111823/EU XXIV. GP
Eingelangt am 18/04/13

**COUNCIL OF THE EUROPEAN UNION**

**Brussels, 18 April 2013**

**8627/13**
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**TELECOM 78**
**IND 109**
**MI 303**

**COVER NOTE**

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| from: | Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director |
| date of receipt: | 11 April 2013 |
| to: | Mr Uwe CORSEPIUS, Secretary-General of the Council of the European Union |
| No Cion doc.: | SWD(2013) 142 final |
| Subject: | COMMISSION STAFF WORKING DOCUMENT Strengthening the environment for Web entrepreneurs in the EU |

Delegations will find attached Commission document SWD(2013) 142 final **(Part 3 of 3)**.

Encl.: SWD(2013) 142 final **(Part 3 of 3)**

EUROPEAN
COMMISSION

Brussels, 11.4.2013
SWD(2013) 142 final

Part 3 of 3

# COMMISSION STAFF WORKING DOCUMENT

## Strengthening the environment for Web entrepreneurs in the EU

**COMMISSION STAFF WORKING DOCUMENT**

**Strengthening the environment for Web entrepreneurs in the EU**

# Contents

# ANNEX III (part 2)

## 2. WEB PLATFORMS AND THE INTERNET ECONOMY

### 1.1. State of Play in the European Internet Economy

*Key Findings*

A significant and growing portion of economic growth in Europe and elsewhere can be attributed to the Internet[1] with some countries such as the UK and Sweden leading the way internationally with over 5% of GDP coming from the Internet[2]. With an estimated Internet population reaching nearly half the world population in 2016, the importance of the Internet for European Economies will only grow.

Software and Content based services, the business of *web entrepreneurs*, represent a small but fast growing segment of the Internet Economy. Cloud computing (5.8B) generated the bulk of direct web services revenues in 2010 followed by Games (2.3B). Advertising income is mostly generated through search (6.5B) and online press (1.5B).

Web services in Europe exhibit double digit growth in terms of the number of businesses, users, revenues and offerings. Direct revenue growth is highest in eBooks, paid services for Social Networks and mobile apps.

However, with the exception of games, the EU is still trumped by the US in nearly all segments of the Internet Economy in the revenue generated with web applications and services.

#### *1.1.1. Internet is mainstream*

The World Wide Web has rapidly become the prime way to access and publish services and content with available web based applications. It is rapidly expanding and is now at the core of the digital life and even occupies a key part of daily activities (offline and online). The Web is now truly in the mainstream of life in advanced countries, where more than 80% of people use the Internet.

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[1] 20% on average between 2004 and 2009 according to OECD estimates.

[2] Internet matters, McKinsey (2011)

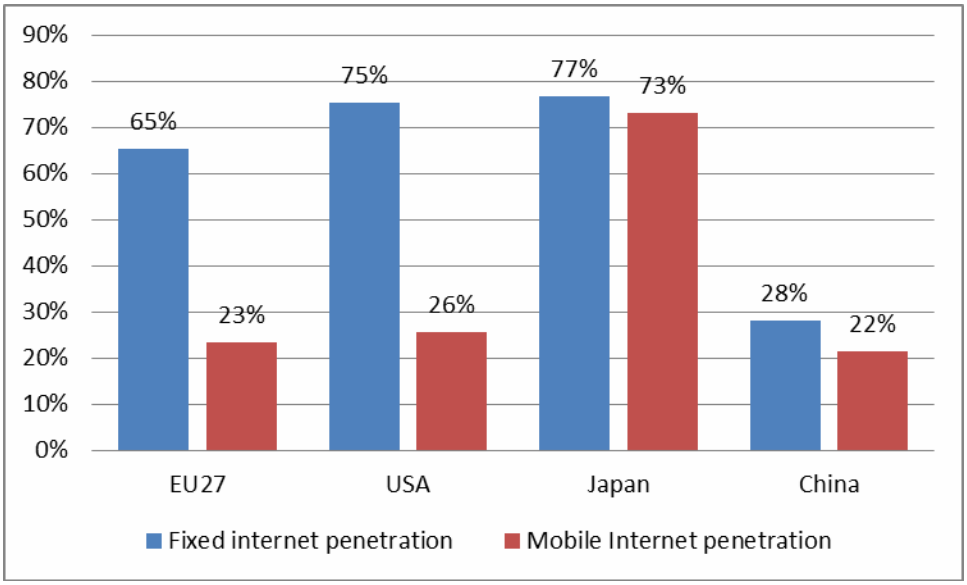


*Table 1: Fixed internet penetration in 2010. Source: IDATE, in "World Internet Services Market", June 2011. (Fixed internet penetration = Fixed internet users / population)*

Through connections with the Web and other applications, the Internet attracted around 1.5 billion active users in 2010 worldwide. Production and consumption via these platforms and services is likely to be boosted further still, thanks to the mobile Internet spurred especially by the rise in traffic coming from emerging countries. There are more than 300 million Internet users in Europe, more than in the USA, but less than China in 2010.

The use of the Web is intensifying, with it serving both as a competitive medium and entertainment centre as users are spending more and more time on the Internet (3 to 8 hours per week in Europe). Internet is also as a major tool for communication, to shop for goods and services, to discover new information, to organize, to define and publish services, to contribute and participate. The web enables the same key services that already existed offline (communications, commerce, practical services, and consumption of content) with often better performances. But it also allows for new services with a much greater scale. While many services are now popular, only a few ones are really mass market: search, email, e-commerce, social networks, online video; plus information such as news and maps.

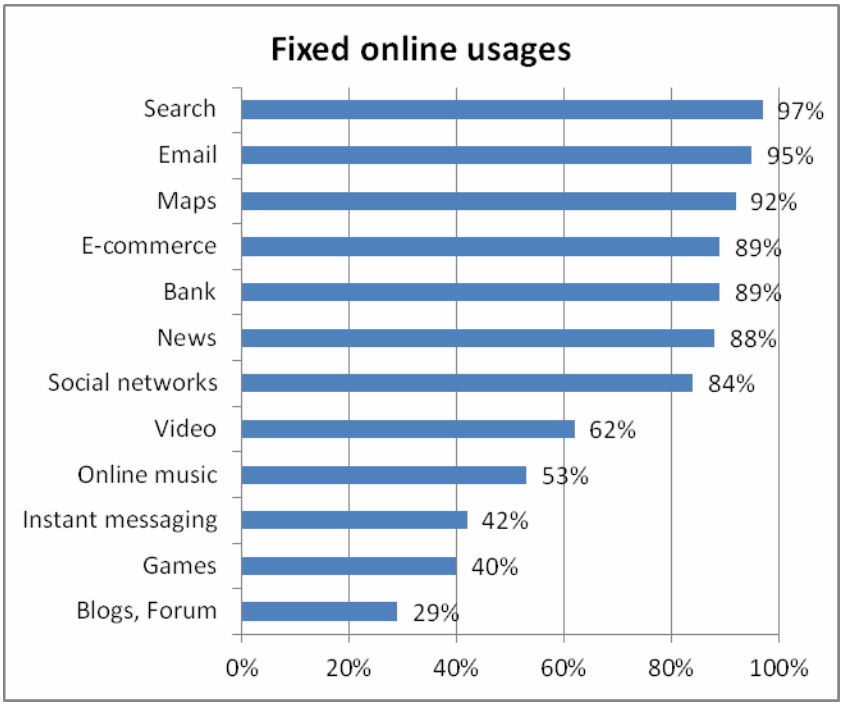


*Figure 1: Fixed Internet usage. Source: CDC Survey, scope:France, 2011*

These are the ones to generate adequate revenue, leading to a concentration of the players. Business models rely heavily on online advertising, through sponsored links, search advertising, and e-commerce sales. *A select number of Internet giants dominate the monetisation of services*. While emerging technologies may come from new players, future developments will most likely benefit the macro players that already control the revenue streams.

Google remains the global reference, thanks to the success of its search engine and the main areas into which it has branched out (video, mobile OS, etc.), in some cases through acquisitions (YouTube, Android, AdMob, Keyhole…). Aside from local players in certain Asian markets (e.g. Sina, Baidu and Tencent in China), Google's chief rivals are no longer just Yahoo! and Microsoft – which nevertheless remain prime challengers in terms of revenue – but rather, and increasingly, Facebook, Amazon and Apple.

The biggest social networking site on the planet, Facebook continues to be a highly coveted property, and is now the website that represents the most time spent online and the most popular mobile application. Plus users are able to access more and more applications without leaving their Facebook page and can now pay from within the Facebook platform.

Meanwhile, Amazon has managed to expand its footprint from physical goods to digital ones (including books), and especially to third-party services and tools based on their platform (cloud infrastructure, payment solutions, etc.).

Finally, Apple capitalized on its devices, mobile platform and iTunes store by creating content and apps for its iPhones, iPods and iPads. It is likely that their role increases further with the launch of the company's own advertising service (iAd).

### *1.1.2. Internet platforms*

In addition to standalone services, all key players operate platforms to leverage their position on the open Web. Internet platforms play an increasing role in the way the Web is structured. An Internet platform is both a hub of services for the end-users and the manager of a set of tools for third parties to develop additional services to be used inside or outside the platform:

- inside the platform: part of the destination web site (generally the one of a major player) can be used by a third party to provide applications, contents and services, with direct access to the eyeballs of the destination web site. Traffic remains within the destination website, seen as a container (at least from the end-user point of view).
- Outside the platform: providers of the platform offer APIs and tools for getting their services used outside their own web site on 3rd party platforms. API (Application Programming Interface) allow to reuse data in the context of other websites. This is a key trend on the web with programmable web, in which players combine different APIs to build a new service. APIs are typically used around search or map mash-ups, digital identity (Facebook Connect, etc…). Internet platforms can be built on very different core services: search (Google), social networking (Facebook, LinkedIn), content (YouTube, Yahoo!), communication (Microsoft), ecommerce (Amazon), digital content (iTunes) and aim at becoming the Web's main point of entry aggregating the largest number of services.

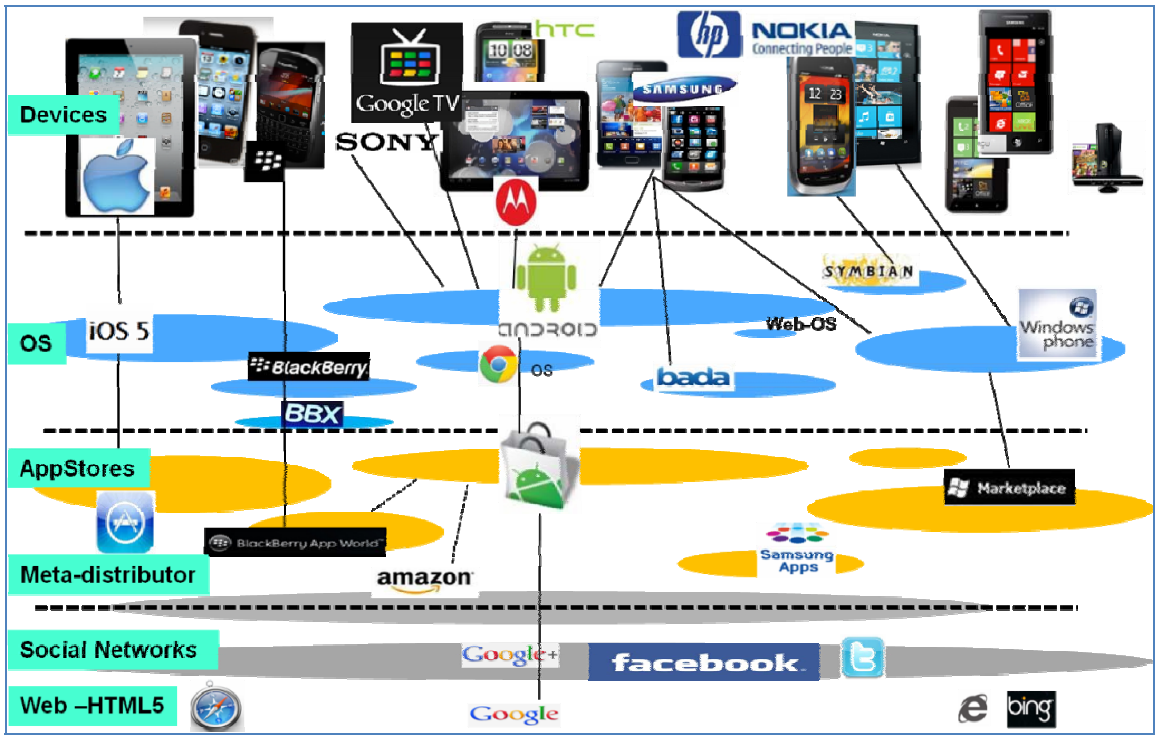


*Figure 2: Internet Platform landscape. Source: IDATE*

Opening up to other players creates large platforms that collect additional data through third-party services. Numerous efforts led by Internet giants are falling into that approach:

- development of widget platforms (such as Facebook Platform, Open Graph and Open Social)
- development of ID systems (typically, Facebook Connect and MySpace ID)
- development of cloud platforms (including AppEngine, EC2 and S3)
- development of structured results (notably Monkey)
- development of software and platforms to attract developers on the mobile Internet (of the likes of App Store and Android)

Despite the variety of services on offer and their different approaches, all of these players primarily work to monetize their massive databases (containing personal and other data) to achieve more streamlined targeting and product recommendations, or to upsell online shopping solutions. Internet Giants focus on the monetization of data through killer apps inventory/services, generally using an adapted and scalable infrastructure (mostly closed) and a big focus on improving core services through selected acquisitions or internal closed R&D.

To accelerate the development of inventory and income, Internet Giants use open innovation strategies: getting more data from users or from other websites through platforms and APIs; more direct revenues by larger exposure bringing additional traffic and audience; and improving core services monetization through the exploitation of new data.

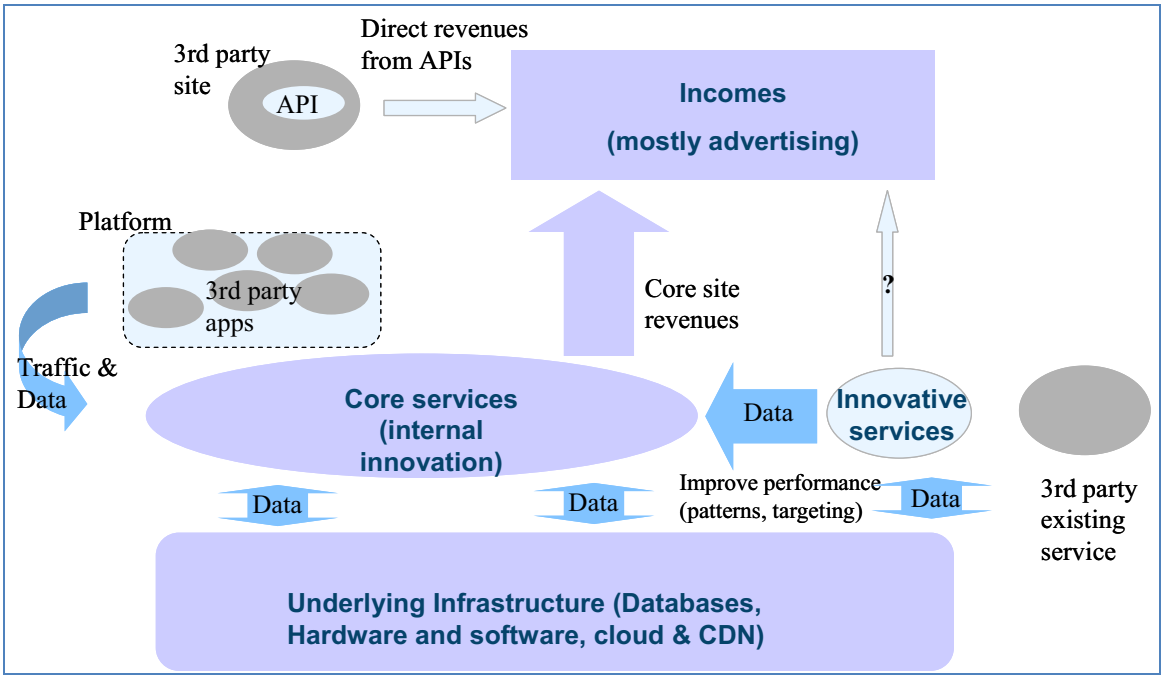


*Figure 3. The monetization scheme of Internet Giants around APIs and platforms. Source: IDATE*

Internet platforms follow either a proprietary or open approach, with data portability on the one side and platform interoperability on the other. Whereas Facebook or iTunes keep control of the users' personal data, Google, being a challenger in that space with less personal data, tends to favour the portability of data.

As the number of users is the first incentive for third party service providers to be available to end-users though a platform, the major US players in the field of search, content, social networking or commerce are in a position to extend their leadership from their original core business to become universal gateways.

### *1.1.3. Structure of the Internet Industry*

Our analysis of direct Internet markets and industries only counts services which would have no value without the Internet. A web page without Internet is obviously useless, while a connected car can still be driven if there is no connectivity. In the former case, we will take into account the whole value generated by the web page (around paid services or advertising), while in the latter case only the value-added service will be taken in account. For software and digital content, as the marginal cost is zero, we can take in account all associated revenues. We will call the value added generated through Internet the *Internet intensity*, i.e. the share of revenues that can be associated directly with Internet.

While a key part in the traditional definition of the Internet services, E-commerce will be taken into account but treated separately as most of the value is associated with the sale of the product or service itself (a book, a car, an airplane ticket), including related help-desk services thus replacing many existing labour forces via self-service. Only the value-added provided by the Internet sale should be taken in account.

The Internet industry and markets can be divided in three main building blocks:

- *Software-based services and applications* (or Internet of Services, Software as a Service): all activities based of the delivery of raw data or software (tools, games, system, etc…). This corresponds mostly to revenues coming from Paid-Web Based or Advertising as defined in the EC study on Economic and social impact of Software and software based Services[3], but excludes all other forms of revenues (i.e. packaged software and IT services). Major contributors in this segment are cloud computing (with both software as a service and infrastructure as a service), online games and some consumer web services. Most of those activities are generally made available through the World Wide Web, but more and more services can be accessed directly with widgets, thin clients - where the bulk of the data processing occurs on the server, 'apps', or direct integration into databases. Obviously, not all the software industry should be accounted, end-user software licences or IT services will be excluded. Most of the revenues of social networking services are accounted in this category, as a form of communication service based on software.
- *Content-based services and applications* (or Networked Media, Content as a Service): all activities based of the delivery of digital content (TV, video, press, book, radio, music) based on IP technologies through the open Internet (web, widgets). The content delivered can be either through streaming or downloads. Obviously, not all the media industry should be accounted, as content delivered through other channels (DTT, DVB-H, physical products…) should be excluded. Controlled IP channels of telecoms (IPTV, etc…) are also out of scope. Online video (paid or free, fixed or mobile) is expected to represent a major

[3] Economic and Social Impact of Software & Software-Based Services, EC Study, August 2010. http://cordis.europa.eu/fp7/ict/ssai/docs/study-sw-report-final.pdf.

contribution, but all media and cultural content are considered (ebooks, online music, etc…).

- *Access-based services and applications* (or Internet connectivity, IaaS: Infrastructure as a Service): all activities based on network infrastructure that provide connectivity of end-users to the Internet. The associated networks can be either wired (copper, cable, DSL, fibre, etc…) or wireless (GSM, CDMA, 3G, LTE, WiMAX, WiFi, satellite, etc…). Those activities are generally considered as 'traditional telecommunications'. Obviously, not all the telecommunication industry should be accounted (for instance, traditional analogue voice or SMS, which are making most of the revenues of mobile operators, are excluded from the scope). End-users can either be humans using dedicated devices (PCs, mobile phones) but also machines or other objects (M2M communications, Internet of things). *This building block is outside the scope of the study, but figures will be reviewed for comparison.*

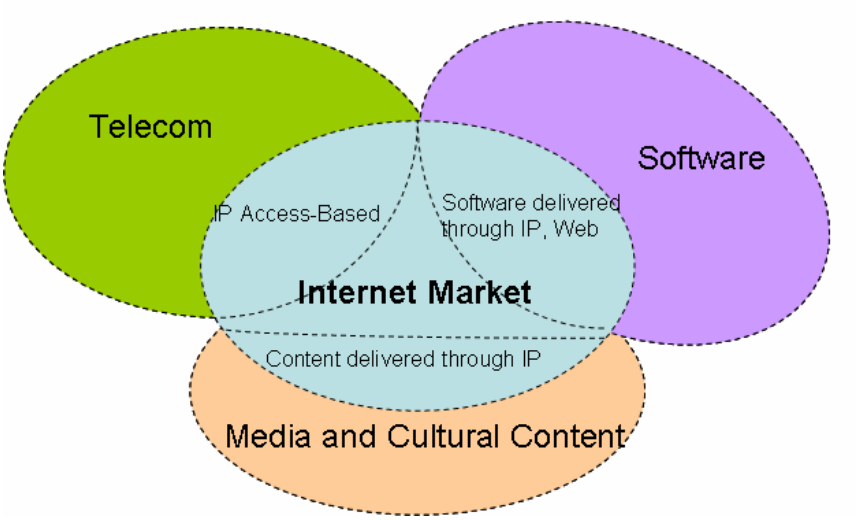


*Figure 4. The internet industry. Source: IDATE*

A fourth additional block, *e-commerce of non-digital content*, also needs to be considered when analysing Internet markets. However, it cannot be put at the same level as the other market segments because it includes both revenue from the intermediation *and* revenue linked to the product/service delivered. That second revenue is already counted in traditional sectors. Nevertheless, e-commerce is already big in terms of revenues and a major contributor to the Web industry. Indeed, e-commerce players are favouring online for their advertising campaigns (faster and better return on investment) and are very often the first users of advanced web technologies.

We, therefore, define the open web market as the sum of the following markets:

- Software-based services and applications, which include SaaS/cloud computing, web services, but also Internet of things services or mobile software
- Content-based services and applications: online content, mobile content (both free and paid)

Access-based services (or Internet connectivity,) and E-commerce will be considered for comparison only, as explained above. Only the E-commerce value-added directly provided by the Internet sale is included in the definition above.

| **Segmentation of Internet markets** | | **Direct revenues** | **Advertising revenues** |
|---|---|---|---|
| Access based | | | |
| | Fixed Access | ● | |
| | Mobile Access | ● | |
| Software-based services and applications | | | |
| | Search | | ● |
| | Paid mobile application[4] | ● | |
| | SaaS / Cloud computing[5] | ● | |

[4] Including mobile games. But no double counting when looking at total paid revenues.

| | | | |
|---|---|---|---|
| | Games | ● | |
| | Social Network | ● | ● |
| Content-based services and applications | | | |
| | Video (OTT)[6] | ● | ● |
| | Press | | ● |
| | Music | ● | |
| | E-book | ● | |
| E-commerce | | ● | |

*Table 2. Segmentation of the Internet Industry. Source: IDATE*

The EU market indicators are benchmarked with data from the USA, China and Japan, because:

- USA is clearly the leading country for the Web, especially on software-based services and applications. All Internet giants are coming from USA (Google, Facebook, Apple, Amazon, etc.)
- Japan is the leading country for mobile Internet and related mobile Web. Like in Europe, US-based players dominate some of the web markets, but Japan has also its own leading players, especially on games and mobile related markets (Mixi for social networking, Mobagetown, etc.).
- China is an emerging economy with already strong Internet penetration (both fixed and mobile) and some interesting level of advertising revenues. Also, China has its own ecosystem of players, which dominate their home market (Sina, Baidu, Sohu, Tencent/QQ).

[5] Only professional SaaS and cloud computing. Consumer side of this market is reflected in other sub categories.

[6] Fixed video only, meaning delivery of videos through fixed Internet. Also includes delivery on mobile devices through Wi-Fi.

### *1.1.4. Data sources*

Market data come from various third party sources (industrial and services players, government agencies, surveys, professional associations or syndicates, other consultancy institutes) in addition to IDATE publications (World Telecom Markets, World Internet Services Markets and World Television Markets) published every year.

| Type of data | Sources used for market data |
|---|---|
| Access | Operator's financial results<br>NRA reports |
| Search | E-marketer, Zenith optimedia, IAB, Nielsen, Dentsu |
| Social Network | Comscore, |
| Mobile Apps | Comscore |
| Music | IFPI, Price Waterhouse Cooper |
| Cloud | PAC |
| E-commerce | Us Census Bureau, Red.es, CMT, FEVAD, Ministry of Commerce Japan |

*Table 3: Sources by type of services*

### *1.1.5. State of the EU Internet Market: Internet revenues in 2010*

Regarding internet revenues on the whole, e-commerce is the main source of revenues on the web, with over 200 billion EUR in 2010 in EU27 and the USA. However, the percentage of this which can be attributed to Internet revenues as defined for this study is much lower. The second source of revenues comes from access based services which accounts for 46.6 billion EUR in Europe in 2010. Revenues for web services and applications are lower: online advertising represents just shy of 11 billion EUR in EU27, behind the USA (more than 15 billion EUR). Paid services such as cloud computing, games, and contents represent a similar figure of 10 billion EUR in Europe, also behind on the USA. *On the whole, both services (advertising + paid services) account for 22 billion EUR in Europe, against 33 billion in the USA*.

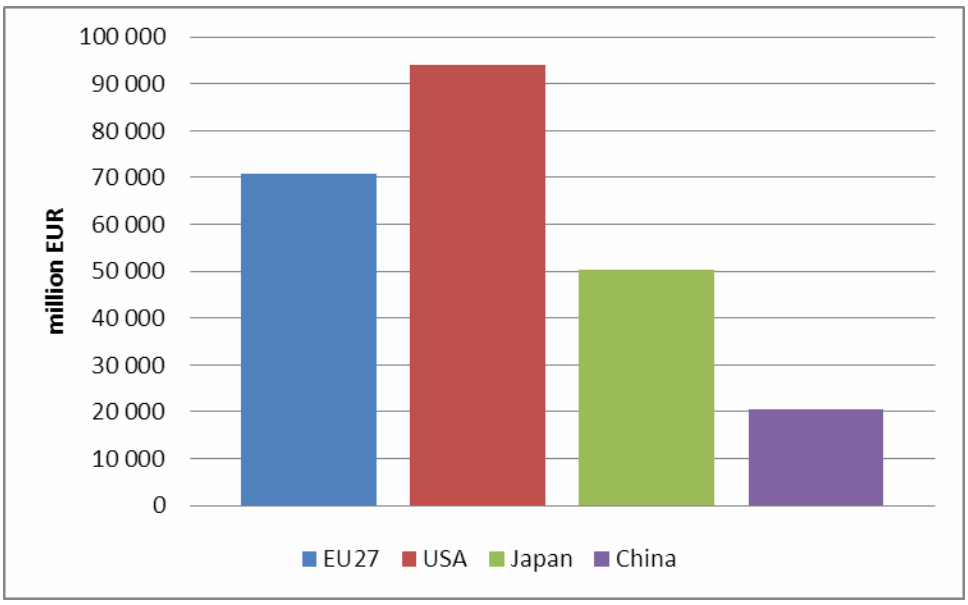


*Table 4: Internet revenues – 2010. Source: IDATE*

### *1.1.6. Internet access revenues*

- On fixed internet access, Europe tops USA, with nearly 30 billion EUR of revenues in 2010.
- However, in the United States and Japan, the *mobile* internet market is more advanced. In Japan, the industrial structure with consortium including telecoms operators, manufacturers and banks has favoured the development of mobile internet usages and revenues.
- China is still an emerging market regarding internet access.

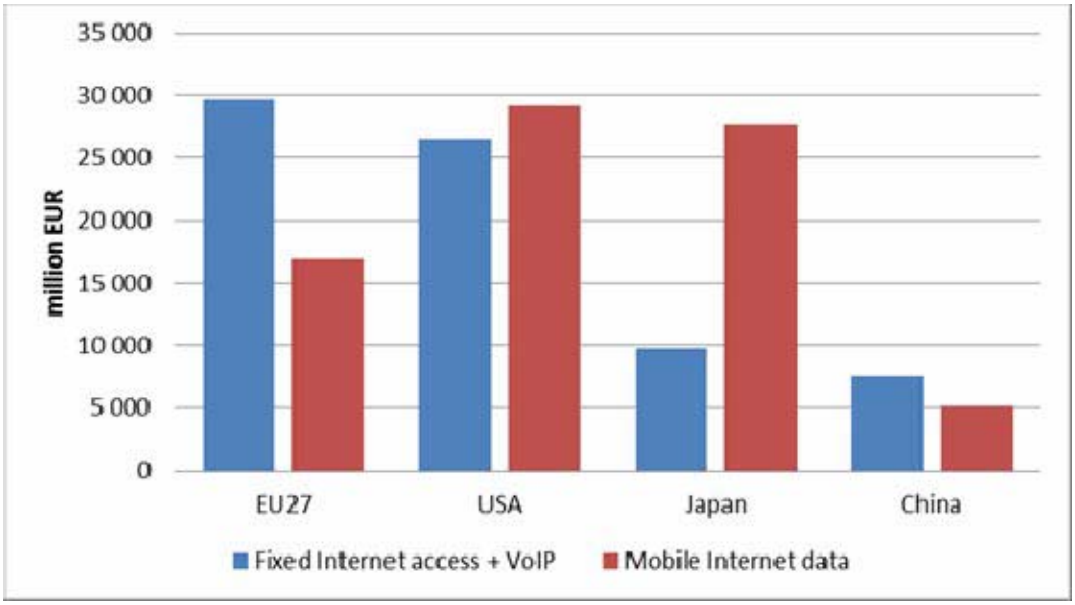


*Table 5 Internet access revenues – 2010 Source: IDATE*

### *1.1.7. Advertising revenues*

The main stream of advertising revenues relies on search platforms, whatever the geographical zone: 6.5 billion EUR in EU27, and 8.5 billion EUR in the USA. Press is another driver for online advertising (respectively 1.3 and 2.9 billion EUR for EU27 and USA). Social networks and videos have also significant weight, especially in the USA.

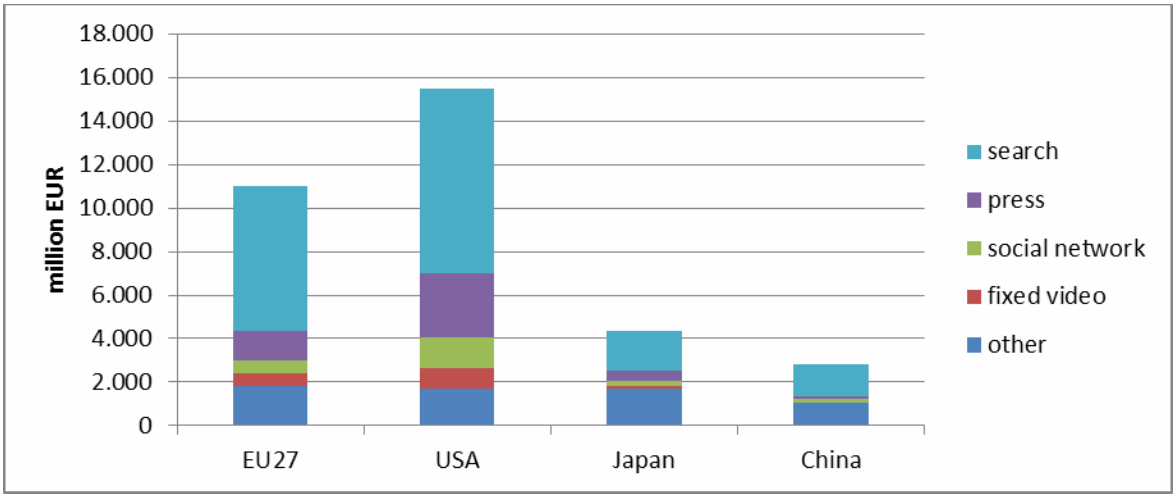


*Table 6. Advertising revenues – 2010. Source: IDATE, video revenues not available for China*

### *1.1.8. Paid services and applications revenues*

Regarding paid services, Cloud computing represents the main stream of revenues, especially in the USA. Games (for fixed we include mobile games in the mobile apps category) are also an important source of revenues, and for once, Europe is ahead the USA, with 2.3 billion EUR in 2010, compared with 1.8 billion EUR in the USA.

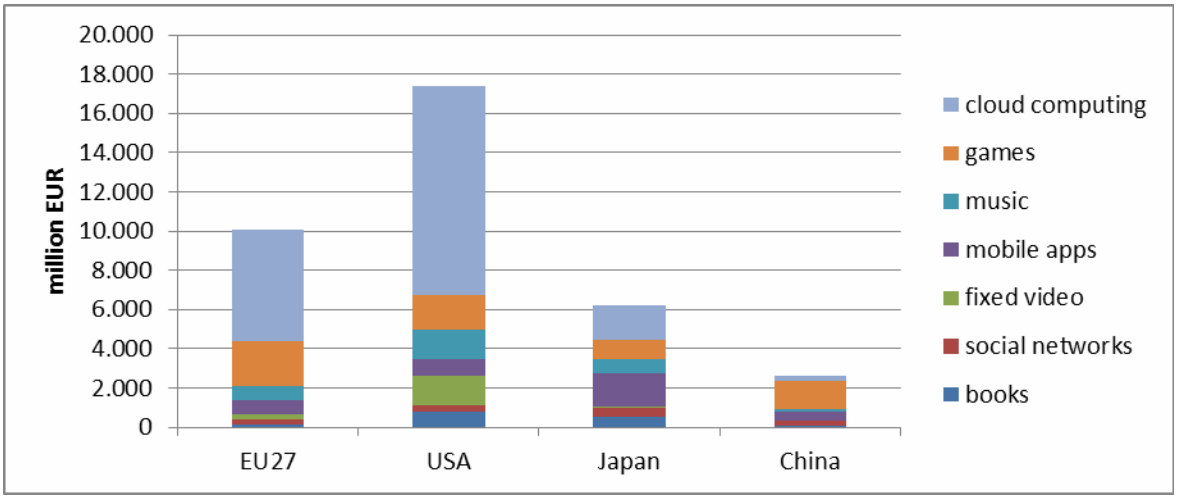


*Table 7. Paid services & applications revenues – 2010. Source: IDATE, video revenues not available for China*

The difference in revenue per Internet user is even stronger between USA and Europe:

- 17.5 EUR per user per year in Europe, versus 45.7 EUR in the USA for cloud computing
- 2.7 EUR in Europe versus 10.5 EUR in the USA for video

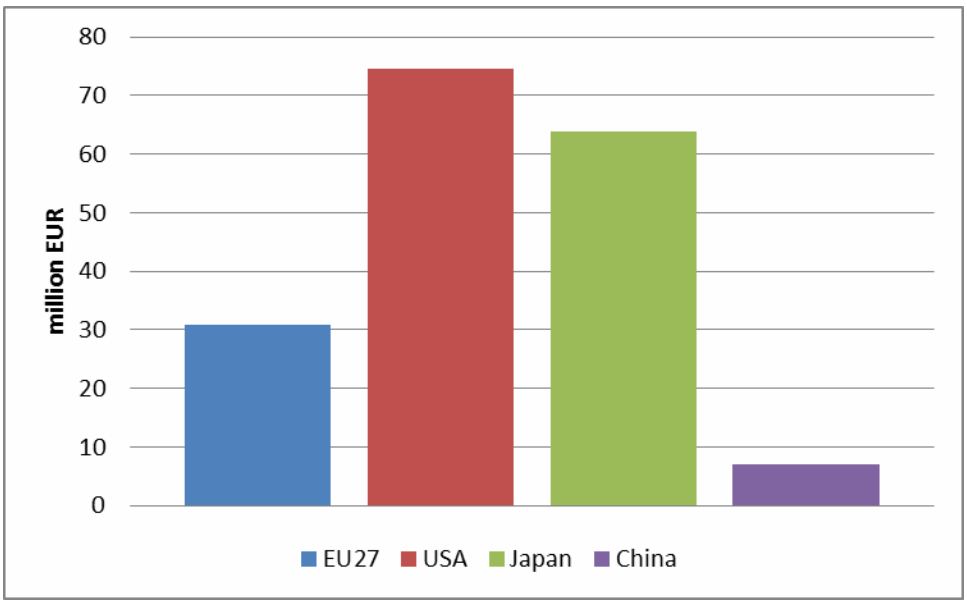


*Table 8: Paid services & applications revenues per Internet user – 2010. Source: IDATE, video revenues not available for China*

### *1.1.9. State of the European Internet: Trends*

*Global revenues*

Whatever the market, (i.e. internet access, online advertising, paid services or e-commerce), Europe has been seeing double digit growth in the past years: 13% AAGR (average annual growth rate) on average during the period 2006-2011 for internet access; 21% AAGR during the same period for online advertising, falling to 6% during 2009 downturn; 32% AGR between 2009 and 2011 for paid services; and finally 16% for e-commerce.

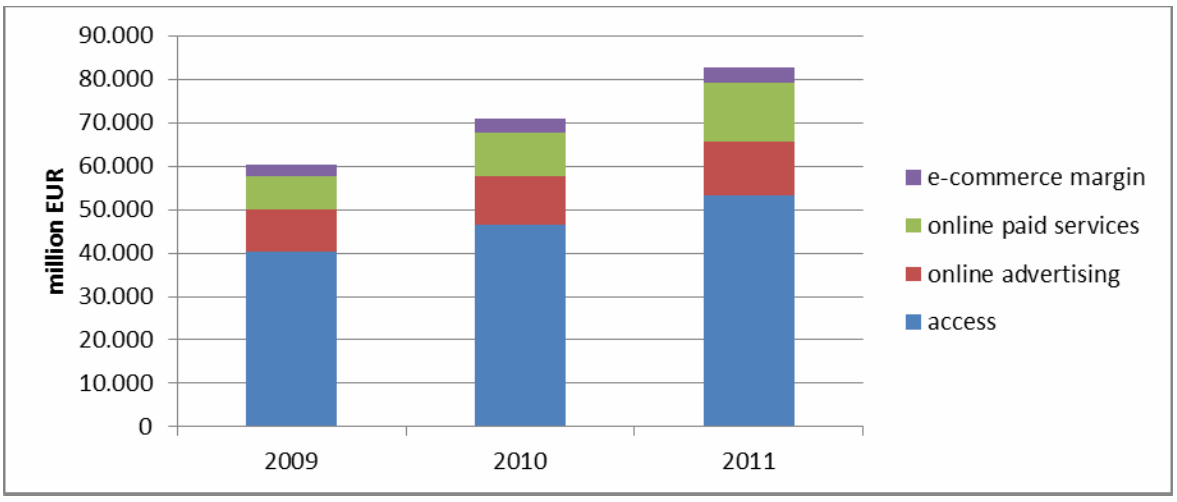


*Table 9. Overall Internet revenues in Europe. Source: IDATE*

*Access based revenues*

Until now, fixed Internet access revenues are still behind mobile internet access revenues, but the difference between both tends to narrow, with a steady annual growth of 31% between 2006 and 2010 for mobile market.

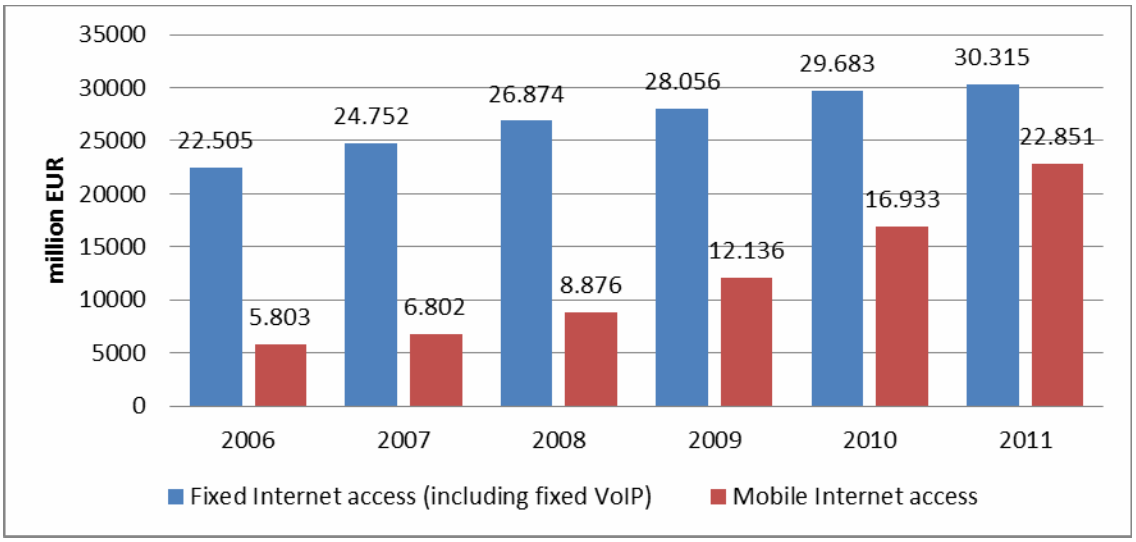


*Table 10. Internet access revenues in Europe. Source: IDATE*

*Advertising revenues*

Search advertising revenues have been growing steadily in Europe, with a 30% average growth rate between 2006 and 2011. Advertising revenues relying on online press is also growing, as well as advertising linked to videos.

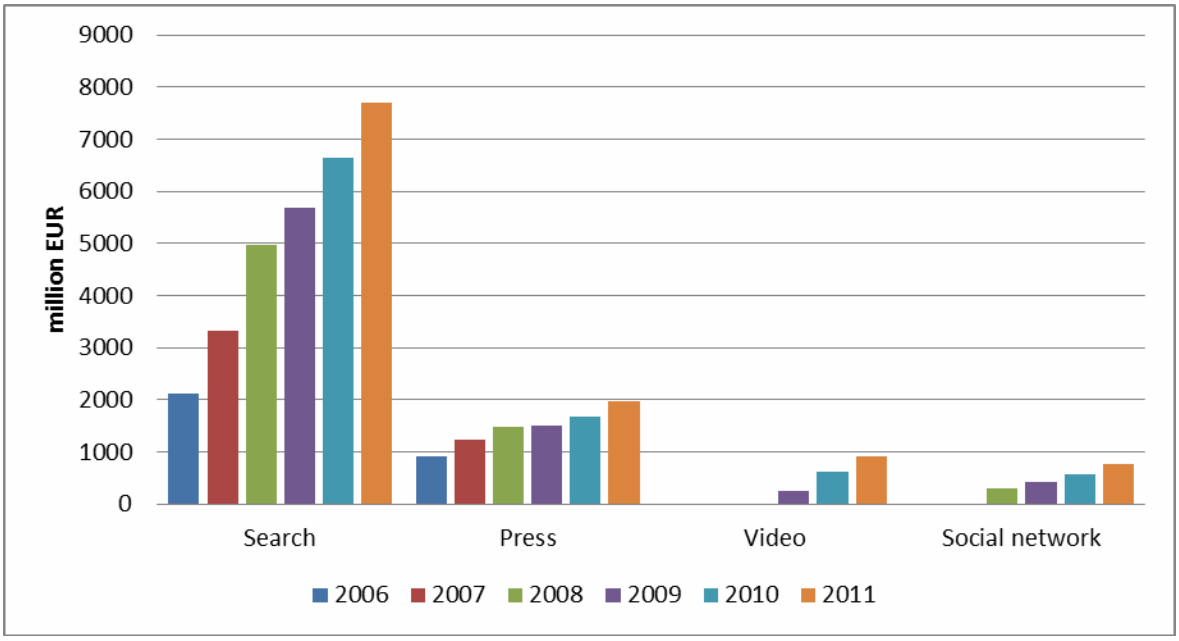


*Table 11: Advertising revenues in Europe. Source: IDATE*

*Paid services and applications*

Paid services and applications could represent new opportunities with high growth rates in those new markets[7].

Cloud computing has been growing sharply since 2008 (28% AAGR), as well as games market (22% AAGR). However, other emerging markets are growing even faster:

- +138% AAAGR for e-books (2011-2008)
- +57% AAGR for paid services in social networks (2008-2011)
- +45% AAGR for mobile applications (2007-2011)
- +43% AAGR for fixed paying videos (2009-2011)

[7] For a detailed review of market data for each paid service category see the detailed report on the state of the European Internet Economy available from the project website www.opus2012.eu.

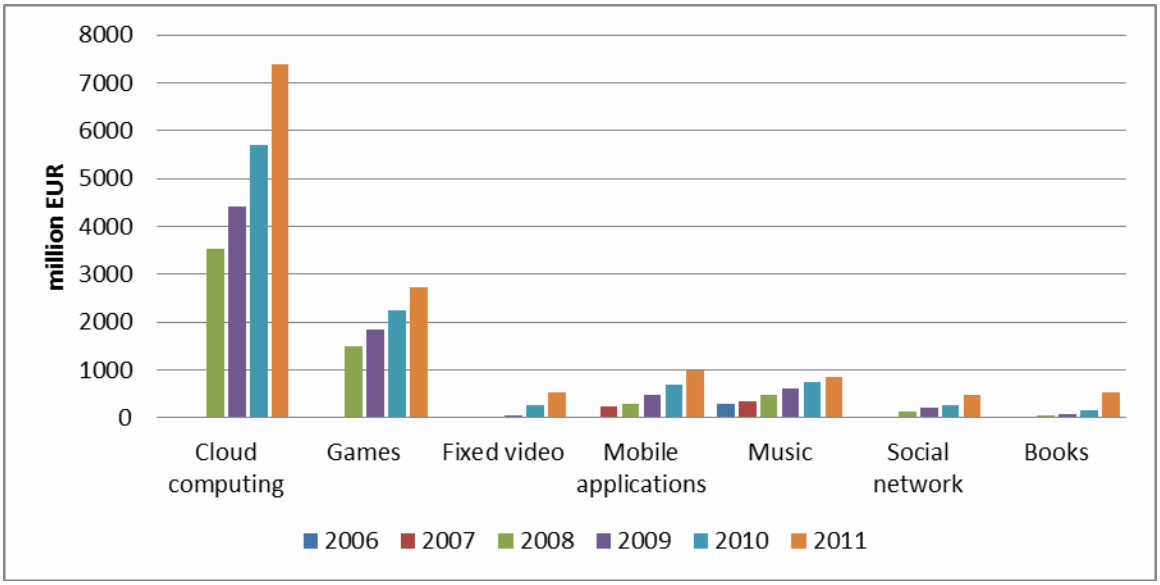


*Table 12: Online paid services revenues in Europe. Source: IDATE*

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## 1.2. How web businesses create value

*Key Findings*

Beyond 'black-box' variance models, richer accounts are needed of how web services impacts come about and how the economy at large is affected, taking into account: micro-evidence ( firm-level data and cases); demand and sector-specific aspects; network effects ( aggregation effects); IT-related spillovers; negative impacts (balanced accounts). A process-based IT approach can fulfill the requirements of micro-evidence and sector specific demands providing an important starting point for the evaluation of web economy impacts.

Developers create value with Apps in three main ways: (1) exploiting the platform ecosystem, App developers create services that build on a combination of functions and features provided by multiple software and device platforms; (2) Creating solutions by making efficient complements, matching supply and demand of two-sided markets in novel or more efficient ways, using apps; (3) Creating complementarities (combinations of products and services with enhanced value) through social and physical integration.

In-depth case studies show that highly dynamic ecosystems of web entrepreneurs are capable of generating high revenues and high employment, together rivaling big players in the most competitive and innovative industries.

### *1.2.1. Impact of web services*

Two main theoretical model types are commonly used in IT impact research: *variance-based* and *process-based models* (Markus & Robey, 1988). The models differ primarily in the logical structure of the causal relations. Variance-based models assume that a cause is necessary and sufficient to produce an outcome. Process-based models state that a cause is a necessary condition for the outcome to occur, but even then, outcomes may not occur because of external and probabilistic events. In other words, IT is a necessary condition for growth, but does not cause growth because the relation is governed by complementary factors. Although process models provide a more detailed picture of the impact of IT, the variance-based models remain popular because they usually require fewer resources to implement and allow for easy empirical testing. Following is a further elaboration of the scope, advantages, and disadvantages of both model types.

*Variance-based models*

Much of the researchers investigating the business value of IT use variance-based models in the form of production functions (Brynjolfsson & Hitt, 1995). Production functions have their root in economic theory and are mathematical representations of a production system in which the outputs are explained by an algebraic combination of inputs. It has been demonstrated that the Cobb-Douglas production function best characterizes firm-level production (Gurbaxani, Melville, & Kraemer, 2000), and is commonly used in IT impact studies (Brynjolfsson & Hitt, 2003). A basic form of the Cobb-Douglas production function (represented in figure 9) relates the value-added by a production system to three inputs (i.e. labor, ordinary capital, and IT capital). The productivity of the system reflects the efficiency with which the inputs are used to create the output. Therefore, by knowing the effect that IT capital has on value-added, the impact on productivity caused by the IT resource can be estimated[8].

Another way of modeling a more specific IT resource in a Cobb-Douglas production function is by adding adoption variables (Hitt, Wu, & Zhou, 2002).

The resulting production functions can be used to model web-based applications and services in a variance-based matter, depending on data-availability.

[8] This is usually done by the following equation: log (value-added) = intercept + $a_1$ log (labor) + $a_2$ log (non-IT capital) + $a_3$ log (IT capital)

*Figure 5. Representation of the relations of a basic Cobb-Douglas production function*

Advantages and disadvantages of variance-based models include:

**INPUTS**
Labor
Non-IT Capital
IT Captal

- ✓ Relatively easy and straightforward to apply.
- ✓ Clear interpretation of data.
- ✓ Use of large data-sets allows for generalization.
- – 'Black-box' method, i.e. not explaining how and under what conditions the IT resource actually impacts productivity. Complementary factors and spillovers need to be known in advance and explicitly modeled.
- – Data-availability might be an issue, depending on the adoption variables that are modeled regarding the phenomenon 'web-based applications and services'. Because the phenomenon is relatively young, there might be a lack of indicators available through Eurostat.

*Process-based models*

Process-based IT impact models assume that IT-capital as an input is a necessary condition for creating added value, but does not necessarily do so. Therefore, the question of *why* and *how* IT creates added value should be investigated as well (Markus & Robey, 1988). Process models often include organizational factors and broader economic impacts (Soh & Markus, 1995; Tallon, Kraemer, & Gurbaxani, 2000). The process model is now the preferred scientific approach to IT impact studies because of the higher level of detail. This is useful because IT impact has become much more complex in the last decades (especially web-platform based). An example of a process-based IT value model by Melville, et al. (2004) is given in figure 10. The model shows that attention should be given to the value generation process at the firm level to assess the value of IT. Additionally, the influences from the competitive and macro environment need to be taken into account. Appendix 1 shows examples of constructs that can be used to measure each of the factors.

Advantages and disadvantages of process-based models include:

- ✓ Look inside the 'black box' of the production process; look at intermediate factors (how people/organizations influence IT impact).
- ✓ Focus on industry and macro-environment factors, i.e. how the system influences IT impact.
- ✓ Focus on how impact develops over time (through interactions between technology, people, and system).
- – Problems with generalizations, as data are usually collected through a limited number of case studies.
- – Usually time-consuming to collect data.

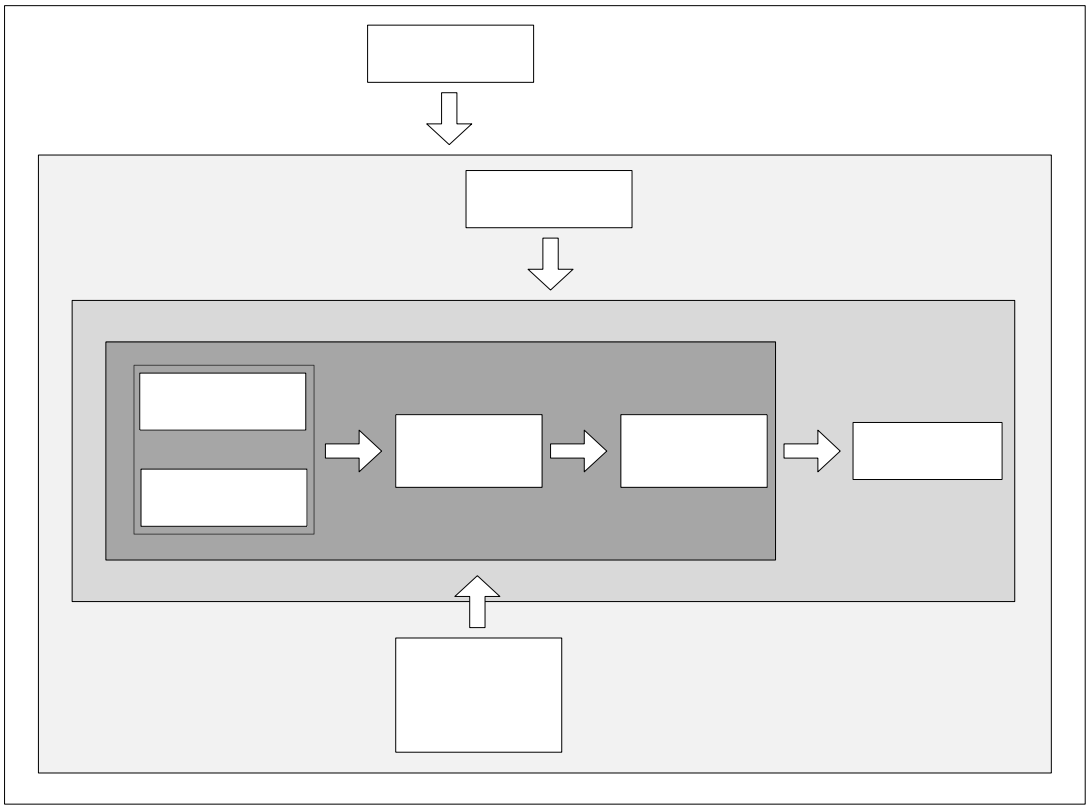


*Figure 6. IT value model (Melville, et al., 2004)*

*Methods used in established Internet impact studies*

1. *The Impact of Broadband on Growth and Productivity (2008), Micus Management Consulting Gmbh*
   - Partial process-based approach by "argued calculation" of broadband impact on employment and GDP through increased productivity.
   - Used meta-analysis of existing studies to estimate a constant for improved productivity caused by e-business.



III. MACRO ENVIRONMENT

- Argument is that broadband deployment in itself does not add value, but rather the use of 'online services' (calculated as an aggregate from indicators taken from Eurostat's Community Innovation Survey). Actual productivity improvement through broadband = constant for productivity improvement x adoption rate of online services. Then the study calculated what the effects of this increased productivity means for employment at the macro level, taking into account outsourcing/displacement effects (Figure 11).
- Two case studies of specific instances of broadband impact to illustrate the dynamics behind the impact.

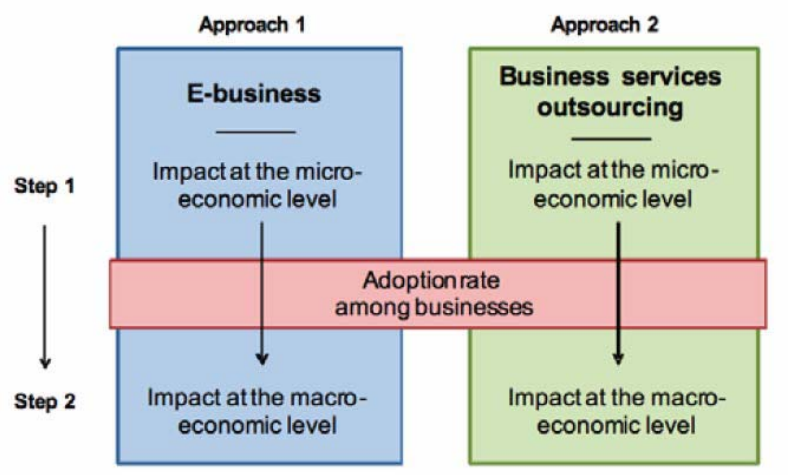



*Figure 7. Methodological overview of the Micus study on broadband impact*

2. *The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data, The Brookings Institution, 2007*
   - Variance-based approach to estimating the effect of broadband deployment on output and employment growth in the USA.
   - Regression models with 'number of broadband lines per capita' as independent variable, and 'GDP' and 'employment' as dependent variables (controlling for several other variables).

3. *Broadband Infrastructure and Economic Growth, Czernich et al. (2009), CESIFO Working Paper NO. 2861*
   - Variance-based approach estimating the effect of broadband infrastructure on economic growth in OECD countries.
   - Regression model based on a production function with 'broadband penetration rate' as independent variable, and 'GDP per capita' as dependent variable (controlling for several other variables).

4. *World Bank unpublished paper by Christine Qiang "Telecommunications and economic growth", quoted in Intel White paper: Realizing the benefits of broadband (2010)*

    - Variance-based approach estimating the effect of telecommunications on economic growth.
    - Regression model with 'telecommunications penetration' (aggregate variable consisting of several proxies) as independent variable, and 'GDP per capita' as dependent variable (controlling for several other variables).

Although variance-models are more popular in IT impact studies, data-availability regarding web-based applications and services will limit its use for this study. *A process-based approach best fits the assessment of web-engendered economic impact, as it also aims at explaining the 'black-box' of impact, i.e. by looking at how an economic impact is caused*. Basically, a process-based approach would be an argued bottom-up investigation following the impact trail. An approach for the impact assessment could use several of the constructs and indicators used in process-based models. Appropriate bases of generalization need to be found to be able to extrapolate the results to a macro-economic level. For this purpose, the argued approach followed by the Micus study on 'The Impact of Broadband on Growth and Productivity' could provide guidelines.

Recent studies[9] of Internet Economy and Apps Economy have focused on the impact of the internet economy and online intermediary activity. These studies have significant drawbacks. Most are partial focusing on a specific domain or sector. They are supply side only, overlook aggregate demand and often suffer from double counting. They tend to overestimate effects by an all-inclusive approaches while neglecting negative effects.

Lessons from impact studies show that 'black box' accounts have limited explanatory power. Richer accounts are needed of how impacts come about and how the economy at large is affected that take into account:

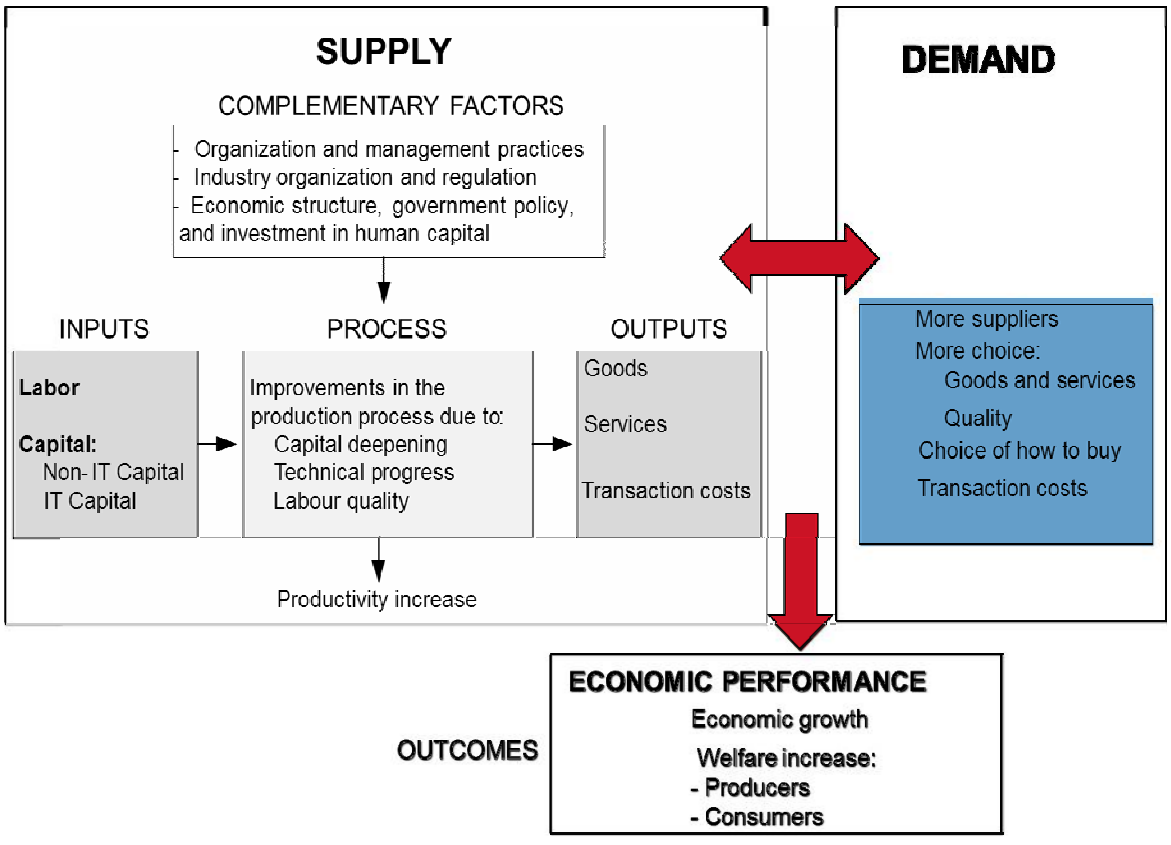
- micro-evidence such as firm-level data and cases
- demand and sector-specific aspects
- network effects ( *aggregation effects*)
- IT-related spillovers
- negative impacts (balanced account)

[9] Among others there are McKinsey (2011): Internet Matters, Copenhagen Economics (2012), University of Maryland (2011): Impact of Facebook apps economy, and Forrester (2010): Impact of Google apps

Current developments are pervasive, disruptive and fast, analyses tend to run behind and data problems are endemic. A more comprehensive impact framework is needed. Such a framework could follow a bottom-up, process based approach using case studies at micro level, combined with a demand-supply framework that allows for generalization and disentanglement of the old and the new (web-based) economy. Finally, such a framework would require a dynamic perspective (linking past, present and future). Figure 12 below presents a possible dynamic, process based, micro-macro impact model.

This model also takes into account the dynamics of two-sided markets, including:

- the creation of new markets, products and players
- substitution and demise of existing markets, products and players
- effects on productivity, transaction costs, product choice and quality



The full implementation of such a comprehensive model is beyond the scope of this study given the timeframe and cost involved but also due to the paucity of data currently available to represent the dynamics of the web services arena. However, the requirements of this model may inform a future web entrepreneurship data observatory that if it were to be put in place would allow for a detailed evaluation and monitoring of this vital, emerging part of the European economy.

In the next sections we will continue with a *process based approach*, compiling data from case studies and interviews to unearth the mechanisms of value creation at work in the web entrepreneur ecosystem.

## 1.3. Business models of the major platforms

To explore more in-depth the mechanisms of web business value creation the study started with an investigation of selected key web platforms and services (see table 13), following the *Business Model Canvas* method as developed by Alexander Osterwalder and Yves Pigneur.[10] The business canvas distinguishes nine well known building blocks of business models: Key Partners, Key Activities, Key Resources, Value Propositions, Customer Relationships, Segments, Channels, Cost structure and Revenue Streams. Below we analyse business models of three successful European web business: Sweden's music streaming service Spotify and Lithuania's App store Getjar and Rovio's mobile game Angry Birds on the Apple Appstore [11]. Angry Birds is available on many platforms but here we focus on the Apple Appstore.

*Table 13 Six key platforms investigated*

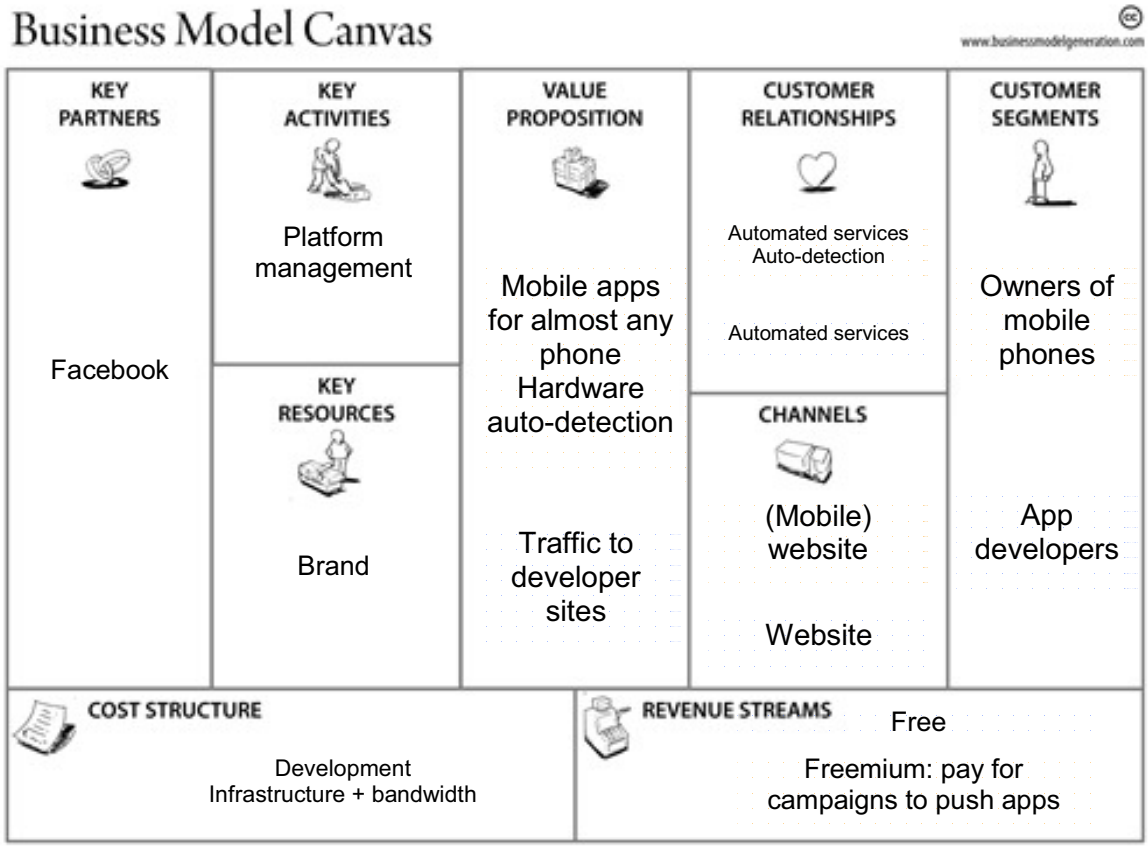
| Service | Company / Platform |
|---|---|
| Search | Google |
| Cloud | Amazon Web services |
| Social networks | Facebook |
| Mobile Apps | Getjar, Apple App store |
| Online video | YouTube |
| Music streaming | Spotify |
| Gaming | Rovio |
| eCommerce | Marktplaats |

[10] See www.businessmodelgeneration.com

[11] For a detailed description of all platform business models described in the study we refer to the detailed report on the state of the European Internet Economy available from the project website www.opus2012.eu.

### *1.3.1. Getjar*

Getjar is a website where users can download mobile phone applications. Founded in 2004 in Lithuania by Ilja Laurs, it now features more than 150□000 mobile apps in 190 countries. These apps have been downloaded over 2 billion times. Getjar is often compared with Apple's App Store or the Android Market. But it differs from these stores in several ways.




The first difference is that Getjar works on many different handsets and platforms. Users can download these apps through the mobile site m.getjar.com. The site automatically detects the type of handset and only shows apps that work on the handset. No registration is required In this way users can easily find apps for their phone. Getjar even provides apps to non-smartphones, or "feature phones". In fact 70% of its users have feature phones. Getjar provides them with for instance Facebook access. The Facebook "app" is simply a link to Facebook's mobile website. But for users it provides the same functionality as an app. The link increased views of Facebook's mobile page from 150□000 per week to 1.5 million per week.

The second difference is that all applications on Getjar are free. In fact, Getjar did not even implemented a billing system for app users. Developers can also upload their applications for free. Getjar makes its money by selling advertising slots for developers. Developers can bid for these slots, setting a maximum price per download and per day. They can target their ads by location, mobile carrier, and handset. Through these ads they can give their application premium visibility. Placing ads for free apps may seem like a waste of developer's money. However, Getjar's idea is that the free apps serve as advertisement for the developer's website. Many apps on Getjar are trials or demos, which link a user to a website to buy a full version. Getjar also stimulates game developers to upload their old games as advertising for their new. The third difference is that Getjar spends almost no money on marketing. New users are mainly acquired through word of mouth. With no marketing and no billing system, the only costs for Getjar are the development and maintenance of the site.

### *1.3.2. Spotify*

Spotify is a streaming music service founded in 2006 in Stockholm, and launched in 2008. It states as its mission "to help people to listen to whatever music they want, whenever they want, wherever they want"[12]. Using the Spotify software on a computer or mobile phone, users can listen to more than 15 million tracks. The value for music lovers is that Spotify is cheaper than iTunes or CD's, and easier than piracy. Users get 20 hours for free or unlimited music for €10 per month, instead of buying new CDs for more than €15 or tracks on iTunes for €0.99 each. Spotify software provides immediate and personalised access to a massive, very comprehensive music collection.

Spotify's revenue model is based on freemium: free drives paid. Users start with a free account, and then get hooked. As they start using the free service more, they run into limitations: they can listen only 20 hours per month, music is interrupted by advertising, cannot be listened offline or on a mobile phone, and has a low bitrate. Users can overcome these limitations by upgrading to a premium account. Spotify reports that around 7% of all users upgrade. In September 2010 it reported 15 million users, of which 1 million were paying. Most paying customers opted for a premium account at €10 euro per month, allowing unlimited, personal access to Spotify music across computers, tablets and smartphones. With that, Spotify was collecting revenues of around 10 million per month or 120 million per year.

A second revenue stream that uses the non-paying listeners is advertising. Advertisers can buy 30 second audio ads, or simple banner ads. The ads are targeted according to location, demographics, and music taste. A third source of revenue is internet access providers. The Dutch provider KPN has signed a deal with Spotify to offer all its users a free premium account.[13] In the UK Virgin Media is offering Spotify as an extra service to its users.[14]

To offer music at such a low price, Spotify needs to keep its costs down, especially the music licensing costs. As the iTunes music store before it, Spotify needed to partner with the record companies to get a good licensing deal. In the US record companies were for some time not willing to cooperate with Spotify, unless it drops

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[12] http://www.spotify.com/nl/about-us/press/background-info/

[13] http://www.rtl.nl/components/actueel/editienl/nieuws/2011/w43/Gratis-spotify-premium-voor-kpn-klanten.xml

[14] http://thenextweb.com/uk/2011/07/06/virgin-media-signs-deal-with-spotify-offers-access-from-4-99-a-month/

free music streaming. So Spotify could not launch in the US. Why do record companies license music to Spotify?

Looking at Spotify's prices it seems impossible that record companies make the same revenue from Spotify as from traditional CD sales or from iTunes. According to the Swedish newspaper Expressen, Lady Gaga made only $167 from the 1 million times her hit 'Poker Face' was listened to on Spotify.[15] Swedish musician Magnus Uggla has said that in after six months he had only earned "what a mediocre busker could earn in a day", and wanted to remove his music from the service.[16]

Record labels do not see Spotify as a replacement for CDs or iTunes, but as an alternative for piracy. Thierry van Engelen, director of digital sales of Universal Music Netherlands stated: "Consumers who wanted to listen to music now and then, didn't buy CDs the last few years anyway. So we didn't make any money from them now. I prefer paid models, but at least in this way we earn some money on each consumer who listens to music. And hopefully they will convert to the paid model eventually" [17]. So it looks as if record companies see Spotify as an experiment to make some money on consumers who they lost to piracy. In their deal with Spotify major record companies got a share of 18% of the company. So if the experiment succeeds they make a lot of money. If it fails, they can always stop licensing their music.

And it looks as if this experiment is paying off. According to Sony Music Sweden's director of digital sales, Jacob Herbst, Spotify is already their biggest source of revenue in Sweden: "Looking at the past few months, it is the most revenues for artists and record companies… We already have several artists who receive eighty per cent of their revenues from Spotify. An artist who draws in half a million kronor can get 200 thousand to 300 thousand from Spotify."[18] Even Lady Gaga does not seem disappointed: in Sweden her album 'Born This Way' debuted exclusively on Spotify.[19]

Spotify also tries to keep its other costs low. It spends very little on marketing, relying on word of mouth and advertising by its partners, the record companies. For instance in the UK Universal ran an advertising campaign to publicize that they were offering

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[15] http://www.mt.nl/158/23690/techbusiness/redt-spotify-de-muziekindustrie.html

[16] http://www.aftonbladet.se/nojesbladet/musik/article5637161.ab

[17] http://www.mt.nl/158/23690/techbusiness/redt-spotify-de-muziekindustrie.html

[18] http://www.wired.co.uk/news/archive/2010-10/29/spotify-swedish-revenue

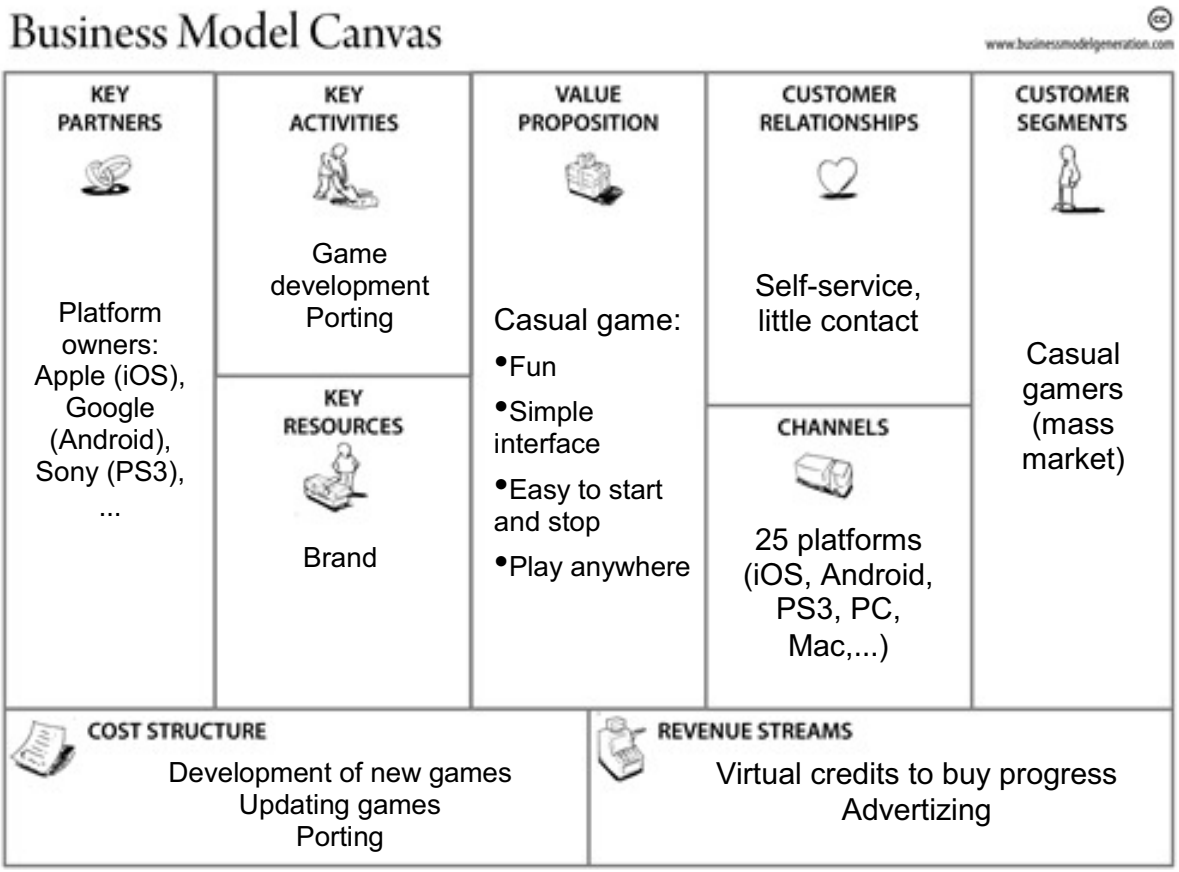
[19] http://www.spotify.com/se/blog/archives/2011/05/13/lady-gagas-new-album-born-this-way-to-debut-exclusively-on-spotify/

the new U2 album first exclusively on Spotify. For the marketing of its US launch Spotify partnered with Coca-Cola and Sprite, Chevrolet, Motorola, Reebok, Sonos and The Daily. It also limits its Bandwidth costs by using peer to peer technology. Users share the tracks they are streaming with their peers, so that not all tracks need to be downloaded from Spotify's servers.

Spotify distributes proprietary clients for Windows, Mac OS and several mobile platforms (iOS, Android, Blackberry and Windows Mobile). Tracks are distributed in the Open Source Vorbis format. Spotify uses digital rights management (DRM) software to prevent users from saving the tracks on their computer. Spotify has partnered with Facebook for account management. Users need a Facebook account to login on Spotify. They can also share their favourites through Facebook.

### *1.3.3. Rovio's Angry Bird game on the Apple App store*

Angry Birds is a casual game developed by Finnish computer game developer Rovio Mobile, distributed on many platforms, including the Apple App store. In the game players launch birds with a slingshot to destroy all pigs in the playing field. Besides being fun, the attraction of angry birds is that it is easy to play. The interface is simple and intuitive, players can start and stop playing anytime, and on an iPhone or iPad they can play it anywhere.




Angry Birds is very profitable for Rovio, because it was cheap to develop and is played by very many players. Because Angry Birds is a simple game without complex graphics or programming, it cost very little to develop compared to PC or console games. The initial development costs are estimated at around €100□000 (mobilewebgo.com: "How did Angry Birds become a blockbuster?"). But the game has been downloaded over 400 million times. To cash in on the success Rovio has made several updates with new levels.

It has also ported it to more than 25 platforms, such as Android, the PlayStation 3, PC and the Mac. Each platform has its own revenue model. On the iPhone and iPad,

Rovio sells Angry birds and its expansion for €0.99. On Android it gives the game away for free but with ads (because the android app store does not offer paid apps in all countries). On the PlayStation 3, where games are usually more expensive, it sells the game for €2.99. Besides making money on the game itself Rovio has revenues from merchandising like toys and t-shirts.

## 1.4. How entrepreneurs created value with Apps

Besides exploring well-known and successful platforms and companies the study wished to apply a process based impact assessment and explore more in-depth value creation mechanisms driving small web startups. For this an interactive case study on App development in the Netherlands was conducted. The case study involved the following web startups:

- Peerby (peerby.com)
- Truienradar (truienradar.com)
- Rushkick (rushkick.com)
- Sugarhabits (sugarhabits.com)
- Couverts (couverts.nl)
- Moneybird (moneybird.nl)
- Toogethr (toogethr.nl)
- Roots2share (roots2share.org)


*Figure 8 Truienradar, social clothing advice*

| ***Rise of the App*** |
|---|
| |

'App'[20] was voted word of the year in 2010 by the American Dialect Society. Especially *mobile* apps have gained strong popularity in recent years, and currently over a third of the adult population in the U.S. has apps on mobile phones (Purcell, Entner, & Henderson, 2010). Since its launch less than four years ago, Apple's App Store has seen over 25 billion apps downloaded, and has an availability of over 500 thousand apps (Apple, 2012). Popular examples are gaming apps (e.g. Farmville, Angry Birds), social networking apps (e.g. Facebook, LinkedIn), and navigation apps (e.g. Google maps).

Apps have the potential to impact the economic performance of organizations and countries. The sale of apps alone generated around € 5 billion in 2011, and is estimated to grow to over € 18 billion in 2016 (iDate, 2012). In the U.S., employment related to the 'app economy' is estimated at over 460 thousand jobs in 2011 (Mandel, 2012). Organizations are presented with new opportunities to create value using apps (Varnali & Toker, 2010). Firms are adopting apps in an attempt to meet new demands, increase efficiency, and improve competitiveness (Unhelkar & Murugesan, 2010). There are indications that apps can be used for different facets of business, for example as a new marketing medium, allowing more efficient inventory management, and providing a mobile office environment to employees (Varshney & Vetter, 2002). A recent report shows that small businesses are benefiting from using apps because they allow entrepreneurs to work more effectively and thus save time and money (Small Business & Entrepreneurship Council, 2011). However, given the high adoption numbers by the public, besides being leveraged to boost internal productivity apps can be deployed on the customer-side of an organization. Many large established organizations have attempted to create value with so-called 'branded apps' (Distimo, 2011), but success stories are rare as many of the apps published by major brands have low download numbers (Deloitte, 2011). Because of the little research done in this field to date, much is unknown about the value that apps create, and the manner in which this value is created.

The study employed a *Dynamic Capabilities* approach whereby specific characteristics of the App ecosystem are seen as enhancing business capabilities with which to create real business value (reduced infrastructure cost and spreading of risk, etc) [21]. Through this approach the study identified three main mechanisms of app-enabled value creation:

1) Use of platform ecosystems

   Apps create a service that builds on a combination of many platforms, including, but not limited to, operating system platforms (e.g. Apple iOS, Google Android), distribution platforms (e.g. Facebook apps, Apple Store, Google Play), social

[20] Throughout this paper the term *app* will be used to refer to a *web-based application*, including mobile apps.

[21] See Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533. For a full description of the approach taken we refer to the detailed report on value creation available from the project website www.opus2012.eu.

platforms (e.g. Facebook, LinkedIn, Twitter), payment platforms (e.g. PayPal), ecommerce platforms (e.g. Amazon), and, in case of smartphones and tablets, the device itself is a platform for contextual awareness (e.g. access to camera, accelerometer, GPS). The value that is created through this mechanisms includes:

- **IT cost reduction** for businesses by using (freely) available platform functionalities.
- **Mitigation of risks** from businesses to platform owners. For example, letting people login to the app using their Facebook profile transfers privacy-related risks to Facebook, and using PayPal to fulfill a monetary transaction transfers associated risks such as fraud to Paypal.
- **Increased market reach** and/or **reduced distribution and delivery costs**, for example through app stores and payment platforms.
- The above points leads to a lower threshold to start an app-based business, or to lower costs and risks for existing businesses that adopt an app, which can ultimately lead to **business growth**.
- **Consumer welfare** is increased because of the **added convenience** to users of platform-embedded apps. For example, using Facebook-login allows users to avoid creating yet another account, and using known payment platforms allows users to pay in a trusted environment.

2) Create solutions by making novel or more efficient complements

The availability of apps encourages businesses to find new value propositions and new ways of funding these propositions. Two-sided markets (bringing together supply and demand) play a key role here. Supply and demand is matched in novel or more efficient ways using apps. The value that is created through this mechanisms includes:

- **Improved product and/or service innovation** through the creation of new or more efficient solutions.
- **Strenghtened competitive capabilities** by differentiating the initiative from potential competitors.
- The above points can ultimately lead to **business growth**.
- The above also leads to an increase in **consumer welfare** through the **added choice** consumers have in supply, and the **added convenience** consumers have to find this supply.

3) Create complementarities through social and physical integration

Apps create complementarities (i.e. combinations that are more valuable than its separate components) by integrating social functionality into the product and/or service. Additionally, complementarities are created by (1) integrating the app into a physical product hereby creating app-enabled or app-enriched products

such as coffee-makers controlled by an app, or engine management of cars through an app, or (2) integrating the physical environment of the user into the app hereby creating contextual awareness, for example through GPS or camera-enabled augmented reality. The value that is created through these mechanisms includes:

- **Improved product and/or service innovation** through the creation of better products and services, and the extension of physical products with app-enabled services.
- **Strengthened competitive capabilities** by differentiating products and services from potential competitors.
- The above points can ultimately lead to **business growth**.
- The above also leads to an increase in **consumer welfare** through the **added choice** in products and services for consumers, and the **added convenience** these products and services bring to consumers.

## 1.5. Wider impacts of the web services market in Europe

The rise of social networks, mobile applications, online video, the cloud but also vast changes in existing domains such as search and e-commerce is driven by an ever faster Internet connecting massive numbers of people and things through wireless, PDAs, tablets, smartphones, and miniaturized, embedded systems and sensors.

What does the rise of this potent web-based platforms and services entail for Europe? Web-based platforms perform an intermediary function as an aggregator or broker of supply and demand. The platform itself acts as supplier of services, or it acts for third parties, i.e. other suppliers. Platforms attract and 'aggregate' demand (viz 'long tail'). Geographic borders and domestic markets pay a lesser role than before. Local markets are no longer shielded, facing new competitors, but also new demand.

Web platform markets are *anytime*: two-sided activity 24 hours a day, 7 days a week, e.g. shopping in the evening; and *anywhere*: enabling two-sided activity at every location in the world, watering down the concept of a "domestic market". For goods and services that are tradable and web-transferable, the world is a single market place. With a marginal cost of zero, prices can even be zero (free services). Finally the web allows 'footloose' consumption and production, coming from everywhere and anywhere with important implications for trust and identity. Two kinds of disruptive change may ensue:

*Positive change*

- benefits for supplying companies and buyers
- supply-side: first-mover, "winner takes all" type effects (e.g. Amazon, Google)
- benefits for new suppliers: lowering barriers to entry, enabling new forms of supply (co-creation), facilitating new entrepreneurs (web-platforms, app-makers, etc)
- opportunity of attracting new customers
- positive economic growth and employment implications: new companies, new markets and fast growth

*But, also generating negative change:*

- 'Creative destruction' leading to players being worse off:
- Potential destructive impact on 'old' sectors and trades
- Negative growth and employment implications
- Those who do not adapt quickly enough ('laggards') may or will lose: companies, old economies (vs emerging economies); customers that are not web savvy.

Opportunities, including for Europe, are that the rise of the web economy promises new web platforms, new web entrepreneurs and thus new avenues for growth. There will be disclosure of new markets and new customers within the global market place. Finally there could be new employment in particular for youth.


*Figure 9. Asset light health. Source KPCB (2012)*

Threats include the entry of new competitors outside Europe with 'leapfrogging' ability. Then there is the danger of the 'winner takes all' model that seems to rule the web and that so far favored large companies outside Europe. The dominance of 'old' business models and a lack of willingness to change may also hamper benefits. The exposure of thus far isolated and protected European (national or regional) markets may present a risk. Finally there may be negative employment impacts for example when lower paid jobs replace high value jobs.

Will positive impacts outweigh the negative impacts for Europe? Worldwide the web presents itself as a positive sum game. Europe may have to get much better at this game to ensure its share of the benefits. In her end of the year address Mary Meeker (2012)[22] used the term *asset-light* to describe the effect current web services have on a range of traditional industries: *transforming slow moving, asset heavy markets into asset-light services*. This effect is slowly extending from the creative industry, where some of this began, to a wide range of sectors and industries, including very traditional ones like health, education, sports and energy.

If this is the case then being a high achiever in the web business arena may be the key to innovation and global competitiveness driving growth in all sectors.

*Employment effects*

Though there are no comprehensive job impact studies in Europe, several partial studies collected data on the web services jobs market, in particular on the Apps economy and the internet advertising industry. Apple released data indicating that there are now over 290□000 iOS app economy jobs in the US representing nearly half of all jobs created by Apple in the US - and over $6.5 billion paid in royalties to App store developers[23]. A much quoted study by Technet[24], also on the US, analysed job ads listings to conclude that the App economy created close to 500M jobs in the US in little over 4 years. The study covers both jobs at 100% app firms such as Zynga but also counts app jobs created at big internet companies Google, Apple, Amazon and Facebook. The internet-advertising industry created 3M+ jobs according to one study[25] which includes Google's 20K+ full-time jobs at Google in the US.

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[22] See http://www.avc.com/a_vc/2012/12/mary-meekers-2012-internet-trends.html

[23] Via http://www.apple.com/about/job-creation as of December 2012.

[24] http://www.technet.org/wp-content/uploads/2012/02/TechNet-App-Economy-Jobs-Study.pdf

[25] Hamilton Consultants, "Economic Value of the Advertising Supported Internet Ecosystem", June, 2009

The University of Maryland study of the Facebook Economy[26] whose approach was reviewed above, estimates that Facebook added 180K direct and indirect jobs to the US economy representing a total value of 12B USD. App-promo created an infographic explaining what is behind such numbers (figure 15 below)[27]. It shows the app market is a tough place where only 1 in 5 developers make enough money to support a stand-alone business. Based on a survey with 400 programmers, Blackberry reported that 13% of apps 'vendors' earned more than 100 000$ with their apps[28].

Regarding the future, BCG[29] (2012) estimates that "the overall Internet economy of the G20 will nearly double between 2010 abs 2016, when it will employ 32 million more people than it does today".

*Europe*

[26] http://www.rhsmith.umd.edu/digits/pdfs_docs/research/2011/AppEconomyImpact091911.pdf

[27] http://arstechnica.com/apple/2012/05/ios-app-success-is-a-lottery-and-60-of-developers-dont-break-even/

[28] http://crackberry.com/blackberry-developers-make-more-money-android-and-ios-developers

[29] http://fr.slideshare.net/fred.zimny/bcgs-paper-the-internet-economy-in-the-g-20

For Europe there is even less data. A Deloitte study[30] on the economic impact of Facebook in Europe in 2012 suggests that Facebook would have generated 232 000 jobs in Europe (EU27) with an economic impact of 15.3 billion. This is comparable to the level of impact suggested in the Maryland study. All these studies use typical multipliers between 2 and 3 to convert direct employment to indirect employment spin off. Internet impact studies such as McKinsey's 2011 study also suggested multipliers between 2.4 and 2.6. Every internet or web job creates another two to three indirect jobs. Of course these 'black box' studies do not take into account many economic effects as described above (firm level effects, demand and sector-specific aspects, network effects, IT-related spill-overs, negative impacts).

One study by France Digital and Ernst and Young[31] (2012) looked more in detail at the economics of web startups in France. The 108 startups investigated by the study generated on average €7.7 Million. Breaking down their annual revenue by year, the study found that the 108 startups brought in a total of €753 million in 2010 growing to €1B in 2011. As France Digitale points out:

*"if [] you look at the 108 startups as one big company, you get a company that, in 2011, produced over €1Billion in revenue with 33% growth over the previous year – that beats out most French giants – that beats out most global giants on growth. In no other stage of a company's life cycle can you anticipate this type of growth, and as the startup scene grows in 2012 and beyond, there is a clear sustainability and benefit to France as a whole".*

Other relevant findings are that more than 25% of the startups' annual revenue came from outside of Europe. In 2011, the 108 startups employ a total of 5433 people, a 24% increase over 2010 (4384) with 87% of all employees employed under a CDI contract, the most job secure type of contract in France.

In-depth studies like France Digitale's give a better feel of the way web businesses are transforming the (jobs-) market place.

### 1.6. An evolving web ecosystem

[30] http://www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Industries/TMT/uk-tmt-media-facebook-europe-economic-impact.pdf

[31] http://www.rudebaguette.com/2012/07/03/france-digitale-launches-with-a-bang-french-startups-make-1-billion-euros-per-year

*Key Findings*

Under the current regime the US will continue to lead in the Internet Economy between 2014 and 2020. It will overtake Europe in access based revenues, both fixed and mobile. China will gain ground in all areas moving towards 2020. In advertising revenues the US will extend its dominance while in paid services and applications Europe may actually gain ground.

Our 'business as usual' estimates predict that web services revenues in Europe will increase five-fold to over 100B in 2020, mostly from fast growth in paid services and applications. Advertising revenues will double in that period to 30B. However, disruptive transformations remain likely in the emerging web arena in which case the outcomes may be much more pronounced.

Key technology areas for web entrepreneurs, in the short term, are Security/Privacy Technologies and Data Analytics (such as Big Data). Beyond 2015 web companies expect Artificial Intelligence, Sensor Technology and Human Enhancement to play a big role in web services.

### *1.6.1. The internet market in 2020*

The forecasts on the size and make-up of the Internet economy in 2020 assume a relatively linear development of the Internet regarding its mature markets (like search) and a significant growth for its emerging markets (like social networking), at least in the short/medium term. Detailed assumptions include:

Continued growth of Internet users and of intensity of usages, especially on mobile, due to lower costs of usage and better experience

Moderate overall growth of GDP (except for China) and purchasing power. Internet should continue to over perform significantly the GDP growth

Improvement of existing services and enabling technologies

Roll out of very high speed broadband offerings

Increasing transfers towards the Internet (e.g. regular retail activities towards e-commerce), driven by additional efficiency, regarding either cost of the service or analytics

Stable pricing of Internet services or of access services for a given service (paid by advertisers or by end-users), players offering more value (like targeting)

Increased share of advertising in revenue models, especially on mobile

Differences between regions on the advancement of monetization of Internet services

USA remaining dominant on Internet services, with new services appearing first on their domestic market and generating first revenues there

*Internet access revenues*

Here we forecast Internet access revenues for the fixed Internet, mobile Internet and total. Regarding the fixed access revenue, while the EU27 leads for 2012, this will quickly be overtaken by the USA, where there is greater growth. A similar pattern applies for Japan and China but with a lower total, with Japan generating more revenue initially but to be outgrown by China eventually. *CAGR for the period 2012 to 2020: EU27 2.5%, USA 4.4%, Japan 3.1%, China 5.9%.*

Looking at mobile access revenues, the margins between nations are smaller. The USA is expected to lead throughout the period of 2012 to 2020, but the EU27 and particularly China will gain ground. Especially China, who is a laggard in 2012 is expected to show enough growth to overtake Japan and come close to the EU27. *CAGR for the period 2012 to 2020: EU27 9.3%, USA 6.5%, Japan 3.2%, China 20.7%.*

Finally, looking at the total for Internet access revenues (ie fixed + mobile), we see that the general pattern is similar to that of mobile Internet access revenues. This is unsurprising since mobile is generating more of the revenue. Thus the USA will lead and continue to lead, followed by EU27, Japan and China in 2012, but China will see the greatest growth allowing it to overtake Japan and get closer to EU27. *Combined CAGR for the period 2012 to 2020: EU27 6.1%, USA 5.7%, Japan 3.2%, China 15.1%.*

*Advertising revenues*

The USA is expected to remain strong in the foreseeable future for advertising revenues, showing continued growth despite its already established lead on the EU27. China will in fact show more than double the USA for CAGR, but since the total revenue is so far behind the US it will still remain small in comparison. Still, China will grow enough to outpace Japan.

CAGR for the period 2012 to 2020: EU27 10.5%, USA 10.4%, Japan 7.7%, China 23.3%.

Regarding revenue per user, we see that the USA leads with Japan second and EU27 not much behind. China is expected to remain relatively low, despite enjoying the biggest growth. *CAGR for the period 2012 to 2020: EU27 7.5%, USA 8.6%, Japan 7.6%, China 17.6%.*

*Paid services and applications revenues*

Direct paid revenues forecast shows a similar pattern to that of advertising, in that the USA leads and will continue to lead, with EU27 coming in second. The obvious difference is Japan, where direct paid revenues are traditionally strong, and it is expected to maintain its lead over China.

CAGR for the period 2012 to 2020: EU27 19.7%, USA 15.1%, Japan 13.3%, China 17.4%.

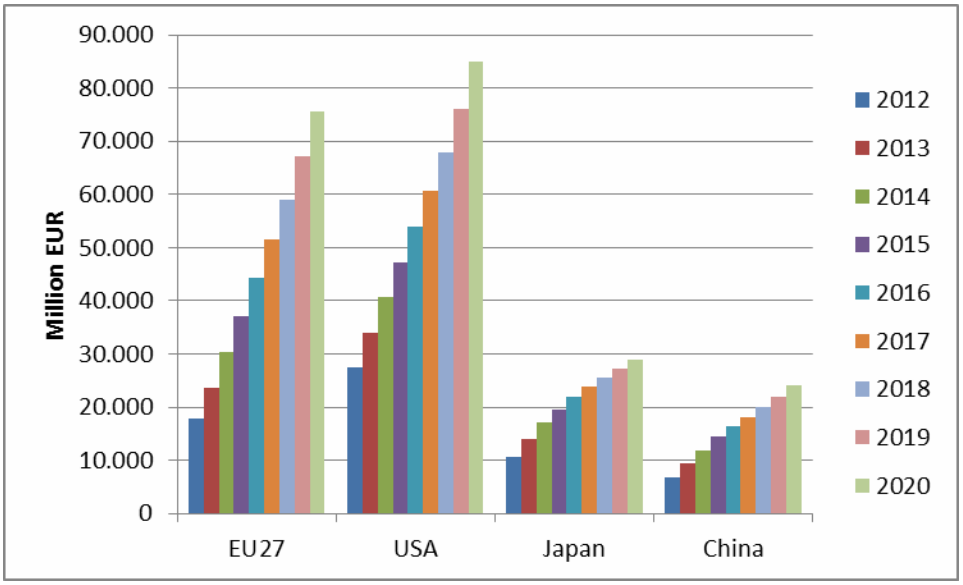


*Table 14: Paid services & applications revenues forecast. Source: IDATE*

Looking at paid revenue per internet user, we see that China has very low revenue per Internet user value (due to strong level of piracy) which explains why they have low overall paid service revenue as described in the table above. Conversely Japan has high revenue per Internet user, although a little behind the USA.

CAGR for the period 2012 to 2020: EU27 16.5%, USA 13.3%, Japan 13.2%, China 11.9%

### Advertising and paid service revenue combined

Finally, we look at the total of advertising and paid revenues combined. The USA leads and will continue to lead, followed by EU27. At the other end, China brings up the rear although they will show the highest growth, meaning they are expected to overtake Japan by 2020.

CAGR for the period 2012 to 2020: EU27 16.3%, USA 13.2%, Japan 11.7%, China 19.3%

### *1.6.2. Technology Roadmap*

Contrary to the linear assumptions in the projections presented above, the evolution of web ecosystem will likely be a non-linear one, impacted by future innovations. To assess the impact of emerging technologies and innovations on a developing web ecosystem we will use an established Technology Roadmap Framework (TRM). Using TRM we can map relationships across three major thematic areas/communities:

(1) Innovation areas, which are at the heart of the activity of business. They can be seen as broad product/market combinations, where demand and supply come together.

(2) Research and technology areas, representing the output of science and including new technologies and scientific insights. They are enabling to the innovation areas.

(3) Societal issues, representing the demand side of our economy. Coming from both business, consumers and even governments, they include the societal needs for new services.

The TRM approach was developed in the course of over 30 research and innovation oriented projects. It is built into the OPUS information management system to visualize the mapping of stakeholders on technologies and innovation.

Innovation in the Future Web may spawn from a wide range of thematic areas, but typically only involve a select number of key technologies. Some of these technologies can of a disruptive nature such as the uptake of smart phones and tablets. Other technologies are more predictable, with incremental improvements extending existing technologies. Smart phones for instance gave a huge increase of bandwidth demand for mobile Internet, while tablets had a disruptive effect on our thinking of web-based applications and services. There is always uncertainty as to which (predictable) next step key technologies will be winners or losers. Not all new technology will be applied in practice. UMTS, for example, was said to have a huge impact and huge investments have been made in these technologies, but it is not really clear if they generated actual profits.

### *1.6.3. Taxonomy of innovation concepts*

Drawing on literature, short case studies, in house expertise, interviews and prior art the first step of the TRM is the development of a taxonomy of Innovation, Technology and Socio-economic concepts. The case studies included a review of social web technologies (table 22), data analytics and big data, and privacy enhancing technology (PET). Prior work involved a topical study by TNO on the impact of the Future Internet (2012)[32] and earlier work on robotics, nanotechnology and photonics[33].

| | Facebook | Flickr | foursquare | Google+ | Habbo | LinkedIn | Reddit | Spotify | Twitter | Yelp | YouTube |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Open Graph | ✓ | | | ✓ | | | | | | | |
| OpenID | ✓[a] | ✓ | | ✓[a] | | | | | | | |
| OAuth | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓[b] | ✓ | ✓ |
| Web feeds | | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| OpenSearch | | | | | | | | ✓ | ✓ | | ✓ |
| oEmbed | | ✓ | | | | | | | ✓ | | |
| OpenSocial | | | | ✓ | | ✓ | | | | | |
| API Test Console | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | ✓ |
| API Client Libraries | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | | ✓ |
| Apps | ✓ | ✓ | ✓ | | | ✓ | | ✓ | | | |

*Table 15. Technologies of the social web. Source TNO*

An ordered, hierarchical representation of topics driving innovation on the web was deducted from the sources based on expert review. It includes the following categories and subtopics described below.

The main categories of technologies, innovations and social trends likely to impact the evolution of the web that emerged from the topical analysis are listed in table 23 below.

[32] Impact of Future Internet on public services, CPI/TNO for Ministry of the Interior, 2012

[33] Maurits Butter at al., Photonics21, the leverage effect. http://www.photonics21.org/download/Leverage_Internetversion.pdf

| | |
|---|---|
| | **Technologies** |
| 101 | Data analysis and Information Management |
| 102 | Semantic Technologies |
| 103 | Security and Privacy |
| 104 | Advanced Software Design |
| 105 | Artificial Intelligence and Complex Systems |
| 106 | Communication Technology |
| 107 | Presentation, Imaging and Interface technology |
| 108 | Sensor Technology, Internet of Things and Mechatronics |
| 109 | Digital Manufacturing |
| 110 | Human Enhancement Technologies |
| | |
| | **Innovations** |
| 201 | Next Gen Social Networks |
| 202 | Gaming, content and marketing |
| 203 | Cloud and software services |
| 204 | Data driven value propositions |
| 205 | Digital manufacturing |
| 206 | Sectoral Innovation |
| 207 | Future Web Innovation Paradigms |
| | |
| | **Socio-economic trends** |
| 301 | Selforganisation |
| 302 | Platform economies |
| 303 | Virtualisation |

*Table 16 Major categories of technologies, innovations and Socio-economic trends. Source TNO 2012.*

In a polling of web entrepreneurs consulted during the project, all listed technologies were considered relevant in web business innovation (Table 24 below). The most dominant ones according to the web entrepreneurs, in the short term, are Security/Privacy and Data Analysis. Beyond 2015 web-innovation may shift to Artificial intelligence, Human Enhancement, Sensor technology and, to a lesser degree, Digital manufacturing. More details on the stakeholder analysis are presented in Chapter 3.

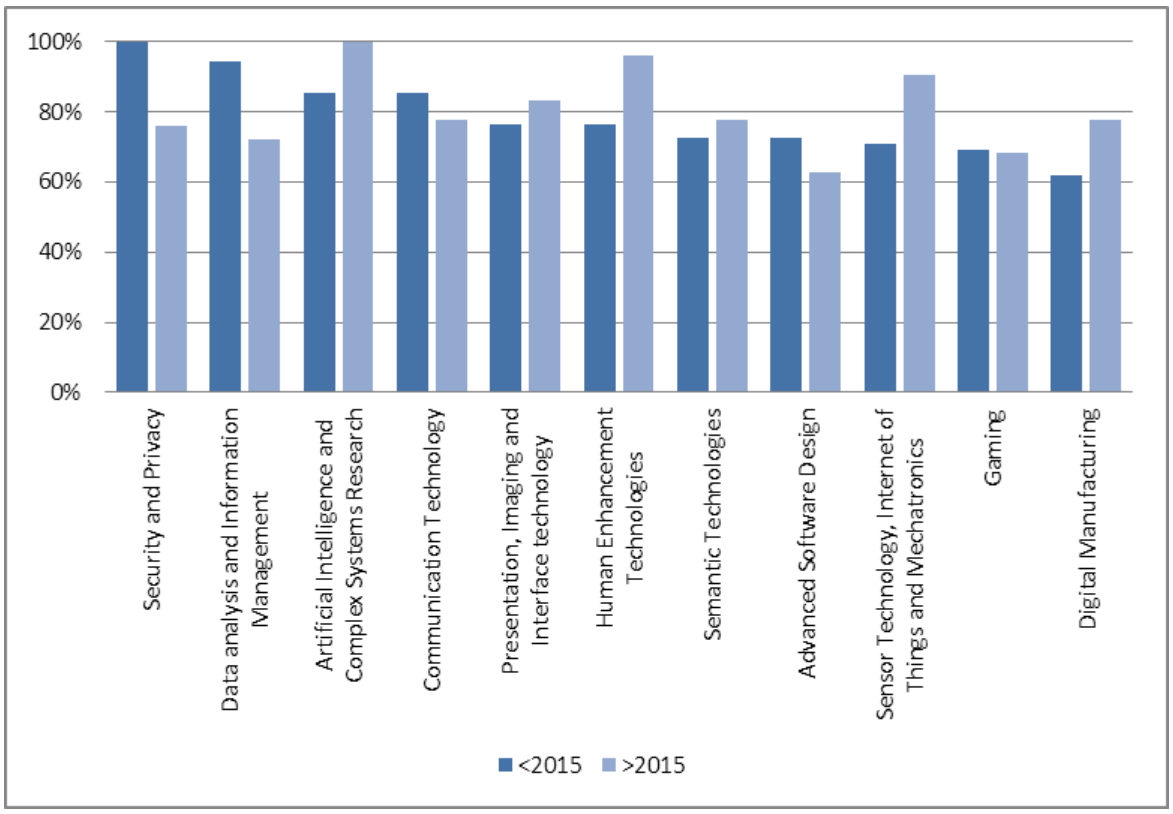


*Table 17. Polling of key technologies among web stakeholders*

Below we will present an overview of subtopics in these four key categories[34].

[34] For a complete description of all subtopics we refer to the roadmap tool on the project website www.opus2012.eu.

*Technologies*

Judging by the sheer number of research topics and innovations devoted to it, data analysis technologies are a key source of innovation for the web at the moment.

| **01 Data analysis and Information Management** | |
|---|---|
| 10101 | Descriptive analytics |
| 10102 | Predictive analytics |
| 10103 | Constraint based data mining |
| 10104 | Time Series / Sequence based mining |
| 10105 | Spatial / Geographic data mining |
| 10106 | Multimedia mining |
| 10107 | Distributed, collective datamining |
| 10108 | Ubiquitous data mining |
| 10109 | Phenomenological data mining |
| 10110 | Domain driven, actionable mining |
| 10111 | Mining Hypertext / Hypermedia |
| 10112 | Unstructured and complex data mining |
| 10113 | Sentiment analysis |
| 10114 | Fast Preprocessing |
| 10115 | Information Management |
| 10116 | Data warehousing architectures |
| 10117 | Enterprise Content Management |
| 10118 | Data Quality Research |
| 10119 | Text mining |
| 10120 | Business Analytics (L Search Big Data) |
| 10121 | Non-Relational database technology (NoSQL ) |
| 10122 | Analytics as a service (AAAS) |

| | |
|---|---|
| 10123 | Multidisciplinary analytics |
| 10124 | Fuzzy merging of internal and external data |
| 10125 | Anomaly detection and pattern recognition |

*Table 18 Data analysis technologies. Source TNO.*

| | |
|---|---|
| | **Security and Privacy** |
| 10301 | Cyber security |
| 10302 | Risk Management & Analysis |
| 10303 | Digital Identity Research |
| 10304 | Federated security |
| 10305 | Data ownership (ePortfolio, persona) |
| 10306 | Ethical Architecture |
| 10307 | Privacy Enhancing Technologies (PETs) |
| 10308 | Trustmarks |
| | **Artificial Intelligence and Complex Systems** |
| 10501 | Cognitive Computing |
| 10502 | Multiple Agents Systems |
| 10503 | Sentiment Analysis (link naar Datamining en HET) |
| 10504 | Evolutionary Computing |
| 10505 | Simulation and Modelling |
| 10506 | Cybernetics |
| 10507 | Adaptive Systems |
| 10508 | Machine Learning (link to Big Data innovation) |
| 10509 | Design Patterns |
| 10510 | Regulation and Control Theory |
| 10511 | Creativity, Design and Innovation Research |
| 10512 | Logistics and Mobility Research |
| 10513 | Societal Systems Research |
| | **Sensor Technology, Internet of Things and Mechatronics** |
| 10801 | Socio-metric badges |

| | |
|---|---|
| 10802 | Wireless Sensor Networks |
| 10803 | Flexible sensors |
| 10804 | Wearable sensors |
| 10805 | MEMS sensors |
| 10806 | Semantic sensor networks |
| 10807 | Underwater sensors |
| 10808 | Back Illuminated Sensors |
| 10809 | Bio and Nano Sensors |
| 10810 | Neural networks |
| 10811 | Energy harvesting (active) sensors |
| 10812 | RFID Open Standards |
| 10813 | M2M (Machine to Machine) |

*Table 19. Security, AI and Sensor technologies*

In the following sections are listed the innovations and socio-economic trends that were identified as relevant to the emergence of a future web ecosystem. As part of the TRM approach, the individual topics are linked and situated in time (2010-2020). The end result is projected onto an online interactive, visual map (see http://www.opus2012.eu). The interactive TRM tool allows the exploration of hotspots of web innovation that can be linked to geographical areas in Europe and web entrepreneurs. The current version is a snapshot based on over 500 web entrepreneurs and other stakeholders. A future version could be linked to near real time databases of web entrepreneurship data such as available through accelerators, VCs and community driven databases (e.g. Crunchbase) to provide a comprehensive overview of web entrepreneurship in Europe.

*Innovations*

| | **01 Next Gen Social Networks** | | |
|---|---|---|---|
| 20101 | Social TV () | 20105 | Geocached networks (SoLoMo) |
| 20102 | Social Music () | 20106 | Personal shopping Networks (Vente Privee) |

| | | | |
|---|---|---|---|
| 20103 | Social reading | 20107 | Smart Global HR Platforms () |
| 20104 | Social Sensors (Pachube) | | |
| | **02 Gaming, content and marketing** | | |
| 20201 | Gesture and sensory gaming (eg FAAST) | 20206 | Affiliate marketing () |
| 20202 | Social Media mining and analysis | 20207 | Alternate Reality Gaming (Beyond 4square) |
| 20203 | Music and audio streaming () | 20208 | Immersive gaming () |
| 20204 | Over The Top media content () | 20209 | Social gaming () |
| 20205 | eBooks () | | |
| | **03 Cloud and software services** | | |
| 20301 | Everything as a service (xAAS) | 20303 | Music as a platform (Spotify) |
| 20302 | Everything as a platform (xP) | 20304 | Asset light services (cherry car wash) |
| | **04 Data driven value propositions** | | |
| 20401 | Large Open Unstructured Databases (HADOOP) | 20407 | Behavioural targeting () |
| 20402 | Large Proprietary Unstructured Databases ( ) | 20408 | Linked Open Data () |
| 20403 | Personal data services (PET based) | 20409 | Semantic Web services (FOAF, Softplant) |
| 20404 | Data brokerage () | 20410 | Performance Analytics (sports, etc) |
| 20405 | Data markets () | 20411 | Finance (Klarna) |
| 20406 | Big data medical research and diagnostics() | | |
| | **05 Digital manufacturing** | | |
| 20501 | App enabled products (iPad coffeemaker) | 20504 | Rapid and remote manufacturing () |
| 20502 | Body parts printing | 20505 | 3D Art |
| 20503 | 'Hyper customisation' | 20506 | Domotica |
| | **06 Sectoral Innovation** | | |
| 20601 | Smart Cities () | 20605 | Smart Security (Serious War Games, 2020) |

| | | | |
|---|---|---|---|
| 20602 | Smart Transport () | 20606 | Personalised and Assistive Healthcare () |
| 20603 | Green Tech () | 20607 | Digital Education, digital libraries() |
| 20604 | Smart Grids () | | |
| | **07 Future Web Innovation Paradigms** | | |
| 20701 | Collaborative Web () | 20705 | Conversational Web () |
| 20702 | Intelligent Web () | 20706 | Data-veillance () |
| 20703 | Domain Webs () | 20707 | Gamification () |
| 20704 | Web of Trust () | 20708 | Symbiont Networks () |

*Table 20. Overview of web related innovations*

By linking web technologies and web innovations to core trends of the information society through the online TRM we can identify which clusters of technologies and innovations may be considered to contribute to societal problems and solutions. Table 28 presents an overview of these socio-economic trends.

| | |
|---|---|
| | **Selforganisation** |
| 30101 | Local & sustainable |
| 30102 | Autonomy |
| 30103 | Digital empowerment |
| 30104 | Slacktivism |
| 30105 | Peer to Peer service (bartering) |
| 30106 | Online Value Communities |
| | |
| | **Platform economies** |
| 30201 | Multisided markets |
| 30202 | Service oriented value creation |
| 30203 | Value filtering, grouping |
| | |
| | **Virtualisation** |
| 30301 | De-materialisation |
| 30302 | Asset light economies |
| 30303 | Anytime, Anywhere |
| 30304 | Surveillance society |
| 30305 | Digital identity |
| 30306 | Digital art |

*Table 21. Socio-economic trends*

# 2. ENGAGING THE WEB ENTREPRENEUR COMMUNITY

## 2.1. Introduction

In this chapter we collect the views of web entrepreneurs on the evolving internet economy with the aim to reach a shared understanding on effective measures to stimulate the development of a vibrant and competitive web ecosystem in Europe. First, we elaborate on the concept of *web entrepreneurship* and why web entrepreneurs should be treated different from regular entrepreneurs. Next we look at ways the commission might effectively engage with the web entrepreneur community. Finally, drawing on the inputs of a wide array of web stakeholders, we compile and discuss a list of key bottlenecks as well as measures to overcome them, for consideration by the commission.

## 2.2. What are web entrepreneurs?

The study adheres to the following definition of Web entrepreneur:

*'Web entrepreneur' is an umbrella term that covers startup founders who build innovative and often disruptive businesses on top of the Internet, mobile and various cloud-based technologies, programming interfaces and platforms.*

Web entrepreneurs exhibit the traits of real innovators: they are very ambitious, highly adaptable, and they are true networkers.

*Ambitious:* Web entrepreneurs tend to have an *ambitious* mind-set that allows them to steer their business towards rapid international, even global growth. This ambition combined with the opportunities afforded by web platforms allows them to reinvent business models, market segments or even entire industries.

*Adaptable: Web entrepreneurs* constantly iterate on ideas and business models to improve their offerings, often changing course radically on multiple occasions. In doing so they *adapt* quickly to changing conditions or user feedback. They are able to operate under difficult circumstances and constant pressure under rapidly evolving market conditions, high failure risk, low barriers to competition, a global, borderless playing field and often unproven existing technologies, platforms and distribution mechanisms. Acknowledging the high risk nature of their business, Web entrepreneurs build their exit strategy (IPO or M&A) into the initial business plan, going beyond the scope of the current venture or working on multiple ventures at once.

*Networkers*. Web entrepreneurs operate a kaleidoscope of existing and emerging Web technologies, APIs and cloud platforms, to develop their products and create new services, as well as to distribute and sell them. They build knowledge-intensive

businesses by attracting talented engineers, programmers, developers, scientists, digital marketing specialists and creative staff. In doing so they rely on virtual networks independent of physical locations, both in terms of building their businesses and in finding and servicing clients.

These characteristics mean that Web entrepreneurs can scale their businesses extremely fast, requiring very little time to build new Web or mobile products and distribute them, going from idea to-market in the blink of an eye. This clearly sets them apart from more traditional entrepreneurs starting small companies such as restaurants, candy stores or gardening service firms. Their needs and problems are simply not the same. Successful Web startups can grow from a team of 2 people to 200 people in less than a year, and increase revenues tenfold in the same period from customers worldwide, while most categories of entrepreneurs in other sectors do not design or intend for their business to ever reach that kind of scale. Fast growing web businesses stimulate job growth, in particular when business start competing on a global level. Web entrepreneurs are on average 10 to 15 years younger than traditional entrepreneurs[35]. According to data from ACCA/Delta economics (2012)[36], the average age of growth-oriented entrepreneurs is lowest in China, at 35. By contrast, the average age in the other BRICSA countries is much higher. India and Russia are the next lowest at 40, followed by Brazil and South Africa at 45. The average age of growth-oriented entrepreneurs in the US is one of the highest globally at 50; although Belgium has the highest average at nearly 52. The UK, Germany and France are not far behind at 46. Interestingly, the average age of entrepreneurs in Europe is lowest in the Netherlands and Spain at 43.

The young age of web entrepreneurs could make them an important vehicle in addressing youth unemployment.

Finally, Web entrepreneurs, by virtue of the everyday products and services they create, improve, distribute and sell, have an enormous impact on human society. This impact will only deepen and broaden as the next generation grows up in a world where technology in all its forms has become so ubiquitous that most people could not even imagine life without it.

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[35] Y combinator estimates average web entrepreneur age at 26. See http://neilperkin.typepad.com/only_dead_fish/2012/02/is-the-average-age-of-entrepreneurs-getting-older.html.

[36] http://www.accaglobal.com/content/dam/acca/global/PDF-technical/small-business/pol-tp-hgs.pdf

## 2.3. Stakeholder engagement approaches

*Key Findings*

Web entrepreneurs prefer to be engaged with European level policy process by means of consultation and collaboration.

Means of engagement, ideally are embedded in existing stakeholder forums and platforms, such as Techmedia channels and key conferences. The key message is of course not to start separate communities. Instead, the Commission will need to take time to build trust by participating in existing and emerging web entrepreneurship communities. This means convening fewer sessions at EC premises while more frequently assisting at 'embedded' activities with key communities.

Key motivations for engagement are to help *stimulate economic growth, to network with stakeholders* within the European web entrepreneurship community and to find new business opportunities. Stakeholders that like to *collaborate* are more likely ideologically driven.

This section evaluates suitable methods for engaging web entrepreneurs and other web stakeholders. This will allow interested parties such as the Commission to select appropriate methods when soliciting inputs from a web community operating largely out of sight from policymakers.

### *2.3.1. Designing stakeholder engagement*

Engagement of stakeholders enhances the effectiveness of policy measures to support the emerging domain of web entrepreneurship. Typical reasons for engagement include[37]:

- Higher quality decision-making on the side of the public sector;
- Increased efficiency in and effectiveness of 'product and service' delivery by the public sector;

[37] Source: State of Victoria (Department of Education and Early Childhood Development) 2011. Stakeholder Engagement Framework. Melbourne

- Improved risk management practices – allowing risks to be identified and considered earlier, thereby reducing future costs;
- Streamlined policy and program development processes;
- Greater engagement with stakeholder interests – ensuring services are delivered in collaboration with stakeholders and provide outcomes which meet community needs;
- Enhanced community confidence in projects undertaken;
- Enhanced capacity to innovate.

When stakeholder engagement is effective, stakeholders will benefit from:

- Greater opportunities to contribute directly to policy and program development;
- More open and transparent lines of communication – increasing the accountability of Government and driving innovation;
- Improved access to decision-making processes, resulting in the delivery of more efficient and responsive services;
- Early identification of synergies between stakeholder and Government work, encouraging integrated and comprehensive solutions to complex policy issues.

*When is stakeholder engagement appropriate?*

Stakeholders can be involved at all stages of policy action. In the reflection stage, providing input for ideas. Second, stakeholder engagement could also be included when choosing what to do, Last, stakeholder engagement is needed during the implementation. Although possible, involving stakeholders in every step of the policy process would require significant resources and time, slowing down the process. However, some level of engagement is needed at every step.

*Which stakeholder should be engaged?*

In order to ensure that all stakeholders are represented it is necessary to map them.

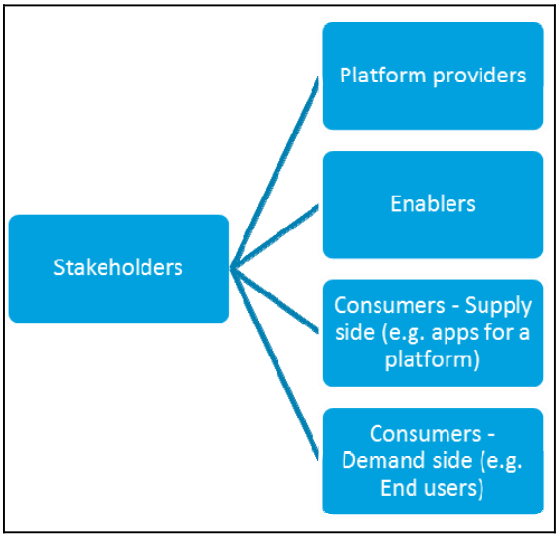


*Figure 10. Stakeholder taxonomy*

The taxonomy of stakeholders for the area of web platforms was developed based on viewing the environment from a market perspective. In any given market there are suppliers, consumers and enablers. This approach was chosen because through segmentation with a market lens the different wants, needs and general perspectives of stakeholders become most evident. However, in the area of web platforms, in addition to traditional enablers and (web-platform) providers/suppliers, there is in addition *a consumer provider side*. Figure 15, above, illustrates the four main categories of stakeholder in the most basic breakdown. The figure reflects the split into 'Consumers – Supply side' and 'Consumers – Demand side'. The 'supply side' refers to companies or individuals whose product or services are enabled by the platform. An obvious example of this are the App developers who develop their products to work through a web platform.

The definitions of the basic categories in the taxonomy are as follows:

**Platform providers** are the organisations that make the platforms available for use.

**Enablers** are any organisations that enable any of the other three main categories of stakeholders.

**Consumer – Supply side** are the consumers of the web platforms that use the other suppliers that use the platforms to provide their services to end-users.

**Consumer – Demand side** are the end-consumers of the platforms, not ones that use

is to provide their services or product, but the end-users.

*What is the required level of engagement?*

Two key factors determine a stakeholder engagement strategy: *stakeholder influence* and *impact of the policy on the stakeholder*. When stakeholders have little influence and are only impacted to a low degree, then they may simply be *informed*. Whereas if stakeholders have a high level of influence, but are only impacted to a low degree, then they should be *consulted* as needed. Once stakeholders are impacted to a high degree, they should be more deeply engaged. If stakeholders are impacted to a high degree, but have low influence, they should be *involved*, if they are impacted to a high degree *and* have high influence then the stakeholder engagement should take the form of *collaboration*.

There are many methods and tools for stakeholder engagement and it is important to know which tools to use for which level of engagement. Table 29 below shows the most commonly accepted and used tools for the different levels of engagement.

Apart from the type of stakeholder and the tools, the individual incentives need to be clear from the start. Incentives relevant in the context of online engagement include:

- Altruism
- Stimulate economic growth
- Networking opportunities
- Increase business opportunities
- Lower market barriers
- Increase reputation
- Financial Compensation
- Donations to 3rd parties
- Increased chance of EU or national funding

### *2.3.2. Evaluating suitable stakeholder engagement strategy for web entrepreneurs*

To design an optimal stakeholder engagement strategy for the field of web entrepreneurship, the team designed a test protocol, three scenarios of stakeholder engagement strategies and tested these scenarios with 50 stakeholders by means of a web-survey and 10 in-depth interviews.

The test protocol consists of four different elements:

- How to minimize bias of the test;
- Selecting the stakeholders to include in the test;
- Selecting the engagement methods;
- Selecting the engagement measures;

Three scenarios with each a mix of methods and measures were designed:

- Scenario 1: Social media as a tool to inform
- Scenario 2: Survey as a tool to consult and collect quantitative data
- Scenario 3: Interviews as a tool to consult and collect quantitative data

*Findings*

Most respondents from the survey indicate that they would like to be at least consulted regarding setting the agenda and policies with regards to web platforms and web entrepreneurship in the EU. Below is a description of the five involvement categories, together with the tools and methods preferred by the respondents for each of these categories. Over one third of respondents would like to participate at the highest level, namely by collaboration throughout the policy-making cycle.

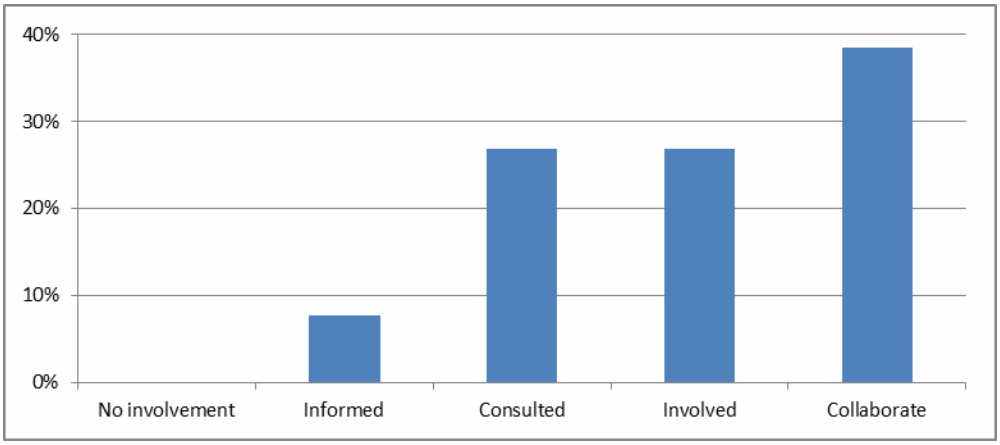


*Table 22. Preference of web entrepreneurs on engagement levels*

Naturally, the entrepreneurs prefer to be *informed* through online media: websites, blogs, and Twitter. Preferred ways to *consult* are interviews, social media, focus groups, and surveys. *Involvement* could take place through professional Community Advisory Groups to obtain informed opinions and feedback. According to the polled entrepreneurs, *collaboration* could take place in stakeholder panels and online forums. The interviews showed that most stakeholders were prepared to commit to higher levels of engagement if asked. Import messages from the interviews to consider when engaging the stakeholder community:

- **Do not start your own platform:** Use existing platforms where the stakeholder community is already engaged. Face-to-face is good, but a good option is to create small online panels (e.g. Google hangouts with a maximum of 15 stakeholders) where people can cooperate on specific entrepreneurship topics, and create direct input for policymakers.
- **Work with established web entrepreneurship communities:** There is need to create a community around policymaking efforts. For this purpose, trust and confidence among entrepreneurs has to be gained. Working established events (e.g. LeWeb, NordicStartup) can help to create a big entrepreneurial community in the Europe. Programs that shape policy are trusted better and more effective if they are part of the community.

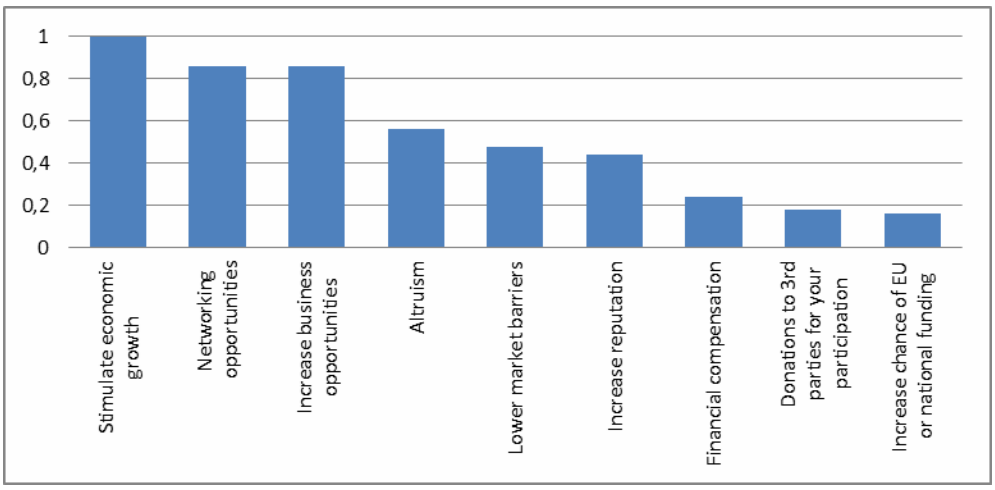


Table 23. Motivations to participate

The most important motivations to participate are to help stimulate economic growth, networking opportunities, and finding new business opportunities. Interestingly, the three least important motivations for participating were the ones relating to financial compensation of different kinds. In addition, the interviewees mention the following motivations to collaborate:

- Personal contribution, responsibility as EU citizen,
- Web entrepreneurship is connected to field of work,
- Important to signal problems from the field, expertise can be helpful for forming policy,
- Getting to know the issues others face,
- Creating a big entrepreneurial community,
- Love for high-tech start-ups.

*Findings*

The surveys and interviews support the following observations:

**Level of engagement:** When web entrepreneurs know what the Commission can mean for web entrepreneurship, most prefer to be engaged by means of *consultation* and *collaboration*.

**Engagement methods:** Web entrepreneurs with rapid growth paths and hyper charged business development cycles have even less time for engagement than regular entrepreneurs. Hence, the best methods are to embed means of engagement in existing stakeholder forums and platforms, such as Techmedia channels and key conferences. The key message is of course not to start separate communities. Instead, the Commission will need to take time to build trust by participating in existing and emerging web entrepreneurship communities.

**Engagement measures:** The key motivations for engagement are to stimulate economic growth, networking with stakeholders within the web entrepreneurship community and finding new business opportunities. Stakeholders that like to collaborate are more ideologically driven.

These observations may seem self-evident to some degree, the reality is that they are not *put into practice*. This means convening fewer sessions on EC premises and more embedded activities with key communities across Europe. One way to facilitate this is to work through community moderators that operate at arm's length of the commission such as accelerators and tech news organisations.

## 2.4. A web entrepreneur perspective on the EU economy

*Key Findings*

Collecting data on web entrepreneurs remains a challenge and, as a result, much of their activities remain below the radar. To improve monitoring of web business activity, a more systematic data collection approach needs to developed. Interfaces like the OPUS TRM tool could be a front-end data-collection instrument that collects data from accelerators, enablers such as VCs, entrepreneur self-collected data (e.g. Crunchbase) and more, following a standardised web entrepreneurial activity benchmark.

The three most important challenges web entrepreneurs face are related to finance, innovation culture, and human resources and education.

The main reason given for *financial impediments* is the lack of understanding in the European financial world of the dynamics of web entrepreneurship. European venture capitalists and banks dismiss web startups as simply too high risk. There are relatively few web savvy venture capitalists and investment angels in Europe compared to the United States, so they are not sure what they are investing in. The biggest hurdle is first round investments, when there is no proven track record. The

focus should lie on investing in growth potential or future business value, shown by the vision of the entrepreneur, venue, user, and/or community growth. *Measures that could help overcome this bottleneck would be to inform and educate investors about the dynamics of investing in web entrepreneurship.*

The number one administrative burden hurting *innovation culture* is hiring new employees. Despite freedom of movement in the European Union, it is often easier to find available people with the required skills if these people do not have to relocate. The main reason is the varying and complex employee legislation across Member States. Most measures to resolve innovation culture issues advanced by the interviewees include the *provision of some form of guidance to entrepreneurs to lighten or ease the administrative burden of hiring staff*.

As in the USA, entrepreneurship knowledge and skills should be embedded in engineering studies. The current entrepreneurship studies are not sufficiently hands-on. *Measures could stimulate connecting IT curricula to entrepreneurship*. Connecting accelerators to universities is one way to achieve this. The added advantage is that student grants provided by governments have a double function: they pay for professional formation and they provide a basic-level income to start-up entrepreneurs.

There is a lack of specific IT skills in the EU job market. Current IT curricula tend to focus on well-established IT technologies instead of emerging, promising technologies. In order to ensure that the workforce of the future has the skills needed in the future, policy measures should place more emphasis on emerging technologies and on the kind of technologies that may become mainstream in the future.

Industries with high salaries (oil, finance and automotive) take the majority of IT talent, resulting in a lack of skilled people working for start-ups. In the EU the best employees avoid "risky" start-ups, although they would generate more economic growth. Web entrepreneurs should be of high esteem so that good programmers would choose them above bigger companies. Southern European Member States that currently experience high unemployment rates due to the financial crisis might ultimately benefit when their skilled labour moves into the high growth domain of web entrepreneurship. Web entrepreneurs from Greece attach great importance to the web economy in targeting youth unemployment.

This section describes the perspectives of web entrepreneurs and other stakeholders on the need for specific support measures to grow a vibrant EU wide web-ecosystem.

### *2.4.1. Approach*

In addition to ad-hoc interaction at workshops and web entrepreneur events, information from web stakeholder groups was gathered through an extensive mapping of 500+ stakeholders, mostly entrepreneurs, a structured survey of 50 targeted representatives and finally selected in-depth interviews.

Data on an EU wide profiling across stakeholder groups was captured in the interactive OPUS TRM tool also used for the roadmap (see section 2.3 and www.opus2012.eu ). Detailed, interactive maps can be obtained through the online tool. The data gives a flavour of activity across the EU but cannot be comprehensive due to the lack of data, data fragmentation and difficulty in accessing existing datasets. For a more comprehensive profiling of activity a more systematic data collection strategy needs to be developed beyond the scope of this project. Interfaces like the OPUS TRM tool could bring in data from accelerators, enablers such as VCs, entrepreneur self-collected data (e.g. Crunchbase), and more following a standardised web entrepreneurial activity benchmark.

The structured survey was drawn-up based on previous studies and results from EC funded initiatives such as the OpenIdeo web entrepreneurship *crowdsourcing challenge*[38]. The survey included questions in the following areas[39]: perceived business value of the web, importance of emerging web technologies, perceived challenges, and potential policy measures. A link to the survey was sent to over 500 individuals from organisations belonging to the stakeholder group (software developers, platform providers, accelerators). Additionally, 60 communities were selected and engaged to act as multipliers. Key communities (Techstart, Founder Institute, OpenIdeo, and Rockstart) were asked to notify their members of the OPUS survey. Several communities posted a link to the survey on their website, Linkedin group forum or Twitter.

To collect in-depth information on the subject the survey data was complemented with information from targeted interviews. A semi-structured interview protocol was developed to guide the interviews focusing on (1) problem areas, bottlenecks and potential policy-measures, and (2) engagement in the policy-making process. The interview protocol was tailored to the interviewees following their responses in the survey. Eight stakeholders eventually participated in interviews for a duration of approximately 30 minutes.

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[38] See http://www.openideo.com/open/web-start-up/brief.html

[39] For the complete questionnaire including a description of the organization and the interview protocol see the detailed report on stakeholder engagement available from the project website www.opus2012.eu.

### *2.4.2. Issues affecting web entrepreneurs*

The three most important challenges web entrepreneurs face relate to finance, innovation culture, and human resource and education. Table 32 shows how the respondents scored the problem areas. Clearly, availability of technology and infrastructure is not a hampering factor for European web entrepreneurs.

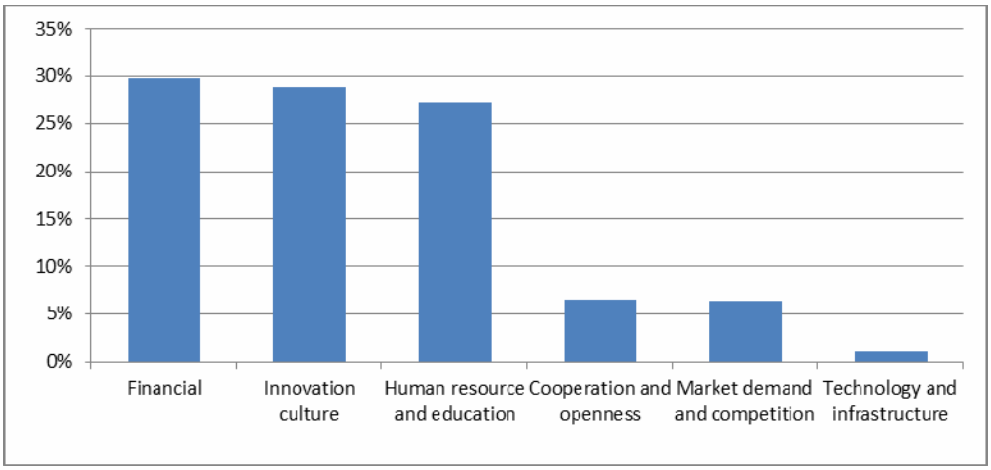


*Table 24 Main challenges as perceived by web entrepreneurs*

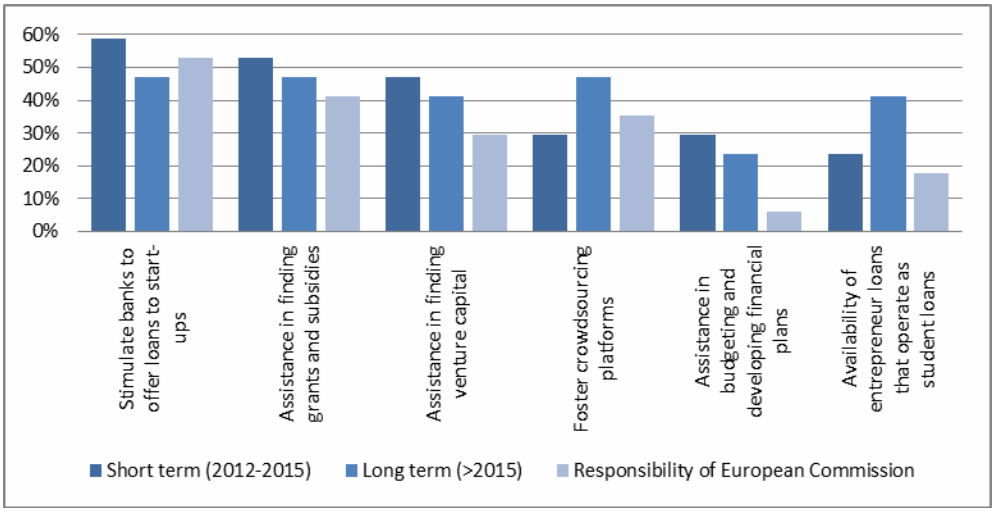


*Table 25. Measures that could help improve access to finance*

*Finance*

Hindrances related to finance are limited access to venture capital, bank loans, and public funding. Two popular measures that address this include *stimulating banks to offer loans to start-ups* and *providing assistance in finding venture capital, grants, and subsidies*. Roughly half of the respondents think these two measures could be or should be the responsibility of the European Commission.

**Risk-adverse investment climate:** the main reason for the financial worries of web entrepreneurs is purported to be the lack of understanding in the European financial world of the dynamics of web entrepreneurship. This results in European venture capitalists and banks dismissing web startups as high risk. Measures that could help overcome this bottleneck would be *to inform and educate investors about the dynamics of investing in web entrepreneurship*. A problem that was voiced by the interviewees is that due to the risk-averse approach to the web by investors in Europe, funding rounds can take twice as long as in the US. Web entrepreneurs can ill-afford such lag, and as a result opportunities are frequently missed.

**Understanding the web-domain, investing in growth**: related to the previous point, investors lack an understanding of the high-tech, web domain. Many banks and venture capitalists in Europe are not sure what they are investing in. There are relatively few web savvy venture capitalists and investment angels in Europe compared to the United States. In terms of investments, the biggest hurdle is in first round investments, when there is no proven track record. The focus should lie on investing in growth potential or future business value, shown by the vision of the

entrepreneur, venue, user, and/or community growth. Many web-based businesses are virtual: they have no offices, they are not bound to a region, and can be scattered across multiple locations. An investment fund that requires entrepreneurs to settle in a specific region therefore ignores the dynamics of the web-domain. Informing and educating European investors is key to help overcome this bottleneck.

**Access to R&D funds:** current R&D funds (such as through EU framework programmes) present a heavy administrative burden which makes these programmes irrelevant for web entrepreneurs. A potential solution is to reduce the administrative burden and have representatives from the programmes in the different regions, distributing responsibility and accountability for funds to more local representatives who have a better chance of judging the potential of the proposed investment projects. An additional measure noted by an interviewee is to stimulate re-investment in the web-domain by web entrepreneurs that have had previous success, for example through tax-incentives and/or support regarding financial regulations when investing own capital this way. The advantage of the latter is that these investors truly understand the web-space. Re-investment is popular in the US, but lags in Europe according to the interviewees.

**Tax climate:** interviews suggested that there fundamental problems in Europe for example with the inequality between the VAT on online and offline services and products, which does not stimulate the market and which therefore may become a barrier to the growth of web startups.

**Risk sharing:** although risk sharing initiatives exist, such as through crowdfunding and crowdsourcing, these are more appropriate in second round funding (and even then have they limited reach) as they primarily work once there has been an assessment that the start-up will be successful. Measures to lighten the risk-burden on entrepreneurs would be to stimulate an investment system where entrepreneurs with a good plan could get access to seed-funding that is non-repayable in case the venture fails.

**Investment networks:** many web entrepreneurs have an IT background and are not networked into the financial community. Social networks, specifically with investors, are vital for the success of web entrepreneurs. Measures to help solve this problem could focus on providing web entrepreneurs with networking opportunities beyond those provided in start-up bootcamps. Deeper social ties have to be made between investors and entrepreneurs.

*Innovation culture*

The main cultural bottlenecks in this area are the rigidity of the workforce regulation (e.g. hiring freelancers), a discouraging tax regulation for entrepreneurs, and the complexity of regulations (e.g. relating to intellectual property rights). Popular measures to stimulate the innovation culture include the *provision of tax-incentives* and the *reduction of the administrative burden for start-ups*. A majority of respondents indicate that these could be addressed at EU level.

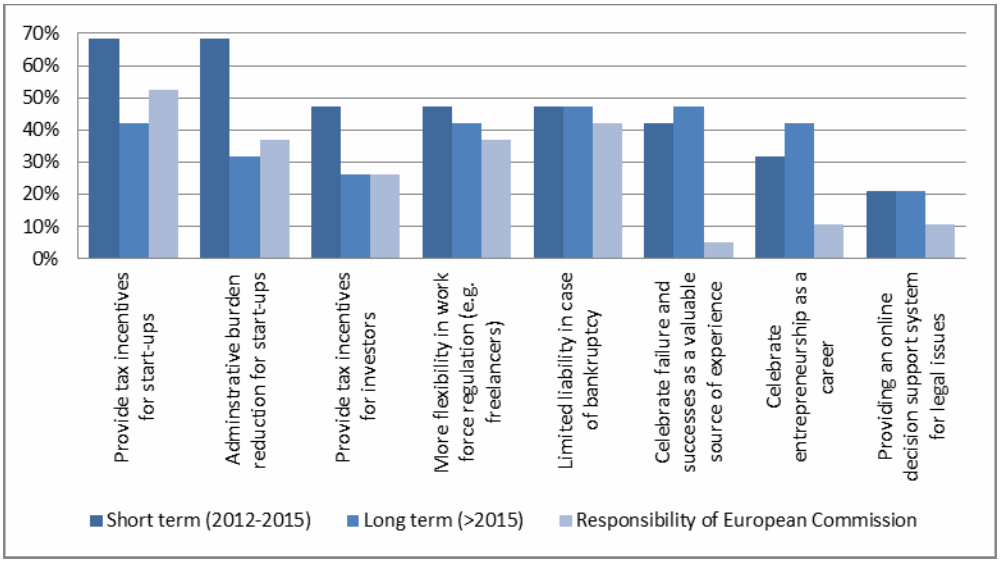


*Table 26. Measures that could help to overcome the bottlenecks relating to the innovation culture*

**Administrative burden for web entrepreneurs:** an important bottleneck is the complexity and inconsistency of European rules and regulations to start and run web businesses. Most web entrepreneurs are not trained to handle this burden and therefore lose a lot of time on these issues. The number one administrative hurdle is hiring new employees. Specialised IT Engineers are scarce. Hence, it is necessary for entrepreneurs to source these skills from other European countries than the one in which they are established. Despite freedom of movement in the European Union, it is often easier to find available people with the required skills if these people do not have to relocate. The main reason is the varying and complex employee legislation across Member States. Most measures to resolve innovation culture issues advanced by the interviewees include the provision of some form of guidance to entrepreneurs to lighten or ease the administrative burden of hiring staff. A specific measure is to create a one-stop-shop for all rules and regulation affecting web entrepreneurs. Such a one-stop-shop- should transcend national forums. Another measure advanced by some of the interviewees is to exempt start-ups from some of the time-consuming regulation for a period of time, so they can focus on growth first.

**Lack of innovation and entrepreneurial culture:** interviews also re-emphasized a well-known cultural obstacle: the lack of failure acceptance in Europe. This discourages

individuals to become entrepreneur, let alone high risk web entrepreneurs whose dynamic ventures have both a high failure (and high growth) rate.

*Human resources*

The main human resources related bottlenecks for web entrepreneurs are the limited availability of skilled labour, the difficulty of finding skilled labour, and the labour cost. Popular measures include *encouraging entrepreneurship education*, *encouraging computer science studies*, and *providing financial incentives to start-ups for hiring new personnel*. Over 60% of respondents indicate that encouraging entrepreneurship education could be a responsibility of the European Commission.

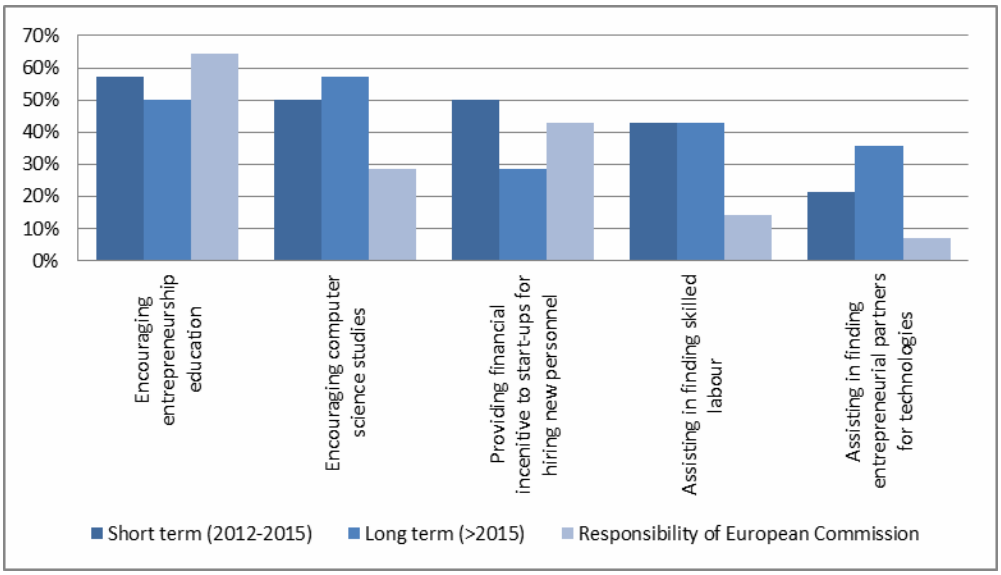


Table 27. Measures that could help to overcome the bottlenecks relating to human resources and education

**Entrepreneurship education:** Interviews reveal that most European university curricula either focus on IT engineering *or* entrepreneurship as part of business administration. As in the USA, entrepreneurship knowledge and skills can better be embedded in engineering studies. The current entrepreneurship studies are not sufficiently hands-on. As one interviewee illustrated: American professors are themselves founders of successful start-ups and partners in accelerators, while in Europe most professors are academics only. Measures could stimulate connecting IT curricula to entrepreneurship. This could be in the form of providing grants or incentivizing students to start their own business while at campus. Connecting accelerators to universities is one way to achieve this. The added advantage is that student grants provided by governments have a double function: they pay for professional formation and they provide a basic-level income to start-up entrepreneurs.

**Availability of talent in cutting-edge information technologies:** there is a lack of a number of very specific IT skills in the EU job market. One example is IT skills and skills within the field of Geospatial and mobile technologies. Current IT curricula tend to focus on well-established IT technologies instead of emerging, promising technologies. In order to ensure that the workforce of the future has the required skills, there must be more emphasis on emerging technologies and on the kind of technologies that may become mainstream in the near term.

**Attractiveness of being a (web) entrepreneur:** start-ups compete with conventional industries in the job market. Industries with high salaries (oil, consultancy and large IT companies) take the majority of IT talent, resulting in a lack of skilled people working for start-ups. Basically the best employees are not going for "risky" start-ups, although here they could add more to economic growth in the end. If web entrepreneurs would be valued more (which of course refers back to the issue of innovation culture), good programmers would choose them above the bigger companies. One measure stimulating skilled labour to join start-ups could be to provide more security for start-up-employees. Southern European Member States that currently experience high unemployment rates due to the financial crisis might ultimately benefit when their skilled labour moves into the high growth domain of web entrepreneurship.

**Limited mobility and coaching**: There is a lack of exchange of knowledge and experience between web entrepreneurs in Europe, partly due to a lack in mobility. A perceived obstacle is the lack of focus across regional clusters in Europe in web-innovation. Policy action could focus on supporting the exchange and mobility of entrepreneurial minded people, for example through networking internships linking major European web entrepreneurship hubs such as London, Berlin and Copenhagen.

# 3. CONCLUSIONS

## 3.1. Summary of findings

*On the state of play in the European Web economy*

A significant and growing portion of economic growth in Europe and elsewhere can be attributed to the Internet[40] with some countries such as the UK and Sweden leading the way internationally with over 5% of GDP coming from the Internet[41]. With an estimated Internet population reaching half the world population in 2016, the importance of the Internet for European Economies is destined to grow.

Software and Content based services, the business of *web entrepreneurs*, represent a small but fast growing segment of the Internet Economy. Cloud computing (5.8B) generated the bulk of direct web services revenues in 2010 followed by Games (2.3B). Advertising income is mostly generated through search (6.5B) and online press (1.5B). Web services in Europe exhibit double digit growth in terms of the number of businesses, users, revenues and offerings. Direct revenue growth is highest in eBooks, paid services for Social Networks and mobile apps.

However, with the exception of games, the EU is still trumped by the US in nearly all segments of the Internet Economy in the revenue generated with web applications and services.

*On how web entrepreneurs create value*

[40] 20% on average between 2004 and 2009 according to OECD estimates.

[41] Internet matters, McKinsey (2011)

Developers create value with Apps in three main ways: (1) exploiting the platform ecosystem, App developers create services that build on a combination of functions and features provided by multiple software and device platforms; (2) Creating solutions by making efficient complements, matching supply and demand of two-sided markets in novel or more efficient ways, using apps; (3) Creating complementarities (combinations of products and services with enhanced value) through social and physical integration.

In-depth case studies show that highly dynamic ecosystems of web entrepreneurs are capable of generating high revenues and high employment, jointly rivaling big players in the most competitive and innovative industries.

Beyond 'black-box' variance models, richer accounts are needed of web services impacts and how the economy at large is affected taking into account firm-level data and cases; demand and sector-specific aspects; aggregation effects; IT-related spillovers; and negative impacts. *A process-based* IT approach can fulfill the requirements of firm level evidence and sector specific demands providing an important starting point for the evaluation of web economy impacts.

*On the future web economy*

Under the current regime the US will continue to lead the Internet Economy between 2014 and 2020. It will overtake Europe in access based revenues, both fixed and mobile. China will gain ground in all areas moving towards 2020. In advertising revenues the US will extend its dominance while in paid services and applications Europe may actually gain ground.

Our 'business as usual' estimates that web services revenues in Europe will increase five-fold to over 100B in 2020, mostly from fast growth in paid services and applications. Advertising revenues will double in that period to 30B. However, disruptive transformations are likely in the emerging web arena, in which case the outcome will be more pronounced.

Key technology areas for web entrepreneurs in the short term are *Security/Privacy Technologies* and *Data Analytics* (such as Big Data). Beyond 2015, web companies expect Artificial Intelligence, Sensor technology and Human Enhancement to play a big role in web services.

*On Stakeholder engagement*

Provided their role is clear, web entrepreneurs prefer to be engaged with the European level policy process by means of consultation and collaboration.

Means of engagement ideally are embedded in existing stakeholder forums and platforms, such as Techmedia channels and key conferences. The key message is of course not to start separate communities. Instead, the Commission will need to take time to build trust by participating in existing and emerging web entrepreneurship communities. This means convening fewer sessions at EC premises and more 'embedded' activities with key communities.

Key motivations for engagement are to *stimulate economic growth*, *to network with stakeholders* within the web entrepreneurship community and to find new business opportunities. Stakeholders that like to *collaborate* are more likely ideologically driven.

*On the perspective of Web entrepreneurs*

Collecting firm level data on web entrepreneurs remains a challenge, and as a result much of their activity remains below the radar. To improve monitoring of web business activity, a more systematic data collection strategy needs to be developed. Interfaces like the OPUS TRM tool could be the interface to data collected from accelerators, enablers such as VCs, entrepreneur self-collected data (e.g. Crunchbase) and more, following a standardised web entrepreneurial activity benchmark.

The three most important challenges web entrepreneurs face relate to finance, innovation culture, and human resources and education.

The main *financial impediment* is the lack of understanding in the European financial world of the dynamics of web entrepreneurship. European venture capitalists and banks dismiss web startups as simply too high risk. There are relatively few web savvy venture capitalists and investment angels in Europe compared to the United States, so they are not sure what they are investing in. The biggest hurdle is first round investments, when there is no proven track record. The focus should lie on investing in growth potential or future business value, shown by the vision of the entrepreneur, venue, user, and/or community growth. *Measures that could help overcome this bottleneck would be to inform and educate investors about the dynamics of investing in web entrepreneurship.*

The number one administrative burden hurting *innovation culture* is hiring new employees. Despite freedom of movement in the European Union, it is often easier to find available people with the required skills if these people do not have to relocate. The main reason is the varying and complex employee legislation across Member States. Most measures to resolve innovation culture issues advanced by the interviewees include the *provision of some form of guidance to entrepreneurs to lighten or ease the administrative burden of hiring staff*.

As in the USA, entrepreneurship knowledge and skills should be embedded in engineering studies. The current entrepreneurship studies are not sufficiently hands-on. *Measures could stimulate connecting IT curricula to entrepreneurship*. Connecting accelerators to universities is one way to achieve this. The added advantage is that student grants provided by governments have a double function: they pay for professional formation and they provide a basic-level income to start-up entrepreneurs.

There is a lack of a number of very specific IT skills in the EU job market. Current IT curricula tend to focus on well-established IT technologies instead of emerging,

promising technologies. In order to ensure that the workforce of the future has the skills needed in the future, policy measures should place more emphasis on emerging technologies and on the kind of technologies that may become mainstream in the future.

Industries with high paying jobs such as oil, finance and automotive take the majority of IT talent. In the EU, more than in the US, talented employees avoid "risky" start-ups, although they would contribute more to economic growth in the long term. Web entrepreneurship should be valued for the contribution they make, such that more good programmers opt for them over traditional companies. Member States in Europe with high unemployment rates due to the financial crisis may benefit when their skilled labour moves into the high growth areas of web entrepreneurship. Web entrepreneurs from Greece already see the web entrepreneurship as key in targeting youth unemployment.

### 3.2. Policy Recommendations

*Drawing on the findings summarized above the following policy recommendations could be considered by the Commission:*

*Access to financial and other resources*

Nearly half of the polled web entrepreneurs see a clear role for the Commission in enhancing access to finance and other resources such as to facilitate early stage and second stage funding for Startups. Measures on the European stage that could address the main hindrances include:

- Inform and educate EU investors on the critical importance of investing in web entrepreneurship. This could be done by leveraging EU venture Capital networks and by engaging European Web entrepreneur champions. Innovation funds like the EIF need to be made aware of the opportunities web entrepreneurship can afford and the specific attention they require.
- Promoting re-investment by successful European and international web-entrepreneur. These investors already understand the web-space.
- Enhancing access to European R&D facilities under H2020 and by making provisions stimulating the participation of web entrepreneurship intermediaries (accelerators, hubs) as part of the regular call requirements.

*Innovation Culture and Talent development*

Behind the limited access to resources highlighted above lie more intractable

hindrances related to the European entrepreneurship culture. Measures to boost a dynamic web entrepreneurship culture at European level include:

- Creating an intuitive one-stop-shop at EU level for all rules and regulation affecting web Startups. This would include information on hiring and firing, access to financial and educational resources, cross border issues, and much more.
- Linking entrepren-eurship programmes including mentoring programmes to engineering faculties for example by promoting interaction between accelerators and universities. Mentors need to be sourced from successful, innovative internet companies.
- Placing more emphasis on teaching emerging rather than traditional technologies. Invite tech and business entrepreneurs to teach on emerging topics.
- Celebrating the achievements and opportunities of web entrepreneurship to raise its status among graduates and investors. Web entrepreneurs should be valued for the contribution they make to economic growth and the opportunities they provide for unemployed youth.

*Monitoring and Evaluation*

All existing studies on the impact of the web economy highlight an extreme lack of consistent aggregate, firm level data on web entrepreneurship across Europe. To inform policy actions implementing the Digital Agenda a serious effort is needed to improve monitoring of web entrepreneurship activity. This should include an EU level data campaign resulting in an observatory that harmonizes, aggregates and expands on data already collected by VCs, Accelerators and Techmedia. The data should fulfil the requirements of a more comprehensive model of web entrepreneurship impact such as described in this study.

European Commission

**OPEN PLATFORMS FOR WEB-BASED APPLICATIONS AND SERVICES IN EUROPE, ENLARGING THE STAKEHOLDERS COMMUNITY (SMART 2011/0043)**

Luxembourg, Publications Office of the European Union

**2013** – Pages: 76

ISBN number

DOI: