

## KM Systems to support Incremental Innovation in Manufacturing Industry

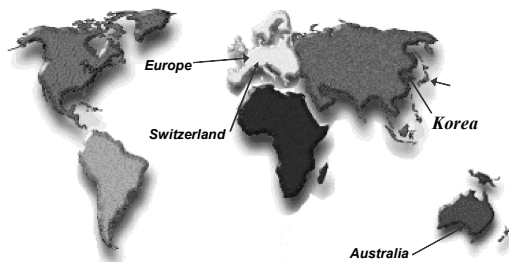
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### The Project AIM



### The Project AIM – Objectives

- To develop a means of stimulating the creation of innovative ideas and collecting them from people involved with the products and processes.
- To develop a way of processing these ideas and storing them into a structured knowledge repository.
- To develop a means of analysing innovative knowledge to determine which is useful, and which is not, i.e., to enable the viability of ideas to be assessed.
- To develop the best means of delivering innovative ideas to product and process designers for maximum effect.

### Ideas and Innovation

- **Idea:** a set of information/knowledge that describes a possible action to be implemented to overcome a problem, to provide an improvement, or to reach an innovation. These ideas can represent different types of knowledge: technical, empirical etc.
- **Innovation:** something new that was introduced in an environment, i.e. a new product, a new way of realising a process etc. Therefore, an innovation represents the final stage of a development process, representing the result achieved and implemented successfully.
- **Incremental (or continuous) innovation:** Innovations, that can be implemented with minor changes in business practices are considered to be incremental. Incremental innovation refers to improvements due to use or experience, and often takes the form of smaller enhancements.

### Conclusions from the state-of-the-art

- Practical means for developing ideas into innovations in products and processes are still missing.
- Methods and tools for capturing and structuring innovative ideas, over extended enterprise, in a way that enable the best used for product/process innovation are still missing.
- Providing means for team development of innovative ideas over extended enterprise is a high challenge and asks for a generic approach for development of ontologies applicable in the context of specific products/processes.

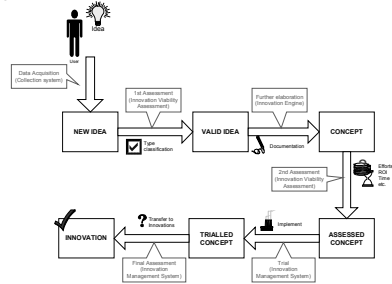
### Research Needs

- **Ontologies:** means for continuous update of ontologies enabling long life of knowledge systems.
- **Structuring of ideas:** develop a high-level meta classification of ideas which will enable structuring of this knowledge for effective re-use.
- **Methods and tools for gathering knowledge on product/processes, problems and ideas:** use existing tools (RBR and CBR) in combination to appropriate ontologies definition, meta classification of ideas, product/process models and adequate user interface.
- **Methods that can be used to develop innovations:** 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 will be applied.
- **Methods and tools for Graphical User Interfaces:** extend existing methods and tools to develop adaptable and personalised user interfaces for standard software application (called fat client).

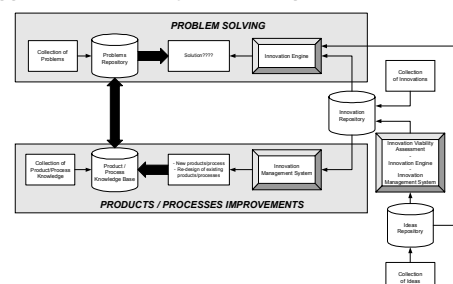
### Ideas and Innovation – KM

- **Based in these concepts, it is possible to identify what kind of information an idea represents, i.e. why is an idea in the ambit of an extended enterprise. Ideas can be:**
  - New products/processes;
  - products/processes improvements;
  - potential causes for a problem;
  - possible actions to solve a problem.
- **Ideas will be collected throughout the extended enterprise, aiming to involve all relevant actors in the company's services and products. The users of the AIM system will then be:**
  - suppliers;
  - design and development teams;
  - production planning;
  - manufacturing;
  - sales;
  - customer service;
  - customers.

### Life Cycle of an Idea



### Approach – Overall System Concept



### Approach

- **Innovation Repository**
  - Product/process knowledge base.
  - Problems/Potential Improvements repository.
  - Ideas and Innovations.
- **Collection of ideas and product/process knowledge**

### Design Decisions

Topic/AIM component	Design decisions
Ontologies	Re-use and further enhancement of the existing ontologies and re-use of the existing tool for ontology definition (selection left for the specification phase).
Knowledge to support definition of ideas	A new structure will be developed.
Methods and tools for gathering knowledge on product/processes and problems and ideas	Re-use of existing methods and tools - RBR and CBR (selection left to laboratory prototype).
Innovation Engine: Methods and tool for development of innovations	A combination of existing methods TRIZ, RBR and CBR (selection left to laboratory prototype).
Innovation Management	Apply Foro Workflow, developed for SchlumbergerSema, LVT will be considered in the specification phase.
Innovation Viability Assessment	To be developed based on CBR, RBR tools, decision trees and TRIZ principles.
Adaptable and personalised user interface	Use existing methods and tools applied in web browser software.

## End Users

### • Business Case 1: Product innovations in SMEs

- 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. Focus on providing a structured and rapid approach to product innovation, so that the time to market is reduced.

### • Business Case 2: Multiple site process innovations in high volume manufacturing

- Innovation in multiple site manufacturing process based on the identified problems and potential improvements. The special challenge of this business case is that it will address manufacturing process distributed over multiple sites.

### • Business Case 3: 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. Therefore, a system for collecting of innovative ideas from both employees and suppliers is an urgent need.

## Conclusions

- Companies do not have access to any tool or system suited for the support of gathering innovative information and expertise from all the players involved in manufacturing processes, and making the best use of it.

- AIM's main goal is to increase innovation and accelerate its introduction into the market. This objective will be achieved by combining a strong methodology with a supporting and robust system.

- The main RTD challenges to be faced are the combination of methods for generating innovative ideas (i.e.: TRIZ) with "classical" methods for collection of knowledge on products/processes and their problems, and the development of specific ontologies needed to enable efficient exchange of ideas between different experts/actors within the extended enterprise.

- The full implementation of the AIM system is expected to realise the necessary means for: stimulating the creation and collection of innovative ideas; analysing the innovative knowledge to determine its usefulness, i.e. performing a viability assessment of the information stored; and delivering the innovative ideas to product and process designers for maximum effect.