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Communication

Systems Thinking, a different approach for designing our world

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Abstract: This paper intention is only to show the experiments to incorporate systems theory and complexity science into the industrial design process, all work was done by students of 8th semester in the design workshop lecture held by the author. Industrial design has strongly participated in the ever-accelerating task of product consumption ruled by our economic structure. Given our finite resource input and current rate of consumption it turn out evident now that we can't keep on doing business as usual. The work here presented is an attempt of thinking differently in how to design our world.

Keywords: design, complexity, sustainability, strategies, services, system thinking.

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1. Introduction

For the past 60 years or more, industrial design's true main goal has being helping increase the sales, "make the economy grow". The ideals of beauty and functionality, the improvement of life quality and other high propose statements have being set aside to pursue an evermore accelerated rate of sales; planned and perceived obsolescence are the key in gross market products [1], we have coupled our concept of progress to the sale of physical objects [2]. These last together with the exponential population growth and the greed for infinitely increasing

profits has taken mankind to one of its most dangerous periods in history, for the first time our species is under threat by our own activity and it's impact in our context [3].

Almost all man creations since the industrial revolution, in the gross market products range, have being thought linearly; phrases like "one size fits all" and "cradle to grave" perfectly represent the reductionist thought of 20th century production and service activities. It's until relatively recently that concerns for sustainability and the clear impact of human activity on ecosystems has taken further steps into widely applying complexity principles [4] into diverse kind of problem solving methodologies and therefore taking a systems thinking point of view [5].

This paper intends only to show our experiences in complexity approach in teaching industrial design. In the last four years we have experimented on changing the focus from the classic problem solving method in an Industrial Design workshop into a systemic solution point of view incorporating the complexity behaviour of our everyday living.

2. Teaching process

The eighth semester design studio of our Industrial Design program aims to formulate a complex problem or situation that includes social, economical, and environmental issues. The first step is oriented in increasing the sensitivity on the students towards the idea that all man creations are susceptible of errors and thus to change or improvement; we encourage our students to question deeply almost everything surrounding them, teaching them to be objective and support with evidence their statements. In this first step the activities are viewing films and documentaries and class discussions and debates.

Documentaries and films normally used:

Home (2009) Yann Arthus-Bertrand
Ilha das Flores (1990) Jorge Furtado
Story of stuff (2008) Anne Leonard
Comprar, tirar, comprar (2010) Cosima Dannoritzer
Nineteen Eighty Four (1984) Michael Radford
Zeitgeist (2007) Peter Joseph

Facing a design problem the usual student response is to think only in object terms, as they have been told during their studies, to create new goods in order to keep the consumer society working and growing. Through these debates and videos, social, economical, and environmental sustainability, ecological footprint and life cycle of products are analysed; considering at large human consumption and nature depletion helps the student to see beyond the object and start questioning the deepest roots of our consumer system and what economic growth in nowadays terms really means.

The second step is introducing systems theory principles and ecosystems, natural capital, etc. Bertalanffy, Meadows, Capra, Lovins, Mcdonough and Braungart are some of the authors that students read. These readings have the intention to make them understand natural cycles and the basics of non-linear dynamics, thermodynamics, behaviour, etc. It is at this point that discussions surpass the realm of objects and products. Concepts like services and systems start to emerge as the next target for designers. The object is thus considered as only a small part of a complex network of people, economics, politics, markets, function, semiotics, production processes, natural capital, etc.

The third step is to freely select a problem in their surroundings, not necessarily a classical industrial design problem, something that for the student have meaning. We go through a phase of graphically map the system in order to set boundaries and identify stakeholders and their relations/exchanges.

Once identified the stakeholders we put on use some ethnographic [6] tools and we teach the students the complementarity principle to make them clear the importance of understanding as best as possible the point of view about the system, and the needs and desires of each stakeholder. In this moment the designer becomes a synthesizer of information.

Is at this moment that we use the classic design methodologies (mind maps, scenarios, storyboards, etc.) in order to design possible solutions; we encourage students to think to their proposals as hypothesis that must be experimented and confirmed, the “leverage points” of Meadows are the main instrument to find proposals. Once the solution or set of solutions is clear, students are asked to design an experiment to test their hypothesis. Normally this means using again the ethnographic tools or in some cases building up prototypes, simulators or video-prototypes in order to test directly with the stakeholders.

The outcome of this approach has been projects of high sustainable value, this means economically viable (basic business models and financial projections are developed), socially desirable or meaningful and environmental responsible. Project topics are varied, ranging from strategies, services, policies, and products to entire systems.

3. Samples of projects

2008

problem named:
Solid waste recovering

we found:
over designed equipment, lack of strategy, lack of worker benefits, missed business opportunities.

the solution was:
redesign of apropiate equipment, integral strategy, new business development.

team:
Ana Sofia Reyes-Retana, Miguel Franco, Jose Gordillo, Azucena Muñoz, Maria Madgalena Gonzalez, Manuel Amaro, Sandra Portillo, Michaela Stachova, Salvador Guerrero, Juan Herrera, Daniel Gayosso, Alejandra de la Cerda, Pedro Diaz, Diego Stehle, Gabriela Morales, Jessica Zepeda, Tania Muñoz, Fabiola Lezama, Ricardo Suarez, Salvador Soto, Benjamín Valencia.

2008

problem named:
Political campains advertisment

we found:
disproportionate amount of public resources, huge amount of waste, visual contamination, corruption.

the solution was:
sustainable business model design, order in amount, type and position of advertisments (regulations), use of infraestructure in non campain periods, reuse and recycling of ad material.

team:
Veronica Gonzalez
Teresita Suarez
Leonardo Romero

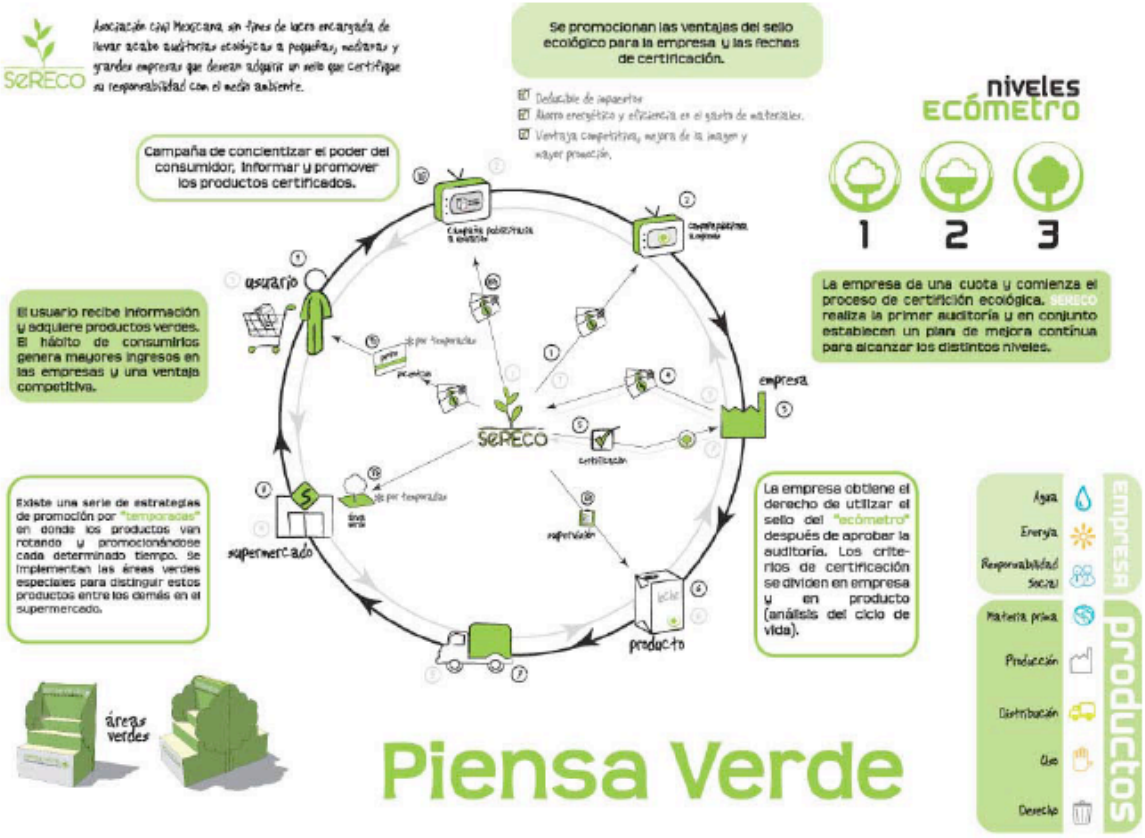
2008

problem named:
Sustainable certification for industry and products

we found:
Hundreds of certifications for different things, lack of an integral and easy to understand logic for customers.

the solution was:
design of certification tests, seal, strategy for an integral certification of products and industries as well as public awareness.

team:
Laura Segarra, Adriana Garcia, Tanyha Lopez



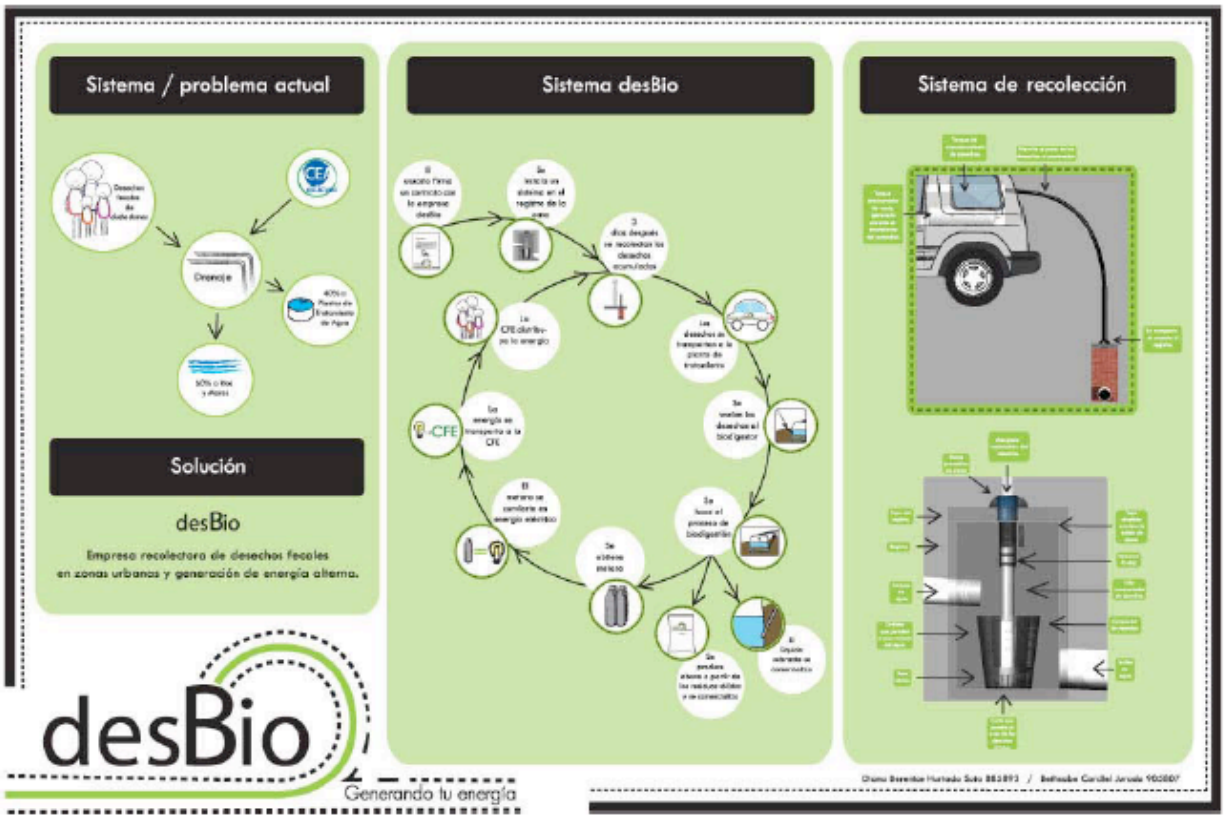
2009

problem named:
Human body waste

we found:
In many cities of the world the human fecal and urinary waste are not properly treated, in Queretaro 86% of sewage waters goes to rivers and oceans, impossibility to change infrastructure, business opportunity unexploited.

the solution was:
Desbio is a company that recolects human fecal waste and process it to create methane and with it electricity, entire business model and necessary equipment to perform the task cleany and safety.

team:
Diana Hurtado, Bethsabe Cardiel



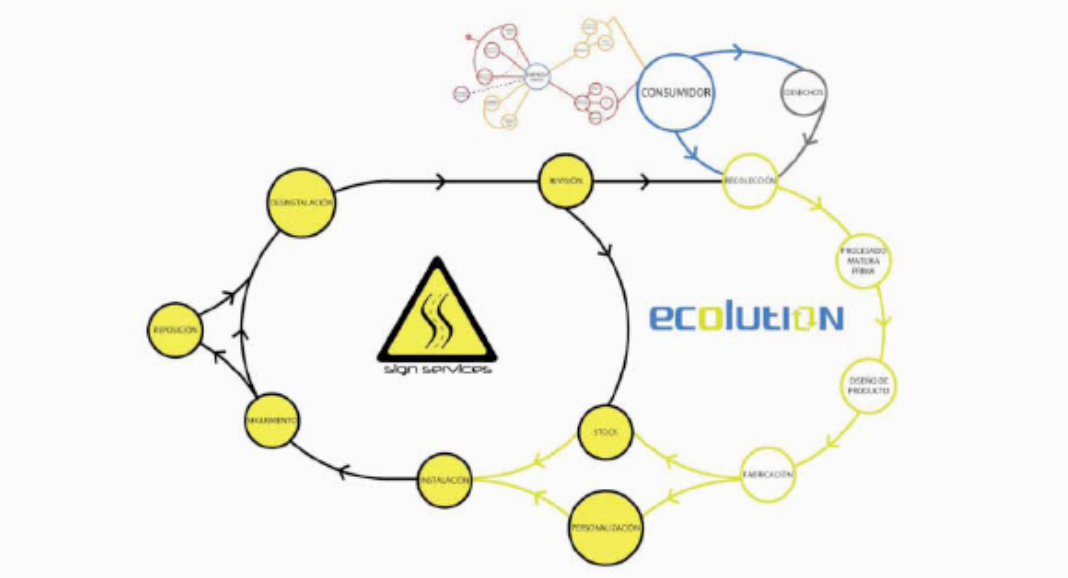
2009

problem named:
junkfood packaging waste

we found:
huge amunts of bi-polypropylene ending in landfills, material waste, high pollution and business opportunity unexploited.

the solution was:
ecolution, a company dedicated to recolect the material and recycling it, creating new products under the Product-Service-System scheme.

team:
Laura Segarra, Adriana Garcia, Tanyha Lopez



ecolution

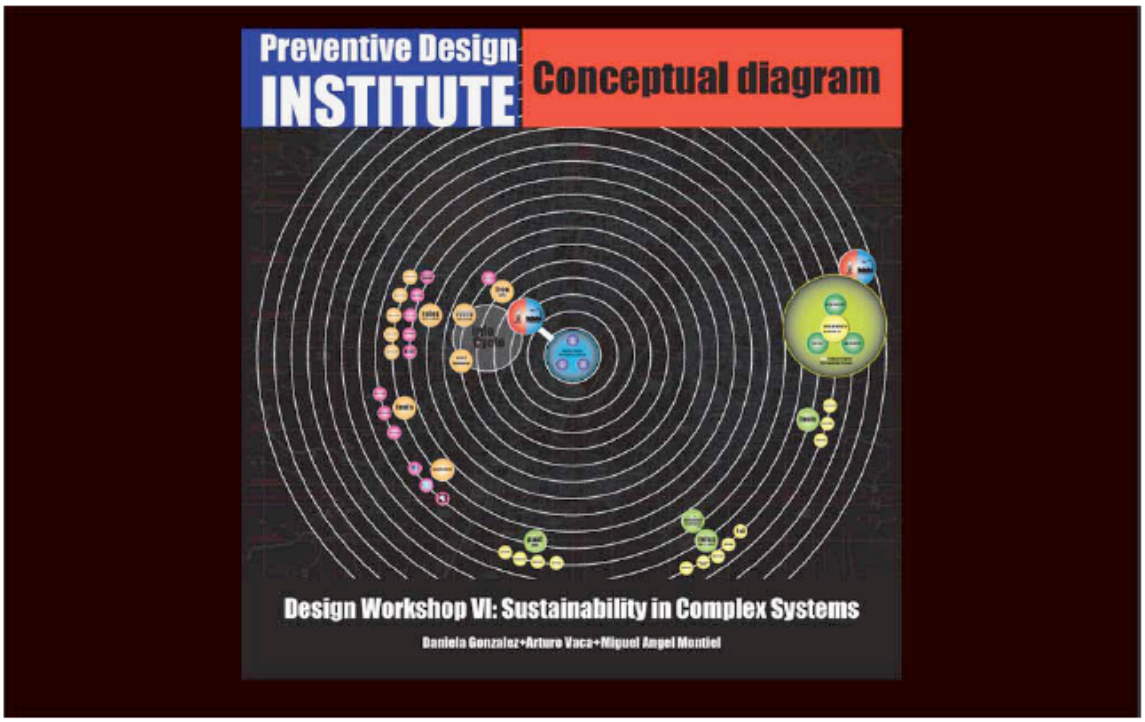
2009

problem named:
global awareness on current global trends

we found:
lack of awareness on people about global situation, lack of correlation between people, industry and government in order to reach a sustainable future.

the solution was:
the Preventive Design Institute is an organization which will perform a constant monitoring of the current economical, social and environmental models in order to avoid that the current solutions become the problems of the future.

team:
Miguel Montiel, Daniela Gonzalez, Arturo Vaca



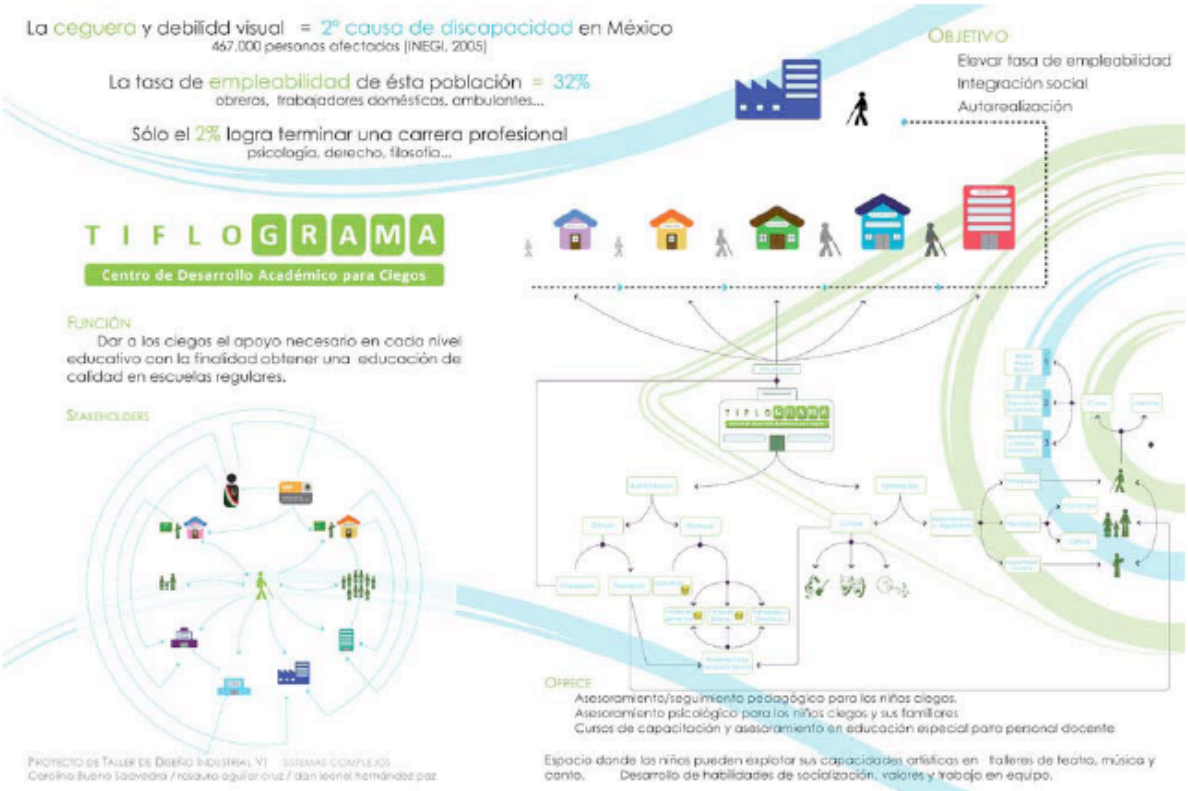
2009

problem named:
No education opportunities for the visually impaired

we found:
lack of trained professors, lack of schools with apropiated infrastructure, social rejection, no economic activity integration.

the solution was:
tiflograma, a center for academic development, pedagogic guidance from primary school to university, professors training courses, psicological support and social-cultural activities.

team:
Carolina Bueno, Rosaura Aguilar, Dan Hernandez



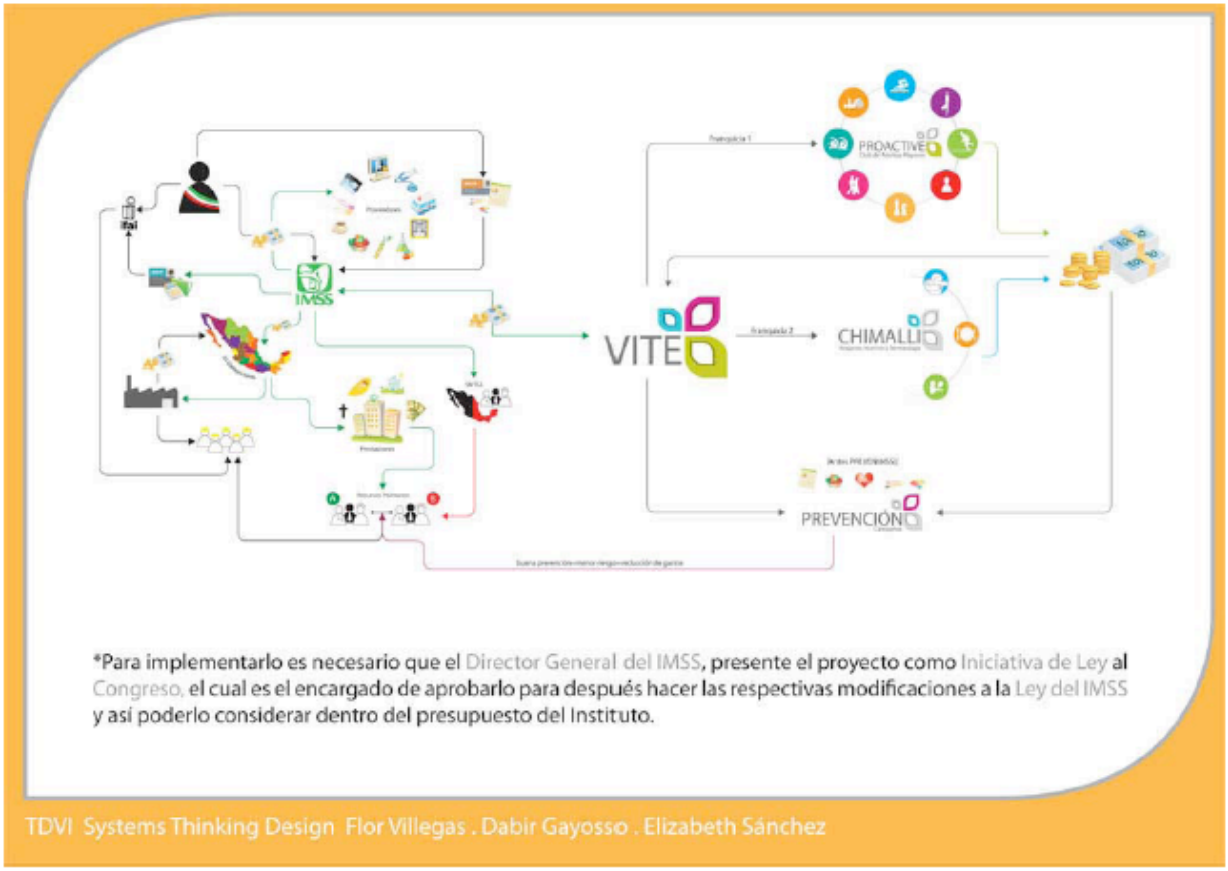
2009

problem named:
economical problems in the social security system

we found:
service saturation, lack of motivation on personel, lack of economic power, bad public image, lack of future strategy and business opportunity unexploited.

the solution was:
VITE is a dependency of IMSS which administrates the franchises Chimalli for elderly care and Proactive health prevention through prehispanic techinques.

team:
Flor Villegas, Dabir Gayosso, Elizabeth Sanchez



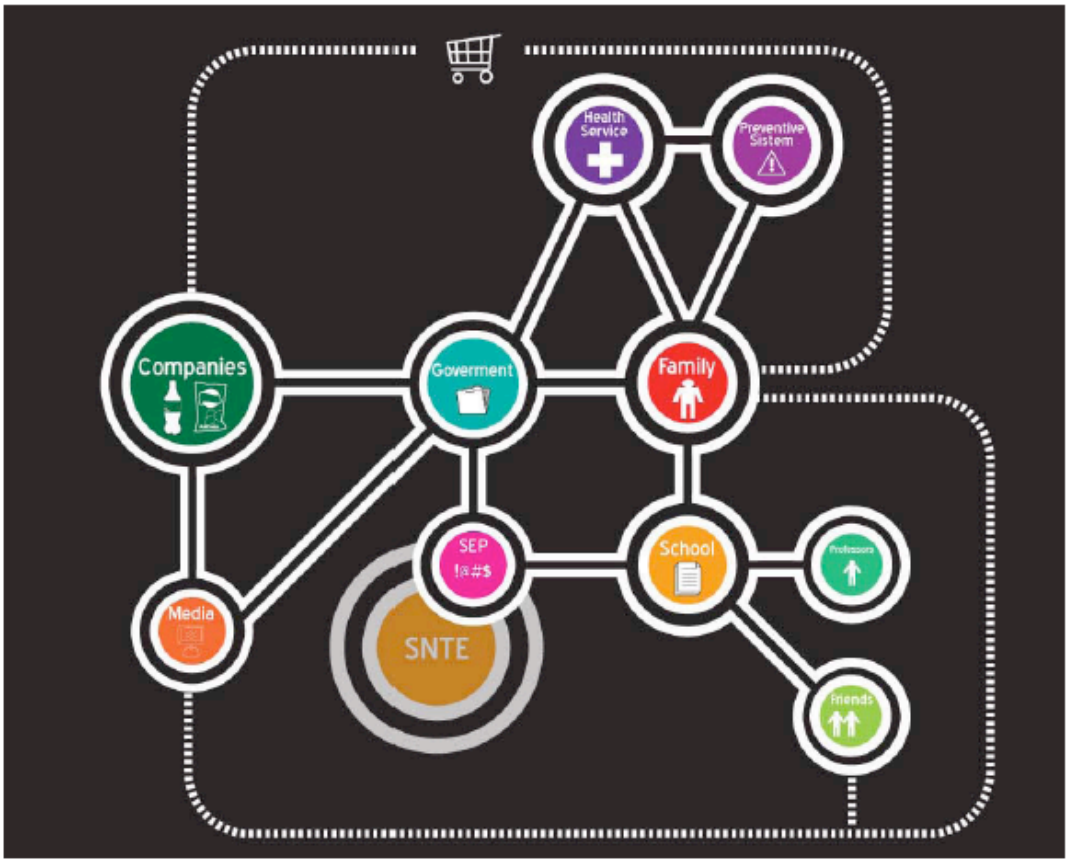
2010

problem named:
child obesity

we found:
severe obesity problems in Mexcian children, lack of comitment by junk food industry and government, mass media manipulation, social pressure, severe economic problems in the future for the social security system.

the solution was:
a series of strategies directed to families, schools, mass-media and changes in regulations, all orchestrated to create a preventive systems instead of a reaction system.

team:
Marisa Bracamontes, Alejandro Suarez, Ernesto Hernandez



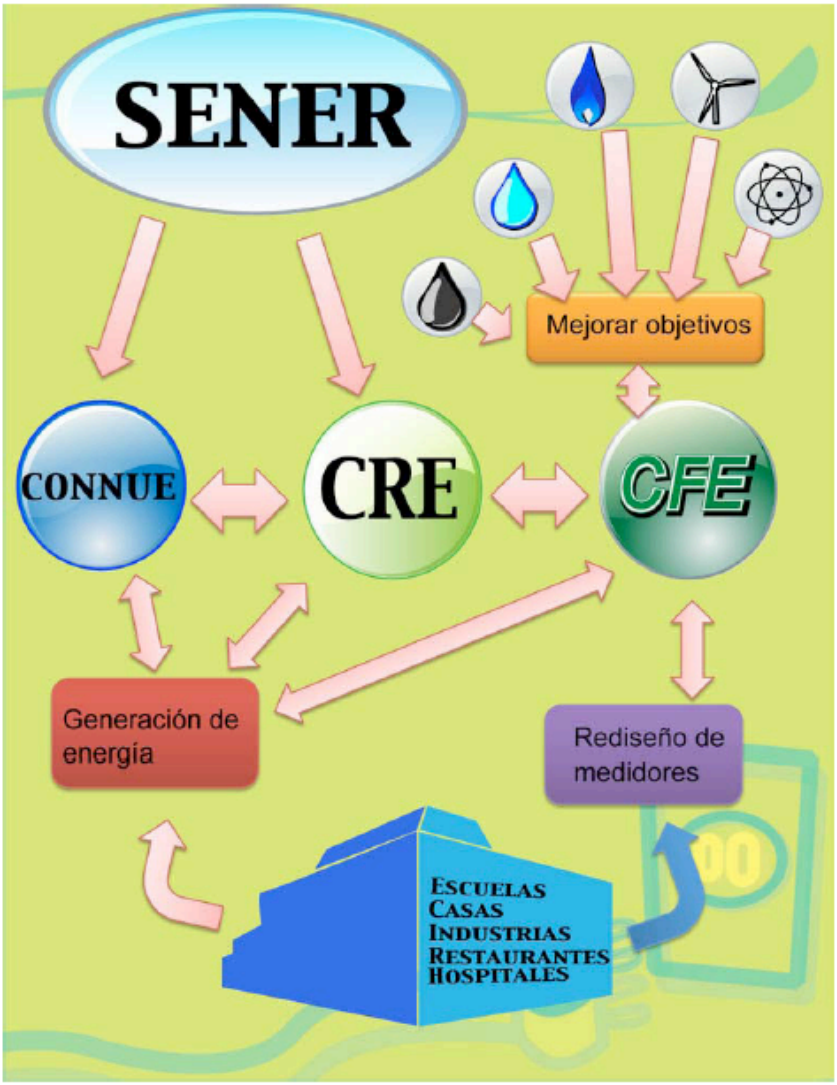
2010

problem named:
excess of energy consumption

we found:
lack of real awareness in people about their energy consumption, lack of alternatives for co-generation and future renewable sources of energy.

the solution was:
redesign the communication system so people can really understand their consumption habits, a change in regulations to open the co-generation strategy, create a feasable plan for having in a near future 100% of energy produced by sustainable sources,

team:
Karime Kanchi, Arlette Lomeli, Juan Pablo Martinez



2010

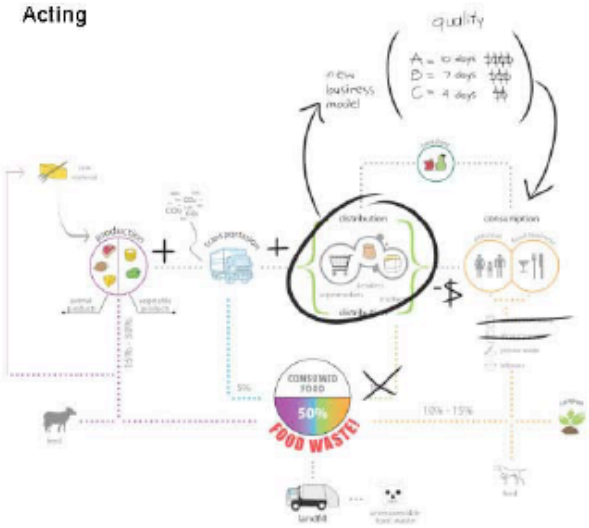
problem named:
food waste

we found:
in some cases up to 50% of the food produced is somehow wasted or discarded, lack of kownledge in people about nature, seasons and fruit and vegetable production, and business opportunity unexploited.

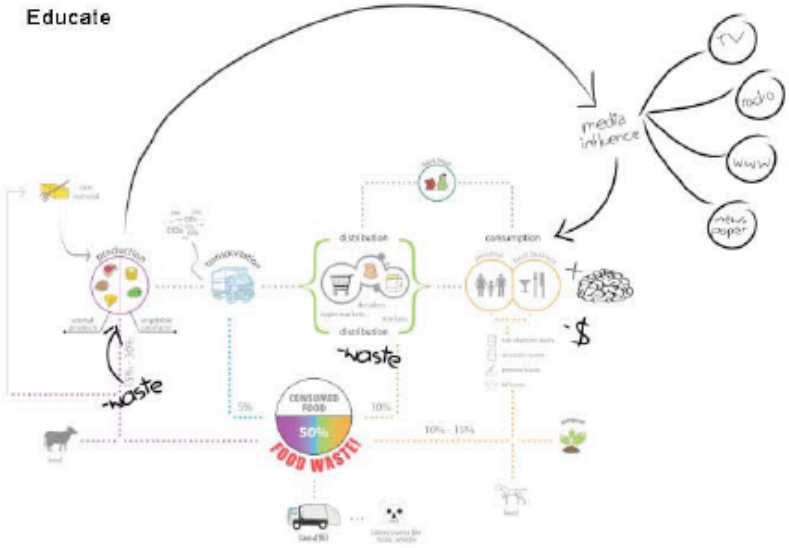
the solution was:
a mass-media communication program to emphasize the right fruit and vegetable consumption according to the seasons, new business for different qualities of vegetables and fruits.

team:
Juan Pablo Alanis, Eleonora Morales, Antonio Martinez

Acting



Educate



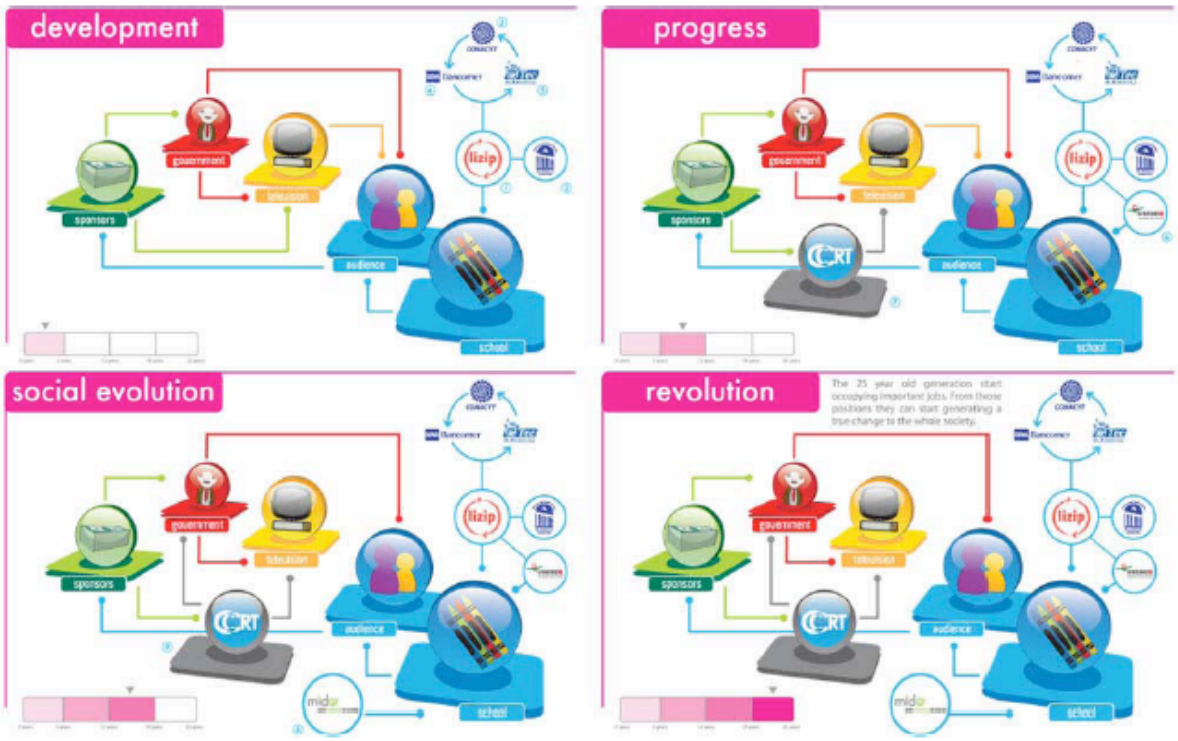
2010

problem named:
promotion and idealization of individualism

we found:
a current development in industry, consumption and mass-media promoting individualism, lack of social cohesion, lost in the potential for progress.

the solution was:
a strategy aimed to all stakeholders to change in a 25 year period its focus on social cooperation.

team:
Karen Ocampo, Ricardo Vega.



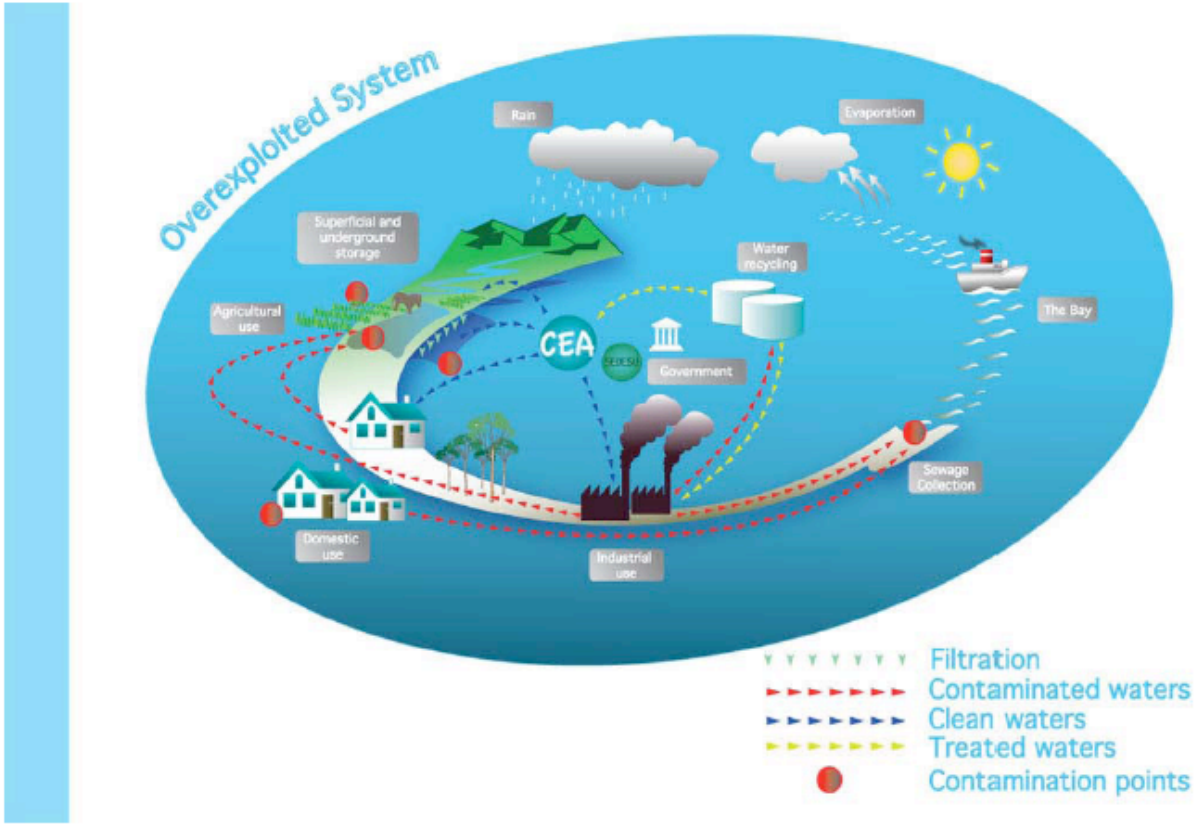
2010

problem named:
overexploited water system

we found:
in Queretaro 85% of the water is used in farms surronding the city, most of them produce alfalfa for cow food.

the solution was:
changing the cows diet.

team:
Sofia Orvañanos, Andres Fellowes, Cinthya Leon



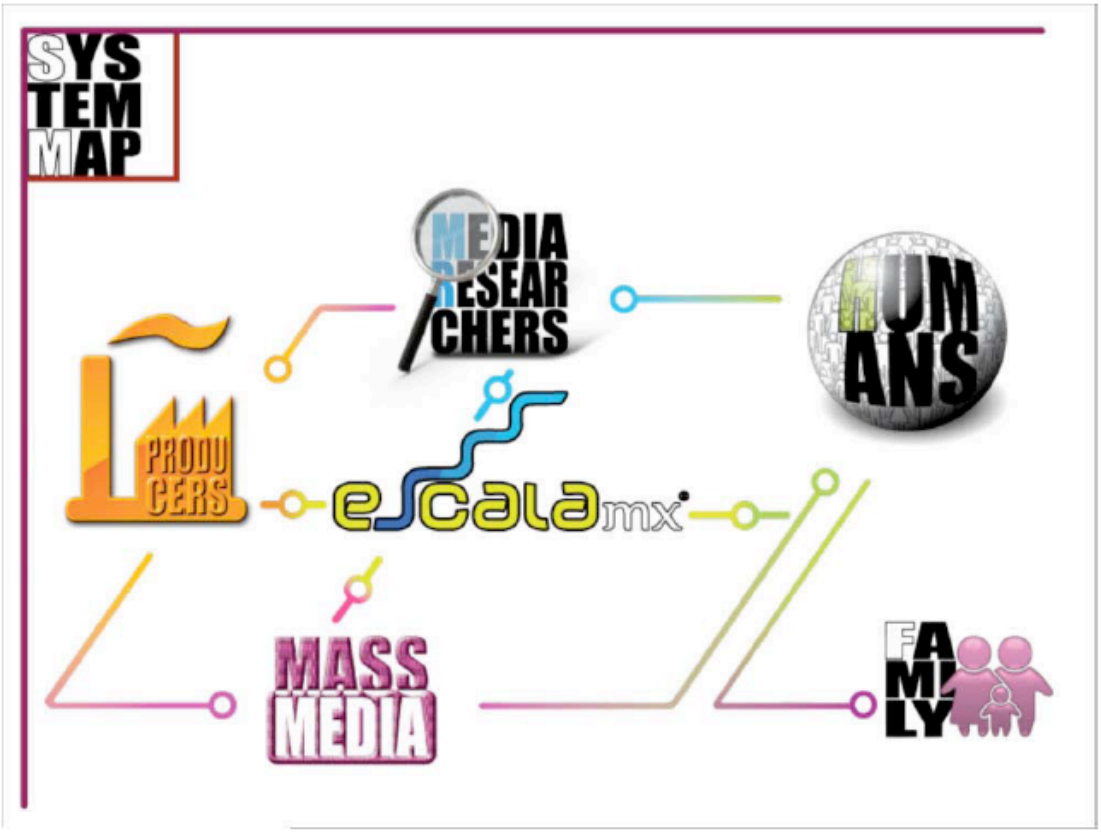
2010

problem named:
lack of opportunities for youngsters in Mexico

we found:
lack of social cohesion, in some cases the only attractive future is narcotrafic or crime, lack of cultural and educational structure.

the solution was:
escala mx, a non profit organization dedicated to find talent in our youngsters, a system of cooperation and integration.

team:
Monica Martin, Cesar Neria, Oscar Melchor



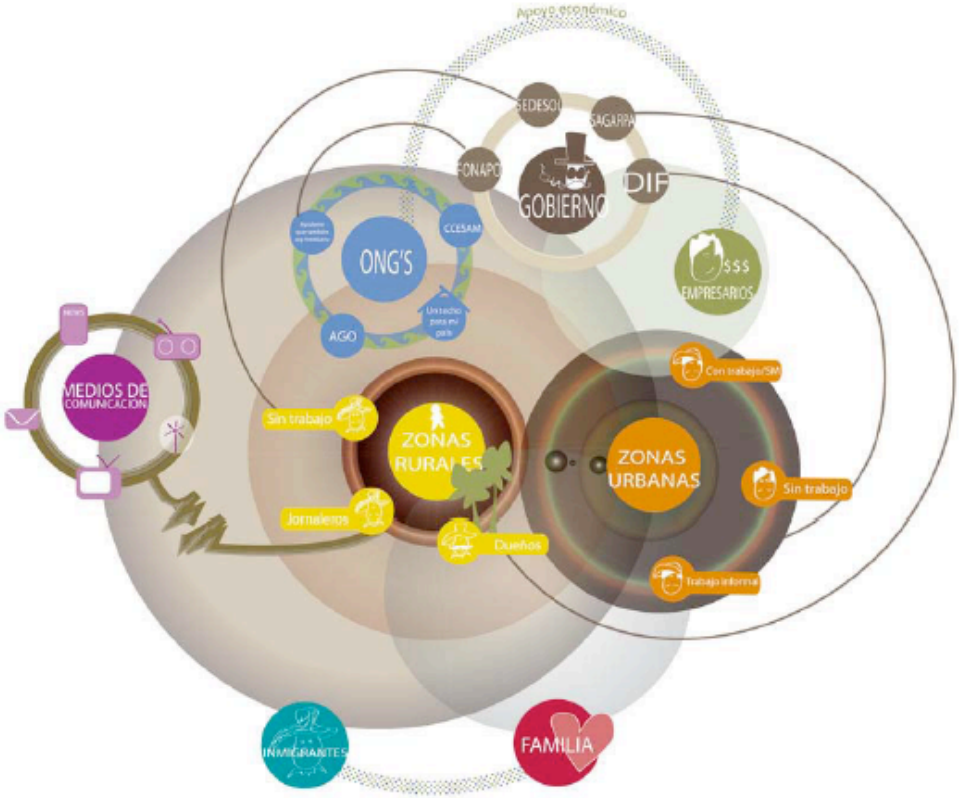
2010

problem named:
lack of infrastructure in rural Mexico

we found:
profound delay in the construction of basic infrastructure, corruption in government aid, lack of social cohesion.

the solution was:
por mi campo is a public organization that promotes the purchase of products from companies who donate to build better infraestructure in rural communities

team:
Varenka de la Vega, Alejandra Enzástiga, Eduardo Cordova



2010

problem named:
family planning

we found:
very little information about the issue and aimed mainly to women, lack of integral view.

the solution was:
developing the concept of "life project", a government agency dedicated to support young people and following them across their lives, this is done by a strategy called "community guide" and a strategy of loans for entrepreneurship.

team:
Albany Gomez, Stephanie Bernal, Servando Lopez

4. Conclusions

The experiences for students during this course have been very satisfactory; in only 16 week they are able to develop interesting and innovative ideas, co-designing and testing them with the stakeholders; some of them with high possibilities for real business. And also many declare have changed their perspective on things, accepting that a more holistic approach could guide them to more successful and sustainable solutions.

As part of other activities related to this, a research on systems thinking in education was performed in 2009 [7], being this course one of the experimental groups in order to test the impact on systemic thinking in the students.

Conflict of Interest

The author declares no conflict of interest.

References and Notes

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