MOBILE SEARCH, A CASE FOR NEXT GENERATION INFORMATION SOCIETY POLICIES

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Claudio Feijoo[1] , José-Luis Gómez-Barroso[2], Margherita Bacigalupo[3], Ramón Compañó[3]

[1] Universidad Politécnica de Madrid, Spain
cfeijoo@cedint.upm.es

[2] Universidad Nacional de Educación a Distancia, Spain
jlgomez@cee.uned.es

[3] Institute for Prospective Technological Studies, European Commission
margherita.bacigalupo@ec.europa.eu
ramon.compano@ec.europa.eu

Abstract

After more than a decade of development work and hopes, the usage of mobile Internet has finally taken off. Now, we are witnessing the first signs of evidence what might become the explosion of mobile content and applications that will be shaping the (mobile) Internet of the future. Similar to the wired Internet, search will become very relevant for the usage of mobile Internet. Within the mobile ecosystem framework, this paper will discuss if and how intense public action in the mobile search domain should (could) be. Potential actions refer both to 'conventional' and 'non-conventional' regulatory approaches. Public administrations as procurement bodies may leverage services and thus acting as early deployers of applications is an example of a 'conventional' case, while the use of the wealth of public data with high added value in mobile search scenarios would be one of a 'non-conventional' case. The paper will present a list of different policy options and analyse their feasibility. These include policies options aimed both at the demand side (user-oriented) and at the supply side (innovation-support policies, regulatory policies, industrial-type policies, …) of mobile search.

1. INTRODUCTION

The mobile base will reach nearly 5,000 million subscribers worldwide by 2012. By the end of 2013, broadband mobile connections will account for more than half of all connections and 40% of total subscribers are then expected to adopt mobile internet. Its emergence will support an explosion of mobile content and applications. Numerous examples could be mentioned: new

entertainment content produced and personalised for the mobile environment, productivity applications for mobile workers, or health and education mobile solutions to increase quality of life, since the mobile device is 'the mean to harness collective intelligence at the point of inspiration'.

Similarly to the wired internet, many of these new mobile web models will require access to data in an orderly and meaningful manner. Search engines, which are already gateways for more than half of the users connecting to the internet, will therefore become (are already becoming) the mean to reach appropriate content and applications and to provide additional value to services in mobile platforms. In addition, mobile search has unique features in providing added value in a number of environments. It exploits the fact that mobiles are very personal devices storing and regularly capturing data about the user, like the user's location, contact lists, preferences, etc. This enables context-awareness search services in current and future ambient intelligent environments (e.g. making use of wireless sensors and cognitive techniques). In short, search is likely to become equally or even more critical in the mobile domain than in the wired environment. As a result, mobile search is becoming, no doubt, an attractive expansion market for all types of existing players (web search engine providers, telecom operators, handset suppliers) and newcomers. It is a clash is many respects: different business cultures (ex-monopolists vs. com start-ups), governmental influences (highly regulated vs. non-regulated), business models (subscription-based vs. advertising-based) and the relationship between user and service provider (price-based vs. innovation-based).

From a policy point of view, the interest of decision makers with regard to mobile search is twofold. First, to set the basis for a framework where citizens benefit at most from future innovation and second, within this framework, to explore possibilities for European industry getting into the driving seat, so that value (and jobs) is created here. With this objective in mind, in this paper we will elaborate a analysis for Europe and extract some policy options for decision makers. For this, we will present the mobile search market structure and its actors, and identify the trends likely to influence the domain.

Throughout the paper the basic economics of mobile search will be presented, including a model for the ecosystem. In particular current downsides will be discussed: on the techno-economic side, there are multiple layers composed of competing, closed and non-interoperable standards, on the market side monetizing mobile search is a pending issue, and on the institutional side achieving a levelled playfield able to attract sustainable innovations is also a pending issue. In this respect, it will be noted that the European internal market is far from being established (e.g. roaming charges) and recent practices (e.g. applications stores) may maintain the momentum of incompatible silo models.

Further, the paper will discuss if and how intense public action in the mobile search domain should (could) be. Potential actions refer both to ‘conventional’ and 'non-conventional' regulatory approaches. Public administrations as procurement bodies may leverage services and thus acting as early deployers of applications is an example of a ‘conventional’ case, while the use of the wealth of public data with high added value in mobile search scenarios would be one of a ‘non-conventional’ case. The paper will present, finally, a list of different policy options and analyse their feasibility. These include policies options aimed both at the demand side (user-oriented) and at the supply side (innovation-support policies, regulatory policies, industrial-type policies, …) of mobile search.

2. THE MOBILE SEARCH ECOSYSTEM

The ecosystem metaphor is useful to describe the relationship of a considerable number of players interacting amongst themselves within a given environment and in which none of players controls the system completely; thus, both collaboration and competition occur at the same time. Today's mobile ecosystem is characterised –in general terms– by an increasingly intense competition at the mobile platform level (Pieter Ballon, 2009a; S. Ramos, Feijóo, González, Rojo, & Gómez-Barroso, 2004). With respect to previous periods, the focus of the mobile industry has shifted "from single-firm revenue generation towards multi-firm control and interface issues" (Pieter Ballon, 2007).

Feijoo et al (2009) propose a general model for any mobile content or application, which can be adapted also the mobile search case. The roles of players in the mobile search value network can be broadly divided into three main stages: information processing, delivery and capture/use/interaction. This three-layer structure is typical of ICT ecosystems (Fransman, 2007); it is developed in Figure 1 presenting the main activities that players can adopt. For each of the three main stages their major contributions to are presented in light grey boxes. The dark grey boxes highlight activities which could be considered new to mobile search. Figure 1 includes also the different phase of the mobile search evolution (light to dark blue underlying boxes): the initial on-portal approach (left), the subsequent on-device and additional 'input functionalities' (down), the mobile version of web search (right) and, finally, the context-aware search (up).

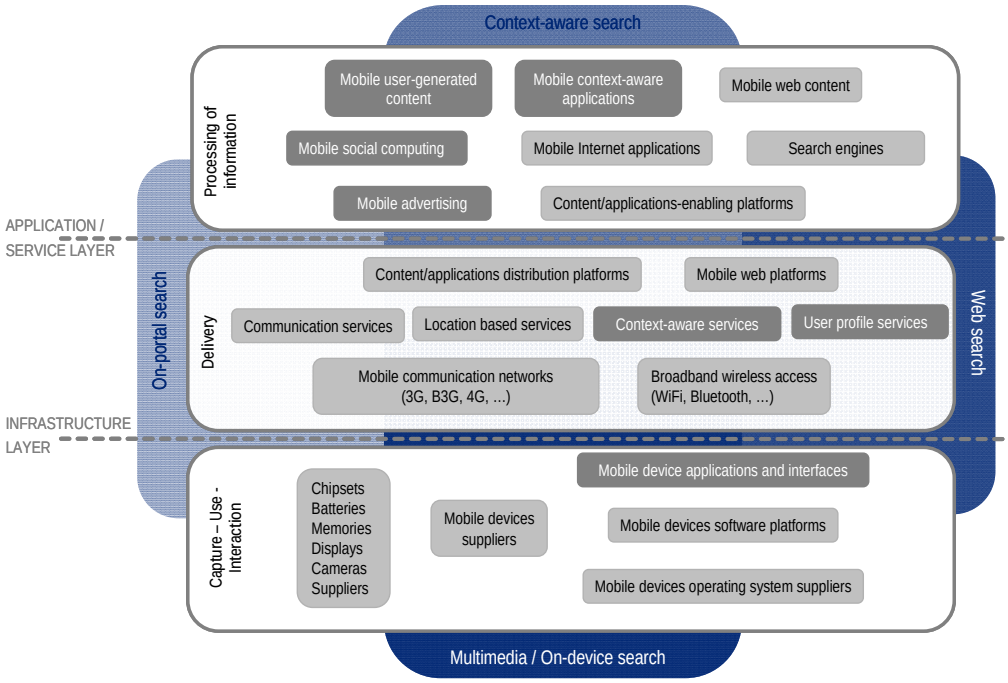

Figure 1: Activities and players in the mobile search ecosystem. Source: adapted from Feijoo et al (2009)

The mobile search provision to users requires the contribution of players carrying out most of the activities shown. Obviously some of these players will try, and eventually succeed in, integrating as many activities as possible for a tighter control of the value network. This strategy will result in a "platformisation" of the ecosystem, in which each player fights to shift the value towards the platform under its control, ideally including a "gatekeeper" role (Pieter Ballon, 2009b). Existing web search engines, including the necessary adaptations to the mobile environment, are one of these platforms where the gatekeeping role is mainly related to their favourable and unique position to act as a entry point for end-users to retrieve, subscribe and use content and applications (P. Ballon, Walravens, Spedalieri, & Venezia, 2008).

3. TECHNOLOGIES DRIVING THE EVOLUTION OF MOBILE SEARCH

From a general perspective, there are three main technology families that have a direct impact on mobile search: enabling technologies, search technologies (in general) and specific mobile search technologies, as described in Table 1.

	Technology	Keywords
Enabling technologies	Wireless networks	Broadband access ubiquity, dynamic spectrum management
	Sensor networks	RFID, internet of things

	Devices	Multimedia, location, interoperability, openness
	Cloud computing	Web browser, connectivity, security, data protection
Search technologies (general)	Semantic and multimedia	Enriched content search
	Cognitive	Environment understanding
Mobile search technologies (specific)	Context awareness	Context acquisition and processing
	Augmented reality	Enriched context awareness

Table 1: Technologies that have direct impact on mobile search. Source: own elaboration

Search technologies, for example for retrieving accurate and enriched content may include semantic approaches, cognitive approaches and multimedia retrieval. Specific mobile search technologies include technologies that render mobile data acquisition, its processing and its matching more context-aware, or that introduce augmented reality technologies to enrich context awareness. Finally, technology components that enable mobile applications include wireless networks (broadband access ubiquity, dynamic spectrum management), sensor networks (RFID, internet of things), devices (multimedia capabilities, location, interoperability, openness), and cloud computing (web browser, connectivity, security, data protection).

Interestingly, most of these technological building blocks are either already available or in an advanced prototype stage. However, they have not yet been used to any great extent in commercial services and applications. Thus we conclude that, in the short to medium term, there is no missing 'critical technological component'. Instead, the main technological challenge is to better integrate (existing) technologies. In other words, system integration and technological interoperability is the key to success, rather than the development of new “hard-core” search components.

With regard to the long-term prospects, system integration is particularly challenging, i.e. getting the necessary components operational for the next generation of mobile networks, 4G-type and beyond (arguably the most relevant enabler of mobile search). In addition, current and future networks will also be interoperable with other types of wireless networks such as near field communications for interaction with sensors.

4. SOURCES OF REVENUES IN MOBILE SEARCH

Using the above framework and compiling revenue models from available literature on the mobile web, applications, content and service models1, Table 2 summarises, from the authors' perspective, the revenue models that mobile search providers are using or could use. They are shown from the perspective of final users, and therefore, intermediate provision models (e.g., white labels, wholesale, brokerage, billing services, software development, hosting, etc) are not considered. The table includes an example usage scenario (later used for the experts' survey) to better indicate the level of their current existence in practice and their connection with the two main types of mobile search previously described. The fourth column in the table is an indicative of the new business models that context-awareness can bring and which are not present, in general, in the web-based type of search. The revenue models for mobile operators, hardware and software suppliers and other potential intermediaries are not shown in Table 2, although some of them could benefit indirectly from the adoption of mobile search. Finally, also note that the presented revenue schemes are not exclusive and could be complementary to each other.

This list highlights the expectations put on advertising and user profiling as main revenue models in mobile search. In the advertising model, typically the search results are provided free-of-charge to final users and the revenues are generated from third-party advertisers. Advertising models include several very different business strategies. For instance, there could be off-portal campaigns for certain categories of services, such as travel, restaurants, automotive, or consumer electronics. A traditional strategy consists in simply adding a banner on search results, usually including a direct response method as well (a link to a microsite, a click-to-call link, or a short code). This approach fits well, for instance, into events. As another example, click-to-call text links connected to search results is a simple way to leverage the voice capabilities of mobile devices. Off-portal keyword bidding – also called auctioning-, especially for marketers offering digital content, is another main example. Without exhausting all the possible options, ad campaigns for products related to what mobile operators offer on their mobile portals (ringtones, games, wallpapers, music, video, etc) is an example of on-portal

[1] The interested reader can consult Rappa (2007) for Internet web business models, Bowman et al (2008) for a general approach to mobile business models, several works of Ballon for specific aspects of mobile revenue models (Pieter Ballon, 2007; Pieter Ballon, 2009a; P. Ballon et al., 2008), Uglow (2007) for mobile content business models, Feijóo et al both for mobile content and applications models (C. Feijóo, Maghiros, Abadie et al., 2009; C. Feijóo, Maghiros, Bacigalupo et al., 2009; Claudio Feijóo, Maghiros, & Gomez-Barroso, 2008) and Ramos et al for the mobile operators approach to business models (S. Ramos, Feijóo, C., Castejón, L., Pérez J., Segura, I., 2002).

search. Each of these examples could be equally applied to the case of user profiling in exchange for providing the mobile search results.

Revenue model	Example of scenario of usage	Currently in use in general?
Pay-as-you-go (impulse purchase)	Travel	No
Premium services (basic functionality free)	Leisure	No
Value-added services (additional contract for services on top of conventional ones)	Productivity	No
Subscription	Well-being	No
Merchandising - Affiliation	Consumer goods	Yes
Packaged with the mobile device	Information	Yes
Packaged with the (voice, data) services of the mobile operator	Content	No
Packaged with some product or service not related with mobile ICTs	Health	Yes
Advertising in general	Information	No
Advertising linked with product placement	Additional value in purchase of goods	Yes
Exploiting user profile derived from mobile search for marketing purposes	Marketing	Yes
Maintained by user community (and free for final users)	Community	No
Public service (not a commercial one)	City planning services	

Table 2: Main revenue models for mobile search

The list also denotes the still largely unexplored potential of applications where mobile search, typically of the context-aware category, is the engine within. Mobile application providers are looking for business models to incorporate the revenue flow from the application itself, therefore departing from the traditional pay-per-download. There are different business tactics here as well. These can include time-based billing for services, event-based billing for specific situations or item-based billing as a function of the results obtained in the search.

The potential of advertising and value-added applications are both confirmed by industry surveys and consultancy firm's forecasts. A recent survey of innovative firms in the mobile

content and applications domain (Feijoo et al, 2009), reveals that 24% of the sampled firms do advertising, whereby pay-per-use / on-demand / pay-as-you-go is the most popular revenue model (17%), outnumbering by far the subscription model (6%). Also, the "secondary" revenue models of the Internet - brokerage, user profiling, merchant, community, affiliation - were relatively well represented in the sample (11%). Interestingly, some form of revenue sharing, mainly with the mobile operator, was considered by less than 1 in 2 companies in the sample (44%), and fewer than 1 in 4 are explicitly use “on-deck” strategies on the mobile operators' portals (22%). Market analysts (Chard, 2008) expect the advertising contribution to the total mobile search revenues to grow from 30% in 2009 to 40% in 2013, which is a revenue aggregate growth of 27% for the same period to a total of 4.8 B$. According to the Mobile Entertainment Forum (MEF), advertising revenue split ratios among players will likely be similar to those of the internet, with about one third for the search solution provider and about two thirds for the publisher; moreover, unlike the web, a residual percentage up to 10% will be available for other players in the mobile value network. Regarding value-added applications, market analysts (Holden, 2009) estimate global revenues from all categories of mobile applications at about 15 B$ in 2014.

5. EXPERTS’ SURVEY

The prospects of emerging technologies can be captured by foresight tools, such as Delphi, surveys and scenario building exercises (Georghiou, 2008; IPTS, 2010). Each such tool has advantages and disadvantages. Delphi techniques usually employ an iterative survey of expert opinions, normally aimed to facilitate the reach of some degree of consensus (Linstone & Turoff, 1975). Scenario based evaluation on the other hand allows to elicit opinions based on specific contexts of use, accounting for user's motivations and activities and allowing for an exploration of the role technology, business models and user perceptions could play in that context (Rizzo & Bacigalupo, 2004).

To this regard, the aim of the activity was not to reach a consensus on alternative and mutually exclusive predictive views or policy options. Rather the objective was to foster a multi-stakeholder prospect of mobile search, pulling together different opinions to help build a shared understanding of the complex relations that are shaping the evolution of this area. Therefore, scenarios were used to facilitate understanding on the prospects of mobile search by providing a common ground for answering the questions and fostering a debate with academics and practitioners with different expertise. For this reason a final round of discussion of findings face to face was considered.

The first round of the Delphi Exercise consisted in an online survey. In March 2009, we sent a questionnaire to 240 experts. 61 answers were collected, 27 from experts currently at industry and 34 from academia. The sample covered expertise in all necessary domains for the study. In particular, 41 respondents declared expertise in business/market development, 37 in user experience, 28 in technology, 12 in legal and 9 in regulatory issues.

The second round consisted in a face-to-face workshop, which took place in Seville (Spain) 14-15 April 2009. Nineteen (19) of the respondents of the first round survey were invited to take part, based on their field of expertise. The results of the survey (first round) were presented to the expert panel and ad-hoc responses to the presented results were recorded. Then a structured discussion was performed chaired by one the authors. Whenever necessary, supportive material was presented and critically analysed. Finally, both consensual results and diverging views were recorded.

The results obtained were threefold: a scenario building exercise (not presented in this paper), a SWOT analysis and a set of policy options. These two latter results are discussed in the following sections.

6. SWOT ANALYSIS OF MOBILE SEARCH FOR EUROPE

One of the main objectives of the experts' survey was to analyse strengths, weaknesses, opportunities and threats (SWOT) for the future success of the mobile search domain. SWOT analysis was originally designed as a tool to position a specific company with regards to its competitive environment. The results are typically inputs to the company's creative generation of potential future strategies. Ideally, it should be carried out by a multidisciplinary team that represents the broadest range of perspectives. SWOT analysis can also be used any decision-making situation when a desired objective has been defined, in our case successful development of the mobile search domain. In this paper we focus specifically on Europe.

Results from the SWOT analysis are presented and discussed. They are compared with similar findings from the overall search domain. For additional reference, some items that were more controversial or which were considered of secondary relevance, are briefly presented at the end of the section.

Main results from the SWOT analysis and discussion

The methodology for the SWOT analysis was the following. From the results of the Delphi first round and the face-to-face discussion, experts were asked individually to write down points they considered the most important one for each of the four aspects of the analysis (strengths,

weaknesses, opportunities and threats). Then they were asked to present them and to justify their choice. Once the round of the individual contributions was concluded, the panel set up a first list of topics comprising all items. Then, similar items were grouped using a commonly agreed nomenclature. This new list, served further discussion. Table 3 summarises the results of the SWOT that were agreed upon by the panel. Items not having full consensus, or reflecting only minority views are not included, are briefly summarized in Table 4.

EU Strengths	**EU Opportunities**
• Extremely high penetration of mobile technologies and critical mass of advanced mobile users • Industrial landscape strong (operators, suppliers…) and past success stories of co-operation • Main technological puzzle pieces in place (devices, networks, applications…) • Good research standards • Increasingly available and affordable mobile broadband connections • Increasingly available, affordable and usable mobile devices • Availability of content of higher quality for mobile use (geo, land-property registry, …) • Availability of public funded content (broadcasting…) • Multicultural background • Public awareness of privacy issues and increasingly focused laws and regulation	• Improving the integration between web/mobile/PC platform for a richer user experience • Existence of niche markets/services related to mobile search • Mobile search linked with local content (multicultural) • Partner with the experiences of mobile internet usage in developing countries • Be the first to put in place a new (regulatory) framework for API's-interoperability, privacy… • Create an open ecosystem for data portability among players and applications based on mobile search • Liberation of European public data for the creation of new services and applications • Use forthcoming disruptions (cloud computing, internet of things…) • Empowerment of the user for granular privacy and identity control internet of things debate.
EU Weaknesses	**EU Threats**
• Techno-economic and market fragmentation (data roaming, standards, application stores, convergent regulation, cultural diversity…) • Need for better / understandable / more secure pricing models and roaming charges in mobile broadband connections • Lack of interoperability and (open) standards • Uncertain strategies for revenue generation. Early state of development of business models • Strategic decisions on innovation and investments in (mobile) search are outside the EU • Search mostly dominated by global companies • Lack of entrepreneurship culture and framework for continuing venture capital action	• Delay of enabling technology developments • Increasingly fragmented market (silos, platforms, app stores…) and closed ecosystem (mobile search needs links and references with other domains) • Companies outside EU will control the developments in mobile search • Asymmetry of regulation among electronic communications, internet services and content regimes • Regulatory lag (spectrum management…) • Privacy and data protection issues not acknowledged and solved

Table 3: SWOT analysis main results

The SWOT analysis leaves a number of clear-cut conclusions.

On the demand side, Europe enjoys a large base of early adopters of mobile search and a huge mass of mobile users with the economic strength to demand and pay for advanced mobile internet services that satisfy their expectations and requirements. On the supply side, Europe's industry is able to provide users with all the required technology. The industrial tissue is strong and readily available in all required sections of the mobile search ecosystem and particularly strong in some parts of it (telecommunications, handset producers and software and application

providers). European companies have significant experience in past success stories (and failures) and, more important, they are increasingly pushed by the market, to simplify mobile tariffs and make them more affordable. Thus, a very positive conclusion is that Europe has both a strong supply and demand side in mobile search. Moreover, European industry is also actively involved in developing countries where mobile devices will become prime means to access the internet. This shared experience could become beneficial in both ways: spreading European innovations and learning from massive usage of mobile internet access.

One specific European asset is that Europe possesses a large collection of high quality information that may trigger advanced mobile search applications at the service of the citizens. Geo-data (e.g. cadastre), images and pictures (e.g. national libraries), or video (e.g. public broadcasters) are examples of data collections in the hands of public authorities, which have already been digitised to a very large extent, that could add significant value to new categories of mobile search. Note that most of this content comes from public sources and/or has been subsidised in the past by public institutions. It seems therefore that public administrations have not yet fully understood how they can exploit in the best possible way this value and how to get into various partnerships and collaborations to unlock its potential. The prospect of "liberation" of public data could also put governments into a favourable position to enforce an open and "loose interoperability" model to allow data portability across applications and players. Forthcoming disruptions in technology could help to deploy such models.

Finally, the many times used but also many times empty-of-practical application motto of "reaping the benefits of Europe's cultural diversity" could become true in the mobile search domain. Some of the most promising applications of mobile search pivot around local information, local culture and specific languages, which is supposed to be complemented by the emergence of many niche markets and services. Civil society is increasingly aware of the need to establish digital identities, which in turn sets the conditions for a stable and firm framework to develop mobile (search) applications, both appealing to users and respectful with them and their preferences and motivations. Europe could be the first to put in place such a light-handed and user-empowered regime that could shift the interest of global innovators in mobile search.

Still there are many challenges and barriers to be overcome. The current mobile ecosystem is largely fragmented in terms of both techno-economic models and markets. On the techno-economic side, there are multiple layers (devices hardware and software, applications, networks, development platforms, content platforms, etc) composed of competing, closed and non-interoperable standards. On the market side, the European internal market is far from being established (think on roaming charges, for example) and recent practices (applications stores) keep the tradition of silo incompatible models. Mobile broadband connections are still expensive, particularly in many situations where mobile search would have an extreme value for

users (such as finding places in foreign countries), high roaming charges dissuade users from even attempting to connect to the internet. Monetizing mobile search is also still a pending issue. Many business models are possible as discussed through the document (see Section **¡Error! No se encuentra el origen de la referencia.**), but none of them has yet crystallized as the winning one.

The mobile search market will remain to be heavily influenced by the web search engines. Given that the most influential ones have all their headquarters abroad, many of the strategic decisions that would influence the evolution of the domain are going to be taken outside Europe's frontiers. To compensate such an effect, a more supportive framework (cultural, institutional and business-like) for entrepreneurs and innovators in Europe would be needed.

The potential delay in the adoption of appropriate regulation regimes (electronic communications, spectrum management, content, consumer protection, etc) will slow the adoption of mobile search. In this sense, a stable, clear and forward-looking framework is desirable which would address the new issues coming from advanced mobile applications.

Finally, there is a risk of a mobile digital divide. Next generation mobile infrastructures may not reach some geographical areas in the short to middle term and the prices both of devices and mobile connections are not affordable for many citizens. Also the skills and physical capabilities to use a mobile device in a search scenario need to be further addressed.

In summary, the main messages raised from the SWOT analysis are:

- Availability and affordability of mobile broadband connections is the main enabler of mobile search. Europe has a good position in this emerging market and several key industry players are well prepared, but a number of issues remain to be solved to this regard: market fragmentation, roaming charges, mobile digital divide, interoperability and institutional and regulatory framework.

- An open ecosystem for mobile search is desirable for innovation to thrive. This openness refers to the adoption of open standards and to putting in place a “loose interoperability” concept similar to that of web 2.0 solutions.

- There is an ample role for public action in the mobile search domain. Potential actions refer to the “conventional” regulatory approach but also, and maybe more relevantly, to the use of the wealth of public data with potential high added value in various mobile search scenarios. The role of public administrations as deployers of applications could be the key, since they are the natural playfield for the convergence of the many stakeholders involved in mobile search applications.

- Users have a definitive role to play in the success of mobile search applications. They ought to contribute to innovations but they also need a granular and easy control of their mobile digital identities and personal data.

Finally Table 4 summarises some additional results of the SWOT analysis. These particular results were either highlighted by some of the experts, in spite of not reaching a complete consensus, or were thought of secondary relevance but somewhat important.

EU Strengths	**EU Opportunities**
• Internal market provides a coherent information space • Comparatively high ICT adoption and literacy in general with comparatively high income levels • Availability of new devices with new interfaces. • Young people use new mobile services extensively, and have strong virtual community feelings	• New ways of advertising (non intrusive, highly targeted) • European champions • Telecommunications industry (operators and suppliers) abilities and position. • Leap frog evolution from online internet thinking to mobile services thinking
EU Weaknesses	**EU Threats**
• Some technologies (i.e., NFC) are not reaching the market • Lack of trusted third party metrics for interested players in mobile search (advertisers, service providers, …) • Lack of critical mass in mobile search, low penetration of advanced mobile devices and low usability of them • Low capacity of marketing innovation and market developments slower than US/Asia • Context-aware technologies not developed • Weak innovation track of mobile operators • Lack of consideration of user value, no seamless user experience and little user need in mobile search • No tools for user management of personal data • Social expectations – technology provision imbalance • Weak regulatory regime for (mobile) content • Asymmetrical regulation operators – search providers • Context aware technologies not fully developed • Closed markets for technology and business development	• Reduced consumer spending in economic crisis • Intergenerational digital divide (intergenerational) • Security of new mobile applications • Risks of data theft • Data ownership/data portability issues • Difficulties for data aggregation • Fear of mobile network operators of being relegated to "dumb pipes" • Slow pace of progress/execution

Table 4: SWOT analysis additional results

The vision that emerges from these additional results is the early stage of development (technical, market, regulatory) of the domain, the controversy about the role of the existing industries in the new mobile applications domain and the huge barriers for use of data belonging to different domains (user, public, internet) in a seamless experience.

7. POLICY OPTIONS

The methodology followed for the policy recommendation has been the following. The authors explored possible policy actions at the EU level. This list of actions was appropriately introduced in the survey to receive feedback from the respondents. The proposed actions were discussed with the experts in the Mobile Search Workshop (Seville, April 2009), with the aim to

arrive at a minimum consensus on the policies more feasible and with a higher positive impact in the mobile search domain ("prioritisation"). A methodology for "convergence" of the discussion was used. The policy recommendations were re-elaborated following the workshop results and additional consultation with experts by authors of the report. The main potential policy actions are presented and discussed.

The list of potential policy options that were considered in the prioritisation exercise is presented below, grouped in relevant areas of action:

- User-oriented policies aimed at the demand side of mobile search (policy options U):
    - Enhance user-awareness of opportunities and risks (policy option U.1)
    - Create (policy-push) tools for user empowerment, i.e., for granular management of privacy or electronic identities (policy option U.2)
- Innovation-support policies (policy options S):
    - Supporting innovators and entrepreneurs through an improvement of the institutional framework, i.e., access to venture capital, taxes, education, etc (policy option S.1)
    - Promoting living labs, in particular, for mobile applications and open access to them (policy option S.2)
    - Promoting research projects focused one missing technologies and enablers, i.e., FP-type (policy option S.3)
- Regulatory policies (policy options R):
    - Reforming the mobile search regulatory framework, i.e., in electronic communications, e-commerce, privacy, consumer rights, etc (policy option R.1)
    - Promoting self regulation of the mobile search industry, i.e., codes of conduct (policy option R.2)
    - Harmonisation and enforcement of EU internal market (policy option R.3)
    - Mandate data portability suitable for mobile search applications (policy option R.4)
    - Creating and enforcing an independent agency, i.e., a watchdog for mobile data usage (policy option R.5)
- Industrial-type policies (policy options J):
    - Promoting standards and interoperability (policy option J.1)

- Promoting content production suitable for mobile search (policy option J.2)
- Supporting a European champion in mobile search (policy option J.3)
- Setting up a multi-stakeholder platform (policy option J.4)
- Helping accelerate the deployment of 4G mobile broadband infrastructures (policy option J.5)

- Public involvement in the supply side of mobile search (policy options P):
  - Development of mobile search public services, i.e., for cultural purposes in cities (policy option P.1)
  - Public procurement, i.e., public administration as buyers and users of mobile search applications (policy option P.2)
- No public involvement at all

0 shows the result of the discussion to prioritise potential policy intervention. It positions the policy options with respect to their relative importance to the mobile search domain in Europe and the feasibility to put them into practice. Policies in the upper-right quadrant are considered candidates to be implemented.

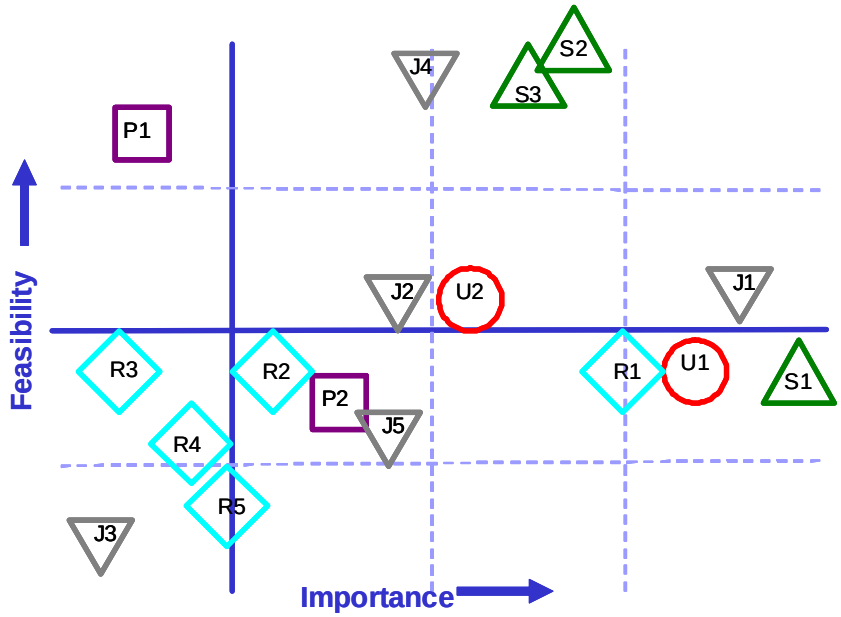

Figure 2: Policy options for the mobile search domain, positioning the options with respect to their relative importance to the domain and the feasibility to put it into practice. The nomenclature is described in the text.

The overall vision on policy action is very balanced among the different possible options or, in other words, it is regarded that the mobile search domain requires a combination of different

types of policy actions to thrive and succeed and the experts do not think that a sole type of policy will suffice to achieve this aim.

Looking in detail into each of the potential policy measures, in the first place, there is a need to impel the demand side of mobile search, raising the awareness of users and then empowering them with the tools to manage their data.

This should be complemented with reinforcing all polices aimed at innovation: from the support to innovators and entrepreneurs, to the use of living labs and the more traditional research programs.

On the regulation side, it is considered that the existing frameworks should be quickly reviewed and adapted to the new needs of advanced mobile applications., However, there is no much faith amongst experts in the self-regulation of the industry or in other actions beyond the regulatory framework like specific agencies or decisions.

From the industrial policy perspective, the idea of promoting the use and adoption of open standards and the achievement of a reasonable level of interoperability, including, if needed, a platform to gather all the stakeholders involved has considerable support by the experts. Helping to develop content for added value mobile search is also highly regarded. However, it is thought that neither supporting a European champion in the mobile search domain nor forcing a swifter deployment of 4G-type mobile communications infrastructures would be helpful.

Finally, it is thought that for some niche mobile search applications public administrations can have a leading role, setting the conditions for their deployment or even becoming their providers.

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