoted structural change in order to approach the customer and be perceived by the customer as 'One Company'. The new organisational structure reflects the avoidance of silos and the use of an underlying layer structure to organise the different areas within BTGS. Figure 6.3 shows the components of the layers. At the bottom, it continues the functions and centres of excellence as specialised units serving all the service lines (i.e. IP Networking and IT& Professional Services) that in turn serve specific market (i.e. UK or international, and subdivided into market segments, e.g. healthcare, financial services, retailing etc.) which eventually serve customers (in the UK or internationally).

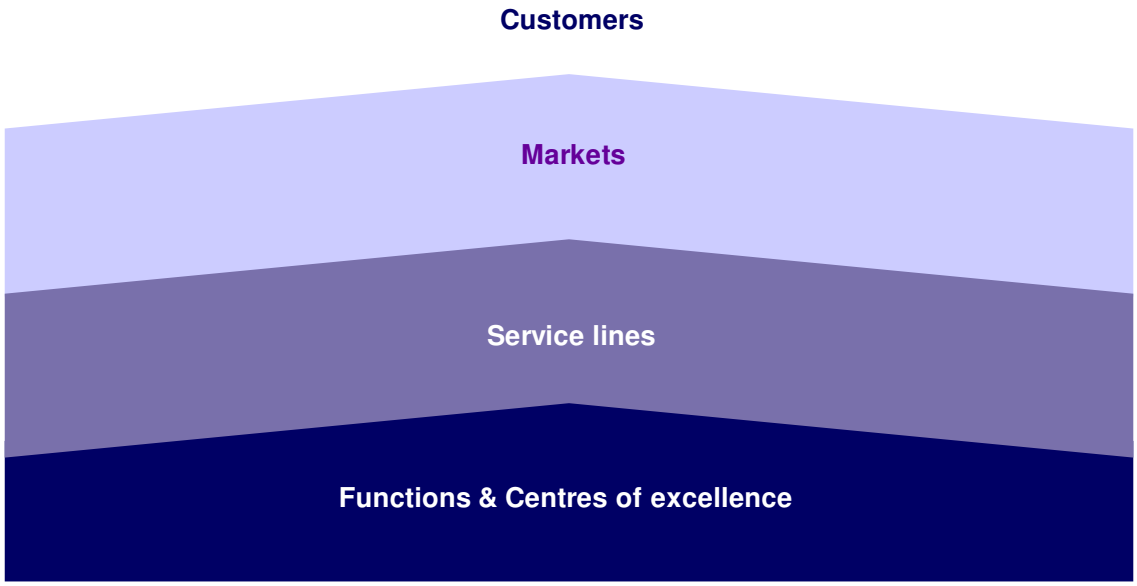

Figure 6.3 – Towards a Customer-Centric Organisation
Source: Presentation 'BT Global Services Update' by BTGS CEO Andy Green on 29 June 2005 to market analysts in London.

Figure 6.4 details the components of the layers, according to BTGS structure. At the bottom, there are the traditional functions of: (i) HR; (ii) finance; (iii) strategy and development; and (iv) and commercial, legal and regulatory. On top of them, the operations are divided into front-end (facing customers) and back-end (facing support activities and technology) sections. The service lines are divided into two parts (i.e. IP Networking, and IT and Professional Services) that perform the networked IT services. Market and customers are primarily divided into UK and international sections. Global Business involves multinationals with global presence, and International Business deals with overseas customers with specific requirements in their countries. Major customers are further divided into their specific markets. Although these represent major changes in the organisational structure of BTGS, divested interests and power struggles still exist, and make the underlying changes more difficult and time-consuming. In conjunction with the organisational restructure, the business processes need to change in order to measure performance against customers and customer satisfaction, and not only against isolated products and commercialised services. The purpose of the layer approach is to emphasise the integration of technology with business in the approach to customers, i.e. BTGS helps the customer in the use of technology, taking advantage of the best technological features in the business customers are in.

Figure 6.4 – The New Customer-Centric Organisation
Source: Presentation 'BT Global Services Update' by BTGS CEO Andy Green on 29th June 2005 to market analysts in London.

This new structure has some benefits such as more flexible resourcing, and a faster and more adequate response to customers. However, this structure increases the level of complexity that BTGS has to manage. BTGS takes more risks in the integration of different products and systems with the existing systems used by the customer. The integrated solution for each customer tends to be highly customized, and for increasing profits to be obtained, much work is necessary on reducing costs of providing solutions through creating repeatable solutions from customer to customer. The aim is to

productise a solution that means BTGS does not need to reorganise and reinvent every time it delivers an integrated solution. Solutions can be reused in the same way that engines can be reused in different models of cars. Thus, higher revenues may not necessarily imply higher operational costs.

In order to illustrate the complexity of the tasks faced by BTGS, Figure 6.5 shows the range of services provided by BTGS. The value propositions are based on network-centric ones, as BTGS is striving to build a services company from a communications background deeply grounded on a reliable network. At the base of the pyramid resides the global IP infrastructure services, where BT21CN plays a major role as a converged network. The nearer the top of the pyramid we climb, the higher the value of the services provided. BTGS is trying to focus on the high value end of business transformation services, supported by the global IP infrastructure, applications and its management, and outsourcing and managed services. This means that BTGS is concentrating on helping businesses to use the technology to achieve their growth aims.

Another aspect of the complexity of the task is the level of partnership required to deliver integrated solution. For each layer of services, there are several partners that are combined according to the needs of each integrated solution. For example, in the global IP infrastructure services, BTGS works with partners such as Cisco Systems, Intel, Alcatel-Lucent and Vodafone. For the application and application management services, some of the partners are Computacenter and Microsoft, for the outsourcing and managed services, CSC and Siemens, and for the business transformation services, Accenture. Another important partner is Hewlett-Packard, ranging from the global IP infrastructure to the outsourcing and managed services. The high value business transformation services require people with different skills and the ability to integrate technology with business imperatives. This is where other large firms such as IBM are concentrating their efforts.

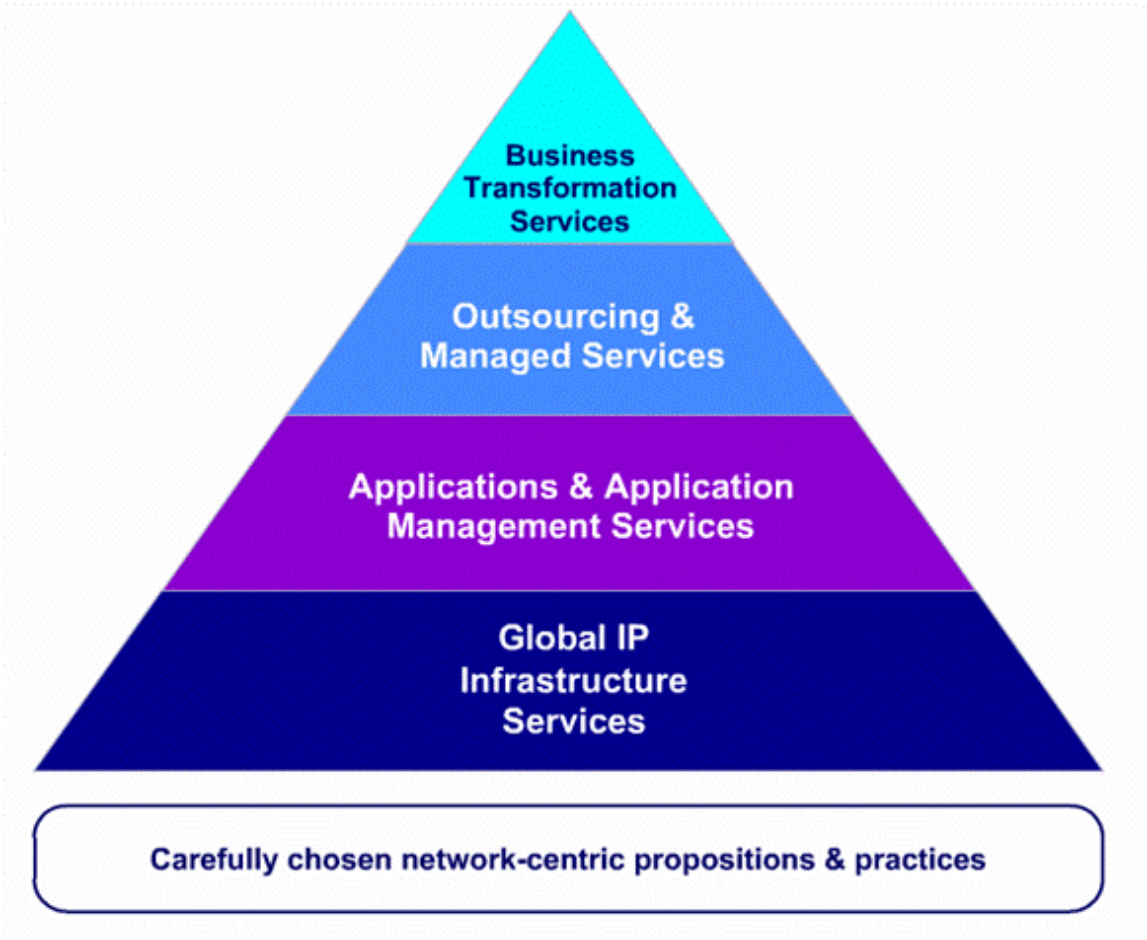

Figure 6.5 – Range of Services Provided by BTGS
Source: Presentation 'BT Global Services Update' by BTGS CEO Andy Green on 29th June 2005 to market analysts in London.

The complexity of services and variety of partners involved illustrates the aspect of convergence where different firms from different trajectories (i.e. from hardware and software providers, IT services and network) are brought together to provide value to the customer. For example, Accenture is a partner, and BTGS is not trying to become Accenture. However, BTGS is increasingly investing in professional services and trying to increase the number of billable people, i.e. people who add value directly to the business through consultancy and support services. Partners in one project can be competitors in others, but this is a relatively normal situation across the telecommunications industry.

For this business of networked IT services to be sustainable over time, it needs to be efficient, and two initiatives need to be worked out: repeatability and knowledge

transfer.[205] These remain a challenge within BTGS efficiency improvement processes. Repeatability refers to, as mentioned before in this section, productising solutions, a process by which solutions become standardised platforms which can be reused in other integrated solutions for other customers. Knowledge transfer refers to the internal flow of knowledge in such a way that knowledge and lessons learned in one project can be transferred to another and to the development of repeatable solutions. These are difficult tasks, and firms like IBM have been struggling for years to make the repeatability and knowledge transfer processes work.

The delivery of integrated solutions requires that the integration be made within the customer's organisation. It requires a great deal of partnership with other suppliers, increasing the levels of complexity to be managed. BTGS moved to a customer-centric organisation, and the transition from a product-centric one required not only structural changes, but also changes in the mind-set of the people working for the benefit of the customer. Some people may not fit in, and people with new capabilities may need to be brought in. People and firms from different areas (i.e. hardware/software providers, IT services and networks) are brought together for the customers to take advantage of the benefits of convergence. BTGS continues to struggle with the implementation of the customer-centric organisation, as other firms like IBM did, as repeatability and knowledge transfer initiatives are being perfected as part of the efficiency improvement which is imperative in this type of business. The next section deals with the integrated solutions leveraged by the new organisational structure of BTGS.

6.4 The Rise of Networked IT Services as Integrated Solutions at BT Global Services

As detailed in Chapter 5, BT started a major transformation around the year 2000, when high debts were threatening the survival of the firm. At that time, in April 2000, it created one division called Ignite to be responsible for broadband IP network business, including Syntegra, their systems integration business. Ignite was a response to the growing market for data communications led by the IP technology. By the end of 2001, BT Ignite was being considered for divesture (BT, 2001, p. 8). In 2002, BT Ignite was described as the 'business services and solutions division, serving customers worldwide' (BT, 2002, p.15). Its activities were then realigned to focus on multi-site corporate customers (BT, 2002, p.15). In April 2003, BT Ignite was renamed BT Global

[205] Interview with BT Senior Manager, March 2005.

Services (BT, 2003, p. 15), BT's 'managed services and solutions provider, serving multi-site customers worldwide', and the target was '10,000 global multi-site organisations with European operations' (BT, 2003, p.15).

This situation faced by BT at the start of the 2000s finds some parallels in the situation faced by IBM in the mid 1990's. IBM was also suffering financially and some analysts were suggesting that it would be better for IBM to be broken up and sold in order to survive (see, for example, Gerstner (2002)). Although neither company was broken up, analysts suggested breaking these companies up and selling their parts.[206]

In 2005, BT Global Services was described as addressing 'the networked IT services needs of multi-site organisations including major companies with significant global requirements and large organisations in target local markets' (BT, 2005c, p. 8). 'Networked IT services' was the expression adopted by BT as ICT (Information and Communications Technologies) services were not understood by some customers in North America.[207] 'Networked' emphasises the infrastructure nature of the IT services provided by BT Global Services, since the network is supposed to be BT's core capability.

The starting point for the analysis of networked IT services as integrated solutions can be the value stream approach in CoPS shown by Davies (2003b, p. 343), where he highlights four stages: manufacturing; systems integration; operational services; and service provision (see Figure 6.6). Integrated solutions occur in the 'manufacturing-services' interface for suppliers of CoPS. In the case of BTGS, as a large user of CoPS, integrated solutions occur in the service provision. Networked IT services are provided to multi-site firms. Customers are not only the final consumers; they are also large and sophisticated business customers.

As Davies (2004) points out, in order to analyse how firms are moving into high-value integrated solutions, it is necessary to identify (i) the firm's strength or 'base'; and (ii) how firms diversify to other activities which render or will render profitable growth. BT passed through difficult times in the beginning of the 2000s, and in 2002, BT was trying to understand their strengths better in order to play those strengths (BT, 2002). Providing integrated solutions to large multi-site corporations seems to be one of the

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206 Interview with BT Senior Manager, March 2006.

207 From a presentation by Andy Green, CEO of BT Global Services in 2006. The term ICT is not widely used in the United States.

strengths that BT is playing in order to transform itself. Networked IT services represent both the convergence of telecommunications and IT, and the emergence of integrated solutions as one of the major business models for the transition to Next Generation Networks (NGNs).

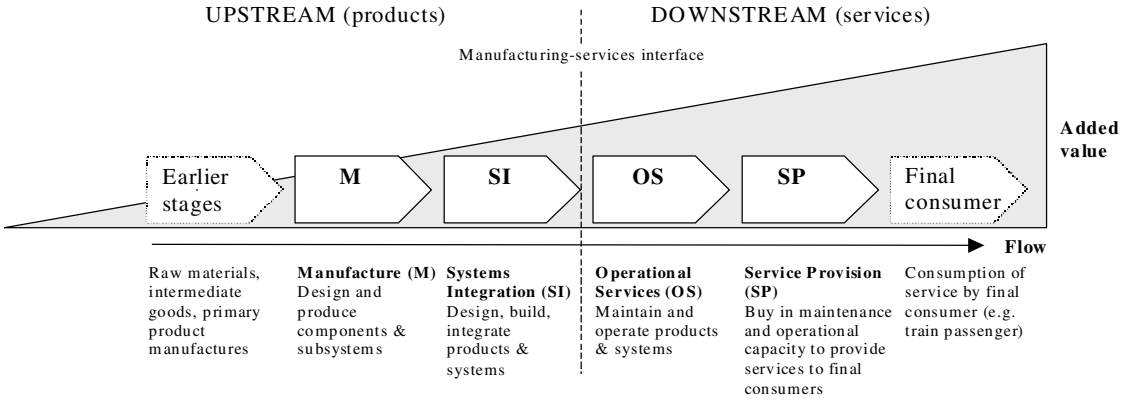

Figure 6.6 – The Value Stream in CoPS
Source: (Davies, 2003b, p. 343)

The core capability of BT was, and continues to be, the design, operation and maintenance of networks, and the services offered around those networks.[208] These networks used to be called telecommunications networks, but at a certain point they were renamed communications networks (BT, 1999, p.5). Although there are signs that value will migrate to services on top of and throughout the network, there are currently major opportunities to offer integrated solutions to large multi-site corporations in Europe. BT, through its major transformation project BT21CN, continues to invest and improve its core capability in designing, operating and maintaining networks.[209] However, the nature of the services being offered is changing from fragmented products and services, such as fixed-network calls; exchange lines; receipts from other operators; wireless products; and private services, to integrated solutions including 'desktop and network equipment and software; transport and connectivity; managed LAN (local area network), WAN (wide area network) and IPVPN (internet protocol virtual private network) services; managed mobility; applications hosting; storage and security

[208] Interview with BT Senior Manager, October 2006.
[209] Ibid.

services; and business transformation and change management services' (BT, 2005c, p.33). IT systems have increased substantially in terms of scale and complexity in large firms. Their complexity and internetworking compel such firms to spend huge amounts of money and effort building and managing them. BT (and other operators) sensed an opportunity to provide their large business customers with the simplicity of one contract/provider, allowing them to concentrate on their core business (when IT is not their core business).

Incumbents like BT chose, from the 1990s, not to produce and manufacture their own systems and equipment, preferring instead to buy them from the market (Fransman, 2002b). Thus, BT concentrates its efforts on the architecture and design of the network and selects the best vendors to realise them.

The value stream approach depicted in Figure 6.6 emphasises the manufacturing-services interface as the locus of integrated solutions. This would be the locus of BT21CN interpreting it from the perspective of integrated solutions. For BTGS, as a provider of integrated solutions to large customers, where manufacturing does not play a significant role, the proposal is to extend the value stream approach to include large customers (and not only final consumers such as train passengers).

Moving from a Base in Services

BT has been experiencing decreasing turnover from fixed-to-fixed voice calls in the last years. This can be seen in part by examining the revenues from BT Retail. The strategy then is to move from traditional fixed-line voice services only to networked IT services. This comprises integrated solutions for large firms that intend to outsource their network operations. The traditional value stream for the supply of capital goods is as follows (Davies, 2004, p. 737):

Manufacture → systems integration → operational services → service provision

The interface between systems integration and operational services represents the locus of what Wise and Baumgartner (1999) term going downstream from manufacturing to services. Incumbent operators like BT are service firms that long ago abandoned manufacturing activities. From BT's perspective, systems integration occurs when building the infrastructure, such as BT21CN. In this case, BT needs systems integration capabilities to match the systems integration capabilities of the suppliers and integrate multiple vendors into a single major project. The value stream is extended by BT

considering the service provision as an integrated solution, where BT offers systems integration, managed services and consultancy services to large multi-site corporations.

The end service provision is transformed into another cycle of systems integration and operational services as follows:

Manufacture → systems integration → operational services → systems integration → operational services → service provision

Thus the downstream of the value stream approach needs a differentiation between final consumers and large business customers, as shown in Figure 6.7.

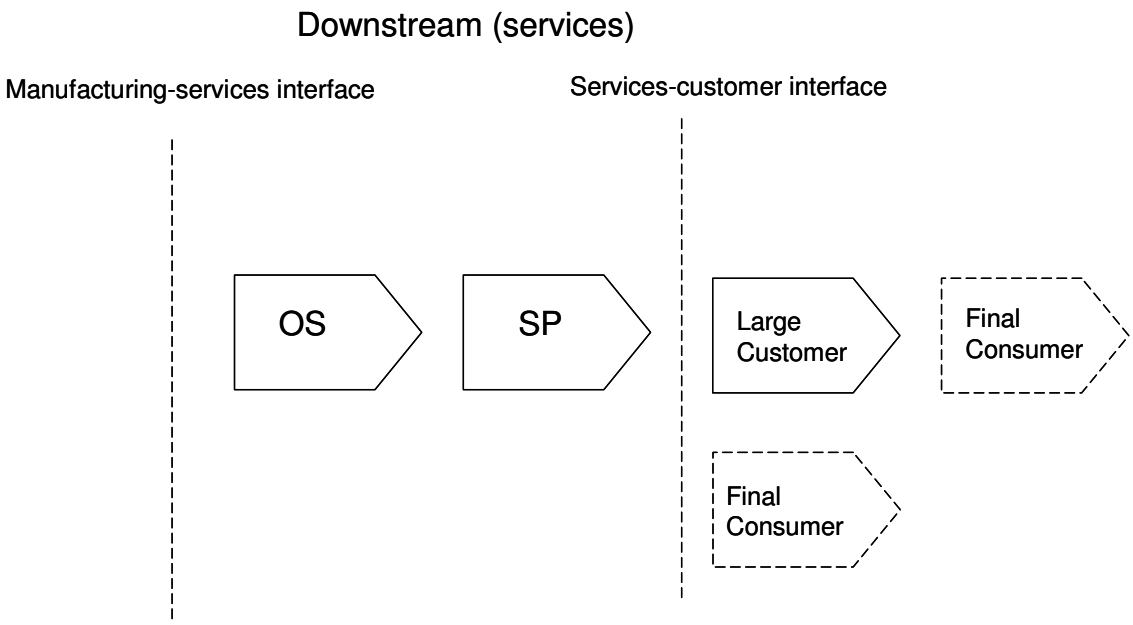

Figure 6.7 – Integrated Solutions in the Interface Services-Large Customer
Source: Modified from Davies (2003b, p. 343)

Integrated solutions happen in the manufacturing-services (such as in BT21CN) and services-large customer (such as in BTGS) interface. As the customer becomes more sophisticated (in terms of size and level of resources and capabilities), the higher the scope for integrated solutions becomes. For the final consumer, as long as it becomes

more sophisticated (based on, for example, Personal Networks)[210], the possibility of offering integrated solutions becomes higher.

Among the capabilities for the delivery of integrated solutions, Davies (2003b) points out systems integration, operational services, business consultancy and financing. In the case of BTGS, financing is rarely mentioned. The other three capabilities are generically called professional services by BT, with three components: systems integration; consulting; and outsourcing (see Figure 6.1). In terms of systems integration, BTGS has won many contracts to provide and manage networks for multi-site organisations. Providing networks means to integrate different equipment and systems from various external suppliers (e.g. Cisco and Nortel) and then in turn integrate them into the customers' networks. Regarding consulting, 'consultancy services are also provided to help organisations understand network performance, operate their networks and applications efficiently and transform their business to gain advantage in the digital networked economy' (BT, 2006a, p. 33). Thus, consulting involves not only the conceptualisation of the problem, but also support in the customer's operations. Outsourcing can be seen as an instance of operational services, as firms have been trying to focus on their core competence and delegate the operation of non-core functions to third parties. In this way, besides building and/or upgrading the network, BTGS becomes responsible for monitoring the performance of the network and taking care of the maintenance and preventive actions to keep the network running according to the SLA (Service Level Agreement) levels.

Systems integration and consulting services are underpinned by project management capabilities which are used to plan and execute the underlying activities. Such activities may or may not lead to operational services, i.e. where customers require BT to manage their network under contractual terms for a certain period of time. Designing and maintaining these operational services also highlight the need for project management capabilities. Thus, professional services encompass the capabilities of: (i) articulating the needs of the customer and providing guidance on how to address those needs (consulting); (ii) identifying the sources of knowledge (internal and/or external to BT/BTGS) needed to provide solutions and integrating them into a coherent system

[210] The idea of Personal Networks (PN) is based on the possibility of offering individual 'physical network arrangements' according to the needs of each consumer (Noam, 1994). This idea continues to be valid, although the emphasis is not in the network, but in the services on top of it, which may require customised arrangements.

responding to customer's needs (systems integration); and (iii) managing the issues of time/timing, design specification, and installation and operating cost in order to meet mutual needs and goals (project management).

Both BT21CN and BTGS represent two approaches of integrated solutions, one in which BT receives the integrated solutions from its suppliers and the other in which BT provides integrated solutions to its large customers. Both approaches are advantaged by the transition to NGN. The next section of this thesis integrates both these approaches.

6.5 Integrating BT21CN and BTGS from the Perspective of Integrated Solutions

This section examines the integration between BT21CN and BTGS from the integrated solutions perspective. BT21CN deals mostly, according to Figure 4.1 (see Chapter 4), with the infrastructure level (initially discussed in Chapter 5), while BTGS deals mostly with the service side (which is discussed further in Chapter 7).

Figure 6.8 below shows the two faces of integrated solutions at BT. On the left, integrated solutions are in the domain of a major project, BT21CN, established as a temporary organisation within the permanent one (BT), as noted in Chapter 5, Section 5.5. On the right, integrated solutions (cf. Davies, 2003a) are represented by various major projects for each major customer. These projects can be also seen as temporary organisations (Lundin, 1995, Lundin and Soderholm, 1995, Packendorff, 1995, Turner and Mueller, 2003) that sustain the permanent one (in this case BT Global Services).

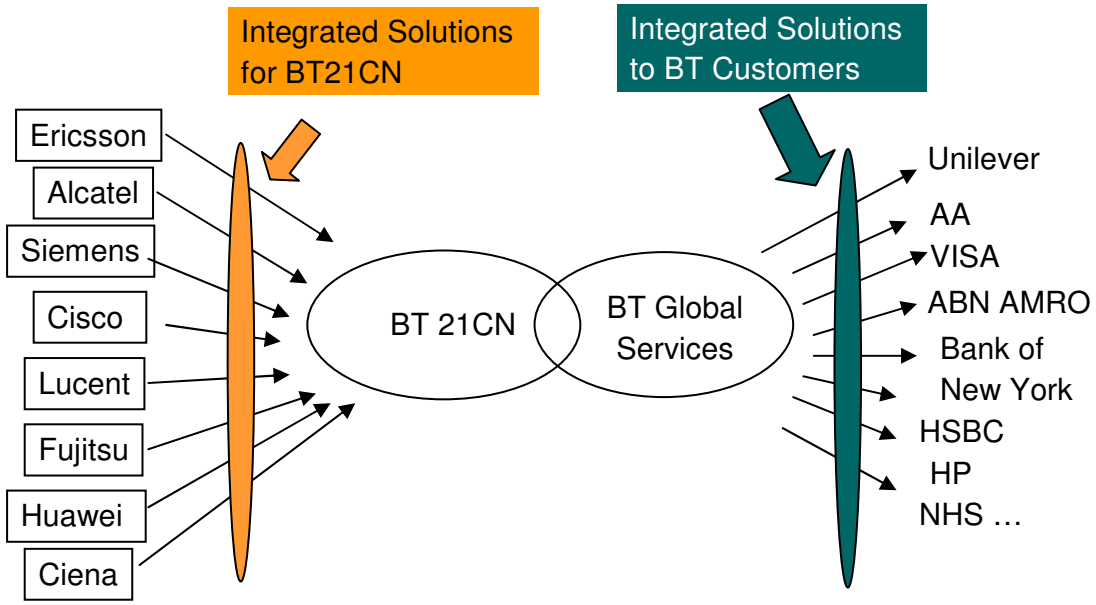

Figure 6.8 – The Two Faces of Integrated Solutions at BT
Source: Author's elaboration

As mentioned before in Section 6.4, systems integration, operational services, business consulting, and financing capabilities were identified by Davies et al. (2001) in their research about integrated solutions, but they need some reinterpretation in order to fit into the telecom/BT environment, and also some more specific capabilities need to be addressed.

Professional services are usually the capability that joins IT and network products together (see Figure 6.1). Within professional services are systems integration, business consulting and outsourcing capabilities that allow BT to cope with more complex solutions, dealing with its own and third party products and systems. Professional services are a capability that BTGS is building on. BTGS has also built a team of thousands of 'billable professional services people'.[211] The idea is that these people are not only considered support for the business, but they take active participation in the value creation of the business. BTGS has hired people from Deloitte, PWC, Accenture and IBM, and this shows one aspect of convergence where people from one domain (consulting companies) move to another domain (telecom operators).[212] This is a major transformation in the nature of business for BT, where the profile of the people required to work in this environment is much more different from that where the aim was to sell a lot within a limited variety of products and services.

Financing capabilities are not frequently mentioned, but they continue to be important, and there are some similarities and differences to the context of CoPS indicated by Davies et al. (2001). The similarities involve the financial stability of the supplier. Customers want a financially strong supplier because they want the supplier to support them in the years to come, providing technical and business support to the solution they purchased.[213] Some level of financing for products and services may be necessary depending on customers' requirements. Another aspect is that the business model used in this context by BT usually starts to contribute with profit only in the third year of the contract (on average), and the cumulative cash flow starts to become positive usually only in year 4.[214] This is a financial burden and business model that only large firms with appropriate financial capabilities can afford.

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211 Interview with BT Senior Technical Manager, March 2007.
212 Interview with BT Senior General Manager, March 2007.
213 Interview with BT Senior Account Manager, October 2006.
214 Interview with BT Senior General Manager, March 2007.

Capabilities of the business of integrated solutions generally pointed out by BT interviewees are those such as business transformation, change management, large-scale project management, process transformation, solutions design and innovation.[215] These capabilities can be categorised in three levels, following up the framework of Figure 4.1 (see Chapter 4). The first level corresponds to fundamental changes (business transformation and change management), that largely affect the resources and infrastructure of customers' firms. The second level corresponds to intermediary capabilities (large scale project management and process transformation) which act on the resources and infrastructure to leverage the third level of services (through solutions design and innovation). These capabilities are intertwined, but it is important to note that the engagement with the customer tends to be at the business level, i.e. what the customer intends to do with the solution being provided. This usually requires the engagement of BT with the customer at a more strategic level. An understanding of the customer strategy is needed and sometimes the customer can consider matching the supplier's (BT's) values in order to decide whether or not to take the contract. This engagement and match of supplier's (BT's) and customer's strategies are unusual in the way BT (and other incumbent operators) traditionally do business.[216]

Another identified capability that seems to be particular to this context is the geographic capability. This is required due to the global nature of BT's customers, and also drives the decisions on BT's partnerships and acquisitions. BT's global customers have operations around the world and BT needs to provide a solution in different parts of the world including those countries where BT may not have a network or an operation. The internationalisation strategy of BT is based predominantly on the demands of the existing customers to expand to other countries. When a customer requires BT to have presence in a country where there is no BT operation, if the business is strategic and worthy, BT decides what the best strategy is to undertake: partnership; acquisition/merger; or the establishment of a new operation. This reinforces the customer-orientation strategy. The geographic capability is driven initially by firms in Europe that want to move to other regions, for example, Latin America. If an operation is established in Latin America then BT tries to leverage it by offering communication

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215 Interview with BT Senior Manager, March 2006.

216 This aspect of business is emphasised in chapter 7, where real customers are brought into the analysis of integrated solutions in various market sectors.

services to firms in Latin America who want to expand into Europe.[217] This contrasts significantly from the internationalisation strategy of the 1990s, where the aim was to expand into foreign markets, frequently without proper consideration of customer demand in those markets.

This section (Section 6.5) integrated both initiatives BT21CN and BTGS from the perspective of integrated solutions, and developed further on the capabilities being developed by BTGS in order to deliver integrated solutions. Besides the capabilities of systems integration, consulting, outsourcing and financing, it identified the geographic capability as particularly important in the context and strategy of BT. The next section (Section 6.6) develops further the business of integrated solutions, referring to the business models, platform strategy and the co-creation of value with customers.

6.6 Building the Business of Integrated Solutions of BTGS

Building a business based on the integrated solutions approach requires a reorganisation of structure in order to be more customer-centric, a reassessment of the business model, and thorough preparation of the organisation in order to be open to the co-creation of value with customers. This section tackles these issues, recalling that the platform strategy requires robust business models in order to co-create value with customers in the long-term.

The differentiator of the business of integrated solutions is based firmly on the quality of relationship with the evolving needs of customers with the aim of persuading these companies to renew contracts after some years. In fact, much of the value and profit of this type of business is dependent on long-term relationships with the customer. BT's position in the UK and especially in London, where many multinational firms have placed their headquarters, creates good conditions for the business of integrated solutions to thrive.[218] This may not be the case for other operators in Europe, where the volume of this business is lower. Also, to change the internal culture of the incumbent telecom companies into a more professional services environment may prove too difficult for some operators.

As noted in Section 6.3, for this type of business to thrive in the long term it is necessary to gain some efficiency in terms of repeatability and knowledge transfer, where the solution provided for the next customer can be re-used to at least some extent

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217 Interview with BT Manager, October 2006.
218 Interview with BT Senior General Manager, October 2006.

from the solution developed for the previous customer.[219] This reinforces the platform strategy being implemented by BT at strategic level, and instantiated in other parts of the business within BT. The repeatability usually refers to repeatable solutions (Davies and Brady, 2000), and also the importance of acquiring good references in order to market services to new customers. Although projects are supposed to be unique, customers usually ask for details of other customers where the proposed solution was implemented. This is supposed to reduce the execution risk for the new customers. The requirements of having good financing capabilities and good references in the market may make the business of integrated solutions in accessible for many companies, but it is a major opportunity for large firms who need to grow, and grow fast, and cannot rely on breakthroughs alone for their growth.

The activities of BT Global Services include: Global IP Infrastructure Services, Applications and Application Management Services; Outsourcing and Managed Services; and Business Transformation Services.[220] These activities are substantially carried out with partners: Cisco, Intel, Alcatel, Nortel, Vodafone, and Marconi for Global IP Infrastructure Services; Computacenter and Microsoft for Applications & Application Management Services; Siemens, CSC and HP for Outsourcing and Managed Services; and Accenture for Business Transformation Services. BT Global Services has restructured its division from a fragmented service to another that is more simplified from the customer perspective.[221] This restructuring prevented a common problem of one customer being visited by several teams from BT, with one team unaware of the customer approaches of the other, creating confusion and a bad image of BT for the customer.[222]

The types of contracts that BTGS are now dealing with are of higher value and longer term (for some 3 to 10 years usually), and one important part for the profitability of this business is the renewal of major contracts. BT claims that around 90% are renewed and, as noted earlier, long-term contracts are essential for the profitability of the business model.[223] Each contract represents a different customer with different needs. In this sense, skills in large scale project management are important. In some instances, the learning in one project can be transferred to another, but the real gain (and profit) occurs

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219 See footnote 205.
220 Interview with BT Senior Technical Manager, March 2007.
221 Interview with BT Senior Manager, March 2007.
222 Interview with BT Manager, March 2007.
223 Interview with BT Senior General Manager, March 2007.

when the contract is re-signed.[224] In large business-to-business contracts, factors like trust, reliability and security are valued highly.

The business of integrated solutions as practiced by BT Global Services follows the life cycle proposed by Davies and Hobday (2005) which comprised of: strategic engagement; the value proposition phase; the systems integration phase; and the operational services phase, which feeds back into the strategic engagement based on customer needs (according to Figure 6.9). In the case of BTGS, re-signing is an important feature of this type of integrated solutions project in order to be profitable in the long term.[225] Thus the transition from the operational services phase to the strategic management phase is important for the profitability of the business model when a contract is renewed due to the identification of another project or due to the extension of the operational services phase. In this transition, the cycle could take the form of a spiral to emphasise the identification of a new project and the re-signing of contracts. Besides that the strategic engagement seems to be important over all the phases of the life cycle, as BTGS is trying to build trust and long-term relationships with their customers. One special measure of success in these integrated solutions projects is when the same customer extends the contract and relationship for additional years. The ultimate aim of BTGS would be to achieve customer 'lock on', which happens 'when customers want the enterprise as their sole or dominant choice' (Vandermerwe, 2003, p. 56)[226].

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224 Interview with BT Senior Manager, March 2007.

225 From a presentation by Andy Green, CEO of BT Global Services in 2006.

226 According to Vandermerwe (2003), customer lock-on differs from customer lock-in and customer loyalty. When customers are locked in, even when they are dissatisfied, they have no choice of changing suppliers as the alternatives do not present a real gain for the customer. Customer loyalty assumes that customers repeat the purchase of the same product or service. Further discussion can be found in Vandermerve (2001) and Vandermerve (2003).

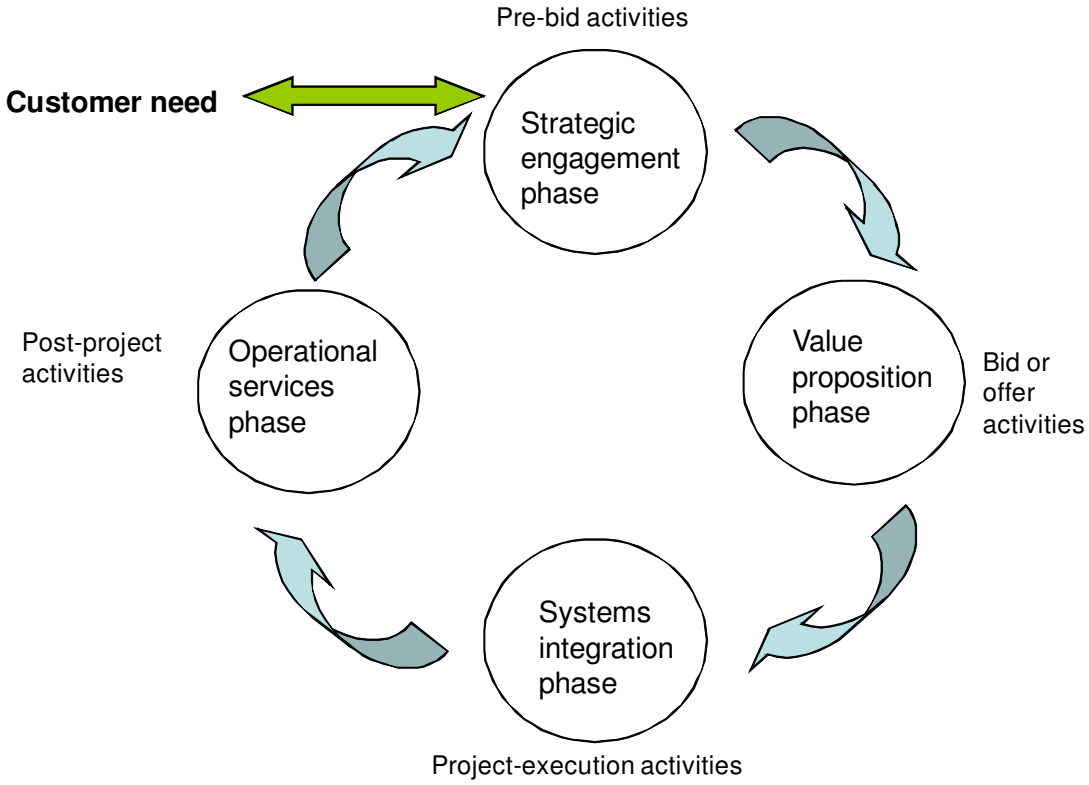

Figure 6.9 – The Integrated Solutions Life Cycle
Source: Davies and Hobday (2005, p. 245)

The case of Barclays Africa illustrates this life cycle. BT and Barclays Africa had already been in a business relationship for ten years when their service contract was coming to an end in March 2004. This was the point of transition from the operational services to the strategic engagement phase, where BT was providing installation and support for Barclays Africa's satellite network to provide real time services to customers in Africa. The end of the contract represented an opportunity to 'take a fresh look at Barclay Africa's strategic telecommunications requirements' (BT, 2007a, p. 2). Although other options were considered, BT was selected due to its existing relationship, good service availability in Africa and technological and operational expertise. These factors composed a good value proposition for the integration and building of a broadband infrastructure including a satellite-based solution. The project lasted less than 12 months from contract sign off to full implementation. After the project finished, operational services continued with the technical support for the broadband infrastructure on an ongoing basis until a new major customer need is identified.

Another example is VISA CEMEA (Central and Eastern Europe, the Middle East and Africa). BT had a relationship with VISA as a network provider since the early 1990s. In 2002, VISA CEMEA recognised that their legacy networks were now inadequate to keep pace with business growth and response times required for the card business (BT, 2007k). Besides that, VISA wanted to consolidate its network and reduce the number of supplier contracts. About 250 firms took part in the initial negotiations and eventually BT was selected as the provider of the new network (BT, 2007k). The new network was built and BT continued to be a prime partner of a managed service solution. The result is better availability of the network and an improvement in the response time for card processing. An interesting concept that was used in this project was the 'in-sourcing', i.e. BT people working inside the VISA organisation. This helps to identify and solve problems quickly, and better positions BT for another round of strategic engagement for further integrated solution projects.

The business of integrated solutions of BTGS shows that convergence happens on the customer's side. Based on customer needs and requirements, BTGS strives to offer the most suitable solutions. Technological convergence, like the IP (Internet Protocol) technology, integrating voice, video and data services, allows BTGS to deliver complete and integrated solutions to customers more seamlessly and at a lower cost in the long term. Customers have a fluid and integral experience of the product and service, not a fragmented one. Network IT services, as an instance of integrated solutions, represent the convergence at the service level, close to the customer, and on top of the technological convergence. From a base in networking, BTGS aggregates IT and professional services to offer converged services addressing customer needs. The higher degree of preparedness, provided by the platform strategy within both BT21CN and BTGS, favours the delivery of integrated solutions.

BT21CN represents an extreme of integrated solutions that requires much more anticipated preparation and resources than the integrated solutions provided by BTGS to its customers. These instances also represent two different types of projects, where BT21CN is much more affected by uncertainty and cannot be approached as a traditional project bounded only by time, cost and quality/scope. It is a transformation project that has major strategic impact on the future of the whole BT business. On the other hand, the integrated solutions projects managed by BTGS have the aim to deliver on time, on budget and to specification, once it is agreed with the customer. This allows

a more traditional view of project management. It is not clear from the data that there are major links between BT21CN and the projects undertaken in BTGS, in terms of knowledge transfer or sharing of resources. Although one enables the other, during the time of this research, it seems that this link has been barely explored, perhaps because the BT21CN project and projects in BTGS have very different natures. Thus, in practice, it is as if they are running in parallel, and project management methodologies and procedures seem to be elaborated independently, although they may follow some common principles.

The year of 2005 was a remarkable year for BT Global Services as it reported operating profit, proving the business of integrated solutions. 'The 2005 financial year saw Global Services deliver its first ever full year operating profit before goodwill amortisation and exceptional items, at £7 million' (BT, 2005c, p. 33). However, recent developments in November 2008 indicate major setbacks in BTGS (Barker, 2008), although it is too early to assess its long-term effects on the whole business. This resonates with similar financial problems from firms like IBM, WS Atkins and Serco (Davies, 2003b) and the significant number of bankruptcy cases of firms in the servitisation context (Neely, 2009).

In order to build the business of integrated solutions, BTGS needs to be in close contact with its customers in order to create value and profit in the long term. Fundamental to this long-term profitability is the re-signing of contracts, which occurs when BTGS identifies a new project within the same customer or when the customer wants to extend their operational services phase due to a satisfactory experience with BTGS. The ultimate aim is to achieve customer lock-on where the relationship was satisfactory and the customer is willing to continue it, even with the presence of other potential competitors. Working closely with the customer leads to the issue of co-creation of value with customers, which is the subject of Chapter 7.

6.7 Conclusions

The crisis suffered in the early 2000s made BT adopt a more humble and focused strategy. From a vision of being 'the most successful worldwide communications group' (BT, 2000, p.1), BT moved to a more customer-centric strategy, focusing on European customers with global presence.

Large firms such as BT struggle with the imperative of growth. Just a few percentage points of growth may represent millions or billions of pounds of additional revenues.

Even large firms may not have enough resources to obtain those additional revenues from their own new products and services. They need to rely on new uses and applications of their existing technologies, products and services.

Although BT (during its years in crisis in the early 2000s) and IBM (in the mid 1990s) experienced the same dilemma of whether they should be split and sold, or remain as one firm, both BT and IBM were able to remain as one firm. This echoed the underlying idea that innovation is an end-to-end process. In the business of integrated solutions, splitting the firm may weaken the innovation process. When large firms intend to deliver innovation to large customers, size matters, particularly if rapid and large scale developments must be undertaken (Neely, 2009). That is the essence of integrated solutions for BTGS: to understand customer needs and offer the best solution possible using their own and/or third party partial solutions, and in the process, achieve customer lock-on. However, in order to not get lost in offering solutions, as firms may end up offering anything to anybody, two important lessons from BTGS are important for the business of integrated solutions:

- Firstly, to have customer focus, selecting which type of customer the firm intends to target. BT decided to focus on multi-site organisations with operations in Europe;
- Secondly, to identify its strengths or its core capabilities, which must be within the integrated solutions being offered, otherwise the whole solution may fall apart, if trying to offer anything to anybody. BT identified this strength as 'networked IT services', providing services within their integrated solutions that leverage their network (infrastructure) capabilities.

The BT Global Services case illustrates how BT is taking advantage of integrated solutions to emerge from crisis and achieve targets of future growth. The profitability of the business of integrated solutions relies on a challenging and risky business model. Projects start to deliver profits only after a few years from the start of the project (usually three years), and its profitability is also highly dependent on the renewal of contracts, i.e., on long term relationships. So, the business of integrated solutions goes beyond selling integrated products and services. It is about building relationships and trust, in a culture where the service-dominant logic prevails. The development of capabilities in professional services (i.e. consultancy, systems integration, project

management and outsourcing), underpinned by network and IT products, requires major investment by BTGS.

In the value stream approach presented by Davies (2003b, 2004), it is important to differentiate customers not only as final consumers, but also large sophisticated business-oriented ones. Thus the value stream is extended and integrated solutions emerge in other interfaces: not only at the manufacturing-services interface (which is the case of BT21CN and its suppliers), but also in the operational services/service provision-large customer interface as in the case of BT Global Services (according to Figure 6.7).

Integrated solutions seem to be a way of implementing the service-dominant logic, where products and services in isolation are not the main focus. Instead, the onus is on how they are put together in a coordinated way to satisfy a customer need, which can change over time. The customer experience is of the utmost importance, having network/IT products and services as a support (according to Figure 6.1).

The business of integrated solutions represents another instance of the platform strategy being implemented by BT in order to reduce cost, improve time-to-market and improve customer experience and empowerment. This type of business provides great flexibility for the customer, which needs to be supported by the flexibility embedded within the provider (i.e. BT). In this sense, BT21CN is the platform that increases the flexibility of BTGS to deliver new services. Chapter 7 deals with the co-creation of value between BTGS and customers within the business of integrated solutions. A number of customer-centric projects are analysed to illustrate the connections between customer/markets, the platform strategy, and BT capabilities.

7. Capabilities Development and Platform Strategy in Integrated Solutions

7.1. Introduction

The strategy set forward by BT in the 1990's was very ambitious and highlighted its international aspirations, disclosing the vision of becoming, as mentioned in the last chapter, 'the most successful worldwide communications group' (BT, 2000, p. 1). As this strategy led to unprecedented and unsustainable levels of debt, worsened by the downturn in 2001-2002, BT set forward a new strategy in 2002, with prioritising the customer as one of its aims. This strengthened the BT businesses related to integrated solutions, represented by its networked IT services, and required renewed attention to identifying and defining customers' needs. One issue is about how to segment and choose such customers. Another issue, however, is that the business of integrated solutions can become unfeasible and unprofitable if the firm does not manage customers and projects in a systematic way. Pursuing both customer prioritisation and segmentation, and creating the organisational design to profitably develop this type of business model became BT's plan for the future.

Prioritising the customer (i.e. customer focus or customer centricity) is not a new concept in the telecommunications industry. For example, Mansell (1993, p. 111) stated that:

> Towards the end of the 1980s, British Telecom engineers and technicians adopted a more customer-friendly vocabulary. Network design would be *customer facing*. The R&D division was expected to sell its services to other divisions which were interacting directly with customers. The orientation towards the demand side of telecommunications network design was being driven by the company's aim, which was to become an international manager of telecommunications networks.

Looking back to the 1990s, it seems that the *intention* to be customer focused (centred or oriented) was present, and this set the ground for the practical moves taken by BT and others in the 2000s to realise customer centricity. The business of integrated solutions, established by BT Global Services in 2003 as a business unit (at the same level as BT Retail and BT Wholesale), is not new for BT either, as systems integration and consultancy services have been growing organically and through acquisitions since 1997.[227] The emergence of IP/MPLS technology, however, helped to enhance the business of integrated solutions, as this technology has been proving to be superior in

[227] Interview with BT Senior Manager, October 2006.

terms of consolidating networks of large customers that grew in a fragmented way with different types of technology deployed according to local needs. In the same way, historically, IP emerged when ARPANET demonstrated the interconnection of disparate networks which had data communication protocols that were not inter-operable (Fransman, 2002b, p. 61). As globalisation has been taking place, the diverse localised needs of expanding companies created a need for a technology that would be flexible. This made IP/MPLS technology a good match and a source of expansion and revenues for telecommunications service providers like BT.

Integrated solutions can be analysed as a combination of market/customers, platforms and capabilities (cf. Yang and Jiang, 2006, Meyer and DeTore, 1999). This combination is relevant since most of the literature on integrated solutions (e.g. Davies et al., 2001, Davies and Hobday, 2005, Davies, 2003b, 2004) examine the issues from the supplier perspective, underplaying the role of the customer/market in their analysis. In addition, the role of platforms in integrated solutions is rarely addressed. Finally, aspects of project marketing and project management of platform development need to be considered in conjunction with the technological choice and organisational design issues, since integrated solutions involve 'a different type of project which extends the traditional life cycle backwards into a pre-project phase and beyond the delivery phase into the operational phase' (Brady et al., 2005, p. 360).

Chapter 6 showed how a division of BT – BT Global Services (BTGS) – was organised for the delivery of integrated solutions (IS) and how IS represented a further instance of convergence in services on top of the network that already embodied a process of convergence and integration. The aim of this chapter is to deepen the understanding of the development of capabilities and platforms in the business of integrated solutions, through the analysis of a series of cases of integrated solutions. A single case, Unilever, is chosen for in-depth analysis because it illustrates well the issues of integrated solution development and because this major project was considered a landmark for BT Global Services. To complement this detailed analysis, a set of another 179 cases of integrated solutions with real customers is analysed in a systematic but more superficial way to examine the process of value co-creation between suppliers and customers. The analysis shows how the capabilities are deployed for specific customer segments and the importance of platform approach to make the business sustainable and profitable. The platform approach becomes important not only when deploying the provider's own

platform (such as BT21CN), but also in providing a platform for the customer, with the simultaneous aims of cost reduction *and* development of new applications and services. The borders between the providers' and customers' platforms become blurred as increasing numbers of large customers choose to outsource various functions of their IT network to major providers like BT. Customers use these platforms not only to develop marketable new products and services, but also to improve their own business processes. As a consequence, BTGS engages with not only customers' networks as an infrastructure, but also with customers' goals at the strategic level of revenue generation and process improvement.

This chapter is divided as follows. Section 7.2 discusses the critical capability of understanding customer needs for the ICT-based integrated solutions that BTGS is able to provide, using the case of Unilever as a major customer. Section 7.3 shows the dynamics of developing platforms for integrated solutions. Section 7.4 shows the most important capabilities and the role they play in the business of integrated solutions. Section 7.5 provides a discussion combining customer needs, platforms and capabilities, comparing these to the approaches of other firms, such as IBM and C&W. Finally, Section 7.6 presents the main conclusions of this chapter.

7.2. Understanding Major Customer Needs: Unilever

The business of integrated solutions in BT is usually called 'networked IT services'. It represents the convergence of three domains (network products, IT products and professional services, as described in Chapter 6), and it is 'adjacent to [BT's] heritage and strength'.[228] The latter phrase is an indication of the intention to retain the core competence of BT in building and maintaining a network. The difference is that BT moves from not only building and maintaining its own network, but also from building and maintaining other organisations' networks as an extension of its own.

Much attention has focused on the issue of whether BT (and other incumbent telecom operators) should change their core competences and become content providers in order to avoid becoming a low cost pipe network. BT, however, denies that it is becoming a 'content producer', focusing on the means to deliver (aggregating and distributing) content to customers, taking care of billing and digital rights management.[229] At the time at which this thesis is being completed, BT is in the midst of positioning itself as a

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[228] From a presentation by Tom Craig, BTGS President, IP Networking, on 14 September 2006.
[229] Interview with BT Senior Manager, September 2005.

builder and maintainer of network infrastructures, with the provision of services being built on top of this infrastructure. In the longer term, BT is preparing itself to compete in the applications software arena, concentrating on those applications that have strong network utilisation features.

In order to understand customer needs, the analysis starts with one of BT's major customer, Unilever, which was important in setting up the business of integrated solutions and consequently BT Global Services. Unilever has a special meaning to BT as it was the contract that provided a step change in BT Global Services' business.[230]

In this type of business it is usual to have a tender process, and the Unilever contract was no exception. The short list of bidders included AT&T, BT, Deutsche Telekom, France Telecom and Sprint. This contract can be seen as a strategic partnership, as the relationship between BT and Unilever went beyond the functionalities of the solution to the establishment of a shared vision of the future. The specific project was fortuitous as 'BT's ambition to move into a global space matched Unilever's needs'.[231] In other words, BT and Unilever shared common goals at the strategic level. International presence is part of BT's overall strategy and one of the main targets to be achieved by the networked IT services through BT Global Services. In the same way, as globalisation is a driving force for large multinational firms, so it is for Unilever.[232]

In 2006, Unilever had a presence in 150 countries, with physical business interests in 100 countries and 365 manufacturing sites spread throughout the world.[233] In order to meet the communication demands of firms such as Unilever, BT had to expand into other countries where the customer had presence and where interconnection was demanded. One of the reasons why BT won the contract was that it owned network coverage and presence through partnerships in locations that BT did not reach into through its own network.[234] As noted in Chapter 6, Section 6.5, this 'geographic capability' is of major importance in this type of business and for this type of customer and market.

In addition to geographic coverage, another aspect of Unilever's problem was that it had different contracts for various parts of its network, individual voice and mobile service

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230 Interview with BT Senior Manager, March 2006.
231 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
232 Interview with BT Senior Manager, October 2006.
233 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
234 Interview with BT Senior Manager, October 2006.

contracts, and data networks for each country. Unilever wished to simplify this operation in order to have as few contracts as possible (thereby benefiting from lower costs in comparison to the management of diverse contracts and providers, and possibly by reducing the cost of the services themselves). Also, Unilever concluded that an external partner could deal with such cost and quality issues better than Unilever: '[Unilever] makes soup and soap, and as a company, it particularly does not want to do IT, but it has to do IT'.[235] This is a typical example where the customer core competence is outside the IT arena, but it needs to use IT in order to have flexible, agile and efficient operations. As Unilever's own IT activities became very large and complex, it became worthwhile to have a strategic partner to take care of it *and* its evolution. An understanding of the business needs of the customer at the strategic level and a vision that matches the provider's own strategy and values became important for a long term and effective partnership. Another distinctive point of the large projects in integrated solutions is the shared success between customer (in this case Unilever) and provider (BT): 'BT's success is [Unilever's] success and vice versa.[236] In large projects, this generates a shared commitment, as the consequences of failure are a bad reputation in the market and possible negative effects in present and future projects.

As the ICT infrastructure becomes more complex in various industry sectors, the need for partnership increases. This, therefore, is the 'golden opportunity' of BTGS networked IT services. BTGS approaches the market from the perspective of a network provider, from a base in network services, aggregating IT products from partners and developing and sub-contracting professional services. Other firms may approach from the IT path. The most famous example is IBM, which reinvented itself in the 1990s and is now a major provider of integrated solutions (Gerstner, 2002). Other firms like Accenture may also approach from the professional services perspective and aggregate network and IT products and services.[237] The common denominator is the identification of the business opportunity, and working on a business proposition that will likely rely on partnerships (even with competitors in other projects and markets), as problems are at a level of complexity that no single firm can resolve alone.

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235 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
236 Ibid.
237 Interview with BT Manager, October 2006.

Interestingly, Unilever, with its 350 operating companies around the world, aims to move to One Unilever.[238] This is an attempt to consolidate the company into a more coherent company. The initiative involves moving from 1600 to 400 brands globally. This represents a huge change culturally, politically and financially. Each of those 350 companies has its own chairman.[239] BT also had the strategy to move to One BT.[240] The main problem of having this large conglomerate of companies is that each company tends to work for its own targets, and tends not to have the culture of leveraging their scale, technology, knowledge and resources, or presenting the firm to the customer as a unified company.[241] Both BT and Unilever are examples of companies that are trying to achieve 'higher levels of strategic integration between their business and subunits', where 'each unit head feels responsible for the performance of other units as well as for their own, and actively looks for ways to help them deliver' (Doz and Kosonen, 2008, p.80). Although the idea of a unified company may seem to mean the centralisation of decisions, this is not the case. It is about the collective commitment of the top management (Doz and Kosonen, 2008) to support each other's business, sharing a common vision, and leveraging resources.

Unilever signed a multi-year contract with BT, that was said to be a 'leap of faith'.[242] Unilever had a contract with WorldCom at that time and in the first half of July 2002 WorldCom failed,[243] and the telecom industry as a whole was in a bad shape. Unilever decided to sign with BT in December 2002. This reveals a major contextual influence on winning a contract: the failure (bankruptcy) of the previous provider at the time of negotiating the contract. The 'leap of faith' was due to the fact that this type of multi-year contract has many challenges and it usually does not work as it was supposed to do in the early stages (usually in the first three years).[244] To resolve this problem it is necessary to invest in the relationship and in the values of the provider (BTGS): it is necessary to believe that the firm (BTGS) will be able to execute.[245] Although evidences and prior experience are requested, they do not guarantee success. At the end of the day, it is necessary to believe that BT (the provider) will do what they are saying they will

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238 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
239 Ibid.
240 Interview with BT Senior Manager, March 2007.
241 Ibid.
242 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
243 An account of WorldCom' s demise can be found in Jetter (2003).
244 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.
245 Ibid.

do; that is the 'leap of faith'. In other cases, previous successful relationship helps to lower the barriers for this 'leap of faith'. This case shows that there are many aspects of the relationship that needs to be worked on throughout the project. Before going on to these relationship issues, it is important to look at BT's selection as the service provider for Unilever for this specific project.

Selecting BT (from the Perspective of Unilever)

Some of the criteria used by Unilever to select the partner were: (i) to be a world leader in the provision of network services; (ii) to have enough financial stability to be in the market for a long time to come; and (iii) to be able to work together through shared values and vision.[246] Regarding the financial capabilities it is important to highlight that it was not only the fact that BT could provide Unilever with the best financial terms that was important, but also that BT itself was financially stable in order to be in the market during the period of the contract and beyond. This had become more sensitive due to the bankruptcy of WorldCom, their former provider, a few months before the signature of the contract with BT. On the other hand, for BT as a provider it is also important that the customer is financially stable and does not go into bankruptcy during the contract, as substantial financial commitments are made at the beginning and throughout the project, which may put the provider in a risky situation if the customer is not able to pay the provider anymore.[247] This illustrates the case where the failure of the customer may imply in the failure of the provider.

The first three years of the project were dedicated to the shaping of the relationship and to transforming BT from a supplier to a partner. In fact the initial phase of the relationship could not be characterised as a partnership, as 'the behaviour did not match the intention'.[248] These initial years were crucial to establish the relationship between the customer (Unilever) and provider (BTGS), which can be further capitalised later with new projects.

Unilever and BT have been meeting many challenges during the evolution of the project, with Unilever focused on cost reduction and BT on adding value, but

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246 Ibid.

247 This is another important aspect of financial capability, as the author has experience working in a firm which deployed integrated solutions whose customer went into bankruptcy when the provider had already made many resource and financial commitments. In this case, the provider was a subsidiary company which was eventually rescued by the parent company.

248 From a presentation by Neil Cameron, Unilever's Chief Investment Officer, on 14 September 2006.

communication within the project was not good at the beginning, with some poor understanding of staff transfers, governance and billing issues.[249] This highlights the potential complementarity of combined effort between customer and provider, where the customer is focused on cost reduction and the provider on adding value. This creates a tension that, if constructively managed, can generate gains in operational efficiency.

Cost Control and Reduction

One important aspect of the customer need is the cost reduction issue. This is usually translated into reduction of operational expenses, and can originate from various aspects of the organisation operation. However, cost control can be difficult to achieve. One usual example is the cost of roaming for mobile calls. As it is more convenient, executives and staff can easily fall into the habit of using the mobile phone instead of the fixed phone line, mainly when they are travelling (participating in a conference, for example).[250] As the cost centres are spread over the firm, the bills may come from different parts of the organisation and it is very difficult to know who is spending how much. Telephone call bills are increasingly expensive.[251] Other firms have operational problems with their communication network, like communicating real-time with facilities geographically dispersed (using not only voice, but also video and graphics). IP/MPLS network can now offer reliable services and even produce cost efficiencies in the operation.

Although the cost reduction is of utmost importance to make the business case for the implementation of the solution, for demanding customers like large multinational corporations, it is important that the solution actually works as advertised. That is where the resiliency of the incumbent telecom operators makes a difference. Customers soon forget about cost reduction if the solution does not work properly.[252] Cost reduction *and* appropriate customer experience need to go together. It is not enough to have one or the other. That is the domain of convergence, the domain of *and*, not *or*, where different aspects of the service are blended, and it is difficult to consider them separately. Each part *and* the synergy count, and in order for this synergy to work, a certain level of customer understanding and maturity is expected. This is examined as follows.

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249 Ibid.
250 Ibid.
251 From a presentation by Tom Craig, BTGS President, IP Networking, on 14 September 2006.
252 From a presentation by Andy Green, CEO of BT Global Services in 2006.

Customer Understanding of Integration Issues

The value proposition in this business of integrated solutions is to guarantee end-to-end performance, so 95% of BT's customers ask BT to manage the entire domain.[253] Only in this way is it possible to guarantee end-to-end performance. Then, in most cases, customers do not want to buy solutions as point products[254], as they understand that there is an integration issue. The provider needs to understand the impact on other parts of the system and act on those, or at least to make recommendations for the customer. Integration with existing systems owned by the customer is necessary, and this is a different aspect of systems integration found in the development of complex products and systems. Customers have already made some investments in existing systems that they do not want to lose or replicate in adopting a new system. Also situations sometimes occur where the investment was made and the solution does not work as expected. For example, the customer may have previously chosen to buy different point products that do not integrate appropriately. In this case, the provider needs to find a way to mitigate the consequences of this erroneous investment *and* minimise the loss stemming from this earlier investment.[255]

At this point it is important to make a distinction between integrated solutions and systems selling. Usually the systems seller has the practice of selling its system as a point product wrapped with some services connected to the product, i.e. goods-dominant logic prevails. The mindset for integrated solutions is that services are the dominant part of the business: the service-dominant logic. To implement the latter logic requires consultative selling to the customer, bearing in mind the customer's business requirements and perhaps even engaging with the customer's strategic intentions. The selling is based on the envisioning of a more long-term relationship, and it may consider partial solutions from partners and even competitors. Customers may require partial solutions to be integrated from competitors of the provider. This is the situation where the customer has already made a substantial investment in systems and equipment from the competitor and the provider needs to integrate them with other partial solutions. This may seem unconventional and not all firms are willing to do it. It is a practice that may

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253 From a presentation by Tom Craig, BTGS President, IP Networking, on 14 September 2006.

254 Point products refer to those products that provide a particular solution to a specific customer problem, but which leave the integration of the whole solution to the customer.

255 From a presentation by Tom Craig, BTGS President, IP Networking, on 14 September 2006.

inevitably occur in the telecom industry[256], and one of the first major firms to have institutionalised it was IBM in the 1990's (see, for example, Gerstner (2002)) in the IT industry.

The provider's emphasis in serving customer's needs for the end-to-end service is on the management of customer risks. Taking charge of end-to-end integration of services thus becomes a process of relieving the customer of risk. End-to-end integration also requires a different attitude from the provider in comparison to the point product/system selling mindset. As previously mentioned in Chapter 5, Sub-Section 5.4.1, this attitude has been termed 'substantial rationality capability', i.e. the ability to consider the part and the whole at the same time when approaching a problem (Clegg, 1990, Morgan, 1986). It requires people with not only technical skills but also with the psychological temperament to be concerned with how a part of the solution has an impact on the whole solution or system.[257] This may not be achieved by a simple period of retraining. Understanding customer needs goes beyond technical issues, and includes the cultural and governance aspects of the customer as an organisation, and such understanding is necessary in order to make the project successful. This requires different skills for the people involved in the negotiation process.

Negotiation Process

As discussed in Chapter 2, Section 2.3, the project marketing literature emphasises the events which happen before the start date and after the finish date of the project, categorising three periods for the formation of projects (Cova et al., 2002): independent of any project; pre-tender; and tender preparation (leading to an offer). The first two phases are usually neglected by the traditional project management literature. In the ICT-based integrated solutions analysed, many new projects are based on a past relationship: a project is used to deploy a network, which is directly related to a continuous service. Then, after the end of the project, there is a service that continues to be provided (like voice and data services). This provides a relationship that can serve as a foundation for identifying new needs and further projects to improve the infrastructure and the services on top of it as the customer firm changes.

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256 Interview with Alcatel Manager, March 2006.
257 Interview with Siemens Senior Manager, March 2006.

One of the most important aspects of the business of integrated solutions in ICT-based services is the negotiation process from the articulation and identification of the need right through to the contract signature. This process is supposed to be long, and may take years in some cases. However, some BTGS projects analysed were characterised by rapidly concluded negotiations. For example, Bank of New York praised BT for submitting a proposal in just a week. There are other situations where the customer had tried other providers who had failed to provide a reasonable solution. In addition, in the negotiation phase, offering fast action to fix problems created or aggravated by a previous provider can be important for winning the contract. A further complication is the possibility that regulatory issues will pose specific deadlines or delays. From these examples it can be seen that the environment for this ICT-based type of integrated solutions is much more varied than other projects involving, for example, the supply of high-speed railways, large bridges, or complex weapons. Although all large projects require a long period of negotiation, the organisational and governance issues negotiated may be more complex in the case of telecommunication services.[258]

Usually the project is considered to be as temporary in the sense that it has definite start and end dates. Although the end date may not be so definite in practice, the aim of this type of business of integrated solutions in ICT-based services is to have long-term relationships in the future. Thus, the aim is not simply to terminate the project and move on to other projects with other firms, but also to extend the contract, trying to identify other projects with the same customer that emerge as the company keeps changing. In this sense, lessons learned can be reused and refined in order to improve performance in subsequent projects *with the same customer*. In some of the projects analysed, it is claimed that stable account management (i.e. the same people serving the same customer for many years in current and subsequent projects) was an important factor to sign-in a new project.

In the process of understanding customer needs, the processes of provider selection, controlling and reducing costs, understanding integration issues, and negotiation provide different perspectives of the customer-supplier interaction and how they eventually co-create value. Both provider and customer are pursuing the aim of creating value at the lowest cost possible. In particular, the provider attempts to achieve the cost reduction through repeatable solutions and approaches which can be replicated for

[258] For some figures for flight simulators, see Davies and Hobday (2005, p. 158).

different customers and, sometimes more importantly, with the same customers over time, as a result of long-term relationships. One of those approaches is the development of platforms for integrated solutions that can be systematically offered and delivered to customers.

7.3. Developing platforms for integrated solutions

BTGS delivers network IT services that are ICT-based integrated solutions (cf. Davies (2003b)) to meet the needs of large customers. As defined in Chapter 2, Section 2.5, a platform can be understood as 'a subsystem or interface that is used in more than one product, system, or service' (Meyer, 2007b, p.149). This definition can be applied to the service context, where reusable subsystems, interfaces or processes are used to develop services faster while reducing costs.

After examining the case of Unilever in Section 7.2, this section examines other cases of integrated solutions based on the 179 cases provided by BTGS (shown in Appendix 3). It also shows the industry/activity in which each customer performs, and the countries where the integrated solutions projects were mostly undertaken between 2003 and 2008. Table 7.1 shows the distribution of industries/activities of customers among the cases. Services, government and industrial manufacturing correspond to more than 50% of the projects in this sample. Within the field of services, it includes financial, telecommunications, business, IT, recruitment, legal and rental services. Projects for the government are highly concentrated in the UK.

Table 7.1 – Distribution of Industry/Activity within the Sample of 179 Cases/Customers.

Activity/Industry	Number of Occurrences	Percentage
Services	45	25.1%
Government	38	21.2%
Industrial Manufacturing	20	11.2%
Healthcare	16	8.9%
Retail	12	6.7%
Transport and Logistics	12	6.7%
Consumer Products	6	3.4%
Education	5	2.8%
Media and Broadcast	5	2.8%
Energy	4	2.2%
Leisure	4	2.2%
Pharmaceutical	4	2.2%
Charity	2	1.1%
Oil and Gas	2	1.1%

Utilities	2	1.1%
Construction	1	0.6%
Trade Union	1	0.6%
TOTAL	179	100.0%

Source: Author's elaboration

Table 7.2 shows the countries involved, and the frequency in which the integrated solutions projects were undertaken. The majority of the projects were undertaken in the UK. This reflects the need and strategy of BT to internationalise into markets abroad.[259] The United States come in second, showing that they continue to be a significant market for BT, despite divestments made in the USA in the early 2000's.[260] Twelve projects mentioned multiple countries in Europe, Asia and Latin America, without specifying precisely where they were. Thus, these multiple countries are not included in the number of occurrences of Table 7.2.

Table 7.2 – Distribution of Countries within the Sample of 179 Cases/Customers

Country	Number of Occurrences	Percentage
UK	126	60.6%
USA	15	7.2%
Germany	7	3.4%
China	6	2.9%
Spain	6	2.9%
Belgium	5	2.4%
Netherlands	5	2.4%
India	4	1.9%
Singapore	4	1.9%
Italy	4	1.9%
Austria	3	1.4%
France	3	1.4%
Ireland	3	1.4%
Canada	2	1.0%
Malaysia	2	1.0%
Portugal	2	1.0%
Sweden	2	1.0%
Australia	1	0.5%
Brazil	1	0.5%
Czech Republic	1	0.5%
Egypt	1	0.5%
Estonia	1	0.5%
Hungary	1	0.5%

[259] Interview with BT Senior Business Manager, March 2007.

[260] For example, Concert, BT's global joint venture with AT&T, was launched in January 2000 and was formally divested in April 2002 (BT, 2002).

Indonesia	1	0.5%
South Africa	1	0.5%
Denmark	1	0.5%

Source: Author's elaboration

The analysis of these cases points to a different dynamic from the traditional literature. Usually the literature assumes that it is possible to start designing modular architectures from the very beginning, as it assumes the development of products for the mass market. It does not emphasise the cumulative nature of the platform in the form of repeatable solutions that are built as long as the provider (BTGS in this case) deploys integrated solutions for customers of a determined market segment. Repeatable solutions as platforms emerge from a process of variation, selection and retention in interaction with customers from project to project (Davies and Brady, 2000). This process of refinement is usually done under contract with the customer. The emerging platforms are therefore financed by customers, and the replication of these solutions for serving other customers may decrease the costs of subsequent projects.

Integrated solutions are instantiated through a project with a customer. Thus, integrated solutions are not decoupled from a customer. If a firm has a solution in the form of a system or product, but it is not associated to a customer addressing its business and technological needs, it is not yet considered an *integrated* solution. Solutions as systems selling are offered; integrated solutions are offered *and* deployed within a customer business with the collaboration of third party firms. There is always an explicit customer involvement, and as the solution integration is the supplier's responsibility, most of the risks are assumed by the supplier. Therefore, there are substantial additional costs involved. The integrated solutions business model competes with those that adopt a point solution (e.g. Oracle and SAP), selling a system which is customisable (i.e. 'forcing' a model or solution on to the customer) and which has produced a large market in customisation service consulting. In this case, the division of labour between Oracle, SAP and consulting companies served the customer's specific interests but does so without (or with the minimum of) direct costs to Oracle or SAP. BT's integrated solution model, on the other hand, assumes a large portion of the risks and costs of the integration.

The process of refinement and definition of emerging platforms as repeatable solutions is what contributes to the sustainability of the business over time. One important

element of the business of integrated solutions is that every investment in a solution for a customer is to be leveraged in other customers. As one BT executive said: 'Wherever we win big outsourcing and managed service contracts and we have to invest in infrastructure or people to service those contracts – and this is the margin magic – we will look to leverage that investment time and again to service other customers'.[261] Leveraging investments is an important aspect of this business, and platforms as repeatable solutions are re-used to accomplish it. BT is making the assumption that it will be able to do what companies in the 'point product' market have not been able to accomplish, i.e. to respond in a very authentic way to user customisation needs *and* to achieve gains from re-use of software and other information. However, in the previous experience of the IT industry, other companies (such as DEC and a number of other more specialised companies) tried and failed to follow the model that BT is now attempting to employ.[262] It is not clear at the time this thesis is being completed whether or not BT's strategy will succeed despite earlier industry history that followed a similar pattern and failed.

The business model of integrated solutions is tough because for its profitability it depends on the long-term relationship with the customer and on the ability of the provider to reuse its solutions.[263] As there are many projects under execution at the same time, an appropriate process of knowledge access and transfer needs to be in place.[264] Creating this repeatability and reuse has not been easy for BT. It is also influenced by the fact that this depends on the level of maturity or life-cycle of the whole business: BT Global Services was established in 2003, although consulting and systems integration activities had already existed before this for many years (since 1997). This may explain an initial lack of repeatability in the 179 cases analysed, as they cover the period from 2003 to 2008 approximately. On the other hand, the lack of repeatability may just reflect the inherent intractability of the problem, where chasing individual needs as expressed by their customers is unsustainable. For example, customer needs can be inconsistent and can develop along time in undisciplined ways where risks and costs of delivering the solution become unfeasible and unprofitable. The project may be profitable in itself, but on average, it takes between two and three

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261 From a presentation given by Maggy McClelland, BTGS President, Strategy & Development, on 14 September 2006.

262 For a further discussion on this previous experience, see Steinmueller (1996).

263 Interview with BT General Manager, March 2007.

264 Interview with BT Manager, March 2007.

years for a large integrated solution project to contribute to the profitability of BT. It also takes around three to four years for the cumulative cash flow to become positive.[265] This is a type of business that requires financial strength and consistency of high quality services for an extended period of time dedicated to defined customers. As noted in Chapter 6, Section 6.6, the profitability of the business model depends very much on renewing the contracts, i.e. extending the contract for a longer period of time which may extend the profitability period, and ultimately repeatability and replication.

Unilever, for example, signed an initial contract of five years, and 'they re-signed for a further five, which is quite unusual [in the telecom business]'[266]. The Land Registers of Northern Ireland established a 12-year strategic partnership with BT in an account base marketing programme to modernise the Land Registers' systems (BT, 2007g). The City of Edinburgh entered into a 15-year IT outsourcing partnership with BT with the aim to transform the council's IT system and hence improve council services (BT, 2006f). BT engaged in a 12-year public private partnership (PPP) contract with Disclosure Scotland[267] in order to design and manage criminal record check applications (BT, 2007i). There are some other examples of long-term contract and re-signing which support BT's business model of integrated solutions. However, many contracts and projects are delivered in the short/medium term (one year or two), and although '[BT's] contracts are moving from one or two years to five, six or seven years'[268], another dominant player, IBM, stated that there is a trend in their Global Services to 'shift to smaller deals of shorter duration, higher profitability and more industry-specific focus' (IBM, 2006, p.4). Hence, the strategy of BTGS to depend on long term contracts and re-signing for profitability is questionable.

This business also depends on referrals, and customers usually ask to talk to or visit other customers where a similar integrated solution was implemented. The customer wants to assess to what extent the solution offered was deployed before, reducing execution risks. This is another aspect of the platform, which is related to demonstrating the capabilities of the provider in similar projects with other previous customers. An

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265 From a presentation by Andy Green, CEO of BT Global Services in 2006.

266 From a presentation given by Francois Barrault, BTGS President, BT International, on 14th September 2006.

267 Disclosure Scotland is part of the Scottish Criminal Record Office (SCRO). It was established in 2002 and it allows an individual's criminal record to be available not only to select organisations, but also to those which work with children and vulnerable people (BT, 2007).

268 From a presentation given by Francois Barrault, BTGS President, BT International, on 14th September 2006.

entire integrated solution becomes a platform to be replicated as much as possible with other potential customers. The case of Bimbo, a food manufacturer, illustrates the deployment of BT's AAI (Application Assured Infrastructure), which comprises a range of packaged services with the aim of better controlling assets and infrastructure, and as a result improve the performance of applications. Bimbo requested references from other business using AAI in order to decide on a solution (BT, 2007e). Cases of network (e.g. IP/MPLS) deployment include: DGB-Rechtsschutz (BT, 2008a), a legal services company in Germany; Dystar (a global manufacturing company) (BT, 2005k); and Integrated US Healthcare Organisation (BT, 2007f). These companies required reference sites where they could check the functionalities of the network. The case of the London Borough of Lewisham (provider of public services in government) illustrates one of BT's point solutions, BT QueueBuster, which is a call centre queue management solution and real time call back system.[269] In the case of Lyreco, a retail company, BT provided an Avaya IP-based contact centre system along with project management and other managed services (BT, 2005h). ZTE, a telecom manufacturer, also purchased a contact centre solution from BT (BT, 2008e), and Tesco contracted a hosting and storage solution (this last one in partnership with EMC) (BT, 2006g). All these customers requested references from other customers as evidence of the capability of BT to deploy similar solutions. These cases also reveal that the integrated solution may start with point solutions (e.g. BT QueueBuster) that may later set the scope for a larger project. Finally, these cases show the openness of BT to use systems from other companies (e.g. Avaya and EMC) in order to meet customer needs.

The platform approach is important for the provider (i.e. BTGS) to reduce its operational costs in the production of the solution while keeping a certain degree of flexibility either internal (giving more degrees of freedom and choices to the internal team) or external (to the customer). Some degree of standardisation across the customer-supplier system is needed, as it is common to find customer and supplier not understanding each other due to differences in terminology and communication methods.[270] One way of dealing with this problem is through accreditation.

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269 Case study found in http://www.globalservices.bt.com/LeafAction.do?RecNo=3&Context=casestudy&fromAboutUs=true&fromPage=Aboutus accessed on 03rd July 2008.

270 Interview with BT Senior Manager, March 2007.

Accreditation of the provider by a standardisation body is another aspect that is sympathetic both to customer need (or requirement) and platform development. In this type of IT business, both ITIL (Information Technology Infrastructure Library) and ISO/IEC 20000 (International Organisation for Standardisation/International Electrotechnical Commission 20000) certifications are usually required to participate in bidding processes. Potential customers may rate accreditation as a pre-requisite or may rate it as desirable (and assign a certain amount of points if the bidder has the accreditation). ITIL provides then a common language and framework for different actors to communicate about the project within business-to-business interactions (Louwhoff, 2007). Thus, the accreditation contributes to the spirit of platform approach that pervades this business by offering common language and practices that facilitate the communication and interactions of supplier and customer. This is an example of how a customer requirement helps to align the processes with the provider. For this reason, BTGS has been investing in accreditations.[271] The accreditation approach, however, cuts in the opposite direction of customer involvement (in terms of 'pure' customer-driven solution), and adds elements of the 'forcing' model in dictating the business process model that customers need to adopt. It is a balance that both customers and BTGS are striving to achieve.

Platforms Driving Innovation and New Businesses

There are some cases where BT tries to use its experience in solving its own problems of building and maintaining networks where it can identify a new platform and transform it in a new business. Some examples are: (i) the 21C Global Venture, already mentioned in Chapter 5, Section 5.4, where tools, techniques and design capabilities developed for BT21CN can be sold on to and reused by other telecom operators wishing to make the transition to NGN;[272] (ii) M&A (Merger & Acquisition) practices, where BT created its own methodology for M&A and is providing consultancy based on its own M&A experience; (iii) Call Centre Management (CRM – Customer Relationship Management); and (iv) Account-Based Marketing Communications, where BT uses its own experience in providing customer service and marketing communication services of its own internal projects to customer projects.

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[271] Interview with BT Manager, March 2007.
[272] See footnote 139.

One of the characteristics of the platform leaders is to drive innovation in the industry, and certainly this is starting to be the case for BT. However, there is something different in the business of integrated solutions, for this is a type of business that drives innovation usually under contractual terms, when an opportunity is identified by BT and there is a large customer involved. It does not address the mass market.[273] Conversely, in the case of Intel and Microsoft, for example, the mass market is usually addressed.[274] It refers to developing point products or systems using the platform frequently in non-contractual terms. For integrated solutions, innovation occurs within a defined context with a defined customer usually under contractual terms. Other companies, like Microsoft, may deliver integrated solutions in some of their projects, although they do not constitute a main business line for that company.

Extending the Platform to Customers

In the business of integrated solutions in ICT-based services, the concept of platform would be important in order to develop repeatable solutions that could be re-used in subsequent projects, thus decreasing the cost and improving the effectiveness of the solution. In the concept of platform as 'a subsystem or interface that is used in more than one product, system or service' (Meyer, 2007b, p. 149), the focus is on the subsystem, like the engine made by Honda being used in different cars and different appliances (Meyer, 2007b). For the business of integrated solutions, as the cases analysed show, the re-use happens at the product level, which may be part of the provider's product portfolio or provided by a third party. It can be software-based, like the BT OneBillPlus and BT Billing Analyst, two BT software-based products that help customers to better control their telecommunications expenses. These products can be commercialised as a point service or as part of a bigger project.

From the cases analysed, the knowledge transfer occurs mainly in the customer segment in which the project is undertaken. Projects undertaken in the healthcare sector, for example, are used as reference for customers and for subsequent projects in the same sector. The value of knowledge transfer seems to be higher in projects within similar contexts. Thus BTGS creates expertise in offering integrated solutions to certain industries such as pharmaceutical, healthcare, oil and gas, retail, transport, utilities,

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[273] This is the case for BTGS. There was a recent restructuring of BT, creating BT Design and BT Operate in 2007 to develop and deploy software-driven products and services for customers in general, including the mass market (see, for example, (Meyer, 2007)).

[274] See Gawer and Cusumano (2002) for a discussion of the platform approach in Intel and Microsoft.

leisure, and financial services among others. MedcoEnergi Global, an energy company specialising in oil and gas exploration, pointed out the proven experience of BTGS in the oil and gas sector as one of the reasons for having chosen BTGS to provide services for their global communications needs (BT, 2008g). In the same way, Meriter Hospital chose BTGS in part due to BTGS knowledge of the healthcare environment and its challenges in order to improve the use of Meriter Hospital's WLAN (Wireless Local Access Network) infrastructure (BT, 2007l). Finally, MoD (Ministry of Defence) emphasised BTGS's expert knowledge of the defence industry when it was hired to rationalise MoD's disparate networks into a single secure infrastructure (BT, 2005g).

There is also evidence that this type of business relies heavily on knowledge transfer from the provider (BT) to the customer. For example, Friends Provident, a financial services company, praised BT for sharing knowledge about the specifics of the network and services in a way that is not common in the industry (BT, 2005i). Friends Provident wanted to improve the way they were using the technology of their contact centre. Knowledge and skills needed to be transferred as they wanted to manage their IP telephony system by themselves in the long term (BT, 2005i). This practice may constitute a threat for BTGS's model of long-term contracts. On the other hand, it would be beneficial if further needs arise and the customer (i.e. Friends Provident) eventually outsources the network. The important feature in this case is to create a strong bond with the customer with the aim of continuing the service and being the provider of choice for subsequent undertakings by the customer (i.e. customer lock-on[275]).

At the level of network, the IP/MPLS network has been a significant advantage in order to deploy the convergence of networks (and services on top of it), leveraging the consolidation of customers' networks. Many large firms and public institutions grew organically with different technologies (e.g. ISDN, frame relay and ATM) being deployed according to local needs. This is the case of Conwy Council in the public sector, where it was necessary to bring together under the same administrative umbrella different types of organisations (e.g. council offices and schools) with disparate legacy IT systems (BT, 2008c). Software AG, a software company based in Germany, decided to consolidate its communication network (WAN, fixed telephony, mobile telephony and PBX installations – this last one in 16 countries) and hand over its management to BTGS. Network consolidation allows more efficient use of resources, and the

[275] See footnote 226.

consequent cost reduction due to the simplification of the matrix to suppliers, who are ideally reduced to one partner relationship (BT, 2007b). The network fragmentation did not allow such customers to provide consistent services in many instances, and the cost of maintaining diverse networks was becoming too high as firms grew (due to expansion, merger and acquisition, joint ventures, etc.), and the demand for better and more numerous services from the public institutions also increased. For example, Pershing, a financial services company, was acquired by The Bank of New York, and this created the need to consolidate and rationalise their existing data centres (BT, 2007h). Canon in Spain hired BTGS in order to design and manage their IT infrastructure with the aims of consolidating their IT services (e.g. web page, intranet, e-mail and various corporate applications), and increasing network security (BT, 2005j). Networks are being used as platforms for customers to become more efficient (i.e. to reduce operational costs) and at the same time to allow the creation and provision of new services.

One of the consequences of outsourcing, merging the customer and provider network, is that resources can be released for concentrating on IT applications that are meaningful for the customer's business. Thus, new applications can be developed by customers themselves (increasing the use of the network) or by BT to be passed on to customers. Providers like BT can become more knowledgeable about customer needs in real time, i.e. closer to the moment when the need arises. However, the profitability of such approaches over time remains as an issue.

Global Contract Profitability

This integrated solution type of business requires financial strength from the provider. The fact that the aim is to absorb risk for the customer implies that the provider (i.e. BTGS) assumes that risk, who in turn may be able to transfer it to their own suppliers or third party firms (e.g. insurance companies). The business model depends on long-term relationships (five years is supposed to be a good average) and one of the success criteria would be to re-sign the contract if it involves providing continuous services to customers. Considering the whole business, projects and contracts are likely to be in different phases of their life cycle. Some projects may be in their 'investment' period and other projects may have entered their profit contribution phase already.[276] Financial

[276] Interview with BT Senior Manager, March 2007.

capabilities adequate to meet the scale of costs in the initial phase where most of the contracts are in their 'investment' phase are required. Over time, more mature projects may be financing those in their initial phases. Also, payment may not be made until the system works rather than when it is delivered and installed.

In addition to the life cycle financing problem, profitability is affected by the overall operational efficiency of the company, and much of this efficiency is based on standardisation of processes and the refinement of repeatable solutions. As already noted in this section, repeatable solutions are very dependant on identification of systems, processes and interfaces that are re-usable in subsequent projects. The balance between repeatability/standardisation and flexibility is at the heart of the platform approach. Other operational cost savings approaches are possible through reductions in the number of staff and in global procurement.

Some contracts may never reach the profitability phase. Thus, such 'toxic' contracts may exist in the portfolio, and these may hinder the performance of the firm in the medium and long-term.[277] Poor results from BTGS in 2008 (BTGS was officially established in 2003) demonstrate that this business model is tough to deliver. One of the reasons for the poor performance may be the offering of more technical/commercial flexibility that underestimated the risks for the provider (BTGS), and this process must be refined throughout the years in order to have a better balance between the technical/commercial flexibility for the customer (following the customer focus approach) and the need for profitability and growth of the provider. However, the continuous refinement over a number of years assumes that the current integrated solutions business model adopted by BTGS is the right one. Eventually the long-term partnership and contract resigning may prove unfeasible and BTGS may have to switch to other types of business model in its search for a viable business position, for example, a switch to more 'forced' solutions such as the business models that Oracle and SAP have found more feasible over the long term.

The platform approach offers a feasible alternative for BTGS to expand its business of integrated solutions while keeping costs under control, assuming that this approach is feasible in the long term. If feasible, a platform, in the form of network and products

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[277] From Ovum, a market research firm, text found on http://newsweaver.co.uk/empnewswire/e_article001260577.cfm?x=b11,0,w (accessed on 07th December 2008).

and services, will increase the level of engagement between customer and BTGS in a way that allows needs to be quickly identified and met. In principle, customers and BTGS can co-evolve their platforms, and drive innovation. The platform approach is also, in principle, complementary with other capabilities required for dealing with the changing and evolving needs of large customers.

7.4. Developing Capabilities for Integrated Solutions

'Networked IT service' is the term used to describe the converged services that BTGS deploys for large customers. It represents the convergence of network products, IT products and professional services to offer an end-to-end solution that has a strong component of network products and services (BT's traditional core capability). Large firms have already invested huge sums of money in their IT and communications systems and networks. These are constantly evolving and needs and problems emerge as such firms change and grow. As noted earlier in Section 7.2, it becomes complex and risky for these firms to build, maintain and manage such systems and networks if it is not part of their core business. Internationalisation of such large customers makes the scenario even more complex. It is in this scenario where BT has found an opportunity to win customers.

The competitive advantage of BTGS to deliver integrated solutions, according to the 179 cases analysed, is highly dependent on consultancy, systems integration and project management capabilities. For example, Air China, an airline company, relied on BTGS consultancy services in order to build a new facility for their customer contact centre, due to an Air China expansion into Europe (BT, 2008b). It required a deep understanding of Air China's requirements in terms of cultural issues and operational costs. Systems integration usually refers to the ability of working together with multiple suppliers, managing resulting dependencies in order to deliver a coherent solution to the customer. In this integration process, BTGS served as the single point of contact with the customer. A typical example is the case of Cork County Council, where BTGS provided a new CRM (Customer Relationship Management) and call centre environment, a unified and centralised IP telephony system, and the upgrade or replacement of the existing LAN infrastructure at the Council sites (BT, 2008d). Throughout the entire project, BTGS was the sole point of contact for the Cork County Council. In this case, project management referred to the attendance of tight deadlines and effective coordination of activities to deploy the solution. An interesting example is

the case of Britannia Building Society, a financial services company, where BTGS built a new broadband WAN. There was pressure to built it quickly, as the sooner the project was completed, the more it would save in operational costs (BT, 2005e). Britannia was forecasting savings of £1.5 million in the three years following the end of the project due to the lower operational costs of the new network (BT, 2005e).

Consultancy, systems integration and project management can be considered under the label of 'professional services'. Professional services people have different skills from the people working with the traditional voice services. Professional services have existed in BT for some years before BTGS was established in 2003, through its consulting and systems integration divisions.[278] However, with BTGS, professional services have increased and BT has been hiring more intensely people from firms like IBM, Deloitte and Accenture[279], which are known as strong players in the IT and professional services domain. Professional services are not support people. They are 'billable' people as it is possible to relate their work with the charges done by BT.[280] Hiring people from the IT domain also shows how convergence is happening in practice.

Financial capabilities were rarely mentioned by customers in the 179 cases examined, with the exception of Land Registers of Northern Ireland (LRNI) who stated that BT's innovative approach to financing the project made the whole programme possible (BT, 2007g). The programme was to modernise the land recording system of Northern Ireland, which was predominantly paper-based (BT, 2007g). However, financial capabilities is indirectly mentioned by customers when referring to the financial stability of BT, as the result of the requirement of doing long-term business with a company that will likely be operating in the long-term. For example, China Shipping Group selected BT's global MPLS network to connect the firm to Asia Pacific and the Americas, and one of the selection criteria was BT's financial stability (BT, 2008f). In the same way, Origo Services, a financial services company, relied on BT's strong brand and financial stability to manage a system to validate the user identity and authentication for sensitive financial transactions of independent financial advisors (BT, 2006e). Harveys Furnishing also selected BT due to its financial stability as one of the selection criteria when Harveys decided to converge their voice and data networks into

278 Interview with BT Senior Manager, October 2006.
279 Ibid.
280 Interview with BT Senior Manager, March 2006.

a single network using BT's hosted voice solution (BT, 2006b). On the other hand, as mentioned before in Chapter 6, from the perspective of BTGS, financial capabilities are important as the integrated solutions contracts take several years before they start to contribute to the profitability of BT.

An extreme example of the supplier-based approach is to 'force' a certain product or service onto the customer without much scope for adaptations according to the customer's specific needs. The customer-centric approach requires a different attitude towards the customer, which in turn requires different skills and capabilities from those people in charge of interacting with the customer. John Radcliffe Hospital valued BT's understanding of the healthcare business and environment, as BT was involved in NHS and other healthcare projects, when BT proposed a wireless infrastructure to extend the use of applications for, for example, processing blood transfusion data (BT, 2006h). In the same way, Meriter Hospital (BT, 2007l) and NW London Hospitals NHS Trust (BT, 2007c) valued BT's knowledge of the healthcare environment and its challenges, and in the latter case BT was able to show a similar solution implemented elsewhere, which contributed to BT winning the contract. In Meriter Hospital, it was involved in the implementation of a wireless voice solution to improve patient care and communication among staff (BT, 2007l). In NW London Hospitals NHS Trust, BT integrated their voice and data networks using IP-based solutions from Nortel and Cisco (BT, 2007c). The Irish Government valued BT's understanding of government requirements, as BT has worked with many local and national government organisations (BT, 2006d). In this case, BT deployed a multiplexing and network solution to support a digital broadcast network (BT, 2006d). In the retail sector, WHSmith valued BT's retail experience when BT was selected to overhaul WHSmith's store IT and communications systems (BT, 2007j). Finally, Scotia, a financial services company, valued BT's in-depth understanding of Scotia's business and operational requirements to adopt BT's trading technology (BT, 2005f). These cases provide evidence that the experience of BT in specific sectors (healthcare, government, retail and financial services) supplies the capability to understand the business in which customers are engaged, and enhance the value of integrated solutions in the contexts where customers operate.

Value in the context of the business (and for larger projects the goals of BT and the customer) is matched at strategic level.

Integrated Solutions for Internationalisation Strategy

This strategy of internationalisation is quite different from that of the 1990s, when worldwide success was pursued based on partnerships, mergers and acquisitions, and it was highly dependent on investing money without the customer focus behind those investments. It is also a strategy based on the fact that the UK and Western Europe is BT's home base. The expansion is based on creating a platform in the UK and then expanding it to Western Europe and to other countries around the world where customers are demanding BT serve them. As noted in Chapter 6, Section 6.6, BT has a privileged position in the UK and London, which is the base of many multinational firms.

The contracts that BT is signing with large customers are becoming longer in terms of timescale (from one/two years to five/seven years), and this has a direct impact on the growth stability and anticipation capability to foresee customers' needs in the future.[281] It is a business model that reinforces long-term relationships, but of course this might have its disadvantages if the relationships suffer along the journey; the cost of a 'divorce' can be financially and emotionally high. Also being too close to customers may blind the provider to other disruptive opportunities (cf. Christensen, 1997), but this may have a lesser impact in this context, as BTGS and the incumbent providers are not producers of technology, but they leverage technology in order to create new services and benefit customers.[282] The impact of disruptive innovation may also be minimised by the way BT is organising innovation in services with a more 'open' approach.[283]

Although there are claims that many vendors would be involved in one-off projects, the various integrated solutions delivered by BTGS show that the vendors are limited to a few 'strategic' partners. Cisco and Nortel provide most of the network equipment for integrated solutions. There are also a few cases where Avaya and Siemens are used due to customer request and familiarity with those vendors. Some solutions for CRM (customer relationship management) offered by BT are based on Siebel systems, which

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281 From a presentation given by Francois Barrault, BTGS President, BT International, on 14 September 2006.

282 Interview with BT Senior Manager, October 2006. BT and other incumbent service providers obviously produce technology in terms of patents and technological knowledge about the network, but they do not produce equipment and systems, which historically were relegated to specialist equipment providers (e.g. Ericsson, Siemens, etc.). See Fransman (1994) for further discussion about the role of R&D (and production of technology) for incumbent telecommunications operators such as AT&T, BT and NTT.

283 This is further discussed in chapter 8.

are used by BT itself to deal with its own CRM. Some integrated solutions deployed by BT benefit from the fact that the customer uses the same appliances used by BT, for example, for its mobile technicians: the 'ruggedised' Panasonic laptop was already being used at AA – The Automobile Association, and BTGS offered to use the same laptop for the integrated solution offered to the Association.

Customers internationalising into other markets require a high degree of resilience of their network, and that is where BT has established its core capability. As noted in Chapter 6, Section 6.5, in association with resilient network capability, geographic capability is a distinct advantage when offering integrated solutions to large multinational organisations in terms of being present in various countries with their own network or through partnerships. 'Customers are paying BT to develop a multimedia core in these countries, driven by demand'.[284] This refers to the global reach and coverage of BT's physical networks. For example, Staples, a retail company, adopted BT's MPLS (Multi-Protocol Label Switching) network to interconnect their facilities (offices and stores), and stated that 'BT had a good physical presence in each country we were interested in. This was important when working across many sites in different countries without using a third party' (BT, 2005d). Danske Bank chose BT's global multiprotocol label switching (MPLS) network for its WAN (Wide Area Network) as BT were present physically with its network where services were needed at competitive prices (BT, 2007d). This informs the partnerships and acquisitions made by BT within its internationalisation strategy.

Network, IT services delivery, consultancy, project management and systems integration capabilities all allow the delivery of integrated solutions by BTGS. Network capabilities are the base from where BTGS diversifies the scope of its business, taking the convergence of services to another level. At the same time, dealing with large customers with global strategies, BTGS deploys its internationalisation strategy more sustainably according to customer needs. At this point it is interesting to compare the approach of BTGS with others, such as IBM and C&W. IBM has been in the business of integrated solutions for a long time (since the 1990s), and C&W is in the same communications market as BT, but on a smaller scale.

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[284] From a presentation by Tom Craig, BTGS President, IP Networking, on 14 September 2006.

7.5. Comparison of BT Global Services with Cable & Wireless (C&W) and IBM

The literature on integrated solutions suggests that there is a tendency to move downstream from manufacturing to services (Wise and Baumgartner, 1999). Davies (2004) argues that firms may be moving to integrated solutions from a technology (manufacturing) or service base. Davies (2004) also uses the C&W case to illustrate the move from a service base. Whilst somewhat similar to the BTGS case, there are some differences. The similarity consists of the fact that most of C&W integrated solutions projects were based on outsourcing, as this had become a huge market for IT services in general. BT had at that time consulting and systems integration department to explore this market.

The differences regard scale and purpose. Compared to BT, C&W is relatively small. The extent of the projects C&W could undertake and its financial capabilities to cope with this type of business have been much more limited than BT. Even so, C&W experienced some financial problems performing this type of business.[285] A huge advantage BT has over C&W is its size and scale, and the geographic capabilities that BT is able and willing to provide, expanding its platform to other countries as large multinational companies require. On the other hand, BT's size and scale may encourage the undertaking of large projects that have the potential to incur bigger losses if there are intrinsic problems with the profitability of the business. The aim of BT to internationalise into other markets, nonetheless, suggests that these risks will be undertaken. Integrated solutions which result in global contracts imply that BT needs to be present in many countries (it is now in 170 countries) and this expansion is mostly financed by customers who have operations globally or want to expand into other markets worldwide.

Although Davies (2004) has identified the move from a base in services, C&W and BT offer an example of one type of service to move from. This is the network service, which is highly reliant on a resilient infrastructure. Firms like Accenture and Price Waterhouse come from the IT professional services base, and IBM comes from the IT technology base (originally offering products as goods or tangible entities). The domain of network IT services identified by BTGS to operate in the integrated solutions arena is in the intersection of these three different paths: network; IT; and professional services. This is one aspect of convergence and it is evidenced by the fact that those three

[285] See, for example Cassy (2002) for problems with C&W in its Global Unit.

companies are working together on many projects and competing in others. The success of this business is in identifying a need and defining the best solution for it, including third party suppliers. All firms operating in the converged domain are operating in the adjacency of their core capabilities.

Usually the concept of platform is used to emphasise the commonality and uniqueness of subsystems and interfaces (Meyer, 2007b), and it focuses on the capabilities of the firm to identify *internally* such common components, and on their diffusion to as many projects as possible. This approach usually downplays the role of standardisation like ITIL (used by BTGS), which offers a common framework for different parties to interact around, including third party suppliers *and* the customer. This shows the role of standardisation that becomes a platform for the actors to interact and collaborate. This also impacts on the cost reduction of the portfolio of projects over time, and shows the need to have a common framework for the communication and interaction between customer and provider.

The fact that BTGS has experienced financial problems with integrated solutions in 2008, like other firms such as IBM[286] and C&W, shows that the customer focus approach may have its limitations, since what is good for the customer may prove unsustainable for the provider in the mid or long-term. The aim of integrated solutions is to minimise the risk for the customer, and offer flexibility. However, too much flexibility for the customer may have a negative impact on the results for the provider (e.g. BTGS, IBM and C&W). The experiences of BTGS, IBM and C&W suggest that there might be a period in the life cycle of the business of integrated solutions where performance suffers.[287] The customer orientation may tempt such providers into being too flexible (e.g. in commercial terms) with the customers and after the maturation of the initial projects (usually a period of three to five years), well and badly negotiated projects may emerge. Usually there are problems with the risks of execution of those projects that are underestimated, and then refined in subsequent projects. The average maturation period of the projects undertaken by BTGS is now between three to five

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[286] IBM Global Services had increasing revenues, but decreasing gross profit margins in the fiscal years of 2002, 2003 and 2004, according to IBM Annual Reports. In 2005, margins increased compared to 2004 due to improvements in productivity and contract profile, and it was the first time that the revenue of IBM Global Services represented more than 50% (i.e. 52%) of the total revenue (IBM, 2005).

[287] This is in line with Neely's (2009) findings.

years.[288] As BTGS started its operations officially in 2003, this may explain why the maturation of some 'toxic' projects may have led to a weak financial performance in 2008. The BTGS case suggests that even hiring people from IBM, Accenture, Deloitte, etc., who may have experienced similar types of problems before, is not enough. There is an organisational learning curve that may lead to positive returns if the firm can overcome the period of initial struggle to create a base of competencies, achieve operational efficiencies related to replications and repeatability, and continue to win sufficient customers to justify the business.

Although the business of integrated solutions represents a new type of business model to BT, it is not very different to the way BT has been operating in order to build its own network. Sometimes there is a tender process, and sometimes the negotiation is directly based on previous successful or strategic relationships. Once the solutions are designed, projects are managed in the traditional way under the constraints of cost, deadline and specification. Tolerance to failure is limited and sometimes a trial is made to prove the concept before large scale or actual execution takes place.[289]

Generic capabilities to deliver integrated solutions include: systems integration; operational services; business consultancy; and financing (Davies et al., 2001, Davies, 2003b, Davies and Hobday, 2005). Although referred to separately, in practice they are intertwined. In the context of BTGS, one particular capability appears particularly important to win contracts: the geographic capability, i.e. to be where the customers are and where they intend to be geographically in the world. For the sustainability of the business, the capabilities of knowledge transfer and diffusion projects are important for improving the operational efficiencies of the portfolio of projects. Also, financing capabilities are important as it may take years for the project to contribute with profits.

7.6. Conclusions

BTGS decided to focus on large customers with multi-site operations who have their base in Europe. Globalisation and the unique position of BT in the UK (and London) drive the opportunity for BT to explore the delocalisation of large multinationals. Besides that, customers are increasingly requiring converging IT and networking services based on business and technological needs. User needs are diversified according to different customers in different sectors and market segments. For large

[288] Interview with BT Senior Manager, March 2007.

[289] For example, BT had to prove through a trial that its satellite technology worked for a mobile branch application for Aliance&Leicester.

customers, BTGS is hitching its platform to the customer's platform, creating the opportunity to identify needs as long as both BTGS and customer co-evolve, i.e. pursue together their imperative to growth. For this, BTGS and customers attempt to align their goals to the strategic level.

BTGS has identified a 'golden opportunity' that lies in the convergence of network/ IT products and professional services: the end-to-end integrated networked IT services. It is built on the core capability of BT in network products and services. Point products and services are used to enable the selling of services over a broader scope. As the business evolves, BTGS needs to invest in operational efficiency through repeatable solutions, i.e. the identification and definition of platforms that may be re-used in subsequent projects. The aim is to maximise the use of repeatable solutions to decrease costs. BT21CN and the customers' networks tend to become a common platform that allows new applications and services to be deployed on top of it while reducing operational costs.

Contracts for integrated solutions tend to be very risky, and during the learning process, the business may suffer some setbacks, as not only BTGS, but also IBM and C&W have seen. Quality of products and services (output) is not enough as the main differentiator for this type of business. Quality of relationship built with the customer becomes more relevant. Technology is not a differentiator, as it is widely accessible in the market. Quality of people and pervasiveness in the global network becomes a more relevant differentiator.[290] As noted in Chapter 6, Section 6.2, BTGS is 'a service business with a network inside, not a network that does some services'.[291] Also, 'service is defined first and foremost in terms of [customer's] business imperatives, rather than IT or networking requirements' (Louwhoff, 2007, p.3). This represents a major shift in the mindset of BT in conducting their business and it indicates the increasing relevance of the service-dominant logic in the business of integrated solutions.

The period for negotiating integrated solutions projects can vary from a few weeks to several months. It depends on various contextual factors, including the urgency of the customer to meet a deadline imposed, for example, by regulatory bodies. The negotiations are ultimately envisaging that the provider locks into the on-going

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[290] From a presentation given by Maggy McClelland, BTGS President, Strategy & Development, on 14 September 2006.

[291] See footnote 201.

customer's needs and changes. The sustainable business model depends on renewing contracts and long-term partnerships. Projects are based not only on solving a point customer need, but in many instances on establishing a platform for the customer and provider to co-evolve, identifying new sources of efficiency through cost reduction and improving effectiveness of the customer's processes, deploying new ways of doing the work required to achieve the customer's aims.

Besides systems integration, operational services, business consultancy, financing and problem solving, another major capability that needs to be developed and refined by integrated solutions providers is problem structuring through understanding of customers' needs. More than solving problems, providers are supposed to identify and shape the right problems to solve. This counterbalances the attitude of favouring certain solutions by pushing preferred systems and equipment from the suppliers (the 'forcing' approach), and it creates a more open approach to solving problems.

The BTGS projects show that innovation is not only about using the provider's new products and services, but also about integrating third party products and services in a way that satisfies a customer's need. However, network products/services were always from BT (as part of their core capabilities) and no evidence was found to support the claim that BT offers network products/services from their competitors in the same way that IBM offers servers from competitors when such servers represent a better solution for the customer. Larger and more sophisticated customers are keen to integrated solutions in order to simplify their operations and reduce costs, but increasingly individual consumers are becoming more sophisticated as well. Noam (1994) predicted the existence of Personal Networks (PN), and although it is still in the first stages (through service bundling), it may become a reality that make the business of integrated solutions a pervasive practice, even for final consumers.[292]

The customer orientation can be seen even in the building of geographic capability based on customers' needs. When it is decided that an acquisition of network is necessary, it is in response to current and future customers' needs, not with the aim of gaining an idealistic worldwide success (as it was in BT's strategy in the 1990s).

The integrated solutions delivered by BTGS induce service innovation through close relationship and co-creation of value with customers. It involves recognising new

[292] See also footnote 210.

business opportunities in existing customers (needs and requirements that need to be met in the present and in the future), and searching for knowledge and solutions both internally and externally. Hence innovation becomes more distributed along networks of firms working towards a common goal. Also, there is the recognition that even large firms such as BT cannot rely on their own internal innovation resources and processes. R&D still plays an important role, but R&D cannot be confined to its own laboratories. The boundaries are becoming more permeable. The goal of BT21CN is to build a platform where BT can co-create and co-develop new products and services with third-party firms and customers. The laboratory is extended to the market, and this is the essence of Open Innovation in BT, which will be explored in Chapter 8.

8. Service Innovation in the Converged Communications Landscape

8.1 Introduction

This chapter is concerned with how BT is reshaping its service innovation processes while implementing its platform strategy through BT21CN. The focus of this chapter is the nature and consequences of open innovation as it is applied to platform innovation with the aim of changing the way BT innovates in the development of new services.

As competition from different parts of the industry emerges, threatening the traditional sources of revenues of incumbent telecom operators, and with the landscape becoming clearer about the convergence of markets, the traditional ways of introducing new products and services are no longer adequate to keep pace with the speed of change in the market. A platform strategy demands that the organisation adopts more open practices. By definition a platform strategy involves the ability of others to 'build' on the platform which means that the information necessary for interoperability and the capacity to interoperate needs to be provided to others. In addition, open means that the incumbent telecom operators are more inclined to collaborate externally not only in R&D, but also in the implementation of different business models for commercialisation. This happens because at the infrastructure level, the incumbent telecom operators have divested the equipment suppliers which were part of the vertical integration of more monopolistic times (Fransman, 1994). At the services level, the uncertainty about the future services and applications which will render revenues leads BT to look actively for external innovators and technologies which can be somehow combined with BT resources in the development of new services. Thus, incumbent telecom operators are reorganising their infrastructure and processes in order to increase the 'interaction surface' with third party firms.

The term innovation was originally devised to distinguish the process of invention from commercialisation (Freeman and Soete, 1997). Invention and commercialisation can occur in the various stages of the innovation process, taking the linear model as a reference: closer to the original invention (i.e. closer to science and R&D), during intermediate stages of developing products and services, and finally closer to the final

customer (i.e. the final commercialisation).[293] The platform strategy facilitates a more open strategy, where further mechanisms of external collaboration and access to external resources facilitate invention and commercialisation in the various stages of the innovation process. Thus, open innovation emphasises a more collaborative approach with external parties in the various stages of the innovation process.

In this chapter, the aim is to show how the open innovation strategy operates as part of the platform strategy being undertaken by BT. Open invention is primarily done through partnerships with academics from universities, and sometimes through direct interaction with customers at the level of the application of the technology. Open commercialisation happens through the business of integrated solutions in interaction with larger customers, and through initiatives like Web21C[294] that try to address smaller customers and the mass market. Although the focus is on BT, it is very likely that many of the ideas discussed here may be usable for other incumbent telecom operators. The analysis of open innovation at BT indicates that it is used as a framework to build a coherent innovation strategy, coordinating all innovation initiatives that have been occurring separately (and sometimes disjointedly) as a result of both top-down and bottom-up approaches. In other words, the usage of 'open innovation' as a management injunction at BT is one favouring a multiplicity of knowledge sourcing and development models, each of which needs to have a suitable business model, and all of which must be co-ordinated within the framework of creating a coherent environment, landscape, or eco-system.

This chapter is structured as follows. Section 8.2 discusses the major challenges for service innovation in the context of incumbent telecom operators. It proposes a typology of services and it points out the increasing importance for incumbent telecom operators (and for BT in particular) of changing their innovation processes to support the creation and delivery of different types of services; innovations that are necessary because of emerging market dynamics. This section points out the increasing importance for BT of preparing for non-contractual innovation in order to compete in the web space and applications market. Section 8.3 discusses the major changes in the philosophy of

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293 This is a modified view of the original linear model, where commercialisation is only a downstream activity. In this modified view, commercialisation can occur in intermediate stages of the model.

294 Web21C was part of the BT21CN initiative, where BT made available API (Application Program Interface) for third party developers to access BT's network and to develop applications. It is the idea of opening the platform for external firms and developers. In 2008, BT acquired Ribbit, which overtook the Web21C initiative (Meyer, 2008).

innovation within BT, and why and how the innovation strategy and processes needed to be changed. Section 8.4 shows the various initiatives of BT to implement the open innovation concept. Section 8.5 discusses such initiatives and the innovation model pursued by BT, and elaborates on the implications for incumbent telecom operators in general. Section 8.6 draws conclusions from this chapter.

8.2 The Challenges and Initiatives for Service Innovation and Platform Strategy

BT and other incumbent operators face innovation challenges on two fronts. Large customers are demanding integrated solutions that satisfy their needs appropriately and quickly. Convergence has also provided an extension of the core capability of incumbent telecom operators in network products and services, addressing IT products and professional services in an integrated way. This led BT to change its business model by offering networked IT services to large customers in a contractual manner.

The other area of innovation encompasses the consumer market (mass market). Here the competition is different in nature. This is the domain of Google, Yahoo and e-Bay, where the dynamics of innovation are very different. Much of the innovation occurs in a non-contractual way with customers, and the first question is if incumbent telecom operators like BT should compete with the likes of Google and Yahoo. Ultimately, Google is considered one of BT's competitors and BT has a lot to learn from Google.[295] This section elaborates on this innovation area for BT and the other incumbent telecom operators in general, and how BT is tackling this issue.

If open innovation is establishing the causes and conditions for service innovation, while building a platform for innovation based on Internet technologies, what are the services that will render revenues and profits? While the traditional telecom operators and service providers struggle to find out what the services 'of the future' are, Internet firms like Google, Yahoo and Skype, and websites like Myspace.com and Youtube move fast, creating new rules and new markets. However, traditional telecom operators are targeting the more robust markets (business and critical mission applications) that Internet firms are unlikely to address.

Another concern is the limitation of the public Internet infrastructure, as demand for high bandwidth services grow, and the argument that the Internet architecture has 'ossified' (Handley, 2006). Paradoxically, the architecture of the Internet, which has

[295] Interview with BT Senior General Manager, October 2006.

allowed unprecedented change and advance, has not evolved significantly since the early 1990s (Handley, 2006, p. 127). Network operators believe that the public Internet will not be able to evolve in an effective way in order to deliver the convergent services of the future.[296] The Next Generation Network (NGN) is seen as an opportunity for incumbent telecom operators to overcome the competition from Internet-based services through changing its infrastructure and devising a more effective architecture. However, the change in infrastructure has serious implications for the organisational structure and processes of the incumbent telecom operators.

A consequence of the convergence of networks and services is that the internal organisation divisions are also being broken up due to the convergence of technologies. The silos in structure and management are being dismantled and a reconfiguration of organisational structure and capabilities is taking place as Levy (2005, p. 49) exemplifies:

> In the past things were clear – a customer bought a voice service and a separate data service, with a separate help desk for each. Today with new services such as 'BT Communicator' (launched in July 2004) where a customer can click on a directory name over the Internet and initiate a PSTN call, these distinctions are blurring and a more holistic service support infrastructure is required.[297]

As noted in Chapter 4, Section 4.4, BT is identifying and implementing 'common capabilities' which allow faster development of new services. Common capabilities are reusable elements, building blocks that reduce the time to deliver new services. Some of these common capabilities are: authentication; digital rights management; secure connections; directory; and profile (Levy, 2005). Another interesting aspect of this approach is the decoupling of the physical elements in the infrastructure from the service and support logic in such a way that any change in the service level does not necessarily translate into a change at the infrastructure level. This approach is commonly adopted in the computer industry, where new applications are developed around a 'common' operating system (e.g Windows, Unix or Linux) (Levy, 2005).

The temporary and unique characteristic of creating new services and the faster time-to-market that is demanded stimulates the development of 'good project management' practices. For the infrastructure transformation, BT created the 'BT 21st Century'

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296 Interview with BT Senior Technical Manager, March 2007.

297 BT Communicator was part of a partnership with Yahoo. The service was terminated in 2006 and replaced by BT's own service, BT Softphone.

project, which is an umbrella project for the whole transformation of its PSTN infrastructure into a new IP-based NGN infrastructure.

Recognising the lack of capabilities of BT in the software applications arena, BT CEO Ben Verwaayen stated that 'the challenge now is horizontal applications for broadband […] now it is more about whether we can get real innovation so we can benefit productivity and lifestyle'.[298] The term 'horizontal' means that those applications run on top of the network, and it is not necessary to change the network for a specific service. Also important is to differentiate application from connectivity services (transportation of bits and bytes) and infrastructure services. These last two services are in the domain of BT Global Services where project management and systems integration capabilities play a major role. In the applications domain, the software development capability becomes crucial for establishing reusable components and interactive processes with users. These are different capabilities from those needed for BT Global Services. Indeed BT Global Services need software capabilities for embedded and network management and support systems applications, but these are of a different nature from the software needed for interaction with consumers (related to applications involving gaming, music, film, and entertainment in general). Although it is clear that BT has advantages in providing connectivity and infrastructure services, the horizontal applications for broadband (which ultimately would compete with Internet-based firms such as Google and Yahoo) is an area that is extremely underdeveloped in BT and it is too early to be confident that BT will ever be able to compete at the applications level.

Nonetheless, BT's executives do not lack confidence. CTO Matt Bross claims that 'BT has moved from being a communications company to a service company and now is moving to an innovation company'.[299] BT has its traditional reputation on connectivity services, namely the fixed-line voice service. Later, taking advantage of adjacent opportunities it started to explore systems integration services offering a complete integrated solution to customers (this is the basic role of BT Global services). However, the last years with convergence and broadband, and the influence of the Internet and its horizontal applications have changed the landscape of services, allowing the customer

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298 From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82, p.12

299 From the interview with BT CTO Matt Bross found in http://networks.silicon.com/telecoms/0,39024659,39152548,00.htm (accessed on 13th December 2005).

to be more active and to have more choices. Now 'effort has got to go into creating, and that's completely different'.[300]

Many businesses have recognised that it is important to consider the whole customer experience when offering new products and services, but some still think that to be customer-centric means to satisfy customers without giving proper attention to cost and realistic returns (Patmore, 2003). This relates to two major issues of the customer experience approach: (i) the feasibility of the business for the supplier, and (ii) whether or not, after purchasing the service, the customer is willing to re-purchase it and recommend it to others.

Types of Services

Services provided by an incumbent telecom operator like BT can be categorised into three types. Type 0 is the service required to build infrastructure, such as to install and maintain network equipment in the customer premises. This is part of the work of BT Global Services when offering complete and integrated solutions to customers like Unilever. Type 1 service involves the data carrying services, provided after having built the infrastructure and subject to SLA's (Service Level Agreements). Type 2 service is the horizontal broadband applications, highly dependent on software, which run on top of the network. These services compete with Internet services like the ones provided by Skype, Google and Yahoo.

The categorisation and relationship of these three types of services can be seen as a consequence of the three layers that characterise the Next Generation Network (NGN) shown in Figure 1.2. Type 0 services are concerned with the infrastructure layer, where BT provides engineering and installation services for customers wishing to develop their own separately managed infrastructure as well as offering to extend the BT infrastructure into customer facilities. For example, the case of Unilever analysed in Chapter 7 is within this type of service. Type 1 services involve the specific capabilities of the network as an intermediate layer between the infrastructure and applications at the service innovation level, e.g. passing on information about call origin or routing, and session control. Type 2 services are applications that may use Type 1 service information but that are essentially decoupled from the complexities of the underlying

[300] From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82, p.12

infrastructure. These services include, for example, customer-facing applications for multimedia terminals, such as PCs, mobile phones and Personal Digital Assistants (PDAs).

Services provided by the Internet are changing the way customers perceive value. Like the low cost airlines (i.e. EasyJet and Ryanair) and travel services (i.e. Expedia and Lastminute.com), communication services are being profoundly affected by the Internet. Skype, founded in 2003 and sold to e-Bay by the end of 2005 for US$ 2.6 billion, is a remarkable example. Niklas Zennström stated Skype's value proposition very clearly: 'To change the way people communicate for free'.[301] Skype implemented the notion that it is possible to make a long distance call with good quality for free or very low cost, compared to traditional methods. This is changing the rules of the mainstream industry.

Internet services are proving to be a huge challenge for incumbent operators. The challenge begins with the unusual business plans used by such software-based Internet firms. These business plans can be based on 'free' services, where the service is not paid for by the users themselves. They are offered for free and they are funded by other sources (most often advertising). Google, for example, offers a free search service and most of their revenues come from advertisers. Skype offers free PC-to-PC voice services and charges a low fee for PC-to-traditional phone lines that is nonetheless high enough to make a profit for the company. Although the business models of Skype and Google may be disruptive to traditional network operators, this represents just one type of service (i.e. type 2 services consisting of applications for 'friends and family' and small and medium business for voice services (Google has its Google Talk services)).

Incumbent network operators are better prepared to compete in services type 0 and type 1, as they have been offering such services and building their capabilities for a long time. They are part of their core competence, offering services that require reliability, robustness, and are very complex in nature as they usually represent business-to-business, high value contracts and projects. Services of type 2, on the other hand, are very close to Internet services, applications and contents. This is where creativity plays a major role in developing and delivering new services. Collaboration is another issue that is different from collaboration for services type 0 and 1. In these types, collaboration is meant to be long-term, i.e. governed by high value contracts, that are

[301] Skype Night event on 30th November 2005.

intended to last for a longer period of time, usually years. The services also tend to be better defined or definable, business-to-business, and do not usually have interaction with end users. There is much interaction between producer and user of the services (as happens in the delivery of complex systems). However, telecom operators have the possibility of creating services for mass consumption by the end user. Services can be mass produced and mass customised (as personalisation is becoming a trend with the explosion of mobile phones). Furthermore, users are increasingly participating in the process of developing new services (they are users and producers at the same time), and they are also producers of contents (the phenomenon of services such as MySpace and Youtube).

Type 2 services place a major pressure on BT to have different processes in place to deal with this type of service. To address this, BT created the Web21C.[302] This initiative is to expose capabilities (functionalities) through the publication of APIs (Application Program Interfaces) that developers can access and develop their own applications accessing BT network. BT makes available SDK (Software Development Kits) that allows others to develop new applications. This is already a practice common in the IT/software development industry, but is a practice that BT needs to learn and find its optimum and effective point within its context. As noted in the previous paragraph, this requires a different set of collaboration 'rules' in comparison to type 0 and 1 services.

Within BT, type 2 services require an application environment. In this environment, as noted in Chapter 4, Section 4.4, BT is reorganising its functionalities and identifying common capabilities that can be used (or mainly reused) in order to decrease the time taken to develop new services. Examples of these common capabilities are authentication, directory and profile, storage, and home and office hubs (Levy, 2005, p. 50). These common capabilities are tightly related to the underlying infrastructure. They make the connection between the applications on the top of the network and the functionalities of the network. The application environment is in its first stages of trial and development (Darling and Sauvage, 2005, p. 89) and seems to be at the edge of BT learning processes. BT and other incumbent operators are preparing to compete at the applications level and acquire the capability to implement the service as soon as the

[302] See footnote 294. BT acquired Ribbit in 2008 and moved the Web21C initiative to Ribbit's platform. This move does not change BT's aim to establish a platform to interact with third party firms and developers.

service order is received.[303] For this, the OSS 'will be transformed into systems which are part of the service, rather than back office to service (Crane, 2005, p. 16). At present, however, if a customer tries to acquire or change a service today, the new service or change is not activated until two days later, and this is unacceptable at the applications level.[304] In other words, the nature and characteristics of the services with which BT is accustomed (service type 0 and 1) are very different from type 2 application services.

Another aspect of type 2 services is the creation of services itself. One issue is to establish the platform for innovation and collaboration, for others to innovate upon. This requires combining the infrastructure with flexible processes. Another issue is the management of creativity in order to really have new creative services delivered in the future. Here it seems that other approaches that are different from the existing and traditional ones are needed. Services in the past, like the traditional voice services, used to last for years and they were well defined in nature.[305] There was no concern about the contents of them, as they were supposed to be connectivity services and 'people talk what they want to'.[306] However, the application level is one step above the connectivity services. Contents matter and the way the customer interacts with the service matters: the so-called total customer experience. BT is establishing multidisciplinary 'customer experience' teams composed of social anthropologists, ergonomists and psychologists to interact with engineering teams (Patmore, 2003). Besides that BT is using a more interactive software development process (the traditional water fall model fails in this context), interacting with the user, and trying to understand the service from the user/customer perspective, i.e., how the customer really uses or experiences the service as a whole, not merely as the designer thought they should. For this, video diaries are used to document the users discovering and using the service and how they 'feel' about it (Patmore, 2003).

Another challenge of the application environment is the incumbent way of doing things that may not be productive and effective to compete with Internet services. One is the cultural gap in terms of how to develop new products and services, and it is better to illustrate this with an example. It seems that the services that Google, Yahoo and others

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303 Interview with BT Manager, September 2005.
304 Interview with BT Technical Manager, October 2006.
305 Interview with Ovum Senior Analyst, September 2005.
306 Ibid.

are developing are of the same type as the ones the incumbents are intending to develop. Taking the example of Google Talk, it appears that it was developed by only seven people, something that it would not be possible in an incumbent environment.[307] In the incumbent environment, it would probably be necessary to involve many more people, and the process would be more 'complicated'. About the rapid product and service creation, Shainberg (2007, p. 6) comments that:

> Often you create a committee who will decide who is going to be on the committee, to decide who's going to be on the steering committee, to decide who's going to decide how the product will be delivered. However we've got to change. So we're going from this traditional waterfall of the serial process into a more parallel environment, and create what we call this agile service assembly process.

This demonstrates how complicated any action in an incumbent environment can become when there is a bureaucratic mindset, which may be valuable and necessary for developing services that have a high impact on security (including national security) and mission critical services. However they prove to be inappropriate in horizontal broadband applications where a short time-to-market period is essential. Another challenge for the incumbent processes is the selection of new services. This tends to be made by some 'chosen' people of the incumbent operator. Frequently those experts within the incumbent are not able to foresee unintended uses of the services and miss a good opportunity. Internet firms, instead of relying on complex processes and on having an elaborated service until it launches into the market, launch a prototype and let some lead users play with it to check how they use the service (Iansiti and MacCormack, 1997). That is a mindset and attitude towards developing new services that incumbent operators need to learn.[308] There is a 'cultural gap' between what incumbent network operators think about services and Internet software-based firms (like Google and Skype) think.[309]

Internet firms provide a continuous availability of APIs (and do not try to internally select the best services like the incumbents). On the other hand, it is not clear yet if trying to overcome this 'cultural gap' is going to be the answer for the sustained competitive advantage of incumbent telecom operators. It is clear that the responses from Internet firms tend to be less complex and closer to users' needs, and there are

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307 Interview with Telecom Italia Senior Technical Manager, March 2007.
308 Interview with Telecom Italia Senior Manager, March 2007.
309 Ibid.

obvious lessons to be learned from Internet firms, which may be perfected for type 0 and 1 services rather than for type 2.

Internet firms are providing the same services incumbents are thinking about, but doing it quicker and without IMS (IP Multimedia Subsystem).[310] The difference is not in the service but in the approach to innovation. IMS is the response of both fixed and mobile operators to establish a platform that is going to be the enabler for operators to innovate by themselves and with the cooperation of third parties.[311] It represents a major framework where different parts (representing different functionalities) are put together and firms (suppliers) can position themselves in the provision of those parts (sub-systems). It also reinforces the central control that contrasts with the public Internet. IMS is sometimes also compared to the Intelligent Network. The purpose of IMS is for the network operators to have a platform for the development of new services. Olleros (2008) argues for the decentralisation of the core network, as it would make it (the core network) more scalable and flexible. The centralisation of the 'core', which would include the IMS, refers to the central control of the services by the network operator, as opposed to the distributed nature of the public Internet. He admits however that some networks have a substantially centralised core (e.g NTT DoCoMo i-mode) and that it may be necessary in some instances. For the moment, practitioners in the telecom industry defend the centralised intelligence in the network, saying that otherwise the incumbent telecom operator 'will become reduced to a low cost pipe company'.[312] This apparent paradox between highly centralised intelligence and flexibility may be resolved through the appropriate segmentation of customers and market, where some customers may need an intelligent network and the network can cope with other applications where network intelligence is not needed or can be operated in a distributed way. Besides that, network operators expect to extract revenue by stimulating applications on top of the network that in turn would increase the use of 'core' services. This is the reason why operators are trying to improve the access to their networks to third party firms.

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310 Interview with Heavy Reading Senior Analyst, May 2007.

311 For further information about IMS, see, for example, Bertin and Crespi (2009) and Camarillo and Garcia-Martin (2008).

312 Interview with BT Senior Manager, Deutsche Telecom Senior Manager, NTT Senior Manager, May 2008.

One of the initiatives of BT to address the non-contractual innovation is the Web21C,[313] which has already been introduced in this section. BT is making available some interfaces for third party firms to develop new applications that may require BT's network services. This is mostly what Internet-based firms like Amazon or Facebook are doing when they release their APIs (Application Program Interfaces), and is part of the platform idea of 'unleashing innovation beyond the boundaries of the payroll, exposing capabilities for others to develop'.[314] This is a fact in the open source community, where developers collaborate in the development of Linux without being paid for it. Focusing on people, the practical boundary is who is paying for the work of those people. Focusing on system, who is paying the cost of setting up and maintaining that system? Although the Web21C/Ribbit initiative is very immature at the moment, it proves the willingness of BT to play in this more uncertain market and to learn with it. To what extent the incumbent telecom operators should play in the domain of Google, Yahoo and MySpace is still an uncertainty, but BT and other incumbent telecom operators seem to be willing to do so, hoping to capitalise on it once the right opportunity emerges and as a protection against possible disruptive innovations which may prove fatal to their business in the future.

In summary, the uncertainty level regarding future services is currently high in the telecommunication industry. The technology and its trajectory is predictable to a certain extent, but not the way it is going to be used, even more so now that customer interaction is increasing. In order to minimise this uncertainty, traditional telecom operators are creating what can be called a 'platform for innovation'. This platform is based on Internet technologies (e.g. IP – Internet Protocol) and enables the operator to deliver services combining voice, video and data seamlessly. The immediate effect is the convergence of networks and services, and the possibility of many firms from different industries cooperating in ways that were not possible (or feasible) before. Market boundaries between infrastructure (BT, Deutsche Telekom or France Telecom) and content (e.g. Time Warner or Disney) firms are blurring and opening up new opportunities.

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313 Replaced recently by Ribbit in 2008, as mentioned before.

314 From a presentation by BT CTO Matt Bross at the Telemanagement Forum 2007, in Nice, France.

New value propositions are redefining business models, and it is no wonder now that innovation is based more around business models than around products and services.[315] Customers talk less about the networks and technologies, and more about the services and how to use them, and ultimately the recurrent question is 'what is value in the telecom industry?'.[316] Also, as market boundaries are increasingly being broken, the idea of 'telecom industry' itself needs to be revised.

The idea of value opens up an area where imitation and conformance to existing market rules are outdated. If start-up and traditional firms want to survive, they are now invited to change the rules of the market, and it is not possible to do this alone. That is why the power of partnership between start-ups and traditional firms has become so important, and why the concept of open innovation has become increasingly popular in the telecom industry. In this section, the different types of services that incumbent telecom operators needed to deal with were discussed. Whilst types 0 (infrastructure services) and 1 (connectivity services) are familiar to incumbent telecom operators' activities, type 2 services (horizontal applications for broadband) are a new breed of services whose innovation processes incumbent operators need to learn. Although these service types were presented separately, in practice, a major challenge is to make type 2 services drive types 0 and 1. The next section addresses how BT has been changing its innovation processes in order to address the challenges of a different innovation space as discussed above.

8.3 Changing the Way to Innovate in Services in BT

Traditional innovation in complex network industries such as telecommunications involves a multiplicity of possible concerns about inter-operability, security and the robustness of the network. The heterogeneity of network equipment and the difficulties of the analogue technology involve much weaker capacities to isolate and process signals. With digital technology, network elements can become more modular. However, with increased opportunities for control and processing, the complexity of the overall system is somewhat reduced. For example, with digital technology, the control could be physically separated from the system being controlled, which was a significant advance in terms of network design and management.[317] In a more general way, the changes in BT reflect the change in the belief that: 'If it could be done it would be done

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315 Interview with IBM Senior Business Manager, March 2006.
316 Interview with Heavy Reading Senior Analyst, October 2006.
317 Interview with BT Senior Manager, November 2005.

thoroughly and therefore slowly'.[318] The approach to innovation seems to be very thorough and still very inward looking. For operating support systems, for example, such systems are still too complex for most customers.[319] This comment refers to suppliers of telecom equipment and systems such as Ericsson, Alcatel and others providing solutions to customers such as BT. However, it seems to be applicable to incumbent telecom operators, as BT also wants to have a 'more meaningful relationship with customers'.[320] One of the ways to have more meaningful relationship with customers is to create simple-to-use/operate solutions that address specific customer needs. This is another significant influence of the overall strategy on BT's innovation strategy.

Incumbent telecom operators and their suppliers are known for the robustness and reliability of their equipment and systems and, therefore, the network services they offer to very demanding customers. These are customers in, for example, the defence industry, traffic control and large multinational firms, where high degrees of reliability are necessary. This is a significant market for incumbent telecom operators, and they may approach such large and demanding customers in different ways (as it is the case with integrated solutions). However, there are those increasing number of applications where more interaction with consumers[321] is necessary, and where incumbent telecom operators may compete or cooperate with Internet-based giants such as Google and Yahoo, for the mass market. The approach to innovation of the incumbent telecom operators seems to be in need of change.

Incumbent telecom operators usually segment the market between consumers (i.e. the mass market) and business customers (i.e. enterprises and small, medium and large firms). For large business customers, BT is focusing on large multinational corporations and providing services based on needs identified with such customers. These services are provided through contracts and projects, in the form of integrated solutions. This is what is called contractual innovation (cf. Olleros, 2007). Included in this contractual innovation are those third party firms hired by BT to develop application on top of its platforms. There is however another space of innovation largely explored by Internet-

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318 From the interview with BT's CEO Ben Verwaayen in Global Telecoms Business Sept/Oct 2005, n82.

319 Interview with Ovum Senior Analyst, March 2007.

320 Interview with BT Senior Manager, March 2006.

321 Consumers refer specifically to 'individuals acting largely outside of any business or other organisational context' (Moschella, 2003, p. xviii)

based firms such as Google and Yahoo, and applications like Youtube, MySpace, Flickr, e-Bay, Wikipedia, etc. which are a part of the so-called Web 2.0, where users have the ability to contribute with contents. These Web 2.0 applications are becoming increasingly accessible due to the deployment of broadband, and as BT's CEO pointed out: 'In all cases our customers are saying that broadband will change the business model'.[322] This last type of innovation, made possible by the Internet (World Wide Web) and broadband, depends in a large extent to what is called non-contractual innovation (cf. Olleros, 2007).

The challenge for incumbent operators in the 2000's is in creating new products and services. It is not a numbers game anymore, where success is measured through the number of connections made.[323] As a result, existing jobs will migrate to other parts of the world due to the network economy, and due to the fact that a firm needs to find the right people for the right job. To illustrate this with an example, the top 250 BT executives hold 17 different passports between them[324]. A more diverse team is expected to favour innovation.

The platform strategy being deployed by BT at a higher level assumes that much of their internal resources can be redeployed, and value can be created by re-using existing resources and capabilities. To support the 're-use' approach, BT's CTO Matt Bross claims that 'probably the most misunderstood thing about BT21CN is that my role has been to unlock what has already been embedded here'.[325] The idea of 'unlocking what is already there' is the philosophy that permeates the organisation of innovation within BT. Matt Bross uses the concept of 'innovation continuum' to explain his points: 'innovation continuum comprises three elements, [1] discovery and research; [2] validate and articulate; and [3] execute. […] These processes work to provide an open and honest approach to creating new developments.[326] However, the concept of 'innovation continuum' used by BT is based on a linear model, and as such, it reproduces some of the problems encountered in the linear model, specifically the time and opportunity lost due to the long feedback time from execution to discovery and research. To minimise the feedback delay time, a set of aims and purposes are

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322 From the interview with BT's CEO Ben Verwaayen in Global Telecoms Business Sept/Oct 2005, n82.
323 Ibid.
324 Ibid.
325 From the interview with BT's CTO Matt Bross in Global Telecoms Business Sept/Oct 2005, n82.
326 Ibid.

established for the teams to drive innovation worldwide. Global intelligence teams around the world are put in place in order to search and identify new trends and technologies that may impact BT's business. Finally, a team was established to analyse and translate the technological and economic jargon into a business case of products and services that can be commercialised.[327] All these initiatives were put in place or enhanced in order to give a more coordinated and systematised approach to innovation.

Constructive criticism and tolerance to genuine failures (through a culture of trial and error) make the innovation environment more fluid. Several stages of the innovation process are exposed and subject to criticism. Considering innovation as the various processes from invention to commercialisation, it is possible to verify the degree of openness (in terms of external collaboration and access to external resources) in the various instances of invention (closer to R&D) and commercialisation (closer to the contract with the customer or the purchase by the consumer). The customer focus strategy of BT enhances the commercial focus of innovation. BT's approach to innovation, in the view of one senior manager 'changed [BT] from being technology driven to commercially driven'.[328] This means that 'in the past BT aspired to be the most innovative in new technology. That changes into aspiring to be the world's best at leveraging technologies to the benefit of our customers and shareholders'.[329] Leveraging technologies is consistent with the platform strategy of the next generation of telecommunications. This leveraging strategy is also favoured by the fact that most of the incumbent telecom operators have separated their network operations from the design and development of equipment and systems (Fransman, 2002b).

To summarise BT's innovation strategy, it seems that the reorganisation of innovation is based on the idea of having a common framework that is shared within BT, showing how various parts are connected to it.[330] BT is calling this reorganisation 'open innovation'. The next section investigates further into how BT is implementing its open innovation strategy.

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327 Ibid.
328 Ibid.
329 Ibid.
330 Ibid.

8.4 Open Innovation at BT

BT, a traditional telecommunication operator in the UK, has been examining 'the process of innovation itself as they attempt to transform themselves and drive sustainable sources of value creation' (BT, 2006c, p. 4). As part of this examination, BT is deploying what it calls 'open innovation'.

For BT, open innovation means that 'organisations can draw on external resources and best practices to complement the value of their own "internal" innovation assets – and achieve greater real returns on their overall investment in innovation' (BT, 2006c, p. 6). 'Innovation itself is valued as a commodity that can be bought and sold, loaned, licensed, hedged and re-invested' (BT, 2006c, p. 6). Products and services need to be delivered much faster than in the past. Traditional firms like BT were used to deliver a single or few set of products and services for a long time (usually years), for a definite set of customers (with no other significant choices). Now customers have more choice and certain services can last few months or even weeks or days. Thus, the capability to offer new services faster became too complex for just one firm to provide, relying on its internal R&D and product development pipe.

With a high degree of technological choice among the various suppliers in the telecommunications market, the expectation of innovation is higher and incumbent firms, in order to sustain their growth and competitive advantage are not expected to innovate alone. In fact, they reached a point where external collaboration is needed to sustain growth and profitability. One of the arguments of the open innovation model is that large firms should do less R&D and rely more on external partners to deliver new products and services. In the telecom industry it is known that this shift to less in-house R&D by the incumbent operators was a reality by the end of 1995, when most of the R&D performed for the infrastructure (network and its elements) was relegated to the specialist equipment providers (Fransman, 2002b). During the 2000's, this pattern continued for BT and for other incumbent operators.[331]

In 2002, BT hired a new CTO, Matt Bross, who came from the USA with experience in a non-incumbent telecom operator, Williams Communications. He says that having never worked for an incumbent telecommunication network operator before is a positive, as he has been unafraid of breaking the boundaries and changing the

[331] Fransman (2002, p. 49) compares the R&D expenditure as a percentage of sales of NTT, BT and AT&T compared to suppliers, other (new entrant) operators and other industries. See also footnote 58.

innovation processes of BT[332]. These attributes seem to be necessary to meet the challenge of the transition to NGN. Surely, implementing the new network is a very complex activity, which requires many skills in project management and systems integration. However, one central challenge is to change peoples' minds, behaviours and attitudes: people are accustomed to PSTN processes and resist changing to the new NGN-based processes.[333] The PSTN processes are related to functional structure and clear end-services, and the NGN processes are related to platform multifunctional structure and enabling new services (frequently without having a clear idea of what services will be developed). BT's approach to innovation is changing the way the firm operates.[334] The resistance to change is understandable, since people may perceive change as a threat to the status quo and the benefits of change may not be clear for them.

As the BT CTO says: 'BT has always been innovative, but I believe we need to innovate the way that we innovate. […] We have changed from being technologically driven to commercially driven. […] In the past, [the focus was] on the invention of things. Now it's the real focus on the products [BT is] getting out of the marketplace'.[335] 'Innovating innovation' is the same argument used by John Seely Brown in the foreword of the book by Chesbrough (2003) on open innovation. In order to survive, incumbent telecom operators like BT are trying to change the way in which they innovate, firstly by making innovation a top management level strategic issue, and then by putting in place not only mechanisms and processes to allow others to collaborate, but also actively seeking external partners to complement their internal innovation.

The revised innovation process that is being set up in BT involves exploring innovation worldwide by establishing global intelligence teams to identify and communicate new ideas. According to Bross, BT is moving from an internally focused to an open innovation model.[336] These global teams are called innovation scouts (BT, 2006c). As the BT CEO Ben Verwaayen says: 'Where we spend the £ 3 billion [in R&D and capital expenditure], how we spend it, yesterday or tomorrow, will make all the difference

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332 From the interview with BT CTO Matt Bross in Global Telecoms Business, Sept/Oct 2005 n82, p.34.

333 Interview with BT Senior Manager, November 2005.

334 Interview with BT Senior General Manager, March 2006.

335 From the interview with BT CTO Matt Bross in Global Telecoms Business, Sept/Oct 2005 n82, p.34.

336 Ibid.

whether we can help others to innovate'.[337] That is the new mindset of 'open innovation' where the incumbent operator is trying to establish a platform that helps others to innovate. The incumbent operator does not perform all the tasks related to innovation.

Old models of innovation, based on internal R&D-driven products and services pipelines are not agile enough to drive sustainable growth (BT, 2006c). In this old model, IPRs (Intellectual Property Rights) continue to be internal resources, without much chance of being commercialised, i.e. sold to others in the event the IPR cannot be used internally to derive commercial value from products and services. The mindset is to invest a larger amount of resources proportional to the results that the firm envisions obtaining, or in the words of BT CEO Matt Bross: 'This insular viewpoint dictates that the quantity of innovation an organisation can deliver correlates directly with the amount of resource invested' (BT, 2006c, p. 3). As firms become larger in revenues, for example, every percentage of growth is increasingly harder to obtain by themselves as 'the number of new ideas that can be developed and brought to market – in other words the breadth of your innovation pipeline – is ultimately constrained by the size and wealth of a company's R&D department' (BT, 2006c, p. 3). Although the size and wealth of a company's R&D department is seen as a constraint, the problem seems to be that managing an ever larger R&D effort increases more rapidly than its growth in scale leads to diminishing marginal returns in the delivery of effective solutions. Thus it is solving the problem of diminishing marginal returns rather than overcoming a fixed constraint of wealth that is important. In order to break this unsustainable model, BT has been examining 'the process of innovation itself as they attempt to transform themselves and drive sustainable sources of value creation' (BT, 2006c, p. 4). These sustainable sources of value creation seem to be more interactive with external collaborators and resources, where costs are shared and value can be unlocked from any stage of the innovation process. Thus, BT is engaged in transforming their R&D as part of their innovation process.

As a way to enhance the interaction with external collaborators and resources, BT relies on innovation partners: BT customers, academic research partnerships (MIT, University of Cambridge, University College London, Stanford University and UC Berkeley),

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[337] From the interview with BT CEO Ben Verwaayen in Global Telecoms Business, Sept/Oct 2005 n82, p.12.

external venturing partners (in association with BT's New Venture Partners) and strategic business partnerships (e.g. HP, Microsoft and Intel) (BT, 2006c). Research partnerships with universities, for example, may result in products and capabilities that may not make sense for BT to take advantage of now, but a new venture can be formed in order to explore them. One example is a spin-off from BT called Psytechnics that develops software for measuring and monitoring voice and video quality in communication networks.

In brief, open innovation means that large corporations like BT are becoming more 'humble'. Instead of waiting for others to look to BT for their ideas and technologies, BT is actively looking for ideas outside its boundaries. For this purpose, BT has created three units: Innovation scouting teams; Innovation Central; and the advanced technology centre.

Innovation scouting teams operate in the USA, Asia and the Middle East in order to identify new technologies, business propositions and market trends. They search for new technologies and ideas, interacting with technology companies connected to venture capitalists, with start-up firms and BT suppliers. They ultimately present innovative ideas and technologies to development groups within BT (BT, 2006c). With this active search of new technologies and ideas in different sources and markets, BT avoids the limitations of relating only to their existing suppliers as technology sources.

Innovation Central, championed at chairman level, is a new organisational unit with the mission to deliver a structured innovation process (BT, 2006c). The idea here is to have an integrated process, with high-level sponsorship. The integrated process means that each area of BT is invited to contribute and avoids giving importance to one activity to the detriment of others. As Matt Bross puts it:[338]

> The notion here is putting in place a set of processes that allows people who exist in each one of the different areas of BT to contribute, as opposed to have the pendulum swing and say, for example, it's all about the portfolio and forget about the management. Or it is all about the new customer care system, forget about the product development cycle.

This addresses an important point of having the sponsorship at the highest level of the corporation (as is emphasised in project management literature such as Kerzner (2006) and Meredith and Mantel (2006)) and the notion of 'integrated process'. Usually what is

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[338] From the interview with BT CTO Matt Bross in Global Telecoms Business, Sept/Oct 2005 n82, p.34.

emphasised is how the different parts of the system fit together and what to do to accomplish it. However, little emphasis is put on the people who are doing that. As BT CTO Matt Bross argues: 'People make things work, boxes don't. The raw material is always people'.[339]

The advanced technology centre is responsible for prototyping and validating concepts from the idea stage to the commercial product (BT, 2006c, pp. 13-14). On the other hand, the centre can stop an initiative as soon as it proves unfeasible. The aim of the centre is to connect the global scouts and external collaborators with the internal product development teams.

These initiatives provide evidence of BT's commitment to transform their R&D into a more open innovation strategy, introducing processes and teams to connect external and internal innovators and resources. The active search for new technologies in the external market also evidences a different mindset where BT recognises that it may not have all the resources and technologies to develop the next products and services. Finally, an important point of this strategy of open innovation is to place the responsibility of R&D structure at chairman level. As important as the activity itself is the sponsorship at the appropriate level.

BT's Additional Processes to Access External Innovation

BT has been establishing several processes to interact with other firms and gain access to external innovation (BT, 2006c):

- BT has published the BT Technology Journal since 1997, where researchers and managers from BT share their knowledge and vision with a wider community. This journal presents the concepts and ideas BT is using to deploy their networks, and it is a way for the BT R&D people to publish their 'blue sky' research. It also contains information about patents granted to BT. This exposure of patents allows further possible commercialisation with external parties. However, these journals may be part of the IPR strategy management. By disclosing certain researches and results in the journal, BT reveals them to be current practice which makes it impossible for others to patent them. The journals may also disclose 'blue sky' research as a way of building claims for the originality of ideas for which patents may subsequently be issued. Finally, the disclosure of patents in such journals is

339 Ibid.

not only a way to reward those who have devised the patents and offer commercialisation opportunities, it is also a way to reinforce BT's claims of originality for these patents and thus assist their defensibility if they are challenged. Whatever the motivations, journals increase the exposure to the external community, stimulating interactions and, sometimes preventing them.

- Partnership with universities. BT has strategic partnerships with MIT, the University of Cambridge and University College London. About 10% of BT's research budget is divested through these partnerships and in 2006 BT was reported to have 36 core research activities with such academic partners, 23 of them within the UK. The partnership with academia helps to identify disruptive technologies; to work on products and services that may be in the market place within three to five years; and analyse the competitive landscape for telecommunications within five to ten years.

- Supporting postgraduate students and researchers. BT has an annual research fellowship programme, where researchers are selected to spend a limited period of time within BT for their academic research. Also, through the academic partnerships, academic researchers can stay in BT facilities conducting joint researches that render value to BT.

- Venture Capital. As of 2006, BT works closely with New Venture Partners (NVP) LLP. Firms are spun-off BT and both BT and NVP fund the new ventures, having equities in such start-ups. As of 2006, BT launched eight start-up companies, leveraging BT's IPR portfolio.

- Strategic business partnerships. BT has strategic partnerships with firms like HP, Microsoft and Intel to leverage technology for long term applications.

- Another source of external innovation and knowledge are the skilled people that BT is able to attract even from other industries or other segments of the market. Examples start with the top management like Ben Verwaayen (CEO) and Matt Bross (CTO). Other people came from IBM, from consulting firms (e.g. Accenture) and from software development companies (where BT has wanted to learn about the horizontal broadband applications).

The initiatives under the 'umbrella' of open innovation show the commitment of BT to transform its R&D in order to interact more actively with external innovators and

resources. Several of the initiatives mentioned above are not new ones, but it is intended that they be part of the coordination effort involving combining existing and new initiatives under the same 'umbrella', hence allowing both bottom-up and top-down innovation approaches to be more effective.

8.5 Open Innovation Implications for BT

Considering that innovation may be seen as the process from invention to commercialisation (Freeman and Soete, 1997), it is important to verify what happens in the interfaces between invention and commercialisation, as the organisation which makes the invention may not commercialise it, creating various possibilities of purchasing technologies, products and ideas from different firms. This is the basis of the concept of open innovation (cf. Chesbrough, 2003). BT, for example, uses the concept of 'innovation continuum' to highlight its end-to-end process (Figure 8.1).

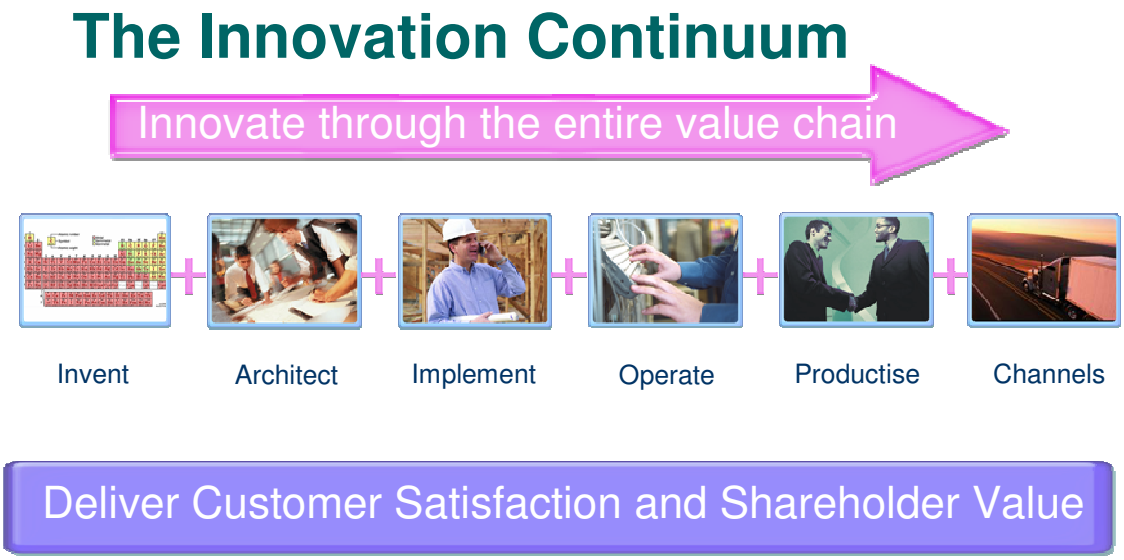

Figure 8.1 – The Innovation Continuum at BT
Source: Dunbar (2005)

In expanding the concept of innovation and considering it as an end-to-end process, innovation may be seen as composed by invention, integration and commercialisation, where invention is predominantly on the supplier's side; integration is represented by architecting and implementing the network (the infrastructure level), highly dependent on project capabilities; and commercialisation is represented by operating, productising and distributing the products and services. The locus of innovation is moving to the right edge as the processing power of consumer devices and competition increases. It is increasingly feasible to come up with a new application, select and discard it without

going into bankruptcy. The cost of failure tends to decrease. Thus, the left-most processes in Figure 8.1 representing a technology driven company become much more about how to leverage those technologies to the benefit of customers. This makes the issue one of not only concentrating on internal processes, but also on managing boundary processes to achieve such an aim. The right timing to deploy the new infrastructure and to deliver new services (decreasing delivery time, for example) becomes an important part of the innovation strategy. So, including the timing dimension, the innovation process encompasses, besides invention and commercialisation, integration with the appropriate timing.

From the perspective of incremental-radical innovation, taking the voice-only service as the existing product of incumbent fixed-line telecommunications operators, the NGN contributes to the commoditisation of this service, which is still used and purchased but also bundled with other services. The increased capacity of IP networks makes it possible to resell bandwidth for various applications, and then: (i) regulators choose not to allow BT or other network operators to discriminate in favour of particular services; (ii) network operators must offer high capacity data transmission at tariffs which attract customers; and (iii) customers can disaggregate and sell this capacity in the form of voice grade lines (services with low or absent quality-of-service standards). The ability of network operators to create scarcity[340] of network capacity is no longer possible due to the combination of these factors. The business model for the long distance voice tariff becomes obsolete and, as a consequence, voice-only services generate less and less revenues. There is a general consensus that broadband is cannibalising the incumbents´ businesses, and there is an increasing pressure of Internet companies like Skype, Google and Yahoo with their VoIP (Voice over Internet Protocol) services, pressing prices down and challenging incumbent business models.

The fact that BT, as an incumbent, is embracing a radical innovation in a more radical way may be partly explained by the company's strategic leadership. BT changed its top management significantly at the beginning of the 2000s, a few years before announcing BT21CN. The main changes seem to have been in the CEO and CTO positions, which were assumed by company outsiders. This may have accelerated the decision-making process to deploy BT21CN.

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[340] For a discussion about the dialectic of scarcity-abundance of communication and information access and its implications, see Mansell (1999).

In terms of organisational capabilities, the transition to NGN is 'competence-destroying, in relation to the PSTN technology. However, most of the incumbent operators are making the transition in an 'incremental' fashion that will take years to complete. In large systems such as the telecommunication networks, there is much inertia to change (Hughes, 1987), and it may take much more time to change than in the mass market products context. So, incumbents have more time to position themselves in response to the 'radical' innovation.

The term 'disruptive' is being overused in the telecom industry to express the impact of VoIP (Voice over Internet Protocol) on the incumbent telecommunications operators business. VoIP services provided by firms like Skype do have a disruptive trajectory. However, unlike other markets analysed by Christensen (Christensen, 1997, Christensen and Overdorf, 2000, Christensen and Raynor, 2003, Christensen et al., 2002), the transformation in telecommunications networks is over a large and complex system, in a regulated environment and with high inertia. Due to this inertia, incumbents have time to adapt to the new technology and their business seems not to be destroyed. Also, incumbents have the option to partner or even buy Internet companies, minimise the effect of VoIP on their core business, and learn. For example, BT partnered with Yahoo in 2004 and started offering VoIP, but with no reduction in prices.[341] After the purchase of Skype by E-Bay in 2005, BT started to offer a VoIP service that was even cheaper than Skype's. On the other hand, although incumbents may have time to adapt to the new technology, the inertia in the telecommunications environment is uneven. Other players such as the cable TV providers and smaller network operators can move faster and fill in the market gaps left by BT. Thus, by the time BT (and other incumbents) finishes the upgrade of their network, their competitive advantage may be significantly reduced, or even worse, overcome.

Innovation in incumbent telecommunications operators cannot be analysed only within the firm. As these operators are large adopters of technologies, the selection of suppliers to work with is of the highest importance. Matt Bross, CTO of BT Group, characterises the innovation 'continuum' as composed of three elements: (i) research and discovery; (ii) validate and articulate; and (iii) execute (Berris, 2005). From this perspective, the innovation continuum may not happen within one firm; it happens more frequently across boundaries, from the invention, through to the supplier's network and the

[341] See footnote 297.

suppliers themselves, to the service providers, the distribution and to the final customers. The challenge is that innovation locus is moving closer to the customer. BT and other service providers are starting to invest in a new network to provide 'new services' without knowing exactly what these services are going to be. The new services dilemma breaks the paradigm of control and predictability: the willingness to know how things will end before they begin.

Although BT, as a large incumbent fixed-line telecom operator, is innovating aggressively in transforming its network, this is not happening at the same pace in other incumbents in Europe and throughout the world. Interviewees from other incumbent operators say that what BT is doing is 'too radical' for their context. Also, in this context, as the telecom operators are not producers of technology, they innovate to the extent that their suppliers innovate. The key innovation factor for the operators is the selection of the most appropriate partners. All of the selected BT partners for the BT21CN project are large companies: Siemens, Cisco, Alcatel, Ericsson, Fujitsu, Ciena, Lucent and Huawei. The smallest is Ciena. However, the majority of these large firms are partnering with smaller firms to supply their solution to BT. As the telecommunications networks are large and complex systems, where some components are CoPS (Complex Products and Systems), the key to innovation and success in the market is to combine its core capabilities with those of smaller firms in order to deliver complete, end-to-end solutions to sophisticated and demanding business customers. Thus, in this context, large firms and small firms partner with each other to innovate. It is true however that the IP technology was first developed by smaller, non-incumbent firms of the telecommunications market.[342]

The innovation process at BT is still much based on the linear model. Although this presents several limitations, the emphasis is on opening the various phases (e.g. according to Figure 8.1, inventing, architecting, implementing, operating, productising and distributing) of the process to interaction and collaboration to external innovators and resources. One major implication is the need to understand the whole innovation process, not only the early phase of invention and later stages of commercialisation, but also the intermediate integration and timing issues. This leads to initiatives to change the internal organisation and processes to deal with interactions with the external

[342] Sonus was one of the firms founded in the late 1990s to take advantage of the emergence of IP technology.

environment. The open innovation at BT is one of such initiatives focusing mostly on the early stages of the process, closer to invention of new technologies.

8.6 Conclusions

The main conclusions of this chapter are: (i) BT is moving to a more open innovation model, collaborating and allowing collaboration with external partners; and (ii) open innovation is a management injunction which BT is using to systematise innovation under a common framework to leverage technologies and knowledge to address customer needs, and to change the way of thinking about innovation within BT.

The response of BT to survive the market convergence/competition in services and the technological change with the massive adoption of IP (Internet Protocol) technology is based on redesigning its innovation processes by means of higher levels of openness and collaboration with third party firms and customers.

BT is changing the way that it has been innovating. Innovation has become a highly regarded activity championed at chairman level. Also BT is actively seeking external partners, not being mainly focused on its existing suppliers. The existing suppliers play a major role in building the infrastructure and transferring the new accomplishments to BT. However, that is not enough anymore. The service layer has become much more dynamic. There is an increasing effort to decouple the infrastructure from the service layer. The absence of certainty (or any clear idea) as to what services will render the future profits and growth needed by BT requires a new mindset for developing new services. For BT, this new mindset is based on opening network interfaces to external collaboration, following a platform strategy. However, just opening interfaces is not enough. BT is actively seeking new ideas and technologies from external firms and working actively to diffuse those ideas and technologies within its own development teams.

By actively searching new ideas and technologies, incumbent firms like BT diminish the impact of potential disruptive technologies. The term ‘active search’ by incumbent providers also implies a different and more humble attitude towards innovation: incumbents cannot do it alone any more. The establishment of processes which depend on discovering new ideas and technologies, not only depending on existing suppliers becomes important. Existing suppliers of BT understand mostly about infrastructure, and less about services.

The infrastructure as a platform based on IP supports the strategy of establishing the innovation structure championed at chairman level and that embraces the whole company. The IP as a common technology from which it is possible to deliver voice, data, video, and mobility services with different types of contents allows incumbent operators to seek for internationalisation (new markets) with a more structured approach.

It can be noted that one important evolution of BT in the transition to NGN is the approach to innovation. The creation of Innovation Central championed at chairman level in order to have a company-wide structure for innovation is one sign of the importance given to it.

In the end, BT21CN is the effort made by BT to acquire the features, skills and processes to compete with Internet software-based firms (like Skype, Google and Yahoo) while strengthening its position in infrastructure-based services. BT is making this transformation by building an ICT platform, based on IP-based infrastructure and APIs and SDKs in the applications level.

The challenge is not only in the service itself, but also in the approach to innovation, i.e. how new services are developed. The monolithic, internal and complex approach of incumbent operators is not enough anymore. The approach tends to be more open to external collaboration throughout the various stages of the innovation process.

How ‘generalisable’ is the open innovation of BT to other incumbent operators? Preliminary investigations indicate that open innovation has wider application and implications in the telecommunications industry. The platform strategy and the needs of external collaboration are becoming largely diffused throughout the telecommunications industry. However, external collaboration is not something new in the context of incumbent telecommunications operators, and the issue of control remains a major theme of debate. External collaboration is necessary, but incumbent telecom operators are still very reluctant to abandon the centralised control of networks and services. Customer choice is evolving, but with the underlying assumption that the incumbent telecom operator chooses what the customer may choose.

9. Conclusions

9.1 Introduction

This thesis investigated the capabilities development of incumbent telecommunications operators facing the transition to Next Generation Networks (NGNs). It looked specifically at the case of BT in the UK, as it was identified as the forerunner in the transition, and the incumbent which has taken a more drastic approach, making it a leading agent of change.

Given the need of companies in general to sustain and grow their business, the incumbent telecommunications operators are facing this challenge as well. After the bubble burst and telecom downturn in the beginning of the 2000s, incumbent telecom operators faced a crisis with great uncertainty about the direction for future growth and development. Falling revenues from the traditional services, a huge debt and rising competitive environment are forcing the incumbent telecom operators to change the way they do business. This thesis has shown that an outsourcing movement started in the late 1990s and the beginning of the 2000s, with most of the telecommunications operators establishing their 'Global Services' division. At the same time, IP (Internet Protocol) technology was emerging as the *de facto* standard for convergent services including voice, data and video. Outsourcing, IP and globalisation set the context for the transformation of networks and for the development of integrated solutions as a major source of revenue and future growth.

During the first half of the 2000s, the telecommunications industry reached an unprecedented agreement that the IP/MPLS technology should be applied to the backbone of their networks (Fransman, 2002b). Their networks therefore need to be changed in order to accommodate this technology. Incumbent telecom operators have not been producing systems and equipment to build the telecommunications networks since the mid 1990s (Fransman, 2002b), and they have been historically in the business of building and maintaining networks that offer a set of well defined communication services, strongly linked to network functionalities and capacities, to their customers. IP/MPLS changes both functionality and capacity in ways that challenge many of the historical business models employed by incumbents, requiring corresponding changes in their strategy.

The increasing competition from different parts of the information and communications industry (i.e., mobile/fixed services like Orange, T-Mobile, C&W and EasyNet; satellite (e.g. Sky); cable TV (e.g. NTL/Telewest); and Internet-based firm (e.g. Google and Yahoo)), and the resulting variety of services and business models being offered have led to a need to change strategy with respect to customers by incumbent telecom operators. A significant change in the strategy of telecom operators is to have their strategy driven by customers' needs. This focus on the customer is different from the earlier internationalisation strategy of building presence through networks globally (e.g. with the purchasing of 3G licences) and concentrating on mergers and acquisitions, paying less attention to customers' demands and needs: an approach that naively supposed that demand would be there if the infrastructure and service were available (Mansell and Steinmueller, 2000).

The separation between infrastructure and service (in a layer model) is the underlying assumption for the transformation of the incumbent network *and* for the transformation and consolidation of the customer's network. While BT and other incumbent operators transform their network, they are transforming their customer's networks following the same principle. With outsourcing, incumbents seek to make customers' networks part of (or an extension of) incumbent networks. As a major customer target is that of global customers, the incumbent network needs to have a global reach. This is the way BT and other incumbents are pursuing their internationalisation strategy. The network becomes a platform which, to be effective and profitable, means that (i) subsystems are reused; (ii) innovation is driven through collaboration with third parties (due to limits in the internal capacities of the incumbent to expand R&D and match others' capacities for variety generation); and (iii) incumbents and large customers engage with each other in the development of new services according to their evolving needs.

Traditionally, service providers like BT saw services as productised entities, not as a relationship established to resolve customer's problems supported by productised entities. However, the business of integrated solutions is much more dependant on understanding customers' needs by comprehending the business in which customers are engaged. This simple shift has major implications for the capabilities of the organisation and people involved in the delivery of integrated solutions, including the innovation processes.

BT is trying to change the way it innovates in the creation and development of new services, relying more on external collaboration, and trying to get more value from its internal accomplishments (through the commercialisation of patents and intellectual property rights). On the infrastructure level, with BT21CN, the external collaboration with suppliers is an extension of BT's traditional market approach, where BT does not rely on one or on a specific set of a few suppliers, but elaborates a tender process open to the market. However, on the service level, the target is to create a more flexible service layer that can respond to a more competitive and dynamic service market, decoupling the service layer as much as possible from the infrastructure layer. With the high uncertainty of the services that will render future profits and growth, BT is developing a new approach based on the exposure of interfaces and functionalities of the network for external innovators to access them and to drive the usage of BT's network. Besides that, BT is actively engaged in seeking new ideas and technologies from external innovators. BT also created an organisational structure that connects those external innovators, ideas and technologies to development teams inside BT, considering not only the technological, but also the commercial feasibility right from the very early stages of the innovation process. This is part of what is bundled into the broad management injunction adopted by the company, its 'open innovation' initiative.

The network as a platform based on IP/MPLS supports the strategy of establishing innovation structure championed at chairman level, and that embraces the whole company. The IP is seen as a common technology from which it is possible to deliver converged voice, data, video, and mobility services with different types of content, and that allows incumbent operators to seek for internationalisation (new markets) with a more structured approach. Integrated solutions promote convergence at the services level, taking advantage of the convergent technologies underpinned by IP.

According to Chapter 5, BT21CN is the effort made by BT to acquire the features, skills and processes to compete (and collaborate) with Internet software-based firms (like Skype, Google and Yahoo), while strengthening its position in infrastructure-based services. BT21CN has a major impact in converging the network and IT platform, increasing the flexibility of the network to behave as a platform for innovation. BT is accomplishing this transformation by building a platform around IP-based infrastructure, and open and shared interfaces at the applications level. The challenge is not only in the service itself but also in the approach to innovation, and how new

services are developed. The monolithic, internal and complex approach of incumbent operators is not enough anymore.

Eventually the incumbent telecom operators must discover ways to change how customers and users perceive their network from a more passive acceptance of the services offered to a more active engagement in the use of network, devising new services and applications. It seems that the answer so far is that the network should be seen as a platform where users are allowed to participate and interact. This participation and interaction can lead to further collaboration in a process of variation, selection and retention at the edge of the network. The core is supposed to be lean, resilient and flexible. The extent to which intelligence needs to be decentralised, or not, will continue to be an issue. Innovation may be materialised on the edge of chaos, but such an edge is connected to a highly orderly core that enables the edge to be creative.

This chapter summarises the findings of the thesis, relating them to theory (Section 9.2), empirical evidence and methodology used (Section 9.3). Section 9.4 raises some issues about the future of BT. Finally, Section 9.5 discusses the limitations of the research and topics identified for future research.

9.2 Theoretical Argument and Main Findings

The main findings and the literature associated to them are discussed according to the three layers depicted in Figure 4.1: (i) the infrastructure or network at the physical level; (ii) the capabilities (new and existing) serving as mediators between the infrastructure and service layers; and (iii) the service level, where innovation occurs with greater influence from customers.

The Network as a Platform

The outsourcing movement in the ICT industry at the end of the 1990s and the beginning of the 2000s was driven by advancements in the IP technology with the emergence of MPLS to deal with real-time services. Globalisation and international expansion also required large firms to expand and consolidate their ICT networks. The Next Generation Network emerged as the result of IP/MPLS and the need of telecommunications operators to be more agile in the development of new services. For this to occur, it has been agreed to transform the silo-based network architecture into a layer-based structure with its edge ‘open for collaboration’. IP/MPLS favoured the development of platform for convergent services and business growth.

BT21CN illustrates two aspects of the platform concept. Firstly, it takes advantage of the re-usability of subsystems or interfaces previously identified and made available to develop new services. This is the same idea of platform as developed in manufacturing sector, like the automotive industry (e.g. Meyer and Lehnerd (1997), Meyer (2007b), Meyer and Dalal (2002) and Meyer (2008b)). Secondly, it examines the more recent concept of platform coming from the IT industry: the platform as the driver of innovation in the industry (e.g. Gawer and Cusumano (2002)). The underlying idea is to open up the interface of its product (for example, Intel's microprocessor and Microsoft's Windows) for third party firms and users to innovate (i.e. develop new services, products and applications which use the original product platform). These two integrated approaches are part of BT21CN strategy and they seem to be prevalent in the transition to NGN of other incumbent telecommunications operators, such as Deutsche Telekom and France Telecom. This shows that product innovation and service innovation are not completely distinct and that lessons learned from product innovation can be transferred to service innovation.

Building the network as a platform has two major implications for the development of capabilities and for the dynamics of innovation in BT. The first implication is the need for development of capabilities in integrated solutions, which is closely related to BT establishing a new business unit, BT Global Services (BTGS). BTGS takes advantage of BT21CN as an enabler of integrated solutions to connect and extend BT's platform (i.e. BT21CN) to customers' networks by offering networked IT services to large customers. The second implication, linked to the first, is leading BT to look more actively to external collaboration in order to develop new services. Internally, BT is using the term 'open innovation' as a management injunction to coordinate all the innovation efforts with external collaborators. These two implications are further elaborated below.

Capabilities Development for the Transition to NGN

In a convergent market, firms from different trajectories (e.g. IT, telecom and media) start to compete for the attention of the same customer. It is usual to wonder if the firm will diversify in such a way that it is going to move away from its core capability. In the case of BT, one could question if BT would become a content producer and become a BBC-like firm. This research shows that this is not happening and that it is very unlikely to happen in the near future. The analysis of the networked IT services of

BTGS as integrated solutions and customer-centric project business reveals that BT is operating in adjacent markets with a strong footing in its traditional base, which is to build and maintain networks. The difference is that the major technology behind the network (IP/MPLS) offers more flexibility to BT and its customers to build platforms that allow the possibility of creating new services and applications at lower cost. The ability to compete and collaborate with other firms is leveraged by the IP/MPLS technology. Such flexibility allows BT to change and propagate change to customers. Flexibility becomes a core capability for survival and growth.

The integrated solutions delivered by BTGS aim at long-term relationships with customers at the strategic and vision level where the establishment and evolution of customer's networks is highly dependent on the evolution and reliability of the provider's network. The engagement of the incumbent operator with their customers about their needs at the strategic level helps to mitigate the risks of an uncertain market. Outsourcing is not only the delegation of functionalities and activities to another firm (provider). It becomes a relationship of trust where the provider is responsible for keeping the ICT network up to date and competitive for the needs of the business the outsourcing firm is in.

Building the network as platform and adopting a customer-centric approach, led BT to develop platform capabilities that impacted on the way of delivering services to large customers. The development of networked IT services as integrated solutions required BTGS to invest in the development of capabilities in professional services, namely consultancy, systems integration and project management. The base of such integrated solutions is the network products/services, where the core capability of BT resides, complemented by IT products and systems, which come mostly from third party suppliers. Professional services are the domain of large consultancy projects, such as Accenture, which reflects in this context the increasing overlapping and convergence of the business of firms from different trajectories (i.e. network/infrastructure firms, IT and consultancy firms). Professional services require a great amount of interaction with customers, understanding their needs and identifying the adequate problems and bespoke solutions. These are capabilities that BT has decided so far (as of 2009) to develop organically without acquiring a consultancy firm.

Both BT21CN and the projects delivered by BTGS are instances of the business of integrated solutions, where one of the major components is project management. Project

management in this context encompasses the planning, execution and termination side (the usual project management approach such as in Kerzner (2006), and Meredith and Mantel (2006)) and the period between projects, where there might be no project under way with the customer, but the provider maintains a relationship trying to anticipate needs (this is the domain of project marketing as developed by Cova et al. (2002). The context of these projects is also customer-centric: the fact that projects only exist as instantiated within a specific customer (in this case large businesses). The customer is an external one, and internal customers are not considered in this approach (this is different from the approach of customer-based project organisation as developed by Pinto and Rouhiainen (2001), where they consider both internal and external customers). Thus, the business of integrated solutions as a customer-centric project business offers a context where project management and project marketing can be merged (following Cova and Salle (2005)). Examining the definition of project business as 'the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms' (Artto and Wikstrom, 2005, p. 351) into the concept of customer-centric project business, the following considerations can be made:

- It refers to the part of the business (e.g. BT21CN and BTGS) that relates *directly* to projects. The business is set up as a major project (like BT21CN) or a portfolio of projects (like the ones in BTGS).
- The customer centricity implies that the project is instantiated within a customer (usually a large business one) and that the purpose includes not only the achievement of the providers' objectives but also those of customers. This implies that the providers should have the ability to understand the customers' needs and the businesses in which the customers are engaged.
- Customer-centric project business aims to create a long-term relationship between the customer and provider so that organisational change can be anticipated and better understood and served. The period between projects (the domain of project marketing) is included.

Thus, customer-centric project business can be defined as 'the part of business that relates directly to projects, with a purpose to achieve the objectives of a firm, or several firms and of the customer, forging mutually beneficial long-term relationship'. In this

sense, project management becomes a service to the customer, commercialised as part of the integrated solution. As an industry, telecommunications moved from the strategic (supply-led) to the idealist (demand-led) model (cf. Mansell, 1993). BT's strategy to be more customer-focused corroborates it, and BT21CN, as an NGN initiative, enables and facilitates this move.

Service Innovation

At the level of service, two categories of customers are treated separately. One is the large customer and the second is the consumer, who is not necessarily connected to an organisation. The major impact analysed in this research was on large customers, through the integrated solutions of BTGS. The impact on consumers is still under development. The initiatives being developed by BT, such as Web21C/Ribbit, reflect the commitment to a more open network of the platform strategy, where new applications are expected to be created by external innovators using BT's infrastructure and software interfaces.

The delivery of integrated solutions by BTGS to large customers led to a shift in the perception of services. Services can be seen as particular goods or products developed internally and offered *to* customers. These services usually refer to point solutions in the form of connectivity services addressing a specific communication need expressed by the customer. This reflects the goods-dominant logic (GDL) as referred to by Vargo and Lusch (2004). It usually tends to not take into account the global needs and the strategic goals of the customer. Integrated solutions tend to target on the totality of the customers and their long-term strategic goals. Thus, the business of integrated solutions is '[…] a service business with a network inside, not a network that does some services'.[343] This shift to a service-dominant logic (SDL), as referred to by Vargo and Lusch (2004), is subtle but significant. It drives further external collaboration and it triggers project formation as a result of an innovation process.

The approach of BTGS integrated solutions to large customers relies on the use of third party products and systems, which requires a great deal of external collaboration. At the level of creation and invention of new services, and identification of new technologies that may impact BT's future, further collaboration is being actively pursued with external innovators. Besides that, the active identification of business opportunities to

[343] See footnote 201.

unlock value from internal BT's R&D projects and intellectual properties (e.g. through venture capital) is also being pursued. All these initiatives have grown organically (and sometimes disjointedly) within BT, and the term 'open innovation' is being used as a management injunction to structure and coordinate those various initiatives in a more effective way.

9.3 Empirical Evidence and Methodological Argument

Empirical evidence was collected with the aim of identifying the implications of a project business approach and platform strategy. These were identified as the major capabilities and strategy behind the transition to Next Generation Networks. Being an emergent phenomenon over the time of research, empirical data was taken qualitatively through a series of interviews, mingling with telecom executives in various events dedicated to the topic.

A significant uncertainty permeated the telecom industry after the downturn at the beginning of the 2000s. How to increase revenues and cope with increasing competition in convergent markets became a major issue. The Next Generation Network (NGN) emerged as a response to this situation of uncertainty, and soon BT realised that the NGN was not only a network transformation, it also involved significant changes in its innovation and business processes. This realisation may be extended to other incumbent telecommunications operators.

Platform Strategy

In order to support BT's strategy for cost transformation, speed to market, and customer experience and empowerment, it has been necessary to abandon the silo-based way of delivering services which limits the flexibility to create, develop and deliver new services. Chapter 4 introduced the platform strategy at the industrial level, a strategy highly influenced by the shift to the customer-centric approach and the demand-led idealist model. Chapter 5 demonstrated that BT is engaged in building such a platform through BT21CN as a major project, while Chapter 6 showed the reorganisation of BT which led to the establishment of BTGS in order to leverage its platform strategy through integrated solutions in networked IT services, many of whose projects were analysed in Chapter 7.

Integrated Solutions and Service Innovation

As a general segmentation, incumbent operators divide their customers into mass market (or consumers) and business customers. Although much of the focus of change was frequently motivated by the emergence of mass market service due to the emerging competition from Internet-based firms like Google and Yahoo, the focus on Internet-based services eclipsed the discussion about the developments made within the business customer in terms of offering integrated solutions. Chapter 6 analysed the integrated solutions at the organisational level (in BTGS), showing the reorganisation needed to deliver integrated solutions and present BT as 'One Firm' to the customer. Chapter 7 moved into the integrated solutions project as the unit of analysis, showing the engagement of BTGS to innovate in services driven by customers' needs, and the establishment of long-term relationships. This allows BT to gain a better position to identify emerging service demands and lower the uncertainties of service innovation. Chapter 8 showed the use of open innovation as an 'umbrella' or management injunction for the various initiatives with external innovators, connecting them with internal BT teams.

Methodology

The NGN started to take shape in the early 2000s and began to consolidate by the middle of the decade. Due to the contemporary nature of the transition to NGN, the qualitative method was used and many interviews were undertaken with interviewees coming from different backgrounds (suppliers of equipment, market analysts, policy makers, and incumbent and non-incumbent telecom operators), complemented with analysis of secondary data. Quantitative and comparative methods were considered but discarded because although many operators had plans to transition to NGN, only a few had effective implementation projects under way at the time of the research. Through different views from different backgrounds, the aim was to (i) identify the best case which would represent the transition to NGN at its initial phases, which turned out to be BT; and (ii) gather primary data to be confronted with secondary data, and refine the information obtained throughout the three stages of the research (as shown in Table 3.1), as long as new events emerged. The extensive set of interviews with different sectors within the industry tried to enhance the reliability and validity of the empirical data collected.

9.4 The Future of BT

Throughout this research, a central issue has been how BT changed its strategy in order to survive the downturn in the early 2000's and to sustain growth and competitiveness. One element of BT's strategy is to transform its network into a platform that takes advantage of the reusability of functionalities and of the use of open interfaces which lower the barriers of cooperation with external innovators at the service and applications level. The second element is BT's customer-centric strategy, which led to establishing and organising BT Global Services (BTGS) to serve the needs of large customers through integrated solutions, labeled as 'network IT services'.

The first element of BT's strategy, building a network as a platform for innovation, leads to the comparison with other firms who seem to be adopting a platform strategy. Gawer and Cusumano (2002) examine the cases of Intel, Microsoft and Cisco to build their argument that each of these firms established products (microprocessors, operating system and routers respectively) as the platform of choice, which other firms adopted and interconnected with in order to develop new services and applications. The argument is compelling, but such cases are of platform leadership, where Intel, Microsoft and Cisco assumed a dominant position *globally* with their platforms, which gives a significant contribution to the feasibility and profitability of their business model. On the other hand, BT does not enjoy a *global* dominant position with its platform, and due to the nature of competition with other incumbent telecom operators, it seems very unlikely that BT will ever reach such a dominant position.

The second element of BT's strategy to be more customer-centric and deliver integrated solutions to serve the needs of large customers leads to a comparison with IBM, which is a benchmark in the market with its IBM Global Services division. IBM has successfully become a service company, with more than 50% of its total revenue coming from services in 2005 (IBM, 2005). However, this success came after periods of turbulence, when the integrated solutions projects were not performing as expected, and IBM had to learn and recover from bad performance. In the case of BT Global Services, after establishing this division in 2003, the profitability came in the fiscal year of 2005, and there were significant problems with projects and losses in 2008. The case of IBM offers some hope. However, as for the platform leadership cases, IBM enjoys a *global* dominant position in the integrated solutions arena, and it had a longer history of accomplishments. One major difference is that IBM acquired PricewaterhouseCoppers

Consulting in 2002, boosting IBM's professional services capabilities. BT, on the other hand, seems to be trying to develop its professional services capabilities internally and organically, focusing its acquisitions on the network infrastructure level (e.g. acquisitions of Albacom and Infonet). BTGS can be considered to be in the first stages of the learning process, and the prospect of recovery at the time this thesis is being completed remains unclear.

The transition of BT to NGN is to a large extent the transition from a provider of standardised and mass produced services (largely based on type 1 services) to a provider of professional services based on consultancy services, systems integration and project management (integrating all type 0, 1 and 2 services).[344] The losses of BTGS in 2008 raised doubts about its strategy and its future as an independent and global communications provider. However the ups and downs of IBM's experience as a provider of professional services may indicate that BTGS's losses are transitory and the recent period of observation is one when performance gets worse before it gets better. The transition to a provider of professional services seems to be just one part of the puzzle that BT needs to solve in its path to remain as a global and competitive player in the information and communications industry.

In summary, for the future of BT and BTGS there is hope, but the prospects are very uncertain. The assumptions underlying the platform strategy and customer-centric/integrated solutions approach may have worked satisfactorily for Intel, Microsoft, Cisco and IBM. However all of them enjoy a *global* dominant position, which is not currently the case for BT. Thus, BT and BTGS may not have the elements necessary to be successful in the platform and customer-centric strategy, which makes the future of BT and their current strategy questionable. If the global dominant position is a fundamental element for the success of the platform and customer-centric strategy, probably the dominant position will have to be achieved by mergers and acquisitions. This would imply a company maintaining a global dominant position in order to compete with profitable business models in telecommunications. However, at this moment, it is possible only to speculate if BT will be the acquirer, acquired or merged company in the creation of such an entity or whether separate national regulatory authorities would ever permit a merger of this scale.

[344] Type 0, 1 and 2 services as defined in Chapter 8.

9.5 Limitations and Further Research

This research has the following four limitations. Firstly, the focus was only on one case, BT. This incumbent operator was selected after a scanning of the most suitable candidates for the transition to Next Generation Network. BT stood out due to its more aggressive approach. The strategy of Deutsche Telekom and France Telecom was not clear or well articulated at the time of choosing the cases (in 2005). Secondly, the conclusions of this research are related to the telecom industry for ICT-based services. Other industries have large firms providing integrated solutions through customer-centric project business (e.g. energy and transport), and the specific capabilities and innovation dynamics might be different. Thirdly, although the customer-centric project business involves the customer in the analysis, this research is not emphasising marketing perspectives (more specifically industrial marketing) and the significant literature on user innovation. It is however the intention of this research to establish bridges to such streams of literature from the project business perspective. Finally, it is not possible to evaluate the success (i.e. business sustainability and economic performance) of the project business and platform strategy as they are under way and an appropriate period to assess it would be in the middle of the next decade where most of the NGN initiatives will have matured. BTGS had a setback in its performance in 2008 (see, for example, (Barker, 2008)), but it is too early to say if it is a failure or a temporary adjustment in the business. In particular, the integrated solutions projects (179 cases analysed in Chapter 7) were from BTGS only. Further cases from other telecom operators and other industries should be analysed in order to have a better view of the extent of success of the project business and platform strategy.

The following topics are suggested for further research. Firstly, other incumbent operators (such as Deutsche Telekom, France Telecom, NTT, Telefonica, AT&T and Verizon) can be investigated and compared to BT. Those incumbent operators may be following different strategies and specific capabilities may be more or less relevant depending on the context in which they perform. Secondly, firms from other industries (like energy, transportation and construction) can be investigated. This may include firms from the IT side (e.g. IBM) and from the professional service/consultancy side (e.g. Accenture). Integrated solutions from a base in service and a base in technology/equipment can be compared. Thirdly, the issue of business sustainability in terms of economic performance remains an open issue. For BT in particular, repeatable

solutions and knowledge transfer among projects still remains an issue mainly after the setback in 2008. Finally, including industrial marketing and user innovation streams of literature would be helpful to bring more perspectives of the customer/user into the project business and platform strategy. The context for the Next Generation Network is based on developed countries as these are the first to be adopting it. However, initiatives in developing countries and their impact could be investigated in terms of its strategy and feasibility compared to initiatives in developed countries.

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APPENDIX 1

Sample questions for the interviews

The letters in parenthesis indicate if the question is related to technology (T), organisation (O) or customer (C), according to the theoretical framework developed in Chapter 2 (Figure 2.10 and Figure 2.11).

The following questions were primarily aimed to operators, suppliers and, when applicable, regulators:

1. What does this transition to NGN represent to operators in terms of innovation? (T)
2. Is the adoption of NGN changing the supply/value chain of the operator? Are the suppliers/partners the same as for PSTN? Are you making more partnerships with content or application providers? (O)
3. Do you think that VoIP is a disruptive technology for the operators? If yes, in what sense it is disruptive? To the customers, to your internal people/processes, to your supply chain? (The term disruptive in terms of requiring a different set of processes, resources (people) and values that were not the mainstream of the firm). (T, O, C)
4. What is/was the initial customer target for VoIP solutions: mainstream or emergent customers? (C)
5. What is the process of delivering solutions to large customers? (C)
6. Is the strategy of engaging with customers and users of the network changing? If so, how? (C)
7. Does the transition change the technological and market knowledge/capabilities of the operators? (O)
8. Does this transition represent a component or architectural innovation for operators? (T)
9. How does the top management dominant logic affect the transition to NGN in terms of: (i) decision-making to do it; (ii) how to do it (faster or slower); (iii) when to do it. (O)
10. (For operators) Is your company offering VoIP? What is your business model for VoIP? Is it cheaper than traditional telephony? (T, C)
11. What is the impact of convergence in terms of organisational structure, processes and competitiveness? (O)
12. Do you think that there is a dominant design within the operators or do the architectures differ from operator to operator? (T)
13. What is the main driver of this innovation: economic reasons (decreasing revenues), technological saturation (suppliers not supporting PSTN technology in the future), or other? (T, C)
14. Do you think that the operators' R&D will increase or decrease in the future? And do you think that R&D is a good measure of innovation in an operator? How do you think one could measure innovation in an operator (indicators)? (O)

15. How do you see the role of regulation in the context of transition to NGN? Is it accelerating or slowing down the transition? (O)
16. Do you think that the standardisation is 'modularising' the solutions? In other words, the industry tends to become more disintegrated (modularised) than integrated (when it was for PSTN, for example)? (As there are more suppliers and open interfaces?) (T)
17. Do you think this transition is more top-down initiative or bottom-up initiative? Do you see more 'self-organised' teams, and the whole transition more subject to emerging properties, and uncertain/unknown events? (O)
18. What is the role of standards in the transition to NGN? Is it different from the era of PSTN? Do you think that standards development affect the capabilities development? (T)
19. How long have you been investigating the use of IP networks and VoIP? (T)
20. When did you decide that the technology was ready for NGN? What was the decision-making process to build NGN, and how long did the process take? Do you think that BT would have adopted this radical approach if the new top management has not been hired? (T, O)
21. How are you managing risk/uncertainty in the transition to NGN? (O)
22. How has the basis of competition changed from 1995 to 2005 and how has this affected the capabilities development of the telecom industry in building the NGN? (O)
23. What are the drivers of capabilities over time? Christensen says that the capabilities migrates from resources to processes to values as the firm matures. This may be valid from suppliers' point of view, but is this valid for service providers? I believe BT is now taking the reverse path; changing values, changing processes and changing resources again to begin the cycle from resources to processes and values. It is necessary to achieve the conviction to change and sustain it. Is there a life cycle of capabilities? (O)
24. Can BT's radical migration be transformed in 'an experience that comes too fast [and] overwhelm managers, leading to an inability to transform experience into meaningful learning'? (Eisenhardt and Martin, 2000, p. 1115). (O)
25. Has a crisis motivated a rapid evolution/radical strategy for BT and other operators? (O)
26. How are the processes being changed inside BT? (It seems to be difficult to develop a process without the firm having a 'similar' process in the past. Do they use a consulting company?). (O)
27. BT's change is not disruptive in Christensen´s sense, but it will require leadership to be good at change. What is the experience of the leadership in change, according to the school of experience theory? (O)
28. Is BT using an emergent strategy for the BT21CN? (O)
29. Where is the locus of innovation of BT? Has it moved? Where is the locus of problem solving? (O)

The following questions are about capabilities for the transition to NGN. Such questions were targeted specifically at operators:

1. What are the main organisational capabilities being changed due to the transition to IP NGN compared to PSTN and their impact on their organisation? (We can view capabilities here as the set of processes/mechanisms (routines, organisational structure), resources (knowledge base, infrastructure) and values/mindset). (O)
2. How are technological capabilities developed in order to be able to adopt NGN products and systems? Through R&D activities (absorptive capacity)? Internal development and/or merger/acquisition? What happens to the people who are specialists in PSTN? (T, O)
3. What is the impact of this transition to NGN on OSS (billing system), customer support (more automated functions?), network management (more capable people to deal with more complex situations: one equipment/system supporting voice, video and data, for example). (T, O, C)
4. Do the operators need to change their market capabilities? If yes, how? (Are new customers approached? If yes, what are new customers for incumbents?) (O, C)
5. If you understand capabilities as strategic, functional and project capabilities, do you see that project capabilities are more intense in this transition? (e.g. are there more project managers or project-based activities in the firm, for example?) (O)
6. How does information interact between strategic, project and functional activities? (O)
7. Can you see new capabilities being developed, old and new capabilities interacting, and old capabilities fading away? If yes, could you give examples of them. (O)
8. What is the impact of convergence on operators' capabilities? For example, do you see that the transition to NGN facilitates convergence, then the boundaries of the operators are more 'fuzzy' or 'blurred' and this makes the operators to be more relational and look for more partnerships than in the era of PSTN? (O)
9. Is the transition to NGN making the operator change its core competence? (O)
10. How do you see the reaction of the PSTN specialised people and functions towards the transition to NGN? Are they a core rigidity, in the sense that they hinder/slow down unnecessarily the transition? (O)
11. Is it necessary to have a new knowledge base and management style to manage IP NGN as compared to PSTN? (O)
12. What is the business model to deliver services to large customers? How does it impact the capabilities of the operator? Is it necessary to develop new/existing capabilities? (O, C)

APPENDIX 2

Chronology of sample of interviews

a) Considering total number of interviews (including those not referenced in the thesis)

The interviews took place from March 2005 to May 2008, in three stages as shown in Table 3.1. The tables below list the trade conferences and events (with time period and place) attended, and the number of interviews made (including those not referenced in the thesis):

Stage 1 – From March 2005 to July 2005 (Exploration Phase)

Conference/Event	Time Period	Place	Number of Interviews
CEBIT 2005	10-16 March 2005	Hanover, Germany	22
VON Europe 2005	23-26 May 2005	Stockholm, Sweden	12
Light Reading - The Future of Carrier Class Ethernet 2005	28 June 2005	London, UK	7
The IEE Annual Course on Telecoms NGN	04-05 July 2005	London, UK	5
		Total	46

Stage 2 – From August 2005 to July 2006 (Exploitation Phase)

Conference/Event	Time Period	Place	Number of Interviews
Light Reading: The Future of Telecom – Europe 2005	07-08 September 2005	London, UK	5
Carriers World 2005	19-22 September 2005	London, UK	8
Broadband World Forum Europe 2005	03-06 October 2005	Madrid, Spain	9
ITU-T Focus Group on NGN 2005	14-17 November 2005	London, UK	9
CEBIT 2006	09-15 March 2006	Hanover, Germany	16
21st Century Communications World Forum 2006	27-30 March 2006	London, UK	18
		Total	65

Stage 3 – From August 2006 to May 2008 (Exploitation and Confirmation Phase)

Conference/Event	**Time Period**	**Place**	**Number of Interviews**
The New Telco: Europe 2006	05 October 2006	London, UK	3
Broadband World Forum Europe 2006	09-12 October 2006	Paris, France	10
IP Leaders 2007	21-22 March 2007	London, UK	4
C5 World Forum 2007	26-29 March 2007	Milan, Italy	14
Carrier Ethernet Expo 2007	02-03 May 2007	London, UK	7
ITU-T Kaleidoscope Academic Conference 2008	12-13 May 2008	Geneva, Switzerland	8
		Total	46
		Grand Total	157

List of firms and organisations to which interviewees belonged (numbers in parenthesis represent the number of interviewees in the firm/organisation)**:**

Network Operators (Total 62 interviews)
AT&T (1), Belgacom (1), BT (32), C&W (1), Deutsche Telekom (7), France Telecom (5), KT (Korea Telecom) (1), NTT (3), NTL/Telewest (2), Portugal Telecom (1), Swisscom (2), Telecom Italia (2), Telefónica (2), Telenor (1), THUS (1).

Suppliers (Total 90 interviews)
Alcatel (9), Ciena (1), Cirpack (4), Cisco (4), ECI (1), Ericsson (4), Fujitsu (4), Huawei (8), IBM (7), Juniper (6), Lucent (14), Marconi (5), Nortel (5), Siemens (13), Sonus (1), Veraz Networks (1), ZTE (3).

Regulator (Total 1 interview)
Ofcom (Office of Communications) (1).

Market Research (Total 4 interviews)
Heavy Reading (1), Light Reading (1), Ovum (2).

b) Considering only the interviews that were referenced in the thesis

The tables below give the number of interviews that were referenced in the thesis, taken from the sample above.

Stage 1 – From March 2005 to July 2005 (Exploration Phase)

Conference/Event	**Time Period**	**Place**	**Number of Interviews**
CEBIT 2005	10-16 March 2005	Hanover, Germany	7
VON Europe 2005	23-26 May 2005	Stockholm, Sweden	3
Light Reading - The Future of Carrier Class Ethernet 2005	28 June 2005	London, UK	3
The IEE Annual Course on Telecoms NGN	04-05 July 2005	London, UK	1
		Total	14

Stage 2 – From August 2005 to July 2006 (Exploitation Phase)

Conference/Event	**Time Period**	**Place**	**Number of Interviews**
Light Reading: The Future of Telecom – Europe 2005	07-08 September 2005	London, UK	2
Carriers World 2005	19-22 September 2005	London, UK	6
Broadband World Forum Europe 2005	03-06 October 2005	Madrid, Spain	8
ITU-T Focus Group on NGN 2005	14-17 November 2005	London, UK	9
CEBIT 2006	09-15 March 2006	Hanover, Germany	14
21st Century Communications World Forum 2006	27-30 March 2006	London, UK	16
		Total	55

Stage 3 – From August 2006 to May 2008 (Exploitation and Confirmation Phase)

Conference/Event	**Time Period**	**Place**	**Number of Interviews**
The New Telco: Europe 2006	05 October 2006	London, UK	3
Broadband World Forum Europe 2006	09-12 October 2006	Paris, France	9
IP Leaders 2007	21-22 March 2007	London, UK	5
C5 World Forum 2007	26-29 March 2007	Milan, Italy	14
Carrier Ethernet Expo 2007	02-03 May 2007	London, UK	1
ITU-T Kaleidoscope Academic Conference 2008	12-13 May 2008	Geneva, Switzerland	3
		Total	35
		Grand Total	104

List of firms and organisations to which interviewees belonged (numbers in parenthesis represent the number of interviewees in the firm/organisation)**:**

Network Operators (Total 57 interviews)
AT&T (1), Belgacom (1), BT (32), C&W (1), Deutsche Telekom (6), France Telecom (5), KT (Korea Telecom) (1), NTT (2), NTL/Telewest (0), Portugal Telecom (1), Swisscom (1), Telecom Italia (2), Telefónica (2), Telenor (1), THUS (1).

Suppliers (Total 42 interviews)
Alcatel (5), Ciena (1), Cirpack (1), Cisco (4), ECI (1), Ericsson (4), Fujitsu (4), Huawei (3), IBM (3), Juniper (2), Lucent (3), Marconi (1), Nortel (2), Siemens (5), Sonus (1), Veraz Networks (1), ZTE (1).

Regulator (Total 1 interview)
Ofcom (Office of Communications) (1).

Market Research (Total 4 interviews)
Heavy Reading (1), Light Reading (1), Ovum (2).

APPENDIX 3

Integrated solutions case studies examined in Chapter 7

	Customer	Industry/Activity	Country
1	ADAE	Government	France
2	Air China	Transport and Logistics	Estonia / China
3	Albacom - BT M&A Practice	Services (Telecommunications)	Italy/UK
4	Alliance & Leicester	Services (Financial)	UK
5	Analog Devices	Industrial Manufacturing	Ireland / USA
6	Anchor Trust	Charity	UK
7	Arcelor Mittal	Industrial Manufacturing	Belgium
8	AstraZeneca	Pharmaceutical	UK
9	Avon Rubber	Industrial Manufacturing	UK/Europe
10	Bank of New York	Services (Financial)	UK
11	Barclays South Africa	Services (Financial)	South Africa / UK
12	BBC Children in Need	Media and Broadcast	UK
13	Bilborough College	Education	UK
14	Bimbo	Consumer Products	Spain / Portugal
15	Bradford&Bingley	Services (Financial)	UK
16	Britannia Building Society	Services (Financial)	UK
17	Brown Thomas	Retail	
18	BT - Compliance	Services (Telecommunications)	UK
19	BT - Sustainable Data Centres	Services (Telecommunications)	UK
20	BT Identity Management	Services (Telecommunications)	UK
21	BT-Blackberry	Services (Telecommunications)	UK
22	BT's Matrix Architecture	Services (Telecommunications)	UK
23	Caixa Galicia	Services (Financial)	Spain
24	Canon	Industrial Manufacturing	Spain
25	Cardiff Council	Government	UK
26	China Shipping	Transport and Logistics	China / Asia / USA / Canada / Latin America
27	Chivas	Consumer Products	UK
28	City of Edinburgh Benefits Online	Government	UK
29	City of Edinburgh Council Children and Families	Government	UK

30	City of Edinburgh GIS	Government	UK
31	City of Edinburgh Payroll	Government	UK
32	City of Edinburgh Planning and Building Standards	Government	UK
33	City of Edinburgh Smart City Refresh	Government	UK
34	City of Edinburgh SWIFT	Government	UK
35	City of Edinburgh Virtualisation	Government	UK
36	Clearlybusiness	Services (Financial)	UK
37	Coca-Cola Enterprises Limited	Consumer Products	UK
38	Conwy Council	Government	UK
39	Cork County Council	Government	UK
40	Corporate Services Group	Services (Recruitment)	UK
41	Coventry Building Society	Services (Financial)	UK
42	Criminal Justice IT	Government	UK
43	Daiwa	Services (Financial)	UK
44	Danske Bank	Services (Financial)	UK/Denmark
45	DAS Espana	Services (Financial)	Spain
46	DCSA	Government	UK
47	DCSA - Defence Learning Portal	Government	UK
48	Devon and Cornwall	Government	UK
49	Dexia	Services (Financial)	Belgium
50	DGB-RS	Services (Legal)	Germany
51	Disclosure Scotland	Government	UK
52	DKSH	Services (Business)	Malaysia
53	Dystar	Industrial Manufacturing	Germany / Singapore / USA / China
54	E.ON Field Service Management System (Hungary)	Energy	Hungary
55	E.ON Sattelite Broadband	Energy	UK
56	Eastern and Coastal Kent PCT	Government	UK
57	Eden Project	Leisure	UK

58	EGGER Group	Industrial Manufacturing	
59	Energizer Battery	Industrial Manufacturing	USA
60	Essex Police	Government	UK
61	Fiera di Vicenza Partners	Services (Business)	Italy
62	Financial Times	Media and Broadcast	UK
63	Findel	Retail	UK
64	First Group	Transport and Logistics	UK / USA
65	Friends Provident	Services (Financial)	UK
66	Gallaher Group	Industrial Manufacturing	UK / Europe
67	George Mason University	Education	USA
68	Geoservices	Oil and Gas	34 countries / 40 locations
69	Grafton Recruitment	Services (Recruitment)	UK / Ireland (30 international sites)
70	Grampian Public Partnership	Government	UK
71	Greater resilience for leading European Healthcare Service	Healthcare	Europe / European Union
72	Guy's and St Thomas' NHS Foundation Trust	Healthcare	UK
73	Harveys Furnishing	Industrial Manufacturing	UK
74	HBOS General Insurance	Services (Financial)	UK
75	Hever Castle	Leisure	UK
76	Hewden Stuart	Services (Rental)	UK
77	Hilton International	Leisure	UK
78	HP Asia Pacific	Industrial Manufacturing	Malaysia / Singapore
79	HSBC	Services (Financial)	UK
80	ICM Computer Group	Services (IT)	UK
81	Integrated US Healthcare Organization	Healthcare	US
82	Integrated US Healthcare Organization	Healthcare	US
83	Interflora	Transport and Logistics	UK
84	Irish Government	Government	UK
85	Isabel	Services (Financial)	Belgium
86	ITS	Services (Financial)	UK

87	JetStar Asia	Transport and Logistics	Singapore
88	John Radcliffe Hospital	Healthcare	UK
89	Laing O Rourke	Construction	UK
90	Land Registers of Northern Ireland	Government	UK
91	Land Registers of Northern Ireland BT - Account Based Marketing	Government	UK
92	Leeds City Council	Government	UK
93	Lewisham College	Education	UK
94	LifeLines India	Charity	India
95	Lincolnshire NHS Shared Services	Healthcare	UK
96	Liverpool City Council	Government	UK
97	Lloyd's Register	Services (Financial)	UK
98	London Borough of Lewisham	Government	UK
99	Lyreco	Retail	UK
100	M & S Clothing	Retail	UK
101	M&S Fresh Food	Retail	UK
102	Maritime and Coastguard Agency	Government	UK
103	Marktplaats	Retail	Netherlands
104	MedcoEnergi Global	Energy	Singapore / Indonesia
105	Mercury Blue	Services (Telecommunications)	Australia
106	Meriter Hospital	Healthcare	USA
107	MoD	Government	UK
108	Mondi Packaging	Industrial Manufacturing	Austria
109	Mothercare	Retail	UK
110	Muller Dairy	Consumer Products	UK
111	MWWFRS	Government	
112	Mykal	Industrial Manufacturing	UK
113	Nestle	Consumer Products	UK
114	Network Rail	Transport and Logistics	UK
115	Newcastle Building Society	Services (Financial)	UK
116	NHS Direct	Healthcare	UK
117	NHS Direct Wales	Healthcare	UK
118	NHS N3 infrastructure	Healthcare	UK
119	NHS North East	Healthcare	UK
120	NHS Spine	Healthcare	UK

121	Northumbrian Water	Utilities	UK
122	Norwich and Peterborough Building Society	Services (Financial)	UK
123	Nottingham City Council	Government	UK
124	NW London Hospitals NHS Trust	Healthcare	UK
125	Nycomed	Pharmaceutical	Germany
126	Origo Services	Services (Financial)	UK
127	P&O Ferries	Transport and Logistics	UK / Netherlands/ France
128	Panasonic	Industrial Manufacturing	UK
129	Panasonic Electric Works	Industrial Manufacturing	Germany / Europe
130	Pershing	Services (Financial)	UK
131	Port Ghalib	Leisure	Egypt
132	Powys County Council	Government	UK
133	Premiere Fernsehen	Media and Broadcast	Germany / Austria
134	Prudential	Services (Financial)	UK
135	Regio College	Education	Netherlands
136	Registers of Scotland	Government	UK
137	Registers of Scotland ARTL	Government	UK
138	Repsol YPF	Oil and Gas	Spain
139	Rotherham Brought Together	Government	UK
140	Rotherham Metropolitan Borough Council	Government	UK
141	Royal Cornwall Hospitals Trust	Healthcare	UK
142	RSI	Services (Financial)	Spain
143	Saint-Gobain	Industrial Manufacturing	UK / France
144	Samenwerkende	Retail	Netherlands
145	SCA	Industrial Manufacturing	UK / Sweden
146	Schuh	Retail	UK
147	Scicom	Services (Business)	Malysia
148	Scotia	Services (Financial)	Canada / Europe
149	SEOS	Industrial Manufacturing	USA / UK
150	Sitel	Services (Business)	USA / India / Europe
151	SKF Group	Industrial Manufacturing	Sweden

152	Software AG	Services (IT)	Germany / UK
153	Solvay (by Gartner)	Pharmaceutical	Belgium / USA / China / India (Global)
154	South West Trains	Transport and Logistics	UK
155	St George's Healthcare NHS Trust	Healthcare	UK
156	Staples	Retail	USA / UK / Germany / Belgium / Netherlands / Portugal
157	Student Awards Agency for Scotland	Education	UK
158	Suffolk County Council - Flexible working	Government	UK
159	Suffolk County Council and Mid Suffolk District Council	Government	UK
160	Suffolk Police	Government	UK
161	Tate Online	Media and Broadcast	UK
162	TD Waterhouse - IM	Services (Financial)	UK
163	TD Waterhouse - IVR	Services (Financial)	UK
164	Team Trackers	Transport and Logistics	Czech Republic / Prague
165	Tesco	Retail	UK
166	The Automobile Association	Transport and Logistics	UK
167	The Newcastle upon Tyne NHS Foundation Trust	Healthcare	UK
168	The Royal College of Nursing	Trade Union	UK
169	TNT Express Italy	Transport and Logistics	Italy
170	Unilever Brazil	Consumer Products	Brazil
171	Unisys	Industrial Manufacturing	UK
172	Veolia Water Solutions and Technologies	Utilities	UK
173	VISA CEMEA	Services (Financial)	CEMEA (51 countries - 265 sites)
174	Wallem Group	Transport and Logistics	China / USA

175	WHSmith	Retail	UK
176	Williams Power	Energy	USA
177	Wolters Kluwer Italia	Media and Broadcast	Italy
178	Wyeth	Pharmaceutical	UK
179	ZTE	Industrial Manufacturing	China / India