

# Unleashing the Potential of the European Knowledge Economy

## Value Proposition for Enterprise Interoperability

### Annexes

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## **Editors**

Man-Sze Li, IC Focus  
Servane Crave, Orange / France Telecom  
Antonio Grilo, Universidade Nova de Lisboa  
Roelof van den Berg, Erasmus Research Institute of Management

## **Contributors**

Spiros Alexakis, CAS Software AG (FUSION)  
Leyla Arsan, Tages  
Wernher Behrendt, Salzburg Research (ImportNET)  
Gash Bhullar, TANet / Control 2K  
Yannis Charalabidis, National Technical University of Athens (GENESIS)  
Iakovos Delioglani, Q-PLAN North Greece (PANDA)  
Asuman Dogac, Middle East Technical University (iSURF)  
Nicolas Figay, EADS IW (ATHENA)  
Gerard Freriks, Electronic Record Company B.V.  
Andreas Friesen, SAP (FUSION)  
Ricardo Goncalves, UNINOVA  
Jan Goossenaerts, Eindhoven University of Technology  
Claudia Guglielmina, TXT e-solutions (ABILITIES)  
Sergio Gusmeroli, TXT e-solutions (ABILITIES)  
Herbert Heinzl, Value Chain Group / H<sub>2</sub>O  
Ioannis Ignatiadis, Kingston University (PANDA)  
Norbert Jastroch, MET Communications  
Kostas Kalaboukas, SingularLogic SA (GENESIS)  
Baptiste Lebreton, INSEAD (ATHENA)  
Aggelos Liapis, VUB STARLab  
Alexander Mahl, University of Karlsruhe (ImportNET)  
Milan Marinov, University of Karlsruhe (ImportNET)  
Robert Meersman, VUB STARLab  
Michele Missikoff, IASI-CNR  
Stelios Pantelopoulos, SingularLogic SA (GENESIS)  
Colin Piddington, CIMMEDIA (INTEROP)  
Henri-Jean Pollet, Perceval Technologies SA/NV (VISP)  
Keith Popplewell, Coventry University (SYNERGY)  
Igor Santos, Fundación European Software Institute  
Adomas Svirskas, Institut Eurecom (PANDA)  
Eugene Sweeney, Iambic Innovation  
Luigi Telesca, CREATE-NET  
Attila Toth, Novitech  
Cor Verdouw, Agricultural Economics Research Institute  
Matthew West, Shell International  
Steven Willmott, 3scale Networks S.L.

## **Contributing Projects**

FP6 ATHENA, <http://www.athena-ip.org/>  
FP6 ECOLEAD, <http://www.ecolead.org/>  
FP6 INTEROP, <http://www.interop-noe.org/>  
FP6 ABILITIES, <http://services.txt.it/abilities/>  
FP6 FUSION, <http://www.fusionweb.org/>  
FP6 GENESIS, <http://www.genesis-ist.eu/>  
FP6 ImportNET, <http://www.importnet-project.org/>  
FP6 CONTRACT, <http://www.ist-contract.org/>  
FP6 PANDA, <http://www.panda-project.com/>  
FP6 VISP, <http://www.visp-project.org/>  
FP7 iSURF, <http://www.srdc.com.tr/isurf/>  
FP7 SYNERGY [project URL tba]

## **European Commission Coordinator**

Cristina Martinez, Head of Enterprise Interoperability Cluster, EC, [cristina.martinez@ec.europa.eu](mailto:cristina.martinez@ec.europa.eu)

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## Annex I Summary of Contributions Received

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Contributors are listed on page iv of this document. All contributions received are available at [http://cordis.europa.eu/fp7/ict/enet/ei/ei-isg\\_en.html](http://cordis.europa.eu/fp7/ict/enet/ei/ei-isg_en.html).

### Introduction

The content of the report "Value Proposition for Enterprise Interoperability" relies heavily on a broad debate within the Enterprise Interoperability Cluster<sup>1</sup>. Many members of this cluster and other interested parties contributed papers, presentations and additional comments on the different aspects of Enterprise Interoperability (EI) Value Proposition. All of these were processed by the editors and input to the drafting of the main report and the present Annexes document. In addition, the content of the main report also takes into account information and arguments from other sources. This annex summarises the contributions received in a more direct, albeit much abbreviated form.

### General considerations

During the EI Cluster meeting of 23 May 2007 (where the Informal Study Group convened for the purposes of this report was launched), it was suggested to discuss the business value of EI with the use of three main questions:

1. **What** (is/will be available)?

This corresponds to the chapter on EI offerings (Chapter 5 of the main report) for the more technical aspects and Chapter 2 of the main report concerning the (future) business context. At a more detailed level, it was felt by the meeting participants that the "what" should be addressed by a classification of functionality and scope of components in the repository of EI solutions, which would be much more precise than what is currently available. Many results are already available but what exists exactly, where can they be applied and what are their functional effects? A classification would also show clearly where additional R&D is especially needed. The lack of visibility of what is already available does not only apply to commercial products, but also to the results of EU projects, according to the cluster members. It should become easier to proposers of new projects and the community at large to find out what were the results of previous research to prevent duplication.

2. **Why** (should these components be used)?

This should be addressed by a classification of business cases/value opportunities, with reference to EI in its business context. This is primarily addressed in Chapter 3 of the main report.

3. **How** (should the potential value be generated in a specific case)?

This should be addressed by a methodology to identify and generate value in a specific situation, phased in time, through the implementation of an appropriate selection of components from the repository of EI solutions. This is predominantly addressed in Chapter 4 of the main report. Recommendations for a new approach to identify value are provided in Chapter 6 of the main report.

Subsequent contributions submitted after the publication of versions 1, 2 and 3 of the main report and summarised below usually related to one of these three questions. Together they addressed all three. Some focused on large companies, others (most) emphasised SMEs. Some concentrated on specific business sectors; others discussed the deployment of EI technology in general. Some stressed technical challenges; others emphasised legal, managerial and/or cultural aspects. Most took the perspective of the "users" of ICT, but the perspective of the ICT providers was also represented. The overall feedback is clustered below.

### Using EI to support working in eco-systems

One important message of the main report is that enterprises will increasingly work in dynamic networks as opposed to working in static and linear chains. Relevant projects in FP5 and FP6 have already provided a rich source of inspiration to categorise the various types of cooperation in networks

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<sup>1</sup> [http://cordis.europa.eu/fp7/ict/enet/enterprise-inter\\_en.html](http://cordis.europa.eu/fp7/ict/enet/enterprise-inter_en.html)

between enterprises or individuals (within enterprises or on their own). Main classifications were for instance provided by the FP6 ECOLEAD project.

These projects generally start from the assumption that the acceleration of the process of creative destruction, partly driven by the increased opportunities of ICT, is forcing companies - including SMEs - to increasingly position themselves in one or more networks for dynamic collaboration and “open” innovation. Currently around 25% of all companies can be considered to work along these lines. The assumption is that in the next decade (e.g. 2012 as envisioned by ECOLEAD) most enterprises will be part of such breeding environments/ecosystems of some sort, for the formation of opportunity-driven dynamic virtual organisations. The transition towards more networked value creation is broadly shared within the EI cluster. A significant number of running projects and some that are about to start – both integrated projects and small/medium sized projects – have contributed explanations on how they help to realise this.

### **Using EI to move from a static enterprise to a dynamic one**

Many of these projects are inspired by a particular weakness of the current approach to EI deployment: it still assumes that a firm is essentially static. It focuses on one collaboration scenario and a fixed (usually relatively limited) set of requirements for EI, and basically assumes that this way of working will continue to make good business sense until some time in a very distant future. Indeed, current technical approaches and existing solutions for EI show limited appreciation for changes to different aspects of the business and the resulting need for flexibility and maintainability over time. Available value models for EI do so even less. Essentially it is assumed that a “big bang” implementation and related process change will settle challenges to productivity once and for all. Vendors of EI solutions like to stress the relative ease of the initial installation of their systems, but usually ignore the fact that changing them – sometimes soon – afterwards can be almost equally demanding.

To generate and assess the real value of EI, approaches – both technical and economic - which basically assume that the firm will remain as-is, are seen as having limited value. Instead, approaches need to be dynamic and take into account that the enterprise will change. Even more, especially in the light of EI and its role in enterprises – as an essential part of the glue that keeps people and their “stuff” together - it seems more appropriate to accept that the enterprise changes on a continuous basis and in a distributed fashion, primarily through the creativity and initiative of individual, critical workers (much more than because a visionary CEO wants it). This even occurs to the extent that it is doubtful to presume that **the enterprise**, as a common reference and repository of unambiguous procedures for all involved, really exists. People involved in the enterprise have different perceptions of it and their presumed role in it, like (according to one contributor) “blindfolded men who inspect different parts of an elephant and reach completely different conclusions about what they are confronting”. The increased level of education of the workforce, and the growing need for initiative and intrapreneurship further amplify this. From this perspective the level of organisation that exists in enterprises is primarily the result of a process of continuous sense making, structuring and updating of world-views, instead of detailed, formal and hierarchical procedures and instructions that are maintained by an elite of leaders. Ideally the individual and changing perceptions, projects and preferences can be met by flexible capabilities of the EI systems.

Of course, this perspective fits a context of dynamic virtual organisation, but it collides quite dramatically with the traditional top-down “*we install this because the management wants you to start working according to the best practice enforced by the system*”. EI solutions so far have only abandoned this last approach to a limited extent and could offer much better support to a more bottom-up approach.

The contributions seemed to agree on the fact that indeed more and more enterprises will invest in ICT-facilitated dynamic collaboration with business partners. They also agreed that substantial benefits may result from these investments. At the same time they implicitly warned against too much of a utopian view and often explicitly pointed out that for instance:

- Many industries are still far removed from a full-blown digital ecosystem as described in the main report. Often “simple” data exchange between firms in an alliance that are, for instance,

co-engineering a large facility (e.g. an oil platform) based on a common data model is already quite a challenge.

- The threshold to investment in advanced technology for EI is still too high, especially for many SMEs. The technology needs to become more modular and more open to reduce the complexity and the associated technical and financial risks. Clearly customers of EI solutions seem to become more assertive about this. A general decrease of the market's willingness to accept uncertainties surrounding EI was perceived, e.g. technical risk, ambiguity surrounding implementation plans or hurdles to usability. Vendors are increasingly pressed to deliver products with an ease of use that resembles Google's, hide the complexity of their solutions and deliver within budget and on time, based on the assumption of a steady rise of maturity in the industry. Nonetheless more reduction of complexity is still needed to boost proliferation of EI.
- One aspect of better deployment of EI solutions concerns more satisfactory accommodation of legacy systems. Often the functionality of these legacy systems represents a mission-critical factor in firms. That their architecture may be archaic and begs replacement is not a sufficient reason to replace them when the mission-critical data and procedures are not somehow preserved in the next generation of systems, ideally with minimal effort. New offerings need to support easy accommodation of legacy systems.

These limitations exist primarily at the level of the (technical) solution. For these and other reasons, the majority of contributors did not expect wide proliferation of radically different solutions for EI in the near future. However many contributors did expect innovative offerings, as a result of new, radical business contextualization of the technology.

### **Semantic modelling of “networks of commitment”**

An approach to facilitate the above and directly related to support to legacy systems is the proliferation of more powerful semantic modelling techniques. These techniques allow approaching the firm (or the value network or ecosystem) as essentially a network of commitments, where actors derive meaning from speech acts. These techniques do not model existing systems, or current procedures, but stress critical elements of the understanding of individuals and of their relation to the organisation as a whole. It is suggested that based on a semantic modelling layer, legacy systems and next generation solutions can be integrated, through a better appreciation of how they both relate to “sense making” in the firm.

This perspective emphasises that conversations (based on the understanding of individuals) between people take place to trigger a subsequent action. A communication breakdown occurs when a conversation does not lead to the desired effect. According to this view, EI should prevent communication breakdown and its design should be based on breakdown anticipation. Future offerings connected to the semantic elements of so-called “Web 3.0” would need to support more effective and richer interactions between people based on shared meaning.

### **Specific needs of SMEs**

Several contributions were devoted to the specific needs of SME regarding EI. Their lists of SME characteristics and requirements were highly similar:

- SMEs are more flexible than large companies
- SMEs lack resources
- SMEs require a relatively short pay back time for their investments
- SMEs are rather opportunity driven and usually cannot afford long-term strategic investments
- SMEs have a fear of losing control of their operations (and thus their flexibility).

This last point in particular shows how interoperable solutions can have value to SMEs. SMEs prefer not to be locked in into the operations of one large company (typically their main customer). They also do not want to become very dependent on the solutions of one ICT provider, which are often geared towards larger companies and burden them with much unnecessary functionality. Instead SMEs need solutions that are:



- Highly reliable
- Offer open access and connectivity
- Enabled by or available from a choice of providers.

This requires a new approach (“a new generation of networked applications”) where enterprise infrastructures can be built up from modular generic services. The SOA’s currently existing are still highly proprietary and solutions for e.g. payment, identity, contract formation, monitoring and workflow management etc, only apply in a limited context of businesses.

A new generation of networked applications does not – and does not need to - cover the full range of the enterprise system portfolio. Instead, this generation of networked applications will be used on top of the more static core enterprise functionality. The key point is that they can be easily, cheaply, and seamlessly created, implemented and deployed, and they will “live” in an open, multi-provider environment. These new networked applications will facilitate enterprises to fully participate in the dynamic “project economy” (based on work done within virtual organisations), which according to some contributors is estimated to increase tenfold in the next ten years.

Thus, also for SMEs, most value of EI is not considered to derive from increasing the efficiency of the “business as usual” but from enabling open innovation, swift partnerships and a rapid response to new market opportunities.

Another type of value of EI was also described in the contributions. Not only consumers of the technology will benefit (through increased flexibility of their business operations), but also providers. Small players, who cannot compete with the current global and large providers of total enterprise solutions, will especially be better able to succeed in a situation where niches for vendors of specific open services exist, that can seamless be integrated into the products of others.

### **The need for (international) institutional frameworks**

The ability to model common meaning within firms and between firms also creates the basis for modelling joint value creation. In other words, it can provide a “rich picture” of the business model. EI solutions should then be deployed according to this semantically rich model. Given the changes in market conditions in most sectors however, value creation and the related models will be increasingly subject to change over time. Thus, flexibility of operations is crucial and consequently EI solutions also need to be flexible. This does not only require EI products that are based on different, more open architectures (see above), but also a different institutional framework to support the truly open submission, adoption and replacement of modular EI (service) components of enterprise (management) content by a variety of vendors, e.g. components that are dedicated to payment or credit checks, identify management and access control. This institutional framework may include international rules and regulations to leverage advanced approaches to EI. Existing components can then be integrated into a more comprehensive solution that combines the products of very many providers. This would be like “opening up” the LEGO “interface” and then allowing all companies to produce attractive and original LEGO toys according to this interface. Of course this is a legal issue as much as it is technical.

As pointed out in some contributions, this approach would require that the architectures for these combinations of products exist in a “commons”<sup>2</sup> context. This would allow all possible vendors to know the details about the architectures and design their service components accordingly. Those components could then be plugged into more comprehensive solutions with only very limited effort. Currently the market of EI products is still dominated by proprietary architectures that do not allow this approach. This hinders especially the small, specialised vendors to exploit dedicated components as

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<sup>2</sup> The idea of “Commons” as applied to ICT infrastructures has been advanced by a number of academics and authors notably Lawrence Lessig and raised in the works of for example Yochai Benkler and Jonathan Zittrain. In his book “*The Future of Ideas: the fate of the commons in a connected world*” (2001), Lessig argues that creativity flourished on the Internet because the Internet protected an “innovation commons”. Moreover, the Internet’s very design built a neutral platform upon which the widest range of creators could experiment. The non-profit organisation “The Creative Commons”, of which Lessig was a founder, is an implementation of concepts and principles linked to this view. The commons idea has been influential in developing the Interoperability Service Utility (ISU) Grand Challenge in the Enterprise Interoperability Research Roadmap, specifically the notions of the ISU as a basic infrastructure and interoperability as a “public good – non-rivalrous and non-exclusive”. These notions were implicitly and explicitly substantiated in several contributions to the development of the main report and have been input to the drafting of particularly Chapters 4 and 5 of the main report.

part of a wider solution created by others. Moreover, large vendors would also benefit from more flexibility to offer “best of breed” solutions in a wide variety of circumstances. Overall, the “commons” approach would stimulate creativity and innovation, both at the vendors and the users.

On the other hand, a sophisticated mechanism would be needed in order to support the proper reward for the use of individual service components as part of the integrated solution. Currently, where complete solutions are offered by one vendor, users pay one license fee for that particular release. When however a solution consists of different releases of smaller-scale dedicated components from different vendors, it should be possible to protect and reward IPR at a more detailed level. This requires a substantial revision of the current framework for IPR protection, which is not very suitable to support the way software is developed and disseminated at the moment, and will become even less suitable for software development and dissemination for the future.

### **The need for a next generation of investment support tools**

It was also stressed in the contributions that the actual benefits of EI in relation to the facilitation of different types of collaboration differ along many dimensions, e.g. the specific business sector and the behaviour of their markets, the countries concerned including the nature of their company and trade laws, the maturity of the legacy systems and the level of general ICT penetration and proficiency and even the level of collaborative culture and alliance competence inside the enterprise. To further complicate matters, this value usually only surfaces after subjective appreciation, i.e. as perceived value of EI, which incorporates the depreciation of future costs and benefits based on subjectively perceived risks of any kind. SMEs for instance are most often cash-driven. They are willing to take risk and be creative but cannot afford to invest in projects with a long pay back time. Large organisations on the other hand are essentially budget-driven and will typically discourage unforeseen investments and risks even at the expense of eventual profit, but are better able to sustain the effects of postponed returns.

Requirements for investment support tools for EI are addressed in Chapter 6 of the main report. Some contributions stressed that as a direct consequence of providing support to more dynamic and temporary business processes, the expected value of investments in EI should be clearly phased in time. What is the life time of the expected income? Radical innovations are only radical for a limited period of time. The blue ocean does not remain blue forever. When it offers lucrative new opportunities others will soon follow the first-movers and offer fierce competition, requiring agility and adaptability. Therefore, alternative EI investments should not only be assessed by the level of value they offer at a certain moment in time given a selected business model, but also need to be compared based on the level of agility and adaptability they offer. More than helping a firm to reach a specific location in the ocean, they need to leverage its ability to explore.

## II.1 Expanded Notes to Chapter 3 of the Main Report

### Note 3.1

#### **Co-creation of Value**

In a recent article Hinchcliffe (2007) confirms this trend and states that *"it's a fundamental shift for a business to turn over a large part of its product development to its users, becoming more of a mediator and facilitator than a product creator or owner. This is the shift of control from institutions to individuals that the apparently relentlessly democratizing force of the Web has begun exerting on the business models of organizations of every description around the world."*

This co-creation movement is happening in the development of ICT services between providers and their customers, which is becoming relevant in the sector (Dobardziew, 2007; Abe, 2005). For example, innovation at BT Global Services is described as the following: *"end-user story is an essential prerequisite to all product and process enhancements. IT projects do not commence without the end-user story, which is no longer about thick manuals, but a short synopsis of the user experience"*.

#### **Exploiting the Long Tail**

This will support a movement that has been designated as mass customisation in a globalisation context (Anderson, 2004). Another good example of exploiting the "long tail", but in a reverse order, is given by Chesbrough (2007). Large companies are using an "InnoCentive platform" to provide a "brokerage" service in order to find someone, anywhere in the world, who can solve innovation problems; and companies like P&G and IBM are making available patents according to specific needs of other companies and exploiting the revenues resulting from it (Tapscott et al, 2007).

#### **Thickness of Products/Services**

According to Fujitsu Research Institute, "in the manufacturing industry, the competition to keep prices down for hardware products is intensifying on a global scale, and companies seeking a way out of this struggle are turning to the practice of adding services to their products." (Abe, 2005). However, this approach must be taken with care since it can lead to pitfalls such as misunderstanding the value of the service for the customer. This reinforces the development of a strong value proposition for both the product and the service. EI will thus be able to enhance value by the use that consumers/customers may have of enhanced products/services.

#### **Use of Collective Wisdom/Knowledge**

Although still at a seminal stage, the prediction markets will certainly evolve to more integrated mechanisms where interoperability will play a supporting role. Similarly, initiatives such as Wikipedia and the Open Source movement rely on aggregation of the dispersed collective knowledge. Often described in the Open Innovation context (Chesbrough, 2003), this trend of open collective development will evolve and crystallise into more integrated and automated mechanisms and facilities enabled by interoperability.

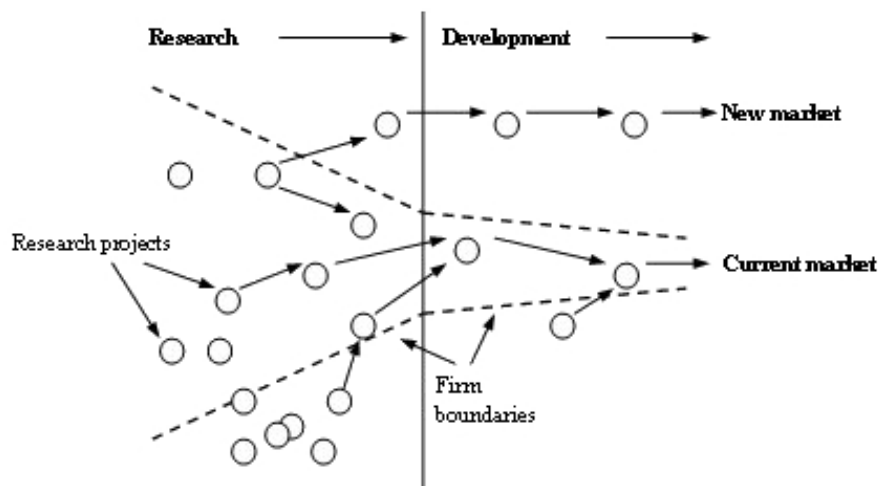
The above tendencies will lead to increased complexity for companies in the way they interact with their customers. They will also place new demands on EI suppliers in the years to come. For example, EI will need to address and support "embedded interactions" between suppliers and (potential) customers, as well as the need for enterprises to rapidly adapt in increasingly fragmented, "democratised" markets that are far less stable and predictable than those in the past.

### Note 3.2

Ecosystems involve the direct creative participation of a large community of end-users, suppliers, manufacturers, software developers, governmental bodies, and citizens in general, etc., in what Chesbrough (2003) designated as Open Innovation. They depart from the stable interoperable (e-business) hub-spokes dyadic structures, and evolve to more highly dynamic business networks

(Nachira et al, 2007). These networks tend to be “complex systems” in that while they have emerged in volatile environments, they nevertheless have a great capability for adaptability and learning. They are characterised by the way they set up their own configuration, by how they organise themselves with loose governance structures, and by their ability to be sustainable and to optimise relationships as needed.

Open Innovation can be generally described as combining internal and external ideas as well as internal and external paths to market for the purpose of advancing the development of new technologies, products, services, processes etc. The concept is presented in the Figure 1 below.



**Figure 1 Open Innovation Concept (Chesbrough 2003)**

Note 3.3

The following provides a description of three periods of interoperability from the lenses of technology evolution. Each period is characterised by one or more specific technologies. The dates given are indicative of the primacy of the specific technologies - they however do not suggest that the technologies in question no longer exist after the particular period. In fact, the co-existence of technologies (both old and new) is a main feature of the field of EI.

**The Childhood of Interoperability: from the 1980s to 1995**

This period is characterised by the EDI technology and the use of Virtual Private Networks (VPNs), much based on closed proprietary solutions (and the end of the phase coincides with the emergence of the World Wide Web and the associated set of Web-based technologies). During this period, some regional/national initiatives and limited European initiatives were conducted in a variety of industries – e.g. automotive, finance, retail and distribution, transport and travel - triggering issues and early solutions of EI. The interaction types in use were mainly communication and some forms of basic coordination. Integration between companies was rare. The interaction types were used mainly in intra-company and hub-spokes situations, particularly connecting large companies with their suppliers. In some industries, the EDI standards became quite pervasive amongst major players.

During this period, the value level of the EI, as a consequence of the EI interaction types, breadth of impact and geographical range, was essentially efficiency related (Figures 2, 3 and 4).

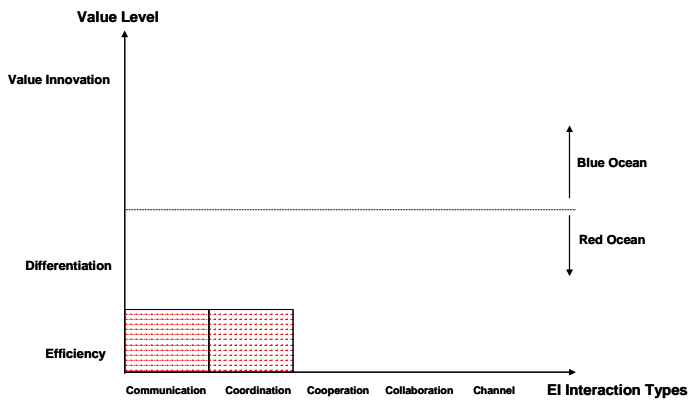


Figure 2 Value Level and EI Interaction Types 1980s to 1995

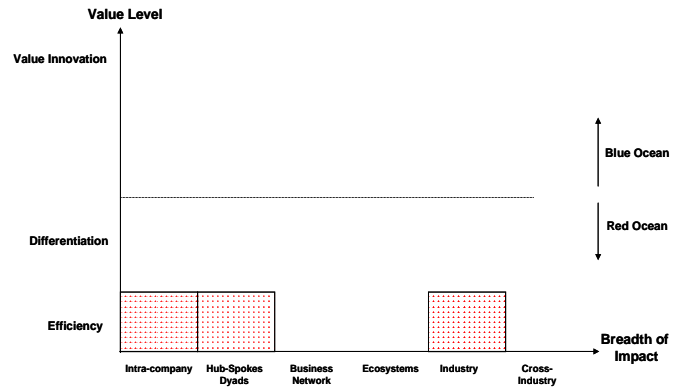


Figure 3 Value Level and Breadth of Impact from 1980s to 1995

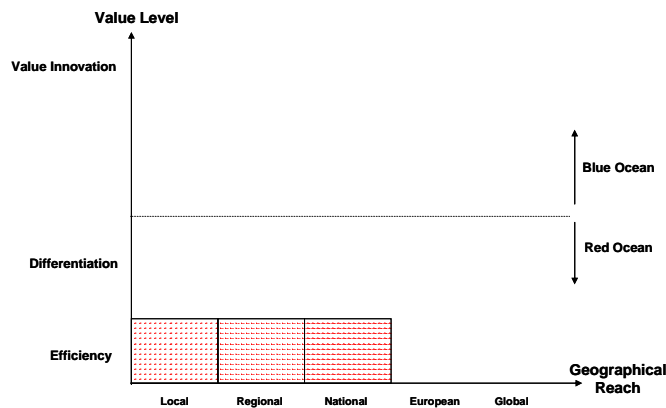


Figure 4 Value Level and Geographical Reach 1980s to 1995

At the individual level, there was little impact on the human capital. EI was very much focused on transactional life-cycle, connecting specialised applications, with little interaction with employees.

At the economy and society level, there was an apparent paradox, with studies suggesting that ICT investment led to no increase in economic productivity.

### The e-Business Era: from 1995 to 2004

The emergence of the WWW and the boom of the Internet, reaching enterprises and people in a very rapidly way, introduced some significant changes in the way companies became interoperable. The Internet technology popularised first e-commerce and then e-business. The low cost and widely available Internet technology led companies to develop a plethora of ICT platforms and solutions mainly for communication and coordination, but also the development of some forms of cooperation and collaboration. These ICT platforms have supported the extension of interoperability beyond the traditional stable hub-spokes to business networks, covering the whole life-cycle of products and services. Interoperability initiatives have also significantly reached beyond the regional/national boundaries, to become European-wide and even global.

The value level of interoperability was still very much focused on efficiency, though there were some strategic initiatives for the creation of differentiation, achieved through deployment of cooperation and collaboration interaction types, and the dynamic development of business networks (Figures 5, 6 and 7).

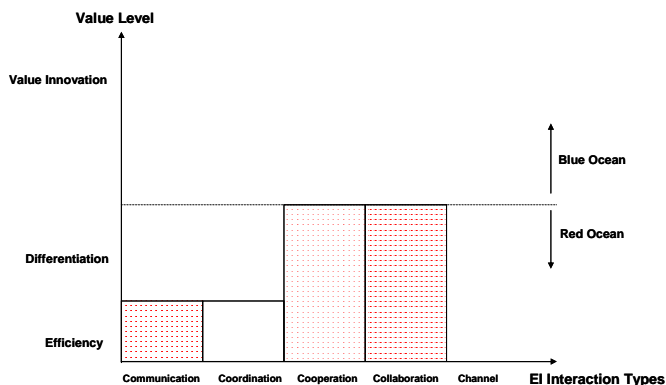


Figure 5 Value Level and EI Interaction Types from 1995 to 2004

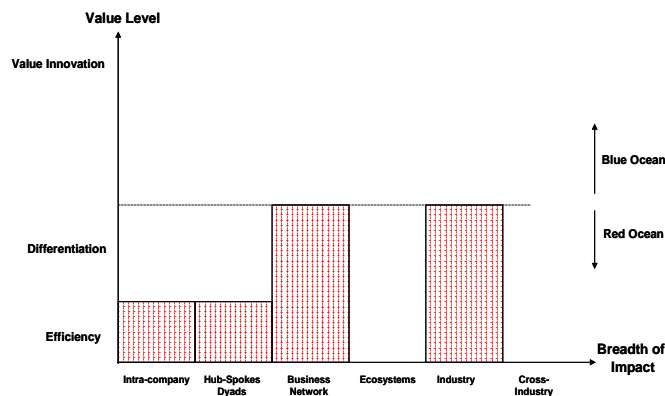


Figure 6 Value Level and Breadth of from 1995 to 2004

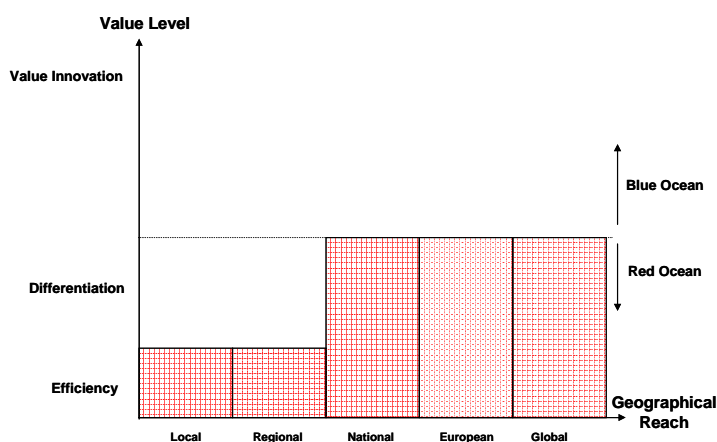


Figure 7 Value Level and Geographical Reach from 1995 to 2004

At the individual level, employees started to become more empowered mainly as a result of re-engineering initiatives, enabled by ICT. Workers also began to have access to a large plethora of data obtained from interconnected databases and applications, reinforcing the emergence of the knowledge worker.

At the economy-society level, there was emerging evidence in some sectors that ICT contributed directly, indirectly and through “spill-over” to productivity growth, and that the US was able to exploit this ICT opportunity more extensively than Europe.

### The New Business Context Era: from 2004 until...

Since 2004 Web socialising and new forms of interactions started to emerge on the Internet, collectively designated as “Web 2.0” (see Section 4.4.1 of the main report). Co-existing with e-business and e-commerce driven technologies and business models, EI was beginning to enter a new phase of development. A main feature is that strategic EI initiatives are demonstrating significant potential for increasing the value level, shifting from the red ocean strategies of efficiency gain and differentiation, to blue ocean strategies of value innovation. There are major changes to the EI interaction types deployed, with a stronger focus on collaboration and channel. This requires not only adaptations to information systems and business processes (mainly on collaborative tools and collaborative processes such as product development). It also requires employees and company culture to be more open and participative, with less concern for IPR, leading to new management of business relationships. The main challenge is to harness collective intelligence and knowledge, which are at the core of the new business context.

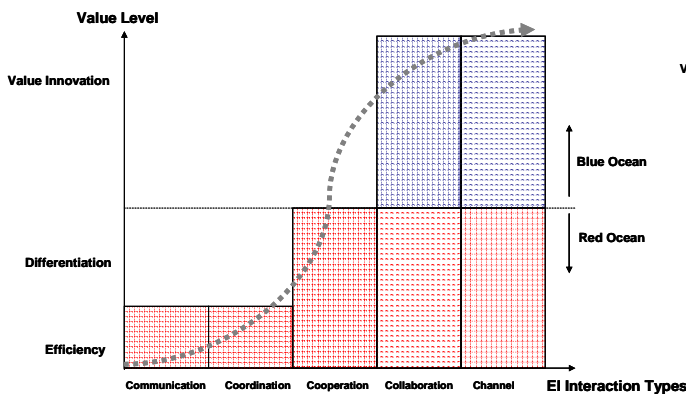
Four actions can be sought for achieving Value Innovation through EI in the new business context: Elimination, Raise, Reduction and Creation, as depicted in Figure 8.

<p><b>ELIMINATION</b> Which factors, that the industry takes for granted can become unnecessary through interoperability?</p>	<p><b>RAISE</b> Which factors, should be raised well above the industry standard through interoperability?</p>
<p><b>REDUCTION</b> Which factors, should be reduced well below the industry standard through interoperability?</p>	<p><b>CREATION</b> Which factors, should be created through interoperability, that the industry never offered?</p>

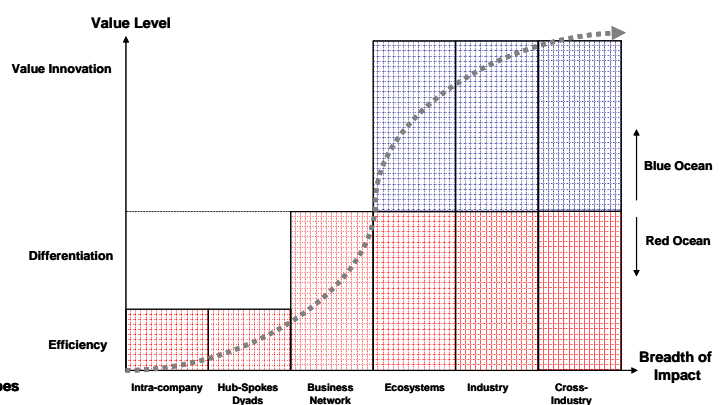
**Figure 8 Actions for Value Innovation through EI (Adapted from Kim and Mauborgne, 2005)**

The new values that will result from the EI actions are likely to flow from a strong interaction between customers, producers, suppliers, distributors, ICT providers, as well as citizens and public organisations, via an open collaborative attitude. Value creation will increasingly occur in global, volatile and complex ecosystems, involving expanding and evolving constellations of stakeholders that will be developing new adaptation and learning capabilities. In parallel, the value of specific niche markets will increasingly be exploited. These developments are likely to result in a shift towards the production of “mass customisation” of products and services.

The increasing trend towards blue ocean strategies is depicted in Figures 9, 10 and 11.



**Figure 9 Value Level and EI Interaction Types in the New Business Context Era**



**Figure 10 Value Level and Breadth of Impact in the New Business Context Era**

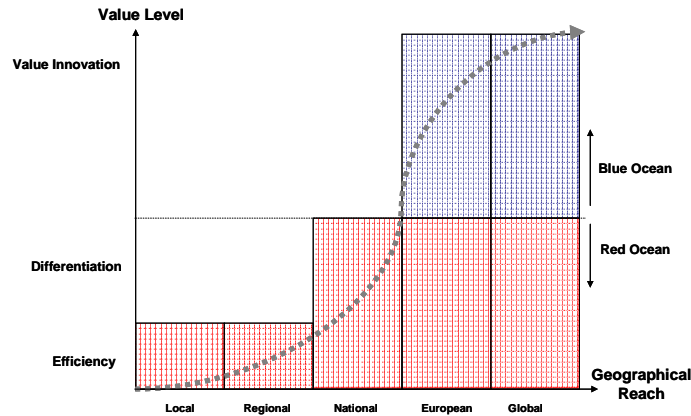


Figure 11 Value Level and Geographical Reach in the New Business Context Era

At the individual level, there is an increasing importance of EI for the development of employees' further empowerment, mainly in relation to social capital, but also increasingly in relation to intellectual capital and emotional capital.

For the future, it is envisaged that EI will be critical for generating productivity growth, not only just in terms of efficiency and differentiation, but also increasingly in terms of new revenue streams derived from the use of innovative technologies.

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## II.2 Expanded Notes to Chapter 4 of the Main Report

### Note 4.1

The following is provided by courtesy of Igor Santos, Fundación European Software Institute.

#### **Use of Web 2.0 technologies for enterprise interoperation**

As already introduced in the main report, the application of Web 2.0 technologies to the enterprise has been coined as Enterprise 2.0. The term has already been defined by Harvard Business School's Associate Professor Andrew McAfee as "the use of emergent social software platforms within companies, or between companies and their partners or customers" (McAfee, 2006a). McAfee also proposes a framework for Enterprise 2.0, introducing the "SLATES" acronym that depicts the six main components of Enterprise 2.0 technologies: search, links, authoring, tags, extensions and signals (McAfee, 2006b).

On the other hand, other authors like Tim O'Reilly and John Musser (founder of ProgrammableWeb.com) propose a broader approach that builds on O'Reilly's previous seminal article on Web 2.0 (O'Reilly, 2005), depicting the eight core patterns for Web 2.0 and providing some Enterprise 2.0 recommendations (Musser and O'Reilly, 2006). Dion Hinchcliffe also proposes a broader vision in an attempt to provide a visualisation of the main Web 2.0 technologies, platforms and concepts. Hinchcliffe tries to distinguish between externally facing and internally facing aspects and social and technical issues, although he admits overlaps in his visualisation (Hinchcliffe, 2007). See Figure 12.



**Figure 12 An Updated View of Web 2.0 in the Enterprise (Hinchcliffe, 2007)**

All this work sets the basis for what should be understood as the application of Web 2.0 to organisations (not only enterprises, as the term Enterprise 2.0 suggests). In the following, a set of successful case studies on the application of Web 2.0 platforms to different kinds of organisations are outlined. A short description of each case is given, pointing out the key messages from a business perspective and, where possible, the type of business model introduced in Section 4.3 of the main report is referenced. Finally, a set of interesting figures on Web 2.0 trends in the Business environment are listed.

### **Dresdner Kleinwort Wasserstein**

Dresdner Kleinwort Wasserstein (DrKW) is an European investment bank based in London and Frankfurt, with 6,000 employees spread throughout the headquarters and the rest of offices in New York, Paris, Luxembourg, Tokyo, Singapore and Hong Kong. With such a large number of employees, the geographic distribution and the nature of the business, up-to-date data and efficient communications were essential. Before adopting different Web 2.0 solutions, DrKW was using traditional intranet software that hindered rather than encouraged people's inter-relationship and was facilitating the formation of communication silos.

DrKW was already running a wiki within its IT department and the challenge was to extend its usage to business people. The wiki was introduced in a staged process where a few enthusiasts were in charge of spreading its use among the different departments. The process was heavily supported by managers who even encouraged people to take part in the project by adding initial useful content to the wiki pages, word of mouth should do the rest. The wiki was mainly used for brainstorming and publishing, managing meetings (minutes, agendas, etc.) and creating presentations. Apart from the wiki (provided by Socialtext), a blogging tool for internal blogs (provided by b2evolution) and messaging software (provided by Mindalign) were rolled out successfully.

One year after the deployment of the wiki in 2004, 2,500 employees were reported to be using the wiki and blogging activity was growing steadily. In an effort initially pushed by managers, word of mouth worked neatly and many people were using these tools because it saved them time which was previously devoted to writing e-mails, allowed people to share and improve ideas, communicate efficiently with distant colleagues etc (Socialtext, 2006).

### **Motorola**

Motorola is a US multinational communications company based in Chicago, Illinois and with different departments all around the world in countries like Germany, UK, France, Australia, Russia and Denmark. In some of those departments such as the Motorola Systems-on-Chip Design Technology team, they were already using a wiki mainly for team communication but the tool was difficult to maintain and the initiative only involved an specific team. On the other hand, at the Copenhagen Motorola Tetra World Wide System Development (TWSD) a static QMS (Quality Management System) was in place that didn't allow for fast updates on changing processes.

Both in the Systems-on-Chip Design team and in the TWSD, a wiki solution based on TWiki (<http://.twiki.org>) was introduced. In the former case, the use of wikis increased after the deployment of the new tool and new deployments were carried out within other departments, including the TWSD center. At the TWSD center, the wiki was used to facilitate updates to the QMS processes, allowing the center to create a user maintained quality assurance system while still maintaining the change control and quality records required in an ISO9000 environment.

The use of wikis in Motorola is a case of real success. Wikis were first introduced in Motorola in 2004 together with blogs and instant messaging software. As of 2006, 3,200 wikis were reported to be in use together with 2,600 blogs and 12 million instant messages per day. Motorola is actively using TWiki and has a team supporting its deployment and extension through plug-ins. The main use includes ISO 9000 compliancy, reporting, project management, information sharing, requirements gathering etc (Lavrsen and Currie, 2007).

### **Other interesting case studies**

After a slow start in 2006, 2007 was pointed out as the year for successful wiki deployments and predictions have not failed. A huge number of successful case studies can be found involving organisations like SAP, British Telecom, Novell, Nokia, Yahoo, Thomson Learning, Ziff Davis Media, Boston College, etc. The types of organisation differ, ranging from IT providers to academia, and the use of wikis is also different.

Many of the organisations use wikis internally in order to gain efficiency in processes, improve communication or support the creation of ideas within the organisation (e.g. DrKW, Motorola, Novell, Nokia, SAP etc). Most of these initiatives belong to the segmented type of business model described

in Section 4.3 of the main report, comprising companies targeting both efficiency and segmented differentiation in an existing market and with planned innovation processes.

Other remarkable examples like the Telco B2B (<http://www.telcob2b.org.uk/>) initiative from British Telecom are more aligned with a business model that targets both efficiency and a high degree of differentiation in an existing market but with an externally supported innovation process. The aim of the Telco B2B initiative is “to agree system & process standards & best practice for automated business transactions between UK Communications Providers (CP) via Business-to-Business (B2B) and portal interfaces”.

The Salesforce example is a good one to illustrate the introduction of SaaS (Software-as-a-Service) models and mashup concepts to the Enterprise 2.0 environment, which at present seems to be largely restricted to the use of wikis, blogs and instant messaging. Salesforce provides a SaaS CRM pay-as-you-go service accessible through the web and capable to be combined (aka mashed-up) with other applications or services through a provided API. This is a clear example of a business model targeting efficiency and differentiation in an existing market, but also paying attention to value innovation in new markets through an ecosystem of new applications that run on a hosted platform. The innovation process is integrated with the business model.

Finally, it is worth mentioning the case of IBM and its “Innovation Factory” initiative that “consists of integrated software assets for accelerating innovation through the creation of ecosystems consisting of enterprises, partners, suppliers, and customers collaborating and co-creating new services. [...] Collaborative services include Web 2.0 tools such as wikis, blogs, and social networking and tagging tools for enabling and accelerating collaboration across globally and organizationally dispersed teams. [...] With these capabilities innovation factory has the ability to create whole new businesses in emerging markets.” (Coveyduc et al, 2006). The business model IBM is proposing in this case is a fully open and adaptive one, where there is continuous experimentation with new business models.

### **Successful case studies in the Basque Country**

All the examples provided so far involve highly innovative large organisations often associated with early adopters of technological innovation. However, it is useful to introduce other lesser known case studies of the application of Web 2.0 concepts within organisations allegedly not so innovative. The case studies below relate to organisations located in the Basque Country.

**Ordiziako Jakintza Ikastola** is a school that has used Web 2.0 tools like blogs, syndication feeds (RSS) and wikis in order to achieve an awarded QMS, as a means to facilitate interaction between teachers and pupils, publication of educational content, etc. Its case study is well-known in the Basque Country and has stirred interest from other schools in Spain.

**IRIZAR** is a coach builder and part of Co-operative Corporation (MCC), which is a market leader in Spain, Europe's second biggest producer by volume, and is commercially active in 71 countries. It went through crises in the 1990s as a result of changes in internal and external environments. The appointment of a new leader brought an innovative management strategy aligned with two of the main Enterprise 2.0 concepts: people as the source of competitive advantage and flat organisations. The application of the methodology brought by the new manager favoured a significant shift that led the company to unprecedented successful performances. This is a significant case study from the conceptual point of view of Web 2.0, which is considered as much a social phenomenon as a technological one. The case study has been researched in many distinguished business schools including Harvard Business School and IESE. The methodology is now being applied to many other organisations and is described in the work of Saratxaga (2007).

**Fundación European Software Institute (ESI)** is a technology centre integrated in the Tecnalía Corporation focusing on software development excellence. About a year ago, a wiki was deployed within ESI's research and development department. Initially the wiki was used as a placeholder for different information relevant for the department that everybody could update. The use of the wiki is now going to be extended to support knowledge sharing, generation of ideas and to improve the efficiency of some processes in ESI. Besides, other departments within ESI are planning to use it as an interface with their customers.

## Conclusion

As a conclusion of the different case studies presented, we can say in first instance that even if peer production and non-centralised development is one of the characteristics of Web 2.0, many of the Enterprise 2.0 initiatives have been pushed by managers rather than employees. However, this is a positive piece of information as support from management is important for the successful deployment of Web 2.0 solutions. Besides, in every mentioned case study people's participation has been encouraged and facilitated.

The use of Web 2.0 technologies within organisations is in its initial stages and most of the initiatives are restricted to internal use of wikis, blogs and instant messaging. However, there are cases where external collaboration is fostered and the use of other Web 2.0 technologies like mashups should also be considered. The investment in wiki technology in particular is very low and the payback is difficult to quantify, though usually intuitively understood. Many IT providers have not shifted their products to the Enterprise 2.0 era but big players like Microsoft and IBM are announcing wiki technology in their future service offerings (GIB06).

## Figures of Interest

- The market for business social software is expected to be \$920 million this year and blossom to over \$3.3 billion by 2011.  
Source: Radicati Group. <http://www.socialtext.com/node/309>
- Social software market will grow from \$226 million in 2007 to more than \$707 million by 2011.  
Source: Gartner. <http://www.socialtext.com/node/309>
- Among the Fortune 500 companies, 46 (9.2%) are blogging as of 12/09/07.  
Source: Socialtext.  
[http://www.eu.socialtext.net/bizblogs/index.cgi?fortune\\_500\\_business\\_blogging\\_wiki](http://www.eu.socialtext.net/bizblogs/index.cgi?fortune_500_business_blogging_wiki)
- 19% of companies have invested in social networking tools, followed by podcasts (17%), blogs (16%), RSS (14%), wikis (13%), and mashups (4%). When you add in companies planning to invest in the tools, the percentages are as follows: social networking (37%), RSS (35%), podcasts (35%), wikis (33%), blogs (32%), and mashups (21%).  
Source: McKinsey. [http://www.roughtype.com/archives/2007/03/american\\_compan.php](http://www.roughtype.com/archives/2007/03/american_compan.php)

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## **Annex III      Relevant Deliverables & Materials from Contributing Projects**

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This Annex consolidates the inputs from the contributing projects listed on page iv of the present document, under the following two main headings:

- Business Scenarios for Enterprise Interoperability (Section III.1)
- Enterprise Interoperability Problem Space and Solution Space under FP6 (Section III.2)

### **III.1      Business Scenarios for Enterprise Interoperability**

This section contains descriptions of a number of business scenarios for EI drawn from seven FP6 projects in the field: the ATHENA Integrated Project, the ECOLEAD Integrated Project, the ABILITIES STREP Project, the FUSION STREP Project, the GENESIS STREP Project, the CONTRACT STREP Project and the PANDA STREP Project.

#### ***ATHENA Business Scenarios***

**Main focus:** enabling seamless interoperability of enterprise systems and applications in order to support collaboration among networked enterprises during the entire lifecycle of the product.

Within the scope of the ATHENA programme, business scenarios were provided in particular in the area of Product Data Management (“Aeronautic and Aerospace collaborative product development within networked organisation” and “Automotive Collaborative Product Design”), Supply Chain Management (“Automotive Inventory Visibility and Interoperability”, “Automotive Outbound Logistic”), e-Procurement (“Furniture e-Procurement”), and Product Portfolio Management (“Telecom Product Portfolio Management”).

#### **Key points:**

- ATHENA proposes a holistic semantic based approach addressing interoperability at Enterprise level, Knowledge level and Information and Communication Technologies level.
- Solutions were developed according the IDEAS interoperability roadmap from research in different fields such as Enterprise Modelling, Ontology, Model Driven Development, and Service Oriented Execution Platforms.
- ATHENA targeted creation of an Enterprise Interoperability Centre as an international world-class organisation providing interoperability services to enterprise for different sectors and domains.
- ATHENA developed a business model in order to analyse potential impacts of non-interoperability and added value of enhancing interoperability.
- ATHENA solutions were developed in order to factorise as much as possible solutions responding to the various needs responding to interoperability issues classified per industrial sectors and discipline domains.
- In such a context, the business scenarios were developed in order to cover various industrial sectors and discipline domains, but also in order to be able to drive dynamic requirements engineering, to analyse common and dissimilar interoperability issues, to identify generic solutions and finally to validate specific implementation of solutions provided by ATHENA through test scenarios.

#### **Expected Value of ATHENA results implemented in the business scenarios:**

1. Aeronautic and Aerospace collaborative product development within networked organisation
  - Method to set-up a Product Lifecycle Management collaborative hub within a networked organisation
  - Based on usage of existing PDM standards, application engineering standards and standard Service Oriented open execution platform coming from the community
  - Added value is capability to shorten the process to set-up a collaboration based on Product Data Exchange and Sharing, without breaking the digital chain between the partners

2. Automotive Collaborative Product Design
  - To speed up the process of Process Models distributions and sharing
  - A strong simplification of the mechanisms that enable two or more enterprises to build and to share a common collaborative process and then to make it executable in an (semi) automated way
  - Tools are able to perform the correct semantic mapping between the different ontology systems that need to be connected by the business processes, and that are able to do this in a reliable way
  - Strong cost reduction - Model driven and adaptive architectures should drastically reduce all the costs related to the architecture design and software development
  - Strong time reduction in the establishment of new collaborative channels between enterprises
3. Automotive Inventory Visibility and Interoperability
  - More capable management of interoperability requirements at the enterprise level
  - More capable data interchange modelling and novel model-driven data interchange implementation process
  - More efficient Web Services-based execution of data interchange processes
4. Automotive Outbound Logistic

Closing a circle consisting of “Car dealer process -> product configuration -> CRM -> ERP -> car dealer process”; in detail this consists of:

  - Supplying the car dealer with information from sales, service and ERP items
  - Supplying the marketing department with information for target group campaigns
  - Supplying the headquarter with central controlling items
  - Supplying the car manufacturer with accumulated information
5. Furniture e-Procurement
  - Simplification of the mechanisms used for generate the documents (i.e RFQ)
  - Automation of the exchange of the data flow (documents) through the different organisations that are implied
  - Tools are able to perform the correct semantic mapping between the different ontology systems that need to be connected by the business processes, and that are able to do this in a reliable way
  - Generation of a specification of services by use of a common Web Service platform and the UI
  - Creating the communication between the runtime model and the Web Services required, having a coherent relation between the messages generated by the design time and runtime level.
  - Development of semantic mediator
6. Telecom Product Portfolio Management
  - See Figure 13

Enterprise Levels	Benefits and Expectations
Strategic	<ul style="list-style-type: none"> <li>• Better return of investments</li> <li>• More competitive market positioning for products and services</li> <li>• Lower product and process cost and increase profit margin</li> </ul>
Tactical	<ul style="list-style-type: none"> <li>• Improve customer satisfaction through quicker response and better service process</li> <li>• Faster and accurate decision making process</li> <li>• Better knowledge reusability resulting in lower operational cost</li> <li>• Faster propagation of changes in organization, knowledge and business models</li> </ul>
Operational	<ul style="list-style-type: none"> <li>• The application execution through an integrated environment will increase usability, decrease learning curve and facilitate faster information access, analysis and combination</li> <li>• The model driven generation of the workplaces will allow the reduction of time, effort and cost to initiate a collaboration (through the shared workspaces)</li> <li>• The capability of models definition and management will allow reusability of models, facilitate change management and design-time adaptability to organization's evolution</li> <li>• The application of integration technologies will allow legacy systems functionality reusability in reduced cost and time</li> </ul>

**Figure 13 Expected Benefits of ATHENA Telecom Product Portfolio Management Scenario**

## References

Scenarios Mapped with Interoperability issues Part A and Part B, ATHENA Public Deliverable DB4.3, available from ATHENA Project Coordinator

ATHENA Aerospace Pilot - Collaborative Product Development <http://nfig.hd.free.fr/ATHENA/index.html>

ATHENA public deliverables <http://www.athena-ip.org/> (Public Documents section)

## **ECOLEAD Business Scenarios**

**Main focus:** enabling networked SMEs to efficiently collaborate and to meet customers' requirements while giving them the level of preparedness necessary to trigger joint and collaborative activities.

### **Key points:**

- These business scenarios cover business processes from the creation of the cluster (members' registration for instance via an ontology definition) to the operation of Virtual Organisations (VOs). Consequently, they support the full life cycle of an industrial cluster, entitled a "Virtual Breeding Environment" in the ECOLEAD project.
- The business scenarios address knowledge-based collaborative networks.
- Interoperability is not the main focus of ECOLEAD but it is obvious that enabling collaboration among different organisations implies a high level of interoperability.
- Interoperability is not only considered in terms of delivering technical solutions, but will also rely on other dimensions such as trust building and maintenance, business models, shared values. In addition, interoperability among different organisations can also involve some intangible assets of the SMEs, such as the intellectual capital (all assets which are not in the financial report analysis of one organisation).

The present study is based on 6 business scenarios - all in the industrial sector (mechanical) - developed in the lifetime of the project covering different business needs:

- Lack of standardised mechanisms for guide and support the registration of new members in a cluster of SMEs.
- Inadequate mechanism to manage cluster member's information and VOs.
- Improvement of the performance management process in the cluster.
- Improvement of the VOs configuration and creation processes.
- Supporting the definition of a framework combining 4 axes (business, product, technology and partnership) able to evolve along the timeline within the network.

- Managing (monitoring) and measuring the performance (controlling) the activities within the different VOs. Monitoring can be decomposed in two main parts: real-time monitoring when a VO operates and, once the VO is ended, evaluation of the performance and of the inheritance factors of the VO.
- Cluster Bag of Assets and Profiles/Competencies Management: Optimising the management of the created knowledge as well as the management of the profiles and competencies at the member (basic competencies) and at the VBE (aggregated competencies) level.
- VBE performance management: creating a system to assess the whole entity performance through a set of indicators which will evaluate VBE members, VOs and then the VBE as a whole.
- New VO creation: identifying new business opportunities on the web and reaching a more efficient creation of regional and international VOs already at the quotation stage.

#### **Expected Value of ECOLEAD's results implemented in these 6 business scenarios:**

- Understating and developing the accumulated **knowledge valuable to the cluster partners**
- Better **mapping and more appropriate use of competencies**
- Means to **proactively** improve VO performance
- More **fluent quotation processes**
- **Shorter product life cycle**
- **Smaller administration expenses**
- Towards **universal real-time concept**
- Constitution of a **long term collaborative network to support the dynamic creation of VOs within or between the clusters**. This will enable participation into ever more challenging tasks.
- **Increase of transparency** of the VBE skills and resources and thus creation of a basic **trust** level amongst single members
- A method and tool for **rapid, systematic search of partners** for a target oriented VO that improves the quality of the selected consortium and thus the outcome.
- **Faster implementation of the contracts** with less hassle typical for ad hoc way of doing things.
- **Decomposition of products and services** in assemblies, sub-assemblies, components and activities respectively enabling a **better structuring of products/services information**, storage and availability for further analysis, assignment of competences and request for quotations.

#### **References**

AIESEC: Professional Virtual Community

<http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/AIESEC.pdf>

ISOIN and CeBeNetworks

[http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/CeBeNet\\_ISOIN\\_Helice.pdf](http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/CeBeNet_ISOIN_Helice.pdf)

EDINFORM

<http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/EDINFORM-FEDERAZIONE%20ECOLEAD%20LEAFLET.pdf>

IECOS/ITESM

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Orona Innovation Network

[http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/Orona\\_Leaflet.pdf](http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/Orona_Leaflet.pdf)

Supply Network Shannon

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Swiss Microtech

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Virtuelle Fabrik

[http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/VF\\_Leaflet.pdf](http://www.ve-forum.org/Projects/284/Dissemination/End-User%20Pilot%20Cases/VF_Leaflet.pdf)



## **ABILITIES Business Scenarios**

### **Main focus:**

The objectives of ABILITIES is to study and provide tools that enable interoperability among networked organisations, with a specific focus towards networks of Small and Medium Enterprises in Enlarged Europe (specifically the New Member States and Accessing countries), in the particular context of the order to invoice procurement process.

Five partners from NMS and CMS were involved for clarifying specific needs of SMEs related to ABILITIES objectives. Each partner analysed user scenarios and needs of SMEs in the specific area of industry in each country.

### **Key points:**

The pilots SMEs were involved and test-beds were based for testing ABILITIES in each country. The partners clarified how ordering-invoicing processes execute on legitimate basis of each country, what documents circulate between SMEs, what are the contents and the type-forms of these documents. Results of analysis were collected in the form of use cases and requirements. Finally synthesis of all requirements and generalization was done for harmonize potential ordering-invoicing processes among SMEs in Enlarged EU.

- **Retail Industry in Lithuania** - The vast majority of Lithuanian enterprises are small and medium. About 90% of enterprises are small manufacturers and retailers, keeping close commercial relationships with Lithuanian and neighbor countries' business subjects. Development of information technologies didn't miss Lithuanian businessmen. Starting from 1990 Lithuanian enterprises began to use personal computers and software for accounting of their business activities. Today almost every business enterprise uses one or another financially available accounting system and has experience of creation of various electronic business documents, archiving of these documents in electronic form and data processing. Internet and mobile communications brought new potential for enterprises – electronically intercommunicate by exchanging documents and data in order to implement their business relationships. IT Enterprises want to move interoperability to electronic environment, they must purchase, master and support expensive software, which is usually financially unavailable for vast majority of small enterprises. So small enterprises which use local accounting systems are forced to use legacy interoperability means: make paper copies of electronic documents, and exchange them using fax or physical delivery. For enterprises which have fully functional electronic document creation and data management systems unused possibilities of electronic interoperability are harmful from many sides: additional costs, lost time, big probability of data errors, psychological burden of unused potential, etc.

ABILITIES is probably the first step eliminating inadequacy between challenges of small businessmen and potential of IT. This business case is limited to main operation of businessmen interoperation: 1) submission of order including negotiation on prices, delivery terms, etc. 2) payment for fulfilled order including some specific order fulfillment details (partial fulfillment, return of goods, etc.) These operations are most important in business relationships; they cause lots of inconvenience, especially in case when interoperability partners use different document forms, different key data, different languages, etc. While sending and receiving business documents it is also very important to follow documents path through workplaces of responsible persons.

Problems considering orders and payments are common in the area of retail market. Business case, which represents the real situation in retail market in Lithuania, was formed for testing purposes of ABILITIES. Someone supplies raw materials, someone produces final product, someone provides transportation and logistics services, someone sales. This almost completely covers variety of subjects and relationships types in retail market. Of cause it is possible to find specific cases, which ate atypical and it is less expensive and easier to adjust to typical solutions, rather than development of specific means for interoperability. These cases are rare and were not deeply considered. Five enterprises were invited to take part in testing of ABILITIES. Today they are deeply involved in this work, which results will be base for dissemination of ABILITIES ideas and means.

- **High-Tech Industry in Slovakia** - Companies that trade with outcomes of advanced technology, or that applies advanced technologies in providing services are considered to be companies operating in field of high-tech industry. Base of our test-bed comprises of companies that are supported as a part of activities of High-tech Incubator in Kosice, but we have also included requirements and business cases of companies that are not directly located in the High-Tech Incubator of Kosice. SMEs in the region, actively involved in RTD activities are holders of innovative ideas. This is the group of potential clients of the incubator. Commonly available technologies and procedures are currently applied in execution of above mentioned steps, such as - telephone, fax, post service what in many cases causes significant slowing-down of a business case execution, since participating parties are not always available and ready to deal with a business case as soon as possible. Sometimes there can appear a human factor error in development of required business documents, since the same data have to be repeatedly transcribed and filled in into various documents, in dependability on a particular business case.

Even though some companies already have and use their own systems that support order-to-invoice process, outcomes of those systems are not unified for the whole market the causes many problems in supplier–customer chains, mainly in conduction of new business connections with new subjects.

- **Agro-food Industry in Turkey** - INNOVA is the IT solution and service provider that analyzed the companies working in the Agro-food domain observing that they have similar requirements, needs and functionalities for order-to-invoice cycle. These companies have different IT infrastructures from simple ordering systems to complicated ERP systems. The actors in agriculture industry, depending on the stage of the agro-food production process involved in, can be classified as Agricultural Cooperatives, Market-chains, Agro-chemicals, Feed and Seed Companies, Processing Companies, Food Manufacturers. Suppliers are manufacturing firms and customers are primarily retailers or distributors. Customers usually aggregate different vendor products from a network of suppliers and market them to other small businesses in their region or end customer directly.

The suppliers have sales points, known as distributors, which are eligible to make orders according to the demand of villagers. Orders are taken by the salesperson working at the supplier office by fax or mostly by phone and order is formed with product item type, quantity, delivery date and payment term choice details in addition to buyer and seller information. Received information is entered electronically to order management and payment systems. Orders are changed, cancelled or modified by the customer or the salesperson. If the quantity in the order initially specified by the distributor does not fit to the capacity of the transportation vehicle, transportation quantity can be changed after teleconferencing with the distributor. The order information consists of order items as well as customer and shipping information.

- **Wood-Furniture Industry in Romania** - FILBAC is an SME player in the Wood industry and applies the order to invoice test bed scenarios in relation with ours SMEs for wood processing in Romania. Because of Romanian legislation we need to use numerate printed invoices obtained from Ministry of Finances. Only in relationships with foreign customers we can use printed invoice. There are no rules how this invoice must be done, or what to contain, but we must do a domestic invoice also. For ordering, every company use their own methods, there are no rules for this. Mostly we receive and confirm the orders by fax or e-mail. For payments by cash we must use a numerated receipt obtained also from Ministry of Finances. In case of bank transactions there are different document form to complete, every bank has there own document type.

In our relationships with our partners we will use these steps for the order to invoice cycle:

- Receiver the Order from Customer
- Analyzing the Capacity/Add details/Respond to Order
- Send Invoice/Receive Payment/Finish Order

This will reduce the lost off time and misunderstandings between the Order-To-Invoice Process that we use today.

In relationships with wood suppliers, FILBAC uses simple communication methods such as phone calls, faxes, e-mails, meetings and negotiations between managers, customized contracts and rules for each partnership. All this is slowing down the business process, and increases the costs, time lost, and people work.

For Ordering, the Customer sends a fax with the requested products, adding quantity, quality, delivery time, and other details such as transport, or technical requests. This Order is processed by the Management Team who gives an answer after checking the possibilities to product and supply in time the products requested. In the Management Team decision is also included the research and capacity analyze for a raw materials suppliers or services needed for processing the goods. For preparing an Offer for customer we have to wait and analyze the offers received from suppliers.

After deciding the final Offer we send it to Customer and wait for the answer. If we receive the order confirmation, we process the goods, else we analyze the order changes and we rebuild the offer. We do the negotiation by phone, or in a face-to-face meeting, if needed, and establish all the conditions.

After processing and sending the goods we complete an invoice and send it to the customer. The payment mostly is be done by bank transaction according to an established contract, and by banks rules. If the payment is made in cash we must fill a receipt and give it to the customer also. All this process needs a lot of paper work, time and resources.

- **Tourism Industry in Hungary** - MATISZ is a Tourism content association and applies the ABILITIES results in the field of Tourism industry in Hungary.

The order to invoice cycle is far from simple in the tourism domain. To start with, we can talk about not one, but two Business-to-Business and two Business-to-Customer relations. These are the Tourist Supplier-Distributor and Distributor-Distributor (B2B), as well as the Distributor-Customer and Tourist Supplier-Customer (B2C) relations. In our test-bed we choose to cover the Tourist Supplier-Customer (B2C) relation as this area determines a typical relationship and within tourism industry, this domain alsodevelops rapidly.

In tourism sector, the products are also different from the physical objects that are usually delivered at the business processes of other sectors. Tourism items (pysical objects or toursim service offered for selling for a defined duration) and packages (connected items in the same timeframe) also vary widely in terms of attributes and related process flows, so in our test-bed structure we are focusing mainly on the order-to-invoice process of hotels and other accomodation facilities (object types) only.

(e)Tourism generally has the same flow as any other (e)Commerce flow, but there are differences like product is not transferred, but Customer goes to Tourist Supplier location. In B2C relation payment after 'service ending date' is typical. On the other hand, B2B relations are run only on electronic networks nowadays, that means, Distributors reach the Tourist Suppliers or other Distributors electronically. In this relation, UBL can have serious advantages here, because there exist non-transferable, specified protocol-based distribution networks. If a Distributor wants to join such a network, it should develop more client software that handles (transfer business data among) different business protocols. In case of Tourist Supplier, usually this involves a manual data-transfer.

#### **Expected Value of ABILITIES results implemented in 5 business scenarios:**

The potential benefits for the companies that will adopt such an approach for more interoperable applications are:

- (a) A significant reduction in the required time and effort for carrying out everyday order to invoice processes. It is estimated that, for a typical SME, this effort will be in the order of several man-months per year while the gain per transaction time is enormous – from days to seconds.

- (b) A significant reduction in the rate of errors that are currently made due to telephone and fax conversations and manual interventions in these processes.
- (c) A major decrease in the cost of adoption of e-Business processes for SMEs, as such the systems are meant widely available at relatively small cost.
- (d) Mobile interfaces as valid means to enable users to do their order to invoice cycle processes without bound to the office or computer.
- (e) Abilities platform enables the SMEs increasing trading capabilities.
- (f) Abilities carries out the development of technical solutions to problems or needs common to a large number of SMEs in specific industrial sectors of the value chain.
- (g) Abilities results will bring SMEs to conform EU norms and standards.

Abilities advocates the implementation of an entirely electronic order to invoice processes, where all data relating to these processes is exchanged between the buying and selling parties by electronic means, ideally from computer system to computer system with as little manual intervention as possible. Avoiding manual intervention reduces the time that each processes step takes, eliminates the potential for typing and transcription errors and reduces the cost to process each step.

The use of standard messages and their exchange is important to business. The key component of a business data exchange is the quality of meaning, not the medium for exchange. In business communications, as with verbal or written dialogue, we can be clear or vague in our instructions. Vague instructions will lead to unsatisfactory results. A standard approach is essential, if the needs of one party are to be understood and acted upon faultlessly by another. The objectives of any business process step, should be to convey the minimum amount of data which will result in correct, timely action with a minimum risk of error. Considering all these facts, UBL messages and Abilities system providing message exchange satisfies the business needs.

The Abilities service allows parties (buyer or seller) to receive or send accurate and consistent data from other parties in a single format (UBL). Abilities advocates the use of UBL for the description of all of the business documents that relate to the order-to-invoice, namely:

- Order Management: Purchase Order, Order Acknowledgement and Order Confirmation
- Delivery Management: Delivery Advice and Goods Receipt
- Invoice Management: Purchase Invoice and Credit Note

The UBL standards are emerging as the preferred means of describing business documents as they are:

- Both computer and human readable
- Capable of automated validation for completeness and correctness
- Naturally extensible, making evolution straightforward and predictable.

### ***FUSION Business Scenarios***

#### **Main focus:**

The aim of the FUSION project is to support collaboration and innovative interconnection between commercial enterprises by developing a framework and technology that allows the semantic fusion of heterogeneous service-oriented business applications. The concept is based on the semantic annotation of Web Services.

FUSION will facilitate three trans-national business cases, typical examples of cross-organizational collaboration. The first is the integration of transactions of a franchising firm (Greece, Poland, Romania, ...); the second pilot deals with the automation of international career and human resource management services (Hungary and Germany); the final example depicts a collaboration of companies in a chain of schools of foreign languages and computing (Bulgaria, FYROM, Albania).

#### **Key points:**

The pilots cover interoperability aspects, in order to represent the breadth of European SMEs:

- Tailoring degree: use of individually tailored vs. standard legacy systems
- Automation: fully, partial or manual process operation
- Complexity: complex process involving several systems vs. simple process involving two systems.

A further aspect considered for the selection is the intercultural focus. Some of the selected processes need harmonisation due to intercultural differences.

More specifically, the scenarios include:

1. **Stock Replenishment:** everyday the franchisees have to replenish their stocks by ordering new items from the franchisor that has to invoice and deliver the items requested. The replenishment procedure involves and triggers processes of most systems comprising the network IT infrastructure, e.g. the ERP and WMS system of the Franchisor and the Retail Systems of the Franchisees.

2. **HR scenario:** international candidate search: the searching process involves local CRM/HR systems and a central Candidate Pool. A global search in the pool delivers a short list of candidates based on normalised candidate profiles and job descriptions.

3. **Student transfer process:** in the frame of this scenario a student is transferred from one school of the network to another. Exchange of relevant information and handshaking between both local systems of the involved schools and the headquarter management information system are automatically performed.

From the technical point of view each pilot is actively involved in the following phases of the FUSION approach:

- Web Service Enablement and System Installation: expose the functionality required for implementation of the business processes as Web Services
- Ontology Engineering Phase: extensions and instantiations for customising the FUSION Enterprise Application Integration (EAI) Ontology to the pilot environment
- Semantic Uplifting Phase: annotation of Enterprise Services and publication of Semantic Profiles
- Process Design Phase: manual or semi-automatic composition of Enterprise Services into Business Processes
- Process Execution Phase: execution of EAI Business Processes.

#### **Expected benefits from FUSION:**

FUSION addresses the need of many European enterprises to implement business processes that involve a number of business partners and information systems. FUSION extends the concept of SOA by utilizing Semantic Web Service technologies. The FUSION ontology defines semantic concepts that allow for tool-supported semantically-assisted data mediation to overcome data level heterogeneities, a more efficient business process implementation by semantically-assisted Web Process composition based on reusable Abstract Process Models, and semantically-assisted search, discovery, and selection of the appropriate Web Services. Each pilot benefits by the introduction of automated business processes, which can be cost-effectively implemented by the FUSION EAI Ontology:

1. The setting up of a new franchisee expects to be less effort and error intensive as the consistency of business processes will be ensured.
2. FUSION allows for seamless connectivity of the IT-environments of the network partners in order to implement an international candidate selection process.
3. Administrative activities like the student transfer process will be automated and therefore become more efficient and transparent.

Expected benefits as reported by the participating end users include:

- Documented interoperation (at process level) of heterogeneous business applications
- Improved transparency and flexibility
- Minimisation of errors, reduction of efforts for maintenance
- Cost reduction, shorter response time and faster customer service
- Optimisation of decision making.

## **GENESIS Business Scenarios**

### **Main Focus:**

The GENESIS project will develop a prototype system to enable the typical, usually small and medium, East-European enterprise to conduct its Business transactions over Internet, by interconnecting its main transactional software applications and systems with those of collaborating enterprises, banking/social insurance institutions and governmental bodies, with respect to the evolving legal and regulatory status.

A typical business case of GENESIS will include the following: The enterprise will produce business documents through its existing enterprise application or via a web browser (if no application is available) in order to submit it to another collaborative enterprise. Through the GENESIS server the document will be stored and forwarded to the final recipient ensuring security and confidentiality of data. The recipient will retrieve the document and automatically incorporate it into its existing application (or web browser in case no application exists).

The Genesis system will be piloted in 8 countries, will cover both inter- and intra- country transactions and with focus on the following transaction types:

#### *Business to Business*

- Catalogue provision
- Quotation
- Ordering
- Invoicing

#### *Business to Government*

- VAT Statement (periodic)
- Social Security Statement Contribution
- Employee Contracting

#### *Business to Banks*

- Payment

### **Key points:**

The project aims at modelling both the above mentioned transactions (in terms of private processes and collaboration (abstract) views (between the collaborative parties) and will provide the necessary infrastructure for facilitating the collaboration of the SMEs through the internet.

The main key points of the Genesis project are summarised as follows:

- A "hybrid" approach for the collaboration of the SMEs using either server based functionality (document exchange and process execution) or P2P through the initialization of the collaboration (Collaboration Agreement)
- A single platform for trans-domain and cross-country collaboration
- The Genesis system will also act as an system-independent definition of executable process models
- The information to be exchanged is modelled based on contextualized data models (based on the UN/CEFACT CCTS [ISO 15000])
- Modelling of the users processes has been done using a holistic approach from specific to generic (collaborative) level process descriptions

### **Expected value from Genesis:**

The expected value of the Genesis project, according to the groups of interested parties is summarised as follows:

Small and Medium and Very Small Enterprises (SMEs and VSEs), will benefit through the:

- Reduction of required effort and time for checking, entering, verifying and completing transactions in ERP or financial applications.

- Increase in correctness of data for inserting documents into the existing ERP (invoices, purchase orders, etc.) according to the traditional way. It is estimated that the number of errors due to the human reasons in data entry in the ERP will be eliminated (zero levels) as the documents will be automatically entered into the system.
- Decrease the cost and effort for integration of other enterprise applications.

ERP Vendors will benefit from the GENESIS system due to the following reasons:

- After a possible commercialisation of the GENESIS system they will be able to increase their competitiveness in the market of e-Business solutions as they will be able to offer new technologies for application interoperability with benefits to their customers.
- A common comprehensive framework of models and ontologies (Ready-made process models and XML schemas) will be created, regarding the most common business processes applicable in the represented by the project participants EU countries. This is a major advantage for an enterprise application vendor, whose customer may operate with branches outside the national level and there is a need for integrating its different enterprise applications.
- They will be able to create their own A2A Web Services clients, in a less costly and time consuming manner, taking advantage of the GENESIS middleware and integration guidelines (constituting one of the deliverables of the project).

The expected benefits for the Governmental bodies include the following:

- Significant reduction of required effort and time for entering and verifying governmental transactions (VAT declarations, etc.). Governmental bodies will benefit as they will save the time needed for entering data in the application system (relevant documents from the enterprises in hard copy) and also for checking the correctness of the information as the transaction will be done in electronic way and most of the checks will be done automatically through the validation of the XML exchanged.
- Governmental bodies will improve its level of citizen's trust, as they will increase their range of services made electronically ensuring security, speed and accuracy of data.

Research and Institutes will benefit from the GENESIS project, as research in Enterprise Application Interoperability and B2B e-Business systems constitutes today one of the most important sectors of research, with benefits for students, scientists and teaching staff. Research in technological state of the art (standards, data models, available infrastructure) will create the following:

- Accumulation and structuring of the existing research knowledge in specific domains of application area into specific deliverables. Results (including areas for further research) will be used for education reasons (seminars, courses, etc.) along with presentations to the academic community.
- Research during the project will be the subject for students' work (thesis, papers, parts of Phd, post-doc, etc.) along with the practical experience of students in enterprise problems.

Standardisation bodies will benefit from the GENESIS project, as deliverables of the project (models, ontologies, etc.) will contribute to the enrichment of the existing knowledge in electronic transactions with definitions of processes, data models and ontologies from the participant countries.

### ***CONTRACT Business Scenarios***

**Main focus:** to show how the contract-based technology developed by the project will be applied in four domains: Modular certification testing, Dynamic insurance settlement, Aerospace aftermarket and Service level agreements (SLA) in software engineering. The aim is to explore multiple aspects of contract-based systems, in particular contract management, monitoring and verification.

**Key Points and Expected Value of CONTRACT's results implemented in the business scenarios:**

1. **Modular certification testing** allows a large number of heterogeneous and independent businesses to flexibly collaborate on the provision of certification services. The model has been applied to computer literacy testing using the European Computer Driving Licence (ECDL2)

concept and can be equally well applied to other certification programmes of a similar structure. Expected benefits are:

- Increased flexibility of customer and supplier relationships due to significantly decreased overhead associated with forming on-demand business collaborations to meet specific customer needs
- Cost reduction due to decreased labour cost and improved utilization of resources
- Improved Reliability and Quality of Service thanks to the continuous monitoring of service provision and the ability to rapidly detect and respond to potential problems.

**2. The Insurance domain** highly relies on traditional ways of claims handling. Every aspect of a claim is dealt with by different specialized persons working in different departments of the company, or in different companies involved in the total claims handling process. Therefore, the whole process is very costly. Nowadays, the insurance market is looking more and more for ways to economize the claims handling by increasing the level of process automation and improving the integration of all different parties (e.g. victims, witnesses, surveyors/experts, lawyers, insurance companies, middlemen and doctors) and systems involved in the process. Expected benefits are:

- Decreased cost due to reduced manual labour, and due to the increased competition and improved efficiency of the claim handling market
- Accelerated claim handling due to automation and continuous monitoring of the process
- Greater variety of insurance policies and a wider range of repair options due to greater customizability of individual contracts.

**3. The aerospace aftermarket** is increasingly populated by customers buying a service rather than a product. In this use case, the aircraft engine manufacturer is responsible for providing the required number of serviceable engines so that the airline operator's aircraft can be kept flying. The engine manufacturer is paid by the hour when the engines are available and may face a penalty if planes are on the ground waiting for a serviceable engine. In this business model, servicing and maintenance becomes a key driver of long term profitability for the engine manufacturer. Aftercare contracts are worth millions of Euros and can last several years. They are complex with stipulated service levels and penalties for failure to meet them. Expected benefits are:

- Modelling Level Integration: Contracts could guide monitoring of the model, to determine where obligations may not be met, leading to refinements
- Explicit Runtime Contracts: Contracts could be made explicit in agents so that their behaviour is governed by the contracts they are attempting to fulfil (or considering breaking).

**4. Service Level Agreements (SLAs)** play an increasing role in IT service management. Customers expect from their IT service providers high quality and flexible services at reasonable costs meeting customer's requirements. One of the major tasks of service level management (SLM) consists in grasping requirements of end users and offering respective services. In this process the quality and quantity of services at acceptable costs are negotiated, defined, measured, and continuously improved. To ensure stable and reliable operation of the IT infrastructure of an organization with a high degree of performance, the responsible managers within the organization establish, verify and monitor contracts with service providers. Expected benefits are:

- Supporting continuous monitoring of performance indicators before and during service delivery, issuing early warnings in case of the risk of not meeting the conditions and obligations set in the agreement, and thus preventing contract violations
- Providing an accurate and up-to-date view on contracts and the state of corresponding commitments, and opening a way for the optimization of the provisioning process
- In scenarios with multiple dependent contracts, requesting changes to already established contracts can be controlled better, avoiding inconsistencies and unnecessary business disputes.
- Well-defined syntax and structure of electronic contracts allows a clear definition of the obligations for the IT service provider and the respective expectations of the customer.



## References

Use Case Outlines and Requirements (Contract Public Deliverable D6.1)

[http://www.ist-contract.org/index.php?option=com\\_docman&task=doc\\_details&gid=16&Itemid=44](http://www.ist-contract.org/index.php?option=com_docman&task=doc_details&gid=16&Itemid=44)

Use Case Summaries (Contract Public Deliverable D6.1 - Summary)

[http://www.ist-contract.org/index.php?option=com\\_docman&task=doc\\_details&gid=15&Itemid=44](http://www.ist-contract.org/index.php?option=com_docman&task=doc_details&gid=15&Itemid=44)

### **PANDA Business Scenarios**

The PANDA project demonstrates interoperability amongst actors in the European ERP/CRM industry of SMEs, with the use of Web Services as the technological framework. Interoperability at the data level is demonstrated with the exchange of information from various actors through the use of a portal. Interoperability at the software level is demonstrated by the use of different tools (project management, agents' technologies, reputation management) that can be flexibly adapted and substituted to meet to needs of particular ERP/CRM value chains.

*Note on Service-Oriented Architecture (SOA):* Although not an economic theory in itself (but rather a business approach or a design principle), a SOA approach emphasises agility, adaptability to changing market requirements, interoperability, and value through differentiation. As such, it should also be looked at as a design principle for EI. Moreover, SOA should be further investigated as an instance of EI. The expected benefits of such an approach should be explored, also combined with Web 2.0 or Enterprise 2.0 principles.

### **III.2 Enterprise Interoperability Problem Space and Solution Space under FP6**

Under FP6, EI research has focussed on interoperability of enterprise software and applications, including intelligent infrastructure in dynamic networks, new generation of semantic tools, architectures and frameworks as well as open networks of interactive, autonomous and intelligent software components<sup>3</sup>.

In general, the FP6 IST projects within the domain of Enterprise Interoperability have delivered technical offerings in the following areas:

- Enterprise (business/knowledge)
- ICT systems and Architecture & Platform
- Methodology
- Semantics and Ontology
- Generic Modelling.

For further descriptions of these areas, see Section 3.1 "State of the Art" of the Enterprise Interoperability Research Roadmap and Annex I to the Roadmap<sup>4</sup>.

### **ATHENA**

The ATHENA Integrated Project proposed an integrated, holistic approach to interoperability, based on an analysis of today's situation in integrated projects, as depicted in Figure 14.

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<sup>3</sup> European Commission (2007): Ex-post evaluation of the IST Thematic Priority in the 6th FP for EU RTD – "Self-assessment" Input for the "ICT for Enterprise Networking" Domain [ftp://ftp.cordis.europa.eu/pub/ist/docs/ict-ent-net/assessment-ict-fp6\\_en.pdf](ftp://ftp.cordis.europa.eu/pub/ist/docs/ict-ent-net/assessment-ict-fp6_en.pdf)

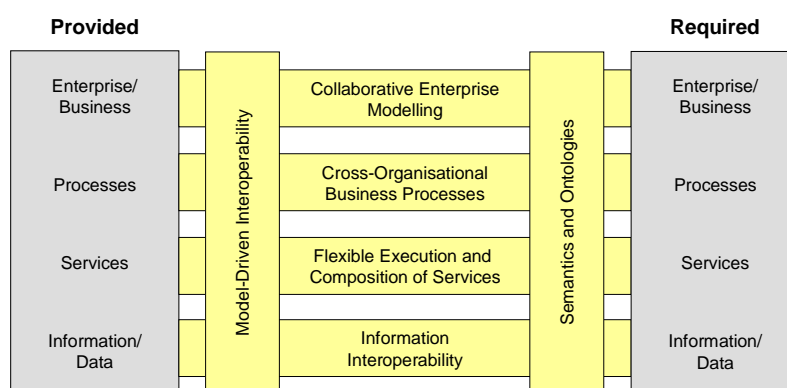
<sup>4</sup> [http://cordis.europa.eu/ist/ict-ent-net/ei-roadmap\\_en.htm](http://cordis.europa.eu/ist/ict-ent-net/ei-roadmap_en.htm)

ATHENA is a research project proposing an **integrated, holistic approach** to interoperability.

<b>Community</b>	Consensus efforts do not tap their full potential in industry usage
<b>Business</b>	Incomplete models for value assessment of interoperability projects
<b>Enterprise Modelling</b>	Capturing Enterprise Knowledge is too time consuming and expensive; no exchange of models; models and reality often not synchronized
<b>Processes</b>	Processes embedded in application logic; modeling tools mainly for drawing; disjoint B2B process modeling; programmatic integration
<b>Services</b>	Static definition & usage; current WS standards landscape not interoperable
<b>Information</b>	Proprietary data formats without semantics, many incompatible standards; hard coded transformations
Today's situation in integration projects	

**Figure 14 Challenges in Enterprise System Interoperability<sup>5</sup>**

Building upon the vision statement that “By 2010, enterprises will be able to seamlessly interoperate with others”, ATHENA has developed an ATHENA Interoperability Reference Architecture, ATHENA Interoperability Methodology (AIM) and ATHENA Interoperability Framework (AIF). These three main outcomes are summarised in respectively Figures 15, 16 and 17. Collectively, they define the solution space for more specific deliverables from the project. These include reference models; interoperability requirements for applications, data and communications and solutions for meeting those requirements; methods for enterprise modelling and collaboration; semantic mediation solutions; and components of interoperability infrastructures.



**Figure 15 ATHENA Interoperability Reference Architecture**

<sup>5</sup> Berre, A. et al. (2007), ATHENA Interoperability Methodology, presentation give at eChallenges e-2007 conference session on Networked Enterprise – Interoperability, The Hague, 24 October 2007

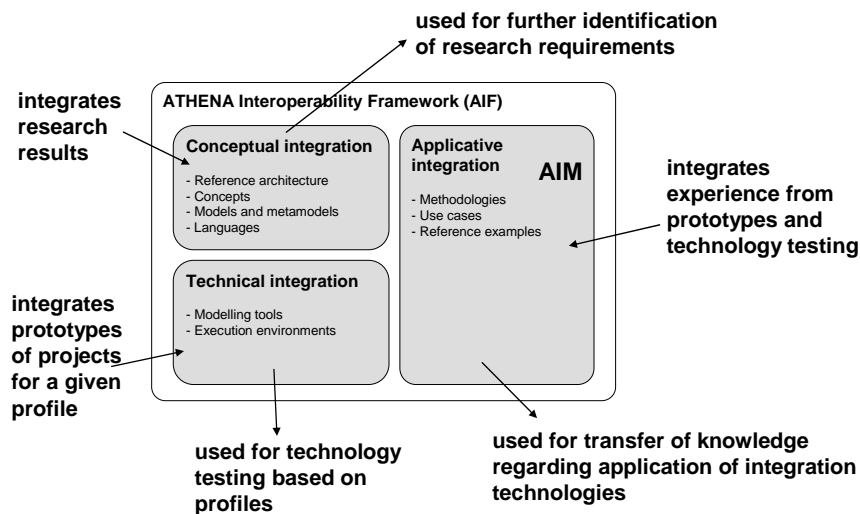


Figure 16 ATHENA Interoperability Framework

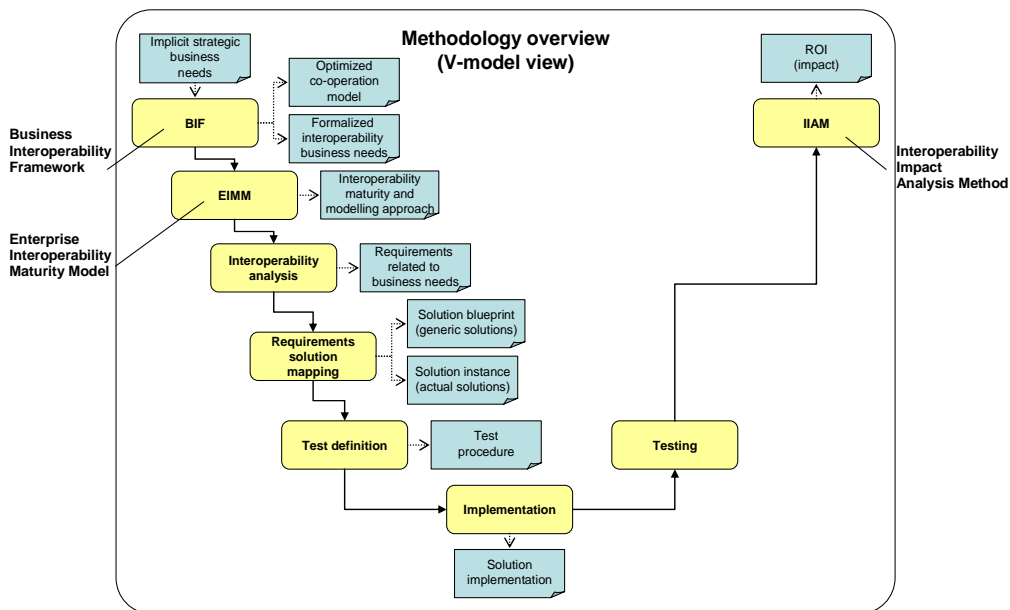


Figure 17 ATHENA Interoperability Methodology (AIM)

**ECOLEAD**

The ECOLEAD Integrated Project developed the subsequent vision: “In ten years, in response to fast changing market conditions, most enterprises and specially the SMEs will be part of some sustainable collaborative networks that will act as breeding environments for the formation of dynamic virtual organisations”.

Collaborative networks of organisations provide a basis for competitiveness, world-excellence, and agility in turbulent market conditions. They can support SMEs to identify and exploit new business potential, boost innovation, and increase their knowledge. Networking of SMEs with large-scale enterprises also contributes to the success of the big companies in the global market. Reinforcing the effectiveness of collaborative networks, mostly based on SMEs, and creating the necessary conditions for making them endogenous reality in the European industrial landscape, are key survival factors.

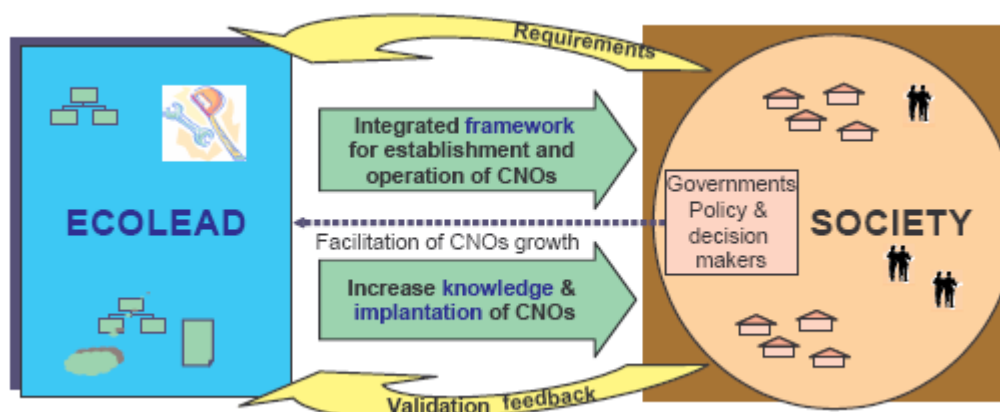
As a result, ECOLEAD focuses on developing methodologies and tools for Virtual Organisation Breeding Environment (e.g. Industrial Districts, networks of SME), which is defined as *an association or alliance of organizations and their related supporting institutions, that adhere to a base long term cooperation agreement, and adoption of common operating principles and infrastructures, with the main goal of increasing both their chances and their preparedness towards collaboration in potential future Virtual Organizations (VOs)*".

The main expected result of ECOLEAD is an integrated framework consisting of: Reference models and guidelines, ICT collaboration infrastructure and support e-services for the establishment and operation of collaborative networked organisations (CNO), providing platforms for VO Breeding Environments, Dynamic Virtual Organisations, and Professional Virtual Communities<sup>6</sup>.

The ECOLEAD framework includes:

- Well founded reference frameworks and business models adapted to emerging behaviour in complex networks
- Governance, management, value system and metrics systems
- Invisible, secure, plug & play infrastructure for collaboration, based on interoperability standardisation
- ICT collaboration support e-services
- Extensive use of pervasive computing and support for decision making and problem solving
- Accepted mechanisms to handle innovation and new value systems
- Social responsibility, including "life maintenance", based on suitable ethical code
- Comprehensive (international) legal frameworks for VOs.

The ECOLEAD consortium expects its results to significantly impact industrial competitiveness and societal mechanisms, for SMEs and large organisations alike. As a result of the mechanisms developed by the project, a strong and cohesive social fabric would be built, supporting the actual implantation of collaborative networks in the society, and enabling organisations to respond to turbulence and uncertainty in global economy. This is depicted in Figure 18.



**Figure 18 ECOLEAD Expected Main Result**

<sup>6</sup> For more information, please refer to: <http://www.ve-forum.org/Projects/284/Leaflet/ECOLEaflet.pdf>.

## **ABILITIES**

The objective of the ABILITIES STREP Project is to study and provide tools that enable interoperability among networked organisations, with a specific focus towards networks of Small and Medium Enterprises in Enlarged Europe (specifically the New Member States and Accessing countries), in the particular context of the order to invoice procurement process. The detailed project objectives include: (1) Interoperability of business documents (BOD), which pragmatically starting from OASIS' Universal Business Language (UBL) 2.0 specifications; (2) Architectures and platforms, in particular to provide a flexible interoperability platform on the basis of Enterprise Service Bus technology; and (3) Interconnection of Business Processes for the support of Service Orchestration among companies that are inherently less structured in terms of IT support.

### **EI Offerings**

The main result of ABILITIES is an architecture aimed at supporting interoperable operations of closed and private networks of peers that have reached a formal agreement for developing business and running it on an e-commerce basis. The ABILITIES solution supports the design and execution of order to invoice processes, allow the flexibility the peers need to have in the structure and content of the exchanged business documents, support run-time negotiation of document content and collaborative sessions to support humans in the phases.

The ABILITIES solution is planned to comprise specifications of business documents and order to invoice business processes for the five planned test cases as well as tools that would allow independent definition of equivalent artefacts for new and diverse domains, industries, and states constraints, creating dedicated profiles for each network seeking for e-business enactment support.

The ABILITIES interoperability platform for SME networks includes a set of modules that are summarised in the following bullets:

- A Business Object Editor (**Ontology Delta Editor**), as a customisation of Open Source ontology editors. The Ontology Delta Editor component of the ABILITIES platform allows the users to customize the documents based on their requirements.
- A **Business Documents Reconciliation Engine**, which at runtime will be able to apply the reconciliation rules to specific business documents mapping problems. As mentioned before, the UBL expects the user communities to customize the documents. These customizations might lead to different document formats. The Reconciliation Engine component of ABILITIES platform will solve the issue of different document formats.
- **ABILITIES Collaboration tools**, including a multimedia repository, an editor to enrich UBL documents with multimedia content, and support for involving groupware tools during business processes. The federated interoperability approach of Abilities provides multi-modal and interactive means for achieving agreements on details of business documents/transactions.
- An Abilities **UBL Document Content Negotiation Platform** able to customise Abilities exchanged UBL messages according to negotiation rules previously stored in a Negotiation Rules Repository.
- An **ABILITIES Interoperability Bus** allowing the integration between:
  - A **Service Oriented Architecture** (for the access to local knowledge and sources such as company databases, through web services)
  - The Abilities Negotiation Platform and the Abilities Reconciliation Platform
  - The Abilities Collaboration Platform.
- A **Legacy Systems Interface (LSI)**, which will specify an open interface to legacy systems, implement it as open plug-ins, and provide an interactive user-centric environment for UBLtc ++ documents editing and viewing.
- A **Process Modeller** to specify the order-to-invoice business processes including UBL enriched business documents as well as to extend collaboration processes with decision point and human management control activities.
- A **task manager**, for the support of human oriented decision points and work lists.
- A **workflow engine** to enact order-to-invoice processes enriched with UBLtc ++ documents exchange.

- A Portal for Single-Sign-On access allowing users to access the main functionalities of the ABILITIES solution for the enactment of the order-to-invoice processes among peers.

### **EI Offering in support of the Grand Challenges**

The ABILITIES project results positioning with respect to the Grand Challenges provided in the EI Roadmap show clearly that the results are mostly placed under the main Web Technologies area and – to a smaller extent - to the Knowledge-Oriented Collaboration area.

The results are intended to be used as tools that enhance interoperability as well as collaboration among networked SME enterprises in their effort to exchange BODs and allow all parties to understand each other in these transactions.

The assumption is that SMEs have higher needs for flexibility, in adherence to standards without incurring in the relevant costs associated to their full adoption, in being compelled to participate to more networks simultaneously, in keeping the legacy systems possibly very lean, in needing human collaboration as well as flexibility in roles and people functions.

In order to achieve its objectives ABILITIES has studied the potentials of adhering to a BOD standard (UBL2.0) allowing flexibility at schema and content levels; the potentials of applying collaborative primitives and tools to allow human operators to interact with the process steps and decision points; the potentials of introducing a negotiation mechanism to cut the approval cycles; the opportunity of a process management platform.

During the past year in the framework of Enterprise Interoperability research the concept of providing software shows a tendency to shift from the traditional licensed software paradigm to the software provided as a service (or rather utility) and possibly licensed per use.

The Enterprise Interoperability Research Roadmap describes these principles in the Grand Challenge “ISU: Interoperability Service Utility” to support a diversity of continuously evolving ecosystems of enterprises. In particular, interoperability as a utility-like capability is described as essential for enabling business innovation and value creation, and is envisaged to be particularly useful and attractive for SMEs and start-up companies.

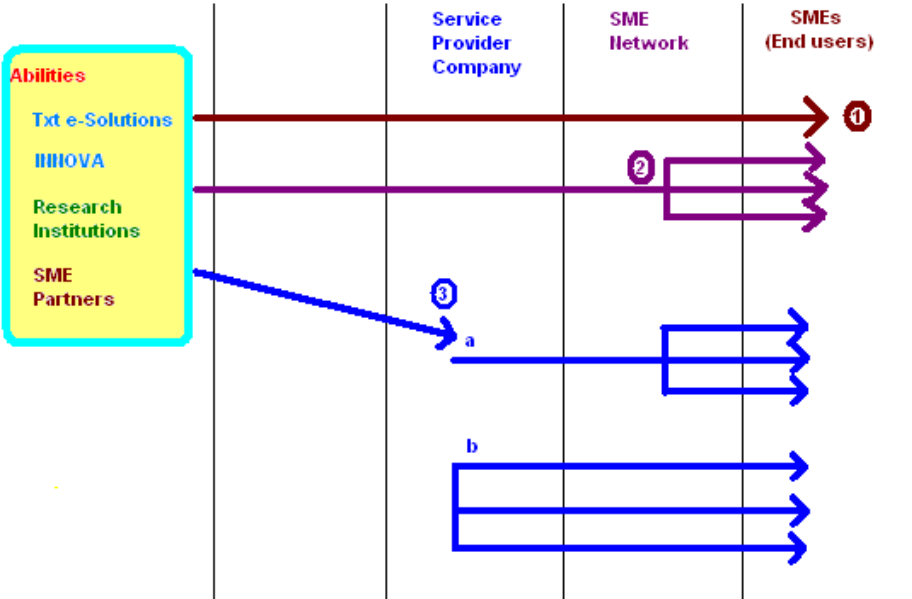
The concept is emerging and is far from being established, but the ABILITIES research team sees the research results of the project to be suitable for being provided in the form of Service Utility. At the same time the research team acknowledges that the architecture and the results of the project need to be adapted and complemented e.g. with architectural features such as reliability and non-repudiation in order to be adoptable as an industrial platform.

### **Open Source Model**

The ABILITIES architectural solution and components results are planned to be bundled and available as open source results. The ABILITIES results can be provided in a number of different deployment schemas, as follows:

- **ABILITIES Open Specifications;** examples of these are:
  - Definitions of the regional and industry localisations of Business Documents (UBL etc)
  - Definitions of order to invoice process collaboration models in the form of generic templates for reuse and customisation
  - Definition of the collaboration models specialised for the environments deployed in the ABILITIES testbeds.
- **ABILITIES Open Platform comprising a set of Open Modules;** The modules address interoperability issues and in most cases are developed on the basis of state of the art technology and standards and planned to be available as open source modules.
- **ABILITIES Platform integrated with Proprietary Systems;** The ABILITIES Platform is the result of integrating ABILITIES modules for the specific purpose of the business interoperability needs of the SME network to be supported, on the basis of the customisation of the Open Specification for the needs of the addressed network.

This variety offers support towards a number of value chain business models for supporting the transactions (see Figure 19 below).



Marketing Models of the Abilities Solution

Figure 19 ABILITIES Marketing Models

The application contexts currently foreseen for the project outcomes are mostly traditional supply chains and it is expected that even the system integrators in the short term follow the traditional value model for the implementation.

But it is already evident that depending on the nature of the business entity that adopts the ABILITIES platform and architectural solutions, the nature of the business model varies significantly. In the cases in which the solution is adopted by business service providers and expanding on the scale, a clearer distinction between the base-generic interoperability services and value added services for interoperability would emerge and become more evident. A need to model these service layers is seen as interesting research follow-up.

**References**

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<http://www.viewzone.org/abilities/home/>