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Internet of Things: redefinition of Business Models for the next generation of Telecom services

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Internet of Things: redefinition of Business Models for the next generation of Telecom services

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Abstract

This paper provides an assessment of existing M2M business models and arrangements in selected industry segments. It studies the drivers and barriers for adaption of M2M and IoT in transforming operations in the selected industry segments, and focusses on identifying recurring patterns in the transformation process. The change in value propositions as well as how value networks transform is studied and analysed. The studied segments and services are:

- Public transportation services
- Automotive and vehicle related services
- Smart energy services
- Health care and home care services

The analysis has targeted business modelling KPIs of the type “Business application cases” and includes two different cases; one for a mobile operator and one for a system and network equipment manufacturer. In both cases the description focuses on the identified business opportunities for the actors and the required actions that are identified in order to exploit the opportunities, the following aspects are included:

- The set of features that can be offered to end users
- Capabilities, resources or knowledge to develop
- Business relations to exploit and develop
- Change of position in the value network
- Potential conflicts (with partners, customers and internally) to handle

All of these items are clearly related to transformation of the business and hence a change for the involved actors and their customers, suppliers and partners.

In summary the findings of the analysis are as follows:

For drivers and benefits the common themes from the cases are that users get a value of being connected and/or to be available and/or to be able to collect data or perform activities on the move.

Identified barriers include challenges related to acquiring new competences about services and application areas and to build up and maintain new customer relations.. Also the number of customers at a market (national or global) is a key issue. A mobile operator may be able to have business relations with 10 big actors but not with 100 or 1000 smaller actors. The same applies for telecom vendors that are used to handle a limited number of big customers.

In addition to new competences and ability to handle customer relations a key to success is to be able to change market position.

Introduction

In this study we look into business related aspect of services enabled by IoT solutions and M2M communication. The main objectives of the study are to:

- i. To identify and analyse drivers, benefits and “values” for different actors
- ii. To identify and analyse barriers and bottleneck problems for the actors
- iii. Identity why and how value networks can and/or may change
- iv. How ICT businesses can be transformed by introduction of IoT solutions

Another objective related to items i) - iv) above is to identify recurring patterns in the transformation process. Hence, we look into different industry sectors and different types of applications and we will make an assessment of existing and proposed business models used to provide services based on M2M/IoT solutions.

The analysis targets business modelling KPIs called “Business application cases” and includes two different perspectives cases; one for an mobile operator and one for a system and network equipment manufacturer.

The study focuses on the potential impact on society and business using IoT and M2M solutions. Hence, we have focused our analysis on primary industry and application segments in a Smart City environment. The included industry sectors and application areas are:

- Public transportation services
- Automotive and vehicle related services
- Smart energy services
- Health care and home care services

The reason for selecting public transportation, automotive and energy services is that is part of the Ericsson strategy to focus on big organizations and companies. These sectors consist of few big actors on the national and/or global market.

Health care and home care applications are included to reflect sectors with a larger fragmentation of the market with more customers and potential purchasing actors. Equipment and services for healthcare are usually procured by hospitals or local/regional authorities. In Sweden (a small country) there are around 20 regional “landsting”. For home care services procurements are made on the municipality level, i.e. in Sweden more than 200 potential customers.

Besides identification of drivers and barriers for adoption of new services the analysis considers a number of business model factors. Examples are; the added value for various services, value network transformations and the role of future value networks, opportunities with new cooperation models.

This analysis enable us to propose new approaches by adapting traditional business thinking to new models that fulfil the requirements for providing “new” services by:

- Re-thinking of company roles;

- Creating clear customer definitions;
- Determining partnership models;
- Facilitating easy market entry for new players;

The paper includes identification of key IoT/M2M application areas but we will not be able to propose draft market entry plans, this was included in the original project outline. In the same way we will not provide any infrastructure profitability analysis.

In order to identify and analyse “Business application cases”, we will present two different “Business application cases” using the perspectives of two different types of actors:

- A mobile network operator
- A manufacturer of telecom equipment and services

In both cases the description focuses on the identified business opportunities for the actors and the required actions that are identified in order to exploit the opportunities. This two “Business application cases” include the same items:

- The set of features that can be offered to end users
- Capabilities, resources or knowledge to develop
- Business relations to exploit and develop
- Change of position in the value network
- Potential conflicts (with partners, customers and internally) to handle

All of these items are clearly related to transformation of the business and hence a change for the involved actors and their customers, suppliers and partners.

1.1 Research question

In this paper we aim to answer the following research question related to the gap and area of study:

How do drivers, barriers and challenges of ICT-based transformation of major industries affect IoT services development?

Methodology

1.2 Overall research approach

The methodology includes a two stage approach. The first stage provides information on existing practices for specific use cases and applications in the following selected industry sectors:

- Public transportation
- Automotive
- Smart energy
- Healthcare and home care

The second stage provides an analysis with the objective to identify recurring patterns across the different cases. The analysis is focussed on producing insights into end-user

values, how actors cooperate and how they distribute their roles and also to identify and understand the drivers and obstacles for introduction of new services and cooperation strategies. A key issue is to understand the mechanisms and patterns of transformation of company offers, roles and business models.

1.3 Data collection

A number of pre-study interviews were conducted 2013-2014 with R&D and marketing people at Ericsson. In total we have performed around 10 interviews with persons involved in the development and marketing of ICT solutions for health care, energy and transport services. The questions have been focused on:

- how and why Ericsson started to develop these services
- what actors that have been involved
- how other actors have cooperated with Ericsson and end-users
- lessons learned from different sectors

The findings from these pre-study interviews were used to organize a number of case studies in different industry sectors including a number of different services and applications. During the spring 2014 a number of case studies were performed;

- One for the energy sector (Alvarez, 2014),
- For health care services (Armstrong, 2014), (Cedergren, 2014),
- For transport (Deandres, 2014), (Mesaikos, 2014) and (Micheli, 2014).

For home care services we have done 10 interviews with solution providers and with home care authorities (Markendahl & Laya, 2014). In addition we have considered findings from similar studies on adoption of new technology and services in transport ticketing (Apanasevic, Markendahl, Arvidsson, 2014), and different type of NFC services (Apanasevic, Popescu, Markendahl, 2014), (Apanasevic, 2013).

1.4 Analytical framework

The applied analysis framework can be described by listing key factors and aspects, what are looking for and what we want to understand in the investigated cases. Some key of these key aspects are related to **values and value networks**

- **Value proposition**, the understanding of the value proposition is developed based on awareness of what customers' needs that are addressed but also how the value of the service is created for the customer
- **Value Creation Process**, since the value creation is a process we need to build an understanding of what this process looks like, who creates value and how value is created. This includes "how the customer is involved and what roles the different stakeholders can or will take.
- **Value Network, Relationships and Interactions**, when new services and/or technologies are introduced the businesses are transformed which has an impact on the value network. Hence we need to learn about current value network structures, relationships and interactions between stakeholders in the value network how they change due to the business transformation.

In addition there some other aspects related to the **business transformation**

- **Drivers, barriers and challenges**, what are the key drivers that make customers decide to go into a business transformation and what are the barriers and challenges that stop others to do so?
- **Transformation and Change**, how do the value propositions change based on ICT enabled transformation and how is the value network transformed? What relationships are changed or created first, which relationships are more important in later stages?

When we look into how new ICT based services are introduced we look into what activities and resources that are controlled by different actors. For each activity the need for new resources (devices, service platforms, applications or skills) will be identified. This is typical **ARA modelling** with actors, resources and activities (Håkansson & Snehota, 1995), (Ford, Gadde, Håkansson, & Snehota, 2007). The ARA approach states that actors perform certain activities using some type of resources. The control of a resource and the responsibility for the related activities are often closely linked. This approach is also supported by **Activity System** perspective (Zott, Amit, & Massa, 2010) which provides information about the distribution of activities among actors, what activities that provides a certain type of value and the interaction patterns between different actors. This analysis will provide insights about the following aspects: What activities and actors that are included in the value network, how the roles are distributed among actors, and the interaction patterns between actors.

Industry specific sectors

In a recent publication, we have introduced multiple uses-cases in any of the four aforementioned sectors; Public Transportation, Automotive, Energy and Health Care. This had been done in order to enable linking similarities and exploit “lessons learnt” services (Alvarez, Ghanbari, Markendahl, 2015). Therefore we will skip introducing the use-cases but instead focus on learnings and outcomes from these uses cases.

By summarizing “Value Networks” and “Value Propositions” of the introduced industry sectors, we will be able to introduce drivers and barriers of the transformation towards a Horizontally Integrated IoT ecosystem. This transformation is interpreted in IoT as a process of how redefining business models would help and advance this horizontal integration. The answer to the question; “How these barriers and drivers conclude on the changes that happened to aforementioned sectors?” is also a part of this chapter.

1.5 Public Transport

The main value proposition that public transport delivers is an efficient means of transportation that can substitute private transportation. Since this goal is not achievable without combining multiple systems that offers public transport, Multimodal Transport (MMT) is introduced. As a result, one of most efficient ways of getting from point A to B is achieved via combining different means of transportation in a time/cost efficient manner.

This is mainly because it is economically inefficient to connect all point As to all Bs directly via public transportation.

MMT is an ICT enabled system that can only perform by utilizing ICT/IT. So the transformation of Public Transport from historical approaches (i.e. facilitating transport via singular systems such as busses only) towards a more comprehensive system via ICT is quite undeniable. It should also be reminded that provisioning of connectivity for enabling such system is a major concern that can highlight the presence of the Telecommunication as a major driver. In such a setup for public transport, currently, there is a mix of two major schemes for value networks;

- Public Authority to end user
- Public Authority to 3rd party to end user

The first scheme represents a Business to customer (B2C) setup and the latter represents a Business to Business to Customer (B2B2C) setup.

In the first setup, the public authority is takes part in providing MMT services for the end users and facilitates the public transport needs. And in the second setup a 3rd party company is responsible to do so. In most studied cases, the 3rd party is under strict supervision of public authorities since public transport is considered as a main responsibility of the Local Authority. Eventually, Local Authorities, OTT service providers and 3rd party platform developers are the ones who create value in these networks; where the local Authority does this by convincing end-users to avoid using private means such as cars.

1.6 Smart Energy Grid

The traditional value network in the energy sector is composed only by the energy provider company which is in charge of providing the product itself (electricity) and services, such as periodical consumption readings, Customer relationship management (CRM) and billing. This network can be also described as unidirectional, where the only role of the user is to receive the product/service from the energy company.

In a new Smart Grid ecosystem the value network will change significantly. The concept Smart Grid or Smart Energy expands the range of services and activities that can be provided in the energy sector. This new range of services includes: smart metering, home applications, distributed generation, micro grids and others. In this new context, new competences and technology expertise are needed and therefore opportunities for new actors appear. These actors are mainly Mobile network operators, Telco vendors and consulting firms, which provide connectivity services (management and/or network ownership), metering management/reading or home services/applications. This new ecosystem is a much richer environment where value is not created by only one actor, but instead is created by several actors that collaborate and create alliances. In addition to that, the enablement of distributed generation and smart metering creates a bidirectional relationship between the providers and the final user.

The main value proposition of Smart Energy or Smart Grid can be divided in two different parts: value for the final user and value for the energy providers. The value proposition for

the final users is based on the potential benefits of smart metering. Potential benefits from smart metering are:

- Real-time consumption information. Providing data to user's decision-making process on its consumption patterns.
- New offerings based on dynamic pricing adapting to consumer needs.
- Home applications and services. Appearance of home applications and services related to smart home concept.
- Value proposition for the energy providers is based on the implementation of communication technologies in the power grid. These benefits are:
 - Monitor and control of the power grid. Real time information on grid status and enablement of remote operation.
 - Provide consumer-tailored offerings increasing customer satisfaction.
 - Efficiency usage. By gathering information of the grid, the energy provider can optimize its usage and be more efficient in the generation and transport of energy.

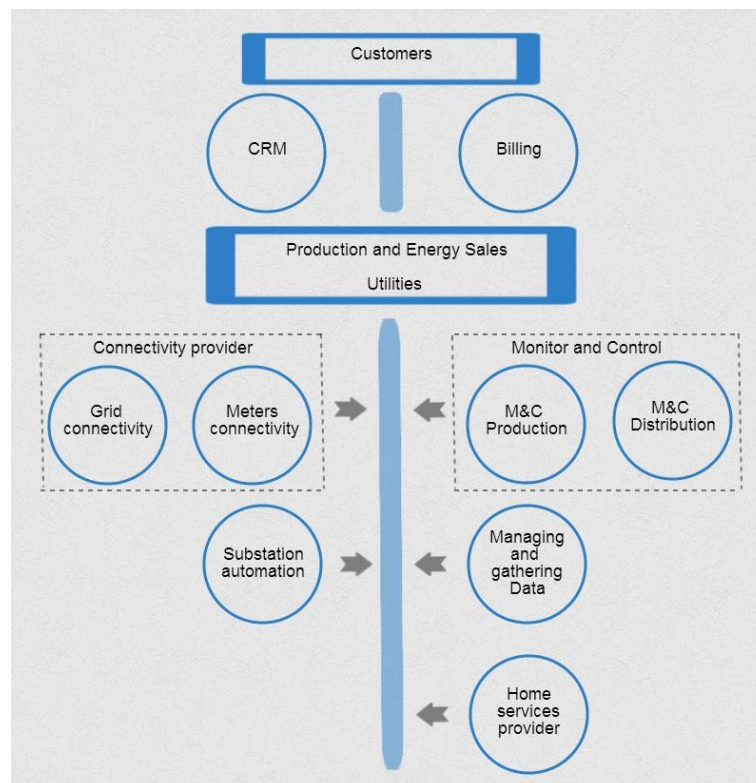


Figure 0-1 Smart Grid ecosystem roles

In addition to these value propositions, general value for the society would be: efficient usage of energy resources and enablement of distributed renewable sources.

The development of Smart Energy will depend on how the industry and the new actors collaborate and deal with the drivers and barriers identified:

Drivers:

- Aging Infrastructures. In many countries large parts of the existing infrastructure dates from the beginning of the 20th century and is reaching the end of its useful life. Equipment is under extreme stress during peak demand.
- Integrating intermittent energy sources. Intermittent energy sources such as wind and solar will put additional strains on existing grids. Their intermittence must be counter-balanced with more intelligence in the Grid, base load power generation (hydro, nuclear) and storage.
- Lower Energy prices. Regulators are pushing for more competition to lower energy prices. Utilities need to add information and communication techniques to maintain profitability and retain the ability to invest in infrastructure.
- Security of supply and increase in energy needs. Efficient and reliable transmission and distribution of electricity is fundamental to maintain functioning economies and societies. Electricity demand is steadily increasing.
- Sustainability. Public interest groups are putting pressure on politicians to reduce CO2 emissions through the adoption of alternative energy sources and put in place regulations to increase energy efficiency.

Barriers:

- Lack of business models.
- Slow-changing industry. Technology life-cycles in the sector can extend for decades, this results in a slow-changing industry.
- Regulatory barriers. Highly regulates sector where public roadmaps have a big importance.
- Lack of standards. Until now there is no unified definition of global standards for smart grid.

The business transformation in the sector produced by the development of smart energy will change how the sector works and the relations between company and consumers. Utilities are in the middle of a transition from highly regulated markets to liberalized-competitive markets. Smart grid development will promote the entrance of new actors, like MNO or Telco vendors; creating a new ecosystem enhancing competition and where collaboration will be the key aspect in order to achieve commercial success.

1.7 Connected Vehicle Cloud

The traditional value network in the automotive sector is composed only by the OEM (Original Equipment Manufacturer) which is in charge of providing the product itself (car). This network can be also described as unidirectional, where the only role of the user is to receive the product/service from the OEM. In a new Connected Vehicle Cloud (CVC) ecosystem value network will change significantly. The CVC concept the range of services and activities that can be provided in the automotive sector includes a new range of services:

- Remote diagnostics and software updates.
- Alco-lock
- eCall

- Variable insurance depending on driving style
- Charging support for electrical vehicles
- Car sharing
- Mediaroom.

In this new context, new competences and technology expertise are needed and therefore opportunities for new actors appear. These actors are mainly public institutions, insurance companies, Telco vendors, MNO's and parking companies. In a similar way to the energy sector, this new ecosystem is a much richer environment where value is not created by only one actor, but instead is created by several actors that collaborate and create alliances

The main value proposition from these services is the following:

- Cost reduction. Services like Remote Diagnostics, Car-sharing or Insurance billing bring important cost reductions to car ownership and insurance services. Cost reduction can be identified in: breakdowns prevention, sharing-costs with more than one driver and reducing insurance billing based on driving style.
- Security. Alco-lock and eCall services are examples of how CVC can improve driver's security and fast reaction and support to traffic accidents.
- Increase customer satisfaction. Reached by providing new and innovative services which create a better driving experience for the car users. Mediaroom is a clear example where added value services like personalized TV experience, video on demand and location-tailored ads are provided.
- Improved quality. Remote diagnostics service provides better maintenance information, increasing the quality of the product itself which now includes improved quality.
- New business opportunities. Innovative CVC services like car-sharing or Mediaroom offer new opportunities for business aiming to provide innovative services and obtain new revenue streams.

The development of CVC will depend on how the industry and the new actors collaborate and deal with the drivers and barriers identified:

Drivers:

- New business opportunities by using ICT.
- Competition and added value services.
- Safety and sustainability.

Barriers:

- Coordination and collaboration between partners.
- Lack of standards.

Connected services and connected society development is changing the way we travel and the way we live in general. Car manufacturers are, of course aware of this situation and this industry needs to adapt and provide services considering the new user expectations and demands. The addition of new services requires different competence and expertise, even though the car manufacturer is still in the middle of the value chain, new actors will enter the market enabling the appearance of these new services. CVC services development will

promote the entrance of new actors, like MNO or Telco vendors; creating a new ecosystem enhancing competition and where collaboration will be the key aspect in order to achieve commercial success.

1.8 Health care and home care

When it comes to the “caring” services the two case of remote patient monitoring and mobile phone support for the home care staff are quite different, that is why we selected them. The remote patient monitoring is focused on the patient while the home care services focus on the working processes of the staff.

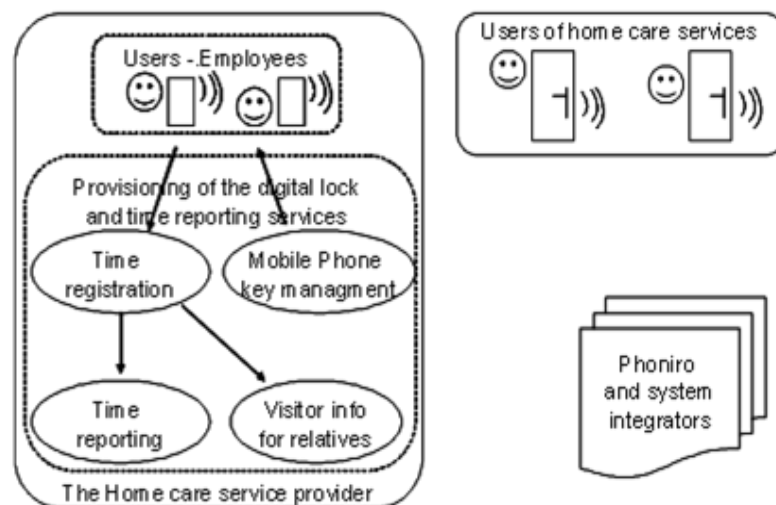


Figure 0-2 Main activities for home care service with mobile phones and digital locks

The implementation of remote patient monitoring services

The value for both the patient and the hospital is that the patient is constantly connected and monitored in the home, this improves the “user experience”, releases the hospital resources and saves costs. The health care service is provided by the hospital but Ericsson manages the service platform and AT&T is responsible for the agreement with the hospital.

Cost savings and better resource usage is the main driver for the hospitals. In order to provide this kind of service the mobile operator need to develop competence in the health care sector and establish business relations with hospitals. A company as Ericsson needs to have a partner at the local market that can establish the customer relations, Ericsson as such would have large problems to deliver this services alone.

Mobile Phones for Access and Time Reporting

The value for the home care staff are the increased flexibility and control of time and resources as well as a more time efficient reporting. The home care authorities and relatives of the elderly benefit from the real-time reporting meaning that you all the time knows if, when and by whom the elderly has been visited.

In this case the service is provided by the technology and solution provider, Phoniro. This and similar companies have built up competence about home care practices and established

good relations with the municipalities, the home care authorities and the home care providers. In our example a mobile operator was initially heavily involved but then decided to withdraw. This example quite well illustrates the obstacles: a need to develop new competences and a need to handle a large number of different customers. For a company as Ericsson it would probably be feasible to develop competence and applications but it would be difficult to handle a multitude of business relations with many (small) customers.

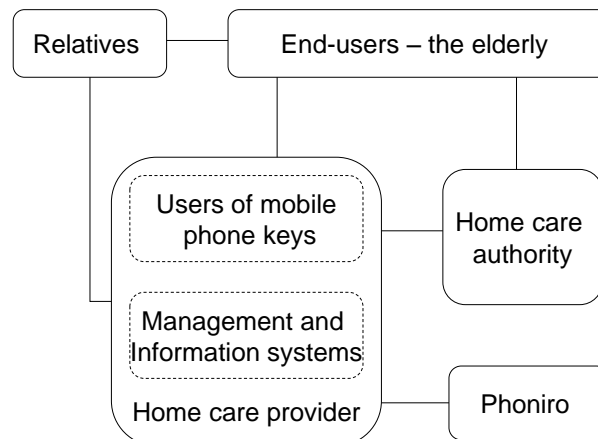


Figure 0-3 Actors and relations for home care service with time reporting and portal for relatives

Conclusions

Horizontal integration of different layers in the M2M ecosystem has become a buzz word in the m2m world in recent years. The “Horizontalization” concept has found its way also to the vocabulary of both small and big actors of the m2m world. Small actors keep pushing for this concept in order to make room for themselves among others and sell their services, while big actors mainly mention this concept while they still keep running the business as they used to. The formation of sub-ecosystems is also an emerging phenomenon, while companies form alliances in order to enable more potentials of m2m.

1.9 The main issues and questions

In order to better understand this situation, the trends and the changes we have looked into the following aspects, repeating them from section 2.

- i. To identify and analyse drivers, benefits and “values” for different actors
- ii. To identify and analyse barriers and bottleneck problems for the actors
- iii. Identity why and how value networks can and/or may change
- iv. How ICT businesses can be transformed by introduction of IoT solutions

When it comes to *drivers and benefits* we can see that the common themes from the cases are that users get a value of being connected and/or to be available and/or to be able to collect data or perform activities on the move.

Identified *barriers* include challenges related to acquiring new competences and to build up and maintain new customer relations. The competence is not just about technology of

working processes but also about to understand why and how services are created and provided and how the business is organized. Also the number of customers at a market (national or global) is a key issue. A mobile operator may be able to have business relations with 10 big hospitals in a country but not with 100 or 1000 municipalities to offer home care services. The same would apply for the telecom vendors that are used to handle a limited number of big customers, i.e. mobile operators.

Another obstacle that can be identified from the cases is the multitude of different services within each sector. For example; for healthcare there are many different services and even for remote patient monitoring there are differences depending on the type of condition and in what country. The same goes for services for the home or the car; a multitude of different types of services each with different service components (often also with different service solutions, platforms and providers) can be identified.

The examples in the paper illustrate why and how the *value networks* can or may change; the new features require that someone take the responsibility for providing connectivity, manage data collection and distribution and also in some case to integrate new solutions into existing business systems.

When it comes to how ICT businesses can be transformed we can make some observations besides the multitude of services, solutions and actors. It can be observed that big actors such as Mobile Network Operators and Telco Vendors try to maintain their existence in this game while accepting (very slowly) the fact that they may need to reposition themselves in the value chain in a way that guarantees their presence among others as an important player; a player that brings a value that other cannot easily afford losing.

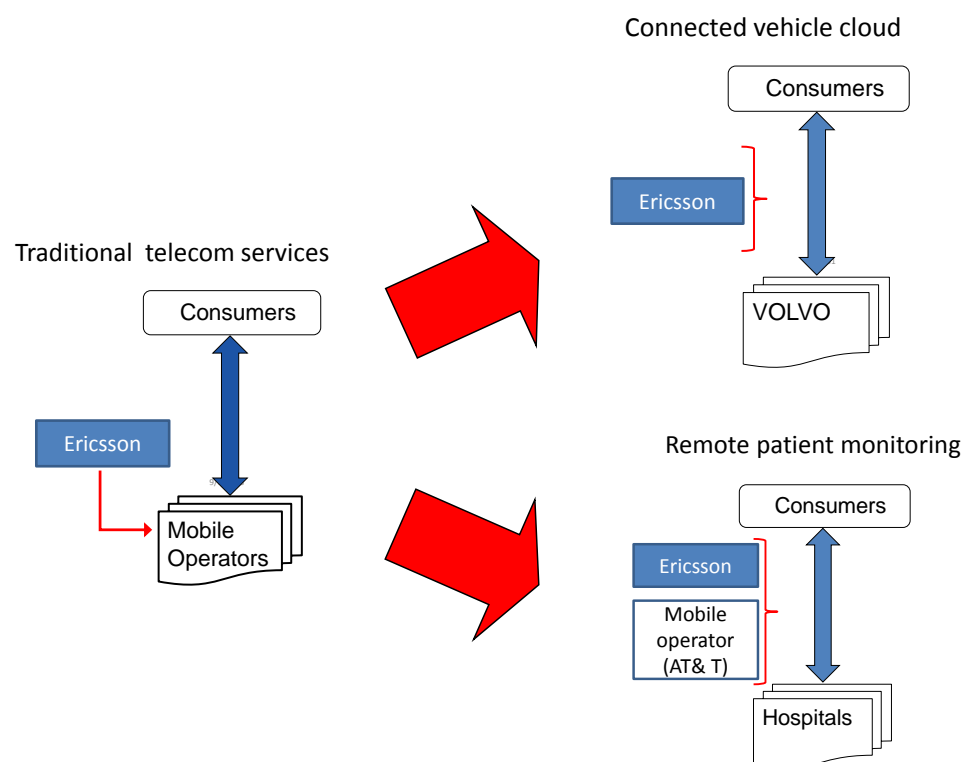


Figure 0-1 Change of market position of Ericsson when entering the service business

In this paper we have presented some examples with successful and less successful re-positioning of actors. The clearest cases are the home care service where the mobile operator decided to leave the area and the healthcare case where the mobile operator very clearly decided to develop new competences and new businesses. Figure 6-1 illustrates how a vendor can change market position in different ways.

1.10 The business applications cases

The Business Modelling KPI we have addressed in this study and paper is: *Identification and analysis of "Business application cases"*.

The result is not some *killer application* for a service x in sector y provided by actor z but rather what actors should do in order to enter a new business. Hence, we focus on what capabilities and resources a mobile network operator and a manufacturer of telecom equipment and services should have in order to be able to be successful.

- Mobile operators:
 - To provide sector/domain specific competence
 - To understand the business logic
 - To manage customer relations at a national market
 - To organize the partner network
 - To provide connectivity
 - To provide SIM cards, platforms and billing
- Telco manufacturer
 - To manage complex systems, large number of devices
 - To provide sector/domain specific competence
 - To provide or manage the connectivity (Volvo case)
 - To manage relations with BIG customers
 - To organize the partner network

In short we think that the cases about remote patient monitoring (AT&T) and the connected vehicle cloud (Ericsson), s figure 6-1, are good examples on what to do.

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