

Collaborative Project

ASPIRE

Advanced Sensors and lightweight Programmable
middleware for Innovative Rfid Enterprise applications

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Contract: 215417
Deliverable report – WP2 / D2.2

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Content

Section 1 - Executive summary	7
Section 2 - Acronyms.....	8
Section 3 - Introduction	9
Section 4 - Methodology to collect SMEs' needs.....	10
4.1 - General Survey.....	10
4.2 – RFID Information days	10
4.2.1 - Greece.....	11
4.2.2 - United Kingdom.....	13
4.2.3 - France	13
4.2.4 - Portugal.....	14
4.2.5 - Denmark.....	14
Section 5 – General Survey Analysis	16
5.1 - Profile of polled companies	16
5.2 - IT Infrastructure.....	17
5.3 - Traceability needs.....	18
5.3.1 - Manufacturing processes	18
5.3.2 - Asset management	19
5.3.3 - Stock management	19
5.3.4 - Logistics	20
5.3.5 - Maintenance / warranty	20
5.3.6 - Recycling / Dismantling.....	21
5.3.7 - Counterfeiting.....	22
5.3.8 - Evaluation of traceability tools, methods and solutions.....	22
5.4 - Conclusions on Needs Collected and General Survey Analysis.....	23
Section 6 - RFID Usecase : Logistics Sector	24
6.1 - Logistics sector overview	24
6.1.1 - Definition	24
6.1.2 - Logistics sector organization	24
6.1.3 - Logistics sector participants	24
6.1.4 - French participants.....	25
6.2 - Specificities of the logistics sector	25
6.2.1 - Lead-time	25
6.2.2 - Reliability	25
6.2.3 - Availability	26
6.2.4 - Quality and conformity.....	26
6.3 - Logistics sector evolution.....	26
6.3.1 - Evolution of the production organization	26
6.3.2 - Data flow evolution	27
6.4 - Traceability through the supply chain	27
6.4.1 - Internal traceability	28
6.4.2 - External Traceability.....	29

6.4.3 - Description of a traceable object	29
6.4.4 - Which kind of information must be tracked	29
6.4.5 - Safety of the data	29
6.5 - Operational examples which can involve RFID technology.....	30
6.5.1 - Follow-up of the temperature	30
6.5.2 - Damage during the transport.....	30
6.5.3 - Storage in bad condition.....	30
6.5.4 - Geo-localization.....	30
6.5.5 - Best before date	30
6.5.6 - Timestamp.....	30
6.5.7 - Routing of a parcel	30
6.5.8 - Check of the contents of a load during an itinerant control	30
Section 7 - Conclusions and synthesis on the collected requirements	31
Section 8 - Induced software requirements from the qualitative end user requirements collection.....	33
8.1 - Introduction to software requirements specifications	33
8.2 - Overall Description	33
8.3 - External Interface Requirements	34
8.3.1 - ASPIRE Middleware User Interfaces	34
8.3.1.1 - [R01] : Easy Business Process Description	34
8.3.1.2 - [R02] : Easy Business Process and Event Generation	34
8.3.1.3 - [R03] : Project Management Tools.....	34
8.3.2 - ASPIRE Middleware Hardware Interfaces	34
8.3.2.1 - [R04] : Drive Hardware Components	34
8.3.2.2 - [R05] : Easy integration of heterogenous hardware components	34
8.3.2.3 - [R06] : Hardware Management Tools	35
8.3.2.4 - [R07] : Extra data association	35
8.3.3 - ASPIRE Middleware Software and Communication Interfaces.....	35
8.3.3.1 - [R08] : Standardized Business Types	35
8.3.3.2 - [R09] : Standardized Reader Message Protocol	35
8.4 - ASPIRE Middleware Features (Functions).....	35
8.4.1 - System Feature (Function) 1 : Low Cost Reader	35
8.4.1.1 - [R10] : Low Cost Reader	35
8.4.1.2 - Low Cost Reader Functional Requirement	35
8.5 - Other Nonfunctional Requirements.....	35
8.5.1 - Performance Requirements	35
8.5.1.1 - [R11] : Royalty Free	35
8.5.1.2 - [R12] : Supported by Lightweight Architectures	36
8.5.1.3 - [R13] : Modular Architecture.....	36
8.5.2 Security and Privacy Requirements	36
8.5.2.2 - [R14] : Ensure Privacy.....	36
Section 9 - Conclusions : Synthesis Tabular Overview of Software Requirements and liaisons with ASPIRE Specifications	37
Appendix A	42
A.1 Online Survey	42
A.2 Greek Infoday's flyer	46

A.3	Portuguese infoday's flyer.....	47
A.4	English infodays' flyer	48
A.5	Danish infoday's flyer	49
A.6	French infodays' flyer	51
A.7	Overview of SMEs and RFID deployments in Portugal.....	52

Section 1 - Executive summary

European networked enterprises in general and SMEs (small and medium enterprises) in particular are still reluctant to adopt RFID (Radio frequency Identification) since they perceive RFID as unprofitable or too risky. This is largely due to the fact that the adoption of RFID technology still incurs in a significant Total Cost of Ownership (TCO). ASPIRE project aims at significantly lowering SME entry costs for RFID technology through developing and providing a lightweight, royalty-free, innovative, programmable, and privacy friendly middleware platform that will facilitate low-cost development and deployment of innovative RFID solutions. This platform will act as a main vehicle for realizing the proposed swift in the current RFID deployment paradigm.

The use of RFID technology is driven by business and/or user needs. However, in RFID perhaps more than in other technologies, those needs have a considerable impact on the selected architectures, hardware modules and standards to be targeted. Hence, the accurate knowledge of these needs and requirements is fundamental for the development of a technological solution which will exactly fit such requirements thus maximizing as much as possible the revenues for the end users.

Therefore, the main objective of this deliverable is to present a detailed analysis of the SMEs/user/business requirements collected by the partners of the ASPIRE project by means of an online general survey and by the different RFID information Days that took place across the different countries of the consortium (i.e. Denmark, Greece, United Kingdom, Portugal, Belgium and France.). The RFID info days have helped the partners of the consortium have a better idea of their current local market status on RFID, the level of awareness of SMEs about RFID technology, particular needs that can be addressed by the implementation of RFID technology, and the way in which current business processes are achieved. In this deliverable, each partner of the consortium presents the outcomes of their organized RFID Info Days, which provides a rich variety of perspectives that arise from the heterogeneous set of the countries of the consortium but which are also consolidated in this document together with the results of the online-survey towards a single perspective that will constitute the input for further developments in ASPIRE.

These further developments can be mainly identified as the design and implementation of the envisioned middleware platform and some innovative added value hardware components such as low cost readers and active tags with sensing capabilities. The objective is that these final products will fit the identified SMEs needs regarding the RFID technology.

This deliverable also presents a software requirements that will be used directly to define the modules and architecture of the ASPIRE middleware platform. The requirements specified in this deliverable will also be used in future documents of the project that will deal with the details of software implementation, programmability features and with the planning of pilot trials for the platform. Therefore, this deliverable constitutes a crucial document in the project that will serve as the basis, together with other documents of the project regarding the study of state-of-the art software tools related to RFID solutions such as D2.1, for the future of the ASPIRE middleware platform and its success in bringing tailored RFID solutions to small and medium enterprises.

Section 2 - Acronyms

AIT	Athens Information Technology
ASPIRE	Advanced Sensors and lightweight Programmable middleware for Innovative Rfid Enterprise applications
BEG	Business Event Generator
EPC	Electronic Product Code
IT	Information technology
IT	Instituto de Telecomunicações
KPI	Key Performance Indicator
OSI	Open Source Innovation
OSI	Open System Interconnection
PDA	Personal Digital Assistant
PV	Pole traceability Valence
RFID	Radio Frequency Identification
ROI	Return of Investment
SME	Small and Medium Enterprise
TCO	Total Cost of Ownership
UEAPME	European association of craft, small and medium-sized enterprises
UJF	University Joseph Fourier

Section 3 - Introduction

Despite the simplicity of its operation, Radio Frequency Identification (RFID) is perhaps the technology that will have the most important implications in our everyday lives [1]. Although RFID was proposed as early as in the 1960s, it was not until recent years that the drop in the costs related to its implementation has paved the way to several new and potential applications [2]. The main feature of this technology is that it allows bridging the gap between the virtual world of computer networks, composed of software operations and events abstractions and our real world, composed of objects placed in several locations with different physical and environmental parameters [3]. Having access to such real world parameters had been, until now, an unrealized dream of application developers. However, if deployment costs associated with RFID are considerably reduced and the privacy issues related to its operation are somehow alleviated, then within a few years we will be experiencing a significant change in the way we interact with products, objects and probably with other persons [4].

Briefly speaking, RFID is a technology that consists of automatic or semiautomatic, contactless and non-line-of-sight retrieval of information from small tags attached to different places, objects or persons [5][6]. Such information mainly consists of identity strings and optionally of measurements such as temperature, position, etc. The advantages given by these operations will be reflected in the automation of several production processes, better and improved supply and cold chain management techniques, automated toll payments, passport identification systems, tracking of objects, among many others [7].

Although there has been a generalized enthusiasm in the research communities as regards RFID deployments, a large number of involved stakeholders, particularly SMEs, are still reluctant to adopt this technology [8]. There are three main reasons for this behaviour: first the costs associated with deploying a complete RFID solution are still relatively high; second, most of the SMEs are still uninformed and hence doubt about the benefits of RFID; and finally privacy issues associated with RFID remain as an open problem today [9][10].

ASPIRE (Advanced Sensors and lightweight Programmable middleware for Innovative Rfid Enterprise applications) is a European FP7 (Frame Project 7) project that has been created with the objective to change the aforementioned RFID deployment paradigm through an innovative, lightweight, royalty free, privacy friendly, open source middleware architecture that will greatly reduce the total cost of ownership associated with RFID, particularly for SMEs [8]. Among the several tasks required for the success of the ASPIRE project, each partner needs to provide, through surveys made to SMEs and other market research techniques, a status of the SMEs in their respective countries and the characteristics of their IT infrastructure. This will provide a better picture of what kind of RFID middleware the project should address.

The deliverable is organized as follows: Section 2 describes the methodology used to reach as many users as possible, explaining how companies have been contacted and how requirements/needs have been gathered. The requirements were also collected using an on-line survey. The results of this survey are analyzed in section 3 of the deliverable.

Finally, section 4 discusses a scenario concerning particularly the logistic sector. A thorough description of end-user requirements with respect to the logistics sector is presented, based on the interviews organized by Pôle Traçabilité. This is one of the major fields for the ASPIRE trials.

Section 4 - Methodology to collect SMEs' needs

4.1 - General Survey

In order to gather requirements/needs from SMEs, a general survey has been constructed.

Main topics of the survey were related to:

- 1 – Description of the company: size, field of activities,
- 2 – IT infrastructure of the company
- 3 – Awareness regarding RFID technology
- 4 - Traceability needs
- 5 – Assessment of counterfeiting risks

This survey has been published under the aspire website, <http://www.fp7-aspire.eu>, in English, Greek, Spanish, Portuguese and French.

In every communication related to the ASPIRE project, the internet link to the online survey has been provided. Attendants to the RFID Information days organized under the ASPIRE project have been encouraged to fill in the survey online and have also, in certain cases, been given a hard copy of the survey. The complete survey is presented in the appendix of this document.

Fully in line with the ASPIRE “Description of Work” a list of over 50 companies featuring different sizes, business activities (i.e. sectors) and countries were directly contacted by consortium members and participated in the survey. Results of the survey will be discussed in section 3.

4.2 – RFID Information days

RFID information days have been organized in consortium countries, Denmark, Greece, United Kingdom, Portugal, Belgium and France, giving input to the survey.

The RFID Information Days were in general planned as specialized events targeting SMEs, which engage in business activities that could benefit from RFID deployments. RFID Information Days typically comprised:

- Presentations of business benefits of the RFID technology for different sectors (by experts both within and outside the ASPIRE consortium).
- Presentations on the ASPIRE project and its targets (by ASPIRE consortium members).
- Demonstrations of RFID applications.

The main objectives of these information days were the following:

- 1 - Raising awareness regarding traceability and RFID technology
- 2 - Presentation of the ASPIRE project
- 3 - Collection of needs during working group sessions
- 4 - Taking early contacts for potential future ASPIRE pilots.

The UEAPME network has been used to widely contact European SMEs. The process involved approaching SMEs by their representatives in national organisation. Additional companies were also approached based on other ASPIRE partners national networks (e.g., OSI's networks in UK, SENSAP's network in Greece, Pôle Traçabilité's networks in France and Aalborg University's in Denmark). Each partner has also used its own network, communicating via internet websites, asking help from local relays, diffusing information via

Contract: 215417
Deliverable report – WP2 / D2.3

numerous mailing lists and newsletters. Presentations and invitations to the RFID information days have also been performed in several conferences and workshops.

At the end of each information day companies and specially SMEs were asked:

- To complete the ASPIRE survey.
- To declare interest about participating in the ASPIRE trials.

Details on the information days organized in each individual country follow.

4.2.1 - Greece

The two Greek partners, AIT and Sensap, organized the RFID information day in Greece, which was held at the Corallia Cluster Initiative premises, Athens. This information day was specifically focused on but not limited to the application of the RFID technology in the fields of foods and beverages, footwear and apparel, pharmaceuticals and counterfeiting. The participants' selection process was carefully performed so that the presentations would be best targeted to the audience. The final list of participants included entrepreneurs from a variety of marketplaces and also from the public sector. This list numbered 150 individuals.

Field experts and researchers informed the participants about the significant advantages that the emerging RFID technology can provide in their companies' procedures and to their companies as a whole. These experts were also able to provide the audience with real case studies experience in the area of clothing, pharmaceuticals, food and logistics. Significant impact was caused by the speech of a Quality Manager employed by the Greek branch of a multinational company active in the food industry, who analyzed in much detail the applications of the RFID technology in this field and more specifically in traceability procedures within the food supply chain. Other presentations with similar impact were the ones of a representative of the Greek branch of GS1 who talked about the standardization process of the RFID technology and of a Greek University professor that presented a series of state-of-the-art consumer application scenarios.

Apart from these presentations that we have pointed out, the participants were able to watch the following presentations:

- A traceability solution for fresh meat using RFID technology,
- An overview regarding automatic identification technologies in general with a comparison between the traditional technologies and the RFID technology,
- A case study of a traceability application of the RFID technology in Cold Supply Chain,
- A case study of an RFID based application in the apparel domain
- A presentation describing the impact of RFID technology in document management in the public sector, and finally
- A presentation regarding the ASPIRE project

The participants also had access to a show room, where they could have hands-on experience on demos of real world applications that use the RFID technology. Some of the demos were specifically customized to interact with the RF identification card that each participant carried. The show room had the following demos:

- An application that monitored the amount of people that was in the show room and in the presentations room,
- An application that announced a person's name and company if he/she passed through an identification gate,

Contract: 215417
Deliverable report – WP2 / D2.3

- An application that demonstrated how tagged items within a carton box could be identified and counted automatically in a few seconds,
- An application that is designed for museums, and provides information for tagged exhibits through a PDA that the museum's visitors are provided with,
- An application that provides tagged stock visibility on a map by collection information through special RFID enabled observation points.

Note that the above demonstrations were based on software and middleware developed by ASPIRE partners SENSAP, AIT and UJF. Some of these demonstrations relied on the middleware that will be used to assemble the first version of the Aspire middleware in the scope of WP3. Hence, SMEs could also get a flavour of a preliminary version of the ASPIRE middleware and tools, even though these were in their infancy.

Finally, the participants were given the opportunity to get actively involved in the ASPIRE project through questionnaires and short interviews. A small selection of companies was also asked to declare interest for potential pilot deployments.

Conclusions, which arose during the Greek RFID information days, can be summarized in the following statements:

- In general companies are concerned with innovations that could help them improve their business results. Several companies are still investigating whether RFID can improve the way they do business in a profitable way. There is still need for promoting awareness within SMEs, since most of them know very few things about its operation and potential value.
- Greek companies that are involved in the Foods and Beverages sector (including several SMEs), need to get quickly familiar with the use of the RFID technology in order to catch up with the European directives demanding traceability mechanisms to be deployed. Also, recent incidents in the Greek food sector (e.g., a sunflower oil contamination scandal last Spring) have manifested the need to deploy traceability in the food chain. Another positive aspect for RFID technology is that it is common sense that RFID is the most promising technology towards the achievement of this goal.
- Companies (including SMEs) in the sector of apparel can significantly improve certain operations and processes with the use of the RFID technology and the interest of these companies is likewise significant. This was manifested in the scope of real-life case studies during the Greek RFID Information Days, which have already demonstrated tangible ROI (Return-on-Investment).
- Several companies rely on bar-code systems and see opportunities for using the bar-code in conjunction with RFID. Hence, bar-code support must be provided by the ASPIRE middleware.
- The Greek public sector is in the process of digitalizing all its documents. One possible method to do this is to track hard copies of the original documents through the use of RFID tags.
- Consumers can also greatly benefit by the introduction of RFID technology into their day-to-day transactions, e.g. in the supermarkets. EU funded research projects are exploring the extent to which RFID technology can make everyday life easier. Companies agreed that consumer benefits and services could also reflect positively on their turnover.

The following topics attracted the attention of the companies:

- RFID in the Apparel Sector.
- RFID in the Food and beverage chain.
- Presentations from realistic case studies and trials including EU projects' presentations.

Contract: 215417
Deliverable report – WP2 / D2.3

- ASPIRE RFID demonstrations performed within the specially configured demonstration rooms.

4.2.2 - United Kingdom

With the support of the British government, particularly its Electronic Knowledge Transfer Network (EKTN), and of leading RFID organizations such as the British RFID Centre in Bracknell and the Auto ID Centre (AIDC) in Halifax; Open Source Innovation organized and coordinated events to bring RFID and specifically ASPIRE to British SMEs. The events took the shape of presentations where renowned speakers from the EPCglobal, British government, Privacy Commissioner and leading RFID vendors explained RFID. Open Source Innovation also explained ASPIRE and invited SMEs to participate.

Focusing on horizontal, generic solutions was confusing for most of the attendants. When it comes to selling the technology, it should have been better to focus on specific applications and use their own language.

Similarly, industry is still not convinced about the business advantages of using RFID, particularly about the business case associated with specific applications.

Standardization is also a strong issue, which many potential adopters waiting for a leading standard to emerge. First movers are only those where externalities are low (closed-loop applications). This is not the case of most small SMEs, which may explain the low attendance to ASPIRE's RFID information day.

4.2.3 - France

The Traceability Centre organized two information days in Valence. These days started with a traceability presentation, underlining the three stakes of a traceability approach: competitiveness, risks management and innovation. Examples for each of these stakes have been given. The methodology to construct an efficient traceability solution has been introduced, traceability's functions such as identification, authentication, locating, etc, have been reminded. Numerous technologies currently used in traceability solutions have been presented, from barcode technology to authentication technologies.

Architecture, in terms of traceability solution, has also been reminded (capture technologies, middleware, high level application). Attendants have also been informed about the ongoing problem of counterfeiting.

Then, a complete presentation of the RFID technology was made by one of the experts of the Traceability Centre. This has been both a technical and use cases presentation, providing information regarding components of a RFID solution : tags, frequencies, readers, middleware, etc. but also lots of concrete examples in several fields such as logistics, food, health, manufacturing, steel, etc.

A visit of the demonstration room of the Traceability Centre has then been performed. This has been a great opportunity for all the attendants to concretely see running demonstrations involving RFID technology. Demonstrations shown in the centre are the following:

- RFID tagged pallet and RFID tagged cardboard passing through an RFID gate.

Contract: 215417
Deliverable report – WP2 / D2.3

- Item level tagging : a cardboard full of RFID tagged items passing through an RFID tunnel
- RFID equipped shop (textile) to improve stock management and visibility.
- Picking operations using a WIFI RFID mobile device
- RFID document management.

The afternoon has been dedicated to ASPIRE project presentation and to open discussions concerning needs of companies in terms of traceability and RFID technology. Some of the companies have expressed interest in testing the ASPIRE solution but no formal decision has been taken.

Conclusions of French information days can be summarized in the following statements:

- A combination of traceability technologies such as RFID, barcodes, datamatrix codes, is necessary in a lot of domains (health, logistics, etc.)
- Concerns about confidentiality of data that could be embedded into the memory of a RFID tag have been expressed.
- There is a lack of packaged traceability solutions, especially for small SMEs.
- A lot of SMEs, consider RFID as a new technology, not yet reliable.

4.2.4 - Portugal

The RFID Info Day in Portugal took place on Friday September 5th 2008 with the attendance of 6 local SMEs: two from the pharmaceutical sector and four retailers. In general, SMEs have little understanding of the RFID technology, and, except for one of the retailers, they showed little interest in the possible benefits it could bring to their organizations in the near future. The SME participants possess, in general, a poor IT infrastructure which often is limited to one or two old PCs, or as for the two medium retailers to a database with a basic description of their products. Also, the majority of the SMEs do not have a clear idea of how to improve their business processes, which implies that the potential implementation of RFID systems may face administrative problems as a key factor in obtaining benefits from RFID systems is by optimizing the internal business processes. On the bright side, the four retailers showed an open position to the potential implementation of new technologies to improve their business processes, although not necessarily related to RFID. Finally, some SMEs had some interest on how the information carried by tags can be protected from possible intrusive attacks. Additional information concerning Portuguese SMEs and the RFID market has been provided by the Portuguese National Institute of SMEs. This information is presented at the end of this document as an appendix.

4.2.5 - Denmark

AAU discussed with two organizations in Denmark who can bring ASPIRE efforts and work closer to the SMEs in Denmark, Danish Technological Institute (DTI) in Copenhagen and Center for Software Innovation (CSI) in Sonderborg. As a result the first information day was organized in May 2008 and a briefing was planned for October 2008.

The first information day in Denmark was organized by AAU together with CSI. It was held in the premises of CSI in Sonderborg. The information day focused on Security, Privacy and Legal issues for Personal networks (PN) including RFID. These topics were results of prior input from the SMEs and companies joining the information day. The applications and scenarios discussed during the workshop were healthcare sector, food and smart living. It was a very interactive afternoon.

Contract: 215417
Deliverable report – WP2 / D2.3

The participants' process was carefully performed as the scenarios were already identified early in the discussion with CSI. The total participants were 10. RFID networking issues, Internet of things (IoT), PN Architecture – IoT enabling technologies, Security and Privacy issues and Models were presented together with the legal issues. These were identified by the participants as the key issues they were interested in. The ASPIRE project was presented too with updates on what is going around the world in this field.

4.2.6 – Belgium

The UEAPME Organization gave the opportunity for a one hour speech to present the RFID technology and the ASPIRE project during one of their meetings with SME representatives.

The meeting focused on food industry and the audience was mainly composed of representatives of very small SMEs (1-5 persons).

On the whole they have a very poor understanding of the RFID technology and they didn't see how to implement it into their current processes.

Most of them pointed out that even the barcode technology is only used by few companies and this implementation takes time.

Examples of RFID applications like slaughterhouse hook identification, butcher knives identification or even plastic boxes identification have been considered reserved for bigger SMEs (more that 30/50 people) and not the SMEs present at this meeting.

Section 5 – General Survey Analysis

5.1 - Profile of polled companies

A total of fifty one companies contributed to the survey. Figure 1 shows the repartition by country of the polled companies. Respondents mainly come from Greece and France. Sizes of polled companies are various and well balanced. Nearly 60% are effectively SMEs. Fields of activity are in different sectors, e.g. health industry, housing, food, logistics, etc.

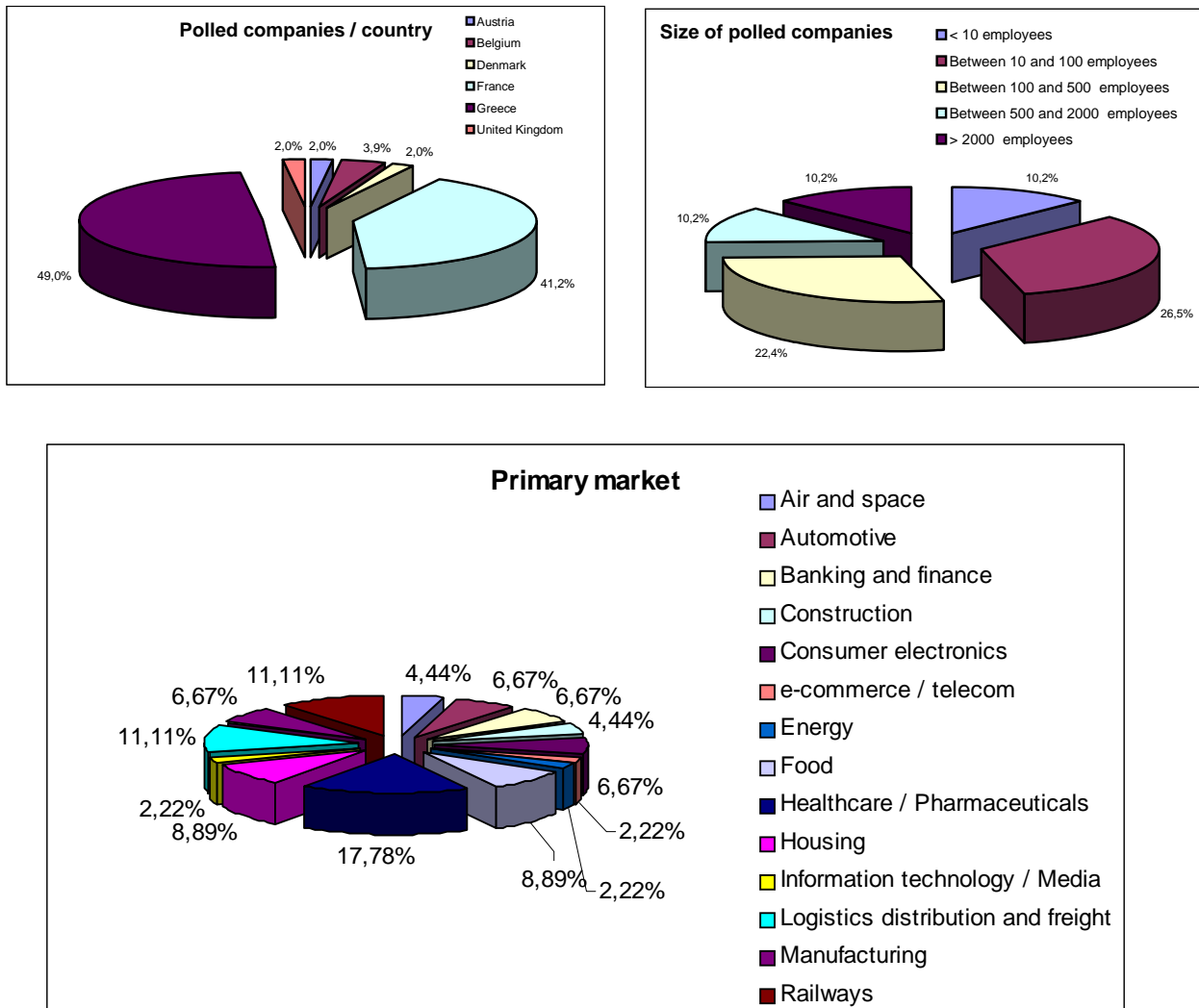


Figure 1: Repartition by country of the polled companies

5.2 - IT Infrastructure

Four questions in the survey were related to IT infrastructure. It remains difficult to provide conclusions since responses are quite balanced. It appears nevertheless that most of IT infrastructures are managed internally. Moreover, one out of four companies has already done IT infrastructure investment over the last year and more than fifty percents plan to invest within two years.

Figure 2 illustrates the answers provided by polled companies.

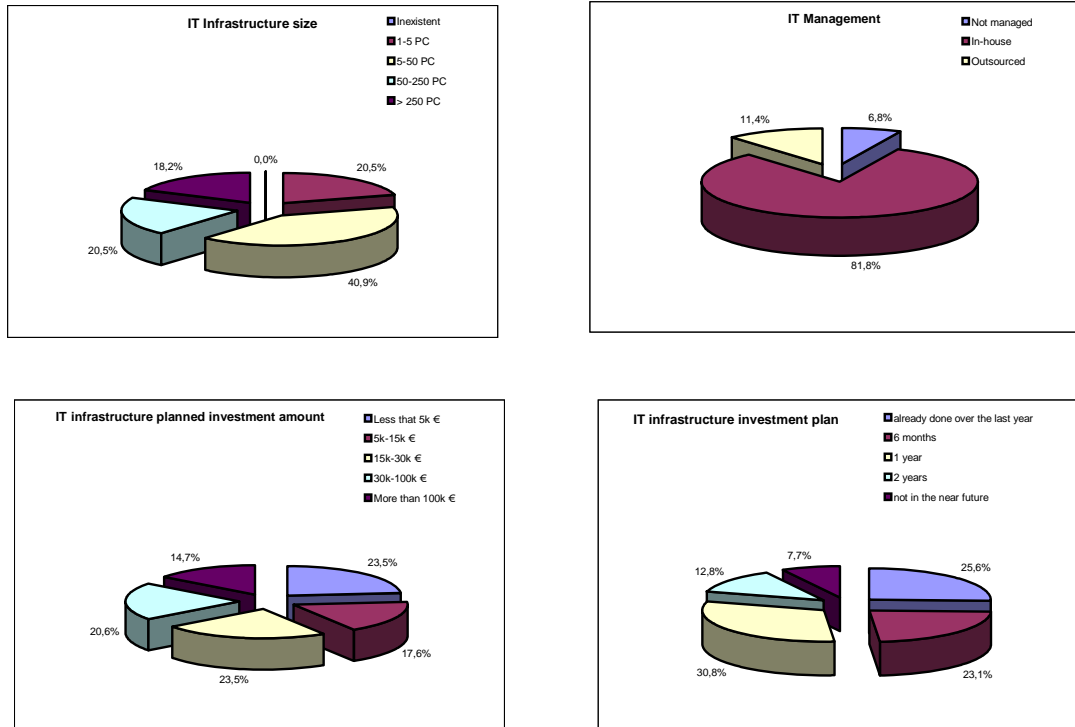


Figure 2: Answers provided by polled companies

5.3 - Traceability needs

In order to have a better understanding of the needs of SMEs in terms of traceability, the questions have been divided into eight parts:

- Manufacturing processes
- Asset management
- Stock management
- Logistics
- Maintenance / warranty
- Recycling / Dismantling
- Counterfeiting
- Evaluation of traceability solution

5.3.1 - Manufacturing processes

Concerning manufacturing processes, it appears that functions such as product or batch identification, quality controls, tracking and automation of manufacturing processes and raw material identification are very important according to the polled companies. Companies interviewed during the RFID information days also underlined the fact that most of the time, they are compelled to use a lot of heterogeneous traceability markers, such as barcodes, datamatrix codes, RFID tags, and that it seems really difficult to imagine the use of only one marker, RFID for instance.

Figure 3 shows answers provided by polled companies

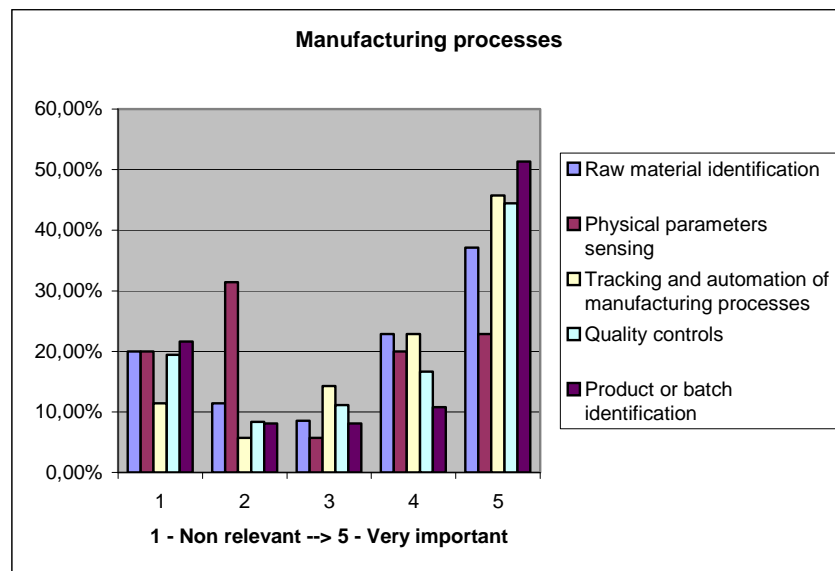


Figure 3: Answers by the polled companies

5.3.2 - Asset management

Answers to the asset management question, clearly show a need for turnover tracking and control, locating. Physical parameter sensing also appears to be quite a important function (see Figure 4).

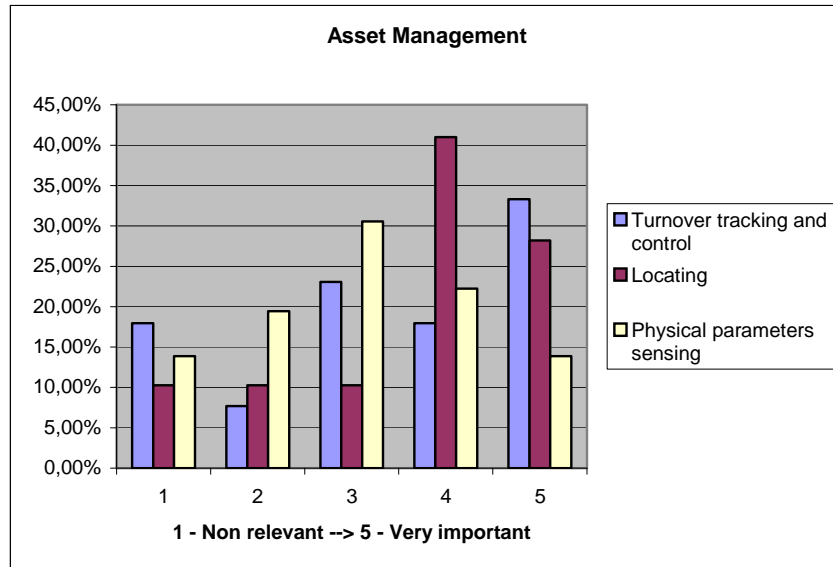


Figure 4: Asset management answers by polled companies

5.3.3 - Stock management

Concerning stock management, companies have expressed needs for locating and real time inventorying. Sensing seems not to be an important need among polled companies. Nevertheless, it is well known that for instance, monitoring temperature under a storage area is an important function specially when related to food or health industry.

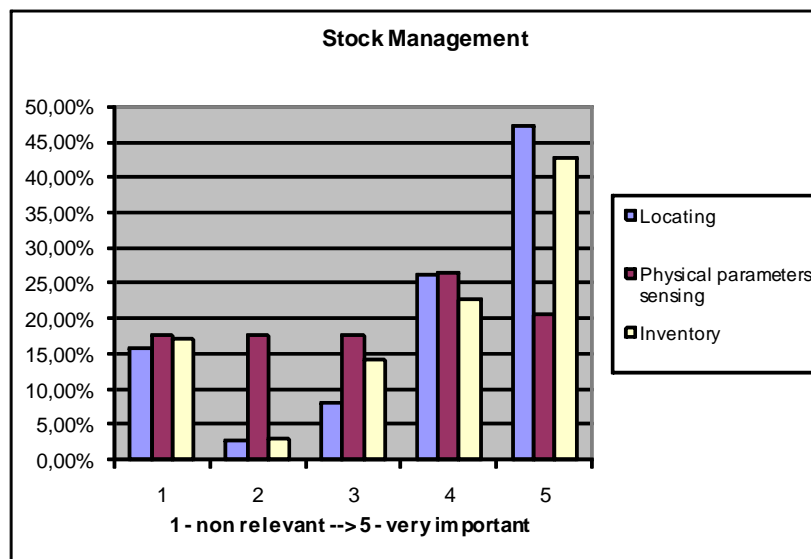


Figure 5: Stock Management answers provided by polled companies

5.3.4 - Logistics

The logistics question reveals that the polled companies considered the locating function as very important whereas physical parameters sensing seems to be non relevant. However, interviewed companies and specially those evolving in the logistics field clearly stated that they have to monitor temperature, sometimes humidity and also shocks when transporting goods (see Figure 6).

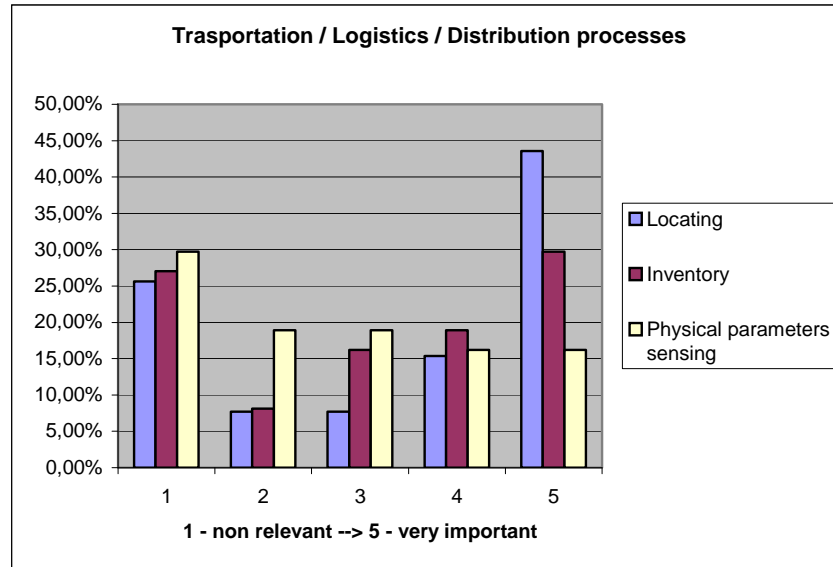


Figure 6: Logistic answers provided by polled companies

5.3.5 - Maintenance / warranty

Concerning warranty and maintenance there is a clear need of identification of the product. One interviewed company, health products' manufacturer, underlined the fact that the need of accessing to technical datasheets when performing an onsite maintenance operation is crucial to ensure efficiency of the operation.

Among polled companies, physical parameters sensing seemed not to be a relevant function for maintenance and warranty operation. Nevertheless, we can easily imagine a system that monitors shocks associated to the product. This functionality could be very valuable, for instance, to decide whether the warranty applies or not (see Figure 7).

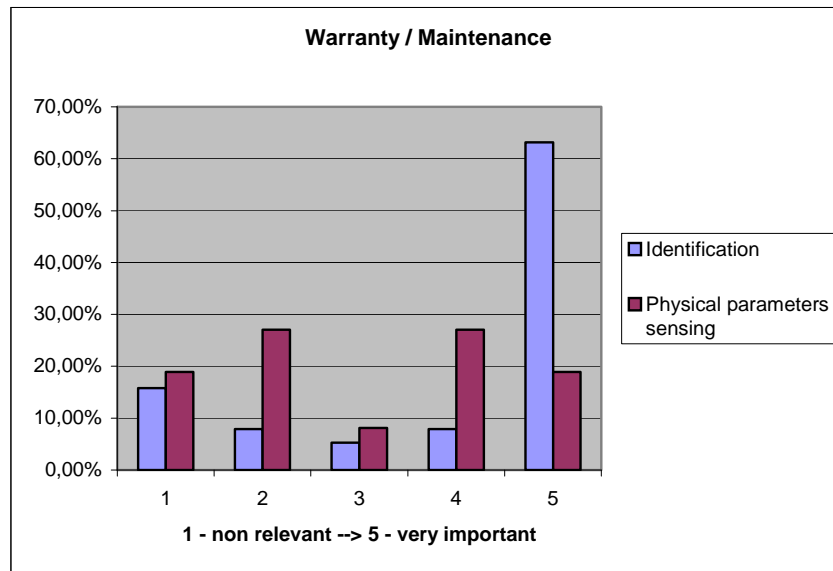


Figure 7: Maintenance / warranty results

5.3.6 - Recycling / Dismantling

Regarding recycling and dismantling, the identification function appears to be very important among polled companies. Answers provided for inventory and locating needs are balanced (see Figure 8).

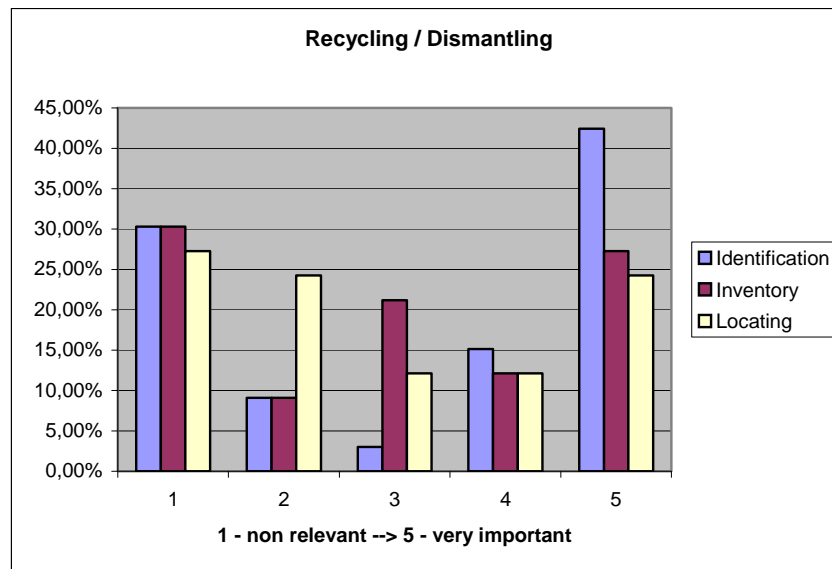


Figure 8: Recycling/Dismantling results

5.3.7 - Counterfeiting

Companies have been asked for their assessment of the risks related to counterfeiting. Answers provided are completely balanced and it is thus really hard to draw any conclusion (see Figure 9).

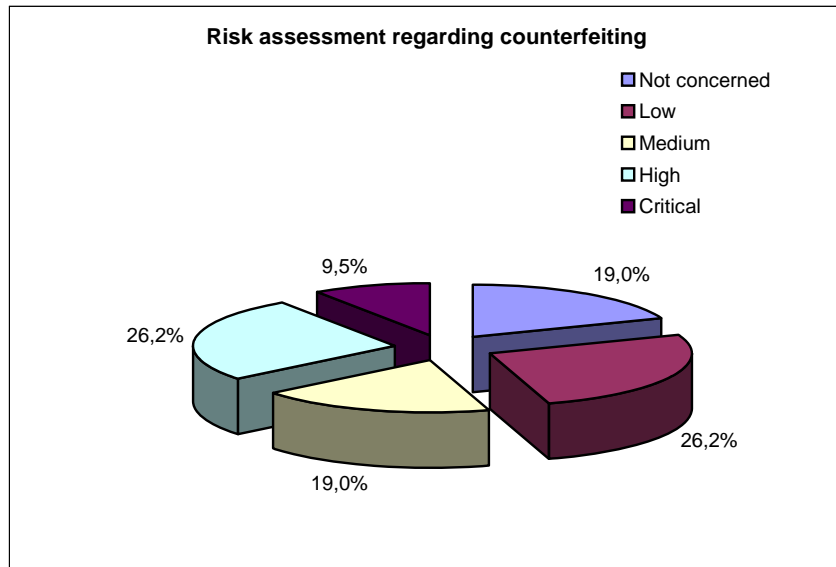


Figure 9: Counterfeiting results

5.3.8 - Evaluation of traceability tools, methods and solutions

The majority of the polled companies feels quite confident with their traceability solution. Existing traceability solutions are mainly considered as efficient or quite efficient. It appears nevertheless that these solutions could be optimized from an economical point of view, especially for manufacturing processes, transportation, logistics and distribution (see Figure 10).

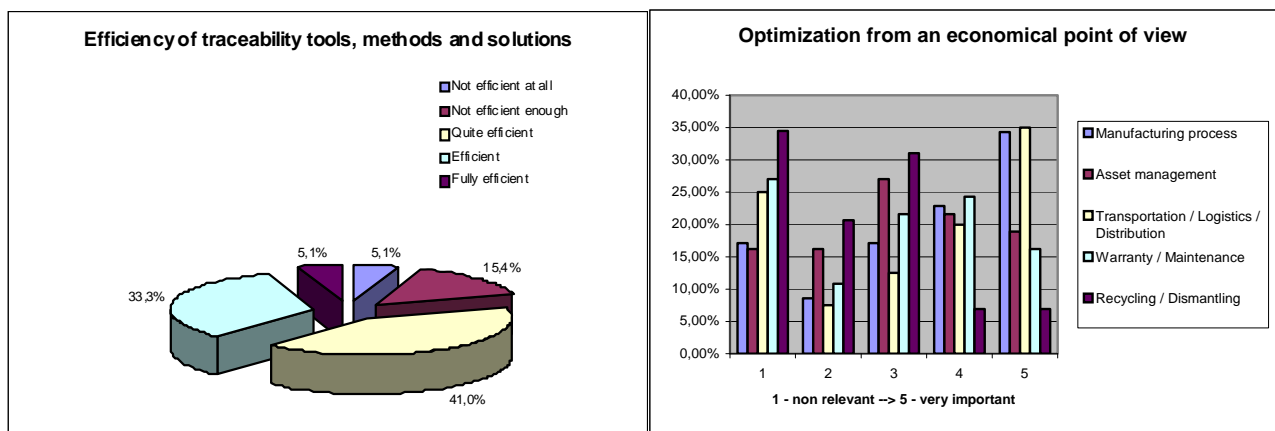


Figure 10: Evaluation of traceability tools, methods and solutions

5.4 - Conclusions on Needs Collected and General Survey Analysis

Many communication efforts and tools, e.g. newspapers, emailing, workshop, etc., have been used to involve companies and particularly SMEs in this survey. Most of the inputs come from the questionnaires that were given to attendants of RFID information days. The partners succeeded in collecting 50 questionnaires and the analysis of them underlines several important points.

The first one is that most of the companies are already using traceability solutions and feel quite confident with these existing solutions. On the other hand, they also believe that these solutions could be optimized from an economical point of view. This is in line with one of the goal of the ASPIRE project which will deliver an open source software platform as well as low cost RFID reader prototypes. Small SMEs seem not to be ready to use RFID. This is mainly due to the fact that building an RFID solution still remains uneasy. There is a clear lack of packaged solutions on the market. Small SMEs are more looking for “on the shelves” solutions than specific applications. ASPIRE, will clearly ease the development of packaged solution by providing, at the lowest level the possibility to interact with and to mix heterogeneous hardware. On the other side, several high level interfaces will enable the connection with numerous already existing applications such as WMS, ERP, MES, etc.

The second point, coming from interviewed companies, is the need of a multi-technology middleware that will allow the use, of course, of RFID technology but also older technologies such as barcode, datamatrix technologies or even sensors. This point seems to be really important for SMEs. Indeed, using RFID, still considered as a new technology could be considered as risky for a lot of SMEs. They have clearly express the need of mixed solutions during the information days. This could give them the possibility to use already deployed traceability solutions (barcodes/ datamatrix) while testing and step by step replacing older technologies or solution by RFID provided that, for the considered process, RFID is more reliable, efficient and economically interesting.

Security and Privacy concerns have also been expressed. It is quite clear that most of the companies are compelled to exchange data for example for traceability or logistics reasons. Theses exchanges have to be done while ensuring security, confidentiality and privacy. ASPIRE will be designed under the “privacy friendly” concept and will also embed several mechanisms that will ensure security features and privacy. Open source software ensures transparency as everybody can access the code, understand every mechanisms and procedures.

Concerning IT systems, SMEs are using various IT infrastructures and few have plans to invest in IT systems in the near future. With this results, ASPIRE’s open source and lightweight platform will clearly address all these above mentioned concerns.

The ASPIRE middleware will be designed as a low-cost versatile platform that can:

- Support many different tags (via tag translation mechanisms), including legacy bar-code systems.
- Support many different readers LF, HF, UHF and SHF.
- Fit within SME plans for low IT budgets and investments.
- Provide tools and programmability.

Additional conclusions derived from ASPIRE survey have been incorporated in Deliverables D2.5 and 2.6.

Section 6 - RFID Usecase : Logistics Sector

6.1 - Logistics sector overview

6.1.1 - Definition

Logistics is a set of necessary services to market and manufacture products. This is the set of means and methods to plan the flow of items before, during and after the production. Logistics means having the right thing, at the right place, at the right time.

6.1.2 - Logistics sector organization

Logistics activities involve production, supplying, stocking and delivery. They are mainly applied within industrial and commercial companies, as well as by logistics or services partners.

These activities are confronted with the intensification of the competition and with the release on the European plan of the rules of social and economic functioning.

Besides, new technologies quickly develop the equipments for transport, handling and storage. These economic and technical changes are translated by concentration of companies, customers' new needs and by the arrival on the market of new logistics companies.

6.1.3 - Logistics sector participants

Actors of logistics and transport take care of :

- Physical operations (transport, handling and storing)
- Management of information flow
- Complete management of factory flows

The market is divided into several sub-activities:

- Delivery of goods:
Local road transports of goods, Long-distance road transports of goods, Rent of trucks with drivers, transport by inland waterway
- Handling and storing:
Not harbour handling, Refrigerated storing, not refrigerated storing.
- Transport organization of freight:
Messaging, express freight Chartering Organization of international transport, airport Services.

6.1.4 - French participants

Companies name	Number of employee	Turnover (k€)	Activities
SNCF	175 400	22 059	Railway transport
AIR FRANCE-KLM	102 600	18 226	Air transport
CONNEX	61 288	3 678	Passenger transportation
RATP	44 352	3 138	Public transport
KEOLIS	28 500	2 200	Passenger transportation
GEODIS	22 725	3 370	Transport, logistics
TRANSDEV	21 600	690	Passenger transportation
ND	12 200	1 303	Transport, logistics
GEFCO	8 841	2 894	Logistics
ADP	7 738	1 821	Airport management

6.2 - Specificities of the logistics sector

6.2.1 - Lead-time

The lead-time is the central characteristic in logistics. It has several meanings:

- Lead-time of delivery (from the departure of the truck to its arrival at the customer or to his reception by the customer),
- Lead-time of order treatment, including or not the transport,

The respect of lead-time allows at the same time to satisfy customers and to limit costs and losses of incomes for the supplier.

6.2.2 - Reliability

The lead-time is central in logistics services, reliability is also a very important requirement. Few customers prefer reliability on the respect for the average lead-time of delivery rather than shorter, but more variable lead-time.

The average lead-time determines for the customer its rotating stock which allows him to work between two deliveries. The customer adds to this rotating stock a safety stock, established according to the reliability of the logistics partner. It can then be more interesting for a customer to increase the duration of his rotating stock if he can reduce the duration of his safety stock. Lead-time and reliability can then keep pace.

6.2.3 - Availability

This constraint also constitutes the heart of the logistics.

Availability represents the capacity to deliver products according to the needs for the periods and conditions planned while avoiding risks of provoking stock shortages for the customer.

The commercial risk can then compel the customer to cancel orders or to get production losses in case of non availability of products.

6.2.4 - Quality and conformity

Finally, delivered orders have to be in accordance with demands of the customers and have to exclude errors in their preparation.

Also, products must be delivered according to rules inspired by these characteristics:

- Respect for the cold chain in case of products with steered temperature
- Respect of stability for fragile products

6.3 - Logistics sector evolution

6.3.1 - Evolution of the production organization

One of the first explanations of the evolution of the logistics during the last twenty years is the organizational evolution of the production:

- Hyper segmentation of products and their differentiation according to the needs of customers resulted in a need of increased flexibility at the production lines' level and profoundly modified the functioning of logistics.
- The just-in-time policy which ensues partially from this segmentation and from this need of flexibility, necessary to respect the lead-time given by the commercial but also to decrease the number of products stored thanks to regular deliveries of goods, widely transformed the logistics function.
- The important relocations of textile, mechanical factories, etc., ended in the creation of factories of assembly different from factories of production: they modified the streams of goods in Europe and on the international stage.

In this context, the global control of supply chain takes on an increasing importance for companies. Indeed, the stakes in logistics are wide within the company:

- Support a quality policy: it is a question of limiting the errors, the averages or of mastering the lead-time.
- Balance the costs of storing, supplying and optimising the geographical choice of warehouses implantations to insure the best profitability of the product.
- Reduce operating costs by optimising physical structures of storing, by grouping warehouses of dangerous products or products of the food-processing industry implying specific infrastructure operating costs (for instance : grain silos or tanks of toxic products).

6.3.2 - Data flow evolution

The logistics returns invariably the manufacturers to a very concrete reality:

- Store pallets,
- Handle products,
- And fill trucks.

But with these physical flows are added data flows.

With Internet and the harmonization of certain European rules, logistics' partners can't content themselves for only stocks logistics, they also have to deal with the logistics of flow.

In other words, they do not only manage some bricks of the information system of their customer, but have to develop flows planning software.

Customers are then connected with their logistics providers and provide information coming from their production management. These logistics providers already proposed a follow-up of the goods and a traceability of these goods thanks to the exchange of computerized data (EDI), they rely on Internet today.

But in the heart of logistics, thought meet themselves again in the lead-time and the costs of delivery.

If Internet is synonymous of speed, several manufacturers and distributors gave up the shipping towards the European Union on their website for the moment, because of a lack of logistics solutions compliant with customs legislations, costs of delivery or still management of returns due to dissatisfaction of the customers.

Computing, by increasing speed of the flow of information, increases at the same time exchanges between partners of the physical flow.

So, far from taking away individuals, computing generates a more and more important number of contacts and, at the same time, it allows traceability throughout the supply chain.

6.4 - Traceability through the supply chain

Traceability management through the supply chain involves the association of a flow of information with the physical flow of items (see Figure 11).

Each partner must perform different roles within the supply chain, but all partners must follow a basic traceability process.

In order to achieve traceability through the supply chain, all partners must achieve internal and external traceability.

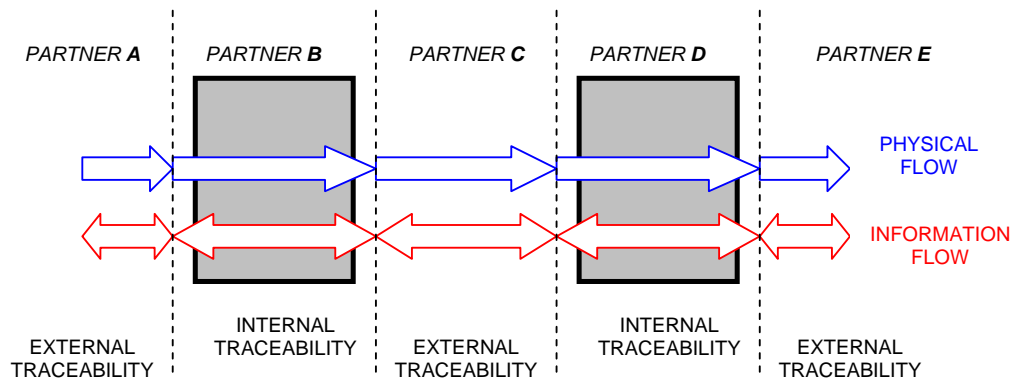


Figure 11: Flow of information with the physical flow of items

6.4.1 - Internal traceability

Reminder of the traceability definition (ISO 8402):

- Capacity to find the history, the use, the localization of an entity by means of recorded information.

Traceability means acquiring, recording and restoring.

Internal traceability takes place when a partner receives one or several instances of items as inputs. These inputs are subject to internal processes; before one or more instances of items are considered as output items (see Figure 12)

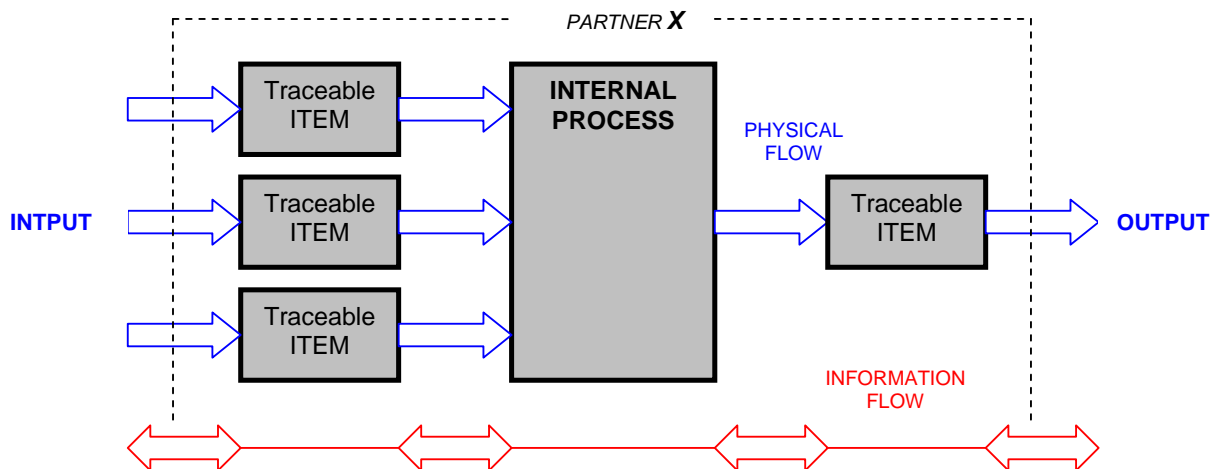


Figure 12: Internal traceability

An internal process is one or more sub-processes performed by the same partner.

An internal process consists in, for example, moving, transforming, storing or destroying, etc.

Every partner has the responsibility to maintain data that links input with output when considering transformation processes, and to link the original and final location after movement during product's internal life cycle.

6.4.2 - External Traceability

External traceability takes place when an item is physically moved from one partner to another (see Figure 13):

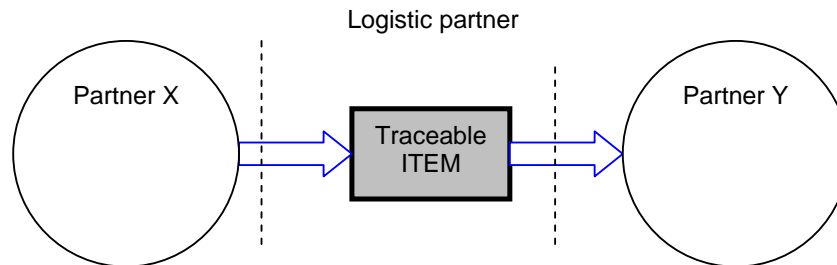


Figure 13: External traceability

Every partner must be able to track the source of an object and also to identify the destination of an object.

Traceability does not mean that every partner has to keep and send all the traceability information.

The source partner and the addressee of the object have to communicate and record the identification of at least a common level in their respective systems, as for example, a serial or batch number, to ensure an effective ascending and downward traceability.

All objects must have a unique identification when being labelled or marked during their manufacturing.

The identification must remain on the object until the object is destroyed.

6.4.3 - Description of a traceable object

A traceable object is a physical object for which it might be necessary to retrieve information about its history, application or location.

The level for which the traceable object is defined within a product packaging or logistical hierarchy is depending on the industry and degree of required control.

An item can be a shipment with one or more logistic units, a lot of items, or a single product.

6.4.4 - Which kind of information must be tracked

Information to be tracked must be sufficient to answer the following questions:

- Where are the products?
- What are the original components of the product?
- Which process was applied to the product?

6.4.5 - Safety of the data

Some data can be confidential or protected but nevertheless have to follow the product. It is thus important to plan that one part of the tracked data has restricted accesses.

6.5 - Operational examples which can involve RFID technology

6.5.1 - Follow-up of the temperature

A food raw material equipped with a RFID tag went out of a cooled stock to be used in a finished product. The middleware may control if the storage conditions of temperature were respected before using the product. It means that the system should monitor temperature in the storage area.

If the product stays for a long time outside the fridge, this has to be detected and the product has to be classified as a non useable one.

6.5.2 - Damage during the transport

When a shock appears, the RFID tag should be able to record the information so that the system could alert that there might be a problem with the product.

6.5.3 - Storage in bad condition

A product equipped with a RFID tag measures the rate of humidity and sends the information to the IT system so that it can decide if the product is in accordance with a normal use.

6.5.4 - Geo-localization

A product equipped with a RFID tag sends its identifier associated with its position to the system in order to allow the geo-localization of the product

6.5.5 - Best before date

A product must be used before a best before date. It is, for example, the case of a product with a chemical treatment which deteriorates in time.

When it went out of the stock, the system checks the date and confirms or not its use.

6.5.6 - Timestamp

A parcel has to follow a defined way with time constraints. The RFID tag can record a date and a location at each control point.

6.5.7 - Routing of a parcel

A parcel must be routed according to a specific destination in an automatic sorting system. The RFID tag has to record the final destination and the system sorts the parcel according to the information.

6.5.8 - Check of the contents of a load during an itinerant control

For safety reason or in case of a police control, characteristics of a product must be checked. This could be done by the use of mobile equipment.

Section 7 - Conclusions and synthesis on the collected requirements

Creating the survey and organizing RFID information days have been a great opportunity for the ASPIRE consortium. End users have been involved, by expressing their needs/requirements in the early specifications of the ASPIRE platform. It is also clear that the ASPIRE consortium had several difficulties involving small SMEs to the project. Small SMEs have indeed a poor knowledge regarding RFID technology. Most of them consider this technology as a “still in research” technology. These small companies will probably use RFID when packaged solutions will appear on the market. “On the shelves” RFID packaged solutions, targeting small SMEs, still do not exist on the market.

To properly address SMEs' requirements, ASPIRE will have to :

- Provide a lightweight middleware that could be used on SMEs existing IT systems
- Provide efficient means for easy integration with Legacy Systems
- Support Barcodes and older traceability technologies
- Be hardware independent
- Secure access to RFID functionalities
- Ensure Privacy (especially for consumer related deployment)
- Ease the development of packaged traceability solutions addressing small SMEs.
- Manage SMEs Business Processes
- Help SMEs in building RFID innovative solutions
- Lower Integration Efforts and Consulting Costs
- Ensure minimal maintenance costs

According to the survey and organized information days, the main points are the necessary compatibility of the ASPIRE middleware with older or different technologies such as barcodes, datamatrix codes and sensors but also the need of a cheap and lightweight tool that could be used on SMEs' existing IT systems. Most of the polled companies are already using traceability solutions but still think that these could be optimized from an economical point of view. There are also important concerns regarding security and privacy.

As ASPIRE will provide an efficient and reliable middleware, enabling heterogeneous hardware connections and numerous high level interfaces, this will clearly ease the development of packaged solutions and facilitate the integration with legacy systems, directly addressing small SMEs.

This deliverable aims at providing material to the ASPIRE technical teams. In addition, the ASPIRE on-line survey and the RFID information days provided essential input to:

- Deliverable 2.6, which describes concrete applications that will be piloted in the scope of ASPIRE,
- Deliverable 2.5, which provides valuable information regarding privacy issues.

However, this deliverable will be primarily valuable input for the technical work packages of the project (namely WP3, WP4 and WP5). With all of these data, the ASPIRE consortium will now be able to start the development of the ASPIRE platform while integrating traceability and privacy needs.

Also, the analysis of the logistics sector will provide a valuable input to the ASPIRE middleware and trials.

The online survey will be maintained on the ASPIRE website to continue interacting with end users.

During the information days, several contacts with companies have also been taken. We are now in the process of re-contacting each of these companies in order to actively involve them in:

- Future ASPIRE workshops for SMEs (as part of WP7).
- Future ASPIRE training workshops (as part of WP7).
- The ASPIRE trials in France (as part of WP6).
- Using the ASPIRE middleware.
- Testing and evaluating the ASPIRE middleware.

As a results the SME contacts, processes and results established as part of this deliverable will proof invaluable for many future activities of the ASPIRE project.

Section 8 - Induced software requirements from the qualitative end user requirements collection

8.1 - Introduction to software requirements specifications

The present D2.2 deliverable “(End User) SMEs Requirements” elaborates on SMEs technical and business requirements regarding RFID deployment.

This deliverable does not aim at bringing technical specifications of ASPIRE’s solution and environment. It aims at providing significant inputs (from qualitative requirements collected) to other technical specifications building tasks of Work Package 2 (reported in D2.3b, D2.4, D2.5, D2.6 deliverables).

Then, the present section only aims at translating the major qualitative requirements synthesised in Section 7 (synthesis of general SMEs requirements filled in in the survey) into technical concerns that should drive technical specifications building. It does not constitute a full “Software Requirements and Specifications” document as proposed by Volere and IEEE SRS templates.

As a consequence, this section is only built upon few parts of Volere and IEEE SRS templates, but not upon the full content of these same templates, which are dedicated to the production of the full specifications of a software product in its finalized version.

In order to have a good correlation between the requirements collected by this task and specifications built in the following tasks of WP2, this section provides brief definitions of requirements linked to functional software “boxes” and types of technical specifications to be developed and implemented in all the ASPIRE’s Middleware architecture.

One of the major goals of ASPIRE FP7’s research project [see *Target Objectives #3, #6 and #11 mentioned in the Description of Work*] is to enable the “foundations” of an open source community, by providing (to the potential new contributors of such a community) an appropriate set of tools (well documented, available, quickly testable, etc.) that eases the way to experiment the potential added value gained by using RFID technologies on various applications.

Succeeding in such a goal at the end of the project, will allow a larger appropriation by SMEs (RFID system integrators and end users) of the produced content by the small legacy community, and gain from them new and larger software contributions (“generic tools” oriented or “dedicated to an application” oriented).

This section also tries to give inputs to specification tasks to satisfy such a goal.

8.2 - Overall Description

As mentioned in Section 7, the survey done on end-user SMEs allowed the identification of the following qualitative requirements for the development of the ASPIRE’s Middleware :

- 1. Lower RFID implementation global cost**
- 2. Lightweight**
- 3. Legacy IT infrastructure**

4. **Barcodes and old traceability solutions**
5. **Hardware independent**
6. **Secure access to RFID**
7. **Ensure privacy**
8. **Packaged solutions**
9. **Manage SME business**
10. **Help SMEs for innovation in RFID**
11. **Lower integration efforts and consulting**
12. **Minimal maintenance costs**
13. **External data association**

The requirements defined in the following section bring a technical liaison to these qualitative requirements. A Tabular synthetic overview is proposed in Section 9 to specify those liaisons.

8.3 - External Interface Requirements

8.3.1 - ASPIRE Middleware User Interfaces

8.3.1.1 - [R01] : Easy Business Process Description

Aspire should provide flexible and graphical user interfaces that allow definition of business processes and associated data collection / filtering functionalities, in order to ease the implementation by end users of RFID Technology.

8.3.1.2 - [R02] : Easy Business Process and Event Generation

Aspire should provide a large set of business processes building tools in order to reduce the consulting effort associated to a project of integration and deployment of RFID technology.

8.3.1.3 - [R03] : Project Management Tools

Aspire should provide a large set of management tools easing the collaboration between stakeholders on a RFID project, and easing the innovation idea generation by RFID implementation.

8.3.2 - ASPIRE Middleware Hardware Interfaces

8.3.2.1 - [R04] : Drive Hardware Components

Aspire should provide solutions to be able to real-time drive hardware components

8.3.2.2 - [R05] : Easy integration of heterogenous hardware components

Aspire software should be hardware independent, providing a HAL (Hardware Abstraction Layer) that will be able to translate messages from a wide variety of reader vendors or legacy optical bar scanners, to allow the use of the existing hardware traceability components available in the end-user company

8.3.2.3 - [R06] : Hardware Management Tools

Aspire environment should provide a set of hardware management tools to reduce the integration effort (adjustable parameters of a large set of hardware components, etc).

8.2.3.4 - [R07] : Extra data association

Aspire should allow to easily associate extra data to tag detection (such as sensor data, geo-localization data, etc.) to enable the generation of new services upon RFID technologies.

8.3.3 - ASPIRE Middleware Software and Communication Interfaces

8.3.3.1 - [R08] : Standardized Business Types

Aspire should support standardized business data logic so as to be compliant with the available ERP and WMS systems.

8.3.3.2 - [R09] : Standardized Reader Message Protocol

Aspire should provide standardized readers message protocols such as RP and LLRP, that are widely used, so as to be ready to support a wide range of standard RFID Readers.

8.4 - ASPIRE Middleware Features (Functions)

8.4.1 - System Feature (Function) 1 : Low Cost Reader

8.4.1.1 - [R10] : Low Cost Reader

To lower the cost of mobility, a low cost, easy to implement and associate with IT ASPIRE's architecture Reader is needed.

8.4.1.2 - Low Cost Reader Functional Requirement

Aspire's middleware should develop and natively integrate a very simple and low cost reader (based upon standardized light version of LLRP protocol).

8.5 - Other Nonfunctional Requirements

8.5.1 - Performance Requirements

8.5.1.1 - [R11] : Royalty Free

ASPIRE's environment should provide a royalty free software environment based upon a set of open source middleware modules and tools, to lower the global cost of integration of an RFID solution.

8.5.1.2 - [R12] : Supported by Lightweight Architectures

Aspire should be compliant with and supported by lightweight software and hardware architectures. The middleware produced by ASPIRE will use lightweight software components that will be able to run over low end information systems.

8.5.1.3 - [R13] : Modular Architecture

Aspire should be structured and should provide (well defined, easy to test and well documented) single software modules, to ease its use and adoption by system integrators, in order to allow them give them the option to use the entire or partial implementation of the ASPIRE architecture to build and deploy a RFID solution.

8.5.2 Security and Privacy Requirements

8.5.2.2 - [R14] : Ensure Privacy

ASPIRE middleware should offer privacy by design approaches in order to be compliant with the state-of-the art privacy directives.

Section 9 - Conclusions : Synthesis Tabular Overview of Software Requirements and liaisons with ASPIRE Specifications

Ref.	Type of Requirement	Name	Brief Description	Benefit	Associated qualitative end-user need collected	Link with technical specification
R01	User Interface	Easy Business Process Description	Aspire should provide flexible and graphical user interfaces that allow definition of business processes and associated data collection / filtering functionalities	Help end-user in modeling business processes in order to make them more efficient by using RFID technology	10. Help SMEs for innovation in RFID 11. Lower integration efforts and consulting	See D2.4 ASPIRE IDE and Tools Specifications (Section 8)
R02	User Interface	Easy Business Process and Event Generation	Aspire should provide a large set of business processes building tools	Ease consulting efforts	10. Help SMEs for innovation in RFID 11. Lower integration efforts and consulting	See D2.4 ASPIRE IDE and Tools Specifications (Section 8)
R03	User Interface	Project and Innovation Management Tools	Aspire should provide a large set of management tools easing the collaboration between stakeholders on a RFID project, and easing the innovation idea generation by RFID implementation	Ease consulting efforts	10. Help SMEs for innovation in RFID 11. Lower integration efforts and consulting	See D2.3b CIMF first part of deliverable sections 3-9

Contract: 215417
Deliverable report – WP2/ D2.2

Ref.	Type of Requirement	Name	Brief Description	Benefit	Associated qualitative end-user need collected	Link with technical specification
R04	Hardware Interface	Drive Hardware Components	Aspire should provide solutions to be able to real-time drive hardware components		Native requirement of a middleware	See D2.3b Section 12 and Details in D2.4
R05	Hardware Interface	Easy integration of heterogenous hardware components	Aspire software should be hardware independent providing a HAL (Hardware Abstraction Layer) that will be able to translate messages from a wide variety of reader vendors or legacy optical bar scanners.	To allow the use of the existing hardware traceability components available in the end-user company	3. Legacy IT infrastructure ; 5. Hardware independent	See D2.4 and D2.3b Section 11
R06	Hardware Interface	Hardware Management Tools	Providing a set of hardware management tools	To ease integration efforts and to lower maintenance costs	10. Help SMEs for innovation in RFID 11. Lower integration efforts and consulting 12. Minimal maintenance costs	See D2.4 Section 8 and D2.3b Section 12
R07	Hardware Interface	Extra data association	Aspire should allow to associate extra data to tag detection	Enable new services integrating sensors (shock, temperature, etc.) and geo-localization data	13. External data association	See D2.3b Section 12

Ref.	Type of Requirement	Name	Brief Description	Benefit	Associated qualitative end-user need collected	Link with technical specification
R08	Software Interface	Standardized Business Types	Aspire should support standardized business data logic so as to be compliant with the available ERP and WMS systems	Easy compliance with existing IT infrastructures	3. Legacy IT infrastructure	See D2.4
R09	Software Interface	Standardized Reader Message Protocol	Aspire should provide standardized Readers message protocols such as RP and LLRP, that are widely used, so as to be ready to support a wide range of standard RFID Readers.	Hardware reader compliance	1. Lower RFID implementation global cost 3. Legacy IT infrastructure	See D2.3b section 11 and 12 D2.4 section 7
R10	Function	Low Cost Readers	To lower the cost of mobility a low cost, easy to implement and associate with IT Aspire's architecture Reader is needed	Aspire's middleware should develop and natively integrate a very simple and low cost reader.	1. Lower RFID implementation global cost 2. Lightweight	See D2.3b section 12

Contract: 215417
Deliverable report – WP2/ D2.2

Ref.	Type of Requirement	Name	Brief Description	Benefit	Associated qualitative end-user need collected	Link with technical specification
R11	Performance	Royalty Free	Aspire's environment should provide a royalty free software environment based upon a set of open source middleware modules and tools.	Lower the cost of an RFID solution	1. Lower RFID implementation global cost 2. Lightweight	See D2.5
R12	Performance	Supported by Lightweight Architectures	Aspire should be compliant and supported with lightweight software and hardware architectures. The middleware produced by ASPIRE will use lightweight software components that will be able to run over low end information systems.	The aim is that SMEs can fully reuse existing IT infrastructure with a minimum investment on upgrading modules or components (servers, etc.)	1. Lower RFID implementation global cost 2. Lightweight	See D2.3b section 12
R13	Performance	Modular architecture	Aspire should be structured and should provide (well defined, easy to test and well documented) single software modules, to ease its use and adoption by system integrators, in order to give them the option to use the entire or partial implementation of the ASPIRE architecture to build and deploy a RFID solution.	Ease the adoption of ASPIRE by RFID system Integrators community	2. Lightweight 8. Packaged solutions	See D2.3b and D2.4

Ref.	Type of Requirement	Name	Brief Description	Benefit	Associated qualitative end-user need collected	Link with technical specification
R14	Privacy	<i>Ensure Privacy</i>	ASPIRE middleware should be designed by default as privacy friendly conception.	This means that ASPIRE functionalities will be compliant with the state-of-the-art privacy directives.	7. Ensure privacy	See summarized privacy directives described in deliverable D2.5.

Appendix A

A.1 Online Survey

The online survey is accessible on the ASPIRE Website : www.fp7-aspire.eu

This survey is anonymous

Q1 - Please, select your country

Austria

Q2 - Number of employees in your company

- a- <10
- b- Between 10 and 100
- c- Between 100 and 500
- d- Between 500 and 2000
- e- > 2000

Q3 - Activities / markets targetted by your company

- a Healthcare / Pharmaceuticals
engineering Manufacturing Distribution Servicing
- b Leisure
engineering Manufacturing Distribution Servicing
- c Healthcare / Pharmaceuticals
engineering Manufacturing Distribution Servicing

Q4 - About your product

- a Footwear
engineering distribution Sales or rental Servicing
- b Other privacy-sensitive products – see (1)
engineering distribution Sales or rental Servicing
- c Other portable products – see (2)
engineering distribution Sales or rental Servicing

If your are dealing with privacy sensitive products (related to sex, religion or politics) or products that can be carried by a consumer, please specify your product :

Q5 - How would you describe your IT infrastructure?

- a- Inexistent
- b- 1-5 PC
- c- 5-50 PC
- d- 50-250 PC
- e- > 250 PC

Q6 - How is your IT managed?

- a- Not managed
- b- In-house
- c- Outsourced

Q7 - Are you planning to invest in your IT infrastructure within the next:

- 1- already done over the last year
- 2- 6 months
- 3- 1 year
- 4- 2 years
- 5- not in the near future

Q8 - How much are you planning to invest in your IT infrastructure within the above period?

- a- Less than 5k €
- b- 5k-15k €
- c- 15k-30k €
- d- 30k-100k €
- e- More than 100k €

Q9 - What is your degree of awareness regarding RFID technology?

- a- I've never heard about this technology
- b- General information (press / internet)
- c- Specific information coming from my own business area (customer / competitor / exhibition / professional organization)
- d- I plan to use RFID technology
- e- I already use RFID technology

Q10 - About your manufacturing processes. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|--|----------------|
| a | Raw material identification | Not applicable |
| b | Physical parameters sensing | Not applicable |
| c | Tracking and automation of manufacturing processes | Not applicable |
| d | Quality controls | Not applicable |
| e | Product or batch identification | Not applicable |
| f | other (specify): | Not applicable |

Q11 - About Asset management. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|-------------------------------|----------------|
| a | Turnover tracking and control | Not applicable |
| b | Locating | Not applicable |
| c | physical parameters sensing | Not applicable |
| d | other (specify): | Not applicable |

Q12 - About Stock management. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|-----------------------------|----------------|
| a | Locating | Not applicable |
| b | physical parameters sensing | Not applicable |
| c | Inventory | Not applicable |
| d | other (specify): | Not applicable |

Q13 - About your Transportation / logistics / Distribution processes. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|-----------------------------|----------------|
| a | Locating | Not applicable |
| b | Inventory | Not applicable |
| c | physical parameters sensing | Not applicable |
| f | other (specify): | Not applicable |

Q14 - About Warranty or Maintenance of your products. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|-----------------------------|----------------|
| a | Identification | Not applicable |
| b | Physical parameters sensing | Not applicable |
| c | other (specify): | Not applicable |

Q15 - About recycling /dismantling of your products. Please rate the importance, from 1 to 5, of each need below.

- | | | |
|---|------------------|----------------|
| a | Identification | Not applicable |
| b | Inventory | Not applicable |
| c | Locating | Not applicable |
| d | other (specify): | Not applicable |

Q16 - Your risk assessment regarding counterfeiting.

- a- Not concerned
- b- Low
- c- Medium
- d- High
- e- Critical

Q17 - About the efficiency of your traceability tools, methods and solutions.

- a- Not efficient at all
- b- Not efficient enough

- c- Quite efficient
- d- Efficient
- e- Fully efficient

Q18 - For each process below, please rate the importance of optimization, from an economical point of view

- | | | |
|---|---|----------------|
| a | Manufacturing process | Not applicable |
| b | Asset management | Not applicable |
| c | Transportation / logistics / distribution | Not applicable |
| d | Warranty / maintenance | Not applicable |
| e | Recycling / dismantling | Not applicable |

Q19 - About your customers personal data. Personal data is data that, either individually or combined, can potentially identify a person or group of persons, typically: name, nickname, national ID, passport number, nationality, date of birth, credit/debit card number, bank account number, service account number, affiliation or membership numbers, car numberplate, mortgage or loan account numbers, loyalty card number, driver license id, social security number, address, fixed or mobile phone numbers, email or IP address, website, usernames to access computers or websites, biometrics (photo, fingerprint, iris pattern, voice etc.). Select the appropriate degree applicable to each question in the list below.

a Does your business require collecting personal data about direct or indirect customers or other individuals?

Answer unknown

b Does your business involve buying or selling personal data about direct or indirect customers or other individuals?

Answer unknown

c Does your organisation have formal procedures and systems to manage personal data about direct or indirect customers or other individuals?

Answer unknown

d Does your business require keeping track of items bought or rented by customers for statistical, warranty, service, return or other purposes?

Answer unknown

e Does your business require keeping track of customers who received services for statistical, warranty, service, return or other purposes?

Answer unknown

f Does your country have in place legislation and mechanisms to protect personal data and enforce customer privacy?

Answer unknown

A.2 Greek Infoday's flyer

ASPIRE EU FP7 Project

Aspire Today, Inspire Tomorrow



ATHENS INFORMATION TECHNOLOGY
CENTER OF EXCELLENCE FOR RESEARCH AND GRADUATE EDUCATION



RFID Information Day

Ωρα	Τίτλος Ενότητας
09:30 – 09:50	Προσέλευση – Καφές
09:50 – 10:00	Χαιρετισμός – Καλωσόρισμα Δρ. Γιώργος Κουτσογιαννόπουλος, Πρόεδρος Δ.Σ. Ε.Ν.Ε.Β.Η.
	Τεχνολογία RFID, Ιχνηλασιμότητα & Διαχείριση Αποθεμάτων
10:00 – 10:15	Τεχνολογία RFID – RFID Sensors – Εφαρμογές Προστιθέμενης Αξίας Δρ. Πάνος Δημητρόπουλος, Sensap Microsystems SA
10:15 – 10:30	GS1, EPCglobal και Ιχνηλασιμότητα κ. Γ. Δημητρακόπουλος, κ. Ν. Τσαπραλής, GS1 Ελλάς
10:30 – 10:45	Ιχνηλασιμότητα στην Εφοδιαστική Αλυσίδα Τροφίμων – Ποτών κ. Χρήστος Αποστολόπουλος, Friesland Foods Hellas
	Σενάρια Λειτουργίας & Εφαρμογές
11:00	Χαιρετισμός Καθ. Βασίλειος Μακίος, Διευθυντής Corallia Clusters Initiative
11:00 – 11:15	RFID στην Εφοδιαστική Αλυσίδα Ένδυσης – Υπόδησης Δρ. Πάνος Δημητρόπουλος, Sensap Microsystems SA
11:15 – 11:30	RFID στην Εφοδιαστική Αλυσίδα Τροφίμων (Cold Chain Management) κ. Νεκτάριος Λεοντιάδης, Athens Information Technology
11:30 – 11:45	RFID στην Εφοδιαστική Αλυσίδα Φαρμάκων (e-Pedigree) κ. Leon de Ridder, IMPINJ, Sales Director EMEA
12:00 – 12:15	RFID στο Σημείο Πώλησης - Νέες Υπηρεσίες για τον Καταναλωτή Δρ. Κατερίνα Πραματάρη, ELTRUN - ΟΓΙΑ
12:15 – 12:30	RFID στη Διαχείριση Διαδικασιών & Δημόσια Διοίκηση Δρ. Δημήτρης Δρακούλης, Telesto Technologies
12:30 – 12:45	Το έργο ASPIRE Δρ. Γιάννης Σολδάτος, Athens Information Technology
	Παρουσιάσεις Συμμετεχόντων & Επιδείξεις
13:00 – 13:45	Παρουσιάσεις Επιχειρήσεων & Οργανισμών κ. S. Jodeau (Printronic), κ. Σ. Κατσικός (Prisma Electronics SA), κ. Π. Κατσαρός (MobileTechnology SA), κ. Δ. Γρηγορόπουλος (ITS Hellas), Δρ. Α. Αμδίτης - Δρ. Μ. Μπίμπας (ICCS-ΕΜΠ)
13:45 – 14:00	Έκθεση Sensap Microsystems SA, IMPINJ, Printronix Athens Information Technology, Prisma Electronics SA
14:00 – 14:30	Κλείσιμο Ημερίδας – Γεύμα

Πρόγραμμα Ημερίδας




SUBSCRIBER


Εκτύπωση σε ψηφιακό
εκτυπωτή XEROX DC 260, σε
χαρτί XEROX DOCUCARD.
Ευγενική χορηγία της
XEROX HELLAS.

A.3 Portuguese infoday's flyer

5 de Setembro'2008

Dia de Informação sobre RFID de Pequenas e Médias Empresas

O INSTITUTO DE TELECOMUNICAÇÕES gostaria de convidar pequenas e médias empresas (SMEs) para um dia de informação RFID a realizar no Anfiteatro do IT, Campus Universitário, em Aveiro.

Este dia de informação RFID é especificamente direccionado mas não limitado a empresas que estão activamente implicadas nos campos da alimentação e bebidas, vestuário e calçado, produtos farmacêuticos e contrafacção.

O RFID, que é considerado como uma substituição do código de barras, uma tecnologia que emergiu há alguns anos na área de provisão e que, continuamente, ganha considerável aceitação em tal domínio. Além disto, a intensa pesquisa no desenvolvimento da tecnologia e suas aplicações, que é levada a cabo em centros de pesquisa Europeus, é apoiada pelos investimentos proeminentes do Comité Europeu e da iniciativa privada e fornece proveitosos resultados diariamente.

Este "workshop" é organizado como parte do Projecto Europeu ASPIRE, suportado por um grande consórcio de institutos de pesquisa e empresas de muitos países Europeus. O objectivo do projecto, com a duração de 3 anos, é desenvolver um sistema integrado que permitirá às pequenas e médias negócios entrar no mundo do RFID com um baixo custo (TCO) e sem a significativa necessidade do conhecimento da tecnologia.

Participando neste "workshop", as empresas terão uma oportunidade de adquirir conhecimentos sobre as características-chave do RFID, junto com as tendências de pesquisa actuais. Adicionalmente, também serão capazes de adquirir uma experiência sólida da tecnologia por estudo de casos e outros demos. Além disso, através de questionários e curtas entrevistas aos responsáveis das empresas, o consórcio ASPIRE será capaz de satisfazer os desejos e as exigências da tecnologia, na visão de SME, e assim alcançar melhores resultados. Por fim, as empresas que participarem neste "workshop" terão a oportunidade de fazer parte da fase inicial do projecto ASPIRE.

14.00-14.30 Recepção

14.30-15.20 O que é o RFID?

15.20-15.30 Coffee break

15.30-16.10 Projecto ASPIRE, RFID para pequenas e médias empresas (SMEs)

16.10-17.00 Segurança no RFID

A.4 English infodays' flyer



RFID information days Glueing it all together

This pair of conferences will look at the issues of the “middleware” of RFID solutions and are aimed at SMEs interested in participating in the OSS project ASPIRE and improving their competitiveness by adopting RFID.

Whilst business benefits from RFID are significant, dealing with and integrating RFID data with existing back office solutions poses tremendous business and technological challenges, mainly in terms of cost of ownership and heterogeneity of RFID implementations. Similarly, issues such as data protection and privacy are becoming more important for maintaining trust in RFID adoption and public acceptance of solutions, and the European Commission has taken interest in these issues and is holding a public online consultation to develop Europe-wide recommendations on RFID privacy and security.

These conferences will look at both the current position as well as the emerging solutions that address these issues. It brings together different standardisation initiatives, big industry and SMEs, and privacy-oriented solutions with an aim at “glueing it all together” and advance the RFID movement. The agenda is:

- 10:00 – 10:05 Welcome – Nigel Rix (EKTN)
- 10:05 – 10:20 Introduction – Richard Foggie (BERR)
- 10:20 – 10:50 State of the Industry – Peter Harrop (IDTechEx)
- 10:50 – 11:15 Privacy and Data Protection – Florent Frederix (European Commission)

Coffee break

- 11:45 – 12:10 Bridge Project - David Weatherby (GS1)
- 12:10 – 12:30 Aspire Project - Humberto Moran (Open Source Innovation)
- 12:30 – 12:55 Overview of solutions - Richard Rees (Scanology and BSI)
- 12:55 – 13:10 Closing Remarks

13:10 – 14:30 Lunch, Networking and visit to Centre

<p>2nd May Register online: www.reqonline.co.uk/rfid02b</p>	<p>15th May Register online: www.reqonline.co.uk/rfid01h</p>
<p>RFID Centre Ltd Lakeside House Cain Road Bracknell Berkshire RG12 1XL http://www.rfidc.com Tel: +44 (0)870 7622200</p>	<p>The European Centre of Excellence for AIDC Elsie Whiteley Innovation Centre, Hopwood Lane, Halifax HX1 5ER http://www.aidc.org/ Tel: +44 (0) 1422 399499</p>

Please note that some speakers may change depending on location.

A.5 Danish infoday's flyer

RFID Information Day in Denmark

The RFID Information Day in Denmark is held on these following dates :

- Copenhagen, April 30, 2008. The RFID Information Day is held with Danish Technological Institute to discuss on how to spread information on RFID and ASPIRE to SMEs.
- Sønderborg, May 26, 2008. The RFID Information Day is held with CSI and 10 participants from both industries and research institutes. The aim is presentation on personal networks/RFID and security and privacy.

Briefing on October 30, 2008, Copenhagen, Denmark

Automation og overvågning – juridiske og økonomiske aspekter

Kromann Reumert, logica og Teknologisk Institut inviterer til en briefing om, hvad man som virksomhed bør overveje i forbindelse med automatiseret overvågning af produktion og ejendom.

Kvalitetssikring, optimering af produktion og arbejdsgange, lagerstyring, tyverisikring, kostoptimering. Der er mange gode grunde til at indføre automatisk overvågning, og RFID og sensornetværk breder sig i de danske virksomheder.

Men selv den mest uskyldige løsning kan risikere at være på kant med loven eller rumme trusler for privatliv og sikkerhed. Få klare svar på, hvilke rammer lovgivningen sætter.

Sikkerhed og privatlivsbeskyttelse koster. Men det gør klager og dårlig omtale også. Vi sætter tal på udgifter og indtægter ved god beskyttelse og sikkerhed.

Briefingen indeholder også et konkret eksempel på Privacy Enhancing Technologies, samt en præsentation af ASPIRE, et EU projekt der skal hjælpe små og mellemstore virksomheder til at få glæde af RFID.

Program

9.00 **Introduktion til RFID og sensornetværk.** Hvad kan de bruges til, hvad består de af, hvordan virker de?

Torben Jørgensen

9.45 **Lovgivning, privacy og trust.** Hvilke nationale og internationale love og regler bør man tage i betragtning, når det drejer sig om opsamling, transmission og opbevaring af data?

Jan Hvarre

10.30 **Pause**

- 10.45 **Security and privacy solutions:** What are the typical security and privacy issues related to RFID and wireless sensor networks, and what are the possible solutions?
Keywords: End to end security, cryptation, threat analysis. **Neeli R. Prasad**

Bemærk venligst at dette indlæg holdes på engelsk

- 11.45 **Frokost**

- 12.30 **Kan det betale sig?** De økonomiske konsekvenser af at anvende Privacy Enhancing Technologies, eller at undlade at gøre det? **Mikael Hertig**

- 13.15 **ASPIRE:** Presentation of ASPIRE - The EU funded project that brings RFID to SMEs
Neeli R. Prasad and Thomas Christiansen

Bemærk venligt at dette indlæg holdes på engelsk

- 13.45 Future of internet: Applications scenarios: Logistics, Cold chain management, Tele homecare

Neeli R. Prasad

Bemærk venligst at dette indlæg holdes på engelsk

Indlægsholdere

Dr. Neeli Rashmi Prasad, Aalborg Universitet. Associate Professor and Head of Wireless Security and Sensor Networks Group and Project Coordinator of European Commission funded Integrated Project ASPIRE on RFID and Middleware
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Advokat og partner Jan Hvarre, Kromann Reumert
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Fuldmægtig Thomas Christiansen, Administrative Manager of Center for Teleinfrastruktur (CTIF) Aalborg Universitet and European Commission funded Integrated Project ASPIRE on RFID and Middleware

Seniorkonsulent Mikael Hertig, logica

Seniorkonsulent Torben Jørgensen, Teknologisk Institut. Innovativ og forretningsmæssig udvikling og anvendelse af IKT.
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Dato: Tirsdag d. 30. oktober 2008 kl. 10.00 – 14.30

Sted: Kromann Reumert, Sundkrogsgade 5, 2100 København Ø

Pris: 1.100 kr. incl. Frokost

Sprog: Nogle af indlæggene vil blive holdt på engelsk

Tilmelding: www.????.???

Sidste frist: 23. oktober

A.6 French infodays' flyer



Journées d'information sur la technologie RFID

Projet européen ASPIRE

Le projet de recherche européen ASPIRE a pour ambition de changer le modèle de déploiement actuel des solutions RFID, plaçant un logiciel **libre de droit** au cœur de l'infrastructure d'une solution RFID. Dans ce modèle, une grande partie de l'intelligence de la solution RFID sera déportée au sein même de cet intergiciel dont l'accès sera **gratuit pour les utilisateurs finaux** (particulièrement bénéfique pour les petites et moyennes entreprises). L'intergiciel s'interfacera aussi bien avec des matériels de faibles coûts qu'avec l'infrastructure réseau existante de l'entreprise. Pour assurer ce changement, **ASPIRE** développera et fournira un intergiciel, léger, libre de droit, programmable, respectant les recommandations liées aux données à caractère personnel, compatible avec les standards actuels, intégré et intelligent. Cette plateforme logicielle facilitera le **développement et le déploiement, à faible coût, de solutions RFID innovantes et entièrement automatiques.**

Dans le cadre de ce projet européen, **2 journées d'information sur la technologie RFID** sont organisées par le Pôle Traçabilité.

- Vous travaillez dans une petite ou moyenne entreprise et souhaitez **en savoir plus** sur la technologie RFID.
- Vous souhaitez **contribuer**, en nous soumettant vos besoins, au développement d'une solution libre de droit et adaptée à l'environnement des petites et moyennes entreprises.
- Vous êtes intéressés pour **intégrer, tester et faire évoluer** la solution ASPIRE, bénéficiant par la même occasion des compétences d'une équipe européenne de chercheurs et d'experts RFID.

Alors participez gratuitement à l'une des journées d'informations sur la technologie RFID !

Dates prévues par secteur d'activité :

29 avril 2008 20 mai 2008
 (Santé) (Logistique)

Agenda :

10h00	Accueil
10h15	Présentation de la démarche traçabilité et de ses enjeux
10h45	Présentation de la technologie RFID
11h15	Visite du centre de démonstration
12h00	Buffet
13h30	Présentation du projet ASPIRE
14h00	Groupe de travail et de réflexion
16h00	Clôture

Lieu :
 Pôle Traçabilité
 26 rue Barthélémy de Laffemas
 26000 Valence

Contact :
 Pôle Traçabilité
 Julien VINAY - 04 75 78 41 80
jvinay@poletracabilite.com

Vous pouvez également participer à l'enquête en ligne disponible sur le site www.fp7-aspire.eu

Projet Européen ASPIRE - www.fp7-aspire.eu
 Pôle Traçabilité – 26 rue Barthélémy de Laffemas – 26000 Valence
 Tél. 04 75 78 41 80 – Fax. 04 75 78 41 81

A.7 Overview of SMEs and RFID deployments in Portugal

Objective

This document provides a general overview of the characteristics of Small and Medium Enterprises (SMEs) in Portugal. It particularly emphasizes those features related to the possible integration of RFID applications, including economical profiles, information technology infrastructure and a brief review of the current status of RFID deployments in Portugal.

Scope

ASPIRE (Advanced Sensors and lightweight Programmable middleware for Innovative Rfid Enterprise applications) is a European FP7 (Frame Project 7) project that has been created with the objective to change the aforementioned RFID deployment paradigm through an innovative, lightweight, royalty free, privacy friendly, open source middleware architecture that will greatly reduce the total cost of ownership associated with RFID, particularly for SMEs [8]. Among the several tasks required for the success of the ASPIRE project, each partner needs to provide, through surveys made to SMEs and other market research techniques, a status of the SMEs in their respective countries and the characteristics of their IT infrastructure. This will provide a better picture of what kind of RFID middleware the project should address. The main goal of this document is to fulfil this requirement by first providing an overview of the SMEs in Portugal and then presenting some statistics about the IT infrastructure available at such SMEs using information from surveys and some other references. Finally, an overview of current and future RFID deployments in Portugal is also presented.

Overview of SMEs in Portugal

This section provides an overview of the status of SMEs in Portugal, focusing on the parameters and characteristics that are relevant to ASPIRE RFID applications. The total number of registered Portuguese enterprises in the year 2005 was close to 400,000, ranging from micro, medium, small and large enterprises [11].

As in many European countries, most of the Portuguese enterprises are SMEs. According to the Portuguese government and the European Union, an SME is an enterprise with less than 250 employees with a volume of business transactions lower than 50 million Euros per year (from now on in this section, unless otherwise stated we will deal with quantities per year). Among these, microenterprises are those with less than 10 employees with a volume of business transactions lower than 2 million Euros, while small enterprises are those with less than 50 employees with a volume of business transactions lower than 10 million Euros. The remaining enterprises are regarded as medium [11].

According to the National Institute of Small and Medium Enterprises of Portugal (IAPMEI, as called by its acronym in Portuguese) the SMEs constituted, by the end of 2005, the 99.6% of the total number of registered enterprises; they generated the 75.2% of the private jobs in the country and more than half of the total volume of business transactions (56.4%, see Fig. 1). This means that there exist around 297 thousand SMEs which generate around 2.1 million jobs and more than 170.3 million Euros of business transactions [11] (See Fig. 1 below).

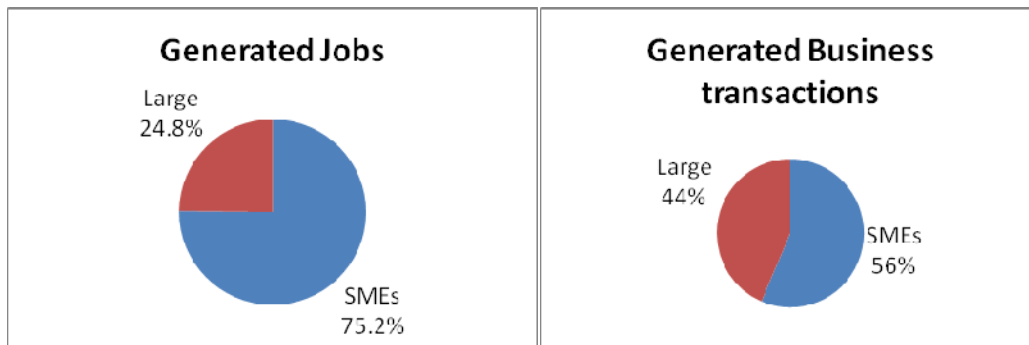


Fig. 1 Distribution of generated jobs and generated volume of business transactions for SMEs and large enterprises in Portugal [11].

Within the SMEs, the microenterprises have become particularly important as they represent the 97.3% of all the enterprises they created more than half of the number of jobs (55.2%), and they generated 106.7 billion Euros of business transactions (around 35.3%)[11].

Growth rates

Between the years 2000 and 2005, the Portuguese SMEs had a larger growth rate than that experienced by large enterprises, particularly in terms of number of enterprises, number of generated jobs and the total volume of business transactions. The number of SMEs grew at a rate of 7% per year, versus 1.1% for large enterprises. In terms of the number of generated jobs, the SMES grew at a rate of 4.2 %, while in terms of total volume of business transactions they grew at a rate of 2.2%. In comparison, large enterprises recorded 2% and 1.6% growth rates in the same areas, respectively. These figures mean that 17.1 thousand SMEs were generated per years, thus creating 77.2 thousand jobs per year and more than 3.4 billion Euros of business transactions. In comparison, the number of large enterprises increased at a rate of 13 units per year, thus creating 12.7 thousand jobs per year and an increase of 2 billion Euros per year in the volume of business transactions [11].

Small and micro enterprises were mainly responsible for this growth rate accounting for a 7.2% in the number of new enterprises, 5.6% in generated jobs and 3.6% in business transactions. This represented 17.1 thousand small and micro enterprises, thereby creating more than 72.7 thousand jobs per year and an increase of 3.5 billion Euros in business transactions. Conversely, the number of medium enterprises showed a slight decrease of 0.1% per year (-7 enterprises per year) and a decrease in the volume of business transactions of 0.1% (around 43 thousand Euros per year). However, the number of generated jobs registered an increase of 0.8% per year (around 4.5 thousand jobs per year). Similarly, microenterprises had a decrease in their volume of business transactions of 0.5%, although they experienced a nominal increase of 2.6% and an increase in the number of generated jobs of 6.7% per year [11](See Fig.2).

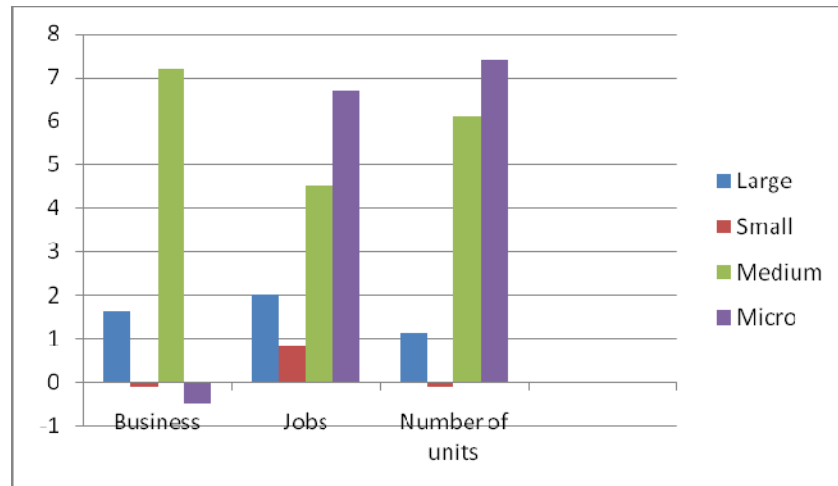


Fig. 2 Growth rates of generated jobs, number of enterprises and generated business for SMEs and large enterprises in Portugal [11].

Relative weight

In terms of relative weight, during the period from 2002 to 2005, SMEs increased their weight in the Portuguese enterprise framework by 0.13 pp (percentage points) in terms of the number of enterprises, 0.66 pp in terms of generated businesses and 2.07pp in terms of generated jobs (See Fig.3).

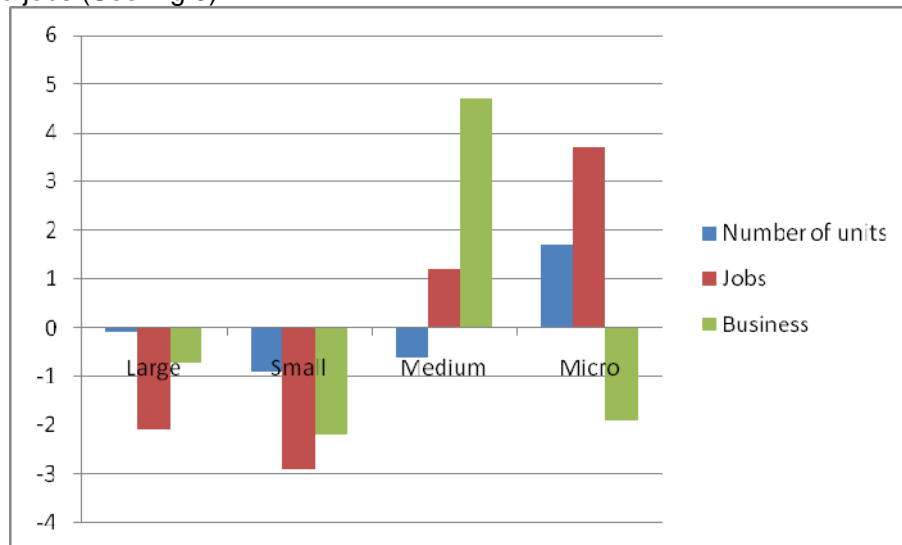


Fig. 3 Gain in relative weight for the number of units, jobs and business transactions for large, small, medium and micro enterprises in Portugal [11].

Analysis by sector

Portugal has an enterprise structure clearly biased towards the third sector. Commerce and services (including tourism) represent the majority of the active enterprises with a 71.3%, thereby generating 57.6% of private jobs and 64.6% of business in the country. Among these, commerce accounts for the 31.7% of the number of enterprises, 41.1% of the generated business and 28.3% of the generated jobs. The weights of the remaining sectors are shown in Figure 4 [11].

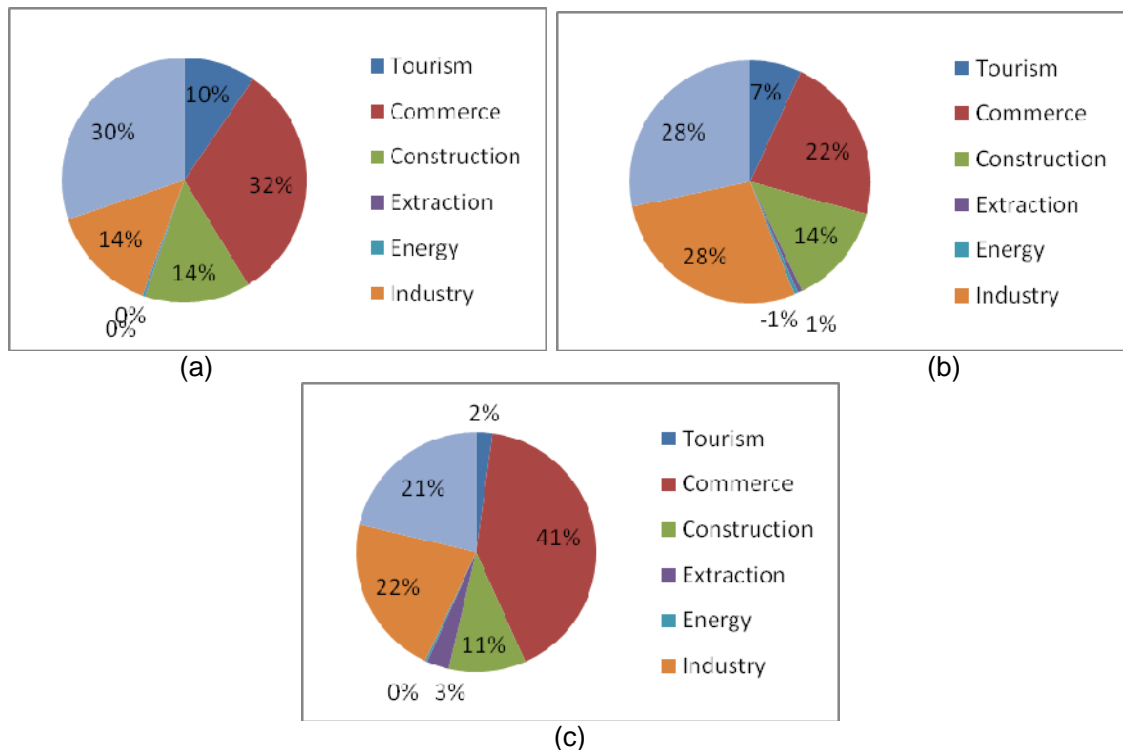


Fig. 4 (a) Number of enterprises, (b) generated jobs and (c) generated volume of business transactions for SMEs and large enterprises in Portugal distributed by the economic activity or sector [11].

Analysis by region

Portugal is a country clearly divided in three economical entities, from which two of them have traditionally concentrated most of the activities and enterprises: the North and Lisbon. Nevertheless, recent years have seen an increased activity, particularly by means of new SMEs, in the rest of the country, thus reducing the importance of both the North and Lisbon regions. These regions registered, by the end of 2005 65.7% of the total number of enterprises while generating more than 70% of the jobs and national businesses [11].

IT infrastructure of Portuguese SMEs

Portugal is a country that between the year 2001 and the year 2004 registered a decrease in the annual investment in communication technologies and in the number of service providers [12]. However, the revenues obtained from telecommunication services, and the market penetration of several applications, mainly mobile telephony, wireless data services, internet and broadband access connections, have registered an steady increase since then. From these, the most notable is the market of mobile communications which currently has most of the revenues in information technology services and almost 100 % penetration, a fact that is found in several European countries [12].

According to the Portuguese National Institute of Statistics (INE), by the end of 2006, 66% of the enterprises with 10 or more employees in Portugal had access to broadband Internet services, 83% used dial-up Internet services, 84% used email and 95% had basic IT infrastructure, i.e. computers. See Table 1 [14].

Table 1. Information and communication technologies in enterprises with more than 10 persons on service (distributed by dimension) [14].

Number of employees	Usage of computers	Email	Internet	Website
Total	96.4	83.6	83.1	35.5
10 to 49 persons	93.8	80.9	80.3	31
50 to 249 persons	99.1	98.6	99.1	57.3
More than 250	100	100	100	85.2

Table 2 shows the distribution according to the sector or economic activity, showing that letting services show the largest penetration of own websites. In comparison, construction enterprises show the lowest penetration of IT services [14].

Table 2. Information and communication technologies in enterprises with more than 10 persons on service (distributed by economical activity) [14].

Economic activity	Computer	Email	Internet	Website
Total	94.6	83.6	83.1	35.5
Industry	100	85.2	80.8	33.0
Construction	76	68.7	68.9	17
Commerce	100	85.1	88.4	38.1
Hotels	98.1	98.1	98.1	84.1
Transport	100	99.8	100	X
Finance	99.7	99.7	99.7	82.9
Letting	94.9	93	94.5	53.6
Others	100	100	93.8	X

Table 3 shows the type of Internet connection used by enterprises. It can be noted that the preferred technology for Internet access is DSL, with 63.3%, while the lower ones were found in the dedicated access and cable domains [14].

Table 3. Enterprises with access to Internet classified by the type of connection [14]

Type of connection	Percentage
Analog modem	25.2
RDIS	17.9
DSL	63.3
Another fixed band access	24.8
Cable	11.2
Dedicated line	10.5

Fig 5 shows the distribution of broadband Internet access versus the number of employees in the enterprise with a clear dominance of larger enterprises [14].

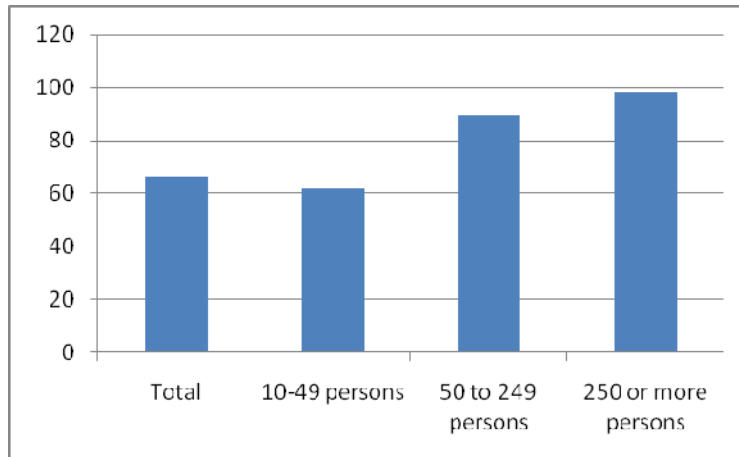


Fig. 5 Distribution of broadband Internet access versus the number of employees

Table 4 shows the percentage of enterprises with broadband connection distributed by economical activity, which shows again that letting enterprises show the highest penetration while construction industry showed the worst performance.

Table 4. Enterprises with access to broadband Internet classified by the type of economical activity [14].

Economic activity	Percentage
Total	66.2
Industry	67.1
Construction	48.7
Commerce	64.9
Hotels	81.4
Transport	88.6
Finance	66.3
Letting	88.4
Others	87.5

Finally, Fig. 6 shows the type of electronic security measures used by enterprises and the percentage of usage [14].

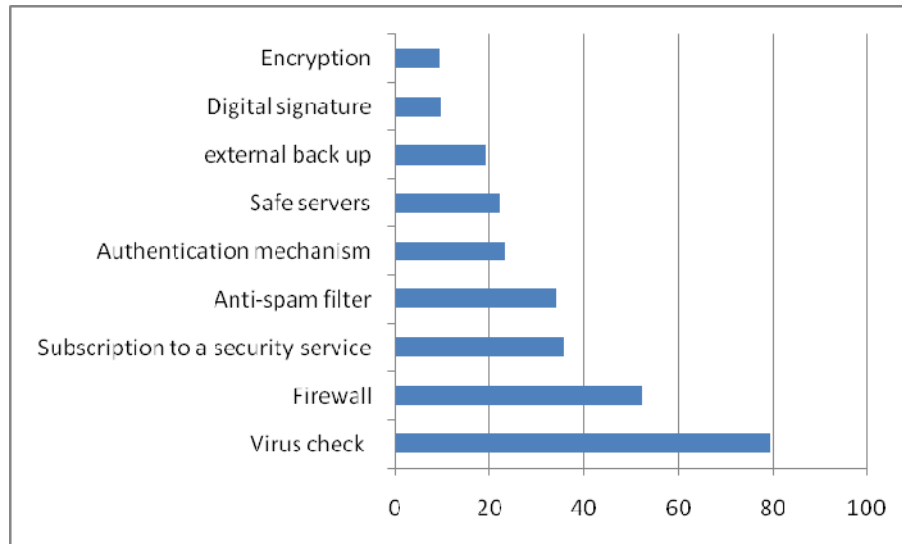


Fig. 6 Enterprises that use security applications distributed by the type of security measure

SME data and surveys

This section presents data collected from different public Portuguese institutions for SMEs and some data collected by hand from several SMEs with different economical activities and size.

SME 1. Tourism and business trips

- 50 employees
- Good information technology and telecommunication infrastructure (,management software with good connectivity)
- Intensive use of e-mail and Internet connection by all the staff.
- The SME IT infrastructure basically consists of a proprietary ticket sales system (called Amadeus) that is interconnected with many other sales points.
- Good knowledge of technology including RFID.
- Current IT projects: extension of an extranet to offer better services to its clients
- Possible future RFID projects: **Smart tickets**

SME 2. Enterprise of metallic dishes

- One of the best SMEs in Portugal, with offices in Lisbon and abroad.
- Good IT infrastructure
- Integrated ERP software.
- Limited Email and Internet connectivity.
- Reasonable knowledge of new technologies.
- ISO9000 Quality compliance.
- Future IT strategies: extranet to manage the relations with clients.
- The enterprise is developing a catalogue to collect the requests in an electronic way to substitute traditional paper based requests.

SME 3. Enterprise for processing wood materials’.

- This SME is dedicated to wood related goods.
- It has a good infrastructure of communication and information technology.
- Integrated ERP software that covers most of the parts of an enterprise.
- ISO 9000version 200
- Frequent use of email to external destinations
- Reasonable preparation of the staff for adopting new technologies.

SME 4. Enterprise for processing wood materials.

- This SME is dedicated to wood related goods.
- It has a good infrastructure of communication and information technology.
- Integrated ERP software that covers most of the parts of an enterprise.
- ISO 9000version 200
- Frequent use of email to external destinations
- Reasonable preparation of the staff for adopting new technologies.
- Future projects: Development of an extranet to sell, track and manage the products along the supply chain.

SME 5. Textile Enterprise.

- This SME is dedicated to textile products with two more filial.
- It has a good infrastructure of communication and information technology.
- Integrated ERP software that covers most of the parts of an enterprise.
- ISO 9000version 200
- Frequent use of email to external destinations
- Reasonable preparation of the staff for adopting new technologies.
- Future projects: Development of an extranet to sell, track and manage the products along the supply chain.

SME 6. TIC Enterprise.

- This SME resells and distributes informatics material, as well as providing assistance about it.
- It has an excellent infrastructure of communication and information technology.
- Integrated ERP software that covers all the parts of an enterprise.
- 100 percent email and Internet usage.
- A young team with a perfect knowledge of new technologies.
- Business processes are clearly defined and formalized.
- They have a fully deployed extranet to manage all the sales personnel.
- Future projects: Development of an extranet to sell, track and manage the products along the supply chain.

SME 7. Distributor of Electronic and Electrical Material.

- Reasonable IT infrastructure.
- Software management and internal network.
- No formalized internal business processes.
- Reasonable preparation of the staff for adopting new technologies.
- They have one of the most successful B2B portals in Portugal
- Implementation of RFID would be an easy step for tracking all their products.

Some of the above data was obtained from the study carried out by the IAPMEI in [13]. It is worth pointing out that the conclusions of this document are that most of the Portuguese SMEs will be hiring hosting and other networking services as they cannot afford to invest high quantities of money in IT infrastructure. These conclusions might be relevant to the ASPIRE strategy.

Current and future RFID deployments in Portugal

As in many other countries, RFID is not new in Portugal. It has already been used since the 1990s in applications such as toll payments, book identification and smart tickets. Trains, subways and highways in Portugal are current examples of HF (High Frequency) RFID deployments, such as all the transport systems in Porto (2004) and in the Lisbon region [15]:

- Underground: Metropolitano de Lisboa (2000)
- Urban Bus and Tram: Carris (2003)
- Boats & Ferries: Transtejo (2004)
- Trains: CP (2005/6)
- Private train: Fertagus (2006/7)
- Private light-rail: Metro Sul do Tejo (2006/7)

- Sub-urban bus (private): several operators (2007),

According to the ID TechEx [16], current RFID applications are dominated by HF tags. However, market predictions for the next few years indicate that UHF (Ultra High Frequency) tags will gain important terrain in the RFID markets. The reason for this is that UHF tags are particularly useful in item and consumer goods tracking, an application previously unreached by other types of RFID tags.

UHF RFID applications based on the EPC standards are expected to dominate the market. Portugal is actually being place of several interesting RFID deployments.

The important retailer Throttleman has been deploying RFID systems to tag each one of its products. The first implementation goes back to 1991, but with very limited capabilities. In the 2000 the retailer chose RetailID (www.retaildid.net) to enable more items with the RFID technology. By 2005 Throttleman had already tagged two more of its departments, using UHF EPC tags Class 1 Gen 2 from Squigle In-lay, and an RFID Tunnel and middleware platform provided by Sybase [16].

One of the largest libraries in Lisbon, Byblos, deployed in 2007 what they claim to be the largest RFID deployment in the world in order to track and inventory over 100,000 book titles, cds, and multimedia discs. With middleware provided by Creativesystems, and RFID technology provided by Advanced ID Corporation, Byblos has been able to deploy a UHF Radio Identification systems compliant with the EPC standards class 1 Gen 2 and ISO18000-6B [17].

In supply chain management applications, the Portuguese door manufacturer Vicaima announced in 2007 the deployment of a large RFID system to track every piece wood from the start of the supply chain up to the Point of Sale. They will be using Creative systems middleware technology, Gen 2 EPC Squiggle UHF tags, and Alien Technology Corporation reader technologies [18].

The Portuguese government announced in 2005 that Digital Angel Corp would be providing an implantable RFID system for dog tracking and identification to be completed by 2007 [19]. The main international airports of Portugal, in Lisbon and in Porto, were the first European airports to implement the RFID passport identification system in 2005.

Future RFID deployments envisioned in Portugal include the tracking of luggage and trolleys in 8 domestic and international airports of Portugal [20].

RFID will be also deployed by CTT, the postal service of Portugal, to track and manage the transportation of packages from one place to another [21]; in the railway systems to identify failures in Bogies, Axies, etc. [22] , and by the group Portucel in the supply chain of the pulp and cell industry [23].

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