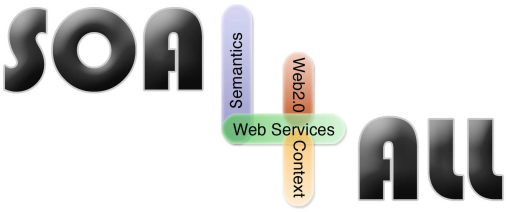



Project Number: **215219**

Project Acronym: **SOA4All**

Project Title: **Service Oriented Architectures for All**

Instrument: **Integrated Project**

Thematic Priority: **Information and Communication Technologies**

# D8.5. Telco 2.0 Recommendations

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| **Dissemination Level** | | |
| **PU** | Public | **X** |
| **PP** | Restricted to other programme participants (including the Commission) | |
| **RE** | Restricted to a group specified by the consortium (including the Commission) | |
| **CO** | Confidential, only for members of the consortium (including the Commission) | |

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DEFINED.

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# Glossary of Acronyms

| Acronym | Definition |
|---|---|
| AAA | Authentication, Authorisation and Accounting |
| ANI | Application Network Interface |
| API | Application Programming Interface |
| B2B | Business to business |
| BSS | Business Support System |
| BYON | Bring your own network |
| COTS | Commercial Off The Shelf |
| FMC | Fixed/Mobile Convergence |
| HTML | Hypertext Markup Language |
| HTTP | Hypertext Tranfer Protocol |
| IP | Internet Protocol |
| IPR | Intellectual Property Rights |
| IPTV | Internet Protocol Television |
| ISV | Independent Software Vendor |
| MPLS | Multiprotocol Label Switching |
| MVNO | Mobile Virtual Network Operator |
| NaaS | Network as a Service |
| OS | Operating System |
| OSS | Operational Support System |
| PSTN | Public Switched Telephony Network |
| RDF | Resource Description Framework |
| SDK | Software Development Kit |
| SDP | Service Delivery Platform |
| SIP | Session Initiation Protocol |
| SLA | Service Level Agreement |
| SME | Small and Medium Enterprise |
| SOA | Service-oriented Architecture |
| SOWER | Sower is nOt a Wsdl EditoR |
| SPICES | Semantic Platform for the Interaction and Consumption of Enriched Services |
| SWEET | Semantic Web sErvice Editing Tool |
| SWOT | Strengths Weaknesses Opportunities Threats |
| UC | Unified Communications |
| URI | Uniform Resource Identifier |
| VAS | Value-added Services |
| VICSP | Vertically integrated communications service provider |
| VOD | Video on Demand |

# Executive summary

In a world of ever increasing technological change and market innovation, businesses have to be more agile in responding to customer demands. Telecommunication operators, or *telcos*, have encountered an urgent and pressing need to change if they want to maintain their traditional strong position in the market, whilst increasing numbers of web and/or software based companies (also known as w*ebcos*) are delivering services over the Internet.

This report analyses the rapidly changing telecommunications sector from both a business and technology perspective. The principal purpose of the document is to provide a set of recommendations on possible transformational paths for traditional telecommunications operators who, challenged by declining revenues in their traditional business, need to transform themselves in order to grasp the new opportunities provided in the so-called 'Telco 2.0' world.

The document provides an analysis of the current commercial and technological contexts which are driving the emergence of Telco 2.0 business strategies in the telecommunications sector. It examines both traditional and emerging business models and then describes the technology innovations which are making these new business models possible, with particular reference to the technology outputs of the SOA4All project. The results from a focus group discussion with UK-based SMEs in the telecoms area is also included, aiming to widen the scope of opinions and viewpoints in relation to the use of SOA4All technology in the environment of strategic transformation to Telco 2.0. The deliverable then examines various strategic options for telecommunications companies and the possible role(s) for such companies in the Telco 2.0 world. Consideration is also given to the opportunities for, and commercial threat offered by, webcos and technology start-ups in the new environment.

Telecommunications companies ('telcos') are facing increasing commercial pressures because of falling revenues and profits in the traditional markets. The report discusses this trend, exemplifying with examples from the UK and Europe. It is explained how telcos can exploit their existing assets and strengths in new ways by moving from a 1-sided to a 2-sided business model, thereby tapping into new revenue streams from novel products and services. In brief, 2-sided business models are those in which revenues flow in two directions, in contrast to 1-sided models where revenue flows in only one direction. Successful use of 2-sided models from web-based companies ('webcos') such as Amazon and Google are discussed.

Technologically, making this change involves exposing telco capabilities via open APIs on the web in an 'open services ecosystem.' The relevance and role of SOA4All project technology is clear: a major goal of SOA4All is to make it easier for non-experts to access, combine and use services, thus assisting in the uptake of the open service ecosystem.

When exposing capabilities via a platform in this way, a telco can take on various roles.

- Platform Provider – here the telco offers a platform from which its own and/or other organisations' capabilities can be exposed;
- Service (Capability) Provider – the telco exposes some of its own capabilities, either on its own platform or via a platform belonging to another organisation;
- Application Provider – the telco creates applications and services built from compositions of its own and/or third party capabilities;
- Application Reseller – the telco offers an environment wherein application developers can publish their applications for sale, effectively making the telco a reseller of these applications with an appropriate revenue sharing agreement.

Which role(s) a telco will wish to take on depend on the commercial environment(s) in which it is operating and its own technological and business preparedness.

The required transformation of a telco proceeds along a number of identified axes: network transformation, cost transformation, process transformation, IT transformation, product transformation and business model transformation. The first three of these are necessary but not on their own sufficient; the last three are the changes which have the potential to deliver increased revenues and improved customer experiences in the Internet world.

The report summarises its findings with a number of SWOT analyses, concluding there are significant opportunities for established telecommunication operators to re-invent themselves in order to tap into the new opportunities in a world dominated by web-enabled service providers. Technologies such as those developed on SOA4All can be instrumental in this transformation, thus meeting important business needs.

# 1. Introduction

## 1.1 Introductory explanation of the deliverable

In a world of ever increasing technological change and market innovation, businesses have to be more agile in responding to customer demands. In the last few years, the storage capacity and processing power of computers has grown exponentially while their cost has been drastically reduced. At the same time, increasing advances in the miniaturisation of components and devices started the evolution of portable devices (such as laptops and cell phones) into indispensible tools in users' everyday business and personal lives, while the availability of increased bandwidth enables the movement of massive quantities of digital data. The now ubiquitous network infrastructure has enabled virtually everyone to connect with others, the causing the emergence of the culture of "anytime, anywhere" , becoming an accepted part of all aspects of our lives. Users and government are driving network neutrality and the increasing exposure of data, driving real-time delivery of enriched communication services over the Internet. In addition, companies are forced to pay much more attention to customized products, in order to offer an enhanced customer experience and meet the growing fashion and demand for such products.

Telecommunication operators, or *Telcos*, have encountered an urgent and pressing need to change if they want to maintain their traditional strong position in the market, while increasing numbers of web and/or software based companies (also known as *Webcos*) are delivering services over the Internet. These companies are fast to move, quick to adapt and to try out different business models, experimenting and using both in-house innovation and external developer communities to create new offerings.

This report will provide an analysis of the current commercial and technological contexts which are driving the emergence of so-called 'Telco 2.0' business strategies in the telecommunications sector. We will examine both traditional and emerging business models and then describe the technology innovations which are making these new business models possible, with particular reference to the technology outputs of the SOA4All project. The deliverable then examines various strategic options for telecommunications companies and the possible role(s) for such companies in the Telco 2.0 world. Consideration is also given to the opportunities for, and commercial threat offered by, webcos and technology start-ups in the new environment.

## 1.2 Purpose and Scope

This document analyses the rapidly changing telecommunications sector from both a business and technology perspective. The principal purpose of the document is to provide a set of recommendations on possible transformational paths for traditional telecommunications operators who, challenged by declining revenues in their traditional business, need to transform themselves in order to grasp the new opportunities provided in the Telco 2.0 world. As such, it is not primarily technological but rather sets out the *commercial context* in which SOA4All and related technology emerging.

## 1.3 Structure of the document

As mentioned above, telcos have encountered an urgent need to transform themselves. This strategic transformation underpins one of the three use cases of SOA4All, and thus impacts both the needed features in the SOA4All platform and front-end tools, and the exploitation planning for SOA4All results. This report aims to clarify the direction and opportunities of this transformation, and links these with the developments in SOA4All.

This report provides an analysis of the current commercial and technological contexts which are driving the emergence of so-called 'Telco 2.0' business strategies in the telecommunications sector. It examines both traditional and emerging business models and then describe the technology innovations which are making these new business models possible, with particular reference to the technology outputs of the SOA4All project. The results from a focus group discussion with UK-based SMEs in the telecoms area is also included, aiming to widen the scope of opinions and viewpoints in relation to the use of SOA4All technology in the environment of strategic transformation to Telco 2.0. The deliverable then examines various strategic options for telecommunications companies and the possible role(s) for such companies in the Telco 2.0 world. Consideration is also given to the opportunities for, and commercial threat offered by, webcos and technology start-ups in the new

environment.

The report summarises its findings with a number of SWOT analyses, concluding there are significant opportunities for established telecommunication operators to re-invent themselves in order to tap into the new opportunities in a world dominated by web-enabled service providers.

## 1.4 Methodology

The data on which this deliverable is based was gathered from a number of sources, principally:

- Desk-based research, i.e. access and analysis of public (web-based) literature and private sources (such as telecoms sector analysts);
- Interviews and discussions with interested parties in BT having both a commercial and technological background;
- Discussions with telco customers (e.g. through focus groups with SMEs at University of Manchester;
- Discussions with the development community (e.g. through workshops at the Semantic Week 2009 conference and the NESSI Semantic Technology Working Group);
- Discussions with industry bodies with whom BT has a relationship (e.g. the Tele Management Forum[1]).

[1] http://www.tmforum.org/

# 2. Change in the telecoms sector: commercial drivers and responses

In this section, we will provide an overview of both traditional and emergent business models in the communications sector.

As Wikipedia states, “A business model describes the rationale of how an organisation creates, delivers, and captures value”[2] and it may encompass a broad range of informal and formal descriptions to represent core aspects of a business.

Put slightly differently, it is a description of how an organisation makes money, with this description typically setting out (i) what the organisation does and (ii) the financial implications of this activity.

## 2.1 Traditional Business Models and the need for Change

Traditional telco business models, also dubbed “Telco 1.0” and subsequently “Telco 1.5,” have been proved successful over many years. They are characterised as operator defined closed environments, with tight control over the whole value chain and processes, and direct revenues achieved via network/billing silos.

In the Telco 1.0 model, the operator offers services to customers such as voice calls or text messages (SMS). These services are aimed at the mass market with little or no customisation and the model relies on vertical integration, where the telco owns (or at least has control over) the network. It utilises a very simple cost and revenue model:

- the operator *incurs cost* by maintaining the network, purchasing equipment and providing customer facing services (support, billing, etc);
- and *receives revenue* by billing users for services used, traditionally on usage-based tariffs.

The reasons for the past popularity of this model were the capital-intensive nature of telecoms infrastructure and the organisational culture prevailing in former utilities. The infrastructure was predominantly relying on fixed copper lines and centralised routing, so the lack of flexibility and inertness is inherent in such model, The situation started to change with the advent of mobile telecommunication services and with the increased interchange of roaming customers with the operators abroad, and the appearance of the “virtual providers” which do not own the infrastructure but specialise in customer service aspects (for example Virgin Mobile in UK and Australia). In addition, the falling price of mobile phones and competitive pricing of non-subscription calls on the pay-as-you-go model allowed many individuals to optimise their expenditure through owning more than one mobile phone. These developments lead to the assumptions underlying the Telco 1.0 utility-based model becoming invalid. In addition, over the last 20 to 30 years, the telecoms sector has been subject to market liberalisation and competition has been introduced, replacing the traditional monopolistic state-owned national telcos which were previously in place in many European countries. In many cases, this has meant a separation between wholesale and retail providers and we have seen the emergence of the Telco 1.5 model. This latter model (Telco 1.5) has been associated with increased network capabilities, leveraging IP technology and protocols such as Parlay[3] and SIP, expanding into broadband, mobility and networked IT services (known as ‘new wave’ areas).

With respect to these new Internet-based communication services, protocols have been developed with the aim of bridging the world of traditional telecommunications, and the new Internet enabled world. As in the previous Telco 1.0 model, however, Telcos still retain strong control over their part of the value chain, selling Telco services through traditional retail channels. Essentially Telco 1.0 and Telco 1.5 are wedded to the notion of one-sided business models wherein revenue flows in one direction only (from customer to telco to supplier).

[2] http://en.wikipedia.org/wiki/Business_model

[3] Parlay is an open API for telephony networks.

These traditional and (formerly) lucrative ways of doing business are, however, coming under increasing pressure due to a number of factors:

**Declining Fixed Voice Business**

In probably the area of most commercial concern to telcos, traditional voice services are becoming increasingly less profitable and revenues are declining. Voice revenue in BT was 46% of total revenue in 2004: by 2007, this percentage was 39% and declining further. This trend is visible across the entire telecommunications sector: Analysys-Mason found that fixed line voice service revenues fell by 9.1% in Western Europe between 2008 and 2009, and they predict that this trend will continue [8] (see Figure 1).

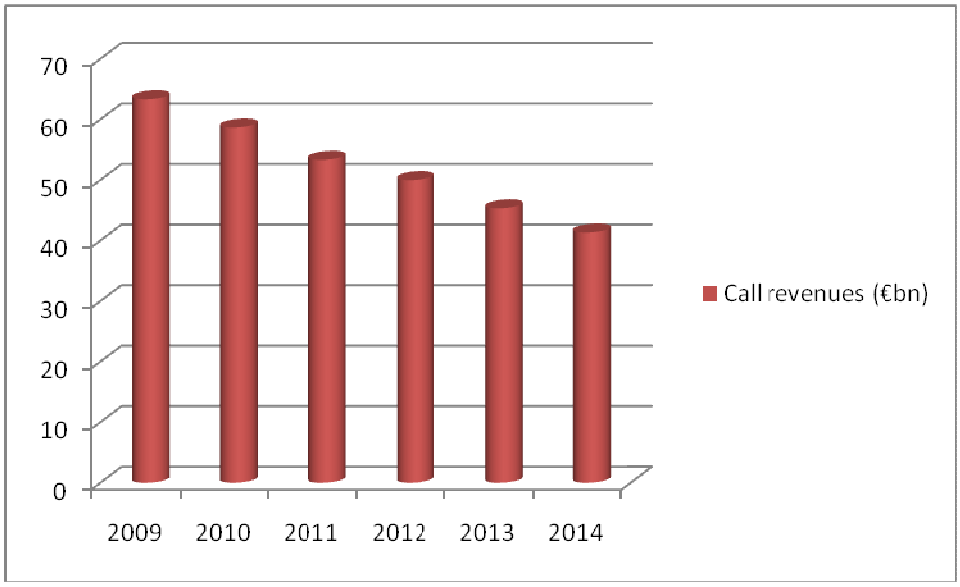


***Figure 1**: Fixed Call Revenue predicted trends in Western Europe [8]*

Similarly, Ofcom in the UK report that fixed voice call minutes in the UK declined from 167bn minutes in 2003 to 138bn minutes in 2008, while revenues fell from £11.7bn to £9bn over a similar period, as depicted in Figure 2 [9]. Furthermore, in the UK in 2008 BT, the incumbent operator, had a retail share of call volumes from landlines of less than 50% for the first time.

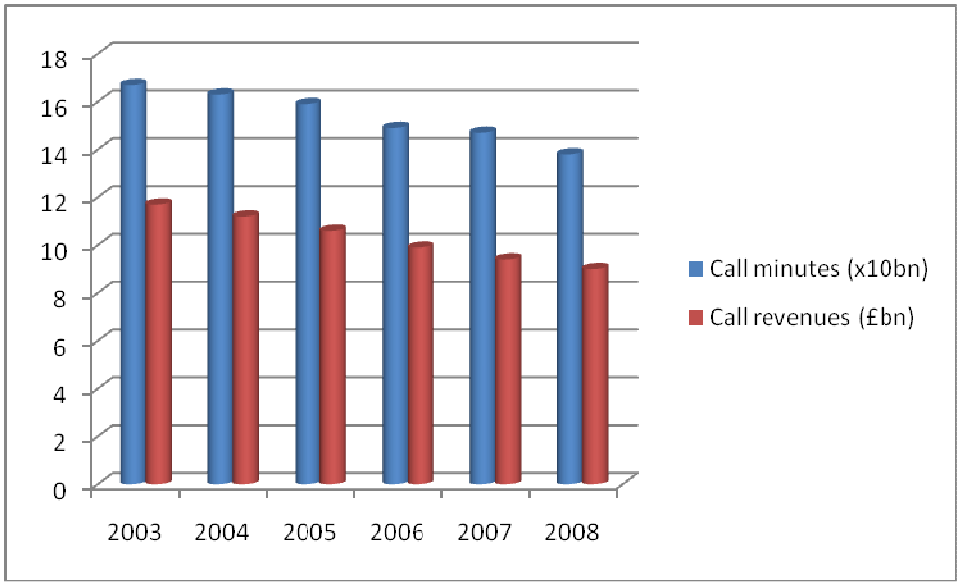


***Figure** 2: Fixed Call Revenue and Call Minutes trends in UK [9]*

### Changing Customer Expectations

Telcos have historically provided two basic services to customers: connectivity to a network and the ability to communicate over this network using the media of voice, data and fax. Initially connectivity was offered to a PSTN circuit-switched network or, in the case of some business networks, private lines. More recently, IP-based packet-switched services have been available: in particular a wide variety of broadband offerings have been available to both personal and business customers. This has led to changing expectations regarding the communications services to which customers want to have access: on one hand, novel home services (e.g. IPTV, VOD) and on the other, more sophisticated business solutions (e.g. UC - unified communications) are the order of the day.

### Blurring of Industry Sector Boundaries

The acronym ICT denoting Information and Communications Technology is increasingly commonplace but until at least the mid-1990s telecommunications and IT services were provided by entirely separate providers, such as AT&T, BT and Telefonica on one hand and HP, IBM and SAP on the other. Today, players from both sectors are offering ICT products, services and solutions combining IT and telecommunications capability from a single provider, bringing additional demands on service providers and increased competition.

In other areas, the same phenomenon is being seen: for example, when UK satellite TV company BSkyB bought broadband service provider Easynet, by offering 'bundled' (combined) TV and broadband offerings, Easynet's subscriber base grew rapidly. In addition, BSkyB used technology and expertise from Easynet to develop and market interactive TV services. The largest service bundle currently offered is the so-called quad-play, offering fixed telephony, mobile telephony, Internet (broadband) and TV services in one package. In the UK, this is offered by, for example, Virgin Media, which was created when Virgin Mobile merged with NTL, the UK's largest cable TV company.

Telcos have also been challenged by webcos such as eBay and Google entering the communication marketplace, as well as retailers (in the UK, supermarket giant Tesco offers highly competitive packages) and computer and consumer electronics companies such as Apple and Sony.

**Unsustainability of traditional models**

In the face of the decline in fixed voice call minutes and revenues we reported above, telcos are responding by seeking efficiency improvements, capital expenditure reductions and lower prices from their suppliers (network equipment providers and others) in order to maintain margins while prices were falling. This strategy had a degree of success but in the longer term is not sustainable: in a nutshell, eventually you cannot reduce expenditure any further without impacting negatively on revenues and ultimately resulting in the opposite effect to that you intended. Thus when traditional models have been optimised as far as is possible, the strategic imperative is that novel business models must be identified.

Having identified the urgent requirement to seek new business models and revenue streams, telcos then faced further challenges: many of their processes and much of their expertise were designed for the traditional one-sided telco business model. Specifically, telcos tend to be technology-led, and in particular network engineering focussed, companies. A large proportion of their labour resource and costs are tied up in maintaining and operating their networks, and this tends to mean that they are technology-driven without sufficient focus on the market and the customer. As customers demand more sophisticated services and agile new entrants crowd into the marketplace, a keen customer and market focus are essential. A particular issue here is the dichotomy between the skills, culture, outlook and processes required to run a national public phone network at 99.99% reliability rates and those required to quickly innovate and engineer new applications in the IT world, and to evolve those applications fast in the light of customer feedback and other market activity. Another aspect of telco processes less appropriate in the changing communications sector is the tendency to structure operations around the products or services, leading to product 'silos' where inefficiencies can build up due to replicated effort and cost across multiple products and a lack of agility due to barriers between the different products services.

In the face of the declining revenues and other changes and challenges described above, traditional telcos have tended to expand their operations into 'new wave' areas as mentioned above: broadband, mobile services, etc. One particular area is providing networked IT services for corporate customers where the telco takes the role of systems and network integrator providing a complete end-to-end ICT solution. Telcos are obvious participants in the emerging cloud computing[4] market since they have they have core capability in networking.

Nevertheless, increased competition, market saturation and declining margins means that using one-sided business models in traditional telco areas (such as voice services) is no longer viable [1].

Lessons learned from the traditional business models have shown that the innovation is imperative to ensure telcos are not only providers of "bit-pipes," reduced to moving data at low cost for other players who are offering value-added services with much higher profit margins. Market innovations introduced as part of Telco 1.5 - flat-rate and bundles plans for example - have had multiple benefits: they are easy to understand and liked by customers and they reduce the cost for both subscribers and operators. Conversely, since they are relatively simple to implement, they are easily copied by the competition.

As the margins available for providing simple telecoms services such as voice and for providing network infrastructure have declined, new, more profitable revenue streams have emerged from areas other than core telecom capabilities, such as TV, broadband access, games, music, gambling, messaging and social networking. The challenge for telcos here is to adapt their traditional back office systems to be able to offer interactive, flexible and instantaneous subscriber account management, subscriber interaction and billing [3].

[4] http://en.wikipedia.org/wiki/Cloud_computing

## 2.2 Telco 2.0: new structural and business models

### 2.2.1 Telco 2.0 Structural Models

In response to the challenges discussed above, telcos are considering how best to re-structure in order to meet the new and increasing competitive pressures. For existing telcos, and especially former incumbent operators, the most popular emerging structural model is that of the vertically integrated communications service provider (VICSP). In this model, the telco builds on its historic strengths (such as ownership of significant network assets and expertise), whilst also adopting a more open approach - more reminiscent of typical webco structures - where appropriate.

VICSPs own the network(s) and IT systems over which products, services and – crucially – ***capabilities*** (access to infrastructure functionality) are made available, as well as creating and delivering the products, services and capabilities themselves to the marketplace. The customer base in this model is naturally divided into 3 areas: wholesale customers, business customers and personal customers. Value for the telco in this model is located in a number of areas:

**Networks**: the network provides the connectivity over which products, services and capabilities can be delivered.

**Products & Services**: products and services are offered to the marketplace in the 3 segments identified above (very much as in Telco 1.0/1.5).

**Capabilities[5]:** in a key change from Telco 1.0, in Telco 2.0, IT changes from being principally a means for back office functions (customer support, billing, etc.) to being a source of value. IT functionality can be exposed as 'capabilities' which can be used by both internal developers and external customers. Furthermore, *telecommunications* capabilities ('place a voice call,' 'send an SMS message,' 'set-up a conference call,' etc.) can be similarly exposed – typically via the Internet - allowing novel services and applications to be built either by the telco or by external developers. Since the telco is effectively making available a platform for onward development rather than an end-user product, exposure of functionality in this way is often referred to as a ***platform play***.

**Customers:** some customers become 'prosumers' (producers and consumers) and a source of value in their own right. Telcos continue to offer customers traditional voice, data and network products and services, along with newer offerings such as IPTV but they also become value generators by using the exposed capabilities discussed above to generate novel products, service and applications to meet the demands of an increasingly fragmented and sophisticated market where one size no longer fits all.

This structural model for Telco 2.0 is shown at a relatively abstract level in Figure 3. It is of course in these last two areas (exposure of capabilities and customers as producers of products) where SOA4All technology finds its relevance.

[5] Strictly, exposed capabilities could be regarded as 'just another service' offered by the telco. It is instructive to separate them here however for the purpose of drawing the distinction between traditional models and Telco 2.0.

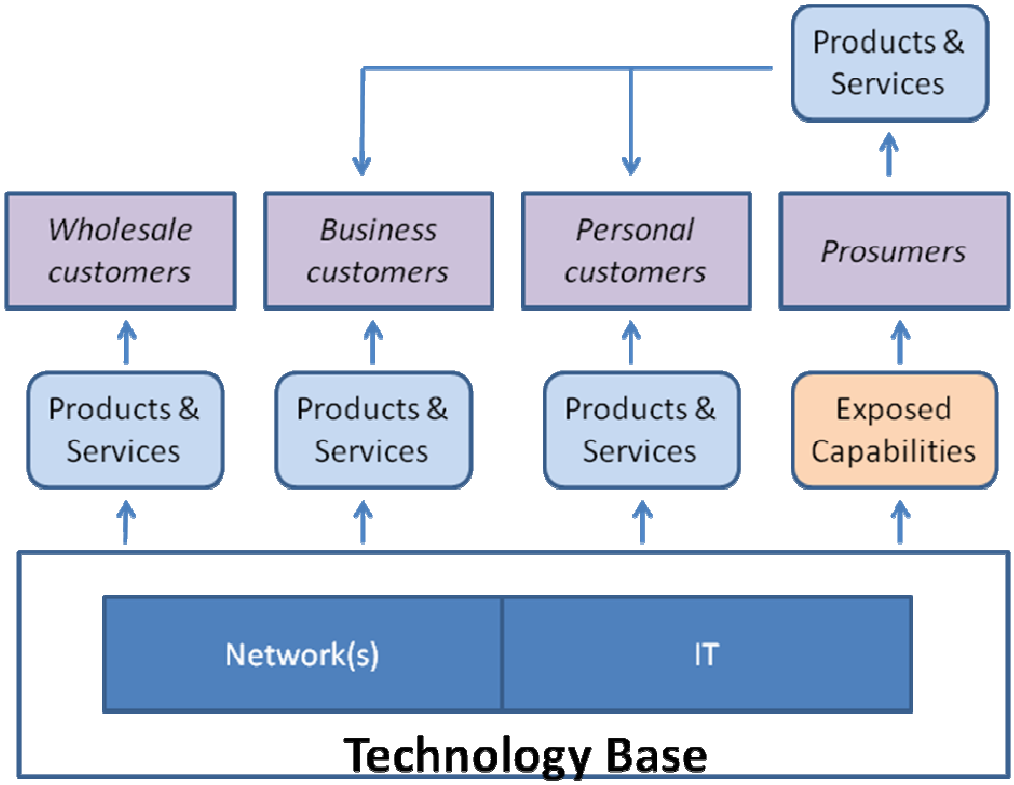


***Figure 3**: Structural Model for Telco 2.0*

### 2.2.2 Telco 2.0 Business Models

The move by telcos to expose capabilities via the Internet can be seen as part of a larger initiative that is changing the web from a place offering primarily information to users to a so-called 'service web' or ***open service ecosystem*** where many parties are exposing functionality (capabilities) on the public web. The established webcos and telcos are among the leaders in this trend with organisations such as Amazon, Google, AOL, BT and Telefonica among those who have already moved in this direction, along with many smaller start-up webcos. From the telecoms perspective, this development brings the telco into contact with new customers with new expectations and new ways of doing business.

In particular, a trend that first emerged in the web world is users' expectations that use of services will be free of charge at the point of use. This trend has crossed over into related and complementary communications services, including those offered by telcos and raises the key commercial issue of what are valid business models for telcos offering open service ecosystem platforms and services. This issue presents more difficulties to telcos than to webcos, due to the significantly higher costs of network infrastructure and processes which telcos have to bear.

Telecoms operators have traditionally retailed their services to consumers, businesses, not-for-profit and public sector organisations. Additionally, carriers have resold their services to other operators as wholesale services. Although telcos have historically focused on providing interpersonal communications, recently they have increasingly become an electronic transport and delivery business. The Telco 2.0 initiative[6] introduces the notion that telcos should use the opportunity provided by their position in the value chain in order to develop new "2-sided" business models. 2-sided business models exist where an organisation is able to extract value from 2 sides of a value chain. An example outside the telecommunication domain would be credit card companies who are able to charge card users fees and/or interest payments on one side and are able to charge

[6] http://www.telco2.net/

merchants a percentage of the transaction value on the other.

In the telecommunications context, one revenue 'side' consists of essentially traditional revenues from core telco services such as voice and messaging; the other revenue side is made possible by the telco's position as a platform provider. This second revenue stream is derived from offering platform services to other businesses who then build on those services to offer services and applications to their own customers. An important aspect of this second 'side' is the leveraging of the telco's customer relationship to add value to the offerings of the upstream customer's offerings (e.g. by utilising cutomer data to provide better targeting of adverts). This is depicted in Figure 4, where the 'upstream customers' correspond to the prosumers of Figure 3.

This upstream platform 'play' can be broadly divided into B2B value-added services (VAS) platforms and distribution platforms (as seen in Figure 4).

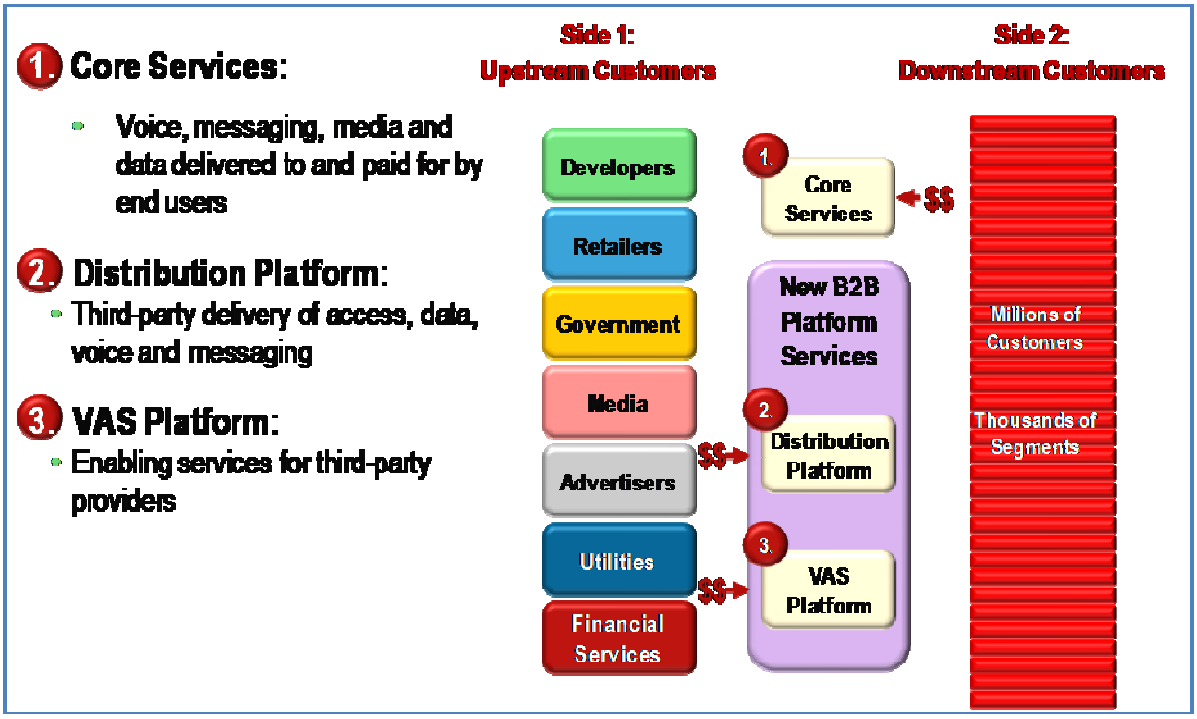


***Figure 4**:* 2-sided business model framework Source: www.telco2.net

Creating value-added services will enable third party organisations in multiple vertical sectors to become much more effective and efficient in their everyday interactions and business processes by allowing them to access and tailor services to their own specific needs and/or to build novel applications and services to meet the particular needs of their own customer base in a fast-changing technological environment.

The distribution platform opportunity can be defined by four criteria:

- The distribution service is essentially concerned with moving electronic data from one location to another. Distribution revenues relate to this alone. The terms 'upstream' provider and 'downstream' customer relate to the commercial relationship and not to the flow of data. Distribution services can apply to moving data in either or both directions.
- The service may include an 'above-standard' technical specification and quality of service to meet specific performance requirements, generally associated with the nature of the application for which the data is being sent.
- The service is being paid for by the upstream third-party provider, but is often initiated by the downstream customer.
- The distribution service is a telecoms component of the primary non-telecoms service or goods being accessed by the downstream user. Mostly, the distribution service is enabling interaction between the upstream third-party provider and downstream customer. For example, a Kindle user is paying Amazon for an e-book that is delivered over a network. Amazon pays the telecoms operator (in the US, this was Sprint and is now AT&T) for the delivery of the e-book (the main non-telecoms product) – this criteria is the distinction between *two-sided distribution* and traditional wholesale activity.

Of course, different actors in the Telco 2.0 arena may choose to embrace the Telco 2.0 model in its entirety, while others may embrace specific aspects: to some it may mean moving toward exposing network intelligence to the third parties creating their business around the services offered while to others it means providing Network-as-a-Service (NaaS) to web application developers and getting revenue from that [4]. However, some common factors that may be the key for success [2] include:

- Willingness to open the value chain to third parties (including competitors);
- Innovative approaches to business models that can create new revenue streams;
- Service delivery platforms that support these models.

We have discussed above how a changing commercial environment has led telcos to look for new sources of revenue and the structural change to Telco 2.0 which this has meant. We have also discussed the 2-sided business model type associated with this change.

Currently, Telcos, Webcos and third parties, primarily application developers, are all active in the search for the specific business model(s) that will enable their business to thrive. Nevertheless, the market is still immature and a number of models are being experimented with (some companies will use only one but often a combination of several business models can be found). The main characteristics of new (Telco 2.0) models include an open environment with both direct and indirect end-user relationships (consequently providing direct and indirect revenues). These models may include both looser and tighter controls over the environment. In the next section, we examine some of the key features of these new business models and some of the revenue models (types and sources of income) associated with them.

## 2.3 Telco 2.0 market opportunities

In this section, we discuss some of the key features of the emerging Telco 2.0 marketplace and the revenue models which may be adopted.

### 2.3.1 Key Features

#### *2.3.1.1 Exploiting the 'Long Tail'*

The Telco 2.0 long tail business model involves letting the market innovate, by allowing third party developers to implement new niche personalised services. This requires Telcos to expose their capabilities to the third party applications – a way of achieving this is known as Telco API (Application Programming Interface, or ANI, Application Network Interface, or third party interface). Services exposed via the Telco API can be divided into three main segments:

- Operator branded services – using core operator branded services (e.g. telephony) in combination with third party features or other operator services to create a new offering
- Co-branded services – services that enable a brand's customers to be accessible to an operator, e.g. operator's Facebook widget.
- Long tail services – services that are generally too niche for operators to consider offering to customers

In addition to the APIs, telco functionality can be exposed by allowing third party developers to create new services via an SDK.

Having and exposing the Telco API is not enough: in order to achieve critical mass, operators must nurture and support an application developer community (innovation community). For the API to be used it is necessary to make it easy for the applications to get on the operator's network, easy to be discovered by early adopter customers, and to have easy to use tools for the community that enables rapid application development. Allowing developers to create their own applications and providing them an option to be a part of an ecosystem (e.g. "iPhone App Store") gives an opportunity for Telcos to take a share of the revenue, hence implementing new business models described in the next section.

#### *2.3.1.2 Data Brokerage Opportunities*

New revenue sources can be created by using the customer data brokerage to enhance existing and create new service offerings – using available subscriber data, brokering it and/or combining it in a single database that can be accessed through open interfaces by any application. In that case, applications can become "dataless", only requiring a connection to a common directory.

As an example, when travelling in Europe, a mobile phone provider could share the data that the user is roaming and a credit card provider can use that fact to allow card transactions (as opposed to blocking them for security reasons), improving the user's overall experience. Using subscriber data in a novel and more creative way and at the same time adopting a two-sided business model, with subscribers on one side and business partners and advertisers on the other, could open up new revenue-generating opportunities for communication service providers.

A Nokia Siemens Networks survey of 100 senior executives of mobile operators and mobile Internet portals has revealed widespread recognition of the need to invest in improved subscriber data systems[7]. Forrester European Mobile Forecast 2008 to 2013[8] predicts that by 2013, nearly 38% of European mobile users will be accessing mobile Internet services at least once per month. Nokia Siemens Networks forecasts an 800% rise in the volume of data transmitted over mobile networks over the next four years. Making the most of this opportunity demands a full understanding of customer mobile Internet behaviour based on the real-time analysis of subscriber data.

[7] http://www.nokiasiemensnetworks.com/insight/unite-magazine/unite-magazine-february-2009/taking-mobile-data-to-new-heights

[8] http://www.forrester.com/Research/Document/Excerpt/0,7211,42199,00.html

Nokia's study also highlights the difference between mobile portals and mobile operators in their approach to data brokerage. Due to confidentiality requirements and longer-term customer relationships, only 4% of mobile operators currently offer incentives to their customers to allow their data to be shared with third-party businesses. The comparable figure for mobile portals was 27%, highlighting their greater success in convincing customers to allow personal data sharing.

More detailed and combined user data will also move the focus from demographic-based advertising to more behavioural-based advertising, that takes into account a customer's current status and behaviour and provides a more successful model for mobile advertising.

### 2.3.2 Revenue models

The following models describe different ways for telecommunication providers to tap into potential revenue. A provider can use one or a combination of any number of the revenue models with its chosen strategy model.

#### *2.3.2.1 Freemium / Free-of-Charge / Free-for-All*

Freemium[9] is a business model that works by offering basic services free of charge, while charging a premium for advanced or special features. The word "freemium" is created by combining the two aspects of the business model: "free" and "premium". The base of this model is to give away service for free and quickly acquire a wide customer base – by using word of mouth, referral networks, organic search marketing and others – and then offer premium priced value added services or an enhanced version of your service to your customer base.

This approach is a cornerstone of the business models for Web2.0 sites. The reasoning is that the customer is not the consumer, instead the consumer will get everything for free for being part of the product (to be more precise, part of the data) that is sold to the real customer – the advertiser. Outside the online world, this business model is also being used by free newspapers.

#### *2.3.2.2 Advertising-Based Model*

Services which are free to use may generate advertising revenue (as in the web search engine model). However, there may be valid alternative pricing models to the classic "ad-driven" approach. As new technologies on the Internet emphasize information reuse, there is a potential for models based on charging a small fee per "content" call, similar to the one providers like Amazon apply on API calls. Like the adsense technology today, one proposed solution is to have a content ID associated with certain content, which would bring the content owner some revenue every time their content is viewed on third-party pages / networks. This would offer a tremendous incentive for the distributed creation of original content. Notably, Telefonica are experimenting in the UK with an ad-funded service which is free to the end-user under the brand name *Giffgaff*.

#### *2.3.2.3 Subscription Business Model*

The subscription business model[10] requires customers to pay a subscription price to access the product/service. The model was first used by magazines and newspapers, but is now used by many businesses and websites as well. Subscription sells periodic (monthly/quarterly/annually/other) use or access to a product or service, instead of selling them individually.

Renewal of a subscription may be periodic and activated automatically, so that the cost of a new period is automatically paid for by a pre-authorized charge to a credit card or a checking account. The user is tracked in both a subscribed, and an unsubscribed status.

A common model on web sites, colloquially becoming known as the freemium model (explained in the Section 2.3.2.1), is to provide content for free, but restrict access to premium features (for example, archives) to paying subscribers. In this case, the subscriber-only content is said to be behind a paywall. The "razor and blades" business model[11] (also called the "bait and hook" model, involving

[9] http://en.wikipedia.org/wiki/Freemium

[10] http://en.wikipedia.org/wiki/Subscription_business_model

[11] http://en.wikipedia.org/wiki/Freebie_marketing

offering something for free until the user is “hooked”) is an attempt to approximate the subscription model, but with a formal agreement by both parties.

There are different categories of subscriptions:

- A subscription for a fixed set of goods or services;
- A subscription for unlimited use of a service or collection of services, where usage may be personal and non-transferable;
- A subscription for basic access or minimal service plus some additional charge depending on usage.

Vendors have a clear business benefit because they are assured a constant revenue stream from subscribed individuals for the duration of the subscriber's agreement. Not only does this greatly reduce uncertainty and the riskiness of the enterprise, but it often provides payment in advance, while allowing customers to become greatly attached to using the service and, therefore, more likely to extend by signing an agreement for the next period close to when the current agreement expires.

Consumers may find subscriptions convenient if they believe that they will buy a product on a regular basis and that they might save money. For repeated delivery of the product or service, the customer also saves time. An unlimited use subscription to a service for a fixed price is an advantage for consumers using those services frequently. However, it could be a disadvantage to a customer who plans to use the service frequently, but later does not. The commitment to paying for a package may have been more expensive than a single purchase would have been.

This was a common business model in the traditional telco world, as the telecoms were doing business with addresses (first fixed lines and then mobile phone numbers), using the subscription based model with various service plans.

#### *2.3.2.4 Pay-As-You-Go/Pay-Per-Content Model/On Demand Model*

Lessons learned from other domains are coming into the Telco world. Similar to Pay-as-You-Go model introduced in the mobile communications, there are more occurrences of Pay-Per-Content model, especially in the sports (e.g. ESPN) and TV on demand domain.

The on demand model mentioned here includes non-recurring bundles purchased by users.

## 2.4 Overview of Current Telco 2.0 Activity

### 2.4.1 The telco response

As we have seen above, this is a time of rapid change for the telecommunications sector and telcos are already responding to the challenges.

BT is undergoing the redefinition of its roles and offerings in the 21st century, known as the 21CN programme[12], the objective of which is to deliver a new IP-based 'future-proof, flexible, intelligent' network. At the same time, France Telecom has conducted internal restructuring and Deutsche Telekom launched a corresponding strategic restructuring plan. Netherlands KPN and Austria Telekom have put the transformation of the network on the agenda. In the United States, Verizon plans to spend 15 billion dollars in the next 10 years or more to lay down a huge fibre network, and expand their business to video services, while AT&T is also undergoing the transformation of its networks. In Asia, Japan's giant NTT is looking into how to implement a transformation strategy effectively in the new environment, and China Telecom has set the goal of becoming a so-called integrated information service provider.

In addition to these significant infrastructure investments, most of the major players mentioned here have currently opted to provide free usage of published capabilities via an API but are of course reserving the option to change the model later. One alternative some operators are using is the credit based approach: pricing each of the available services in terms of 'credits' and offering customers a possibility to buy the credits in bundles, following the mobile operator pay-as-you-go approach. Additional incentives for telcos (and an advantage over webcos who own no network assets) are increased network traffic and hence another source of additional revenue; and increased customer retention by providing exciting new wave applications to their customers. Another, less usual, alternative offered is a pricing model that charges a small fee per "content" call, similar to the model Amazon uses with its API calls. It should be noted that with the benefit of additional network revenues comes the requirement to maintain (and upgrade) network assets and the potential extra agility of webcos who need not be tied to any specific network.

Even though the Telco 2.0 area is still under constant development, there are already lessons learned available – Microsoft released the news about shutting down its CSF (Connected Services Framework) product in December 2008. CSF was Microsoft's major Telco 2.0 initiative to develop a service delivery platform that could be widely deployed and this decision is a significant indication that the telecom industry has not moved as quickly as they had anticipated to embrace a common approach to service delivery. The reason offered for this decision was that current deployments, in 30 service providers globally, had proven to require a much higher degree of customisation than Microsoft expected, prompting the software giant to focus more on the delivery of Web services via Exchange Online and SharePoint Online and leave the telecom service delivery platform business to systems integrators.

As mentioned above, in addition to telcos, webcos and, increasingly, device manufacturers (Nokia, Motorola, etc.) are also participating in this new environment and, in addition, there are many smaller companies offering functionality over what is sometimes referred to as the 'programmable web.' Indeed, SOA4All Deliverable D8.4 created an application using multiple services from multiple, mainly small, service providers as shown in Table 1.

[12] http://www.btplc.com/21cn/

| Service provider | Service Description |
|---|---|
| Last.fm | Provides a list of friends |
| FireEagle | Provides user's location |
| Multimap | Provides driving or walking directions between a set of locations |
| WeatherBug | Provides live weather data |
| Yelp | Provides local search and retrieves a list of businesses |
| Ribbit (BT) | Provides send SMS service |

***Table 1:*** *Service Providers in a BT Telco 2.0 Application*

### 2.4.2 Telco 2.0 & Platform as a Service (PaaS)

Figure 5 below shows a high-level view of the possible platform and tools a Telco might offer to allow telco and other services to be published and combined into applications. As discussed, externalising current capabilities can be seen as a way that will create new growth opportunities and allowing both the Telco itself and third party developers to address long tail demand. The technologies used include telecom web services, enabling the Telco to access long tail revenues via innovative niche applications from third party developers where the Telco is taking the role of a web services aggregator. Of course, some Telcos may not want to embrace all aspects of this model: some may choose, for example, to offer only their own services via their platform to the exclusion of third party services. This model would seem inappropriate in the open environment of the Web and would probably drive users to other sites.

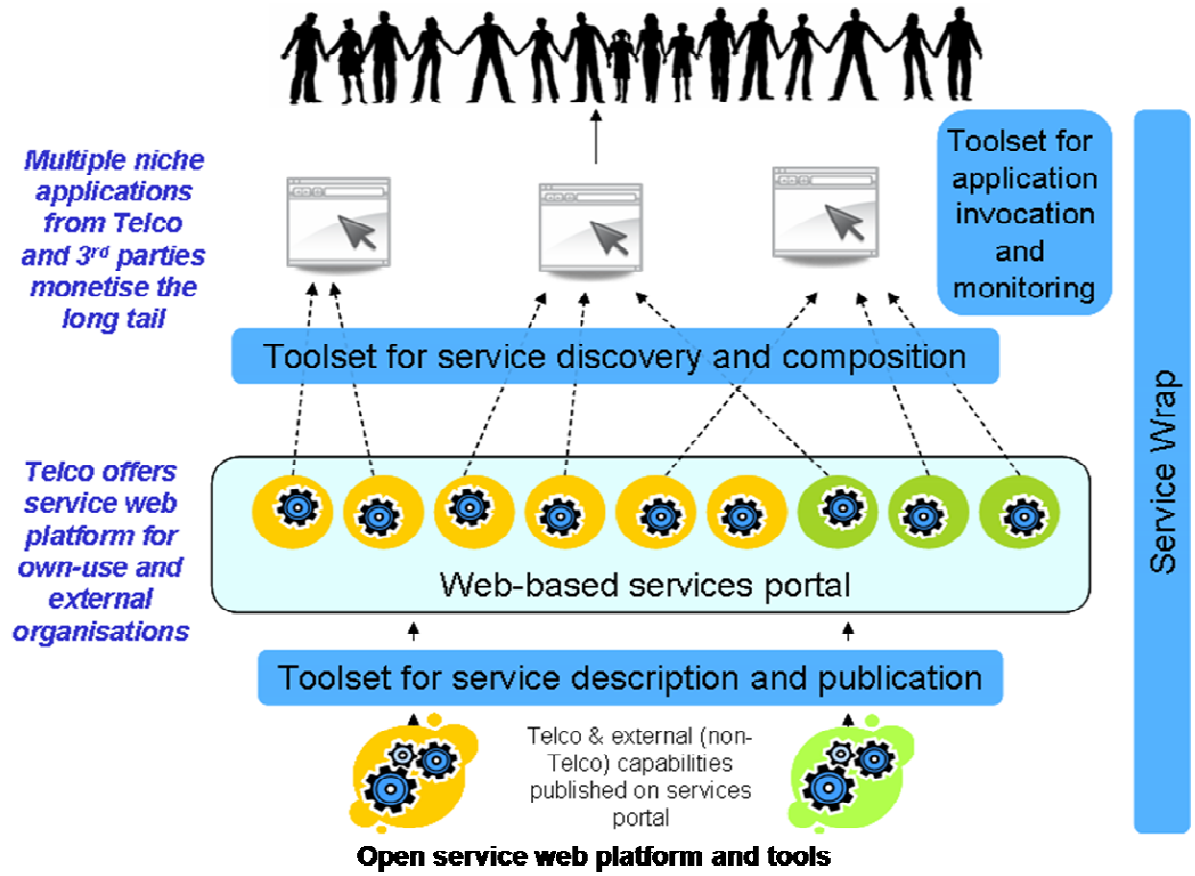


***Figure 5**:* Platform as a Service

Such platform plays are essentially two-sided, offering a platform that facilitates the two groups on the buy-side and sell-side to interact with each other. This lowers transaction costs, builds scale and offers Telcos new opportunities.

Telcos will need to change their market assumptions away from the well-understood one-sided market ("we will buy equipment, integrate it into a platform, and then launch and sell new services, thus adding value") towards the less familiar two-sided approach, where the platform facilitates buyers and sellers to interact directly. There are already limited examples of this in the telco sector, such as freephone services, and advertising via IPTV.

Another interesting proposal comes from Ribbit, who proposed the concept of "bringing your own network" (B-Y-O-N) and using the Ribbit platform to build communications into the business by leveraging an existing underlying carrier network. The Ribbit platform can connect to the existing network either via MPLS links or via a SIP interconnection, thus giving the option to work directly with carriers or with carrier partners. That model implies several styles of partnerships and development approaches for Ribbit and, although Ribbit did not announce specific carrier partnerships at this time, it has already integrated the Ribbit platform with two widely used telco soft switch/application platform vendors: BroadSoft and Sylantro.

## 2.5 Emerging Initiatives

There are a number of emerging initiatives happening in parallel with the emergence of Telco 2.0 which may impact on it. We describe 2 of the more significant of these below.

### 2.5.1 Linked Data

Ever increasing amounts of data are being made available to individuals and organisations and expectations are rising accordingly. A striking example is Thomson-Reuters, the world's largest business information provider who, via their Open Calais project, have exposed their information in machine-readable format using semantic technology (RDF) on the public Web.

Similarly, Tim Berners-Lee has been appointed Information Adviser to UK government with the specific responsibility of opening up more government data to the public (and indeed to private enterprise) and furthermore to link this data together rather than only providing access to 'silos' of information.

This project will also use semantic technology to do this: Berners-Lee is not only the inventor of the web, he is also a very strong proponent of the semantic web, whose purpose is to give information on the web more structure and context, thus making it more amenable to automated processing.

Linked Data is an initiative about using the Web to connect related data that was not previously linked, or using the Web to lower the barriers to linking data currently linked using other methods[13]. In essence, it is about data (RDF) and a unique naming (URI) model on the web – creation of a "Web of Data", following 4 basic principles:

- Use URIs to name things on the web, aiming for complete coverage eventually;
- Use HTTP URIs so everything can eventually be looked up on the Web;
- Provide useful information when URI is accessed;
- Include links to other URIs to allow discovery of more things.

Perceived advantages of this semantic web approach to data integration are:

- Universality – anything with a URI can be linked, no requirement for specific vendor technology
- Lightweight approach based on open standards
- Formal approach offers the ability to infer information from the data
- Extensibility – ease of extending to new data sets

The W3Cs Linking Open Data project has over a relatively short space of time integrated data sets consisting of 4.7 Billion RDF triples, which are interlinked by around 142 Million RDF links, the dataset cloud being shown in Figure 6 below.

[13] http://www.w3.org/DesignIssues/LinkedData.html

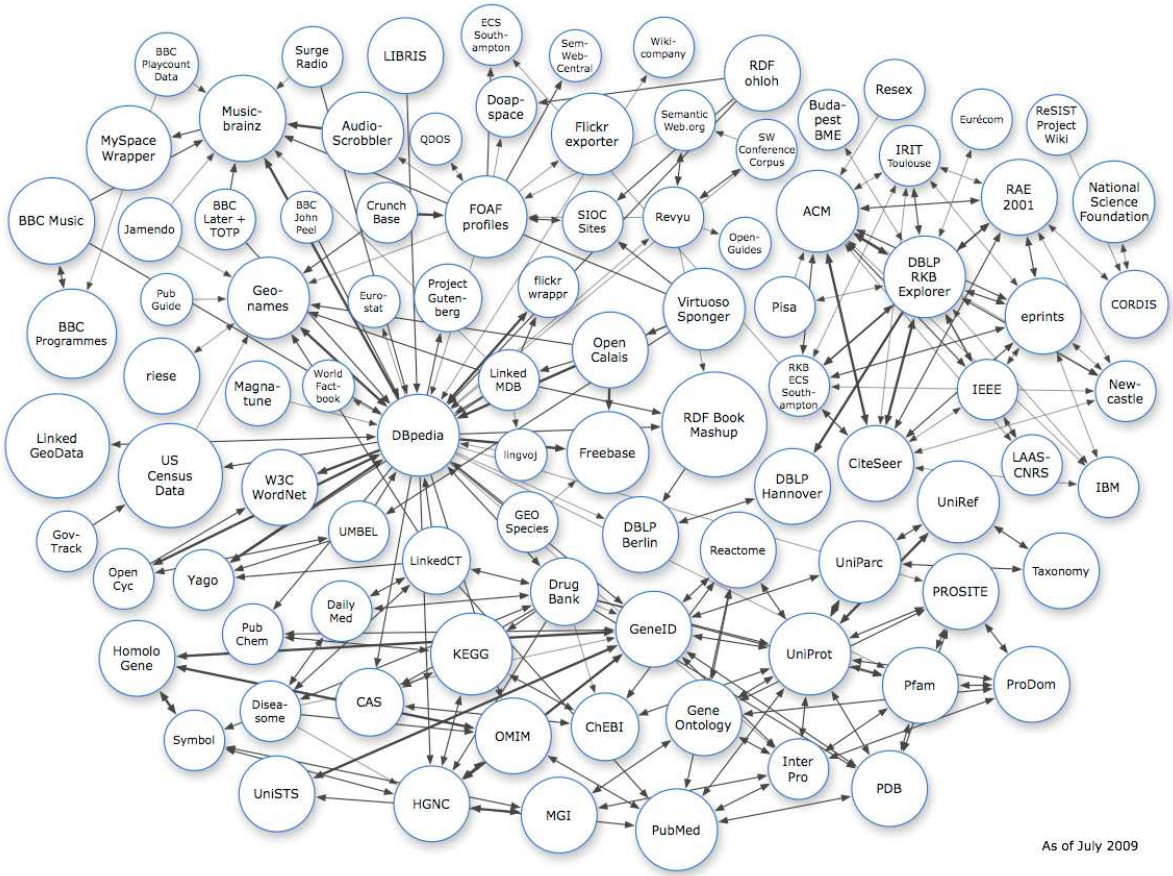


***Figure 6**:* Linked Open Data Dataset source: Richard Cyganiak, July 2009

Currently the datasets typically fall into the following areas:

- Media – The BBC has published programme and music ontologies and associated instance data. On the published media side, the Reuters Open Calais system which automatically extracts entities (people, places, organisations, etc.) from text has linked its ontology and CNET, the 'new media' publisher has made its content available.
- Government – There have been recent high profile announcements by the US and UK governments. The US has already published around 600 datasets in a wide variety of datasets including those on census, environment, medical care, social security, immigration, treasury and government finance.
- Online Encyclopaedic & Geographic data - participants here include DBpedia (which represents the structured facts from Wikipedia as semantic metadata), Metaweb who market Freebase, an open shared world knowledge base, WordNet, the lexical database and Geonames, the geographical ontology. Ordnance Survey appears to be testing the water (or the beer) by linking data about pubs in Southampton.
- Life Sciences – the sector was one of the first to adopt the Semantic Web due the high degree of information intensity. GO, the gene ontology, Pubmed, the medical publications catalogue and LinkedCT, the linked data source of clinical trials are examples of linked data.
- Academic Publications – Beyond life sciences, the IEEE, ACM and CiteSeer catalogues are linked.
- Social Media – participants include online review sites such as revyu.com, social networking data such as FOAF, qdos.com and flickr hosted photos linked from DBpedia.

It can be seen that this initiative, with its emphasis on open access to data has parallels with the open service ecosystem in the Telco 2.0 world. It is likely that many application developers will leverage Linked Data to add value to applications developed using open services.

### 2.5.2 Pragmatic Web

With the rise of Social Networks, the idea of someone's online identity (or multiple identities for different times/purposes) is also a topic of increasing interest. Digital strategist Alisa Leonard-Hansen in a recent article post[14] speaks of the 'Pragmatic Web', when user's web experience becomes more meaningful and relevant to the user as it is layered with contextual social data based on the user's identity.

According to the Pragmatic Web analysis, one's online identity is comprised of three 'pillars:'

- who I say I am,
- what I do and say,
- and who I connect to (and who connects to me).

To clarify, online identities are comprised primarily of three specific kinds of data:

- Explicit or prescriptive data (e.g. the data that I input about myself: name, age, occupation, etc.);
- Activity or behavioural data (e.g. what I do and say online);
- Relationship data (e.g. my social graph and what my connections say about me).

Using the data that is contained in online identities and social graphs, companies can create more meaningful and more relevant experiences when offering services their customers.

Current centralisation of identity data on one or two major networks (such as Facebook, Twitter and MySpace) will not realize the vision and benefit of the pragmatic Web. To harness the full potential of it, individuals will need to be able to access and control their identity across any site or service, through standards that enable data portability and open Web inter-operability. The resulting vision is that of a highly personalized, dynamic, relevant and re-mixable Web experience, yielding greater access to information through discovery, communication and collaboration. For enterprises, this could mean the rise of innovative new business models, based on data-driven value exchange.

Several issues need to be resolved to be able to realise this vision – most importantly, the key factor of timeliness. Essentially, identity data is valuable only if it is recent.

We have above mentioned that one key aspect of Telco 2.0 is the exploitation of the customer relationships that telcos typically have with very large numbers of customers. The pragmatic web initiative is very relevant here since it empowers individual customers to define what telcos can do with their data in their dealings with upstream customers. This could be critical to customers' acceptance of the exploitation of their personal data.

[14] http://www.readwriteweb.com/archives/future_all_about_context_the_pragmatic_web.php

# 3. Telco 2.0 & Technology

In this section, we begin by looking at a number of technology trends enabling the move to Telco 2.0. We then discuss the relevance of SOA4All technology in supporting these changes.

## 3.1 Technology aspects of Telco 2.0

### 3.1.1 Service Delivery Platforms

With the internet becoming more integrated into everyday life, consumers have come to expect a more personalized, transparent, simply priced, and instantaneous relationship with service providers and the services they offer. Various industries, from banking to supermarkets have re-engineered back-end processes to fulfil this need and make their businesses more agile. The consumer's desire to personalize and control their services in real-time is increasingly apparent in their relationship with telecommunication service providers [3]. The Service Delivery Platform (SDP) is one technological development that aims to make delivery of these novel services possible.

Although the SDP is not a new concept, there is increasing interest and projected growth in this area – as long as SDPs are provided as a "common" platform (horizontal layer) that will stretch across all silos (vertical services), so there can be a common platform for managing services. That would enable service providers to easily partner with third parties because the SDP would create commonality among different functions across service and product silos. Using SDP as a B2B-enabling platform could open the route for communication providers to capitalize on their unique and expansive knowledge of their customers. Market analyst Kristofer Kimbler [2] states that a "state-of-the-art" SDP would typically possess the following characteristics:

- A layered architecture that follows the principles of Service-Oriented Architecture (SOA) to facilitate integration with service providers' operations and business support systems;
- A foundation of standard commercial off-the-shelf (COTS) hardware and software;
- Open communications and IT standards rather than vendor-specific solutions;
- Common execution environments, data repositories and sets of standardized service enablers to be shared by services and applications running on the SDP;
- An ability to expose selected network and service capabilities to third parties in a managed and secure way.

Creating a "unique" SDP would be best carried out by using "out-of-the-box" components based on open Telecom and IT standards. Then communication providers can differentiate by tailoring the platform to what they want to achieve. That kind of an "open approach" should be cheaper to deploy and maintain over the SDP's lifetime, but it should also lay the groundwork for integration with other players in the value chain – each of which will be more likely to be using standard components in order to attract developers seeking the path of least resistance.

A valuable asset of communication providers is the vast amount of their customers' personal information (such as communication patterns, physical location, online shopping behaviours, expenditure and web usage habits) – acquired through triple and quad-play bundles. Usage of that information has been problematic and, amongst other things, fraught with ethical and legal issues, as earlier efforts in this area revealed. A way of avoiding such issues would be to give customers the opportunity to opt in to services requiring that their personal information are revealed in exchange for certain benefits (e.g. such as Google does) – as benefits outweigh the risks. SDPs can be the ones who aggregate that vast amount of data and expose it (in a secure way) to both internal and external applications. To enable and support higher quality customer experience requires data associated with the BSS moving to the network-edge and becoming an interactive part of the service. All (or most of) the core information needs to become available, such as subscriber balances, price plans, spending thresholds, blacklists, etc, and it needs to be close to the network (see 7). This requires a drastic change in the function of OSS/BSS, transforming it into a highly dynamic and responsive interface between network, customer, and accounting data.

Providing tailored and differentiated services and managing and monetizing data traffic at the same time, requires the ability to identify, measure, authorize and bill different types of content and services.

Low latency is crucial as data and profiles are needed at real-time, not at some later date as traditional BSS is used to – it is necessary to move to transactional-type interaction, similar to the one associated with pre-paid systems. A merge of network and subscriber data is needed to achieve this new business control layer and a change in the flow of data is needed to enable flexible and dynamic OSS/BSS. Some examples of possible new subscriber promotions could include:

- Usage: bonus of 5 free text messages for every 50 used
- Committed spend: 'free' calls to 5 selected subscribers when you spend over £15 per month
- Refills: receive 20% extra credit if you top up for £25 or more
- Rating plan: switch to this rating plan and get an extra 50 minutes per month for the first 6 months.
- Customer spend: spend more than £50 and get a rebate of £10
- Ad hoc scenarios: reduced rate calls between the countries playing each other on the day of the match
- Subscriber provided information: free value added service for the first month for subscribers who provide user profiles
- Policy basis: e.g., free video share bundle when you buy the gold Quality of Service package

These types of promotions might be crucial in the process of binding the subscriber to the provider since, as currently wired, wireless and cable providers offer the same core services of voice, data and video. Nevertheless, to increase the revenue streams, providers will have to look beyond the subscription and implement one or more (or a combination of) business models described in the previous sections.

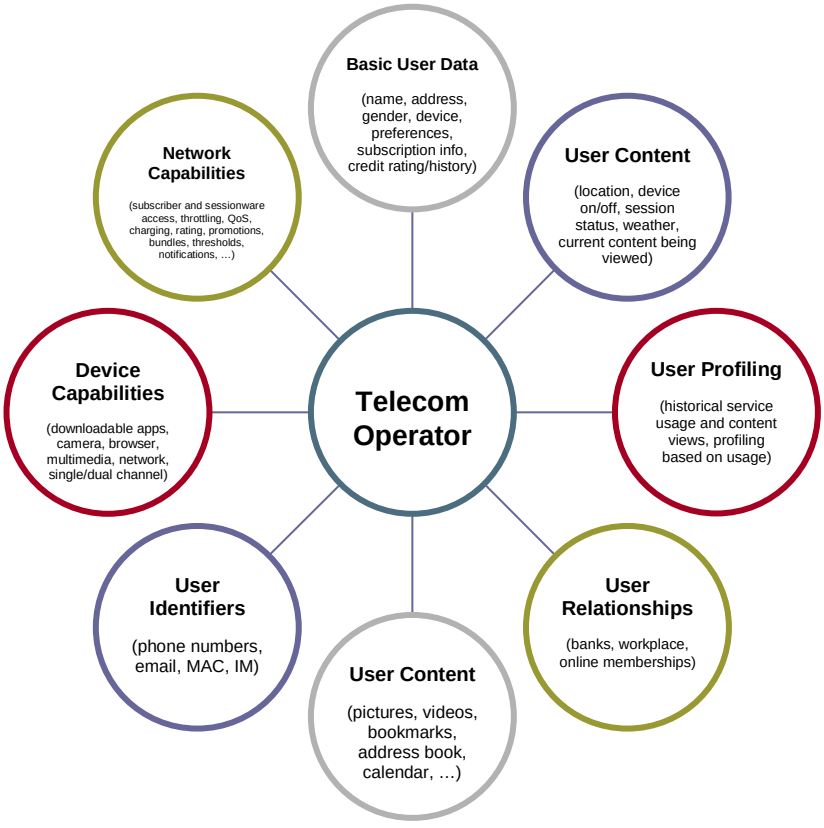


***Figure 7**: Service provider enablers* *source: [3]*

### 3.1.2 OS, API and/or SDK

As we have discussed, the exposure of telecoms capabilities via software is a major feature of the move to Telco 2.0. Telecommunications operators and device manufacturers are both entering this field where the leaders have historically been the webcos and indeed, the distinctions between these types of organisation are starting to blur (see, for example, our discussion of Google's entry into the handset market below and its potential impact on mobile telephony business models).

With regard to handsets, there is a wide choice of operating systems for mobile devices[15] - available on devices from multiple manufacturers:

- Android (by Google)
- Symbian S60
- Windows Mobile (formerly Pocket PC – now Windows Mobile 7 is planned)

And (listed separately), the OS that are restricted to their respective handsets:

- Blackberry OS
- iPhone OS
- WebOS (by Palm, formerly Palm OS)
- Bada (by Samsung – released December 2009)

A comparison of operating system features can be seen in Table 2 below and respective market shares in the US are shown in Figure 8.

[15] http://www.engadget.com/2009/03/19/mobile-os-shootout-iphone-os-3-0-enters-the-fray/

| | Android Cupcake | BlackBerry OS 4.7 | iPhone OS 3.0 | Symbian S60 5th Edition | Palm WebOS | Windows Mobile 6.5 |
|---|---|---|---|---|---|---|
| Kernel Type | Linux | Proprietary | OS X | Symbian | Linux | Windows CE |
| First-party Enterprise Support | None | BlackBerry | Exchange | Exchange, Domino, BlackBerry | Exchange | Exchange, Domino, BlackBerry |
| Wireless Technologies | GSM, WiFi | GSM, CDMA, WiFi | GSM, WiFi | GSM, WiFi | GSM, CDMA, WiFi | GSM, CDMA, WiFi |
| Input Methods | Virtual keyboard, physical keyboard | Virtual keyboard | Virtual Keyboard | Virtual keyboard, T9, and triple tap; character recognition; physical keyboard | Physical keyboard | Virtual keyboard, character recognition, physical keyboard |
| Media Support / Ecosystem | Amazon | Non-DRM iTunes | iTunes | Ovi | Amazon | Windows Media Player / None |
| Browser Engine | WebKit | Proprietary | WebKit | WebKit | WebKit | Internet Explorer |
| SDK Availability / Support | Yes | Ye | Yes | Yes | Yes | Yes |
| Official App Store | Yes | Coming | Yes | Coming | Yes | Yes |

***Table 2:*** *Mobile Operating System Features*

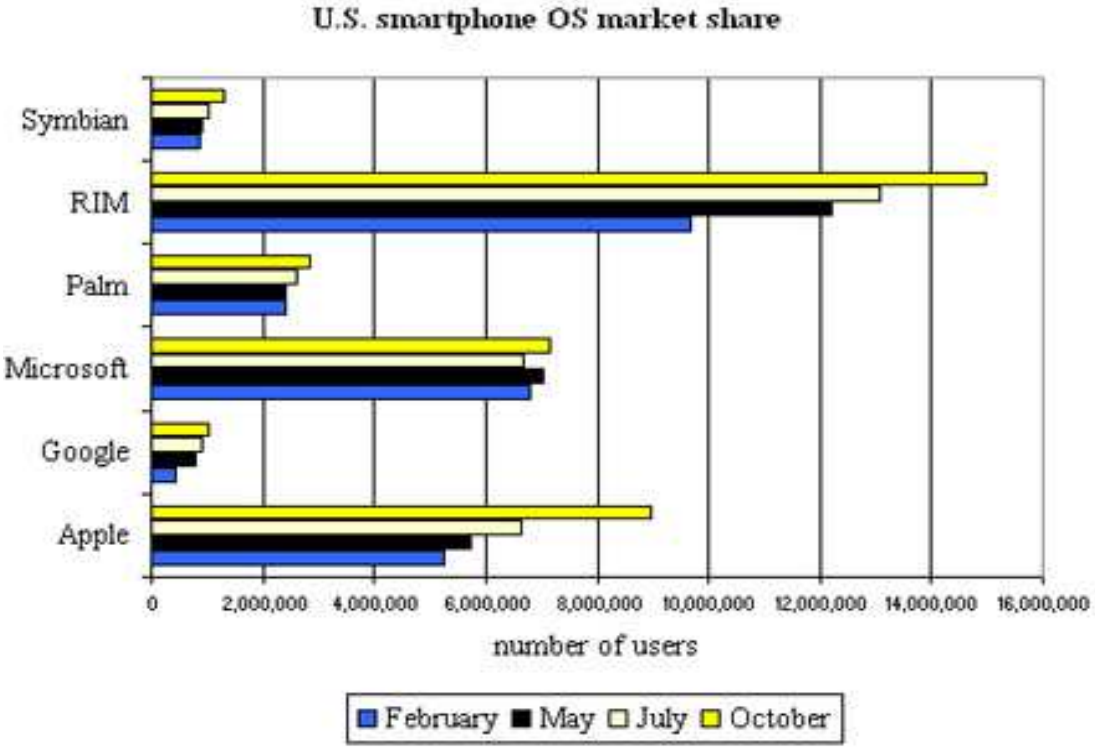


***Figure 8**: US smartphone OS market share (October 2009)* [16]

In addition, device manufacturers are providing APIs and/or SDKs and encouraging the community to use those capabilities and create new services and applications. Capabilities exposed in this way include various device capabilities: device location drives location-based services; games can use accelerometers and the orientation of device for control; music, video and photo services can exploit multimedia files held on the device.

On the other hand, communications providers/operators are offering their APIs and/or SDKs to in-house and third party developers and publishing those applications (usually via some kind of an application store, as described in the following section) to the devices. Those APIs/SDKs are exposing the providers/operators capability, which mixed with the device (or some other third party capability) are creating some interesting and novel applications.

In an interesting recent development, in keeping with its vision to organise the world's information for its customers, Google – the webco *par excellence* – has moved into the mobile device arena with the launch of its Nexus One handset in January 2010. By providing its own handset, Google controls the customer experience with regard to mobile web access. In addition, Google is seeking to change the prevailing business model in the mobile space, away from one where the handset is sold bundled with network access all through the carrier (telco) and towards one where a handset is bought separately from network access. Nexus One will be available from Google either unlocked or bundled with network access but in both cases the purchase will be done via Google (e.g. using a Google Checkout account). The benefits to Google are clear: the telco is relegated to providing a connection with Google gaining advantages in branding and customer relationship.

[16] http://www.engadget.com/2009/12/17/comscore-iphone-overtakes-windows-mobile-use-for-the-first-time/

### 3.1.3 App Stores

Emerging mobile app stores are one of the main drivers for SDP adoption. Following Apple's success, other mobile handset and mobile operating system vendors (e.g. Nokia, Samsung, Sony, Ericsson, RIM, Microsoft and Google) are establishing themselves in the app store space. Several factors influence the entry to the app store market:

- Use of a business model and a platform that will be easy-to-use and rich enough to attract developers so that a portfolio of both free and paid applications can be built
- Enhancement of current SDPs with app store capabilities to attract app developers, offering a broad spectrum of applications

Most of the leading mobile operators have already set up their stores – such as Vodafone's 360 or Orange's Application Shop. The device providers are also a part of the competition as they are setting up their own cross-carrier application stores, mostly aimed for smartphone users – e.g. Nokia's Ovi Store or Samsung's application store. The major benefit of their application stores is independence of the carrier and country.

There is also a possibility of using existing app store solutions such as GetJar[17] and Handango[18], which already have their base of applications for various devices – the route that Sony-Ericsson and LG have taken.

On the other hand, with the release of HTML5 and new mobile browsers (such as Firefox Mobile), there is a rising threat for the app stores as the browser-based experience should become richer. If these open mobile browsers can achieve a high degree of richness in the user interface experience, they have the potential to become a serious challenge to today's model of downloading smartphone-optimised apps[19].

### 3.1.4 Service Ecosystems

With respect to the service ecosystems we introduced in Section 2.2, there are a number of parameters to be considered:

- Should the ecosystem be open or closed?
- Should the focus be on the operator API or on the device API?
- What is the potential overall revenue and ARPU?

#### *3.1.4.1 Closed Ecosystem*

A recent and successful example of a closed ecosystem is Apple and its App Store, which enables a community of developers (who were willing to pay the joining fee) to publish their applications for Apple's iPhone (and iPod variations), as long as the application features do not replace a set of iPhone's primary functions (such as making calls, sending SMS, etc).

For developers, Apple's App Store offers a low barrier to entry, as developers only pay a small fee to enrol in Apple's Developer Program. Apple has a revenue share model in 30:70 ratio – with Apple claiming 30 percent of the application price and the application developer receiving 70 percent. This model has now been followed by the majority of application stores.

A Yankee survey of 1,200 U.S. smartphone owners showed that 18% of applications are paid for[20].

[17] http://www.getjar.com/

[18] http://www.handango.co.uk

[19] http://www.rethink-wireless.com/article.asp?article_id=2314

[20] http://news.idg.no/cw/art.cfm?id=023A53AB-1A64-6A71-CE585289946A1DE2

However with growth in the average cost of the paid apps, and the growth in the number of devices, the U.S. revenues from applications will grow by 10 times between 2009 and 2013, reaching $4.2 billion in 2013[21]. In that survey, more than 70% of all the apps downloaded in the U.S. were games.

Current app store metrics[22] show that the interest (and the revenue) is real as is shown in the tables and figures below.

| Type | Count |
|---|---|
| Total Active Apps (currently available for download): | 98,401 |
| Total Inactive Apps (no longer available for download): | 10,156 |
| Total Apps Seen in US App Store: | 108,557 |
| Number of Active Publishers in the US App Store: | 23,545 |

***Table 3:*** *Count of Active Applications in US App Stores*


***Figure 9****: Count of Application submissions per week to iTunes* *source: 148apps.biz*

On average, during October 2009 there were 280 application submissions *per day* (Note that due to the average approval delay of 11 days, Figure 9 might not show the accurate picture of the application submissions in the last few weeks). Out of those, 230 were non-games applications.

From the price aspect, the current average price is $2.54 per application, although the price range goes from free to $9.99 for over 96% of the applications with the rest (less than 4%) going even up to $999.99 (1 application).

21 http://www.computerworld.com/s/article/9138397/Gold_rush_Big_money_seen_for_iPhone_smartphone_app_developers

22 http://148apps.biz/app-store-metrics/

The category distribution of available applications is shown in Figure 10 below and illustrates the wide range of application domains now being addressed.

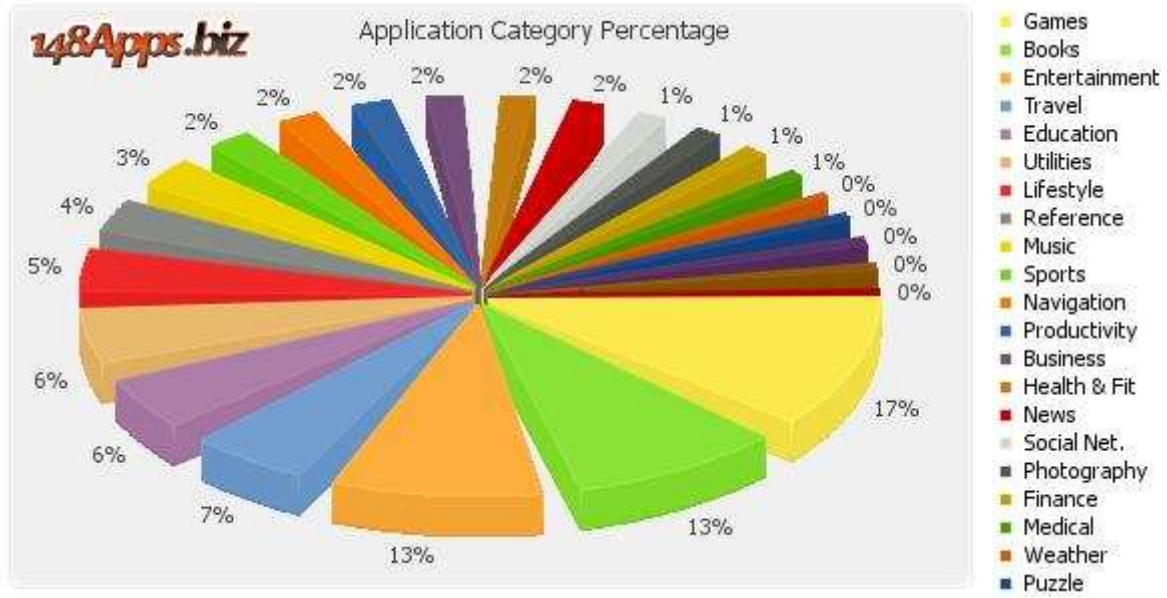


***Figure 10**: Application Category Distribution* *source: 148apps.biz*

The use of the App Store is two-fold: with the revenue received via the downloads/revenue share, there is also the fact that Apple is using the App Store to drive the demand for its hardware and of course this is a key differentiator for the closed ecosystem. The App Store's place in the bigger picture is its strategic relevance i.e. its ability to sell phones and keep users committed to Apple devices[23].

### *3.1.4.2 Open Ecosystems*

An example of an open ecosystem thriving from community innovation is Facebook – about 95% of Facebook users have used one or more of the 52,000 applications available on the Facebook platform. With 660,000 registered developers, adding over 140 new applications per day it is not showing signs of weariness.

Telcos have significant opportunities in joining this open world and leveraging the value locked in their customer data. To do so an open architecture, open partnerships and maximised simplicity for developers in the form of SDKs and intelligent development environments and transparent revenue sharing models are required. Along with monetising their customer data, telcos have an opportunity to introduce messaging, voice and other communications services into the social media interaction process (e.g. 'Ribbit for Facebook').

[23] http://blogs.wsj.com/digits/2009/07/02/just-how-successful-is-the-iphone-app-store/

## 3.2 Applications of SOA4All Technology

SOA4All comprises a set of valuable technologies that can foster the move of a Telco to the Telco 2.0 world, by placing special emphasis on the uptake of services by different actors and thus facilitating the use of their capabilities and generating revenue with them.

By lowering the entrance barrier to the service world, SOA4All contributes to the role of "service prosumer" depicted in Figure 3, i.e., end-users who not only interact with services in a passive manner, consuming them, but are also able to create new ones or compose existing ones, etc. Telcos can leverage this fact by offering a set of base services that expose their telecommunications capabilities with which users can create new applications that make use of them, implementing new niche personalised services in an easy manner.

### 3.2.1 Summary of current technology

A major outcome of the SOA4All project is the **SOA4All Studio**, a set of online tools that cover the whole life-cycle of services from the end-user perspective: Interaction with services is addressed from Provisioning (where annotations are made on different types of services, and where they can be composed into more complex ones), Consumption (where suitable services can be discovered and invoked) and Analysis (where the executions of services can be monitored and analysed at different levels). Figure 11 depicts the architecture of SOA4All with the SOA4All Studio close to the end-users and on top of the other infrastructural services.

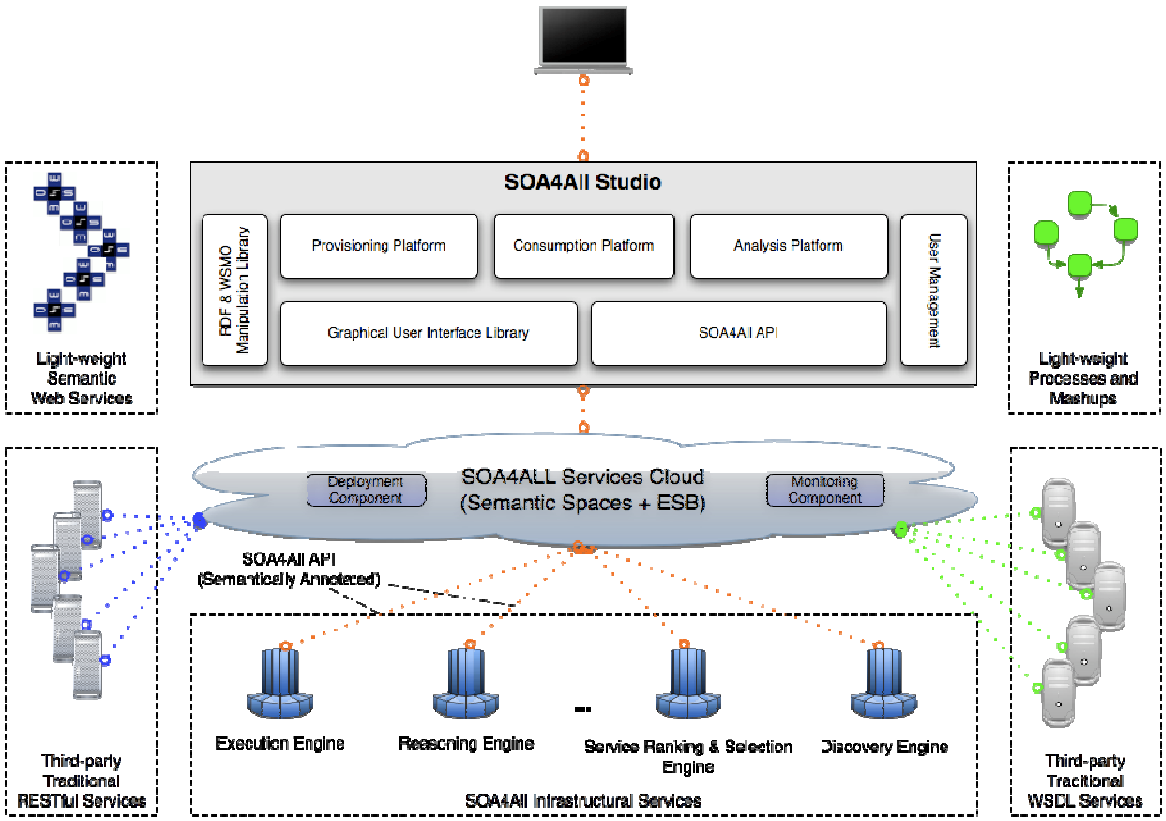


***Figure 11**: SOA4All Architecture*

The different components of the SOA4All Studio have tools that can be exploited for different types of interactions with the services.

- Provisioning: Two editors address different types of services, allowing end-users to annotate traditional WSDL services with **SOWER** (Sower is nOt a Wsdl EditoR) and RESTful ones with **SWEET** (Semantic Web sErvice Editing Tool). These annotations are stored and accessible in a service annotations repository, **iServe**. Grounding editors for linking the annotations to the executions are also included in these tools. Additionally, the **Process Editor** offers the possibility to compose annotated services into processes. In addition to annotations about services, the studio has a **Feedback Framework** which supports ratings, comments and tags made by users. To sum up, the provisioning tools support the addition of new valuable information about services, which can be used later on.
- Consumption: Making use of the annotations made with the provisioning tools, **SPICES** (Semantic Platform for the Interaction and Consumption of Enriched Services) is able to offer end-users the means for finding the services that suit them most, and consume them in an easy manner. Internal components of the platform include input and output **adapters** that abstract the semantics to non-technical users, **invokers** that are able to execute the services based on the semantic annotations and the lifting and lowering definitions, an **authentication engine** to deal with services and API credentials, and a **personalisation engine** that is able to adapt service executions to better suit users. Users are also supported by a **Recommendation System** that is able to suggest services based on their history within the platform.
- Analysis: The **Analysis Platform** provides information at different levels of abstraction that can help users understand the performance characteristics and usage patterns of the services and processes used. Some of these analysis tools are of particular relevance for platform owners that need to understand better the mechanisms that happen within the platform, from a knowledge level.

These resources for end-users are supported within the Studio by infrastructure services and a graphical library. Additionally, they make use of underlying SOA4All Infrastructural Services that support important functionalities:

- **Execution** engine for interacting with different types of services and processes.
- **Reasoning** to support an efficient way of dealing with semantic annotations.
- **Ranking**, **selection** and **discovery** to get the suitable services amongst the large number of them that are expected.
- **Composition** technologies to support complex services.

All of this is made available in a highly distributed and scalable manner via the SOA4All Services Cloud.

The relationship between SOA4All technology and Telco 2.0 concerns becomes clear when one compares Figure 11 above with Figure 5, which depicts the potential roles for a telco when exposing capabilities via a web services platform. The SOA4All Studio aims to deliver the toolsets for service description, publication, discovery, composition, invocation and monitoring in that diagram.

The potential that the aforementioned SOA4All technologies offer to Telcos is that they can be used to push forward the use of services and the reutilisation of resources. Therefore, it will be easier for Telcos to expose their capabilities in a manner that many end-users will be able to mash them up in very different ways, thus promoting the implementation of new niche personalised services, embracing a Long Tail business model.

While this objective is sometimes tackled by exposing an API for programmers, making use of SOA4All technologies lowers the barriers drastically for non-technical users to participate in the creation and consumption of services.

In particular, SOA4All technologies have benefits in environments where a large number of services and users are foreseen, since the semantics involved in these technologies provide an intelligent way of dealing with this scale, and will ultimately enhance the user experience.

### 3.2.2 Limitations in moving to "Telco 2.0"

There are a number of challenges that need to be addressed in order that SOA4All technology can play its full part in assisting in the transformation from Telco 1.0 to Telco 2.0.

Some of these challenges are related to integration issues, as the different components need to be well aligned in order to successfully support the whole life-cycle of services. For example, while it is possible to make use of certain subsets of the Studio to e.g., make annotations on services, when aiming at transforming the processes of a Telco, it is important that these same annotations are then used for discovery and consumption, making a complete solution. However, this should not be an issue, since the tools, even if decoupled, are properly linked together and are able to share the same information (e.g., the annotations made with the SWEET and SOWER are used by SPICES; and the actions that take place in SPICES can be studied in the Analysis Platform, etc.)

Another issue with SOA4All technologies regarding the move to Telco 2.0 is that they do not include revenue mechanisms out-of-the-box. Billing processes and policies would need to be integrated with the existing tools in order to create complete solutions that Telcos would be interested in applying in production environments.

Similarly, SOA4All technologies do not address use and branding requirements that service providers place on the third parties that make use of their resources. This implies that when an external service is annotated and consumed making use of SOA4All tools, there might be other non-technical requirements that would need to be addressed. For example, if the external service provider requires that their logo is present in any third-party application that makes use of their API, the tools would not automatically support it, and it would be necessary that the platform provider tackle this issue.

### 3.2.3 Potential for SOA4All to assist the move to Telco 2.0

The combination of SOA4All's technologies with revenue models that leverage the interaction of different actors with services in heterogeneous ways offers support for the transformation to "Telco 2.0".

Importantly, these technologies can offer Telcos an easy way to expose their resources (e.g., VoIP capabilities, messaging, incoming calls handlers, etc.) as annotated services in a manner that enables end-users to use some kind of marketplace to easily combine them with other external resources. .

By exposing their resources in a way that enables less advanced developers to make use of them, either by directly consuming them or using them in mash ups, the uptake of the telcos services will be increased which in turn will lead to more end-users participating in an application marketplace with a growing number of useful services.

The combination of such a marketplace with pay-as-you-go schemas for applications that make an extensive use of the base Telco resources will generate revenue for the Telco. With this schema, all the parties get benefits: the Telco is able to generate income from exposing the resources in a lightweight manner, the service reseller can easily create advanced services, and the end-users have a broad number of services available to choose from.

# 4. Strategy & Execution for Telco 2.0

## 4.1 Strategic Context

For traditional telecommunications companies (and the ones in transformation now) and other service providers, it would be extremely hard to enter and/or conquer some of the Web markets – such as the search market – unless some disruptive technological breakthrough occurs to give them an unforeseen new competitive advantage. Similarly, products such as mail, maps and others are likely to prove equally difficult, involving major players such as Google, Yahoo and/or Microsoft. Similarly, there is a race in progress between the handset manufacturers (led by Nokia) and webcos (led by Google). Indeed, as discussed earlier, Google have moved into the handset arena so that as well as supplying a handset operating system they are now making available their own handset using that operating system. As we have discussed, the key for telcos is to develop a new set of services to complement their traditional and declining services.

Openet[24] considers following the enablers of next generation services:

- Transactional Intelligence – located between Network Devices (that directly enable services for end-users) and Back Office Systems (that indirectly enable services for end-users), it makes usage information from the network valuable
- Evolving Billing and Charging Systems – to have simpler fixed (and recurring) pricing, capable of handling high volume real time "impulse" transactions
- Creating a "Smarter" Pipe – combining Subscriber and Network Control, Data, Voice and Video Networks, Next Generation Billing and Back Office Systems
- Customer Configurable OSS/BSS – that can support new customers expectations, such as personalisation, transparency, simple pricing and instantaneous visibility and traceability
- Subscriber-, Service- and Session-level Awareness – interaction between end-user services, operator's BSS systems, partner's ecosystem and transactional intelligence

To maximise the benefit, Telcos need to develop and then effectively exploit their latent assets, such as:

- unique opportunities inherent in Telco customer data
- control of the user communications interface
- location services
- mobile developer ecosystem
- emerging GSM m-banking/m-payments systems
- offering a richer, more integrated customer experience

In addition, to be able to go through this evolution, telecoms needs to consider future system investment (as an example, TMForum[25] is looking into what software and what infrastructure is needed).

A further aspect of getting additional revenue is on demand and value added services – a survey by IDC[26] in November 2008 showed that 94% of respondents acknowledged that there is value in services that can dynamically allocate extra spectrum on demand for certain types of traffic including video, VoIP and gaming, and 24% would be willing to pay more for such services. Additionally, 54%

[24] www.openet-telecom.com

[25] www.tmforum.org

[26] http://development.dmflex.com/comspace_newsDetail.aspx?n=43936&id=e9381817-0593-417a-8639-c4c53e2a2a10#

indicated that they would be prepared to move from their existing ISP to a rival offering premium services. Although the web portals have been present for some time, telecom users are still not widely self-supporting and enabling that aspect of user management might bring a differentiating status to the telecom.

In the mobile communications domain, it is important to stress that a sustainable mobile ecosystem (including a balance between a handset, applications and content) should be able to provide recurring revenues to the handset or content company. In that case, the control of the mobile operating system (OS) is a key element in controlling the mobile ecosystem. Current players in the area include Google's Android & Nokia's Symbian OSs, both need a smart phone device to reach their potential – more details about the mobile device OSs can be found in Section 3.1.2.

Telecommunications providers can also learn from other industries – as an example, there are certain similarities between the telecoms industry and the air travel sector, where consolidation, privatisation and the emergence of low-cost operators have all been features in recent years [6]. The main lessons from the airline industry include:

- Users may be tolerant of faults as long as they gain advantage elsewhere (e.g. price);
- Web based consumer facilities can reduce operation costs;
- Globalisation helps expansion over borders, but at the same time removes citizens' loyalties and support;
- Some secondary services may gain increased value when mainstream service prices are lowered.

Forester [7] has identified 15 technology trends that should be relevant within the next 3 years – amongst others, those include integration of community platforms with business applications, common use of telepresence services, the requirement for real-time data quality services, ubiquitous deployment of software-as-a-service for packaged applications, the standardised infrastructure for cloud-based platforms and platform-as-a-service, the expansion of policy-based service-oriented architecture and the increased importance of data-content-based security – all of which can provide additional revenue sources for Telco 2.0.

## 4.2 Operator Roles in the Telco 2.0 World

As shown previously in Figure 5, one of the possible routes for a future telecommunications operator is the proposed Telco 2.0 platform. By analysing that diagram in more detail, one can see that the future Telco can have one or more roles, in particular:

- Platform Provider – here the telco offers a platform from which its own and/or other organisations' capabilities can be exposed (the Web-based services portal shown in Figure 5);
- Service (Capability) Provider – the telco exposes some of its own capabilities, either on its own platform or via a platform belonging to another organisation;
- Application Provider – the telco creates applications and services built from compositions of its own and/or third party capabilities;
- Application Reseller – the telco offers an environment wherein application developers can publish their applications for sale, effectively making the telco a reseller of these applications with an appropriate revenue sharing agreement.

The role(s) a given telco may choose to adopt will depend on a range of factors specific to their own operations and situation, as discussed below.

### 4.2.1 Platform Provider

As the two-(multi-)sided business models are shown possible, Telcos could use their existing assets, in particular the basic infrastructure, and enhance their core competitiveness by acting as a platform provider. Offering APIs/SDKs to third parties such as Independent Software Vendors (ISV) for service publication and invocation, or offering business service for other corporations to rent, the scale effect can bring large potential benefits. Telecoms can provide platforms that facilitate the groups on the buy-side and sell-side to interact with each other, getting a revenue share from each side.

### 4.2.2 Service Provider

Traditional operators have a great amount of latent assets that could be used in the development of new service offerings. Most Telcos already act as service providers, whether they provide Internet access, software or hardware service, application service, telecommunication service, mobile phone operator, web application hosting and so on to other businesses or individuals. There is a rising requirement for services to become more personalised, device/location independent and contextualised. Vodafone 360 is an early example of a service offering to combine communication services on mobile handsets and PCs (device independence), bringing phone, email, chat and social network contacts together in one place.

### 4.2.3 Application Provider

Another possible route is to offer applications by using a Telcos' own SDK. This seems to be a new trend for telecommunication companies, although obstacles exist – especially as the traditional software industry is full of experienced competition. Not only traditional telecoms, but also mobile operators (such as Vodafone, O2 …) and device manufacturers (such as Apple, Nokia …) are exposing their capabilities and nurturing developer communities to harness the external innovation and to gain a share of the revenue. Providing their own application store (or licensing an existing one) enables a Telco to gain about 30% of the revenue produced by application downloads. An easier solution would be to become an aggregator of different app stores (offered by handset vendors and third parties), bypassing the management of various processes involving developers (such as managing relationships with application developers or application certification, but offering the service where Telcos have experience – such as billing, distribution and promotion [2]. This solution seems to be the best route for mobile operators and MVNOs in the markets where they might experience a difficulty in building up the developer community.

### 4.2.4 Application Reseller

The telco can also offer a reselling opportunity to complement a development environment for third parties to develop their own applications on the telco platform. Reslling via the telco has the advantage for the developer of exploiting the greater reach and known brand of the telco. For the telco, reselling means that the telco gets a revenue share from all the applications sold through its platform. A potential disadvantage is that of maintaining brand focus and quality –controls may be required to maintain a minimum level of quality and appropriate application type to be associated with the telco's brand.

## 4.3 User Views and Concerns

The Centre for Service Research at the University of Manchester organised two user-facing "outreach" workshops in October and November 2009, inviting members of the local business community to share their opinions about the recent developments in the telecom and web services, voice any concerns with the proposed developments in the SOA4All vision, and suggest the best way forward in terms of exploitation strategy. The issues highlighted are grouped below under the headings of "Service Value Chains", "Ownership and IPR", and "Growth and Exploitation". Most industrial participants at the workshops were from SMEs, some from the telecoms sector, so the findings are biased towards their concerns.

### 4.3.1 Service Value Chains

The openness of the new service platform was perceived to be the major difference compared to the existing practices, and the correspondent reduction in transaction costs and seamless connectivity was seen to bring new opportunities for providing niche services, including automatically notifying parents if their child's school bus will be late, etc.

These reduced transaction costs were also expected to lead to growth of the value chains, thus making them too deep for fast reaction to problems from the viewpoint of the end customer. For example, an infrastructure problem reported by a customer may need to go through four different service intermediaries before it is addressed and resolved, this may lead to reaction time which is too long. This is one of the significant risks associated with the "white label" models of creating and reselling services to third parties.

The second significant risk was related to the problems a service integrator may face if one of the service components below is found to infringe the IPR of a third party. One of the workshop participants reported such an incident, which cost over a million dollars to resolve.

### 4.3.2 Ownership and IPR

The lack of ownership and control of the component services was perceived as a major risk for the successful uptake of the SOA4All vision in the SME context: there is a perception that software licensed and running on hardware owned by the organisation is less risky than purchasing services 'in the cloud.' This is also linked with the model of funding through Venture Capital which many SMEs use. The traditional view of venture capital funding is that the product should contain protectable IPR and that the SME to be funded should own this. Both would be difficult to demonstrate in the value-added composite service world underpinning SOA4All. Indeed, it would be difficult to explain that the protectable IPR lays in the way in which component services (which the SME does not own) are connected in the composite service.

The way to address these concerns is for the SME to have a track record of successful innovations using the service composition model, failing this a number of success stories can be pointed out to the VC funders. This can be supported by establishing a library of success stories as well as the library of service components.

Another area where the discussions highlighted the need for further education and dissemination work was the way in which inter-component relationships are governed by licenses, and how using a service component does not mean having access to the software and IPR underpinning it.

The lack of ownership may also create problems when one of the service suppliers disappears overnight. An example with a telecoms service provider in the UK was pointed out, which went into liquidation in February 2009. This highlights the importance of the black-box model of service compositions, where any of the service components can be replaced with a minimum of adaptation costs if a particular service instance is withdrawn.

The issue of ownership was felt even more strongly in relation to the data ownership and location in the Service-Oriented model. Uptake of business applications on iPhone was felt to be impeded by the remote data model of some Apps, which requires connectivity for access.

It was not only the SMEs which were felt difficult to convince of the benefits from the service-oriented

software, many of the banks and other big institutions were felt to be reluctant to embrace change when they may have 30 or more years of legacy software.

### 4.3.3 Growth and Exploitation

Our workshop participants started their analysis of this aspect of the SOA4All vision by reviewing the actors involved with this vision, concerned if this can be sabotaged by a big market player, which would aim to install its own standard of interoperable software components. After they were ensured of the global acceptance of the web service technology, they remarked that the correct channel for disseminating this solution to SMEs would be through suppliers of accounting packages, such as SAGE, office applications such as Microsoft, and non-electronic communication providers such as Royal Mail, since these are the main areas of maximum IT exposure by the SMEs. However, suppliers such as SAGE were felt to value the proprietary model of software rather than the service-oriented one, and would be naturally reluctant to open up their functionality to value-added service composers.

iPhone was recommended as an example of service-based distribution, with a wide choice of over 65k apps which users can download to personalise their communication environment. This exemplifies the capability of thousands of providers to deliver their services to a non-technical consumer in an easy-to-understand and use fashion. Unfortunately, as a lot of the public sector and business tools are still at their infancy, current app libraries comprise mostly games and lifestyle apps.

In terms of future exploitation planning, the participants felt that the key is the community of users and providers, where everyone should be happy with the platform. We thus need to find out what form of platform our target users would prefer.

Any payment to use the system should be linked to a specific added-value to the end user, either in terms of information or service which is of value to them. There is a difference in perception dividing social software, where users expect most things for free, and business software, where users would be happier to pay in order to receive service level guarantees and support.

In terms of sponsorship models, there was a concern expressed in terms of the avoiding bias in the platform. It already happens on the comparison sites, yet within the SOA4All vision we talk about potentially using other company's information to its detriment. An example was given where a communications provider may offer the service of distributing household billing information, only to put advertisement banners on top of every telecom bill saying "come to us, we are cheaper for these specific calls".

The paid platform approach might therefore provide best for business purposes, since paying a fee provides some sort of quality contract bringing security to the users. A free option can also be offered to capture audience initially, with the users then making an informed decision to stay free, and, for example, get marketing promotions, or subscribe to the paid model and to the improved quality of service going with it.

## 4.4 SWOT Analysis

In this section, we present a SWOT (Strength, Weaknesses, Opportunities & Threats) analysis for both telcos and webcos with respect to the emerging open services ecosystem.

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| Strengths | Weaknesses |
|---|---|
| • Latent assets (customer billing relationship, subscriber profile, social graphs, identity, location information, large customer base – volumes / scalability)<br>• Infrastructure (access, core transport networks – both private and public; data centre infrastructure)<br>• Know-How (authentication, policy control, resilience, assurance, overload control and network management, fixed-mobile convergence, unified communications, etc.)<br>• Capital | • Lack of flexibility<br>• Need to evolve to ensure agile service delivery<br>• Lack of appropriate senior support for new business models (to fully exploit community innovation)<br>• Silos – need to evolve service execution and OSS architecture to enable integrated services (capabilities should be reusable and exposed as objects following an SOA approach)<br>• Legacy of monopoly/ public-owned culture |
| **Opportunities** | **Threats** |
| • Leverage existing assets (customer billing relationship, subscriber profile, social graphs, identity, location information, large customer base)<br>• Offer a richer, more integrated customer experience with differentiation on functionality, relevance, richness, ease of use<br>• Use existing infrastructure and know-how (reducing time & cost)<br>• Exploiting third party capabilities and harnessing community innovation by exposing own assets to third parties via open APIs<br>• Explore successful webco business models while retaining strengths of telco | • Telecoms' networks are used as pure access, services are consumed from The Cloud ('dumb pipes')<br>• Alternative players (Webcos) that can deliver services via the Internet (real-time communications servicesmultimedia content; Software as a Service to make enterprises infrastructure-less)<br>• Device Manufacturers selling mobile services outside the mobile operators' walled garden – exploiting the potential of their customer base (e.g. Apple)<br>• Competitors integrating innovation from in-house capabilities, open APIs and developer ecosystems (collective intelligence)<br>• Rich integration of real-time communications with online services drives traditional telco customers away |

***Figure 12**: Telco - SWOT Analysis*

| Strengths | Weaknesses |
|---|---|
| • Strong market presence and good understanding of the web environment, commercially and technically<br>• Often have early mover advantages (aws.amazon.com, code.google.com)<br>• Large, international customer base<br>• Low cost base<br>• Experienced in exploitation of 2-sided business models | • Reliance on web customers, no physical retail presence to offer 'physical benefits'<br>• Increasing requirement to support growing 'traditional' webco business may stifle ability to innovate |
| **Opportunities** | **Threats** |
| • Well-placed to capitalise on new Web 2.0 trends (social networking, etc)<br>• Exploit back-office functionality and infrastructure to become businesses in their own right<br>• Move new services onto existing platforms including telephony services (Webco as virtual network operator)<br>• Early exposure of IT capabilities should make webcos first port of call for emerging third-party applications | • As webcos expand to new areas, they will enter competitive markets with strong existing players and possible retaliatory action in their own space<br>• As online markets continue to grow, there will be increasing competition from both established payers in adjacent markets and start-ups |

***Figure 13**: Webco - SWOT Analysis*

## 4.5 Execution Strategies

As we have discussed, the telecommuncations industry is going through major disruption and transformation, due to the changes forced by blurring of the borders in the Digital Ecosystem areas (telecommunications, media and information, software/technology). The Internet and Web2.0 have had a tremendous effect on the value chain and have changed customer attitudes, with the recent recession providing additional strains. Fast change is imperative, even if the underlying technologies require slow and complex production cycles. However, for established operators any action requires caution as the transition to Telco 2.0 may have an effect on its traditional telecom business. In this section, we discuss market entry methods for both new entrants and established telcos.

### 4.5.1 New Entrants (Telco 2.0 Start-Ups)

The way of entering the market for a Telco 2.0 start-up will depend on the maturity of the market, but to be able to compete with the existing operators, it will have to be in a form of a Virtual Network Operator (VNO) using the infrastructure of a wholesale provider [5]. It is essential to quickly build a substantial customer base (by offering competitive and fair prices) and, at the same time, have a stable and sustainable income.

The next step is to offer more advanced services to its customer base – such as implementing Fixed/Mobile Convergence (FMC) – offering converged voice services irrespective of the device and access used and unified messaging services. All services should be user centric and independent of the network infrastructure. Including Internet presence offerings is essential in the current markets, as users are getting more tech-savvy and want to keep their online identities up to date. This should utilise the “Free-for-all” model often used by web companies.

Additionally, the start-up should actively support third party service development, harnessing community innovation and willingness.

Ideally, the start-up will find services that offer unique benefits to its customers, ensuring customer retention and expansion of the customer base, driving the revenue at the same time. Offering something that is highly desirable for the customer (e.g. complete control over personal data) can enable the start up to be identified as “better-than-free” and charge more for some services (similar to how Apple/iPhone promoted exclusivity). An additional source of revenue can also come via loyalty programmes that can be run with not only large companies, but smaller local businesses as well.

### 4.5.2 Mature Telcos

In contrast to the start-up, incumbent Telcos already own the infrastructure and most of the necessary back-end systems to (re)enter the market with their offerings. That fact can also be one of the disadvantages – traditional telecoms have been known not to adapt to change well or to do it too slowly. Traditional telcos must enhance the user experience in an environment where there is a variety of standalone networked devices, applications and services that don’t easily exchange information between themselves. The telecom operators have the unique opportunity to take the role of an aggregator/mediator between the different players and data sources, providing a richer and more personalised experience to the user. In addition, telcos as platform providers can provide usage statistics and other relevant data, enforce Authentication, Authorisation and Accounting (also known as AAA) or Service Level Agreement (SLA) policies for the services available on the platform.

Potential revenue sources lie in the dormant assets telcos have about their users and their habits, mostly collected trough triple and quad play bundles – such as the customer’s location, expenditure, communication patterns, location, online shopping and web usage behaviours, social circle, …). In order to tap into that source, major changes are required – from dealing with privacy and legal issues, to aggregating that data and exposing it in a secure way. Also, based on their relationship with the customer base and the wider offerings, telecommunication providers are capable of reaching their customer base via several channels – devices (e.g. via mobile phones/sending texts, broadband/sending emails, set top boxes/video ads), direct contact (direct phone or via the call centres) or plain mailing.

In addition, looking specifically at BT as it operates as a MVNO, the role of an (app store) aggregator

seems to be the route with the most chance for success – providing a selection of applications to its customers and allowing the developers from different backgrounds (app stores for different networks and devices) to tap into that customer base, plus additionally enriching their applications with the Network APIs BT might expose.

Choosing the appropriate business model will be a challenge for a mature telco – as many factors have to be taken into consideration – especially how to get the maximum revenue from the new opportunities but not to undermine the exiting offerings (or finding a right balance between new and old). Several constants have been identified [2]:

- Opportunity for 70/30 revenue share between application/content provider and the service provider
- Need for simple, published rules with limited commercial assessment
- Need for greater application/content provider control over branding, pricing and promotion

Alongside these, to ensure success, service providers should:

- Differentiate their offerings by extending, enhancing and combining network assets, developing compelling new applications (in-house or by third party)
- Attract developers/application providers/content providers by enabling the environment they are looking for – with APIs, network capabilities, authentication, back-end support and developers support in a form of a portal, SDK, sandbox environment etc.
- Provide a toolkit that allows easily integrated functionality for promotion and monetisation
- Provide monitoring and management capabilities

# 5. Conclusions

## 5.1 Options for Change

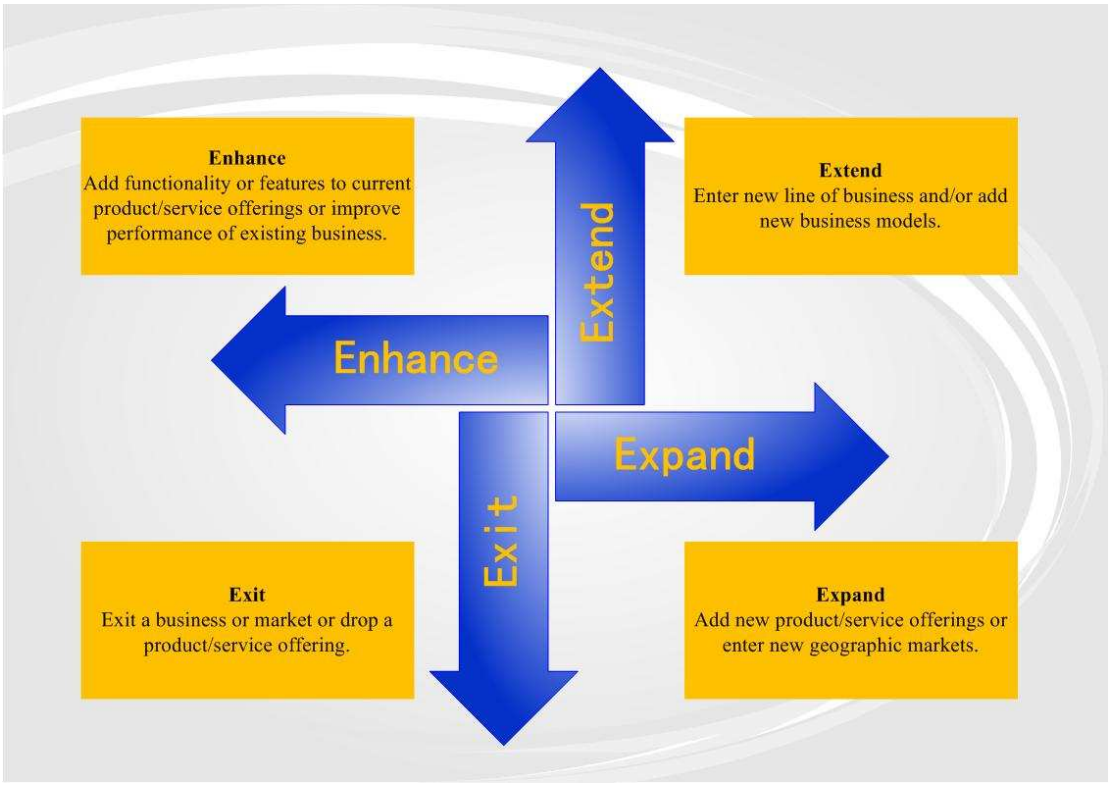


***Figure 14**: Evolving the Business*

How best to transform a business depends on the current status of the telecommunications provider and as shown in Figure 14 above, there are four principal options available for any given market or product:

- Enhance – Adding of new functionality or features to current product/service offerings or improving the performance of the existing business. The context of the declining use of traditional services limits the options for traditional telcos. New product or service features may improve one's position in a declining market but are unlikely to reverse the overall downward trend.
- Extend – Entering a new line of business and/or add new business models. 'Telco 2.0' fits here and this is the most appropriate track for telcos to pursue in the current environment.
- Expand – This is also an appropriate response and involves moving into adjacent markets such as, for example, a move into TV services or ICT.
- Exit – Exiting a business or a market or dropping a product/service offering if no longer profitable. This strategy needs to be reviewed on a case-by-case basis at the product level but telcos at this point in general should defend their market share in traditional markets while newer markets and business models are developed.

## 5.2 Critical Transformations

As we have seen, transformation is currently a very significant issue for the telecommunications sector. In this conclusion, we summarise the various axes along which transformation is proceeding, with different organisations executing transformation strategies with varying speed and emphasis according to their specific competitive environment and internal structure. Key aspects which are necessary but not sufficient include:

- Network transformation: the switch from a fundamentally circuit-switched approach to the packet switching of the IP world;
- Cost transformation: taking opportunities to remove cost from current operating models is a topic that should be kept under review by companies in all sectors and particularly in areas like telecommunications where new technology makes the potential savings significant. However, cost reduction tends to deliver shorter term wins but lacks the ability to deliver longer term growth, where the focus has to be on new revenue generation and the customer experience;
- Process transformation: related to cost transformation is the streamlining of business processes for more efficient operation.

All of the above need to be pursued in the Telco 2.0 world. More important, however, are transformation activities which have the potential to deliver new revenues and enhanced customer experience in the Internet world:

- IT transformation: adopting service-oriented principles both inside and outside the enterprise, the goal of IT transformation is to expose IT capability in a way which makes re-use of existing systems assets much faster and more straightforward. The availability of APIs and SDKs have a key role to play here of course;
- Product transformation: The exposure of capabilities via open APIs allows both the telco and partners to develop and deploy new products and services much more quickly and flexibly and gives telcos the ability to add ‘long tail’ products to complement their existing high volume, standardised offerings;
- Business Model transformation: as discussed in this paper, the shift from traditional one-sided telco models to two-sided models is in many ways the most fundamental shift of all and is critical to monetising the opportunities made possible by the transformations described above.

Telcos moving towards adoption of the Telco 2.0 approach may encounter a number of issues. There is a potential tension between the telcos existing traditional product portfolio and the new approach: whereas in the former case, the objective is to maximise revenue from end-users of traditional telco services (voice, messaging, data), in the latter case, these services may be given away or sold at reduced rate in tandem with revenues being generated from other streams (e.g. advertising).

It will therefore be important that any Telco 2.0 initiative is supported at senior level within the organisations and that it has the freedom to act as an independent business unit. This may bring it into competition with established business units – in this case competition will decide which of the two approaches is the more profitable for the particular telco.

Achieving the radical transformations recommended above will potentially raise a number of issues for consideration. Specific issues which may be encountered include:

- API wholesale providers: as open APIs become more commonplace, it is likely that some organisations will seek the role of aggregators of APIs and the telco will need to decide whether to itself becomes an API wholesale provider or to publish its API via one or more such providers.
- Essential in building scale in terms of API usage will be the size and strength of the development community associated with the API. It will be key to nurture and grow these development communities. One option that could be considered here would be to reach out to existing large development communities, such as those of big IT players and webcos.
- Related to the above point is the attractiveness and ease of use of the published API for developers: the API must be as simple to use as, for example, Amazon's Web Service API (here SOA4All technology has a key role).
- Commercial policy will be important with regard to competitors: for example, the legal position when a competing telco attempts to use a telco's API should be carefully considered *a priori.*

The telecoms sector is in a period of rapid change with falling traditional revenues but many new opportunities in the new Digital Ecosystem (telecommunications, media and information, software/technology) as the borders between the sectors are increasingly blurred. There is an increasing need to reconsider business and structural models to compete effectively in this new world. As we have discussed and as summarised in the SWOT analyses of Section 4.4, there are significant opportunities for established telecommunication operators to re-invent themselves in order to tap into the new opportunities in the web-centric world. The alternative scenario is perhaps that ***services.google.com*** becomes the world's most popular website and telcos become utility companies offering bandwidth at ever-decreasing margins.

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