

The development of mobile services – the impact of actor groups in the standardization process

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Abstract: This paper presents the impact of actor groups in the development of new mobile services. We have taken a micro view and collected actual data from a standardization process to contrast the general macro perspective in use. We develop four metrics; strength, openness, depth and efficiency to measure the impact of groups. Our findings indicate that contrary to popular belief the manufacturers and operators still dominate the development process. They score highest on all aspects while the application vendors score low on almost all aspects. We also find that governments and content providers are almost absent from the standards development process for new mobile services.

Keyword: Actor groups, Mobile services, standardization, development process

Introduction

The telecommunication sector is one of the largest service sectors with an annual revenue of over 1 trillion USD (OECD 2007) in the OECD area. During the last decade and especially since the downfall in 2000, the sector has undergone a transformation. This is most profound in the development of new mobile services and infrastructures. The 3G infrastructure has been developed in many markets, connecting the mobile infrastructure to the fixed Internet, and new enhanced handsets gives the opportunity for a whole range of new Internet related services. New and possible disruptive technologies, like VoIP, Wi-Fi and WiMax are also altering the existing landscape. Into this environment come large actors from the IT, media and broadcasting industries as well as new actors from emerging new markets like China and South Korea. The operators, regulators and telecom vendors are striving to find their place and role in this transformed environment. What used to be a market with national monopolies, and standards that were developed by operators and regulators through the International Telecommunication Union (ITU), have now become a many-sided market where each country has many op-

erators, the operators and vendors operate globally, and standards are developed by a multitude of standards organizations, alliances and consortia.

The changes are affecting the development of new mobile services and the constellation between the actors. One pivotal factor in this changing landscape is standards. Standards are essential for the reconfiguring of the actor constellations and the development of new mobile services (Werle 2001; Lyytinen and Fomin 2002; Maitland, Bauer et al. 2002; Yoo, Lyytinen et al. 2005; Iversen and Tee 2006; Whally and Curwen 2006).

This paper addresses the research question: *How do different actors influence the development of new mobile services within standardization organizations?* To address this question we have compiled a number of metrics from the involvement and contribution of actor groups within the Open Mobile Alliance, the largest standardization consortium in the mobile sector. Our findings show that the operators and manufactures have a larger impact than their numbers should indicate and that some groups like governments and content providers are absent from the process. A macro perspective on the actors involvement in the development of new mobile services suggest that new actors have a large impact on the development of new mobile services (Steinbock 2005; Tilson and Lyytinen 2006). Our findings contradict this belief and we conclude that the 'old' alliance of operators and manufacturers still dominate the process.

The rest of the paper is structured as follows. In chapter two a framework on group involvement in mobile service development is presented. We then present our research methods, framework and findings in the following chapters. The paper ends with a discussion of the findings and finally draws some conclusions.

A framework for showing standardization involvement

Lately a theoretical perspective (framework) has been used to analyse the dynamics and changes in the mobile industry (King and Lyytinen 2002; Yoo, Lyytinen et al. 2005; Tilson and Lyytinen 2006). The framework has a macro perspective and uses some terminology like actor and actor-network from Actor-Network Theory (Latour 2005), to track the different actors and the changes in the actor constellations. The framework divides the mobile industries institutional environment into the following parts (see also figure 1).

- *The Innovation system* is the interlinked network of sites, competencies, ideas and resources that over time is able to develop new services and technologies. Exploitation of the new services and technologies in a wider system is according to the framework dependent of the creation of standards.
- *The marketplace* is a set of actors that produce services or technologies by exploiting the technological potential defined within standards and technical innovations.

- *The regulatory regime* is any type of authority that can influence, direct, limit or prohibit any activity in the innovation system, the marketplace or the regulatory regime itself.

These domains form the institutional environment in which mobile services are created, and the domains are situated around and interlinked with the standards creation regime. The standards are not merely a technical component but act as an important mechanism for coordination among the actors (King and Lyytinen 2002). Yoo et al (2005) calls this network an innovation and diffusion system for mobile infrastructures.

It is possible to place the different actors in mobile services standardization into this framework. Tilson and Lyytinen (2006) do this in their study of the US mobile industry, see figure 1. In the innovation system you have different types of manufacturers. This can be infrastructure, device (handset) and/or semiconductor manufacturers. The manufacturers are the traditional actors in the innovation system. With the introduction of 3G and new mobile services actors like system integrators, application providers, and middleware vendors have entered the innovation system. Thus, while the marketplace used to consist of operators and their customers new mobile services have introduced new actors like service and content providers into the marketplace. The convergence of telecommunication, data and broadcast has also triggered a convergence of the regulatory authorities in some places (García-Murillo 2005).

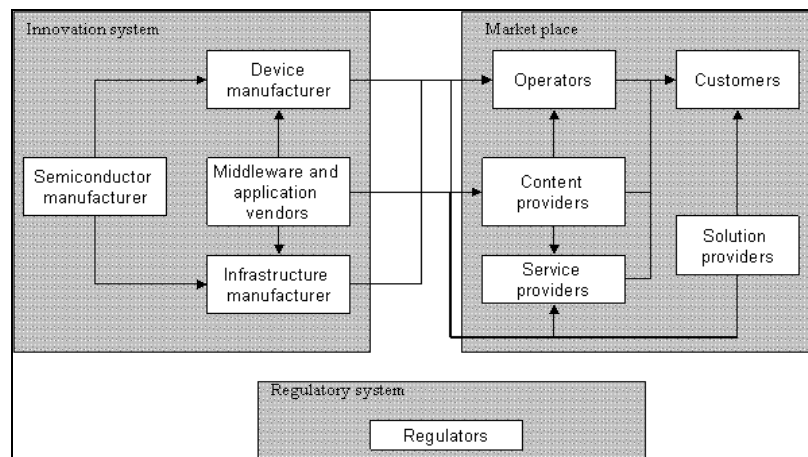


Figure 1 – The mobile industries institutional environment with the main participants (adapted from Tilson and Lyytinen 2006)

The above picture shows the industry participants within the institutional environments in the mobile industry. As the picture show the constellations between the actors are many and they are interlinked. Some companies are expanding and take on more than one role. This is a macro view and gives one perspective of the

involvement of the actors. With our metrics we will add a more nuanced and alternative perspective on the actors actual involvement in the standardization process since it will be based on actual contribution not mere presence.

Our framework and research methods

The data for this paper are from the Open Mobile Alliance (OMA) and was gathered during the period October 2006 until December 2007. The data is based on participant observation in OMA, interviews with participants and to a large extent analysis of the documents found in the OMA portal. The OMA meetings and the OMA document portal are only available for OMA members. The access to OMA and the portal was secured when a large international operator let us participate as a part of their delegation. This was cleared with the OMA staff. Participation in OMA was necessary in order to determine which standards to look at and how to find the relevant data in the OMA documents.

Finding out what factors we should develop metrics for was done by examining previous research (Weiss and Sirbu 1990; Axelrod, Mitchell et al. 1995; Shapiro and Varian 1999) and talking with the OMA participants. We decided on four factors/aspects that we developed metrics for. There are of course more factors that can be measured, but for the purpose of this paper we focused on the following four.

- *Strength*. The number of essential IPR each company /actor group holds. This metric indicates the technical strength of a company. The more essential IPR a group has the more it can influence the technical content of a standard.
- *Openness*. The number of new work items supported by each company /actor group. This metric indicates the cooperation efforts of a company. In OMA four companies must support a proposal for a new work item, while in ITU five companies must support a proposal for a new work item. This metrics indicates how well a company cooperates with other companies in creating new work items. The more proposals it supports the more cooperative and open is that company.
- *Depth*. The number of positions each company /actor groups holds. This metric indicates the ability to steer the standardization process of a company. Holding a position as a chair, vice chair or editor of a working groups give influence in the actual shaping of a standard. A company with more positions can influence the standard setting process in more ways. The have a greater depth and reach in the way they can alter and shape the standards.
- *Efficiency*. The number of contributions each company /actor group get approved and included in the requirement specifications. This indicates how good a company is at getting their requirements and solutions into a standard. The more contributions a company get accepted the more the end result ends up the way they want.

The first three metrics are calculated for the organization as a whole, while the number of contributions is calculated for each work item/standard individually.

Even if the data was collected for individual companies we grouped the data into groups of companies. OMA has the following categories of companies: Operators, Telecom vendors, IT vendors and others (meaning content providers, financial institutions, etc). We took this as a starting point, but since the distinction between telecom vendors and IT vendors can be a little blurred we decided to categorize them according to if they provided handset/infrastructure or applications. This distinction is also in accordance with von Hippels (1988) categorization of sources of innovation; lead users, manufactures, suppliers and others. In this setting the operators can be thought of as lead users, the chip, handset and infrastructure providers as manufacturers, the application vendors as suppliers and the rest as others. We ended up with the following categories of companies:

- *Operators*. This is companies that provide mobile subscriptions and mobile services to the end users.
- *Manufacturers*. Handset, infrastructure or equipment vendors. This is vendors that provide mobile handsets (devices) to the market, vendors that provide parts to mobile devices or vendors that provide the technical infrastructure for mobile networks.
- *Application vendors*. This is vendors that provide IT solutions to the operators and handset vendors.
- *Others*. This is companies that provide content to mobile services, financial institutions providing financial solutions for mobile services, test laboratories, other standard organizations and governmental agencies.

The framework used for the analysis of the influence of actor groups in the development of mobile services is presented in the table below.

Factors/ Group	Operators	Manufacturers	Application vendors	Others
Strength				
Openness (towards new work)				
Influence/Depth				
Efficiency				

Table 1 The metrics framework for measuring the impact of user groups in the mobile domain

Every step of proposing, creating or altering a standard in OMA is done formally through a document, and the document is placed in the OMA portal. The portal is a repository of all OMA documents and includes over 66.000 documents. Associated with the documents are also the companies that are supporting the proposal.

To find out which companies were supporting proposals for new work items in OMA we looked at the final proposal document that was sent to the OMA technical plenary and registered the companies that supported the proposal. We went

through the 40 last new work item proposal. This is approximately for the last 2.5 years.

To find which companies got their contributions approved we did the same for two sets of final requirements proposals, the Mobile Email and Push to talk Over Cellular standards.

The number of work group leaders and the number of IPR each company had was found by a simple count of all the IPR declarations and by going through the name of the leaders of all the work groups.

The actual numbers in the metrics could have come about because the number of companies in each actor group was unbalanced and tilted towards some actor group. To counter for this we also present what would be an expected number based on the distribution of companies among the actor groups. The expected number for each actor group is the same for all metrics and based on the size of each actor group.

Below we present the distribution (both in numbers and percentage) of the voting members of OMA per July 2007. The percentage will be used to measure the expected result of the metrics and will be constant for all metrics.

	Operator	Manufacturer	Application vendor	Other	Total
Numbers	35	46	31	6	118
Percentage	30%	39%	26%	5%	100%

Table 2 - The distribution of voting companies in OMA for different actor groups

Findings – presentation of the data

First we present the data for the strength, openness and depth metrics. Then we present data for the efficiency metrics through two examples.

Technological strength – The number of essential IPR

In OMA 25 companies have declared that they have essential IPR. 10 companies are manufacturers (40%), 11 companies are application vendors (44%), 2 companies are operators (8%) and 2 companies can be regarded as content providers (others) (8%). This shows an almost even distribution between the number of application vendors and manufacturers that have declared essential IPR.

If we count the numbers of essential IPR the different types of companies hold, the numbers show another story. The manufacturers hold 182 essential IPR (79%), the application providers hold 43 essential IPR (18%), the operators hold 5 essential IPR (2%) and others hold 3 essential IPR (1%). The manufacturers are the dominant actor when it comes to the number of declared IPR.

There are great differences in the expected distribution and the actual distribution when it comes to IPR. Each manufacturer holds more IPR compared to all other groups. The manufacturers have the highest strength, the operators have the lowest strength while the application vendors and others have a low strength.

	Operators	Manufacturers	Application vendors	Others
Distribution of companies that have declared essential IPR	8%	40%	44%	8%
Expected distribution	30%	39%	26%	5%
Actual distribution of declared IPR per actor group	2%	79%	18%	1%
Impact	Lowest	Highest	Low	Low

Table 3 - The strength metric

The depth metric – Number of chairs and editors

37 different companies have a position as a chair, co-chair or editor (chair for short) of a working group. 14 (38%) of the companies are manufacturers, 14 (38%) are application vendors, 8 (22%) are operators and 1 company (2%) are defined as others.

If we count the numbers of chairs held by each actor group the numbers again show some differences. 58% of the positions are held by manufacturers, 18% are held by application vendors and 23% are held by operators and 1% is held by others.

The distribution between manufacturers and application vendors are even when it comes to the number of companies that holds chairs, but each manufacturer holds more chairs. The manufacturers' numbers of chair rises, the application vendors' numbers drop while the operators have the same number of chairs compared with their distribution. The others group is hardly present. The manufacturers have the highest depth, the operators a medium depth, the application vendors a low depth while the others group have the lowest depth.

	Operators	Manufacturers	Application vendors	Others
Distribution of companies that hold a chair	22%	38%	38%	2%
Expected distribution	30%	39%	26%	5%
Actual distribution of chair per actor group	23%	58%	18%	1%
Impact	Medium	Highest	Low	Lowest

Table 4 – The depth metrics

The openness metric – Number of proposals supported

95 different companies have supported one or more of the 40 latest work item proposals in OMA. There can be an unlimited number of companies supporting a work item, but there has to be a minimum of four. 21 operators have supported one or more proposals (22%), 30 manufacturers have supported one or more proposals (32%), 41 application vendors have supported one or more proposals (43%) and 3 other companies have supported a proposal (3%).

When we look at the number of proposal that have been supported by the different types of companies the numbers are a little different. 38% of the companies backing a proposal have been manufacturers, 28% have been application vendors, 32% have been operators and 2% have been others.

The actual numbers are close to the expected numbers. Each operator supports more work items than the application vendors and a little more than the manufacturers while the others group again has little impact. The operators have the highest impact, the manufactures and application vendors a medium impact while the others group have the lowest impact

	Operators	Manufacturers	Application vendors	Others
Distribution of companies supporting a new work item	22%	32%	43%	3%
Expected distribution	30%	39%	26%	5%
Actual distribution of new work items supported per actor group	32%	38%	28%	2%
Impact	Highest	Medium	Medium	Lowest

Table 5 - The openness metrics

The efficiency metric – two cases

Two cases will be presented here to show how efficient the different groups are at getting their contributions into the specifications; Mobile Email and Push to talk Over Cellular. There are both small and large companies in every group. The operators have companies like Vodaphone, Sprint and NTT DoCoMo, the application vendors companies like IBM and Microsoft, while the manufacturers have companies like Nokia and Intel. Size alone can not explain any difference in influence in the contributions.

First we provide the distribution among the actor groups for the participating companies, and then we present the number of accepted contribution from each group.

Mobile Email

Looking at the number of participants gives us these numbers: Operators 21%, manufacturers 42%, application vendors 32% and standard organizations 5%. Summarizing the contributions per type of company shows that 23% of the approved contributions are from operators, 49% are from manufacturers, 23% are from application vendors and 5% are input from other standardization organizations. The effectiveness of a group is an indication of the difference in the number of companies participating and the number of contributions each group get accepted. Here we can see that the manufacturers are the most efficient group, the application vendors have the lowest efficiency while the operators and standard organizations (others) have a medium efficiency.

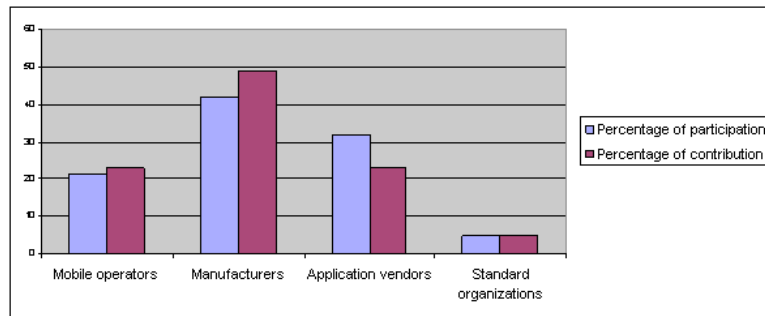


Figure 2 – The participation and contribution in the mobile email standard development

Push to talk Over Cellular (POC)

The POC standard is a typical new service specification. It requires new functionality in the handset and new offerings from the operators. Looking at just the number of participants the distribution is manufacturers 50%, operators 37% and application vendors 13%. In this working group both the chairman and co-chair are manufacturers. Summarizing the contributions per type of company shows that 19% of the approved contributions are by operators, 79% are by manufacturers and 2% are by application vendors.

Here we again can observe that the manufacturers are the most efficient group of actors, while the operators have a low efficiency and the application vendors the lowest. This data gives another perspective on the contribution by the application vendors. With a contribution of 2 % the actual influence of the application vendors is almost negligible.

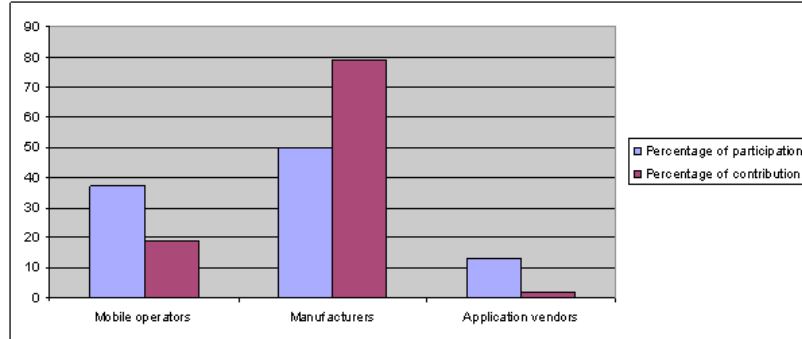


Figure 3 – The participation and contribution in the POC standard development

Summary of our metrics

Our findings show that the manufacturers have the highest impact in the development of new mobile services while the application vendors score low on almost every aspect. The others group have the lowest impact, almost zero.

Factors/ Group	Operators	Manufacturers	Application vendors	Others
Strength	Lowest	Highest	Low	Low
Openness (towards new work)	Highest	Medium	Medium	Lowest
Influence/Depth	Medium	Highest	Low	Lowest
Efficiency	Medium	Highest	Low	Lowest

Table 6 – The framework showing the impact of actor groups in developing mobile services

General observation and discussion

A first observation is that the group others, including governments and content providers are almost absent from the standard setting process. This is in contrast to what macro perspectives (e.g. Lyytinen et al 2006) suggest. Why this is the case should be researched further but is outside the scope of this paper.

From the previous we can see that manufacturers are more efficient and have higher strength and depth than other types of companies. Overall the hardware manufacturers/vendors seem to be most efficient. Since these companies have to produce physical goods they have a longer production setup than the application vendors and they also have a higher initial production cost. According to our interviewees the manufactures have the most to gain to get their standards into the specifications, since this can shorten their production line setup and give them a shorter time to market. The following statement from one participant illustrates this. *“The vendors and the operators have different reasons to participate. The op-*

erators want to influence the requirements, and know what products they can expect from the vendors. The vendors want to reduce time to market and get their functionality (and IPR) into the specifications.”

Reading the standards documents carefully, we find corroborating evidence. The standards do not enter into the domain of interoperability and pricing at all, which are the two singularly most pressing concerns for the parties outside the network operators and handset manufacturers.

Whally and Curwen (2006) find that there has only been one truly new entrant into the European 3G market. This is in line with our findings. Even if the value chains are changing in the mobile industry (Maitland, Bauer et al. 2002; Steinbock 2003) and include new actors, these actors mainly adapt to the development of the operators and manufacturers. For them this is just a new channel to the market.

In view of the convergence of IT, broadcast and mobile telecommunication, one would perhaps be inclined to think that the IT and broadcast/content sector should be more deeply involved in the specifications of new mobile services. They are, after all, the ones who stand most to gain from interoperability standards and an open interface towards the means of getting paid for mobile content. Our metrics on the contrary show that the influence of the IT sector is much lower than their numbers indicate and that the broadcast/content sector is almost not present in this picture at all. This ought to make us think twice on the statement that the involvement of the new sectors will fundamentally change the business. Our research indicates that the manufacturers and the operators still control the business models and key features of new services through the specification process.

IPR is essential in the development of mobile infrastructures (Bekkers, Verspagen et al. 2002). Controlling this gives influence in the development process. The strength of the manufacturers is an indication of their control of the process. After all 4 companies hold more than 2/3 of the essential IPR for the 3G infrastructure (Goodman and Myers 2005).

Gaynor and Bradener (2001) have contributed towards a quantitative theory for standards, which complement nicely the framework that we have suggested in this paper. It is different inasmuch as it is concerned with the standards themselves, rather than, like ours, the process of standardization. Comparing our metrics with the framework of Tilson and Lyytinen (2006) shows that some general trends can be found using their framework, but to get the more detailed picture one must use a metrics framework, like the perspective that we have presented in this paper.

Conclusion

Our findings indicate that the view in existing research that new actors have a large impact on the development of new mobile services is not entirely true. The manufacturers and the operators still dominate the process. Governmental presence is absent in the consortia setting as well as the influence of content providers. The manufacturers are the group with greatest strength and also the most efficient

group in terms of getting their requirements into specifications while the operators are the most open group in terms of collaboration with others. The application vendors main influence is through the creation of new work items within the standardization process.

The metric presented here provide a complementary view compared with existing macro perspectives on the mobile service industry and can be a good starting point for further discussions on the impact of actor groups in the development of mobile services.

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