D4

Report

Lead Market Opportunities in key ICT domains – Trends considering the two regions: Carinthia and Friuli Venezia Giulia as a joint ecosystem

Friuli Innovazione – Udine I
Lakeside Labs – Klagenfurt A
Università degli Studi di Udine – Udine I
Alpen-Adria Universität – Klagenfurt A
Università degli Studi di Trieste – Trieste I
BIC Incubatori FVG S.p.A – Trieste I
CReS – Udine I

www.tri-ict.eu
info@tri-ict.eu

List of Figures

EXECUTIVE SUMMARY

The following report comprises the individual market reports of research lead markets a) E-Health and Domotics, b) Tourism, Culture and Creative Industries, c) Transport and Logistics, d) Renewable Energy and Sustainability. The aim of the report is to explore on the one hand the endowments and expectations of lead users regarding information and communication technologies (ICT) and on the other hand to analyse the collaboration intent between lead users and suppliers within the four researched lead markets. The empirical data is based on 71 interviews with lead users and suppliers in the two regions: Carinthia and Friuli Venezia Giulia.
The results of our study indicate that importance of ICT ranges from low to rather high across the lead markets. Furthermore, collaboration intent is particularly high among suppliers. Yet again, the collaboration objective differs across the lead markets.

INTRODUCTION

The Information and Communication Technology (ICT) domain is of paramount importance, especially for the SME in the two regions Carinthia und Friuli Venezia Giulia. In quantitative terms, the ICT sector encompasses 380 SME and 6.275 employees in Carinthia and 2.420 SME and 7.749 employees in Friuli Venezia Giulia.

To narrow the scope of analysis within the ICT sector, following lead market[1] clusters have been investigated: a) E-Health and Domotics, b) Tourism, Culture and Creative Industries, c) Transport and Logistics, d) Renewable Energy and Sustainability.

The report i) analyses in detail a series of dimensions specific to either users or providers of ICT, and ii) seeks to identify the areas of possible opportunities of interaction among the actors of the ICT sector, iii) emphasizing the critical issues constraining collaboration.

Regarding ICT-adopters (i.e. lead users[2]), the following dimensions are analysed: i) the endowment and the actual use of ICT; ii) the expectations about the adoption of ICT in the future; iii) the attitude to collaborate with providers and other organizations in the process of definition and implementation of ICT solutions; iv) the features of decision-making process, with regard to the purchase of ICT.
Concerning ICT-providers, the following dimensions are analysed: i) the current offer; ii) the expectations about technology dynamics and the evolution of the supply; iii) the capabilities to interact with customers.

---

[1] A lead market is the market of a product or service in a given geographical area, where the diffusion process of an internationally successful innovation (technological or nontechnological) first took off and is sustained and expanded through a wide range of different services. The Lead Market Initiative (LMI) for Europe was launched by the European Commission following the EU's 2006 Broad based innovation strategy. The Lead Market Initiative is the European policy for 6 important sectors that are supported by actions to lower barriers to bring new products or services onto the market.The policy instruments deal with regulation, public procurement, standardisation and supporting activities. The LMI identified the following markets: eHealth, Protective textiles, Sustainable construction, Recycling, Bio-based products and Renewable energies. (Source: http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/#h2-1)

[2] The term "lead users" describes on the one hand main adopters/users of ICT (e.g. because of their high quantity demand or dominant presence in the market) on the other hand "lead users" are those organization that make and "advanced" use of a technology and that are able to guide the innovation process stimulating technology-providers by providing "intelligent" feedback and expressing sophisticated needs. The latter definition applies to certain extent to the original idea of lead users by von Hippel (von Hippel, E.: 1986, Lead Users: A source of novel product concepts, Management Science 32, 791-805). Both groups are addressed within this report, whereby the first may dominate.

DATA AND METHOD

The population of the study consists of ICT lead users und ICT suppliers in the regions Carinthia and Friuli Venezia Giulia. ICT lead users are mostly big sized companies, also from the public sector, ICT suppliers are SMEs only. Contact data was provided by project consortium, based on individual research, geographic proximity and (existent) relationship with an informant in the organization.

The report draws on a quantitative and qualitative research that has been carried out in the period from April 2009 to November 2010. We chose a sequential approach, analysing each lead market separately. The research has been conducted in face-to-face interviews with key personnel in the organizations under analysis. In particular, the IT manager or the managing director of "lead users" organization was interviewed, while for providers, interviews were addressed to R&D directors, project managers, or sales-forces. When possible, information gathered by functional managers was triangulated with information provided by the managing director.

The questionnaire set (one for lead user, one for suppliers) composed of a set of multiple-choice questions complemented by open questions provided guidance to the interviewers and assured the homogeneity of data collection across groups. After first piloting of a unitized questionnaire set for both regions, the necessity for a region specific approach was discovered. Therefore the questionnaire set was adapted to the specific requirements of the Italian and Austrian market. This process resulted in two sets of questionnaires (one set including the lead user and supplier version respectively) for each region. All questionnaires have been validated by two pilot interviews, carried out by one Italian and one Austrian unit.

The interviews generally took place in the place of work of the informant, and lasted from a minimum of 30 minutes to a maximum of 2 hours.

Overall, 71 interviews were conducted, thus representing the sample for the report. Figure 1 summarises the composition of the sample regarding the four lead markets, including a breakdown according the country while figure 2 analyses the breakdown among organisation (i.e. distinction between lead users and suppliers) per lead market.

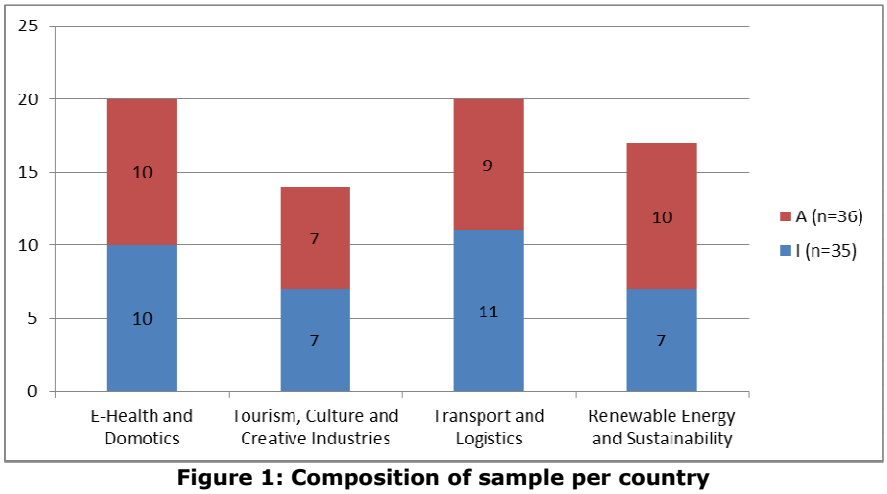


Figure 1: Composition of sample per country

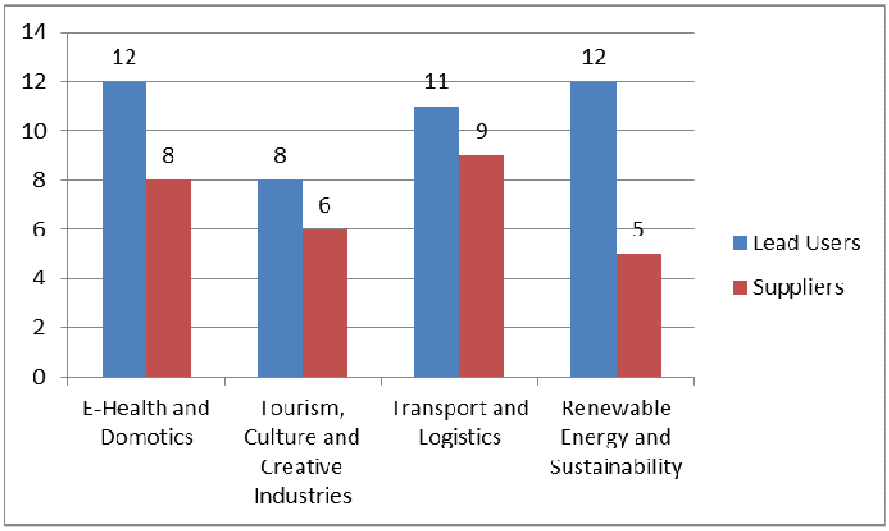


Figure 2: Lead users and supplieres according to lead market

RESULTS AND TRENDS

E-Health and Domotics

The sample for the market of E-Health and Domotics is composed of 20 organizations, 10 Austrian and 10 Italian.

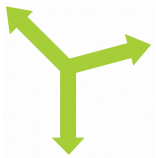
The project team identified 12 organizations that - given their position in the competitive space or the complexity of information-intensive activities performed - are expected to behave as "lead users". The remaining 8 organizations can be regarded as suppliers of ICT solutions.

Lead User

Deepening the analysis to the nature of the activity carried out by the lead users, it emerges that the sample is composed in prevalence of organizations working on health-related issues. In particular, the sample includes four Italian hospitals, one devoted to medical research, one private clinic, two public hospitals, three healthcare and wellness centres (thermal baths) - two Austrian and one Italian - one Austrian healthcare consulting firm, two Italian public healthcare services bodies, one Italian spin-off in biotechnology. Finally, the sample includes one Italian research centre providing services to the furniture, and domotics, industry. Most of lead users operate in a regional or national market, while in fewer cases the scope of activities extends to European countries.
All the lead users are services providers - with the notable presence of two organizations specialized in R&D.

Endowment and expectations regarding ICT

Despite of the information-intensive nature of the activities performed, lead users' IT managers and directors do not seem to regard ICT as the key driver of competitive advantage and operational effectiveness. The importance of ICT for the organization is evenly distributed: for two respondents ICT has a crucial importance, for two others the importance is on average, and according to two respondents, ICT have a limited impact



in their organizations. Such a perception could seriously dampen the possibility to enter cooperation projects or business transactions.

The lead users make an extensive use of ICT in the "non-core" activities of the value-chain, in particular Accounting and Finance. The state of ICT use in the "main activities" is more articulated and it is strongly tided to the actual nature of activities performed by the organizations. The lowest common denominator among lead users' is the need to store, diffuse and gather information about their core processes - would they be patients' exams or medical records, or data on biological processes, or pieces of knowledge developed across a series of R&D projects in Domotics.

The main area of interest in the next 3 years is data-warehousing, that is relevant for 6 out 8 respondents, followed by system integration and computer security and privacy, relevant for 5 and 4 respondents respectively. Web services and the re-engineering of IT architecture are of limited interest.
The results seem coherent with the information-intensity of the activities carried out by the lead users. The concern about privacy and security seems to be a little bit underestimated - e.g. the relevance of this issue is estimated with a score of 4 (out 5), against 4.4 scored by system integration; one could expect that this issue was of key importance for organizations dealing with highly sensitive personal data.

The main processes the lead users expect to digitalize are:

- management of medical records - digitalization of medical register; digital signature of physicians;
- remote access to medical databases - both in hospitals and in medical examination outside hospitals;
- supply chain management - of drugs, medical devices, and other goods to be employed in thermal baths or sold to customers;
- knowledge management systems - data storage, mining, gathering.

The lead users make a rather limited use of the website that in the large majority of cases (6 out 8 respondents) plays a purely informative function; in one case, it is integrated with the other business processes - i.e. an online booking system. The main applications of the intranet are internal mailing and internal data exchange (5 out 8 respondents), while in one case it offers protected areas for employees, and in another case it networks offices in different sites. E-Learning is a theme of attention for 4 organizations while for 2 it seems to be of negligible interest.

The survey reveals that standard commercial software is not generally adequate to fulfil the needs of lead users: all the 5 organizations that expect to invest in ICT to enhance the digitalization of core processes will rely on custom software - in case combined with standard software. At the same time, reliance on custom software is more usual for non-core activities.

The ability of lead users to develop ICT solutions internally is not homogeneous: the two R&D organizations, the healthcare consulting firm, and the research hospital are able to develop - or at least to customize - the software they need; the other organizations generally depend on external providers.

An important feature of the FVG market is the presence of a strong player that provides specialized software and services for the healthcare sector that have become the

standard. It should be noted that the choice of solutions offered by different providers could compromise the compatibility with the IT infrastructure developed by other organizations (i.e. the Regional Administration) involved in the healthcare sector. Apart from these long term partnerships, lead users established many consumer/licensee contracts for non-core supplies.

In terms of the nature of the process leading lead users to express their ICT needs a non-systematic approach prevails.

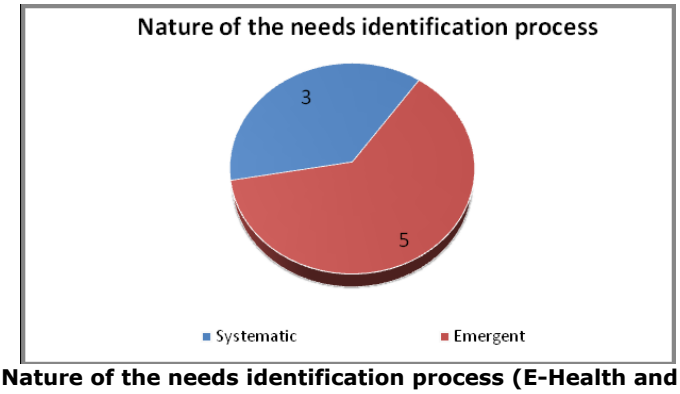


Figure 3: Nature of the needs identification process (E-Health and Domotics)

In both cases, the needs identification process is activated by the top management, who searches novel opportunities in the environment and then shares and discusses the insights with lower level functional managers. Functional managers often interact in the search process. The implementation of ICT solutions is often made possible by the intervention of "specialist" employees, generally IT specialists or advanced users. The evaluation of the solutions adopted pertains to the top or functional management. The emergent and systematic approaches differ for the orderliness in the scrutiny of the technological environment.
A budget for ICT is formalized in 4 cases (out of 7 respondents); the IT manager - present in 5 organizations out of 9 - has generally technical autonomy, but has to share the investment decisions with the general manager. The organizations are generally free to purchase ICT solutions from any provider, although in some cases the authorization of the headquarters is necessary.

Collaboration Intent

Ambivalence could be revealed in terms of collaboration intent. The sample is split among those lead users who would establish a partnership to develop ICT and those who would not.

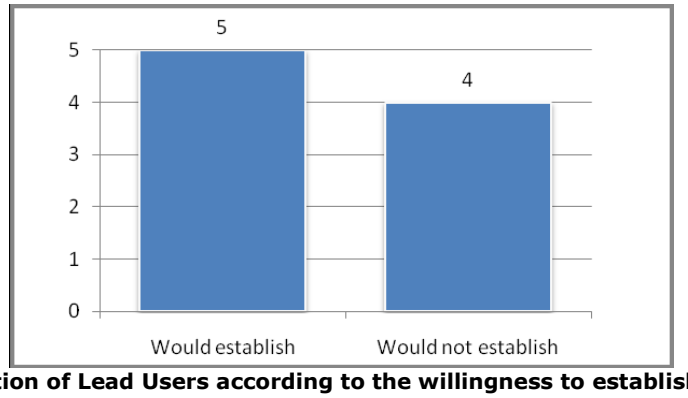


Figure 4: Distribution of Lead Users according to the willingness to establish a partnership to develop ICT (E-Health and Domotics)

The main reasons lead users would not establish a partnership refer to the lack of capabilities within the organization that does not allow taking part to the design of a new ICT solution (3 cases). Those who would establish a partnership are interested to develop specialized software jointly, or to access external competences anytime the organization is not able to develop a solution internally.
An additional constraint to the adoption of IT solutions - noticed in some larger organizations - is the poor formalization of internal processes, or the resistance to change expressed by the employees.

Supplier

Almost all the suppliers are small-sized companies - employing from 3 to 15 employees. The turnover of these companies falls into a range of € 1-5 million, a figure that is expected to growth sensitively in almost all cases. As for the business model, only one company is a pure service provider; two companies are active downstream in the value chain, working as distributors and providing customer service; other 5 are more integrated, performing R&D, production, implementation and customer service activities. As a consequence, the employment of Ph.D.'s, as well as the prevalence of professional and managerial jobs is not an exception in these "brain-intensive" companies. As for the geographic scope of operations, it should be noted that some companies are very tided to customers in the local market, while others extended their operations to the national and even EU market. Thus, it should be noted that, although small in absolute terms, the suppliers can be regarded as quite complex firms given the nature of the business and the sophistication of employees' skills. The sample is completed by the key player in the Friuli Venezia Giulia IT services market, a large company with 850+ employees, covering almost all the main activities in the value chain and operating in mainly the "Business to Government" market. The company has the core of its operations in FVG, but it serves customers also in other Italian Regions and in neighbouring foreign Regions. While the small providers can leverage on flexibility and adaptability, the drivers of competitive advantage for this company seem to be the strong control of a huge market share. The outlook for the company is highly uncertain, since the ownership and the organizational model are currently under revision.

Collaboration Intent

All the suppliers have already established business relationships with large firms, public administrations, governmental bodies, as well as hospitals and other healthcare

institutions: suppliers are well acknowledged of the rules of interaction with bureaucratic or government backed bodies. This could improve the interaction between suppliers and lead users that are, in majority, medium-large organizations.

On the other hand, all the suppliers - except for the large Italian company and one Austrian company that attempted to establish a partnership to enter the Italian market - have a rather limited experience in taking part to international projects. Despite of this, they are generally interested in establishing cross-border cooperative relationships to exploit market opportunities.

Among the main difficulties in establishing cross-border partnerships, the most relevant are:

- the identification of a reliable partner;
- the necessity to adapt products and services to the specific needs and regulations of foreign customers;
- the translation of the support documentation and the provision of training to foreign users.

The companies seem more interested in opportunities of commercialization of marketable solutions, rather than in entering upstream research projects.

This research put into light that opportunities of cross-border cooperation exist in the areas of

- mobile medical services;
- digitalization of medical records.

Tourism, Culture and Creative Industries

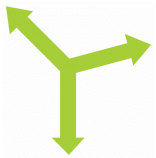
The sample for the market Tourism, Culture and Creative Industries is composed of 14 organizations, 7 Austrian and 7 Italian.

The project team identified 8 organizations that - given their position in the competitive space or the complexity of information-intensive activities performed - are expected to behave as "lead users". The remaining 6 organizations can be regarded as suppliers of ICT solutions.

Lead User

Among the lead users touristic services providers clearly prevail on cultural organizations. In particular, the sample includes two Austrian hotels, two Austrian and one Italian tourism promotion and development consortia, one Italian consortium for the promotion of a local food production brand that also organizes marketing activities with a touristic impact, and one Italian manager of bathing facilities. Finally, the sample includes one Italian theatre as a representative of the cultural and creative organizations.

Despite the nature of "services providers" of all the entities considered, it is possible to identify two main clusters of organizations in the sample: those providing accommodation and leisure services - that could be regarded as "core" touristic services - and those providing infrastructural services, in particular the promotion of a local area defined by a food or beverage production.



Endowment and expectations regarding ICT

It is possible to figure out a misalignment between the actual use of ICT by lead users, and the perception of lead users' IT managers and directors on the contribution of ICT to innovation and competitive advantage.

Among the critical success factors in the industries under examination, i) the quality of user-provider interaction - that implies the ability to convey intangible values and to create a unique experience - and ii) the ability to deal with information both in the core process of service delivery and in the infrastructural activities of analysis of customers behaviours and market trends seem to play the most prominent role.

It is difficult to single out a general trend across the organizations, because of the heterogeneous nature of activities performed. Despite of this, it is possible to recognize that all the lead users implemented digital information systems, coherently with the drivers of competitive advantage. The use of ICT is extremely intensive in the Marketing and Customer Service area. The website is regarded as a key channel of communication, to present promotional as well as informational content. Great attention is paid to the informative content production process that often requires the (automated) integration of the contributions by different partners. In few leading cases, digitalized tools are used to collect customers' feedbacks that have become a valuable input in the process of service innovation. It is important to indicate that ICT complement, and do not substitute, traditional processes of communication and personal, trust-based interaction. From one side, customers still like paper media, such as brochures, and face-to-face contact; from the other side, standard CRM software and digitalized fidelity cards are regarded as too rigid and unsuited for lead users' volume of activity. The emphasis on traditional media and tools may lead some organization to delay investment in ICT. An additional constraint to the adoption of ICT solutions - noticed in some larger organizations - is the resistance to change expressed by the employees.

For what concerns operational effectiveness, several organizations adopted web-based booking systems that complement the "traditional" processes of reservation of services. Thus, for some of the lead users the website has not only a "showcase" function, but offers "advanced" options and opportunity of interaction.
As for the "non-core" activities of the value-chain, almost all lead users have computerized Accounting and Finance functions and generally use internal mail and document management systems.

Also the cultural organization adopted ICT in the ticket booking process, as a communication tool (informative website), and in the administrative activities; moreover, the theatre encourages innovation in art, and thus the use of new technologies as an expressive medium in the performances it produces.

Despite the centrality of ICT in the operations, and the deliberate orientation towards innovation, lead users' management does not credit ICT with a strategic importance. The impact of ICT for the organization is regarded as "moderate" by 7 out 8 lead users, while only for one responded it has a crucial importance. According to this picture, lead users underestimate the actual value and the potential of value creation of ICT solutions. Increasing the interest towards these issues appears as a prerequisite to the promotion of any ICT-based cooperation program.

The main processes the lead users expect to digitalize in the next future are:

- mobile communication with customers: various lead users are interested in adopting technologies allowing the tourist service providers to push multimedia personalized information to customers in a bounded area; some lead users identify the opportunity to offer information-on-demand services, i.e. the delivery on requested information on portable tools;
- ICT devices for guest cards;
- web-based digitalization of reservation process;
- supply-chain management: as a result of a diversification strategy, one lead user produces and commercializes a line of products based on local natural resources. This activity is quite uncorrelated with the lead user's core business. Given the low volumes of production and the marginal incidence on the operations, the related processes are not currently digitalized; but, in case of success, a SCM-system could be of interest.

It is possible to expect that lead users will source their ICT-based innovation projects mainly with standard software. They have a limited endowment of resources to devote to IT co-development projects, and in particular they present a shortage in capabilities to actively take part to the software development process. As a consequence, 7 out 8 lead users are not able to develop internally - or at least to customize - the software needed and thus they depend on external providers. Many lead users have signed long term contracts for hardware, software and services supplies; in some cases, providers are specialized firms operating with an international scope of operations; more often, they are regional providers. One organization realized a booking tool in-house.

In terms of the nature of the process leading lead users to express their ICT needs a non-systematic clearly approach prevails: only in one case, the organization structures the needs identification process, but the outcomes depend on emergent practices.

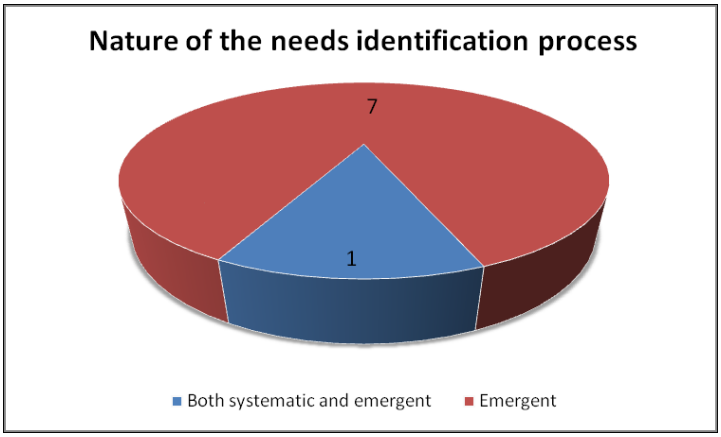


Figure 5: Nature of the needs identification process (Tourism, Culture and Creative Industries)

In the large majority of cases, the needs identification process is activated by the top management - e.g. the managing or the administrative director - who searches for novel opportunities in the technological environment. The inputs to the search process are given by external actors - such as customers and suppliers - by the participation to events (fairs, presentations and exhibitions), and, in the case of consortia, by the affiliated members. Top managers play a key role in sponsoring the adoption of the innovation, towards both the body in charge of the approval of the investment, and the employees.

The implementation of ICT solutions is often made possible by the interaction of "specialist" employees, generally IT specialists or advanced users, with external providers. The evaluation of the solutions adopted pertains to the top or functional management with the involvement of specialist employees and users.

In 5 out of 8 organizations, the position of IT manager exists. He/she has generally technical autonomy, but has to share any investment decisions with the general manager and with the board of directors or with the shareholders' representatives. The lack of financial autonomy of IT managers is made evident by the fact that only in one case a budget for ICT is formalized. The organizations are generally free to purchase ICT solutions from any provider; in the case of companies working on the basis of franchising agreements, the franchisee has the opportunity of adopting the franchisor's software.

Collaboration Intent

Ambivalence could be revealed in terms of collaboration intent. The sample is split among those lead users who would establish a partnership to develop ICT and those who would not.

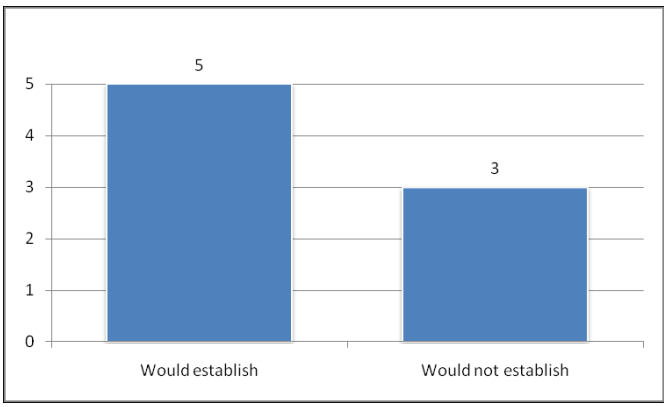
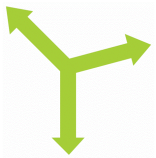


Figure 6: Distribution of Lead Users according to the willingness to establish a partnership to develop ICT (Tourism, Culture and Creative Industries)

The lead users look with favour to international cooperation, and to ICT cooperation in particular. Cooperation is regarded as a tool to overcome the internal lack of technical capabilities, maybe underestimating the fact that a certain level of skills is necessary to effectively engage a cooperation program. Another critical issue associated to cooperation regards the concern of a misalignment of goals among partner and an associated decline of commitment as the project goes on; cultural differences may amplify these problems.

Supplier

Almost all the suppliers are small-sized companies - employing from 2 to 12 employees. The turnover of these companies is extremely low, falling into a range of € 20,000-0.5 million. Several providers have been established in the last few years, as academic spin-off companies or high-tech start-ups incubated in technology parks. In almost all cases, the volume of activity is expected to increase quickly in the next future. The majority of the companies adopt a business model that includes R&D, production (i.e. software and application development) and customer service activities; one company is even more integrated downstream, while another is specialized in service provision. The combination of a business model focalized on the development of IT solution and the nature of "brain-



intensive" company translates into a prevalence of professional and managerial jobs, and into the enrolment of highly educated employees.

As for the geographic scope of operations, two Italian companies are closely tied to local suppliers and customers: a share between the 60% to the 100% of the revenues is generated in the regional market, and the 50% to 100% of suppliers is local. One of these suppliers identifies the roots in the local territory as a driver of value for customers. The third Italian provider, instead, has a more international vocation: it has no local commercial relationships and generates the 60% of its revenues abroad (10% in neighbouring countries); the 50% of its suppliers are non-domestic, and a further 40% resides in non-neighbouring Italian regions. It is interesting to notice that many suppliers expect to increase their international activities in the next future. This evidence suggests that although small in absolute terms, the suppliers can be regarded as quite complex firms given the nature of the business and the sophistication of employees' skills.

Four out the six suppliers under consideration develop customized software and solutions, and manage the customer relationship; one is carries out internally also the R&D and distribution and another is more focused on R&D. The suppliers seek to avoid competition from large companies entering into specific technological and market niches. The suppliers indicate the incorporation of scientific advances in their solutions (this is true for research-based companies in particular) and the original assembly of technologies provided by the big players on the market as the main sources of product innovation. The technologies and solutions offered are quite heterogeneous, but the provision of creation and dissemination of digital content and services through mobile devices seems to emerge as the most promising areas for the development of innovative solutions.

The providers recognize customer satisfaction as a key strategic goal; for this reason, they expect to improve marketing activities and to pursue a strategy of differentiation of products and services in order to meet customer's needs. Since the suppliers generally play in a "global niches", the international extension of commercial network is a priority. Generally, suppliers identify the participation to fairs and workshops as a viable tool to establish this kind of relationships, even if in some cases the effectiveness of these tools is questioned.

Some suppliers identify the existence of a strong digital divide as a constraint to the process of diffusion of innovations is in sectors such as tourism; thus, the provision of solutions based on up-to-date technologies does not assure commercial success: providers should offer the solution that fits customers' ability to deal with new technologies. Another mismatch between demand and supply lies on the role of digital vs. paper communication media: suppliers expect that digital media will replace the traditional ones, while, according to touristic organizations, the two will coexist.

Collaboration Intent

The companies that have strong ties with the academic environment have a track of cooperation with organizations of different kind (research institutions; science and technology parks; other companies) and have already experienced the participation to international projects. Even the non-academic-based companies have established partnerships with providers of complementary technologies and complementary products.

Diverging from the main trend of openness and interest towards cooperation, one supplier has decided to carry out the whole process of innovation internally.

All the suppliers have already established business relationships with SMEs, public administrations and governmental bodies. In addition to these customers, three companies sell their solutions directly to final customers, while another company works with large-sized companies. This fact suggests that the average supplier probably owns the capabilities to deal with any lead user.

The companies seem more interested in opportunities of commercialization of marketable solutions, rather than in entering upstream research projects.

This research put into light that opportunities of cross-border cooperation exist in the area of mobile information services.

Transport and Logistics

The sample for the market Transport and Logistics is composed of 20 organizations, 9 Austrian and 11 Italian.
The project team identified 11 organizations that - given their position in the competitive space or the complexity of information-intensive activities performed - are expected to behave as "lead users". The remaining 9 organizations can be regarded as suppliers of ICT solutions.

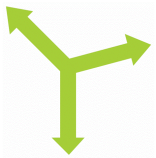
Lead User

All the organizations of the sample can be characterized as "service providers". A more fine grained analysis suggests partitioning the lead user's population into two sub-sets. The first one consists of providers of shipping services, the second one of managers of transport infrastructure.
The first subset includes three shipping, handling, and advanced logistics providers, two of them located in Italy and one in Austria, as well as two providers of handling services at the intermodal terminal in Cervignano del Friuli and Gorizia. In this subset we consider are a bus operator the Udine area and in Friuli Venezia Giulia and a bus operator for city and tourism passenger in Carinthia.
The second subset includes the managing company of motorway routes in North-Eastern Italy and in Austria, the manager of mobility and parking services in Udine and in other towns in Friuli Venezia Giulia, and an Italian manufacturer of information systems and ICT devices for urban and extra-urban areas.

Endowment and expectations regarding ICT

ICT have a central role in organizations in the transport and logistics sector, not only as a part of innovation strategies but also in all business processes.

Although the lead users present some heterogeneity in the activities performed, it is possible to recognize that all the organizations implemented digital information systems, coherently with the drivers of competitive advantage in the industry. The use of ICT is extremely intensive in the core processes of service production, that generally involve workload and capacity planning, the real-time monitoring of operations, and the processing of customers' orders. Lead users' information systems receive external data (e.g. position of a truck or bus; number of cars in a parking area; conditions of weather and roads) through sensors and transmitted with fibre of GPS technology. All these



activities are always computerized. Moreover, for organizations operating within public service concession schemes, documentation management is a priority to fulfil the auditing duties required by the control authority. One organization is required to provide traffic data to the Local Administration in order to contribute to the mobility planning process. Regulation is generally regarded as a driver of innovation of administrative processes. For those organizations, communication towards potential users is not only a marketing strategy, but also is part of the public service concession.

Delivery of information at the site (e.g. the road, at the parking area, the car, or the bus stop) is generally achieved through electronic boards connected to the organization's information systems generally through fibre. The Internet represents the most effective remote communication media for this kind of organizations. Websites have primarily an informative function, often providing interactive services relative to traffic conditions; web-based booking or payment systems, instead, are less often available.
An "informative" orientation seems to characterize also shipper's websites. While in the case of public services concessionaires this function may be correlated to the nature of the activity, in the latter case it indicates that firms underestimate the potential gains of efficacy and efficiency allowed by the use of the Internet. In one case, managers plan to use the Web in the next future to provide tracking services and digitalize paperwork in the relationship with the customer.

As for the "non-core" activities of the value-chain, almost all lead users have computerized Accounting and Finance functions and generally use internal mail, data exchange, workgroup and document management systems. In few cases, employees are provided with mobile devices to receive internal communications.

Lead user's management is aware of ICT's strategic importance. The potential of ICT is better perceived among managers of transport infrastructure than shipping companies. The impact of ICT for the organization is regarded as "high" or "very high" by 7 out 9 lead users, while for two respondents it has a moderate importance. Of the 7 lead users attributing ICT a "high" or "very high" importance, 5 ascribe innovation a moderate strategic importance - suggesting that ICT are perceived as an essential prerequisite for running a business in logistics, rather than an enabler of strategic innovation. Only one organization assign ICT a moderate importance and indicates innovation as a priority - suggesting the pursue of an innovation strategy based on non-technological drivers.

The perceived importance of ICT for the logistic business substantiates in the ability to develop this kind of solutions internally. Five out nine organizations currently develop or customize ICT, another one relies on internal and external competences and plans to improve the internal activities; two organizations currently do not develop any solution internally, while another one has rarely started projects of this kind.

The main processes the lead users expect to digitalize in the next future are:

- Operations: tracking fleets with GPS-systems in shipping companies. This investment would require the purchase of mobile devices and to interconnect the trucks with the firm's headquarters.
- Operations: tracking goods in shipping companies. This investment would require the implementation of RFID-system in all firms' premises and the purchase of optical readers and hardware and software infrastructure.

- Operations: a bus company has been implementing a system for blind people - or with severe sight diseases. The user has a device that beeps as it gets closer to a bus stop, and also informs about next stops when on board.
- Operations: a bus company has been implementing a system for providing info on timetables and variations at the bus stops.
- Planning: a transport infrastructure company is currently developing software for traffic data analysis.
- Administration: since privacy and security are a major issue, the update of firewall systems is scheduled by some companies.

The lead users show some dynamism in the development, and co-development, of ICT solutions. At least in 3 cases (out 6 respondents) the number of people with IT skills is not negligible - between 16-20 units. Those organizations are also the more open to enter in cooperation with external partners to develop new ICT solutions.

Some of the most active organizations identified a pool of long term reliable partners to co-design and develop the solutions. In other cases, they work with the partner to customize standard packages. They require the accomplishment of high quality standards to engage a partnership.

Many lead users have signed long term contracts for hardware, software and services supplies; in some cases, providers are specialized firms operating with an international scope of operations; more often, they are regional providers.

In terms of the nature of the process leading lead users to express their ICT needs a non-systematic clearly approach prevails, although it should be recognized that transport infrastructure companies and larger organizations introduced systematic process of identification of IT-needs.

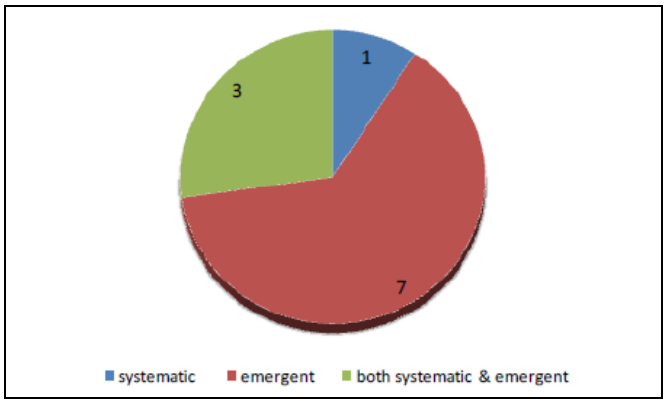


Figure 7: Nature of the needs identification process (Transport and Logistics)

In the cases of organization adopting a more systematic approach, the needs identification process is involves all the top management - e.g. the managing and the administrative director, and the IT manager; the latter has generally a proactive role offering insights about novel opportunities in the technological environment. The other organizations often rely on the contribution of employees whose ideas are discussed in meetings with the management. This approach is regarded as particularly effective by the smaller ones. In one case, the search process is generally activated in reaction to contingent events.

The inputs to the search process are given by external actors - such as customers and suppliers - by the participation to events (fairs, presentations and exhibitions). In one case, systematic interaction with customers supports the identification of ICT needs. Top managers play a key role in sponsoring the adoption and funding of innovation. The implementation of ICT solutions is often made possible by the interaction of "specialist" employees, generally IT specialists or advanced users, with external providers. The evaluation of the solutions adopted pertains to the top or functional management with the involvement of specialist employees and users. Interestingly, some of the organizations adopting a less structured approach feel the need of implementing more systematic practices in the next future.

In 4 out of 8 responding organizations, the position of IT manager exists. He/she has generally technical autonomy, but has to share any investment decisions with the general manager, and with the board of directors. In those organizations a budget for ICT is formalized suggesting some degree of financial autonomy for the IT managers. In other organizations the IT manager is deliberately entrusted of purely technical responsibilities. When an IT manager is not present, an "expert" specialist plays a leading technical role.

Collaboration Intent

All the 9 respondents would establish a partnership to develop ICT.

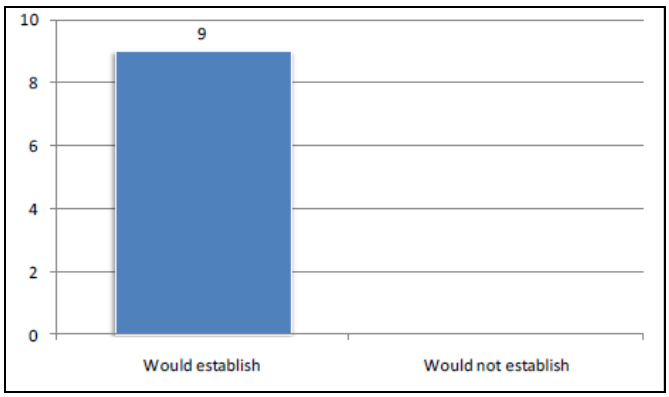
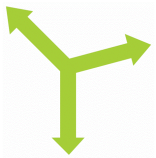


Figure 8: Distribution of Lead Users according to the willingness to establish a partnership to develop ICT (Transport and Logistics)

The lead users look with favour to international cooperation, and to ICT cooperation in particular. Cooperation is regarded as a tool to overcome the internal lack of technical capabilities and to boost innovation process. A critical issue associated to cooperation regards the concern of a misalignment of goals among partner and an associated decline of commitment as the project goes on; cultural differences may amplify these problems.

Supplier

Almost all the suppliers are small-sized companies - employing from 5 to 20 people, with a median of 10. The turnover of these companies is falls into a range of € 50,000-1.5 million. Although small in absolute terms, the dimension of the companies should be appreciated in relation to the peculiar kind of the activity. It should be emphasized that some of the providers have been established in the last few years, as high-tech start-ups incubated in technology parks. In almost all cases, the volume of activity is expected to increase slowly - despite the threats of a particularly uncertain worldwide economic outlook



- in the next future. The picture is completed by a multinational firm with more than 1000 employees, a turnover of € 200 million and presence in 23 countries.

R&D is a key activity in the business model of the large majority of the companies, together with customer service activities. Most of the firms internalize production (i.e. software and application development); one company is even more integrated along all the value chain activities. The picture is completed by one company that emphasizes the manufacturing activities and another more focused on the customer-end of the value-chain. The combination of a business model focalized on the development of IT solution and the nature of "brain-intensive" company translates into a prevalence of professional and managerial jobs, and into the enrolment of highly educated employees.

As for the geographic scope of operations, the smaller companies are generally tied to the local market. For five out six respondents, the share of revenues generated within the home-region or in neighbouring regions exceeds 80%. The sixth company has a more international profile, generating 20% of the turnover abroad. Generally, local customers are regarded as the most important. The companies expect to access in the near future to new customers in the domestic market. The companies seem less tied to local suppliers - only in one case 100% of suppliers is local, and, the most internationalized company generates 35% of its purchases abroad. It is interesting to notice that many suppliers expect to increase their international activities in the next future. This evidence suggests that although small in absolute terms, the suppliers can be regarded as quite complex firms given the nature of the business and the sophistication of employees' skills.

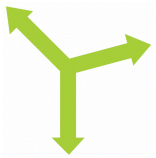
All the suppliers develop customized software and solutions, and manage the customer relationships. The solutions offered often incorporate the GPS, RFID and mobile technologies. The suppliers indicate the incorporation of scientific advances in their solutions and the original assembly of technologies provided by the big players on the market as the main sources of product innovation. As a matter of fact, all the companies carry on internal R&D. One firm is moving from hardware manufacturers characterization towards to that of providers of integrated and open solutions.

The providers recognize customer satisfaction as a key strategic goal; for this reason, they expect to improve marketing activities and to pursue a strategy of differentiation of products and services in order to meet customer's needs.

Collaboration Intent

The large majority of the sample has a track of cooperation with organizations of different kinds (university and research institutions; science and technology parks; R&D companies) and have already experienced the participation to international projects. Larger companies have established partnerships with providers of complementary technologies and complementary products that actively contribute to the co-design of innovative solutions.

All the suppliers have already established business relationships with SMEs, public administrations and governmental bodies. Eight out nine of the suppliers work with the two latter counterparts - although rarely the public sector accounts for the revenues. Interactions with the public sector are often problematic for suppliers: some of them put into light that these bodies have a narrow orientation towards innovation and that their



decision process is sometimes opaque. In the majority of the cases the interaction with the public agencies takes the form of long term relationship, less frequently it is project-based.

All the suppliers are open to engage cooperation projects, aimed by various goals. The most important goals are the access to competences not presents internally, the development of research projects, and the access to a wider customer basis. In one case, the firms' core product is developed on the basis of a licensing-in agreement. Suppliers stress the fact that cooperation is a resource-consuming activity, they engage it when it is expected to improve internal effectiveness and to deliver value to the final customers.

This research puts into light that opportunities of cross-border cooperation exist in the areas of services and devices for transport infrastructure management, in the solutions for fleet management, and in environmental and traffic data analysis services.

Renewable Energy and Sustainability

The sample for the market Renewable Energy and Sustainability is composed of 17 organizations, 10 Austrian and 7 Italian.

The project team identified 12 organizations that - given their position in the competitive space or the complexity of information-intensive activities performed - are expected to behave as "lead users". The remaining 5 organizations can be regarded as suppliers of ICT solutions.

Lead User

Deepening the analysis to the nature of the activity carried out by the lead users, it emerges that the sample is composed in prevalence of producers and distributors of energy. In particular, the sample includes two Austrian heat and energy producers and distributors, two utility companies: one operating in the field of waste management, and one provider of electricity. Moreover, two public bodies, one from Austria and one from Italy are included. The Austrian public body provides electricity, heat and natural gas, in additions to its responsibilities ad a local authority. Italian public body is responsible for environmental planning, providing forecast of the behaviour of rivers, and plans defence measures in case of flooding. The sample is completed by three Austrian and two Italian firms. For Austria, a company works in the field of energy consulting that releases energy performance certificate, the second company is a developer of heating system solutions and the third is a manufacturer of solar cells and solar systems. The two Italian firms are on the one hand providing photovoltaic solutions for private households and large buildings (including all the activities from the planning phase to installation) and on the other hand a company that is more focused on the is the installation of photovoltaic panels and accessories, e.g. software for a constant check of the use of energy.
The size of the staff of the organizations is not homogeneous, with the presence of small, medium and large organizations.

Endowment and expectations regarding ICT

The importance of ICT for their activity is regarded as very high for three organizations; in two other cases it is elevate, while one organization perceives ICT as of moderate importance for innovation and the operations.

The lead-users make an extensive use of ICT in the activities of the value-chain that support internal processes, in particular Accounting and Finance and Human Resource Management - although only a minority of organizations institutionalized the latter activity. The state of ICT use in the "main activities" is more articulated and it is strongly tided to the actual nature of activities performed by the organizations. The lowest common denominator among lead users' is the need to store, diffuse and gather information about their core processes. In some cases, the processes of demand forecast are computerized, in particular in the organizations that offer services to individual customers or users. It is interesting to notice that in many cases the procurement processes are computerized.

All the lead users run a website, that generally plays mainly an informative function, and have an intranet, that is use to manage internal mailing and internal data exchange.

The survey indicates that the lead users need custom software to perform their core processes, while standard solutions can be usefully adopted in the support activities. As a general trend, the lead users look to external providers of ICT solutions to fulfill their needs; anyway, in one case, the internal development of software is preferred. Importantly, none of the leads user finds a shortage of supply for any technology regarded as "strategic" for the organization. In part for because of the satisfaction with the existing suppliers and in part because of normative concerns, as much as three lead users would not consider purchasing hardware and software from a foreign supplier. Although not interesting in international supply agreements, those organizations would participate to more articulated international projects if they developed technologies of interest. Possibility of customization of standard software seems essential to lead users.

In terms of the nature of the process leading lead-users to express their ICT needs, below figure reveals the combination of systematic and emergent approaches prevail.

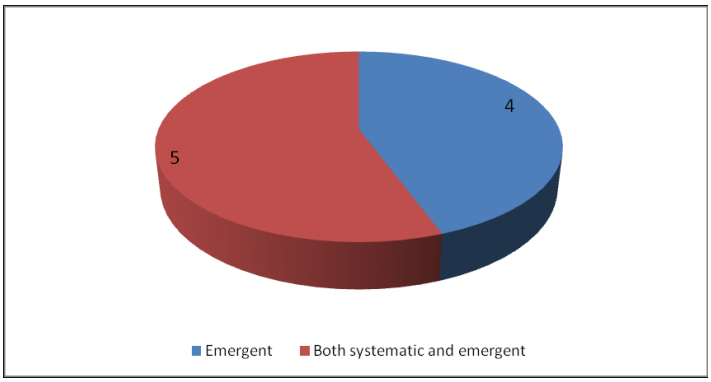


Figure 9: Nature of the needs identification process (Renewable Energy and Sustainability)

A pivotal role in the process is played by the IT-manager. All lead users have an IT-manager supported by one or two IT-specialists. This resource endowment allows lead users at effectively interacting with the suppliers, although they probably lack the competences to develop an ICT-project entirely in-house.
The inputs to the search process are given by external actors - such as customers, users, and suppliers - and sources such as presentations and exhibitions, as well as by internal processes, such as project teams. The IT-manager collects all those inputs and formalizes them into investment plans that generally are approved by the board of directors or analogous bodies for public subjects.

A budget for ICT is formalized in 2 cases (out of 4 respondents). Except for a public administration, the organizations are free to purchase ICT solutions from any provider.

Collaboration Intent

The large majority of the lead users consider collaborations as a routine for the development of ICT, in particular if it can deliver more value for users. The lead user that would not engage collaborations is bounded by the legal framework associated to its nature of public body.

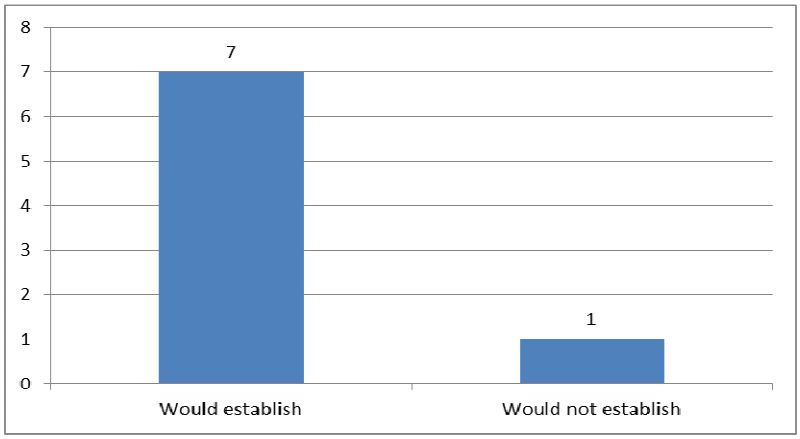


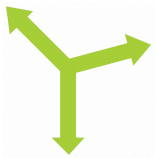
Figure 10: Distribution of Lead Users according to the willingness to establish a partnership to develop ICT (Renewable Energy and Sustainability)

The picture that emerges portrays a procurement strategy characterized by the external sourcing of ICT and a regular effort of customization of the solutions.

A matter of concern relative to ICT partnership regards the lack of experience in international projects to develop ICT tools: only two lead users have already entered an EU-wide cooperation.

Supplier

All the suppliers are small-sized companies - employing from 3 to 46 employees. The turnover of these companies falls into a range of € 10,000 - 7 million, a figure that is expected to growth sensitively in almost all cases.
As for the business model, only one company is a pure service-provider, but all the companies include provision of services among the activities in their value-chain. Besides this common feature, heterogeneity can be recognized in the business models adopted by the companies. One company operates upstream, focusing on R&D and services; two are integrated suppliers, covering R&D, production and services; a third another is integrated with a downstream orientation, combining production, retail and service; a fourth is a retailer offering also services.
As a consequence, the employment of Ph.D.'s, as well as the prevalence of professional and managerial jobs is not an exception in these "brain-intensive" companies. As for the geographic scope of operations, it should be noted that most of the companies are much tided to customers in the local market: four companies generate at least 85% of their revenues in their home-region or in a neighbouring one. One company presents a varied



portfolio of outlets, reaching the national and the EU market. Thus, it should be noted that, although small in absolute terms, the suppliers can be regarded as quite complex firms given the nature of the business and the sophistication of employees' skills.

Collaboration Intent

All the suppliers have already established business relationships with large firms, public administrations, governmental bodies, and professionals in the field of engineering. SMEs are a less important target group for the suppliers.

The suppliers generally enter long-term relationships with customers; in some cases, they entered public tenders, indicating that they developed the competencies to interact with public administrations.

The suppliers have previous experience in cooperation projects. Some companies entered more than two or three projects; other played the role of coordinator involving expertise from different sectors.

All the suppliers would take part in a cooperation for the development of ICT solutions, with the goals of entering new markets - both product and geographical, to carry out R&D projects in order to improve their competence basis and develop innovative capability.

The major concerns of suppliers towards cooperation regard the chance to enter overcrowded projects, the difficulty in setting strict and precise arrangements regarding activities, deadlines, sanctions, the problems with the circulation of information among the partners, and the necessity to coordinate research and production activities.

COMPARISON BETWEEN LEAD MARKETS

The following section focuses on the similarities and differences in terms of ICT in the investigated lead markets. At first the lead users will be compared in terms of their endowments and expectations regarding ICT, thereby showing the opportunities for the future. Second, supplier's intent concerning collaboration will be highlighted in order to present the opportunities in the suppliers sector.

Lead User

One of the major commonalities among lead users in all researched markets is the use of ICT in the "non-core" activities of the value chain, namely in Accounting and Finance. In the core processes of service production the market of Transport and Logistics stands out in terms of ICT intensity, i.e. ICT is a key factor for e.g. workload and capacity planning, real-time monitoring of operations, processing of customers' orders. Other lead markets are aware of the potential of ICT for their core processes and will in that terms mostly rely on custom software. Standard solutions are preferably adopted for the support activities. Concerning ICT proficiency our study reveals ambiguous results, i.e. ability of lead users to develop ICT solutions internally. These ambiguities doe not only apply to the different lead markets, but also within the lead markets (e.g. E-Health and Domotics).

As for the business model, all but one company in our sample provide services - either consulting or post-sell. The picture relative to the other activities of the value chain is more articulated (see below table). The suppliers are generally more specialized in the

upstream activities of R&D and production than in the distribution - to the final users or to resellers - of their software and solutions. Examining in detail the upstream activities, differences across sectors emerge: for instance, companies addressing the Tourism, Culture and Creative Industries sector are over-focused on the Production (i.e. software and application development) and under-focused on R&D than those operating in the other sectors. On the other hand, R&D is performed by almost the totality of the companies in the Transport and Logistics sector. Suppliers operating in E-Health and Domotics and Transport and Logistics sectors emerge as the most vertically integrated; interestingly, one quarter of suppliers in E-Health and Domotics operate as wholesalers, signifying the existence of more complex marketing channels.

	E-Health and Domotics	Tourism, Culture and Creative Industries	Transport and Logistics	Renewable Energy and Sustainability
R&D	63%	50%	78%	60%
Production	63%	83%	67%	60%
Wholesale	25%	0%	11%	0%
Retail	25%	17%	22%	20%
Service	100%	100%	89%	100%

Table 1: Share of companies entering each activity of the value chain in the four sectors

Regarding the state of ICT in terms of use of the website, results slightly differ depending on the actual nature of activities performed by the organizations. The sector of E-Health and Domotics as well as Renewable Energy and Sustainability use it primarily as an information channel. Likewise in the market of Transport and Logistics the website has primarily an informative function (e.g. information about traffic conditions). For the sector of Tourism, Culture and Creative Industries on the other hand the website has a paramount communication and promotion function. All lead users are familiar with ICT in terms of intranet, mainly using it for internal mailing and data exchange.

Looking at the perception of the strategic importance of ICT (following figure) another partitioning of the Lead-Users emerges. In Transport and Logistics (transport infrastructure organization in particular) and Renewable Energy and Sustainability the awareness of the importance of ICT is widespread among the lead users; despite of the information-intensive nature of the activities performed, E-Health and Domotics and Tourism, Culture and Creative Industries do not seem to credit ICT with a strategic importance - interestingly, the former sector presents a much higher variance than the latter. Such a perception could seriously dampen the possibility to enter cooperation projects or business transactions.

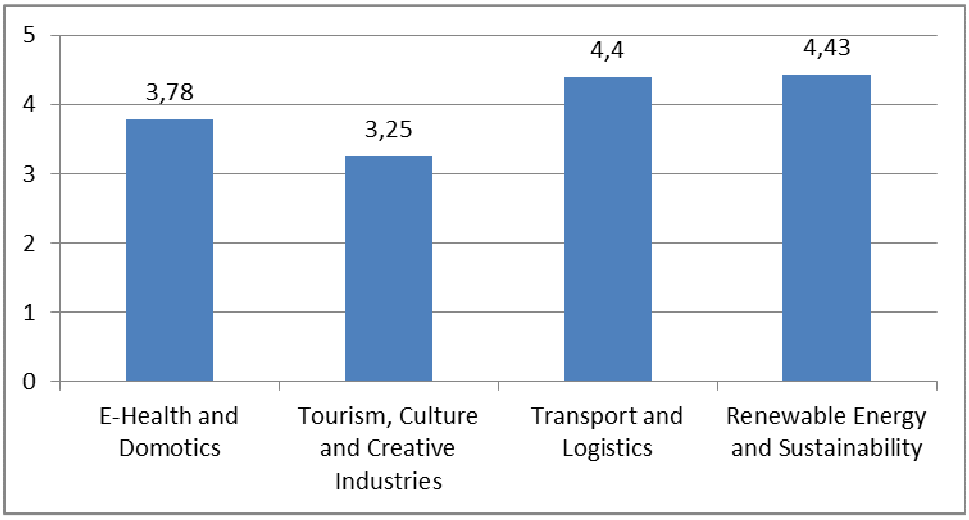


Figure 11: Average relevance of ICT for the Lead-Users (34 respondents)

To some extent, the importance of ICT is reflected within the role of IT manager. Several institutions are already aware of the crucial role of the IT manager. In the lead market E-Health and Domotics 5 (out of 9) have a position dedicated to the IT manager; within Tourism, Culture and Creative Industries 5 (out of 8); within Transport and Logistics 4 (out of 8) and within Renewable Energy and Sustainability 9 (out of 9). The IT manager has generally technical autonomy, yet the investment decision is made by or jointly with the general manager (board of directors/shareholders representatives).

The identification of the needs relative to ICT is an emergent and unplanned process for the large majority of the lead users in all the sectors as shown in the below figure.

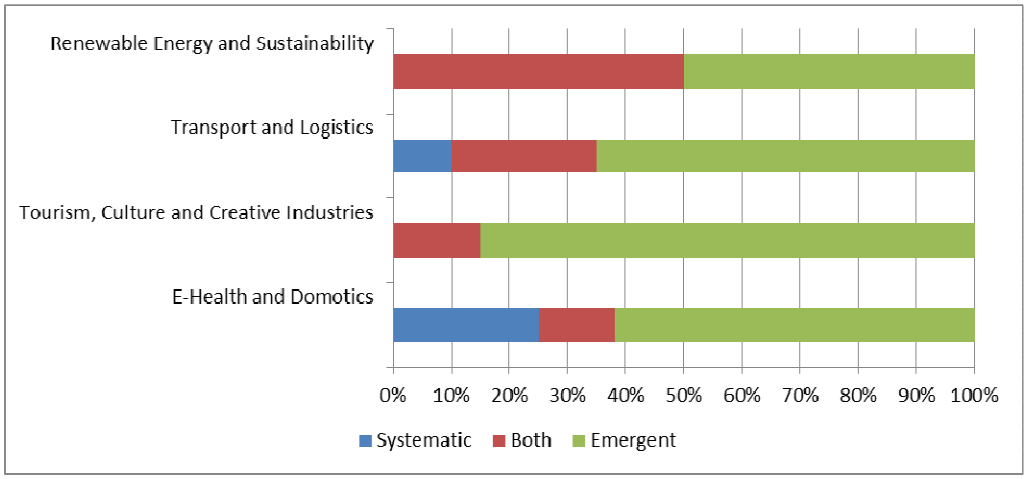


Figure 12: Nature of the needs identification process in the four sectors

Interestingly, some lead-users in Transport and Logistics and E-Health and Domotics adopt instead a systematic and formalized approach to the identification of the needs, providing an indication of attention towards the topics related to ICT. Combining this evidence with the results on the perceived importance of ICT for the competitive advantage of the organization presented in the previous section, one could conjecture that lead users in E-Health and Domotics consider ICT more as an issue rather than a

driver of strategic performance. It is important to notice that a considerable share of lead-users, in particular in the Renewable Energy and Sustainability sector, formalize some procedures for the identification of needs but they become defined as a consequence of the emergence of contingent events. Importantly, some lead-users adopting a less structured approach feel the need of implementing more systematic practices in the next future. In all sectors, the process is generally activated by the top management that searches novel opportunities in the environment and then shares and discusses the insights with lower level functional managers.

Supplier

In terms of suppliers we focus on their experiences and ambitions to take part in collaborative (international) projects. Within the sector of E-Health and Domotics the suppliers have a rather limited experience in taking part to international projects. Within the field of Tourism, Culture and Creative Industries it could be identified, that companies that have strong ties with the academic environment have already a track of cooperation with organizations of different kind (research institutions; science and technology parks; other companies) and they have also already experienced the participation in international projects. Equally could be identified for the sector of Transport and for the sector of Logistics and Renewable Energy and Sustainability. The latter shows that some companies entered more than two or three projects; other played the role of coordinator involving expertise from different sectors.

The suppliers in the following two lead markets: E-Health and Domotics and Tourism, Culture and Creative Industries seem more interested in opportunities of commercialization of marketable solutions, rather than in entering upstream research projects. Companies coming from the field of Transport and Logistics are interested in cooperation projects that would cover not yet internally presented competences. Further, they foster cooperation intent when it is expected to improve internal effectiveness and to deliver value to the final customers. Similar results where shown in the sector of Renewable Energy and Sustainability. All the suppliers would take part in a cooperation for the development of ICT solutions, with the goals of entering new markets (i.e. product and geographical) to carry out R&D projects in order to improve their competence basis and develop innovative capability.

Several difficulties in establishing cross-border partnerships where pointed out by the suppliers across all lead markets. Among the most relevant are: identification of a reliable partner, necessity of adaptation of the products/services according to the specific foreign needs/regulations, language difficulties (e.g. translation of the support documentation and the provision of training to foreign users), project management (e.g. setting strict and precise arrangements regarding activities/deadlines/sanctions, circulation of information among the partners, coordination of research and production activities).

Many suppliers have been established in the last few years, as academic spin-off companies or high-tech start-ups incubated in technology parks. Those new companies operate in particular in the Tourism, Culture and Creative Industries and Transport and Logistics segments. For what concerns the outlook, in almost all cases, the volume of activity is expected to increase, although slowly, in the next future.

CONCLUSIONS

The analysis of the demand and supply sides of the market for ICT applied to all four lead markets in Friuli Venezia Giulia and Carinthia puts into light that the activities performed by the lead users are information intensive and require ICT both in the "core" and in "support" processes. Nevertheless, organizations in the sector of a) E-Health and Domotics as well as b) Tourism, Culture and Creative Industries often underestimate the impact and the opportunities offered by ICT, because of a limited commitment of the top management towards the adoption of new technologies, an unclear organizational role of the IT manager and also of an inadequate presence of IT specialists.

Distinctive aspects are related to the respective lead market. Below, key issues of lead users per lead market are listed:

- E-Health and Domotics: Production, storage, access and diffusion of information produced along the core processes.
- Tourism, Culture and Creative Industries: Creation of an unique experience also through the use of a complete set of communication devices, the collection and analysis of customer data and the management of customers bookings. Despite the differences in organization and offer, touristic and cultural organizations share similar needs in the ICT area.
- Transport and Logistics: The acquisition, process, analysis, and delivery of information to multiple users - customers, users of services, the management, public authorities. These organizations are often conscious of the impact and the opportunities offered by ICT, and, when adequate financial resources are available - as in the case of transport infrastructure companies with positive and stable cash flows - are willing to invest in innovation. Generally, larger lead users are endowed with dedicated units of IT specialists.
- Renewable Energy and Sustainability: Production, storage, access and diffusion of information produced along the core processes.

In terms of the supply side, we can conclude that different lead markets share the promising areas, namely specialisation of IT providers regarding mobile and mobility solutions. The sector of E-Health and Domotics shows also future potential in the field of data management consulting.

It can be further concluded that cross border cooperation could be facilitated by the fact that suppliers have developed experience in the interaction with large firms and public bodies, as well as by the strategic orientation towards internationalization, whereby the existence of clear and shared goals is a prerequisite for effective cooperation. The constraints to collaborations are on both sides: sometimes, lead users seem to lack the absorptive capacity to adopt innovative solutions successfully. Suppliers, despite a strong position in the national market and to some experiences of international commercial transactions, sometimes seem to lack of the full range of competences to engage an international cooperation. An issue common to both the demand and supply side is the necessity to establish a trustworthy relationship.