33 THE MSKIN CO-ENGINEERING NET

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The Mastrit Skin project intends to develop two new technologies in two consecutive phases: Stage 1, a device to capture and catalogue in an automatic way defects on worked skins providing leather digital maps with measurable quality parameters and Stage 2, a B2B platform capable of providing new services such as the e-procurement and the nesting of leather. The proposed device to be developed, MSkin Intelligent Quality Control System, is composed of three main elements: 1) the Leather Quality Reference Model, 2) the Modular Acquisition System and 3) the IT system (the database and leather e-configurator). The integration of these components into a unique product and its launch to the market is planned to be accomplished by the MSkin co-engineering network. This collaborative net will merge different SME's competencies in order to design, manufacture and sell in the best efficient way the innovative MSkin Intelligent Quality Control System (iQCS). The current paper will describe: the MSkin Collaborative Net strategy, the market analysis realized, the proposed business model and the core business processes to be carried out to develop and launch the proposed new technology. The prototype of the MSkin Intelligent Quality Control System is planned to be delivered in June 2006, so the formation and integration of the network should be accomplished during the same period of time to deliver the expected results.

1. INTRODUCTION

The Mastrit Skin project intends to develop two main new technologies: 1) a device to capture and catalogue in an automatic way defects on worked skins providing leather digital maps with measurable quality parameters and 2) a B2B platform capable of providing new services such as the e-procurement and the nesting of leather. To be able to achieve this, several competencies and areas of knowledge are required from both academic and industrial partners (Flores, 2003). This paper will focus on the creation of a collaborative network to develop the device.

Mastrit Skin 2002 is an Eureka project performed in collaboration with both Swiss and Italian universities and six main industrial partners. The Swiss project

focused on understanding the needs of the different final consumers in order to develop the leather quality reference model to identify the parameters and their required precision to measure the different defects. Another goal was to develop a model and different possible scenarios to develop a proposed architecture for the construction of a B2B marketplace where leather could be sold and acquired in global markets taking advantage of the different technologies developed in the project. The Swiss project looked forward an integrated supply chain between tanneries and final users using a reference model for measuring quality and a new platform B2B to sell and buy leather. The Italian project had as main objective the design and development of a system to capture and catalogue in an automatic way defects on worked skins to optimize the inner process at the tannery.

1.1 The proposed Strategy for the iQCS Development

During the Mastrit Skin 2002 Quality Standard & Global Concept evolution, it was acknowledged that the Italian device under construction could not reach the precision required by the Swiss Mastrit Skin industrial partners in order to identify the defects on their skins. For this reason, new technologies should be developed by the Swiss project (Flores, et. al, 2003). As a result, the project efforts were focused on constructing the different modules required to obtain the digital maps, for the several leather morphological and quality zones. The proposed new solution is called **The MSkin Intelligent Quality Control System (iQCS)** and it is formed of three main elements: 1) The Leather Quality Reference Model, 2) The Modular Acquisition System and 3) The IT Solution. To accomplish this radical innovation, a cluster of four aR&D projects was developed. The current solution will focalize on the leather sector; nevertheless the project concept and modules could be re-used to deliver solutions also for other sectors that produce flat products. The research proposal is under development and the project is planned to start in June 2004 and last for 30 months. The total estimated funding to be requested to the Swiss Innovation Promotion Agency (CTI) to carry out the four integrated MSkin projects will be approximately of 3.5 million Swiss Francs.

1.2 The importance of the network creation

It was clear that all the industrial partners have specific competences in different areas (data gathering systems, cameras, sensors, algorithms, nesting, etc) and that it will be difficult to find a unique company that can develop all the elements for the MSkin Intelligent Quality Control System. It was then identified the need to create a **collaborative network of partners** to launch the innovative product to the market. So, besides developing different technological projects to develop the different new components, special attention should also be taken on the business model to produce and commercialize the solution after its development. Thus, the concept of the **MSkin Co-engineering** net emerged. The following sections will describe the market analysis, the business model, main actors and business processes proposed to enable the creation and operational success of the network with the main purpose of delivering the MSkin Intelligent Quality Control System to the market. The development of the MSkin Co-engineering net is a workpackage on the first project:

TSkin_P1: MSkin Intelligent Quality Standard Development and Technology Demo-Platform Implementation.

2. THE MSKIN CO-ENGINEERING NET

To integrate the different components into a unique product and launch it to the market is not an easy task. Another important fact is the need to merge the different partners' competencies in order to design, manufacture and sell in the best efficient way the innovative MSkin Intelligent Quality Control System. This net should enable in a simple way the organization of the partners to **sell the system to the market with a unique face to the customers.** By creating this collaborative co-engineering network the competitiveness of participating SME's will increase and it will allow them to develop more innovative products than if they were standing alone by themselves and at the same time share the risk. The co-engineering net could develop with time not only solutions for the leather sector, but also for other flat products that have very strict quality specifications such as wood, glass, steel, etc. So more business opportunities for this network are expected.

The term Virtual Organization (VO) is used to describe an operational structure created from different organizational entities for a specific business purpose (Camarinha-Matos, 2003). A virtual organization is a geographically distributed organization whose members are bound by a long-term common interest or goal, and who communicate and coordinate their work through information technology (Ahuja et al., 2003). The formation of the proposed collaborative co-engineering net will focus on the virtual organization concepts, in which members of various companies and academic research units voluntarily come together to develop and advance a technology on an ongoing basis. These members will assume well defined roles and status relationships within the context of the virtual group that may be independent of their role and status in the organization employing them.

2.1 The Network Commercial and Business Objectives

During the formation of the co-engineering network is important to define business rules, roles, and the set of business processes that will be the foundations for the company start up and successful on going operational activities. The commercial deliverables of setting up the network will be:

- The product strategy, the market strategy and marketing activity plan
- The Start-up and integration of the new company (network of companies sharing their competencies)
- Trhe modular acquisition system and IT solution prototypes design realized under the Concurrent Engineering concept
- The tested and final prototypes
- The validation of the Market needs and verification of the Market potential
- The final verification of the quantitative and qualitative technical requirements before industrialization
- The pilots of the system done with the potential future customers

The specific business objectives for the network are:
1) Launch to the market the first working and tested prototype in June 2006
2) Obtain the first selling contract with one of the final users in the network
3) Implement the first pilot machine in December 2006

2.2 Market Analysis: Place, Price, Product and Promotion

Italy is by far the main market for the Mastrit Skin solutions in Europe; approximately 85% of the leather producers in Europe are located in Italy and at the same time is the second producer in the world, after China. Tanneries in the two main clusters of Chiampo Valley and Santa Croce are the target markets. Another interesting fact is that in Italy approximately 7300 new employees have started working in the tannery sector, from 23,000 in 1992 to 30,300 in 2002, and in the same period approximately 200 new tanneries started operations, confirming that in this country the leather sector is prosperous.

The potential of sales of the MSkin systems offered to the market has been very carefully evaluated to be 2.7% of the total 2700 tanneries located in Italy, Spain, Germany, United Kingdom and Switzerland in the next five years, thus 72 MSkin iQCS can potentially be sold. The estimated unit sales price will be between 360 – 400 KCHF and the estimated cost per unit will be approximately between 250 – 320 KCHF, as both of them depend on the components and requirements for the specific system from the final consumer. Approximately 15 to 20 new jobs will be generated in Switzerland by the end of 2008.

According to the Tanners Council, at the global level in 2000 the footwear sector was the one that used most of the world production leather (65%); nevertheless there is an expected reduction of this demand and an increase in the furniture and automotive sectors in the following years. The garment sector will remain the same. At the European level, Italy and Spain are the main exporters of shoes. These facts mean that **the expected main consumers** of the MSkin products are **tanneries that produce leather for shoes or shoe makers,** so the initial promotion strategy will probably focus on this sector. There will be mainly four different products to be sold; a device to measure leather defects: 1) for wet blue hides, 2) for finished leathers, 3) for wet blue hides and finished leathers and 4) option 1, 2 or 3 with the nesting functionality. The product will be produced under an Engineering to Order (ETO) manufacturing typology, providing a product that exactly meets each customer's requirements.

3. PROPOSED BUSINESS MODEL, ROLES AND PROCESSES

Before any VO starts, two main elements should be analyzed: 1) the cluster of companies that will form the network and 2) the Broker. These two elements are required to configure and manage partners' capabilities or core competencies to accomplish a specific objective or business opportunity. Mainly five types of partners are proposed to form the MSkin co-engineering network: 1) the **producers** of high tech components (artificial vision, lasers, nesting algorithms, high frequency sensors), 2) the **selling and marketing partners,** who have experience in selling

and distributing machines for the leather sector 3) the **final users** from different industries such as shoes and furniture, who will provide specific requirements and then test and validate the prototype to measure leather defects, 4) **academic partners** who participate actively in the development of the components and in the overall project management will function as net enablers to coach industrial partners) and 5) **leather quality associations** (ICEC, VESLIC, INESCOP) to accept the proposed quality reference model and certify the correct measurements of the machine. Most of the partners are located in Switzerland; other three are in Italy, Spain and Germany respectively. The network will be formed of approximately ten to twelve different entities.

3.1 Identifying the best business model to enable collaboration

Camarinha-Matos (2003) proposed three different structures of virtual organisations: **Supply Chain, Star or Peer-to-Peer.** In a similar way, Katzy and Löh (2003) identified three main topologies for Virtual Enterprises: Supply Chain, Hub and Spoke and Peer-to-peer. Where in supply chains long term relationships are assumed and the partners' interaction follow a chain of activities, in the star topology all the partners interact with one central hub or strategic centre and this allows a more rapid reconfiguration. Finally, in the decentralized peer to peer model, peers communicate symmetrically and have equal roles which are based on strong social relationships. The proposed business structure for the MSkin Co-engineering network will be based on a hybrid model as shown in figure 1: **star and peer to peer.** This means that the network will be based on an active number of partners working under a decentralized peer to peer network, where they have the same governance power but there will be a **MSkin system integrator** that will synchronize all the activities. All partners will be able to share information and together will define the business strategy and goals, but the integrator will follow up the deliverables to be accomplished and will make sure the network works as a unique system.

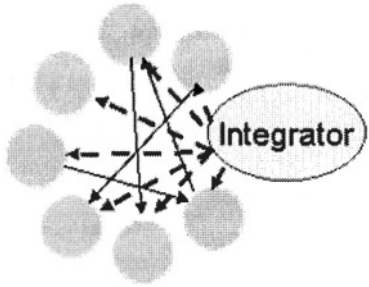

Figure 1 Hybrid Star – Peer to Peer Hybrid Topology

3.2 Proposed key roles for the MSkin network operation

A research was carried out to identify business frameworks that could enable a successful operation of a Virtual Organization. D'Atri (2003) proposed a framework to organize Virtual Enterprises operations based on three main actors: the **E**nabler,

the **C**atalyst and the **B**roker (ECB). He defines how these three elements interact and the main tasks each entity should accomplish. On the other hand, Plüss and Huber (2003) presented the five main roles that currently exist at the Virtuelle Fabrik to run the network operations: 1) order broker, 2) auditor, 3) network-coach, 4) in-outside manufacturer and 5) order manager. Finally, Molina and Flores (2000) and Molina, Mejía and Velandia (2003) present the key activities to be developed by the broker and tools to be used linked to the new product development process proposed by Cooper (1993). As a result, the organizational needs of the MSkin Co-engineering network were identified and the following five main roles were proposed as necessary for 1) the new product development and 2) the network operation after the iQCS launch. At this moment, it is still not defined which partner will develop each role. It could be possible that one partner executes one or more functions. The objective is not to have a broker that develops all the networking activities and treats the partners as suppliers (such as the supply chain or the star models). The objective is to do a **decentralized organization,** where partners besides providing a product for the network can accomplish other support activities. Its core characteristic will be that no single entity will have the overall decision authority that decisions will have to be reached in consultation and between independent entities. The key identified roles are:

1) **MSkin System Integrator:** will follow up the overall orchestration of the activities to develop, produce and sell the MSkin Intelligent Quality Control System and ensure that the overall business objectives and goals are accomplished. This role should control the financial performance of the MSkin Collaborative Net, as it can be said that the person in charge will have the CEO responsibilities of the MSkin network.
2) **Operation Broker:** Will focus mainly on the activities to be developed at the supply chain level, such as sourcing contracts, follow up of suppliers schedules and delivery dates to deliver the product on time to final customers. S/he will be in charge of the ICT usage among partners for the network operation.
3) **Market Manager:** The partner to accomplish this task will have already experience selling and distributing specialized machines to the leather sector. S/he should have already contacts in the sector and should focus to market, sell and distribute the MSkin solution.
4) **Product Manager:** Will be in charge of following the product development process, from the initial idea to the launching. S/he will test and validate the prototype, develop the quality manuals and the installation procedures. Once the product is launched to the market, the person in charge of this role should work on doing product improvements and develop new solutions for other sectors.
5) **Net Enabler:** should be a neutral partner that will facilitate the collaboration among the members by providing training, coaching and tools. One core objective is to facilitate the exchange of tacit knowledge to make this strategic alliance successful (Dyer, 2001).

3.3 Proposed MSkin co-engineering network business processes

The proposed business processes to be carried out by the MSkin co-engineering network are defined in three integrated macro levels: **1) the new product**

development, 2) the supply chain operations and 3) the network support. The new product development activities should concentrate on the integration of the results of the four aR&D projects proposed for the development of the different technological components. The supply chain or execution level should enable the continuous operation of the network to source goods, make the components and assembly them and finally deliver them to the final consumer, following the main core processes of the Supply Chain Reference model (SCOR). The collaboration support process should enable the collaborative environment by providing tools and methodologies to optimize its operation. During the first year of the project, efforts will concentrate on the coordination support and the new product development levels. The proposed supply chain of partners to deliver the iQCS system to the market is shown in figure 2.

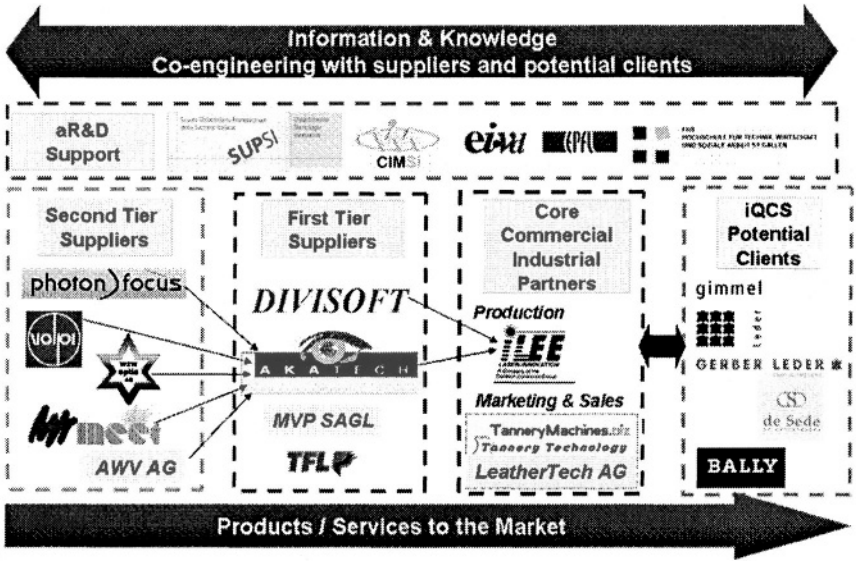

Figure 2 - Proposed MSkin Co-engineering Net and the industrial partners role to develop and produce the Intelligent Quality Control System (iQCS)

4. CONCLUSIONS

This paper described the need to create a collaborative network for the development and launching of the innovative product MSkin Intelligent Quality Control System. It presented the initial market analysis carried out, the proposed organizational structure, main roles and processes to enable the network successful operation. Three future key activities to be developed and implemented once the project starts are: 1) a MSkin scorecard to assess the network performance to measure the network results against the defined strategy, 2) a detailed assessment of the possible risks and conflicts that could arise among the MSkin Co-engineering net partners and 3) the implementation of a communication platform or tool to facilitate the information sharing and partners' collaboration. The proposed iQCS solution represents an opportunity for tanneries and leather consumers to improve the leather selection

process and calculate in a more accurate way the real value of leathers based on quantitative quality parameters.

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