

Applying Industrial Ecology

Geographic information system applied to industrial symbiosis - A case study in Geneva, Switzerland

Guillaume Massard, Michael Kalbermatten, Suren Erkman

Corresponding author: guillaume.massard@unil.ch
 Université de Lausanne
 FGSE - IPTEH - Industrial Ecology Group
 Amphipôle Building
 CH - 1015 Lausanne

2. Legal basis for industrial ecology implementation in Geneva1



Local Agenda 21 adopted in 2001:

«Law on public action towards sustainable development»

Article 12 (ECOSITE):

«The State facilitates possible synergies between economic activities in order to minimize their environmental impacts.»



1. Overview of Geneva economic activities

General information:

- ✓ 447'584 Inhabitants
- ✓ Surface 283 km²
- ✓ 95% of direct boundary with France

Economic activities:

- ✓ 85% trading, transport & services
- ✓ 14% industries and construction

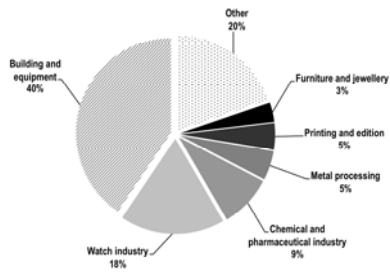
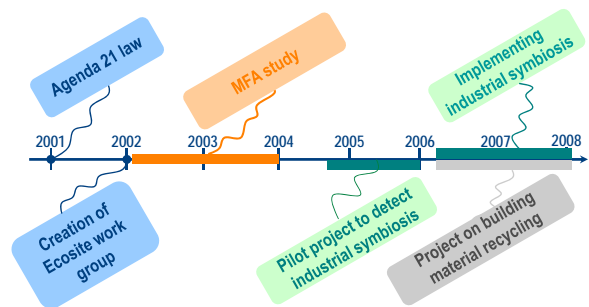


Figure: Main industrial sectors in Geneva (2006)

Waste production: (2006)

- ✓ 575'476 tons
- ✓ 22% urban
- ✓ 6% industrial
- ✓ 72% construction

3. History of the Ecosite work group



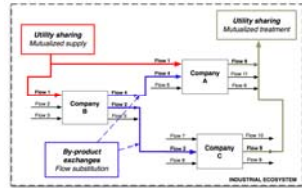
4. Goals of the industrial symbiosis project in Geneva

Goals for territorial and industrial planning:

- To go beyond classical collecting and recycling systems by locally reusing material and energy flows through by-product exchange networks
- Study the feasibility of sharing and mutualising infrastructure and services in industrial estates
- Insert by-product reuse in decision process for industrial planning and setting up of new activities

Goals for the SD:

- Reducing the impact of economic activities through efficient and local resource management



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5. How can GIS helps in optimizing industrial systems

Database linked GIS system and territorial planning:

- Allow territorial understanding at different scales by overlapping spatial layers and data
= decision support tool for IS implementation
- Allow spatial problem solving such as:
 - Calculation of euclidean distance between objects
 - Definition of preferential path
 - Definition of spatial buffer
 - Choose of locations that meet some requirements
 = decision support tool for the spatial organization of economic activities
- Possible combination with other tools to geographically anchor networks and processes
= linked to material flow database

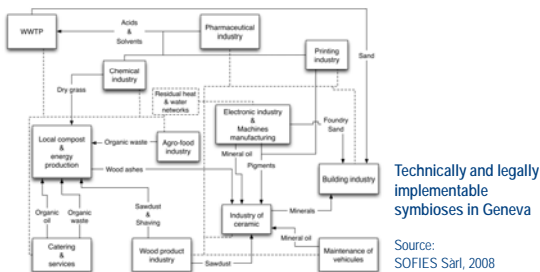
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4. Goals of the industrial symbiosis project in Geneva

Status 2008 (database building and field projects) :

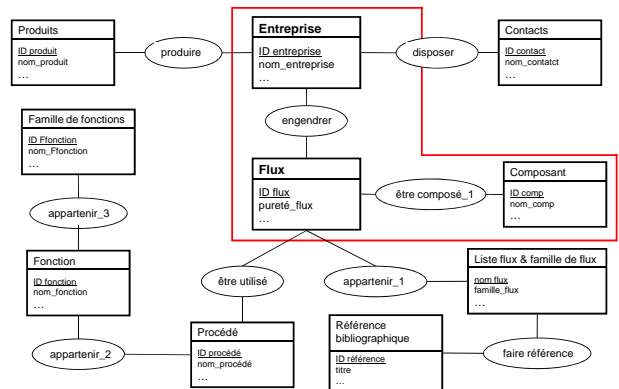
- 31 companies from 12 sectors, more than 800 flows described from 12 industrial sectors
- 6 pre-existing symbioses detected, 17 opportunities under study, 1 implemented



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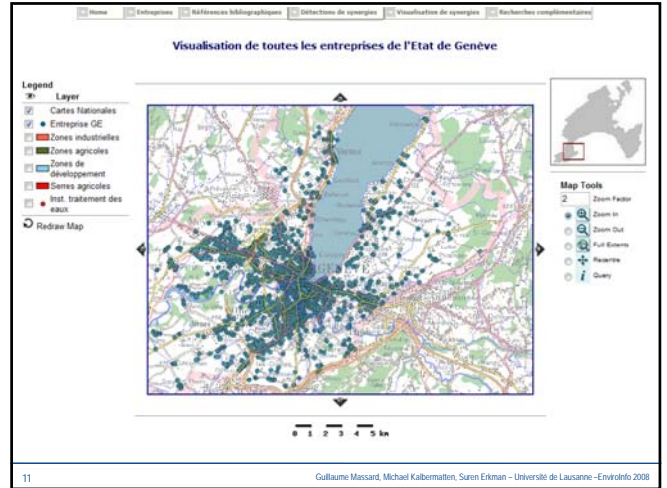
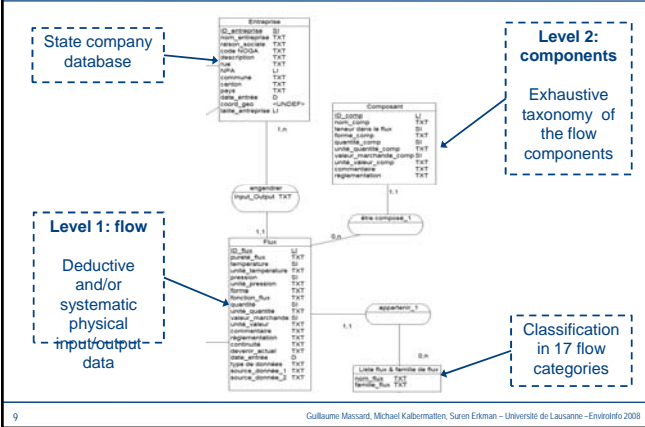
6. Building the database for flows management: conceptual model



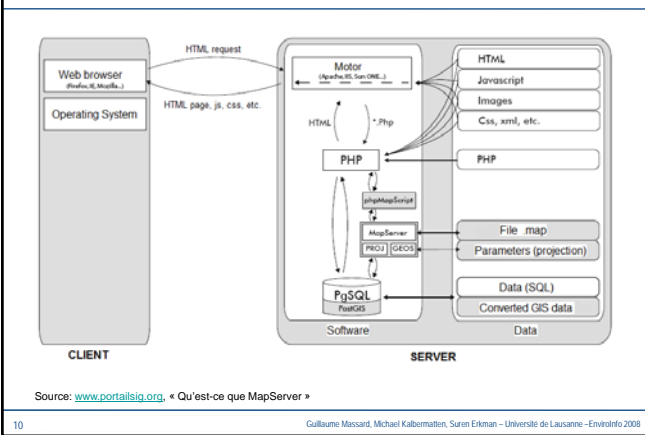
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6. Building the database for flows management: conceptual model



6. Building the interface: mapserver



Menu | Entreprises | Références bibliographiques | Définitions de synergies | Visualisation de synergies | Recherches complémentaires

Modification d'un flux de l'entreprise Caillou SA

Nom de flux*	Oxyde de chrome	Taxation des flux																					
Nature	input																						
Type de données	Systematique																						
Unité de flux (%)	00																						
Température	0	Unité: -																					
Pression	0	Unité: -																					
Forme	-																						
Quantité	0	Unité: -																					
Valeur marchande	0	Unité: -																					
Commentaire	Réglementation																						
Implémentation																							
Contraintes																							
Devenir actuel																							
Date de la mise à jour	2008-09-05																						
Source de données 1																							
Source de données 2																							
Fonction																							
Composants	<table border="1"> <thead> <tr> <th>Num*</th> <th>Oxyde de chrome</th> <th>Taxation des composants</th> </tr> </thead> <tbody> <tr> <td>Teneur (%)</td> <td>0</td> <td></td> </tr> <tr> <td>Forme</td> <td>-</td> <td></td> </tr> <tr> <td>Quantité</td> <td>0</td> <td>Unité: -</td> </tr> <tr> <td>Valeur marchande</td> <td>0</td> <td>Unité: -</td> </tr> <tr> <td>Commentaire</td> <td colspan="2"></td> </tr> <tr> <td>Réglementation</td> <td colspan="2"></td> </tr> </tbody> </table>		Num*	Oxyde de chrome	Taxation des composants	Teneur (%)	0		Forme	-		Quantité	0	Unité: -	Valeur marchande	0	Unité: -	Commentaire			Réglementation		
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Visualisation cartographique de toutes les synergies

Legend Layer

- Cartes Nationales
- Synergies
- Entreprises concernées
- Entreprise GE
- Zones industrielles
- Zones agricoles
- Zones de développement
- Semes agricoles
- Inst. traitement des eaux
- Redraw Map

Map Tools

- Zoom Factor
- Zoom In
- Zoom Out
- Full Extent
- Previous
- Next
- Query

0 1 2 3 4 5 km

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Visualisation de la synergie "Acide - Acide" de l'entreprise Chemical SA

Legend Layer

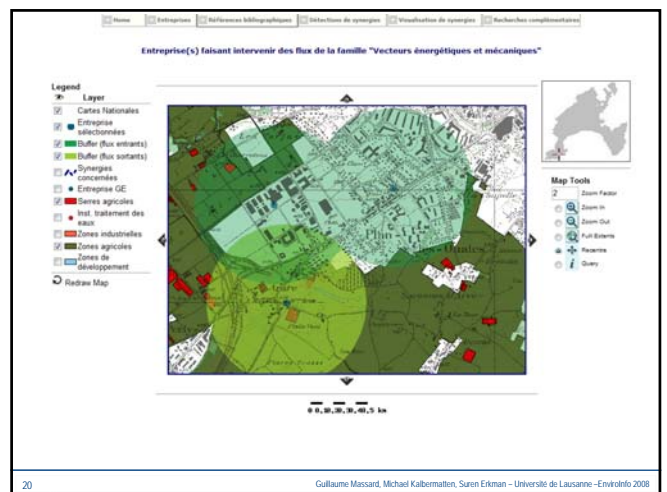
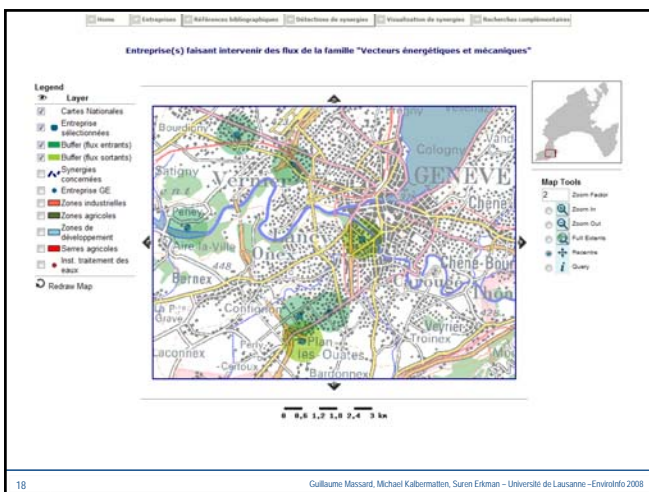
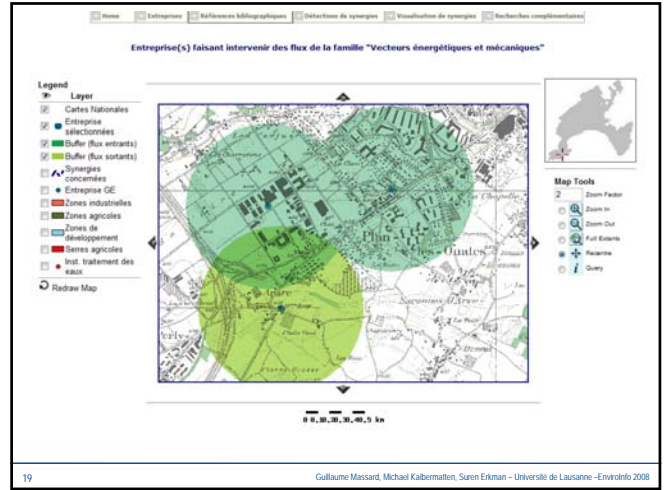
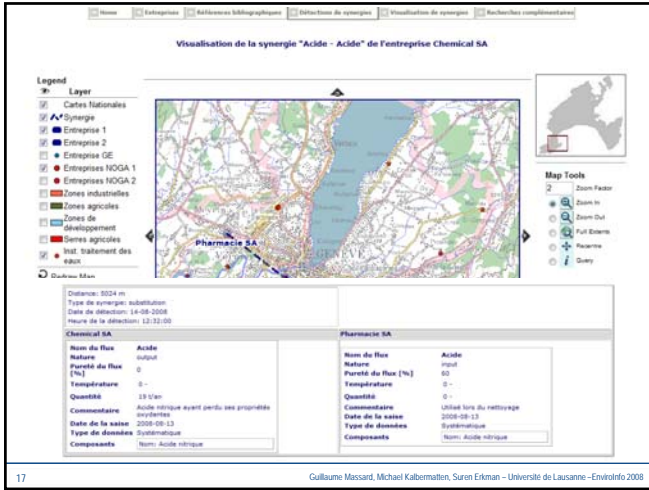
- Cartes Nationales
- Synergie
- Entreprise 1
- Entreprise 2
- Entreprise GE
- Entreprises NOGA 1
- Entreprises NOGA 2
- Zones industrielles
- Zones agricoles
- Zones de développement
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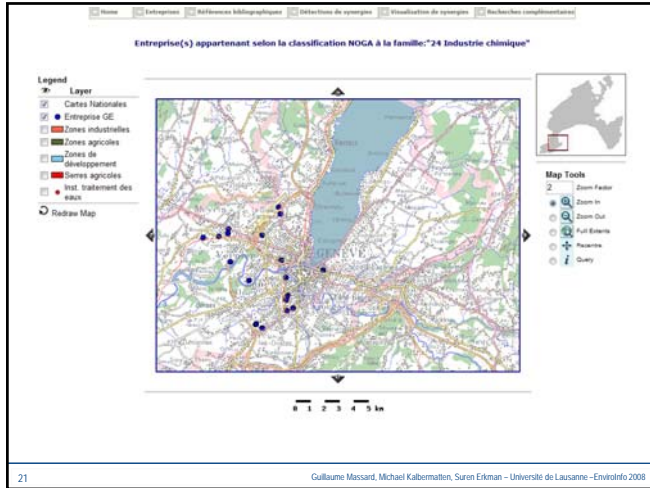
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0 1 2 3 4 5 km

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6. Conclusion and perspectives

Database linked to GIS interface: systematic approach

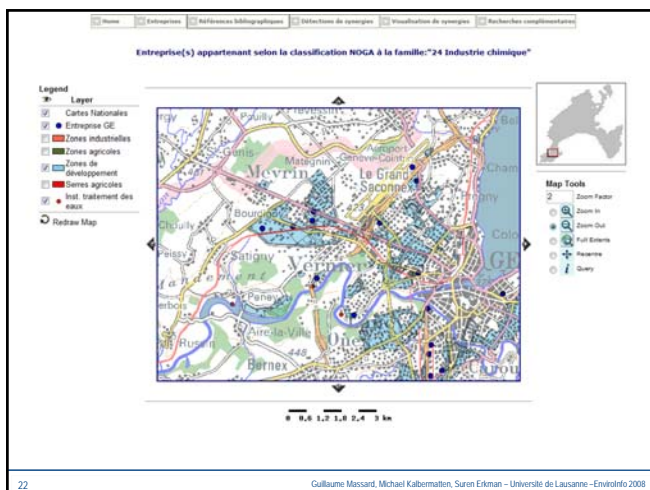
- Create added value for technical analysis of IS opportunities and risk evaluation and can be used as a decision support
- Powerful tool for visualization and communication

Database linked to GIS interface: deductive approach

- Allow deductive analysis for all economic activities (without interaction in the preliminary phase)
- Allow data storage on material flow and can be use as basis for local MFA studies
- Introduce a new parameter in industrial estate and territorial planning
- Can be used as a guide to set up priorities and detect quick wins for an efficient and local use of resources

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Thank you for your attention !


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Guillaume MASSARD
guillaume.massard@unil.ch

Suren ERKMAN
suren.erkman@unil.ch

Albin Viquerat
aviquerat@hotmail.com


ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Michael Kalbermatten
michael.kalbermatten@epfl.ch

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