University of Louvain, Information Systems Research Lab

Organizational Analysis with i*: A Social-Driven Process

Bed Management at the St Luc University Clinics

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http://www.isys.ucl.ac.be/staff/manuel/istarwk.pdf

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Agenda

- Bed Management Modeling with i*
  - Problem
  - Tropos Process
  - Early Requirements with i*
  - Late Requirements with i*
  - Design
- Reorganization of the University IS (with KAOS)
- Descartes Architect: an i* driven CASE tool
- An Industrial Case Study (Steel Making)
- i*/ social agents Cluster Project in Walloon Region

Bed Management Analysis

- **Requirements analysis needed**
  - **to reorganize and improve the hospital information system**
  - **and the university**
  - **We focus here on the bed reservation process**
- **Complicating factors include**
  - **the complexity of the university hospital**
  - **the individualism and specificities of its employees and units (e.g. management, patients, health units, bed reservation service),**
  - **the changes to the environment related, in particular to emergency and non-planned activities.**

Using i* : the Tropos Process

- 1. Early requirements: understanding a problem by studying an organizational setting; output : organizational model with relevant actors, their goals and inter-dependencies
- 2. Late requirements: system-to-be described within its operational environment, with relevant functions and qualities
- 3. Architectural design: global architecture defined in terms of interconnected subsystems
- 4. Detailed design: behavior of each architectural component defined in detail
- 5. Implementation: system implementation carried out consistently with detailed design

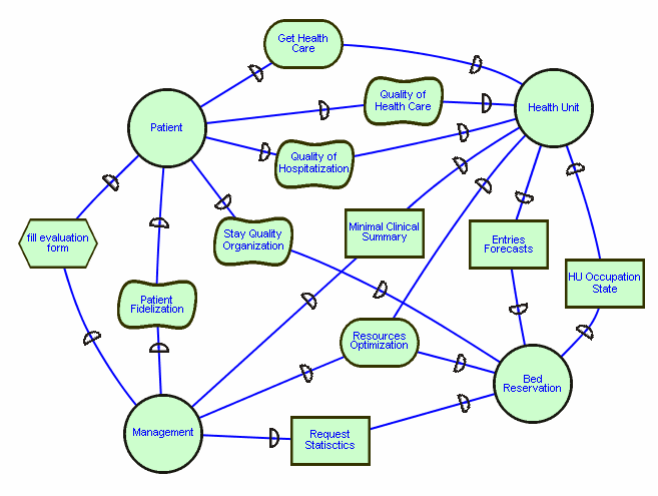
Some General Problems

- Re-encoding
- Lost of time
- Inadequate Applications
- Maintainability
- Organizational Structure and Politics
- Human Computer Interaction
- Bulk-headings / Not open minded

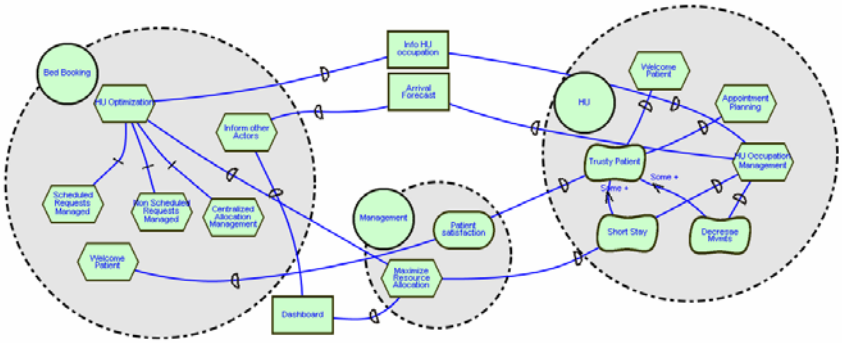
Bed Management Problems

- Information Systems do not answer to requirements
- Access to Applications
- Data Archiving
- Paper-based Processes exceeds IS
- Multiple Encoding
- Low usage level of the System
- Delocalization Tracing
- Historical Data
- Cancellation Causes

Early Requirements: the Organizational Setting

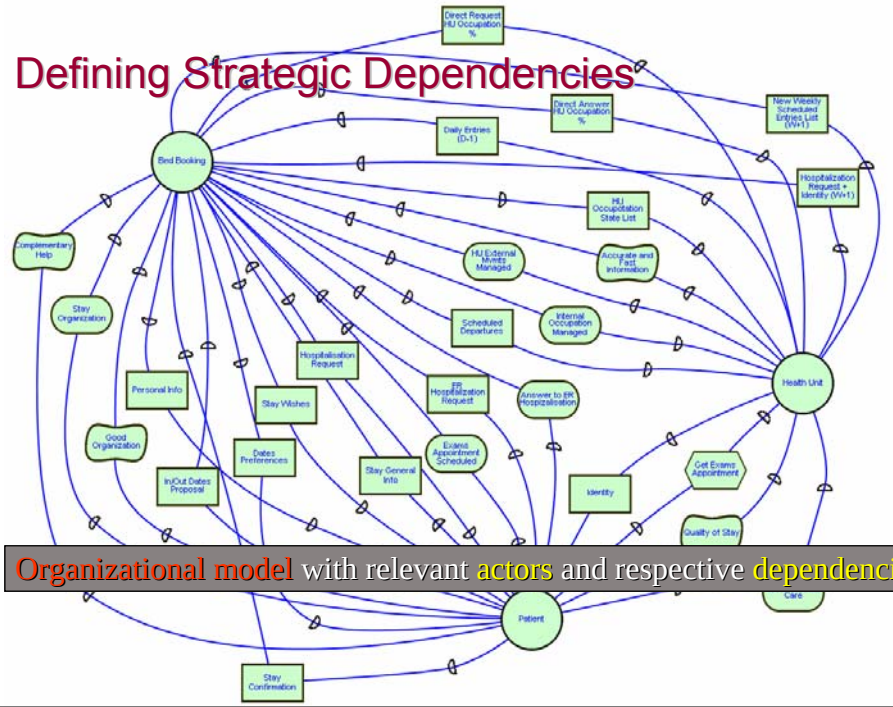


Actor Rationale Analysis



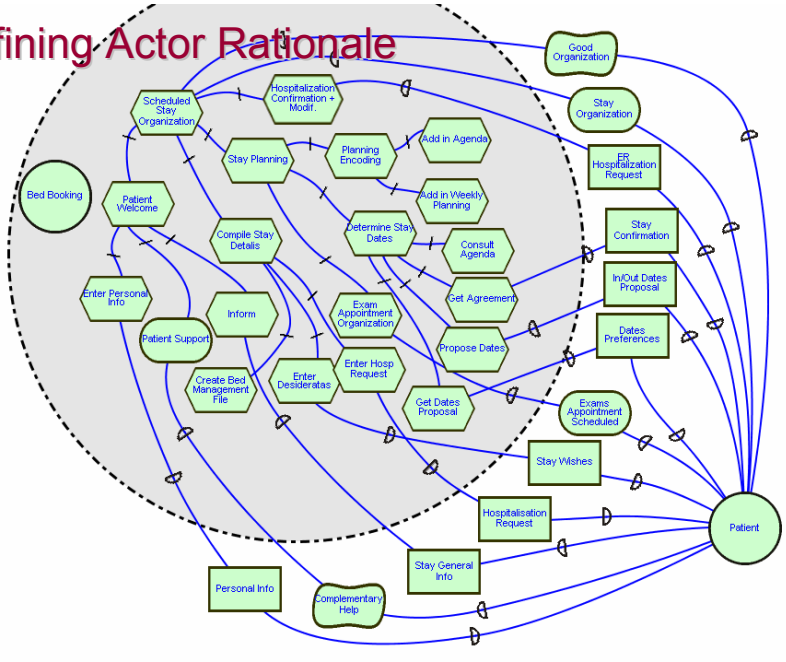
Examples: Bed Booking and Health Unit

Defining Strategic Dependencies

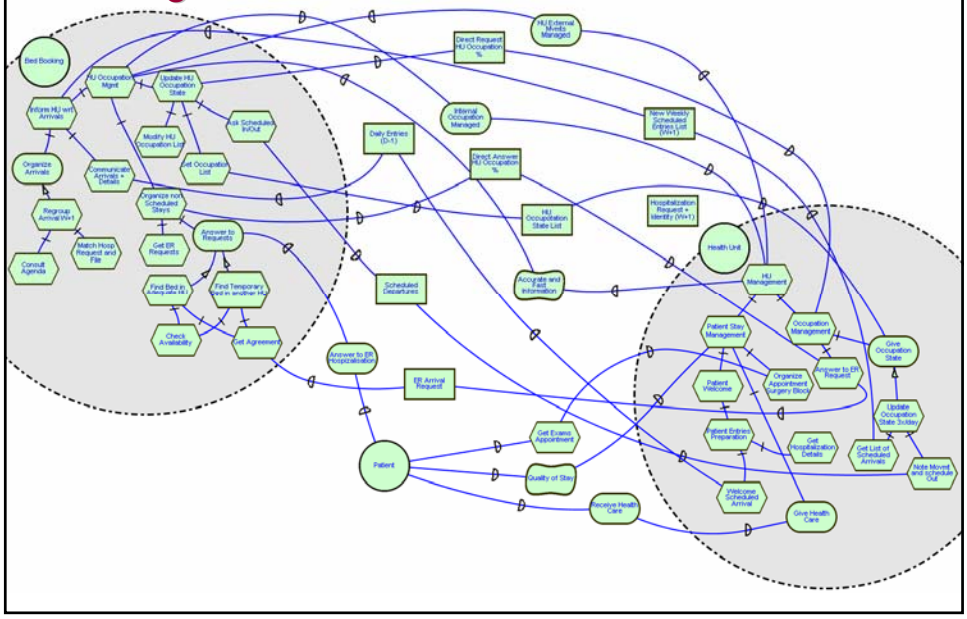


Organizational model with relevant actors and respective dependencies

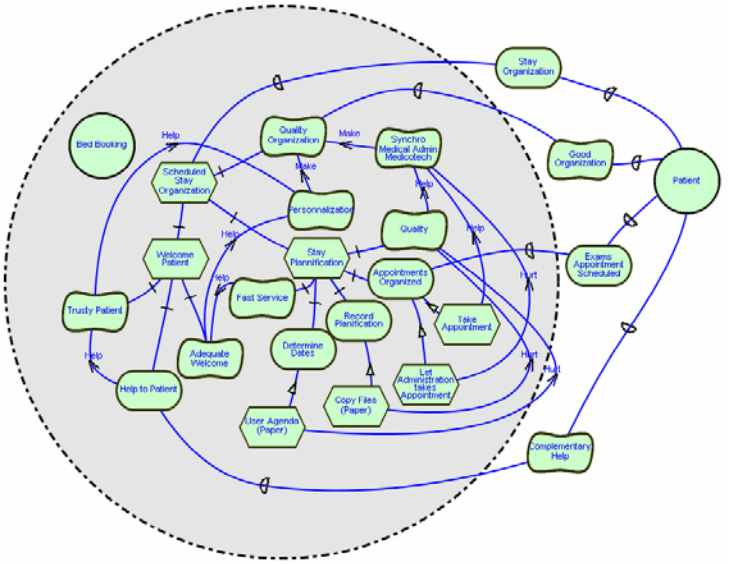
Refining Actor Rationale



Refining Actor Rationale: Health Unit



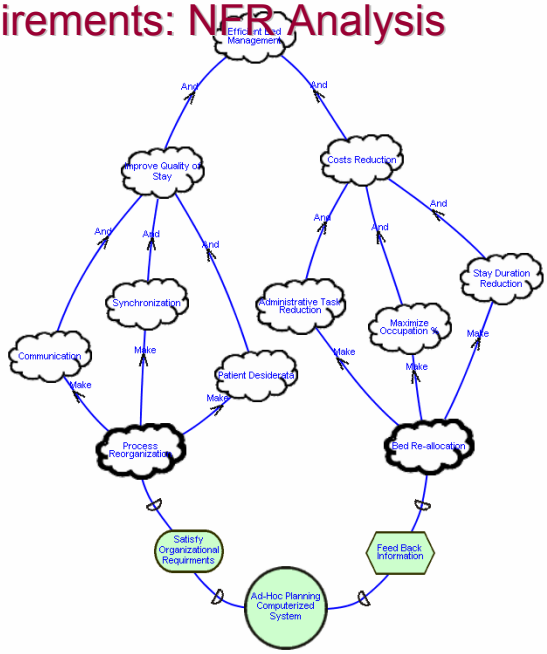
Refining Actor Rationale: Determining Problems



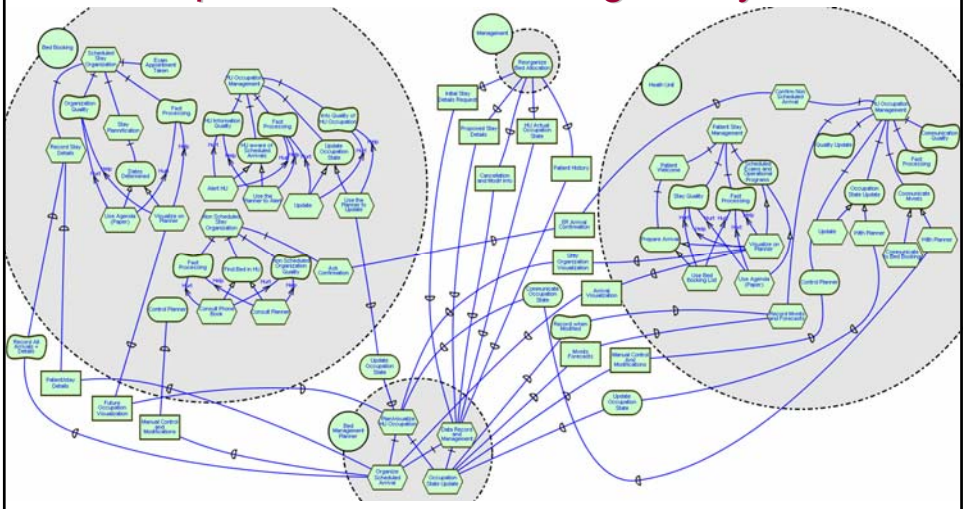
Strategic Objectives: Qualities and Contributions

Quality Objectives	Contributions
• Improve Patient Stay Quality	• Improve Communication • Reduce Delays • Improve Answers Quality
• Decrease Costs	• Decrease Stay Length • Improve Bed Occupation % • Reduce Administrative Tasks

Late Requirements: NFR Analysis

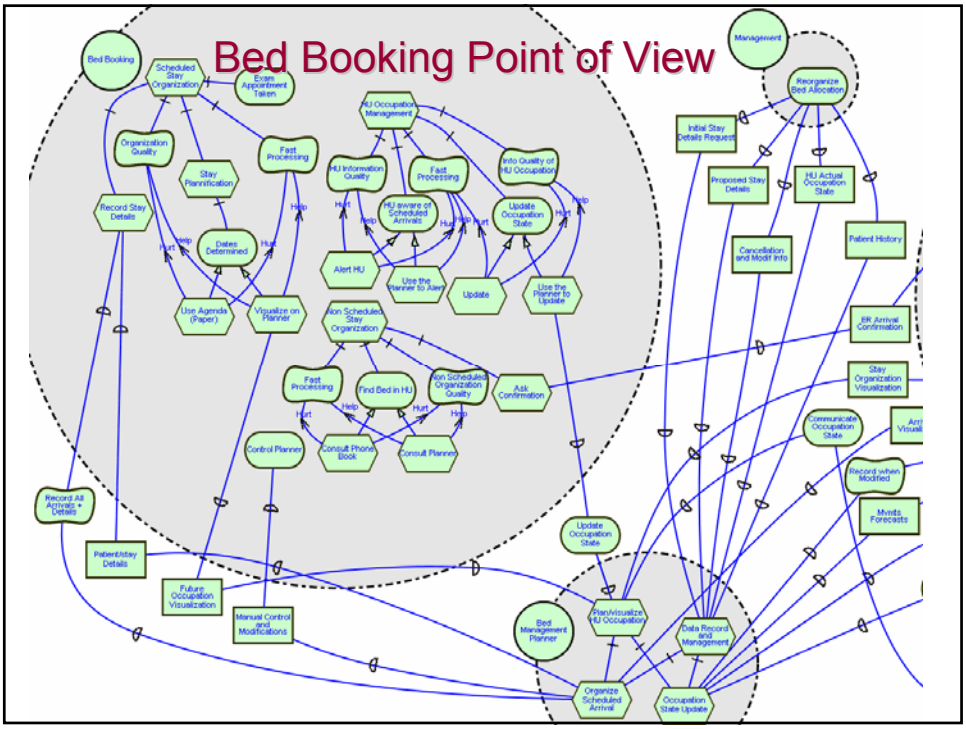


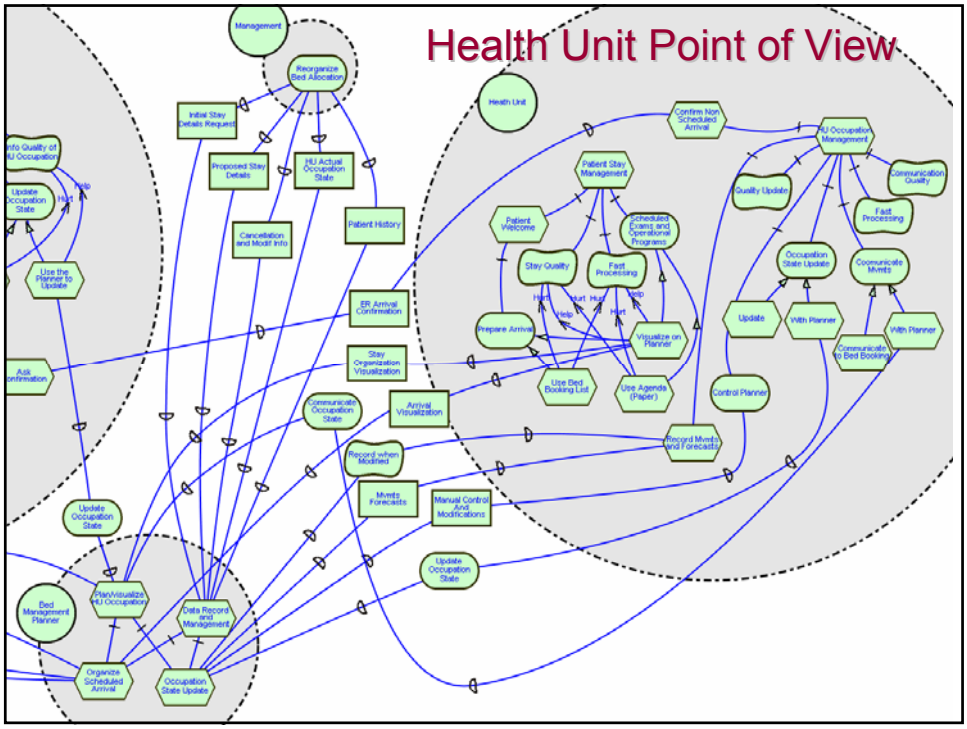
Late Requirements: Introducing the System



Functions and qualities of the system in its environment

Bed Booking Point of View





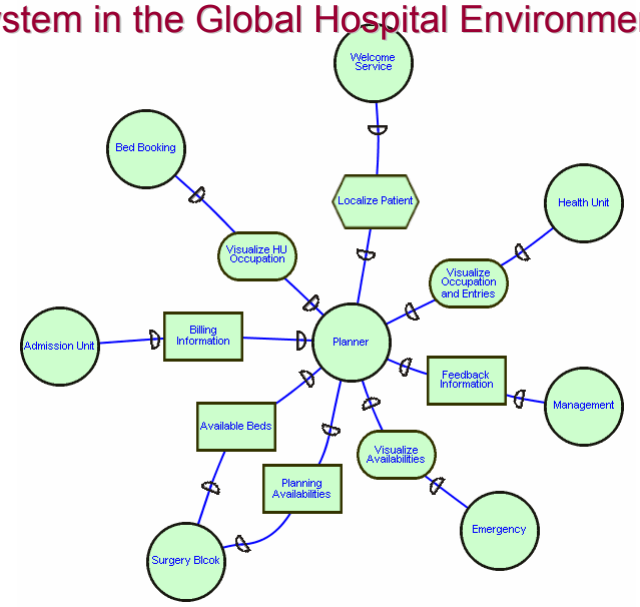
Bed Booking and Heath Unit Before/After Planner

Bed Booking Unit		**Health Unit**	
Before	*After*	*Before*	*After*
Welcome Patient	√ ►	Welcome Patient	√ ►
Patient Stay Details	√ ▼	Organize Exam/Operat.	√ ▼
Inform Patient	√ ►	Prepare Patient Arrival	√ ▼
Plan Stay	√ ▼ ▼	Encode Movements	√ ▲
Record Stay Plan	×	Update HU Occup.	×
Exam Appointment	√ ►	Communicate Occup.	×
HU Arrivals	×	Accept ER Arrival	√ ►
Update HU Occup.	×		Trace
Receive ER Arrival	√ ►		Patient
Find Bed in HU	√ ▼ ▼		Planner
	Planner Control		Control

Paper-Based to Computerized Tasks

- **Bed Booking**
  - **Hospitalization Request**
  - **Hospitalization Voucher**
  - **Hospitalization Agenda**
  - **Patient Convocation**
  - **Daily Health Units Occupation**
  - **Arrival Tracing Lists**
- **Health Units**
  - **Bed Occupation List**
  - **Health Unit Occupation**
  - **Appointment Schedule**
  - **HU Patient History**

The System in the Global Hospital Environment

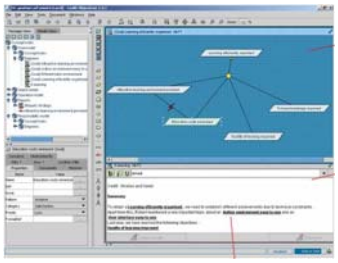


Towards Social-Driven Design Process

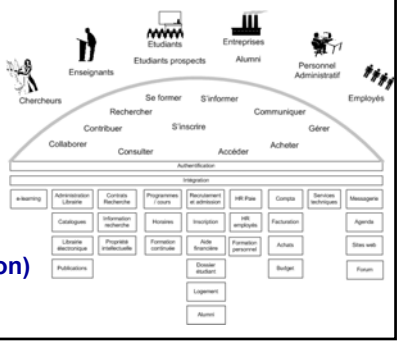
- **Architecture**: **Organizational Structures**
  - Follow the organization
  - For the University: A Matrix-based Model
- **Detail Design**: **Social Patterns**
  - Broker, Matchmaker, Mediator, Monitor, Embassy, …
- **Implementation : Agent, Peer**
  - goals, actors, social dependencies, …

Reorganization of the University IS

- **KAOS Requirements Analysis**
  - **Objectiver (http://www.objectiver.com)** ☞
- **Compliant with i***
  - **Goal versus Social Analysis**



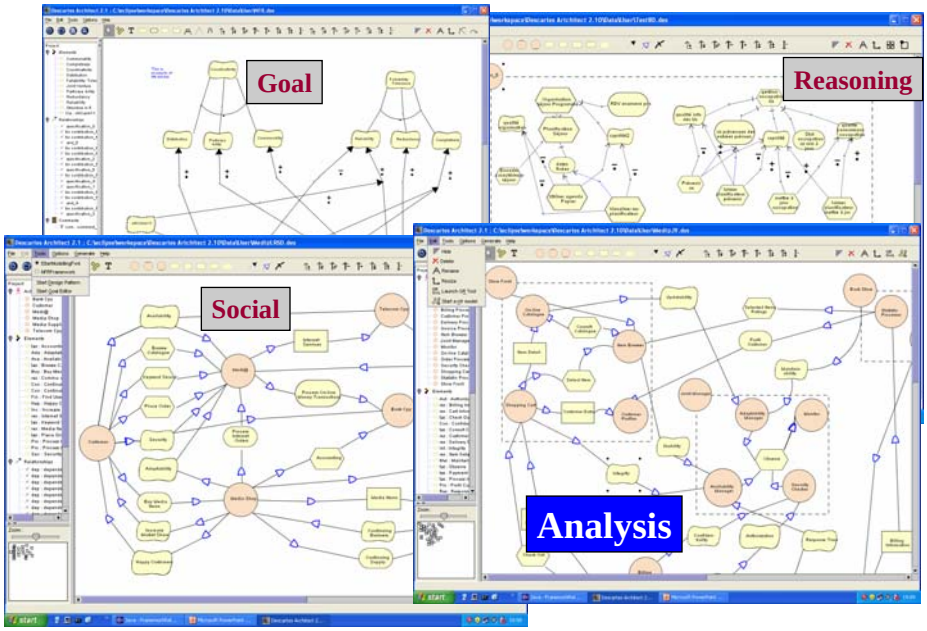
- **New Information System**
  - **University Information Portal** ☞
  - **New IS Organizational Structure**
  - **Redefinition of Roles and People**
  - **Task and Project Standardization**
  - **Integration of Existing Systems**
  - **New Requirements (ex.: EU Uniformization)**

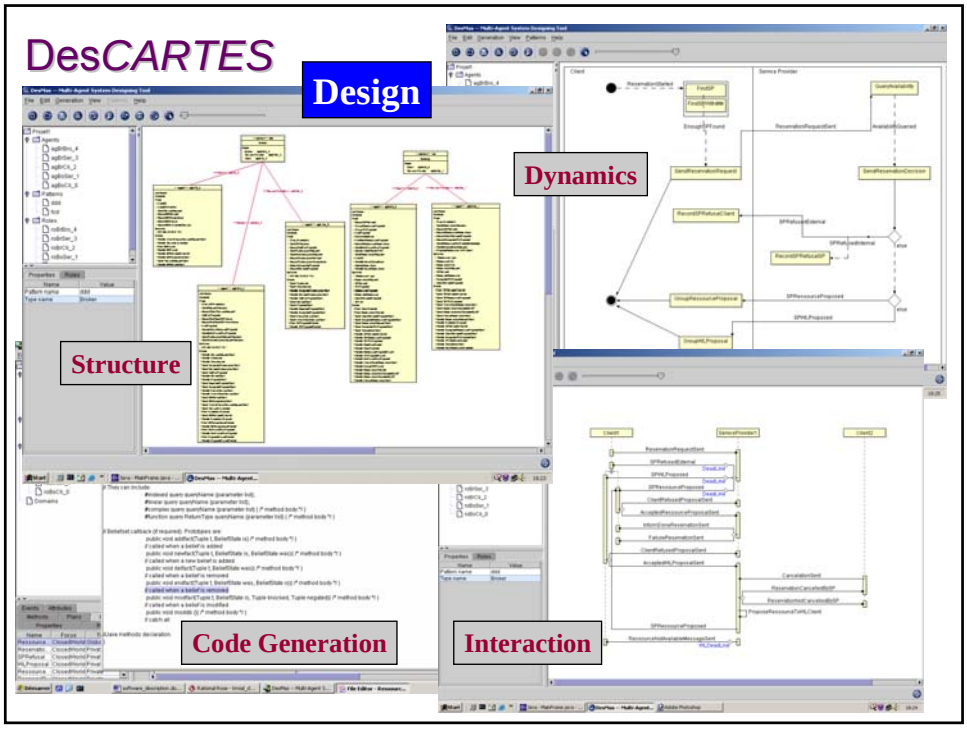


Des*CARTES* Architect: A i* driven CASE tool

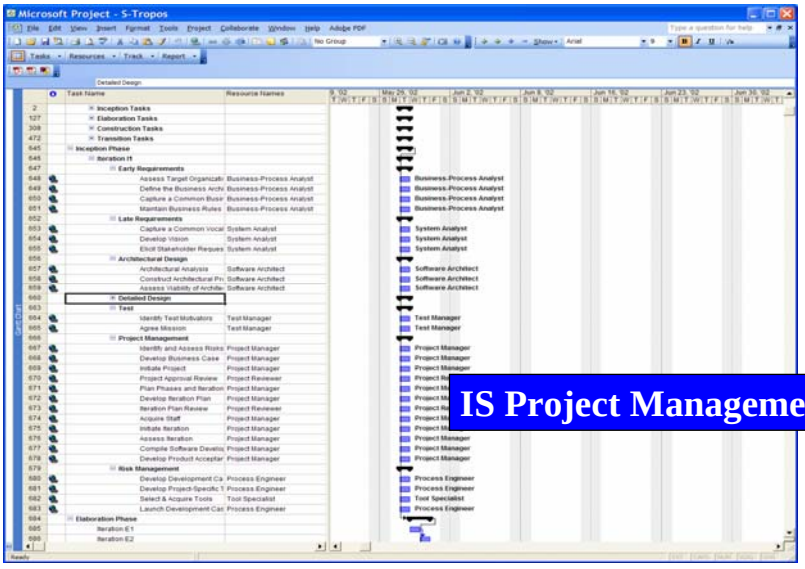
- i* Support
  - Strategic Dependency Model
  - Strategic Rationale Model
- i* Extended Enterprise Model Support
  - Goal-Role Model
  - Operational Process Model
- NFR/Goal Analysis Model
- DES-MAS Design Editor
  - Agent UML-Based Support
  - Agent Social Patterns Support
- Code Generation for JACK, JDE and JADEX Agent Platforms
- OME-i* Models Import
- XML based Support
- Gr-Tool Basic Integration
- Iterations Traceability : refinements brought to models by human resource
- S-Tropos management templates

Des*CARTES* Architect: An i* driven CASE tool

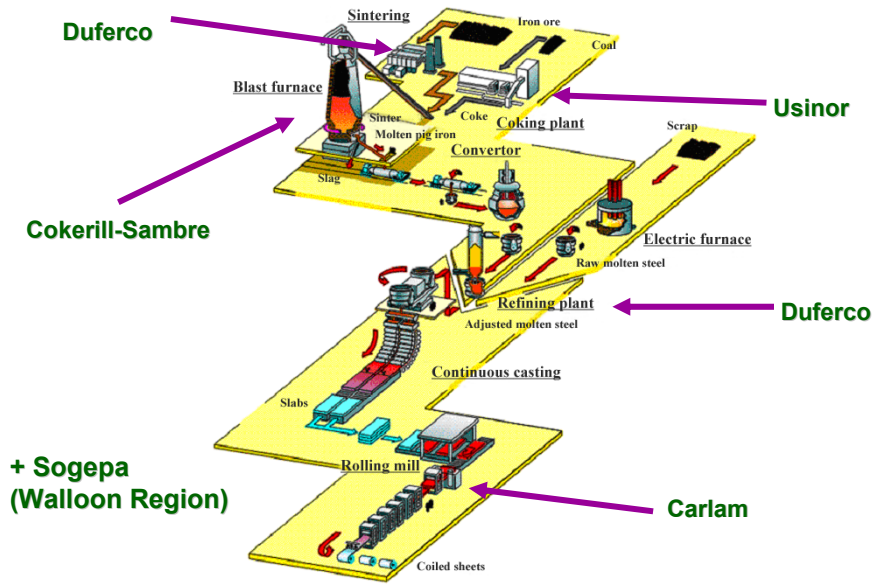




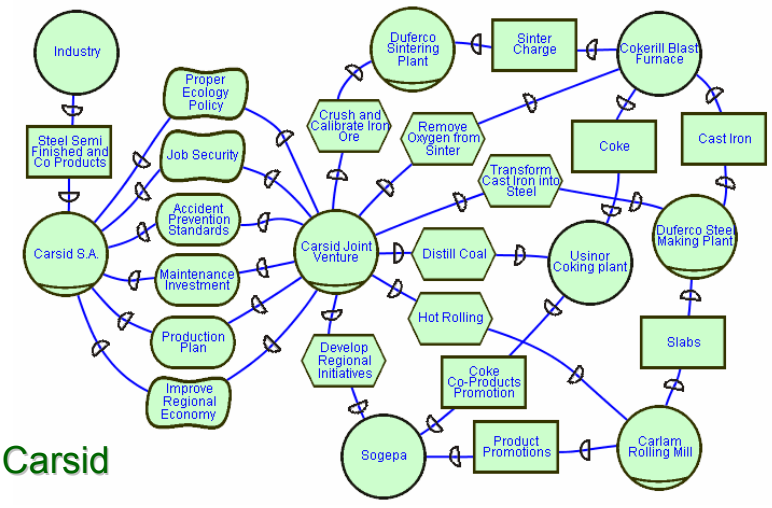
Case Tool : DesCARTES



Steel Making at Carsid



i* Joint Venture Applied to Steel Industry



Carsid

Social Agents/Models Cluster Project in Belgium

- **High Tech Small and Medium Software Companies in Walloon Region**
  - Selligent (Intelligent Sales and Marketing, http://www.selligent.com)
  - Synthetis (Management and Process Control, http://www.synthetis.be)
  - Pepite (Intelligent Data Exploration, http://www.pepite.be)
  - Manex (Network and Software Solutions, http://www.manex.be)
  - Devstage (Web applications, http://www.devstage.com)
  - Evadix (E-Publishing, http://www.evadix.be)
  - Immedia (E-business and Web Development, http://www.immedia.be)
  - Citobi (Customer Relationship Management and B2C, http://www.citobi.be)
  - Denali (Workflow and Content Management , http://www.denali.be)
  - Iris (Document Management, http://www.irislink.com)
  - Mopsys (Medical E-learning Applications, http://www.mopsys.be)
  - ...
- **University Labs**
  - Information Systems Research Unit, University of Louvain (http://www.isys.ucl.ac.be)
  - Operations Management and Technology, University of Namur (http://www.fundp.ac.be)
- **Political and Social Lobby**
  - Agoria, Multisector Federation of the Technology Industry (http://www.agoria.be)

Conclusion

- New IT domains for the Enterprise (open, dynamic, distributed)
  - Virtual Enterprises / Communities, E-MarketPlaces, TeamWare
  - ➔ **Social Environments**
- Architectures in terms of requirements and social modeling concepts
  - ➔ Social Structures, Conceptual Framework, ADL
  - Agent-Based Architectures as Social Styles
  - Details in terms of social design patterns

➔ Narrows the gap requirements / design