



Bringing Autonomic Services to Life

D6.6 - Organizational Model for new communication paradigms (2nd release)

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1 Introduction

1.1 Purpose and scope

The definition of the *Connected Society*, along with an analysis of the needs of the final user was the main input of the **Organizational studies** activity. The aim is to identify features of possible future business contexts focusing on the match between final user and major players of telecommunications, web, consumer electronic and information technology scenarios.

More specifically, organizational studies aim to:

- specify market trends that autonomic communication technologies will meet;
- understand how these trends need to be faced and handled;
- predict how autonomic communication technologies can influence these trends;
- make a preliminary identification of business arenas for autonomic communication technologies.

All these results will be included in a business model that will constitute the basis for the development of specific services.

Organizational studies are summarized in two deliverables: deliverable D6.6 (the present document) and deliverable D6.4 “Organizational Model for new communication paradigms (1st release)”.

The current document has the main objective of representing the final report for organizational studies. As such, it will include the final results and the definition and description of the business model related to autonomic communications technologies.

The document is structured as follows: section 2 presents the framework selected to introduce the business model. Section 3 provides the analysis of the value proposition for autonomic communication technologies. Section 4 gives a market segmentation to identify the target market for autonomic communication. Section 5 describes an analysis for the value chain. Section 6 presents a preliminary revenue model. Section 7 offers an analysis on competitive strategy referring to the convergent industries. Such analysis is also introduced in deliverable D6.4. Section 8 presents the *growth strategy*. Section 9 discusses the adoption of the business model in the application scenario of personal behaviour advertisement.

Future developments are related to the identification of guidelines that will lead to future internet paradigms in order to contextualise the business model and understand its potential evolution.



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1.3 Document History

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0.1	31/07/2007	Daniela Guarnieri Claudio Colmegna	Initial ToC
0.2	15/12/2007	Claudio Colmegna Daniela Guarnieri	First draft of the complete deliverable
0.3	21/12/2007	Claudio Colmegna Daniela Guarnieri	Second draft of the complete deliverable
0.4	07/01/2008	Claudio Colmegna Daniela Guarnieri Peter Deussen	Third draft of the complete deliverable
Final	08/01/2008	Claudio Colmegna Daniela Guarnieri	Final version



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2 Business model

A business model aims to provide a broad picture of how an innovative concept will create economic value for the parties, also considering the infrastructure required to introduce a product/service in the market in a way which will be easy to use and convenient for customers and profitable for companies.

A business model could be defined as follows [1]:

“A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.”

In simpler words, a business model describes how businesses can find a sustainable position within the economy and generate revenues.

A business model aims also to convert innovation into economic value for the business. In the current document we will not introduce a business model for an enterprise or for a family of enterprises (such as service providers), but we will discuss how business topics (such as entrepreneurship, strategy, economics, finance, operations, and marketing) will change in response to the introduction of **Autonomic Communication Technologies (ACT)**. The objective of the current document is to catch the potential strategic innovation due to the introduction of ACT. That strategic innovation lies in the creation of growth strategies, new product categories, services or business models that change the businesses and generate significant new value for customers and corporations. Clearly, introduction of every service or family of services will involve more detailed analysis, discussion of which is beyond the scope of this deliverable.

The approach proposed to identify the business model of ACT is composed of the following sections (Figure 1):

- **value proposition:** gathers all the features which are common to the services available through autonomic technologies and influence their exploitation;
- **market segmentation:** identifies variables needed to segment the market and get the target for ACT. The nested approach was already introduced as a segmentation framework in D6.4 “Organizational Model for new communication paradigms (1st release)”. In the current document we will apply this framework;
- **value chain analysis:** defines how value for prosumers can be created through ACT. A precise application of value chain analysis was introduced in D6.4 for the scenario of personal behavioural advertisement;
- **revenue model:** identifies the driver for understanding revenues and costs generated through the introduction of ACT. Considering 2015 as the time horizon, it is helpful to identify some drivers that could influence the turnover related to the introduction of autonomic technologies with respect to the introduction of a mathematical model with many hypotheses and variables;
- **competitive strategy:** analyses the possible strategies that actors might employ, identifying some foreseen market movements determined by the application of ACT. In particular, the analysis will identify potential strengths and weaknesses for players, who traditionally belong to different contexts such as telecommunication



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(TLC), Consumer Electronic (CE), Information Technology (IT) and Web. An example of this analysis is already presented in D6.4, describing the scenario of behavioural advertisement following the Porter schema [2].

- **growth strategy**: identifies the most relevant drivers needed to monitor and understand the depth of the impact of ACT. A growth path is required for every newly-introduced technology to survive.

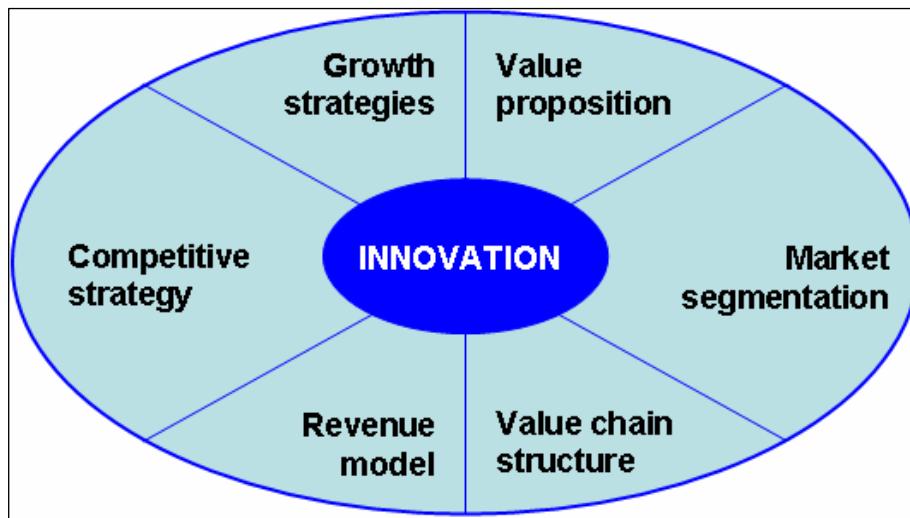


Figure 1 - Business model

For every section identified, we will not only provide a general analysis for the impact of ACT, but will also present an analysis of the scenario selected by the CASCADAS partners.



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3 Value proposition

A customer value proposition is defined as the difference between total customer benefits and total customer costs [3]. In this respect, ACT can be considered as **enabling technologies**, as in fact they are expected to allow provision or customization of many services to directly meet customer needs.

One real need we have identified in previous work is for a complete range of services available and universally accessible with respect to time and location, particularly mobile services (see D6.1 Part B: “Prospective studies on the socio-economical aspects of the Connected Society”). This last trend is confirmed by the increasing enthusiasm related to WiMax technology, which has the potential to intensify the traffic and the amount of information flow on the Web.

ACT have some distinctive features allowing a high degree of service customization. Services will be accessible anytime, anywhere, and allow access to any object. A fundamental element of these features is exploitation of *self-** properties (self-organization, self-configuration, self-healing, self-protection, self-awareness), which could ensure an “**always-on**” high quality portfolio of services. Considering the underlying infrastructure as a black box which allows service provision, ACT constitute an incredible opportunity to improve the infrastructure itself, which can be optimized to offer services adequately. In addition, it is worth noting that customers’ needs¹ often overlap consistently with needs of other actors such as services and applications providers, network operators, etc. . To this extent, it is worth looking at section 7 “Competitive strategy”, where competition issues in convergent markets are addressed in detail. However, it is also worth remarking here on some concepts which have already been faced during the project:

- pure TLC operators need to find new services and markets to decrease the margin related to their core activities;
- web operators (i.e. Google, Yahoo!, etc.) have the opportunity to exploit their tight contact with customers by offering them services and contents which could overlap with the contexts of other industries such as TLC or IT;
- IT operators take risks by losing profits as a consequence of alternative services that could substitute those currently being offered.

Flexibility and customization are other characteristics that ACT-enabled services are expected to provide, while services also need to be available in a **fast and secure** way. The former is ensured by self-organization and self-optimization, while the latter is strictly linked with the autonomic technologies paradigm (as testified by the presence of the security dedicated WP4 in the CASCADAS project).

The changing characteristics of the final user must also be taken into consideration. Their competences and knowledge are constantly growing, and consequently they may become prosumers. According to this vision, provision of contents/services are expected to be increased significantly, and prosumers are to be given the possibility to **produce and distribute their own contents/services**. Thus, prosumers become “main actors” in

¹ An analysis of actual and future communication needs was provided in D6.1 Part B: “Prospective studies on the socio-economical aspects of the Connected Society”



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autonomic scenarios. This will also have an impact on future services provision, since services will need to adapt to the needs of prosumers.

Finally, other distinctive features of ACT are principally related to **ease-of-use**. Many experts, interviewed on this subject, are certain about the importance of this feature for exploitation of future technologies. In particular, future technologies need to be accessible in everyday life and be capable of supporting use on a continuous basis. Autonomic properties can certainly help achieve this through features such as self-adaptation and self-organization. All these features will be reached through ACT in a cost-effective way both for prosumers and other actors involved in this provision.

Summarizing,

autonomic technologies will configure themselves as enabled technologies that will:

- *present a complete range of services;*
- *provide always-on services;*
- *provide customized services in a flexible way;*
- *provide not only more contents/services, but also the opportunity to produce them;*
- *provide ease-of-use services.*

All this in a cost-effective way through a most effective infrastructure management, and the reduction of maintenance costs.

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4 Market segmentation

In deliverable D6.4, a methodological framework has been provided to the extent of segmenting convergent markets and identifying target markets. This methodology, known as the nested approach [4], is composed by different, sequential steps. Each step uses a segmentation basis, which increases the degree of detail at every step (see Figure 2).

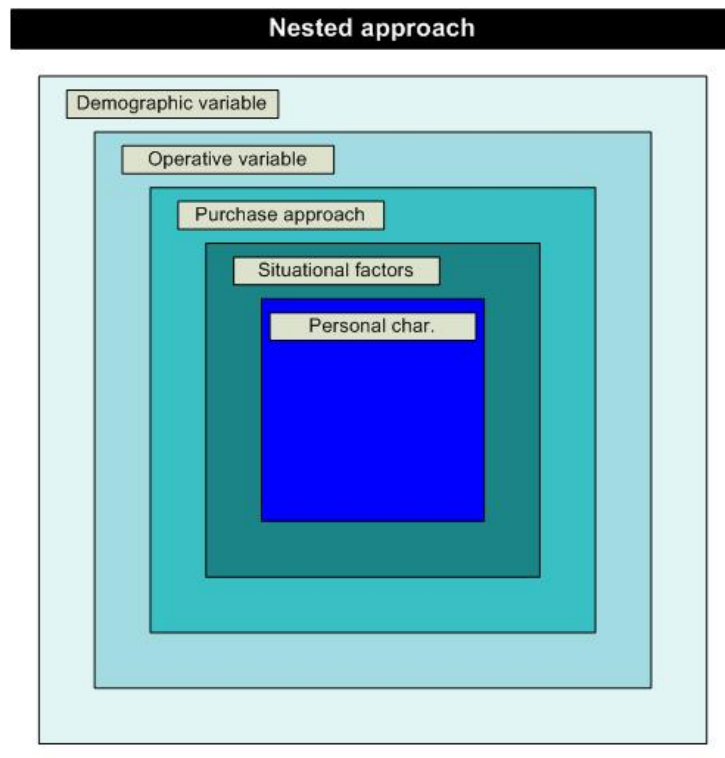


Figure 2 - Nested approach representation

The aim of this section is to apply this approach in the convergent markets of TLC, ICT, CE and Web so as to identify the target market for ACT.

The starting point is the identification of a **demographic variable**, which has the purpose of dividing customers based on general features. For example, the sector or geographical area they belong to, for B2B customers and their age or income, for B2C customers.

Geographic distinctions among European countries are not applicable in this context, since autonomic technologies will be adopted by all members of the European Community. Similarly age does not allow market segmentation from the demographical point of view, though age could be used as a non-direct measurement to represent other variables.

A final consideration needs also to be done for the B2B and B2C markets, whose separate consideration does not appear to be important in this moment in history. In fact, considering that ACT will make a wide range of services available, it seems more meaningful to refer to persons, and their habits, as it is foreseen that the success of ACT will depend on capabilities to directly meet people's needs. This is expected to happen



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independently of the usage in business markets. Put simply, if ACT succeed in fulfilling people’s needs, the decision makers in B2B contexts will have confidence in these technologies and will employ them. As a consequence of this consideration, referring to European market there is no demographic variable that could be adopted: people all around Europe constitute a potential market for ACT.

The previous statement could surprise the reader, because for example it can be hard to think of an elderly person exploiting an innovative technology. However, if we consider for example an independent living scenario it will be evident that even such persons could benefit from introduction of ACT. This vision is foreseeable because of the ease-of-use that services provided through ACT are expected to provide.

As a consequence, the potential market selected through the demographic variable is determined by the projection of the population. Eurostat [5] projections are represented in the following table:

Table 1 – Population projection in EU 25 (data in million). Source: Eurostat

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
EU population	458.5	464.1	467.3	469.3	470.1	469.4	467	463	457.3	449.8

The data in the table above might constitute a potential market for ACT. However, some more precise definition is needed.

EU 25 above does not consider the entering of other two countries (e.g. Romania, Bulgaria) in the EU. Thus, EU population is going to grow. Moreover, these data represent an objective in the long term for autonomic technologies, but it is very difficult to reach.

The step following the segmentation through the demographic variable will be the adoption of **operative variables**. This step consists of considering the services/products used by customers with particular emphasis on the employment modalities that they usually select. It is also useful to consider that the focus is not on a single service, but rather on a technology that might be adopted in a wide range of services for different people. However, the innovation linked to services based on ACT requires a careful remark. The **propensity for innovation** will constitute a fundamental driver to understand the type of reaction generated by autonomic technologies. In particular, referring to the technology adoption life cycle [6] (see next Figure), the people to consider are innovators, early adopters and early majority.



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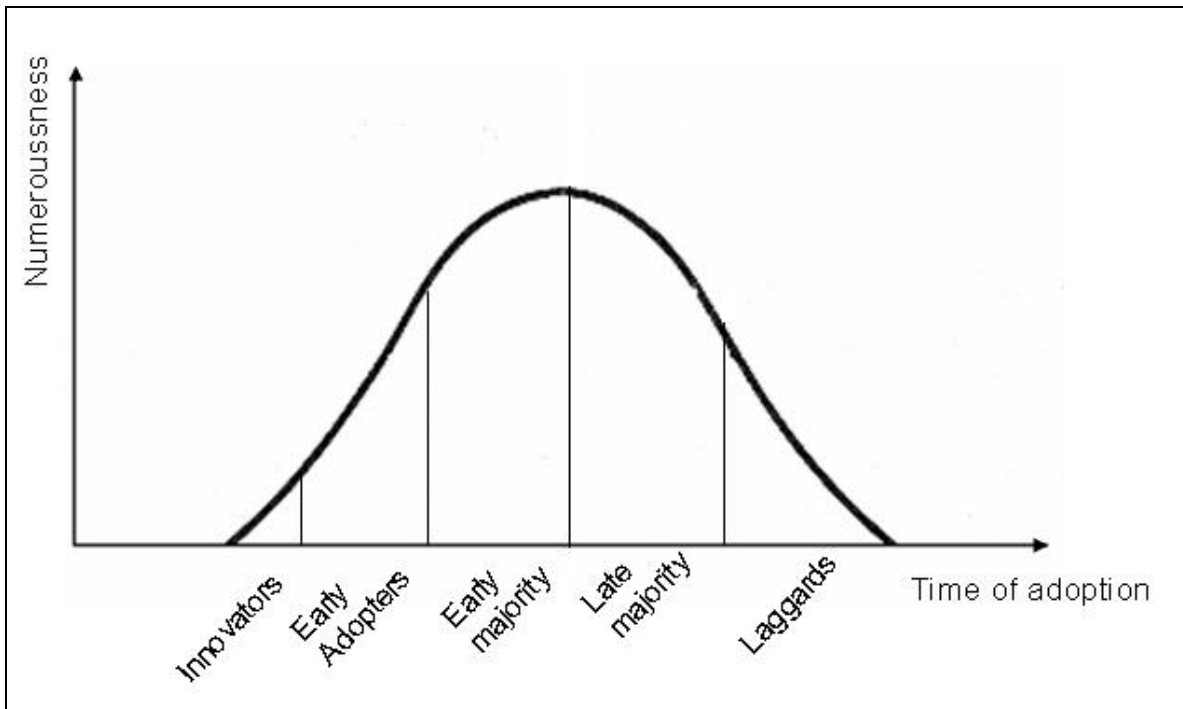


Figure 3 - Technology adoption lifecycle

Clearly, the curve represented in the model needs to adapt to ACT in order to understand the percentage of people with a medium-high inclination to innovation.

Different factors make this task difficult to achieve:

- The subjectivity and the abstractness intrinsically linked to the measurement;
- The wideness of the environment involved in the exploitation of ACT, that could bring different measurements for the same person.

An objective and general² measurement is sorely needed. The European Innovation Scoreboard (EIS) [11] might contribute to solve this issue. The European Commission has chosen this indicator as the instrument for the annual check of the European Council strategy stated in Lisbon in 2001. This evaluation is based on the results of the “European Community Innovation Survey (CIS)” that became obligatory in September 2004.

For the first time, a typology based on attractiveness of innovative products or services is elaborated according to all Member States, leading to 4 categories for EU-25 citizens:

- 11% are enthusiasts towards innovation;
- 39% are attracted by innovation;
- 33% are reluctant to innovation;
- 16% are anti-innovation.

² Referred to social features and not only to specific environment



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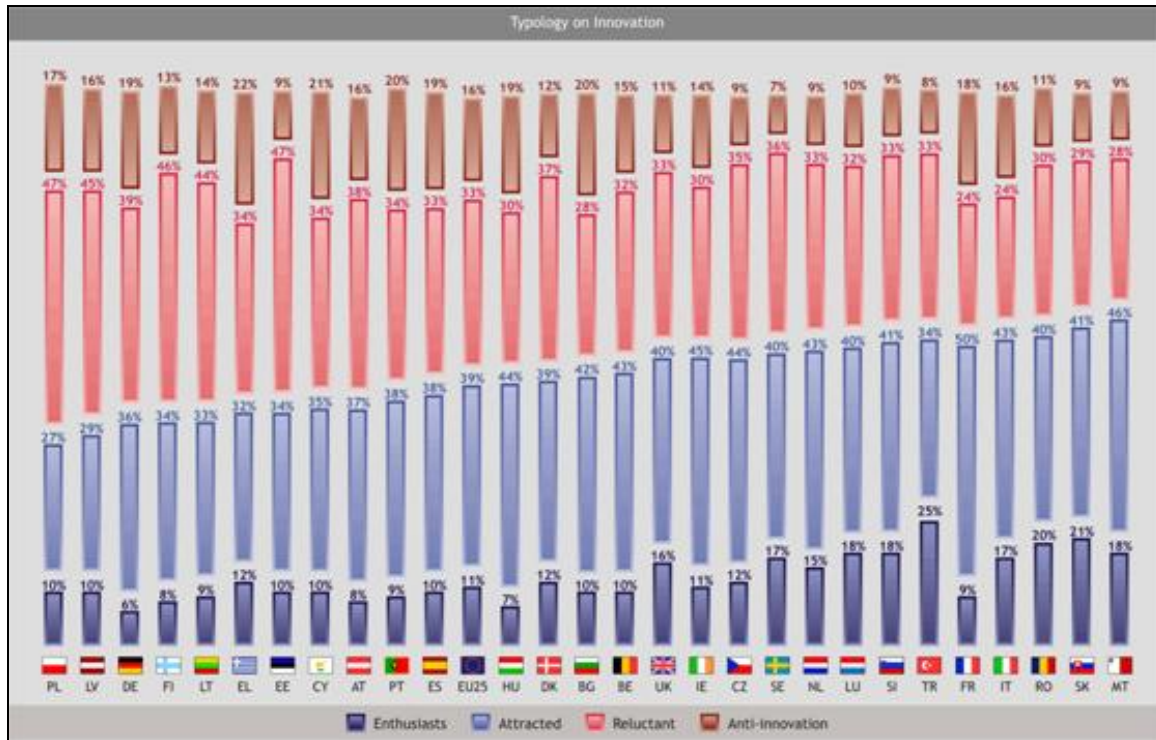


Figure 4 - Innobarometer 2005: Typology on innovation [11]

It is possible to consider that only persons with a high propensity for innovation can be considered as the initial target market of ACT, because of the innovativeness strictly linked to this type of services. So, it is possible to claim that enthusiastic and attracted by innovation can be considered as the target market for autonomic technologies, i.e. 50% of European people. Referring to the product lifecycle model, the first step of autonomic technologies would be reaching Innovators and, subsequently, Early Adopters and Early Majority. However, it is possible to consider introduction of ACT as “thunder” on the market and its exploitation could be instantaneous given the possibility to impact user needs directly; for these reasons, the reach for Innovators, Early Adopter and Early Majority needs to be the initial goal for ACT.

From this discussion it is possible to consider 50% of people selected after demographic variable as the target.

Table 2 - Target market after operative variable

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
EU population	458.5	464.1	467.3	469.3	470.1	469.4	467	463	457.3	449.8
Target market after operative variable	229.25	232.05	233.65	234.65	235.05	234.7	233.5	231.5	228.65	224.9



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The next step in the Nested Approach concerns the adoption of **purchase approach variables**. These identify the purchase habits, and the features of the decision process leading to the purchase. Many experts in opinion leaders companies have been interviewed on this subject. In particular, people from strategic planning and R&D functions from Telecom Italia, Telefonica, British Telecom, IBM and Cisco have been involved. These experts highlight the importance of this family of variables, since the adoption of services provided through autonomic technologies is strictly linked to the purchase approach. In particular the propensity to purchase through e-systems and the trust in online transactions are strictly needed to adopt this kind of services (not necessarily linked to direct transactions). Experts agree that **age** is certainly the most important indicator to identify people who are well-disposed to receive continuous online services. In particular their age is between 15 and 65 years. This does not mean that people belonging to other clusters will not be interested in ACT introduction in the future. However, their usage of ACT services is foreseen to take place on a lesser extent or simply be less profitable.

The next figure shows the composition of the actual EU25 population:

Table 3 - EU25 population composition

Age cluster	Percentage
0-14	15.8
15-24	12.6
25-49	36.3
50-64	18.3
65-79	12.6
More	4.3

In order to segment the target market through purchase approach variables, two hypotheses can be introduced:

- people have the same propensity to innovation in every identified population class; this hypothesis is certainly conservative given that the average value could probably be higher for the classes we are selecting;
- population composition remains the same over the coming years.

Adopting these hypotheses, it is possible calculate the total amount of persons reachable through autonomic technologies after purchase approach variables (please see next figure). In particular considering people between 15 and 65, 67.2% of the population identified might be considered as target market after purchase approach variables.



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Table 4 - Target market after purchase approach variables segmentation

	2005	2010	2015
0-14	36.2	36.7	36.9
15-24	28.9	29.2	29.4
25-49	83.2	84.2	84.8
50-64	42.0	42.5	42.8
65-79	28.9	29.2	29.4
More	9.9	10.0	10.0
Target market	154.1	155.9	157.0

It is useful to reduce the forecast time horizon, given the increasing level of detail introduced; in fact the adoption of a more accurate detail level requires a more immediate time horizon in order to confer significance to the forecast.

The results obtained through purchase approach variables need to be reviewed according to **situational factors**. These are similar to operative variables, but more transient and require a more detailed knowledge of the customer. In fact, situational factors refer to the possibility the customer has to access the product/services under consideration, in our case the access to services potentially offered through ACT. The ease-of-use is one of the main features of ACT, but nonetheless a customer must at least be familiar with online technologies.

To reach this information, the same problem faces operative variables (subjectivity and significance); in the future the Eurostat database might provide a good and objective measurement. As a first attempt we used this query:

Percentage of individuals who have carried out one or more of the following computer related activities: used a mouse to launch programs such as an Internet browser or word processor; copied or moved a file or folder; used copy or cut and paste tools to duplicate or move information on screen; used basic arithmetic formulae to add, subtract, multiply or divide figures in a spreadsheet; compressed files; written a computer program using a specialised programming language.

The result of this query is 24%; the results obtained due to the situational factors are summarized in the following figure:



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Table 5 - Target market after situational factor segmentation

	2005	2010	2015
<i>0-14</i>	8.7	8.8	8.9
<i>15-24</i>	6.9	7.0	7.1
<i>25-49</i>	20.0	20.2	20.4
<i>50-64</i>	10.1	10.2	10.3
<i>65-79</i>	6.9	7.0	7.1
<i>More</i>	2.4	2.4	2.4
<i>Target market</i>	37.0	37.4	37.7

The last step in the approach considers **personal characteristics** to obtain the final target market. This analysis is typically the hardest given the increasing level of detail required; the difficulty is increased also by the subject. In fact, as stated since the beginning of the document, the focus of this business model is exploitation of ACT and not the services to be potentially provided. Since personal characteristics are strictly related to services we do not feel that their consideration adds anything useful, and that it is best to focus on the result already obtained after segmentation through situational factors.

This result highlights the attractiveness of exploitation of ACT, and might constitute the basis for the identification of potential services offered through autonomic technologies.



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5 Value chain analysis

A value chain for a technology represents the route by which value is derived by each actor involved in a service supply scenario. The creation and survival of companies are based on the added value they offer to customers utilizing products or services. If customers deem that such value is not sufficient, or is less than what the customer is willing to pay, the normal consequence is that the company disappears from the markets, as demonstrated by Coase's law. The fundamental function of a firm is to increase the value on behalf of customers and shareholders. Thus, the value chain model describes this process with which the value is increased. This process was first presented by Porter, and its framework defines three steps in firms. These steps are [7]:

- identifying the strategic business unit;
- identifying critical activities, defining products;
- determining the value of an activity.

More recently, this concept has been enlarged to describe the entire industry-level value chain. The industry-level value chain model observes the firms in the market independently, and describes the positions of firms in the overall industry.

Analysis on value creation, and the concept of the value chain developed on the form of value network, is discussed in the literature on strategic management [7]. A network is built upon relationships, capabilities and superior customer values of key firms within the value chain. The value increase of the network is generated by the capabilities of the firms within the network. In other words, the core capabilities of all firms together create the improved customer value. The way firms combine to create this value captures the nature of the relationship that firms have together. Value drivers for the e-business context were efficiency, complementarities, novelty and lock-in.

In this context, where technology has made a strong impact, the Kothandaraman and Wilson's [8] model (as drawn in Figure below) offers a good base for value analysis. Kothandaraman and Wilson pointed out that value generation in the network comes from a combination of core **capabilities, relationships** and **superior customer value**.

Core capabilities define the firm's ability to deliver services and goods that satisfy customers' needs and wants coming from the market. Together, core capabilities and relationships create the value network that generates the value offers for customers who are the third party in the model.



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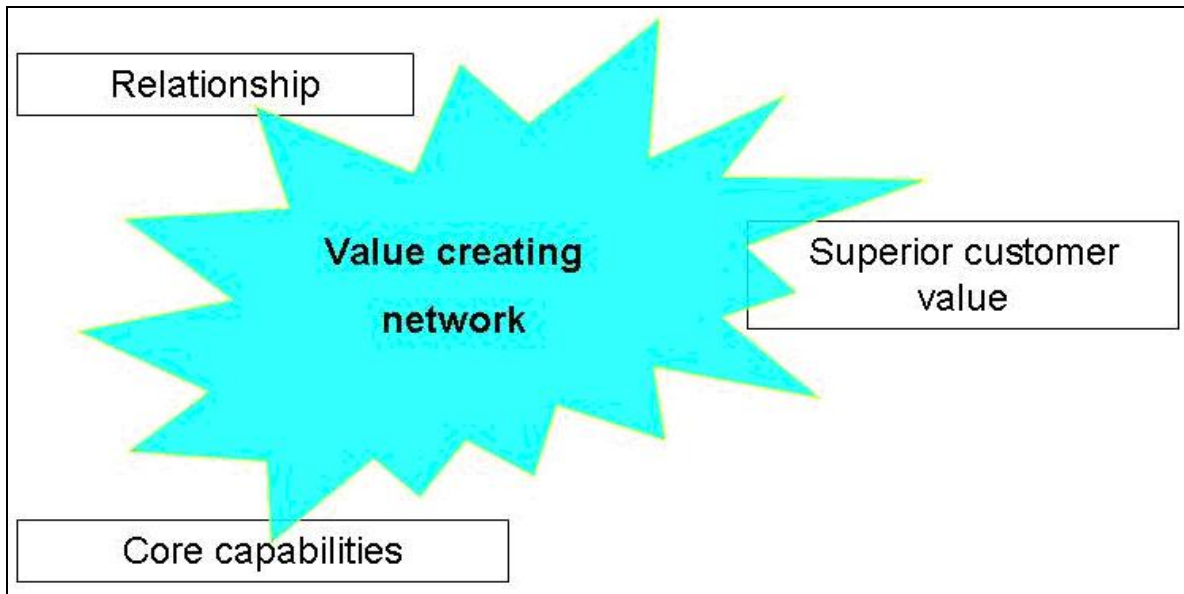


Figure 5 - Value-creating network model. Source: Kothandaraman and Wilson, 2001

From this theory, a possible value chain model for mobile commerce was drawn by Barnes [9]. This model includes *two paths* where both are further divided into *three phases* (please see next Figure 6).

The first path describes the content development, while the second the infrastructure and services provided and needed by the mobile commerce scenario. The *content path* further expands into:

- content creation;
- content packaging;
- market making phases,

While the *infrastructure and services path* consists of :

- mobile transport;
- mobile services;
- delivery support and mobile interface & applications.

Mobile markets and wireless value chains have forms that are able to identify the basic functionality of the market.



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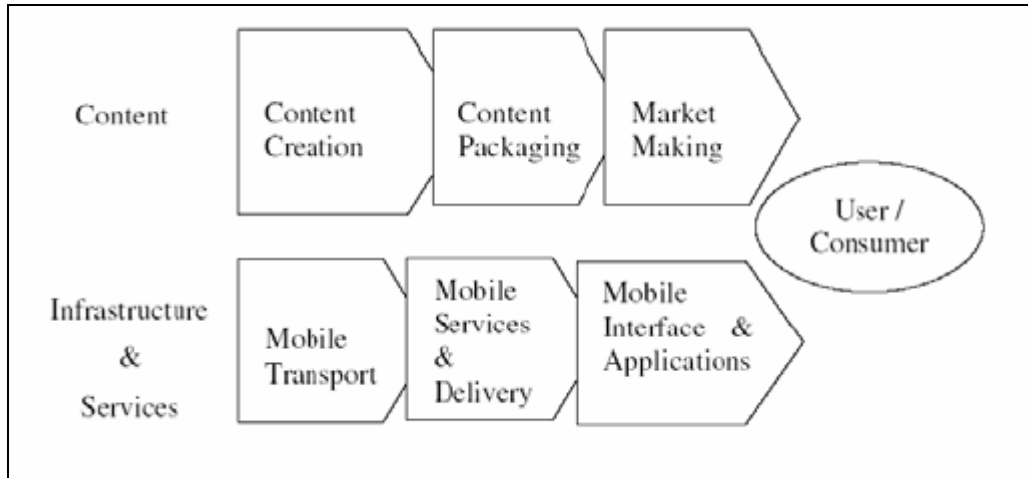


Figure 6 - Barnes' value-chain for mobile services

This vision constitutes a good starting point to understand the potential value chain for ACT. In fact, it represents simply the main business issues that operators need to face in order to provide autonomic services. In particular, it is evident how different industries operators could work together in order to provide services. The main problem originated by the introduction of autonomic principles in this value chain is related to the interaction between the two lines identified by Barnes. This distinction could be accepted in a market before introduction of ACT, since roles were well-defined and the only possibility to assume new ones is the integration through mergers and acquisitions. As already stated, the situation will change perceptibly after introduction of ACT because of the possibilities to manage other parts of the value without big investments, thanks to the ease-of-use of the technology.

As a consequence, it is useful to highlight the link between different parts of the value chain.

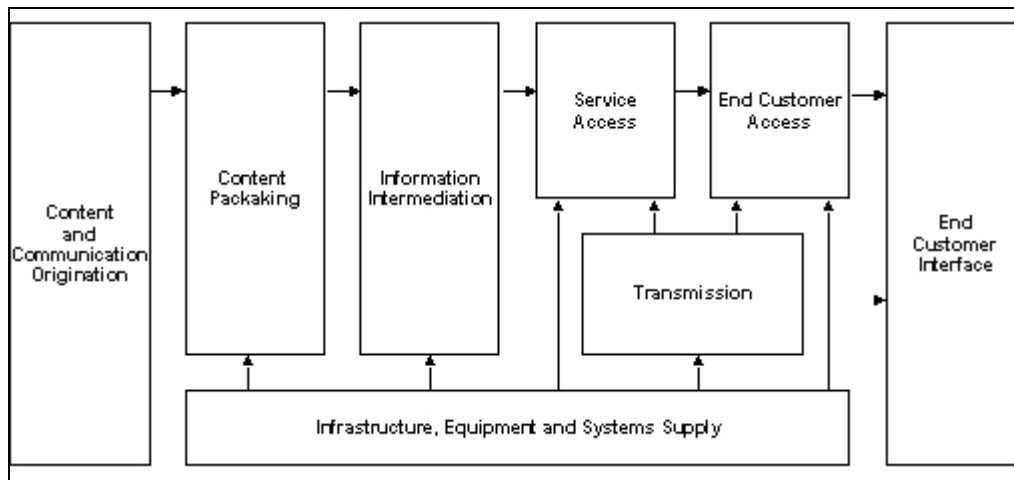


Figure 7 - Interactive information network value chain [10]

Figure 7 presents a more detailed analysis of the value chain. However, the flow remains linear and does not demonstrate the continuous relationship and potential strategic



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movements identified in the competitive strategies section. As a consequence we need a new representation that demonstrates the possible strategic decision that could change the value chain and the interaction among roles.

The first issue is analyzed in Chapter 7, where possible strategic decisions for players belonging to convergent sectors are introduced³. These concepts need to consider the definition of a value chain for ACT.

Operators in several sectors interact to provide autonomic services; they could certainly be in competition because of the possibility to easily cover different roles in the value chain. However, as seen in the section on competitive strategy, each could have different strengths that are difficult to eliminate by an operator coming from another sector because, as stated before, the gap in competence could always generate value and the entry level become lower. In this situation business partnership could constitute the best solution because of the possibility to add the maximum value for the final user. In this situation the key strength will be the owning of services/contents and so by the intellectual property.

Another consideration is needed to explain the relationship with actual communication infrastructure; in fact ACT will not substitute the actual infrastructure, but they could be adopted together with them in order to generate the best service possible for the final user. The last consideration of this section is dedicated to final user; as seen in D6.4, he/she will have not only the opportunity to receive pervasive services/contents everywhere, but he/she will have the opportunity to produce and share his/her own contents. This has a crucial impact on value chain definition because of the introduction of non-linear elements; in fact (see next Figure) final user roles will change. First of all, their needs will be directly met by services/contents provider. Moreover users will have the opportunity to produce their own services/contents. This subverts the traditional vision in which services are created and made available only by providers and the final user remains only a “receiver”.

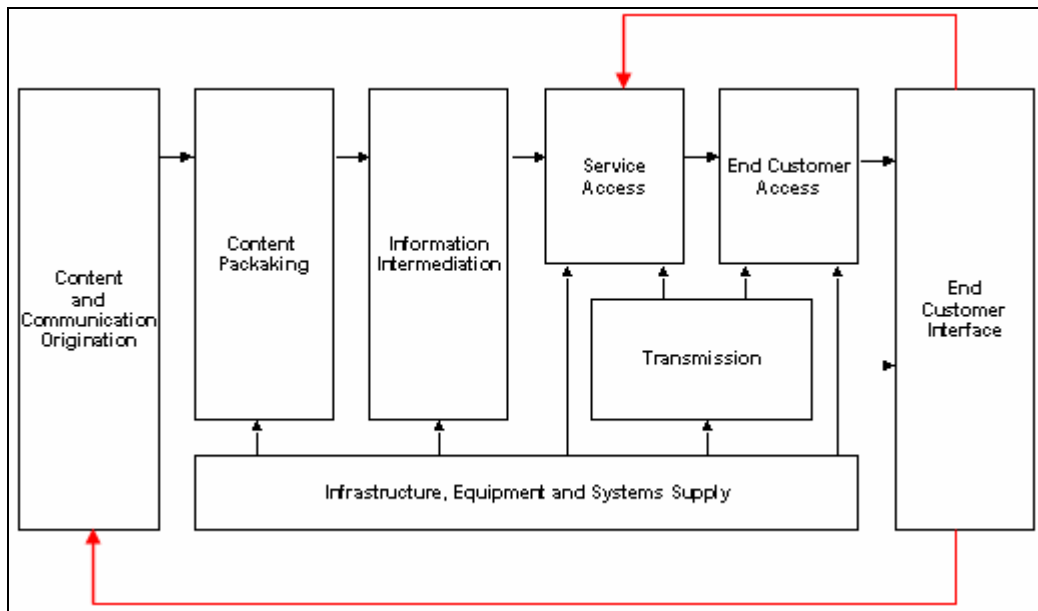


Figure 8 - ACT value chain

³ This analysis will be deepened in the third project year



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6 Revenue model

A revenue model aims at defining which paths revenues could follow and so what could drive the trends in related revenues. The decision to consider a traditional revenue model arises from considerations on the cost-side (offer side). First of all, ACT introduction does not require huge investments in infrastructure, because no particular infrastructure is strictly needed to adopt autonomic principles⁴. In fact in the CASCADAS vision the ACT introduction will require new software package and not particular infrastructure. On the contrary, a cost reduction is foreseeable because of the elimination of bottlenecks in the network and the substantial reduction of maintenance cost (thanks to autonomic principle of self-healing).

Since the major effects of autonomic technologies introduction are on the revenue side and on the cost side there no contraindication, the consortium decided to focus on the identification of a revenue model.

In this task a few points have to be taken into account; the time horizon (2015) could not allow a precise figure because of economic scenarios will provide a high variability to the effective revenues. Moreover ACT will not generate revenues directly, but through services. Clearly the services features and the capability to produce them will influence definitively the total revenues. In this situation it is more useful to analyse in a differential way what kind of revenues will be influenced by autonomic technologies introduction and how; this will allow a continuous monitoring of them and the elaboration of a future revenue model for the “autonomic services”.

Reasoning in a differential way with respect to the actual situation, the revenue sources that will be influenced by autonomic technologies introduction will be:

- Direct selling of services/products (actual services/products commercialized in a new way, new services/products introduction);
- Selling of aggregate data;
- Direct services of contents;
- Advertisement.

The first two sources of revenues are related to selling; the selling of products/services and contents could be considered the same.

E-business is today one of the most attractive commercial opportunities. In fact web-based transactions are constantly increasing after an initial diffidence across Europe. If the transactions of products/services through the Web are growing, it is clear that the potentiality of autonomic technologies could be really high. In fact the possibility to have access from everywhere to transactions could have a decisive impact on transactions. If

⁴ This does not exclude a new infrastructure planning and design, but at the moment this is not considered strictly needed.



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people will have the possibility to buy anything in the moment in which a need happens, certainly their propensity to acquire could be strongly increased⁵.

In particular the situation could rapidly transition from informational to transaction enabled. There are two types of transaction revenue models:

- match-maker (transaction fee);
- distribution (margin).

In the match-maker model, the supplier, not the intermediary, owns the product. The portal revenues are based on the net revenue or the commission it receives from the product's sale. Under this approach, the portal extracts a toll from each transaction. In some cases, the fee is levied to both the supplier and the buyer, and is typically 0.05-3.0 percent. The complexity of the transaction typically determines the fee. Commercial transaction-based sites range from eBay to priceline.com. Many B2B portals also use this model, but the definition of "transaction" differs from firm to firm in B2B models. In the distributor model, the intermediary takes ownership of the product. As a result, it realizes the total revenues it gets from the product's sale. For example, a supplier purchases a product for \$1.00 and resells it for \$2.00. The \$1.00 is the supplier's margin before costs. Once cost is factored in, however, the gross margin can be substantially less. Amazon.com is a typical example of this model. Transaction models look simple in theory but are notoriously difficult to profitably execute. This is especially the case in situations where the margins are low (less than 10 percent). Here, it would take significant transaction volume to build a sustainable business.

A particular category of transactions is represented by micro-transaction revenues which are based on a simple pay-as-you-go service and are essentially one-time pay-per-use transactions. A typical example is pay-per-view television. A number of gaming, online information and entertainment portals are implementing micro-transaction revenue models in the mobile environment.

From the growing capability to offer services related to real and actual needs, the number of subscribers of TLC, CE, IT will increase. This fact will be led by:

- the opportunity to have access to customized services;
- the opportunity to have services/contents everywhere and in every moment;
- the opportunity to have access to required contents;
- the opportunity to produce contents/services through an ease-of-use technology.

In particular these opportunities will increase the willingness to own sufficiently capable access devices; and if all the other industry operators will collaborate in order to make it possible, the subscribers for each of the mentioned industries will be increased.

Finally, the audience of advertising will certainly influence the total revenues. In particular from the offer side it will be decisive for the opportunity to target a wide range of audience. As a consequence not only the dimension of the audience will influence the revenues, but also the kind. In fact, as demonstrated in the personal behavioural advertisement scenario,

⁵ When public screen was proposed in a commercial centre the sale of the goods advertised on that screen had a high increase



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it will be possible, through the knowledge network functionalities, to increase strongly the probability to have access to interested people.

Another opportunity related to ACT introduction is represented by the constitution of a local knowledge network strictly linked among them; they will allow a constant collection and statistical elaboration of data. In the new economy data have a high value and could be commercialized very easily, especially because the collection will be potentially based on ontologies and folksonomies, giving secure and correct aggregate information.

Finally, advertisement will certainly offer great potential revenues in relation to ACT introduction; in particular the presence of a knowledge network that collects statistical information and provide contents/services maximizing the possibility to increase return. This could provide an increase of revenues.

Advertising and sponsorship revenues are derived from companies paying a fee to advertise. Revenues will depend on:

- *channel selection;*
- *type spaces;*
- *dimension of space;*
- *audience.*

Matching the different combinations of the previous variables the revenues related to advertising could deeply change; one factor is that “space” to advertise will be increased and this will have a strong impact on revenues generated. Future socio-economic studies could also aim to define the relationship among them, because they will be strictly linked to identifying customer needs and the services to meet those needs.

Referring to public spaces, such as an exhibition centre in the personal behavioural advertisement scenario, the most important variable will be the kind of audience because their receptivity will be the main driver of revenue trends.

Referring to private devices, they could be mobile or fixed because in both cases they could belong to a knowledge network. For example the web portal spaces, Yahoo!, Lycos, and Excite, accessible from both mobile and fixed devices, are very well adapted to advertising/direct marketing. As stated before, the introduction of autonomic principles will increase this predisposition. Moreover advertising is the basis for many mobile services provider business models. Many of these are making the common mistake of overestimating the size of the market and the amount of money advertisers would be willing to pay to acquire new mobile customers. Also, as competition builds among portals, the volume and price of advertising usually slumps. Hence, it is hard to visualize a sustainable mobile business model that is based on advertising alone, but it could have a great impact if related to services of high quality.

Considering public or private spaces, advertising-related revenues could be generated by content of different formats, ranging from annoying pop-up boxes to banner advertisements to complex blends of links, icons, messages, and backlinks that pay commissions to the referring site. A challenge in this sense will be constituted by the definition of a common



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standard that will enable access from all devices. From this point of view visibility will be the driver that leads price and, as a consequence, revenues.

The dimension of the space is related to the time of advertising and the dimension of the part of the screen on which communication happen. Clearly increasing time/space will correspond a higher price and so a higher revenues. However the relation is not necessarily proportional; the objective function of the offer side is to maximize total revenues, with the two variables of space and time available.

7 Competitive strategy

The aim of this section is to understand how operators could reach the target market identified in the previous paragraph. A clarification is strictly needed; the Consortium would like to point out possible strategies to attack the target market, but to reach this objective other elements are needed. First of all products/services have to be selected and then a way to generate results from this has to be identified; at the moment this path is impossible to accomplish because the focus is on a technologies family and not yet to specific services provided by them. An example of complete competitive strategies analysis was provided in D6.4 on personal behavioural advertisement.

In other words, although a value proposition has been identified, another effort will be required to identify services that reflect it and to analyze the business arena generated.

As a consequence, the aim of this section is the identification of threats/opportunities related to autonomic technologies introduction, focusing on strengths/weaknesses for the firms traditionally belonging to different sectors. These sectors could definitively converge thanks to autonomic technologies.

In the following the competitive analysis will consider the position of firms of the following sectors:

- Telecommunication (TLC);
- Web
- Consumer electronic and Information technology (CE+IT)



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7.1 TLC operator potential strategy

In their traditional business model, TLC operators sell voice services, data transmission and Internet connection; the related business model was often facilitated by the total absence of free competition. Deregulation changed this situation across all European countries. National operators were privatized, but in many cases they maintain their competitive strategy thanks to their infrastructure management competences. In many cases these operators persist as big companies and demand consideration in the future of ACT.

The high cost structure in this industry was covered in the past thanks to the high and growing revenues. Now the figure is quite different; the market is in a saturation phase (please see next Figure). The entry to the saturation phase is testified by many indicators; the two most representative ones are ARPU (average revenues per user) and the number of subscribers⁶. In this saturation phase, revenues remain high, but profits are decreasing.

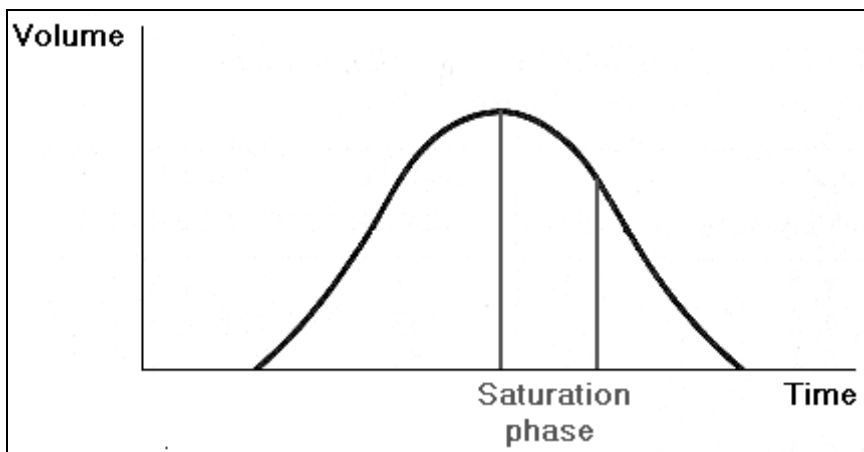


Figure 9 - Saturation phase in product lifecycle model

In the saturation phase there are different possibilities for TLC operators:

- segmentation;
- merger and acquisition;
- exploit and favour sector convergence.

The first one is to adopt an extensive **segmentation** strategy. Enterprises could select different variables in order to segment the market identifying different prosumer classes and offering them the most appropriate services. This methodology is certainly needed according to all experts interviewed, but in order to provide a wide range of services it is suggested to make business partnerships. In fact this strategy minimizes risks and investments and allows TLC operators to meet precise needs through specialized competences. Although segmentation is strictly needed for every company, TLC operator strategy could not be based only on this; in fact the risk associated with this strategy is to

⁶ To have more information on these indicators trends, please see D6.4



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adopt an overly-detailed analysis level, reaching specific needs of prosumers belonging to market niches. If market niches could be really profitable, major TLC players have too big dimensions and too high cost structures to be interested in attacking more market niches.

Segmentation could be adopted together with a **merger and acquisition** strategy. In the current era, it is possible to undertake many mergers and acquisitions in several sectors and also across different industries. This could be a good alternative to partnership especially if the merger and acquisition strategy allows major firms to absorb smaller firms with high potential but in need of money for investment. This strategy is adopted especially across sectors; in fact no player at this moment could have the necessary capital to absorb other great players. So merger and acquisition has its place, but for specific cross-sector opportunities rather than within-sector consolidation.

The third opportunity is to **exploit and favour sectors convergence**. This theme was already dealt with in D6.4 where it was demonstrated that different kinds of convergence are possible. In the current deliverable some other considerations on convergence are needed; first of all, convergence appears to be the only opportunity to revamp the TLC market, because it raises the possibility of new revenues and profits. In fact although revenues related to TLC remain high, the related profits are decreasing because of the scarce possibility to offer value-added services. The importance of convergence is now completely accepted by TLC operators as testified by mobile-fixed communication convergence. Now the challenge is to converge completely with other industries, especially with Web operators where, in the business area of convergence, the TLC operator certainly has important strengths. The size of the major TLC operator allows them to make important investments to enter new businesses. But size could also constitute a weakness because they could be less flexible than other industries. Certainly the main strong point is their ownership of, and competence in managing, infrastructures. This gives them the ability to understand quickly how to provide services corresponding to prosumers' needs. Their shortcoming is in failing to understand some prosumers' needs because they lack the kind of relationship that Web or CE players have with prosumers.

As a consequence the main option for a TLC operator is a business partnership with other industries players. The main objective for the TLC operator will not be to offer their own contents, but to aggregate them and make them available to prosumers.



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7.2 Web operator potential strategy

The Web operator situation is quite different from the TLC situation. The number of people who have access to the Web (not necessarily subscribers) is increasing as demonstrated in Eurostat data (please see next figure).

	2004	2005	2006	2007
Total	38	47	47	52

Figure 10 – Percentage of people that can join an internet connection

As this percentage rises, so does the awareness about online services. As a consequence Web operators are offering a wider range of services perceived as value-added ones (e.g. Google, Amazon, Yahoo). Indeed Web operators have found it relatively easy to raise capital over recent years. In this situation it is strongly in the interest of Web operators to maintain a preferential relationship with prosumers. This allows the Web operator to create and maintain value-added services in their portfolio. In fact Web operators own many technologies in different stages of the hype-cycle⁷ (please see next figure).

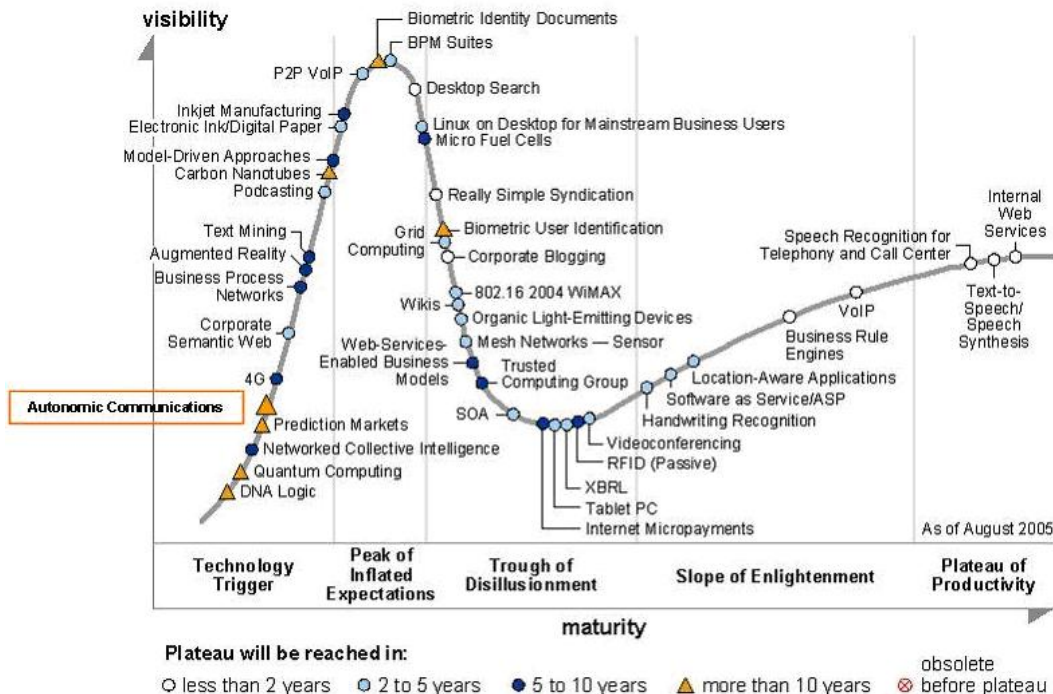


Figure 11 - Gartner hype cycle

⁷ For many information about Gartner hype cycle, please see D6.1 studies on the socio-economical aspects of the Connected Society”



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The services offered through these technologies could answer prosumers' needs directly, and thanks to the continuous relationship with them a Web operator can monitor these needs constantly. In this situation two options are opened:

- find new services/contents;
- handle the contents directly rather than simply aggregate them.

The second alternative is certainly the one with less risk relative to the potential profits; the first alternative could generate a really sharp “war” with TLC operators (with a base already established). Clearly this collision could be dangerous for every contender. Autonomic technologies could constitute a way to minimize risk and obtain high profit; in fact generating businesses partly combining TLC operator and Web operator functions:

- avoid risking strong competition with strong players;
- offer new services;
- have access to missing competition (managing infrastructure).



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7.3 Consumer electronic and information technology operators strategy

This kind of operator traditionally couldn't be taken into account alongside TLC and Web operators because of different market rules and situations. In the current deliverable, they are considered on an equal footing for several reasons.

In the IT sector we are considering the whole producer of software and component ware.

The sector comprises:

- many small software house;
- big players providing contents/services.

Till this moment there had been a place in the market for every operator because of the impossibility for big players and big software houses to serve particular market niches. But now the situation is changing, first of all competition, especially with Web operators, is strongly increasing so the ICT market is being squeezed. It is also narrowing in response to the availability of many open source systems that oblige operators to constantly offer new applications. Moreover autonomic technologies will make it easier to understand prosumer needs and satisfy them.

A similar situation is unfolding in the CE market; established players have big dimension and revenues but find their profit margins under pressure. This is because the devices they sell are covering all the market and so, most of the transactions are replacements. In this situation CE operators have to find new value added services in order to generate new revenues.

As a consequence for both IT and CE operators convergence becomes a need; both “families” need to find new exploitation and could exploit their own strong competences respectively by creating new software and incorporating new elements (ACEs) in their devices.

It is possible to summarize some concept from this competitive analysis:

- Convergence will be a necessity to survive;
- Autonomic technologies could represent a convergence instrument;
- All operators have strengths which can be used to attack convergent markets;
- Partnership will represent the most effective strategic solution.

In conclusion it's possible to affirm that if the owning of infrastructure and the relationship with customers represented the real battleground in the past, in the future the capability to offer adapted services/contents in the right moment/place will represent a strong plus.



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8 Growth strategy

Growth can be achieved by looking at business opportunities along several dimensions, summarised in the diagram below:

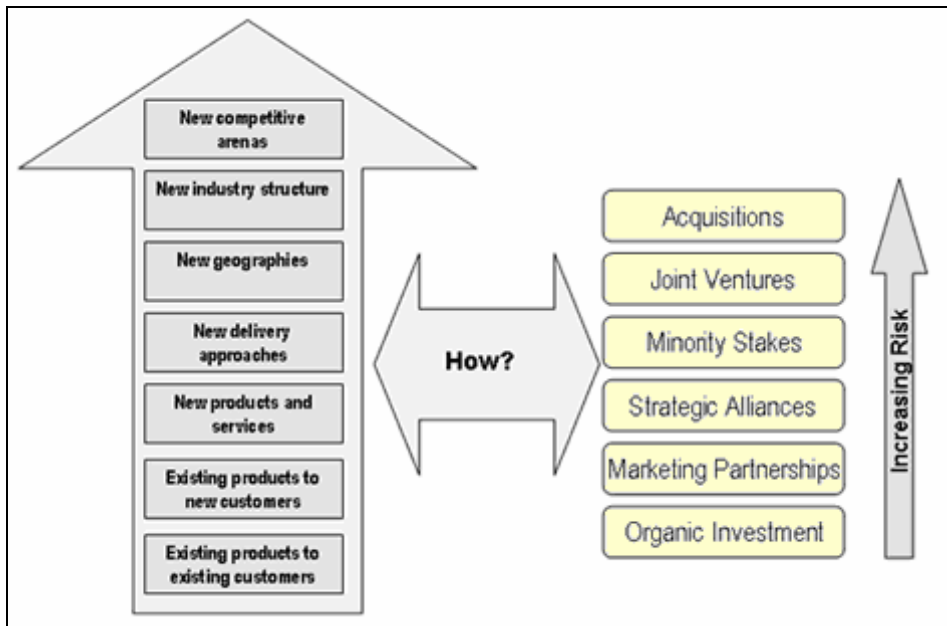


Figure 12 – McKinsey’s growth strategy model

This model could be adopted also to understand possible growth paths for autonomic technologies, but clearly the focus could not be put on singular enterprise issues and problems. As a consequence, referring to this model, it is necessary to clarify which skills and assets could lead the growth of this kind of technology. It is possible to consider:

- operational skills;
- privileged assets;
- growth skills;
- capabilities to establish and maintain strategic business contacts.

Operational skills are the “core capabilities” that a business has which can provide the foundation for a growth strategy. Autonomic technologies core capabilities⁸ are strictly related to their possible value proposition: in particular they could be the capability to offer ease-of-use services, to manage in a cost-effective way the network and to have a direct link to actual prosumers needs.

Operational skills are directly linked to privileged assets. **Privileged assets** are those held by the business and hard for competitors to replicate; from this definition the link with operational skills is clear. In fact core competences are the only ones that could allow a

⁸ Please see value chain section to have more detailed definition of core competence



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company interested in autonomic technologies to develop and maintain privileged assets. Companies coming from different sectors have different privileged assets (please see competitive strategy section); in particular:

- network for TLC operator;
- brand and customized services for Web operators;
- infrastructure not only to produce, but also to commercialize facilities for CE and IT.

As a consequence it is evident that operational skills are the most important ones in order to open up autonomic technologies market opportunities. However they have to be placed beside growth skills. **Growth skills** are the skills that firms need if they are to successfully “manage” a growth strategy. These include the skills of new product/services development or negotiating and integrating acquisitions. In the case of autonomic technologies this means the facility to identify prosumers’ needs and satisfy them through adequate services, but also the capability to supply the services in a correct way, without putting prosumers off. This requires a careful analysis of the range of potential services/contents to see what is really going to appeal to prosumers and what could be overload or ‘clutter’.

Also the **capability to establish and maintain strategic business contacts** could be considered as a growth skill; however it is useful to separate them because the capability to establish and maintain strategic business contacts does not apply only to growth, but also to survival in an unsure and complex market⁹ with new options opening continuously.

The model outlines seven ways of achieving growth, which are summarised below:

- **Existing products to existing customers:** the lowest-risk option; try to increase sales to the existing customer base; this is about increasing the frequency of purchase and maintaining customer loyalty;
- **Existing products to new customers:** taking the existing customer base, the objective is to find entirely new products that these customers might buy, or start to provide products that existing customers currently buy from competitors;
- **New products and services:** a combination of Ansoff’s market development & diversification strategy – taking a risk by developing and marketing new products. Some of these can be sold to existing customers – who may trust the business (and its brands) to deliver; entirely new customers may need more persuasion
- **New delivery approaches:** this option focuses on the use of distribution channels as a possible source of growth. Are there ways in which existing products and services can be sold via new or emerging channels which might boost sales?
- **New geographies:** with this method, businesses are encouraged to consider new geographic areas into which to sell their products. Geographical expansion is one of the most powerful options for growth – but also one of the most difficult.
- **New industry structure:** this option considers the possibility of acquiring troubled competitors or consolidating the industry through a general acquisition programme
- **New competitive arenas:** this option requires a business to think about opportunities to integrate vertically or consider whether the skills of the business could be used in other industries.

⁹ M. Grant, 1999



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Autonomic technologies will certainly require a new delivery approach and open the possibility to offer new product services. Moreover a new industry structure is foreseeable (please see competitive strategy section). But probably the most relevant effect of autonomic technologies introduction will be that, by enabling convergence, they provide the possibility to open and attack new competitive areas.

After the introduction of the McKinsey model for growth strategy and its implications for autonomic technologies, it is essential to identify a precise growth path for such technologies. The aim of path definition is not to define how the introduction of autonomic technologies will be faced by different operator, but to understand the potential evolution of the technologies. The starting point for autonomic technologies introduction will be the identification and the analysis of customers’ actual needs, both met and unmet; in fact autonomic technologies will allow operators to monitor prosumers’ habits and needs continuously and to offer with a high probability the most appropriate contents and services. This leads to the possibility to have new geography, new delivery approach, and new industries structure descending directly from autonomic principles. Having identified prosumers’ actual needs it is possible to provide new services and contents that will constitute a new competitive arena. This arena will bring:

- a revenue increase from new application of current services or by the introduction of new services;
- a cost reduction from better network infrastructure maintenance and by the elimination (or a strong reduction) of actual infrastructure bottlenecks thanks to the possibility to have autonomic communication.

This will generate the possibility to have new investments in services/contents plan and supply. Please note that all these paths are related to autonomic technologies and not to operators within single industries.



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9 An application scenario

In D6.4 a scenario application was introduced: the personal behavioural advertisement¹⁰. The value proposition of this kind of service was to offer contents inherent to the situation and the habits of the prosumer with a higher probability. The service will be simple to use, with a prosumer just needing to register with the knowledge network.

After the value proposition identification, it is necessary to identify the target market of the service. The analysis provided for autonomic technologies has to be considered as the starting point of this analysis. In particular, referring to the nested approach and the scenario proposed, the demographic variables could be considered the same as the general autonomic technologies analysis because in every European country people could have access to this kind of advertisement. The same consideration could be adopted for operational and purchase approach variables; in fact propensity to innovation and the age are the main features to segment people. Referring to situational factors the analysis has to be changed definitively; in fact going into more detail for a single service, situational factors have to consider the audience of the single exhibition centre. Clearly it is out of the scope of this document to hypothesize the size of a specific exhibition centre audience. It is useful to analyze which kind of variable could be adopted as situational factor. The dimension of audience for an exhibition centre could be evaluated by the transaction accomplished (where the relationship is constituted by a single transaction, e.g. a theatre) or by the total sales made (e.g. a supermarket). This part of the analysis markedly reduces the target market and is based on the assumption that every exhibition centre has its own auction centre that maximizes the revenues from personal behavioural advertisement. Once the audience is identified, the percentage of persons belonging to the previous steps of market segmentation has to be applied also to the audience.

Finally, referring to personal characteristics it is necessary to find an analogy in order to foresee the possible personal reaction; a good analogy could be built with mobile TV. In fact people that adopt mobile TV now could be considered as innovators without any fear of new technologies and are very confident in new technologies services. Research from M:Metrics has shown that up to 41% of mobile TV consumers would accept advertising-subsidized services. The results of this trial confirm the willingness of viewers to embrace advertising.

Having identified the target market, the value chain analysis has to identify how different actors add value to the final service. This part of analysis was already accomplished in the application scenario in D6.4. The main results are summarized in the following figure.

¹⁰ The demonstration scenario considers a modern exhibition centre (like a museum or stadium) in which it's possible to find pervasive infrastructure of embedded devices (for example WiFi connections or RFID tags). Also, it's realistic to assume that visitors to the exhibition centre may have a PDA or a smart phone, and that they can be provided with an RFID-based ticket, on which to store information about the fact that the user has paid the entrance fee and possibly other optional fees for additional features, and possibly to store additional information about the user.



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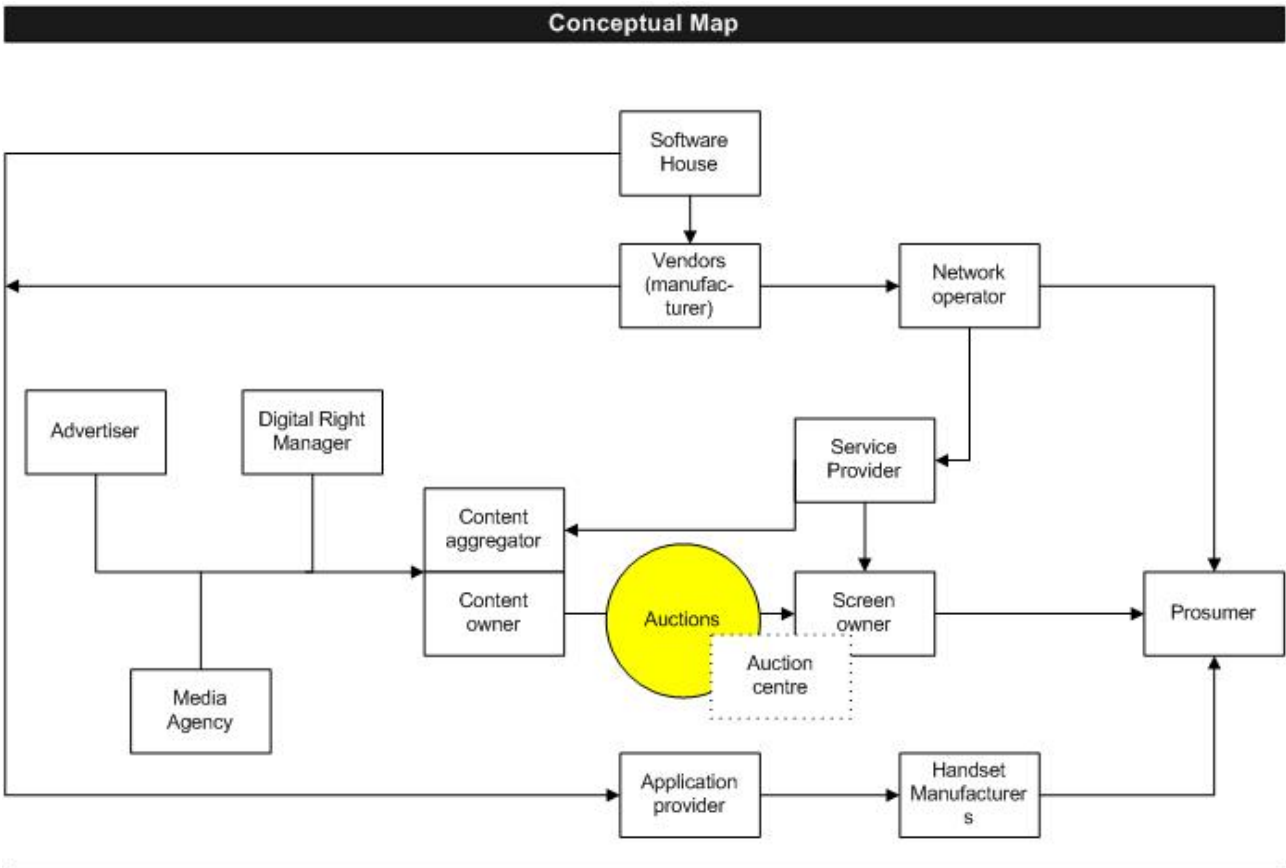


Figure 13 - Personal behavioural advertisement conceptual map

After value chain analysis, a revenue model has to be built. Referring to the schema introduced for autonomic technology, personal behavioural advertisement could:

- directly increase the revenues deriving from advertisement space selling;
- indirectly increase the revenues from selling thanks to a most effective advertisement impact.

These dual revenue streams need to be exploited in the precise model for every auction centre since it maximizes the opportunity to get the right target, in the right moment for the right commercial. This will allow maximal revenues for advertiser and, as a consequence, the advertisement space value.

From the value chain introduced, a competitive strategy analysis has to be defined; this part of the analysis was completely dealt with in deliverable D6.4 and identified for every role on the conceptual map:



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- *Current competitors* (existing companies): those companies that offer the same product or service as the company in question. In the demonstration scenario they will be all the companies that could provide screens to show behavioural advertisements. We bring this example intentionally - in fact it could be natural to see the advertiser as the centre of competition, but from the service delivery system point of view, this would be wrong.
- *Potential new entrants*: those new companies that could enter the industry in the future, but that currently are offering products/services in other markets. For example companies that have sufficient economic resource, competence or interest (strong interest and a good project could facilitate greatly research resources);
- *Customers*: visitors, users and providers and potential visitors, users and providers of the product/service;
- *Suppliers*: those companies that supply the company with the products (or parts of product) and/or services embedded or offered by the company. Other suppliers could be, for example, the Web hosting, software, and other vendors that supply Web-enabling technology;
- *Substitutes*: other Business Areas that offer products/services different from the company, but satisfying the same customers' requirements. For example by providing personal behavioural advertisement with another technology.

Finally, the growth path has to be identified. The first step is to identify customer needs; referring to the auction centre, customers are represented by the advertiser side (media agency, content owner, content aggregator) . Their need is to maximize their profit and so their return on advertisement investments. As a consequence, the auction centre customer needs could be transposed to the identification of prosumers' needs. In fact if the auction centre will touch the needs of prosumers', their inclination to buy will be increased. Moreover the auction centre will be the centre of the local knowledge network; as a consequence it collects data that could be sold to a media operator in order to have more effective advertisement. However it is also possible that these data will be sent to media operators (or made public through an API for example) without any fee, applying a win-to-win logic (considering that a most effective advertisement message could increase its revenue and so the value of advertisement space).