

Workshop: Linked Data in Architecture and Construction
Wednesday 28 - Thursday 29 March, 2012
Organized by: SmartLab, Multimedia Lab
University of Ghent, Belgium

RESEARCH PROJECTS

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Universitat Ramon Llull
Barcelona, Spain

ARC (Architecture Representation Computation) is a multidisciplinary research group integrated in the School of Engineering and Architecture La Salle founded in 1999

Members of the group are architects, computer scientists, multimedia engineers and graphic designers.

It is dedicated to the design, development and application of information and communication technologies (ICTs) to architecture in different areas, including education, design and construction.

Architectural Design and Building

Computer-based design and construction processes, building information modeling (BIM), building component catalogues, modular buildings and industrial construction.

Pedagogy

Environments to support collaborative learning, repositories of educational resources and learning systems.

Information spaces

Interactive interface design, information visualization, concept mapping and data mining.

Featured Projects

ARC is a multidisciplinary group dedicated to the design, development and application of information technology and communication (ICT) architecture, in several areas: education, projects, and research. The group was founded in 1999 and in 2009 was officially recognized as research group by the Catalan Government. During this time it has conducted numerous educational and research projects, whose results have been published in journals and at international conferences.

Currently, the lines of research of the group are:

- Design and construction: building information modeling (BIM), modular construction and manufacturing, simulation, design and construction processes, and product modeling.
- Pedagogy: collaborative environments, digital repositories, and learning models.

Among the projects funded by national research programs in Europe stand out: coordination of the project [BARCODE SYSTEM HOUSING](#) (Spanish National R+D+I plan); coordination of the project [RÉPENER](#) (Spanish National R+D+I plan); coordination of the European project [OIKODOMOS](#) (Life Long Learning Program), as well as the participation in the FP7 project [IntUBE](#).



[Interactive PDF](#)

[\[Printable version: 50Mb\]](#)



VRML environment that allows users to set relationships between spatial units, building a 3d model collaboratively. Awarded first prize in the category "Interface design" in the international competition "ACADIA Digital Design Exhibition, 2002",...

[SDR:NETWORKING \[ESPACIO\]](#)



Web environment that allows a group of students to analyze texts by means of a semantic network.

[SDR:NETWORKING \[TEXTO\]](#)



BCNi-matges Web-based environment to visualize and send photographs and photomontages done in the theme IMAGE of the course "SDR, Sistemas de Representación".

[BCNi-matges](#)



SISTEMAS DE REPRESENTACIÓN, is a pedagogic project which integrates interdisciplinary content, collaborative working methods and information technology in an innovative manner. A web-based learning environment, named SDR NETWORKING, has been designed and implemented...

[SDR NETWORKING: INFO](#)



Web pedagogic environment to promote collaboration between citizens and architecture students in the urban analysis and transformation.

[ILLA MYRURGIA](#)

Conferences

ECAADE Conference

2011-10-10

The paper "OIKODOMOS Virtual Campus: Constructing learning processes in collaboration" was presented in the ECAADE conference, that took place September 26 to 28, in Ljubljana, Slovenia.

CIB conference

2011-10-10

ARC will participate the CIB W078-W102 conference with the paper "Integration of an infrared-based monitoring system with an EIIP...." which presents some of the results obtained in the FP7 project INTUBE. The conference, organized by CSTB, will take place in Sophia Antipolis, 26 to 28th October.

OIKODOMOS International Conference

2011-07-12

The OIKODOMOS International Conference, "Innovating, Housing, Learning" will take place October 27-28th in Brussels, at W& K Sint-Lucas Architecture School.

CAAD Futures 2011

2011-07-12

A poster has been presented in the CAAD Futures conference, that took place in Liège, from the 4th to the 8th of July 2011, which summarizes the development of an integrated information platform to improve energy efficiency in the entire building lifecycle. The research work has been conducted in the project FP7 Intube and is continuing in the project REPENER, funded by the Spanish National RDI plan.

News

Workshop on ontology modelling

2011-12-29

The ontology modelling workshop, held in our institution this week on 27-28/12/2011, joined people from different countries (Spain, Belgium, Germany) with the idea of sharing knowledge and common issues about ontology design methodologies, linked data, ontology matching, data mining with ontologies,...

OIKODOMOS (Long Life Learning Programme, 2007-2011)

A Virtual Campus to promote the study of dwelling in contemporary Europe

REPENER (Spanish National RDI plan, 2009-2012)

Control and improvement of buildings energy efficiency by means of repositories

SEMANCO (FP7 programme, 2011-2014)

Semantic Technologies for Carbon Reduction in Urban Planning

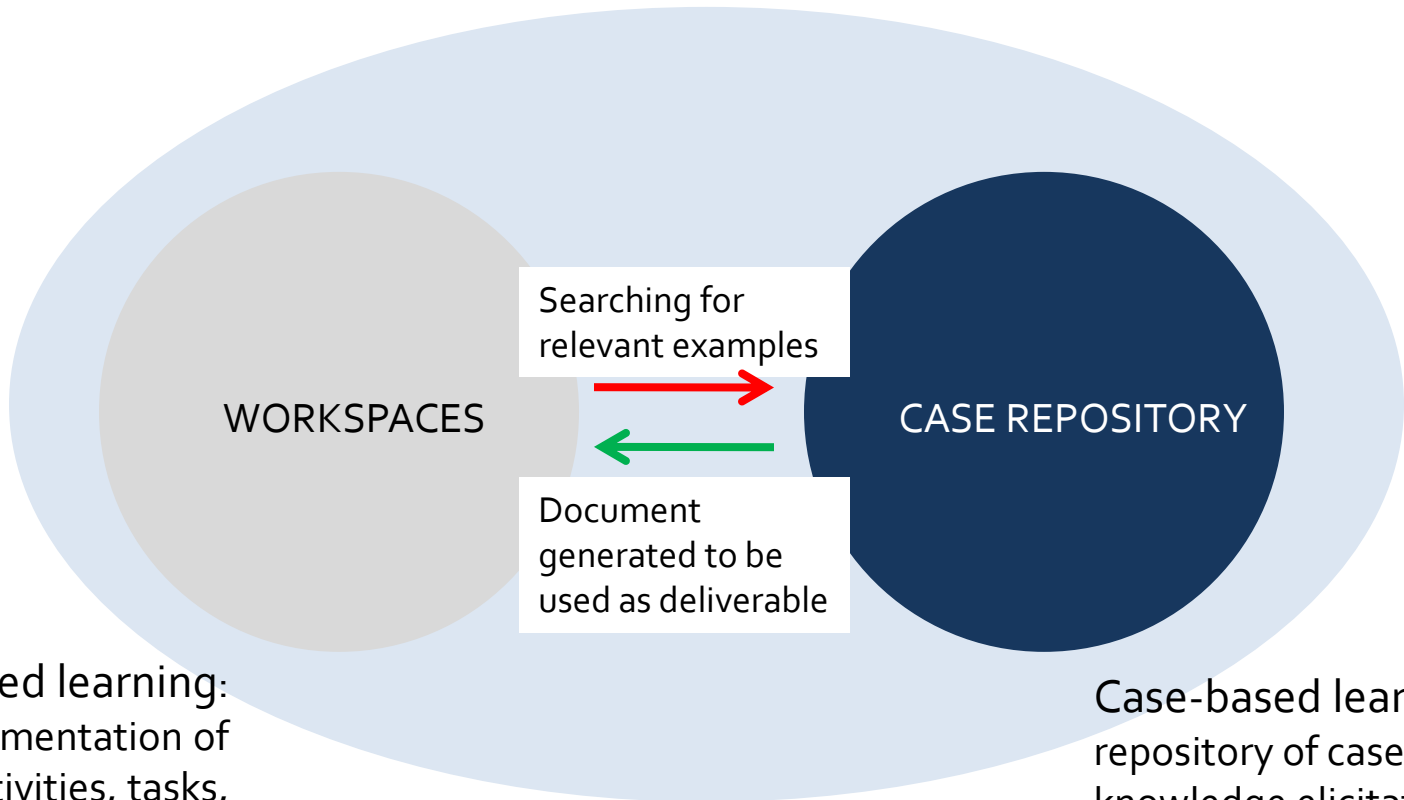
Long Life Learning Programme, 2007-2009, 2010-2011

OIKODOMOS Virtual Campus is a space of collaboration where schools of architecture and urban planning collaborate in the design and implementation of learning activities to study housing in an interdisciplinary way

It is a network of learners (teachers, students, adult learners) and activities, as opposed to an organization of schools with shared curriculum.

A digital platform has been specifically developed and implemented for the Oikodomos Virtual Campus to support a blended-learning pedagogic model. It consists of two environments: Workspaces and Case Repository.

OIKODOMOS ICT PLATFORM



Project-based learning:
Design/implementation of
learning activities, tasks,
deliverables, evaluation

Case-based learning:
repository of cases,
knowledge elicitation,
collaborative analysis

OIKODOMOS: HOUSING REPOSITORY

Hello **guest guest** | Logout
You have logged as a **Student**
Activate selection mode
View my summary cart

HOME USERS CASE STUDIES KEYWORDS TAGS COLLECTIONS SUMMARY PAGE BIBLIOGRAPHY

OIKODOMOS10_11 / Home

OIKODOMOS10_11
Date start: 2010-09-20 Date end: 2011-06-30

1

Most recent cases ▼ Most graphic information cases ▼ Most tagged cases ▼

Gated communities
Date start: 2010-03-17 Date end: 2010-09-17

Most recent cases ▼ Most graphic information cases ▼ Most tagged cases ▼

Usability Test (La Salle)
Date start: 2009-12-04 Date end: 2009-12-04

Usability test from la Salle (04-12-2009)

Most recent cases ▼ Most graphic information cases ▼ Most tagged cases ▼

Usability
Date start: 2009-11-16 Date end: 2009-12-21

Usability

Most recent cases ▼ Most graphic information cases ▼ Most tagged cases ▼

EFFECTIVE HOUSING
Date start: 2009-10-29 Date end: 2010-03-01


This workspace is dedicated to the analysis of the concept of 'Effective Housing' the topic in the Oikodomos Bratislava Workshop, carried out from 14th to 16th of October 2009. Participants in this workshop are students from the courses taking place in Superior d'Arquitectura La Salle, Hogeschool voor Wetenschap & Kunst, Institut iUG i Faculty of Architecture during the first semester 2009/10.

Most recent cases ▼ Most graphic information cases ▼ Most tagged cases ▼

Housing@21.eu: workshop 3
Date start: 2006-09-01 Date end: 2008-09-30

OIKODOMOS HOUSING REPOSITORY

This information system, dedicated to the study of housing, is a further evolution of the repository created for the Housing@21.eu project (www.housing21.eu.net). Currently, it contains over 300 cases documented and analyzed. This knowledge base will be increased during the learning activities carried out in the project OIKODOMOS (www.oikodomos.org).



CASE REPOSITORY

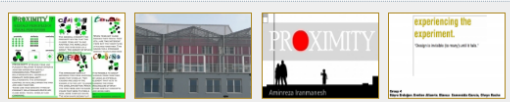
OIKODOMOS: WORKSPACES No workspace active User not connected

SystemAdmin

Workspace: Proximity
Date Start: 10 February 2011 Date End: 31 July 2011
This Workspace is dedicated to analyze or rethink the status and design of the contemporary domicile in densification processes in European (sub)urban landscapes. Besides existing theories and practices of the compact city as a way to preserve the natural landscape, reduce energy consume and consolidate social cohesion, reality often shows a contrasting practice of low dense landscapes conditioning an efficient and sustainable functioning of urban systems. A Joint Workshop dedicated to this theme will take place in the Istanbul Technical University, from May 2nd to 6th 2011.

Institutions participating in this workspace:
ITU, Sint Lucas, IUG, FA STU, EMU, Gebze Institute of Technology, URL - La Salle, Others, SUPSI, Escuela Técnica Superior de Arquitectura de Valencia, USI

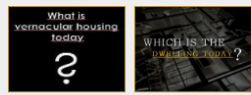
Relevant deliverables:



Workspace: Winter Semester 2010-11
Date Start: 07 October 2010 Date End: 28 February 2011
Learning Workspaces for the shared learning activities in the Winter Semester

Institutions participating in this workspace:
IUG, Sint Lucas, URL - La Salle, EMU, FA STU, USI

Relevant deliverables:



Workspace: The FINAL WORKSHOP
Date Start: 05 November 2009 Date End: 15 December 2009
This workspace is an applied research project financed by the Lifelong Learning programme (2007-2009) carried out by higher education institutions and research centers from Belgium, France, Slovakia, Spain, Switzerland and the United Kingdom. The goal of the project is to create a virtual campus to promote the study of dwelling at a European scale. The Oikodomos team have developed innovative online workspaces which have been integrated within the course structures of partner institutions. In parallel a common understanding of pedagogical practice and language appropriate to Architecture and Urban Planning studies has been developed. The pedagogical model arising

WORKSPACES

OIKODOMOS: a virtual campus to promote the study of dwelling in contemporary Europe

OIKODOMOS is a research project financed by the Lifelong Learning programme (2007-2009) carried out by higher education institutions and research centers from Belgium, France, Slovakia, Spain, Switzerland and the United Kingdom. The goal of the project is to create a virtual campus to promote the study of dwelling at a European scale.

The aim of OIKODOMOS, a Greek word for 'the builder of a house', is to set an innovative learning structure in motion, incorporating on-line and on-site activities (blended learning). This virtual campus is going to develop new methods to study housing in a multidisciplinary way, interweaving different courses and seminars, digital repositories and on-line learning environments, cases analysis and project workshops taking place at the participating institutions. Community representatives and local authorities in the participating countries are expected to participate in the project's activities.

View slideshow of the application.

LA21 TK1 Understanding of Proximity | Scheerlinck, Kris | Personal Task | 22 February 2011 to 29 April 2011

Description Predecessor Task Successor Task Keywords Learning Outcomes Materials Groups

All Groups

Deliverables of Design Studio Brussels (9)

Order by: Date | Author | Comments | Evaluations

<p>Stephan, Jud 01/03/2011</p> <p>Group1.pdf Co: 3 Ga: <input type="checkbox"/></p>	<p>Marques Ana, Rita 28/02/2011</p> <p>proximity.pd... Co: 2 Ga: <input type="checkbox"/></p>	<p>Portilla Laura, Albero 28/02/2011</p> <p>Proximity(2)... Co: 3 Ga: <input type="checkbox"/></p>	<p>Jagoda, Krawczyk 28/02/2011</p> <p>Group7.pdf Co: 3 Ga: <input type="checkbox"/></p>	<p>Eva, Misslaen 28/02/2011</p> <p>Proximity.pd... Co: 2 Ga: <input type="checkbox"/></p>	<p>Larissa, Denis 28/02/2011</p> <p>proximity.pd... Co: 2 Ga: <input type="checkbox"/></p>	<p>Evelien, Allaerts 28/02/2011</p> <p>Proximity2co... Co: 3 Ga: <input type="checkbox"/></p>	<p>Weronika, Kowa 27/02/2011</p> <p>Proximity-gr... Co: 3 Ga: <input type="checkbox"/></p>	<p>Maria, G 27/02/2011</p> <p>proximity Co: 3 Ga: <input type="checkbox"/></p>
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Deliverables of Design Studio Gent (0)

Deliverables of EMU Informal Studies on Housing II (1)

Order by: Date | Author | Comments | Evaluations

Tekbiyik, Bedia
15/03/2011



proximitybyb...
Co: 1 Ga:

WORKSPACES

A learning environment where teachers can design learning activities in collaboration

Students develop the tasks both in the digital environment in the classes

Path

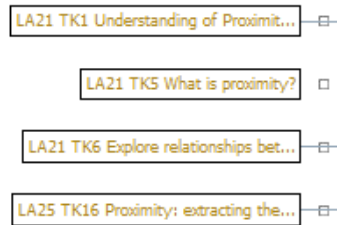
ACTIVE: => TK1 => TK4 => TK5 => TK8 => TK7 => TK8 => TK11 => TK12 => TK14 => TK16 => TK17

LOADED :

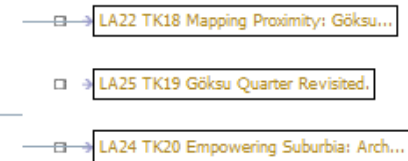
Tasks | Paths

- TK1 Understanding of Proximity
- TK2 Methods of participation
- TK3 Comment and evaluate Mapping Exercise by Urban Studio LaSalle
- TK4 Mapping Proximity: LINDEN
- TK5 What is proximity?
- TK8 Explore relationships between proximity and housing
- TK7 Mapping the proximity - Bratislava suburbs
- TK8 Evaluate and comment previous tasks: Understanding Proximity
- TK11 Urban development dynamics, Housing , proximity
- TK12 What is social cohesion?
- TK13 Micro Urban Strategies
- TK14 Interfaces I: Analysis of local houses
- TK15 Interfaces II: Housing groups in Lefkosa
- TK16 Proximity: extracting themes.
- TK17 In Situ Göksu Quarter: Signs of Proximity.
- TK18 Mapping Proximity: Göksu Quarter
- TK19 Göksu Quarter Revisited.
- TK20 Empowering Suburbia: Architectural Strategies in Linden.
- TK21 task 1
- TK22
- TK24

Add Predecessor Task



Add Successor Task



WORKSPACES

Learning tasks are organized in sequences.

Each task can be carried out by a different group of students, in one or several institutions

search

CASE STUDIES

TITLE | USER | ARCHITECT | YEAR | DATE search COMMENTS

▼	*21 Apartments, Kathan, Schranz & Strolz	Z. Dravecka	[2009-12-03]	0	✍
▼	*108, Hind House, H Arquitectes	B. Romero	[2009-12-02]	0	✍



(add to private list)

Architect: H Arquitectes
Country: España
City: Santa Cristina d'Aro
Address: Rosamar development
Dwellings:
Completion year: 2004

Creator: **Bruno Romero**
Date creation: 2009-12-02
Case added in Workspace: **EFFECTIVE HOUSING**

Description: 108, Hind House, was thought with the intentions of generate the minimal ecological footprint. The project is adapted to the natural slope together with the Mediterranean thick vegetation of the land: reducing large quantities of ground which they would have to dig out, reducing foundations and waste generated.

Keywords: *detached single-family housing, *Traditional building technique/ Self-construction, *Natural ventilation systems - courtyards,

▼	*Weiner Residence, Cross Architecture	E. Pérez	[2009-12-01]		
▼	*GATA Summerhouse, Valdimar Harqarson/ASK arkitektar	Z. Dravecka	[2009-11-26]		
▼	*EXPONOR HOUSE, Fatima Fernández & Michele Cannatà	A. Sánchez	[2009-11-26]		
▼	*cellophane house, Kieran&Timberlake	I. Contreras	[2009-11-26]		
▼	*COMUNAL DWELLINGS FOR WORKERS, J. M. Puigdemasa Hospital	M. Gispert	[2009-11-26]		

CASE REPOSITORY

It contains over 350 cases of housing projects and buildings, documented and analyzed by students from different schools

It is more than a digital library: it is a learning resource to support collaborative learning

Concept

Customization

Flexibility and Variability

Gated Communities

Housing Amenities and Utilities

Impact of ICT on the Human Psyche

Mix of Urban Functions

Mixed-Use Housing

Neighborhood

Participatory Process Pattern

Proximity

Reconversion and

Regeneration

Social Diversity and

Availability

Social Mix

Suburban Housing

System

Universal Design

Flexibility and Variability

[Introduced by Viera Joklova , 2011-12-09 14:47:34]

Housing flexibility and **housing variability** can be defined as the design of dwelling structures with an understanding of the prospective development of the site as well as life and social scenarios, and with the possibility of making appropriate changes in the living environment. Flexibility and variability enable one to change the living environment according to the new requirements in the course of their existence. It can be applied to urban and architectural design related to the actual and future needs of the people living there.

In the **urban context** it applies mainly to the structure of amenities of a city and community in order to design specific areas for shops, services, offices, leisure and culture. The variable, flexible structure of amenities of a community within a city offers an attractive mixture of different functions, which can be linked in a variety of ways with multifunctional, point-concentrated units, i.e. shopping malls, multipurpose complexes, courthouses and greenery. Public spaces play significant role and create a connecting framework for the combination of individual amenities. Public spaces may offer a number of variable, flexible elements that increase their attractiveness of use and may also change their functions. The final outcome in the context of a variable, flexible urban structure improves the quality of housing through its relationship to such structures.

In the **architectural context**, the flexibility and variability provide specific conditions to create spaces that are designed to change their functional use. They are the spatial expression of the activities created by a rapidly changing way of life. Architects and planners must be able to translate the needs and resources of society into plans and express the ideals of the time.

Related Cases

Variability of dwelling unit (student work)



A variable apartment is a dwelling without changing the total area and with inexpensive modifications to the

Flexibility of dwelling unit (student work)



A Flexible apartment is a type of flexible but uncomplicated and of sliding walls and a variety of unchanged. Such an apartment furniture elements are generally

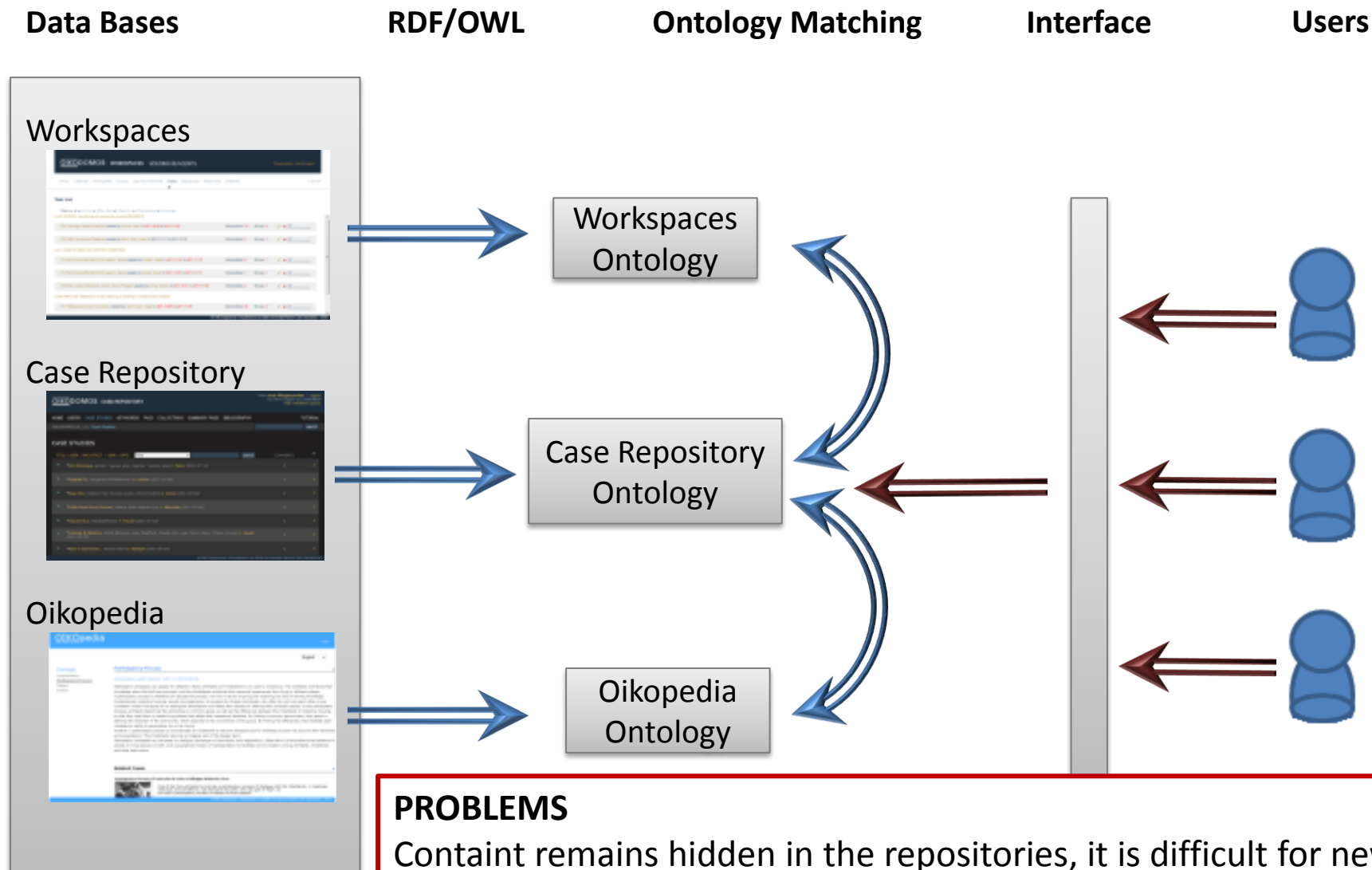
OIKOpedia

Key concepts regarding housing studies formulated by participating teachers

Associated cases

Descriptions in seven languages (English, Spanish, French, Italian, Dutch, Slovak and Turkish)

OIKODOMOS_ontologies



PROBLEMS

Content remains hidden in the repositories, it is difficult for new users to find “decontextualized” information
Potential relationships among databases are not visible

OIKODOMOS_ontologies_interface


Search Flexibility and Variability in all Repositories

Context filters

Repositories	Concepts	Activities	Cases Studies
-All -CaseRepository -Oikopedia -Workspaces	-All -Customization -Flexibility -Impact of ICT -Mixed-Used -Neighborhood -Pattern -Proximity	-All -Analysis -Blended learn -Collecting -Defining -Designing -Developing -Organizing	-All -1 Centaur

Results

Flexibility and Variability [21, *21], B. González Ferrer-Vidal [2012-03-09]



Case study: **Les Nids**, Christophe Ouhayoun, Nicolas Ziesel, [KOZ architectes]
Private libraries: (no added in private libraries)
Defined by: [B. González Ferrer-Vidal] The white box is "plugged" into the living room without a pre-defined function.
Added in: **Oikodomos_Ontology**

(add to private libraries)



- **Flexibility and Variability** is a **tag** attached to **case Les Nids** in *Case Repository*.
- **Flexibility and Variability** is a **Keyword** attached to **learning activity Reflections on Housing** in *Workspaces*.
- **Urban theoretical concepts** is a **task** added to **learning activity Reflections on Housing** that has attached **Flexi**
- **Today's apartment architecture** **Variability** in *Oikopedia*.

GOALS

To transform the interface in a space of interaction, with certain "depth"

The interface helps the user to construct knowledge; it is more than a search tool

Spanish National RDI Plan, 2009-2012

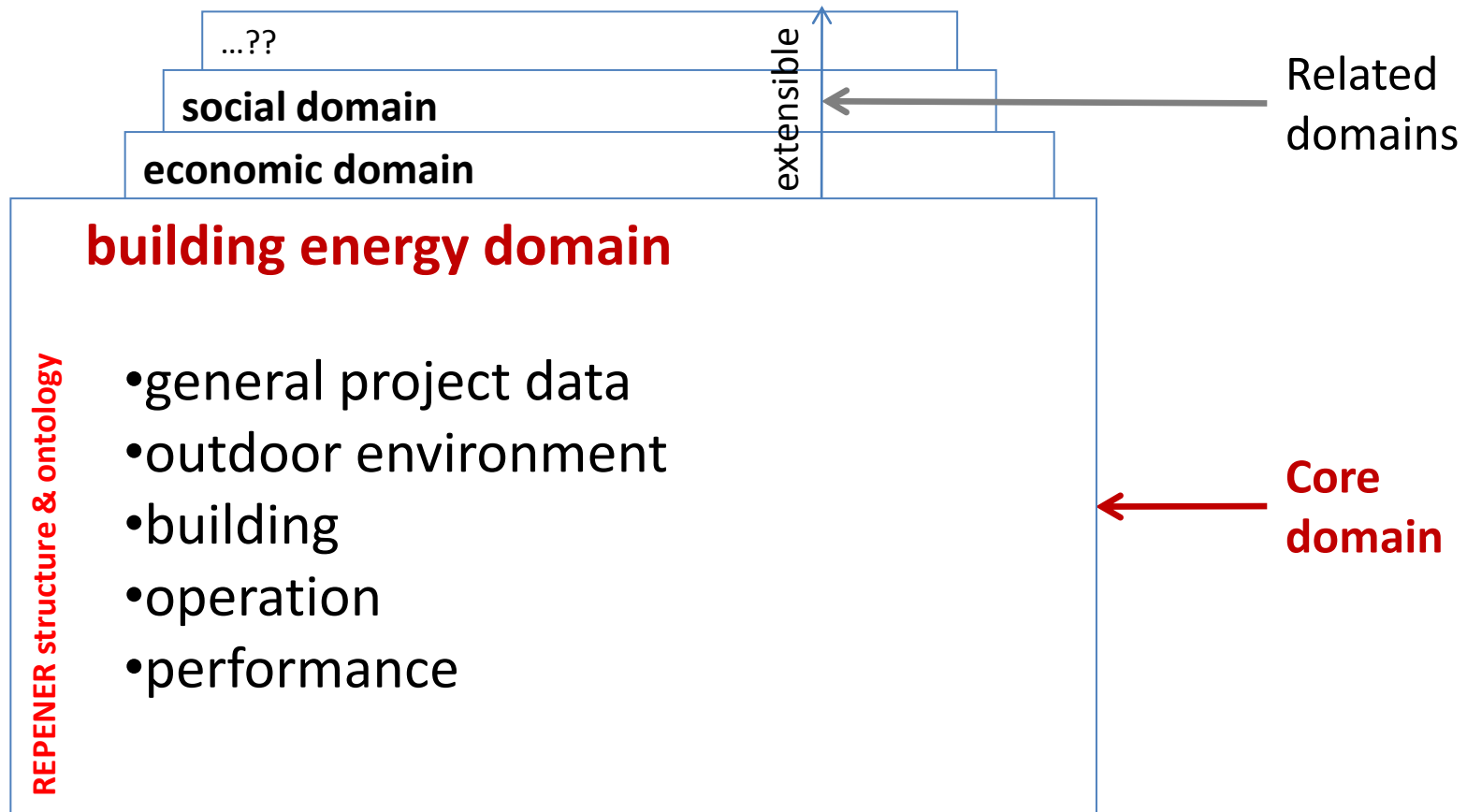
The purpose is to create a energy information system based on the model proposed by the initiative Linked Open Data

The energy model embraces two kinds of energy information:

- building information (building systems, consumption,...),
- contextual data (economics, climate,...)

The data sources are of two types: proprietary and open. Both types of data sources have been interlinked by means of ontologies.

REPENER_energy model



Scale : EU/State/Reg/Urb/**Building**/Unit/Zone

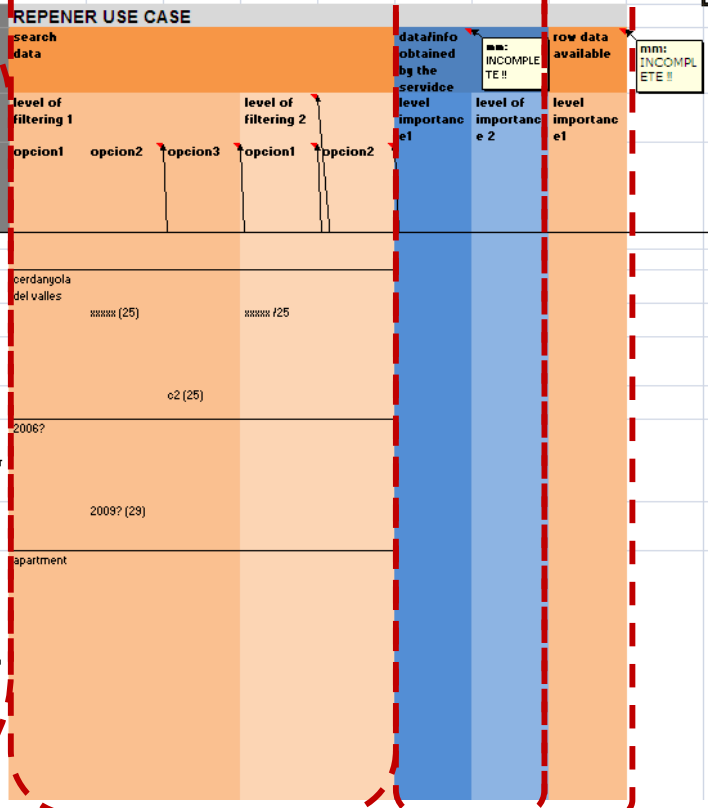
To build-up the **energy model**, the knowledge of experts in building energy domain was formulated in terms of categories. These categories provide the starting point for the creation of a generic **data structure**.

REPENER_data structure

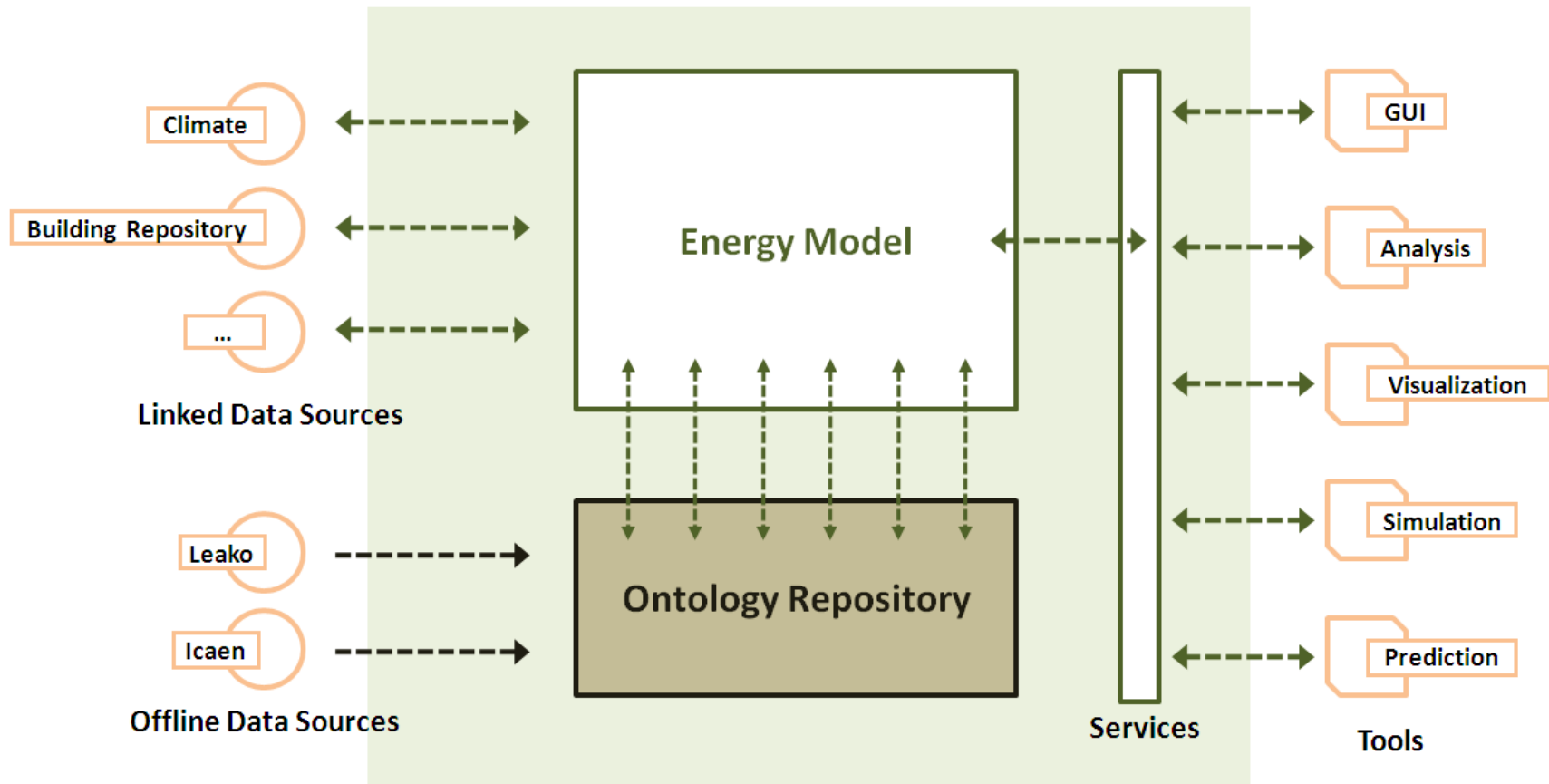
Use cases have been used to reduce the number of parameters (potentially an immense list!) included in the energy model **data structure**. **Energy parameters** have been analyzed and classified and **relationships** between them have been identified. Based on this study, an open and flexible **data structure** has been created jointly by **energy experts** and **ontology engineers**.

Definiciones datos (proyecto DATAMINE; ISO 13790:2008)

DATAMINE DATA STRUCTURE Version 1.0 from 30th October 2006					
No.	data field name	data field label	unit	definition	input type f: free p: predefined
B General Building Data					
25	building location: city	bu_city			f
26	building location: post code	bu_post_code			f
27	building location: region	bu_region		if applicable, for each country a list of regions (respectively provinces, departments, Bundesländer ...) should be provided	p
28	building location: climate zone	bu_climate		if national climate zones are defined a list should be provided	p
29	building erection year/period: first year	year1_building	a (year)	year of erection (finishing) of the building. If not the concrete year but the approximate time period is known (e.g. building was erected some time between 1900 and 1920) insert here the first year of this time interval (in the example: 1900)	f
30	erection year/period: last year	year2_building	a (year)	If the year of erection is exactly known insert it here a second time. If it is not exactly known insert the last year of erection period (in the example: 1920)	f
31	main building utilisation	main_utilisation		main utilisation of the building.	p



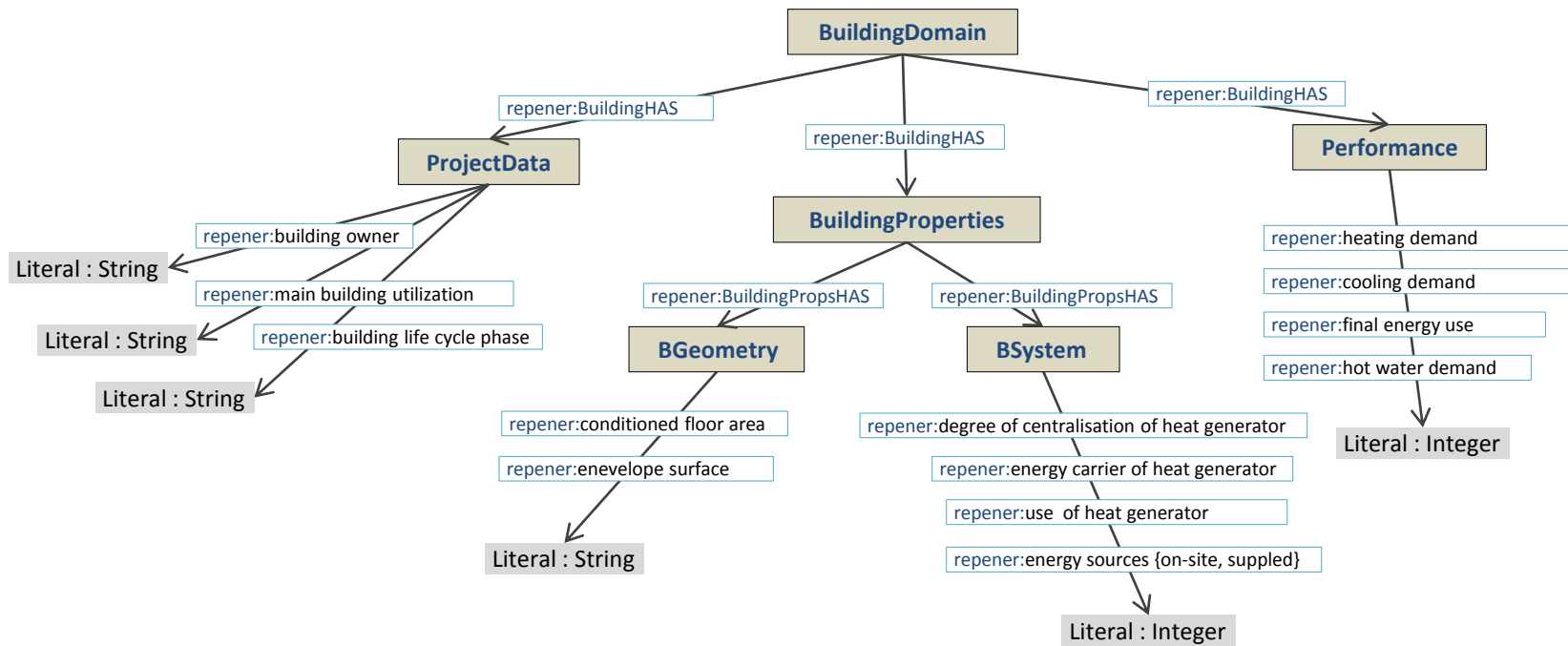
REPENER_ontologies



The core of the information system is the energy model which contains descriptions of terms, relations, types and units which are present in all of the data sources.

The energy model is implemented as a global ontology which is the union of the sets of terms from all data sources.

REPENER_ontologies



- Local ontologies have been designed for each data source using the OWL.
- An ETL process has been applied to translate relational databases into RDF.
- D2RQ mapping language has been used to obtain RDF dumps which have been uploaded to a RDF server (Virtuoso server).

REPENER_ontologies_interface

REPENER - Control and improvement of energy efficiency in buildings through the use of repositories

Welcome to REPENER !

Introduce yourself and REPENER can bring you the information you need

I'm a

building user
building owner
architect
engineer
facility manager
public administrator
researcher

[see more](#)

I'm involved in a

project of a new building
project of building retrofit
feasibility study
energy certification
research

[see more](#)

I'd like to know

typical solutions
building examples
typical performances

[see more](#)

REPENER_ontologies_interface

REPENER - Control and improvement of energy efficiency in buildings through the use of repositories

building location

[map](#)[advanced search](#)

Main building utilisation

[advanced search](#)

Passive Systems

[mark items v]

 orientation solar control insulation inertia envelope natural ventilation

Active Systems

[mark items v]

 heating[Less details](#)

Energy Carrier

- gas
- oil
- biomass
- electricity
- renewable

Degree of centralisation

- district heating
- central system for building
- system for apartment
- other

 cooling hot water lighting

[See the 137 building examples found !](#)

FP7 STREP Project, ICT Systems for energy efficiency, 2011-2014

CO₂ emissions reduction is a systemic problem that must be addressed at multiple geographical, social and economic scales. This approach to carbon reduction in urban environments can be fostered by exploiting ICTs and the application of semantic energy data modeling.

SEMANCO's purpose is to provide semantic tools to different stakeholders involved in urban planning (architects, engineers, building managers, local administrators, citizens and policy makers) to help them make informed decisions about how to reduce CO₂ emissions in cities.



WP8

CO₂ emissions reduction!

WP6

Enabling scenarios for stakeholders

Regulations Planning strategies Urban Developments Building Operations

Policy Makers Planners Designers/Engineers Building Managers Citizens

Building stock energy modelling tool

Advanced energy information analysis tools

Energy simulation and trade-off tool

Interactive design tool

WP5

SEMANTIC ENERGY INFORMATION FRAMEWORK (SEIF)

WP4

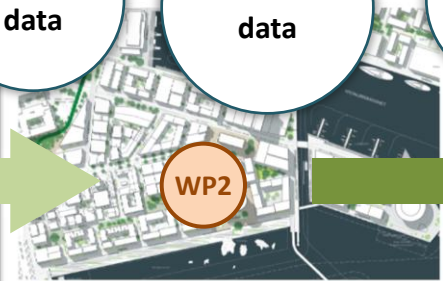
Building repositories

Energy data

Environmental data

Economic data

WP3



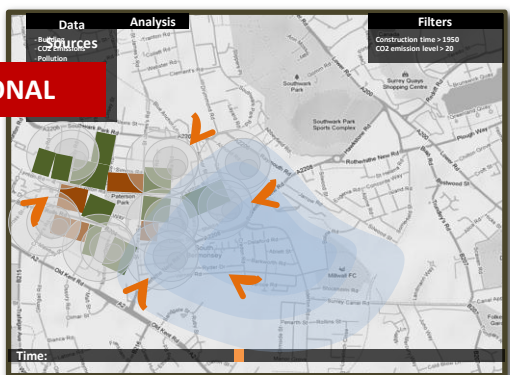
WP2

Application domains

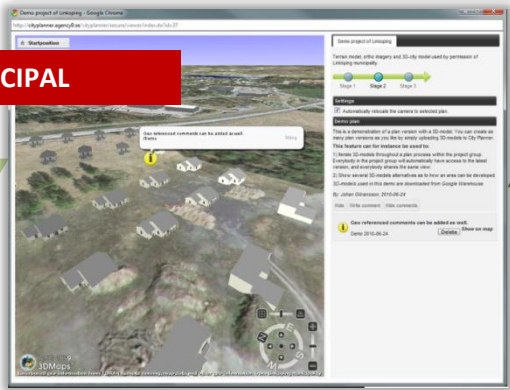
Stakeholders

Technological Platform

REGIONAL



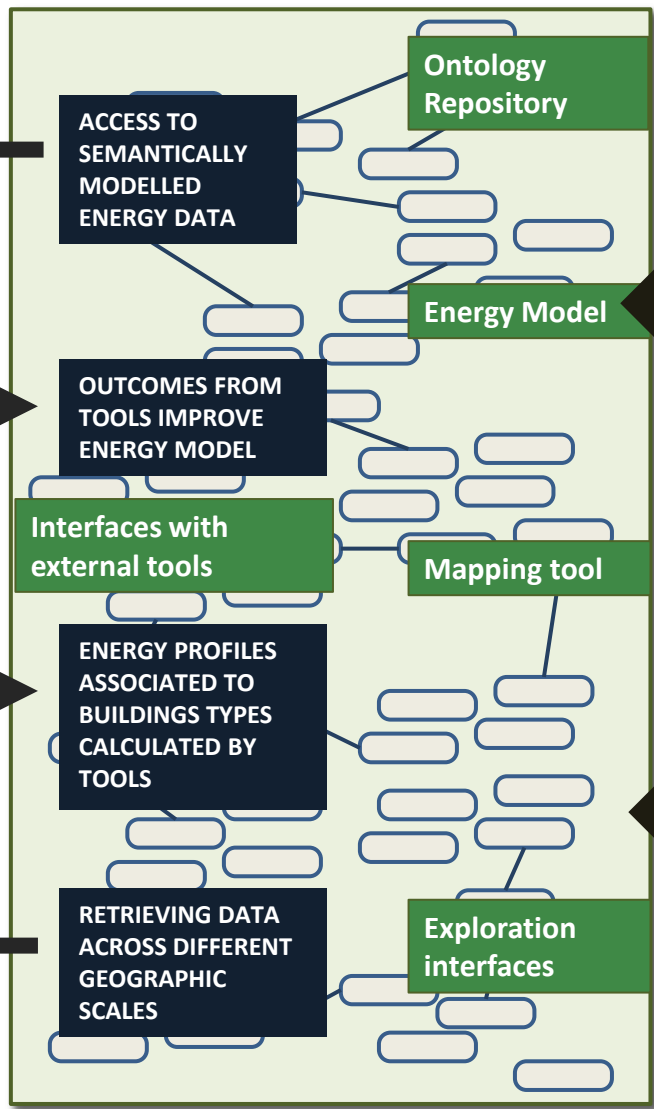
MUNICIPAL



NEIGHBORHOOD



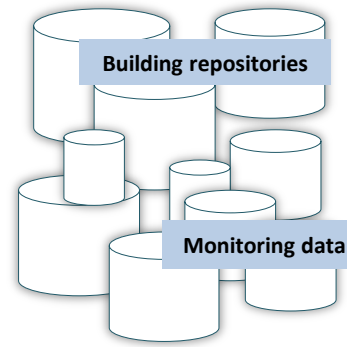
TOOLS: (visualization, analysis, simulation)



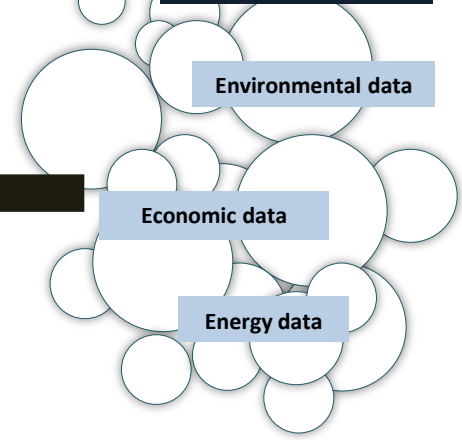
SEIF: Semantic Energy Information Framework

DATA: Distributed repositories of energy related information

Off-line data



Open Linked Data



www.salleurl.edu/arc

BARCODE HOUSING SYSTEM

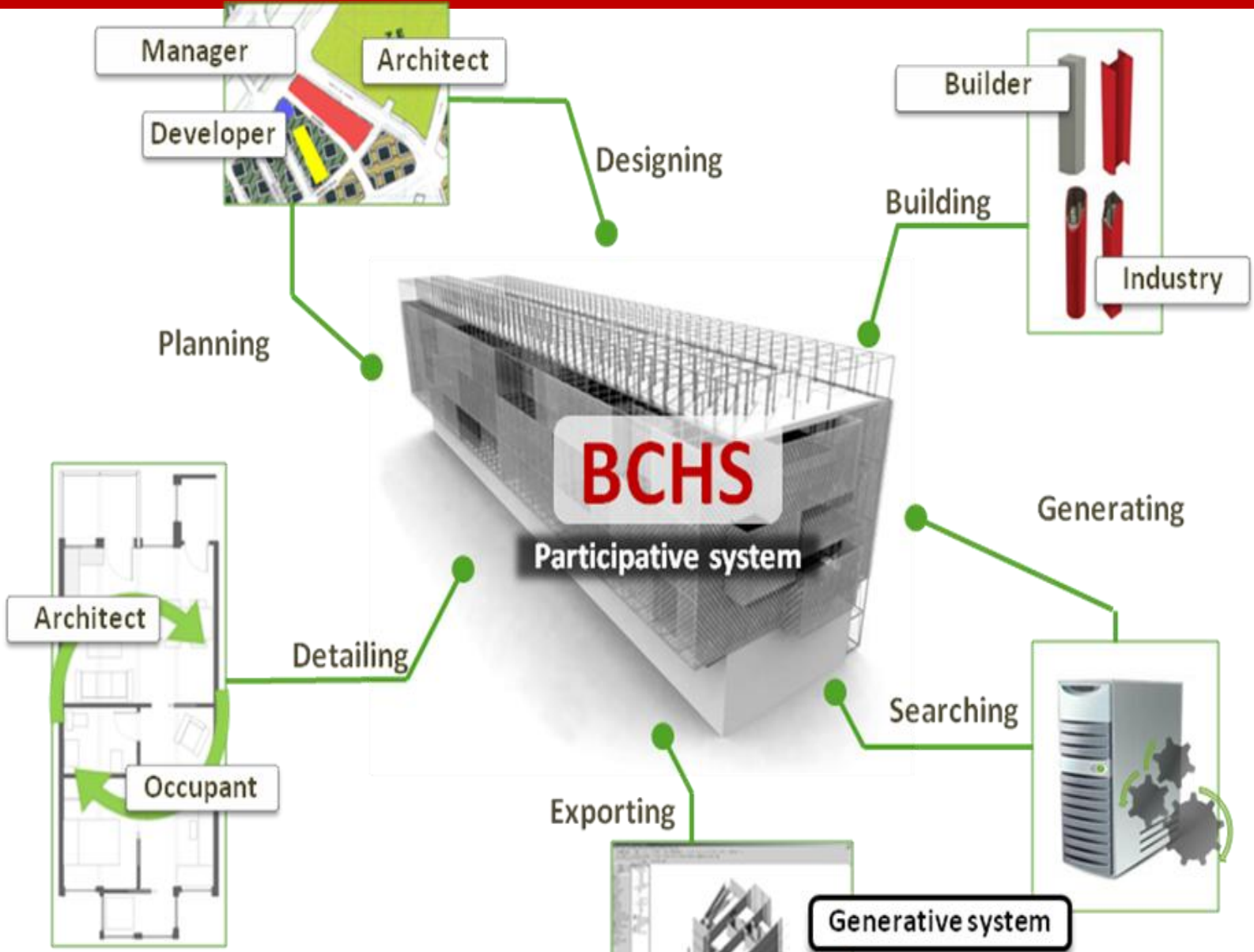
Spanish National RDI plan, 2005-2009

2002-2005, development of a stand-alone prototype system

2005-2009, development of a environment which supports the design and construction of housing blocks with flexible dwellings, using industrial components and assembled according to the principles of open prefabrication.

It is an open, participatory, modular system that facilitates the interaction of the different actors (architects, builders, manufacturers, occupants, facilities managers) involved in the design, construction and use of housing.

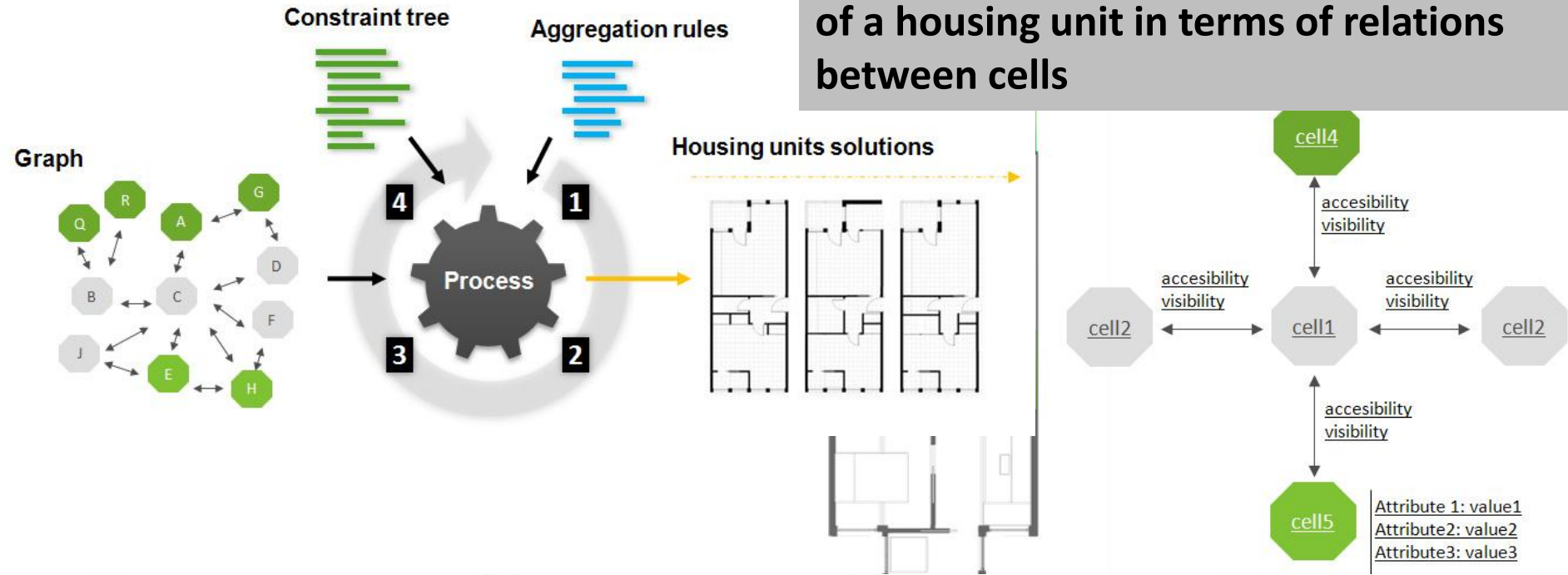
BARCODE HOUSING SYSTEM_environment



In this project we have buildt our own data model, it is not using BIM. Because of this, we could integrate a building model with a product catalogue; we could define assembly rules for spaces as well as for building components. This integration of the different environments worked because we had control on the whole environment. To achieve such level of integration using BIM software we would need to use of semantic technologies.

BARCODE HOUSING SYSTEM_environment

A graph represents the spatial structure of a housing unit in terms of relations between cells

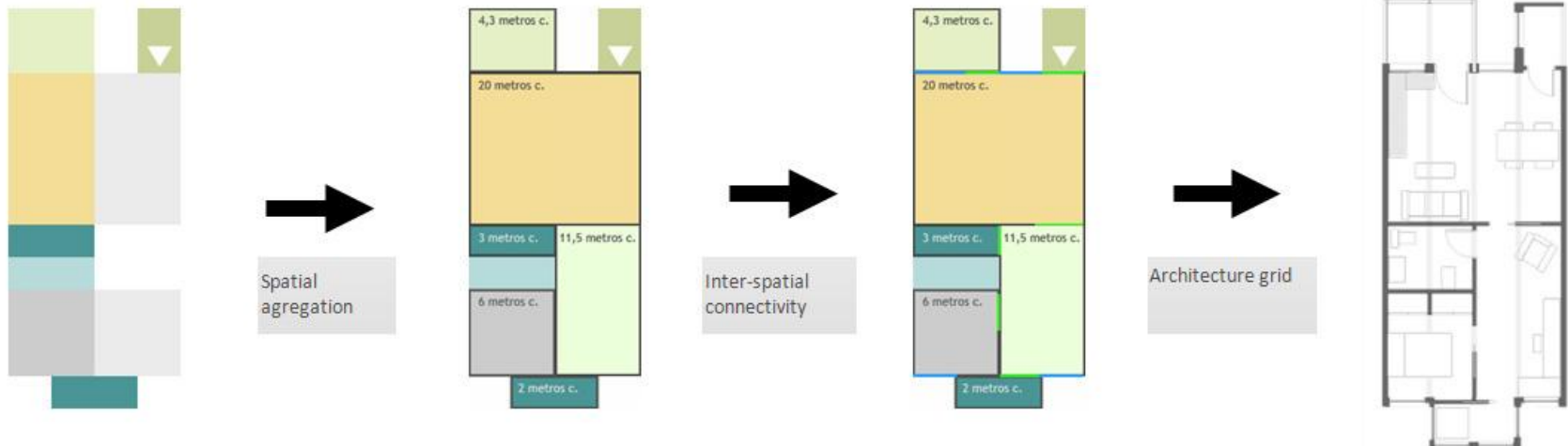


1 DIMENSIONLESS PHASE

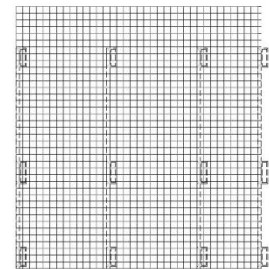
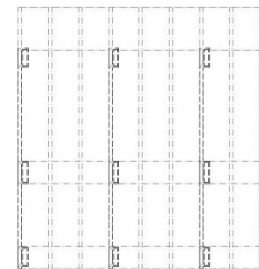
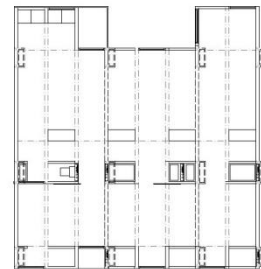
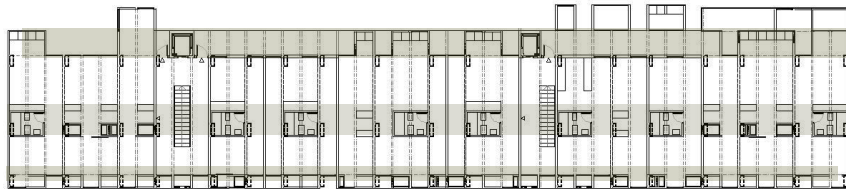
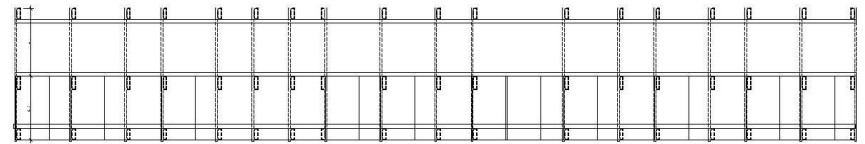
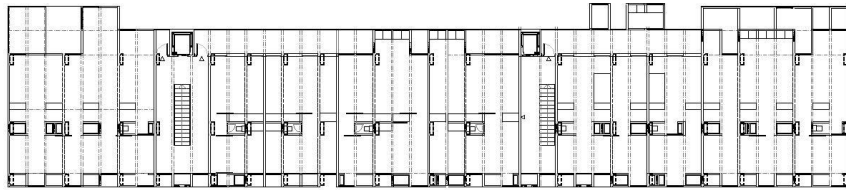
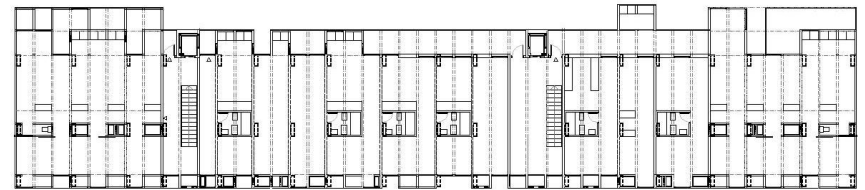
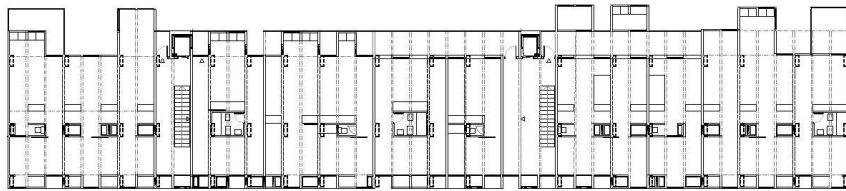
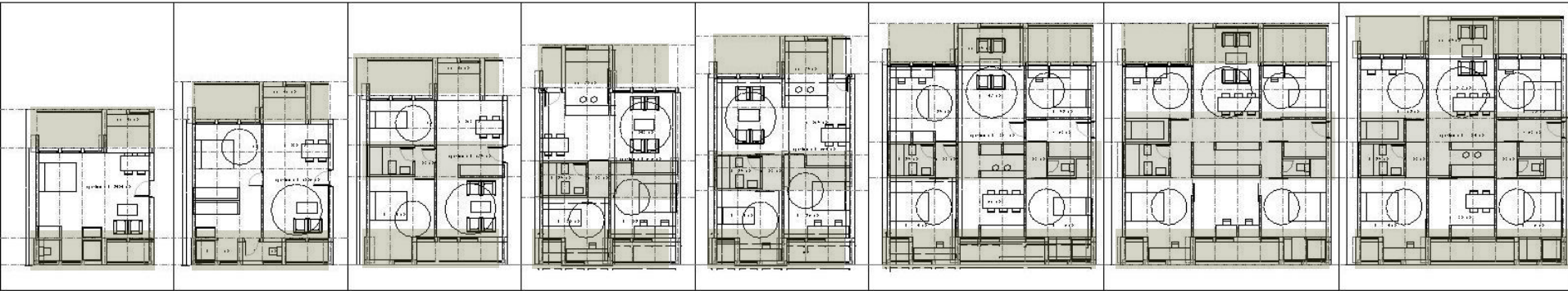
2 SPATIAL PHASE

3 CIRCULATION PHASE

4 DEFINITION PHASE

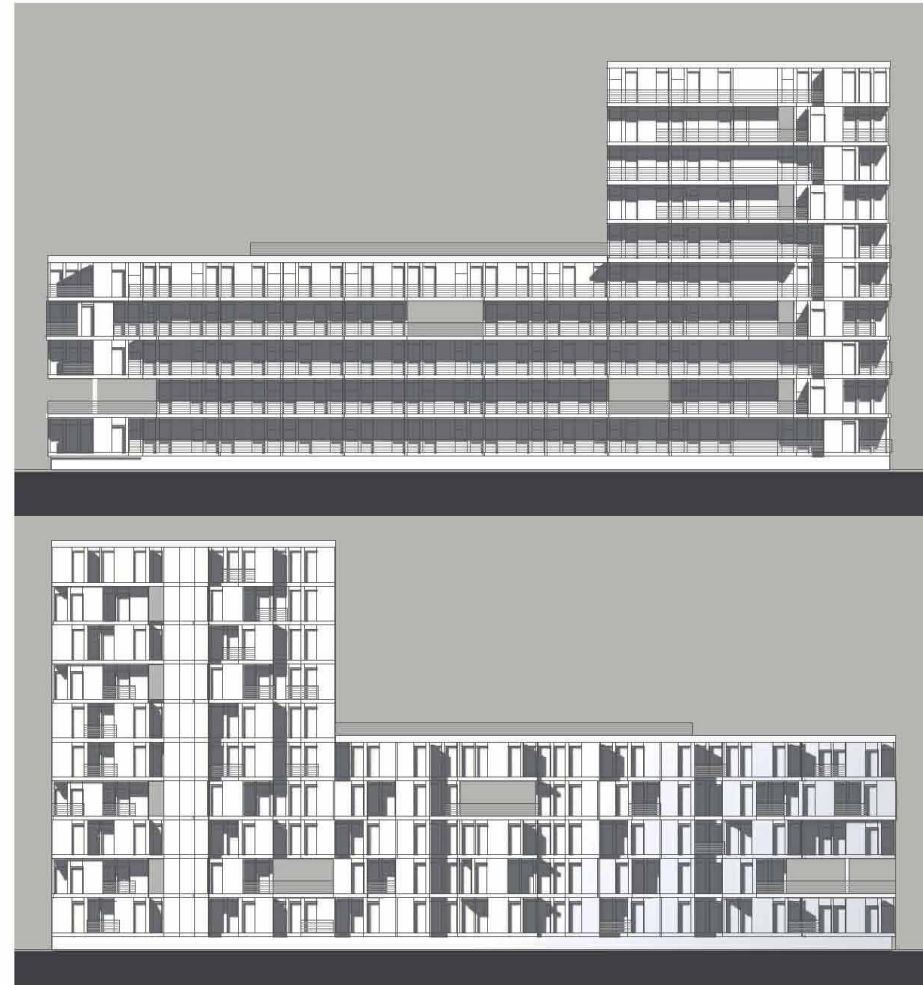
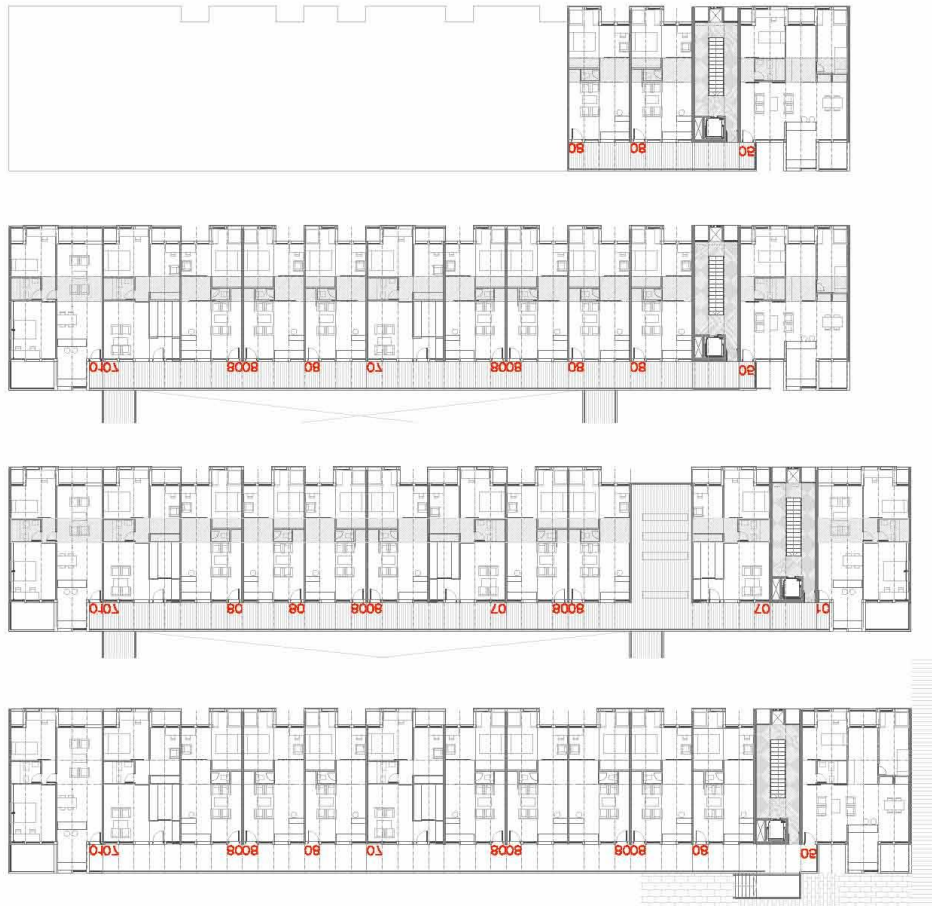


BARCODE HOUSING SYSTEM_environment

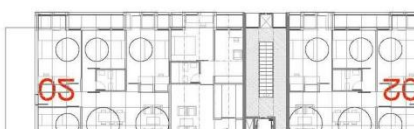
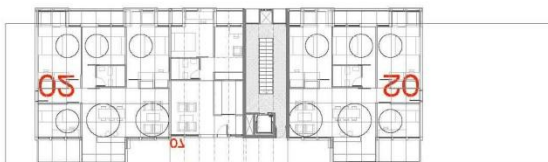
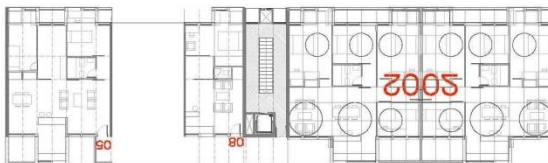


These are the floor-plans generated by the rule-base system

BARCODE HOUSING SYSTEM_environment

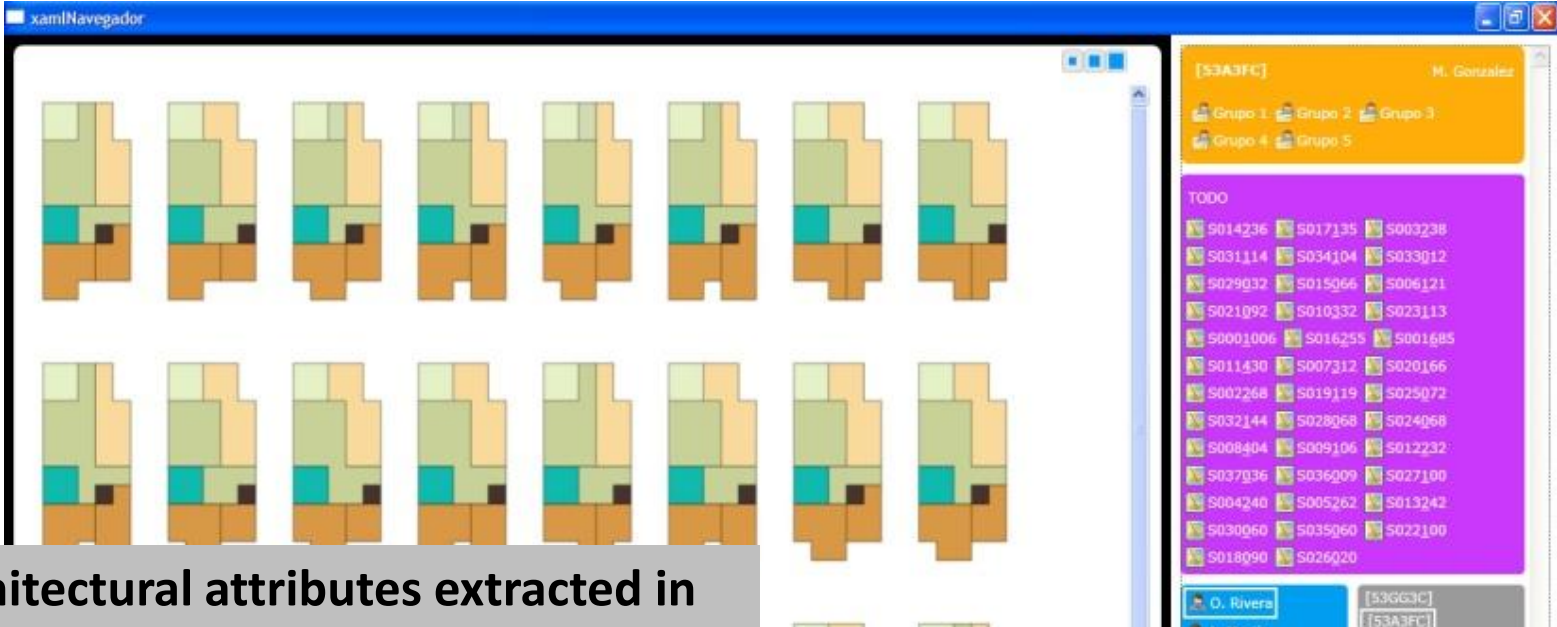


BARCODE HOUSING SYSTEM_environment

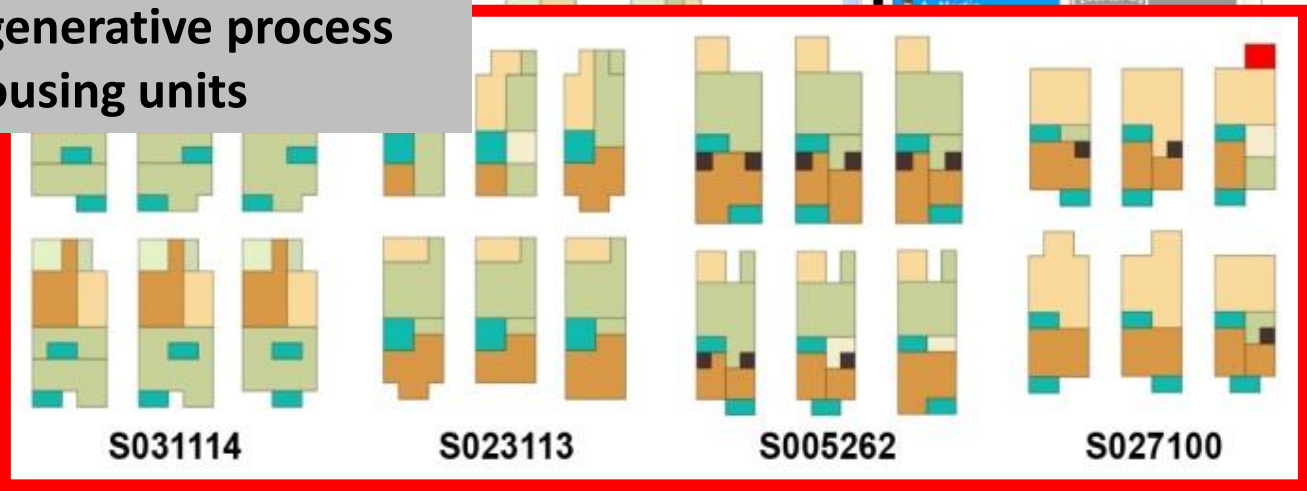


These are examples of the kind of housing blocks that can be generated by assembling the housing units. The

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The architectural attributes extracted in the last stage of the generative process are used to cluster housing units



The architect seeks in the system the most appropriate housing units for a specific program requirements. The search is done with clustering techniques.

BARCODE HOUSING SYSTEM_environment



Matching support and infill

The housing units retrieved in the previous interface are used to generate the block. In the process to create a housing blocks, the housing units (infill) and support structure (e.g. the rules governing the position of building systems, structure,...) need to conform to each other. The final block is the solution of the interaction between both systems, infill and support.

CONNECTORS



BAR CODE HOUSING SYSTEM

BARCODE HOUSING SYSTEM_environment



Matching support and infill

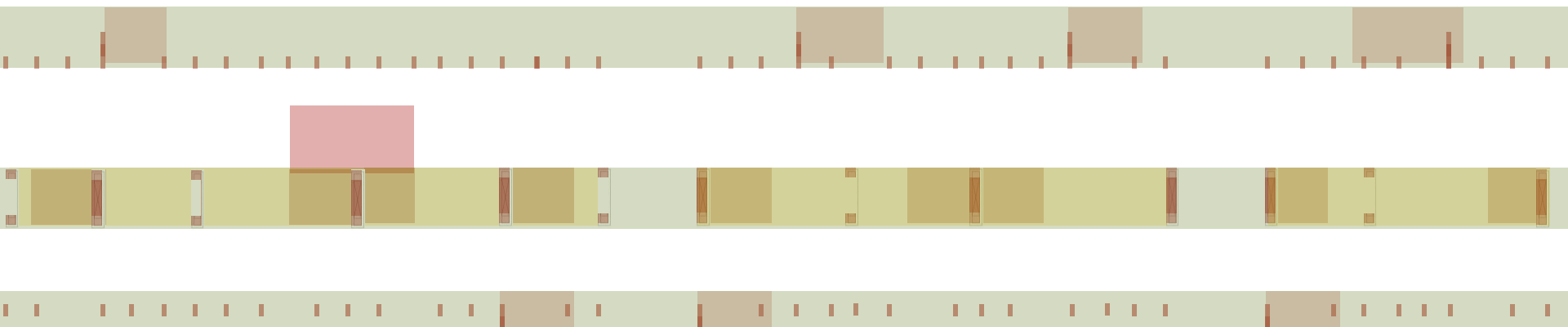
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CONNECTORS



BAR CODE HOUSING SYSTEM

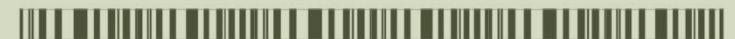
BARCODE HOUSING SYSTEM_environment



Support and infill: The underlying support structure which holds a variable combination of housing units

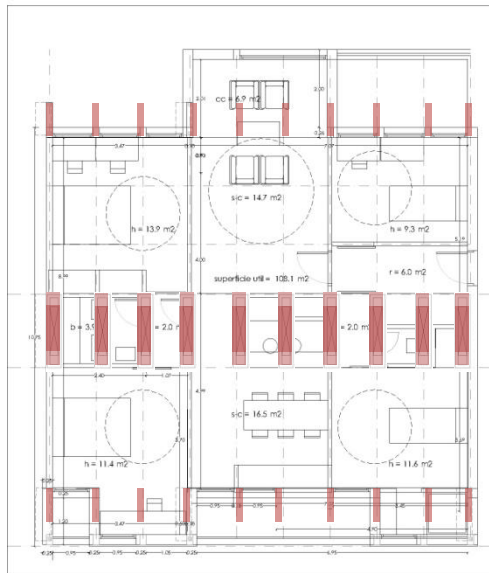
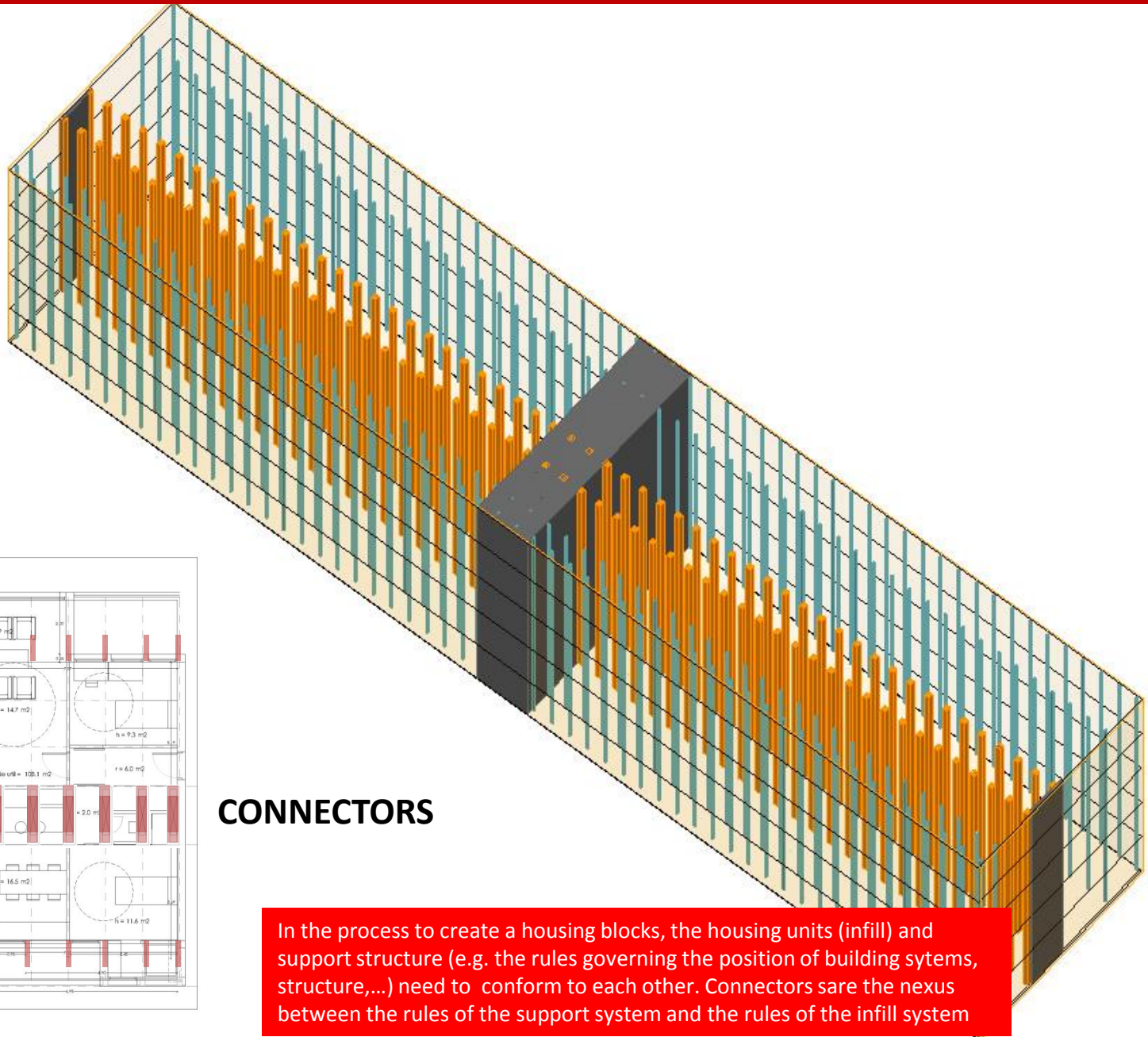
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CONNECTORS



BAR CODE HOUSING SYSTEM

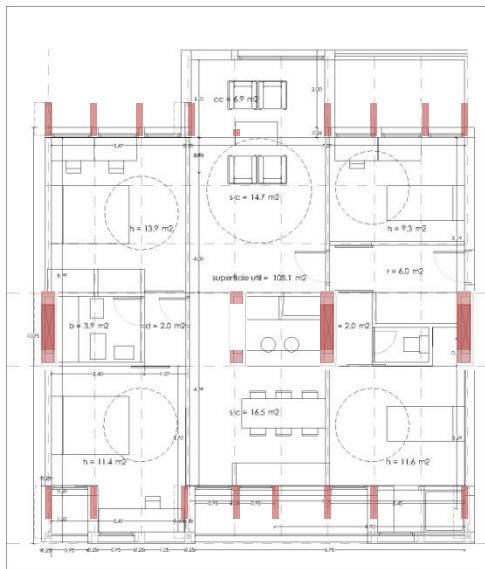
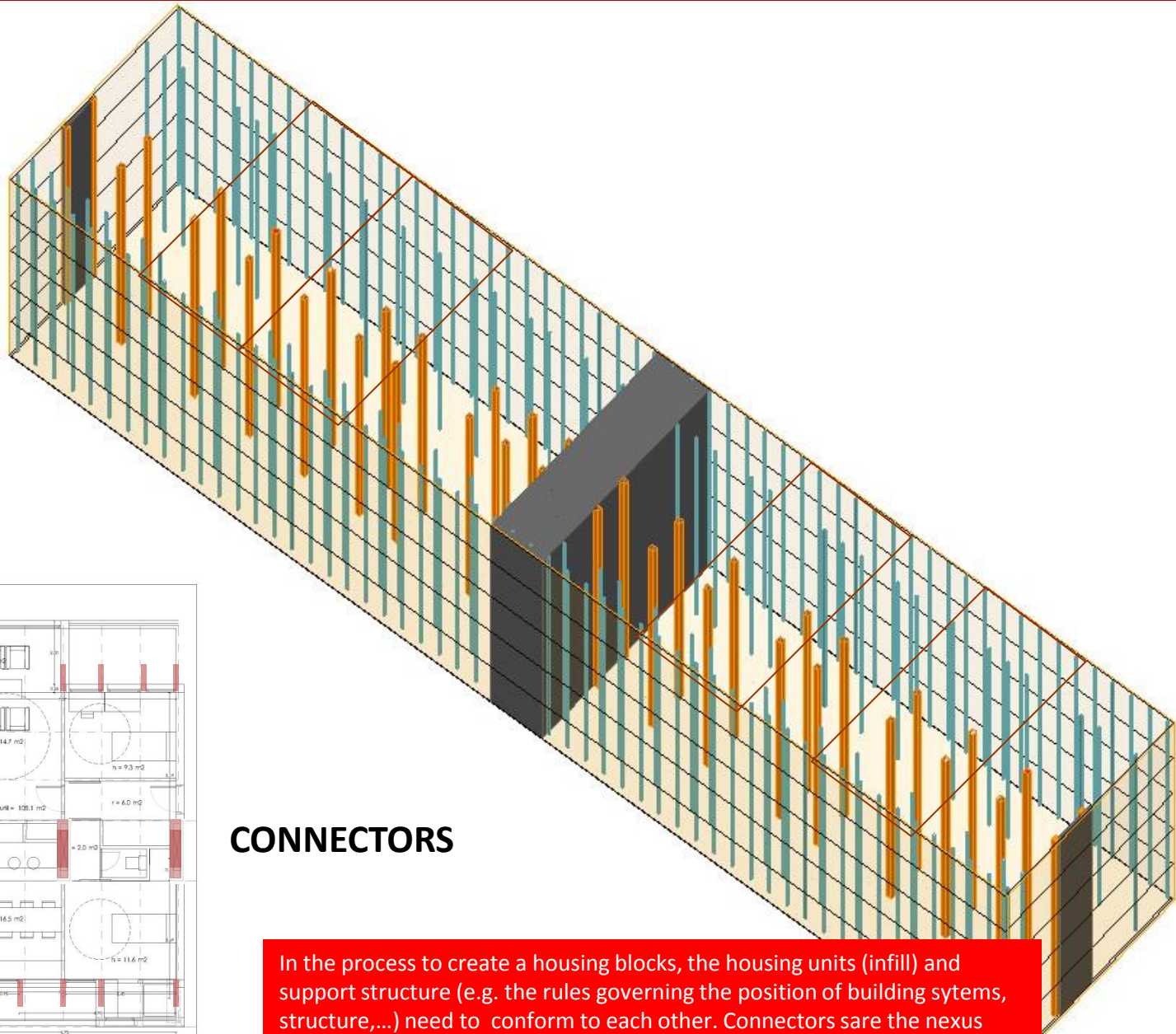
BARCODE HOUSING SYSTEM_environment



CONNECTORS

In the process to create a housing blocks, the housing units (infill) and support structure (e.g. the rules governing the position of building systems, structure,...) need to conform to each other. Connectors are the nexus between the rules of the support system and the rules of the infill system

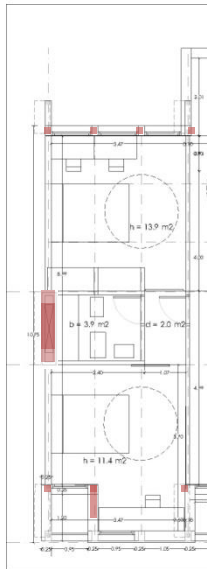
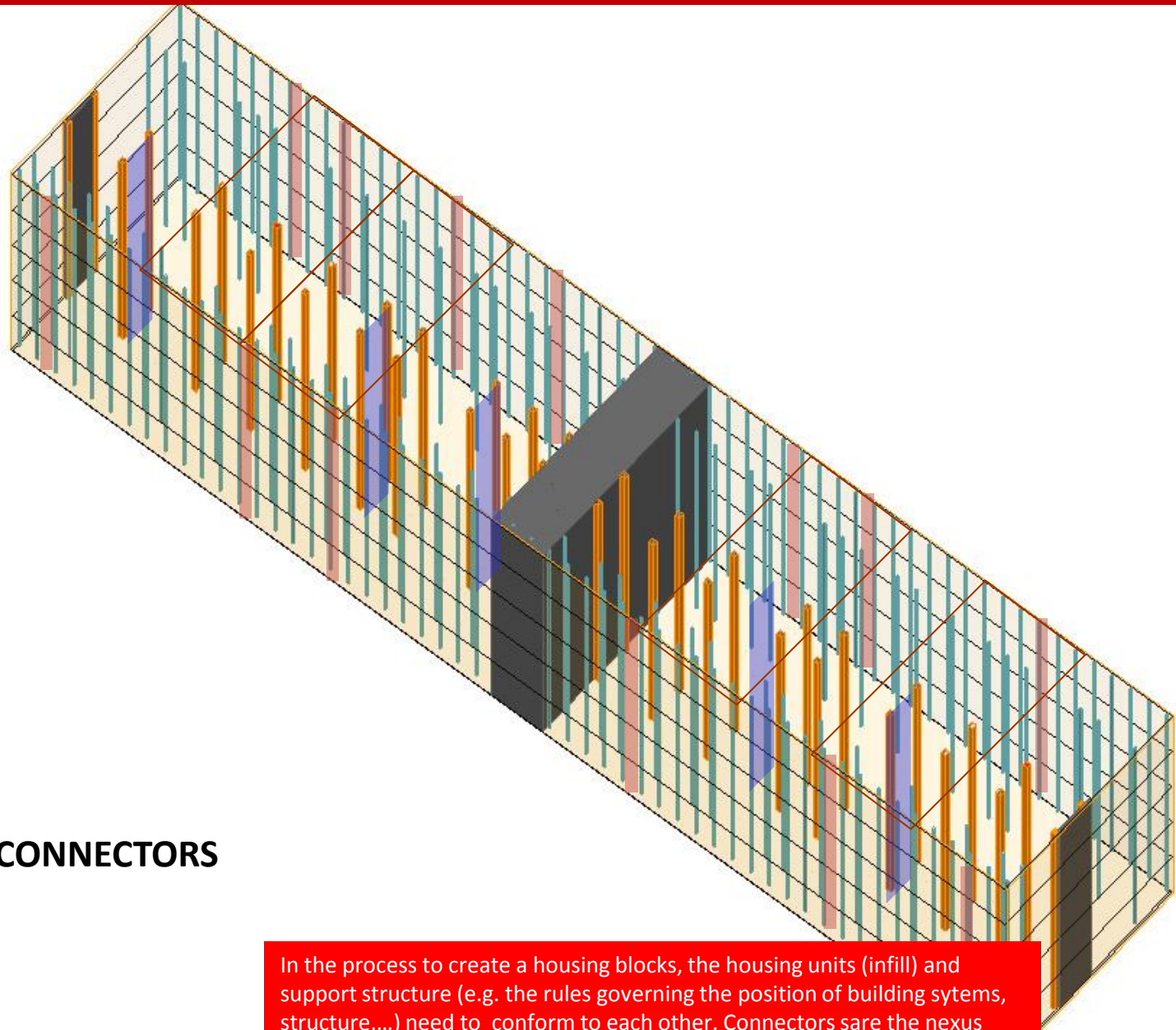
BARCODE HOUSING SYSTEM_environment



CONNECTORS

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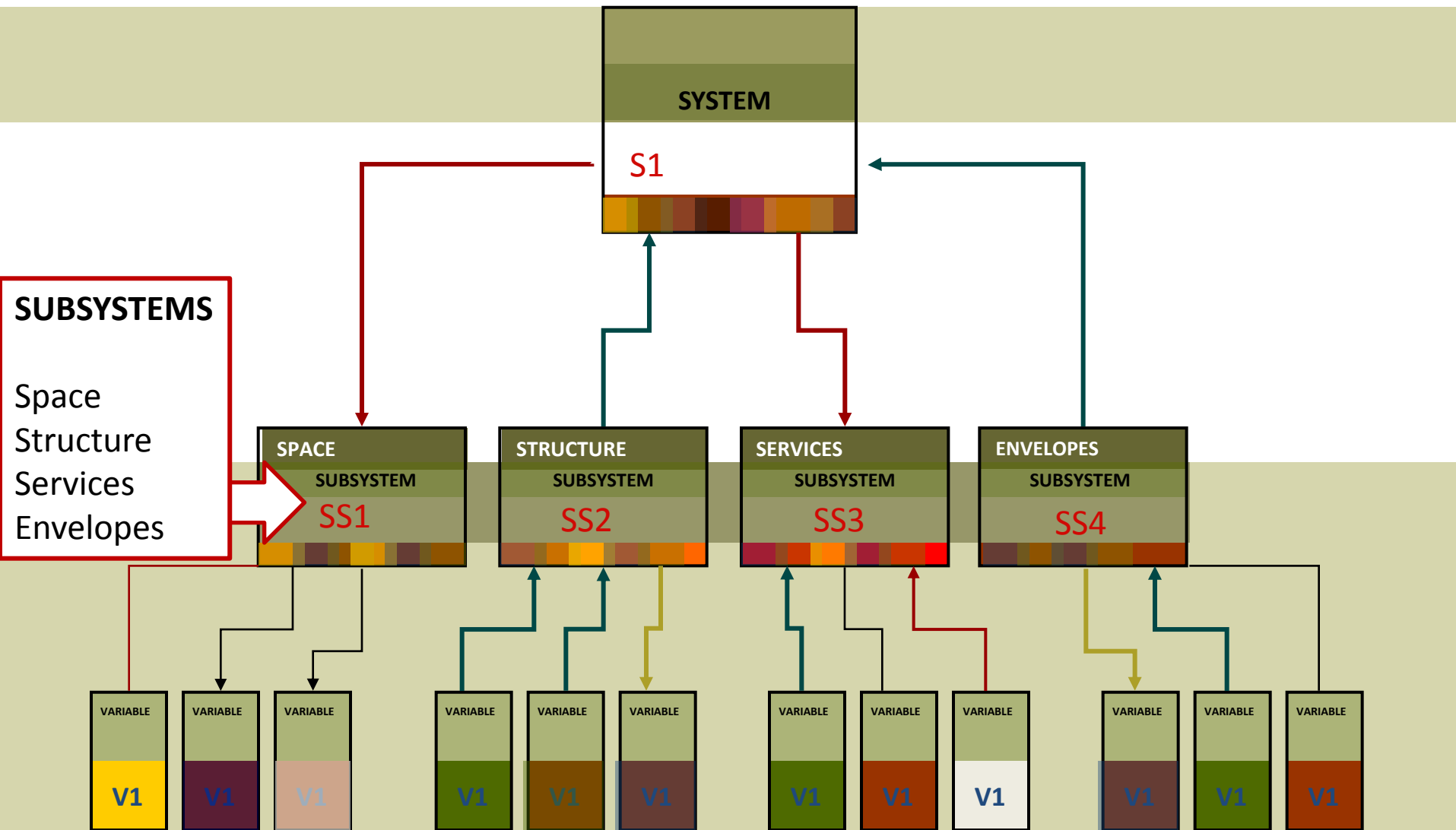
BARCODE HOUSING SYSTEM_environment



CONNECTORS

In the process to create a housing blocks, the housing units (infill) and support structure (e.g. the rules governing the position of building systems, structure,...) need to conform to each other. Connectors are the nexus between the rules of the support system and the rules of the infill system

BARCODE HOUSING SYSTEM_environment



The building model is thought of a system made up of four subsystems. Each subsystem is made up of the components defined at the lowest level. The relationship between levels is in both directions, from top down and from bottom up. Thus, the selection of a particular component for structure might determine the spatial composition. (bottom up), while the selection of a particular subsystem (e.g. steel structure) determines the lower level components.

BARCODE HOUSING SYSTEM_environment

WORKING_SPACES

- Project Development
- Housing Unit Layouts
- Housing Unit Configuration
- Housing Unit Assembly
- Products Catalogue

System log

Date	User	Action
08-05-2009	A. Martín	Has selected 132 housing units
07-05-2009 19:13	A. Martín	Has commented an urban composition
07-05-2009 19:02	A. Martín	Has commented an urban composition
07-05-2009 18:54	A. Martín	Has ran a new housing unit generative process
07-05-2009 17:04	A. Martín	Has ran a new housing unit generative process
07-05-2009 15:11	A. Martín	Has ran a new housing unit generative process
08-05-2009 12:15	A. Vallverdú	Has added new materials into the catalogue
08-05-2009 11:21	O. Rivera	Has selected 78 housing units
08-05-2009 10:23	M. Hernández	has selected the final urban composition
07-05-2009 19:31	O. Rivera	has created a new urban composition
07-05-2009 19:13	A. Martín	Has commented an urban composition
07-05-2009 19:12	A. Vallverdú	Has added new materials into the catalogue
07-05-2009 19:06	M. Hernández	has created a new urban composition
07-05-2009 19:02	A. Martín	Has commented an urban composition
07-05-2009 18:28	O. Rivera	has created a new urban composition

The collaborative process of design and construction is structured in different environments. Different actors can intervene at different stages. The diagram shows the flow of activities leading to the generation of a housing block.

BARCODE HOUSING SYSTEM_environment

The screenshot displays the 'Editor Catálogo' interface for the BCBS system. The top navigation bar includes the 'BCBS' logo and the text 'Editor Catálogo > Edición de catálogo de objetos'. On the left, a sidebar titled 'Explorador de objetos' shows a tree view of product categories: 'ObjetosCatalogo', 'Cerramientos', 'Puertas', 'Ventanas', 'Paredes', 'Techos', 'Suelos', 'Barandillas', 'Estructura', 'Decoracion', 'Mobiliario', and 'Espacios'. The main content area is divided into several sections: a top header with 'Ref.: Nuevo' and 'Tipo: Puerta'; a 'Tipología' section with 'Batiente' selected; a pricing section showing 'Precio: 300 Euros (0-100000000)'; a dimensions section with 'Altura: 2200 mm (1000-3000)' and 'Anchura: 700 mm (400-2000)'; a 'Descripción tipológica' section with the text 'Modelo de puerta simple en la que el material aplicado al marco es el mismo que en el caso del canteado.'; a 'Foto objeto real' section with a placeholder and an 'Explorar' button; and a 'Represent. 3D' section with a 'Captura' button, a 3D model of a door, and playback controls. A 'Crear nuevo' button is located at the bottom left.

PRODUCT'S CATALOGUE

Building components are selected from the catalogue

This is a product catalogue open to external providers but only used by the BCBS model. A research topic could be to develop product catalogues using semantic technologies which can interoperate with