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Acceleration of Innovative Ideas to Market

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Project Co-ordinator: Dr. Mikel Sorli

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LABEIN	E
Ball Packaging Europe (BPE)	D
Charles Robinson (Cutting Tools)	UK
MB Air Systems	UK
ATOS Origin	E
ATB	D
ICIMSI	CH

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1. Project Overview

Partner	Country	Type	Strengths	Role in Project
LABEIN	Spain	Research Institute	Industrial Research: Innovation Methodologies, Design Engineering, Knowledge Management, e-Working, Extended Enterprise, Training, Consulting, Management	Project Manager, Methodology development – emphasis on knowledge management for innovation in design, Solution specification
S-L	Germany	Industrial	Manufacturing, Multi-site	User Business Case – Large enterprise, process innovation for multi-site, Dissemination management, Demonstrator
CTOOLS	UK	Industrial	Manufacturing, SME	User Business Case – product innovation in SME, Demonstrator
MBES	UK	Industrial	Manufacturing, Large Customers	User Business Case – product and process innovation in service area, Demonstrator
ATOS	Spain	Software and Hardware Vendor	Hardware and Software for Extended Enterprises, Software Development, Network Solutions	Software Developer, Ontology issues, Extended Enterprise Solution; Main exploitation role
ATB	Germany	Research Institute	Industrial Research: Knowledge Management, Process Improvement, Software Engineering	Methodology and tool development – emphasis on knowledge management for innovation in process, Solution specification
ICIMSI	Switzerland	Research Institute	Industrial Research: application of computing techniques to mecatronics, industrial electronics, logistics and production; human resources, process management, communication and multimedia	WEB environment for AIM system, simple early prototype for initial collection of knowledge

Main project Achievements:

- AIM software system for accelerating innovative ideas to market, supporting the innovation process in industrial companies, including SMEs, with complex products and/or processes, with a substantial requirement for incremental innovation on products and processes, and which need to harness the product and process knowledge of their staff, suppliers and customers, using the latest technologies:
    - The AIM System addresses the problem of the management of distributed innovation knowledge in complex manufacturing system.
    - The AIM System uses Web services for SMEs to access knowledge management innovation.

2. Project Objectives

Background: Innovation is a critical factor in the success of industrial companies. Innovation is important for all companies, and just as important is the need to get innovative products to the marketplace quickly. To achieve this it is essential to concentrate on good, **innovative products**, and at the same time to focus on **process innovations** (flexible, agile production) to bring these novel products quickly to market.

People inside, and outside the physical boundaries of the industrial organisation are an untapped resource for innovative ideas and knowledge. If the collective talents and knowledge of the people involved with the products and processes of industrial organisation (including the customers and the suppliers) could be collected, processed and developed into a repository of innovation ideas and knowledge, then the potential benefits in terms of innovation could be enormous.

The project goal was the development of a system to support the collection of **innovative ideas and relevant knowledge** throughout the extended enterprise for new and existing process and product developments, and to develop these ideas and knowledge into a means of fostering industrial innovations. Innovation is to be achieved by combining the ideas and feedback from all parts of the product life cycle, including customer interaction with existing products and new product/process ideas, and including customer service and field engineers, including suppliers, and including pooling of knowledge between multiple sites. Such a system will enable **organisational learning** by providing a means to collect, store and use/develop innovative ideas over the extended enterprise.

The basic assumption of the project was that innovative ideas and product/process knowledge can be collected either (a) by requiring innovative solutions of identified product/processes problems and improvement potentials, or, (b) by directly and continuously collecting ideas from all involved actors in an extended enterprise (independently of the identified problems). Therefore, the project concept is to provide an effective collection of innovative ideas, product/process knowledge and information/knowledge on products/processes problems/improvement potentials, to combine/integrate, process and evaluate these ideas and knowledge and deliver them to product/process designers.

The project objectives were:

- To develop a means of stimulating the creation of innovative ideas in general, and specifically on problems solving and on potential product/process improvements and collecting them from people involved with the products and processes.
- To provide aids to efficiently gather information/knowledge on problems and improvement potentials regarding products and processes as a base for required innovation.
- To provide an approach to combine (experience based) knowledge on products/processes and innovation ideas.
- To develop a way of processing these ideas and storing them into a structured knowledge repository. To ensure that all useful knowledge (innovative information) is saved and made available.
- To develop a means of analysing innovative ideas to determine which are useful, and which are not, that is, to enable the viability of ideas to be assessed.
- To develop the best means of delivering the innovative ideas to the product and process designers for maximum effect.

In order to achieve these global project objectives the project had to achieve the following **operational goals**:

- To develop a methodology for collection and management of innovation ideas
- To develop a set of tools including:
    - Collection of innovative ideas and product/process knowledge
    - Collection of information/knowledge on products/processes problems and improvement potentials (asking for innovative solutions)
    - 'Innovation engine' for team development of innovative ideas
    - Innovation Viability Assessment
    - Innovation Management System

  - Innovation repository, product/process knowledge base, problems/improvement potentials repository

- To develop training course to ensure human-centred approach and commitment.
- To validate the developed methods and tools by users.
- To evaluate the success of the results and the potential business offering in terms of exploitation.

The project has been strongly **user driven**, because the project included three end users with clear differences in terms of size (with both large and small enterprises), industrial sectors and improvement areas leading the methodology and tools be validated within several industrial business cases. For each business case the industrial partners (end-users) provided data on the current status of their innovation process:

- number of problems (clearly) identified,
- number of innovative ideas collected within a given time period (taking into account specific product/process aspects),
- number of implemented improvements/new concepts on products/process.

The following **measurable objectives** were initially defined based on definition of the foreseen business cases (these quantifiable objectives will be reviewed and updated in the concept phase of the project):

- To increase the number of innovative suggestions on products from customers and suppliers by 50% (specifically by 60 % with large suppliers and customers – business case 3 and 5);
- To increase the number of innovative ideas on products from employees by 70% (SME business case 1, and business cases 3 and 5);
- To increase the number of implemented innovation/new concepts of products by at least 30 % (SME business case 1, and business cases 3 and 5);
- To increase the number of innovative ideas on processes from employees within an extended enterprise by 50% (business cases 2 and 4);
- To increase number of innovative solutions of the identified problems within processes by at least 30 % (business cases 2, 4).

This should lead to the following **business benefits**:

- Reduction of product innovation cycle-time by at least 30% (specifically for SME business case no. 1, and business case 3 for engineering services, as well as in business case 4 and 5)
- Reduction of time and efforts for solving product/process problems by at least 25 % (all business cases);
- Improvement of process efficiency by 15 % and reduction of wastes by 12 % (specifically within manufacturing process in business case no. 2 and 4).

The main milestones of the project, **enabling measurement of the progress of the project** are:

Milestone 1 (6 M): Finalised conceptual phase, with detailed industrial requirement specifications, and metrics for measuring the actual benefits from the results versus the measurable project objectives.

Milestone 2 (18 M): Early prototype developed, at which point the expected achievements of the system can be estimated.

Milestone 3 (27 M): Early assessment of the system performed, the AIM components have been implemented and are integrated.

Milestone 4 (40 M): Full system training completed and as a result the system is fully validated against the requirements and the project objectives.

3. Applied Methodologies

The project is novel as it seeks to encourage innovation creation in all people who are involved with the product lifecycle, and the production processes. It also encourages team working between people from different sites (and working off-site), and between organisations, customers and suppliers.

The accelerated pace of technological development continuously increases time and market pressures on manufacturers' capacity to innovate new products and designs and to develop the manufacturing processes that produce these products. The relentless race to develop new, higher quality products, simultaneously reducing time to market, reduce product cost, improve quality is a major challenge for all companies. Many companies lack the financial capacity either to invest in the latest technology as it reaches the market or to hire specialists to integrate new methodologies and systematically to improve their products.

Many companies have the required corporate breadth-of-experience to improve their products, improve their processes if they could only make best use of their knowledge resources internally and in partnership with their suppliers and customers. Stimulation of 'Innovation' is a means by which these knowledge resources could be channelled.

Major difficulties for innovation are related with two main topics (which have been addressed by this project):

a) *Intangibility of the inventive knowledge*. The inventive capacity is usually considered more as an inherent property of the genius than something that may be learnt. Intangibility makes the inventive knowledge difficult to accumulate and transfer. Emerging theories say that the capacity for innovation observed in some inventors is not more than an instinctively applied methodology for abstraction, which gives sense to the words "inventive knowledge" (or "innovative knowledge"), defined here as "the knowledge necessary for finding solutions at any abstraction level". Therefore intangibility will be overcome by establishing **rules, methodologies and tools for abstraction and concretion of problems, allowing to accumulate them and their solutions in a hierarchical database** with the abstraction level as hierarchy separator.

b) *Individualisation of the innovation process*. Investigations performed during the last 20 years have demonstrated that innovation is better achieved by working in team. In the first conceptualisation steps the working teams should include the best experts in several fields available worldwide which is completely impractical for many manufacturing companies. Due to this problem, innovation thinking is usually tried by individuals on their own, which becomes almost impossible in the current stressed and time limited working environments.

Such problems could be minimised by employing innovation methodologies during the development process and incorporating tools to support innovation along the process. However, even when enterprises try to incorporate new methodologies, many problems appear due to human- and methodology-specific factors. **Human factors** include **problems of encouraging and convincing people to use new and innovative methodologies**. It is noted that new methodologies, however enthusiastically received, are frequently discarded in favour of familiar methods shortly after they are taught and personnel trained. Implementation of new methodologies is also frequently inefficient in time-management terms due to complexity, dependence on worker experience and interpretation, as well as processing of results. Methodology factors: available engineering methodologies are frequently theory-overloaded and do not integrate well with one another, if at all. In the chain of methodologies there is lack of transparency in planning, cost, technological and quality data's.

3.1 Research Innovations

The basic AIM approach is captured in the Figure 1. The AIM system will include methods and modules/tools for collecting innovative ideas and knowledge on products/processes and on problems and improvement potentials which ask for innovative ideas, for assessing these innovative ideas and their management in order to provide the best use of these ideas for innovative product and process designs.

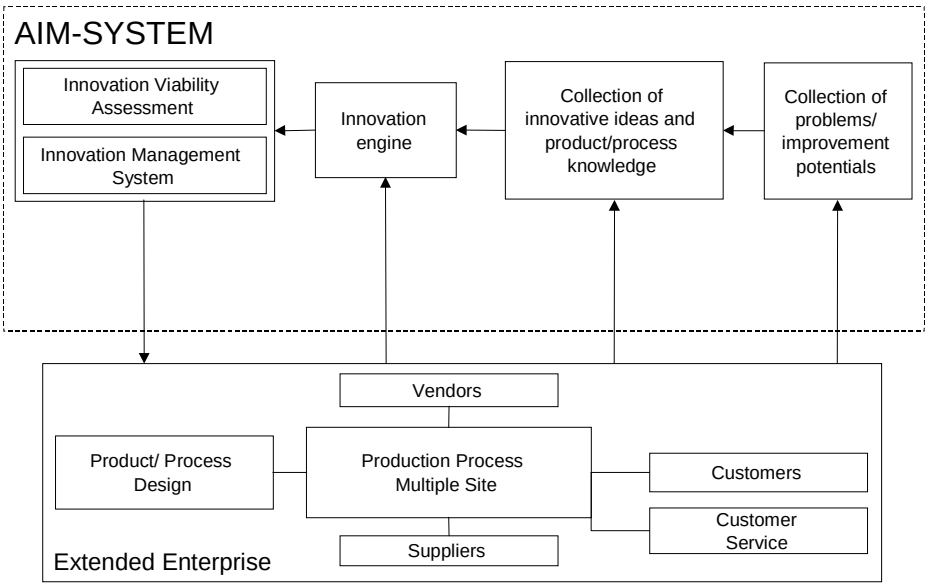

Fig. 1. AIM basic concept

Specific innovations of the proposed approach are:

- **Stimulating the creation of ideas** about products and processes throughout the **extended enterprise**, empowering all people coming into contact with the products or processes to provide their thoughts on improvements and original ideas.
- Interactive solution to be able to take basic ideas, and develop them (by **collective working** throughout the extended enterprise), into product and process design innovations.
- Development of **diverse ideas from multiple sources** into workable innovative designs (for industrial products and processes).
- **Assessment of innovative ideas** to analyse their likely success, and thereby evaluate the viability of ideas / designs.
- Development of specific ontologies needed to **enable efficient exchange of ideas** between different experts/actors within an extended enterprise.
- **Combination of methods** for creating of innovative ideas with 'classical' methods for collection of knowledge on products/processes and problems.
- Development and a **combination of repositories** with innovative ideas, products/processes knowledge and information/knowledge on problems/improvement potentials.
- **Fostering new forms of organisational learning** within the extended enterprise by collecting and storing innovative ideas and making them available over long time period.

3.2 State of the art

The state of the art involves the following aspects:

1. Methods which can be used to develop innovative ideas
2. 'Classical' methods for gathering knowledge on product/processes and problems and improvement potentials
3. Methods for ontologies building
4. ICT Tools which support the innovations process
5. ICT Tools for gathering knowledge on problems and product/processes
6. Research projects in this topic area

These methods, tool and projects will be fully investigated during task T1.2 System Concept (and continually checked to maintain the project innovative status). Particular attention will be given to combine the methods, tools and research approaches for the assessment of innovation and ideas. This will result in a strong baseline for an integrated approach to the AIM methodology.

1) Methods which can be used to develop innovative ideas:

The only known and probed ways of generating innovative ideas are currently based on generic means helping human brains to open their focus, use the lateral thinking and try to be creative. Some creative tools have been developed along the years: Brainstorming, lateral thinking, 6-3-5, think-tank, affinity diagrams, etc. based on the psychological sciences upon the works and ideas of known people as Osborne (creator of the brainstorming and the innovation check list), De Bono (Six Thinking Hats, The Lateral Thinking) and others.
On the other hand, tools extensively used in design such as QFD, VM, FMEA and others give a very valuable help in identifying *where* innovation is needed either by market pressure (QFD), high cost (VM) or potential failures (FMEA) but have few if any hint on *how* actually innovate.

TRIZ – Theory of inventive problem solving. TRIZ is a recently developed methodology giving a more systematic and technological approach promoting not only idea generation, but also a consistent comprehensive method to convert ideas into feasible concepts.

All the methods mentioned in this section will be investigated, as will other relevant methods, and the appropriate (practical and simple) parts of these existing methods will be re-defined and used.

2) 'Classical' methods for gathering knowledge on product/processes and problems and improvement potentials

Possible approaches for detecting products/process problems and improvement potentials include several key 'classical' approaches:

- Benchmarking Approaches,
- Statistical Approaches (methods for the monitoring of processes, e.g. Statistical Process Control, Control Charts etc.),
- System & Model Based Approaches (e.g. simulation, process parameter comparison, model-based reasoning etc.),
- System & Knowledge Based Approaches (Problem solving methods, Rule based Systems, Case based reasoning, Fuzzy Control, FMEA, Ishikawa method, etc.),
- Learning Approaches (e.g. neural networks etc.).

An evaluation of the considered approaches in reference to the stated objectives/criteria such as appropriateness for application within different processes in an extended enterprise, efforts for data/knowledge acquisition and processing, assumed reliability of the results, robustness etc. shows that each of the analysed approaches have certain advantages and disadvantages. For example, statistical approaches require no modelling efforts and are relatively easy to use, but the problems related to the statistical significance of insufficient sample size[1] and the interpretation aspects are critical. On the other hand, system and model based approaches have good interpretation possibilities and no need for a high sample size, but they require high modelling efforts and are sensitive to changes in processes.

3) Methods for ontologies building

The special relevance for the AIM project represent methods for ontology building since they have to serve as a basis to put together and re-use innovative ideas from different actors within an extended enterprise. Knowledge management intrinsically involves communication and information sharing, which can be strongly affected by the context in which it is viewed and interpreted. This situation gets worst when complex domains are considered, as it is the case of the manufacturing domain. The development of ontologies to unify and to put into context the different concepts and terms of the manufacturing domain can be very helpful to avoid misinterpretations. Therefore, application of ontologies is promising to solve basic problems of sharing of knowledge on innovative ideas within an extended and distributed manufacturing enterprise. Work on ontology is becoming more widespread in the ICT area, and its importance is being recognised in many research fields and application areas, including knowledge engineering, database design and integration, information retrieval and integration. In some cases, 'ontology' refers to the result of activities such as conceptual analysis and domain modelling, carried out by means of standard methodologies. In many cases however, 'ontologies' present their own methodological and architectural peculiarities, and it is easy to get too deeply involved in the complex technological issues in this area. A balanced approach is needed.

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1 Sample size of process and product features measurements are often very restricted even in mass production due to high variety of product models etc.

The notion of 'ontology' as a formally specified conceptualisation shared by a community of practice is well established and is applied in several areas relevant to AIM. The essential role of ontology is to support reuse, which can take place in several different scenarios. For example, ontologies have been used to support the specification of reusable libraries of problem solving components, to drive knowledge acquisition, to allow semantic information retrieval and to structure collaborative innovation ideas creation processes. Problem solving methods can be designed to support knowledge sharing and reuse. While ontologies capture a shared terminology, problem collecting and solving methods can define generic algorithms, which can be applied to different tasks and domains.

Different type of ontologies can be defined and with different levels of abstraction. They can range from higher level (concepts common to all domains), to more domain-specific such as ontology of re-engineering, production management or even maintenance. The development of top-level ontologies is still an open-research issue. The most representative type of generic or top-level ontologies are Ontolingua ontologies, CyC, Wordnet, MikroKosmos, Guarino's top-level proposal, and Sowa's Boolean lattice. Another important work to be stressed is the Knowledge Representation ontology, implemented in KIF (Knowledge Interchange Format), which captures the representation primitives of the frame-based languages. In more domain-specific such as manufacturing there are currently several research experiences. The most important are the Enterprise ontology and the TOVE (Toronto Virtual Enterprise). The most well known methodologies to build ontologies are Uschold's (Enterprise project), Grunningen and Fox's (TOVE), and Methonthology's methods (ODE). The most used languages are Ontolingua (based on KIF), CyCL (based on first-order predicate calculus), Loom (based on KL-ONE), and Flogic (an integration of frame-based with first-order predicate calculus).

There are currently several tools to support the development of ontologies. Some of the most promising examples are addressed here: The best-known environment using the Ontolingua is the Ontology server, which provides methods and tools that can be remotely used (leaded by the KSL lab of the Stanford University). The Ontosaurus uses loom as its representation language and is led by the ISI of the University of South California. It can be accessed using a browser because of its ontology browser server. The Knowledge Media Institute of the Open University in UK develops Webonto, which is complemented by Tadzebao. Webonto is a tool for collaboratively browsing and editing ontologies, while Tadzebao is used to support both asynchronous and synchronous discussions on ontologies. The Computer Science of the Polytechnic University of Madrid (UPM) is developing ODE - Ontology Design Environment. It aims to support developers from the requirements specification, through knowledge acquisition and conceptualisation, to implementation of any ontology, covering the entire life cycle.
As being obvious from this brief overview ontologies attract high intention of RTD community. However, their application in practice is not still wide spread and additional RTD activities are needed to provide application oriented method for product and process innovation domain. Especially what is needed is a means for continuous update of ontologies enabling long life of knowledge systems. AIM, whenever possible, plans to reuse or extend ontologies that can be applied in its context. New developments made in the manufacturing context or in any other will be submitted to the above listed representative type of ontologies.

4) ICT Tools which support the innovations process:

There are two software tools based in the TRIZ methodology for inventive problem solving: IBW (Innovation Work Bench) and TECH OPTIMIZER (Both based in USA). Both software packages use schematic representation of problems and automated analysis of generated diagrams that guides the user to the abstract solution. Technical information and examples are included for helping the user in the particularisation of the solution. However, these are both aimed at the scientist level of user, and not at the industrial manufacturing level.

Ideafisher, Inspiration professional edition, is another tool for helping to generate ideas. However, again this is aimed at the specialist level, and is not appropriate for industrial companies.

However, some tools exist to support application of other methodologies (QFDCapture from ITT for QFD, GAMDEC/GAMTREE from France for the FMEA, CDCF for Function Analysis according to French standard AFNOR X50-X51, DECIDOR and EXPERT CHOICE supporting decision-making for concept evaluation, etc) AIM can benefit from these by incorporating their best features in the new system.

Please refer to section 11 References for further details of tools.

5) ***ICT Tools for gathering knowledge on problems and product/processes:***

There are many commercially available products providing means to capture knowledge on problems and product/processes, which the AIM consortium have been investigating and which may be used as a basis for development of certain AIM modules. Further thorough analysis of tools will be carried out within the system analysis phase of the project. The tools analysed primarily address heuristic (Case base Reasoning and Rule Base Reasoning) and model based reasoning approaches. Some examples are listed here:

- Good examples of CBR tools are KATE, Easy Reasoner, ReCall, Know How etc. They all are tool kits to develop Case-Based Reasoning Applications. For example, the KATE Software Suite is an Internet based Tool-Kit. ReCall includes an Object-Oriented graphical language to develop case structures and domain concepts.
- TER includes a Rule-Based System, which supports forward and backward chaining. TER is able to generate decision trees from existing databases. RAZ'R is tool set, which provides the design, parameterisation of models and the diagnosis process.
- GRADE contains tools to assist in the diagnosis and repair process. It captures and automates the knowledge from the process. Diagnostics rely on Model-Based Reasoning and Case-Based Reasoning.
- RODON contains simulation and diagnosis software. Beside other application areas, this is a new generation software system for the functional analysis of complex systems.
- Diagnostician provides a development tool and a run-time tool. The development tool assists the engineer in preparing the run-time diagnostic knowledge base.

The main problems with these reasoning methods/tools is a re-use and sharing of knowledge among different experts and partners within distributed and extended industrial companies, since the most of the existing tools are missing capabilities to provide presentation of the captured knowledge in appropriate form to different actors by provision of a personalised, context-, task- and role-sensitive functionality and a maintenance of such knowledge systems requires knowledge system specialists.

6) Innovation Assessment:

Some tools already exists to help assessing innovation capacity:

- Innovation Styles for Groups from the Innovation Group Consulting Inc.
- According to its description, the product is unique and focus on evaluating *how are you innovative* rather than *how innovative are you.* It is based on the fact that all people are unique individuals and while everyone has the capacity to be creative and innovative, each of us expresses this potential differently
- Innovation System Architecture (ISA) from the same company.
- Assess your team's or organization's "infrastructure" to cultivate, support and sustain innovation. It incorporates the Innovation Group model for creating the framework or architecture for sustaining organizational innovation.
- The Innovation Assessment Program by United Inventors Association.
- It is an inventor/innovator assistance service that provides inventors, entrepreneurs, and product marketing/manufacturing enterprises with an honest and objective third-party analysis of the risks and potential of their ideas and inventions. This is why it focuses on invention evaluation.

These identified tools and methods will be very valuable for the project to help us to set up the methodology's success measurement system. A combination of good ideas from them will probably be integrated in the AIM system

7) Research Projects:

The following are projects of particular relevance to AIM, where the consortium believe significant benefits can be derived to enhance the AIM results:

- COMMA IST-1999-12217 implements and trials a Corporate Memory Management framework based on Multi-Agent technology. The goals are: Performing process that detect, identify and interpret technology movements and interactions for matching technology evolutions with market opportunities to diffuse among employees innovative ideas related to technology monitoring activities.

- AMIES. BR2-0194. Automotive Multi-Company Integrated Engineering System. Within this project we achieved a very relevant knowledge related to product design in a multi-company frame working under Concurrent Engineering and Total Quality Management (Integrated Engineering).
- ON-TO Knowledge IST-1999-10132 applies the concept of ontologies to electronically available information to improve the quality of knowledge management in large and distributed organisations.
- CORMA IST-1999-12685 aims to develop a knowledge management environment to support the new product development processes in "Concurrent Enterprises" in the telecommunication sector.
- QUETA project: Project dealing with knowledge repositories for solving quality problems in extended enterprises. Application of Rule Based Reasoning could be reused for AIM.
- PICK project: Tools for Process Improvements Based on Corporate Knowledge Management. Project dealing with management of corporate knowledge for process improvement. Application of RBR and CBR for problem solving. Application of Enterprise JavaBeans and CORBA. Approaches, which could be partly used for AIM.
- KNOW_IT. IST-1999-56403. Practical Knowledge Management to support Front-line Decision-making in SMEs. PRIME will highly benefit from this project in the collection of product knowledge related to the front-line aspects: servicing and customer's problem solving, order exception, contract set up…
- REMOTE. (GROWTH) GRD1-2000-25433. REMOTE product/customer support via extended enterprise. REMOTE is concerned with problem solving at customers' site, whereas PRIME is an extended enterprise Product knowledge management system. PRIME will benefit by looking at the extended enterprise approaches taken in REMOTE.
- PROMISE. CRAFT (GROWTH)-1999-70326. Product Knowledge Management Support System, across the Extended Enterprise. This project is aimed at extended enterprises for SMEs.

3.3 Challenges

The main challenges that the AIM project faced were:

- Developing practical means of developing ideas into innovations in products and processes. This will involve taking what are currently available and producing methods of rapidly taking many creative ideas, and assisting people to work together in a structured manner to develop these ideas into innovations.
- Capturing and structuring of innovative ideas over extended enterprise in such a way that they can be best used for product/process innovation; this is typical 'difficult to structure knowledge' which asks for high level 'innovation' meta classification- on one side the structure must not restrict creativity of the people, on the other hand they must be structured in such a way to be easy to asses and re-use.
- Providing means for team development of innovative ideas over extended enterprise is a high challenge and asks for generic approach for development of ontologies applicable in the context of specific products/processes.

The research needs, in comparison to the state-of-the-art, which will be covered by the AIM project (i.e. differentiating factors of the proposed research work) include:

- **Ontologies:** Although ontologies attract high intention of RTD community, their application in practice is not still wide spread and additional RTD activities are needed to provide application-oriented method for product and process innovation domain. Especially what is needed is a means for continuous update of ontologies enabling long life of knowledge systems. AIM intends to re-use and further enhance ontologies that can be applied in the context of product/process innovation. The AIM tool will include a set-up enabling continuous update of ontologies.
- **Structuring of ideas:** Since ideas are typical 'difficult to structure knowledge', there is no appropriate approach for structuring of such knowledge in such a way that they can be best used for product/process innovation. AIM will develop high-level meta classification of ideas, which will enable structuring of this knowledge for effective re-use (serve to structure idea and innovation repository). The classification will be adjustable to specific user needs, i.e. the system will include module for set-up of the classification appropriate for user.

- **Methods and tools for gathering knowledge on product/processes and problems and ideas:** An evaluation of the considered approaches shows that each of the analysed approaches has certain advantages and disadvantages. The main problems with the reasoning methods/tools are a re-use and sharing of knowledge among different experts and partners within distributed and extended industrial companies. AIM intends to use existing tools (RBR and CBR) in combination to appropriate ontologies definition, meta classification of ideas, product/process models to be included in the knowledge repository and adequate user interface to provide presentation of the captured knowledge in appropriate form to different actors. AIM will provide an enhancement of classical reasoning tools to achieve personalised, context-, task- and role-sensitive functionality and an effective maintenance of such knowledge systems.
- **Methods which can be used to develop innovations:** Existing methods aim at the scientist level of user, and not at the industrial manufacturing level. AIM intends to provide methods and tools, which will be applicable in the industrial environment. A combination of TRIZ, RBR and CBR as well as repositories of ideas and knowledge on product/processes (included in models) will be applied which is currently not available for innovations development domain. TRIZ methodology refers to the use of past knowledge to overcome problems and both RBR and CBR use past information, gathered in rules or cases, to reach a result. The necessary knowledge to realise these reasoning methods will exist in the AIM system, either as innovations, ideas, or product and process knowledge. Given the presented architecture, the reasoning methods are very adequate to present a possible solution for problems, because the system contains information on past experiences. All three reasoning approaches will be used to combine the ideas into innovation concepts by providing set of ideas that may fit together, providing previous appropriate combinations etc. By providing appropriate user interface the Innovation engine will be built applicable for industrial environment.

3.4 Method Applied

3.5 General Approach

In order to ensure reliable validation of the AIM methods and tools, metrics have been defined to enable a quantitative assessment of the project progress and the results achieved. Some initial metrics and target values have already been defined in the project preparation phase, but they were elaborated in detail in the scope of WP1 specifically within Task T.1.1 Business Case Scenarios and Task T.1.3 Requirements analysis. These **quantitative metrics** include (see Deliverable D.1.3 Requirements analysis):

- Business metrics - benefits such as,
- Reduction of product innovation cycle
- Reduction of time and efforts for solving product/process problems
- Improvement of process efficiency
- Technical metrics – requirements upon the tools.

In order to provide **appropriate procedures for self-assessment throughout the project**, the following strategy is applied:

The metrics related to technical aspects were first assessed within early prototypes of the critical issues (e.g. ontology definition, innovation engine, etc.) while however using the knowledge/information gathered in the real industrial environments.

The early prototypes were installed in the industrial environment to enable testing the tools under the real conditions. The early prototype was focused upon relatively limited number of users within the different business cases. This enabled measuring the success of approaches and tools. The business metrics were applied as well within the testing of early prototypes in the manufacturing environment.

The results of these assessments were used to provide feedback to the full prototype development.

The full prototypes were then applied in the industrial environments of the three end-users, the final measurement of all defined metrics were carried out aiming at achieving all defined targets.

The quantitative results of this evaluation process will be used as marketing arguments for further **exploitation activities** for the methods and tools.

3.6 Testing Method and Guidelines

The approach followed in the AIM project to realise the software architecture is a combination of several state-of-the-art methods, enabled by development environments, and supported by standard terminology. AIM will follow a method combining the Extreme Programming (XP) approach, the "4+1" View Model. A first draft modulation of the AIM architecture was made, using the "4+1" View Model. This first model was driven by the end users' requirements, and was neither too specific nor too detailed. Then, during the whole duration of the project, especially during development, an iterative process will be realised, using practises from the XP approach.

The testing procedure in AIM was partly based in the approach presented in the Rational Unified Process[2]. An iterative approach was used, which also complies with XP concept, which allows detecting errors as early as possible, radically reducing the cost of fixing.

The purposes of testing are:

- To verify the interaction between objects.
- To verify the proper integration of all components of the software.
- To verify that all requirements have been correctly implemented.
- To identify and ensure defects are addressed prior to the deployment of the software.

Tests were performed based in test cases, which are described in detail in this deliverable. As one of the main purposes of the tests was to verify if the system fulfils the end-users' requirements, the information defined in the use cases was used as a basis. From the use case scenarios defined in the analysis and specification phase of the project, and also the requirements derived, test cases were defined. The purpose of the test cases is to define flows of activities to be realised using the AIM system, which can be traced to the use cases and requirements defined.

[2] "Rational Unified Process: Best Practices for Software Development Teams", Rational Software White Paper TP026A, Rev 11/01

4. Project results and achievements

4.1 Overall Project Results and Achievements

Objective	Progress
To analyse and identify End-users Requirements on AIM	Complete
To define the overall AIM System Concept and System Architecture	Complete
To specify the AIM System Modules.	Complete
To develop and implement system components	Complete
To integrate all the developed components.	Complete
To validate early and final prototypes	Complete
To develop Training material and carry out end-users training.	Complete
To carry out the system validation and produce the system validation report	Complete
To produce the Technology Implementation Plan (Final Version)	6th version Complete
To produce the Dissemination and Use Plan (Final Version)	6th version Complete
To create and update the project web-site	Done
To perform dissemination actions.	Done

4.2 AIM Innovation System Full Prototype

Table 1 presents an overview of the modules implemented in the full prototype, with their respective Application Functionality, identified within Deliverable D3.1 Requirements Analysis.

Table 1: Full prototype functionality

No.	Functional Scope and Performance Description
AF-01	**Collection of Product/Process Knowledge:** AIM supports the **introduction of data** related to products and processes and saves it in the Products/Processes Knowledge Base. In addition, AIM Tools supports the collection and the validation of the data provided **by other systems**.
AF-02	**Collection of Problems:** Supporting the introduction of **data related to problems occurred** in the manufacturing processes or products. This information is saved in the Problems Repository.
AF-03	**Collection of Ideas:** AIM supports the **introduction of innovative ideas and relevant knowledge** and saves them in the Repository of Ideas. Ideas can be related to the development of new products and/or processes, as well as related to the improvement of existing products/processes. AIM also supports the collection of innovative ideas and relevant knowledge throughout the **extended enterprise**.
AF-04	**Collection of Innovations:** Supporting the introduction of Innovations in the Innovations Repository. This task will mainly consist **in importing innovations** from existing sources and repositories.

No.	Functional Scope and Performance Description
AF-05	**Innovation Viability Assessment (I):** AIM **classifies the ideas** stored in the Ideas Repository, in order to determine if they are valid and potential innovations or not.
AF-06	**Innovation Viability Assessment (II):** In addition, it supports the **decision-making** weighing up the Concepts developed from a global point of view.
AF-07	**Innovation Management System (I):** Supporting the assessment of ideas realised by the Innovation Viability Assessment, by **delivering the information in a structured fashion**. In addition, AIM Tools controls the efficiency of recommended ideas and gives feed back to the users.
AF-08	**Innovation Management System (II):** AIM provides the innovations **information to the design team and management of the company in the most suitable way**, enabling a more efficient development of new products/processes and improvements of existing ones.
AF-09	**Innovation Engine (I):** Supporting the **products/processes improvements**, completing the tasks realised by the Innovation Management System (II).
AF-10	**Innovation Engine (II):** Providing **potential causes and solutions for problems** detected in the manufacturing processes or regarding the products.
AF-11	**Knowledge Acquisition and Administration:** AIM Tools supports the definition and maintenance of users and user groups, and respective rights.
AF-12	**Graphical user Interface:** Provideing methods to collect personal profiles of each user and provide personalised and context sensitive view for each user.
AF-13	**Ontology:** A generic ontology developed and maintained applying a market available tool and related to repositories in different subsidiaries (plants).
AF-14	**Set-up:** The AIM system includes a module to set-up the knowledge base. In addition, the classification of ideas is adjustable to specific user needs, i.e. the system includes a module for set-up of the classification appropriate for user.

From the technical point of view:

- AIM supports and uses the state of the art standards and technologies, including XML, J2EE1.4, EJB2.0, Webservices and most importantly, it provides **several APIs aiming at providing the possibility of further developments.**
- AIM uses **open source/ freeware libraries** and technologies such as JBoss, JDom/Xerces- XML parser, etc.
- AIM supports **several database management systems**, such as Oracle, MySQL and Informix, giving the customer different options according to their own preferences and company policies.

- AIM strongly uses **component-based development** enabling an easy **extensibility, robustness and customization.**
- AIM is Java-2 compliant as is based on a 3-tier architecture.
- Since companies have different needs and infrastructures, different requirements in that respect have also been taken into account. AIM is **available in two client versions**: a **fat one, which is a java application** to be installed in a PC with access to the AIM main server, and secondly, a **thin client, which is web browser client**. The last one does not require any installation and accesses the server by means of a web browser.

4.3 Brief description of the AIM System full prototype

As described in previous deliverables (see D1.2 or D4.1), the AIM system is divided in several modules. Figure 1 presents the AIM modules.

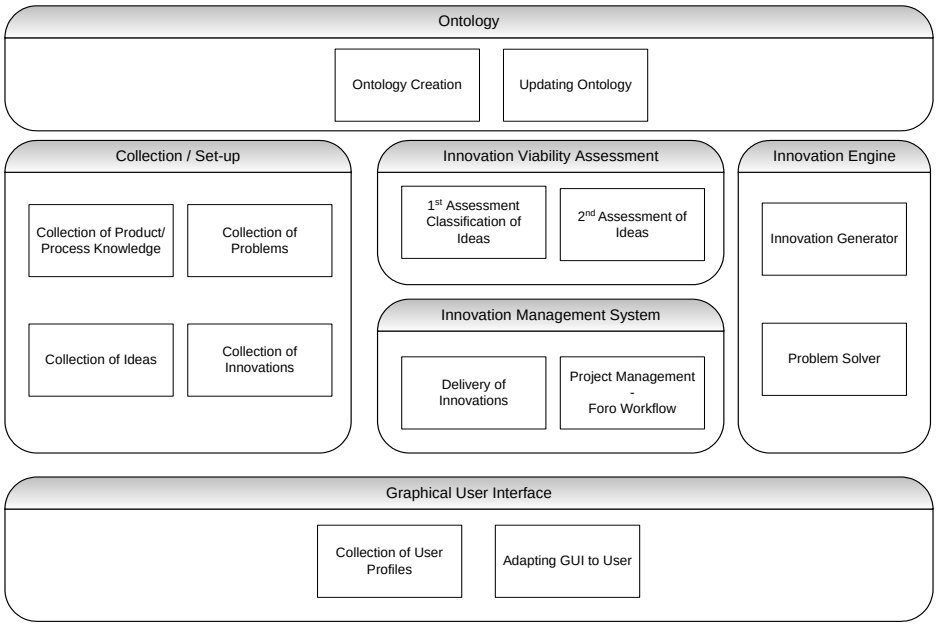


Figure 1: AIM modules

4.3.1 Common Knowledge Base

The Common Knowledge Base was implemented in the three business cases as a relational database, using Oracle. This technology was chosen because it is currently used by all three end-users.

4.3.2 Set-up

The Set-up module was tested in the scope of the early prototype as a stand-alone java application, installed in the companies. This module supports the definition, modification and deletion of all the information that constitutes the static data of the Common Knowledge Base. Figure 2 displays the GUI for the set-up module.

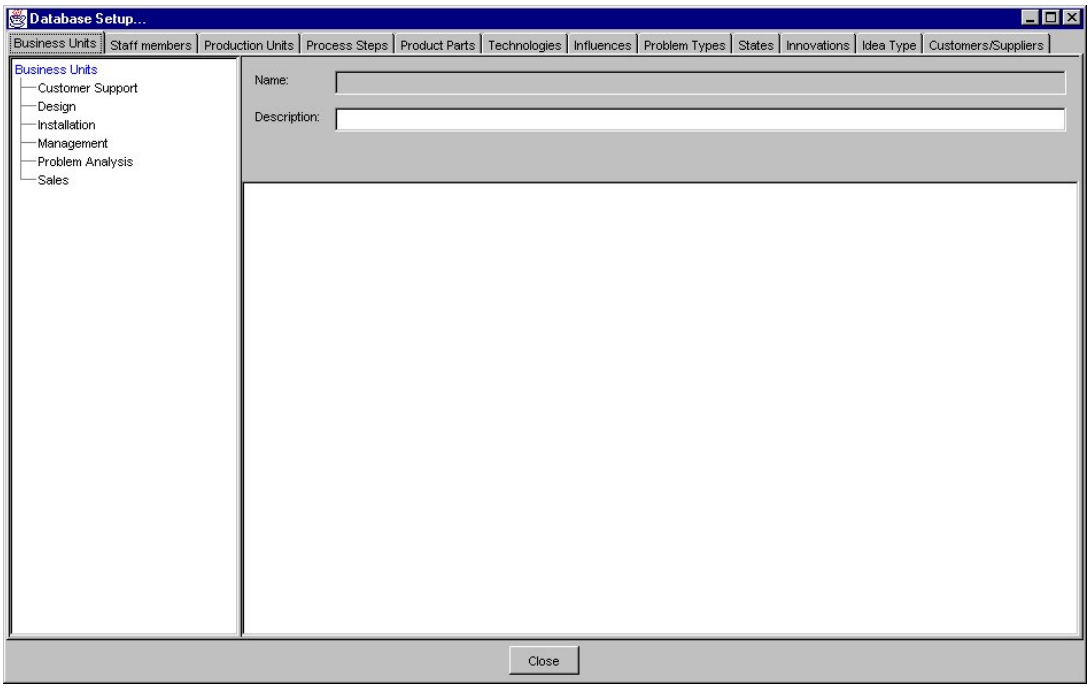


Figure 2: Set-up module

In addition, this Java application comprehended the necessary functionality to administrate the users of the AIM system, including the definition of users and user groups, and the definition of rights for each user group, regarding what could be accessed, modified and/or delete in the system.

4.3.3 Collection System

The Collection system implemented and tested in the early prototype was divided into two parts: collection of ideas, and collection of problems/requirements. The Collection System was provided to the end-users as a Java application.

The part of the module handling collection of ideas covers the following functionality:

- insert new ideas in the CKB;
- modify ideas already stored in the CKB;
- delete ideas stored in the CKB;
- search ideas stored in the CKB, using basic criteria (responsible user, date, generic involved, problem related)
- obtain ideas similar to a selected one, using CBR.

In addition, the functionality to insert or edit ideas could be realised using one of three available GUIs. This selection was made by users, when using the software, and could be modified at any time.

The GUI to list all ideas stored in the CKB is presented in Figure 3, and one of the GUIs to add/edit ideas (Expert GUI) is displayed in Figure 4.

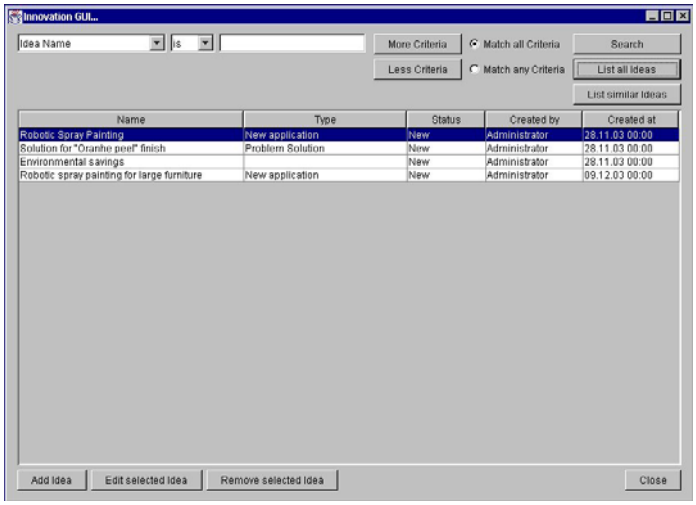


Figure 3: Ideas List

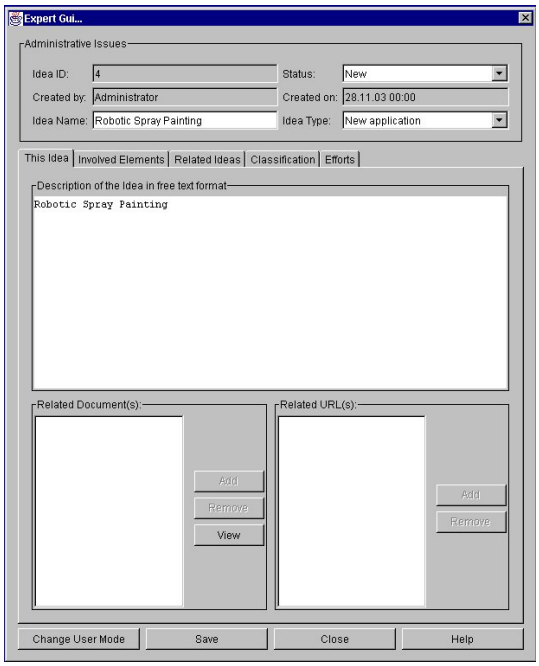


Figure 4: Expert GUI

The part of the module handling collection of problems/requirements covers the following functionality:

- insert new problems/requirements in the CKB;
- modify problems/requirements already stored in the CKB;
- delete problems/requirements stored in the CKB;
- search problems/requirements stored in the CKB, using basic criteria (responsible user, date, generic involved).

The GUI used to list all the problems in the CKB is presented in Figure 5, and the GUI to add/edit a problem is displayed in Figure 6.

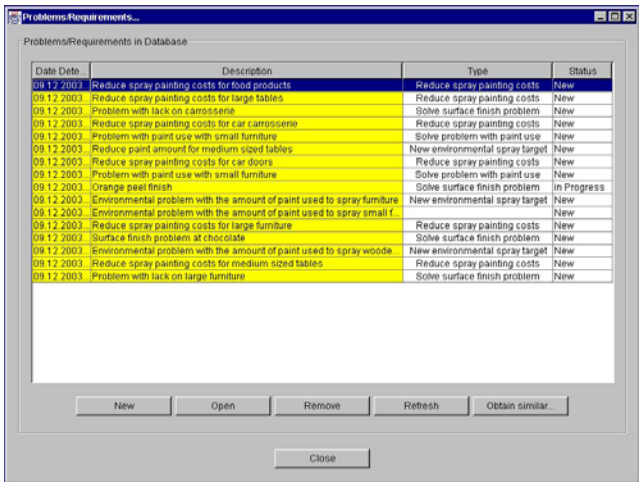


Figure 5: Problems List

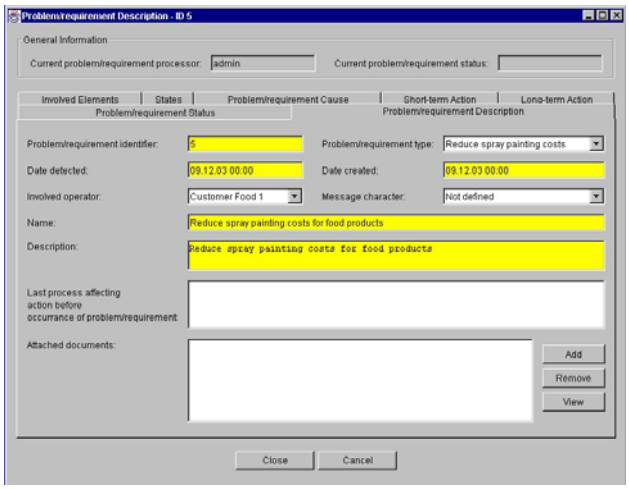


Figure 6: Problem Description

4.3.4 Innovation Viability Assessment

The First Viability Assessment was developed in order to help manage the Ideas/Problems introduced in the AIM System. Raw Ideas and Problems detected that are collected within the AIM System are filtered in order to be stored and work on feasible and realistic ones.

Therefore, the AIM First Assessment prototype was developed to enable the management of the incoming inputs:

- checking the idea/problems pending of validation,
- storing/deleting Ideas/problems depending on their technical viability, interest for the company, innovation associated,
- searching related Ideas, problems,
- relating the Idea/problem to specific products, generics, users, ideas, problems.

The GUI used to realise the first assessment of ideas is presented in Figure 7.

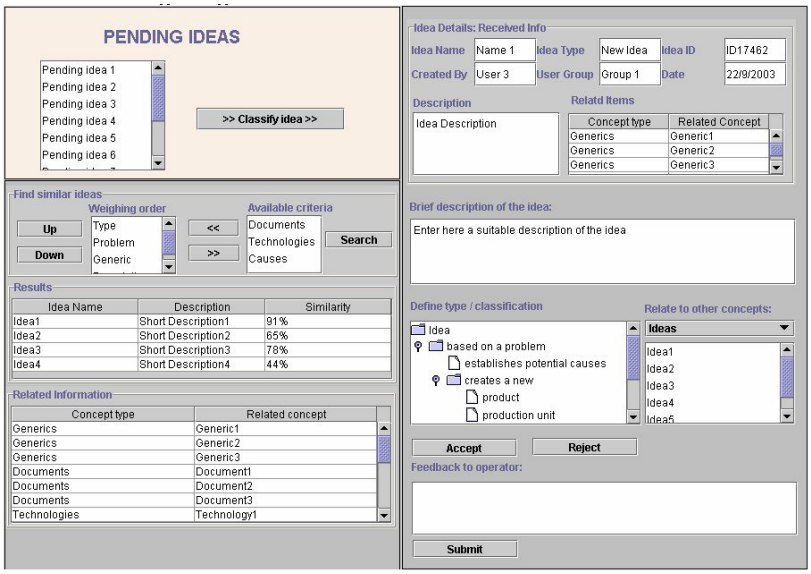


Figure 7: Innovation Viability Assessment I

The Second Viability Assessment will validate the developed Concepts. Due to the complexity of a decision like this, the assessment of the Concept can focus only on technical viability or costs, but also on other aspects related to it as they could be choosing between one or another technical solution, leading times, materials, functionalities, etc. Normally, before the implementation of a developed Concept, several assessments must be done considering all uncertain aspects of it. The final decision must be made conjugating all these assessments, which means a multi-criteria decision-making.

In addition, and from a higher level of decision, usually the innovation processes faced by companies are complex and have different possible paths among which they must select one. This decision must contemplate several aspects, for example between different levels of change for a product or process considering life cycle estimation for it, economical and commercial features, resources availability, etc. Thus, this operation is considered a strategic assessment, where the responsible(s) of weighing up all chances and possibilities must decide the one that best suits to the company's present characteristics. Next, and following the Life Cycle of an Idea defined for the AIM System, the Assessed Concept will be implemented and tried, considering the implementation plan thought up.

The Assessment will be based on information collected from different actors depending on the type of the decision to be made. This information stored in the Innovation Repository, will be of different types. By means of the Project Management application (defined in the Innovation Management Module, D3.2.2) all the information required for each decision analysis will be provided in the most suitable way.

The first step of the validation process will consist on selecting and defining the different alternatives, see Figure 8:

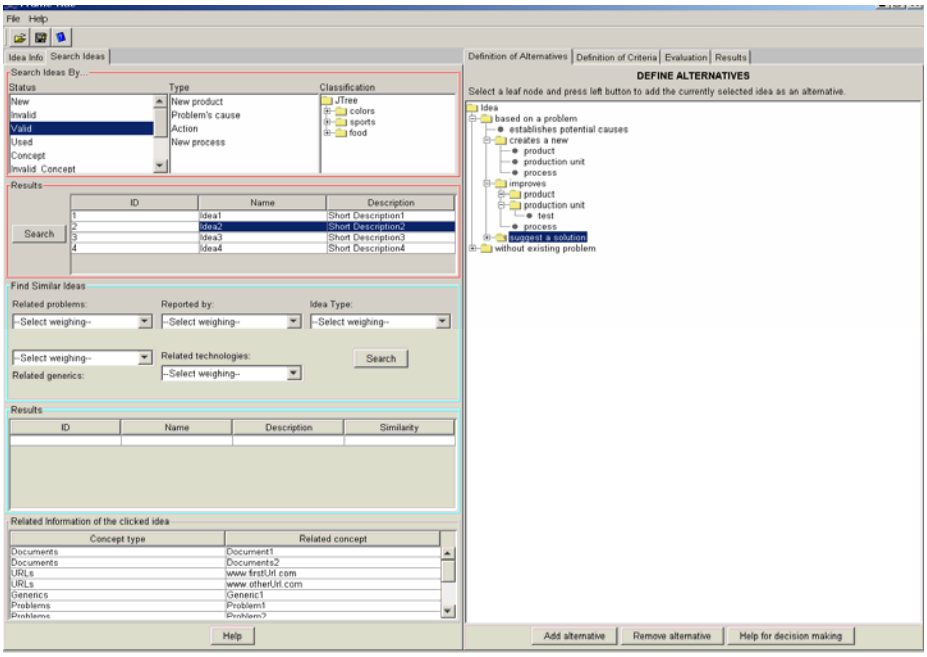


Figure 8: Innovation Viability Assessment II, definition of alternatives

The next step of the Second Viability Assessment is the definition and evaluation of criteria, Figure 9 and 10:

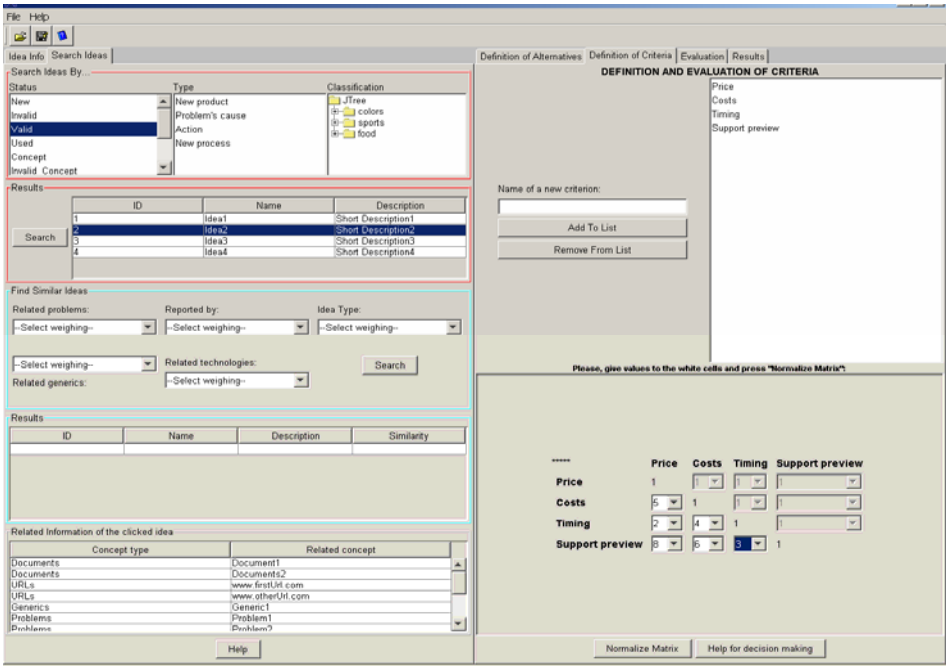


Figure 9: Innovation Viability Assessment II, definition of criteria

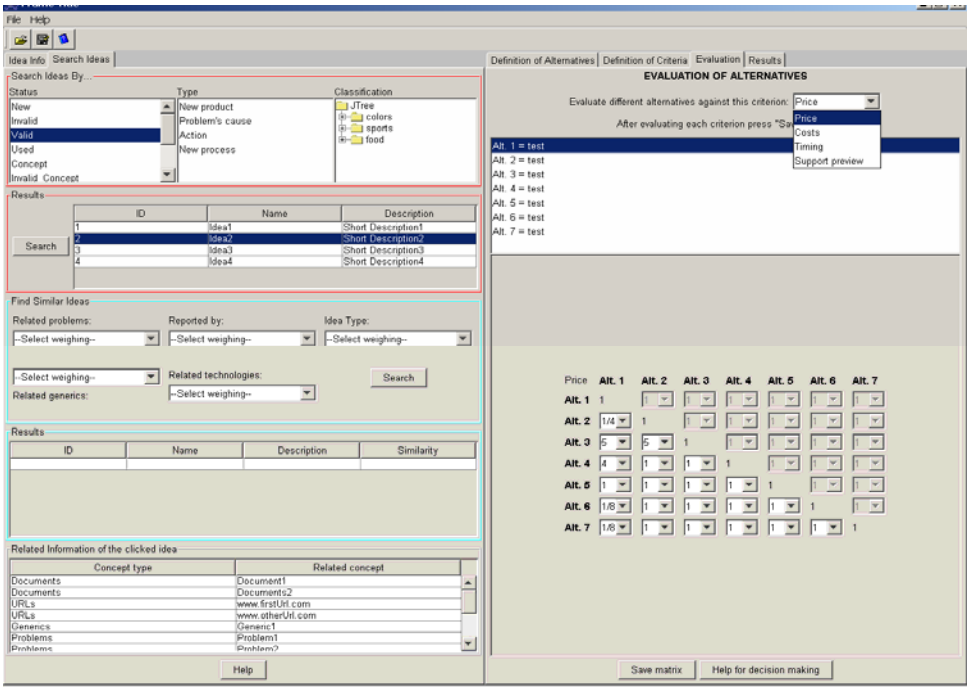


Figure 10: Innovation Viability Assessment II, evaluation of criteria

Being the final step to consult the results from the validation, and take the decision of continuing with the implementation process or not, Figure 11:

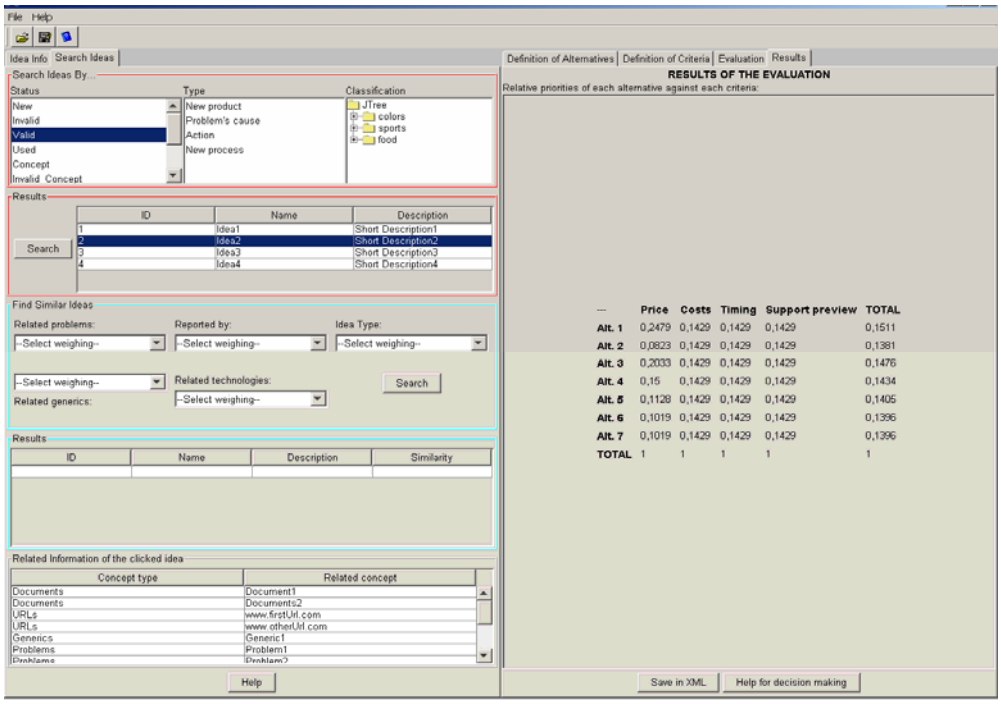


Figure 11: Innovation Viability Assessment II, consulting results

4.3.5 Innovation Engine

The Innovation Engine was implemented and tested in the early prototype in two different ways:

- The Innovation Generator that aims to foster products/processes improvements,
- In order to support the solution of problems detected in the manufacturing processes or regarding products, the Problem Solving was developed.

These applications, developed as Java application to be integrated for fully usability with the rest of AIM Modules, provide different functionalities that aim to support technicians in analysing technical problems and requirements to be solved.

They consist of:

- Easy and friendly access to information/knowledge from the Innovation Repository, making re-use of functionalities, as search problems/requirements stored in the CKB, using basic criteria (responsible user, date, generic involved), developed for Collection System.
- Guided Methodologies, specifically oriented for enabling depth-analysis of the System when this situation arises, and guiding in the process of either developing Ideas or solving Problems.
- A graphical space for representation and combination of Concepts, Ideas or Information.

4.3.6 Innovation Management System

Innovation Management System manages the life cycle of ideas and problems. Both ideas and problems undergo complete cycles with different phases, changing their status as phases are passed.

For that purpose, other modules interface it. Mainly, Collection System will interface IMS when collecting a new idea, to start the life cycle. However, this module will also be able to deliver information to the final users: in the way of feedback to those who participated in the life cycle and in the way of statistics. Both will be further described later.

IMS is based on FORO Workflow that is a commercial workflow engine. With FORO Workflow, processes can be first modelled, using FORO Model Designer and then implemented.

A process model has been designed to keep track of the life cycle of an idea. In the first Figure, an Idea Life Cycle can be seen. The nodes are the status of the idea, from new idea to innovation. The transitions are the steps between states. In the second Figure, the process model designed for FORO can be seen. In this case, the nodes are the steps.

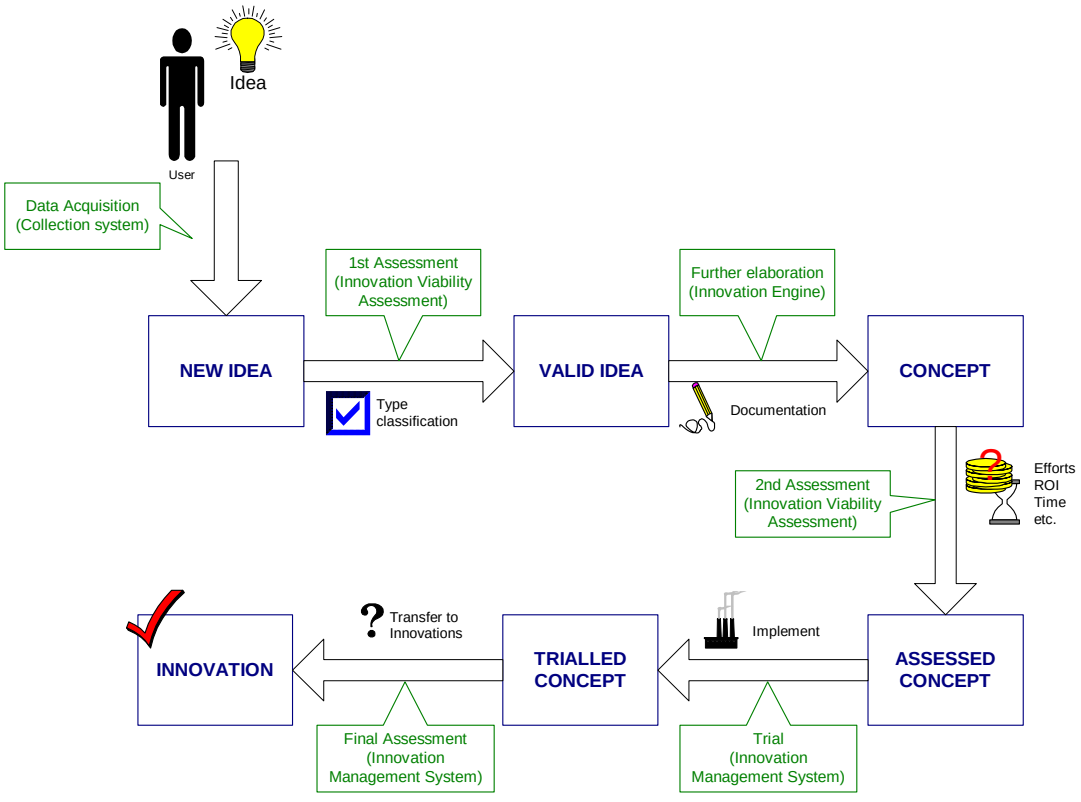


Figure 12: Life cycle of an idea

Design a process in FORO is dividing it into multiple simple tasks and relating them following all the possible branches that can occur in the real business process. In this case, all the steps are sequential, though the sequence can be broken if any step is not approved causing the end of the life cycle.

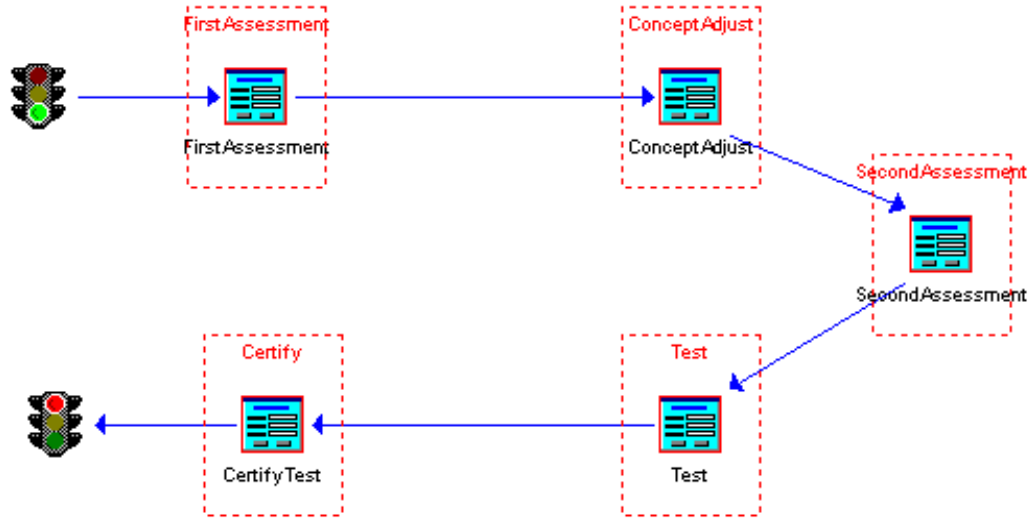


Figure 13: Process Model designed by FORO

4.4 Relations with other Projects

The AIM project is aware of two major networks of excellence: The European KM Forum and CE-NET. The European KM Forum is a network which focuses on Knowledge Management and which has currently found over 2.200 members mainly from industry. The European KM Forum represents itself mainly through the website http://www.knowledgeboard.com. CE-NET on the other hand is a small network (>220 members) of CE experts mainly from academia. The members have strong relations among each other, which can be seen when many of them meet yearly at the ICE conference. CE-NET is represented by their website http://www.ce-net.org.

Both networks were approached to disseminate the results of the AIM project, and to provide further opportunities to benefit the project.

Furthermore, AIM regarded the results of the IMS Humacs and PSIM (IMS-1999-04) projects, to position the AIM deliverables, the relationships to standards, methodology, system architecture and the problem of semantic interoperability.

AIM explored the possibility to develop links with CO-IMPROVE, a research project funded by the European Commission, under the Growth programme, aiming to support Collaborative Improvement (CI) in Extended Manufacturing Enterprises (EMEs).

The AIM project has participated in the " Innovation Cluster Review". This has made it possible to identify potentials for collaboration with the other projects. Collaboration is sought with the DISRUPT-IT project, which is seen as complementary to AIM. AIM is a structured, incremental approach to innovation, whereas DISRUPT-IT is a radical approach to innovation. Customers for both systems are not always the same, but synergies have been found. ATOS Origin is involved in both projects as software solution provider and will provide a means for deep collaboration between AIM and DISRUPT-IT.

4.5 Benefits to Society

AIM is an integrated methodology consisting of leading state-of-the-art techniques to produce a unique methodology for providing a comprehensive support for innovative product and process development. It contributes to several areas of EU policy such as:

Competition

The IST programme supports research activities supporting European competitiveness: Europe suffers from a recognised gap compared with its major competitors, inasmuch as it is less able to translate its scientific knowledge into innovation. Not only research but also innovation in respect of new concepts (e.g. eco-industries) should be fostered to boost competitiveness and productivity.

Future use of AIM throughout European companies will enable European industry to fill the competitive gap with the Japanese and North American competition, in terms of being able to develop and introduce new products to the market faster and more targeted to the market needs.

An important outcome for the project will be for users of the AIM methodology to increase their market share and, to be able to manage future product/market evolution better than before, and maintain increasing market shares.

Horizontal Policies:

The AIM System intends to support industrial companies, applicable specially for SMEs, in the collection and management of innovative knowledge. One of the end user in the consortium is SME and their requirements have been strongly taken into account when specifying the AIM system. Therefore, AIM is likely to considerably contribute to the competitiveness of the SMEs, by providing them with a means to foster their innovation capabilities and shorten the time to market.

Modernisation of European Industry

The current global supply market has generated a wild competition among companies. Under this situation, organisations are compelled to devote huge resources and efforts in modernisation. Within this scope, new products design and development is a key area on which AIM will provide to industrial companies new methodologies enabling them to develop new products including differentiating performances at very low prices. This is the only way for the companies to become really competitive.

AIM will assist European industry to improve its performance in terms of bringing innovations to market, faster, and better than before, and will support innovative process improvements. This achievement of rapid innovation will contribute to the following Community social objectives:

4.6 Employment, education, training and working conditions

- **Employment:**
- The solution resulting from AIM will allow manufacturing companies to highly increase their selling rates and market share. As a direct consequence, increasing levels of production will be necessary to cover market demands and a need of hiring new personnel will arise from the consumer goods manufacturers. In summary, AIM results will greatly enrich the influence area of the partners' industrial companies.
- Current social trends in the participating sectors mostly aim on trying to get the maximum production rates without any increase in manpower. This is possible only if growing rates are not very high. By the achievements from AIM the expected rates of growth for the participating sectors are in the range of 30 to 40%. It becomes clear that these figures are quite impossible to reach without an important rise in the employment levels of the sectors concerned.
- Employment level will also benefit from the fact that a **shorter time-to-market** will bring a higher market share (more sales) and perhaps at a higher price (more earnings/profits). It will result in companies reaching a better position in the market, which will bring more jobs and better quality of life for citizens.
- AIM will help **to increase economic growth and create new jobs** by means of highly improving final results in the industrial partners through increasing sales of their products. Increasing levels of production will result in higher employment rates. In the short term, this will be fully true within industrial partners in the consortium but will later be expanded to several other activity fields and countries.
- **Education, training and working conditions**

- Besides direct impact on employment levels as is described above, **training and qualification** of employees will also get a big relevance since the use of advanced methodologies will increase need for higher skilled workers. There will also arise an important cultural change inside companies since they will shift to customer orientation policies, environmental friendly and higher quality manufacturers.
- New ways of working by using this AIM methodology will have a beneficial impact on **working conditions.** This will be achieved by developing "smoother" design & development processes in the sense that users may work with a comprehensive guidance and support, most problems will be prevented before actual occurrence and emergency "fire-fighting" situations will mostly disappear
- New ways of **co-operation amongst employees** will be enabled by AIM, unifying their attempts to contribute to the development of innovative products and processes, contributing to a removal of departmental barriers.
- **AIM will open new promotion prospects for the employees**. The assessment of employees will be based on their contribution, their sharing and their re-using of the over-all innovative knowledge in the company. This will bring a new, improvement- and team-oriented culture into companies. An individualistic character of innovation will be 'replaced' by team approach being much more appropriate to current working environment.
- AIM will also have a beneficial impact on **safety at work** being safety issues one of the key points to be contemplated in the design requirements within AIM. Innovation methods will mostly deal with this issues taking into account not only user's safety but also safety requirements from workers in the processes of manufacturing, assembly, servicing and disposal (disassembly).

4.7 Environment

Use of AIM in the development of new products and processes will greatly help in the fulfilment of environmental requirements and European standards. Nowadays, environmental requirements are present in the mind of customers and have to be borne in mind when designing products and processes. AIM will assist (and encourage) users to generate innovative ways of incorporating environmental aspects, which have a positive commercial impact on the product or process. For example these could be longer life span (marketing impact), higher rate of material re-cycling (cost savings), cleaner and safer raw materials (working conditions impact), lower process energy consumption (cost savings), etc.

Similarly, innovative solutions for process improvements are expected to bring considerable contributions regarding environmental issues. Specifically, by the application of innovative ideas to be collected and managed by the AIM system the large end-user in the consortium BPE expects to reduce wastes by at least 12% leading to enormous saving in material and preservation of the natural resources (taking into account that the company includes about 50 plants, savings in millions of tons of metal can be predicted). Quality of life, health and safety of the citizens

AIM will enable the design people to develop innovative, cost efficient and environmentally friendly products and processes.

- AIM will clearly impact on improving the **quality of life**, by helping industrial companies to design products with high added value for users including aspects such as: improved mobility, comfort, etc. It will also develop a much better design & development-working framework. Combination of both aspects will result in an overall **improvement of quality of life** for customers, workers and society.
- AIM will improve **health** by reduction of dangerous products, devices, etc. by encouraging designers to be aware of these risks allowing the possibility of replacing dangerous elements and will encourage the use of alternative design solutions.

4.8 Standardisation

From AIM methodology it will be possible to derive a European standard or "best-practice" code for the development of new products covering the aspects of *customer satisfaction (*social benefits), *environmental impact & less material consumption and waste (*environment).

Besides, standardisation has been achieved though the use of open standards in the development of the system. As described in chapter 3.2 AIM Innovation System Full Prototype, two clients have been developed. The thin one relies on the use of Internet, since the access to the AIM server is done by using a standard web browser. All these orientations contribute in some way to current development paradigms, more focused on open standards and distributed architectures.

Some specific examples as described by technical partners in the consortium of this "standardisation" (meaning the use and application of standards, not the direct contribution to standardization bodies) are:

- Use of XML to define properties files to be used by the Innovation Engine and Innovation Viability Assessment. These files are easily read by software applications, and enable an extensive flexibility of the software developed. OUTCOMES: The Innovation Engine and Viability Assessment, as modules of the AIM system
- Use of UML as a standard to completely specify the AIM systems and end-users in detail. This specification included present and to-be situations, reflecting a business perspective on one side and a technical one, on the other side. OUTCOMES: Complete system specification of the AIM system and business modelling of the three end-users in the consortium. REPORTED AS: See deliverables D2.1.1, D2.1.2, D2.2.1, D2.2.2, D2.3.1, D2.3.2, D3.1.1, D3.1.2, D3.2.1, D3.2.2.
- Development of the complete Collection System functionality using Enterprise java Beans (EJB). EJB technology is the server-side component architecture for the Java 2 Platform, Enterprise Edition (J2EE) platform. EJB technology enables rapid and simplified development of distributed, transactional, secure and portable applications based on Java technology. OUTCOMES: The Collection System, as a module of the AIM system. REPORTED AS: the Collection System is a part of the early and full prototypes

5. Deliverables and References

5.1 Table of Deliverables

Del. No.	Revision	Title	Type	Classification	Due Date	Issue Date (*)
D7.2.1	1.1	Project Management Plan 1	R	Restricted	31/08/2002	22/11/2002
D1.1	1.2	Business Cases	R	Restricted	30/09/2002	22/11/2002
D1.2	1.0	System Concept	R	Restricted	30/11/2002	27/11/2002
D1.3	1.0	Requirements Analysis	R	Restricted	30/11/2002	26/11/2002
D1.2	1.2	System Concept (New Version)	R	Restricted	30/05/2003	27/05/2003
D1.3	1.3	Requirements Analysis (New Version)	R	Restricted	30/05/2003	27/05/2003
D2.1.1	1.0	Specification for the Collection System (first version)	R	Restricted	31/01/2003	27/05/2003
D2.2.1	1.0	Specification for the Innovation Engine (first version)	R	Restricted	28/02/2003	27/05/2003
D2.3.1	1.0	Specification for the Innovation Repository (first version)	R	Restricted	31/03/2003	27/05/2003
D3.1.1	1.0	Specification for the Innovation Viability Assessment (first version)	R	Restricted	30/04/2003	27/05/2003
D3.2.1	1.0	Specification for the Innovation Management System (first version)	R	Restricted	31/05/2003	27/05/2003
D6.1.2	2.0	Technology Implementation Plan 2	R	Confidential	31/05/2003	31/05/2003
D6.2.2	2.0	Dissemination Plan 2	R	Restricted	31/05/2003	27/05/2003
D6.3.2	2.0	Project web presentation 2	P	Public	31/05/2003	27/05/2003
D7.1.3	1.0	Consortium Collaboration Agreement	R	Confidential	30/11/2002	22/11/2002
D7.2.2	2.0	Project Management Plan 2	R	Restricted	31/07/2003	31/07/2003
D4.1	1.0	Early Prototypes	P	Restricted	30/09/2003	30/10/2003
D6.3.4	4.0	Project web presentation	P	Public	31/05/2004	31/05/2004
D2.1.2	2.0	Specification for Collection System 2	R	Restricted	30/11/2003	15/12/2003
D2.2.2	2.0	Specification for Innovation Engine 2	R	Restricted	30/11/2003	28/11/2003
D2.3.2	2.0	Specification for Innovation Repository 2	R	Restricted	30/11/2003	15/12/2003
D3.1.2	2.0	Innovation Viability Assessment Specification 2	R	Restricted	30/11/2003	28/11/2003
D3.2.2	2.0	Innovation Management System Specification 2	R	Restricted	30/11/2003	15/12/2003
D6.1.3	3.0	Technology Implementation Plan 3	R	Confidential	30/11/2003	30/11/2003
D6.1.4	4.0	Technology Implementation Plan 4	R	Confidential	31/05/2004	31/05/2004
D6.2.3	3.0	Dissemination Plan 3	R	Restricted	30/11/2003	15/12/2003
D6.2.4	4.0	Dissemination Plan 4	R	Restricted	31/05/2004	31/05/2004
D6.2annex	1.7	MBAS Business Plan	R	Restricted	N/a	08/01/2004
D6.3.3	3.0	Project Presentation	R	Public	30/11/2003	29/01/2004
D4.2	1.0	Implemented Components	P	Restricted	31/05/2004	31/05/2004

D2.4	1.0	Web Infrastructure Specifications	R	RE	31/08/2004	31/08/2004
D4.2	1.0	Implemented Components	P	RE	31/06/2004	31/06/2004
D4.3	1.0	Integrated System	D	PU	31/08/2004	30/11/2004
D4.4	1.0	Implemented Web Infrastructure	P	RE	30/10/2004	30/10/2004
D5.1	1.0	Early Prototypes Validation Report	R	RE	30/09/2004	10/10/2004
D5.2	0.4	Training Materials and Report	R	PP	31/01/2005	25/05/2005
D5.3	1.0	System Validation Report	R	RE	31/05/2005	01/08/2005
D6.1.5	5.0	Technology Implementation Plan 5	R	CO	30/11/2004	31/12/2004
D6.1.6	6.0	Technology Implementation Plan 6	R	CO	30/09/2005	26/08/2005
D6.2.5	5.0	Dissemination Plan 5	R	RE	30/11/2004	20/01/2005
D6.2.6	6.0	Dissemination and Use Plan 6	R	RE	30/09/2005	26/08/2005
D6.3.5	5.0	Project Presentation	R	PU	30/11/2004	30/11/2004
D6.3.6	6.0	Project Presentation	R	PU	30/09/2005	30/08/2005
D7.1.1.5	5.0	Management Reports 5: PPR	R	PP	30/11/2004	27/01/2005
D7.1.1.6	6.0	Management Reports 6: PPR, Final Report, Final Public Report 3	R	PP	30/09/2005	28/12/2005
D7.1.2.3	3.0	Cost Statement 3	R	CO	30/09/2005	28/12/2005
D7.2.3	3.0	Project Management Plan 3	R	RE	31/06/2004	29/07/2004
D7.2.4	4.0	Project Management Plan 4	R	RE	30/09/2005	30/08/2005

(*) This is the issue date for the latest revision.

CODES:

Type	**Classification**
R: Report	PU: Public
D: Demo	PP: Restricted to other programme participants (including the Commission Services)
P: Prototype	RE: Restricted to a group specified by the consortium (including the Commission Services)
O: Others	CO: Confidential, only for members of the consortium (including the Commission Services)

5.2 Papers published and presented

- eBusiness and eWork Conference, Prague, Check Republic, October 16th – 18th 2002
  (Title: *Fostering Innovative Ideas and Accelerating them into the Market*,

  Authors: M. Sorli, D. Stokic, A.R. Campos, A. Sanz, M.A. Lagos) (successfully passed)
- IEPM'03 Conference, Porto, Portugal, May 26th – 28th 2003
  (Title: *Accelerating Innovation in Practice in New Product Design*

  Authors: M. Sorli, D. Stokic, A.R. Campos, A. Gorostiza)
- ICED03 Conference, Stockholm (Sweden), July 19th-21st

  Paper sent under the title: *"Accelerating Innovation in practice in new product design"* (ATB, LABEIN)
- ISPE/CE2003 conference on Concurrent Engineering, Madeira, Portugal, July 26th – 30th 2003
  (Title: *KM System to support Incremental Innovation in Manufacturing Industry*,

Authors: D. Stokic, A.R. Campos, M. Sorli, A. Gorostiza)

- International IMS Forum 2004, Lake Como, Italy, May 17th – 19th 2004
  (Title: *Acceleration of Innovative Ideas to Market*,

  Authors: M. Sorli, D. Stokic, A. Gorostiza, A.R. Campos)
- 10th International Conference on Concurrent Enterprising, Seville, Spain, June 14th-16th 2004
  (Title: *Fostering Innovation in Concurrent Enterprising*,

  Authors: M. Sorli, D. Stokic, A.R. Campos, A. Gorostiza) (accepted for presentation)
- IEEE International Conference on Industrial Informatics (INDIN´04), Berlin, Germany, June 24th-27th 2004
  (Title: *Integrated Approach for Innovation and Problem Solving in Dynamic Virtual Enterprises*,

  Authors: A.R. Campos, D. Stokic, R. Neves da Silva) (accepted for presentation)
- IFIP Conference, Toulouse, France, August 2004

  (Title: *Classification of ideas in an industrial innovation management system*). ATB involved
- eChallenges e-2004 Conference, Vienna, Austria, October 27th-29th 2004
  (Title: *Fostering Innovation in Concurrent Enterprising*,

  Authors: M. Sorli, D. Stokic, A. Gorostiza, A. Correia, A. Campos) (accepted for presentation)
- ICE2005 Conference, Munich, Germany, June 20th-22nd 2005

  (Title: *"Fostering innovation in concurrent enterprising"*

  Authors: M. Sorli, D. Stokic, A. Gorostiza, D. Stokic, A. Campos)
- ISPIM2005 Conference, Porto, Portugal, June 19th-22nd 2005

  (Title: *"Knowledge management of manufacturing product/ processe"*
- FAIM Conference, Bilbao, Spain, July 18th-20th 2005

  (Title: *"Managing product/process knowledge in the Concurrent/simultaneous Enterprise Environment"*

  Authors: M. Sorli, D. Stokic, A. Gorostiza, D. Stokic, A. Campos)

6. Project management and co-ordination aspects

The management of the AIM project for the European module and of the inter-regional project is performed in workpackage WP7. It has been organised into three main components: project management, conducted by the Project Board; technical management conducted by the Technical Committee; and exploitation management, conducted by the Exploitation Committee. A similar structure was adopted at the Inter-regional project, where the board and the committee were extended by the inter-regional partners. All principles presented in the text to follow are valid for both European module as a stand-alone project and for the Inter-Regional project.

Project management organisation

In order to reduce the management overhead, the same representative of a project member may have filled several positions in the project organisation. However, separate meetings have been organised in order to avoid interference between technical, managerial and exploitation issues.

Project Board

The ultimate responsibility for the management of the project lied with the Project Management Board (or Project Board) composed of a senior representative of each partner. The Board was chaired by the representative of the Co-ordinator and was mostly concerned with the definition and monitoring of the exploitation policy and the broad technical direction of the project to ensure it satisfied the commercial concerns of the partners. The day-to-day management was conducted at two levels, namely the local and the overall project management. Each Partner was responsible for the local management of its time and resources. The Co-ordinator was responsible for the overall day-to-day project management, ensuring the financial, technical and research directions of the project.

The Project Board was responsible for reviewing and controlling the good progress of the project and to help the PM to solve any issues or conflicts. Domains treated are:

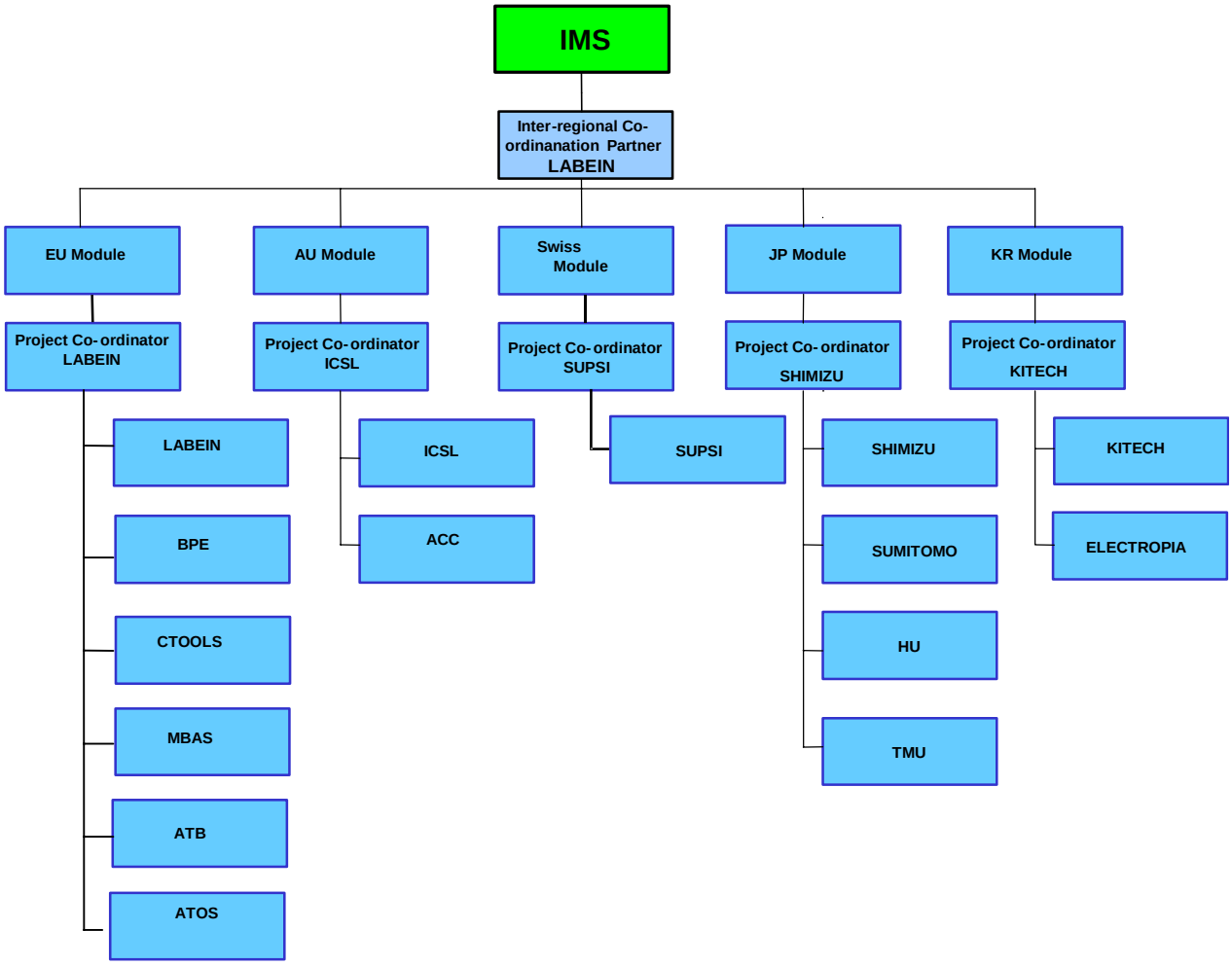
- the top-level co-ordination of activities of the different work packages and tasks,
- the discussion of the technical direction of the project,
- the evaluation and approval of the final technical results,
- the evaluation and approval of major changes in the workplan.

The Project Board comprised one senior representative from each partner participating in the project, having the empowerment from his company to commit staff and other resources required by the project. If a partner representative is not present at a Project Board meeting, that partner is bound to honour the decisions and actions placed on them in their absence. Conflicts are resolved by a majority decision on a vote. Every partner has one vote; the Project Co-ordinator has no vote, unless he is also the co-ordinator representative. The Project Board met twice a year, or if one of the partners calls for an extra meeting. The frequency of extra meetings is restricted to at the most one every two months.

Project Managers and Inter-regional Co-ordination

The Project Manager (PM) for both European Module (i.e. regional co-ordinating partners RCP) and for the Inter-regional Project (i.e. Inter-regional co-ordinating partner ICP) was Dr Mikel Sorli from LABEIN, who has a large experience in the management of multinational projects. The RCP for the Swiss module was Prof. Dr. Denis Baggi, head of the Department for Communication and Multimedia at ICIMSI, while Prof. Vlacic from Intelligent Control Systems Laboratory acted as the RCP for the Australian module. Dr. Namkyu Park, senior Research Scientist from KITECH, was the RCP for the Korean module, and Mr. Tanabe, actual deputy director of the Institute of Technology, from SHIMIZU was the RCP for the Japanese module.

The inter-regional project structure is presented in the following figure:



The PM, under the direction of the Project Board:

- co-ordinated the work carried out, keeping strictly to the predefined timetable;
- was responsible for the efficient administration of the project;
- collected, monitored and integrated financial and administrative data from the partners, and prepared the data for submission to the Board and the Commission and IMS Committee;
- was the contact person for the project with the Commission and IMS;
- discussed contractual and administrative topics;
- controlled and reviewed the financial and technical progress;
- verified the correct development of the project plan and adopted appropriate actions to correct deviations from the schedule;
- discussed and approved the detailed plan for the next six months' activities;
- decided on proposed modifications to the workpackages and tasks in accordance with discussion with the Commission and IMS;
- promoted and stimulated the establishment of contacts with other EU projects and relevant external research projects;
- promoted and approved the attendance and the presentation of papers at conferences and symposia.

Team Leaders

In the execution of its responsibilities, the PM was helped by each Partner's Team leader (TL). The TLs:

- were responsible for submitting correct financial and administrative data to the PM;
- were able to commit their companies in all the necessary financial matters and to negotiate on behalf of their companies;
- were responsible for the availability of adequate resources to fulfil the commitments of their organisations to the project.

Technical Management

A Technical Committee composed of the Technical Co-ordinator (from LABEIN), and the TLs was responsible for reviewing the technical and research aspects of the project. The Technical Committee (TC) was responsible for the control of the technical activities and directions, currently in progress. The review of deliverables and assessment of defined metrics (see section 9.1.6 for measurement approach) at specific project milestones was the basis for the quality plan and the key references for the quality assurance measures of the project. Based on this information and measures, a risk assessment of the project progress was performed (see section 9.1.7 for major risks and initial plans of how to minimise these risks). The Project Manager attended most of the Technical Committee meetings.

Conflict Resolution

In the case of any conflict, maximum effort was spent to resolve the situation with informal discussion to arrive at an amicable decision.

In these cases, a meeting was held with all the representatives, at the appropriate level. During the meeting, agreements were searched for, by dialog and concession. In all these cases, an agreement was reached.

Exploitation Management

The exploitation of the results of AIM was handled through both an overall approach and the exploitation of results by the individual partners. The former will be initially handled centrally, whilst the latter will be undertaken by the individual partners. To agree on how to handle property right aspects and partner co-operations with respect to the commercialisation of the elaborated project results, a Consortium agreement was signed by all partners. IPR aspects were specifically elaborated in the scope of this agreement. It is estimated that upon completion of the project the new methodology will have an impact on the market within a 12-18 month period.

Meetings

The consortium fully recognises that one vital factor contributing towards the successful management of a project is the effective communication between consortium members. During the Project lifetime, an efficient meeting scheme and an electronic information exchange scheme has been followed.

Communication

In addition to using mail, telephone and fax, e-mail and Internet will play a key role for the information exchange between partners and the Commission. A document repository allowing project deliverables, reports and so on, to be stored in a structured way, and retrieved using an Internet browser tool will be established, also covering parts accessible by the public domain. The documentation infrastructure also assists in the production of management reports by allowing each partner to provide reporting data on-line, greatly reducing the administrative overhead associated with reporting procedures. Supporting documents and presentation formats will be made available to all partners. The capabilities of this system will be extended and enhanced as and when needed.

European Module Fallback Strategy: As presented in Section B7, the European module is structured to be fully self-standing. In the case that two other modules are not accepted i.e. in the case of failure of the inter-regional project, the European module will achieve the main project objectives. The results will be applicable for the European end-users and the product objectives could be achieved. However, the application scope will be reduced, since the European module will focus upon innovative ideas for relatively simpler problems and virtual enterprise issue will not be covered.

Consortium Collaboration Agreement (CCA): The consortium will agree and sign the Consortium Collaboration Agreement (CCA) by month 6 of the project. The Commission pro-forma shall be used as the base for this agreement.

6.1 Problems encountered and solved

Certain delays in finalising components and their integration caused certain delay in testing assessment of the system. The project has been extended for 4 months, which allows achieving foreseen results.

7. Outlook

AIM understands that knowledge management and innovation management are in continuous evolution and based on the concrete functionalities and features of the developed AIM System, the AIM Consortium defined an overall exploitation strategy for the AIM Innovation Toolkit and AIM Added Value Services.

This exploitation strategy represents the ideas and philosophy of the partners of the consortium as a whole, to be refined and applied on an individual basis when the exploitation is to be carried out. Conditions regarding the relationship between the exploitation of the system as a consortium initiative and individual exploitations are defined in the Consortium agreement, which sets the policies for the behaviour of individual partners. Nevertheless, since the beginning of the project, roles concerning exploitation were clear between all the companies of the AIM consortium, as it can also be seen in next sections, devoted to Individual Exploitation Plans.

The exploitation strategy for AIM is responsible concerning previous analysis, taking into consideration the information on competitors, consulting companies and products/ services covering any discipline of the Innovation Management cycle. Additionally, it has been defined having as starting point the overall conditions around AIM (study included before the competition research), the market research and the analysis of the AIM competitive position in the market in relation to other actors of the value chain.

7.1 INDIVIDUAL EXPLOITATION PLAN: LABEIN

LABEIN will use the results of the project to improve its consulting offer to industry on the fields of Knowledge Management, Innovation Management, Extended Enterprise implementation and Design Engineering. Labein's Engineering services cover the whole product life-cycle from conception to the installation and servicing at the customer's site; within this cycle, interaction between different actors in the Extended enterprise is becoming a transcendental factor together with the ability of managing company knowledge. Therefore, LABEIN's intention is also to get highest experience in developing and implementing methodologies for answering companies' expectations. The AIM output will cover the interface along the whole line: from the customer, through providers, manufacturer, servicing, coming back again to the customers in which area there is a real lack of valid tools. AIM being a horizontal tool, targets industries that belong to many industrial sectors. The area of influence of LABEIN is, in order of importance, Basque Country, rest of Spain and Europe. In the Basque Country, most of these industries are SMEs with little research resources that could surely benefit from AIM results further adapted to the SMEs specific needs.

The result of the project has been a nearly commercial product, which is foreseen to need small developments to be put in the market. According to the commercialisation plan generated in the project, it is expected that could be in the market within few months after project completion. LABEIN will act as a provider of services for installation of the AIM system within industrial enterprises.

7.2 INDIVIDUAL EXPLOITATION PLAN: ATB

The main area of interest within the AIM project is the further strengthening of the know how in the area of KM for innovation. ATB is conducting and preparing a number of projects for supporting companies to improve their Knowledge Management processes and introduce adequate IT tools. Additional know how and experience in the introduction of IST tools for Knowledge Management in industry, has been gathered within the AIM project, being of prime interest for ATB from its business strategy point of view. In its future research, ATB will specifically focus on development of tool modules for SMEs, providing means to make a product acceptable from the performance /cost relation for SMEs.

Another interest of ATB is a co-operation with other partners in the AIM consortium (specifically with ATOS , LABEIN) on the commercialisation of the tools (i.e. potential products derived from AIM as well as the AIM Toolkit itself and especially the potential to offer their services to customise tools). ATB intends to act as a service provider for AIM system. This means that the prototypes of the SW modules which ATB has developed -or has contributed to develop- and tested in industrial environments through the business cases in

the project, will be further elaborated to make SW tool modules which will be applied to different industrial companies.

ATB has already disseminated (and will continue to do this after the completion of the project according to the needs of the different partners towards their exploitation strategies) the results and experience from AIM through a number of seminars and projects, which ATB regularly performs with its shareholders and other industrial and non-industrial partners. Dissemination has been and will be carried out through direct contacts to industrial customers including demonstration of the prototypes – there is a clear interest to present AIM results to the potential customers to support exploitation opening market for AIM methods and tools (oriented to target audiences: large enterprises and SMEs).

Every 3-months internal seminar is organised. This practice will be continued at least during the year 2005 where both results w.r.t. knowledge management aspects for fostering industrial innovations (e.g. rule base reasoning, case base reasoning, etc.) and experience gained in the application of the knowledge repository are shared.

7.3 INDIVIDUAL EXPLOITATION PLAN: BALL PACKAGING EUROPE

In the scope of the project, BPE has tested the AIM system in two German plants (Braunschweig and Haßloch) enabling to verify the system over multiple sites. It is expected that BPE will install the AIM system in its other plants, first in the two others in Germany and then in all other plants at 50 locations (at first in Europe, later outside Europe as well). These installations will be conducted on a commercial basis (on favourable terms) in partnership between ATOS ORIGIN and the BPE site. Therefore, it may be expected that at least 10 installations of the AIM system could be achieved in the BPE Group within the first 2-3 years after the project end. Introduction of the AIM system over a number of sites is expected to bring more and more benefits, since the innovative solutions to the process problems and potential improvements will be efficiently spread over the whole group. Therefore, BPE expects from the AIM system very efficient ROI. Once introduced in the first two plants, it is expected to bring improvement in productivity and reduction in quality costs for about 5-7 % but once introduced in at least 8 plants world wide, the benefits (due to exchange of ideas on common problems) may bring improvements of over 12 %. For BPE this is of strategic interest since a reduction of wastes and an increase of productivity are major factors to maintain the leading market position. Specifically, the inter-regional project is of a high importance since it assures applicability of the AIM system in US where the main number of plants is located.

7.4 INDIVIDUAL EXPLOITATION PLAN: CUTTING TOOLS

Cutting Tools has provided its requirements, and has validated the results as they have become available in the project (in co-operation with the development partners). This company has the intentions of exploiting the results internally, and as a first attempt it has provided a demonstrator site for the project results (demonstration of an SME using the results, and the business benefits from the use of the AIM results), in return for continued support after the end of the project. The AIM results are expected to ensure the development of its business relationships with its customers. Cutting Tools will also take advantage of these new project contacts (from AIM and participants from other complimentary projects) to develop relationships leading to further business. High profile and high-tech projects such as AIM are important to Cutting Tools in terms of marketing to its customers. Cutting Tools is developing a new area of business providing high precision cutting services using CAD/CAM systems and its cutting expertise for the medical industry. The AIM project will also help to demonstrate Cutting Tools commitment to innovation and state-of-the-art technology to its new (important) customers. Go to the annexes to read the updated Business Plan for C-TOOLS.

7.5 INDIVIDUAL EXPLOITATION PLAN: MB AIR SYSTEMS

MBAS is a leading provider of spray-painting solutions to all sectors of industry, and is strongly oriented towards sales, service, marketing and after-market. MBAS is working closely with its suppliers, and intends to act as an exploiter of the results (as well as a user and internal exploiter of the results, as it has been shown through the project life), by working with ATOS ORIGIN to offer the AIM solution and associated services to its

extensive supplier and customer base.

The Company will be sharing AIM solutions with its prime supplier/partners i.e. Ingersoll-Rand, Domnick Hunter, ITW Finishing UK, and Dresser Roots. This will in turn be shared with its Europe wide customers through its well-established European Distribution Network. These activities will be carried out in co-operation with ATOS ORIGIN Group.

MBAS will exploit the results internally, and for that reason, it has already provided a demonstrator site for the project results. MBAS' main motivation for the project has always been getting an advanced product information system, which can be used as a significant marketing tool, and which is able to augment the corporate strategy of adopting the best practices using new technologies. The company anticipates a sales and profit growth of 10% - 15% to be achieved by the successful implementation of the project results over the next few years. This could equate to additional sales of €2.5M.

MBAS main benefits by using AIM expect to be:

- Developing and maintaining key customers through a close Business to Business approach, through providing them with interactive product information facilities.
- Building the relationships with MBAS suppliers, working together to improve MBAS offer to customers.
- Targeting new customers and transforming into new key customers.
- Increased sales.
- Reducing operating costs for MBAS.
- Improved staff motivation.
- Reducing operating costs for key and targeted customers.
- A more speedy approach in taking new products and services to the market.
- Improve sales and customer support channel efficiency.
- Global marketing.
- The Company will be less vulnerable to any staff movements (absence or leaving the company).

7.6 INDIVIDUAL EXPLOITATION PLAN: ATOS ORIGIN

For ATOS ORIGIN, there are two approaches to the exploitation of the AIM project, mainly business oriented:

- **Direct exploitation of the results in co-operation with the other AIM partners**, particularly through the user groups. ATOS ORIGIN will sell the customised AIM solution and services (customisation, training, consulting etc.) to clients in partnership with the relevant AIM partners. The AIM solution shall be included in the portfolio of ATOS ORIGIN with commercial solutions offered to the customers. The Company's commercial staff, whose network operates throughout Europe, may perform different sale strategies corresponding to the target. ATOS ORIGIN's commercial staff keeps intensive contacts with a large range of customers (public administration entities, private SMEs and large multinational companies) offering continuously the technological solutions available in ATOS ORIGIN as possibilities for building turnkey projects. ATOS ORIGIN is very interested in adding new extended enterprise and knowledge management based tools in its portfolio. Through a clear understanding of business needs, the company can reach an international market of firms willing to apply the AIM solution. These new services of ATOS ORIGIN will be continuously promoted through direct marketing to potential and usual customers and through the IT exhibitions that are organised periodically in the multimedia sector that the company is attending on a regular basis.

- **Exploitation of the know-how acquired in the project by enlarging the expertise of ATOS ORIGIN in performing projects within the area of knowledge management and supply chain management** for its customers that could include the software results and the methodology adopted in the development of the system. The Software Engineering division has been involved in similar activities and related projects, as it is the case of REMOTE, with a knowledge management approach; E-CANNED, dealing with supplier/customers online relationships, or MK-BEEM, managing databases from an ontological aspect. We expect the AIM project to benefit from and increase these synergies. The human resources involved in the project, that have enabled ATOS ORIGIN to be at the top of the current state-of-the-art in

this area, could later participate in deeper researches in this area, leading ATOS ORIGIN to break through new innovative technologies.

The experience of ATOS ORIGIN in creating, maintaining and commercialising software products is large, as can be seen in http://www.atosorigin.com and http://www.es.atosorigin.com. From products for electronic banking to the always highly demanding space market, encompassing flexible workflow support for private and public administrations and software (CASE tools), the range of products alive in ATOS ORIGIN is wide enough to ensure the good capability of the group to understand and perform a perfect software product life cycle.

The core of the ATOS ORIGIN activity is its range of customers, to make them improve their business processes, and grow. Competition on a global scale – coupled with the rapid advance of new technologies - is a powerful driver for change in both the public and private sectors. ATOS ORIGIN's clients have never been more dependent on their information systems to manage their organisations effectively and control core business processes whilst increasing market share and profitability. Those systems now provide a genuine strategic mechanism for growth.

At the same time, computing is becoming more open, with systems increasingly communicating with one another. So solutions can be rapidly implemented to meet market demand and improve customer service, while cutting costs. From the initial concept to managing systems under long-term outsourcing contracts, ATOS ORIGIN works with clients to implement projects vital to their long-term success. We deliver added value to our clients throughout the life cycle of their information systems.

We provide here main areas where ATOS ORIGIN has high market shares. Additionally, the Spanish speaking countries are considered an important target for ATOS, since the company has there a logical strong basement.

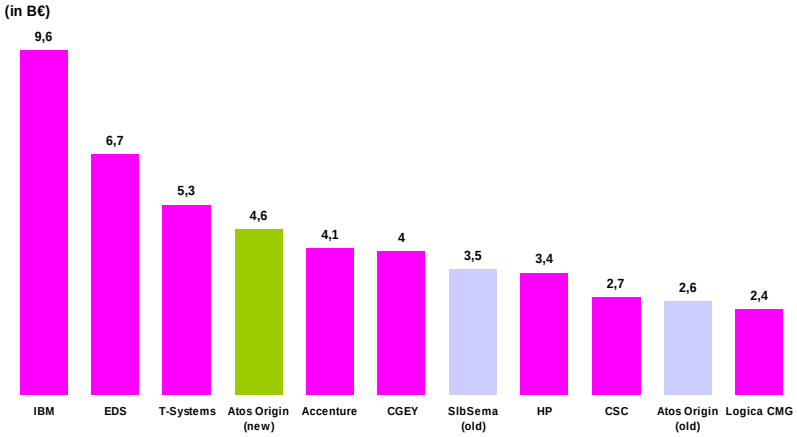
ATOS ORIGIN market shares

Country	% Share
UK	30
France	25
Scandinavian countries	17
Spain	15
Asia	6
South America	4

ATOS POSITION CONCERNING THE EXPLOITATION OF AIM (SUMMER 2005)

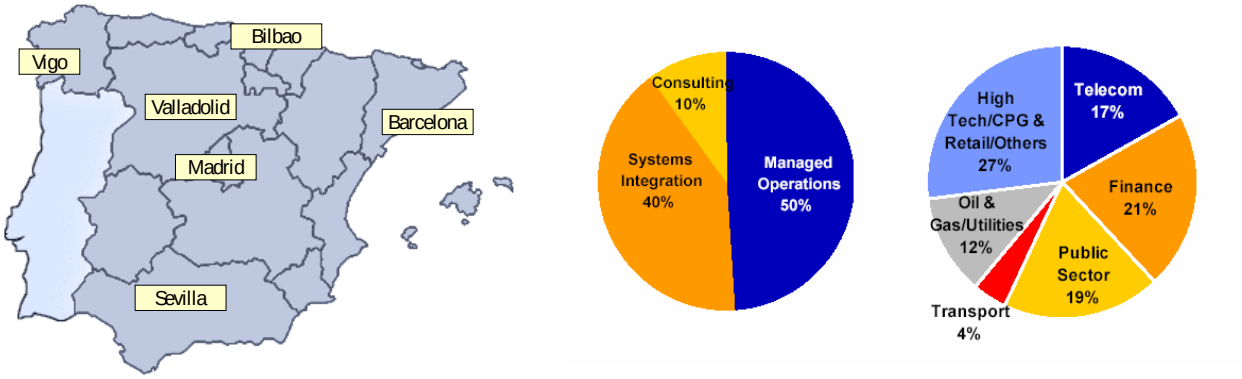
A. Position in the Value Network

The resultant Atos Origin, from the merging of SchlumbergerSema and the former Atos Origin, has access to the largest deals in Europe and it is ideally positioned to capture large contracts in Public Sector as well as to bring wider range of offerings to existing clients. From this viewpoint, the organisation has an enhanced capability to complement the global sourcing strategy. The following figure is ranking Atos Origin in the EU IT market (considering revenues in Europe).



Leading organizations in the EU IT market (ATOS position in green colour)

Specifically, in Spain the company is becoming n°3 player with access to large contracts and very well positioned in consulting (300 staff) and fixed price SI projects. The organization has the chance to better exploit near-shore opportunities (software factory), with the competence centre for the Olympic Games contract, by strengthening its management capabilities.



Main locations of ATOS ORIGIN in Spain and market position within the Spanish market

The organization is approaching the market with a wide portfolio of solutions and services, revealing a stable and balanced decomposition of its business lines. Competitors in the Spanish market (Accenture, EDS, Soluziona, Cap Gemini, Indra) show a similar share in their business areas and their portfolio of solutions: datawarehouse, data mining, business intelligence, Logistics, product data management, Knowledge Management, Content Management, CRM, ERP, e-learning, Security, E-business and marketplaces, ERP, Aerospace, Geographic Information Systems, and telecommunication networks.

Until now, Atos Origin competitors have focused their portfolio on the most profitable (and more popular) fields of IT (e.g. ERP and CRM). Atos Origin on the contrary, not only provides the same services but also has been investigating (and investing in) vanguard technologies and complementary services to fulfil hidden demands in its target market. GRID technologies and e-mobility are few examples of this wider strategy.

The inclusion of Innovation Management Systems in the Atos Origin portfolio is providing to the company a first mover advantage in the field and is a one-more-step in its strategy of complementary services. Atos Origin will compete in the IT market with a top quality solution and will be building synergies between existing solutions and previous projects. The company can follow this approach not only because

has capitalised the know-how included in the development of the tools but also because has acquired the language, the basis and the rationale behind the mechanisms of successful innovation management.

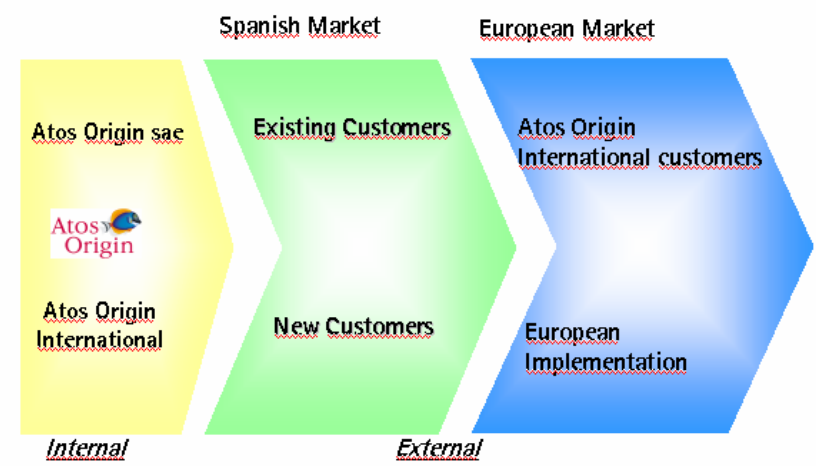
This project (AIM) together with the approach made by DISRUPT-IT complement existing knowledge by providing two SW Toolkits that address the two different kinds of innovation described so far.

AIM→ to be included in the ATOS portfolio as a solution for **Incremental or continuous Innovation Management.**

DISRUPT-IT → to be included in the ATOS portfolio as a solution for **Disruptive Innovation Management.**

Synergies concerning commercialization strategies are also possible and furthermore, both tools make possible for ATOS to achieve an advantageous competitive position in the market of Innovation.

B. Competitive Strategy



Possible markets to be addressed by ATOS for further AIM exploitation activities

Spain: the potential market

The first European target country will be Spain, where innovation management market is relatively small and it is characterized for having the lowest proportion of innovation firms and the smallest rate of investment in Managerial Innovation.

In one hand, due to a non-existing 'Innovation culture' in Spain, the purpose of Atos Origin is to introduce the knowledge of the AIM methodology and the deployment of the AIM tools within companies that are not familiarised with innovation practises. On the other hand, Atos Origin intention is to expand these tools through the innovation departments of the most vanguard medium/large sized companies in order to improve its management processes and decision-making systems.

ATOS will start the exploitation of AIM in Spain, as it is logical, but, if successful results are achieved In the mid-term, the company will expand its campaign around Europe through its headquarters located in the UK, France, Belgium, The Netherlands, Sweden, Switzerland, and Germany. Collaborations with technical partners and user organizations on the project might be required for that purpose in order to promote AIM within a wider range of potential users through their own networks.

Commercial strategies

ATOS ORIGIN regards two main types of exploitation for the AIM products aiming at both internal and external market segments:

1. *INTERNAL STRATEGY*

   Internal usage – the tools will be used in some departments within the Spanish branch of the organisation. The installation of AIM should help to enhance and reconsider existing tools inside the current portfolio; on the other hand, it is expected that the AIM tools will also help to improve or reengineer internal processes and methodologies. After experiencing the impact and the benefits within these organisation areas, it will be rolled out to other departments inside the company. The case of DISRUPT-IT will be taken as an example, since it has already been installed in some departments of the company (Barcelona) in order to take advantage of the DI methodology to improve its portfolio of products and services as well as its internal processes. It will be necessary to specify the lines that establish main differences between both projects and their effective support for Innovation management in ATOS, since it is not expected that both toolkits run in parallel within the same departments.

2. *EXTERNAL STRATEGY*

   Tools and services that ATOS will provide to external customers are: (1) the AIM Toolkit as a complete SW package –some modules could also be sold as individual modules, even if this option will not be considered as a priority now-; (2) VAS, defined by any kind of consulting service needed to accomplish a successful implementation of the system. Customers will require a previous assessment of their current situation, establishing needs and potential benefits of AIM, customization of the SW, adaptation to and interfaces with legacy systems as well as maintenance services. These are some of the expected services to be included within the set of VAS, (3) possible workshops and consulting services more related to methodological aspects of AIM. This could include preliminary studies and will also cope with training sessions for existing or potential customers, and finally (4) ASP service.

   The intention of ATOS is to include the AIM Innovation Management ToolKit in its portfolio of products and services to enrich the value proposition for future proposals. The company will exploit synergies between the solution provided by AIM and other tools and previous projects in the company (as it was described with DISRUPT-IT). As we have said, ATOS will offer to its customers a customization service in order to better adapt the tools to their structure and an ASP service that will host the applications on behalf of a company and provide access through Internet connections.

Although the mere existence and usage of the tools can already bring bright results to our customers, ATOS ORIGIN will always recommend the contracting of external consultancy services to fully exploit the capability of the organization to become an innovator.

8. Conclusions

The consortium managed to achieve successful results.

Good collaboration and coordination was obtained during the Project life and all parts have demonstrated their commitment with the Project's success.

From the very beginning, the Consortium put special emphasis on adjusting the whole AIM System functionalities and the derived Architecture to the specific needs of the End-user Partners. Due to the relevant differences between the Industrial companies and their requirements, two different aspects have been emphasized as: developing Ideas focused on new Products /processes and solving manufacturing failures and problem situations arising during the working day-to-day.

Respecting the Requirements Analysis and the System Concept defined, the different Modules were developed, and the Early Prototypes testing led to improvements in the Final Prototypes of each Module.

The integrated AIM system was commissioned in each of industrial partner's site and was successfully validated. Great benefits are expected, as far as the companies are committed to adopt the AIM concept and continuously train their staff in the use of the AIM System. This commitment provides important exploitation expectations, both to the main Exploitator ATOS Origin and to the other Consortium members.

In parallel, important Dissemination activities were carried out along the project running, and participation in a number of Conferences was achieved, obtaining the interest and appreciation of the participants attending.