BUSINESS MODEL ANALYSIS APPLIED TO MOBILE BUSINESS

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Abstract: Mobile business is a young promising industry created by the emergence of wireless data networks. Similar to other emerging industries, it is characterized by a large number of uncertainties at different levels, in particular concerning technology, business strategy and consumer demand. This paper focuses on the strategic uncertainties, where a large number of actors are trying a number of strategic approaches to position themselves in the most favourable position in the value system. This paper intends to apply a business model analysis methodology in order to better understand the strategic approaches of these actors. We argue that successful business models are likely to be the ones that best address the economic peculiarities underlying this industry, like mobility, network effects and natural monopolies.

1. INTRODUCTION

Many definitions of mobile business focus on enabling business transaction through wireless devices, confusing mobile commerce and mobile business. A commonly adopted definition, by Durlacher, defines mobile commerce as "any transaction with a monetary value that is conducted via mobile telecommunication network" (Müller-Veerse, 1999). Similar to e-commerce, the focus is on the exchange of products and services, but without the constraint of a stationary user using wired infrastructure. We prefer to adopt a broader definition of mobile business, which includes "all activities related to a (potential) commercial transaction through communications networks that interface with mobile devices" (Tarasewich et al., 2002).

Mobile business is a very recent, but promising industry created by the emergence and widespread adoption of wireless data networks, which enable the convergence of the Internet, e-business and the wireless world (Kalakota and Robinson, 2002).

Similar to other emerging industries, mobile business is characterized by a continuously changing and complex environment, which creates important uncertainties at the levels of technology, demand and strategy (Porter, 1979). At the technological level, uncertainties are typically caused by the rapid technological development and the battle for establishing standards, which are typical in the beginning stages of the life cycle of an industry. Concerning demand, despite a generalized consensus about the huge potential of mobile business services, nobody actually knows how to exploit the new possibilities brought by technology to create valuable services that the customers are willing to pay. Finally, strategic uncertainties are a common situation in emerging industries, whose essential characteristic from the viewpoint of formulating strategies is that there are no established rules of the game. Consequently, actors must experience with a variety of strategic approaches and constantly reposition themselves in order to find the most favourable competitive position in the industry (Porter, 1979).

Based on these observations, we developed a general research framework inspired by the works on the Balanced Scorecard (figure 1). Our objective is to conceive a market observation tool for the mobile business industry. The underlying idea is that we can better understand the reality by taking views from different complementary perspectives and putting them all together. The perspectives are chosen to cover all the different uncertainties mentioned above. Each perspective focuses on certain aspects of the mobile landscape and requires specific observation tools. The innovation perspective deals with the future evolution of the

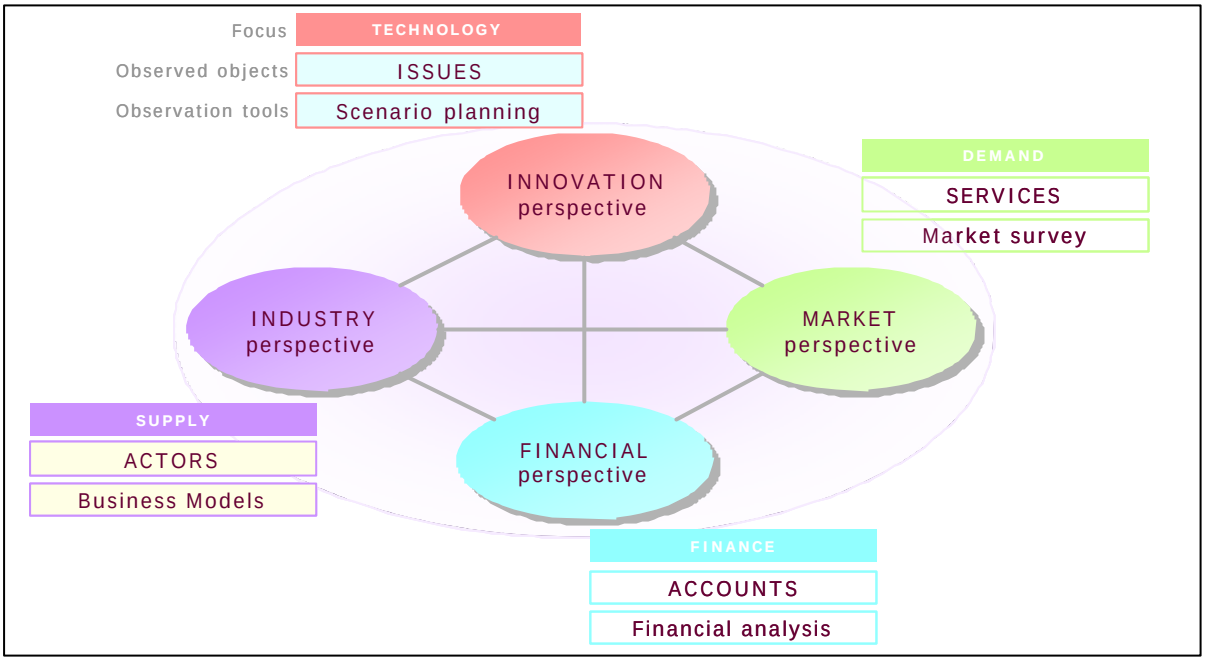

Figure 1: Mobile Market Scorecard framework

mobile landscape and covers technological uncertainties using a scenario planning approach. The market perspective deals with the demand side of the industry and analyzes demand uncertainties using market surveys and adoption studies. The industry perspective looks at the supply side and assesses strategic uncertainties using competitive analysis and business models overview. We also add a financial perspective to assess the sustainability and attractiveness of the different actors, services and technologies.

While technological and demand uncertainties have already been addressed in a number of publications, strategic uncertainties remain largely unexplored.

The objective of this paper is to study strategic uncertainties by analysing the roles and relationships of the different actors participating in the mobile arena. For that purpose, this paper applies a business model analysis methodology based on a formalized ontology in order to better assess and compare the strategic approaches of these actors.

The rest of the paper is structured as follows. Section 2 exposes the principal characteristics of the mobile business industry that enterprises must take into account when designing their business models and that will ultimately determine their success or failure. Then, section 3 defines what a business model is and why it is useful in attaining our objective. After that, section 4 illustrates and classifies the key categories of actors participating in the mobile business and specifies their generic business models. Finally, section 5 illustrates the principal conclusions that can be drawn from our work.

2. MOBILE BUSINESS CHARACTERISTICS

The mobile business industry presents a number of peculiar economic characteristics such as mobility, network effects and proprietary assets.

Enterprises ought to take these characteristics into consideration when they formulate their strategic approaches. Indeed, successful business models are likely to be those that best comply with these particularities.

2.1 Mobility

It is commonly supposed that mobility is the most important characteristic of mobile business, because it represents its principal distinctive advantage upon which mobile services can build their value proposition. In fact, mobility brings several unique benefits that can be related to a number of attributes such as freedom of movement (services can be used while on the move), ubiquity (the possibility of using services anywhere, independent of the user's location), localisation (user's location information can be exploited to offer

location-based services), reachability (users can be reached anywhere, anytime, from selected persons and contexts), convenience (always at hand), instant connectivity (always on) and personalization (personal device, apt to store personal information) (Müller-Veerse, 2000).

However, mobility also involves some drawbacks, and wireless services are actually inferior to their wireline counterparts in different other dimensions. In particular, mobile applications suffer from limited and more expensive bandwidth and device limitations. Bandwidth limitations are a consequence of radio spectrum being a fixed and rare resource and its control being restricted to license owners. Device limitations are due to the portability requirement of mobile handsets that have to be small and lightweight, letting limited space to be used for screen, batteries and input/output interfaces.

Even if valuable services can be entirely built around mobility, exploiting the distinctive features of the mobile channel, combining them with the advantages of e-commerce services and other channels would lead to substantial more value delivered to the customer (Jarvenpaa, 2000).

2.2 Network externalities

Formally speaking, networks are composed of a set of components, connected together by links. These structures exhibit a characteristic economic phenomenon known as network externality.

An externality occurs when a transaction between two actors affects, as a side-effect, a third party that is external to the transaction. A product presents a network externality if the utility that a user derives from consumption of the good increases with the number of other agents consuming the good (Katz and Shapiro, 1985).

According to Economides (Economides, 1996), "*the key reason for the appearance of network externalities is the complementarity between the components of a network, which is inherent in the structure of a network, since many components of a network are required for the provision of a typical service*". He further points out that "*links on a network are potentially complementary, but it is compatibility that makes complementarity actual*".

Network externalities can be direct or indirect. When customers are identified with network components, which is typical of two-way networks such as telecommunication networks, the externality is direct and results from the fact that a user joining a network confers a benefit to all other network members because the number of potential interactions increases.

Rohlfs showed that network externalities play an important role in the telecommunication market, where the utility of joining a communication network is positively related to the number of its members (Rohlfs, 1974). In this case, network effects take the form of being able to communicate (call and receive calls) with a larger number of other users. On the other hand, the increase of the number of network members also produces negative externalities such as network congestion.

Communication network also show signs of indirect externalities, where users benefit indirectly from network size. As an example, an extra customer potentially increases the number of services available to other customers, since by increasing the demand for services, service provisioning become more profitable and more firms would be willing to offer them. Constance and Gower (Constance and Gower, 2001) provide an interesting representation of direct and indirect network effects using the formalism of system dynamics

Network externalities influence both consumers, e.g. when they decide whether to adopt a new technology (Frank and Heikkilä, 2002), and producers, e.g. when they decide whether to standardize their products to allow compatibility with other producers, set the product quality and chose the pricing policy (Economides, 1996).

2.3 Exclusive control over important assets

The mobile business market is also characterized by the existence of important assets that are under the exclusive control of a firm. Exclusive control may arise for a certain number of reasons: the absolute rarity of a good, the existence of a fabrication secret, a special privilege or a patent, which gives its owner the exclusivity over a certain asset, and the presence of particular cost structures with increasing returns or very high initial investments that cause natural monopolies to arise.

One first example is access to radio spectrum, a necessary but finite resource, required by many different industries like mobile telecommunications, military, TV, radio, transport, navigation etc. Spectrum access had to be regulated to ensure an efficient and equitable use of this resource. Consequently, the portion of spectrum allocated to mobile communications is rather small and, except for the very limited ISM frequency bands, it is restricted to a few network operators owning the license to operate on a particular frequency band.

Network operators also have total control over a number of other important assets. By providing the

SIM card to their customers, mobile operators have total control over them, since the communications from and to a user must pass through the operator network. In addition, by controlling the network, the operator possess an unique access to valuable user-related information such as a complete customer profile, call patterns, location information etc.

Moreover, infrastructure deployment could be considered a natural monopoly, because of the substantial investments required to build a network and the redundancy of additional networks. From a societal point of view, a single monopolistic firm could be a blessing, since it can satisfy demand using a lower amount of resources than multiple competing firms. However, it could exploit its dominant position to raise prices above competitive levels and earn above normal profit. Hence, driven by regulatory policy and decreasing costs, and because the cost of building a network has considerably decreased over time, an oligopoly structure with several competing network operators has become possible.

2.4 Implications

Mobility adds a great deal of complexity to application and services development, which requires broader competencies that, in the short term, are only accessible through partnerships or acquisitions. Network effects necessitate that devices and applications must be inter-compatible, requiring partnerships to agree on common standards and platforms. Very illustrative is the example of Symbian, a consortoum bringing together a large number of device manufacturers to develop a common operating system. Finally, the existence of indispensable assets exclusively controlled by network operators requires firms to collaborate with them, unless financial problems or regulation impose them to open up access to these assets to other firms.

From these characteristics, it follows that the provisioning of complete mobile services solutions requires the collaboration of a large number of market players, with a particular consideration towards network operators. In effect, until now, no player managed to succeed in providing an end-to-end solution between the content owner and the end-user on its own. Even the i-mode service of NTT DoCoMo in Japan, benefiting from a very dominant market position and from the peculiar Japanese context, was provided through important partnership with device manufacturers and content providers.

Therefore, enterprises willing to compete in the mobile industry ought to pay considerable attention to the creation of a sustainable network of partners. Hence, partnership management is likely to become a core activity of many of mobile business enterprises.

A sound, sustainable business model involving a network of partners must focus on the question whether it is feasible from an economic point of view. Basically, it must consider the interests of every participant, so that everyone has incentives to participate, which essentially requires that the model is profitable for each actor involved (Gordijn, 2002).

3. BUSINESS MODELS

Although the concept of business model is widely used and seen as important, there is no generally accepted definition of what a business model is.

As explained by Petrovic, a business model describes the logic of a "business system" for creating value that lies behind the actual processes (Petrovic et al., 2001). It can be seen as a detailed conceptualization of an enterprise's strategy at an abstract level, which serves as a base for the implementation of business processes.

Many authors tried to identify the elements composing a business model. An interesting definition by Slywotsky defines a business model as "*the totality of how a company selects its customers, defines the tasks it will perform itself and those it will outsource, configures its resources, goes to market, creates utility for customers and captures profit*" (Slywotzky, 1996). We adopt a similar definition: a business model provides a description of the roles and relationships of a company, its customer, partners and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved, in particular, but not exclusively the customer (Bouwman, 2002).

In order to investigate the business models of the different classes of actors in a consistent way, we based ourselves on a formalized ontology for e-business models specified by Osterwalder and Pigneur (Osterwalder and Pigneur, 2002), which fits well with the above definitions. They understand business models as consisting of four main elements: 1) the product innovation, that consist of the value proposition the firm delivers to its customers; 2) the customer relationship, defining the target customers, the channels and relationship strategy; 3) the infrastructure, containing the resources required by the internal activities and the partnership network that are required to produce the value proposition; 4) the financial aspects, which ultimately determine the profitability of the organization.

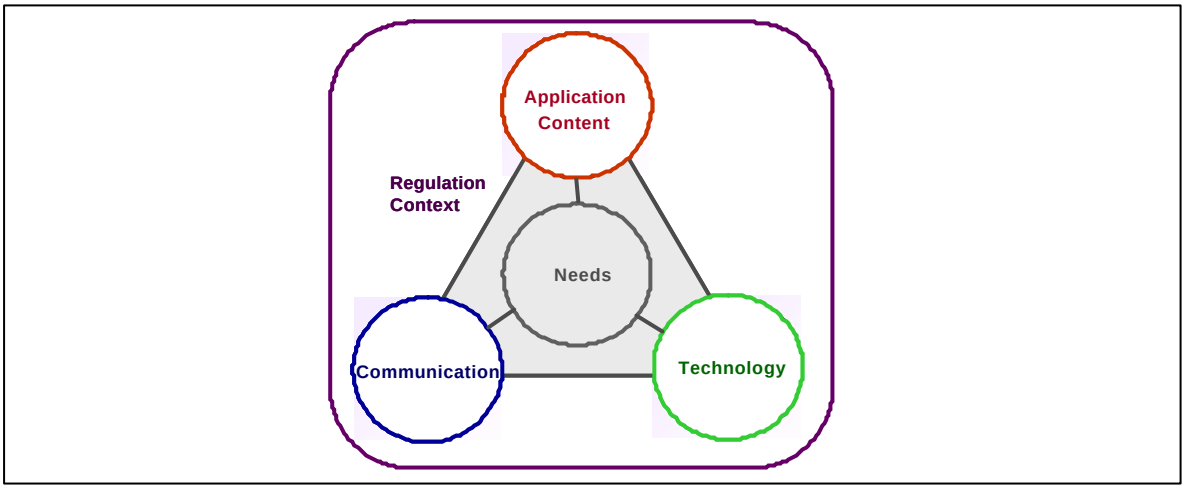

Figure 2: Mbusiness framework

In the next section, we will investigate the business models of the principal classes of actors of the mobile business landscape. Since we will focus on generic classes instead of specific instances of firms, we have to conduct our work at a sufficiently abstract level: for each group of actors, we will describe the value proposition, the key customers, the core activities, the business partners and the revenue flows. We will leave cost issues out of our analysis, because the cost structure is too different between the single enterprises. Furthermore, because of the specificities of the mobile business industry, we will focus more on partnerships than on the other elements.

4. ACTOR'S OVERVIEW AND THEIR BUSINESS MODELS

The previous sections illustrated why the mobile business market is highly fragmented and the provisioning of complete mobile services solutions requires the collaboration of a large number of different market players.

The literature contains a great number of publications that illustrates the abundance of players in the mobile field. Many authors share a similar set of mobile business market key actors, which they classify according to three general main classes: technology, application and network. (Müller-Veerse, 2001).

We already stated in a recent paper (Camponovo and Pigneur, 2002) that these three classes do not give a complete view of the mobile landscape and should be completed by other classes such as regulation, end-user and enabling services (i.e. payments).

We propose to classify the players according to the framework illustrated in figure 2. At the centre of the mobile business world are users, who have mobility-related needs. In order to fulfil these needs, we need three necessary and complementary supporting blocks: communication (including the different networks that provide transmission capabilities), technology (composed by all the required hardware, including network equipment, mobile devices and platforms) and the services (including applications, content and supporting services). These blocks are then constrained by regulation and social context. A graphical representation of the whole industry, distinguishing the actors in the different blocks and their principal relationships is given in the appendix.

Similar to a recent paper (Lai et al., 2000), we distinguish between primary and secondary actors. The next subsections will investigate the primary actors for each block we identified in our framework (technology, communication, application, regulation and user) and we will give a very short textual description of the business model of the primary actors we identified in each block.

4.1 Technology

Technology players provide the hardware and software infrastructure needed to offer mobile services to the end user. The primary participants in this area are access device manufacturers and network equipment vendors. Secondary players include device retailers, component makers and platform vendors that provide software platforms such as operating systems, micro-browsers and development platforms.

4.1.1 Device manufacturers

Value proposition. Provide the physical mobile devices (mobile phone, PDAs, notebooks with wireless cards) to end users that enable them to access a mobile network and to run mobile applications.

Target customers. Device retailers and network operators' distribution channels.

Core activities. Research and development, product design, production and marketing.

Business partners. Device manufacturers purchase from component makers and application developers (operating system, micro browser, embedded software). They then assemble mobile devices and distribute their products through device retailers and network operators' distribution channels. Network operators are very important partners, because they usually subsidy the devices to customers that sign a contract with them and are very active to push the adoption of 3G handsets to capitalize on their 3G network investments. Device manufacturers may also partner with content providers, application providers and portals in order to help them to develop new mobile services that would promote the adoption of new handsets and develop mobile portals, where device manufacturers can bring a strong brand and the possibility of setting the default device configuration and the others the complementary skills, content and applications. Other partners include other device manufacturers, to agree on common standards to ensure application interoperability and exploit network effects. Sometimes they are integrated with network equipment vendors.

Revenue flows. Revenues come from sale of devices to distributors. Additional revenues may come from portal activities and service provisioning.

Examples. There are a variety of device manufacturers, which we can distinguish between mobile phone manufacturers integrated with equipment vendors (Nokia, Eriksson, Siemens, Motorola), other phone manufacturers (Sony, Samsung), PDAs manufacturers (Palm, Handspring, HP, Casio) and wireless card manufacturers (Agere, Cisco and Linksys).

4.1.2 Equipment vendors

Value proposition. Provide the physical core mobile network infrastructure (comprising air interfaces, base stations, routers, switches and backbone transport technologies) and the logical infrastructure required to operate and manage the network (including network management systems, billing systems, network management systems, application and service platforms, etc). They also offer infrastructure related services such as network design, evolution planning, integration, implementation, optimisation and operation.

Target customers. Network operators such as cellular network operators, WLAN operators and ISPs.

Core activities. R&D, production, system development, infrastructure related service provisioning.

Business partners. Equipment vendors purchase from component vendors and application developers, assemble a variety of network equipment and systems an sell them to network operators, with whom they often partner and tightly collaborate. They must also collaborate with other equipment vendors to ensure interoperability and offer multi-vendors solutions; for the same reason, they usually are influent members of standardization groups. In order to promote the adoption of new generations of mobile networks, the actively support and partner with application developers and content providers. They sometimes partner or are integrated with device manufacturers.

Revenue flows. They earn revenue from sale or leasing of equipment and provisioning of services.

Examples. Companies operating this role include Ericsson, Nokia, Motorola, Siemens and Lucent.

4.2 Services

Mobile services are value-added services, content and applications that the user can access on his mobile device. The primary actors in this domain are content providers and application providers. Some authors distinguish these players in more detail and identify content owners, content aggregators, syndicators, mobile portals, application developers, wireless ASPs and system integrators.

This category further includes e-business players implementing a mobile strategy and supporting services providers, which include payment agents (as a primary player), security solution providers (i.e. PKI encryption), trusted third parties, advertising companies and professional service providers (i.e. consultancies).

4.2.1 Content providers

Value proposition. Provide relevant data and information products (such as news, music, video, location-based information,...) and distribute them using the mobile channel. The value proposition often integrates a multi-channel distribution offering that enables to broaden the reach and exploit the

complementary characteristics of different channels.

Target customers. Content aggregators, syndicators and portals (which bundle content from different sources together and re-distribute it to end customers), and the end-customer itself through direct distribution.

Business partners. Content providers often partner with a variety of content aggregators and portals in order to broaden the reach of their products and with content owners, press agencies and other media companies in order to get preferred access to raw information. Other useful partners include network operators to agree on a profitable revenue sharing business model and payment agents for micro-payment services. There might be partnership agreements with application providers for content management platforms.

Core Activities. Content collection, content processing and formatting, content publishing, content distribution, distribution agreements management, ...

Revenue flows. Revenues come from subscriptions fees, usage fees, syndication agreements and airtime revenue sharing.

Examples. This role is particularly done by press agencies (i.e. Reuters), media companies (i.e. CNN, Bertelsmann) and content aggregators (i.e. Yahoo, Videotext).

4.2.2 Application providers

Value proposition. Provide mobile applications and platforms (such as middleware and application servers). The value proposition may include different application-related services such as remote access to a variety of applications that are managed in a central location, with hosting, implementation, integration, support and maintenance services.

Target customers. Target customers include a variety of players in the mobile value chain such as network operators, portals, businesses, device manufacturers and consumers

Business partners. Application providers often partner with network operators, in order to ensure a sufficient quality of services and gain access to essential network services (i.e. location information) and have a privileged contact with their customer base. They also partner with device manufacturers, in order to ensure compatibility with the different existing and future devices and as a sales partner (to exploit their brand). If they do not develop their own applications, application providers purchase from other application developers or establish a partnership with them. Other application providers and system integrators are also useful partners to provide broader solutions and offer a single point of contact to customers.

Core Activities. Application development, integration, application management (versioning, portability checking,...), infrastructure operation, support and consulting services.

Revenue flows. They earn revenue streams from sale of license fees, installation fees, rental agreements for hosting, operation and maintenance services, consulting services.

Examples. Mobile application providers are mainly small, rather unknown start-ups. Examples include iTerra, Geoworks, In-Fusio, Shockfish,...

4.2.3 Payment agents

Value proposition. Provide a method of payment to end-users for cash-free purchases of goods and services via the mobile phone. They can also provide payment platforms to other businesses.

Target customers. End users, different service providers.

Business partners. Payment agents usually partner with different financial institutions (i.e. banks, credit card companies) for payment processing and gain access to their customers accounts. Other valuable partners can be network operators (for billing and collection services), device manufacturers (device interoperability and special payment features), hardware providers and application developers (security solutions) and other service providers.

Activities. Billing and collection, payment platform development and management.

Revenue flows. Subscription and transaction fees.

Examples. Payment agents comprise network operators, banks, credit card companies, smartcard companies and start-ups. Example include PayBox, Sonera and Visa. More examples can be found in (Müller-Veerse, 2001)

4.3 Communication

Communication players provide communication services that enable mobile devices to access mobile services. The primary actors are mobile network operators (MNO) or carriers, and internet service providers. If mobile network operators certainly are among the most important players in the cellular and other GSM or UMTS area, we can observe the first self-organized networks, WiFi networks and large scale wireless local area networks. Other players include virtual operators and infrastructure management service providers.

4.3.1 Mobile Network Operators

Value proposition. Provide ubiquitous communication services to end users, giving them access to their network and other network operators' networks and the Internet. Provide also various network-related services such as location information, user identification and billing services to third parties.

Target customers. End customers, businesses, application providers, virtual operators, ISPs, ...

Business partners. Operators purchase from infrastructure vendors in order to build their networks. They must set traffic agreements with other network operators and ISPs in order to let their customers to access other networks (i.e. other operators' networks, the Internet). They also subsidy and distribute handsets in order to build their customer base. Given their central role in the mobile business, they are required to partner with a great number of other players including content providers, application providers, service providers, virtual operators and portals. These players are essential to develop the market for 3G services, thus increasing operators' revenues, and the operator can help them with revenue sharing agreements and access to network-related services (i.e. through open APIs, such as OSA-Parlay).

Core Activities. Network operators have a typical value network configuration (Stabell and Fjeldstad, 1998). Their main activities are network promotion and contract management (customer care, sales, problem handling, invoicing,...), service provisioning (service development and operations, quality management,...) and infrastructure operation (network planning, deployment, maintenance, systems management,...).

Revenue flows. Network operators earn revenues from their subscriber charging a combination of subscription, airtime fees and volume-based fees. They also earns revenues from network services provided to other parties, transaction fees (for their billing services) and may earn revenues from portal activities.

Examples. This category includes traditinal network operators (e.g. Swisscom, Vodafone, Orange), virtual operators who provide services through networks of other operators (e.g. Tele2), and satellite network operators (Globalstar).

4.3.2 ISPs

Value proposition. Provide access to the Internet network.

Target customers. Network operators, other ISPs (traffic agreements) and end users.

Business partners. ISPs purchase from infrastructure vendors for Internet equipment in order to build their part of the network and the gateways to other networks. They must set traffic agreements with network operators in order to gain access to customers and with other ISPs in order to let their customers access the whole Internet. They also may partner with content and application providers in order to differentiate their offering.

Core Activities. Similar to operators, their main activities are network promotion and contract management activities, service provisioning activities and infrastructure operation activities.

Revenue flows. ISPs earn revenues from user subscriptions and traffic agreements with other ISPs and operators .

Examples. ISPs include both wireless ISPs such as Jippi and NetAir (see example below), as well as wired line ISPs such as Switch.

4.4 Regulation

Regulation-related players set the legal and societal framework in which mobile business will evolve and that constrains all the other players in the mobile industry. They do not participate directly in the provisioning of services, but have a huge influence on the other players. Players in this area include government, regulation authorities, and standardization groups.

4.4.1 Regulation authorities

Value proposition. Set a legal framework which balances the interest of the different stakeholders, with the aim to provide a favourable economic environment that enables enterprise to provide a wide range of competitive telecommunications services which satisfy the needs of the population.

Target customers. All the players in the mobile landscape, including the end users.

Business partners. Regulation authorities interact and consult all the implied parties in order to develop an adequate legislation that best satisfies and balances their diverging needs. They are supervised by the government and are influenced by different lobbies which represent the different enterprises categories and consumer association.

Activities. Legislation development, frequency allocation management, service licences management, market monitoring to ensure compliance with legislation and antitrust requirements.

Revenue flows. Licence fees, taxes.

Examples. Swiss regulation authorities are OFCom and ComCom.

Case study example: NetAir

The following example intends to give an idea of how to use our proposed framework. Because of the limited space, we have deliberately chosen to present a small enterprise. NetAir SA is a startup enterprise, currently in its creation stage., planning to offer W ISP services starting on February 2003.

Value proposition. NetAir provides a bare broadband wireless internet connection through the wireless LAN 802.11b technology. The basic version allows residential users to connect to a hotspot covering his home, while the mobile version allows mobile user to connect to any hotspot of the NetAir network. The service is positioned as a low-cost alternative to broadband connections through ADSL and cable modem. Users are offered a low-priced wireless internet connection with limited support, no additional services and minimal quality of service guarantees (128 kbps minimal data rate).

Target customers. The basic service targets residential customers wanting a wireless low cost broadband connection to the Internet in their homes. The mobile version targets mobile users equipped with a laptop and a wireless card. From a technology adoption cycle perspective (Moore, 1999), the firm targets the consumer mass-market users, who are typically interested by convenience and low prices. On the other hand, it does not target early adopters and businesses who are more interested in performance.

Core Activities. The main activities performed by NetAir are network planning, network operation, maintenance, promotion and contract management. The network consists of autonomous hotspots, mainly hosted by partner users, connected to the Internet by an independent ADSL connection. Hotspots basically share the authentication and security software.

Business partners. NetAir purchases network equipment such as antennas, access points and ADSL modems from equipment vendors. It also rents ADSL lines from an ISP to connect its hotspots to the Internet. NetAir plans to count on various resellers such as computer stores. Moreover, NetAir offers revenue sharing possibilities to users who host NetAir hotspots (network equipment and ADSL connection) on their properties.

Revenue flows. Net Air essentially gains revenue from user subscriptions.

4.5 User

End-users, both businesses and consumers, are also important players in this game, because they ultimately can determine the success or failure of mobile business. It might be useful to consider some "vertical" players with particular mobility needs separately, like those of the travel, logistics, healthcare, retail and car electronics sectors. It seems that no expert mentions consumer groups as actors, yet some of them are very active against electronic smog and will have a true impact on some decisions, such as the deployment of UMTS infrastructure and antennas

4.5.1 Consumer groups

Value proposition. Defend the interests of consumers.

Target customers. End customers

Business partners. Consumer groups influence different players in the mobile landscape, with a particular attention to regulation authorities.

Activities. Consulting and information services, legal assistance, lobbying.

Revenue flows. Subscription fees, donations.

Examples. Different consumer associations, property owner associations.

5. CONCLUSIONS

Until now, the mobile industry was principally analyzed using the value chain framework. A first problem is that this framework is only well suited to analyze traditional manufacturing industries, and should be extended to consider other value configurations such as the value net, which better represents the mobile industry. (Stabell and Fjeldstad, 1998). Furthermore, by applying a business model methodology, we suggest that the analysis should consider additional aspects such as the value proposition, customer relationship and business partners, rather than focusing on infrastructure and activities alone.

Even without going into a detailed view of the business models of the different actors participating in the mobile landscape, it is apparent that the economic characteristics underlying the mobile business have a profound impact on the adopted business models. As suggested from section 2, partnerships are likely to be an important part of the business models of most players, given that the complexity of providing a complete end-to-end solution requires many complementary

competencies, which in the short term can only be acquired through partnerships or acquisitions. Furthermore, players require to collaborate with network operators and device manufacturers, to support interoperability (thus exploiting network effects) and ensure access to essential proprietary assets (a consequence of natural monopolies).

It is worth reminding that the mobile business industry is a very recent one and that the different players are still experimenting with a variety of business models in order to conquer a sustainable and profitable position in this industry. Hence, it is yet premature to predict what business models will prove to be sustainable.

The high levels of uncertainty about the future of the mobile industry hinder the use of traditional forecasting tools (Courtney et al., 2001). For that reason, a scenario based forecasting approach (i.e. (Flament et al., 1998), (Aarnio et al., 2001)) should be employed to identify a set of scenarios describing alternative future outcomes and the events indicating that the market is moving toward one or another scenario.

We argue that business models that explicitly address mobility, network effects and natural monopolies issues and that are profitable to all the different players needed to provide an end-to-end solution will be the most successful and sustainable.

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7. REFERENCES

Aarnio, A., Enkeberg, A., Heikkilä, J., Hirvola, S. 2001, Scenarios for Mobile Commerce in 2006, University of Jyväskylä, Jyväskylä.

Bouwman, H. 2002, "The Sense and Nonsense of Business Models", International workshop on business models, Lausanne.

Camponovo, G., Pigneur, Y. 2002, "Analyzing the Actor Game in M-Business", 1st m-business conference, Athens.

Constance, S., Gower, J. 2001, A Value Chain Perspective on the Economic Drivers of Competition in the Wireless Telecommunications Industry. Master thesis, MIT Sloan School.

Courtney, H., Kirkland, J., Viguerie, P. 2001, Strategy under Uncertainty In McKnsey Quarterly, vol. December 2001, pp. 5-14.

Economides, N. 1996, "The Economics of Networks", International Journal of Industrial Organization, vol. 14, no. 4, pp. 673-699.

Flament, M., Gessler, F., Lagergren, F., Queseth, O., Stridh, R., Unbehaun, M., Wu, J., Zander, J. 1998, Telecom Scenarios 2010 - a Wireless Infrastructure Perspective, Royal Institute of Technology.

Frank, L., Heikkilä, J. 2002, "The Pricing Logic of Services Paid by Mobile", 1st m-business conference, Athens.

Gordijn, J. 2002, Value Based Requirements Engineering: Exploring Innovative E-Commerce Ideas. Ph.D. thesis, Vrije Universiteit.

Jarvenpaa, S. 2000, Internet Goes Mobile: How Will Wireless Computing Affect Your Firm'S Internet Strategy?, Working Paper.

Kalakota, R., Robinson, M. 2002, M-Business: The Race to Mobility, McGraw-Hill.

Katz, M., Shapiro, C. 1985, "Network Externalities, Competition and Compatibility", American Economic Review, vol. 75, no. 3, pp. 424-440.

Lai, J., Mohan, A., Gustafson, G. 2000, Understanding the Emerging Mobile Commerce Marketplace.

Moore, G. 1999, Crossing the Chasm, Harper Business.

Müller-Veerse, F. 2000, Mobile Commerce Report, Durlacher.

Müller-Veerse, F. 2001, Umts Report - an Investment Perspective, Durlacher.

Osterwalder, A., Pigneur, Y. 2002, "An E-Business Model Ontology for Modelling E-Business", 15th Bled Electronic Commerce Conference, Bled.

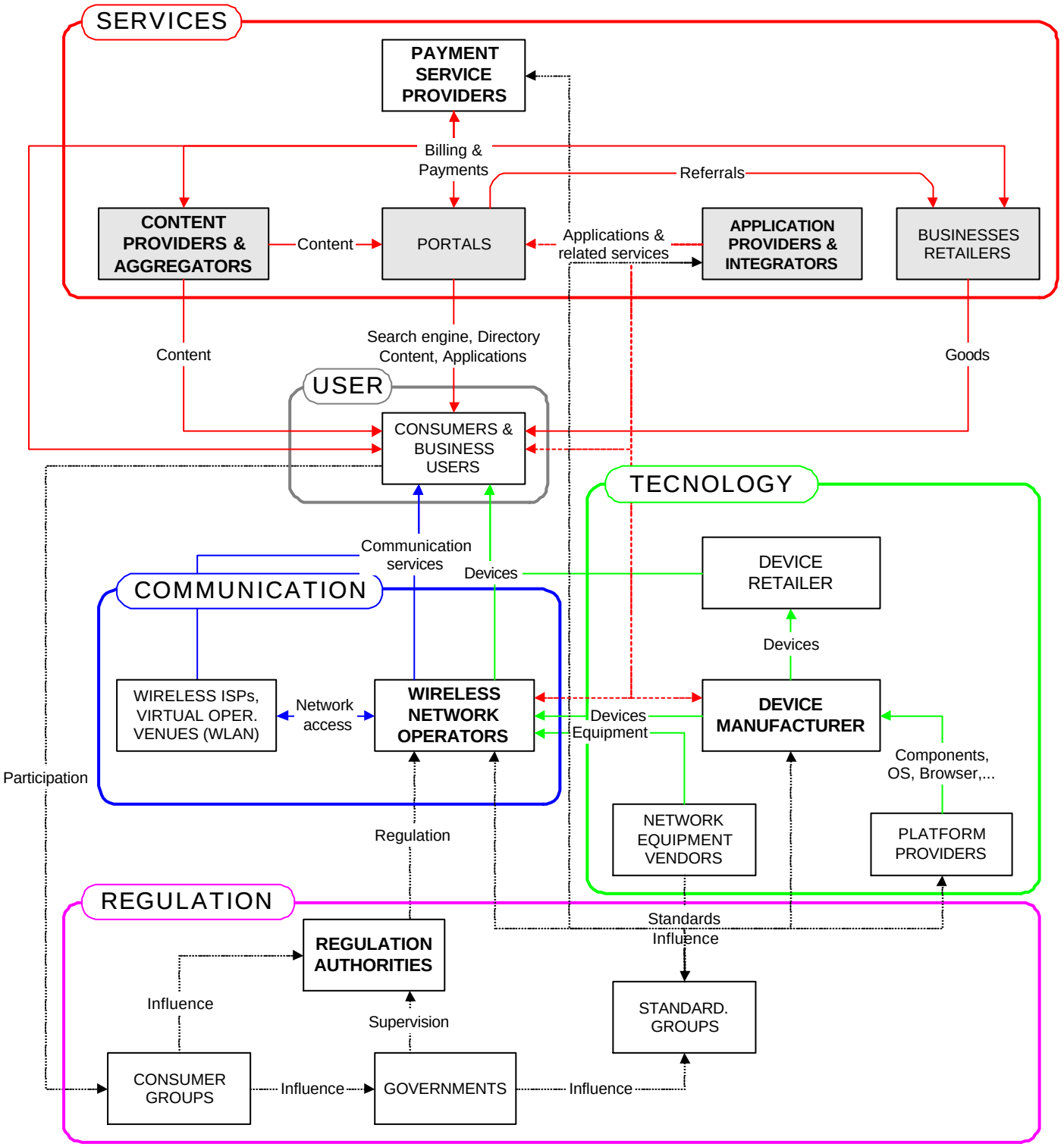
Petrovic, O., Kittl, C., Teksten, R. 2001, "Developing Business Models for Ebusiness", International Conference on Electronic Commerce, Vienna.

Porter, M. E. 1979, Competitive Strategy, Free Press, New York.

Rohlfs, J. 1974, "A Theory of Interdependent Demand for a Communications Service", Bell Journal of Economics, vol. 5, no. 1, pp. 16-37.

Slywotzky, A. 1996, Value Migration, Harvard business school press.

Stabell, C., Fjeldstad, D. 1998, "Configuring Value for Competitive Advantage: On Chains, Shops, and Networks", Strategic Management Journal, no. 19, pp. 413-437.

Tarasewich, P., Nickerson, R., Warkentin, M. 2002, "Issues in Mobile Ecommerce", Communications of the AIS, no. No. 8, pp. 41-64.

8. APPENDIX 1: WIRELESS ACTORS' MAP