Politecnico di Torino

Scuola di Dottorato

DOTTORATO in
SISTEMI DI PRODUZIONE e DESIGN INDUSTRIALE
XXVI ciclo a.a. 2011 - 2013
tutor: prof. arch. Luigi BISTAGNINO

SYSTEMIC NETWORK INNOVATION
and Its Application in the Brazilian Context of the “Estrada Real”

candidata:
Rosângela Míriam LEMOS OLIVEIRA MENDONÇA

PhD in Management Systems and Industrial Design
XXVI Cycle – 2011-2013

Tutor: prof. arch. Luigi Bistagnino

Systemic Network Innovation

and its Application in the Brazilian Context of the "Estrada Real"

How to make ideas become a resource for social-economic improvement

by

Rosângela Míriam LEMOS OLIVEIRA MENDONÇA

Turin, February/ 2014

Acknowlegements

This work have been developed thanks to the agreement signed between the University of the State of Minas Gerais ("Universidade do Estado de Minas Gerais" – UEMG), the Politecnic of Turim ("Politecnico di Torino"), with the financial support of the Foundation for the Support of Research of the State of Minas Gerais ("Fundação de Amparo à Pesquisa do Estado de Minas Gerais" – FAPEMIG), to whom I thank in the person of the Rector of UEMG, Prof. Dr. Dijon de Moraes Jr., the Chairman of the PhD Program in Design at the Politecnico di Torino, Prof. Arch. Luigi Bistagnino and the President from FAPEMIG, Prof. Mário Neto Borges.

This is the last page of this thesis that I am writing, already late at night, so, I am afraid of being unfair and indelicate forgetting people that have been important to me and to the accomplishment of this work. I am immensely grateful to all those that have been with me during these good three years of work – friends, relatives, teachers, colleagues, professionals that I have interviewed. I will try and nominate them, but please, forgive me if I fail to do it thoroughly.

I thank Prof. Luigi Bistagnino, for giving me guidelines and mostly for being the mentor of the methodology that serves as basis of this work. His passion and firm convictions are an example to me. He has also taught me a lesson for life – you must be for you and not against anyone.

I am grateful to all the professors and colleagues of the Program in Design of the PoliTO who have given me advices for my work. I would mention specially Prof. Pierpaolo Peruccio. I remember well that he was the one to introduce me to this group through an invitation to participate in an event where visiting researchers from Australia were being introduced to the Systemic Design.

The friends I have made in Turin have been one of the secrets of my strength (necessary to support leaving my family back in Brazil and moving alone to Turin), to assume the challenge of a PhD. I thank all of them in the person of my Italian special friends Cristina Marasso and Giuseppe Ghibò, and also Simona Abraham (that was also an Italian teacher or mine) and Mauricio Coletto (my Argentinean friend) with whom I have also shared very good moments.

So many professionals have collaborated to me in this research. The participants of the Canavese Connexion project who have gently conceded me interviews, I thank in the person of Prof. Marco Bozzola who, besides reviewing the guidelines for the interviews as a professor from our department, have also

given his testimony as one of the participant designers. Thanks to the enterprises of the footware cluster of Nova Serrana for their testimonials, specially to Junior César Silva from Crômic for his kind availability for giving detailed information, as has also the Prof. Heloiza Schor coordinator from CTIT/ UFMG.

Sérgio A. Lourenço FIEMG's Superintendent of Entrepreneurial Development (to whom I have been introduced by my colleague and friend Prof. Marco Túlio Boschi) and his team have contributed significantly giving information about their fostering activities, and indicating the Crômic project as a noteworthy case study.

I am also grateful to my friends and colleagues Prof. Alonso Lamy, who many times served as a connection between me and UEMG, and Prof. Nadja Mourão who has inspired me with some cases (about Álvaro Apocalypse and UEMG's "The Participative Design" project) in our chats during her short stay here at Torino.

Baques Sanna has honoured me accepting my invitation of being my "external advisor". He helped me then revising my texts, giving examples, suggestions, detailing information and providing material about the actions of the "Instituto Estrada Real".

Much of the information related to the subject of horses could be gathered thanks to Osvaldo Diniz and Lincoln Fernandes, who have received me in their farms, and Bárbara Romagnoli and Múcio Salomão, from the Association of the Campolina Horse, who have provided me with interviews and materials.

All the team from Local Motors, have gently received me for a stage to get to know, by experience, this interesting case. Thanks specially to Jay Rogers, Alexis Fiechter and Damien Declercq.

Agnese Vellar from I3P, Davide Gomba and Gualtiero Tumolo (that is also a good friend) from FabLab have also helped me with some information in my many investigations about their activities… Thanks!

For my family – my mum, Vicentina Lemos, my husband Gilberto Mendonça, my son, Marco Túlio and my daughter, Amanda Cecília – I owe all the loving energy! They have been my examples, supporters, motivators, companions. If that would not be enough they have also been my revisers, counsellors, collaborators. For you, the accomplishments of this work. For my brother, Renato Lemos, thanks for helping taking care of our parents!

Abstract

The question that this work proposes to answer is already part of its title: “How to make ideas become a resource for social-economic improvement”.

In order to approach an answer, a new strategy must be found, since this is a long lasting question, especially in contexts of developing countries with large social differences, such as Brazil. We have then started from the Systemic Design methodology which proposes the valorisation of the territory, people, relations and the optimization of resources. The application was set to be the Brazilian territory of the “Estrada Real”, on the state of Minas Gerais.

The subject “ideas”, took us to investigate aspects of innovation, also because many institutional strategies in public and private spheres, are based on its potential as a development driver. Then, besides the institutional strategies themselves, we have studied some cases of actions that had as goals the promotion of a region, cases of incentive for entrepreneurship. Analysing these cases from the point of view of the Systemic Design has allowed to identify their positive aspects, elements of attention or that should be changed, and propose approaches for its improvement.

This previous work has raised other elements to be investigated. What would be the ideal size of a company? What, in fact, can be called technology? Who would be responsible for the changes we need?

Here the economic bias has emerged very strong. It had then to be conciliated with other values of the Systemic Design. This has culminated in the development of the **Systemic Network of Integral Endeavors**, a concept yet broader than that of clusters. This includes the evolution of the elaboration of Business Models, which nowadays’ is largely adopted to plan innovative businesses.

Then some real businesses were studied to exemplify some of the values and concepts previously treated.

Finally, the historical legacies of the “Estrada Real” and nowadays’ features were researched. That has allowed the identification of nuances of resources and of a project that would have the potential of involving, as desired, many social classes, in a subject that is part of the territory history.

As another product of this research, besides the identification of the “**best practices”** themselves, **an instrument** for the collection of data and elaboration of guidelines was created. Considering the importance of the participation of all stakeholders in the definition of actual actions to be taken, this instrument will assist on the debate to the distilling of “**best practices**” to be adopted for the initiatives in the “Estrada Real”. This experience will be able to assist in its evolution for the planning of the Olympics and Paralympics events in Brazil in 2016.

Sommario

Il problema che questo lavoro si propone di rispondere è già parte del suo titolo: come fare diventare le idee una risorsa per il miglioramento economico e sociale.

Per avvicinarsi a una risposta si deve trovare una nuova strategia, poiché questo è un problema di lunga data, specialmente nei contesti dei paesi in via di sviluppo con grandi contrasti sociali, come il Brasile. Abbiamo allora iniziato dalla metodologia del Design Sistemico, che propone la valorizzazione del territorio, delle persone, delle relazioni e l'ottimizzazione delle risorse. La ricerca applicata è stata impostata per essere il territorio brasiliano della "Estrada Real", nello stato del Minas Gerais.

L'argomento "idee", ci ha portato a investigare sugli aspetti dell'innovazione, anche perché molte strategie istituzionali nelle sfere private e pubbliche, sono basate sulle potenzialità di apportatori di sviluppo. Allora, accanto alle stesse strategie istituzionali, abbiamo studiato alcuni casi studi, da quelle che avevano come obiettivo la promozione di una regione, a quelle per l'incentivazione dell'imprenditorialità. L'analisi di questi casi dal punto di vista del Design Sistemico ha consentito di identificare gli aspetti positivi, gli elementi sui quali bisogna porre attenzione o che devono essere cambiati, e di proporre approcci per un ulteriore miglioramento.

Questo lavoro precedente ha sollevato ulteriori elementi di studio. Quali sarebbero le dimensioni ideali di un'azienda? Che cosa possiamo chiamare con il termine "tecnologia"? Chi sarebbe il responsabile per i cambiamenti di cui abbiamo bisogno?

*Qui, l'influenza economica è emersa molto forte. E doveva allora essere conciliata con gli altri valori del Design Sistemico. Ciò è culminato con la Rete Sistemica delle Imprese Integrali ("**Systemic Network of Integral Endeavors"**), un concetto ancora più ampio di quello dei "cluster" e include l'evoluzione dell'elaborazione del modello di Business, che al giorno d'oggi è ampiamente adottato per pianificare i business innovativi.*

Si sono allora studiati dei business reali per semplificare alcuni dei valori e dei concetti precedentemente trattati.

Infine, si è fatta una ricerca sulle eredità storiche e sulle caratteristiche odierne della "Estrada Real". Questo ha consentito l'identificazione delle sfumature delle risorse e di un progetto che vorrebbe avere il potenziale di coinvolgere molte classi sociali, in una materia che è parte del territorio storico.

*Come altro prodotto di questa ricerca, accanto all'identificazione delle stesse **migliori pratiche**, si è creato uno **strumento** per la raccolta dei dati e l'elaborazione delle **linee guida**. Considerata l'importanza della partecipazione di tutti gli stakeholder nella definizione delle azioni attuali da intraprendere, questo strumento assisterà nel dibattito sul "distillare" quali possano essere le "**migliori pratiche**" da adottare per le iniziative nella "Estrada Real". Quest'esperienza consentirà di assistere nella evoluzione della pianificazione degli eventi Olimpici e Paraolimpici del Brasile 2016.*

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

1. INTRODUCTION

It is part of human nature the desire and even the need of evolving. This need translated to the level of nations means to strive for development. But what is development?

Although the concept of development is shifting from that purely economic to the concern about the quality of life (as can be seen if you analyze development goals of international organizations such as the "United Nations" - **[United Nations, 2006]** the economic wealth of a nation is still a very important notion, and then employment is one of the forces to achieve development.

For Europe, for instance, the Europe 2020 (which is the EU's growth strategy for the coming decade) is about delivering growth focused on "employment, innovation, education, poverty reduction and climate/energy" being:

- "smart, through more effective investments in education, research and innovation;
- sustainable, thanks to a decisive move towards a low-carbon economy;
- and inclusive, with a strong emphasis on job creation and poverty reduction". **[European Commission, 2013]**

There are many organizational initiatives aligned with this view. Some intend to promote the development of a region. In general, they are about working with the context formed by material resources, human capacity and relationships creating business opportunities. Others are about stimulating entrepreneurship by providing information, education, knowledge, economic and networking conditions, supporting ideas to become real productive actions. All of them are

about stimulating the market, businesses and employment, with bigger or smaller economic and social biases.

When these initiatives are analyzed, as one would expect, there are some aspects that work very well, and others that could be improved to reach the desirable results. The aim of this work is to be an instrument for social-economic improvement by helping making these kinds of initiatives more efficient in reaching their own objectives.

Through bibliographic reviews, case studies and grounded on methodologies, we will disclose activities or processes which are indicated as best practices. That means that they are indicated innovations on the way of conducting activities, developed with the aim of achieving higher efficiency on the accomplishment of their goals.

All this analysis is closely related to the territory of application, to its resources and culture. In order to highlight these aspects, and as an experience of cultural exchange, we have worked with case studies in Europe, United States and Brazil. Not only the context and case studies will be Brazilian, but also the territory of application of the results. Specifically, it will be a region of the State of Minas Gerais, called “Estrada Real” (*Royal Road*). Why this choice? Because Minas Gerais, among the 26 states of Brazil, is the second most populous, the third by Gross Domestic Product (GDP) and the fourth largest by area in the country (586.528 km²), having almost twice the area of Italy (that is of 301.230 km²). And it is our choice since it is the region where we come from and therefore where we have a deeper knowledge, both in terms of personal relations and of empiric knowledge of its culture and resources. Besides, the “Estrada Real” is historically very important to Brazil, since it is formed by the various paths that have been opened towards the interior of the country in order to guarantee the ownership of the land for the Portuguese crown, and explore the natural wealth of the region where it has been found gold and diamond, among other precious stones. These paths have an extension of more than 1.700 km (more than the maximum length of Italy, that is of 1.300km). Despite that, it is not very well known abroad. Furthermore, Minas Gerais is a region that portrays the inequalities and problems of Brazil, as can be inferred by the Human Development Indexes (HDI) of its Municipalities. On one hand it is among the most developed regions of Brazil if the municipalities of the South, Center, and “Triângulo Mineiro” are considered. On the other hand it has

alarming levels when considering the statistics of the North and the valleys of Jequitinhonha and Mucuri. Considering the state as a whole, it has improved from a medium to high level of development (HDI of 0,731), but is on the last position compared to the others states of the Brazilian Southeast region, and also behind all states of the South region. **[Maciel, 2013]**

As actions for regional promotion we have analyzed case studies such as Canavese Connexion (Italia); Liverpool and Manchester Design Initiative (England); FIEMG's projects ("Federação das Indústrias do Estado de Minas Gerais" - *Federation of Industries of the State of Minas Gerais*) to foster clusters and "Instituto Estrada Real" (*Royal Road Institute*) touristic actions (Brazil). As initiatives to make ideas become actual products or services, that is, to provoke the emergence of entrepreneurs, in Italia we can mention Torino Lab, Share Hack, Fab Camp, Arduino Camp, Bando di Alta Formazione, Premio Gaetano Marzzotto; in Brazil we can look into FIEMG's RETEC ("Rede de Tecnologia de Minas Gerais" – *Technological Network of Minas Gerais*). "Premio Chiave a Stella" is mentioned as a stimulus to innovation. To these case studies we will add "The role of Innovation".

The Systemic Design Methodology will be the base reference of all the analysis[1] through its principles: optimization of the use of resources; valorization of relationships; local actions; self creation cycle; human well-being as a priority **[Bistagnino, 2011]**.

Considering the importance of local actions and the valorisation of local culture and resources for the Systemic Design, the history of the "Estrada Real" (the site of application of the findings on the Brazilian territory) will be revisited.

---

[1] For each case study there is a summing-up scheme indicating, from the Systemic Design point of view:

- ✓ Their positive features;
- ! Features that require attention or need improvement
- Suggestions of improvement

1.1. State of the Art

This work can be classified within two main categories of strategies for successful endeavors: the first one, the **systemic thinking**, and the second one, **knowledge management** to improve the quality of outcomes.

A system is a plurality of coordinated elements with mutual relationships that form a single unit which perform a certain function. These integrated, well assembled and active elements participate and collaborate with its performance for the result of the whole. This single unit is not one object, but a way of seeing the whole.

In systems science, it is argued that the only way to fully understand why a problem or element occurs and persists is to understand the parts in relation to the whole. **[Capra, 1996]**

A "cousin" of the "systemic thinking" is the "systems thinking". It seems a play on words, but we will make clear the difference. "Systems thinking" regarding production is mainly about delivering to the customer the service he needs instead of just a product with a specific function.

> *"No product is an island. A product is more than the product. It is a cohesive, integrated set of experiences. Think through all of the stages of a product or service – from initial intentions through final reflections, from first usage to help, service, and maintenance. Make them all work together seamlessly. That's systems thinking."* ***[Norman,2009]***

As a methodology that follows this strategy we can mention the "Product Service System" (PSS). **[Halen et al, 2005]** PSS is about "a smart combination of products and services to create a high market value", "function/ value creation for clients", "working modular" and "combining sustainable concepts with powerful presence in the marketplace". It requires collaboration with other actors in the value chain, that is, in the activities related to the domain of the industry's activities.

The Systemic Design is a methodology that stimulates a new way of seeing production, different from the usual linear approach. The linear productive model is focused on the objective of each single business, aiming at the increase of its production as means of maximization of its profit. The Systemic Design, instead, is a methodology for the planning of a network of activities and products focusing on the environmental and cultural protection.

Here, we would say, relies one of the most consistent differences among the specific “Systems Thinking” and the “Systemic Thinking” – the broadness of the activities considered to be part of the system. In the PSS, the actors involved are the ones within the domain of activities of the “central” industry. In the “Systemic Design” thinking, the actors involved may make part of even different biological kingdoms (animals, plants, algae, bacteria and fungi) in a way that the output of one element becomes the input of the other one, and in their relationship there would be no notion of centrality – all actors would be equally important to the system.

The Systemic Design methodology is grounded in other previous works that constitute the bibliography of the book “Design Sistemico” **[Bistagnino, 2011]** and that is brought together and homogenised making a synthesis and integration among authors by the Master thesis “Glossario del Pensiero Sistemico” (*Glossary of the Systemic Thinking*) **[Rudà, 2013]**.

Being a new way of designing and conceive productive processes it has been used to develop a number of projects in the Department of Architecture and Design of the Politecnico di Torino (Italy), by the EcoDesign group **[EcoDesign, 2013]**. Following the values of Systemic Design, these projects aim to obtain environmentally sustainable products by planning the flux of energy that flows from one system to the other creating production relations between inputs and outputs. In this context they also promote a society of closely related citizens that have strong connections with their territory. Their topics have been: events, energy, water, food, handcraft, web2.0, communications, renewable matter, technology and production. There were also developed projects about territories: Giaveno, Val Sangone , Traforo Frejus and even the “Estrada Real” itself. This project focused on the mapping of the particular characteristics of the communities along the “Caminho dos Diamantes” (*Diamond Path*), one of the 4 paths that compose the “Estrada Real”, to understand their potentialities of innovation from the Design point of view.

This project on the “Estrada Real” has been motivated by the yet previously developed projects of “Design and Competitive Integration in the Estrada Real Territory”, that has explored its context of material, immaterial and historical culture. This project, developed through the research partnership between the Design School of the University of the State of Mina Gerais (UEMG) and Politecnico di Torino had two phases: the first one aimed at studies to apply the

design to enhance the territory cultural assets **[Germak et al, 2011]**, and the second one to define effective actions for the region, throughout the breadth and scope of design **[Germak et al. 2013]**.

Considering second category, the aspect of analyzing what has been done to figure out lessons learned, there are many examples of formalizations of this practice.

Using the PDCA cycle, for managing quality is one of the most "popular and evergreen process improvement methodologies" **[Nayab, 2013]**. The PDCA (Plan-Do-Check-Act) model first introduced by Walter Shewhart in 1929 and popularized by W. Edwards Deming in the 1950s as "a flow diagram for learning, and for improvement of a product and a process". The checking phase corresponds to the analysis of what has been done and the act to the corrective action based on what has been learned.

In terms of Project Management, the PMBoK **[PMI, 2013]** is one of the most widespread references worldwide. It consists of a set of best practices, grouped by areas, aiming at the control of important aspects of the development of a project, of a program or a portfolio. These practices give guidelines for a company to define its own working process (or processes) adjusted to its needs such as area of operation, characteristics of the project and culture. These guidelines, in its 5th edition (2013), are organized as 47 processes that fall into five basic process groups (Initiating, Planning, Executing, Monitoring and Controlling, Closing) in ten knowledge areas (Integration, Scope, Time, Cost, Quality, Human Resource, Communications, Risk, Procurement, Stakeholders) that are typical of almost all projects. Within these practices, as part of the Monitoring and Control group, there is the process of Performing the Quality Control where are defined activities for the assessment of what is being performed, checked against what has been planned. The result of this activity is the adjustment of actions in order to achieve the desired results yet during the course of the project. Also within the Closing group, where activities for the formalization of the end of the project are performed, lessons learned must be collected, and the organizational process assets must be updated, taking into account the project's experience.

Knowledge Management is an area that deals with the process of capturing, developing, sharing, and effectively using organisational knowledge with the

goal of the continuous improvement of the organization what would be essential for its competitiveness in the market. Similar to what has been described to the Project Management (which may be applied to very general areas of activities), the software industry has also developed process models, this time for this specific area. As examples of models it can be mentioned: the American international standard CMMI-DEV (Capability Maturity Model Integration for Development); the international standard, ISO / IEC 12207; the Brazilian MPS.BR ("Melhoria de Processo do Software Brasileiro " – *Brazilian Software Process Improvement*); the Process Model of the Mexican Software Industry (MoProSoft); and the process model defined as part of the Process Improvement Program to Enhance the Competitiveness of Small and Medium Software Industry in Latin America – COMPETISOFT **[Galvis, 2013]**. All of them consider practices of knowledge management to capture and share lessons learned from practice. As a specific example, the MPS.Br model requires especially if the company is on a higher level of maturity, all processes to be subject to incremental improvements and innovations based on knowledge acquired **[Softex, 2012]**. It also has the process of quality assurance that keeps track of the adherence of what is being executed with what has been planned, and ensuring that corrections are being made, in order to have a project output according to what has been required.

Many coordinators of incentive projects, such as public institutions, non profit social institutions and class coalition organizations make feedback reports or follow-up inquires to identify the results and the lessons learned of the previous experience. Nevertheless, many times it is not very well structured or a routine action. Moreover, the results expected are frequently the economic ones and is very much associated quantitative statistic analysis.

This work, having as motivation the need of optimization of the use of the resources employed in incentive projects, be it physical, human or economic, will use some emblematic cases for analysis to try and see the lessons learned from them, identifying what has been done that is worth repeating and what could be improved in future similar projects, creating a body of best practices to guide future projects. We are also going to propose improvements to the existing resources to plan businesses and actions in order to, consistently to the Systemic Design principles create effectively sustainable activities, capable of help improving a territory.

2. BASE INGREDIENT: THE SYSTEMIC DESIGN

From the observation of the needs of our society for a healthier environment, it has been foreseen the need for an instrument to trigger, fertilize, systematize and encourage the development by seeing business differently from the usual linear approach.

Currently, the production centers its value on the product. Based on the main product of an organization, the production is planned considering the linear sequence: acquisition of resources, their transformation into product and the commercialization of the product. Some industries, at most, include in their process: the opportunity of doing other businesses, considering the possibility of the selling or the donation of scraps of production; the planning about the recycling of packaging; and, eventually, the indication of the destination of the product when it reaches its end-of-life, that is, how it should be disposed. Most industries are focused on the maximization of production as means of maximization of profit. The production of waste is also considered a means of profiting – the earlier a product is dismissed the more products of a new production will be acquired. The intentional design and manufacturing of products with a limited lifespan to assure repeated purchases is called “Planned (or Programmed) Obsolescence” **[Dannoritzer, 2010]**.

The Systemic Design instead, is a methodology for planning activities and production based on 5 fundamental principles **[Bistagnino, 2011]**:

1. “OUTPUT/ INPUT: The output (waste) of a system becomes the input (resource) for another one, creating: an increase of cash flow; new job opportunities.
2. RELATIONSHIPS: The relationships generate the system: each one contributes to the system; the relationships can be within the system or outside of it.
3. AUTO-GENERATION: Self-producing systems sustain themselves by reproducing automatically, thus allowing them to define their own paths of action and jointly coevolve.
4. ACT LOCALLY: The local context is fundamental because it values local resources: humans, culture and materials; it helps resolve local problems by creating new opportunities.
5. MAN AT THE CENTER OF THE PROJECT: Man connected to own environmental, social, cultural and ethical context.”

The output/input cycle means the optimization of the use of resources. The systemic design process analyzes resources, processes and the whole products’ lifecycle. It is based on the principles of nature that uses the output of a system as a resource of another system. This creates a continuous flow of matter and energy minimizing waste.

The valorisation of relationships, internal and external, is very important since no one element can be taken in isolation. This applies to products, considering its composing parts, or to a set of products, whose functionality is completed and improved by other product’s functionality. It is also relevant to peoples’ relationships since we depend on one another be it in psychological terms or in order to perform activities.

Within the context in which operations happen, although relationships can be internal or involve elements external to the system, local resources and culture are a priority and the globalization and monocultures, where products and activities are disconnected from the territory, should be avoided.

Interrelations of living systems with its environment trigger structural changes within the system. These changes alter the interrelations, what generates continuous structural change (autopoiesis). Living things adapt themselves, learn and develop continuously **[Capra, 2008]**. It is then a continuous auto-

generation cycle: living things change the system, that in its turn changes the living things.

Human well-being as a priority means that the understanding of the user and its culture must be a starting point for the definition of activities and products. The user is considered not as a target to market actions but as an active and aware member of the society, to whom information and choice should be given.

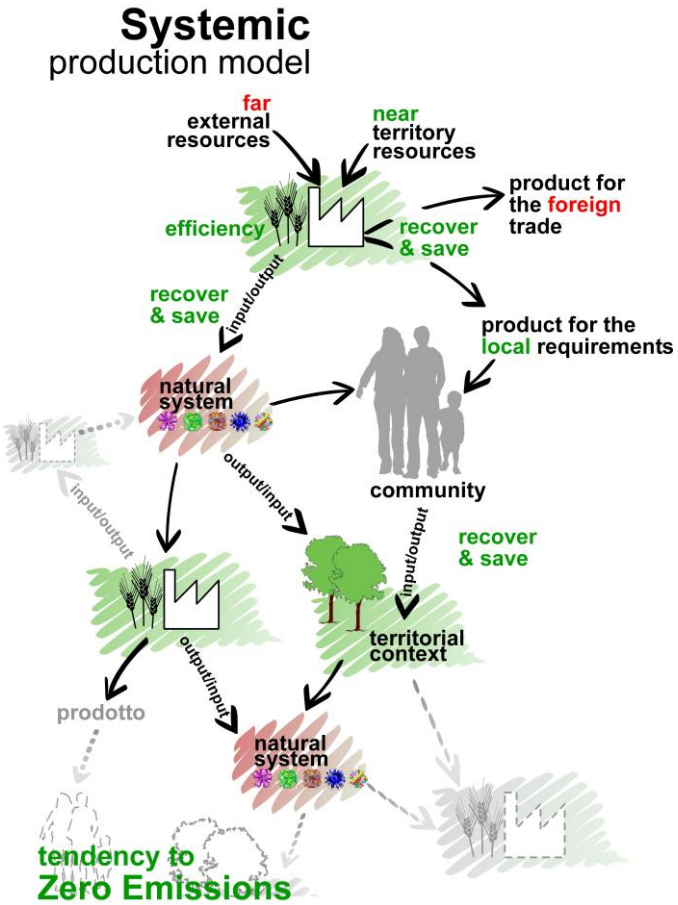


Figure 1: Systemic Production Model - **[Bistagnino, 2011]**

The full unfolding of the use of resources, using as resource of a business what remains from the process of production of another business (and nowadays is considered as waste) makes possible the creation of new equally important businesses. These new businesses open the possibilities for the elaboration of new products and for new entrepreneurs to emerge and also for new working relations to be established. Changing working and production environments brings changes to economy and social relations. The focus is the development, not of just one business, but that of the whole community.

2.1. A Design Resource for New Designers

The systemic planning starts from a survey about the actions actually involved in the activity or group of activities of interest. Then the input and output of each one are analyzed, informing their qualities (e.g: water with detergent; water with organic residues) as well as quantities. The input element is identified and connected with its respective output. Positive and negative qualities of the output are then studied, having as reference the Systemic Design Principles.

Next an analysis is made of the negative aspects to try and fix them in order to make the system more efficient and sustainable. This can be accomplished, for instance, changing the type of input and/or identifying to whom the output might be useful, also considering another biological kingdom. New relations are established and fluxes are defined in a back and forth dynamic, until most of the problems are solved. In doing this, new relations, new activities and businesses emerge.

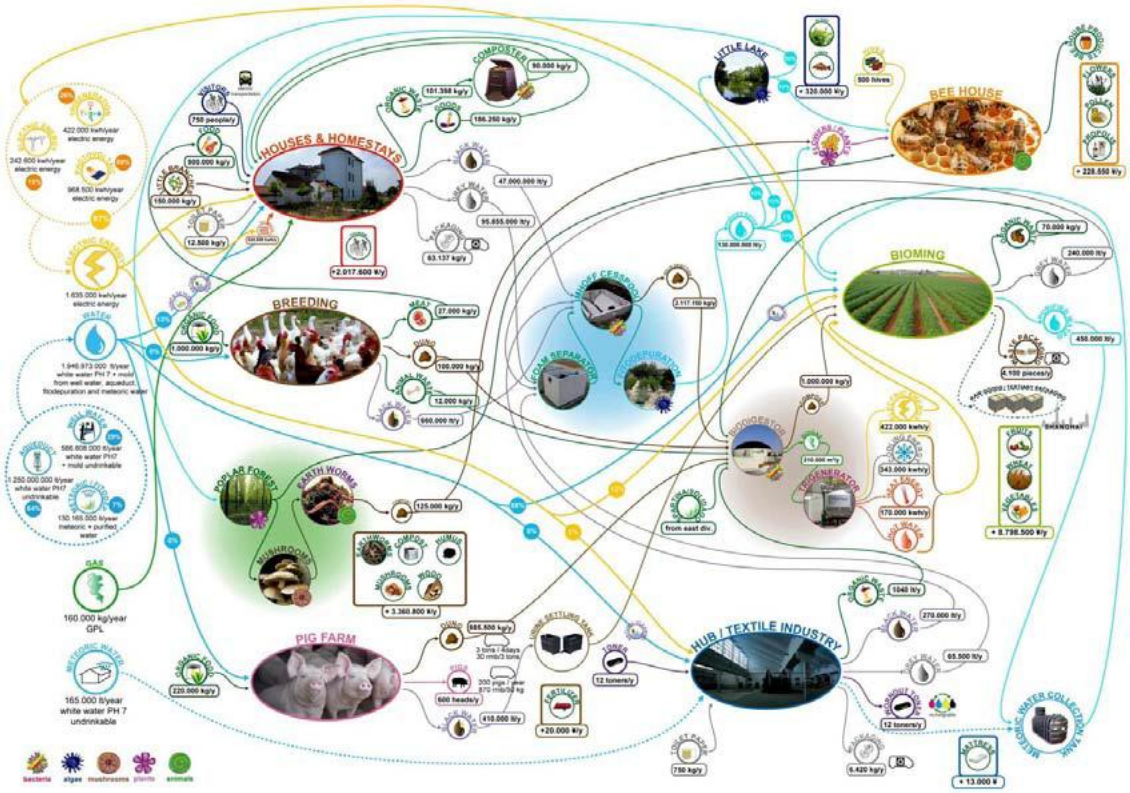


Figure 2: "Chart of the systemic project using the local resources and generating a flow of jobs and economy for the residents" - Chongming island, Shangai. **[Bistagnino, 2011]**

Also the quantities involved are considerably changed. When the economical analysis is made, also the operating results change. Even if the quantity of production is decreased (since one of the principles is producing according to the quantities of local resources), profits are generally higher as a result of the diversity of activities."

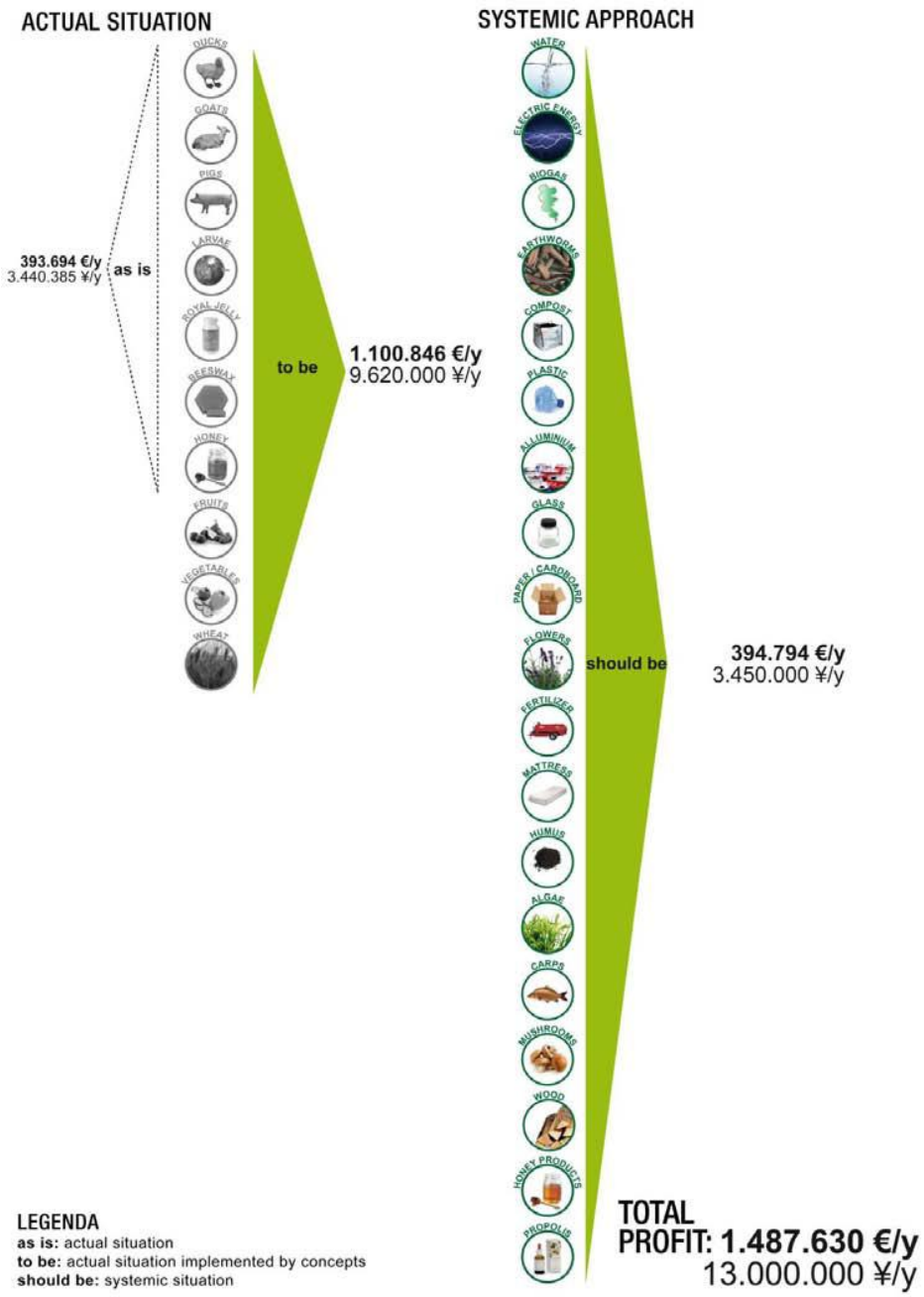


Figure 3: "Chart of the economic assessment of the annual economic outcome produced, to begin with, by the realisation of concepts (Hub, Bioming, Tourism) and, finally with the utilisation of the systemic approach." " - Chongming island, Shangai. **[Bistagnino, 2011]**

The Systemic Design methodology is applied to practically every productive initiative. From the analysis of our activities in the home environment, to the production of objects, the planning of events, agricultural production, industrial production and urban planning.

This is a demanding process where designers plan this network of relationships and fluxes of matter and energy. In order to do so, Systemic Designers activate also other professionals as specialists on other areas such as physics, chemistry, biology acting as a facilitator and an interface for them.

Then Systemic Design is a resource for a new kind of designing professionals that on their turn create new businesses opportunities. An example of this is the **Officine Sistemiche**[2]. It is an association funded by a group of designers[3] which generate solutions originated from a systemic interpretation of the business processes, identifying new eco-sustainable models to operate a cultural and social transformation. They develop design initiatives in the areas of product and graphics design, architecture, communications and related activities. Although it is a very young office, it has already developed projects applying the Systemic Design principles related to the food industry (such as growing of mushrooms using coffee grounds and planning of small agricultural businesses); for reduced environmental impact events; of products designed by components (e.g. an “island” for waste treatment).

[2] Officine Sistemiche: http://www.officinesistemiche.it/

[3] This group is a spin-off from the Systemic Design Approach research group from the *Politecnico di Torino* (Turin - Italy).

3. THE ROLE OF INNOVATION

Contrary to what would be generally thought, that innovations would be the result of research and development within the R&D departments of big companies, nowadays the sources of innovation are very widespread and involve a variety of agents. Therefore, not only the big manufacturers are responsible for innovations, but also suppliers, clients, individual professionals, studios, small companies, and with different levels of expertise – from the general user to the specialized one, from the casual inventor to the professional experienced designer.

Every business or even product has its own specificity that makes one context more adequate than the other. Moreover, there are different forms of innovation that can be classified according to the nature of innovation (product or process innovation); the intensity and extent (radical or incremental); the effect on the competence of the company (competence enhancing or competence destroying); the level of interference on the structure of the product's system (architectural or modular) **[Schilling, 2009]** .

All this influences the market relationship. Besides the traditional competition that exists between companies that operate in the same market, nowadays cooperation relationships are being established between these different agents, being them individuals or enterprises.

For each one of these possible combinations to describe this complex innovation context a new term is created.

Open innovation, for instance, is a term defined by Henry Chesbrough as “a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”. This idea and discussion about some consequences, especially regarding cooperation in R&D between firms, date back at least to the 60s. But more and more, also due to the intensive development of informatics in the last years, the boundaries between a firm and its environment have become more permeable allowing innovations to be easily transferred inward and outward. The central idea behind open innovation is that in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies. In addition, internal inventions not being used in a firm's business should be taken outside the company (e.g. through licensing, joint ventures or spin-offs).” **[Wikipedia, 2011a]**

Among the many sources of innovation, such as creativity, imitation, serendipity and chance, the user is an important one. Therefore, there are many terms also representing the various ways of involvement of the user in the development of a product, in different phases of a product creation and development. Every time in earlier stages and in a more complete way.

Users can be involved in the eliciting of products requirements, in tests during the development of the product or tests to validate the “almost final” version of the product. Regarding tests, it is considered, and economically proved, that, in the development process of a product, the earlier a problem is found, the less expensive it is to solve it. And clients are valuable testers.

The role of the user can range from a living reference to be consulted whenever designers feel they require additional information, to the creator and constructor of a whole new product.

The **User Centered Design**, for instance, is a philosophy of design process that consists in involving the users, by talking directly to them, in various phases of the development of a product trying to understand their actual needs, requirements and comprehension of a product and its components. The ISO 13407 standard defines the essential activities of a user-centered design project, which may be characterized by a number of methods:

- Requirements gathering: Understanding and specifying the context of use - Focus groups; Questionnaires; Interviews
- Requirements specification: Specifying the user and organizational requirements
- Design: Producing designs and prototypes - Usability testing; Card Sorting; Participatory design
- Evaluation: Carrying out user-based assessment - Usability testing; Questionnaires; Interviews

The participants in these methods must accurately reflect the profile of your actual users. **[Webcredible, 2006]**

Nevertheless there are authors that question this methodology defending that a product improved for specific users may present problem to the others. The more adapted to the taste, abilities and needs of the ideal user the less adequate will be to the others.

> *"The individual is a moving target. Design for the individual of today, and the design will be wrong tomorrow. Indeed, the more successful the product, the more that it will no longer be appropriate. This is because as individuals gain proficiency in usage, they need different interfaces than were required when they were beginners. In addition, the successful product often leads to unanticipated new uses which are very apt not to be well supported by the original design.*
>
> *But there are more serious concerns: first, the focus upon humans detracts from support for the activities themselves; second, too much attention to the needs of the users can lead to a lack of cohesion and added complexity in the design."* ***[Norman, 2005]***

User-driven innovation differs from user centered design by the observation of the users rather than the use of questionnaires and focus groups in order to gain insights from them to be used in the innovation process.

Moving the role of the user from reference to creator, **crowdsourcing** is a distributed problem-solving and production model. In the classic use of the term, problems are broadcast to an unknown group of solvers in the form of an open call for solutions. Users – also known as the crowd – typically form into online communities, and the crowd submits solutions. The crowd also sorts through the solutions, finding the best ones. These best solutions are then owned by the

entity that broadcast the problem in the first place – the crowdsourcer – and the winning individuals in the crowd are sometimes rewarded. In some cases, this labor is well compensated, either monetarily, with prizes, or with recognition. In other cases, the only rewards may be kudos or intellectual satisfaction. Crowdsourcing may produce solutions from amateurs or volunteers working in their spare time, or from experts or small businesses which were unknown to the initiating organization **[Wikipedia, 2011b]**.

Crowdsourcing has come in for some criticism for a number of reasons, such as not always producing quality results, and it is being used to source cheap – or even free – labour.

For this reason, crowdsourcing is becoming increasingly used as part of a broader Creative Services Exchange model, where the "crowd" is vetted in advance and professional agency "brokers" facilitate the trading of creative briefs between companies and the "crowd".

There are many well known examples of crowdsourcing as listed in Wikipedia **[Wikipedia, 2013]**. Among them it could be mentioned:

- Facebook has used crowdsourcing since 2008 to create different language versions of its site. The company claims this method offers the advantage of providing site versions that are more compatible with local cultures.
- Social bookmarking (also called collaborative tagging), such as Delicious[4] where users assign tags to resources shared with other users, which has given rise to a type of information organization that emerges from this crowdsourcing process **[Wikipedia, 2011b]**.

To involve the client in the development team or to let users experiment beta versions of the product is an strategic choice, common in the software industry, that allows the enterprise to concentrate its own development efforts in projects capable to satisfy in a greater level market demands. Nokia, for instance thanks to launching an experimental version of "Sports Tracker" in 2004 in its Beta Labs (a website where users are invited to test the software for new generation cell phones before being launched in the market) and gathering users

[4] Delicious: http://www.delicious.com/

suggestions, have developed this product, and this web site that has generated more than a million accesses and 200 thousand downloads in one month. Nokia states that now their problem is to manage feedbacks.

A variation of this strategy is to assign "lead users"[5] who are users that experiment as pioneers the new products, to test new programs to correct their errors and to express the same requirements and demands of the mass market. These chosen "lead users" are early adopters who have, in general, above-average education level and who rely on their intuition and vision to carefully choose new methods, products and technologies. **[Schilling, 2009]**

The **Lead User Method** is a market research tool that may be used by companies and/ or individuals seeking to develop breakthrough products. Lead User methodology was originally developed by Dr. Eric von Hippel of the Massachusetts Institute of Technology (MIT) and first described in the July 1986 issue of Management Science. In contrast to the traditional market research techniques that collect information from the users at the center of the target market, the Lead User method takes a different approach, collecting information about both needs and solutions from the leading edges of the target market and from analogue markets, markets facing similar problems in a more extreme form. The methodology involves four major steps: 1) Start of the Lead User process; 2) Identification of Needs and Trends; 3) Identification of Lead Users and interviews; 4) Concept Design (Workshop). The methodology is based upon the idea that breakthrough products may be developed by identifying leading trends in the to-be-developed product's associated marketplace(s). Once the trend or broader problem to be solved has been identified, the developers seek out "Lead Users"– people or organizations that are attempting to solve a particularly extreme or demanding version of the stated problem.

Can Users do Anything? Some authors argue that the direct contributions of users are possible regarding incremental innovation. However, when it comes to radical innovation it is required a skilled professional, such as a designer. Roberto Verganti, author of "Design-driven innovation" says that

[5] Lead users: term originally developed by Dr. Eric von Hippel of the Massachusetts Institute of Technology (MIT) and first described in the July 1986 issue of Management Science.

> *"products within existing categories and constructed from existing technologies can undergo incremental changes, again driven by human-centered design, but they can also undergo radical transformation in meaning: these are design-driven. Thus, Apple's iPod was a revolution in meaning, not technology. Similarly, Alessi's development of cute, fun corkscrews and other kitchen items caused a radical transformation of that field, but did not require technological changes. Swatch redefined the meaning of watches, creating a radical revolution.*
>
> *The big wins, of course, are where we combine radical technological innovation with radical meaning innovation. These have to be driven both by technological innovations, so they are technology driven, as well as by meaning revolutions, in which case they are also design driven. Wii harnessed the radical technological revolution in sensors with a radical change in the meaning of a video game, to great success."* ***[Norman, 2010]***

The idea of "the creative leap" has for some time been regarded as central to the design process. Whilst a "creative leap" may not be a required feature of routine design, it must surely be a feature of non-routine, creative design. Some would argue that all design, by its very nature, is creative. However, there are times when a designer will generate a particularly novel design proposal. **[Cross, 2007]**

The "creative leap" may be characterized as a sudden perception of a completely new perspective on the situation as previously understood. A professional develops its expertise over the years with the experience and technical observation of each work with critical and trained attentive eyes. An expert is created and matured for having special attention to a certain subject constructing a more complete knowledge and understanding about it what makes possible the visualization of new perspectives. This asset and trace of personality constitute then material for the "creative leaps" that would lead to radical innovations.

3.1. Current Innovation Strategies

Innovation is considered nowadays as an important "competitive advantage".

> *"In many sectors, the technologic innovation has become the determining sector of competitive success: for the most part of the companies, to innovate is, at this point, an strategic*

> *imperative, fundamental to maintain and get a leadership position at the market, as well as to recover from a condition of competitive disadvantage."* ***[Schilling, 2009]***

The innovation process, depending on the business strategy, can be started from a new invention that is pushed through R&D ("Technology Push") or from the identification of a market need ("Market Pull" also called "Demand Pull"). The "Technology Push" strategy consists on developing a product (usually a radical innovation) starting from an idea or discovery from a scientific basic or applied research, which will then go under the design and development processes to be then produced and commercialized. In contrast, an innovation based upon market pull, the stimulus for innovation (generally an incremental innovation) starts from the needs of the society or of a specific market sector, being then developed by the R&D.

Design Driven innovations, according to Verganti, would be yet a third strategy that "do not come from the market; they create new markets. They don't push new technologies; they push new meanings. (...). It's about having a vision, and taking that vision to (...) customers. But where does the vision come from? (... from)"interpreters" - the experts who deeply understand and shape the markets they work in." **[Verganti, 2009]**.

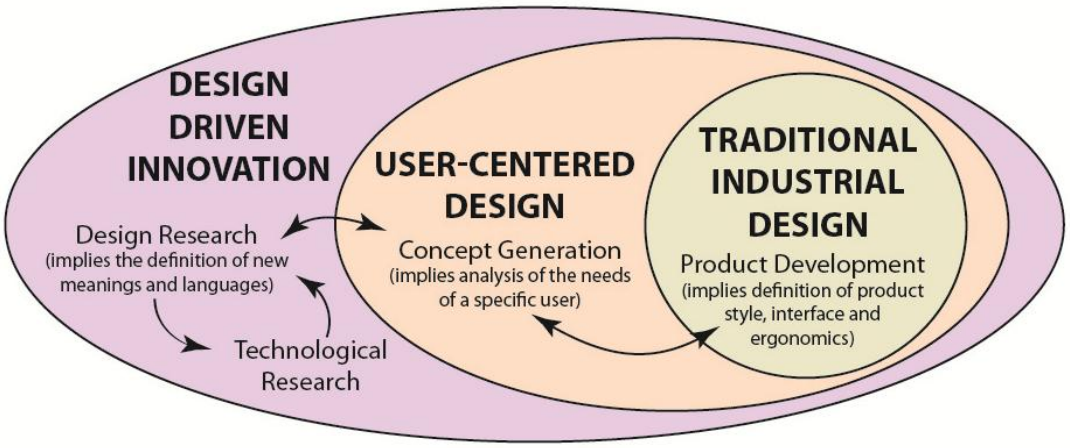


Figure 4: Main focus and relationships between design and innovation methodologies and strategies (based on **[Verganti, 2012]**)

That is to say that a group composed by experts such as designers, firms in other industries, suppliers, schools, artists, psychologists and the media analyse socio-cultural aspects in order to be able to create a product that explores the emotional, psychological and socio-cultural values of the

customers. Their aim is to create products that customers don't expect and that conquer them through passion. They work to develop global companies with "an unbeatable and sustainable competitive advantage through innovations" **[Verganti, 2009b]**.

Product innovation is then seen as not "just a way to acquire competitive advantage, but (also ...) a question of survival, mainly for the enterprises that cannot exploit other sources such as the low cost of labour or privileged access to raw materials." **[Verganti, 2009b]**.

3.2. The Innovation proposed by the Systemic Design

Innovation is undoubtedly a need, recognized by Design Driven Innovation and also by the Systemic Design. But while for Design Driven innovation is an instrument required for competition in market disputes for the Systemic Design it is the essence of a promising lifelong welfare.

But what is the problem with competition? After all, if we are to get inspiration from nature there is not only cooperation but also competitive relationships. The difference between market posture and that of nature is that, mostly, competition in nature is mainly a matter of defence, of self preservation; in the market instead the driving force is the attack in order to, ideally, be not only the dominant but the only one. In nature the need for resources, which are limited what makes competition a necessity, is defined by the requirements of living. In the market there is no limit to the ambition for resources and wealth – the more, the better.

The creation of products, of innovative products, is seen by the Systemic Design as a means of increasing society's well-being. As it happens with Design Driven Innovation, it goes beyond the human centered approach of getting from clients the definition of what they need. Since it is impossible for one person to know everything that exists or will exist in every area of knowledge, it is fair that we have specialists that are focused in studying, learning and understanding specific subjects. Therefore these persons could foresee what could be created that could make a difference in our lives. Even because, when we talk about the knowledge of things, there can be defined 4 categories: things that we know that we know; things that we know that we don't

know; things that we don't know that we know; and things that we don't know that we don't know. So sometimes we cannot even dream of something because we do not even have the awareness of its possible existence. Here comes the role of these design specialists that coordinate the invention of new things to improve our quality of life.

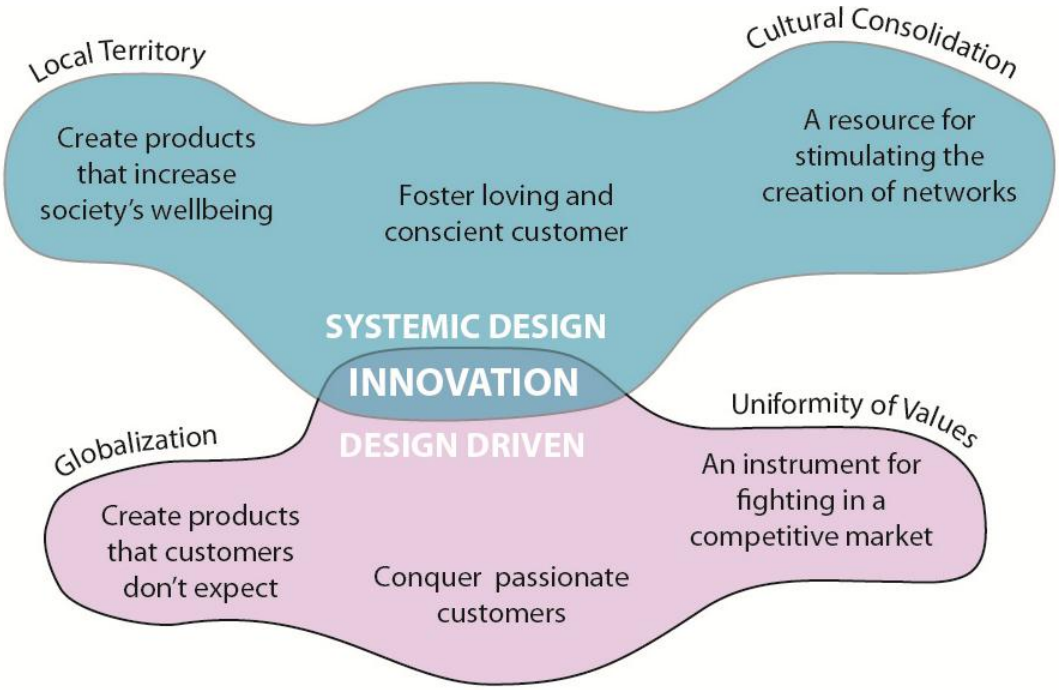


Figure 5: Innovation from the Systemic Design and Design Driven points of view

Although we talk about specialist knowledge, Systemic Design is inclusive, which means that it considers that everyone may be a protagonist and that knowledge must be shared. As in Design Driven Innovation, it believes in the strength of networks, but not only networks of expert interpreters. For the Systemic Design it is important to stimulate the conscious consumer. It is of its interest the evolution of loving witting customers, of users that have a participative role, acting in the conscious choice of their acquisitions, having the awareness that:

- they buy what they need (not what the market imposes, be it in quality or in quantity);
- they can also make part of the network being producers;
- their culture and territory are very valuable, either as consumers or as producers.

The notion of territory is very important to the Systemic Design. “Acting Locally” is one of its principles. At a first glance, it seems to deny the value and benefits that the evolution of communication and transport have brought to our society. If we go back to the activity of living systems, we notice that it has a constant internal activity and eventually exchange matter and energy with its environment. Its priority is maintaining its own welfare and, when it is required because of shortage of resources or need for evolution, it makes exchanges with its immediate environment. Since this process happens with every level of system, it can be said that it happens globally.

Systemic Design believes that global relations are a consequence of growing strong (differently, one of Design Driven Innovation primary goals is globalization). Just after having a firm knowledge of his own values can someone be strong and conscious enough to make fair exchanges and therefore establish a relationship of cooperation instead of domination.

3.3. The Intellectual Property

> *“Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.*
>
> *IP is protected in law by, for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit from what they invent or create. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and innovation can flourish.” **[WIPO 2013]***

There are two categories of Intellectual Properties: the Industrial Property (that includes patents, trademarks, industrial designs, geographic indications of source) and the author rights (copyrights). While the Industrial Property rights are obtained through a process of registration of the property, the author’s right starts automatically with the creation of the work – the registration just reinforces and defines better the rights pertained to the author. Authors’ rights have two distinct components: the economic rights and the moral rights. Even if an artist has assigned his or her copyright rights for a work to a third party, the transferred component is just the economic one - he or she still maintains the moral rights to the work that is untransferable.

Copyrights refers to literary and artistic works – books, music, paintings, sculptures, films, computer programs, databases, advertisements, maps and technical drawings.

For copyrights, Creative Commons "develops, supports, and stewards legal and technical infrastructure that maximizes digital creativity, sharing, and innovation". They are free, easy-to-use copyright licenses that provide a simple, standardized way to give the public permission to share and use creative work — the author dictates how his work can be used[6]. CC licenses let the author easily change his copyright terms from the default of "all rights reserved" to "some rights reserved" **[CC2013]**.

Creative Common licenses are appropriate for all types of content to be shared publicly, except software and hardware. For software it is recommended instead using licenses made available by the Free Software Foundation or listed as "open source" by the Open Source Initiative. For databases, though, CC licenses can be used – "in the 4.0 license suite, applicable sui generis database rights are licensed under the same license conditions as copyright" **[CC2013]**.

All the procedures to protect the Industrial Property are full of details and technicalities that are dominated just by lawyers and specialists. A patent provides its owner with the right to decide how or whether the invention can be used by others, and the respective return benefit. There are strict ties regarding precision on the description of what is being protected, time and precedence of events as well as nuances regarding the countries involved, since the patent protection is territorially limited – the application for the patent must be filed at a patent office with jurisdiction to grant a patent in the geographic area over which coverage is required.

---

[6] Nowadays there are 6 regularly used CC licenses: 1) BY (Attribution alone); 2) BY-ND (Attribution + NoDerivatives); 3) BY-SA (Attribution + ShareAlike); 4) BY-NC (Attribution + Noncommercial); 5) BY-NC-ND (Attribution + Noncommercial + NoDerivatives); 6) BY-NC-SA (Attribution + Noncommercial + ShareAlike). Attribution (BY) means that it must be given credit to the author for the original creation; No Derivatives (ND) means the work may be copied, distributed, displayed and performed only in verbatim copies - derivative works based on it are now allowed; Share Alike (SA) allows the distribution of derivative works only under a license identical to the license that regulates the original work; Non Commercial (NC) refers to the prohibition of the use of the work for commercial purposes **[CC2013]**.

Number of patents is considered an important indicator of performance:

> *"[…]from a consumers perspective it may be argued that patent protection motivates the invention of new goods and services but at the same time may slow down the diffusion of new technologies, techniques and products. A count of patents is one measure of a country's inventive activity and also shows its capacity to exploit knowledge and translate it into potential economic gains. In this context, indicators based on patent statistics are widely used to assess the inventive and innovative performance of a country."* ***[Eurostat, 2012]***

On the one hand the number of patents is used as a measurement to evaluate the performance of an institution – be it an enterprise, an university or a country – and can also mean a valuable property. On the other hand it is argued that it obstacles the diffusion of knowledge and the proliferation of inventions. For the big companies that have enough resources to maintain, defend and that use them as an asset it is a mechanism that is advantageous and quite well dominated. For the small ones it may become an impediment or a threat.

A geographical indication (GI) is another way of protecting the origin and knowledge for production. It is a name or sign used on certain products which corresponds to a specific geographical location or origin. The use of a GI may act as a certification that the product possesses certain qualities, is made according to traditional methods, or enjoys a certain reputation, due to its geographical origin.

Both Geographical Indications and Trademarks are distinctive symbols for products. Trademarks, from one side though, differentiate the products created and made by a certain producer, while geographical indications show the similarities of a group of products that share certain culture, territory and resources. Geographical indications are not created – their unique characteristics are there, in nature, and social recognition must already exist in order to constitute an element to be protected **[Garrido, 2007]**.

In Brazil, the National Institute of Intellectual Property (Instituto Nacional de Propriedade Intelectual – INPI) has given Geographical Indication Registry (IG) for crafts made of golden grass (Tocantins State), clay pots from Goiabeiras (Espirito Santo State), precious opals and handcrafted jewelry of Pedro II (Piauí

State) and income from Renascença (Paraíba State), recognizing the economic and cultural value of handcrafts **[INPI, 2013b]**.

From the point of view of the Systemic Design, Geographical Indications would be an instrument to formalize and stimulate the valorization of local resources and culture.

Patents, though, would be an anticatalyst for relationships and auto-generation. Lots of energy is spent on just guarding property and fighting against violators. On the other hand, what has been produced required investments – time, knowledge, resources – that should be able to repay itself. This investment instead of purely economic return could revert in **reputation**. As far as the authorship is rightly attributed, the technical/ creative capacity is recognized. This constitutes an intangible asset capable of driving the preference of clients, building the value of the brand.

Creative Commons licenses help creators share their work easily to inspire and be used for further work without additional permissions, being a resource to foster for evolution.

Sharing makes the author more known and popular. There is a story involving Alvaro Apocalypse (1937-2003) one of the creators of the Giramundo, a worldwide known puppet theater that creates, performs and give lessons about the creation of manipulated puppets. Behind this work there is a non stop research and innovation. When asked if he wasn't afraid of teaching his techniques and then student would take his place, "steal his ideas", he replied "no" - because what he taught were consolidated techniques; since innovating was a constant of his work, when the student would be capable of reproducing what he taught he would already be ahead. This would make a live productive and innovative environment.

1

2

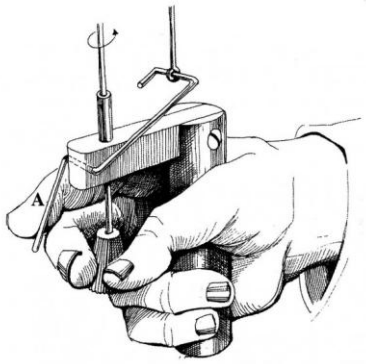


Figure 6: Álvaro Apocalypse and his puppets (source 1: [Barile, 2012]; source 2: [Giramundo, 2011])

As highlighted by Carlo Gubitosa **[Gubitosa, 2007]**, many times it is difficult to attribute rightfully the authorship of a work.

> *"They are many, in fact, the "inventors" who were able to rewrite, with pleasure, wholes pages of the history of science just through the commercial success of their products. For*

> *example, the "cinematograph", patented by the brothers Auguste and Louis Lumière on 13 February, 1895, is nothing more than an improved version of "Kinetoscope," a device patented in 1891 by Thomas Edison, in which the Lumière simply add a device achieved by changing the presser foot of the sewing machine.*
>
> *With this small addition you it can be synchronized the movement of the film with the opening of the shutter, obtaining motion pictures much sharper than those made with previous devices. This small technical contribution, together with the improvement of the quality image, constitutes the decisive push for the diffusion of mass of cinematography.*
>
> *In addition to this extraordinary case, over the centuries many other scientific discoveries have been wrongly attributed to those that, instead, have just edited, commercialized or transformed in products to mass diffusion, and just as many are the men of science who have transformed our daily life and the world in which we live, while remaining anonymous and unknown."*

From the Systemic Design point of view, the most important motivation for innovation, beyond economic wealth, is the sense of community and people's well-being that are made possible and are driven by the strength of collaboration.

4. INNOVATION AS A DEVELOPMENT DRIVER

Considering that the economic wealth of a nation is still a very important notion to evaluate the development of a country, in its turn Research and Development (R&D) expenditure is considered to represent "one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth" **[Eurostat, 2012]**.

In fact, innovation is considered what would really have economic value. "In many sectors, the technological innovation has become the determining factor in the competitive success" **[Schilling, 2009]** . In its turn as suggested by Michael Porter's competitive advantage theory, it is considered that "states and businesses should pursue policies that create high-quality goods to sell at high prices in the market".

We can say that innovation is a necessity for the maintenance of life. Living systems, in order to stay alive, need not only to maintain its internal activity metabolizing their resources to their own production and repairing, but also need to keep a continuous flux of matter and energy with its environment (**[Capra, 2008]**, p.35-42).

These fluxes are not always in balance. The instability caused by the excess of energy may determine a point of evolution. Capra describes that

> *"When the flux of energy increases, it is possible that the system finds a point of instability (known as "bifurcation point")*

> *where the system itself can enter a completely new state, where new structures and new order forms can emerge. (...) This state is recognized as the origin of the development, of learning and of evolution. In other words, the creativity – the creation of new forms – is a key property of every living systems, (... and) life develops continuously in ever new realities.* ***[Capra, 2008]***

These systems aren't just the biological ones. Enterprises are also living systems, and therefore, to maintain its living energy they must innovate.

4.1. Nowadays Strategies for Development in the Brazilian Context

According to the triple-helix as defined by Etzkowitz, university, industry and government are agents of innovation. "Government acts as a public entrepreneur and venture capitalist in addition to its traditional regulatory role in setting the rules of the game" **[Etzkowitz, 2003]**.

The federal Innovation Law ("Lei da Inovação: Lei nº 10.973, de 2 de Dezembro de 2004") for instance "establishes incentives for innovation and for the scientific and technological research in the production environment, aiming at the building of its capacity and technological autonomy and the industrial development of the country". It defines that the "Federal Government, ICTs[7] and fostering agencies will promote and encourage the development of innovative products and processes in national enterprises and non-profit private national entities oriented to research activities, through the provision of financial, human, material and infrastructure resources, to be settled in agreements or specific contracts, to support research and development activities to meet the priorities of the national industrial and technological policy." **[Brasil, 2004]**

The multi-annual plan "Mais Brasil" (Plano Plurianual (PPA) 2012-2015) is "the instrument of the Federal Government that sets guidelines, goals and objectives in order to facilitate the implementation and management of public policies, guide the setting of priorities and assist in the promotion of sustainable development" **[Brasil, 2012]**. Also recognizing that development is more than

[7] ICT is a Brazilian governmental agency or entity that has as one of its institutional missions performing activities related to basic or applied research of scientific or technological nature.

economic results and the importance of the citizens' well-being, the government emphasizes that "a novelty in this edition of the plan compared to the previous ones is the displacement of the focus of public management in favour of results that benefit the citizen. From now on, every government area shows in which the PPA to deliver benefit to the population"[8]. **[Brasil, 2011a]**

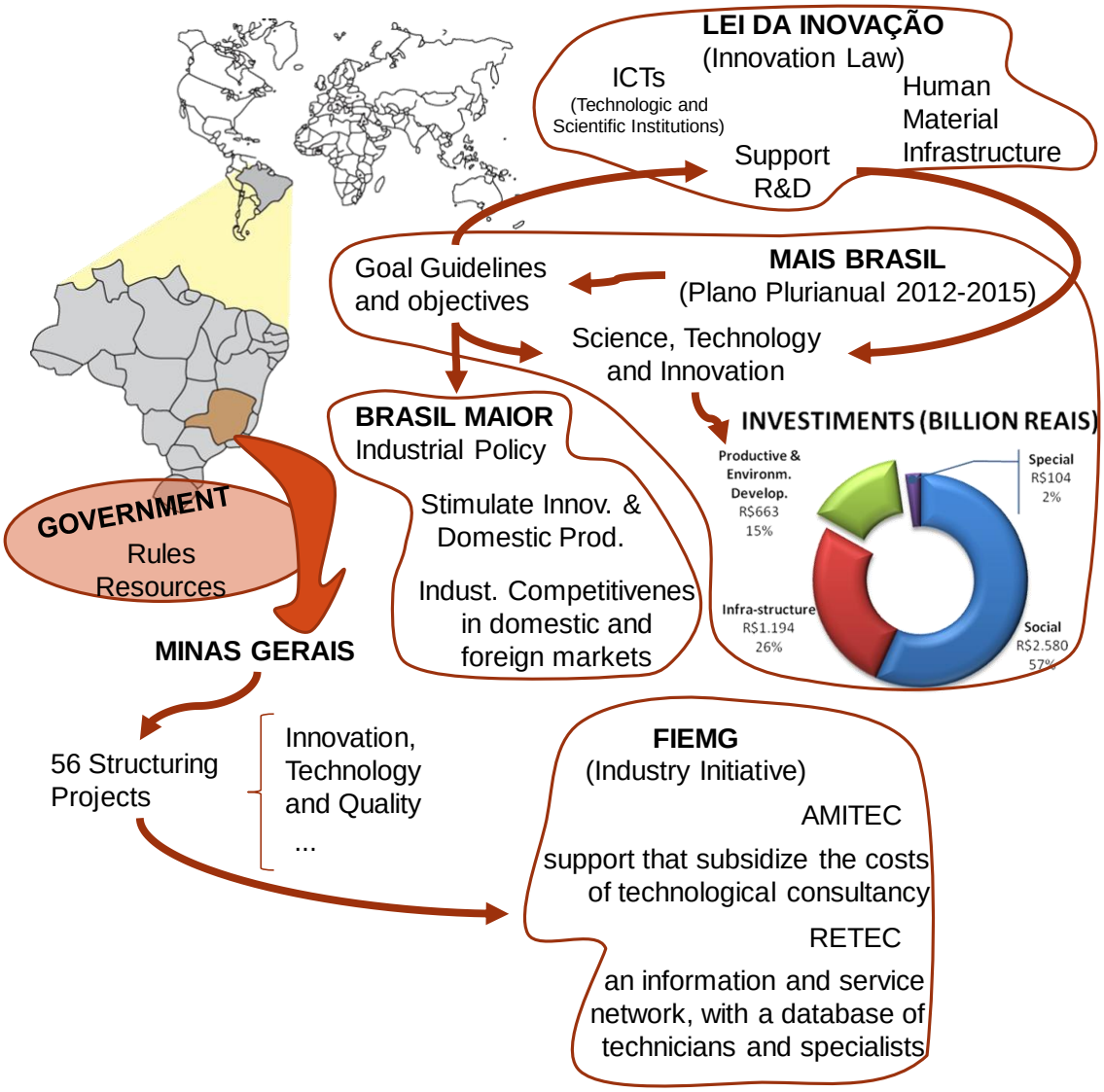


Figure 7: The Development Strategies Context in Brazil and in the Minas Gerais state

[8] For example, the former indicator to evaluate the results of the Unified Health System ("Sistema Unificado de Saúde - SUS) was the amount transferred to states and municipalities. Now, the measurement will be the increase of network equipment and services installed and the larger number of services rendered.

Since also the environmental and economic components are recognized as important, among PPA's "Productive and Environmental Development" policies, that will receive R$663 billion, equivalent to 14.6% of the total funds invested, are the "Science, Technology and Innovation" policies. The Federal Government explains placing these policies in the "center of the country's strategic sustainable development" by stating that "the economic development of countries is increasingly based on innovation and scientific and technological development", what would justify the investments on the area **[Brasil, 2011a]**.

As stated in the PPA 2012-2015 **[Brasil, 2011b]** the government perceives that "the rate of innovation for innovative companies compared to the total number of companies in the Brazilian economy, despite having significantly increased in recent years, is still well below that observed in developed countries, and that still lower is the rate of innovation in new products for the world market". It further reasons that "this observation reinforces what was already known: the distance between the world of science and that of technology", concluding that "more than ever it is necessary to close the gap, taking into account that there is great potential for feedback between scientific and technological production".

The government infers then that "The agenda of "Science, Technology and Innovation" (S,T&I) should include the strengthening, expansion and modernization of qualified R&D infrastructure of Brazilian ICTs. It is also essential a larger academic integration with the productive sector, the establishment of cooperative networks of R&D and the coordination and integration between the various bodies and institutions that make up the national system of S,T&I" **[Brasil, 2011b]**.

Another component of the definition of Brazilian policies is the plan "Brasil Maior", that is the Brazilian's industrial policy for the 2011 to 2014 period, that aims at strengthening supply chains and promoting technological innovation as a mean of adding value to exports and raising the country's participation in the world's most dynamic markets. It focuses on "stimulating innovation and domestic production to leverage industrial competitiveness in domestic and foreign markets. In mobilizing the productive forces to innovate, compete and grow, the plan intends to harness the skills present in companies, the academia and the society" **[Brasil, 2011c]**. This plan integrates instruments from various ministries and agencies in a joint effort to generate to the Brazilian people employment and income.

FINEP is a public enterprise related to the Ministry of Science, Technology and Innovation (Ministério de Ciência, Tecnologia e Inovação - MCTI) that works for the promotion of Brazil's social e economic development by means of public fostering of science, technology and innovation in enterprises, university, technological institutes and other public and private organizations, aiming at "transforming Brazil my means of innovation" **[FINEP, 2013a]**.

For the analysis, monitoring and evaluation of all Lines of Action and Programs FINEP has as important principle the valorisation of sustainable development[9] in its three aspects, namely economic development, social equity and environmental protection. FINEP will give priority to micro and small businesses and value the development of sustainable products, the promotion of local development, the nationalization of production chains, internationalization of Brazilian enterprises **[FINEP, 2013b]**. It defines its operation as comprising all the innovation chain, focusing in strategic and structuring actions that impact in the Brazilian sustainable development **[FINEP, 2013a]**.

Following federal guidelines, also the federation states define development strategies through innovation. Analysing the state of Minas Gerais in special, its integrated development plan ("Plano Mineiro de Desenvolvimento Integrado" – PMDI) contains the state's governmental strategy for the period 2007-2023 considering the mission of "being the best state for one to live" **[Minas, 2007a]**. One of its instruments for effectively executing the defined strategies is the Structuring Projects ("Projetos Estruturadores") **[Minas, 2007b]**. They are 56 Structuring Projects, organized by areas of results that are "focal areas" which indicate where to concentrate the best efforts and resources, targeting the desired changes and improvements in the current reality. One of these areas of results is the "Innovation, Technology and Quality". It has as strategic objectives:

- "Strengthen competitiveness and expand the innovation capacity of the state's enterprises and productive clusters
- Train and qualify labour workforce aligned to the demands of the productive sector.
- Strengthen the network of technological innovation throughout the state.

[9] Sustainable development is the one that "meets the needs of the present without compromising the ability of future generations to meet their own needs" [United Nations, 1987].

- Strengthen the relationship between the S,T&I network and the productive sector.
- Ensure compliance of the products of the state to international quality standards.
- Induce an innovation agenda in order to improve what we already have and to achieve what we don't have yet, defined together with relevant stakeholders, including the productive sector, universities and research centers." [Minas, 2007c]

One of its projects is the Technological Innovation Network ("Rede de Inovação Tecnológica"). The government of the State reasons that the technological innovation has a central role as an engine of growth and economic development, since it has a determinant role on the efficiency of the factors of production. It associates the innovative capacity with the effort in research and development (R&D) and the maturity of the innovation system, that is, the efficiency of the arrangements and governance[10] standards of the different agents that act in the innovation generation chain. Therefore the "Technological Innovation Network" aims at expanding the capacity of generation and diffusion of technological innovations in Minas Gerais, promoting and articulating the different agents – business, government, academia and society – with actions such as:

- "Strengthen the entrepreneurial competence in R, D & I, through actions of direct promotion and training in the development of processes and products and support in basic industrial technology;
- Include the Design as a tool for technological innovation;
- Support the creation and strengthening of innovation habitats such as technology parks and incubators of technology-based companies, as well as virtual environments (e.g. SIMI website11) of innovation;
- Fostering entrepreneurship as a basis for innovation." [Minas, 2007d]

Also from the point of view of the industry, there are some endogenous initiatives. Focusing yet on Minas Gerais, it can be mentioned the "Sistema FIEMG", the System of the *Federation of Industries of the State of Minas Gerais.*

[10] Governance corresponds to consistent management, cohesive policies, guidance, processes and decision-rights for a given area of responsibility

[11] SIMI: http://www.simi.org.br/

5. ACTUAL ACTIONS FOR REGIONAL PROMOTION

5.1. FIEMG System - Policies and Working Processes (Brazil)

Founded in 1933, FIEMG ("Federação das Indústrias do Estado de Minas Gerais" - *Federation of Industries of the State of Minas Gerais*) is the association of the state's industry. It is a private representative entity that covers the entire state of Minas Gerais offering to the industry advice and support in areas such as credit and finance, tax, environment and labour. The Federation also represents the industry and acts in defence of their interests in the state of Minas Gerais in Brazil. It has regional offices to provide services to all municipalities of the estate of Minas Gerais **[FIEMG, 2011]**.

In the second half of the 1990s, it has been integrated to FIEMG, generating the FIEMG System ("Sistema FIEMG"), the institutions SESI ("Serviço Social da Indústria" – *Industry's Social Service*), SENAI ("Serviço Nacional de Aprendizagem Industrial" - *National Industrial Apprenticeship Service*), IEL ("Instituto Euvaldo Lodi"- *Euvaldo Lodi Institute*) and CIEMG ("Centro Industrial e Empresarial de Minas Gerais" - Business and Industrial Center of Minas Gerais). Already in 2001, was created the IER ("Instituto Estrada Real" - *Estrada Real Institute*) to promote the tourism industry in the state. The SENAI was created in 1942 to promote the training and qualification of labour demanded by the firms; SESI, established in 1946, guide actions directed to the welfare of workers of the sector; IEL aims at promoting the incorporation of new management methods and processes in enterprises of Minas Gerais; and CIEMG has a focus on encouraging associations. **[Mercado,2013]**

The FIEMG System works to contribute, through the application of knowledge, to the sustainable development and competitiveness of the industries settled in the state of Minas Gerais as well as the increase and strengthening of the associativism. It offers services to help the "indústria mineira" (i.e. the industry from Minas Gerais) to grow and improve the social economic conditions of the state and of the country.

To achieve its goals of sustainable development, FIEMG counts on the *Environment Management* ("Gerência de Meio Ambiente" – GMA), composed by a multidisciplinary team consisting of lawyers, engineers, biologists, geographers, administrators, architects and environmental specialists. Among the technical services coordinated by this department and commercialized by CIEMG we highlight the *Commercialization of Adds in the Integrated System of Waste Stock* ("Sistema Integrado de Bolsa de Resíduos") **[FIEMG, 2011c]**. The Waste Stock is an exchange tool among industries and companies specially those that invest on environmental issues. Through the site www.sibr.com.br the available waste materials are offered and requested, as well as presented environmental news and events **[CNI, 2008]**. Another service provided is the *Cleaner Production ("*Produção mais Limpa" – P+L) that promotes the Enviromental Management based on the P+L methodology **[Sampaio, 2011]** .

The priority of P+L is to avoid the generation of waste and emissions (level 1). The waste that cannot be avoided should preferably be reintegrated into the company's production process (level 2). If this is not possible, recycling measures outside the company (level 3) could be used **[SENAI, 2011]**. This is aligned with the Brazilian National Politics of Solid Waste ("Política Nacional de Resíduos Sólidos" – PNRS) instituted in August and regulated in December 2010. Among the concepts introduced by this legislation are:

- the reverse logistics: characterized by actions and resources to promote the solid waste collection and return to the industry or the reuse in its own or in some other production cycles, or even another alternative use.
- the sectorial agreement, that is an act of contractual nature for the implementation of the shared responsibility for the product lifecycle, where all actors of the society are responsible for minimizing the volume of solid waste.

Since 2010, FIEMG defined as priorities, the *Regional Industrial Development Plan* ("Plano de Desenvolvimento Industrial Regional"*)*, the *Program for Regional Industrial Competitiveness* ("Programa de Competitividade Industrial

Regional") and the *Programme for Supporting the Competitiveness of the Clusters of the State of Minas Gerais* ("Programa de Apoio à Competitividade dos Arranjos Produtivos Locais de Minas Gerais")**[Mercado,2013]**

Nowadays they are 7 clusters[12] that are being supported by FIEMG: Shoes in Nova Serrana, Electrical and Electronic in Santa Rita do Sapucaí; Furniture in Ubá; Biotechnology/ Human Health in the municipalities of RMBH (Metropolitan Region of Belo Horizonte); Casting in Divinópolis, Itaúna and Cláudio; Shoes & Handbags in the RMBH; Fruit Production in the Jaíba region.

One of its services is provided by the program AMITEC ("Apoio à Melhoria e Inovação TECnológica") that aims at supporting the improvement and technological innovation of enterprises of the Minas Gerais state (**Figure 7**).

The AMITEC has four lines of support that subsidize the costs of technological consultancy undertaken by executing agencies:

- **Technological Information**: quick technological specialist consultancies that may require research database, bibliographic material (books, articles, standards, etc.) or even notorious knowledge with the proper treatment and presentation of information in a well structured summary report.
- **Technical Support**: analysis or tests conducted by experts in laboratories, with the aim of helping companies at gathering information regarding the improvement of processes or products or within technological innovation projects;
- **Technological Consultancy**: more complex consultancies, made by acknowledged experts. The actions may involve Diagnosis ("in loco" visit and solution proposition), Technical Advice (analysis of documentation, conclusions and recommendations), Technological Projects (support on the planning and formulation of proposals for innovation projects within companies and to obtain funding) and Technological Improvement (advice on solving technical or technological issues on the improvement of machinery and equipment used in the production process, or on the implementation of management systems)

[12] Although there are works that differentiate clusters from APLs **[Figueiredo and Serio, 2007]** , here we use the term clusters as a synonym of APLs ("Arranjos Produtivos Locais" - *Local Productive Arrangements*), as being arrangements to work the whole production chain of a particular economic sector, creating a business environment that enables organizations to increase production and conquer new markets.

- **Technological Innovation**: the use of knowledge about new ways to produce and market goods and services aiming at the introduction of a new product in the market (product innovation) or application of a new production process (process innovation).
- **Support to Innovative Enterprising**: preparation of feasibility study technical-economic and business plan projects for individuals to obtain resources related to new technologies.
- **Support to the Innovative Entrepreneur**: preparation of technical-economic feasibility study and business plan for funding projects of individuals related to new technologies. **[FIEMG, 2011a]**

Its implementation tool is the RETEC that is an information and service network, that has in its registration database, hundreds of technicians and specialists ready to solve the company's technological problems (**Figure 7**). The only requirement is to access the site (www.mg.retec.org.br), register as an individual and as a legal entity, and make a service request. The request will be then analysed and, if considered applicable, implemented articulating financial agents and consultants **[FIEMG, 2011b]**.

5.1.1. Cases of FIEMG System/IEL's Actions

One of the areas supported by FIEMG is the footware cluster of Nova Serrana, for which a number of projects have been conducted.

5.1.1.1. NS Conceito

The project "NS Conceito" (Nova Serrana Concept) have been a project from the Nova Serrana footware cluster, created through the partnership between IEL and Sindinova ("Sindicato Intermunicipal da Indústria do Calçado de Nova Serrana" - Intermunicipal Syndicate of the Footwear Industry from Nova Serrana) in 2006. Its aim was to stimulate the use of Design for the development of the collections of the enterprises of the region.

Nova Serrana is a small city with 73.699 inhabitants and an area of 282km^2 within the "Cerrado" biome **[IBGE, 2013]**, in the interior of Minas Gerais – Brazil. It is known for its important position in the production of footwear being the reference city for the footware cluster that is supported by FIEMG. The Nova Serrana pole has about 1000 companies that produce 70 million pairs of shoes a year, employing 18 thousand workers. It is estimated that 55% of the

sports shoes produced in Brazil have their origin in Nova Serrana **[Minas, 2013]**. In its turn Brazil has an important position in the international scenario within this industry. In 2007 it was the 3rd biggest footware producer (behind China and India) and the 5th biggest exporter (behind China, Vietnã, Italia and Indonesia) **[FIEMG et al, 2010]**.

Its prominent position is thanks to the size of production. The biggest part of the businesses in Nova Serrana are micro (up to 19 employees) and small enterprises (from 20 to 99 employees) corresponding to 94,5% of the companies. Having an emphasis on sports shoes (57% of its industry) the market focus of Nova Serrana is in the manufacture of less sophisticated products, targeted to meet the lower income market sectors, with production of larger volumes at low prices. Therefore, their main value is low price and not quality **[FIEMG et al, 2010]**.

The profile of workers is of low level of education, which is aggravated by the fact that a high percentage of companies do not invest in employee training. Production management is the area considered that is most in need of qualification **[FIEMG et al, 2010]**.

Regarding governance, 48,1% of micro companies are not affiliated with the union. But among the small and medium-sized this percentage is reduced to 5% and 5,3% respectively. Within the union there is a unit of SENAI[13] that could provide testing services for Nova Serrana's footwear industry. However a survey indicates that 38,3% of the respondents ignored the availability of this service **[FIEMG et al, 2010]**.

According to research[14] the SENAI lab has a high level of idleness, with few companies using the tests offered. The main reasons for the low demand for tests would be: first, the predominance of the manufacturing of simple, low price

[13] The SENAI ("Serviço Nacional de Aprendizagem Industrial") currently has 809 fixed and mobile units operating throughout the country. It acts in the professional learning, including vocational technical level up to higher education and graduate. It also has a network of 208 certified laboratories that provide technical and technological services to companies across the country. In 2011, this network provided services to over 18,000 businesses, 139,149 having been made services to support innovation and technological development of the industry **[SENAI, 2013]**

[14] Research conducted in 2008 by the USP Polytechnic School (Escola Politécnica da Universidade de São Paulo)

shoes (cutting then on testing costs) plus the prevalent use of synthetic material, a material that would be fairly uniform not prone to quality problems; second, the availability in these laboratories of just simpler tests, compelling some companies to conduct tests in other laboratories outside Nova Serrana **[FIEMG et al, 2010]**.

The NS Conceito project is based on the consultancy of renowned designers/ stylists that work with entrepreneurs and modellers of the region to create value to their products and give identity to the brands.

One edition of the project was developed by the stylists Gloria Coelho e Sandra Silveira. They have conducted a workshop about the creation process, working with the themes of mission, value, themes, inspirations, colors and composition for the creation of a collection.

Another edition was developed by the stylist Ronaldo Fraga, called The China of Ronaldo Fraga. Ironically the theme proposed was the China, “the torturer of the sector”, since it is considered the close competitor that threatens Nova Serrana’s market. “Tradition, pollution, destruction, seduction and habits steered the research for the development of the models and the selection of colors and materials. The entrepreneurs were made familiar with all the phases involved in the development of a piece of design” **[Fraga, 2008]**.

The objective of the projects of making a collection and presenting it in fashion fairs has been reached, what is considered important to leverage the name of Nova Serrana as a footware cluster. Nevertheless it didn’t promote the cultural change as imagined. The industries didn’t establish a routine relationship with designers. Instead, the idea of being an element of status have been reinforced since, more than promoting the industries involved, it promoted the already renowned designers. The products designed weren’t for the market where the industries involved usually operated (class C and D) and, therefore, knew the dynamics. They have been considered concept products for higher classes, which were able to show the cluster’s capacity of production, but not a market where they would normally operate.

SUMMING UP – NS Conceito[15]

http://www.fiemg.org.br/Default.aspx?tabid=560&mid=1437&newsType=Detail&Param=18205

The project aims at stimulating the use of Design for the development of the collections of the enterprises of the region, using renown designers with workshops about the creation process, working with the themes of mission, value, themes, inspirations, colors and composition for the creation of a collection.

✓ The objective of the projects of making a collection and presenting it in fashion fairs has been reached, what is considered important to leverage the name of Nova Serrana as a footware cluster.

! Market strategy – high volumes, low price, cut on costs such as tests; concurrence with Chinese products.

👍 Smaller volumes focusing on local resources, culture and needs

! Employers with low level of education and no training

! Not affiliated with the union

! The project didn't promote the cultural change as imagined.

! The industries didn't establish a routine relationship with designers.

! The idea of the design being an element of status have been reinforced since, more than promoting the industries involved, it promoted the already renowned designers.

! The products designed weren't for the market where the industries involved usually operated (class C and D) and, therefore, knew the dynamics. They have been considered concept products for higher classes, which were able to show the

15

✓ Their positive features;

! Features that require attention or need improvement

👍 Suggestions of improvement

cluster's capacity of production, but not a market where they would normally operate.

- ⚠ Use of synthetic material not prone to quality problems (comfort and aesthetics?)
  - 👍 Forming participative and sharing communities having designers as facilitators, aware of local needs, resources and their properties.
- ⚠ Testing services are available but mostly unknown and insufficient
  - 👍 Improving communication and develop capacities according to local needs

5.1.1.2. The Crômic Case

Crômic is one of Nova Serrana's footware medium-sized company, founded in 1993, having nowadays a bit more than 100 employees. It has participated in the experience of both editions of the NS Conceito project. The company's production at present is around 1200 pairs of shoes a day, but its installed capacity is of 2400 pairs. The partners own also another company (Líder Injetados), also located in Nova Serrana, that employs 35 workers where injected shoe soles are manufactured. 25% of its production supplies Crômic and the other 75% supplies the Nova Serrana's market. The steps of sewing and assembly used to be made by another firm of theirs, but it has been closed for not proving economically viable. The topstitching and sewing is being outsourced to other local firms. The modelling is developed by three design studios in Rio Grande do Sul[16] and relies also on prospecting the market to check the national and international trends, through visits to fairs, monitoring of websites and magazines and attendance to workshops **[Oliveira, 2012]**.

One of its owners, Junior César Silva, has begun working in the company (that was his brother's property) when he was 17 years old. He also has the particularity of playing an active role in the syndicate – Sindinova, having occupied during many years different relevant positions such as of its president,

[16] Rio Grande do Sul is another state of Brazil, where it is located the most important footwear Brazilian APL in terms of volume of production and employment, in the region called "Vale dos Sinos". It is mainly specialized in manufacturing women's footwear.

member of the board of directors, and being today its “first vice-president”. His entrepreneurial personality, the participation on meetings of the sector and the knowledge of processes and opportunities available offered by organizations that have as mission the promotion of the development, allowed him to take the initiatives that would enable the development of a product in partnership with the Federal University of Minas Gerais (“Universidade Federal de Minas Gerais”).

In 2007, again as a reaction to its direct competitor, the Chinese shoemakers, after attending an inspiring Nike seminar in “Novo Hamburgo”, the Crômic company saw as an opportunity developing walking shoes with more refined technological qualities, so that it wouldn’t compete in price as he would be able to offer a product with higher added value. It would be a category of footwear that would lack in the market, being between the high-performance sports shoes for professional athletes and products without any added technology, for people who like to go hiking on weekends **[Oliveira, 2012]**. Making a request to IEL/FIEMG for the development of walking shoes, using the RETEC, they have been put in contact with the UFMG[17].

From this resulted a successful partnership since they developed and patented a system for impact attenuation on walking (Patent nº PI0800552-4 A2 - **[INPI, 2013]**). The team was composed by UFMG undergraduate and graduate students, teachers of the School of Physiotherapy, Mechanics Engineering and Production Engineering. The attenuation system was developed based on geometrical and physical principles of a flexible structure with an arch shape to be applied to shoe soles, which produces the effect of stress distribution and cushioning, and provides greater comfort and ergonomics during activities such as walking and race.

The development process involved the research for existing patents, the consulting of specialists in the university in related areas. It was formed a

[17] UFMG is a federal university in the state of Minas Gerais, created in 1927. Nowadays it offers 75 undergraduate and 207 graduate courses gathering around 40 thousand students and 2704 teachers. It has 804 research groups, with 369 national patents, 108 international and 46 licensed technologies **[UFMG, 2011]**. It has a coordinating office for the Transfer and Technological Innovation (“Coordenadoria de Transferência e Inovação Tecnológica - CTIT”) that operates in the management of scientific and technological knowledge, including activities as the dissemination of the culture of intellectual property and the commercialization of innovations developed at the university.

multidisciplinary team composed of four teachers, eight graduate students (master's and doctoral levels), two undergraduate students, representatives of the Laboratory of Prevention and Rehabilitation of Sports Injuries (LAPREV) School of Physical Education, Physical and Occupational Therapy (EEFFTO); Laboratory of Bioengineering (LabBio) from the Department of Mechanical Engineering, and Integrated Laboratory of Design and Product Engineering (Lidep) from the Department of Production Engineering of the School of Engineering (EE). The Office of Technology Transfer and Innovation ("Coordenadoria de Transferência e Inovação Tecnológica" – CTIT) UFMG assumed the General Coordination of the project **[Oliveira, 2012]**.

Figure 8: Crômic's Aerobase walking sports shoes (http://cromic.com/site/?page_id=15)

This group has developed the design of a sole after considering the required anatomical and biomechanical properties of the new footwear, the characterization of the footwear currently produced by Crômic and the local competitor, the definition of possible materials to be employed in the new shoes and their costs, and the definition of the technology to be applied in the manufacture and respectively costs. Prototypes have been constructed and adjustments have been made considering the results of biomechanical tests.

Afterwards, other adjustments have been proposed by the company and new prototypes have been tested. The Crômic modified design of the absorber to, according to their experience, enhance the appearance and make it more marketable. For the rest of the shoe there has been a proposition from the designers of the UFMG, which hasn't been adopted by the company (**Figure 9**).

They considered that these solutions wouldn't meet the target user needs and taste. Therefore, also the design of the rest of the shoe has been developed internally.

Figure 9: Models of the collection developed by Lidep (Source: Schor, 2008, p. 22 apud **[Oliveira, 2012]**)

The project value was set at R$45.000 of which R$30.000 were funded by AMITEC/ RETEC, and the remainder by the entrepreneur. Besides this financial investment, the company invested about R$200.000 in the making of the aluminium matrices of the sole and the acquisition of EVA injection machine, imported from China, to put into production the new shoes. Furthermore, bought in the domestic market the oven UV48, whose investment was of approximately R$25.000.

In the agreement it has been defined the preference of the Crômic company for the licensing with exclusivity of the developed technology. The duration of the agreement was set to be of 10 years, extendible by consensus of the parties. The university has provided as counterpart the access to the infrastructure of the research laboratories of the School of Engineering and the School of Physical Education, Physiotherapy and Occupational Therapy and salaries of the researchers involved.

As legal instruments they were signed:

- a Technical Cooperation Agreement (August/ 2007) and additive terms for adjustments in the duration of the project and intervenients;
- a Patent filing deposited by the UFMG in the INPI - Instituto Nacional de Propriedade Intelectual (January/ 2008);
- a Contract for Technology Transfer (October/ 2008).

Some of the terms of the Licensing Contract are:

- Cotitularity between UFMG and Crômic (50% each); the innovation can be commercially explored by the company and UFMG can continue to develop research based on the technology.
- The responsibility of Crômic for expenses of development, industrializing, production and commercialization of the technology; protection and maintenance of the intellectual property rights in the national and international spheres;
- The payment by Crômic to UFMG of 1,5% of the gross revenue related to the selling of products obtained from the technology.

As a result of this partnership which produced the “Aerobase walking sports shoes”, Crômic experienced an increase in sales and in the number of employees (from 145 to 170) having its apex in 2010. It has been a positive experience with a contract between university and enterprise considered fair by the enterprise. They acknowledge having had a good return on investment, mainly considering that the equipment bought for its production is also used for other products.

Figure 10: Crômic’s Aerobase running sports shoes (http://cromic.com/site/?page_id=15)

Then, in 2010, the enterprise started a similar process for the development of running sports shoes in partnership with UFMG and with incentive of FIEMG. The development of the design of the upper part of the shoes was outsourced to a design office in Rio Grande do Sul. Nevertheless, this second experience hasn't been as positive as the first one. According to the company, some of the reasons have been establishing an even closer concurrence with the major global producer of sport shoes that, on their turn have lately lowered their prices consistently; the system created for impact attenuation being too specific for running and therefore being somewhat too hard for walking - this being a problem since customers in general do not buy sneakers for too specific purposes, being considered that running shoes must also be comfortable for walking.

Nowadays the sales have decreased even for the walking sneakers and the major buyer of the product is a store related to the university (COOPMED[18]).

The patenting process has been considered simple by the Crômic since the university have assumed the bureaucratic procedures and had the structure necessary for it, such as the representative agent and lawyers to elaborate the documentation. Besides, the patent request was deposited just in Brazil. Therefore the university was responsible for the most expensive administrative aspects and the Crômic for the taxes that they consider to be derisive.

a. General Analysis

The technology transfer process used the model market pull (also called demand pull)[19], that is, the stimulus for innovation came from the needs of society or of a specific market sector. The technology has been completely transferred since it has been achieved the production and marketing of a low cost shoe with proper cushioning for walking, generating jobs and income. The

[18] Consumer Cooperative, Publisher and Medical Culture, medical cooperative of the UFMG, created in 1961 by a group of students and professors of the Faculty of Medicine of UFMG, aiming at having facilities to purchase very expensive imported books and equipment having the benefit of smaller taxes charged to non-profit organizations.

[19] The other transfer model alternative, called *technology push,* is when the innovation process begins with an idea or discovery, from a scientific basic or applied research, that aftwards passes to the design and development of a product that may be produced and commercialized in the market.

project has achieved its main objective: to create a functional shock-absorber system, simple of being produced.

Analyzing the history of this technology transfer process, from the study of Oliveira **[Oliveira, 2012]** and from the interviews made with the team from FIEMG, the coordination of CTIT and the direction of Crômic, they can be highlighted positive features and some improvement opportunities.

This experience has allowed UFMG to have substantial improvements along the process: the development of a model contract practice; the knowledge in the licensing process involving teachers, students and administration of CTIT; the definition of reference costs and time; the generation of masters and PhD researches and the expertise in a new area (shoes); the opening of opportunities for new partnerships and the development of new products. The relationship UFMG-Crômic also enabled greater visibility of the University as an innovative institution and a good partner through the numerous reports and news published by the media.

The close relationship between the University and the company was important to the company's technological improvement. This partnership allowed Crômic to have access to knowledge and a product with added technology.

The closer analysis and monitoring of the production process, provoked by the development of the product, has generated a cost reduction in the cutting phase. 50% of the economic result of this cost reduction is passed on to be divided among employees.

The company has learned a new technique for the production of EVA soles, including supplier identification of the compound suitable for injection process by EVA spill. This supplier, part of the productive cluster, has had the opportunity of beginning a new business – the production of EVA compound.

Another positive factor was the possibility of improving the company's image because of the partnership with universities and benefiting from the Federal University of Minas Gerais reputation. The fact that it is manufactured in Nova Serrana (known for producing very popular basic quality shoes) identifies its image with low quality products. This investment in quality and technology has made the economic level of this sports shoes' customer to change - the

company's products are generally directed to customers belonging to classes C and D, and the "Aerobase walking sports shoes" reaches basically the classes B and C.

This is a factor that, along with UFMG's higher reputation in BH than outside it, may explain the difficulty in marketing the product outside Belo Horizonte. The company has needed to reformulate its promotion mechanisms directing Aerobase especially for class B. The marketing campaign used the image of a nationally known actor. Nowadays it is being commercialized basically just to COOPMED in an area of intense influence of the UFMG.

In addition to improving the quality of its products, the company started using the Shoes' Physical-Mechanic Testing Services offered by SENAI in Nova Serrana, to analyse flexing, abrasion and detachment characteristics. This evaluation solved some initial problems of the product whose sole peeled and even tore, damaging the image of the product.

The problems that occurred during this experience are mostly related to the good timing of all involved. Bureaucracy and slowness of the Federal Attorney and bad timing of some activities such as the preparation of the proposal by the Design team have been a problem. There has also been an error in the schedule of the marketing campaign – the 6 month contract with a nationally known actor worth R$500.000 has been effective just for three months since the preparation of the campaign advertisements were delayed and spent the first 3 months to get ready.

Besides, from the point of view of the company, there has been also the difficulty of getting the university designers to understand the company's client profile. From the point of view of the coordinator of the project from CTIT, Heloiza Schor, the rejection of the proposal of the university design team and the adoption of the solution from Crômic's internal technicians meant that the company succeeded in making a partial change – the sole has been improved but the design remained having as close inspiration the international big makes.

Another technical aspect was that, for its production, it would be necessary more detailed information about the product than that supplied by the technical team, related to the materials used and the dimensioning of the structure. This has been solved by the company itself through trial and error.

The technical experts from CTIT are mostly outsourced, occurring then a high turnover, which prevents from taking full advantage of lessons learned from previous experiences penalizing the quality of the services provided.

Also the change of university's coordination personnel every four years (when the University's Rector changes), penalizes the continuity of capacity building and the training of professionals in various areas of the institution and the rhythm of the execution of the Projects. The role of CTIT as well as the process of technology development and licensing must be better known by the academic community and its peers. There is also the need for making more explicit the Innovation Law rules, creating internal procedures that then must be taken to the knowledge of all involved. Actions such as the creation of an office in the Services Court of the Campus of UFMG and the UFMG's team coordinated work are being taken.

b. Analysis referring to Systemic Principles

When the industry and the academy join forces to evolve we see a significant manifestation of the **valorisation of relationships**. The simple but essential fact of being able to achieve together the primary goal, that wouldn't be reached by each one individually, is an example of the effectiveness of networking. The government, in its various spheres, would be a facilitator of this relationship, be it providing initial resources, be it monitoring the interests of public welfare. The coherence between federal, state and local legislations, programs and initiatives are a very significant ingredient for achieving goals.

On the other hand, an impediment for the continuous, smooth flow of this dynamic is bureaucracy. Moreover, the process must be well managed counting on motivated people. The creation of ICTs is an effort of the Brazilian government to provide organization and management. Nevertheless there are two important points that must be well taken care of: one is the maintenance of working pace; the other is the involvement of a broader range of the society – nowadays there is the tendency of making the participation in this kind of technological initiatives a privilege of the few, mostly those with high education level, excluding a big part of the population.

Some reasons are the lack of clear understanding of what constitutes technology and therefore the breadth of what is fostered by public agencies; and the mechanisms of communicating opportunities (see section 7.2).

It is important for the sustainability of this dynamics the focusing on **local actions.** Being compliant to international standards, international relations, exports, are important but shouldn't be part of structuring actions. The bases, the foundation, must be the knowledge and development **of local resources and culture**. Only after having a strong awareness of the own needs, capacities and potentials it is possible to look outside and see real opportunities and beneficial relationships. Nevertheless, changing the culture of having as close inspiration the international big makes is a real challenge since it has deep roots.

It doesn't mean remaining just working on the basis and being always "behind" in relation to the developed world. It means an accelerated and intensive work of constructing this basis with the participation of the community in actions that put together and involve all levels of expertise – from the elder that has a living experience, to the young that have the energy, is curious and is constructing his knowledge, to the mature expert that have an academic background and/or a market experience.

The Crômic case has elements to backup these statements. Solutions for the project came not only from the university experts but also internally from the company, from people that had production experience. This has happened both in the case of defining the final format of the sole (when the solution came from the practice of the trial and error involving materials and dimensions) and also in the definition of the design of the upper part of the shoes.

The Crômic's market is originally composed by customers belonging to classes C and D. The main motivation for the project developed with the university was to gain technological advantage over its competitors – that is, the focus was on the market not on the customers. Besides local market or its local customers weren't the main worry. The aim was not to change market level but it would be welcome to attract foreign markets. Nevertheless the new feature developed by the project added to the sports shoes has attracted a different level of customer (class B). This project represented many opportunities and has attracted development and growth, for all involved and for this it is considered a success.

Even though there have been unexpected results which were considered minor problems. The company has assumed to know the taste of its clients, and rejected solutions that it considered would not be suitable to them. Since the demand did not come from the clients, the final effects were unknown. It conquered new clients but since the change was partial, it was not able to retain them. The material used didn't have the quality that they expected and this has generated some frustration. The new market required a new marketing approach and entering this unknown field meant some surprises meaning extra costs.

Giving **priority to customers and their well-being** and caring for the **respect of their culture** could mean a different story. In fact it would mean a new kind of effort. The preparation for the project would be longer, starting not from the product development but from a deeper knowledge of customer values, requiring a survey. The involvement of designers and marketing wouldn't happen late in the project but would be activated from the beginning. The problems that were experienced might not have happened. Besides we believe that the product life span would be longer (although for the walking shoes it has already been very satisfactory). We have to admit that this would mean a larger bet. But that is the real innovation.

The Crômic project is also an example of self creation ("**autopoiesis**"). The development of Crômic, its initiative of technological improvement, has brought new opportunities for other companies and a chance of higher income to its employees. Thinking on this project as an element of a system could make this net of opportunities and new initiatives to be even bigger and last longer.

Reasoning about the **optimization of resources** could activate new businesses. SENAI's testing labs, for instance, are considered to be rather idle. There have been mentioned two problems: the lack of knowledge about the availability of the service and the suitability of the services provided in relation to the companies' needs. This means that local resources aren't well used and that there is a communication problem. Networking should then be improved. Also regarding materials used in the fabrication of shoes, it is very likely that resources could be optimized and local resources could be better used.

SUMMING UP - Crômic[20]

Being an industry from the Nova Serrana footware cluster, it proved the strategy of making partnership with an university (who used a multidisciplinary team to develop a product) to improve its market performance through its technological innovation using the resources offered by FIEMG.

- ✓ They succeeded at developing a product and obtaining a patent.
- ✓ They had an increase in sales and in the number of employees, with a good return on investment.
- ✓ Complete technology transfer with a product developed, produced and commercialized.
- ✓ University's practical experience and maturation of the administrative process related to technological transfer
- ✓ Generation of related technical academic works.
- ✓ Greater visibility of the University as an innovative institution and a reputation of being a good partner
- ✓ Opening of opportunities for new partnerships and the development of new products
- ✓ New opportunities, with a new product, for companies from the cluster
- ✓ Technological improvement of the company

20

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- ✓ Revision of product development process that generated cost reduction
- ✓ Improve of the company's image because of the partnership university The initiative of one company has brought new opportunities for other companies and a chance of higher income to its employees.

- ⚠ Difference in the market segment traditionally addressed by the company and the segment conducted by the marketing campaign and qualities of the product.
- ⚠ Lack of synchronisation among stakeholders and bureaucracy
- ⚠ Lack of mutual understanding and alignment of expectations on the essence of Design works
- ⚠ Personnel turnover
- ⚠ Opportunities are a privilege of the few, mostly those with high education level
- ⚠ Resources available aren't well known
  - 👍 Good communication and strict respect to agreements with the conduction of a facilitator
  - 👍 The involvement of designers and marketing should be activated from the beginning
  - 👍 Accelerated and intensive work of constructing base-knowledge with the participation of the community in actions that put together and involve all levels of expertise – from the elder that has a living experience, to the young that have the energy, is curious and is constructing his knowledge, to the mature expert that have an academic background and/or a market experience.
- ⚠ Internationalization efforts
  - 👍 Local market, resources and culture should be treated first
- ⚠ The company has assumed to know the taste of its clients – they haven't been carefully taken into consideration
- ⚠ The material used didn't have the quality that they expected and this has generated some frustration.

- Involvement of designers as facilitators, with the knowledge of the client and study and on resources available to be defined considering the optimization of their use (input/output).
- Identification of other expertises required in various phases of the project such as ergonomists and test planners to execute special activities according to specific needs.

⚠ It conquered new clients but since the change was partial, it was not able to retain them.

- Thinking on this project as an element of a system could make this net of opportunities and new initiatives to be even bigger and last longer.

⚠ Local available resources are left idle, using outside resources instead

- Knowledge of local resources and partnerships to reach the required level of quality

⚠ A second experience was not as positive, because the product made a close concurrence to a strong market leader, with a product too specific

- Products should be developed considering local resources and knowing better the customer and its needs

5.1.2. Instituto Estrada Real – Touristic Actions

5.1.2.1. VER Project (Living the "Estrada Real")

The SESI/ MG, in partnership with the IER, promotes the VER Program aiming at fostering and strengthening the image of the "Estrada Real" as a major destination in the country and consolidating its credibility. The aim of the VER Project is to promote the numerous beautiful natural, historical and cultural attractions of the cities of Barão de Cocais, Caeté, Catas Altas and Santa Bárbara, otherwise known just for the mining activities and steel production. Actions are performed to stimulate the experience of the territory in order to have it valorised by local communities and visitors **[SESI,2012]**.

Some of the actions being implemented throughout 2012 and 2013 intends that sectors of the industry, hospitality, cuisine and crafts are brought to act together generating employment and income for the strengthening and development of the regional identity. Among them the workshop “Turismo: que negócio é esse?” (Tourism: what business is this?) taught in the four municipalities of the path for improvement of tourism ventures and their labour force, and exposition “Caminhos da Moda” (Fashion Pathways at the Minas Trend Preview - nov./2012), one of the most important fashion events in Brazil. In this exhibition dresses were composed with patterned fabrics referring to the historical and cultural attractions of the region[21]. Encouraged by the success of this action, an itinerant exhibition was performed, from May to November 2013, where the dresses and the moulagen technique have travelled through the region, surprising the residents **[SESI,2012]**.

Figure 11: Exposition in the Minas Trend Preview 2012 of the models created by SESI and the respective historical attractions that inspired them (Photographer: Sebastião Jacinto Júnior)

Another action of the VER project was the execution of the “Cidadania Real” (Royal Citizenship) project in late 2012, which mobilized the population of the four municipalities with cultural events, gastronomic meetings, crafts exhibitions

[21] The patterns, created by SESI in partnership with SENAI Modatec, represent six attractions of the region: Santuário do Caraça (Catas Altas); Sítio Arqueológico da Pedra Pintada (Barão de Cocais – Cocais); Bicame de Pedra (Catas Altas); e Cavalhada (Santa Bárbara- Brumal).

and regional shows with local artists, encouraging associations and fostering cultural exchange between the cities. During the events, there were also performed nearly 62.000 free services in the areas of leisure, culture, health care and citizenship, with the integration of the Mobile School of SESI/SENAI to the Royal Citizenship project. Courses related to tourism were promoted, such as training for chambermaid and receptionist, customer service, environmental education and sustainability. The 960 places offered were all taken. The Program "SESI – Brazil Cuisine" takes to communities courses on healthy eating techniques, without waste and with the full utilization of the food – 480 vacancies were offered and completed **[Machado, 2013]**.

SUMMING UP – VER PROJECT[22]

Santa Bárbara : Matriz Santo Antônio; Cavalhada – Brumal/ **Barão de Cocais**: Sítio Arqueológico da Pedra Pintada ; Cachoeira de Cocais/ **Caeté**:- Serra da Piedade/ **Catas Altas**: Santuário do Caraça; Bicame de Pedras (http://www.vivendoaestradareal.com.br/)

Promotion of towns with beautiful historical and cultural attractions otherwise known just for the mining activities and steel production

- ✓ Foster and strengthen the image of the “Estrada Real” as a destination for tourism.
- ✓ Actions for improvement of tourism ventures, Fashion shows with collections using patterned fabrics referring to the historical and cultural attractions of the region.
- ✓ Promotion of cultural events, gastronomic meetings, crafts exhibitions and regional shows with local artists, encouraging associations and fostering cultural exchange between the cities
- ✓ Free services in the areas of leisure, culture, health care and citizenship; training for tourism reception services.
- ✓ Courses on healthy eating techniques, without waste and with the full utilization of the food

22

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- Events mean a mass displacement and concentration of energy and resources
  - Events are important to input new energy to boost the system. Since the event itself means a sudden concentration of resources it must be well planned and managed from the beginning, so that the event itself is a sustainable action considering the use of resources and energy (e.g.: use of sustainable materials for installations and graphic media; waste collection and recycling; use of biodegradable and compostable components for food consumption; reduction of energy requirements, lighting, equipment with low consumption; reduction of paper; maximization of the efficiency of the transport of persons and goods)
  - To effectively profit from the energy input from the event, daily successive actions must be planned and performed as its routine continuity.

5.1.2.2. CRER Project (Estrada Real Religious Path)

The project CRER ("Caminho Religioso da Estrada Real: de Padroeira a Padroeira"- *Royal Road Religious Path – from Patroness to Patroness*) will connect the Santuário de Nossa Senhora Aparecida and the Santuário of Nossa Senhora da Piedade (*Sanctuaries of* Our Lady Aparecida and Our Lady of Mercy), respectively the patroness saint of Brazil and of the State of Minas Gerais. It will be an integrated roadmap for religious tourism, involving 86 municipalities across the sanctuaries of the Serra da Piedade in Caeté, Minas Gerais, and in Aparecida, São Paulo. There will be about 1000 km for the pilgrimage and meditation along which are located about 250 churches.

The project of the religious path of the "Estrada Real", based on the "Camino de Santiago de Compostela", give the tourist options visit it on foot, bike or horseback, thus constituting itself as an option for tourism and pilgrimage in the "Estrada Real". As its Spanish model, the path will be marked, so that the traveller has orientation along the entire path through signalling and guides illustrated with maps. The tourist/ pilgrim will also receive a passport that will be

stamped at set points. Those who have all the stamps will receive a Certificate of Completion of Religious Path **[SJDR, 2011]**.

Another religious path less known that can be used as a reference is the “Via Francigena”.

> *“The Via Francigena is the common name of an ancient road and pilgrim route running from France to Rome, though it is usually considered to have its starting point much further away, in the English cathedral city of Canterbury. As such, the route passes through England, France, Switzerland and Italy. The route was known in Italy as the "Via Francigena" ("the road that comes from France") or the "Via Romea Francigena" ("the road to Rome that comes from France"). In mediaeval times it was an important road and pilgrimage route for those wishing to visit the Holy See and the tombs of the apostles Peter and Paul.”**[Wikipedia, 2013e]***

Experiences described in this route would suggest some problems that may be found in such experience:

> *“The first part of the Via Francigena differs from its Spanish counterpart in almost every facet. Signage was poor, distances per day often too long for me (I managed 30km one day, but I was exhausted), accommodation difficult to find, and, apart from a few notable exceptions, expensive (especially in comparison to the Camino). Food and coffee stops were few and far between, and we found it best to stock up with staples like bread, cheese, sausage, dried fruit etc. as there was no guarantee of finding even the evening meal. We had several occasions to be thankful for the provisions we carried. We were the only two people doing the walk at this time and we found very few of the locals were even aware of the existence of the pilgrim route through their town. **[Moreschini, 2010]***

SUMMING UP – CRER PROJECT

Figure 12: Santuários N. Sra. Aparecida (http://viajeaqui.abril.com.br/cidades/br-sp-aparecida/fotos)/ N. Sra. Piedade (http://www.santuarionsdapiedade.org.br/historia.php)

Project to take advantage of a strong Brazilian cultural trace, which is its religiosity, as well as religious architecture and beautiful natural paths for visits on foot, bike or horseback.

✓ Local resources being explored for the development of the region

⚠ Using the European experiences as an analogous reference for its planning

👍 It is important to identify, not only what can be replicated due to similarities, but also the existing differences and create local solutions. The security in Europe, for instance, is in general a smaller issue than in Brazil – a possibility would be the combination with technological resources, such as Unmanned Aerial Vehicles (UAVs) (**Figure 13**) as a monitoring and communication assistant, which would be more efficient than static ground cameras, due to the unpredictability of the monitored sections, serving as a discouraging element to burglar actions. This means this action must be seen as a part of a bigger context that should be designed systemically.

Figure 13: UAV in action: above, the UAV in flight and below, the UAV in flight and below, the respective images captured by the onboard camera

5.2. The Canavese Connexion Case

The Canavese is an Italian historic-geographical region in north-west Piemonte. The city of Ivrea is considered its capital – "the pulsating heart of the Canavese industrial area" (**Figure 14**)

Until the 1980s, this region's development was based on the examples of Olivetti and Lancia/FIAT.

Figure 14: Location of the Canavese area

The Olivetti industry has had a very strong influence in the life of the region. Founded in 1908, it has been one of the most important companies in the world in the field of typewriters, calculating and electronics machines and one of the first companies to produce personal computers and office printers. From 1924 to 1960 the Olivetti employees in the Canavese increased from 200 to more than 10.000. Ivrea in the same period grew from 17.000 to just over 22.000 inhabitants, while the rest of the Canavese remained virtually unchanged in its global population **[Maggia, 2001]**. This means that, by 1960, almost half of Ivrea's population worked for Olivetti. The company distinguished itself by an entrepreneurial philosophy that centered its strength in the humanistic aspects

first rather than in the profit and success– a social project beyond an industrial dream.[...] Conducted by Adriano Olivetti, the company aimed at improving the quality of life for its employees: new spacious and bright spaces were designed ad hoc by psychologists and architects to improve working conditions and the relationship between the factory and the territory **[Merelli, 2012]** .

Nevertheless, in the late 1990s this model came under strain, “when the Olivetti network collapsed and the Lancia plants in Chivasso closed (**Figure 15**). Fortunately, the downturn was limited, partly thanks to the stability of the minor industries.” **[DGang, 2008]**.

Figure 15: Olivetti, Lancia and their products.

Developed in 2008, the Canavese Connexion Project has been created “with the aim of rediscovering a territory that once had been economically remarkable, developing it through design. [...]. This project should help re-launching the companies, the majority of which contract manufactures that are able to produce but not to sell or invent.” **[DGang, 2008]**.

The purpose of each individual project was to develop a product that could use the productive line, the technology and the knowledge already present within the company. The designer should help the company to develop a strategy for a new stronger positioning, working on the development of an innovative product

not only regarding the company's usual production but also regarding the new reference sector. He should take the company to a context different from its current field – as the designer Andrea Sanna states, "a diversification and requalification experience that might become a necessity and a salvation in case of crises of an specific sector" **[Mendonca, 2012]**.

Analysing the results of the project has confirmed the importance and potential of the sharing of ideas and know-how. This gives us clues of how rich it is the result of an efficient management of diversity, and also problems that may arise. Different points of view can be either a source of divergence or lead to a special, innovative result. We would emphasise that the diversity of experiences and know-how between designers and industry are one of the responsibles for achieving the aim of arriving to the stage of the building of a prototype, showing to the industry its own potential to perform in a new market.

The importance of the "inter-disciplinary cooperation" and of the "inter-relationship between company, market, product, consume and culture" as well as "the contradictory and unpredictable tensions" which complexity tends to, as mentioned by Moraes **[Moraes, 2011]** are also exemplified in this project.

From a series of interviews with the participants of the project a series of judgements have arisen.

The participants mentioned, as positive aspects of this experience, the possibility of learning to work with new resources and new products, and opportunity of getting to know a new territory reality. It has also had the positive effect of making entrepreneurs understand better the role of designers, defining it as "very technological and functional and not only related to aesthetics". They have been able to realize the design's capacity of adding value to the product and the possibility of using design resources to help commercialize it (even when using just the modelling tools to help visualize and make proposals more tangible).

The final results of the project had in common having reached the desired stage of the creation of a prototype, as defined as an objective of the project. However, the grades of accomplishment have varied as some have created prototypes that still needed solve some practical production and functional

problems, and others have developed a product that was ready to market (Figure 16).

Figure 16: 2 Examples of among the 10 Canavese Connexion Projects that involved the partnership between Industry, Senior Designers and Junior Designers and their Resulting Products

Considering it has involved both project and production and that it has been executed through the cooperation between industry specialists and designers, it can be regarded as a successful example of the importance of the involvement of different points of view and know-how. Despite this positive feature,

according to the participants, the project has lacked the participation of yet another expert – the market specialist. Many have considered that the lack of assistance after the creation of the product has prevented the project from achieving its major goal that would be the transformation of the company lead by the new product related to new different market. Another consequence of this absence has been that the most part of the products created has not been taken to production and that even those that have been produced have had difficulty to be commercialized.

Also, regarding the intellectual property, there have been some problems such as the impossibility of patenting due to inadvertent disclosure of the aspects of the product before the patent request has been deposited; the creation of a similar product by a non participating industry that had been contacted to become a partner for the insertion of the product into the market. Not to forget the inherent problems of high costs and fragility of the patent protection.

SUMMING UP – Canavese Connexion[23]

A project for rediscovering a territory that once had been economically remarkable, developing it through design.

✓ Result of the confrontation of different ideas, having reached the desired stage of the creation of a prototype

👍 rich result as far as there exists an efficient management of diversity to help solve problems and use the diversity of points of view to reach special, innovative results.

23

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- The importance of the "inter-disciplinary cooperation" and of the "inter-relationship between company, market, product, consume and culture"

✓ Learning to work with new resources and new products, and opportunity of getting to know a new territory reality.

✓ Making entrepreneurs understand better the role of designers, defining it as "very technological and functional and not only related to aesthetics".

⚠ Design products still seen as elitist

⚠ Lacked market specialist – products created were too far from the market where the company was used to operate and therefore many of them did not bring further benefits.

⚠ Lack of knowledge on patenting process frustrating objectives

- Projects need to be included in an holistic analysis, visualizing relationships and dependencies.
- Continuous communication is important to align expectations, defining clients, partners, base knowledge, extension of changes proposed.

5.3. Liverpool and Manchester Design Initiative

Design Initiative was an agency, a "registered charity", founded in 1992 as Liverpool Design Initiative, aiming at "capitalising on the city's strengths as a centre for culture and design production and to help grow the arts and creative industries sector on Merseyside" **[Creative, 2012]**. In 2000, it extended its operation to Manchester and later to the whole of the North West. The organisation had offices in Liverpool and Manchester." It was closed on 13th April 2012 due to the loss of funding from a number of sources over the previous 12 months.

The initiatives developed involved designers, artists and makers to help them grow their businesses and provided an active voice for the design sector. It promoted the benefit of good design and provided information, advice services and project management to a network of 3.000 members in the North West.

Some of their projects were:

- **Liverpool Design Festival**: consisted of shopping opportunity by bringing together British based designers in one place, featuring designers of interior products, ceramics, furniture, lighting, jewellery and fashion supported by the City of Liverpool and the National Lottery through Arts Council England.
- **Futures**: provided network for design professionals in the communications field – graphic design, web design, advertising, interactive media and related services such as illustration and commercial photography.
- **Hothouse**: was composed by group sessions on developing business skills, market knowledge and creativity; networking events; support from a peer buddy; individual sessions with a mentor from the sector
- **Design Show Liverpool**: comprised 173 exhibitors together with almost 7000 design savvy visitors; catwalk displays; family friendly areas; children's creative workshops. It has been organized the Fast Glass challenge that consisted in turning recycled glass from the opening night to a newly designed also and packaged product within 24 hours. The strictly limited numbers of glass ware went on sale exclusively at John Lewis on Saturday, 21st June, and sold out within 20 minutes.
- **100% Design**: participation in 2007 with a stand in this annual design interiors trade event, considered the commercial cornerstone event of the London Design. It showcased an eclectic mix of contemporary, conceptual products ranging from digitally printed wallpaper and decorative friezes, ceramics that embrace individuality within repeatability, through the British wild flowers caught in layers of glass and coffee tables made with real coffee. It has been part funded and supported by the European Union European Regional Development Fund, Arts Council, England - North West, North West Development Agency, CIDS, Creative Lancashire and Manchester Metropolitan University.
- **The Setting Up Scheme**: this project provided to designer-makers, multi-media, new media, eco-designers, photographers and public artists who wanted to establish their business in Greater Manchester, rent free studio space for 2 years within a Host Organisation. It supplied also with day-to-day support; comprehensive business development programme; access to specialist equipment and administrative facilities; specialist equipment loan-free to the value of £2000; £500 towards exhibition costs; £1500 towards the cost of an e-commerce web site beside photography; marketing and PR. In the last few years, Setting Up Scheme artists: exhibited in Sydney, South Korea, Milan, USA, Mexico, Barcelona and Tokyo; participated in commissions and awards nationally and internationally as well as shows such as 100% Design, Collect,

Dazzle and Chelsea Crafts Fair. They had press coverage in a-n Magazine, Crafts, Blueprint, Elle Decoration, Vogue, Gardens Illustrated, The Guardian Weekend and on BBC TV. 90% of Setting Up Scheme placements have established successful businesses by the end of their time on the Scheme.

- **Setting Up Scheme Pick & Mix Business Development**: was a 2-year business development programme for national creatives. The workshop programme in Greater Manchester included “Preparing your portfolio”, “IPR and Copyright”, “Marketing and Promotion” and “Funding and Support”.
- **Make Me**: this project intended to develop the market for local design and craft bringing thrilling new design and craft to the attention of the general public. It included events, including temporary retail outlets, e-commerce sites, window displays, car-park based markets and gallery exhibitions dedicated to capturing the spirit of North West creativity and appealing directly to the dedicated

As a summary the projects supported design the design sector in the northwest England in 5 ways: 1) supplying advocacy, information and advice services and project management to provide active voice for the sector; 2) working with commissioners to secure work for designers; 3) participating in promotion and profile raising events, publications, seminars and initiatives in the creative sector; 4) developing the infrastructure for design; 5) fostering networking.

As main strengths, this initiative worked for the evolution of the community, capitalizing on its local resource of being recognized as a centre for culture and design production. Elements for increasing their potential have been offered such as business skills, business planning, market knowledge, e-commerce web site; photography, marketing and PR. They were also very attentive to the need of good communication to reach their goals.

Nevertheless the actions were too focused on a few groups of the community - designers, artists and makers. Even if design industry, customers, strategic local, regional and national bodies and education providers were considered, the objective was always centered on this group. Regarding consumers, they were considered a market target. They had a strong focus on the international market and consumerism was stimulated. Even when talking about recycling it was just a punctual action used as rhetoric to stimulate consumption and high prices.

After 20 years, the Design Initiative closed for lack of funds.

SUMMING UP – Liverpool and Manchester Design Initiative

http://issuu.com/cathoderaytube/docs/brochurev1aug07

A “registered charity” agency aiming at capitalising on the city’s strengths as a centre for culture and design production and to help grow the arts and creative industries sector on Merseyside – later extended to the North West.

- ✓ The initiatives developed involved designers, artists and makers to help them grow their businesses and provided an active voice for the design sector.
- ✓ Worked for the evolution of the community, capitalizing on its local resource of being recognized as a centre for culture and design production
- ⚠ Actions were too focused on a few groups of the community - designers, artists and makers.
- ⚠ They had a strong focus on the international market and consumerism was stimulated.
- ⚠ Even when talking about recycling it was just a punctual action used as rhetoric to stimulate consumption and high prices.
- ⚠ After 20 years, the Design Initiative closed for lack of funds
  - 👍 Working on empowering the community, including consumers, could have activated auto-generation mechanisms so that the initiative could become self-sustainable, not dependent on the sponsors for its funding.

6. FROM IDEAS TO ACTION - NOWADAYS' INCENTIVES FOR ENTREPRENEURSHIP

There are a number of initiatives to encourage entrepreneurship. Among the strategies it can be mentioned assisting autoproduction, selecting and supporting start-ups, creating communities, providing training, giving prizes.

6.1. Caplavur and Torino Lab

CAPLAVUR aims at composing systems and strengthening forms of cooperation between designers, craftsmen, companies, institutions and organizations, with the objective of developing and supporting projectual activities and training related to the world of industrial design. Caplavur operates between the emergent design, the self-production and the large production.

Self-production is a process in which the creator manages all phases of production –design, production, distribution, communication. It is similar to the "Maker" culture that, in its turn, would be an extension of the "Do it Yourself" (DIY, in Italian "fai da te" or in French "bricolage") with added technology. The DIY is an activity that consists of small manual tasks, such as making small objects generally or little home improvements and repairs, done by non-professionals as a kind of hobby. The "Makers", besides traditional handcraft, deal with more engineering objects such as electronic or robotic gadgets such as electronic boards, 3D printers, laser cutters. Instead of creating a project and

depending on an industry to manufacture and commercialize it, “self-productors” assume the responsibility of the whole process. The logic isn’t that of large scale industrial production intermediated by distributors but of smaller scale, limited edition, produced in partnership with artisans or small industries or yet using production labs[24]; and more direct contact with consumer, mediated by the internet as selling strategy. Normally the subject of self-production is small design objects.

Caplavur offers a personalized tutoring service that supports designers who have not yet started their own business or are in the process of start-ups. Mentoring is designed to accompany the designers in the creative process: from conception, to search for craftsmen partners for prototyping of the "number zero" until you get to the promotion, marketing and sale.

Caplavur is an idea of the cultural associations “Argent de Posh” and “Ylda”. The actions of “Argent de Posh” are oriented to local development, the strengthening of existing networks, the enhancement of material and immaterial culture, to the creation of systems benefiting from the diversity of knowledge and skills, with the aim of spreading the culture of the project as a catalyst of the actors of a local society.“Ylda” has as mission increasing the involvement of young people in the dynamics of transformation and development of our country through innovative and experimental projects in the field of economic, social, environmental, cultural and tourism " **[Caplavur, 2011]**

TORINO LAB is a planning office that proposes to create a new process from concept to completion, from the first sketch to industrialization. It is a full creative path, starting from materials and semi-finished goods to get to the industrialized product **[TorinoLab, 2012]**.

So come design, materials and semi-finished products from the Italian industry that are re-interpreted by designers to create unpublished everyday objects, furniture, jewellery.

[24] Production labs such as FabLab (fabrication laboratory) would make available to the community equipment users could fabricate "almost anything", covering several different scales and materials. A FabLab is a small-scale workshop, equipped with computer controlled tools such as laser cutters and 3D printers (see also sections 6.3 and 7.5.2).

Torino Lab works then in the designing their own products (typical industrial products), in promoting competitions (design contests), in the engineering of products created by other designers (Design factory) or the selling of design products, designed by them or any other partner (TO Lab).

The Design Factory is a new initiative of Torino Lab, born from the combination of the creativity of young designers and the know-how of the local industry. Torino Lab manages the process beginning by the selection of projects, going through their production up to its distribution. It guides the designers to develop the whole product system, following the engineering of the project through a network of selected partners **[TorinoLab, 2012]**.

SUMMING UP – Caplavur and Torino Lab[25]

It is about composing systems and strengthening forms of cooperation between designers, craftsmen, companies, institutions and organizations, with the objective of developing and supporting projectual activities and training related to the world of industrial design.

✓ Stimulating cooperation and entrepreneurship

✓ Oriented to local development and enhancement of material and immaterial culture

⚠ Concentrate on the involvement of young people in the dynamics of transformation and development

25

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- Provide the community with knowledge and resources for bottom-up innovation
- It is important to give opportunities and involve youngsters, but also the elderly should be able to continue to be productive, be it for being a stimulus to be healthily active and also for sharing their knowledge and experience. Diversity of areas of knowledge, energy and experience are valuable for productive teams.

- Their participation include the engineering of products created by other designers, selling of design products
- Actions involve promoting competitions
  - Competitions are a motivation for improvement, pushing and challenging capabilities. Nevertheless their transformation capacities are limited to the few winners. All participants should have a sound feedback that would allow them to learn so that their performance would increase in next opportunities.

6.2. Sharehack and Startup Weekend

I3P is the incubator of the Politecnico di Torino, founded in 1999, that supports the creation of new science-based enterprises with validated growth potential, founded either by university researchers or external entrepreneurs, providing them with equipped spaces, consulting services and professionals to start their own businesses and a network of entrepreneurs, managers and investors . It operates in several areas: Information Technology/ Social Innovation, Cleantech, Medtech, Industrial Electronics and Automation. In 2011, it launched TreataBit I3P, a path of incubation devoted to digital projects aimed at the consumer market, such as e-commerce portals, social networking sites, web and mobile applications **[I3P, 2013]**.

Treatabit has as mission the creation of an ecosystem that would give support to the growth of innovative digital entrepreneurship. To achieve this objective,

TreataBit organizes projectual and networking events that put together the team with professionals and societies that work with the digital.

It has as partners investment clubs that offers pre-seed financing; big software companies, that offers some of their applications, among others.

Sharehack is an initiative promoted by Treatabit to foster the generation of innovative ideas. In its 2012 edition, it was a 24-hour event where software developers, designers, communicators and innovators worked on the development of a product or service capable of promoting sharing in diverse scopes such as solutions for online and offline collaborative consumption, analog and digital tools, services that integrate open data and logic of crowdsourcing, collaborative platforms. One could propose the own idea or just work on projects proposed by others **[Treatabit, 2012]**.

The Sharehack dynamics consisted on a quick presentation of the ideas, around 5 minutes each, and then a corresponding post-it being attached to the wall. After every idea had been presented, all participants were invited to choose and vote on the best ideas. The ones that had at least 5 votes have been chosen to be developed, non-stop, up to the next morning. The teams formed were multidisciplinary and members could participate either as a developer, as a designer or even helping to define the idea. They were consultants that would give advices during the development. On the next morning, the products were presented (including general ideas of business models), judged by designers, business and development experts and finally the best ones chosen to win prizes. Among other prizes, there was a 3-month incubation in the I3P Incubator, which includes access to the space for co-working, support to the business development and participation on the networking events.

Startup Weekend Torino is another initiative, with a very similar format, that consists of 54 hours of training, networking, developing and team building. The aim is to, by promoting a prolific gathering of those who have ideas and proposals with those who can put them into practice in a company, promote the development of a prototype and of a business model. For this, it brings together developers, designers, marketing, developers, product managers and in general all those who nurture interest in the world of web and mobile applications **[Treatabit, 2013]**. Startup Weekend events focus on educating entrepreneurs

by providing a platform for them as they go through the experience of creating a company.

In both cases, among other prizes, there is a 3-month incubation in the I3P Incubator, which include access to the space for co-working, support to the business development and participation on the networking events. They are based in an international format having as benefit making available to the local organizers, both the brand that allows attracting people from other towns and nations and the organizational structure.

SUMMING UP – Sharehack and Startup Weekend

These initiatives aim at the creation of new science-based enterprises with validated growth potential

- ✓ Organizes projectual and networking events that put together the team with professionals and societies
- ✓ Foster innovative ideas
- ✓ Stimulate networking forming multidisciplinary teams
- ✓ Requires precise communication of ideas and of resources and partners required
- ✓ Prizes include access to the space for co-working, support to the business development and participation on the networking events
- ✓ Focus on educating entrepreneurs
- ⚠ It has as partners investment clubs that offers pre-seed financing and big software companies
  - 👍 Financial support and sustainability are important but should not be a priority – relations should be mostly motivated by partnership for accomplishments.
- ⚠ Events that select the best ideas
  - 👍 The not winning ones should have the support to understand their fragilities and opportunity to meet potential collaborators

6.3. FabCamp and Arduino Camp

"FabCamp Italia" was an initiative held in 2011 during the event "Stazione Futuro", in Turin. This exhibit was one of the events of the Esperienza Italia 150 – to celebrate the 150th anniversary of the unity of Italy.

> *"The exhibit "Stazione Futuro" is a journey that starts in the present day and leads into Italy's future. What it will be and what we want it to be through those ideas that are already out there on the territory and that will become a part of our life in the next ten years.[...]*
> *The ideas, prototypes, products and processes that best express Italian creativity and innovation are at the heart of the exhibition. They come from public institutions, private research centers, large companies and individual inventors.*
> *The items are narrated using sophisticated languages such as multimedia, 3-D videos, holograms and augmented reality and are grouped according to areas that have been identified by evaluating the pivots of local and global change in the next ten years: energy, territory protection, waste products, chemistry, textile, mobility, homing, food and health, communication, work, robotics and space."* ***[Comitato, 2011]***

The FabCamp included an Open Lab, that was a space with equipments such as laser cutters, 3D printers, drills, that could be used by the public to build their ideas, with the condition of sharing projects and knowledge:

> *"L'OPEN LAB is the moment when FABLAB opens itself 360° and it will be you using the equipment present in the lab. The only condition is to leave the details of your work under Creative Commons (BY- SA-NC or BY-SA). This means that anyone will be allowed to reproduce, change or recreate your project and, sure, you will be able to do the same with someone*Ise's project. *The access to Openlab is free, and the only cost is the acquisition of the material and the ticket to the exhibit "Stazione Futuro"* ***[Fit, 2011]****.*

The experience was considered a success counting on the participation of about 200 visitors. Many students of architecture have turned to Fablab to execute their projects. In this way the group involved in the administration of this laboratory was able to enter within the cities' tissue, making itself really useful.

Besides the Open Lab, that was the "performing moment", there has also been lectures, events, workshops (such as recycling electronics; redesign; procedure of 3D scanning, data post-production and quick prototyping applied to restoration – in collaboration with the "Scuola di Alta Formazione del Centro per

la Conservazione ed il Restauro dei Beni Culturali La Venaria Reale"), courses (on Arduino[26]. and related technologies).

The participants were of various ages (from 5 to 90) and FabLab's team has observed great enthusiasm. Nevertheless, the event finished on the 20th November 2011 and the future of FabLab Italia was discussed in a meeting were the results of the experience were presented and the plans for the consolidation of a FabLab were discussed. **[Fit, 2011b]**. It had been considered the creation of an association whose statute was to be written. However there were yet many concerns regarding the sustainability and relationship between clients, professionals, the institution, sponsors, involving the elaboration of a business model. The physical structure and personnel are considered important even to canalize resources, but on the other hand are fixed expenses and rise the issue of security as a major concern, mainly considering the peculiarities of Italian laws. On the side of incomes, workshops were considered a key strategy. The vital factor is always the involvement of the community and for this kind of initiative to persist and endure it would be necessary to have someone to push it continuously.

Arduino Camp Italia, in its turn, is an event, organized by the Officine Arduino in collaboration with Toolbox[27], aiming at involving the community of Arduino's enthusiasts. The 2013 edition was a 2-day event, promoted by the already established FabLab Torino. The first day included a conference/debate called **"Innovazione del Basso"** (Bottom-up Innovation). It is about ideas and people that are changing the world, about the production executed by the planners/ designers themselves or organized in small groups using resources such as open source, open hardware, peer-to-peer, creative commons, creating things and making business without needing the approval and interference of the large

[26] Arduino is an open source electronics prototyping platform based on flexible, easy to use hardware and software. It is intended for artists, designers, hobbyists and anyone interested in creating interactive objects of environments. It can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The boards can be built by hand or purchased preassembled; the software can be downloaded for free (http://arduino.cc/).

[27] Toolbox is a co-working organization that provides space, services and solutions for self-employment offering dimensions and privacy in the right customized measure, adequate to the needs of each type of initiative. It offers the advantages of both the independence and the sharing, for a community of active professionals, businessmen and innovators. In this spirit, Toolbox organizes and hosts events for discussion and networking on issues of creativity, self-employment and business innovation (http://www.toolboxoffice.it/concept.html).

organizations or political institutions. The second one was **a Hackathon** where the participants, divided in groups, challenged each other creating and executing a project to try and correspond to the proposed theme **[Fit, 2011b]**.

SUMMING UP – FabCamp and Arduino Camp

FABCAMP (http://blog.vectorealism.com/2011/news/fabcamp-al-fablab-italia-torino-29-ottobre/; http://www.flickr.com/photos/fablabitalia/sets/72157629725919874// http://blog.arduino.cc/2013/06/18/visual-report-arduino-camp-italia-lets-hackaton/)

Events to mobilize the community of makers interested in sharing ideas, knowledge and resources.

- ✓ Establishment of a FabLab with equipments to be shared
- ✓ The interest was boosted by the event that could find continuity in the FabLab structure
- ✓ Strategies for becoming self-sustainable (courses, workshops, membership fees) have been thought from the beginning.
- ✓ Partnership between Arduino and FabLab that are a mutual resource for each other activities, push one another and connect the interest of communities. To these two business yet another one is aggregated that is Toolbox, providing co-working space, services and solutions for self-employment in the measure adequate for each type of activity.
- ✓ Users are empowered and the extension of the products' life is stimulated since it provides resources and knowledge for fixing partially damaged objects and for the reuse of parts/ scraps to build new devices.
- ✓ Events to promote the exchange of ideas are often organized and serve as valuable input energy that maintains the system.
- ! The type of events organized generally focus on some "personalities" or have a leading commission for selection.
  - 👍 Networking events, where people could personally exchange ideas with each other in an equal level that should have opportunity of continuity. These events should promote the meeting of complementary profiles stimulating partnerships.

6.4. "Bando di Alta Formazione"

The "Alta Formazione" (Advanced Training) is an initiative composed by training interventions to promote the integration into the labour market of those registered in or that have completed a PhD program. The objective of the action is to merge the traditional doctoral program with specific activities such as individual counselling, training and specialist internship, designed to promote the incorporation of research staff into the enterprise **[Polito, 2012]**.

The projects offered were in the areas: Automotive; Energy for Sustainable Development; ICT; Materials and Aerospace; Mechatronics; Nanotechnology; Life Sciences and Bio-medicine: Technology for Health; General Management. The area of General Management differs from the others in the transversal character of the profile to be formed. It is open to all doctoral degrees in technical- scientific disciplines, and does not provide internship in a company.

This path allows students to broaden the academic areas of knowledge, have a notion of cultural differences between countries and between academic and market values. It brings closer the academy and the industry providing this experience of cooperation and prepares researchers to have job opportunities not only in the academy but also in the market.

SUMMING UP - BAF[28]

Bando Alta Formazione

Initiative composed by training interventions to promote the integration into the labour market of those registered in or that have completed a PhD program

✓ Allows the broadening of academic areas of knowledge, give a notion of cultural differences between countries and between academic and market values.

👍 There could be a system to match the abilities acquired with market opportunities that would be a link to other existing systems that would encourage networking and entrepreneuship.

⚠ The system of accountability is too bureaucratic

👍 As many schemes of scholarships and provision of funds, there is a micro-control of expenditures. Controlling wastes energy and time, both from the funding organization and the recipient. There must be a more trustful relation based on the building of reputation, where the funding organization provides the resources according to the estimated budget for the planned activities and just control that the final objective/ product has been reached.

28

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

6.5. Premio Gaetano Marzotto

The Premio Gaetano Marzotto is a competition aimed at creating a platform for innovation in Italy, that rewards proposals of companies that generate employment and social well-being by entrepreneurs who are able to bring together business, society and culture.

The aim of the award is to identify and support the development of new business projects that are able to meet the criteria of economic and financial sustainability and at the same time generate significant benefits for the Italian territory.

Four juries (made up of entrepreneurs, researchers, institutions, universities, business incubators, the world of finance and venture capitalists, journalists and experts in innovation) select the best proposals that, in addition to a cash prize will be able to count on partners and networks to best develop their idea.

The prizes are: €250.000 and courses on competition and strategy, productive processes and sales strategies, for the category Business Project of a product or service, preferably in the fields of Made in Italy (i.e. fashion and textiles, agrofood, tourism, pharmaceutical, mechanical, and home and interior decoration); €100.000 and courses on competition and strategy, productive processes and sales strategies, for the category Business Project of service specially in the areas of cultural, human, social or environmental services and the third sector; 4 months in an incubator in Silicon Valley with dedicated coaching and mentoring and other courses and experiences, for the Young Business Idea Award developed in Hi-Tech with the possibility of international development **[Marzotto, 2013]**.

SUMMING UP – Premio Gaetano Marzotto[29]

It consists of a competition aimed at rewarding proposals of companies that generate employment and social well-being

✓ Preference for business that focus on local production

⚠ Juries select the best proposals to bring together business, society and culture

👍 Encourage networking among segments but giving support to all participants to understand their strengths and weaknesses

⚠ Rewards consist on cash prize, courses, partners and networks to best develop their idea, which are some of the resources necessary to develop a business

⚠ Strong priority to financial aspects and incubation in the Silicon Valley

👍 Financial aspects should be considered an important support, but the real values should be networking and effects of the project for the society's well-being.

👍 Solutions and values for fostering and developing business should be developed locally taking into account existing internal resources and culture.

29

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

6.6. Premio Chiave a Stella

The Prize "Chiave a Stella", created in 2009, had its fifth awards ceremony in November 2013. It concedes the mark of excellence to those virtuous companies in the province of Turin that are able to express and combine innovation and tradition both for the excellence of the product and the community development in Italy and abroad.

Differently from the other initiatives, it stimulates already consolidated companies to continue innovating. The award is aimed at small and medium-sized enterprises in the manufacturing and advanced services sectors, with at least three years of activity, whose registered office or principal place of business is the province of Turin **[Camcom2013]**.

For the 2013 edition, there were two classes of awards based on the companies' turnover: 1) from €500.000 to €3.000.000; 2) from €3.000.001 to €25.000.000. The prize included: delivery of the sculpture "Chiave a Stella", on the occasion of a public event; visibility in the newspaper "La Repubblica"; the permission to use the logo of the award on their letterhead. It is foreseen the possibility of giving more awards, at the discretion of the Technical Committee, for companies that show worthy of mention in categories such as female entrepreneurs, foreign entrepreneurs and new enterprises **[API, 2013]**.

The 2013 prize award event counted on the participation of Mr. Oscar Farinetti, entrepreneur founder of Eataly[30], and other authorities[31] (**Figure 17**).

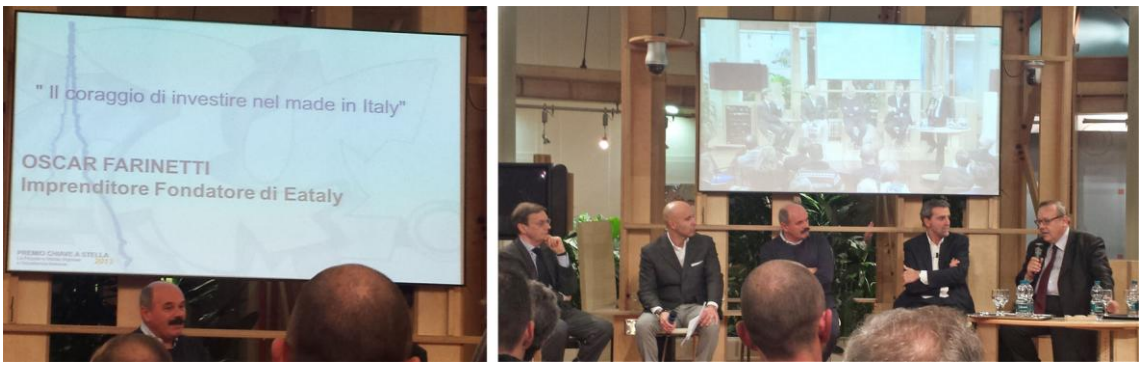


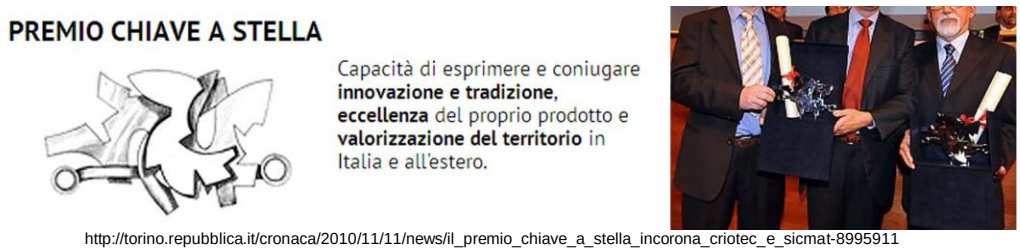
Figure 17: The "Premio Chiave a Stella" 2013 Event – the participating authorities

[30] Eataly is a high-end Italian food market/mall chain comprising a variety of restaurants, food and beverage stations, bakery, and retail items. The first Eataly opened in Turin, Italy, in January 2007. In New York City Eataly opened in August 2010.

[31] Pier Paolo Luciano (responsible for the torinese edition of La Repubblica); Lorenzo Gianotti (Fondazione Cav. del Lav. Mario Magnetto), Fabrizio Cellino (President of API Torino), Vladimiro Rambaldi (Unicredit), Paolo Mignone (Camera di Commercio di Torino), Paolo Pietro Biancone (Università di Torino).

Besides the prizes for the small and medium categories, there have been awarded mentions to two other companies in the categories “Mention Youth Entrepreneurship” and “Mention Female Entrepreneurship) **[Camcom2013]**.

SUMMING UP – Premio Chiave a Stella[32]



http://torino.repubblica.it/cronaca/2010/11/11/news/il_premio_chiave_a_stella_incorona_criotec_e_sicmat-8995911

Prizes to stimulate innovation in already consolidated companies

- ✓ Stimulates innovation of existing companies
- ✓ Evaluation of the enterprises developed through the cooperation between the Association that represents small and medium enterprises, local Engineering and Economy Universities.
- ✓ The work of participating students is recognized with a surprise bonus and presentation in the award ceremony.
- ✓ Prizes consist in publicity and opportunity to build on reputation
- ⚠ News tend to focus on the personalities involved instead of describing the enterprise and its values
  - 👍 Instead of giving too much value to personalities, considering that they are inspiring virtuous examples, it should be given broader opportunities of having individual feedback and personal experience.
- ⚠ Some professors are too busy and are not able to dedicate themselves enough
  - 👍 Other groups from the university, such as undergraduate students, could be involved with professors and PhD students, and internal discussions could be conducted as an academic activity.

32

- ✓ Their positive features;
- ⚠ Features that require attention or need improvement
- 👍 Suggestions of improvement

7. SOME ASPECTS OF THE DEVELOPMENT THROUGH PRODUCTIVE ACTIVITIES

As we have seen, the notion that innovation is very important as a development driver motivates many initiatives. One type that is being very much focused on is the incentive for the creation of Startups.

Startups are newly born businesses that consist of processes and activities undertaken by entrepreneurs, that is, individuals who organize, operate and assume the risk associated with an enterprise they establish in pursuit of an opportunity of gains they and others have identified.

In Italy, I3P is the incubator[33] of the Politecnico di Torino. Among its initiatives, there are projects such as Sharehack and Startup Weekend (previously described in section 6.2 above). Founded on 1999, by now it

> *"has launched 156 start-ups that have been able to exploit the results of research in different fields: from cleantech to medtech, from Information Technology to electronics, mechanical, energy, to other industrial. Every year [they] collect some 250 new business ideas, examine about 60 business plans in detail, and accept 15 new enterprises."* ***[I3P, 2013]***

[33] "Business incubators are organizations geared toward speeding up the growth and success of startup and early stage companies. They're often a good path to capital from angel investors, state governments, economic-development coalitions and other investors." **[Entrepreneur, 2010]**

In Brazil, Start-Up Brasil is a federal program

> *"…developed by the Ministry of Science, Technology and Innovation (MCTI) to support newborn technology-oriented startups, and connect them to accelerators. Start-Up Brasil integrates with TI Maior, the Stategic Program for IT Software and Service, which is part of the National Science, Technology and Innovation Strategy (ENCTI), responsible for electing the ICTs among priority programs to put the Brazilian economy forward."* ***[Brasil, 2013b]***

It is part of the context of a startup promising projects related to innovative ideas, and therefore a considerable level of risk regarding the investment due to the uncertainty about the effectiveness of the idea. Nevertheless it involves small initial costs, but highly scalable, that is, a perspective of rapid and significant revenue growth with small increase in costs. This makes this context attractive to investors, which then, may also make part of this environment.

Usually these startups are **technology-based** companies. In order to begin activities, these businesses need initial capital. More conservative decisions can lead to personal savings or loans, or even **crowdfunding**[34]. More ambitious projects may turn to angel investors[35] or Venture Capital (VC) companies[36]. They may invest asking in return interest or shares of the company.

Since their business is to make money generate profit, VCs typically invest in companies with high economic-financial growth potential. The initial signs that

---

[34] Crowdfunding is the collective effort of individuals who network and pool their money, usually via the Internet, to support efforts initiated by other people or organizations. Examples of Crowdfunding site are: Kickstarter (for creative products such as art installation, watch, music album – not for businesses, causes, charities or personal financing needs); Indiegogo (for most anything – music, hobbyists, personal finance needs, charities – except investment); Crowdfunder (for businesses). **[Bernett, 2013]**

[35] "Angels" are private investors that use their own capital. The term "angel" comes from the practice in the early 1900s of wealthy businessmen investing in Broadway productions. Usually they are the bridge from the self-funded stage of the business to the point that the business needs true venture capital. They typically offer expertise, experience and contacts in addition to money **[Investopedia, 2013]**. Angels, of course, want to make money on their investments, and expect a high rate of return. However, in addition to looking at the numbers, they are more likely than VCs to be persuaded by the company's team commitment to the business or the simple desire to help them succeed.

[36] Venture Capital (VC) companies are firms that specialize in financing new ventures that may provide, if necessary, also the expertise that lacks to the venture such as administrative, legal or marketing.

are used for this diagnostics are taken from their **business models** – that is, a simple description that represents the business and money earning logic of a company, as the connection between the planning and the implementation level (**Table 1**):

LEVEL	LAYER	CONTENTS
Planning	STRATEGIC	Vision, goals & objectives
Architectural	**BUSINESS MODEL**	Money earning logic
implementation	PROCESS	Organization and workflow

Table 1: Business Layers (based on **[Osterwalder, 2004]**)

From the information exposed in the business model, also the Venture Capitalists have information indicating the existence of a sound team (including managerial roles) for the development of a technology that should have a promising dominant position in an emerging market. This has to lead to the development of the prognostics of its potential for a rapid, steady sales growth because this would allow VCs to anticipate the sound possibility of making good business selling his shares either to the public (Initial Public Offering (IPO) or stock market) or to larger firms (acquisition by competitors or by strategic partners).

Normally investments are made in stages, passing from a stage to the other in the measure the company gives signs of good development (**Figure 18** and **Table 2**).

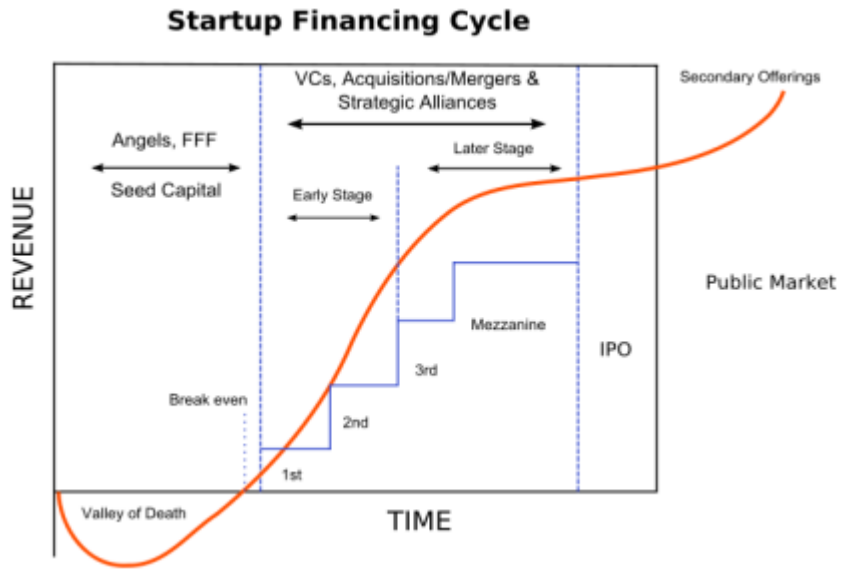


Figure 18: Startup Financing Cycle (Source: **[Techfaster, 2013]**)

Company Stage	RESEARCH	COMMERCIAL IDEA	SEED	STARTUP	EXPANSION
Use of Funds	Research	Research	Commercializing / Prototypes	Initial Products/ Marketing	Expansion
Amount Required (US$)	8.000-10.000	10.000-25.000	25.000-500.000	500.000-1.500.000	>1.500.000
Source of Funds	Research Grants	Research Grants/ Individuals	Research Grants/ Seed VC/ Angels	First Stage VC	Expansion VC

Table 2: Types of Equity Financing by Stage of Development and Indication of Order of Amount Required (based on **[Canada, 2012]**)

This means it is considered that **the larger the firm the better**, since it means greater profitability.

This case of the incentives to the development of Startups allows us to visualize some elements that represent some **key values** for our society. Here we are going to highlight and analyze 4 of these elements: the **SIZE** of the company, the concept of **TECHNOLOGY**, **CROWDFUNDING** and **BUSINESS MODELS**.

7.1. The Size of the Company

What's the ideal size of your company? As seen above, from the point of view of investors, the answer would the biggest possible. In fact we, who live in capitalist societies, grow up dreaming of earning lots of money and becoming billionaires.

When we talk about professional success, it comes to our minds the capitalist stereotype – working for a very big, maybe multinational, company. Or, if we are talking to someone with an entrepreneurial spirit he would be thinking as owning or being the president of such a firm. A very profitable firm! And the biggest it is, the more profitable! The limit is the world.

Associating good profits with big firms is even explained by economics. The neoclassical "Theory of the Firm" says that the reason for creating firms is maximizing profits. Even later modern theories that take into account changing economies and markets goals understand that what motivates company's

choices are based on sales maximization, public relations and market share **[Investopedia, 2013b]**. But these are added reasons to profit maximization. The biggest the firms the better, since it would be able to increase profit by saving on sales taxes, rationing, price controls, because being done internally many operations would not be subject to such transaction costs. Yet, the more transactions, the biggest the firm and therefore the more profitable. In fact, "the upper limit on the firm's size is set by costs rising to the point where internalising an additional transaction equals the cost of making that transaction in the market." **[Wikipedia, 2013b]**

Nevertheless, the biggest the firm also the more complex. Complexity arises when dealing with heterogeneous elements with a diversity of behaviours and subject to time-related mutation (differentiation). These parts are not independent from one another – instead there are multiple relations in number and variety (connections) **[Rafele, 2011]**. Products, means of production, clients, markets, strategies, budgets would be some of the conditioning elements. In a multinational company we can add different cultures and environments - internal and external personal relations, ideas, points of view. The biggest the company, the biggest the numbers and the diversity of these elements.

What's the problem with complexity? It is very difficult to find a good solution for complex systems, as when you actuate at one element other interrelated elements are also changed and many times not with positive results. So the effort will be to find a compromise to reach an optimum point. But also, from the point of view of human cognitive abilities, we are limited. That means that we instinctively apply filters to arrive to solutions leaving some elements out of the equation. The greatest the number of elements the more elements will be neglected. Big companies have then complex structures and many very difficult problems to solve and therefore a large probability of not reaching satisfying solutions.

In order to tackle the problem of managing big structures and reaching efficiency in decision making new strategies are created, either counting on technology or creating new connecting roles.

Complex software systems are developed to store and manage data related to most activities within the administration, production and client relationship.

Enterprise resource planning (ERP) software, for instance, is a business process management software composed by integrated applications to automate its product planning, development, manufacturing, sales and marketing including services and human resources. Also Customer Relationship Management (CRM) software can be integrated to this system to do the management of the interaction between the company and its customer, whether it is sales or service-related. Even the Internet of Things is being developed so that systems automatically take decisions and act based on sensors and communication among objects through the internet. These technological solutions have an important role in aiding on the management of these complex, big, environments.

Regarding strategies that count on people, the Integrator Manager, for instance, is a role that can be created to improve collaboration among functions and other units when there are increases in the number organizational components such as products, key accounts or market segments with high actual or potential volume and with high amounts of uncertainty.

Is there anything wrong with these connecting roles? In fact they may be necessary but must have the “right spirit”. Controlling isn’t an efficient activity if it has the aim of catching misdeeds, since the relationship involved is of rivalry of “opposing interests”, competition of opposite sides as may happen with Corporate Governance[37]. From our experience as Software Quality Engineer, working with Software Quality Assurance that consists in the monitoring of the adequacy of the activities and outcomes in relation to an established process, we notice that there are two opposite approaches possible. One of the inquirer that is investigating searching for mistakes, misbehaviours, irregularities in order to punish them. Another one is that of the professional that evaluates actions and supply orientation, listening to problems in order to help solving them and getting things done right. The results of the positive approach are much more constructive and efficient since it has also an educational aspect that helps things being done better for the next monitoring, what will make it

[37] Corporate governance is "a system of law and sound approaches by which corporations are directed and controlled focusing on the internal and external corporate structures with the intention of monitoring the actions of management and directors and thereby mitigating agency risks which may stem from the misdeeds of corporate officers." **[NAIC, 2013]** It is therefore required when exists trust issues and conflicting interests between shareholders and other stakeholders.

easier. That is, everyone working as the same team instead of confronting teams.

Another strategy of controlling complexity would be acting on the size of the organization. About the size of teams, there are some sources that talk about the number seven. George Miller **[Miller, 1956]** making experiments on communication by increasing the amount of input one dimensional information (in his case, tones) and measuring the amount of transmitted information, arrives to the conclusion that no matter how many alternatives are given we can distinguish just seven (more or less two) of them without error. Increasing dimensions (that is, more categories of variation) many experiments arrive to the value of 150. This is also the Dunbar number. Dunbar studies suggest that it would be around 150 the cognitive limit to the number of people with whom one can maintain stable social relationships, this number being reached just for communities with a very high incentive to remain together **[Wikipedia, 2013c]**. In its turn Scrum, a methodology for software development, establishes as seven the ideal size of a development team[38] **[Scrum, 2013]**. Jeff Sutherland, one of its creators, describes an experience where he concludes that "one of the problems in the large organization is that it was culturally prone to a team size of about 15 people and there was a lot of internal resistance to reducing team size. (...) The hyperproductive teams would always split into subgroups of 7 or less, while the poorer performing teams insisted on working as a group of 15. There is plenty of data to show that team sizes over 7 result in significantly lower productivity. Any team over 7 in size should be split up into multiple SCRUMs." **[Sutherland, 2003]**

It is unlikely that there would be a general, definite answer and a precise ideal number. The context, the profile of team members, the area and type of activity to be developed will certainly influence. Nevertheless, from experience, it is not possible to effectively share ideas in big groups, where every member would be expected and be given the opportunity to express himself and have his ideas

[38] Scrum is a management framework for incremental product development using one or more cross-functional, self-organizing teams of about seven people each. It uses fixed-length typically 30-day iterations, when a product increment should be delivered and client feedback received. Scrum blends all development activities (Evaluation/ Priorization of Requirements, Detailed Requirements, Design and Analysis, Implementation and Developer Testing, Quality Assurance/ Acceptance testing, Deployment) into each iteration. The greatest potential benefit of Scrum is for innovative exploratory products with uncertain or volatile requirements.

commented. Activities that involve debate and decisions would require small teams. If we consider the structure of groups of seven people in a pyramid of maximum depth of seven, it won't come up a small organization – it will sum up more than 960.000 people. Even a lower pyramid of four levels, with groups of 7, makes a group of 2.800 people. If we consider a structure of 3 levels with groups of five people it will (coincidently?) sum up to 155 people[39], the Dunbar number.

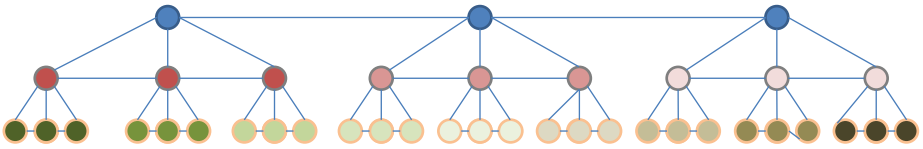


Figure 19: Representation of 3 levels of groups of 3 people adding up to a team of 39 people.

Organizational structure is about division of labour that must be coordinated and that involves decision taking. The right structure must consider the number of types of product(s)/service(s) that is being generated, the groups of customers that are being served, the complexity of what is being produced in terms of resources required for production including infra-structure, materials/ components and knowledge, the price strategy **[Zajac, 2013]**. In our approach, alternatively to the big company's the geographical strategy (where one company would have specific divisions to serve a specific market or region) a network of local companies could be created. Companies with similar interests could cooperate and collaborate, but they would inherently work for the local interests and needs using local culture and benefiting from local resources. For this, the coordination role is very important. The main difficulty of collaboration is establishing the adequate level of communication, first identifying the motivation for collaboration and then maintaining this interest with the right exchange level. Connecting roles will then be very important, counting on leadership abilities, be it in the form of integration or monitoring efforts, using strategies of finding the right incentive, grouping and communication means.

Studies show that entrepreneurs are surprisingly unlikely to have partners. On the other hand extensive research indicates that start-up firms have their financial performance improved when the venture involves more than one person and also that entrepreneurs have a good performance even when

[39] $5^1+5^2+5^3=155$

required to work in teams **[Cooper, 2010]**. Shared leadership has also been found to be an important predictor of new venture performance **[Michael et al., 2003]**. Therefore a natural policy implication of these results is that programs designed to encourage entrepreneurial partnerships will tend to require partnerships able to share leadership to constitute these new enterprises.

That takes us back to the size of the company. Big companies have a team that works with the company's main, primary activity and other teams that work with support activities, such as information technology infrastructure, finance, legal, quality management, human resource management, technological development (R&D). These support activities are generally viewed as overheads. That means that, when the company needs to reduce costs, these supporting teams are the ones that suffer first with cuts of resources and personnel. Acknowledging that is not very motivating for these support teams. It is not rewarding taking part of a "second importance" group. What if each one would be an independent firm, having as primary activity supplying support services, for instance quality management services for a number of firms? Our proposal is to create "enterprise networks", that are networks of small firms whose personnel are mostly dedicated to the firm's primary activity, what would work positively on the motivation aspect.

It sounds like outsourcing – the contracting out of a business process to a third-party. Like outsourcing, our "enterprise network" can help firms to perform well in their core competencies and mitigate shortage of skill or expertise in other areas. This may increase the risk of leakage of information and reduce confidentiality, introducing additional privacy and security concerns. Also quality issues may arise[40]. But differently from outsoursing/ offshoring where

[40] No strategy is either right or wrong by itself. The outsourcing of Toyota is an example. The crisis caused by the intense public attention of the last two years on the impactful "unintended acceleration" recalls and litigation is a known case of quality problems that may arise from outsourcing. But it is also a case that shows some attitudes and values that allow overcoming crisis and recovering reputation. The crisis management allowed, one month after settlement to resolve litigation, Toyota to arrive to the position of the world's largest-selling automaker. This means regaining the confidence of consumers. Some points in its favor have been the sympathy due to the philosophy of building vehicles where they are sold, the fact of its outsourcing being in the United States (and then not being considered by the consumer an outsourcing); tightly control of design and engineering using only suppliers who've proven their ability to deliver on time, maintain quality, control cost and continue to innovate; building then a level of palpable trust that permeates this networks, with rewards for timely delivery instead of just penalties for delay. **[Levick, 2013]**

financial savings from lower (international) labor rates is a big motivation, "enterprise networks" is about collaboration considering that these transactions can have values that outperforms their costs.

But would motivation be an important enough aspect to change the way we think about company's objectives and structures? We will anticipate the result – yes, it is. This will take us back to the beginning, to the original dialog: - What's the ideal size of a company? – As big as possible!!! If we were to analyse it as if it was a dialog between a designer and his customer, we could say that the question has induced the client to the "wrong" answer. The designer would be asking the product the client would like, influencing the customer to say the name of the known, traditional, type of product he thinks he wants instead of going to the basis of his request – the root of his need, the essence of his problem. In this way, the client would tend to ask the designer for a "chair", but what he really needed was a place to relax in his apartment's balcony. Said in this way, there would be a much greater variety of solutions, of products that would meet his need, even more efficiently than a chair. Therefore, identifying the need is one of the best things to innovate, releasing us from predefined ideas and prejudgements. What would then be the reason for answering "as big as possible"? Because, from a very early age, we are taught what we must do to be considered successful, what should be our working motivation – to dominate, and the limit being the world. But in fact what we really want is to be happy and our actions should all take us in that direction, including professional activities. The money we earn is important since it enables us doing what gives us pleasure and brings happiness. Actually, feeling powerful may be one reason for feeling motivated to perform professional activities, but it isn't the reason for many of us. Reasons are very much varied and as diverse as we are as people. So standardizing firms' objectives as maximizing profits would exclude the greatest majority of stakeholders' objectives. According to the economist and journalist Luca de Biase, beyond a certain limit there is no happiness in the economic growth, even because it happens at the expense of human relationships, which are the main generator of happiness.[41] Looking yet from another point of view, motivated people are more efficient and bring better results to the company, as entrepreneurs such as Adriano Olivetti have envisioned and implemented (see also section 5.2):

[41] http://www.feltrinellieditore.it/opera/opera/economia-della-felicita/

> *"An Olivetti's document from 1949 recalls that all employees are entitled to take advantage of free social services offered by the company, without this being regarded as a generous donation of the employer: the services offered are an obligation that derives from the social responsibility of the company.*
>
> *Introduced in the early years of the business, Olivetti's social services, between the '50s and '70s, reach such a development as to constitute an organic system, sometimes described as the "Olivetti's social state".*
>
> *The extent of care (services for children and maternity, health services, cultural, social, vocational education, meals, transportation, accommodations for employees ...), quality excellence, independence of management and outreach to the local community represent something unique in the history of the Italian industry."* **[AASO, 2008]**

Nowadays we are living a context of generalised worldwide crisis. We call it an "economic" crisis and the identified consequences identified are mostly Economic: actual and potential growth, budgetary positions, global imbalances, which considers that countries are "physical institutions". Nevertheless at least one, that is identified as "labour market and employment", considers what countries are really about – groups of people, that is societies **[European Commission, 2009]**.

If we think then about having a healthy society, we would think of small differences among its citizens who would have opportunity to have enough resources to promote their welfare. A high level of social inequality is a characteristic of low development. Big companies require big investments and this is possible for just a few.

Therefore having an environment, economic and social structures that stimulates the creation of a network of small firms will be a new point of view to stop focusing on economic crisis and instead seeing healthy societies with widespread welfare. The size of the project this network would be able to develop would depend on building strong relationships and effective communication between its nodes.

7.2. The Breadth of Technology

Technology and innovation are concepts considered to create a core of potential development energy.

However, "Technological paradigms[42] have a powerful exclusion effect: the efforts and technological imagination of engineers and of the organizations they are in are focused in rather precise directions while they are, so to speak, "blind" with respect to other technological possibilities" **[Dosi, 2000]**. When this happens some possibilities may be discarded due to its temporal context – at the evaluation time, the technology (or some important part of it) may be considered too complex and/ or commercially unviable. With time this situation may change and that possibility that has once been discarded may become a promising solution.

Besides, technology is nowadays commonly considered to be related to some restrict areas of knowledge. Decision makers, in general, view as promising technological projects those that involve computing, electric/ electronic, biology, physics, chemistry. Information Technology and Biotechnology are buzzwords when we talk about initiatives for the promotion of technological innovation. These are the core of nowadays' technological paradigms.

In the Brazilian context, for instance, FINEP considers a priority the following economic sectors and knowledge areas:

- Information and Communication Technology;
- Defense;
- Aerospace;
- Oil and gas;
- Renewable Energy;
- Clean Technologies;
- Health Complex;
- Social Development[43] and Assistive Technology;[44]

---

[42] Technological paradigm is defined by **[Dosi, 2000]** as "model" and a "pattern" of solution of *selected* technological problems based on *selected* principles derived from natural sciences and on *selected* material technologies.

[43] Social development is related to the level of compliance of people's basic needs, such as food, work, school, hospital, housing, sanitation, garbage collection and access to electricity. In the XXI century, some scholars want to insert the information access as a necessity also essential **[Rebouças, 2013]**.

- Aeronautical;
- Biotechnology;
- Nanotechnology;
- New Materials **[FINEP, 2013b]**.

These are areas that are considered to be supported with some type of funding – reimbursable or subvention funding granted to ICTs (see footnote 7) or private enterprises. Even if it includes the area of social development that would be broader than the previously stated paradigms, when the calls for proposal are analysed it can be seen that even there the defined paradigms are present. A call from 2009, the last on the Social Development subject, have as themes: 1) Development of Social Technology in productive contexts of solidary economic enterprises, in urban or rural areas, which contribute to the reduction of poverty and social inequalities and the sustainable territorial development and solidarity; 2) Implementation of Digital Inclusion Centers in rural areas, which contribute to democratize access to information and communication technologies **[FINEP, 2013c]**. Moreover in August/ 2013, for instance, subvention funding active calls are related to "Products Obtained by Biotechnological Processes"; "Sustainable Building and Environmental Sanitation"; "Nanotechnology"; "Information Technology and Communication"; "Assistive Technology (Paralympic sports)"; "Oil and Gas Sector" **[FINEP, 2013d]**.

The coordinating office for the Transfer and Technological Innovation from the Federal University of Minas Gerais ("Coordenadoria de Transferência e Inovação Tecnológica – CTIT/ UFMG") in August/ 2013 was announcing in its site opportunity for application for a job as Intellectual Property Analyst for professionals graduated in the Engineering (Electric, Control and automation, Mechanics, Aerospacial, Chemical), Pharmacy and Chemistry **[CTIT, 2013]**.

Technology is defined at FINEP's concepts index[45] as

> *"the organized set of all scientific, empirical or intuitive knowledge , employed in the production and commercialization of goods and services. The technology generated or enhanced*

---

[44] Assistive technology is an area of knowledge with interdisciplinary features encompassing products, resources, methodologies, strategies, practices and services that give more autonomy, independence and quality of life for people with disabilities, incapacities or reduced mobility **[Brasil, 2010]**.

[45] http://www.finep.gov.br/o_que_e_a_finep/conceitos_ct.asp#indiceT

> *by research and experimental development may require different elaboration degrees until its application in a productive unit. This development requires the specialized engineering services. In other words, the technology produced by research and experimental development must be "engineered" to be used by the productive sector. Hence, for the knowledge generated by universities, institutes and other organizations involved in research and development to have concrete results in the productive sector, it is necessary to work on the setting up of high competence in "engineering". The close link between science and technology made emerge binomial Science and Technology - S&T and the means of communicating this knowledge is the information* **[Longo, 1996]**.

Inspired by Bozeman **[Bozeman, 2000]**, we define technology as specifiable set of processes and products and the definition of how to use it and where it is applicable originated from a scientific method, that is, a disciplined way to study the natural world (including physics, chemistry, geology and biology) based on empirical and measurable evidence subject to specific principles of reasoning, that builds knowledge and organizes it in the form of testable explanations and predictions.

Dosi has defined it as “a set of pieces of knowledge both directly “practical” (related to concrete problems and devices) and ‘theoretical’ (but practically applicable although not necessarily already applied), know-how, methods, procedures, experience of successes and failures and also, of course, physical devices and equipment.”**[Dosi, 2000]**

Therefore, the concept of technology has really a broader meaning than the one that is on the top of our minds. Especially in Brazil, where diversity is part of its very essence, it is important to see technology as a more inclusive subject, both in terms of themes/ scope and in terms of solution paradigms.

The Systemic Design, which considers for the planning of activities the relationships among them, the culture, the territory and the optimization of resources, would be a more inclusive way of planning activities. The various social classes could work together in technological projects, since also the non academic groups have an important empiric experience.

Therefore, for the building of knowledge, there would be cooperation between diverse experiences, from the empirical, to the scientific and academic that

could bring, not only economic development but also a more homogeneous society with a better quality of life for all.

7.2.1. The Popcorn Packaging Case

One interesting example of a solution that came from empirical experience is the use of popcorn as an impact absorbing packaging element. This is a technological solution, specifically if we consider the context of its application.

The Participative Design – an experience in the Jequitinhonha Valley was a project developed by the team of the Design School of the University of Minas Gerais ("Escola de Design da Universidade do Estado de Minas Gerais" – UEMG) that had as one of its goals instigating the development of alternatives of source of income to the local community of the Jequitinhonha Valley by adding value to their crafts products through the reinforcement of their local identity **[Engler, 2010]**.

The Jequitinhonha Valley is a region situated in the northern state of Minas Gerais. It is composed by municipalities that are generally isolated from major population centers and suffers from drought and poor soils. It is a widely known region because of its low social indicators. The valley is also known for its variety of gemstones, colonial-period towns, unique handcraft and starkly beautiful landscapes immortalized by the Brazilian author João Guimarães Rosa. Nowadays its main productive activities are rudimentary agriculture, cattle raising and also craftwork, especially in ceramics, mainly performed by the women, who belong to associations. They are famous for their ceramic dolls "Jequitinhonha's Brides" that are even exported.

Here is the point that we would like to highlight. The "Participative Design" team have identified that one of the biggest problems faced by the Jequitinhonha Valley's craftswoman was the shipping of their goods. Therefore, together with the community they have developed a product line of packaging with local materials: wooden crate, natural unbleached cotton bags filled with popcorn, straw, shredded sisal or eucalyptus sawdust.

Figure 20: An artisan from the project "Participative Design" filling the cotton bags with popcorn as packaging for their crafts (source: **[Engler, 2010]**)

The importance of this approach is finding a viable solution, involving the community, for their problems which include poverty and territorial isolation. That means that to be considered a solution it would have not only to protect the product but also be cheap and locally available. Industrial packaging products wouldn't then meet their needs.

If we make a superficial analysis, we see that popcorn is able to pop because its kernels have a hard moisture-sealed hull and a dense starchy interior. Pressure builds inside the kernel, and a small explosion (or "pop") is the end result.

Being aware of this property, on the other hand, allows the development of an industrial product. Having the Novamont enterprise as a coordinator and funded by the European Union within the 7th Framework Programme, it was developed, through a project that started in 2009 and had its result in January 2013, a "biodegradable biopolymer foam and biological basis to be applied as a solution for protective packaging alternative to foamed materials of synthetic origin.(…) The expansion of the biopolymer was obtained with the aid of microwave technology, which uses the water content inside the material as blowing agent" **[Greenews, 2013]**.

Figure 21: ReBioFoam: biodegradable biopolymer foam and biobased to be used as a solution for protective packaging in alternative to foamed materials of synthetic origin **[Greenews, 2013]**

Here we can identify that cooperation of people of many levels and types of expertise, including empirical, may lead to important solutions. From the point of view of the Jequitinhonha packaging, we would say it would be important yet to develop further some aspects of the packaging. For instance, being a biological product, if used just as a natural product would lead to problems of the growing of insects - the "pantry pests" that are food invaders. Therefore, here there may be yet an opportunity for innovation, that maybe could be achieved through the cooperation of the community and enterprises such as Novamont that could take both solutions (the industrial and the artisanal ones) one step further.

7.3. Crowd Actions

There are many initiatives that rely on the crowd and, as we have seen previously, crowdsoursing (section 3) and crowdfunding (section 7) are two of them.

Crowdsourcing can be used as a source of: online labour force, either by identifying and selecting workers or by posting the work to be accessed and performed by the community; solution to a problem; available knowledge search and organization; ideas, opinions and feedback. This can be used to: collect and organize information (Distributed Knowledge); raise money from many people that believe in your venture or cause (Crowdfunding); access on demand scalable workforce to perform large range of tasks (Crowd Labor); reach a diversity of creative people for idea generation and problem solving (Open Innovation); access the worlds' creative communities to design and develop orignal art, media or content (Crowd Creativity) **[Esposti, 2012]**.

The Sharing Economy is also about the community initiatives of collaboration and creativity to invent productive and sustainable activities. Having as an incentive being a possible way out to survive the crisis, there are several online and offline initiatives, large and small, ranging from swap parties to social vegetable gardens, from the exchange of books to sewing classes. The society feels stimulated to share spaces (in offices, homes, cars, boats), cars, bikes, tools and also doing hand works for producing or repairing. Despite the economic, social and environmental crisis, the digital economy have boosted these initiatives **[Mairineri, 2013]**.

Initiatives such as FabLabs and Toolbox (see section 6.3) also make part of this movement where the society mobilizes itself in order to take in its own hands the responsibility of making the changes perceived as necessary – the "bottom-up innovation". Each one making small actions to change his own life and improve the immediate surroundings, that together is taking a dimension with the potential of changing the society.

7.4. Business Models

Business Models schemes are instruments to understand the production dynamics that is being expected to be generated.

Alexander Osterwalder has developed "The Business Model Canvas" (**Table 3**) from his studies on the ontology of a Business Model **[Osterwalder, 2004]**, as a template for developing new or documenting existing business models. It is a chart that assists firms in aligning their activities by illustrating potential trade-offs **[Wikipedia, 2013d]**.

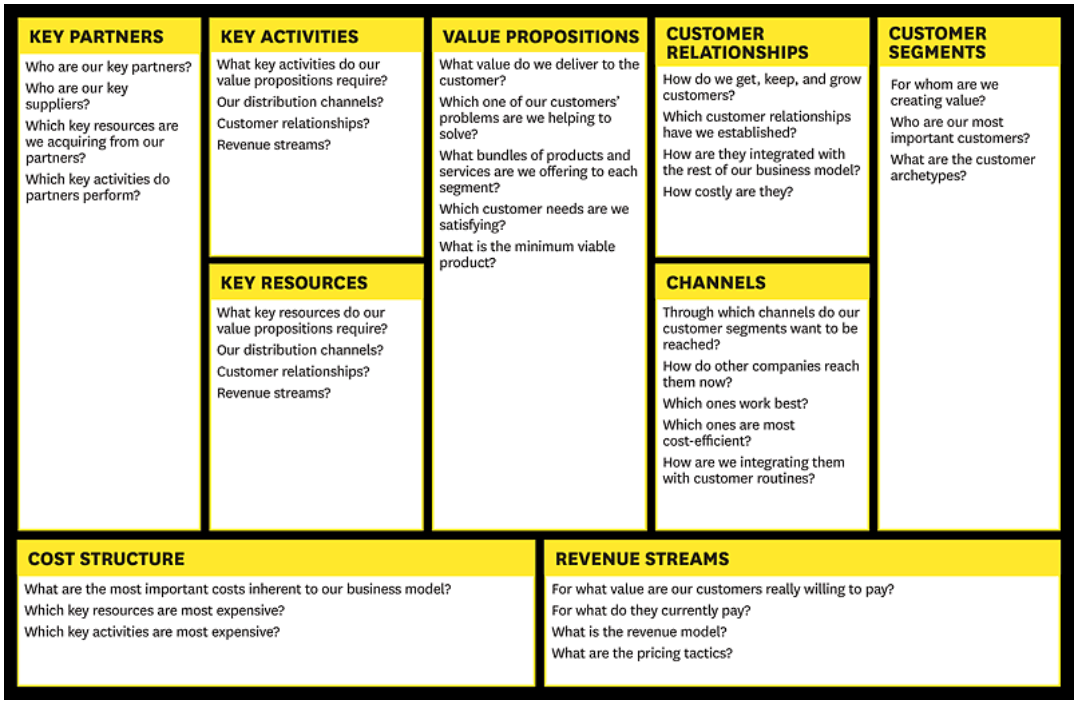


Table 3: Osterwalder's Business Model Canvas (source: **[Osterwalder, 2013]**)

A business model canvas should be used as a means of communication for the team that share ideas in order to fill it in. In doing so, the group can visualise the elements involved in its initiative getting sound decision about what is going to be produced, to whom and what is required to take forward the business, also grounded on the economic-financial viability.

The 9 building blocks that are represented on his canvas are nowadays a reference in many situations where it is necessary to envision the business. During Torino's FabCamp for instance, when the future of the FabLab Italia was being discussed in a meeting in the Stazione Futuro event (see section 6.3) a Business Model Canvas was attached to the wall with the (nominal) intention of gathering suggestions on the issues involved in its implementation and strategies to make it self-sustainable.

Initiatives regarding Startups always count on this canvas to represent the business. Particularly, the call of the Startup Brasil presents as a requirement for the participation in the program, besides the qualification of the team, a document specifying the development of the 9 Business Model Canvas building blocks, for a project clearly characterized as a technological and scientific innovation research **[CNPq, 2013]**.

7.4.1. Integral Endeavors

Osterwalder's onthology is a very careful, systematic and scientific piece of work. Nevertheless, some improvements can be made in order to model the broader relationships that arise when a business is analysed from the point of view of the Systemic Design principles.

First of all, when modelling a business it is important to visualize it in its whole context (**Figure 22** – "Business 1" is the focus of the analysis).

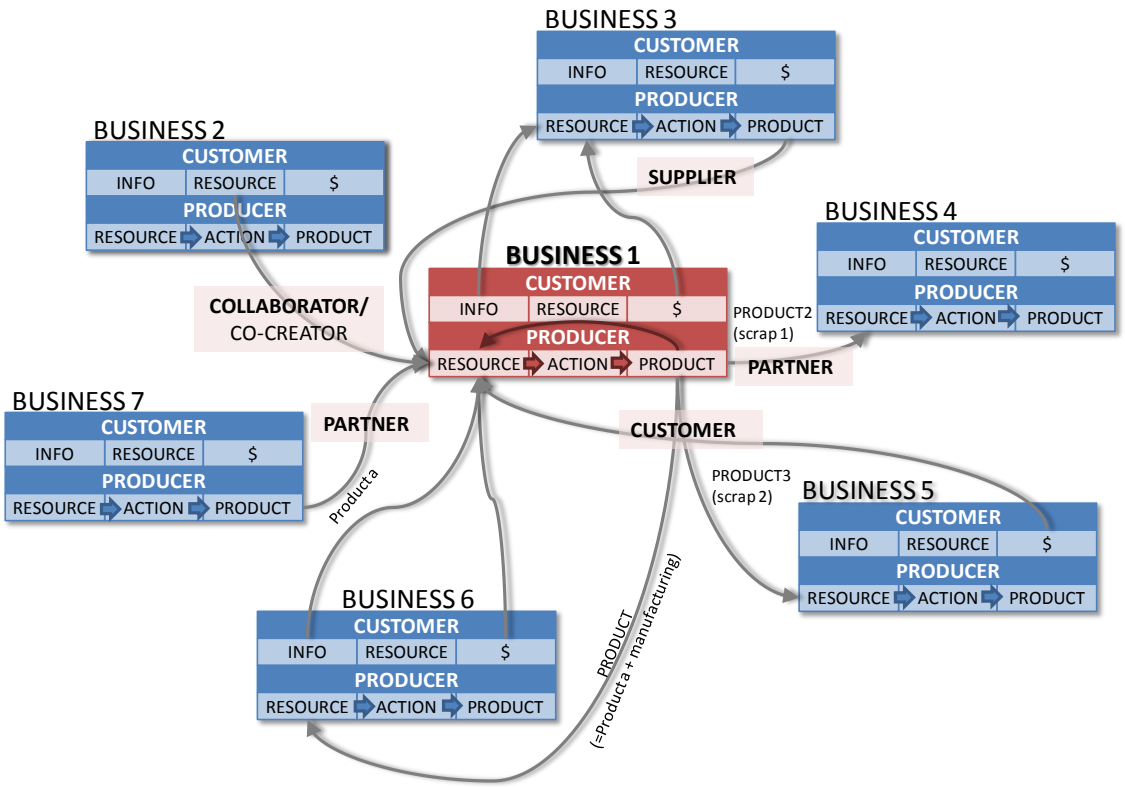


Figure 22: Integral Endeavors Scheme – the environmental context of the "Business 1".

An important concept for a more positive relationship between enterprises is that, every business is essentially **both a CUSTOMER and a PRODUCER**. Therefore, in order to build the trust that is necessary for a collaborative network the attitude required for a supplier towards its customers should be the same as it would wish to be treated when in the position of a customer.

Besides, when planning the activities of a business it should be foreseen the hole network of business that should be created. Taking the Systemic Design principle that the output of a productive activity should become the input of

another one leads to the necessity of the creation of this network in order to optimize the use of the resources. This optimization would mean extracting the most benefit possible from a resource. It would lead to the opportunity of new productive activities and the best use of a supply for the generation of means for good life standards, as well as the minimization of the production of garbage and its negative impacts to the environment.

Here we name “Business” every type of productive activity, be it performed by an industry, a household, an individual or the nature. This creates two new concepts: the **Integral Endeavor**, that refers to the business created by analyzing its holistic relations, and the **Systemic Network of Integral Endeavors** that refers to the network of such businesses.

With today’s concept of business, that focus mostly on the financial-economic aspects, when it is foreseen the importance, the power, of mobilizing the energy of various actors and the benefits of a synergic effort for the development of a region it comes to the concept of **cluster**, as described before (see sections 4.1 and 5.1). A cluster deals with the production chain of specific economic sectors, and as defined by McKinsey & Company are:

> *“companies and/or institutions that interact by generating and capturing synergies with potential to reach higher steady growth to a simple economic agglomeration, geographical area and belonging to a specific sector. Clusters are characterized by the following potential benefits: increased attraction of capital; increase business dynamism; reduction of "lead time"; reduction of costs; reduction of risks; increase of quality; higher quality and flexibility labor; increased quality of life in the region” **[McKinsey, 1999]**.*

The Systemic Network instead does not center on a production chain. It is formed by every business that can extract the best benefits possible from the resources available. This leads even to different biological kingdoms, as it can be considered the productions of Fungi and the many processing of Bacteria, for instance.

The types of relationship regarding this flux of energy and resources can be either of SUPPLIER, COLLABORATOR, PARTNER or CUSTOMER, depending on what is exchanged and on the terms of agreement. The products treated, from the point of view of one business can be **main resources**, **semi-finished**

products, **scraps**, or **waste**. From the point of view of the recipient, it will be always a main resource, that shall be considered as “primary” as the main resource of the first company.

When looking internally in a business in more detail, in the role of a **CUSTOMER** it can be 1) a SOURCE OF INFORMATION (INFO) for the businesses that have supplied him with resources for his activity, giving feedback about the product or service, or participating in surveys that aims at understanding customers and their needs; 2) a PRODUCTION RESOURCE (RESOURCE), when it acts as one element of the Crowdsourcing by organizing information, volunteering for a task, generating ideas to solve problems, designing and developing original art, media or content (see section 7.3 - Crowd Actions) and/ or 3) a SOURCE OF REVENUE ($), when it pays for its acquisitions or even participates in Crowdfunding actions.

Analysing the typical role of the business as a **PRODUCER**, there is this flux where there is an input of RESOURCES, that can be HUMAN or MATERIAL, (supplied by collaborators, partners, internal and external suppliers), that are transformed through activities/ ACTIONS, that become PRODUCTS to be supplied to customers or partners.

Sometimes, when planning a business, the reasoning begins from the product point of view, identifying the resources and actions that are necessary to produce it. From the point of view of the Systemic Design, it should begin from identifying the customer and his needs. In fact, though, it is not about a linear reasoning. It involves loops of back and forth adjustments since products, customers, resources and activities interfere with each other and they must be worked up to the point when they reach a good balance.

ACTIONS can be the actual activity of PRODUCTION, and also activities regarding COMMUNICATION, DISTRIBUTION or RECEPTION (including revenues). For each described ACTION, it must also be identified its CHANNEL, that is, its means of displacement to arrive to destination, and COSTS.

It is important to notice that, actions made in the role of a CUSTOMER, shall be treated as any other productive activity performed by the company, reasoned in

terms of production, distribution and reception, and elaborating its DESCRIPTION, CHANNELS and COSTS.

Another important point is that, within the business itself there are many relationships of the CUSTOMER type, that is, there are activities that are performed for the internal supply – products that become resources for the business itself.

The Integral Endeavors are businesses that are sustainable in their very essence, since the origin of their conception and evolution is the optimization of resources, aiming at “zero waste” and giving priority to the use of local resources. This regards the depth and breadth of the measures as well as their longevity considering the business lifespan. If a business is born without this bias, sustainable measures become artificial, superficial and of difficult maintenance.

The Systemic Network of Integral Endeavors is the network formed by these Integral Businesses, that, in its turn, are planned by the identification of what is needed for the establishment and maintenance of a business. The elements that composes Osterwalder’s Business Model, that is, Partners, Resources, Activities, Value Proposition, Customers Relationships, Customer Segments, Channels, Cost structures and Revenue Streams, are all present in the planning of an Integral Business. Nevertheless, the roles and relationships are more holistically understood. The desirable context is modeled encompassing businesses opportunities and possibilities of relationships to be created and maintained to favor sustainable development and quality of life.

This opens a new stance for those organizations that have as mission promoting the development of a region, broadening the scope of their action. They would assist in the development of a specific business as an Integral Business, which is an element of a set of businesses units (Integral Endeavors), by visualizing the whole context of its Systemic Network. Besides they would maintain in its databases the opportunities that have been designed, stimulating the creation and maintenance of the businesses that would form the Systemic Network of Integral Endeavors. Therefore they would be one of the agents to foster this environment, showing opportunities of businesses to prospective entrepreneurs, with the added benefit of developing an activity in an ambience with the ingredients for their welfare.

7.5. Real Businesses for Reflection

7.5.1. Local Motors

Local Motors is a North American company dedicated to the creation, manufacturing and commercialization of vehicles. It is a particular company since it brings together two current approaches of business into a very restrict market. One is **self-production** and the other **crowdsourcing** applied to the complex **automotive industry**. Besides, its beginning was as a **start-up** and, its evolution has taken it nowadays to experiment with **crowdfunding**.

Local Motors have applied **self-production** (see section 6.1) to the mystified world of vehicles. The strategy was of working with components from main industries, choosing economic engineering solutions for the product. Among the engineering solutions there is, for instance, the choices made for their product called the Rally Fighter: choosing vinyl wrapping instead of painting to reduce fabrication time (4 weeks due to painting cure, against 16-hour-wrapping time), cost and weight; tubular chassis under fiberglass skin instead of stamped steel body **[Uncrate, 2013]**. Furthermore, they often count on **crowdsourcing** for creating innovative design of the body of the vehicle, in some the design elements of its interior and some engineering components (such as the rear view mirror mount, the sun visor, the skid plate support). Normally contests are held for the creation of the design of the car. The entries received up to the contest's final date are then voted by the community and the winner, who receives a monetary prize, is chosen by the final decision of the Local Motors internal team. The detailing and engineering solutions are developed internally in an **open-source** development process, that is, all development documentation is available for the community. Then it is manufactured with the participation of the customer in **co-production**. Parts, assembly instructions, tools are made available to the customer for him to produce himself the car in the Local Motors micro-factory.

Part of its core values is to solve local problems through distributed making, engaging and empowering global communities of designers, engineers, fabricators and automotive enthusiasts. This complements the direct relationship with customers.

The story behind this organization is that, from the ideal of two friends that took its first form in the fall of 2006, was developed a business plan that, in the Spring of 2007 entered in a competition called the “Pitch for Change” where Local Motors faced off against 70 entrants and took first prize. Nevertheless, it had still no funding. About 6 months later they have succeeded having a lead investor in Factory Five Racing, opened their first facility and legally constituted their business. One month later they managed closing on 2 million dollars of additional financing from private investors as part of a Series A Preferred Stock round of financing. Three goals were set: build a first-ever, open-source community for car body design; build a vehicle; build a channel to market. And then they began to fill out the team with experts in each area **[Local Motors, 2013]**. Up to the end of 2012 the internal structure of the company was essentially of a small firm. About 25 people in administrative (HR, Financial, Purchase, Communication), IT infra-structure, engineering, production and sales roles. Since crowdsourcing is a key element for the company, one of its key tools was its website and many roles were related to the building and maintenance of the community of designers. From these 25 people about 15 were directly managed by the CEO.

With this structure they were able to grow and have good visibility, having its first product, the Rally Fighter, debuted at the SEMA (Las Vegas’ automotive specialty products trade event) in November 2009 and since then participating in a number of rally competitions. Several other products have also been developed for different customers, including well known companies.

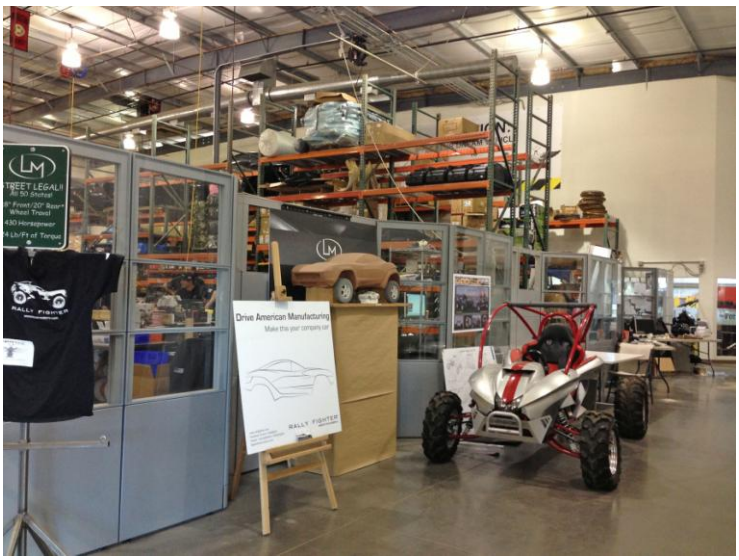


Figure 23: A view from Local Motors Microfactory in Chandler – Arizona – USA.

Therefore, Local Motors intends to, “through open-source principles help solve local problems, locally; make transportation more sustainable, globally; and deliver, through distributed manufacturing, innovative co-created vehicles and components with its virtual community of designers, fabricators, engineers and enthusiasts from around the world.” **[Local Motors, 2013b]**

In 2013, its growth motivated some organizational changes. Always aiming at “a world of vehicle innovations”, Local Motors has its re-stated nowadays mission defined yet under three focuses: **co-creation** is considered its support by “growing a global community of experts and enthusiasts over the next two years”; building an **online makershop** that will be responsible for taking it to market; and operating an efficient **micro-factory** network to effectively build these “game-changing” products.

Each mission is seen as a business unit. Instead of all initial 15 people reporting directly to the CEO, a second level of hierarchy has been created, since it was getting difficult to have this direct relationship with all of them, also because the CEO has a very active role in publicizing the company participating in various types of events, such as conferences and talk shows. Being in the adaptation period this has created some complaints from the part of the staff, resenting of not being directly heard, being intermediated and directed by a boss.

Nowadays there are two main streams of activities in Local Motors: web based community to foster initiatives and provide resources for community and products and the micro-factory to manufacture the vehicles. The makershop is being yet further developed.

Moreover, they are adding other specialists to the internal team in order to generate innovative solutions not only regarding products but also in some engineering issues and conducting the community in specific aspects. It is their intention as well, to develop educational and training activities, also as a means of stimulating and rewarding the community, creating a bond and increasing their technical quality.

Another aspect being adjusted is that the community of designers tend to be energized while producing initial creative ideas, but when these ideas must be revisited to adjust some technical issues involved in the engineering and production, it is difficult to maintain the same level of enthusiasm and

participation. Besides, they need to give clients a plan they can feel confidence with while still allowing the flexibility needed to make this kind of course adjustments. One way of dealing with these issues is working on the development lifecycle, working with design and engineering in parallel in small iterative cycles, in such a way that a set of requirements is focused at a time, and just when all issues are solved the product shall be considered ready for production. In order to coordinate the team and their activities and give visibility to the client with a predictable development working process guidelines could be created with checking points established.

The Tech team, which is responsible for the IT infrastructure and the website that connects the internal team to the community, is already working using elements of the Scrum methodology that has this iterative development style. The team could use this model to inspire their general working process. Being a small team, they are struggling with the pressure of answering to the intensive needs of all three mission units. In this case, two strategies can be used. One is to establish elements of a "Portfolio Management" process[46]. Another one is establishing as an independent unit since it could develop products not only tailored to the Local Motors needs but also applications required by other companies with similar needs. One strategy wouldn't exclude the possibility of the implementation of the other.

In December, 2013 Local Motors:

> *"announces the launch of its first crowdfunding campaign for the Cruiser electric and gas-powered bicycles, designed by Local Motors community member Ianis Vasilatos. In partnership with San Francisco, California-based Crowdtilt, the Local*

[46] To do so they could, together with the "mission responsible", decide what the criterias for priotizing projects are, such as return over investment (analyzed both in quantitative and qualitative terms, that is, evaluate the net benefits in relation to investments/ effort); timing of opportunity (if there is a strategic deadline important to be met); if the project is a need, an strategic improvement or a nicety (nice to have improvement). Then they would give weights for each criteria (because one criteria may be more important than another) and, having this framework, give grades for each project that will be multiplied by the criteria weights and arrive at a priority value. It must be also included the analysis of the resources available for the completion of the project's aim as a whole, that is, it must be considered if enough resources are available to effectively start with that project, not only in terms of IT (e.g.: machines, software, people) but also, of other types of resources (e.g.: an external statistic professional to analyze the results delivered by the software developed), since there is no use for an application to be ready in a certain date, before other applications, if it won't be used before other resources for that project are available.

> *Motors Cruiser crowdfunding campaign is the first step in integrating a fully-customizable crowdfunding capability into the CoCreate vehicle innovation platform."* **[Local Motors, 2013d]**

Considering their goals, it could be said that Local Motors is a case of success living the growth experience. It is an interesting case since it is a company that put together many of the concepts that are current nowadays.

From the Systemic Design point of view, they have as strong point the relations, both by stimulating the internal team and through their mission of building communities. Other positive points are their philosophy of creating alternative solutions to build a car, making the process quicker and taking "some" interest in reducing weight and fuel consumption; dealing somewhat with the component principle that would allow users to choose the configuration of his product and be aware of its composition, select what would suit his particular needs and making viable its repairing substituting just the faulty parts. Local Motors maintains their innovative energy that generates their continuous structural changes which provokes also the involvement and change of other groups.

However, the main motivation of their activity is the financial-economic. It is interesting though that they have identified as source of its resources and strength the valorisation of users and fostering relations. On one hand the strategy of opensourcing combined with design challenges can be said to be an exploration of the passion of designer making the majority of them work for free; on the other hand it has the advantage of being a channel for unknown professionals to have their talent recognized.

They work similarly to the approach of Caplavur (see section 6.1) helping design plans to be produced and commercialized. The main difference is the complexity of the product – small design products versus the design of a vehicle.

Their sustainability principles seem somewhat fragile and superficial, although they say that: they look for fuel saving solutions and that having a lightweight vehicle would be an approach to this problem; that they work to solve local problems, locally. They don't seem to work for the optimization of resources.

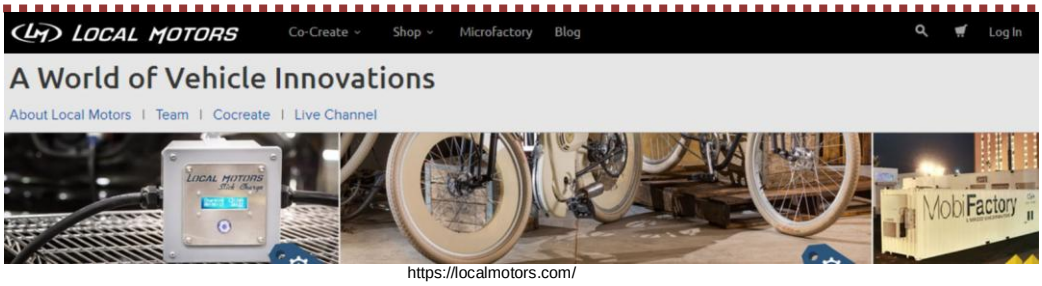
It is not very easily identifiable that their products solve local problems. The Cruiser motorized bicycle, for example, that is available in electric or gas-

powered models, would be a product that would optimize the use of energy for transportation, would need less space for parking and be a healthy means of locomotion since it promotes physical exercise. This is an important aspect considering that the distances are long in Arizona (where one of their micro-factories is located) and that Americans have high rates of obesity – annual medical expenditures attributable to obesity have doubled in less than a decade **[Finkelstein, 2009]**. Nevertheless these are not the attributes that are being publicized in their crowdfunding campaign – they promote it mainly through its design and innovation values. In fact, their crowdfunding campaign, estimated to have one month duration, have succeeded in obtaining about 1/5 of the budget in 3/4 of the time. This may be a sign of not being so much aligned with customer needs, mainly if we consider some comments on their site retaining its price high and that they've "…got the style down very well just not the **ergonomic** functionality that is necessary for a great riding experience". To that comment they have replied that their "goal is to stay as true to the design as possible, maintaining the balance between function and beauty" **[Local Motors, 2013c]**. In spite of that, the crowdfunding campaign was successful, being able to raise US$52.339 of the established US$50.000 from 43 backers.

Figure 24: The Cruiser motorized bicycle, in the electric and gas-powered versions (https://localmotors.com/shop/local-motors-cruiser/)

In order to spread welfare and achieve social improvement, communities should then be empowered with the right knowledge and resources, valorising their local cultures, to create their own "small" businesses to manufacture products and provide services to meet their needs. Planning their activities as an "Integral Endeavor" would add a lot of what is needed.

SUMMING UP – Local Motors[47]



https://localmotors.com/

North American company dedicated to the creation, manufacture and commercialization of vehicles using the self-production and crowdsourcing approaches.

- ✓ Stimulate relations both within the internal team and the development community.
- ✓ Work with components from main industries, choosing economic engineering solutions for the product making it, not only customizable but mainly maintainable and upgradable.
- ✓ Manufacturing involve customer co-production, in the micro-factory that supplies instructions and resources
- ✓ Use crowdsourcing (Crowd Creativity) for innovative designs promoting design contests having, not only the internal team as judges but also the community. It explores the passion of the community of designers but give some power of choice to the community as it participates from the selection.
- ✓ Just a few win a monetary prize. It is a channel with the potential for unknown professionals to have their talent recognized.

47

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- ✓ During development, all may receive feedback using the online community platform.
  - There could be more comments as technical advices. Giving a final technical advice would be an improvement.
- ✓ The shop is a channel for makers to commercialize their products
- ✓ Engineering solutions are open-source
- ✓ Concise internal team with open contact with higher administrative levels able to embrace activities from conception, to manufacturing and selling.
- ✓ Dynamic structure, adapting to the needs created by growth and innovative ideas
- ✓ Intention of developing educational and training activities, also as a means of stimulating and rewarding the community, creating a bond and increasing their technical quality.
- ✓ Using less pollutant processes, such as vinyl wrapping instead of automotive painting.

- ⚠ Difficulty in keeping the involvement of the team of designers after the conception phase for the solving of technical problems and, at the same time, report a development plan for the client
  - One approach could be working with design and engineering in parallel in small iterative cycles (similar to the Scrum methodology used by the IT Team) in such a way that a set of requirements is focused at a time, and just when all issues are solved the product be considered ready for production. In order to coordinate the team and their activities and give visibility to the client with a predictable development working process, guidelines could be created with checking points established.
- ⚠ IT team is struggling with the pressure of answering to the intensive needs of all three mission units.
  - It could organize itself as an independent group, establishing criteria of priority to decide the requirement that should be answered first. It could diversify its clients creating customized products, optimizing the use of their resources making software reuse.
- ⚠ The main motivation is the financial-economic.

- ⚠ Sustainability principles seem somewhat fragile and superficial, although they say that: they look for fuel saving solutions and that having a lightweight vehicle would be an approach to this problem;
- ⚠ They don't seem to work for the optimization of resources.
- ⚠ It is not very easily identifiable that their products solve local problems.
- ⚠ Ergonomics is not a worry
  - 👍 Their relationships could be planned as "Integral Endeavors", considering the principles of Systemic Design.

7.5.2. FabLabs

While some of ways of user participation are possible when it concerns software development and the computational environment relying on the internet, FabLabs are related to the creation of physical products. FabLabs are about the creation and construction of the product entirely by the user or, to say, do-it-yourself design and manufacturing.

A FabLab (fabrication laboratory) is a small-scale workshop, equipped with computer controlled tools such as laser cutting and 3D printing. The conception is that with this equipment users could fabricate "almost anything", covering several different length scales and various materials.

Different from what happens to mass production equipments that are only suitable for mass production, the devices offered by the FabLab structure can be tailored to local or personal needs. Therefore they are used for personal small scale projects, empowering individuals to create smart devices for themselves.

> *"The FabLab program was started in the Media Lab at MIT, a collaboration between the Grassroots Invention Group and the Center for Bits and Atoms (CBA) at the Massachusetts Institute of Technology, broadly exploring how the content of information relates to its physical representation, and how a community can be powered by technology at the grassroots level. While the Grassroots Invention Group is no longer in the Media Lab, The Center for Bits and Atoms consortium is still actively involved in continuing research in areas related to description and*

> *fabrication but does not operate or maintain any of the labs worldwide (with the exception of the mobile FabLab).”* **[Wikipedia, 2011c]**

MIT's Center for Bits and Atoms is an interdisciplinary initiative investigating the interface between computer science and physical science, currently led by Dr. Neil Gershenfeld.

> *“It was launched by a National Science Foundation (NSF) award in 2001 that supported the creation of a unique shared facility to make and measure structures from atoms to buildings, used by researchers drawn from across MIT's campus, in both individual projects and collaborative programs. CBA's students come from, and apply through, MIT academic departments including MAS, EECS, Physics, Mechanical Engineering, and Architecture.”* **[CBA]**

> *“In fact, the objective of the FabLab is to study the interaction between information and matter, between knowledge and manufacturing, between bits and atoms […]. So not only manufacturing technologies, but also an advanced and innovative conception of design and production. Moreover, FabLabs are networked together, the access is public and, indeed, much emphasis is placed on building communities, not only prototypes or knowledge.”* **[Cicero, 2011]**

There are almost 70 FabLabs spread in more than 20 countries, and about 15 other FabLabs planned as listed in **[FabLab, 2012]**.

> *“FabLab output can be practical, or whimsical. For example, herders in northern Norway erected a telecommunications network to track their sheep's wanderings with radio antennas and electronic tags. In India, farmers created measurement tools to ensure a safe milk supply and measure fat content, and women found a way to scan and print carved wooden blocks used for a local kind of embroidery. In a separate project, villagers designed small LED lights for use in areas lacking electricity. Villagers in Ghana, meanwhile, harnessed solar power to make electricity and cook food rather than relying on firewood. On the fanciful front, a teenage girl in Boston created a diary security system that photographs anyone coming near the owner's private writings -- say, a nosey brother. And an MIT student created something called "ScreamBody" -- a backpack-sized wearable air chamber into which someone can voice a muffled scream in a public place. The scream is recorded for subsequent "release" in private.”* **[Cicero, 2011]**

An example of FabLab's activities is the creation of a 2 motor 4 legged walking robot using 4mm thick birch, cut by laser. This Flatpack Walker is Arduino powered, so it could be programmed for all kinds of behavior, especially if some sensors are added (**Figure 25**). It was first constructed within the ProtoSpace Fablab in Utrecht (The Netherlands) by Edwin Dertien, who was incentivated by FabLabs team to publish it in the FabLab website. From this, manufactures got to know the robot and proposed to produce it.

Figure 25: Joris van Tubergen lab manager at ProtoSpace FabLab in Utrecht (The Netherlands) with the Flatpack Walker robot **[Wijnia, 2010]**

Other examples of projects that have been constructed and are being further developed regarding commercial use are related to 3D printing. Makerbot and UltiMaker are 3D printers, that can print with either ABS or PLA plastic. They have been constructed in the context of FabLabs and then have been developed to the level of being commercialized.

Both printers, as well as the walking robot have been used for activities within the FabLab workshops (both have been used in FabLab Italia **[Fablab Italia, 2011]** and have also sites where they are being commercialized by their authors[48].

[48] Makerbot: http://store.makerbot.com/; Ultimaker: https://www.ultimaker.com/products; Flatpack Walker: http://www.edwindertien.nl/shop/).

These experiences with FabLab have proved to be incentives to develop ideas and make them become true objects with potential of new business and new productive relationships.

““We wanted to have a better 3D printer, not necessarily to start a business,” says De Bruijn, who had built several open source RepRap 3D printers before tackling the project. “If FabLab wasn’t there, this whole thing wouldn’t have happened,” insists Elserman.””**[Kalish, 2011]**

7.5.2.1. FabLabs’ Creation and Maintenance

Besides NFS, the CBA (Center of Bits and Atoms) counts on the sponsorship of companies such as Autodesk, Moog Inc., The Manufacturing Institute, Dallah Albaraka, Make A Mind Co., Spirit AeroSystems, Oracle, b_TEC, DenokInn, Schneider Electric, Cisco, CSIR, Sun Microsystems, Microsoft, UPM, NIH, DARPA, NSF who share access to all CBA research.

FabLabs’network, in conjunction with an office to provide scientific advisors for popular media, is used to share CBA's work, providing widespread access to prototype tools for personal fabrication. **[CBA]**

In 2005 Gershenfeld has emphasized the project's practical potential in his search for long-term funding. “The five-year NSF grant was entering its final year, and funding from other potential sources as the World Bank had been eluding him. However, Norway's federal government established a foundation to support FabLabs globally, and a New York-based startup offered venture capital for lab users.” **[Cicero, 2011]**

> *“The current hardware specification and software are freely available. For assistance with ordering, installation, training, and process and project development MIT participates in selected partnerships. However, to scale support for these functions FabLabs are increasingly being organized in regional networks, globally coordinated by a Fab Foundation being established in Norway. Along with the Fab Foundation, a Fab Fund is being launched to provide global access to capital and markets for businesses incubated in FabLabs, and a Fab Academy is being accredited for distributed degree programs taught in the labs. Launching a new FabLab requires assembling enough of the hardware and software inventory to be able to share people and projects with other FabLabs, posting the Fab Charter to provide context for doing that, and*

> *contacting fab-info@cba.mit.edu to be added to the FabLab network."* **[Fab, 2011]**

"The current business models of FabLabs were built around external funding covering the (private) budget to create innovations. The challenge for these labs will be to achieve a level of funding—be it public or private—to sustain the hybrid, private-collective model of innovation. Similar to open source business models, the key probably would be to offer complementary services to generate revenue." **[P2P, 2010]**

> *"The study into the business models of FabLabs finds that the funding for the FabLabs included in the study came from government or hosting institutions. This is not surprising, given their relatively young age and their requirement to become self-sustaining within 3 to 4 years.(…) The labs and the community at large seemed however to struggle with the hybrid aspect when looking for funding to sustain their ability for private investment while keeping the results open—i.e. gratis and accessible—to the community"* ***[Troxler, 2010]***

7.5.2.2. FabLab Italia

Among the FabLabs distributed all over the world, there was a temporary one at the exhibit in Turin, "Stazione Futuro" part of the commemoration of the 150 years of the unification of Italy (see section 6.3 above). Thanks to the efforts of Riccardo Luna and the "Comitato Italia 150" this was the first italian Fablab.

The invitation to participate in this workshop makes clear an important aspect of FabLabs, that is sharing projects and knowledge, leaving details of the work under Creative Commons (BY- SA-NC or BY-SA), is a requirement to gain access.

As exposed in the View Conference 2011 in Torino, "considering the costs, FabLabs are affordable also for young artists and videomakers, being then also a helpful tool for the development of small and innovative enterprises." In the italian FabLab, Blender, a free open source 3D content creation suite, is being used for the production of graphics animation and video. It is available for all major operating systems under the GNU General Public License. **[Digital Media, 2011]**

Nowadays (2014) the FabLab Torino is established and is a rather active community promoting courses and events, including courses for children and, besides the digital projects (for which it counts with 2 laser cutters, a milling machine, two 3D printers and a cutting plotter), also cutting and sewing initiatives.

The association "FabLab" draws the economic resources for its operation and activities by: membership fees and contributions; inheritance, gifts and bequests; contributions from the State, regions, local authorities, bodies or public institutions, also aimed at supporting specific programs implemented and documented as part of its statutory objectives; contributions from the European Union and international bodies; revenue from the provision of services subject of agreements; proceeds of sales of goods and services to members and third parties (…); revenue from promotional initiatives aimed at self-financing, such as parties and also subscriptions for rewards **[FabLab Torino, 2014]**.

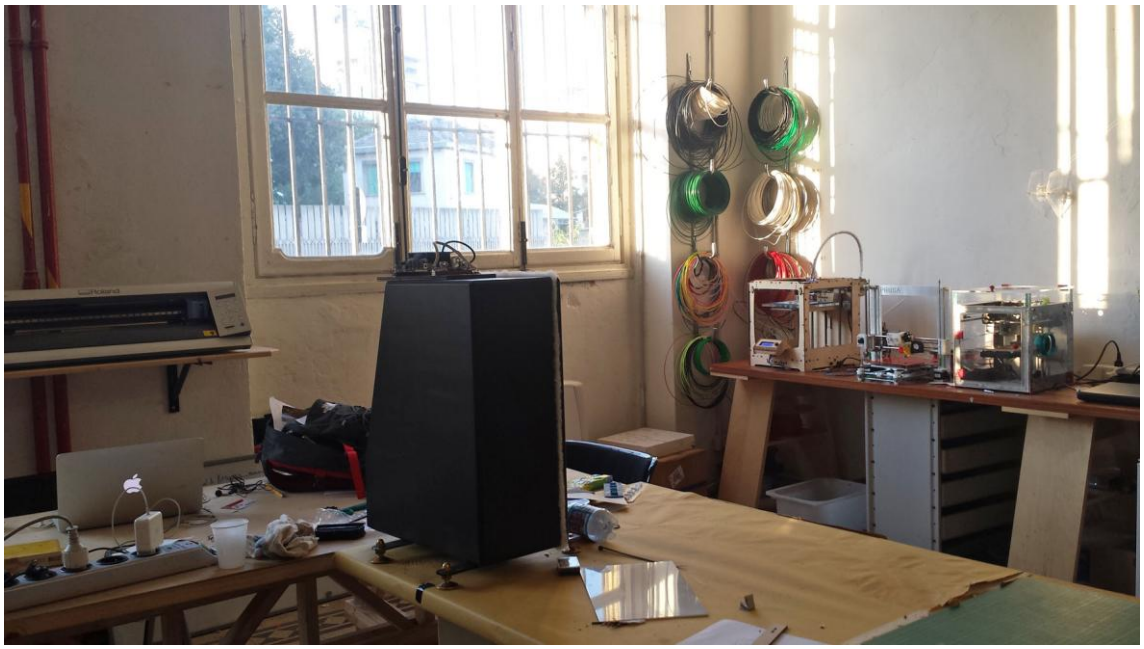


Figure 26: A view from the FabLab Torino premises, showing their two 3D printers (the two boxes on the right) and the cutting plotter (on the very left).

7.5.2.3. Changing Relationship

The idea of involving users closer to production is not something new. What the development of telecommunications and the internet have done is to intensify this approach. The exchange of problems and ideas was greatly facilitated

considering actions, costs and time requirements using these new means of communication.

Technology is also fulfilling its role of pursuing the aim of making not only "digitalizable" things to be exchanged (sounds, images, texts) but also physical objects, as the example of what is being done by the 3D printers.

The fields of application become more and more complete, going from the development of software, teaching, printing, film creation to the building of small objects. But also the limits of physical objects are being challenged. Today it is not sufficient small scale models to be built – full scale architectural components and elements are also the scope of our capability ambition. If we think about an equipment crane-like that is able to print 3D, we foresee that this is not an impossible ambition.

These new possibilities are making possible the visualization of relationships, especially regarding production. Complex and time consuming logistics are being challenged. The philosophy of producing locally what is needed by the community is gaining force and multiplying its developers and supporters.

> *"If everyone had their own personal manufacturing facility, the environmental and economic costs of transporting those goods would be virtually eliminated. Although it may be a while before such a considerable change in the manufacture and distribution of goods is implemented on a mass scale, the Upcycle team dreams of bringing 3D printing technology to communities in developing countries as soon as possible. Locals could print their own goods with environmentally friendly bioplastics, making things that were previously economically out of reach newly accessible."* **[Makerbot, 2010]**

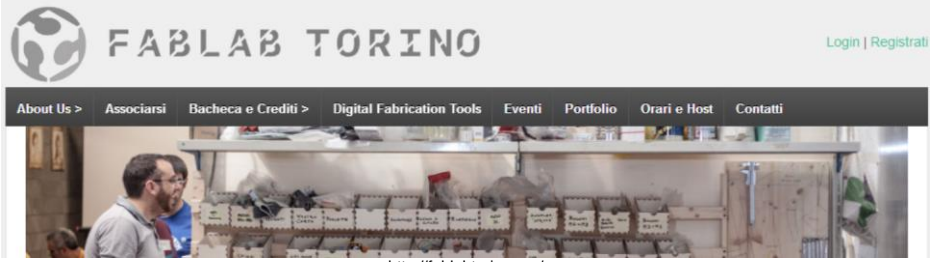
For all this to happen there are yet some challenges. One of them is to establish effective communication. It seems paradoxal but although we have quantity of means of communication we have yet to work in the quality of communication. It must be brought together the interest, comprehension and timing.

Also regarding materials, the availability (both in terms of existence and stock) of the right material for a component and the possibility of having a tool to process it is an issue. The 3D printers (Makerbot and Ultimaker), for instance, use a process of construction that employs either ABS or PLA plastic that creates parts that are not very resistant. The orientation for construction for the

deposition of layers influence on the rigidity but, even finding one that works better doesn't mean that the resistance of the component is adequate.

Also the real meaning of cooperation, collaboration, co-responsibility must be exercised, sometimes struggling against some human instincts that have been developed by our society, such as the preservation of power, the resistance to changes, the difficulty in transferring or even sharing decisions. A new sense of trust is required for the groups that work together, as well as the energy of a group that won't let die the initial enthusiasm.

SUMMING UP – FabLabs[49]



http://fablabtorino.org/

FabLabs are small-scale workshops equipped with computer controlled tools such as laser cutting and 3D printing that are available to the community to create and construct products in the DYI style.

- ✓ Equipments tailored to local or personal needs, used for small scale projects
- ✓ The development of telecommunications and the internet have intensified the involvement of users with production.
- ✓ Empower individuals to create and execute, which means to provide the resources needed to start their own businesses
  - 👍 It makes possible the building of components to extend the life of products, create personalized versions, or use elements as resources of other products
- ✓ Is an interdisciplinary initiative that encourages networking.

49

✓ Their positive features;

⚠ Features that require attention or need improvement

👍 Suggestions of improvement

- ✓ The fields of application are becoming more and more complete, going from the software related production to physical objects that are challenging the limits of size, complexity and logistics.
- ✓ The FabLab Torino is quite active, promoting a number of initiatives drawing its resources from membership fees and supporter institutions; events, courses and services, projects submitted to Italian and European organizations.
- ✓ The business models are built around external funding covering the (private) budget to create innovations to keep results gratis and accessible to the community.
  - It is important to develop self-sustainability.
- ⚠ Difficulties are still the development of some materials (using local resources with the adequate characteristics); establishing effective communication; human instinct of preservation of power; learning to deal with the strain of sharing decisions and overcome the resistance to changes.
  - A new sense of trust is required for the groups that work together, as well as the energy of a group that won't let die the initial enthusiasm.
- ⚠ The community that is aware of this resource is yet restrict
  - Information should be more broadly disseminated to the population in general, including within high schools and technical schools.

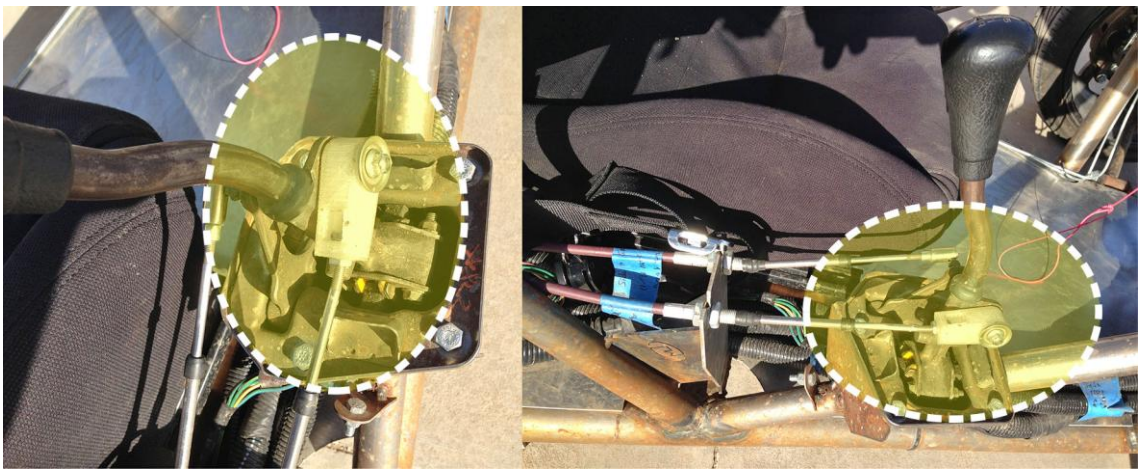


Figure 27:Connection part to fix a gear lever, produced with a 3D printer in the Local Motors Microfactory

8. THE "ESTRADA REAL"

8.1. Local Culture and Resources

It is called "Estrada Real" (Royal Road) the routes used in the Brazilian Colonial Period in the process of settlement and economic exploitation of the resources of the region.

Figure 28: The Territory of the "Estrada Real"

The "Estrada Real" is formed by four paths, in a total extent of approximately 1700km, that were opened towards the interior of the country in order to guarantee the ownership of the land for the Portuguese crown, and explore the natural wealth of the region where it had been found gold and diamond, among other precious stones. These paths cross the states of Minas Gerais, Rio de Janeiro e São Paulo (**Figure 28**).

Figure 29: The Map of the "Estrada Real" indicating the 4 paths and the composing municipalities.

The Project “Estrada Real” (Royal Road Project) was formulated in 2001 by the “Estrada Real” Institute (“Instituto Estrada Real” – IER), a civil, non-profit society created by the Federation of Industries of the State of Minas Gerais (FIEMG) in order to enhance the historic and cultural heritage, stimulate tourism, preservation and revitalization of the surroundings of the ancient Royal Road.

Nowadays the touristic region of the “Estrada Real” includes, 199 municipalities, being 169 in the state of Minas Gerais, 22 in the state of São Paulo and 8 in the state of Rio de Janeiro, adding up 80.000km^2.

It has a very rich history, especially important from 1500 – that is the year of the Discovery of Brazil by Portugal, to 1889 – the year of the Proclamation of the Republic. This is the period when Brazil had a political organization as a Colony of Portugal (Brasil Colônia - XVI to XVIII centuries), became part of the “The United Kingdom of Portugal, Brazil and the Algarves” (Reino Unido de Portugal, Brasil e Alvarves – XIX century) and also the Empire period (Brasil Império - XIX century). This slice of time is the period during which the “Estrada Real”’s DNA has been formed. Beside these political landmarks, other important categories of events and data can be seen as responsible for the territory’s actual characteristics, as detailed in the Annex A.

It is a region of great natural diversity in terms of fauna and flora, with beautiful geological formations, rich in minerals, rivers and falls.

Figure 30: Landscape in the region of Morro do Pilar Minas Gerais – Estrada Real

In fact, even if it seems, at a first glance, that the whole region is marked by common features, a deeper analysis can identify particularities that make each territory unique. Paulo Miranda **[Oliveira, 2013]** has analysed, for instance, three touristic regions in one of the paths (Ouro Preto, Conceição do Mato Dentro e Diamantina). Some of the themes investigated to find peculiar interesting characteristics were Architecture, Agricultural Products, Herds, Gastronomic Products, Handcrafts, Cultural events and Folklore. As a result he has generated an iconographic mapping of each of these regions which

highlight their particularities. These are LOCAL resources to be valorised and used to compose the unique identification of each territory.

Another aspect to be used in the awareness of the own values, potentialities and limitations are the historical reflections on the present characteristics. Using, for example, 5 themes explored by the IER to foster local development, namely **Handcraft, Historical Attractions, Natural Attractions, Gastronomy and Hospitality**, we have schemes with the elements which add up to each specific point of view.

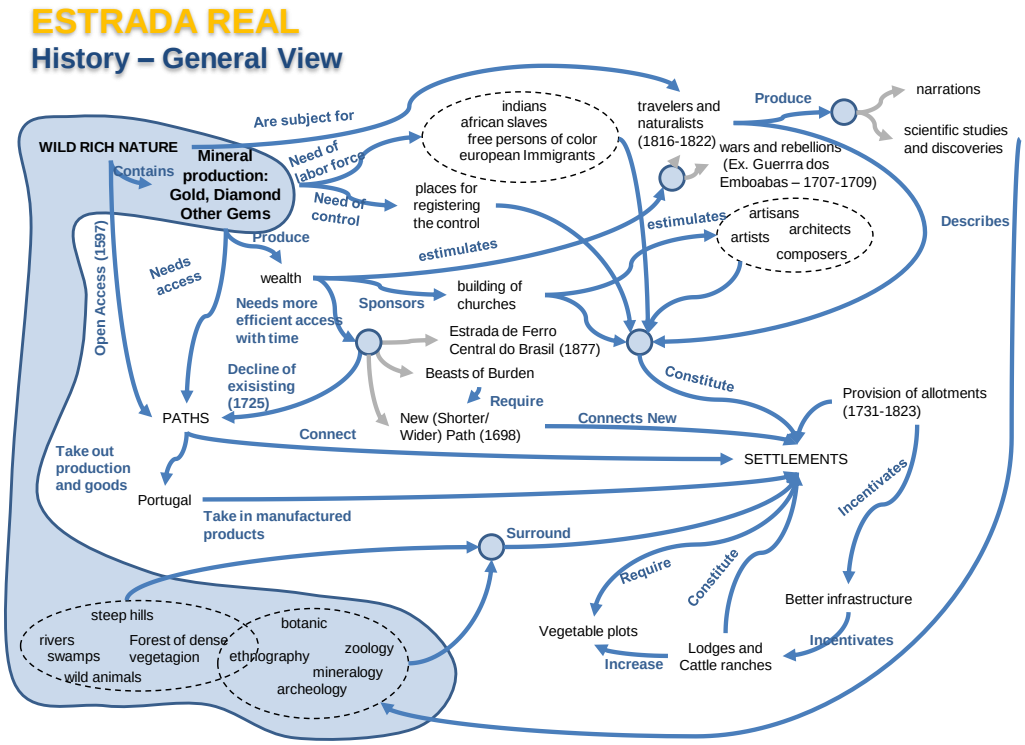


Figure 31: General View from Historical facts with the relationships among them.

From the **General View** of historical facts it can be identified the following positive features and elements of attention:

✓ Rich biodiversity

✓ Abundance of water

✓ Mixture of cultures

- Local knowledge about the integration between humans and nature;
- European artistic and scientific culture

✓ Mineral wealth

! Exploration

- exploring to export local resources;
- unfair working regime – slavery and bad treatment
- the country did not benefit from the wealth that was being extracted
- settlements were created as temporary with poor infrastructure
- land degradation

⚠ ! Exposition to diseases and danger of injuries

- Caused by insects, wild animals and poisonous plants;
- Wild terrains and terrain morfology

⚠ ! Wars, rebelions and conflicts

- motivated by ambition related to the property of the land and its wealth

The historical elements that are related to the **Gastronomy** are:

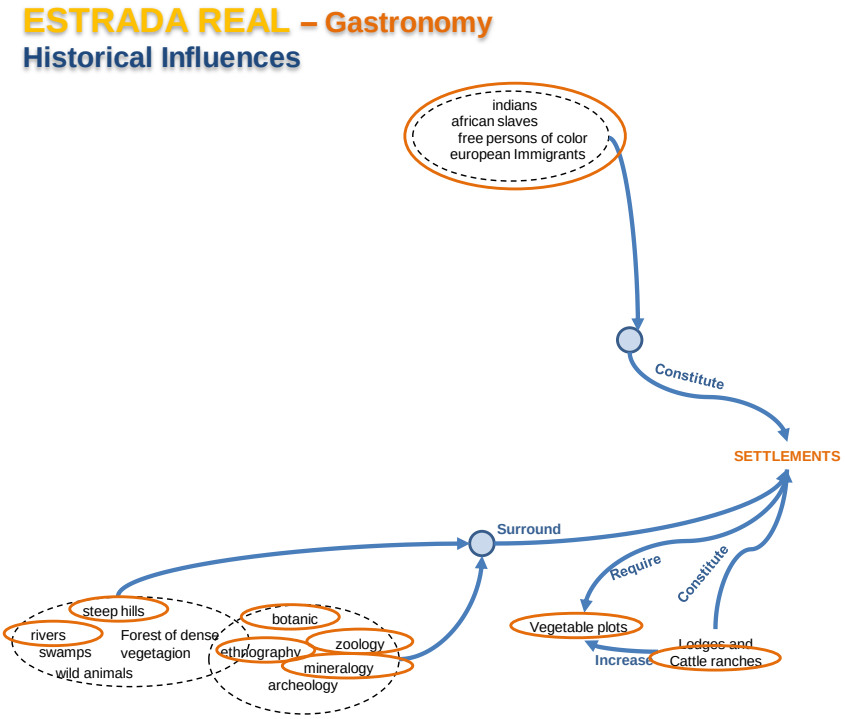


Figure 32: Historical Influences on the Gastronomic Activities.

Its main characteristics are:

✓ Rich biodiversity

✓ Abundance of water

✓ Mixture of cultures

- Knowledge about growing, use and preparation of some plants and animals;
- Foreigners' eating habits;
- Need to be creative to get by with few resources

⚠ ! Exploration

- unfair working regime – slaves were given poor and few eating resources
- rudimentary tools

This historical facts led to the present's following characteristics:

- **Typical food:** Stir fried vegetables (brazilian cabbage, ora-pro-nobis, taioba, quiabo, jiló); Beans (specially black beans); Cará, Chuchu; Rice; Flours (specially maize and cassava); Spices (pepper, cinnamon, clove, garlic); Tropical Fruits (banana, goiava, cidra, fig, pineapple, papaya, jaboticaba, mango); Cheese; Jams and Sweets made of fruits; Drinks, liquors;
- **Cattle:** Cows (meat and powerforce); Horses (powerforce)
- **Domestic animals:** Chicken; Pigs
- **Traditional processing**: Maize and cassava flowers; Sugar cane - sugar, rapadura, liquor
- **Kitchen utensils:** Wood stove; iron or soapstone pans; wooden spoons and bowls; natural fiber baskets; gourds

These are elements of the local gastronomic know-how and culture that leads to present's typical local production and combination of dishes that are:

✓ Diverse, simple, economic, tasty and genuine but

⚠ Not always healthy

⚠ Incorporates recent influences from global culture, loosing genuineness and therefore needing yet to establish a sound identity

Figure 33: Examples of present typical gastronomy of Minas Gerais

The historical elements that are related to **Handcrafts** are:

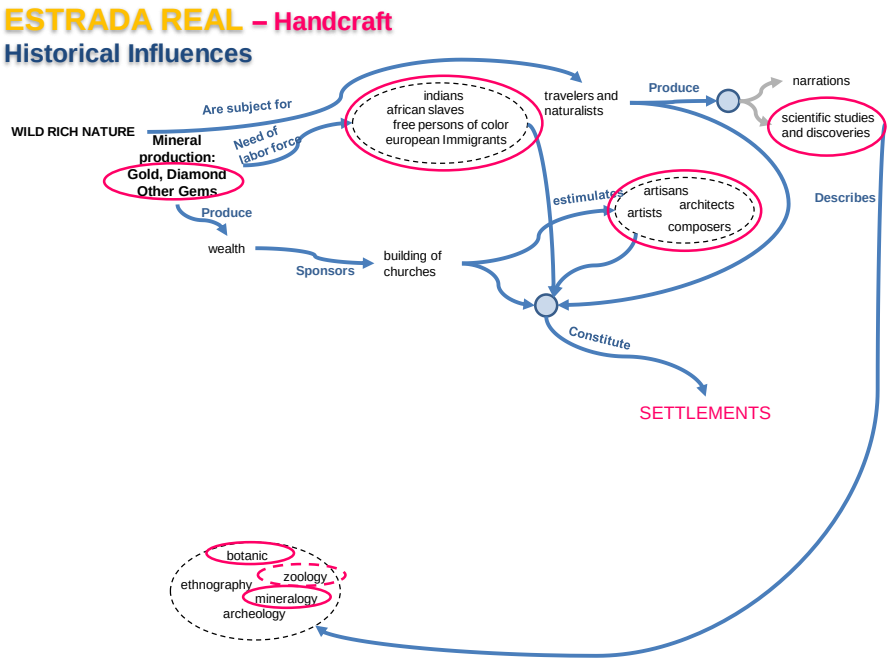


Figure 34: Historical elements of influence on the handcraft activities

Handcrafts has as general historical features:

✓ Abundance and variety of natural materials

✓ Mixture of cultures

- Knowledge about working with different materials and techniques

⚠ ! Exploration

- unfair working regime
- rudimentary tools

The cultural diversity, the knowledge of local people formed by a mixture of cultures have left traces on today's craftworks.The most common products made nowadays are decoration and utilities for the house and personal use, including kitchen utensils such as iron or soapstone pans; wooden spoons and bowls; natural fiber baskets; gourds, using many natural materials and colors as resource: iron; soapstone; woods; natural fibers; gourds; gems. Nevertheless it must be noticed aspects that need improvements:

⚠ ! Quality and Identity

- Large percentage of artisans with low instruction and knowledge
- Market pressure for imediate results
- Lack of self-esteem

- Focus on the external market
- Exporting raw materials

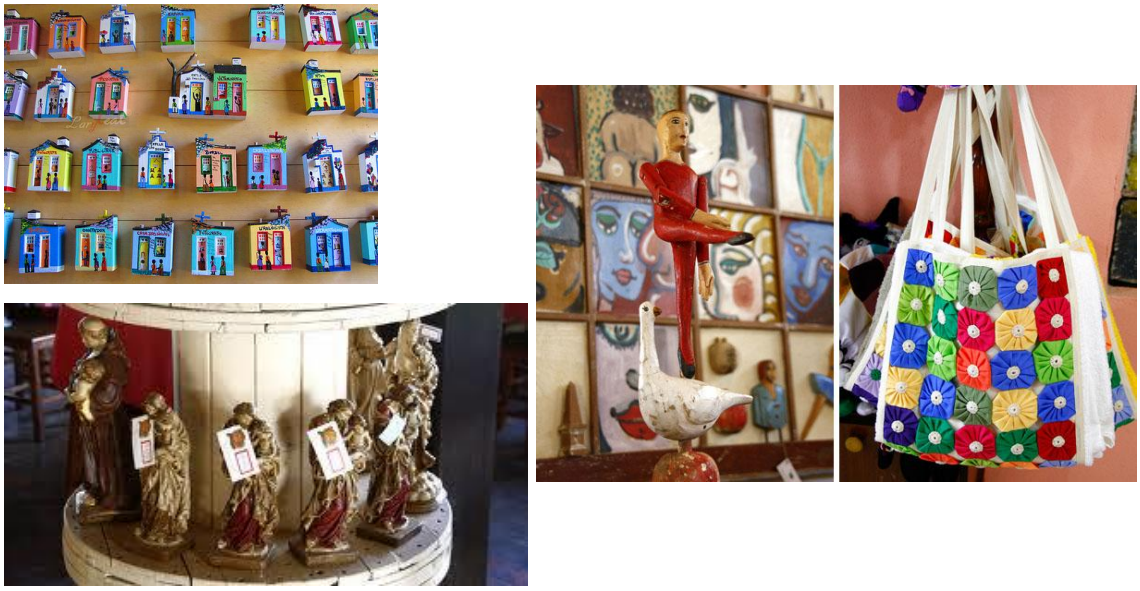


Figure 35: Examples of handcraft works of Minas Gerais

For the analysis of **Historical Attractions** we have:

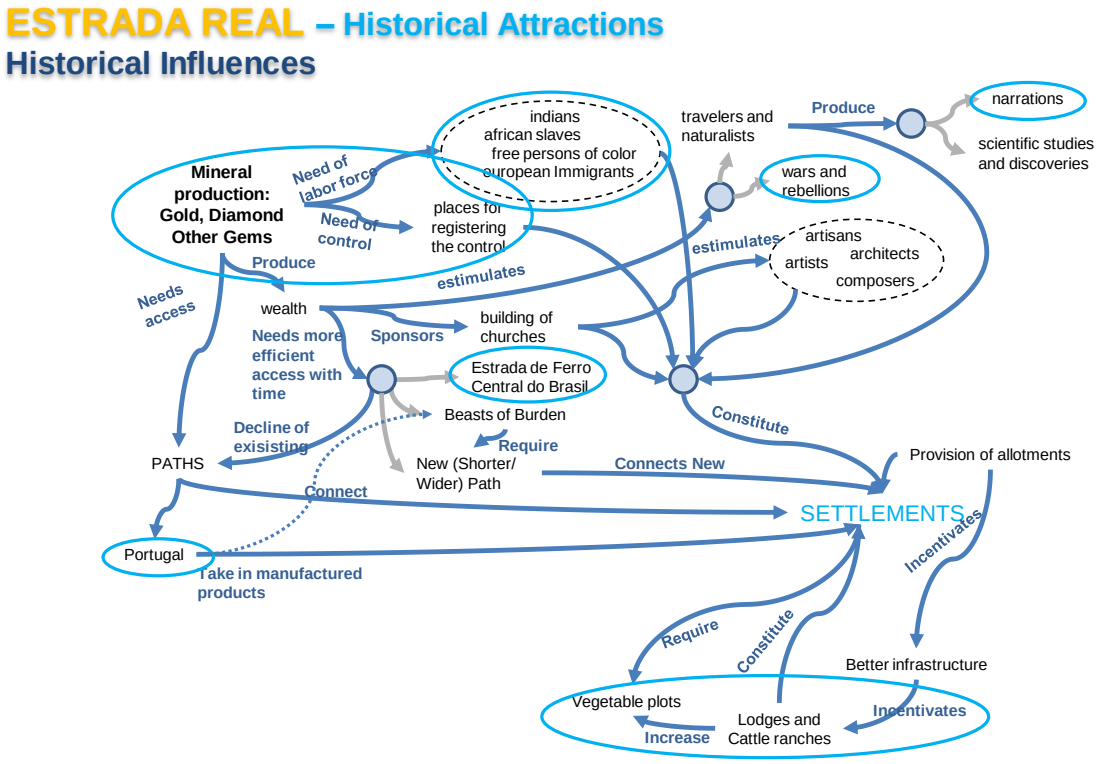


Figure 36: Historical elements of influence for Historical Attractions

As features to be highlighted there are:

✓ Abundance and variety of natural materials

✓ Mixture of cultures

- Knowledge about working with different materials and techniques

✓ Cultural production

⚠ ! Exploration

- unfair working regime – slave work to build and transport materials
- rudimentary tools
- long distances for the transportation of material
- difficult means of transport

These resulted in the following present characteristics:

✓ Diversity of Tangible and Intangible Culture

- Buildings, monuments, bridges, old mines, aqueducts: many forms, materials and building systems
- Books, works of art, artifacts
- Folklore, traditions, language
- Genuine human characters
- History, Stories and “Causos”
- Production Machines and Instruments - Locomotives

⚠ ! Conservation, Restoration and Rehabilitation

- Difficulty in the maintenance of buildings, monuments and collections
- Difficulty in the sustainability and/or sponsoring of services such as museums
- Low investment in creating opportunities of business that profits from the historic heritage
- Difficulty in the dissemination of information and motivation of the communities and tourists regarding these services
- Need of a higher level of disseminated knowledge about the cultural heritage and its history

Figure 37: Examples of regional Historical Attractions

Regarding **Natural Attractions** we have:

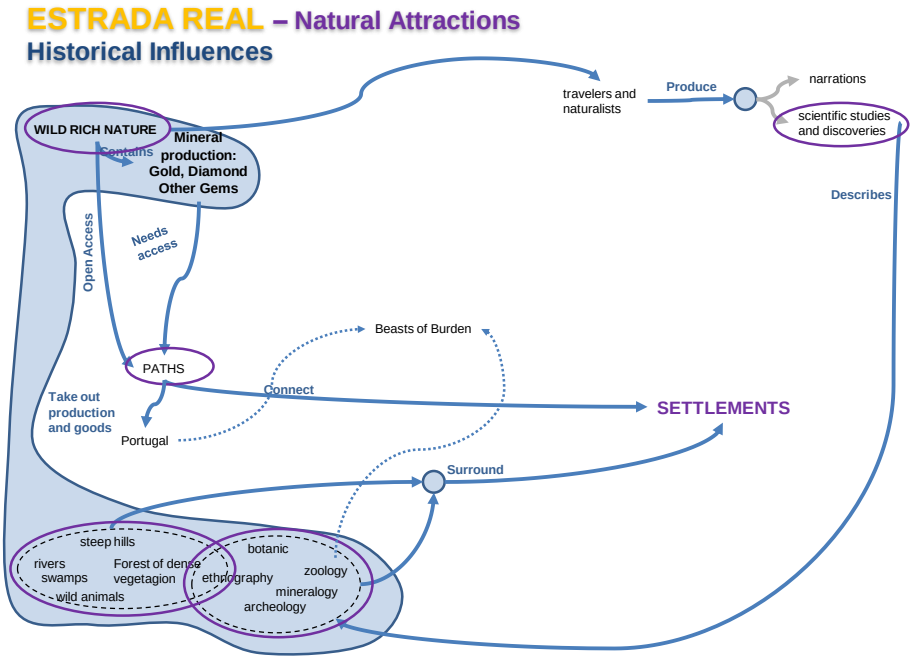


Figure 38: Historical Influences of Natural Attractions

The present characteristics of Natural Attractions are:

✓ Diversity and Genuineness of Species and Resources

- Water (Rivers, Falls, Lakes, Spa): many forms, materials and building systems
- Caves
- Woods with exotic plants, birds, insects and animals

✓ Knowledge about the use of plants.

! Maintenance, conservation, accessibility, appropriation and research

- Difficulty in the maintenance of natural resources
- Some unexplored potential use of plants – loss of empirical knowledge/ traditions/ culture; lack of research explored by Brazilian organizations
- Possible exposition to diseases and injuries (real and prejudice);
- Long distances between settlements with no interest or infra-structure between departure and arrival points
- Bad conservation of roads
- Initiatives to promote the region yet concentrated and with limited range, in terms of the actors and access to users.

Figure 39: Examples of Regional Natural Attractions

Considering **Hospitality**, the historical influences are:

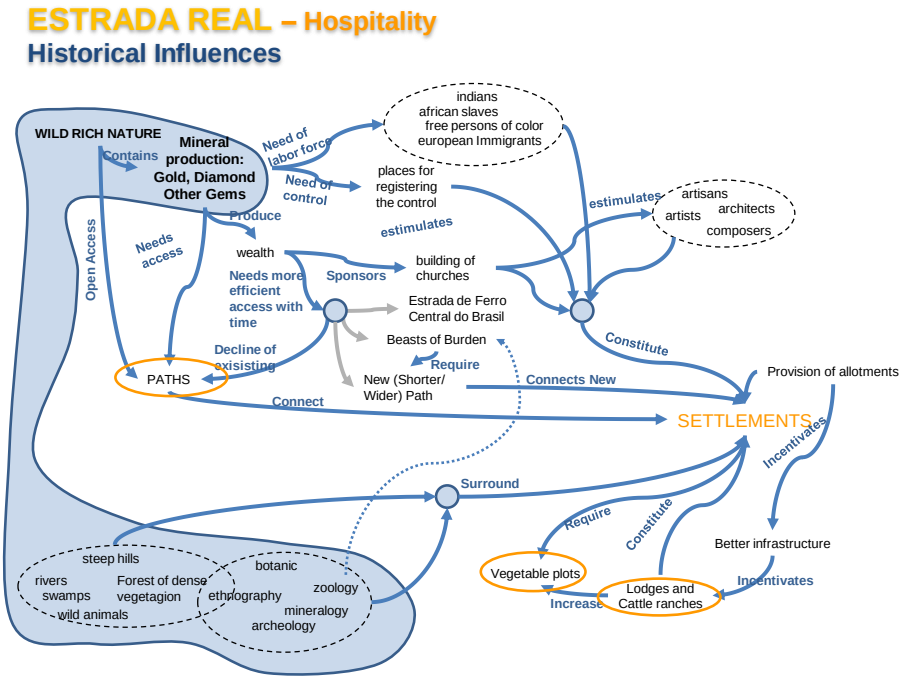


Figure 40: Historical Influences to Hospitality

Their main features are:

✓ Genuine people and places

✓ Very simple

✓ Typical food

⚠ ! Difficult Access

- Long distances with low quality roads and other means of transport

This resulted in its today's attributes:

✓ Genuine people and places

✓ Simple genuine lodging and very friendly hospitality

✓ Some options of higher levels hotels, with local style

✓ Traditional style of life and activities related to farming (Rural Tourism)

⚠ ! Access

- Long distances with low quality of roads and of the public transport

⚠ ! Lack of Enterpreneurial Spirit

- The natural and human resources available could better used for the local quality of life and offering better level services
- Low level of education in general

- ! Some poor quality hospitality services
- ! Need for better structuring of the sites and instruments for the promotion of services
- ! Need to build pride on its own style

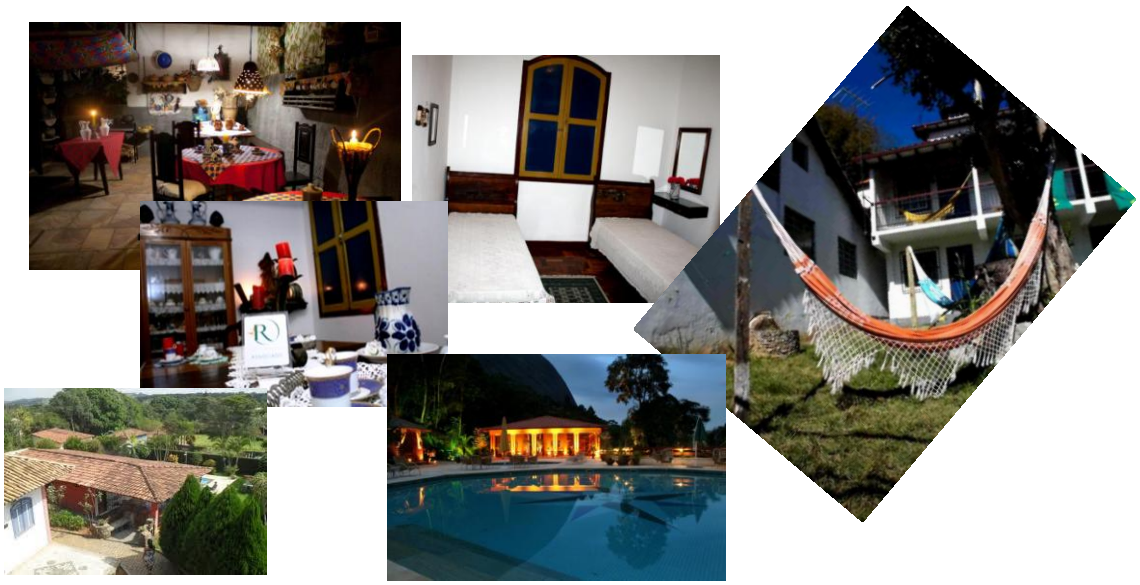


Figure 41: Examples of styles of hospitality facilities

Some other important points about the region, highlighting both positive aspects and elements that would require interventions are:

- There are federal, state, municipal and local roads that serve the region. Many times their state of conservation falls short. The distances are very long, and the settlements are many times far from each other. Nevertheless, in a way of reasoning, it is also very "organic" – like arteries, veins and capillaries, what favours' a very genuine, simple style of life.
- There is also considerable diversity in terms of social development. But the people in general have good manual skills and knowledge of traditional ways of cooking and producing. Sometimes scarcity makes arise interesting manifestations of creativity.
- Historically it can be mentioned as important commercial activities: horse and cattle breeding (including two important horse breeds – Campolina e Mangalarga Marchador); leather; textile industries; mining (iron and precious stones); agriculture (sugar, cotton, tobacco, coffee). In the region it has been installed the first Brazilian hydroelectric industry (at Ribeirão do Inferno – Diamantina).

Developing self-awareness of strengths and weaknesses is the starting point of developing self-confidence and pride for the own culture and resources. Following with the Systemic Design procedure, the remodelling or creation of an

activity begins by finding alternatives to transform negative features into positive ones.

8.2. Present Actions in the "Estrada Real"

There are many productive activities that can be developed in the "Estrada Real" based in its natural, historical and cultural resources. These are resources for a diversity of motivations for tourism, each one capable of creating a different network of activities and businesses as highlighted in a report of the IER, that also identifies the municipalities with higher potentiality for each one **[IER, 2013]** :

- **Historic/ Cultural Tourism:** activities related to the experiencing of meaningful elements of the historical and cultural heritage as well as cultural events, promoting the material and immaterial culture.
- **Adventure and Ecotourism:** practice of adventure recreational and non-competitive activities, using natural resources with the conscience of their preservation. Examples: Buoy – Cross; Climbing; Mountain Biking and Cycling; Rafting and Canoeing; Trekking; Hang Gliding and Paragliding; Ballooning; Crossing; Speleology (natural caves).
- **Gastronomic:** experiencing the pleasure of tasting different, typical ingredients and dishes.
- **Religious/ Folkloric:** expressions of local cultural traditions and faith, specially related to local patron saints.
- **Rural:** activities developed in rural areas, engaged in crop and livestock production and their local, usually artisanal processing.
- **Health/ Welfare Tourism:** activities resulting from the use of resources and services for medical, therapeutic and aesthetic purposes such as hydrothermal stations, hydro stations, water parks, as well as physical and socialization activities for specific groups such as the elderly.

Comprising a team of tourism experts, statistical analyst, system administrators and geographers, the IER operates with a structure composed by a director, a marketing manager, three regional offices (in Diamantina , Ouro Preto and Tiradentes) and four working groups. These working groups are specialized in 1) Destinations: generation of information and data on the paths of the "Estrada Real", strategic action planning, research and partnerships; 2) Products: monitoring travel packages formatted by operators sold by tourism agencies and operated by receptive and also monitoring market trends and emerging tourism segments; 3) Promotion of destinations and actions of the IER for the various market niches ; 4) Projects: development of tourism projects in the

"Estrada Real" and the provision of consultancy to other companies and institutions **[IER, 2013b]**.

As example of specific actions already undertaken, it can be mentioned:

- the demarcation and signalling of routes[50] and of federal and state highways in the region;
- the creation of the "Estrada Real" logo to be licensed for use in products, being commercialize, already in 2006, to chocolates, coffee , sweets, a themed bar and one of the car models of Fiat, the Doblò;
- identification of local vocations (as the areas of tourism mentioned above), so as to provide guidance for specific actions to stimulate the creation of tourism products, dissemination and marketing;
- the creation of Portal with news, information about the cities and touristic destinations, promotion of tour packages, application to indicate trail schemes for planning trips to be covered on foot, bike or horseback **[Mariuzzo, 2006]**.

The IER initiatives also comprise projects such as VER and CRER (see section 5.1.2), which include training activities (in hospitality and others), and also training for micro-entrepreneurs conducted through partnerships with SESI/ SENAI, Sebrae/ Senac institutions. They also work for stimulating entrepreneurial moves that bring together sectors of the industry, hospitality, cuisine and crafts generating productive activities and strengthening the regional identity.

[50] The signs created contain information about the municipality closer to the left and right, GPS location, distances in kilometers, altitude, local attractions and useful phone numbers, and was developed in partnership with geographers from the Federal University of Minas Gerais(UFMG), municipal governments and local communities.

9. CONCLUSION

In order to make ideas become a resource for social-economic improvement they must be put into practice. Innovative ideas that focus on the resources available and on the solution to existing problems have a certain transformative potential.

Mechanisms to protect the Intellectual Property are diversified. There are basically two lines of thought – one for the restriction of access of intellectual property and the other for the sharing of productions. Besides other reasons for both sides, restrict the access allows the creation/ inventions to be commercialized to pay back the investment; sharing would allow them to feed other creations and spread its benefits. The sharing of Intellectual Property would be a friendly motivation for networking since relationships need common interests to create bonds. There are different models that can be adopted which could be beneficial in specific cases. What is to be avoided is the wild fight for economic supremacy and the waste of energy with litigations.

Procedures related to Intellectual Property are generally quite unknown to the creators. In the Canavese Connexion project, for instance (section 5.2), there were some problems such as the impossibility of patenting due to inadvertent disclosure of the aspects of the product before the patent request has been deposited; the creation of a similar product by a non participating industry that had been contacted to become a partner for the insertion of the product into the market. Not to forget the inherent problems of high costs and fragility of the patent protection.

Within the Federal University of Minas Gerais the role of the Coordination for Technological Transfer and Innovation, that deals with the management of scientific and technological knowledge generated in the university, is still little widespread. The role of CTIT as well as the process of technology development and licensing must be better known by the academic community and its peers. There is also the need for making more explicit the Innovation Law rules, creating internal procedures that then must be taken to the knowledge of all involved. Actions such as the creation of an office in the Services Court of the Campus of UFMG and the UFMG's team coordinated work are being taken.

In the Politecnico di Torino, periodical courses and events are promoted, regulations are created and updated. In spite of that, it does not seem a subject dominated by the researchers in general.

For the Crômic Case, a patent was obtained. The patenting process has been considered simple by the Crômic since it encompassed just the Brazilian territory and the university (UFMG) has assumed the bureaucratic procedures since it had the structure necessary for it, such as the representative agent and lawyers to elaborate the documentation. Therefore the university was responsible for the most expensive administrative aspects and the Crômic for the taxes that they consider be derisive. Nevertheless the Crômics' main objective was not to obtain economic benefits for the patent, but guarantee that no other industry could block them from using the system that they had developed.

If the purpose is just keeping the right of producing, there would be other ways of doing it. The simple fact of publicizing it would refrain anyone else from registering it.

The number of patents is considered an important indicator of performance of an enterprise, an university or a country. But the number of citizens benefited by an invention and the depth of this benefit would be even more impacting to societies. In this case the gain to the creator would come from the increase in reputation and, in the case of a business, in the value of its brand.

9.1. Strategies to Seize Potentials

It is very relevant thinking about the activities in the "Estrada Real" as **Integral Endeavors.** The understanding of the whole set of activities in the region as a

system is very important, be it in the scope of the internal activities of the IER or as an instrument to guide the planning and evolution of entrepreneurial actions they stimulate. The Integral Endeavors Scheme (**Figure 22**) will be important as general view of the relationships to be developed to create the environment of Integral Endeavors optimizing the resources.

This is very much aligned with what is already being made by the IER, meaning therefore that these schemes are a resource to aid them in the achievement of their goals. In fact, it is already part of the working practices of the IER network to develop plans to guide their activities.

The National Confederation of the Industry ("Confederação Nacional da Indústria" – CNI), is a national representative of the Brazilian industry, gathering, besides the 1.300 employer associations throughout Brazil, 27 federations of industry, including FIEMG . Its goal is to promote the debate and seek consensus on important national issues with suggestions for the construction and improvement of policies and laws that strengthen the productive sector and modernize the country. As a planning tool for the Brazilian industry, it elaborates documents with strategies to overcome obstacles and develop skills that promote sustainable development.

As part of the processes and activities planned for the 2007-2015 period, there are: stimulating innovation in enterprises, promoting the culture of social responsibility and of the environmental management **[CNI, 2005]**. The FIEMG and the IER in their turn, in their respective state and organizational levels, develop their plans following the guidelines of their national representative, sharing their values. This means that they consider structural the aspects of innovation, local culture, social development and environmental issues.

Especially if treated retrospectively, social and environmental responsibilities are often considered, really as necessary, but also as a burden on the productive organizations.

The Systemic Design and the planning of businesses as Integral Endeavors, reverse this status. Optimizing the use of resources and energy, and stimulating a network of activities involving possibilities for many social classes are born as an inherent of each business. Social and environmental improvements exist as a constituent part of the philosophy of the very constitution of the business. Besides, substituting the production of garbage or high outlays with expensive resources by zero waste and transformation of local economic resources in useful products will also mean general economic gains.

From the case studies analysed, it can be identified that, many strategies for regional improvement and for stimulating the start of productive activities are

based on the choice of the participants that are most likely to be able to convert the resources applied in their assistance into highly positive results, in a foreseen time span.

Most of the initiatives are directly inspired by developed countries strategies, mainly in the ones adopted by the United States. They are very well designed for the goals for the developed countries, especially the North American society. The conversion to societies as the Brazilian one, with higher levels of social inequality, should be carefully analysed.

There are essentially two very different aims – maintaining and increasing the already good levels of activities; or making a profound change in the society taking it to a more homogeneous status. For the first case, the selection process seems to work very well. Nevertheless, if the goal is to decrease differences and raise general standards a different, more complete, approach is necessary.

Programs could identify the most capable entrepreneurs and organizations, but should also have strategies to continue stimulating the growth of the weaker. Education is important, but it could be adopted complementary approaches such as:

- Stimulating groups of different social levels, academic and empiric experiences;
- Giving detailed feedback, mainly for projects that don't reach the level to be selected, indicating the points of improvement, and providing assistance for its improvement;
- Being a continuous program.

Usually, in all these programs, the best projects are elected and the others won't have a clue of what could take them to success. If what is needed is to improve a society not individual initiatives, everyone should have the assistance to increase the respective level. That means that each one should be given help with the adequate resources and on the necessary level according to the specific needs.

It would not be necessary to be an action on the expenses of the government. On the contrary, the society should have the incentive and guidelines to help each other, to continue and expand bottom-up innovations, based on collaboration and sharing, as happens with co-working spaces and shared labs.

The role of the organizations that promotes actions to foster improvement, such as the IER is very important. They would constitute the necessary leadership to facilitate projects and energize groups.

Events are a good energizing strategy to keep and even improve its level of activity. Nevertheless it consists of a concentration of resources that, if not well planned and managed may burst the system's equilibrium. Thus events shall be sustainable actions, also planned as part of a System of Integral Endeavors, which would include routine actions to effectively and fully profit from the input energy.

9.1.1. A Promising Theme for the "Estrada Real"

Tourism is an area that provides many kinds of activities and is capable of attracting external resources. The focus, though, is in providing a service to visitors.

For the communities, it is as important as receiving well the guests, to have a good everyday life and to be able to make evolve their very own territory.

Studying its history and what happens yet today in the region, for the "Estrada Real", a very promising area of activity would be related to horses and mules. The network of activities that they move are very broad and involve all social classes.

Figure 42: Scenes showing diverse activities and social classes involving horses.

Horse breeding is an activity that has its origins in the region back in 1534-1535. Two important Brazilian breeds – Mangalarga Marchador and Campolina – have their origin in two cities of the “Estrada Real” – Cruzília and Entre Rios de Minas, respectively. This is so significant that recently the National Museum of the Mangalarga Marchador Horse has been inaugurated in Cruzília.

Figure 43: Cruzília and Entre Rios de Minas – towns where the breeds Mangalarga Marchador and Campolina have been originated (below the the National Museum of the Mangalarga Marchador Horse in Cruzilia).

Horse breeding involves many economic sectors – agriculture, industry, services. As areas of activities it can be mentioned: veterinary services and products, veterinary medicine, reproduction, trimming and shoeing, horse grooming, food (feed and hay), training, technologies and products for animals, constructions for handling, corrals. It also creates opportunities for other parallel activities such as transportation, education and research, hippotherapy, saddlery and accessories, auctions, insurance, meat and tanning, coaches/ carriages, computer systems, equipment and accessories for horse riding, equipment and installations for sports, museums and fashion. As functional aspects, horses can be used for military work, dealing with cattle, ranch

services, events, tourism, Olympic and Non-Olympic sports means of transport, power source **[Lima et al., 2006]**.

When all these aspects are crossed and detailed, a big network is unfolded. The riding, for example is even an Olympic and Paralympic sport that involves several competitions such as dressage, jumping, cross-country. Other non-Olympic sports are endurance, vaulting, carriage driving, polo, “vaquejada”, rodeo, “cavalhada”.

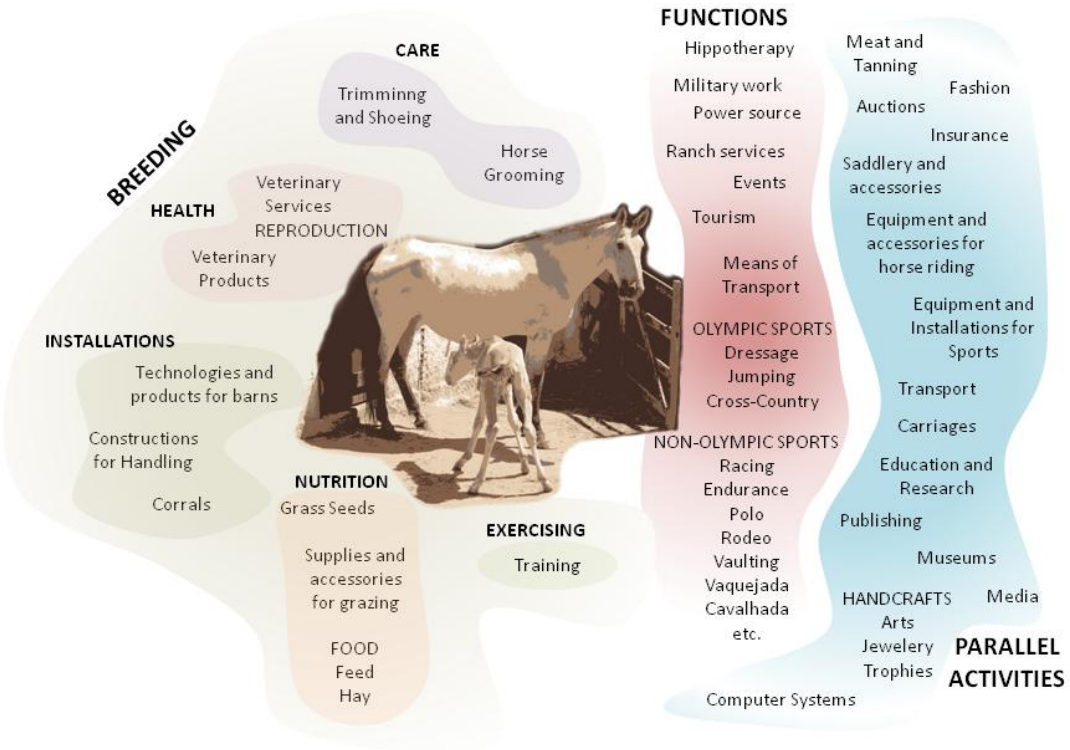


Figure 44: Activities related to horses

Therefore projects centered in this domain is expected to have a very transformative power, mainly if they are planned as part of a Systemic Network of Integral Endeavors.

9.2. An Instrument for More Detailed Analysis

From the case studies analyzed, hundreds of data, information and comments have been highlighted, considering the experience of their participants gathered from interviews, news and publications.

In order to organize this material, we have created an instrument – the **TOBEP (Tool for Best Practices)**. It is made of two parts. The first part is for the manipulation of data and information, so that they can be easily listed, filtered and connections with the Systemic principles visualized. In the second part, it is elaborated the **knowledge acquired** from the Case Studies, that are then refined in rounds of elaboration, that allows the distilling of "**best practices**". The instrument assists just on the representation of the elements that are created by a mental processing from the part of the analyst designer – there is no automatic processing since this must be a work conducted by experienced people. Finally this becomes ready to be used in the communication of the findings to the Brazilian stakeholders that will participate in the final round in order to have the selected **best practices** to be **actually implemented** in the actions of the IER. This round is scheduled to happen in August, 2014.

Figure 45: Instrument for Data and Information gathering (on the left) and rounds of elaboration of Best Practices (on the right), with relationships represented (arrows).

There are many initiatives to foster innovation and entrepreneurship. It is important for them to have a periodicity and learn from previous experiences. Being a part of a network, also lessons learned would be a matter of sharing. However a careful evaluation must be made to understand similarities and differences. If particular features are not well detected, analogous cases may lead to undesirable results. As examples it can be mentioned the two editions of the Crômic partnership with FIEMG and UFMG, where the second was not as successful as the first one (see section 5.1.1.2), and the risks if the European experiences in the proposition of religious paths would be transferred as analogous references to the "Estrada Real" without a deeper analysis of security issues. A local network with shared culture may have a closer understanding of the influencing features to be able to detect how to better use lessons learned. Also the knowledge of roots is important. The Historical Analysis to understand how nowadays' features have historically evolved give

the bases to foresee future potentials. It also allows the consolidation of own values and pride, necessary to establish beneficial exchanges.

Considering the number of participants, initiatives to foster entrepreneurship generally involve a restricted number. Even if the actions are successful the changes provoked are then very limited. Especially considering the extension of the need of social improvement in the Estrada Real, actions must be more inclusive, by creating self-managing workgroups.

Usually the projects promoted by public institutions are planned and conducted by highly qualified professionals. In order to be more inclusive, a new structure of network must be created. Local leaders, working with small groups guided by higher level professionals (that is, with the consultancy of those who could see a broader picture of relationships, such as a researcher and a designer), should act, not defining activities, but just removing impediments for the good flow of activities (like a Scrum Master). Diversity is important for the composition of these working groups – diversity of knowledge and also of age. Most projects worry about giving opportunities for young professionals. Nevertheless, it is important to profit from the experience of the elder. Putting together different generations, with different levels of experience and energy, sometimes seem problematic (as happened in the Canavese Connexion Project). The more experienced tend to dominate and youngsters feel explored. One solution (among others that can be developed with the stakeholders) is to have youngsters as leaders and the elders, more experienced, as consultants. This will bring benefits not only to the projects and to the exchange of knowledge and experience, but also for the maintenance of the self-esteem and health of the elderly, so prone to depression problems in the measure they feel themselves unnecessary. Experience, as used by Caplavur, for instance, would also be a resource for collaborative Integral Endeavors.

Another aspect to be improved is the concept, present in many actions, of “a group that ask to the dominant group that concedes”. The group that is considered to receive assistance puts itself in an inferior position, subdued by a jury. A few win and the others are discarded. The general advice for those who have not won is to insist, and insist, if they believe it is a good idea. Instead of that we suggest the creation of an environment to keep people together and stimulate networking and the development of ideas, even those that initially may seem weak but may be transformed with the right partnership. It should be an

effort of all to support those who are trying to develop, and helping the weaker (but really sturdy) would be a yet more important action.

Although projects are expected to have a long life with many editions, they must become self-sustainable. The public administration and fostering institutions shall give just the resources sufficient for its launching and first consolidation period but afterwards they must become autonomous.

Also, products and services should be conceived with the approach of the optimization of resources, configuring them according the user needs, and extending their life cycle. A deep knowledge of resources are then required, and they can be of human or material type. This means that also Intellectual Property and team motivation is a resource to be planned in the context of Integral Endeavors. For this, it is required not only designers with the knowledge of the Systemic Design methodology, but also the education of new citizens, who are conscious and active users, willing to cooperate and take even more responsibilities but also aware of his real needs and values, in exchange of an increased level of liberty and possibilities of productive activities.

Design is effectively a resource for innovation which, in its turn, is necessary to maintain the required living energy. For this role of a promoter of a new level of development, especially for countries like Brazil, designers shouldn't act as personalities that create elitist products. It is required that they take the role of facilitators and collaborators with a holistic view that includes the knowledge for structuring Integral Endeavors.

Systemic actions need multidisciplinary knowledge. Physics, chemistry, biology supply principles for the development of solutions for the optimization of energy and matter. Economic analysis gives feedback related to the feasibility of the business balance. Since the Systemic Design has as one of its principles the understanding of the user and its culture a starting point for the definition of activities and products, Ergonomics should be one of its allies.

Ergonomics is a discipline that is also concerned with human well being and in making resources adequate to human activities. Nevertheless we witness that the pressure of the market, the need to cut costs and to produce ever more in a shorter time, make activities that involve optimization, such as ergonomic planning, design and evaluation, be an important subject of the cuts performed

by the industry. On the other hand, users/ customers do not make a firm demand for ergonometric qualities. This can be applied to the physical, organizational or cognitive ergonomics.

Ergonomic qualities are complex to be designed and evaluated. They are not easily recognizable and the human part is usually the one to be blamed if system does not work properly. Human difficulties (especially for the elderly) are considered as their fault, as lack of agility, strength or mental capacity.

Therefore the resource to protect human well-being in this situation exists but is not well known or even recognized. Ergonomists work for clients that do not know about the benefits of their work or think that there isn't a good cost-benefit ratio. Besides they do not fight for their right of having products and services with the quality of a good ergonomic development.

Hence Ergonomics and the Systemic Design are complementary, since one of the points of the Systemic Design is to develop user awareness in order to empower him to become an active citizen. Ergonomists should then work with designers for the formation of this new conscious citizen that is proud of his culture, aware of his own values and active through the dynamics of networks.

When the many facets of the industry and the academy join forces to evolve we see a significant manifestation of the **valorisation of relationships**. Initiatives should start from the communities. The government, in its various spheres, would be a facilitator of this relationship, be it providing initial resources, be it monitoring the interests of public welfare.

On the other hand, an impediment for the continuous, smooth flow of this dynamic is bureaucracy. The process must be well managed counting on motivated people that have just general instructions to follow – not a detailed bureaucratic process. Motivation and trust would be a very positive substitute of bureaucracy. One important feature for projects is time keeping - the maintenance of working pace; the other is the involvement of a broader range of the society. The Crômic case has elements to backup these statements. Solutions for the project came not only from the university experts but also internally from the company, from people that had production experience.

Communication is an essential part of this proposal for changing. Together with stakeholders, it must be defined a mechanism, inspired in communication formats such as TEDx[51] and Pecha-kucha[52] to start and maintain the communication dynamics of the communities to put them in motion and maintain their pace. It is important to notice that, for an efficient communication the means used must be a consensus and expectations must be constantly aligned.

The organization, then, should have the right dimension and scope to keep up motivation, communication and collaboration. It must successful in the broadest sense, which means being social, environmental and economically sustainable.

Most of best practices suggested, such as the study of the knowledge acquired (lessons learned) when a project finishes to be used in the next one already exists. The novelty of our proposal resides on the assiduity of the application of the practices and mainly the use of the Systemic Design principles as a base for analysis. This will mean a close adherence with the environmental and cultural protection and the practice of effectively sustainable actions, not to mention the identification and proposition of new working opportunities and new working environments. The implementation of such practices is expected to provoke these initiatives to generate wider benefits involving a bigger and more diversified portion of the society.

9.3. Future Actions

We are living in a period of intense activity. In Italy many initiatives to overcome crisis, in Brazil news of development and expectation on the results of the two large events in the next 2 years – The World Cup in 2014 and the Olympics and Paralympics Games in 2016.

These events are being expected to boost the tourism in the “Estrada Real”. An investment of US$1,4 million is being made on the training of 1910 people to work on the frontline of tourism, with courses of language (English and Spanish)

[51] http://www.ted.com/tedx

[52] http://www.pechakucha.org/

and tour guides. On December, 2013, Famtours Caravans with Portuguese and Italian guests have visited many touristic destinations of Minas Gerais. These Famtours are an action undertaken by the Tourist Office of the State of Minas Gerais (SETUR) since 2007 that represents an opportunity for operators and international travel agents to get to know destinations and tourism products in Brazil, to plan routes and promote the integration and marketing of these products in the main markets of Brazil and abroad.

Since they will be two events of large dimensions in the space of two years, besides making investments that will serve for both opportunities, it is expected that the lessons learned in 2014 will help make an even better event in 2016. We would also expect that the guidelines of this work will add to this experience, taking the opportunity to make interventions of deep, long term effects. The instrument that we created for data and information gathering for the elaboration of Best Practices, the **TOBEP (Tool for Best Practices)**, can be used to aid the analysis. Our experience in using it to select the **best practices** to be actually implemented in the actions of the IER (with a first meeting scheduled to August, 2014) will be used to assess and improve it for this case of the Olympics and Paralympics Games.

Diversity is one of the Brazilian strengths; one reason being is that it means an immense quantity and variety of resources. The Creative Economy, for instance, is an economic model based on creativity and innovation, and thus is leveraged by cultural diversity. The more diverse and richer the cultural contents of a society, the bigger its possibilities of development **[Lima, 2014]**.

> *"The primary inputs [of the Creative Economy are] individual talent or skill. These inputs may be familiar or novel; what is more important is that our creativity transforms them in novel ways. In some sectors the output value depends on their uniqueness; in others, on how easily it can be copied and sold to large numbers of people. The heartlands are art, culture, design and innovation."* **[Howkins, 2014]**

As stated in the UNESCO Report,

> *"The creative economy is not a single superhighway, but a multitude of different local trajectories found in cities and regions in developing countries […]. There is an urgent need to find new development pathways that encourage creativity and innovation in the pursuit of inclusive, equitable and sustainable growth and development. […]Being able to either generate or*

> *access both the economic and the non-monetary benefits of the creative economy must be counted among the instrumental freedoms that are integral to people-centred development* **[UNESCO, 2013]**.

Therefore this resource must be recognized in the Integral Endeavors. The consequence of that is attributing to it the right value, since Integral Endeavors must be also economically and socially sustainable. Differently from the historical roots, that used this diversity to differentiate the value of the resource, (as regards services, for instance, black man and indian work was not rightfully rewarded), in this new context diversity must be taken as an abundance that allows a large and valuable production for all. The values of the nuances of this diversity must be rightfully identified – as Italians do, for instance with their cheeses, wines and pasta (to mention just the most broadly known categories) – since it makes each small part of the territory unique, as highlighted in the work of Paulo Miranda **[Oliveira, 2013]**.

Another particularity of the Brazilian Diversity is that, differently of what happens in cosmopolitan cities, that just contains people and things from many different parts of the world, the Brazilian is just **one** people that was formed by so many cultures. This gives the potential of understanding particularities among cases to be used as examples, since internally they have the data to identify differentiations. What must be done is to recognize this asset and learn to use this data transforming it into knowledge.

From the sample collected as case studies, the most important conclusion is that both Italy and Brazil have practically all ingredients available for social improvement. Specifically in Brazil, almost all good values are already incorporated in the institutions and their actions. FIEMG System have many virtuous actions – encouraging the industry, supplying with resources, facilitating the dialog between the industry and the academy, working for the well-being of workers, creating actions involving the collaboration among its composing institutions; give value to local resources; encouraging the use of the output from an industry as a resource of another.

What is missing is to make a system from it. Even as important as each part working well are their connections working so well and effortlessly that they become invisible, since the desired result is the final product of the system. The

iTunes case is a classic example of the potential of systems; that is, the significant increase of results when the parts work harmoniously (see Annex B).

The procedures illustrated in this work and the instruments created are expected to be resources to be used in future analysis of other case studies, creating an even more consistent body of knowledge on best practices. These best practices generated should be incorporated into the working processes involved in the conception of actions to improve (more than development) the well-being of the society. In this way the potential of good ideas will be a real lever for social-economic improvement.

ANNEX A
BRAZILIAN HISTORICAL OVERVIEW – FROM 1500 TO 1889

Brazil was (officially) discovered by Portugal in April 22, 1500. It was then a colony of Portugal from this date up to December 16, 1815, when it was elevated to the condition of a Kingdom and was united to the kingdoms of Portugal and Algarves, forming a single State under the title of "The United Kingdom of Portugal, Brazil and the Algarves". Later, in September 07, 1822 it was proclaimed the Independence of Brazil which became an Empire. Finally in November 15, 1889, by a military "coupe d'etàt", Brazil was established as a Republic whose constitution of 1891, established the "Republic of the United States of Brazil", granting extensive autonomy to the provinces, now called States, and adopting the Federal system. This period is now called the Old Republic (1889 to 1930). After that, up to current times, there were yet some important landmarks to the Brazilian history (Vargas Era– 1930 to1946; Second Republic – 1946 to 1964; Military rule – 1964 to 1985; New Republic – 1985 up to now). Nevertheless, the period from the discovery of Brazil up to the Proclamation of the Republic was when the "personality" of the "Estrada Real", the focus of the application of our studies, was formed. Therefore this is the period that is going to be analysed here.

The above described landmarks are political ones. However, the possibilities of action in the "Estrada Real" depend also on other aspects. Thus, in order to understand today's characteristics and tendencies of the "Estrada Real", we are going to make an overview of its history, emphasising features regarding 7

aspects: INFRA-STRUCTURE/ SOCIETY (IS), POLITICS (PO), RESOURCES (RE), TECHNOLOGY/ MATERIAL CULTURE (MC), PROFESSIONS (PR), PRODUCTS (PD), MANAGEMENT (MA). The periods chosen are due to the existence of important events, mainly from the point of view of the territory of the "Estrada Real".

The facts will be related to each other in terms of unfoldings, that is, facts that happen as transformations of a previous one, and vice-versa (i.e.: facts that have unfolded into an event or feature, represented respectively by "A" (for "arrival"), or "O"(for origin) followed by the period and the abbreviation of the aspect to which it is related [53]. When facts that have dependency with each other are part of the same group, their relationship will be represented by an arrow starting on the origin and pointing towards the arrival.

a. Earlier Periods – Brasil Colônia -1500

SOCIETY — O/1500/PO

Wild nature and people (Indian semi-nomadic tribes)

POLITICS — A/1500/SO; O/1500/RE

Discovery of Brazil by Portugal (22 April, 1500)

⚠ Portugal would have known previously about it but kept in secret

RESOURCES — A/1500/PO; O/1534-1554/PO

Natural resources: Steep hills, forest of dense vegetation, wild animals, swamps, rivers

Labour force: indians, african slaves, free persons of color, european immigrants

Hinterland Drugs ("Drogas do sertão"): guarana, indigo, salsa, annatto, walnut pixurim, stick cloves, sesame, cocoa, vanilla and Brazilian nut ("guaraná, anil, salsa, urucum, noz de pixurim, pau-cravo, gergelim, cacau, baunilha, castanha-do-pará") (http://www.mundoeducacao.com.br/historiadobrasil/drogas-sertao.htm)

✓ Natural wealth

MATERIAL CULTURE

Subsistence migrant agriculture, gathering, hunting and fishing activities.

Weaving of utensils and textiles

[53] On the right of the title bars, there are "codes" that represent the relationships, and that are links, identified between facts. Example: A/1500/SO means that this element is an unfolding of an event of the SOciety that happened in 1500.

PRODUCTS

Cotton Weaves (In the letter of Pero Vaz Caminha there are references to the clothing used – “charpas”- made ""com huum pano nom see de que[54] "" with which Indian mothers held their children in their arms. José de Anchieta gives us news of the use of cotton in the manufacture of loincloths, besides ribbons, charpas nets). (http://www.cataguases.com.br/Pagina.aspx?104) "

MANAGEMENT

The Pope and the Portuguese Crown as his agent

NOTES

-The eastern part of South America had been granted to the Portuguese by Pope Alexander VI (1492–1503) in the Treaty of Tordesillas (There remained still the medieval tradition of the political supremacy of the Holy See which recognized to Rome the right to dispose of the lands and peoples).

-As Vicarius Christi, the Pope had long claimed universal temporal power; its exercise in this ""new world"" was now delegated to the Spanish and Portuguese crowns as his agents. (http://www.ieg-ego.eu/en/threads/europe-and-the-world/european-overseas-rule)

b. Brasil Colônia – 1534-1554

SOCIETY O/1534-1554/PO; O/1711/RE; O/1807-1812/PR;O/1549-1557/PO

Wild nature and people (indians)

POLITICS
A/1500/RE; A/1534-1554/SO; O/1674-1681/PO; O/1549-1557/PO; O/1597/SO; O/1714/RE; O/1725-1730/PO; O/1707-1709/PO;O/1674-1681/MC; O/1597/MC; O/1549-1557/PR; O/1534-1554/MC; O/1534-1554/RE

"**Entradas**": expeditions organized by the government of Portugal and financed by public funds for expansion of territory, the goals for gold and fighting and capturing the "hostile savages"

"**Bandeiras**": expeditions from the initiative of individuals who sought to profit from its own resources through the discovery of precious metals and slave raiding Indians and blacks and extraction of drugs of the hinterland; initially it was formed by recruiting adventurers;

⚠ Exploitation of people and resources.

RESOURCES A/1534-1554/PO; O/1754-1761/RE

1534-1535- Arrival of horses and cattle

Leather

[54] This means: a cloth made of I don’t know what.

✓ Variety of resources

⚠ Need of large extentions of meadow leading to the destruction of natural vegetation

MATERIAL CULTURE A/1534-1554/PO;O/1534-1554/PR

Jerkin weapons, armor rawhide, cotton padded ("escupil" to cushion the shot with arrows), arquebuses and muskets. Machado (AXE), adzes, sickles, machetes. Mining tools and fishing tackle. Leggings of deerskin or capybara and walked almost always barefoot. When assembled, sported large spurs in bare feet. Leaders wore boots and wide-brimmed hats.

http://www.grupoescolar.com/pesquisa/entradas-e-bandeiras.html

PROFESSIONS A/1534-1554/MC;O/1534-1554/PD

Cowboy, rancher, saddler, tanner ("vaqueiro, peão, pecuarista, seleiro, curtidor")

Bandeirantes (participants of the "Bandeiras") (GIL= EXPLORERS)

PRODUCTS A/1534-1554/PR

Cattle as: meat supply for the population, means of transport, power to move the mills not powered by water supply, leather for crafts and casing for tobacco and other products.

MANAGEMENT

Portuguese

Belgium (SANTOS-SP: Schetz company of Antwerp in 1540)

The potential wealth of tropical Brazil led the French, who did not recognise the Tordesillas Treaty, to attempt to colonise parts of the Portuguese colony (Rio de Janeiro - 1555-1567). Jesuit priests Manuel da Nóbrega and José de Anchieta were instrumental in the Portuguese victory by pacifying the natives who supported the French.

NOTES

- Cattle brought through the initiative of Ana Pimentel, wife of the donee of SãoVincente [...] Through the São Francisco, the cattle reached the regions of Minas Gerais and going up in the North direction to Piauí. (http://www.consciencia.org/gado.a-expansao-geografica.importancia-economico-social-historia-do-brasil)

- The first batch of horses brought to Brazil went to Vila de São Vicente, the second to Pernambuco in 1535, the third to Bahia, brought by Tomé de Sousa.

-"Entrada" of Porto Seguro: Francisco Bruzo de Espinosa, left in 1553 or 1554 the Captaincy of Bahia, who descended sea along the coast, headed inland for the valley of River Pardo, crossed the valley of Jequitinhonha River and reached the Sao Francisco River, crossed the scrubland of the current state of Bahia to reach the current state of Minas Gerais, where stands the current town of Espinosa. He went through natural pastures, identifying mineral deposits of salt, which led to, later on, the region to attract numerous cattle herds, particularly from the seventeenth century, the

ones of the cattleman Antonio Guedes de Brito.-
(http://pt.wikipedia.org/wiki/Entradas_e_bandeiras)

* São Jorge was the third mill ("engenho") in the Baixada Santista, constructed in 1534. Martim Afonso took the initiative for its foundation after his return to Portugal. Together with 3 investors he formed a society that explored the engenho: the "Armadores do Trato". This pact was to dominate the export of sugar and the import of European products in the Capitania. From the start, São Jorge had a link to Antwerp: amongst the partners was Johan van Hielst, overseer ("feitor") in Lisbon of the firm of Erasmus Schetz. Around the year 1540 Erasmus Schetz acquired the entire engenho. (http://www.vitruvius.com.br/revistas/read/arquitextos/06.070/369)[...]

-The history of the mill was made by Portuguese, Germans, Belgians, Dutch and Italians. Meanwhile, the work was done by Indians and a few slaves from Guinea. The owners were represented in Brazil by "feitors", mainly Germans (Peter Roessel, c. 1540; Paulo Werner, 1579) and Italians (Giovanni Batista Maglio, 1556; Jeronimo Maya, 1593). Over the years many new buildings were constructed at the site. The overseers also bought more land to plant sugar cane, because it was not very profitable to work with countrymen ("lavradores").

c. Brasil Colônia – 1549-1557

SOCIETY

Inaugurated an iron producer at São Paulo

POLITICS A/1534-1554/PO;A/1534-1554/SO; A/1549-1557/RE

1549 - establishment of the General Government- of San Salvador (capital of Brazil until 1763) and thus the State of Brazil

1549 - instituição do governo-geral de São Salvador (capital do Brasil até 1763) (**[Fausto, 2012]** p. 20/21) e com isso o Estado do Brasil.

First Jesuit priests to catechize the Indians

✓ New knowledge

⚠ Element of intellectual domination

RESOURCES O/1549-1557/PO

Iron/ Steel

✓ New resources for production

⚠ Nature degradation

PROFESSIONS A/1534-1554/PO

Priests, administrators, soldiers, doctors (physicists-surgeon) , architects and master builder, masons, carpenters, sawyer, locksmith, blacksmiths, cooper, boilermakers, diggers, coalmen, whitewashers, potters, wagooners, fishermen, builders of brigantines, canoeists, barber, book finisher.

✓ New knowledge about comfort in occupations

MANAGEMENT

First Jesuit priests to catechize the indigenous people.

1557 - Inaugurated an iron producer at São Paulo

NOTES

-The Brazilian steel industry has the landmark installation of a small producer of iron by Afonso Sardinha, in 1557, in São Paulo. In the 20th century, the history of the industry dates back to 1921, in Minas Gerais, with the creation of the"Companhia Siderurgica Belgo-Mineira" (Belgo-Mineira Steel Company), with the participation of both the Belgian-Luxembourger consortium Arbed and local businessmen who in 1917 had founded the "Companhia Siderúrgica Mineira" (Steel Company from Minas Gerais). The Monlevade factory (where, after successive expansions, it's still a Belgo-Mineira's unit) was inaugurated in 1939, being at that time the largest integrated steel factory using charcoal in the world. In 1943, the factory reached the capacity of 100 thousand tons/year, the largest share of production corresponded to barbed wire and about 30 thousand tons of rails. (http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/livro_setorial/setorial03.pdf)

-The institution of the general government, with Tomé de Sousa as Governor General had the purpose of insuring the territorial possession of the new land, settle it and organize Crown's incomes. It also represented an effort of administrative centralization, but the general government did not hold all the powers, neither, in its early days, could carry out much extensive activity. The connection between the captaincy was rather precarious, limiting the radius of action of the governors(**[Fausto, 2012]** p. 20/21)

-The mechanical crafts entered Brazil with the Portuguese first in the villages of the grantees, and then more plentiful, when the State of Brazil was founded in 1549. In the armada that led Tomé de Sousa and Nobrega there were all the elements required for the administration and defense of the new state and the construction of its capital that would be built there, where before there was nothing but forests and some straw huts. With the Jesuits and the men of the civil and military administration, notes the presence of a doctor (surgeon and physical), and of an architect with a master builder, numerous masons, carpenters, sawyers, coopers, blacksmiths, locksmiths, boilermakers, diggers, coalmen, whitewashers, potters, wagon builders, fishermen, builders of bergantins, canoeists, and even a barber and a book finisher. (**[Leite, 1953]** p. 27)

d. Brasil Colônia – 1597

SOCIETY A/1534-1554/PO; A/1597/RE;O/1674-1681/SO

Open first accesses/ paths to Mines - "Caminho Velho"

RESOURCES O/1597/SO; O/1698-1700/SO;O/1597/PR; O/1707-1709/PO

Gold

MATERIAL CULTURE A/1534-1554/PO

Salt gourds, tin plates, gourds, horn mugs, mule bags and the essential hammocks.

PROFESSIONS A/1597/RE; O/1698-1700/RE

Prospectors, miners, slaves

MANAGEMENT

1630-1647-RECIFE - The Dutch West Indian Company

The Dutch, English and French stood against Portugal and Spain, but also fought each other. They competed not only for mastery in Europe, but also for spheres of influence in the colonial world that with its riches and resources was a coveted prize as well as providing an extended venue for European wars. [...]

Dutch Verenigde Oostindische Compagnie (VOC) and the English East India Company (EIC). The Spanish and Portuguese empires intensified their territorial rule in South America and in the North, British, French and other European settlers pressed on westwards.

(http://www.ieg-ego.eu/en/threads/europe-and-the-world/european-overseas-rule)

NOTES

-Dutch West India Company, founded in 1602, was a chartered company of Dutch merchants. On June 3, 1621, it was granted a charter for a trade monopoly in the West Indies (meaning the Caribbean) by the Republic of the Seven United Netherlands and given jurisdiction over the African slave trade, Brazil, the Caribbean, and North America. [...] The intended purpose of the charter was to eliminate competition, particularly Spanish or Portuguese, between the various trading posts established by the merchants. The company became instrumental in the Dutch colonization of the Americas. [...] Only in 1630 did the West India Company manage to conquer a part of Brazil. In 1630, the colony of New Holland (capital Mauritsstad, present-day Recife) was founded, taking over Portuguese possessions in Brazil. (http://en.wikipedia.org/wiki/Dutch_West_India_Company)[...]

- Because of the ongoing war in Brazil the situation for the WIC in 1645, at the end of the charter, was very bad. An attempt to compensate the losses of the WIC with the profits of the VOC failed because the directors of the VOC didn't want to.[6] Merging the two companies was not feasible. Amsterdam was not willing to help out, because it had too much interest in peace and healthy trade relations with Portugal. This indifferent attitude of Amsterdam was the main cause of the slow, half-hearted policy, which would eventually lead to losing the colony.[7] In 1647 the Company made a restart using 1.5 million guilders, capital of the VOC. The States General took responsibility for the warfare in Brazil.

e. Brasil Colônia – 1674-1681

SOCIETY A/1597/SO;O/1698-1700/SO

First camps ("arraiais")

POLITICS A/1534-1554/PO;O/1711/SO

Fernão Dias went through the region (from the headwaters of the Rio das Velhas, at the scrublands of Sabarabuçu until Serro Frio) and with his "bandeira" were born the first camps of Minas Gerais.

(http://www.grupoescolar.com/pesquisa/entradas-e-bandeiras.html)

⚠ Danger for health: new diseases in new territories.

MATERIAL CULTURE A/1534-1554/PO

Shotguns, harquebuses, bows and arrows, dagger.

⚠ Conflicts and deaths.

MANAGEMENT

England - The Royal African Company

1612-1614 - French colony in São Luís (Maranhão) - 1615: french expelled

NOTES

-The Royal African Company was a mercantile company set up by the Stuart family and London merchants to trade along the west coast of Africa. It was led by James, Duke of York, Charles II's brother. Its original purpose was to exploit the gold fields up the Gambia River identified by Prince Rupert during the Interregnum, and it was set up once Charles II gained the English throne in the English Restoration of 1660.[1] However, it was soon engaged in the slave trade as well as with other commodities.

Originally known as the Company of Royal Adventurers Trading to Africa, it was granted a monopoly over English trade with West Africa, by its charter issued in 1660. (http://en.wikipedia.org/wiki/Royal_African_Company)

f. Brasil Colônia – 1698-1700

SOCIETY A/1597/RE;A/1674-1681/SO; A/1698-1700/RE;O/1711/SO

Start of New Shorter/ Wider Path

⚠ Lack of lodges

POLITICS

1700- Trail for foot-traveler/ Lack of lodges

RESOURCES A/1597/PR; O/1698-1700/SO; O/1707-1709/PO;O/1698-1700/PR

The gold was found by Antônio Dias de Oliveira, from São Paulo, in the region that after became “Ouro Preto”

PROFESSIONS A/1698-1700/RE

Goldsmith

g. Brasil Colônia – 1707-1709

POLITICS A/1534-1554/PO;A/1597/RE;A/1698-1700/RE

Emboabas' War ("Guerra dos Emboabas")

MANAGEMENT

The gold from Brazil offset by several years the trade-in balance between Portugal and England, it had become a structural data from the eighteenth century. Precious metals held a triangular course: one part remained in Brazil , giving rise to the relative wealth of the region of the mines , another went to Portugal , [that was used to pay for industrialized goods (textiles, weapons) obtained from countries like England], and that was also consumed in the long reign of Dom João V (1706-1750) , especially in expenses of the Court and in works such as the giant palace and convent of Mafra, the third part was directly smuggled , or indirectly , ended up in British hands, accelerating the accumulation of capital in England . (P. L 52/53)

With the mass extraction of precious metals and the consequent displacement of population and increase in the price of slave labor , given the increase in demand , the sugar economy of the Northeast was affected. The axis of the colony moved to the center-south and especially to Rio de Janeiro , from where slaves and supplies came in and gold went out.(**[Fausto, 2012]** p. 52/53)

NOTES

-In the first years of mining activity in the gold mines, the Board of Vila Sao Paulo claimed to the king of Portugal that only residents of the village of São Paulo, who was due the discovery of gold could obtain exploration concessions. The facts demonstrated the impracticability of the desired, since big groups, not only brazilians, specially from Bahia, but also Portuguese, came to the region of the mines. This resulted in what was known as Emboabas War (1707-1709), civil war opposed on one side residents of São Paulo, and on the other side, people from Bahia and other foreigners. The people from São Paulo did not succeed in their claim, but managed to create the Captaincy of São Paulo and Gold Mines, separated from the Rio de Janeiro and the elevation of the village of São Paulo to a city (1711). In 1720 Minas Gerais became a separate captaincy.(**[Fausto, 2012]** p. 54)

h. Brasil Colônia – 1711

SOCIETY A/1674-1681/RE; O/1711/PD; A/1698-1700/SO; O/1711/MC; O/1711/PR; O/1731-1832/SO; O/1731-1823/PO;A/1714/RE

First villages ("vilas"): Ribeirão do Carmo (Mariana); Vila Rica (Ouro Preto)

✓ Comfort and safety in the villages

RESOURCES A/1534-1554/SO

Mules started to go through the New Path

✓ Ease of transport: it was more comfortable and faster.

MATERIAL CULTURE A/1711/SO; O/1711/PD

Roof tile moulds

Table for sweets

✓ Technology to solve practical problems

PROFESSIONS A/1711/SO

Traders, loader, street seller, potter (ceramics).

✓ New opportunities of work and access to products

⚠ Intention of tradesman of taking advantage.

PRODUCTS A/1711/SO; A/1711/MC

Services tiles

i. Brasil Colônia – 1714

RESOURCES A/1534-1554/PO; O/1711/SO; O/1725-1730/PO; O/1740-1771/SO; O/1733-1734/PO; O/1785/SO;O/1725-1730/PR

Discovery of Diamonds

NOTES

-The fragility of the provision based on imported foods from overseas and other captaincies and especially the perception that agricultural activities have constituted a profitable enterprise in face of high prices and insufficient supply, resulted already in the first decades of the eighteenth century , in the emergence and rapid expansion of agriculture and agroindustry. Inserted in this movement, the agroindustry related if sugar activities in Minas Gerais were settled to the domestic market of the captaincy. This priority direction of production of mills of Minas Gerais never changed. (http://www.mao.org.br/fotos/pdf/biblioteca/godoy_01.pdf)

j. Brasil Colônia – 1725-1730

SOCIETY

1725-Decline of the "Caminho Velho"

POLITICS A/1534-1554/PO; A/1714/RE; O/1733-1734/SO; O/1733-1734/PO; O/1754-1761/PO; O/1821-1822/PO

1729- Acknowledgement of the Portuguese crown of the discovery of diamonds

1730- Fiscal measures - definition of taxes

⚠ Objective of controlling trades and diamond extraction to prevent tricking and smuggling

RESOURCES

Diamonds

PROFESSIONS A/1714/RE

Lapidador

✓ Specialized knowledge

k. Brasil Colônia – 1731-1823

SOCIETY A/1711/SO; A/1731-1823/PO

Beginning of sugar mills in Minas Gerais

POLITICS A/1711/SO; O/1731-1823/SO; O/1807-1812/SO; O/1831-1848/SO; O/1860-1877/SO; O/1883/SO; O/1733-1734/RE

Provision of allotments ("sesmarias")

✓ Stimulus for genuine interest on the land

NOTES

-Alongside the geographic expansion of the extraction of gold and diamonds itself, worked up the spread of mills and litte sugarcane mills by the territory of Minas Gerais. [...] In the early eighteenth century, as soon as the metropolitan authorities identified the existence of mills in Minas Gerais territory, began long and reluctant persecution of sugarcane subproducts manufacturers.

l. Brasil Colônia – 1733-1734

SOCIETY A/1725-1730/PO; O/1740-1771/PO; A/1733-1734/PO

Stewardship ("intendência") of the diamonds in the "Arraial do Tijuco"

POLITICS A/1714/RE; A/1725-1730/PO; O/1733-1734/SO; O/1740-1771/PO

Severe law to reduce the production of diamonds, demarcation of the area and prohibition to the outsiders to enter

RESOURCES A/1731-1823/PO

1733 - The first mule troop went through São Paulo towards the Minas Gerais.

m.Brasil Colônia – 1740-1771

SOCIETY A/1714/RE;

The "Caminho dos Diamantes" has turned into an extension of the "Caminho Novo".

✓ Ease of access that lead to the possibility of development

POLITICS A/1733-1734/SO; A/1733-1734/PO

Contract established for the exploitation of the diamond mines

External management

n. Brasil Colônia – 1754-1761

POLITICS A/1754-1761/RE; A/1725-1730/PO; O/1821-1822/PO

1759 - The Prime Minister of Portugal "Marquis of Pombal" ordered the expulsion of the Jesuits from all Portuguese colonies

1761 - Royal Charter prohibiting marketing, creation and use of mules

RESOURCES A/1534-1554/RE; O/1754-1761/PO

3780 mules made the journey from Rio Grande do Sul to Minas Gerais

Decline of horse breeding

(http://www.klepsidra.net/klepsidra4/tropeiros.html)

NOTES

- With the increasing transport made on the back of mules, horses were not acquired, impairing their creators. Hence there was a complaint representation from horse breeders of Bahia, Pernambuco and Piauí to the king (D. José I)

o. Brasil Colônia – 1763

POLITICS

The capital of the Vice Reign was transferred from Salvador to Rio de Janeiro (**[Fausto, 2012]** p.53)

PRODUCTS

Cattle, food and mules.

Gado, alimentos, mulas.

MANAGEMENT

NOTES

-The mining economy has generated a certain linkage between distant areas of the colony. Cattle and food were transported from Bahia to Minas Gerais and a trade was settled in reverse. From the south came not only cattle but mules, required for carrying goods. Sorocaba, in the inland of São Paulo, with its famous fair, became the obligatory stop of animals' convoys, mainly distributed in Minas (**[Fausto, 2012]** p.53)

p. Brasil Colônia – 1785

SOCIETY A/1714/RE; O/1785/PO

Population Growth

⚠ Uncontrolled population growth, that lead to rapid depletion of resources

POLITICS A/1785/SO; O/1821-1822/PO

Charter that prohibited the manufacture of any product in the colony

Supply crises due to the large population growth

RESOURCES

Decline of gold cycle (end of XVIII century)

⚠ Impediments to development caused by the crisis

NOTES

-In the late seventeenth century and early Eighteenth, the concentration of productive factors in the work of extraction, precarious external supplies and rapid population growth have resulted in successive supply crises. (http://www.mao.org.br/fotos/pdf/biblioteca/godoy_01.pdf)

q. Brasil Colônia – 1807-1812

SOCIETY A/1731-1823/PO; A/1807-1812/PO

First Brazilian Bank

POLITICSO/1807-1812/SO; O/1831-1844/SO; O/1807-1812/RE; O/1807-1812/PR

The Portuguese royal family moves to Brazil and with it all the Portuguese Crown.

The colonial pact is broken and the Brazilian ports are open for trade with other countries.

Establishment of industries.

✓ Possibility of development

✓ Concern about local welfare

RESOURCES A/1807-1812/PO

Some of the best horses from the Royal Harass of “Alter do Chão”

1812 - Farmer from the south of Minas Gerais, Francisco Gabriel Junqueira received a gift from the emperor Dom João VI, an Alter stallion, which led to the Mangalarga Marchador breed.

✓ Means of transport and resource for many activities

PROFESSIONS A/1534-1554/SO; A/1807-1812/PO;

Travelers and Naturalists, shoemakers

PRODUCTS A/1807-1812/PR; A/1821-1822/PO

Narrations/ Scientific studies and discoveries

✓ Historical records

✓ Bases for scientific development and good use of resources

MANAGEMENT O/1831-1844/MA

With the relocation of the Portuguese royal family in Brazil, the country becomes the center of the Portuguese Empire.

Brazilian ports are open for trade with other countries.

The Portuguese crown starts to allow the installation of industries (end of 1785 charter).

D. João VI creates the first bank in the country, the"Banco do Brasil" (Bank of Brazil).

NOTES

-In the nineteenth century the legal hindrances to manufacture subproducts of sugarcane were definitely abolished . However, provincial and municipal administrations of Minas Gerais preserved the discriminatory treatment of the previous century. Throughout provincial period, production, distribution and marketing of derivatives of sugarcane were under severe tax laws (http://www.mao.org.br/fotos/pdf/biblioteca/godoy_01.pdf)

Foreign scientists and travelers, as the English naturalist and mineralogist John Mawe, Bavarian zoologist Spix and the botanist Martius, also Bavarian, the French naturalist Saint-Hilaire, came to Brazil, authors of works that are an indispensable source for the knowledge of the time. (**[Fausto, 2012]** p.69)

r. Reino Unido (United Kingdom of Portugal, Brazil and the Algarves) 1815

SOCIETY

The United Kingdom of Portugal, Brazil and the Algarves was formed in 1815, following the Transfer of the Portuguese Court to Brazil during the Napoleonic invasions of Portugal.

PRODUCTS

Narrations/ Scientific studies and discoveries

NOTES

-The Crown took action in order to integrate Portugal and Brazil as part of the same kingdom, taking into account that the war ended in Europe in 1814, with the defeat of Napoleon. The reasons for the court to remain in Brazil apparently no longer existed. Dom João decided however to remain in the American colony and, in December 1815, raised Brazil to the status of United Kingdom to Portugal and Algarves. Months later,

after the death of the queen, Dom João would be sacred king of Portugal, Brazil and Algarves, with the title of Dom João VI. (**[Fausto, 2012]** p. 71)

-During its period of existence the United Kingdom of Portugal, Brazil and the Algarves did not correspond to the whole of the Portuguese Empire: rather, the united kingdom was the transatlantic metropolis that controlled the Portuguese colonial empire, with its overseas possessions in Africa and Asia. Thus, from the point of view of Brazil, the elevation to the rank of a kingdom and the creation of the United Kingdom represented a change in status, from that of a colony to that of an equal member of a political union. In the wake of the liberal revolution of 1820 in Portugal, attempts to compromise the autonomy and even the unity of Brazil led to the breakdown of this united kingdom. (http://en.wikipedia.org/wiki/United_Kingdom_of_Portugal,_Brazil_and_the_Algarves)

s. *Reino Unido (United Kingdom of Portugal, Brazil and the Algarves) – 1821-1822*

SOCIETY

At the end of the colonial period, large parts of the country were almost unexplored or occupied by Indians without contact with the colonizers. It is estimated that Brazil had about 3.6 million people, concentrated in the provinces of Minas Gerais, Rio de Janeiro, Bahia and Pernambuco, in that order. The south of the country was still a peripheral region.

From the racial point of view, the existing data to key provinces suggest that whites accounted for less than 30% of the total population. (**[Fausto, 2012]** p.75)

POLITICS A/1754-1761/PO; A/1785/PO; A/1725-1823/PO; O/1831-1848/PO; O/1807-1812/PD

1821 - Return of D. João VI to Portugal

1822 - Independence of BR / D. Pedro I emperor of BR

✓ Possibility of working for own interest

✓ Motivation for reaction

RESOURCES

Brazilian exportation of sugar, cotton and tobacco and coffee, leather and skin.

⚠ Culture of dependency and overvaluing of overseas culture

⚠ Culture of value of exports

⚠ Monoculture crops

⚠ Monopolies of big industries

PROFESSIONS

Travellers and Naturalists

PRODUCTS

Narrations/ Scientific studies and discoveries

NOTES

-Dom Pedro I declared Brazil's independence. That year, prevailed exportation of sugar, cotton, tobacco and coffee, which accounted for about two thirds of total exportation. Leather and fur accounted for about 15% of exports. (http://www.brasil.gov.br/linhadotempo/html/tema/lista_epocas?tema=Economia)

t. Brasil Império – 1831-1848

SOCIETY A/1731-1823/PO; A/1807-1812/PO; O/1831-1848/PD; O/1831-1848/PR; O/1831-1848/RE; A/1831-1848/PO

In Minas Gerais, the paradigm of the internal market (see technology) - http://www.mao.org.br/fotos/pdf/biblioteca/godoy_01.pdf

Pronouncedly sugarcane industry spatially decentralized; consumer market spatially dispersed. Transport costs tended to make the production for distant markets not viable.

1837- Founded in Rio de Janeiro the Colégio Pedro II

1838- Founded in Rio de Janeiro, the Brazilian Historic and Geografic Institute ("Instituto Histórico e Geográfico Brasileiro- IHGB") (21th october)

✓ Developmente of typical products

✓ Dissemination of knowledge

POLITICSA/1821-1821/PO; O/1831-1848/SO; O/1860-1877/SO;O/1888-1889/PO

1831 - Regency with abdication of D. Pedro I

1840 - Dom Pedro II assumes the throne of Brazil at just 14 years old

1810 -1844 - Portugal -England treaty

1844 - Customs Duty rise to 30%

RESOURCES A/1831-1848/SO;O/1831-1848/MC

1836-1841 - Troops of 50-100 Mules

Growth of the sugarcane industry aligned with population growth

Predomination of small and medium herds.

Lower dependence on slave labor.

Diversity of social relations of production.

Lower dependence on external supplies of manpower. Widespread presence of peasant production, free family labor. Less exploitation on the job. Free work at certain stages of production

1840-Englishman John Rose goes to Brazil and works at "Mineração Morro Velho - Nova Lima"

1830-1838: Coffee becomes the main exportation product of Brazil (RJ, SP, PR, MG);

Decadence of cotton and sugar production.

1848-1874 - Textile company Cana do Reino (Conceição do Serro) - english investment

MATERIAL CULTURE A/1831-1848/RE

Tendency to a technical gap due to the nonexistent competition for price and quality. Propensity to stagnation of techniques. Disincentive to innovation and slow assimilation of technical advances developed externally.

1848-1874 - First company equipped with moderns spinning machines in Minas Gerais (Cana do Reino - Conceição do Serro) (http://www.cataguases.com.br/Pagina.aspx?103)

PROFESSIONS A/1831-1848/SO

Travelers and Naturalists

The craft was the predominant form, the manufacturing exception. Poor division of labor, lack of specialization incipient discipline of the workspace, the tendency of complete dominion of the production process by the worker

Lower profitability for the producer and trader, higher profitability on the movement performed by intermediaries

Distiller, sugar master, cooper, boilermaker, caner

1936-1841 - owner, responsible for horse tacking (arrieiro); conductor (tocador ou almocreve)

PRODUCTS A/1831-1848/SO

Narrations/ Scientific studies and discoveries

1930-1838 - Coffee exports (Decadence of cotton and sugar exports)

Cane industry grows with local market in MG. Blocks of Brown sugar (rapadura) and spirit (cachaça)

The sugar is the cane was the derivative spatially less frequent and of shorter production volume.

Cattle breeding/ Agro-Industry (cassava, maize, castor, dairy)

Plant extraction

Small steel smiths

Textile crafts

Many manual and mechanical crafts

MANAGEMENT A/1807-1812/MA

1810-1844 - England exports treaty (customs duties for their products reduced to 15% - lower even then for Portuguese products)

English investors in textile industry

NOTES

- As noted in the “Relações de Fábricas do Censo “(Relations of Factories Census) of 1831/32 , the economic diversification of agricultural production units derived from sugarcane was the central feature to distinguish the sugarcane agribusiness in Minas Gerais of great production for the external market. The monoculture of sugar cane was an exceptional phenomenon in Minas Gerais . Instead, the sugar mills lived with immense range of economic activities : self-consumption or other commercial crops, livestock in general and other .
(http://www.mao.org.br/fotos/pdf/biblioteca/godoy_01.pdf)

- Only after 1830 , the coffee becomes the main export product of Brazil . Initially produced in Rio de Janeiro , cultivation spread to São Paulo , Paraná and Minas Gerais . At the end of the Regency period (1831-1840) , production intensifies. Between 1837 and 1838, the grain accounted for more than half of the export value . The period is also marked by the decline of the cotton fields and sugar .
http://www.brasil.gov.br/linhadotempo/epocas/1837/cafe-o-rei-da-economia-imperial

- Aim of the “Colégio Pedro II”: formation of a national elite of political cadres and intellectuals for senior management posts, particularly for the public sector.

- 1810 a treaty of alliance and commerce with England, establishing privileges for British products, reducing customs duties to 15%, this rate was even lower than the one applied for Portuguese products entering in Brazil. Consequently our incipient textile industry could not compete with English fabrics. This situation lasted until 1844, when the new tariff system came to foster the evolutionary process of Brazilian industrialization.

- In 1844, the first Brazilian industrial policy was drafted. when the tariffs were increased to an average of 30%, a fact that has sparked protests in several European nations. The measure actually provided a stimulating industrialization. especially for the textile industry, which pioneered this process. However, the process of industrialization did not occur immediately, it was slow and could be considered the period of 1844 to 1913 as the implementation phase of the industry in Brazil.
(http://www.sindimalhas.com.br/estudos_conteudo,14,6.html)

- The first factory in Minas Gerais, equipped with modern machinery for spinning and weaving imported from England, was the Cana do Reino, founded in 1848 [...] In order to stimulate it, the government granted a loan of twenty currency ("contos") in 1851. In 1874, the Cana do Reino Factory was liquidated. The equipment had become idle, they had difficulty in obtaining skilled labor: these were their biggest problems.

- The modern textile industry arises in Minas Gerais in the early 1870s, with the installation of the Fábrica do Cedro at the town of Sete Lagoas.

u. Brasil Império – 1860-1877

SOCIETY A/1731-1823/PO; A/1831-1848/PO

1860- Discovery of Diamond Mines in South Africa

1875: Railways finally suppress the transport mules

(http://www.klepsidra.net/klepsidra4/tropeiros.html0

1876: Founded the "Escola de Minas de Ouro Preto" (12th october)

1877: Inaugurated the Central do Brasil railroad

POLITICS

Diamond prices plummeted (Extracted in total

RESOURCES O/1883/SO

1860: John Rose transfers to Diamantina

1876 -1973: Textile Fabric at Biribiri + Hidroelectric

Lapidation manufactories (ateliers)

Metal Foundry (Bauru)

1870: Fábrica do Cedro (Tabuleiro Grande - Sete Lagoas). Mascarenhas brothers.

PRODUCTS

Fabrics (tissues)

NOTES

-In 1864, Brazil already had a reasonable cotton cultivation, the basic raw material of the textile industry, abundant manpower and a consumer market growing. (http://www.sindimalhas.com.br/estudos_conteudo,14,6.html)

-In 1899, many considered Biribiri the most important point of the district, with plenty of trade and manufacturing development (ESTADO..., 1998). The village also established itself as a venture ahead of its time, of innovative, social and economic character. However, activities of the factory were paralyzed completely in 1973: Biribiri wasn't able to modernize itself to deal with new major industries which appeared on the market.

-John Rose had an indispensable role to the formation of the village: in addition to designing the shed factory, some residences and the chapel of the "Sagrado Coração de Jesus" (Sacred Heart of Jesus), guided assembly of machinery and assisted for its functioning. (BAURU)

v. Brasil Império – 1883

SOCIETY A/1731-1823/PO;A/1860-1875/RE

Comes into operation the first hydroelectric power plant in the country, located in Ribeirao do Inferno, a tributary of Jequitinhonha River in the city of Diamantina (MG).

NOTES

- It all started in the town of Diamantina from Minas Gerais. It was there that in 1883 the first hydroelectric power plant in Brazil, located in Ribeirao do Inferno, a tributary of the River Jequitinhonha went into operation. This first hydroelectric power plant,

generated energy capable of moving water pumps to remove the formations in the diamond mines.

-To understand the importance of such a project in Brazil , it is worth remembering that the French Aristide Berges took first hydraulic power to generate electricity only 16 years before , a relatively short period to an era in which the exchange of information with Europe was taken into another pace . In addition to representing the first Brazilian initiative in the area of power generation , when it was still crawling around the world - Dom Pedro II allowed Thomas Edison to introduce the energy in Brazil four years before - the small Ribeirão do Inferno had another great achievement for the time: had the longest transmission line in the world , with 2 km of length. The plant , now off for years, is in the concession area of the current Companhia Energetica de Minas Gerais - Cemig (until 1984 the company was called “Centrais Elétricas de Minas Gerais” - Power Plants of Minas Gerais), but little remains of its history . (http://www.oempreiteiro.com.br/Publicacoes/11247/Ribeirao_do_Inferno_a_primeira_hidreletrica_do_Brasil_.aspx)

w. Brasil Império – 1888-1889

POLITICS	A/1831-1848/PO

1888-Arrival of Italians and Germans immigrants encouraged by the Brazilian government to work on the coffee plantations replacing slave labor (now released)

1888- Abolition of slavery

1889- Proclamation of the Republic

1889-1891 - Economic Bubble

NOTES

-The Marshal Deodoro da Fonseca proclaimed the Republic on November 15th. Rui Barbosa, Minister of Finance, establishes a new financial regime. The goal was to guarantee more money in circulation to pay the employees (in greater numbers since the end of slavery) and prepare the industrialization of Brazil.

-The government has given more freedom to private banks and facilitated credit. This abundance of credit put a lot of money in the economy. Consequently, inflation rose and the currency depreciated. Moreover, credit growth and the lack of supervision (Central Bank did not exist yet) stimulated the opening of businesses seeking credit and money in the Stock Exchange of Rio de Janeiro. After raising funds, these firms simply closed the door, pocketing all the money.

(http://www.brasil.gov.br/linhadotempo/epocas/1889/nasce-a-republica-e-estoura-a-bolha-economica-do-credito-facil)

ANNEX B
THE iTUNES SYSTEM

For iTunes to be able to became a market leader over powerful competitors such as Napster, Rhapsody, Amazon, it developed a series of conjugated strategies, bringing together interests of customers and partners, as well as a particular business model, having as strengths:

- It was the first legal site that allowed download in a pay-per-song basis;
- There are music from the major record labels and from thousands of independent music labels; that means finding most of the music wanted;
- Instead of buying a hole CD where just a few are of interest, the customer can buy just the selected music for $0,99 each;
- It avoids piracy with the FairPlay system, that allows just 5 computers to play a single downloaded song;
- Only iPods could play the FairPlay protected songs, what increased their iPod sales;
- iTunes almost didn't make any direct impact on Apple's profitability, but it had an indirect impact, by influencing increasing iPod sales, that is actually what makes Apple's profitability.
- Customers can download music directly from the iPhone or iPod (which is more practical, since they can download songs from wherever they are) or download it in the computer.
- Once the iPod/iPhone is connected to the computer, the songs that have been downloaded directly to the iPod will be copied to the computer, and vice versa.
- Besides songs, also films and series can be bought or rent, being more convenient to use iTunes rather than to go to a video rental shop, mainly considering that fees are comparable.

BIBLIOGRAPHY

[AASO, 2008] Associazione Archivio Storico Olivetti Olivetti: Storia di un'Impresa - Filosofia Aziendale. 2008 http://www.storiaolivetti.it/sottotemi.asp?idTema=24 – Consulted in Nov./2013.

[API, 2013] API Torino. Bando di Concorso Premio "Chiave a Stella" 2013. http://www.apito.it/it/download/bando_chiave_a_stella_2013_03052013.pdf - Consulted in October/2013.

[Barile, 2012] Barile, J. Um artista que ninguém esquece. Feb./2012 http://www.revistaencontro.com.br/revista/edicao/128/cultura/um-artista-que-ninguem-esquece.html - Consulted in September/2013

[Bernett, 2013] Bernett, C. Top 10 Crowdfunding Sites for fundraising. Forbes – August/2013 - http://www.forbes.com/sites/chancebarnett/2013/05/08/top-10-crowdfunding-sites-for-fundraising/ - Consulted in September/2013.

[Bistagnino, 2011] Bistagnino, L. Systemic Design: Designing the Productive and Environmental Sustainability, Slow Food Editore srl, 2nd Edition, 2011. p.304

[Bozeman, 2000] Bozeman, B. (2000) *Technology transfer and public policy: a review of research and theory.* School of Public Policy, Georgia Tech, Atlanta. Elsevier.

[Brasil, 2004] Presidência da República (2004). Lei No 10.973, de 2 de Dezembro de 2004. http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.973.htm. Consulted in June/ 2013.

[Brasil, 2010] Portal Brasil *Tecnologia assistiva*. 2010 - http://www.brasil.gov.br/sobre/ciencia-e-tecnologia/desenvolvimento-sustentavel/tecnologia-assistiva - Consulted in January/ 2013.

[Brasil, 2011a] Ministério do Planejamento, Desenvolvimento e Gestão (2011) Governo define 11 desafios para o país até 2015. http://www.brasilmaior.mdic.gov.br/noticia/index/institucional/id/1074. Consulted in June/ 2013.

[Brasil, 2011b] Ministério do Planejamento, Desenvolvimento e Gestão (2011) Plano Mais Brasil http://www.planejamento.gov.br/secretarias/upload/Arquivos/spi/PPA/2012/mensagem_presidencial_ppa.pdf. Consulted in June/ 2013.

[Brasil, 2011c] Governo Federal do Brasil (2011) http://www.brasilmaior.mdic.gov.br/wp-content/uploads/cartilha_brasilmaior.pdf. Consulted in July/ 2013.

[Brasil, 2012] Presidência da República. Lei Nº 12.593, de 18 de Janeiro de 2012. http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12593.htm - Consulted in June/ 2013.

[Brasil, 2013] Ministério do Planejamento, Desenvolvimento e Gestão (2013) *Relatório de Acompanhamento das Medidas Sistêmicas.* http://www.brasilmaior.mdic.gov.br/images/data/201308/ece64f283147b8659e8da12e3da319f7.pdf - Consulted in August/ 2013.

[Brasil, 2013b] Ministério do Planejamento, Desenvolvimento e Gestão – *Startup Brasil – What is it?* 2013 - http://startupbrasil.mcti.gov.br/en/the-program/what-is-it/ - Consulted in August/2013.

[Camcom2013] Camera di commercio di Torino - V Edizione Premio Chiava a Stella – Bando 2013. http://www.to.camcom.it/Page/t08/view_html?idp=15593. 2013 - Consulted in November/2013

[Canada, 2012] Industry Canada The Financing Context for Venture Capital – 2012 - http://www.ic.gc.ca/eic/site/061.nsf/eng/01168.html - Consulted in September/ 2013.

[Caplavur, 2011] Caplavur. Le attività - http://www.caplavur.com/ - Consulted in September /2013

[Capra, 1996] Capra, F. The web of life: a new scientific understanding of living systems. 1996 New York: Anchor Books. p. 30)

[Capra, 2008] Capra, Fritjoj *La Scienza della Vita Le connessioni nascoste fra la natura e gli esseri viventi. P. 70-71* BUR Scienza, 3ª edizione, 2008

[CBA] MIT's Center for Bits and Atoms. About. Available in http://cba.mit.edu/about/index.html - Consulted in October/ 2011

[CC2013] Creative Commons. About. http://creativecommons.org/about - Consulted in October/ 2013.

[Cicero, 2011] Cicero, S. Talking Open P2P Design, FabLabs and Makers with Massimo Menichinelli. Available in http://meedabyte.wordpress.com/2011/04/05/talking-open-p2p-design-fablabs-and-makers-with-massimo-menichinelli/ - April 5, 2011. Consulted in October/ 2011.

[CNI, 2005] CNI *Mapa Estratégico da Indústria 2007-2015.* 2005 – Brasilia - http://arquivos.portaldaindustria.com.br/app/conteudo_18/2012/04/12/198/20120731180801816265a.pdf - Consulted in November/ 2013.

[CNI, 2008] CNI *SIBR - Sistema Integrado de Bolsa de Resíduos.* http://www.sibr.com.br/sibr/portal.jsp?id=9&pagina=uso.jsp - Consulted in August/ 2013.

[CNPq, 2013] CNPq Chamada MCTI/SEPIN/CNPq N º 11/2013 Programa Start-up Brasil - http://startupbrasil.mcti.gov.br/wp-content/uploads/2013/02/Chamada-MCTI_SEPIN_CNPq-11-2013-Start-up-Brasil.pdf - Consulted in September/2013.

[Comitato, 2011] Comitato Italia 150. Future Station. The remaking of Italy. http://eng.italia150.it/Officine-Grandi-Riparazioni/Future-Station.-The-remaking-of-Italy- Consulted in October/ 2011.

[Condè, 2011] Condé Nast Digital. Imagine, Make It Real in Fab Lab. Available in http://www.wired.com/science/discoveries/news/2005/11/69495 - June, 11 2005. Consulted in October/ 2011.

[Cooper, 2010] Cooper, D. Saral, K. Entrepreneurship and Team Participation: An Experimental Study. Munich Personal RePEc Archive- 2010 - http://mpra.ub.uni-muenchen.de/25144/ - Consulted in August/2013.

[Creative, 2012] Creative Times. Design Initiative Closure - http://www.creativetimes.co.uk/news/design-initiative-closure - Consulted in May/ 2012

[Cross, 2007] Cross, N. Designerly Ways of Knowing. Germany: Birkhauser Verlag AG, 2007. 138p

[CTIT, 2013] CTIT *Oportunidade na CTIT*. 2013 - http://www.ctit.ufmg.br/2011/index.php?option=com_content&view=article&id=478%3Aoportunidade-na-ctit&catid=19%3Anotas&Itemid=1&lang=pt – Consulted in August/ 2013.

[Dannoritzer, 2010] Dannoritzer, C. (2010) Planned Obsolescence Documentary - http://archive.org/details/PlannedObsolescenceDocumentary - Consulted in September/ 2013.

[DGang, 2008] Design Gang Network/ Curator *Canavese Connexion – Design Industria Innovazione.* Torino, Umberto Allemandi &C; 2008

[Digital Media, 2011] Digital Media Workshop. Fablab: new opportunities for animation, 3d graphic, and cinema. http://digital-media.top-ix.org/en/fablab-le-nuove-opportunita-per-lanimazione-il-3d-e-il-cinema/. October, 2011. Consulted in October/ 2011.

[Dosi, 2000] Dosi, G. (2000). *Technological paradigms and tecnological trajectories*. In G. Dosi (Ed.) *Innovation, Organization and Economic Dynamics: Selected Essays*, (p.47-62). Chelterham, UK: Edward Elgar Publishing Limited.

[EcoDesign, 2013] EcoDesign Group. Cos'è il Design per Noi. http://areeweb.polito.it/didattica/design/download/presentazione_finale.pdf.

[Engler, 2010] ENGLER, R. (Org.). *Design Participativo - Uma Experiência no Vale do Jequitinhonha*. Barbacena: EdUEMG, 2010. (also available at http://www.slideshare.net/narf2916/design-participativo-by-ana-luiza-freitas-lia-krucken-rachel-montenegro-rita-engler).

[Entrepreneur, 2010] *Getting Started With Business Incubators* - Entrepreneur - 2010 - http://www.entrepreneur.com/article/52802#ixzz2o9P3MhQa – Consulted in November/ 2013

[Esposti, 2012] Esposti, C. *Crowdsourcing and Crowdfunding Explained*. 2012 - http://www.youtube.com/watch?v=-38uPkyH9vI - Consulted in October/ 2013.

[Etzkowitz, 2003] Etzkowitz, H. Innovation in Innovation: The Triple Helix of University-Industry-Government Relations. Social Science Information, September/ 2003 42: 293-337. http://ssi.sagepub.com/content/42/3/293. Consulted in June/ 2013.

[European Commission, 2009] Economic and Financial Affairs Economic Crisis in Europe: Causes, Consequences and Responses. 2009 - http://ec.europa.eu/economy_finance/publications/publication15887_en.pdf- Consulted in August/ 2013

[European Commission, 2013] European Commission – Europe 2020. Priorities. http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/index_en.htm - Consulted in August/ 2013

[Eurostat, 2012] Eurostat. Patent Statistics. http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Patent_statistics - Consulted in October/ 2013.

[Fab, 2011] Fab Foundation. Fablabs. 2011 - http://fabfoundation.org/index.php?option=com_content&view=article&id=46&Itemid=61 - Consulted in October/ 2011.

[Fablab Italia, 2011] FabLab Italia Che cos'è una makerbot. 2011 - http://www.fablabitalia.it/fab_lab_pro/che-cose-una-makerbot#.Tqf4aJuMOEI - Consulted in February/ 2012

[Fablab Italia, 2011b] FabLab Italia Ulltimaker. 2011 - http://www.fablabitalia.it/fab_4_fun/ultimaker#.TqgVwpuMOEI - Consulted in February/ 2012.

[FabLab Torino, 2014] Fablab Torino. Statuto. 2014 - http://fablabtorino.org/statuto/#heading=h.fksoaydq327m - Consulted in January/ 2014.

[FabLab, 2012] FabLab Fab *Lab List: Operating Planned.* 2012 - http://fab.cba.mit.edu/about/labs/ - Consulted in July, 2012.

[Fausto, 2012] Fausto, B. História Concisa do Brasil. Editora da Universidade de São Paulo. 2ª ed. 2012.

[FIEMG et al, 2010] *Perfil da Indústria Calçadista de Nova Serrana 2009* (2010) – Belo Horizonte: FIEMG / IEL Minas / SINDINOVA.

[FIEMG, 2011] FIEMG O que é a FIEMG? http://www5.fiemg.com.br/Default.aspx?tabid=13596 - Consulted in ago./2013.

[FIEMG, 2011a] FIEMG, 2011. *AMITEC – Programa de Apoio à melhoria e Inovação.* http://extrema.fiemg.com.br/retec/sgi_noticias.nsf/(unid)/4D0DAD4C3E81DFCA83257905006C20BD?opendocument. Consulted in June/ 2013.

[FIEMG, 2011b] FIEMG, 2011. *AMITEC – O Desenvolvimento da Indústria de Minas Passa pela Inovação.* http://extrema.fiemg.com.br/retec/sgi_web.nsf/amitec?OpenPage. Consulted in June/ 2013.

[FIEMG, 2011c] FIEMG Produtos e Serviços http://www5.fiemg.com.br/Default.aspx?tabid=13509 - Consulted in August/ 2013.

[Figueiredo and Serio, 2007] FIGUEIREDO; J. C.; DI SERIO, L. C. Estratégia em clusters empresariais: conceitos e impacto na competitividade. In: DI SERIO, Luiz Carlos (org.). Clusters empresariais no Brasil: casos selecionados. São Paulo: Saraiva, 2007. Cap.1

[FINEP, 2013a] FINEP (2013). *A Empresa.* http://www.finep.gov.br/pagina.asp?pag=institucional_empresa - Consulted in June/ 2013.

[FINEP, 2013b] FINEP (2013). *Política Operacional 2013-2014.* http://download.finep.gov.br/politicaOperacional/PoliticaOperacional_Completo_Jun2013.pdf - Consulted in June/ 2013.

[FINEP, 2013c] FINEP *Chamadas Públicas Encerradas / Resultados.* 2013 http://www.finep.gov.br/editais/encerrados.asp?codigoFonte=17 – Consulted in August/2013.

[FINEP, 2013d] FINEP *Chamadas Públicas Vigentes.* 2013 – Consulted in August/2013.

[Finkelstein, 2009] Finkelstein, E. *Obesity Costs U.S. About $147 Billion Annually, Study Finds*. RTI International – 2009 http://www.rti.org/newsroom/news.cfm?obj=329246AF-5056-B172-B829FC032B70D8DE – Consulted in December/2013

[Fit, 2011] Fablab Italia. Registrazione - OpenLab - realizza quello che vuoi tu! Available in http://www.fablabitalia.it/registrazione?regevent_action=register&event_id=49&name_of_event=OpenLab-realizzaquellochevuoitu!. 2011 - Consulted in October, 2011.

[Fit, 2011b] Fablab Italia. FabCamp Torino. Available in http://www.fablabitalia.it/fablabitalia/fabcamp-torino#.Tp8kNptFusp. 2011. - Consulted in October, 2011.

[Fraga, 2008] Fraga, R. Catálogo NS Conceito – A China de Ronaldo Fraga – FIEMG-Sindinova - 2008

[Galvis, 2013] Galvis-Lista, E. Sánchez-Torres, M. A critical review of knowledge management in software process reference models - JISTEM - Journal of Information Systems and Technology Management -On-line version vol.10 no.2 São Paulo May/Aug. 2013 Epub May 2013 –

http://www.scielo.br/scielo.php?pid=S1807-17752013000200323&script=sci_arttext - Consulted in September/ 2013

[Garrido, 2007] Garrido de la Grana A. *Geographical Indications and Trademarks: Combined Efforts for a Stronger Product Identity – the Experience of Cuban Cigar Trademarks and Geographical Indications*. International Symposium on Geographical Indications – Beijing, June 26 to 28, 2007.

[Germak et al, 2011] Germak, C. et al. Design as a resource for valuing territorial assets and local cultures: An experimental model applied to Estrada Real, Brazil, Strategic Design Research Journal, Unisinos 4(2): 69-76 May-August 2011.

[Germak et al. 2013] Germak, C. et al., Design used as a resource in the increase in value of goods and cultures: project design and competitive integration in the Estrada Real territory, Brazil (Phase II), Strategic Design Research Journal, 6(1): 29-38 Unisinos - January-April 2013

[Giramundo, 2011] Giramundo 2011 - http://www.teatrodebonecos.org/2011/ – Consulted in September/ 2013.

[Greenews, 2013] Greenews.info ReBioFoam: Novamont sviluppa nuovi imballaggi in bioplastica per gli elettrodomestici - http://www.greenews.info/comunicati-stampa/rebiofoam-novamont-sviluppa-nuovi-imballaggi-in-bioplastica-per-gli-elettrodomestici-20130131/ - Consulted in August/ 2013.

[Gubitosa, 2007] Gubitosa, C. Hacker, Scienziati e Pionieri - Stampa Alternativa/Nuovi Equilibri – 2007

[Halen et al, 2005] Halen, C., Vezzoli, C., Wimmer, R. Methodology for Product Service Innovation - http://books.google.it/books?hl=en&lr=&id=EtUBsq-CfmIC&oi=fnd&pg=PA3&dq=carlo+vezzoli&ots=XRA_zX_l1c&sig=rj1aUuFFo8N7FoWLuSRSxvt-tU0&redir_esc=y#v=onepage&q=carlo%20vezzoli&f=false Royal Van Gorcun - The Netherlands, 2005. - Consulted in August/ 2013.

[Howkins, 2014] Howkins, J. The Creative Economy – The Basics – 2014 - http://www.creativeeconomy.com/thebasics.htm - Consulted in January/ 2014

[I3P, 2013] I3P. I3P, Incubatore di Imprese Innovative del Politecnico di Torino - http://www.i3p.it/ - Consulted in January/ 2013.

[IBGE, 2013] IBGE, 2013. *Minas Gerais/ Nova Serrana/ Infográficos.* http://www.ibge.gov.br/cidadesat/painel/painel.php?codmun=314520#. Consulted in June/ 2013.

[IER, 2013] Instituto Estrada Real Principais Elementos da Estrada Real. 2013 - https://www.google.com.br/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCgQFjAA&url=http%3A%2F%2Fwww.institutoestradareal.com.br%2Fdownload.php%3Fcod%3D51&ei=Ad2_UomkCoO_ygOFm4KYAQ&usg=AFQjCNHIzsm14lxijqf57EKGEKSoezh4ig&bvm=bv.58187178,d.bGQ – Consulted in November/ 2013.

[IER, 2013b] Instituto Estrada Real *Equipe do Instituto Estrada Real*. 2013 - http://www.institutoestradareal.com.br/institucional/quem-somos - Consulted in December/2013.

[INPI, 2013] INPI (2013) Depósito de pedido nacional de Patente - PI 0800552-4 A2. https://gru.inpi.gov.br/pPI/jsp/patentes/PatenteSearchBasico.jsp. Consulted in July/ 2013.

[INPI, 2013b] *Artesanato em foco nos registros de Indicações Geográficas* – CGCOM 26 dicembre 2013 – Available in http://www.inpi.gov.br/portal/artigo/artesanato_em_foco_nos_registros_de_indicacoes_geograficas - Consulted in November/ 2013

[Investopedia, 2013] Investopedia *Alternative Investments - The Stages in Venture Capital Investing.* 2013 – http://www.investopedia.com/exam-guide/cfa-level-1/alternative-investments/venture-capital-investing-stages.asp. Consulted in September/ 2013

[Investopedia, 2013b] Investopedia *Theory of the Firm*. 2013 – http://www.investopedia.com/terms/t/theory-firm.asp - Consulted in September/ 2013

[Kalish, 2011] Kalish, J. Ultimaker: There's a New 3D Printer in Town. Available in http://blog.makezine.com/archive/2011/08/ultimaker-theres-a-new-3d-printer-in-town.html. August 1st, 2011. Consulted in October/ 2011.

[La Republica, 2013] "L'Italia, business del futuro"Ecco la ricetta di mister Eataly. La Republica - 12 novembre 2013. http://torino.repubblica.it/cronaca/2013/11/12/news/l_italia_business_del_futuro_ecco_la_ricetta_di_mister_eataly-70782482/ - Consulted in November/ 2013

[Leite, 1953] Leite, S. *Artes e ofícios dos jesuítas no Brasil (1549-1760).* Lisboa: Edições Brotéria; Rio de Janeiro: Livros de Portugal, 1953. 324 p. – cited by *Artes liberais e ofícios mecânicos nos colégios jesuíticos do Brasil colonial* -Revista Brasileira de Educação - vol.17 no.51 Rio de Janeiro Sept./Dec. 2012 http://www.scielo.br/scielo.php?pid=S1413-24782012000300012&script=sci_arttext

[Levick, 2013] Levick, R. Spotlight on Outsourcing: Boeing Scrambles as Toyota Triumphs - Richard Levick – Forbes. January/ 2013 - http://www.forbes.com/sites/richardlevick/2013/01/30/spotlight-on-outsourcing-boeing-scrambles-as-toyota-triumphs/ - Consulted in November/ 2013.

[Lima et al., 2006] Lima R.A., Shirota, R. Barros, G. S. *Estudo do Complexo do Agronegócio Cavalo*. CEPEA/ESALQ/USP 2006 - http://www.cepea.esalq.usp.br/pdf/cavalo_completo.pdf - Consulted in October/2013.

[Lima, 2014] Lima, M. *Economia Criativa e o Turismo de Negócios.* FECOMÉRCIO Informativo – Ed. 389 p. 11 – Jan./ Feb. 2014

[Local Motors, 2013] Local Motors *Local Motors was Founded*. 2013 - https://forge.localmotors.com/static.php?p=history – Consulted in February/ 2013.

[Local Motors, 2013b] Local Motors A World of Vehicle Innovations. 2013 - https://localmotors.com/about/ - Consulted in February/ 2013.

[Local Motors, 2013c] Local Motors *The Cruiser. A Stylish Motorized Bicycle.* 2013 - https://localmotors.crowdhoster.com/the-cruiser-a-stylish-motorized-bicycle - Consulted in December/ 2013.

[Local Motors, 2013d] Local Motors *Local Motors Launches Crowdfunding Campaign for Electric and Gas-Powered Bicycles.* 2013 https://localmotors.com/blog/post/local-motors-launches-crowdfunding-campaign-for-electric-and-gas-powered-bicycles/940/ - Consulted in December/ 2013.

[Longo, 1996] LONGO, W.P. *Conceitos Básicos sobre Ciência e Tecnologia*. Rio de Janeiro, FINEP, 1996. v.1. – Cited by FINEP *Glossário* http://www.finep.gov.br/o_que_e_a_finep/conceitos_ct.asp - Consulted in August/ 2013

[Machado, 2013] Machado, O. Turismo Real. Fato Industrial – nº 135 – Sistema FIEMG –July, 2013 http://www.sistemafiemg.com.br/fatoindustrial/index.php/noticias/ler/1913/135 - Consulted in September/ 2013

[Maciel, 2013] Maciel, A. et al - "Minas Gerais retrata o Índice de Desenvolvimento Humano brasileiro" - http://www.em.com.br/app/noticia/politica/2013/07/30/interna_politica,429106/minas-gerais-retrata-o-indice-de-desenvolvimento-humano-brasileiro.shtml. Jornal Estado de Minas, 30/07/2013 – Consulted in October/ 2013

[Maggia, 2001] Maggia, G. *Speciale Olivetti*, La Sentinella del Canavese, Roma. http://quotidianiespresso.repubblica.it/sentinella/nonquotidiano/speciale/olivetti/io201.htm. Consulted in October/ 2012

[Mairineri, 2013] Mairineri, M. *Collaboriamo - Come i social media ci aiutano a lavorare e a vivere bene in tempo di crisi.* Ulrico Hoepli Editore S.p.A Milano, 2013. 214p

[Makerbot, 2010] Makerbot Industries. Upcycling is the new Recycling. Available in http://www.makerbot.com/blog/tag/fab-lab/. November, 2010. Consulted in October/ 2011.

[Mariuzzo, 2006] Mariuzzo, P. *Project to transform the Royal Road tourist route*. Ciência e Cultura - vol.58 no.4 São Paulo - Oct./Dec. 2006. http://cienciaecultura.bvs.br/scielo.php?pid=S0009-67252006000400008&script=sci_arttext – Consulted in August/ 2013

[Marzotto, 2013] Premio Marzotto. Premio Gaetano Marzotto - http://www.premiogaetanomarzotto.it/?p=140, 2013 – Consulted in November/ 2013

[McKinsey, 1999] McKinsey & Company. Development of action programs for the "Cluster" Biotechnology in Belo Horizonte Minas Project grows. Belo Horizonte, FIEMG / CIEMG / SESI / SENAI / IEL 1999. 163p.

[Mendonca, 2012] Mendonça, R. (2012) Canavese Connexion – Interview Notes.

[Mercado,2013] FIEMG: 80 anos impulsionando o desenvolvimento de Minas Gerais. - Mercado Comum Especial http://www.mercadocomum.com/site/artigo/detalhar/fiemg:_80_anos_impulsionando_o_desenvolvimento_de_minas_gerais. Consulted in October/ 2013

[Merelli, 2012] Merelli, S. *Case study: Olivetti, un modello imprenditoriale fuori dagli schemi*. Webfandom, july 2012 http://www.webfandom.com/prodotti-industriali/case-study-olivetti-modello-imprenditoriale-fuori-dagli-schemi/ . Consulted in August/ 2012.

[Michael et al., 2003] Michael D. Ensleya,M. Pearsonb, A. Pearcec, C.L. *Top management team process, shared leadership, and new venture performance: a theoretical model and research agenda Human Resource Management* Review 13 p. 329-346 - http://faculty.utep.edu/Portals/167/19%20Top%20management%20team%20process.pdf – Consulted in August/2013

[Miller, 1956] Miller, G.A. *The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information*. The Psychological Review, 1956, vol. 63, pp. 81-97 – Available at http://www.musanim.com/miller1956/ - Consulted in February/ 2013

[Minas, 2007a] Governo do Estado de Minas Gerais (2007). *Geraes: Gestão Estratégica de Recursos e Ações do Estado.* http://www.geraes.mg.gov.br/. Consulted in July/ 2013.

[Minas, 2007b] Governo do Estado de Minas Gerais (2007). *Geraes: Gestão Estratégica de Recursos e Ações do Estado – Projetos Estruturadores.* http://www.geraes.mg.gov.br/projetos-estruturadores. Consulted in July/ 2013.

[Minas, 2007c] Governo do Estado de Minas Gerais (2007). *Geraes: Gestão Estratégica de Recursos e Ações do Estado – Inovação, Tecnologia e Qualidade.* http://www.geraes.mg.gov.br/projetos-estruturadores/inovacao-tecnologia-e-qualidade. Consulted in July/ 2013.

[Minas, 2007d] Governo do Estado de Minas Gerais (2007). Rede de Inovação Tecnológica. http://www.geraes.mg.gov.br/projetos-estruturadores/inovacao-tecnologia-e-qualidade/rede-de-inovacao-tecnologica. Consulted in July/ 2013.

[Minas, 2013] Exporta Minas - Secretaria de Estado de Desenvolvimento Econômico (2013). *Exportações de calçados do país estão estabilizadas*. http://www.exportaminas.mg.gov.br/2010/noticias/?area=15&id=4975. Consulted in July/2013.

[Moraes, 2011] Moraes, D. *Metaprojeto como Modelo Projetual* in Cadernos de Estudos Avançados em Design. Organization: Dijon de Moraes, Regina Álvares Dias e Rosemary Bom Conselho. Editora da Universidade do Estado de Minas Gerais, 2011

[Moreschini, 2010] Moreschini, R. *Walking from Canterbury to Aosta*. 2010. http://www.pilgrimstorome.org.uk/Walking%20from%20Canterbury%20to%20Aosta.pdf - Consulted in December/2013.

[NAIC, 2013] National Association of Insurance Commissioners Corporate Governance. 2013 - http://www.naic.org/documents/frs_financial_summit_presentations_16_corp_gov.pdf - Consulted in March/2013.

[Nayab, 2013] Nayab, N. Using the Cycle of PDCA For Quality Management. edited by: Elizabeth Wistrom - http://www.brighthubpm.com/methods-

strategies/75326-pdca-for-quality-management/ updated: 7/19/2013. Consulted in September/ 2013

[Norman, 2005] Norman, D. Human-Centered Design Considered Harmful. Available in http://www.jnd.org/dn.mss/human-centered.html. August, 2005. Consulted in October/ 2011.

[Norman, 2010] Norman, D. Design-driven innovation: changing the rules of competition by radically innovating what things mean. http://www.jnd.org/dn.mss/design-driven_innovation_changing_the_rules_of_competition_by_radically_innovating_what_things_mean.html 2010. Consulted in October/ 2011.

[Norman,2009] Norman, D. Systems Thinking: A Product Is More Than the Product http://www.jnd.org/dn.mss/systems_thinking_a_.html - Consulted in August/ 2013

[Oliveira, 2012] Oliveira, M. R. A., *Transferência de Tecnologia da UFMG para uma Empresa Privada, Processo e Resultado: Um Estudo de Caso.* Pedro Leopoldo, Fundação Pedro Leopoldo, 2012.

[Oliveira, 2013] Oliveira, P.M. Turismo, Cultura e Ambiente: L'Approccio Sistemico del Design – Fattori umani, sociale e strategici nella Estrada Real – Minas Gerais, Brasile – Politecnico di Torino – July/ 2013.

[Osterwalder, 2004] Osterwalder, A. The Business Model Ontology – A proposition in a Design Science Approach. PhD Thesis. École des Hautes Etudes Commerciales de l'Université de Lausanne, 2004.

[Osterwalder, 2013] Osterwalder, A. *A Better Way to Think About Your Business Model*. Harvard Business Review – May, 2013 http://blogs.hbr.org/2013/05/a-better-way-to-think-about-yo/ - Consulted in September/2013

[P2P, 2010] The Foundation for P2P Alternatives. Business Models of Fab Labs. Available in http://p2pfoundation.net/Business_Models_of_Fab_Labs. Last modified on 9 October 2010 - Consulted in October/ 2011.

[PMI, 2013] PMI - Project Management Book of Knowledge - http://www.pmi.org/PMBOK-Guide-and-Standards.aspx. Consulted in September/ 2013.

[Polito, 2012] Bando di Alta Formazione - http://dottorato.polito.it/BAF.html - Consulted in August/ 2012

[Rafele, 2011] Rafele, C. Complessità nei Sistemi Organizzati. Lesson Notes, 2011 Torino, Politecnico di Torino.

[Rebouças, 2013] Rebouças, F. Desenvolvimento Social. InfoEscola 2013 - http://www.infoescola.com/sociedade/desenvolvimento-social/ - Consulted in September/2013

[Rudà, 2013] Rudà, B., Schiopetti, M. "Glossario del Pensiero Sistemico" – Master Thesis – Politecnico di Torino - Relatori: L. Bistagnino; P.P. Peruccio, 2013.

[Sampaio, 2011] Sampaio, S.A. Implementação da Produção mais Limpa Apoiada pela Metodologia 5S. Uma Proposta Metodológica - http://www.techoje.com.br/site/techoje/categoria/detalhe_artigo/1155. IETEC, 2011 - Consulted in September/ 2013

[Schilling, 2009] Schilling, Melissa. Gestione dell'innovazione. Seconda Edizione. Italy: Mc-Graw Hill; 2009

[Scrum, 2013] Scrum Alliance *Core Scrum – Values and roles*. 2013 http://www.scrumalliance.org/pages/scrum_roles. Consulted in August/2013.

[SENAI, 2011] SENAI-FIERGS O que é a Produção Mais Limpa – 2011 http://wwwapp.sistemafiergs.org.br/portal/page/portal/sfiergs_senai_uos/senairs_uo697/O%20que%20%E9%20Produ%E7%E3o%20mais%20Limpa.pdf. Consulted in September/ 2013

[SENAI, 2013] SNAI (2013) *O que é o Senai.* http://www.portaldaindustria.com.br/senai/institucional/2012/03/1,1773/o-que-e-o-senai.html. Consulted in July/ 2013

[SESI,2012] SESI/FIEMG Programa VER – Vivendo a Estrada Real http://www.vivendoaestradareal.com.br/, 2012 – Consulted in August/ 2013

[SIMI, 2013] SIMI – Sistema Mineira de Inovação (2013). http://www.simi.org.br/. Consulted in July/ 2013.

[SJDR, 2011] Braga, F. Projeto Caminho Religioso da Estrada Real -CRER: de Padroeira a Padroeira. Blog de São João del Rei - http://saojoaodel-rei.blogspot.it/2011/07/projeto-caminho-religioso-da-estrada.html, 2011 - Consulted in August/ 2013

[Softex, 2012] Softex. MPS.BR - Melhoria de Processo do Software Brasileiro - Guia Geral MPS de Software Dezembro de 2012- http://www.softex.br/wp-content/uploads/2013/07/MPS.BR_Guia_Geral_Software_2012.pdf), Consulted in September/ 2013.

[Sutherland, 2003] Sutherland J. SCRUM: *Keep Team Size Under 7!* – February, 2003 - http://scrum.jeffsutherland.com/2003/02/scrum-keep-team-size-under-7.html - Consulted in August/ 2013.

[Techfaster, 2013] Techfaster. Startup Financing Cycle. 2013 - http://www.techfaster.com/?s=venture+capital - Consulted in September/ 2013

[TorinoLab, 2012] Torino Lab http://www.torinolab.it/ - Consulted in September/ 2013

[Treatabit, 2012] Treatabit. L'hackathon della condivisione http://www.treatabit.com/article/l-hackathon-della-condivisione. Consulted in January/ 2013

[Treatabit, 2013] Startup Weekend Torino. http://www.treatabit.com/article/startup-weekend-torino-2013-1. Consulted in August/ 2013

[Troxler, 2010] Troxler, P. Commons-based Peer-Production of Physical Goods- Is there Room for a Hybrid Innovation Ecology? Available in http://wikis.fu-berlin.de/download/attachments/59080767/Troxler-Paper.pdf. October, 2010. Consulted in October/ 2011.

[UFMG, 2011] UFMG. *UFMG em Números.* 2011 - https://www.ufmg.br/conheca/nu_index.shtml - Consulted in July/ 2013.

[Uncrate, 2013] Uncrate Rally Fighter. http://uncrate.com/stuff/rally-fighter/ 2013 – Consulted in February/ 2013

[UNESCO, 2013] United Nations/UNDP/UNESCO Creative Economy Report – Widening Local Development Pathways 2013 - http://www.unesco.org/new/en/culture/themes/creativity/creative-economy-report-2013-special-edition/ - Consulted in January/ 2013

[United Nations, 2006] United Nations (2006). http://www.un.org/millenniumgoals/. Consulted in July/2013.

[Verganti, 2009] Verganti, R. (2009), Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean. Harward Business School Publishing Corporation – USA

[Verganti, 2009b] Verganti, R. (2009), Design Driven Innovation http://www.designdriveninnovation.com/ - Consulted in September/2013

[Verganti, 2012] Verganti, R. (2012) *Design, meanings and radical innovation: A meta-model and a research agenda.* Università degli Studi di Roma "Tor Vergata". http://www.uniroma2.it/didattica/direzioneestrategie/deposito/Verganti.pdf - Consulted in September/ 2013.

[Webcredible, 2006] Webcredible. User-centered design (UCD) - 6 methods. Available in http://www.webcredible.co.uk/user-friendly-resources/web-usability/user-centered-design.shtml. May 2006 - Consulted in October/ 2011.

[Wijnia, 2010] Wijnia, E. A story on open innovation and FabLab. Available in http://elmine.wijnia.com/weblog/2010/02/a-story-on-open-innovation-and-fablab/. February, 2010 - Consulted in October, 2011.

[Wikipedia, 2011a] Wikipedia. Open Innovation. Available in http://en.wikipedia.org/wiki/Open_innovation. Last modified on 25 September 2011 - Consulted in October 2011.

[Wikipedia, 2011b] Wikipedia. Crowdsourcing. Available in http://en.wikipedia.org/wiki/Crowdsourcing. Last modified on 27 October 2011 - Consulted in October 2011.

[Wikipedia, 2011c] Wikipedia. FabLab. Available in http://en.wikipedia.org/wiki/Fab_lab. Last modified on 1 September 2011 - Consulted in October 2011.

[Wikipedia, 2013] Wikipedia. *List of crowdsourcing projects.* Last updated on 6 December 2013 - http://en.wikipedia.org/wiki/List_of_crowdsourcing_projects - Consulted in December/2013.

[Wikipedia, 2013b] Wikipedia *Theory of the Firm*. Last modified on 18 December 2013 - http://en.wikipedia.org/wiki/Theory_of_the_firm - Consulted in September/2013

[Wikipedia, 2013c] Wikipedia Dunbar's number. Last modified on 13 December 2013 http://en.wikipedia.org/wiki/Dunbar's_number. - Consulted in January/2013

[Wikipedia, 2013d] Wikipedia *Business Model Canvas*. Edited in October/ 2013 http://en.wikipedia.org/wiki/Business_Model_Canvas - Consulted in October/2013.

[Wikipedia, 2013e] Wikipedia *Via Francigena.* Edited in December/ 2013 - http://en.wikipedia.org/wiki/Via_Francigena - Consulted in December/ 2013.

[WIPO 2013] WIPO. What is Intellectual Property? http://www.wipo.int/about-ip/en/index.html- Consulted in Octobber/ 2013

[Zajac, 2013] Zajac, E.J., Beré, J.F. Collaborative Strategy, Structure and Behaviour (lessons notes) – Kellog School of Management - 2013

DOTTORATO in
SISTEMI DI PRODUZIONE e DESIGN INDUSTRIALE
XXVI ciclo a.a. 2011 - 2013
tutor: prof. arch. Luigi BISTAGNINO

SYSTEMIC NETWORK INNOVATION

and Its Application in the Brazilian Context of the “Estrada Real”

candidata:
Rosângela Míriam LEMOS OLIVEIRA MENDONÇA
mat. 178866