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3D/4D Communication Tools for Facilitators in Public Participation

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The international research project, *Planning Inclusion of Clients through e-Training,* (PICT) aims at developing various computerised tools and training programmes to enhance public participation in local urban projects. This article presents a communication strategy and two tools, which were applied in a pilot study in Brussels Capital Region.

The communication strategy involves the use of multiple channels to introduce, inform and involve people to the urban planning debates.

The first tool, called '3D-projection', combines an urban scale-model of the neighbourhood with an interactive projection. Thus, parts of the model are related to photographic and computer-graphic impressions of the existing or future streetscape. The end-user can develop a thorough understanding of the presented changes in the built environment. Getting involved and being informed are made easier.

The second tool, called '4D-viewer', combines planning and design software into evaluative 3D-renderings which visualise the change of a site over time. This tool is supposed to be helpful at meetings of planners, architects and local actors and residents.

The paper introduces the PICT project and the specific planning-approach of Neighbourhood Contracts in Brussels Capital Region. Then, we will describe the communication strategy and present the general concept of the two systems as well as their application in the pilot study for the 'Brabant Groen' Neighbourhood Contract. Finally, we will discuss our experiences with the system and plans for the future.

Keywords: Public Participation, Design & Decision Support Systems, digital city modelling, interface-design.

Public Participation and the use of ICT in Urban Development Projects

PICT is a Leonardo Da Vinci project in the Community Vocational Training Action Programme. PICT is an acronym of Planning Inclusion of Clients through e-Training. The project aims at developing innovative ICT tools and training for communities and professional planners to enhance the participation in local urban projects. The project consists of academic partners, research firms and local authorities in the UK, Greece, Hungary and Belgium. The objectives of the project include the diagnosis of the training needs of planners and the public; the active involvement of the local communities of the participating areas through local partnerships to monitor and animate the project activities; the delivery of training through alternative ICT media; the networking of professionals, academics and community groups to encourage wide use of the project products and transferability to other areas; the cross-fertilisation of experience and expertise between the partners and the participating countries in general; and the validation of the acquired skills through the participating universities.

Currently we are in the test phase of the project and in this paper, we would like to present the general ideas and some of the early results of the tested system prototypes. We present the case studies that are initiated by the Belgium PICT partners at the Hogeschool voor Wetenschap & Kunst, Sint-Lucas Architectuur in Brussels. Our pilot location for development of training programmes and ICT-modules to enhance participation is specifically the Neighbourhood Contract 'Brabant-Groen' in the municipality of Schaarbeek.

Urban Regeneration Programmes in Brussels Capital Region

Certain neighbourhoods, especially in the central areas of the region are fighting high rates of unemployment, degradation of public spaces, difficulties in cohabitation of different groups of population, insufficient collective facilities and infrastructure, etc. The Regional Development Plan addresses these tensions and expresses the will to develop more solidarity between different parts of the region. Specific instruments, like Neighbourhood Contracts, are developed to address deprived neighbourhoods. They started in 1993.

Regional authorities aim at an integrated approach for the development of most deprived neighbourhoods. A brief framing of Neighbourhood Contracts is provided in table 1.

The interventions in Neighbourhood Contracts are designed to be catalytic and as such an example of 'best practice' to be inspiring for the remaining and adjoining areas of the neighbourhood or municipality.

Brussels Capital Region takes the Neighbourhood Contracts as a chance to develop ways of concerted partnership approaches. Three main instruments are designed to involve a large variety of actors:

General Neighbourhood Assembly - open to all inhabitants and aim at facilitating the exchange with official authorities from both the municipal and the regional level. In the first gathering, officials from the municipality inform the inhabitants about the start of the Neighbourhood Contract. Weaknesses and strength of the neighbourhood are discussed with all participants to develop a list of prioritised interventions. The assembly allows choosing members for the 'Local Commission of Integrated Development' (see below). In total there are three assemblies for the nine months of preparation and at least two for each of the four years of implementation.

Consultative Commission For Public Hearing - includes representatives of different official institutions. There is a first public hearing to discuss the preliminary programme and more public hearings about separate important interventions (all in the frame of what is legally demanded for urban permits).

Local Commission For Integrated Development - the main co-ordination in the development of the Neighbourhood Contract is done through so-called Local Commission of Integrated Development. The task of the LCDI is to give advice for the project over four years, before the agreement of the municipal council is attained. The LCDI also advises yearly about the financial and administrative reports of a selection of initiatives. The recommendation in the ministerial circular is to gather at least once every four months.

In the frame of the PICT-project, we have developed various computerized tools with local partners in a Neighbourhood Contract in the municipality of Schaarbeek. The Brabant Neighbourhood is a multi-deprived area near the North Station. Main interventions in the "Brabant-Groen"-project are the construction of a park and the refurbishment of a busy shopping street for ethnic trade. All examples here focus on the development of the Park.

Lowering the thresholds: a communication strategy

Local associations in the Brabant Groen Contract have developed own efficient ways to communicate with actors and residents from a broader local community. Examples of good practice are for instance neighbourhood journals (figure 1), booklets to present a neighbourhood, announcements in local newspapers, posters and information-banners (figure 2). There are frequent meetings of the LCDI in the neighbourhood house, which is also used for announcements on the window and billboards. Another efficient way to inform inhabitants about the programme of the Neighbourhood Contract proved to be the door-to-door explanation. Some associations also use electronic media, for instance for presentations at a general neighbourhood assembly and for reports of meetings. The main share of existing channels are so-called traditional channels though. How can ICT help in this environment?

Table 1
Neighbourhood Contracts in Brussels Capital Region in brief, [Based on: 'Handleiding Wijkcontracten', De Stadswinkel vzw, 1999].

Legal background	Ordinance of Brussels Capital Region 7th of October 1993.
Selection of sites	On base of 18 criteria (socio-economic aspects as well as about quality of life in neighbourhoods), all sites are located within the perimeters for development of housing as indicated on the Regional Development Plan. The sites are centrally located in Brussels in following municipalities: Anderlecht, Sint-Gillis, the city of Brussels, Sint-Joost-ten-Node, Elsene, Schaarbeek, Molenbeek and Vorst.
Program	Different projects are executed within one neighbourhood. These can be for instance the renovation of residences, renovation or creation of spaces for industrial and artisanal activities (often connected to housing programs), refurbishment of public spaces, creation of strengthening of infrastructure and facilities (socio-cultural aspects, sports and others), as well as the initiative for social and participative actions during the Neighbourhood Contract.
Aim	Measurements against degeneration of neighbourhoods, several projects in one neighbourhood strengthen the impact of the intervention and create a new dynamic, interventions focus on different aspects of the neighbourhood, such as the buildings, public spaces, infrastructure as well as social and economical initiatives. It is intended to gather inhabitants and users of the neighbourhood from the very beginning of the contracts.
Budgets	approx. 10 million Euro per project
Financing	Usually divided over Region (larger share) and Municipality, involvement of federal levels as well besides search for private investors in PPP.
Duration	4 years, possible prolongation of up to two years for the termination of on-site implementation.

The communication strategy in the frame of the PICT-project focuses on the development of multiple channels to be integrated with existing channels. Despite sophisticated web-services from for instance local authorities and planning offices, and a generally good Internet access with 40% domestic connections in average in Belgium [Van Belleghem, 2004], there is still a digital divide, which holds that most people just do not find the local websites if they are not actively directed or if they are not already involved. This digital divide is even more outspoken in areas like the Brabant Neighbourhood where low education, high rates of unemployment, illiteracy or different literacy are restricting the potentials of using ICT drastically. Therefore, the integrated use of multiple –both traditional and new- channels is essential for good communication in urban development projects.

We further developed the idea of multiple channels into a comprehensive communication strategy (see table 2). We developed the communication with local actors using a 3D model with projections as well as images from a 4D planning tool. The latter is combining 3D renderings with different time aspects as a fourth dimension. It is our intention to have a strong link between new and existing media and to develop a multi-facetted user profile of the channels. Media can be applied in different degrees of public and private use. There are different steps to get involved in a planning process, from becoming aware to real active participation.

As a first case study for the 3D and 4D tools, we collaborated with the project planning delegates of the Brabant Groen Contract to present a new park design. The design of this park was almost completed, so the tools were mainly used to inform residents about the features and qualities of their new park.

The 3D-projection tool

The 3D-projection tool optimises the presentations of urban design. The tool aims at a better understanding for all those concerned of a neighbourhood in change. The system combines an urban scale-model of the neighbourhood with an interactive projection that directly relates parts of the scale-model to photographic and computer-graphics impressions of the existing and future streetscape (figure 3).

The first specific quality of this system is that it relates overviews to insights in a low threshold,

Figure 1
Example of a multilingual Neighbourhood Journal, developed in the frame of the Neighbourhood Contract: Groen Brabant Verte, by RenovaS – Group for renovation, Schaarbeek.

Figure 2
Information banner in the streets of Schaarbeek. This FORUM is an initiative by Sint-Lukas Kunsthumaniora and the network Limiet Limite. The concept is by Remco Briers.

	public space ←			→ private space
	on the street	exhibition space	meeting room	at home
	getting aware	*getting introduced*	*getting involved*	*getting informed*
existing channels	billboards, flyers, posters	exhibition of urban /architectural plans	group discussion with presentations	neighborhood journal
3D projection tool	images from 3D tool	3D projection tool integrated in exhibition		website with images from 3D tool and 3D model
4D planning tool	images from 4D tool		4D info support for discussions and presentations	website with images from 4D tool and animation

interactive manner. The end-user will get means to build up a thorough understanding of the presented changes in the built environment. The overviews allow to see e.g. the routes, relations and densities in the neighbourhood. The insights show the streetscape from eye-level.

The second specific quality of this system is that it starts from a general scale model on which images are projected in order to emphasise specific aspects. The overall model acts as a frame of reference for the story. The monochrome white or grey model is used as a projection screen. The projections can be boundaries, areas, pictures, text and arrows etc. The projections are arranged by means of an ordinary PowerPoint slideshow (figure 4).

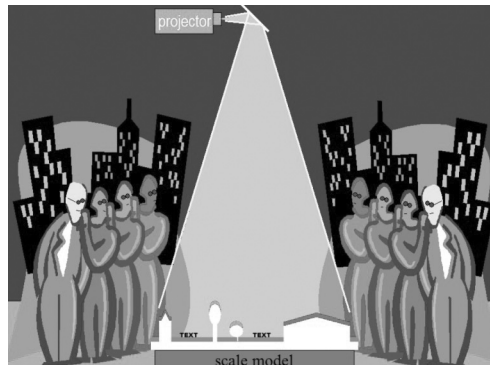The main work to make a purposeful 3D-projetion application is to transform general information sources into a useful scale model and specific projection slides. Before this work can start, a good investigation of the case is needed. The people who want to use the projection tool need to explain what they want to communicate.

Then, like in cinema production, a synopsis, a storyboard and a scenario for interaction has to be made. Based on these descriptions, the needed information sources can be selected. For our specific case of the Brabant Groen Park, we chose to work with aerial pictures, maps, design drawings from the architects and eye level images. The presentation was discussed with planners, inhabitants, representatives of associations and other local actors.

The aerial pictures and maps came as pictures and CAD files from Brussels' URBIS Geographic Information System. The design drawings were the final documents for building the project. Both the CAD files and the drawings were too rich in their information. For good projections, the content had to be reduced.

The 4D-viewer tool

The 4D-viewer is the visualisation module of the 4D Suite that contains also the 4D Builder. D-Studio develops the tool and has the copyright for it (see also www.d-studio.be). We could use the tool to visualise the new design of the Park in the Brabant Groen project for all those concerned in the project. As the tool combines 3D visualisations and time aspects, we were able to show the park in sum-

Figure 3
Projection of images and text on a monochrome scale model.

mertime and wintertime from different points of view. It was discussed with inhabitants to show also the scheduling of the construction of the park, but their interest was more on the use of the park once it is built.

Another advantage of the tool is the possibility to look at the project from any perspective: an overview, eye-level views from all over the park, and most important, moving views by simply manipulating the mouse. Most suitable perspectives were discussed again in focus groups. Inhabitants and other local actors forwarded their demands. This discussion was held around a scale-model. Local actors were basically sitting on the floor, pointing out perspectives from which they wanted to see the park in the 4D-viewer.

The main work to use the 4D viewer is to transform general information sources into a good structured digital 3D model and to define the information related to 'time' to make a time/planning schedule. Before this work can start, a good investigation of

the case is needed. Just like for the 3D-projection, also the people who want to use the 4D-viewer tool need to explain what they want to communicate. Then, again, like in cinema production, a synopsis, a storyboard and a scenario for interaction has to be made. Based on these descriptions, the needed information sources can be selected. For our specific case of the Brabant Groen Park, we chose to work with design drawings from the architects and own winter and summer visualisations.

The 4D builder is needed to combine the 3D model with time aspects:

Digital 3D Model - After collecting the information to build the story and after combining the files a digital 3D model has to be made. The skills needed to make a digital 3D model are generally available at architectural offices and schools of architecture. The graphical data of the 3D model can be originating from following sources; DesignCad 3D Max, Autocad 2000 and upgrades, Autodesk Architectural Desktop 3.3 and upgrades. Files of graphical software without OLE connection will first be converted into DesignCad 3D.

Time aspects - The planning data for the time schedule can be originating from the following sources; Microsoft Project 2000 and any upgrades, Primavera P3 Win, Primavera P3 Enterprise and all software with ODBC connection possibility. Apart from planning data, we also tried to imagine different visualisations for summer and winter as a second time aspect.

The 4D builder remains completely undependable of all original data sources. 4D objects are automatically written to a relational database. The objects only consist of the relation between the data. The original data is only dealt with in the data source and will not be duplicated.

The 4D Builder exports the 4D model to an XML file so that it can be visualised in the 4D Viewer. The 4D Viewer is a stand-alone-application that visualises the XML/4D files. The 4D Viewer uses VRML tech-

Figure 4
Projection on the scale model.

nology as its graphical motor.

In a final step, we developed a separate presentation in PowerPoint, using images from 4D to tell the story of the Park development to the General Neighbourhood Assembly. The presentation answered demands of inhabitants and project co-ordinators to show both overview and eye-level-views, to show the appearance of the Park in summer and winter. It was also asked to add people in the views to have a more human scale of the objects.

The images in figure 7 give an impression of the 'Story of the Park'. They show the zooming-in from a larger to a more detailed site, the selection of perspectives as well as the indication of zones of use in the park. The presentation of the 'Story of the Park' was warmly welcomed by local actors in the Neighbourhood Assembly. Pictures are also avail-

able to the project co-ordinators who consider to use them for a billboard at the entrance of the park during construction.

Conclusions

The first experiences with the communication strategy and the 3D/4D tools are very promising for future use. The 4D application has already been of use in many professional construction planning projects. The use of this tool for the support of a public debate is new and asks for high quality 3D content in order to provide the requested visual quality in the presentation of time and scheduling aspects. The choice for a park as a case study gave new insights in the time aspects regarding summer and winter situations in the park. The 3D projection
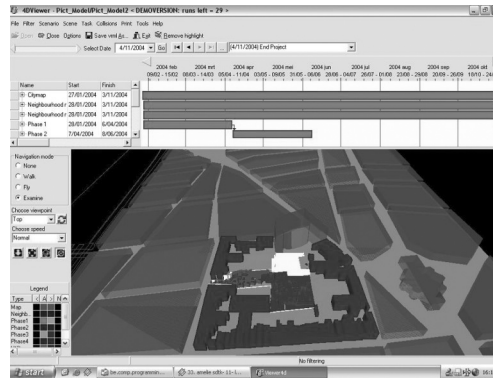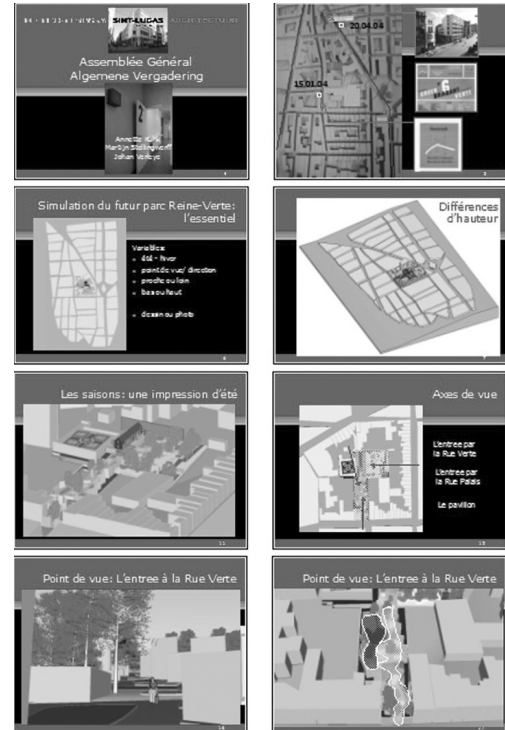

Figure 5 (top left)
The 4D-Viewer combines a 3D-model with scheduling information.

Figure 6 (buttom left)
An example of an eye level view in the park in summer-time.

Figure 7 (right)
Excerpt of the Presentation for the General neighbourhood Assembly.

tool appeared to produce attractive imagery with the potential to bring across complex city-related stories.

The tight collaboration with local actors gave the insights from this research case a high level of applicability. The requests and remarks of the residents were very demanding. This led to better quality images and less abstract realization of the presentation tools and the examples. Especially the request for images with a human scale and for visualization of variation / development and summer / winter situations were directing to interesting uses of both the projection and the planning tool.

The process to reach the requested visual quality and the amount of detail in the visualizations raised the problem of dependency to expertise in visualization techniques and to time intensive development work. High-end content for such tools will not always be available in a standard planning process. However, increasingly design offices make 3D models, which can directly be used in the 4D tool. Such models can also be the basis for production of physical rapid prototyping models of use for the projection tool. If the 3D models are already available, the 3D and 4D tools can more easily be set-up.

In this PICT case study we experienced that architecture, planning, presentation techniques and human sciences can be linked together in order to have better understanding of complex urban challenges. A good practice is to use images as a low-end translation of high end tools. The images can be used for many traditional and new channels for communication. Images combined with a good story and succeeded by a debate, can lead to a better understanding of the developments in the neighbourhood and, as side-effect, to a grateful audience.

Acknowledgements

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