

LISCIVIA Project is not only an acronym, but also a successful correspondence among "significato" e "significante". Liscivia in effect is a material that becomes quite an effective tool for IGIENE, thanks to specific chemical processes. LISCIVIA Project, through a strictly methodological approach and quantitative modelling, provides an useful tool to promote the cooperation between citizens and environmental main issues, in order to obtain a competitiveness improvement without pollution. LISCIVIA will develop effective conceptual models and protocols in order to achieved such aim.

The purpose of this research is to define a parameter system applied in protocol, in order to characterize environmental and economic impacts of a product in its whole life cycle.

LISCIVIA Project will focus on the development of a lean simulation methodology that could allows the creation of quick, but validated and effective models, able to quantify the impact of alternatives in stochastic environments.

The critical aspects are related to create a procedure that could support a quite wide set of possible models, in effect the possibility to experiment this new protocol over a set of different cases could provide some specific benefits both to lean modelling and life cycle analysis.

Considering this aspects, particular attention will be paid to economic aspects.

After the first phase of description and analysis of the state of the art, will be evaluated not only for every process frame, but also for all possible plant solutions, with the aim of waste reducing.

LISCIVIA planning:

#### 1) LCA/LCC State of the Art

This will be a survey devoted to collect data and details about the most recent experiences in this area and to compare them with the current research in Genoa Unit and LISCIVIA Project Partners in order to identify advances and avoid gaps

Industrial districts focused on wood processing and located in Friuli Venezia Giulia, the chair industrial district in the province of Udine and the furniture industrial district in the province of Pordenone and some firms located in the province of Catania, not yet incorporated in an industrial districts, will be analyzed, in order to collect data concerning the economical and production aspects.

At district level, the Bologna unit will recognized an industrial survey through ISTAT register, assembling every firm as belonging to specific process and defining constitutive elements of process (supply chain).

This activity will take about 2 months of solar time.

This phase will be devoted both to Lean Simulation Exploitation among LISCIVIA Partners and researching at local level.

Analysis of data using descriptive and inferential statistical techniques (e.g. cluster analysis, time series etc.), with the aim, in existing districts, to identify sample firms, that can be considered as representative of homogeneous groups of firms in IDs along the operative chain, for which LCEEA-M&S integrated models should be developed. In developing clusters, statistical techniques should be used to extend models and results obtained for single firms to further existing or potential firms of the network and to develop future scenarios. Genoa unit will take part in cooperation with Bologna University.

The Udine unit will take care about Inventory analysis. It develops quantitative analysis of product life cycle and its phases are: definition of analysis system border and life cycle model; data acquisition; data analysis and elaboration; data report.

Lean Simulation are very innovative approaches devoted to create guidelines, best practices, support tools and protocols for quick development of simulation without avoiding proper VV&A (Verification, Validation and Accreditation) and estimation of precision, fidelity and reliability of the developed models. This approach is based on the construction of a detailed roadmap for establishing light team units with support material able to face the M&S (Modeling and Simulation)

issues in a specific set of problems, to complete the related tests and VV&A and to produce the experimental analysis based on the simulation execution.

Genoa Unit will present such techniques to the LISCIVIA partners and will organize knowledge transfer opportunities in order to guarantee that the experiments developed could be tested also by the other units. During this activity it will be possible to consider the specific requirements and preliminary criteria for developing a Lean Simulation protocol for LCA problems.

This activity will benefit of Genoa on-going initiatives and it will be possible to be completed over the first year.

Impact analysis defines qualitative and quantitative potential impacts on environment. This step will consider main aspects such as health, environment, resources.

Phases are:

- data classification in impact categories according to impact parameter (noise, powder etc);
- impact analysis for every single category;
- parameter calculation for every single category

Development of models for potential facilities/services on a district base, whose impact will be evaluated in life cycle analyses. These solutions should be identified and modelled with the purpose of enhancing the use of resources available within the industrial districts or the surrounding territory, as for example production scraps to be recycled or energy recovered, forestry biomass with related logistics issues and so on. Among methodologies that can be applied, a main role will be played by simulation.

This phase will be devoted to complete the General LCA Model Protocol and it will produce several deliverables:

- General Criteria and Procedure Description
- Syllabus for Subject Matter Experts to be interfaced with LCA Lean Simulation Development Unit
- Support Tools for LCA Lean Simulation Development based on IT and web technologies
- Checklists and Handbooks for the development
- Validation, Verification & Accreditation Procedures
- Testing Methods
- Auto-evaluation Support

This part will constitute the major part of the Genoa Unit and it will be concentrated during the 1st year, while the experience in the 2nd year will support their redesign.

The activities planned during the second year will be devoted to the experimental phase; such activity is based on a systematic evaluation of necessities and opportunities of an environmental impact reduction. From this phase will be generate innovative proposals for every single process.

Phases are:

- Plant solutions for natural and energetic resources saving and optimisation;
- Forecasting calculation of environmental and economic effects of plant innovations;
- Guide lines of best environmental practice (BEP) for every process

These analyses will test the ability of integrated LCEEA-M&S models to become new decision making support tools, not only able to enhance competitiveness of existing IDs, but also to guide the development of new industrial districts.

The evolution of ports and changes in logistics are requesting major reorganization of harbors, however their location and impact on the environment and town is very critical the use of LCA M&S will be tested on this framework and used to compare different factors (i.e. risks, congestion, saturation, sustainable development) over the life cycle of new terminals and activities.

The methodology proposed will be applied to case study; the Units will proceed directly in some case based on on-going local initiatives that are following:

- Development of Industrial Activities over High Polluted Areas; in this direction M&S will be used to support quantitative decision making in combine LCA of the products/facilities with the life cycle of highly contaminated areas

Due to changes in laws and regulations, the impact on the environment and the proper Life cycle analysis could provide to local administration a strong support in evaluating proposals/requests as well as in comparing alternatives.

In addition Genoa Unit will support other partners in applying M&S to their cases.

This activity will start preliminary during the first year however the experimental analysis and result synthesis will be concentrated over the second year.

#### 5) Exploitation and Support Development

Genoa Unit will develop some exploitation material that will focus specifically in presenting the benefits of a quantitative modeling approach in the LCA area.

This activity will be combined with results of other active Units of LISCIVIA Initiative.

#### Evaluation

Global evaluation of LISCIVIA project is based on the results given by the experimental phase to be conducted on industrial real cases: this will allow to identify the real potential of the proposed approach, its efficacy such as its limits and will put in evidence, thanks to the relationship with industrial partners, the correct way to proceed to a phase of development and direct support.

In fact the application of researches conducted in the framework of LISCIVIA, besides the project itself, will guarantee an improvement of industrial competitiveness, thanks to the complete evaluation of environment impact, giving to the responsible entities a quantitative support for decision making and for choosing among different development alternatives.

The success of such partnership, as in the experimental phase, will represent the metrics for evaluating the success of the initiative. In reference to each single phase, the following targets will be considered:

#### Phase 1 – State of the Art

The evaluation of its efficacy will be based on the comparison with user companies in order to verify the completeness of research and on a comparison made on international basis among research centers and scientific events in order to check the completeness of the research made and to verify the innovation of concepts settled up in the project LISCIVIA

#### Phase 2

The review of results in this phase, by the persons responsible of the development phase of conceptual models, such as the implementation phase, will work as support for the control of clearness of this analysis and will allow proceeding in verification. It will be in particular monitored that produced reports provide a sufficiently concrete basis for the development of the successive general protocol for models realization. The comparison on this topic will allow also to verify if technology transfer related to methodologies of Lean Simulation is resulted effective for the partners of the initiative and if there is a common basis for the development of lean models.

#### Phase 3

The conceptual models of LISCIVIA will be reviewed with the aid of control techniques of crossing control during the phase of logics definition for models integration. The problems encountered during this phase will work as reference to evaluate the necessity of further investigation from the point of view of simulation. The completeness connected to the thematic aspects of single sectors of applications will be referred to the survey in order to control completeness and adequacy to the examined topics and to the clustering completed during phase 2

#### Phase 4

This phase will be critical for global evaluation of the project such as the following one. It is foreseen that partners (meaning both companies and public agencies), related to application cases, could give a solicitation and a support to the verification phase.

#### Phase 5

In relation to control of advancement, techniques of project management for control of costs and developed activities will be used. The success of dissemination of results phase will be measured

thanks to the success of initiatives such as territorial workshops and thanks to the penetration in the community of public and private users in terms of adoption of developed methodologies.