

# Fostering Innovation in Concurrent Enterprising

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## Abstract

In current Global Markets, it is assumed that one of the most critical factors for success in industrial firms is Innovation. People inside and outside the physical boundaries of the industrial organisation are an untapped resource for innovative ideas and knowledge. In order to take this resource as an advantage, an IST/IMS project, "AIM", focuses on fostering industrial innovations throughout the extended enterprise for existing process and products by supporting the collection of Corporate Knowledge and Innovative Ideas, and to develop these Ideas and Knowledge into Innovations.

The AIM Project System will support the collection of innovative ideas and relevant knowledge throughout the extended enterprise. These ideas and knowledge will later be developed fostering industrial innovations. Such system will provide a means to collect, store and use/develop innovative ideas over the extended enterprise, and it will "accelerate" innovation into the market. In addition, Team-Work will be enhanced by co-operation between manufacturers, customers and suppliers by means of Internet facilities provided.

## Keywords

Co-Innovation, Knowledge Management, Virtual Enterprises, Collaborative Workspaces

## 1 Existing Theories and Work

The AIM System consists of new and existing tools and methodologies combined for fostering innovation in products/processes. The main asset of the AIM System is to provide means of efficiently re-use Corporate Knowledge and develop Ideas in a project basis (by integrating a WorkFlow Project Management Tool), collected throughout the extended enterprise (by offering web-based applications to customers, clients etc.) and stored in a structured repository. Existing works involve the following aspects:

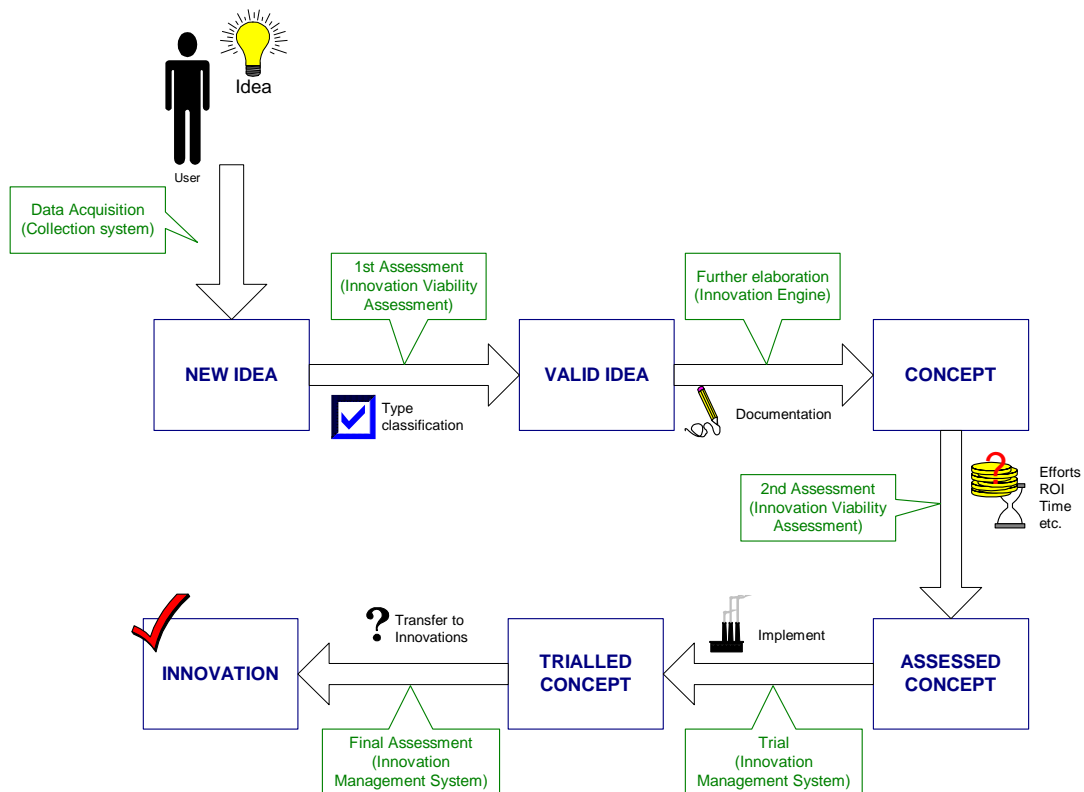
- **Ontologies:** Although ontologies attract high intention of RTD community, their application in practice is not still wide spread. Especially what is needed is a means for continuous update of ontologies enabling long life of knowledge systems. AIM intends to **re-use and further enhance ontologies** 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. 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:** 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 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 that 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 that 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.

## 2 Research Approach

The project is novel as it seeks to encourage innovative 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 AIM approach for developing Ideas follows the next cycle (cf. **Figure 1**):



**Figure 1: Life Cycle of an Idea in AIM System**

Many companies have the required corporate breadth-of-experience to improve their products or 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: creativity is fostered by means of combination of classical Reasoning Methods (Rule Based Reasoning (RBR) and Case Based Reasoning (CBR)) focused on the Company’s Business Objectives with Innovation Supporting Tools (*i.e.* TRIZ) Methodologies for in-depth analysis of Ideas and Failure situations, and graphical aids for combination of Concepts, within the context of specific products/processes formalised by the use of continuously adapted ontologies. Although the main technologies mentioned are available in the market, the results of the analysis of the State of the Art conclude that methods and tools for capturing and structuring knowledge and innovative ideas, over extended enterprise, in a way that enables product/process innovative practical means are missing.

Close collaboration with industrial users allows clear specification of requirements upon the AIM system and the integration of such different technologies be adapted to specific industrial needs and practices. This architecture will be finally deployed following a multi-level architecture based on Internet technologies. Integration with other tools inside each enterprise will carefully be studied and adapted to specific needs.

The main modules of the AIM System are (following Figure 1):

- **Innovation Repository:** for storing and classifying all the information, divided into four parts: Product/process, Problems/Potential improvements, Ideas and Innovations.
- **Knowledge "Acquisition":** for efficiently collecting knowledge from the Extended Enterprise to be stored in the Repository.
- **Innovation Viability Assessment:** for assisting users in assessing the feasibility of new innovative ideas by enabling functional and financial assessments.
- **Innovation Management:** for assisting different Teams (including customers and suppliers) in specifying, designing and assessing new processes and products in a Project basis environment.
- **Innovation Engine:** for finding innovative solutions following a systematic methodology:
  - raw, creative ideas/innovations, can be organised and developed in a structured framework, based on classical Reasoning Methods and Innovation supporting tools.
  - daily manufacturing problems are solved by identifying the causes and solutions based on previous similar experiences, products/processes knowledge and ideas/innovations.
- **Ontology:** for assuring teamwork and efficient communication on innovation issues within the (extended) company.

### 3 Findings

The Project will reach findings and achievements (results of the Validation by the Industrial End-users enrolled in the AIM Consortium will be provided) and will also give practical aids on how to optimise the innovation process. The project will be based on three business cases. These will be used to ensure that the project is driven by industrial needs, and that these needs are met. The business cases will use the AIM system in different ways, enabling to develop and test AIM system for different scenarios, ensuring its general applicability. The following business cases are covered:

- **Product innovations in SMEs.** This business case concerns rapid product innovation in an SME, developing new innovative products internally by getting everyone involved, including field engineers working with customers to generate product ideas, focusing on providing a structured and rapid approach to product innovation, so that the time to market is reduced.
- **Multiple site process innovations in high volume manufacturing.** This business case will focus upon innovation in multiple site manufacturing process based on the identified problems and potential improvements. The goal is to collect problems/potential improvements and innovative ideas from these multiple-site manufacturing plants, i.e. to provide means to put together ideas from actors in different plants. The teamwork on developing the ideas across the multiple sites will be supported by AIM system as well.

- **Product and process innovations in engineering services and customer and supplier focus.** A medium size company, being part of a larger industrial group is a system provider to industry and is strongly oriented towards sales, service, marketing and after-market. The company is working closely with their suppliers/partners. The business case scenario will involve collection ideas internally and at supplier sites.

## 4 Conclusions

The overall objective of the AIM project is twofold: Increasing Innovation and accelerating their introduction to the Market.

**Specific achievements** expected out of the full implementation of the AIM system may be listed as:

- Developing means of stimulating the creation of innovative ideas and collecting them from people at the extended enterprise level involved with the products and processes.
- Developing ways of processing these ideas and storing them into a structured knowledge repository. To ensure that all the useful knowledge (innovative information) is saved.
- Developing means of analysing innovative knowledge to determine which is useful, and which is not. That is, to enable the viability of ideas to be assessed.
- Developing means of delivering the innovative ideas to product and process designers for maximum effect.

This should lead to important **business benefits** on the fields of:

- Reduction of product innovation cycle-time
- Reduction of time and efforts for solving product/process problems
- Improvement of process efficiency and reduction of wastes

### Acknowledgement

This work has been partly funded by the European Commission through IST Project *AIM: Acceleration of Innovative Ideas to Market* (No. IST-2001-52222). The authors wish to acknowledge the Commission for their support. We also wish to acknowledge our gratitude and appreciation to all the AIM project partners for their contribution during the development of various ideas and concepts presented in this paper.

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