



Pierre Audoin Consultants

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Economic and Social Impact of Software & Software-Based Services

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EXECUTIVE SUMMARY

The European Software Industry

A key industry for Europe's growth in transition

The project „The economic and social impacts of Software and Software based Services“ analysed and assessed the development of the European Software Market and Industry and its impact on the economic growth and employment from today to 2020.

Executive Summary

Software is a key driver for the European economy and the EU is the second biggest software market worldwide, but this is not reflected by the overall competitive situation of the European software industry, which lags behind its competitors from the US. Among the world's Top 20 software vendors, 14 are US-based and account for more than 37 % of the worldwide market, while there are only 3 European companies, with only 5% of the market. However, the market is in a period of transition, boosted by new technological and economical developments like the Internet of Services, the Internet of Things, the Cloud Computing or the enhanced mobility, which offers a window of opportunity for the European industry to change this. The study analyses the development of the software market and industry from today until 2020 and develops strategic recommendations to improve the competitive position of the European software industry. The "package of recommendations" as described below is twofold: on one hand it addresses the support of developments in the direction of Cloud Computing, Mobility and Open Source Software, which will be of benefit for the European software market and industry. On the other, it addresses obstacles like market fragmentation, lack of standards and interoperability, procurement policies, skills, R&D financial support and lack of networks, which hinder

the development of competitive software industry.

Both aspects are interrelated and should be addressed by a coherent set policy instruments in a concerted action at the EU level.

Main Conclusions and Recommendations

More detail is provided in later sections of this summary and in the study deliverables. The conclusions reached are that the Commission should:

1. **Empower the People** by supporting the sophistication of users and entrepreneurs through skills and knowledge. This will create a society which is ready to take up innovation and exploit it successfully and increase the size of the market and its dynamism.
2. **Coach the Team** by increasing the R&D activities in relevant fields as well as by supporting the knowledge transfer and diffusion. This will help to improve the innovation capability of European software businesses.
3. **Encourage the Players** by stimulating entrepreneurial activities and support of the financial capital development in order to provide stimuli to the software market and thereby the software industry.
4. **Create a Single Playing Field** by creating legitimacy for new services and removing obstacles to the Digital Single Market. These actions are likely to lead to significant increases in intra-EU trade and the development of innovative solutions.
5. **Level the Playing Field** by regulatory measures aimed at increasing competition as well as at the necessary technology basis. This should make the European software market more attractive and innovative in order to become world leading market.
6. **Organize the Game** in order to provide intelligence and advices for further market development and policy making. This will help to coordinate all actions taken. Set up **monitoring and coordination system** involving all relevant actors.

This coherent set of measures addresses issues in the policy fields that have been

identified as pivotal for a concerted, strategic policy action. If entirely and coherently implemented, it can deliver major economic and social impact, while making efficient use of the resources and powers available at the European level. The European Software market will become a leading market, enabling European suppliers to compete on equal terms with products and standards developed and adopted in other regions of the world. Beyond that, it will form the core of the new digital market described in the Digital Agenda for Europe. Finally it will also contribute to the overall goals of the Europe 2020 strategy of a smart, sustainable and inclusive growth of the EU economy and society.

Summary of the Study

Introduction

The European software sector employs more than 2.75 million people and creates a value added of 180 bn. €. As a major part of the larger European ICT sector it ranks among traditional pillars of the European economy, a performance comparable to the pharmaceutical and automotive sectors. Software is also the key success factor for enabling the productivity growth elicited by ICT, which is responsible for more than 40% of the total productivity growth. Software will grow in importance because of its ubiquitous diffusion in all areas of life, which will be boosted by a set of new technological and economical developments like the emerging concepts of the Internet of Services and the Internet of Things. Moreover, these concepts will change the structure of the EU software market itself, which is the second biggest worldwide with a share of 32% of the global market in 2009.

The emerging segment of Software Based Internet Services that encompasses related developments like Cloud Computing, mobile applications or Machine to Machine communication will be the fastest growing market segment within the European software market. First signs of decline in absolute value of the traditional model of license- revenue in absolute value will occur from 2016/2017. This decline may accelerate after 2020.

Policy Recommendations

The "package of recommendations" forms a coherent set, rather than a shopping list and it is derived from the scenarios which are briefly discussed further on in this Summary, and in more detail in the study final report.

1. **Empower the People** by supporting the sophistication of users and entrepreneurs through skills and knowledge. This will create a society which is ready to take up innovation and exploit it successfully and increase the size of the market and its dynamism.
 - **Strengthen focus on new software service in the e-Skills programme** to increasing the user sophistication which is needed to create anticipatory demand.
 - **Set up e-Entrepreneurial Programme** directed at company founders, which do not profit from the usual programmes.
 - **Create a European network of trade associations** to support especially SME operations.

2. **Coach the Team** by increasing the R&D activities in relevant fields as well as by supporting the knowledge transfer and diffusion. This will help to improve the innovation capability of European software businesses.
 - **Focusing Framework Program ICT on software based internet services** to increase their share in the funding.
 - **Create links between existing software clusters** to coordinate their R&D efforts.
 - **Support local, creative and open platforms** to diffuse knowledge and enable user-driven innovations.

3. **Encourage the Players** by supporting entrepreneurial activities and financial capital developments in order to provide stimuli to the software market and thereby the software industry.
 - Improve the electronic access to **Public Sector Information in order to foster its potential.**
 - **Plan a European Cloud Initiative** aiming at developing of a European Framework for Cloud Computing.

- **Promote pre-commercial procurement** to support the successful commercialisation of public funded R&D results.
 - **Support high-risk, R&D intensive start-ups** addressing the lack of young innovative companies by financial support in the early growing phase.
4. **Create a Single Playing Field** by creating legitimacy for new services and removing obstacles to the Digital Single Market. These actions are likely to lead to significant increases in intra-EU trade and the development of innovative solutions.
- **Complete the Digital, Single Market** addressing barriers related to legal uncertainties in cross-border activities.
 - Support **interoperable e-ID** enabling secure cross-borders activities and innovative e-Government services.
 - Introduce a **European micro-payment system** boosting the intra-EU activities in the Single Digital Market.
5. **Level the Playing Field** by regulatory measures aimed at increasing competition as well as providing legal certainty. This should make the European software market more attractive and innovative in order to become world leading market.
- **Explore a Directive on Interoperability** to improve competition through an ex-ante regulation in addition to an ex-post action on monopolies.
 - **Introduce licensing schemes** aimed at preventing the misuse of IPR for hindering competition.
 - **Supervise procurement procedure** to enforce the existing rules on technology- and vendor-neutrality.
 - **Promote efficient use of mobile broadband** directed at an accelerated take up of mobile internet.
6. **Organize the Game** in order to provide intelligence and advices for further market development and policy making. This will help to coordinate all actions taken.
- **Set up monitoring and coordination system involving all relevant actors.**

This coherent set of measures addresses issues in the policy fields that have been identified as pivotal for a concerted, strategic policy action. If entirely and coherently

implemented, it can deliver major economic and social impact, while making the most efficient use of the resources and powers available at the European level. The European Software market will become a leading market, enabling European suppliers to compete on equal terms with products and standards developed and adopted in other regions of the world. Beyond that, this strategic action plan could be the core of the new digital market described in the Digital Agenda for Europe. Finally it will also contribute to the overall goals of the Europe 2020 strategy of a smart, sustainable and inclusive growth of the EU economy and society

Analytical evidence

The Consortium's Approach

In order to provide recommendations to the Commission, the Consortium performed an in depth market analysis and built relevant scenarios looking at the Software market from two key perspectives:

- Software types (Applications, Tools, System Infrastructure Software and games), including both packaged and custom software, delivered online or offline
- Revenue models
 - Licence : traditional sales of packaged offline software
 - Associated IT Services : software-based services
 - Paid Web Based : software purchased, delivered and used over the Internet like SaaS or App stores
 - Online Advertising : ad-funded software delivered over the Internet; for example through major search engines or webmail services

While the former segmentations are traditional approaches of the software and services market, the consortium has focused its attention on the last one, which is a better indicator to understand the migration of software and IT services from traditional services to the concept of Internet of services (IoS).

Internet of Services represents any service that can be supported, combined and

delivered leveraging IT and Internet platforms. But not all of the Internet of Services should be considered as software. In fact, the Consortium has focused its research on the part of the Internet of Services whose value is intrinsically related to the software and IT resources (e.g. Software-as-a-Service) whereas in the remaining part, the value of Internet of Services is more related to the products and services that sold via an online platform (e.g. e-Commerce). The analyzed part of the Internet of Services is referred to as the Software Based Internet Services in the study.

While Internet is already considered as a fundamental part of the Software and IT Services industry, Software Based Internet Services represented only 5.2% of the Software market in 2008. However, this model is set to take a central position in the future.

Interviews with more than 60 European and Global experts have enabled the Consortium to identify a number of political, economic, social and technical trends and factors that are set to have a major impact on the development of the software market in coming years. Based on these inputs and the knowledge base of the Consortium's ICT market and industrial expertise, a market model was developed to forecast the development of the Software market over the 2008-2020 period.

The 2008-2020 market model takes into account both the macro-economic outlook and specific drivers and barriers to the development of the Software market.

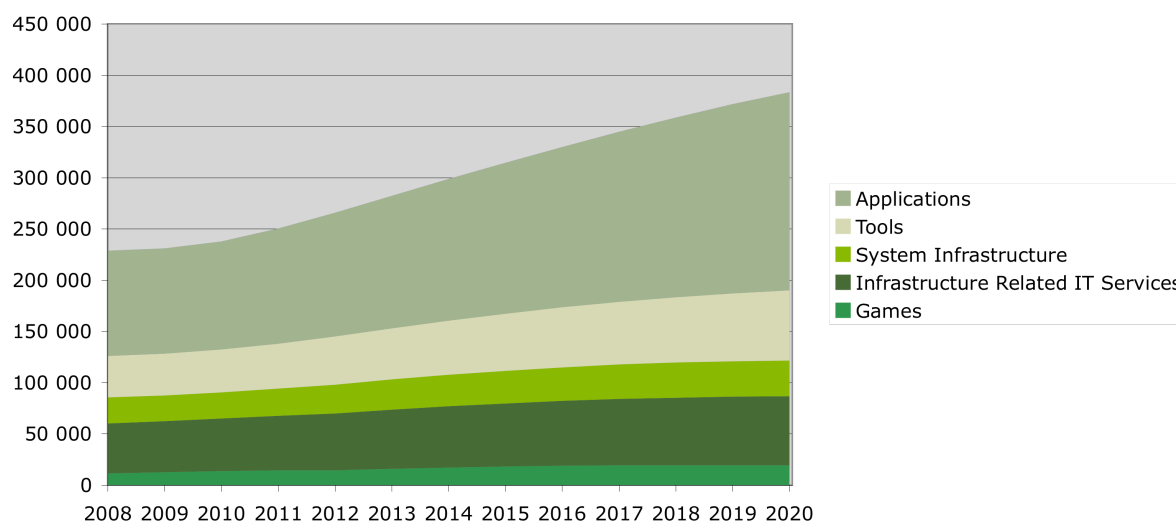
These include key technology enablers that act as drivers for Software Based Internet Services, like broadband (wireline and wireless) enabling faster always-on Internet connection, semantic web technologies helping to improve the relevance of online advertising or virtualization and datacenters powering the cloud computing offerings and infrastructures.

Major expected evolutions will also come from the productivity benefits (already the biggest driver for software investments), particularly in the long term within Small and Mid-sized Enterprises. Market dynamics will be influenced by cost reductions achieved through economies of scale, competition and distribution over the Internet. Social evolutions should represent significant market drivers, as users will be more familiar with software and Internet technologies, being born to it (digital natives) or benefiting from consumerisation of IT, user-centric technologies and education.

Baseline Scenario 2008-2020

Based on these assumptions, the market model was stabilized around a baseline scenario. This scenario represents how the market is projected to evolve without any public intervention in the next 10 years. This scenario forecasts that the Software market for the EU27 region will grow from €228.7bn in 2008 to €383.5bn in 2020. , Enterprise IT will be the primary driver representing a 4.4% CAGR over the period. To provide a comparison, GDP growth is set to increase from 1.82% in 2008 to 2.23% in 2020. In other words, the Software market is forecast to grow twice as fast as the overall economy of the EU27 region.

SSBS Market in EU27 - 2008-2020 (Million Euros)



Furthermore, it is likely to create new jobs at a rate of 2.8% growth each year, reaching 2.4 million jobs by 2020. The baseline scenario also forecasts that software and services expenditure in the U.S. will grow in line with the EU27 region. In Asia (including Japan), and for the Rest of the World, the Software Market is forecast to grow about twice as fast as in the EU27 region.

A qualitative analysis of the 4.4% CAGR shows that growth will increase faster in applications than in infrastructure software. But more importantly, the major trend is the rapid development of Software Based Internet Services, as traditional revenue models are increasingly being replaced by new models, such as Paid Web based

and Advertising based models. In the baseline scenario, Software Based Internet Services will indeed reach more than 26% of the Software market in 2020, ie a CAGR of close to 20% from 2008 to 2020 (compared with only around 2% for the traditional software markets). In this scenario, the traditional licence market should start to decline by 2016/2017.

The advent of the Internet of Services represents a particularly significant factor for the development of the Software Based Internet Services industry and its players. Traditional players, like software vendors (for which Europe is generally trailing behind North America) and IT Service providers (for which Europe is rather competitive) have to face major challenges from new players. The baseline scenario emphasizes in particular new players such as Telecom Operators and Internet players. Telecom operators are among the biggest companies in Europe, which own important assets that could be leveraged to further penetrate the Software market and shape its future evolution. In the baseline scenario, Telecom Operators act as enablers rather than major providers of B2C or B2B software, benefiting indirectly from the growth of Software Based Internet Services.

Alternative scenarios

Alternative, themed, non-exclusive scenarios have been developed to provide insights into the potential risks and challenges that the industry is facing in the years to come. While the baseline scenario is realistic, based on current market and legal conditions, alternatives scenarios, more interesting from an economic development point of view, have been explored. The intention is to provide recommendations on the effect of removing significant barriers like market fragmentation, interoperability issues or lack of infrastructure.

The first alternative scenario is based on faster development of cloud computing - a segment at the core of Software Based Internet Services and already a major market in the baseline scenario. It assumes the generalisation of standardised, secured and reliable public and private cloud infrastructures and the support of European telcos in leading to cheaper IT infrastructure made available as a Service. Compared to the baseline scenario, the cloud computing scenario would represent a shift in the market

from the traditional revenues based on licensing & maintenance and the associated IT services, to the new ones of Paid Web Based Services and Advertising, but not necessarily a growth in itself. However, it can foster an indirect growth making available software and infrastructure at a more affordable price.

The second alternative scenario is based on a stronger development of mobile **applications**, mobile software being already a major market segment in the baseline scenario. This would allow the development of new business models by combining the Internet, software technologies and the ability to use software-based services wherever the end-user is located. Thanks to cheaper and faster wireless broadband technologies plus adapted platforms, the overall Software market would increase by an additional 8% compared to the baseline scenario, mostly coming from a mobile software segment that would double compared to the baseline scenario. Both traditional and Software Based Internet Services segments would benefit from it, leading to limited change of the industry structure.

Other alternative scenarios are not centred about key Software Based Internet Services segments, but are focusing on the major shifts observed in the 2010 IT market.

The Open source–based scenario would accelerate the commoditization of software. Compared to the baseline scenario, it would represent a lost growth of 1.3% in 2020, i.e. -0.1% per year from 2009 to 2020. The overall loss of growth mostly impacts the traditional licensing market segment which would be partly compensated by the additional associated IT services growth. It is a model that potentially destroys value in the software product industry, but which by making knowledge available could improve the innovation capacity.

The final scenario is related to the increasing role of offshore delivery models (offshore is not a market segment in itself). With dramatic price pressure for outsourcing and a potential shortage of ICT skills (especially with the baby-boom generation retiring), Europe is in a difficult position to fight against low cost IT offered offshore. IT services providers would be the most impacted by such a trend. This scenario would see a 10% decrease compared to the baseline scenario.

Of the four theme scenarios developed by the Consortium, only the mobility scenario

presents a net positive growth compared to the overall baseline scenario. It is also the only one that does not result in the cannibalisation of existing revenue streams. The three other theme scenarios result in a reduction of the overall market in 2020, although it remains limited (except with offshore). This is largely a result of the price reductions for products and services that they create. Therefore, it is interesting to consider the positive price elasticity of IT products and services. There are many examples in the literature of this phenomenon that sees demand in IT products and services increase when their prices decrease. Offshore, open source and cloud computing all have a strong negative impact on prices. However, as a result the value reduction is not as large as one could have expected. In effect, this price decrease triggers some value creation in the market. For example, this may result in new projects that were not economically viable before, projects conducted by SMEs for which investments were too large, or simply because these new models have created space in the IT budgets of companies that can continue to invest more in a domain that continuously yields value.

Conclusion

The key lessons for decision makers at European level from the baseline scenario and alternative theme scenarios are that:

- Traditional revenue models will remain a large part of the Software and IT Services market in 2020,
- But also that the gradual shift to Software Based Internet Services is inevitable.

In order not to waste any time and accelerate the evolution towards the Internet of Services, decision makers at European level should be trying to remove barriers currently preventing alternative scenario one (cloud) and two (mobile) which respectively help for faster diffusion of Software Based Internet Services and for additional Software market growth.

- Cloud computing is definitely the one market force that has the highest impact on the current market structure, resulting in important value transfers and price reductions and impacting all segments. It does not provide a direct growth, but

can foster an indirect growth making available software and infrastructure at a more affordable price.

- Mobile software, providing new opportunities to use software on the move, is the most promising scenario for value creation for software markets.
- Open-source may also be considered to a lesser extent to foster the development of the European industry around IT service providers: there is a shift of market potential revenue from traditional software licensing to service provision.
- Younger generations should be encouraged to develop ICT and entrepreneurial skills in order to avoid the negative growth implied by the Off-Shore scenario.

As described in the different scenarios, the move towards Software-Based Internet Services offers a window of opportunity for improving the competitiveness of the European software industry, and changing the current situation in the medium and long term. Moreover, the development of this market is not only a crucial point for the future software industry, but it is also pivotal for the overall competitiveness of the European economy and society.

The methodology used in the study, which encompasses a review of literature, existing policies, stakeholder interviews and expert workshops, demonstrates that this opportunity can be impacted negatively by a set of policy related issues such as market fragmentation or lack of standards and interoperability. These barriers are currently impeding the development of the alternative scenarios mentioned above and demonstrate that this is an issue that can only be dealt with at an EU level.

Project Team

The project was carried out by a consortium led by Pierre Audoin Consultants (PAC) and Fraunhofer ISI, IDATE, and London Economics. The consortium combined the necessary assets to successfully complete the study:

- Pierre Audoin Consultants (PAC) – Software and IT services market and player
- IDATE - Internet and Telecom market and player
- Fraunhofer ISI – ICT policy analysis and development
- London Economics (LE) – Macroeconomic analysis

All reports can be found on the project website:

http://cordis.europa.eu/fp7/ict/ssai/study-sw-2009_en.html