MESVAL project

Gemma Cervantes. Universitat Politècnica de Catalunya
MESVAL Partners

Catalonia:
• CTM-UPC (coord.)
  Technological Center Manresa-
  Tecnical Univ. Catalonia
• AIICA
  Leather Technological Center
• CETEMMSA
  Textile Technological center
• CIMNE Research Center
  (Numerical Methods)
• IUCT Technological Center
  (Green Chemistry,...)
• CU (UPC) Unesco Chair in
  Sustainability

Tuscany:
• Università di Pisa (UNIPI)
• Ecosistemi

Peloponnesus:
• Messinian Chamber of
  Commerce and Industry(MCCI)
MESVAL project is based on:

- **INDUSTRIAL ECOLOGY**
- **VALUATION**: Waste valuation (lab and pilot test)
- **RESEARCH & TECHNOLOGICAL INNOVATION**: Different technologies for the same valuation
- **SUSTAINABLE INDICATORS** (economic, environmental, social): applied to the valuation assays
- **NETWORK**: Technological centers, commerce chambers, universities. Intra/inter regions
- **STRATEGIES**: *regional strategies* for eco-industrial development and *methodologies* for applying indicators to choose the best valuations
Objectives

1. To promote sustainable development and innovation in the reuse of waste streams
   a) The exchange of waste streams between different industrial sectors
   b) Development of indicators to measure the economic, environmental, and social dimension of sustainability

2. To strengthen the network between technological centres and companies which take part in the MESVAL initiative
   a) Exchange of knowledge and expertise within the network of technological centres
   b) Formulation of regional strategies for waste valuation

3. To disseminate the concept of Industrial Ecology within the region
   a) Definition of waste valuation approaches
   b) Formulation of strategic plans for regional waste management resulting from OMR Ecosind.
Steps undertaken

A. **A1.** Development of quantitative flow diagrams of raw material and waste streams of different industrial sectors have been drawn.  
   **A2.** Analysis of the opportunities to match residual flows between different industries

B. Laboratory **valuation assays** and assessment

C. **C1.** Design a set of sustainability indicators  
   **C2.** Application to the valuation assays results in order to identify the most sustainable valuation

D. Contacts with firms in order to develop a **pilot project** of a chosen valuation

E. Creation and update of a MESVAL **web page**

F. Strengthening the **interregional network** through meetings, etc.

G. **Dissemination**

H. Writing the **valuation strategies document** and contributing to **ECOSIND guide**
A1. Constructing the flow diagrams

- Flow diagrams of the processes: surface treatment, tanning, olive oil production, textile
A1. Constructing the flow diagrams (2)

**TASK 2. TEXTILE FLOWCHART: DYEING AND FINISHING**

- **Fabric**: 114 Tn/year
- **Organic dyes**: 0.3 Tn/year

**Burn** → **Finish Removal** → **Rinsing** → **Drying** → **Thermofixation** → **Mercerization and Rinsing** → **Chemical/Alkaline Bleaching** → **Mercerization and Rinsing** → **Drying** → **Thermofixation** → **Dyeing and Finishing**

**Dyeing and Finishing**

- **Wastewater**: 10,040 m³/year
- **SS**: 16,8 mg/L
- **Organic Material**: 139.3 mgO₂/L
- **Soluble Salts**: 1800 g/s/m³
- **Inhibiting materials**: 2 equiv/m³
- **N**: 10 mg/L
- **P**: 1.25 mg/L

- **Packages and driers**: 0.42 Tn/year
- **Plastics**: 0.04 Tn/year
- **Scrap**: 0.1 Tn/year

**Atmospheric emissions**:
- **CO**: 82 mg/m³
- **NOx**: 42 mg/m³
- **CO₂**: 11 %
- **NO**: 61 mg/m³
- **C₂**: 10 %

**Water consumption**: 10,048 m³/year
**Energy consumption**: 46,475 kWh/year
**Natural Gas**: 2,394,387 kWh/year
**Dyes and Auxiliary products**: 40.7 Tn/year
  - **Transport**: 1.98 Tn/year
  - **Fixers**: 0.00 Tn/year
  - **Detergents and softeners**: 1.25 Tn/year
  - **Salties**: 1.0 Tn/year
  - **Catalysts**: 22.5 Tn/year
  - **Bleaching agents**: 4 Tn/year
A1. Constructing the flow diagrams (3)

**Task 2.1.1.3 flow diagram for the white chromium electroplating process**

- **NaOH (>10%) 750 L**
- **H₂SO₄ (<4%) 5 L** Pickling solution: HCl, phenol (<5%), DioN-methane (>25%)
- **2550 m³ H₂O**
- **9.9 m³ distilled H₂O**
- **Chromium trioxide (>50%) 150 kg**
- **25 x 10⁶ kJ**

Diagram includes steps such as:
- Ultrasound degreasing
- Rinsing
- Acid pickling
- Electrolytic degreasing
- Rinsing
- Acid activity
- Rinsing
- Static distilled water rinsing
- White chromium plating
- Rinsing
- Drying

流体: Aqueous Alkaline Solution (1050 L)
- External Waste Treatment

流体: Aqueous Acid Solution (3150 L)
- External Waste Treatment

流体: Air Emission (<0.01 mg/m³)
- 1725 m³ Rinsing water with a high content of Cr(VI)

流体: Waste Physical-Chemical Water Treatment
- Drying
- Landfill

流体: 2586 m³ WASTE WATER

流体: Empty Bags (10) and Drums (60) containing Remains of Raw Materials

流体: Waste management service

流体: Municipal collection service

流体: General waste 8.4 m³
A1. Constructing the flow diagrams (4)

General Overview of the Olive-oil Production Process

Beginning of production

Use of fertilizer/pesticide
- Farming
- Harvesting
- Crushing
- Mixing

End of production

Olive oil production
A2. Flow diagram integration (1)

1st. Flow diagram of the feasible exchanges

Integration of the surface treatment process with the tanning process of raw hides

**Surface treatment**  
**Cr salt**  
**Tanning process**
A2. Flow diagram integration (2)

Integration flow diagram
Integration of tanning process of raw hides and textile process (spinning)

TANNING PROCESS OF RAW HIDES

1 Tm Salted Hide → PRESERVATION → TANNING → FINISHING

30-60 Kg Crust and Finished Trimmings → ISOLATIONS MANUFACTURING

195 Kg Finish Leather

625 m3 Textile Wastes → SPINNING

1,400,000 Kg Yarns

TEXTILE PROCESS - SPINNING

tanning process

trimmings

insulating pannels

textile

Textile wastes
A2. Flow diagram integration (3)

HARVESTING

CRUSHING THE OLIVES

FURTHER SEPARATION OF WATER FROM OIL

WASTEWATER (Phenolic compounds 0.3-0.8 %)

WASTE FROM REFINING (217.88 mg tannic acid/100ml)

OIL

TANNINS SEPARATION

TANNINS and OILS

25-30 Kg TANNINS (RETANNING AGENT)

TANNINS (↓↓)

TANNINS TREATMENT

1 Tm Salted

PRESERVATION

TANNING

FINISHING

OLIVE OIL PRODUCTION

TANNING PROCESS OF RAW HIDE

tannins

WASTEWATER TREATMENT
A2. Flow diagram integration (4)

1 Tm Salted Hide

PRESERVATION

. . . . .

TANNING

. . . . .

FINISHING

160-200 Kg Hair

HAIR TREATMENT PLANT

50 Kg Dryed hair (12.6% N)

FERTILIZERS INDUSTRY

FERTILIZERS (NKP)

61.3% hair
11.0% (NH₄)₂HPO₄
16.7% KCl
6.0% MgSO₄
5.0% FeSO₄

MAINTAINING OLIVE TREES

FERTILIZERS AND PESTICIDES

Olive oil production
A2. Flow diagram integration (5)

2nd. Discovering exchanges that aren’t feasible

1 Tm Salted Hide

PRESERVATION

TANNING

FINISHING

195 Kg Finish Leather

50 Kg Salt
(NCl, KCl, Organic compounds, etc.)

SALT PURIFICATION

112.5 Tn Fabrics
150 Kg Salt (Urea: CO(NH2)2)

FABRIC PREPARATION

PRINTING

FINISHING

112.5 Tn/year printing fabrics

TANNING PROCESS OF RAW HIDES

salt

TEXTILE PROCESS - PRINTING
A2. Flow diagram integration (6)

3rd. Decision of which valuations and exchanges must be chosen
<table>
<thead>
<tr>
<th>Origin</th>
<th>Waste flow</th>
<th>Product obtained</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface treatment</td>
<td>galvanic rinsing waters</td>
<td>Cr(III) salt</td>
<td>Tanning, chemical</td>
</tr>
<tr>
<td>tanning</td>
<td>tanning exhausted liquors</td>
<td>Cr(III) salt</td>
<td>Tanning, chemical</td>
</tr>
<tr>
<td>tanning</td>
<td>fleshings</td>
<td>industrial lubricants</td>
<td>Tanning, others</td>
</tr>
<tr>
<td>tanning</td>
<td>fleshings</td>
<td>protein</td>
<td>Fertilizers</td>
</tr>
<tr>
<td>Tanning</td>
<td>finished trimmings</td>
<td>insulating pannels</td>
<td>Building</td>
</tr>
<tr>
<td>Textile</td>
<td>Textile wastes</td>
<td>insulating pannels</td>
<td>Building</td>
</tr>
<tr>
<td>tanning</td>
<td>Lime Trimmings--collagen</td>
<td>protein based analytical sensors</td>
<td>food</td>
</tr>
<tr>
<td>tanning</td>
<td>Lime Trimmings--collagen</td>
<td>cosmetics</td>
<td>Cosmetics</td>
</tr>
<tr>
<td>Olive oil prod.</td>
<td>olive oil waste waters</td>
<td>Tannins, oil</td>
<td>Tanning</td>
</tr>
</tbody>
</table>
### Investigated processes

<table>
<thead>
<tr>
<th>Process</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual galvanic baths from surface treatment industries and residual Cr baths from tanneries as a source of Cr(III) salt</td>
<td>Optimisation of chromium and liquor recovery</td>
</tr>
<tr>
<td>Leather and textile trimmings to produce insulating panels</td>
<td>Good properties of gelatin/leather trimmings materials</td>
</tr>
<tr>
<td>Wastewater from olive oil production as a source of tannins and oils</td>
<td>Improvement of leather stiffness</td>
</tr>
<tr>
<td>Collagen from the tanning industry as a sensor to test flavonoids in food or natural products</td>
<td>Flavonoid spectroscopic behaviour is influenced by collagen</td>
</tr>
<tr>
<td>Collagen from the tanning industry to produce cosmetics</td>
<td>Formulations tests of milk/cream, gel and shampoo products</td>
</tr>
<tr>
<td>Fleshings as a source of fat and protein</td>
<td>Proteins are employed for fertilizers formulations</td>
</tr>
</tbody>
</table>
B. Valuation laboratory assays (3): some results

Valuation of Galvanic rinsing waters: **two separation methods**

1. Precipitation
   - Agents used:
     - Sodium carbonate
     - Calcium carbonate
     - Magnesium oxide

2. IONIC EXCHANGE (RESIN):
   - Continuous process
B. Valuation laboratory assays (4): some results

Valuation of Galvanic rinsing waters: results

1. Precipitation:
   - By means of MgO a better separation of Cr(VI) and the rest of divalent metals is obtained
   - The final Cr(III) salt obtained by means of MgO has better properties

2. Ionic exchange:
   - Cationic resin gives best separation results than the anionic one
OBJECTIVE:
VALORIZATION OF COLLAGEN (TANNERY BY-PRODUCT) THROUGH THE PREPARATION OF COSMETIC PRODUCTS WITH 5% OF COLLAGEN HYDROLYSATE CONTENT.

COLLAGEN HYDROLYSATE:

<table>
<thead>
<tr>
<th>DETERMINATION</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>12.82</td>
</tr>
<tr>
<td>Dry matter (%)</td>
<td>26.4</td>
</tr>
<tr>
<td>Ashes 500ºC (%)</td>
<td>2.8</td>
</tr>
<tr>
<td>Ca (mg/L)</td>
<td>8617</td>
</tr>
</tbody>
</table>

COSMETIC APPLICATIONS REQUIRES THE CALCIUM CONCENTRATION REDUCTION.

After a purification process, calcium content was reduced to 427 mg/L
B. Valuation laboratory assays (6): some results

**FORMULATIONS:**

- MILK CREAM
- EMULSION
  - O/W (Aqueous external phase).
  - W/O (Oil external phase).
  - W/S (Silicon external phase).

**SHAMPOO / SHOWER GEL**

**GEL**

**CREAM GEL**

- 8 FORMULATIONS AND 5 COSMETIC APPLICATIONS.

<table>
<thead>
<tr>
<th>CODE</th>
<th>FORMULATION</th>
<th>COSMETIC ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>GEL CREAM</td>
<td>Nutritive.</td>
</tr>
<tr>
<td>02</td>
<td>CREAMY BODY WASH</td>
<td>Hydrating</td>
</tr>
<tr>
<td>03</td>
<td>CREAM W/O</td>
<td>Hydrating &amp; reaffirming adapted to sensitive skins.</td>
</tr>
<tr>
<td>04</td>
<td>CREAM O/W</td>
<td>Antiage moisturizing.</td>
</tr>
<tr>
<td>05</td>
<td>MILK W/S</td>
<td>Moisture.</td>
</tr>
<tr>
<td>06</td>
<td>CREAM O/W</td>
<td>Hydrating &amp; reaffirming.</td>
</tr>
<tr>
<td>07</td>
<td>GEL</td>
<td>Stretch marks treatment.</td>
</tr>
<tr>
<td>08</td>
<td>GEL</td>
<td>Reaffirming.</td>
</tr>
</tbody>
</table>

- 2 EMULSIFIERS
- 2 GELIFICANTS
B. Valuation laboratory assays (7): some results

Tannins and oils obtained from wastewater of olive oil production for leather retanning

Olive oil wastewater: filtration, preconcentration 1:10
Leather: cut, treatment, washing, drying and conditioning
B. Valuation laboratory assays (7): some results

Production of insulating panels

FINISHED TRIMMINGS

PRINTERY PASTE WASTES

INSULATING PANELS
B. Valuation laboratory assays (8): some results

Different chemical process to obtain test panels

- **Gelatine**: hydrated gelatine + vegetable dust
- **Plaster**: plaster + chrome crushed leather

• Tests made: dried speed, consistence, lightness, easiness for working, and strength. Heat and water.
• Optimum proportion (gelatine vs dust, plaster vs leather) was determined
• Acoustic and consistence checking is necessary for the use of this new materials in construction.
C1. Sustainability indicators (1)

Set of indicators appliable to waste valuations and to the assessment of the industrial system change

- 6 social
- 6 economic
- 20 environmental
<table>
<thead>
<tr>
<th>SPHERE</th>
<th>OBJECTIVE</th>
<th>THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVIRONMENT</td>
<td>Closure of material cycle</td>
<td>Water recovery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reuse &amp; recycling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Material balance</td>
</tr>
<tr>
<td></td>
<td>Reduction in material and natural resource use</td>
<td>Water consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumption of fossil fuels</td>
</tr>
<tr>
<td></td>
<td>Reduction in energy use and/or in the</td>
<td>Energy consumption</td>
</tr>
<tr>
<td></td>
<td>use of energy from non-renewable sources</td>
<td>Use of non-renewable energy sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of renewable energy sources</td>
</tr>
<tr>
<td></td>
<td>Reduction in air emissions</td>
<td>Greenhouse gas emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CO emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOx emissions</td>
</tr>
<tr>
<td></td>
<td>Protection of water quality</td>
<td>Water emissions</td>
</tr>
<tr>
<td></td>
<td>Reduction in the use of hazardous substances</td>
<td>Use of chemicals</td>
</tr>
<tr>
<td>ECONOMY</td>
<td>Reduction of environmental costs</td>
<td>Waste management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pollutants abatement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Raw material use</td>
</tr>
<tr>
<td>SOCIETY</td>
<td>Creation of new jobs or major quality jobs</td>
<td>Capacity to create new jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capacity to improve job quality</td>
</tr>
<tr>
<td></td>
<td>Increase of social responsibility of the</td>
<td>Application of social measures</td>
</tr>
<tr>
<td></td>
<td>enterprise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upgrading of decentralised technology</td>
<td>Promotion of adequate local/regional/country R&amp;D activities</td>
</tr>
<tr>
<td></td>
<td>Increased local social capital</td>
<td>Social cohesion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creation of jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enterprise relations</td>
</tr>
</tbody>
</table>
### Table 1. Environmental Indicators

<table>
<thead>
<tr>
<th>GENERAL OBJECTIVES</th>
<th>THEMES</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closure of material cycles</td>
<td>Water recovery</td>
<td>Use of recovered water (m³/unit)</td>
</tr>
<tr>
<td></td>
<td>Reuse &amp; Recycling</td>
<td>Reusable/recoverable components of final product at product’s end of life (%) of weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recycled or reused material components of product (% of weight)</td>
</tr>
</tbody>
</table>

### Table 2. Economic Indicators

<table>
<thead>
<tr>
<th>SPECIFIC OBJECTIVES</th>
<th>THEMES</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of environmental costs</td>
<td>Water use</td>
<td>Change in water fees after IEA (%)</td>
</tr>
<tr>
<td>Reduction of environmental costs</td>
<td>Raw material use</td>
<td>Change in raw material costs after IEA (%)</td>
</tr>
</tbody>
</table>

C1. Sustainability Indicators (2): Some examples
### C1. Sustainability indicators (3): some examples

#### Table 3. Social Indicators

<table>
<thead>
<tr>
<th>SPECIFIC OBJECTIVES</th>
<th>THEMES</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>To create new jobs or major quality jobs</td>
<td>Capacity to create new jobs</td>
<td>Increase of new jobs after industrial ecology application (IEA) (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increase of workers wages after IEA (%)</td>
</tr>
<tr>
<td>To increase social responsibility of the enterprise</td>
<td>Application of social measures</td>
<td>New social measures applied in the enterprise after IEA (number)</td>
</tr>
<tr>
<td>To upgrade decentralised technology</td>
<td>Promotion of adequate local/regional/country R&amp;D activities</td>
<td>New technology used in the enterprise’s town/region/country (%)</td>
</tr>
</tbody>
</table>
C2. Choosing the best valuation (1)

- Fleshing valuation to obtain fat for greasing products
- Fleshing valuation to obtain protein for fertilizers

- Separation of Cr (VI) by means of MgO precipitation
  - by means of Na₂CO₃ precipitation,
  - by means of ionic exchange

- Vegetable buffer dust mixed with gelatine to obtain test panels
- Chrome shavings mixed with plaster to obtain test panels
C2. Chosing the best valuation (2): an example

2) Comparison between different options for Residual galvanic baths, source for Cr (III) salt for the tanning process:
A= Separation of Cr (VI) by means of MgO precipitation  
B= Separation of Cr (VI) by means of Na$_2$CO$_3$ precipitation  
C= Separation of Cr (VI) by means of ionic exchange

**Table 10 Assessment of environmental performance of Residual galvanic baths valuations**

<table>
<thead>
<tr>
<th>Ind. Number</th>
<th>Name of indicator</th>
<th>Best performing option</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Water consumption</td>
<td>A=B</td>
</tr>
<tr>
<td>10</td>
<td>Electricity consumption</td>
<td>Not applicable</td>
</tr>
<tr>
<td>15</td>
<td>NOx emissions</td>
<td>A=B=C</td>
</tr>
<tr>
<td>19</td>
<td>Water emissions</td>
<td>A</td>
</tr>
<tr>
<td>20</td>
<td>Use of chemicals</td>
<td>A</td>
</tr>
</tbody>
</table>
Table 11 Assessment of economic performance of Residual galvanic baths valuations

<table>
<thead>
<tr>
<th>Ind. Number</th>
<th>Name of indicator</th>
<th>Best performing option</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Wastewater treatment costs</td>
<td>Not applicable</td>
</tr>
<tr>
<td>26</td>
<td>Raw material costs</td>
<td>A</td>
</tr>
</tbody>
</table>

Table 12 Assessment of social performance of Residual galvanic baths valuations

<table>
<thead>
<tr>
<th>Ind. Number</th>
<th>Name of indicator</th>
<th>Best performing option</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>New jobs that could be created (number)</td>
<td>A=B=C</td>
</tr>
<tr>
<td>30</td>
<td>Number of new activities/projects that could be started</td>
<td>A=B</td>
</tr>
</tbody>
</table>

Environmental…………….A and B
Economic .......................A
Social  ........................A, B, C
Sustainability ..................A
C2. Chosing the best valuation (1)

- Fleshing valuation to obtain fat for greasing products

- Fleshing valuation to obtain protein for fertilizers

- Separation of Cr (VI) by means of MgO precipitation
  - by means of Na₂CO₃ precipitation,
  - by means of ionic exchange

- Vegetable buffer dust mixed with gelatine to obtain test panels

- Chrome shavings mixed with plaster to obtain test panels
D. Pilot plant of chosen valuation

Contacts with some firms for future development of a pilot plant:

- **TEXTILE ASSOCIATIONS (3):**
  ASEGEMA, FNAETT, AEGP
- **TEXTILE COMPANIES (4):**
  Estampados Continentales, Texknit, Estampados Family, Sisa
- **CONSTRUCTION ASSOCIATIONS (2):**
  ITEC, Union of Building Constructors of Mataró and County
- **CONSTRUCTION COMPANIES (2):**
  HORMIPRESA, CIRCA
E. Web site

www.mesval.net

MEMBERS AREA:
• send e-mails to the partners
• browse and download files which require collaborations and revisions
• source of the main documents produced during the project
• organize a forum between the partners or opened towards interested people

Introduction

Presentation and objectives

A new network of technological centres has been created in order to cooperate in Industrial Ecology projects in the Mediterranean area. This network is composed by four technological centres in Catalonia (Spain), one in Tuscany (Italy) and one in Peloponnesus (Greece). This network is coordinated by the CTM Technological Centre in Catalonia.

The MESVAL project is supported by the European Interreg III C project ECOSIND (Industrial Ecosystems in the Mediterranean area, http://www.ecosind.net/).

MESVAL is centred in three aspects:
- Valorisation and experimental assays,
- Indicators and
- Network developing and communication.

Final results will contribute to the design of IE regional strategies as well as to plan cooperative management of regional wastes.

The different technological centres are developing the following valorisation assays:
1) Valorisation of protein and fatty wastes from leather tanning processes. Application will be focused on machinery lubrication and protein hydrolysed for pharmaceutical uses;
2) Textile and tanning wastes as main components of panels for acoustic and thermal insulation;
3) Valorisation of heavy metals from galvanic exhausts as painting components and in leather tannery process.

These examples have been chosen because of the great volume of these kinds of wastes in Catalonia. The technological centres are collaborating with different firms responsible for the generation of these wastes and in the reuse of them as raw materials.

Along this project a monitoring system will be developed, based on the construction of an environmental, social and economic index of the centres. This indicator set could help to decide which technology and valorisation are better to apply for each product in the frame of the IE strategy.
F. Networking

- Inter and intra regional coordination
  - Task coordinators
- Get to know each partner’s research and projects
  - Close human contact (meetings, …)
- Coordination among partners for future collaborations
G. Dissemination (1)

Brochure
G. Dissemination (2)

• Italian small book

Basi tecnico-scientifiche e strategie per la ricerca di nuovi processi di valorizzazione regionale dei residui industriali

sito web: www.mesval.net

Analisì dei diagrammi di flusso

Nei primi mesi di attività del progetto MESVAL, ciascun partecipante coinvolto nel progetto ha analizzato le principali realtà industriali della propria regione (Castelgenova, Toscana e Puglia). Per quanto riguarda la regione Toscana, sono state identificate 4 principali processi produttivi: il settore cervino dei distillatori di S. Croce sull'Arno e Ponte a Egido, il settore olio-orticola di Pisa, il settore cervino di Livorno e il settore cervino di Prato. Per la regione Castelgenova sono stati presi in esame sia il settore cerealicolo che quello vitivinicolo. La regione Puglia non ha invece preso in esame il processo di produzione dell'olio di oliva. Per ciascun settore sono stati esaminati i diagrammi di flusso relativi ai bilanci di materia ed energia relativi a tutte le fasi di innestazione.

L'integrazione dei diagrammi di flusso esaminati dai partecipanti per ciascun settore è stata esaminata a Castelfranco di Sotto (Pisa), in presenza di un team tecnico della MESVAL, che ha presentato le possibili opportunità potenziali di recupero delle risorse. I dati raccolti sono stati utilizzati in seguito per il progetto di recupero di rifiuti, che si è sviluppato in Italia attraverso l'Applicazione di un metodo sperimentale di interramento di rifiuti.
G. Dissemination (3): actions

<table>
<thead>
<tr>
<th>Partner</th>
<th>Event</th>
<th>Where, when</th>
<th>Kind of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCCI (Nick)</td>
<td>ECOSIND meeting in the Peloponneso</td>
<td>Tripoli, March 2005</td>
<td>conference</td>
</tr>
<tr>
<td>MESVAL Coordination (Gemma)</td>
<td>Radio program about Industrial Ecology</td>
<td>Terrassa, April 2005</td>
<td>interview</td>
</tr>
<tr>
<td>MESVAL Coordination (Gemma)</td>
<td>International Conference on Industrial Ecology</td>
<td>Stockholm, June 2005</td>
<td>poster</td>
</tr>
<tr>
<td>IUCT (Carles)</td>
<td>Green Chemistry &amp;Eng Conference</td>
<td>Washington DC, June 2005</td>
<td>poster</td>
</tr>
<tr>
<td>AIICA (Silvia)</td>
<td>Leather Network Meeting</td>
<td>Igualada, September 2005</td>
<td>conference</td>
</tr>
<tr>
<td>MESVAL Coordination (Juanjo, Gemma)</td>
<td>Expoquimia</td>
<td>Barcelona, November 2005</td>
<td>Poster conference</td>
</tr>
<tr>
<td>MESVAL Coordination (Gemma)</td>
<td>ECOSIND meeting in Catalonia</td>
<td>Barcelona, November 2005</td>
<td>conference</td>
</tr>
<tr>
<td>DCCI (Beatrice)</td>
<td>ECOSIND meeting in Italy</td>
<td>Florence, February 2006</td>
<td>conference</td>
</tr>
</tbody>
</table>
H. Strategies and contribution to ECOSIND guide

• “Industrial Ecology” as a methodological tool

• Multidisciplinary approach.
  - Different industrial sectors: textile, leather tanning, metals, green chemistry, olive oil production, organic chemistry
  - Different kinds of organisations: consultancies, research and technology centres, universities, Chambers of Commerce
  - Different dimensions: social, environmental and economic dimension (sustainability indicators)
  - Regions from different countries
  - Multidisciplinary team

• “Matching” the flow diagrams

• Sustainability indicators as evaluation tool

• Research and Technology Development centres (RTD) – Industry cooperation