



# BROWSING ARCHITECTURE

METADATA AND BEYOND

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- 320      collection of essays' images

- 364      index of terms – folksonomy

- 367      colophon



# 7

## HOUSING@21.EU: Integrating Learning Spaces and Architectural Repositories

- › digital repositories
- › housing studies

- › virtual design studios
- › web-based collaborative learning

HOUSING@21.EU ([www.housing21eu.net](http://www.housing21eu.net)) is a web-based learning platform consisting of a case repository and a design studio environment, developed in an Erasmus Intensive Programme between 2003 and 2006, with the participation of five schools of architecture from Belgium, Germany, Poland, Spain and United Kingdom. The purpose of the programme was twofold: one has to do with architecture -studying the forms of dwelling in contemporary European societies; the other with pedagogy – integrating innovative teaching methods with ICT. One of the results of the project is an on-line repository containing 300 cases of study, documented and analyzed using the learning platform specifically created for this project.

The project is continuing through the Virtual Campus οΙΚΟΔΟΜΟΣ ([www.oikodomos.org](http://www.oikodomos.org)), which is being carried out in the years 2007-2009 under the auspices of the Life Long Learning Programme.



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HOUSING@21.EU is the name of a learning platform developed with funding from the Erasmus Intensive programme, whose goal was to study contemporary dwelling in Europe. It represents one more step in a pedagogic line of work aimed at integrating web-based learning environments into architectural education, which began in 1996 with the project AALTO [Madrazo and Weder 2001].


**housing studies**  
**web-based collaborative learning**


The pedagogic goals of the HOUSING@21.EU project were twofold:

1. To learn to grasp the complexities and interdependencies of the factors transforming the way of life in European societies, in order to respond to these challenges with new forms of housing.
2. To design and implement learning strategies to be integrated with a web-based learning platform especially created for this project.

The transforming factors affecting living conditions were considered on three different levels: social, economic and technological. Three different spatial dimensions of dwelling were analyzed: individual, communal and urban. This three-by-three structure enabled students and faculty to grasp the complexity of the issues involved in the conception and production of housing in contemporary European societies.

From a pedagogical viewpoint, the most innovative aspect in this project was the development of a methodology associated with a web-based environment created especially for the project by the research group ARC Enginyeria i Arquitectura La Salle [Madrazo 2006]. The web-based platform HOUSING@21.EU consists of two distinct parts: a case repository to collect and study housing precedents (Fig. 1), and an environment to present housing projects created by students in the design workshops (Fig. 2). This web platform allowed students and faculty from the five participating institutions to carry out joint research on study cases across the Internet.

 Fig. 1: Website to collect and study housing examples – [www.housing21eu.net](http://www.housing21eu.net) (p. 333).

 Fig. 2: Website of the Design Workshop – [www.housing21eu.net/workshop1](http://www.housing21eu.net/workshop1) (p. 333).

## CONSTRUCTIVIST LEARNING USING WEB-BASED PLATFORMS

**constructivist pedagogy**

8 9 11

One of the main objectives of HOUSING@21.EU was to create an integrated learning environment supported by an architectural case repository. This repository was not meant to be an information system, to collect and retrieve information about housing cases. Rather, its goal was to enable learners from the five participating schools to interact with each other both in the virtual space of the web and in the physical space of the classroom in order to elicit knowledge from the collected information.

The distinction between collecting information in the web repository and eliciting knowledge from it is a critical one. In fact, the gathered information already carries within it some conceptual structures. As Van House has





contended: “Information artifacts, including texts and images, are not simply reflections or carriers of knowledge. They shape and reflect practice and are instrumental in creating and re-creating knowledge as well as coordinating work across space and time” [Van House 2003]. Therefore, in order to design efficient digital repositories, it is important to understand how these processes of knowledge construction using data collected in a repository work.

#### digital repositories



In HOUSING@21.EU tools were included which allowed further organization of the information. These supported students adding items to other's cases, assigning key-words to cases and grouping cases, activities which allowed them to not only derive knowledge from the digital repository, but also to add new knowledge to it (Fig. 3, Fig. 4). Working in this context, the educators' role is to act as a mediator, helping to bring the knowledge back and forth between the web and the classroom, through the medium of web-based discussions.

This building up of knowledge through interacting with a digital repository is a typical example of constructivist pedagogy. According to constructivism, meaning is not implicit in the structured information. Rather, learners – students and teachers – should assign meaning to it.

#### role of the educator



Retrieving information from the case library is a fundamental activity, since this is what ultimately gives sense to the way in which the information has been categorized and organized. Furthermore, for learners to carry out this constructive process collaboratively in a web-based environment they must have some “shared understanding” of the tool, the context of the learning and the role of the educator [Puntambekar and Young 2003].



*Fig. 3: Case repository collaborative tools: Keywords mode (p. 334).*



*Fig. 4: Case repository collaborative tools: Grouping mode (p. 334).*

### HOUSING@21.EU'S LEARNING ACTIVITIES

The programme's yearly activities were organized into two major blocks: analysis of relevant housing precedents, and design of new housing. A seminar approach was used for the analysis of precedents, conducted asynchronously at each participant institution, within a 3-6 month period. The two-week design workshop was carried out at the end of the academic year, with the participation of all teachers and students.

The learning activities were carried out both in the shared web-based learning environments specifically created for this project and in courses at each institution. It was necessary to implement an ad hoc approach to interweave the diversity of activities taking place at the five institutions which were running different academic programmes.

The work conducted in the case repository contributed to the exchange of ideas between teachers and students from all the participating institutions. Through this





interaction, it was possible to identify different approaches towards housing in different European countries, while at the same time discovering some common themes.

Some of the topics identified in the web were then further discussed at the start of the joint Design Workshop, where all participants gathered for two weeks to continue reflecting about housing, but this time designing new housing projects.

## CASE STUDY ANALYSIS

### vocabulary of keywords

13 15 17 21

In the analysis stage, students are requested to select three to five examples of their choice, to study them and to explain them in the web environment.

This work is done at each institution under the supervision of a teacher. The work performed in a classroom environment, which precedes the task of inserting a case in the repository, is fundamental to ensure a subsequent meaningful learning using a web-based environment.

A case study documentation consists of graphics (plans, sections, photographs) and texts to describe the case, as well as to reflect on its most relevant characteristics: morphological, spatial, social, and technological.

These reflections, after having been discussed in the class with their teacher, are introduced in the repository using the conceptual structure of spatial dimensions and transforming factors described earlier. Also, the construction of a vocabulary of keywords is an effective way to illustrate the reflections of the learners.

Once the cases have been submitted, the collaborative tasks start at the repository, including:

- › Adding information to another student's study case (images; keywords);
- › Adding comments to the study case forums;
- › Searching for relations among study cases (grouping cases);
- › Participating in the forum discussions about particular cases and about generic housing topics.

Following submission, the pedagogic challenge both for students and teachers is to elicit knowledge by using the case descriptions. This is a fundamental difference between an information system that facilitates access to images and texts, and a learning environment, which promotes the collaborative construction of knowledge.

Case descriptions and their manipulation are used to embed the knowledge that the students have acquired through their study and become the knowledge blocks with which learners can subsequently build knowledge, collaboratively interacting in the web system.

The following table summarizes the content that the students have submitted to the case study library in the three years of the programme:





	03-04	04-05	05-06	TOTAL
case of study	71	110	119	300
images	796	1,623	195	4,369
keywords	87	196	128	411
bibliographic entries	100	58	68	226
url references	54	31	87	172
groups	14	9	11	34
discussion forum entries	n/a	7	15	22
case study forum entries	36	20	50	106
e-mails	190	179	558	937

Tab. 1: Summary of the data collected during the three-year HOUSING@21.eu project.

## DESIGN WORKSHOPS

The joint Design Workshop is the concluding work, following the study of cases on the web. Three workshops took place each summer during the years 2004, 2005 and 2006. Sites were selected in the city of Barcelona to carry out projects for innovative housing, addressing different scales: domestic, urban and metropolitan.

Descriptions of the design tasks (sites and briefs) were published in a website created especially for the workshop (please see: [www.housing21eu.net/workshop1](http://www.housing21eu.net/workshop1); [www.housing21eu.net/workshop2](http://www.housing21eu.net/workshop2); [www.housing21eu.net/workshop3](http://www.housing21eu.net/workshop3)). This website was also used during the workshop, to record the ideas that were being discussed in the meetings and to present the design proposals.

At the start of a workshop, each student exposed his or her personal reflections about housing summarized in a multimedia presentation. This helped students to get to know each other in advance, so that they could select the team members with whom they would work with on the design. Teams were composed of three students, each one from a different institution, with a mix of second or third year students working together with those who were about to complete their degrees. We considered that the mix of different cultures and different knowledge was a challenge that the students should face.

The Design Workshop website allowed students and teachers to monitor the step-by-step development of an idea into a design schema, and from a schema into a design proposal. This was an important feature of the website, which needs to be further developed in order to facilitate the work of distant workshops across the web involving students from different universities.

## OIKODOMOS: A VIRTUAL CAMPUS TO PROMOTE THE STUDY OF DWELLING IN CONTEMPORARY EUROPE

### virtual design studios

2

The experience gained with the HOUSING@21.EU intensive programmes, has been the motivation to create a new consortium to develop a more comprehensive virtual campus to study dwelling at a European scale named OIKODOMOS. The intention is that this new virtual campus will integrate on-line and off-line learning activities encompassing:





1. Innovative pedagogic methods, which interweave on-line resources with traditional classroom activities to study housing from a multidisciplinary perspective by means of seminars and studio projects, analysis of cases, and joint design workshops.
2. Multi-national and multi-professional activities planned in conjunction with community representatives and local authorities, to study the problems of dwelling and to propose solutions to it.
3. Bologna compatible courses (ECTS credited) aimed at supporting the creation of future European Master's programs, which combine physical and virtual mobility of both teachers and students.

Collaborative activities will be reinforced in order to strengthen the collaboration of learners in the construction of knowledge. Moreover, the learning activities will be opened to other learners outside the universities. The design workshop environment will be enhanced into a full-fledged virtual design studio environment, which will enable different schools to carry out on-line design process in collaboration. The designs produced by students will be collected in a project repository.

The expected results of the project are:

- › An innovative pedagogic methodology integrating on-line activities with the curricula at each partner institution, implemented, tested and validated;
- › A critical analysis of e-learning methods and tools applied to architectural education (virtual design studios, repositories of cases of study);
- › Educational open resources stemming from the learning activities conforming to standards;
- › Innovative housing proposals embracing architectural, urban and environmental scale, developed collaboratively by the participating institutions in conjunction with social and professional organizations;
- › Assessment of the pedagogic methods and the learning technologies employed and the results obtained;
- › Reports of good and bad practices and recommendations for other partners to join the virtual campus in the future.

## **EVALUATION OF THE PEDAGOGIC MODEL OF HOUSING@21.EU**

The first task undertaken within the OIKODOMOS project has been to conduct an evaluation of the web-based platform and an assessment of the pedagogic methodology applied in the previous project, HOUSING@21.EU. The results of this study will help to redefine the contents, methods and tools of the future OIKODOMOS virtual campus.

The following is a summary of the conclusions from this study.

### **Evaluation of the existing web-based platform**

The evaluation of the web-based platform HOUSING@21.EU was conducted as a usability study [Oikodomos PR EP1 Report 2008]. The aim was to detect most of the problems, obstacles and breakdowns for the user when interacting with the web ap-





plication. Usability has been defined as “the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments” [ISO 9241-11]. For e-learning environments and applications, usability is a necessary condition (although not sufficient, as discussed above) for effective on-line learning. Usability is the property of a mediated learning environment, which supports the users as transparently as possible in the accomplishment of their learning goals. Examples of the problems which users might encounter include: easily locating and accessing the needed content; orienting oneself in the maze of different paths and nested pages of a structured website; avoiding being overloaded by the information clustered in a page; and being able to use effectively the navigation architecture.

The usability study was developed following the MiLE methodology [Triacca et al. 2004] in its e-learning adapted version [Inversini, Botturi and Triacca 2006]. This method has already been extensively and successfully used in a variety of web application domains (e.g. educational institutions, cultural-heritage, public education, and e-government) [Matera et al. 2002; Bolchini et al., 2003; Triacca et al. 2003] and it has been used and tailored for e-learning web applications. The goal of the process is to provide course developers and instructional designers with a structured “kit” of guidelines and practical suggestions for a cost-effective usability evaluation of their on-line application. MiLE works through the definition of a custom usability framework, consisting of user profiles, usability variables and scenarios with tasks. This usability framework was constructed for HOUSING@21.EU and then used to train the project staff to collect data at their own locations.

The study was carried out on 17 students from Barcelona, Bratislava and Lugano, and the results allowed the identification of both systematic breakdowns, that is issues that affect the overall application, and local problems. MiLE generates both quantitative outputs (rankings of issues) and qualitative ones (user comments).

The results indicate that users perceive the HOUSING@21.EU as a generally good application. Problems identified were mainly in the predictability of user interactions and in the order of layout. The former included uploading pictures, lack of communication (e.g., the lack of error messages) or bugs in the program, which stopped the system (e.g., due to overload). More important design problems concerned the use of pop-up windows and the search interface.

### Assessment of pedagogic methodology

The assessment [Oikodemos PR EP2 Report 2008] reported on the approaches to learning and teaching used in conjunction with the HOUSING@21.EU environment, the user's perception of these approaches and the general usability of the platform. The retrospective nature of this evaluation was based on a combination of the analysis of end of year reports from HOUSING@21.EU combined with questionnaires completed by staff and students, and interviews with staff.

Questionnaires based on previous work [Fill 2005; Riddy and Fill 2004] used 4 point Likert (A-D) scales plus a ‘don't know’ category, open comment boxes and requested brief demographic information. As the project finished in 2006 it has proved difficult to contact and obtain responses from students and staff involved at that time, some having now left their institutions. To date we have received 11 responses from a total of 71 students contacted. Of 14 members of staff contacted one agreed to be interviewed, and the views expressed have been largely supported by anecdotal reports from others involved in the project.





Student responses on the use of the case study repository and associated tools were received from all five Partner institutions, but with only 1 response from 1 of the partners. The maximum scores for students in these 16 questions centered on level B (positive) indicating an overall positive response to using the system to support their learning. The greater spread for some of the responses raises questions on the usefulness of the on-line discussions, the success with which students were able to integrate the variety of information and the suitability of this approach for all learners. Students didn't comment on the constructivist educational process in which they were engaged, but commented more on features of the system and its potential for interaction. These comments support the questions raised above.

Staff found that this environment was useful for supporting learning, but raised a number of issues:

- › Different levels of access to editing resources for staff and students;
- › Speed of response of the system;
- › Better integration of discussion forums with the resources;
- › Use of the environment needed to be tightly integrated with institutional courses, to ensure engagement of the students.

The majority of responses for the 10 questions on the design workshops fell into categories A & B indicating students were giving a significantly positive response to the use of the environment and the educational process. The two questions, which were exceptions, indicate dissatisfaction with the Design Workshop topics, and that language differences resulted in some communication problems between study group members. Staff responses suggested differences between institutions in their approach to assessment of student performance, and consequently in assessing their work. English language ability was recognized as restricting communication generally, and it was felt that group performance would have been effective more quickly if they had engaged in more activities at a distance in advance of the workshop.

The main findings were:

The case study repository and associated tools were found to provide a useful body of information with the potential to support interesting educational discussions between students and their tutors. Usability of tools and the response time of the system were impediments to full integration of the environment within some schools institutional programmes.

The five institutions involved in the project, each took a different approach to using HOUSING@21.EU within their teaching, and different approaches to the allocation of credits for the students work in their regular courses and in conjunction with the design workshops. These inconsistencies need to be resolved if significant progress on collaborative development and provision of courses are to make progress.

One of the great success of the design workshops was the mutual understanding gained from working in mixed nationality/cultural groups.

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### Recommendations

Alongside specific pedagogic and technical recommendations, we have a third category concerning general usability:





## Pedagogic

HOUSING@21.EU was designed to support a constructivist model of education, and this has proven to be effective, and appreciated by the students. The future OIKODOMOS platform should maintain the underlying design philosophy but refine the organization and access to resources, and integrate the discussion facilities to be more fluidly accessible from the other resources. More details on the technical requirements for these changes are given below.

### web 2.0

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To move towards a collaborative provision of courses partners need:

- › To be more consistent in their use of the environment across the partnership, to facilitate collaborative interactions between students in advance of, and during, the design workshops;
- › To develop consistent documentation for courses and modules, which are to be made available across the partnership. To be in line with the Bologna Process recommendations, meaning the specification of competencies and learning outcomes, and ensuring that these are mapped through content, learning and teaching methods, to assess approaches. Consistency will be fundamental to any collaborative developments of courses and materials. This includes fully documenting and explaining the educational justification for allocation of credits for students work.

### **Technical**

Recommendations are based on maintaining the functional design of the underlying structure and tools, but enhancing usability and integration:

- › Redesign to allow access and use of a range of Web2.0 resources to make use of the extra functionality within its own structure;
- › Provide facilities for multi-language user interface;
- › Redesign the menu structure to enhance ease of use and conform to accessibility guidelines;
- › Provide better integration of discussion facilities with working windows;
- › Blend the Case Study and Design Workshop working environments to allow transparent and integrated access to a working/development and main repositories;
- › Create facilities for different levels of user and access rights to the environment.

### **General Usability recommendations**

- › Include keyword category sets for classification of resources, but provide a process for suggestion and selection of additional keywords;
- › Provide facilities for a multi-language user interface.

### **Social web applications**

Web 2.0 applications and the Open Educational Resources (OER) movements have created enormous potential for interaction and made available wide-ranging resources. These include open repository sites such as Flickr (still images) and YouTube (video), in which anyone who registers can deposit and make materials available. The well-known and extensive Wikipedia (on-line encyclopedia) has been collaboratively constructed by individual contributions, and is part of the Wikimedia suite of offerings. Open repositories of educational resources include MIT Open Courseware and Le Mill, with websites such as Great Buildings and Danda holding materials specifically for the architectural domain. Google Earth makes available plan views of locations anywhere on the planet at a variety of scales. Such extensive sharing of resources would quickly run into legal difficulties without a more “open” copyright







system such as Creative Commons, which is more or less consistently applied in the above examples.

## CONCLUSIONS

Following the prototype development of HOUSING@21.EU the evaluations described above have produced design guidelines that can help to produce a technically well-designed application to serve the goal of fostering a pedagogic constructivist model.

The work to be developed in the OIKODOMOS project will make further progress in this integration of learning methodologies and digital repositories, which started with the HOUSING@21.EU programme, in order to create an innovative pedagogic structure which takes advantage of the possibilities offered by the application of information and communication technologies in architectural education.

## REFERENCES + ACKNOWLEDGEMENTS





#### REFERENCES

Bolchini, D., L. Triacca, and M. Speroni. 2003. MiLE: a Reuse-oriented Usability Evaluation Method for the Web. Paper presented at HCI International Conference (Crete, Greece, June, 2003).

Fill, K. 2005. Student-focused Evaluation of e-Learning Activities. Short paper presented at the European Conference on Educational Research (University College Dublin, Ireland, 2005).

Inversini, A., L. Botturi, and L. Triacca. 2006. Evaluating LMS Usability for Enhanced eLearning Experience. In *Proceedings EDMEDIA 2006* (Orlando, Florida, USA, 26-30 June, 2006), 595-601.

Madrazo, L. 2006. Housing@21.eu report.  
[http://www.salle.url.edu/arc/housing21/reports/eu/housing21\\_web.pdf](http://www.salle.url.edu/arc/housing21/reports/eu/housing21_web.pdf).

Madrazo, L., and J. Massey. 2005. HOUSING@21.EU. A web-based pedagogic platform for the study of housing in Europe. In *Proceedings 20th eCAADe Conference* (Lisbon, Portugal, 21-24 September, 2005).

Madrazo, L. and A. Weder, A. 2001. Aalto on the Internet: Architectural Analysis and Concept Representation with Computer Media. *Automation in Construction* 10: 49-58.  
<http://caad.arch.ethz.ch/aalto/>.

Matera, M. et al. 2002. SUE Inspection: An Effective Method for Systematic Usability Evaluation of Hypermedia". *IEEE Transaction* 32, no 1.

Puntambekar, S., and M. F. Young. 2003. Moving Toward a Theory of CSCL. In *Designing for Change in Networked Learning Environments*, eds. Wasson, B., S. Ludvigsen and U. Hoppe, 503-512.





London: Kluwer Academic Publishers.

Riddy, P., and K. Fill. 2004. Evaluating eLearning Resources. In *Proceedings of the Networked Learning 4th International Conference* (Lancaster University, United Kingdom, 5-7 April, 2004), 630-636.

Triacca, L., D. Bolchini, N. Di Blas, and P. Paolini. 2003. Wish you were Usable! How to improve the Quality of a Museum Website. *International Conference on Electronic Imaging and the Visual Arts – EVAo3* (Florence, Italy, 2003).

Triacca, L., D. Bolchini, L. Botturi, and A. Inversini. 2004. MiLE: Systematic Usability Evaluation for E-learning Web Applications. *AACE Journal* 12, no. 4.

Van House, N. A. 2003. Digital Libraries and Collaborative Knowledge Construction. In *Digital Library Use*, eds. Bishop A. P., N. A. Van House, and B. P. Battenfield, 271-295. Cambridge, Massachusetts: The MIT Press.

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## HOUSING@21.EU: INTEGRATING LEARNING SPACES AND ARCHITECTURAL REPOSITORIES

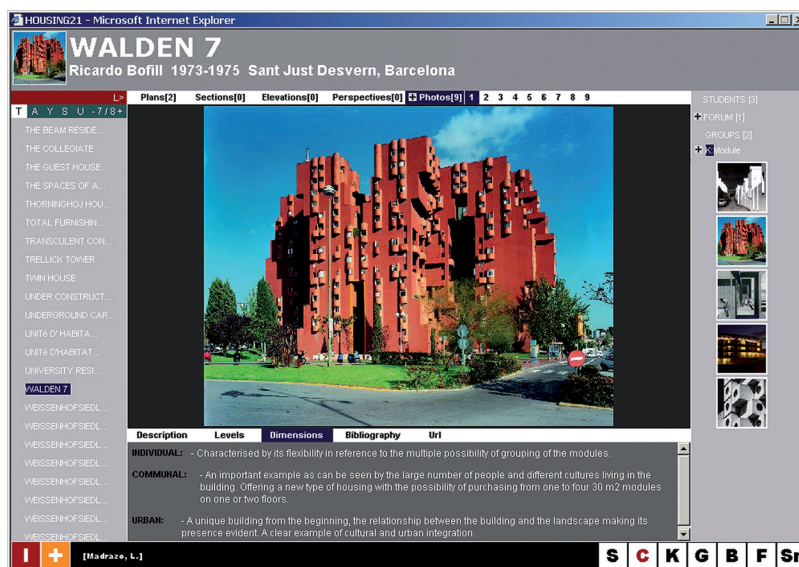


Fig. 1: Web site to collect and study housing examples ([www.housing21eu.net](http://www.housing21eu.net)).

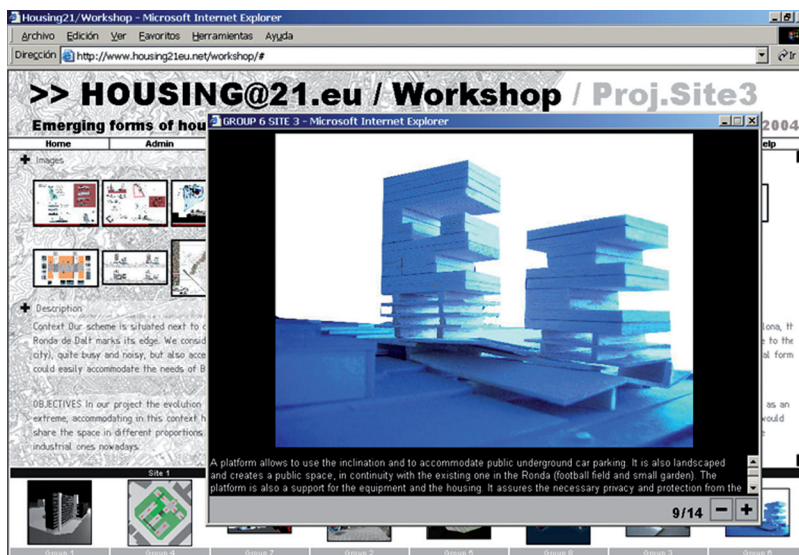


Fig. 2: Web site of the Design Workshop ([www.housing21eu.net/workshop1](http://www.housing21eu.net/workshop1)).

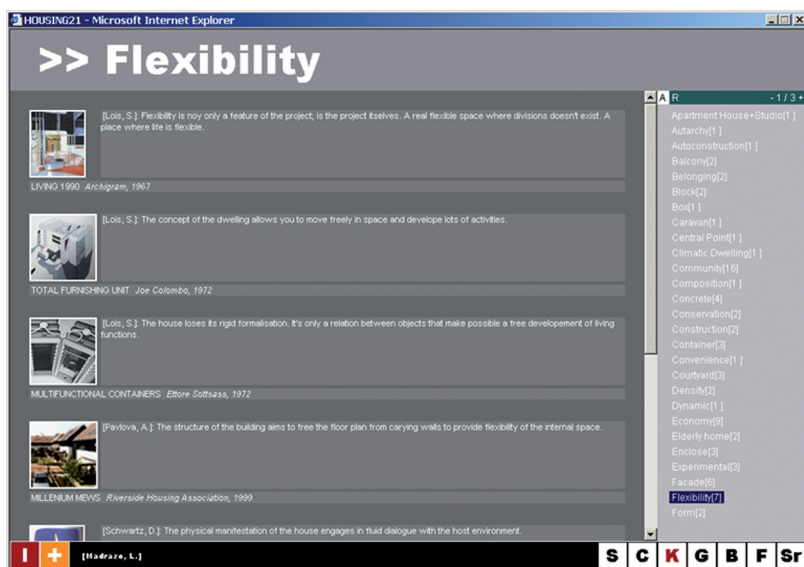


Fig. 3: Case repository collaborative tools: keywords mode.

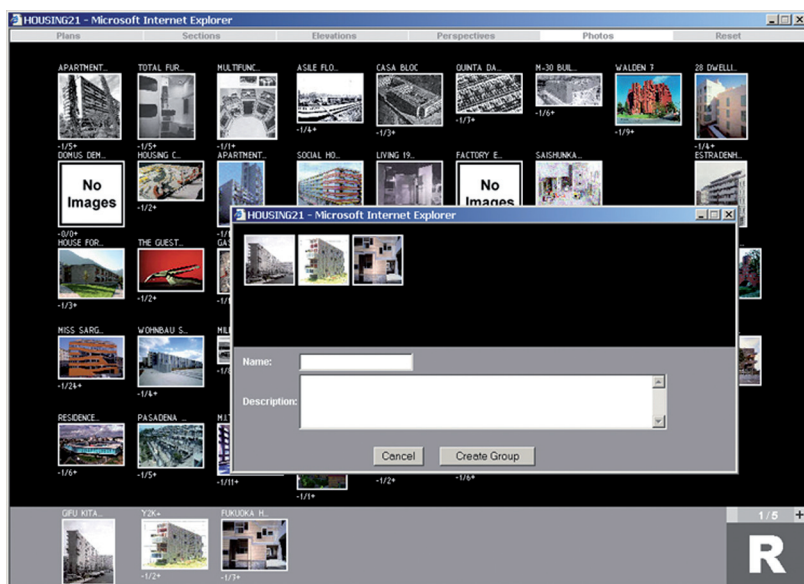


Fig. 4: Case repository collaborative tools: grouping mode.