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# Space to reflect: combinatory methods for developing student interaction design projects in public spaces

MARILYN LENNON,* LIAM BANNON and LUIGINA CIOLFI

Interaction Design Centre, Department of Computer Science and Information Systems, University of Limerick, Limerick, Ireland

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This paper provides an overview of a project-based graduate course on the Design of Interactive Media for Public Spaces, which is part of a Masters programme of study in Interactive Media. Project teams make use of a variety of design methods over the 14-week course: students work through a complete design life-cycle using a combination of methods from observational studies through to concept design, prototyping, testing and evaluation. This paper outlines the structure of the course and illustrates two examples of projects completed by student teams. The paper shows how it is possible in a short time-frame to have students undertake a real-world-based design project, bringing it to the stage of preliminary prototype design. It emphasizes the importance of using a combination of methods, and of supporting students' reflections on their design practice and experiences during the project.

*Keywords*: Interaction design; Public spaces; Interdisciplinarity; Collaboration; Design curriculum development

## 1. Introduction

The one-year taught Masters programme in Interactive Media at the University of Limerick attracts students from different backgrounds, such as art and design, material science, education, business, computer science, engineering and communications. On the programme module titled 'Interactive Media for Public Spaces', project teams are formed consisting of three members, each with different primary disciplines (as far as possible). This is feasible because we have an average of 20 students taking the module per year. The mix of backgrounds has been found to be quite valuable during the design process. The module runs over a single semester—14 weeks, with only 2 hours per week formal team/tutor contact. During this time, an appropriate public space has to be identified and

*Corresponding author. Email: Marilyn.lennon@ul.ie

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thoroughly studied, design scenarios and concepts developed and tested, and finally, a presentation made to a critical audience. The module was designed to teach the students to implement methodologies that, in a limited time-frame, allowed teams to:

- survey a physical space and quickly highlight its major features and elements;
- gather an understanding of the practices and activities within the site;
- collect a body of ideas, suggestions, and possibilities that would guide the later scenario and concept design phase;
- produce a prototype of the envisioned design;
- test the design with users, *in situ* where possible;
- conduct an evaluation of the design.

The techniques used by the teams included: brainstorming, worksheets, group critique sessions, field observations, informal interviews, cultural probes, participatory design sessions, scenario-based design, prototyping, and cooperative evaluation.

In the following sections, after outlining the structure of the course and giving a brief account of the different methods used, we shall illustrate two project concepts our student teams have designed for interactive media installations in specific public spaces. These are 'Bin-IT', an interactive litterbin installation for a small city train station, and 'Pedestrian Enlightenment', a pedestrian-crossing installation.

## 2. Module background

Within the Masters in Interactive Media programme, the students are introduced to theoretical and methodological foundations of Human–Computer Interaction and Interaction Design, which place the user at the heart of Design. Notions of 'activity' and 'interaction' are explored from different theoretical perspectives arising within psychology, philosophy and the social sciences. The emphasis is particularly on situated approaches to understanding human activity in context (Bannon and Bodker 1991, Winograd 1996), the relationship between users/participants and the cultural and social environment (Suchman 1987), and the role that the physical environment plays in shaping and supporting activities (Harrison and Dourish 1996, Ciolfi and Bannon 2005).

Currently, the area of research devoted to the design of technologies for public and social spaces is greatly expanding through a variety of workshops, publications and research projects on the topic. This is due to the increasing capabilities of ubiquitous and pervasive technologies which can be distributed and embedded within the fixtures and fittings of physical environments. These developments have lead researchers in the Interaction Design field to reflect on the kind of conceptual and methodological tools that can aid the design of technological installations in public and shared space (Turner and Davenport 2005). Research in this area is also characterized by a string of multidisciplinary approaches that aims at bringing together perspectives and methodologies from fields such as art, design, architecture, geography and the social sciences.

Our approach in framing and delivering the 'Interactive Media in Public Spaces' module is influenced by our own research in this area, and by our own design explorations regarding public environments as part of multi-disciplinary teams.

To begin our account, we will first outline the design brief given to the students on the course and then proceed by describing the modules features and overall structure.

### 2.1 *The design brief*

The design brief was taken from a brief set by the 'Siena Design Project'.[1] This initiative, aimed at students, involved several academic institutions around Europe and was inspired originally by the 'Apple Design Project'.[2] Our students were invited to participate in the project in 2003 and 2004.

In 2003, the first year of our module, the student teams were asked to produce a design concept for the installation of wireless interactive technologies within a public space, in order to enhance the users' existing experience of that particular space. We have given the same brief to the subsequent years. Spaces explored by the teams have included a farmers market, a scenic picnic area, a multi-storey car park, a shopping centre, a street archway and so on.

Each year our students choose their own space and, with some guidance from the tutors, they negotiate the terms of access for working at that space with any authorities involved.

### 2.2 *Module structure and design*

From the outset, the module design was influenced by the varying expertise of the tutors who taught the module and this was reflected in the design of the 14-week module structure. Elements from practice in Art, Design and Human–Computer Interaction were adapted within an Interaction Design framework to facilitate the process of designing interactivity for a public space. As noted earlier, participating students came from diverse disciplines, and so we arranged that each team comprised three students with differing backgrounds. We chose three members as a team size because we believed that the dynamic of a three-person team encouraged close teamwork, without splinter groups forming. We held that firstly this encouraged inter-disciplinary collaboration, and secondly it ensured that all team members involved themselves in the entire design process, adding to the educational value of the exercise. Each team of students used worksheets, journals, notebooks, drawings, photography and digital recordings gathered during field studies for demonstration in tutorials and group critique sessions. Using a toolkit of methods, students chose different approaches and modified them according to the needs of the project. The success of the project depended on the combination and modification of the methods used. Group critique sessions helped to rationalize the choice of methods and allowed discussion as to the modifications necessary for conducting a specific enquiry. They also provided a platform for reflection and sharing among all teams.

Table 1 briefly describes the methods the students were introduced to, and subsequently used, in each of the phases of the user-centred design process.

### 2.3 *Methods toolkit*

The 14-week course was roughly divided into two sections; the first half was concerned primarily with discussing methods for gathering information on the physical space, its features and major elements and in developing an understanding of the practices and

[1]SDP details: http://www.saul.unisi.it/cdesign/event/index.php
[2]Apple Design detail: http://hci.stanford.edu/bds/9p-apple.html

Table 1. Methods toolkit.

**Phase 1. Understanding the Space and its Inhabitants**

**Method 1. Worksheets**

Worksheets are a version of the 'mood board' often used in industrial design. Guy Julier notes that mood boards 'involve the arrangement and presentation of images of related products, logotypes, environments or other design material onto blank sheets in order to construct an artefactual and associational context for the thing being designed. The designer's own drawings and photographs or samples of materials may also be introduced'. (Julier 2000, p. 95.) Our revision stipulated that the material gathered relate specifically to the public space under study.

**Method 2. Brainstorming**

Brainstorming is used at an early stage in the design process for the rapid generation of ideas in a specific domain, with the emphasis on idea creation and a withholding of comment or critique at this stage (Osborne 1963).

**Method 3. Survey**

Surveys can involve the team observing users on-site as they use the space and taking note of the forms of activity that takes place. Survey methods included were informal interviews, shadowing, story gathering, video recording, sound recording, sketching and observing movement patterns (Newman 1994, Whyte 1998).

**Phase 2. Generating Design concepts**

**Method 4. Cultural Probes**

The use of probes is geared towards design generation. Users are given tasks with an aim to provoke or gain inspirational responses as stimulation for concept design (Gaver *et al*. 1999, Gaver 2002).

**Method 5. Scenario-Based Design**

Scenarios are short written narratives of users and their tasks in a specific context (Carroll 1995).

**Method 6. Storyboarding**

A storyboard is a prototype consisting of a series of screen sketches in sequence. Designers use them to illustrate and organize their ideas and obtain feedback from users.

**Method 7. Informal Participatory Design Methods**

Participatory Design is a design approach, which facilitates the design team and users to work together to design a solution. The tutors are members of a design research group with a long tradition in taking issues of participation in design seriously[1] (Greenbaum and Kyng 1991).

**Phase 3. Prototyping**

**Method 8. Low and Medium Fidelity Prototyping Methods.**

Teams use a variety of prototyping methods as appropriate—including paper prototypes, scenarios, video prototyping, or 'Wizard of Oz' prototypes to test their design concepts (Isensee and Rudd 1966). An example is described in more detail later in this paper.

**Phase 4. Evaluation**

**Method 9. Cooperative Evaluation**

Students are familiar with certain forms of 'think-aloud' evaluations from their earlier course on Human–Computer Interaction. Other more general user reactions to the prototype are also gathered (Monk *et al*. 1993).

[1]The Interaction Design Centre, University of Limerick, Ireland.

activities that occurred on site. The students were supported in this phase with five formal lectures in Contextual Enquiry, Ethnography, Participatory Design, Scenario-based Design and Design Form. We discouraged the students from thinking about implementation of technology during this period.

The second half of the module was occupied with scenario and concept design, prototyping and evaluation—within at least two or three iterations of the design in this time period. (See figure 1.)

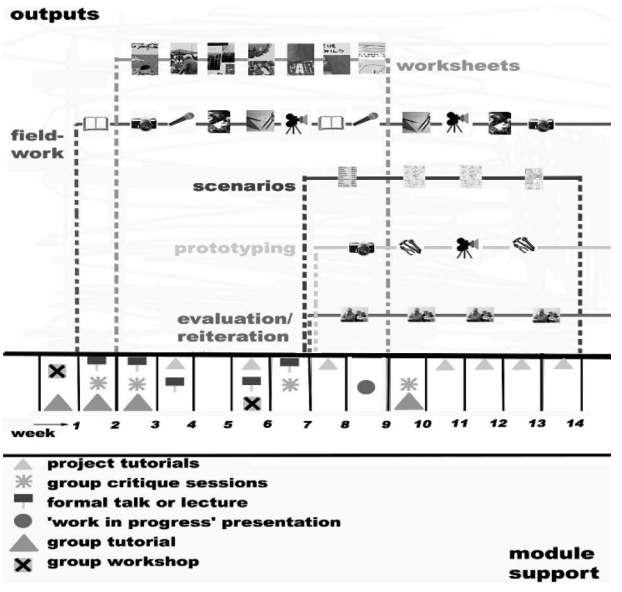



Figure 1. The module structure.

In the following section we exemplify the design process undertaken by the student teams by illustrating two designs produced during the module, firstly, with the project—Bin-IT[3] and secondly with the Pedestrian Enlightenment project.[4]

The Bin-IT team had three members with undergraduate degrees in Graphic Design, Material Science and Education. This team presented their work at the Siena Design Project (SDP) in 2003.

The Pedestrian Enlightenment team comprised three members with backgrounds in Software Engineering, Computer Systems and Fashion Design and presented their work to the SDP in 2004.

## 3. Case one—the Bin-IT Project

The 'Bin-IT' team chose to study the concourse area of Colbert Train Station in Limerick City (Ireland). This station is small, with only four platforms, so the entire space could be studied without difficulty. Mainly passengers, people waiting for passengers, and occasional staff members use the concourse area. It is approximately 1400 sq ft. in area, and is bounded by a ticket office, a left luggage depot, a small newspaper shop, an ATM, a café kiosk, and a bar/restaurant. (See a panoramic view of the space in figure 2.)

The team began the study of Colbert Station by making 25 A2-sized worksheets over the first 7 weeks of the module. These worksheets helped to concretize the visual impact of the concourse and created a focal point for discussion among the team and the tutors during the class critique sessions. The train station staff gave the students access to all

[3]The 'Bin_IT' team participants were Sinead Dinneen, Mary Gannon and Donnacha Toomey.
[4]The 'Pedestrian Enlightenment' participants were Tomas Finnernan, Aoife Ludlow and Cathal Griffin.

areas of the station including the administration offices, which had large windows overlooking the entire concourse. Video of movement throughout the day was captured from this location (figure 4).

A variety of other methods were used to gather opinions and anecdotes from staff and station users, this included shadowing, video and sound capture, storytelling, etc. The team also found that, given the short time they could spend on the research, it was best to try to draw out the station staff's tacit knowledge of the space by employing informal participatory design sessions on-site. The work *in situ* continued throughout the entire 14 weeks of the course, initially focused on developing requirements, and subsequently on evaluating the prototypes. Some of the most significant observations made in the initial phase of the study are listed below.

### 3.1 *Key observations*

- Members of the public considered the place to be boring and cold.
- While staff spent a lot of energy cleaning, they felt they were waging a losing battle against the public who continually littered the space.
- There was no entertainment available in the concourse.
- Occupancy of the space fluctuated between being crowded and being almost empty, at different times of the day (figures 3 and 4).
- The first impression made on visitors when arriving at the concourse was perceived to be important, as the station was considered a portal to the city.

Figure 2. Concourse at Colbert train station.

Figures 3, 4 and 5. Observation data.

### 3.2 *Creating a scenario*

Based on the findings from field studies, the Bin-IT scenario consisted of a set of litterbins that, during quieter periods, travelled from their normal position in the station onto the centre of the concourse to move in a choreographed dance. The bins would also move about the station at other times asking people to feed them with their litter.

From the outset, the team built a strong informal relationship with the station staff. When this concept was discussed in informal participatory design sessions with them, several issues concerning the design of the existing litterbins in general emerged; for example, the difficulty that cleaning staff had in moving and emptying them. Also, they wanted the safety of people rushing through the station to be addressed, and they questioned the security and the possible theft of the bins.

During the design sessions involving the station staff, one cleaning staff member suggested that the robotic bins could be 'rounded up' with a whistle at the end of the day to be emptied, and then move off back to their position in the station afterwards. The station staff also contributed to, and commented on, the early drawings developed during the initial design sessions (figure 6).

### 3.3 *Prototyping*

A prototype was constructed out of papier mâché which replicated the existing bins in the station (see figures 7 and 9). Walkie-talkies and a radio-controlled toy car were used to simulate the movement and speech of the robotic bin. The prototype was introduced into the space, and the interactions between the bin and members of the public were video-recorded for several hours. As we mentioned above, several staff members were very involved and enthusiastic about this project, and contributed significantly to this testing phase, not only making observations about the design, but also in making sure that no harm came to the public or the moving bin during the test.

The results of this first design iteration were somewhat disappointing as the prototype was not adequate to obtain an effective simulation, it was obviously a 'fake' bin and the students believed that this aspect was too distracting to elicit any realistic reaction.

In the next iteration of the design, the stationmaster offered the design team a number of real litterbins for the construction of realistic prototypes. The shell of each bin was removed and a wooden disk with wheels was placed at the base, as demonstrated in figure 8. The wheels served to make the bin move in a fluid manner, and a remote-control car and a walkie-talkie were also used. This set of prototypes realistically simulated

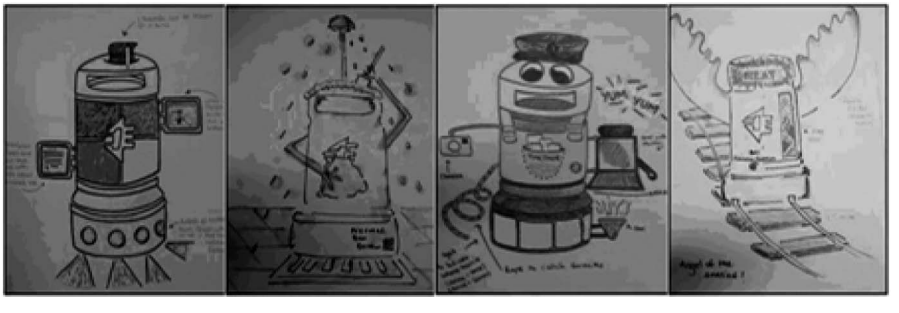


Figure 6. Bin characters developed during informal participatory design sessions with station staff.

the intended design of augmented station litterbins. This prototype was developed according to the Wizard-of-Oz technique, which simulates aspects of the interactive system's behaviour in order to verify people's reactions to and interactions with it.

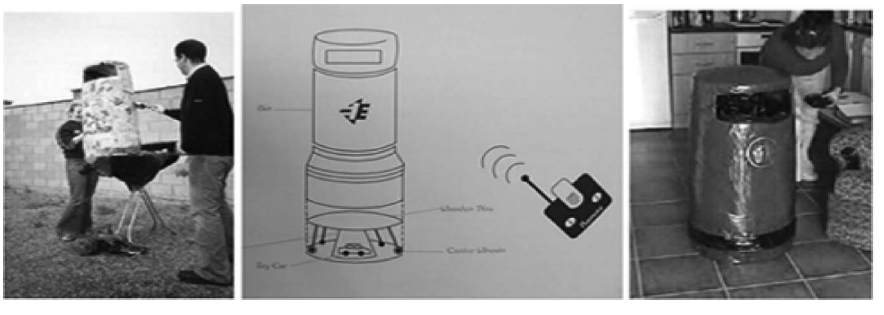
The prototype bins placed in the station were videoed for periods over several days, while moving around the station asking to be fed litter. They were tested at different times of the day in varying crowding and flow conditions (figure 10).

### 3.4 *Results*

The data collected showed that the moving, talking bins were successful firstly in drawing attention to their presence in the space, and secondly in prompting people to use them. They effectively changed the overall impression of coldness and boredom associated with the station; the installation proved to be entertaining, to provoke reactions and to trigger episodes of social interaction among individuals and small groups in the space, causing laughter or mock exchanges with the bin characters as if they were alive or personified.

### 3.5 *Conclusion*

In final discussions with the staff, it was agreed that the interactive bins could be built so as to flexibly adapt to the different crowd conditions occurring in Colbert Station at different times of the day. When the station was quiet and few people were present, the bins could be sent moving about the concourse area and animate the space with their movements, whereas when the station was very crowded, they could remain in their original stationary positions without interfering with the flow of people through the space.



Figures 7, 8 and 9. Construction of papier mâché prototype.


Figure 10. Prototype sketch and stills from footage of prototype *in situ*.

The station staff were very appreciative of the idea that the students had of providing a software programme available to staff members for controlling the bins' movements to suit the flow of people in the space, and that could also allow the staff to choreograph dances for the bins in the concourse space. The staff felt that the Bin-IT installation could provide an excellent solution to the litter problem in the station and to the daily difficulties they encounter in emptying and cleaning the existing bins. They felt that the installation could draw positive attention to the station.

The members of staff also appreciated that the design team had carefully considered their suggestions for design proposed during the participatory design sessions. This was evidenced in the way that they had taken ownership of Bin-IT, supporting it throughout the project term.

Finally, the Bin-IT project was perceived as successful particularly because it was extremely site-specific: it proposed something that was tailored to the particular features of the space and to the people who used it. The design relied on an existing artefact in the station, the litterbin, which was augmented or enhanced, rather than on introducing a foreign or new artefact into the space. Furthermore, the bins would always remain functional in their primary role, regardless of whether or not the digital aspect of their behaviour was active. Finally, we should note how engaging the moving bins were, not just to the travellers and station staff, but also for the design team and the course tutors as well!

We now illustrate the second student project example. 'Pedestrian Enlightenment' was presented at the Siena Design Project in 2004.

This project, in comparison to the previous, demonstrates how diverse public spaces are. The two illustrate that methods cannot be prescribed and must be adapted to address the context.

## 4. Case two: Pedestrian Enlightenment

This section describes a second example of students' work within the Interactive Media in Public Spaces course: 'Pedestrian Enlightenment'. The team's chosen location was a signalized pedestrian crossing junction in the centre of Limerick City (figure 11). The team found this to be a challenging location as it is a public space, but a transient user group uses it, therefore the methods which are usually employed to gather information on users' current experiences of the space needed to be modified and adapted to this particular situation.

The junction is particularly busy as a result of a number of unique factors.

- The main street of the junction is an extremely busy street accommodating freight as well as passenger traffic. This is due to the current traffic structure of Limerick

Figure 11. Bedford Row Junction, Limerick.

city, which has no outer bypass road network, and therefore most of the traffic on this street is 'through' traffic.
- A large and popular shopping centre is located at the junction.
- A bus stop is also located beside the shopping centre and encourages pedestrians to cross the junction in a diagonal path, often dangerously.
- The Irish pedestrian culture also contributes greatly to the activity at the junction, as it became apparent that pedestrian traffic ignored, avoided, misused, and in general paid little attention to pedestrian crossing installations.

The primary focus of the project was to enhance users' experiences at the selected space. In relation to the specificity of the particular space chosen, there were a number of issues that needed addressing, although not all of them were instantly apparent at the onset of research:

- Safety;
- pedestrian attention;
- tedium of waiting 5 minutes for pedestrian traffic lights to change colour;
- stop and flow.

### 4.1 *Methods*

As in the first case study, worksheet montages of materials found in the space, along with sketches, photographs, notes, etc., created a focal point for discussion among the team members, and illustrated features of the space during the presentation of findings to the other students and tutors in group critique sessions.

The team negotiated with staff at Harvey's Quay multi-storey car park to gain free access to the top of their building. The car park is adjacent to the shopping centre and has a notably high and open rooftop, which aided aerial view photography, video recording and observation of surrounding environment. Video recording of pedestrian, car movements and patterns throughout the day was captured from this location (figure 12).


Figure 12. Video footage.

A variety of methods were used to gather opinions and anecdotes regarding this space from pedestrians, drivers and surrounding residents. These included shadowing, sound capture, casual conversations, etc. However, the transitory nature of users' activities made it difficult for the students to either stop people to talk to them or engage them in conversation. It was found that people at the pedestrian crossing were generally on their way somewhere and did not want to be interrupted.

The team, with permission from the shopping centre located at the junction, set up a screen in the lobby of the centre showing aerial footage of how pedestrians weaved through moving traffic in a precarious way. The overall effect was enhanced by the fact that the footage had been speeded up slightly: it was almost comical yet provocative enough to engage the attention of passers-by.

The team also employed a variation of the 'Cultural Probes' method (Gaver *et al.* 1999): postcards were created with a sketch of an aerial view of the junction on one side, while on the back a simple question was posed—'Where did you cross the road?'—to encourage users of the junction to think about and write about their experiences. These postcards were handed to people who had stopped out of curiosity to watch the video footage being shown in the shopping centre's lobby, to ask questions or make comments.

Postcards were used in combination with the video footage because, up until this point, the students found that people were not likely to want to stop for any length of time. Each postcard included a postage stamp to encourage participants' to return the responses they had written in their own time (see figure 13).

### 4.2 *Key observations*

At the midpoint of the research, several key features emerged pertaining to how people experienced using or passing through the signalized pedestrian junction. These key observations were gathered from extensive work involving not only users from the street, but from their cars, from surrounding retailers, and from the city authorities. These observations were used as the guiding elements in developing a design concept.

**4.2.1 Pedestrian indiscipline.** Pedestrians were observed crossing erratically while paying little attention to the lights.

**4.2.2 Drivers' awareness.** Drivers explained how they were somewhat confused and overwhelmed by the amount of erratic pedestrian activity at the busy junction.

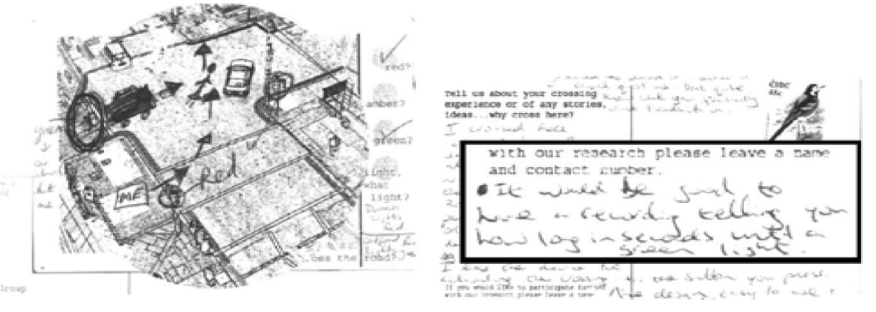



Figure 13. Postcards.

**4.2.3 Impatience.** Throughout informal and formal investigations, pedestrian and even driver's frustration and impatience was apparent.

**4.2.4 Button misuse.** Video data revealed pedestrians'

- mistrust of the effectiveness of the push button control of the pedestrian traffic light;
- reluctance to actually press the button;
- repeatedly misread a small square light on the casing as a button to activate the lights (see figure 14).

**4.2.5 Pedestrian boundaries.** One outstanding feature of the pedestrians' behaviour that the team noted was their disregard for the crossing boundaries set by signage lines painted on the tarmac.

**4.2.6 Timing of lights.** One observation common to both drivers and particularly pedestrians was their unawareness of the length of the light cycles.

### 4.3 *Key objectives*

From the observations, these objectives were developed as crucial points for designing the prototype.

- To highlight the junction boundaries for drivers and for pedestrians.
- To make users aware of the lights' status.
- To encourage pedestrians to cross in a safe manner.
- To create a system that drivers could trust.
- To engage the users of the junction in abiding by the rules of safe behaviour.
- To enhance the effectiveness of the pedestrian push button controlling the traffic light.

### 4.4 *Creating a scenario*

Having developed a set of observations and objectives to be addressed in the design, the team brainstormed using these as key concerns. This work was carried out both *in-situ* and in the studio. Three possible scenarios were written using the scenario-based design

Figure 14. Pedestrian crossing features.

methodology and subsequently presented in a group critique session. One design scenario was chosen and developed in prototype form over three iterations. The prototypes were presented to both a focus group that consisted of both drivers and pedestrians, and to the Limerick city traffic planners. The team contacted the public officials in order to develop an understanding of the crossing in the context of the larger city system and in the context of EU regulations for the safe design of all types of crossings.

### 4.5 *Prototypes*

The scenario developed by the students through a Macromedia Flash animation primarily demonstrated a new signalling protocol for both pedestrians and drivers. The proposed system included the illumination of the junction ground surface to give a bridging effect, using lights embedded in the crossing's tarmacadam surface. The team described a system that would give visual cues to both the pedestrian and the driver, regarding when to stop, when to go and how long they would need to wait for both (see figure 15).

An interactive Flash-based prototype displayed four different aspects, namely views of the junction from both the driver's and pedestrian's perspectives at red and then again at

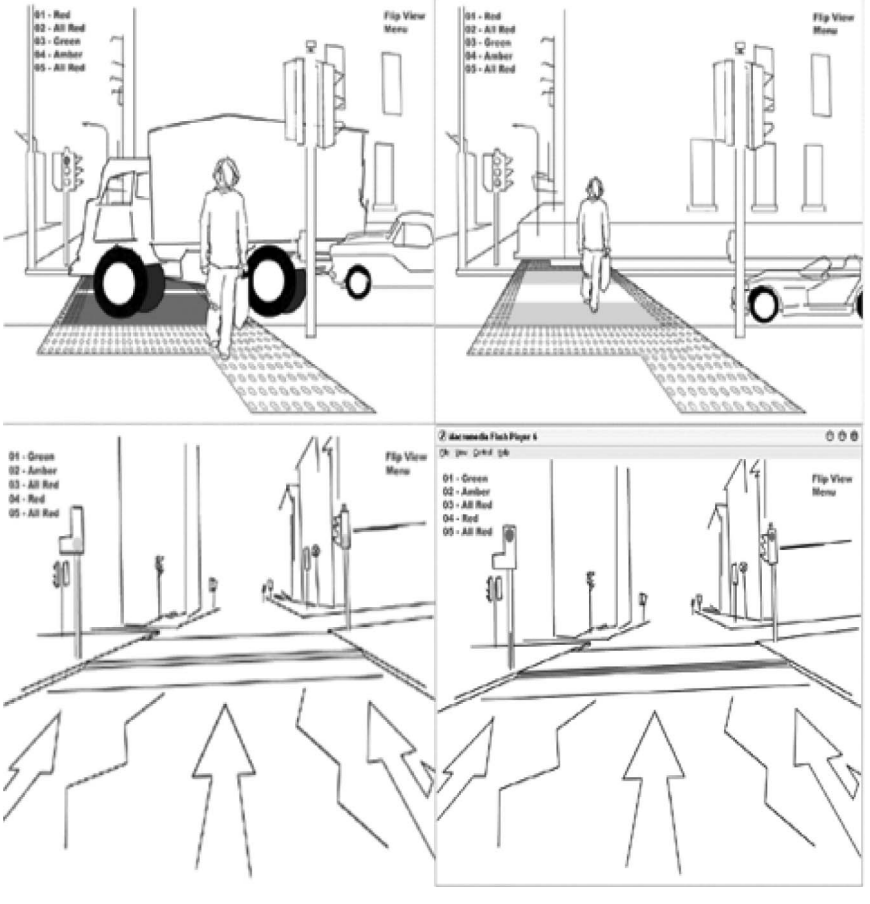



Figure 15. Stills from the animated prototype.

green lights. The final prototype included improvements derived from the focus group's suggestions and continuing fieldwork. Further additions were included in this prototype; namely, a pedestrian sensor, which automatically activated the existing 'push-button' function if pedestrians stood at the junction for a certain time; a sketch of a cat's-eye style light that displayed different colours depending on whether it is viewed from the driver or pedestrian perspective, and some detail on the raised surface, the markings and quality of texture of the crossing surface, which adhered to EU crossing regulations.

### 4.6 *Conclusion*

The Pedestrian Enlightenment team studied a very different space to the Bin-IT team where the stakeholders were less easily defined. The Signalized Pedestrian Crossing Junction had been designed under very strict EU regulations, which the team had to familiarize themselves with and adhere to in developing their scenarios. The crossing was also part of a larger digitally-controlled system in the city, so it was important that the team understood at least the rudiments of how that system operated, and took advice from the operators of the system in this regard.

Taking into account the breadth of stakeholders and the different methods needed to gather information on their needs, activities and experiences was a challenge that the team accepted. Information-gathering methods had to be appropriate to the context because, for instance, passing pedestrians were reluctant to engage with the team and drivers were also on the move. Prototyping methods had to take on board safety as an obvious concern, but also needed to demonstrate clearly the new signalling protocol that the team had proposed in their scenario.

As evaluation sessions revealed that early designs were not clear to the focus group, the team used a variety of low and medium fidelity prototypes in sessions to uncover and address the problems. In a short space of time the team were able to familiarize themselves with the choice of methods that they could employ, and with the possible modifications needed following the group critique sessions.

While this paper advocates using a combination of design methods, we also emphasize the importance of supporting students' reflections on their practice and experiences during the design process. We recount the means we use to do this in the following section.

## 5. Reflection

The research that the students undertake in the Interactive Media for Public Spaces module is carried out with a strong design orientation. The module work involves creating and giving form to something not previously there. In a pragmatic account, design is carried out in a specific real-world place, and designers are engaged in a specific design situation (Fallman 2003).

In public spaces a situation is loaded with a unique dynamic of people, activities, objects, practices, structures, protocols, histories, experiences, etc. In this module it is required that the students are directly involved with the materials and processes of designing interactive artefacts for a specific site. This places responsibility on the students, in their role of interaction designers, to iteratively interpret and create meaning from the effects of their designs on the situation at hand (Schön 1983, 1987, Suchman 1987, Fallman 2003).

Since we set a brief that is not focused on a 'problem' to solve *per se* but on the idea of augmentation and enhancement of current experiences, the students are initially required

to develop an understanding of those 'current experiences' of a particular space. In developing a broad understanding of the practices and activities that people are engaged with in the space, it has been the students' experience that, over the first exploratory period of the module, a number of issues emerge for examination and discussion. At the end of the first 7 weeks the students present solutions responding to problems that they have found in their study at the space. Therefore problem-setting and problem-solving are emergent concurrent activities. As issues emerge in this design situation, it is the student's responsibility to decide which are worth addressing (Schön 1983, Fallman 2003).

While our Masters programme is set in a university where the lecture room model is predominant, we tried to replicate the design studio model, so that the students constructed artefacts, gathered materials and displayed worksheets in their workspaces. Lecturers encouraged open discussion between all of the teams. Each team of students used worksheets, journals, digital audio and video recordings, gathered during field studies for demonstration in group critique sessions. As all teams chose different locations, specific tutorials addressed each teams' individual concerns in open group sessions and in closed meetings involving each of the project teams individually.

### 5.1 *Group critique sessions*

In the group critique sessions each student team in turn showed all materials gathered during field studies, displaying the work carried out to date to the entire class. They gave a general report on their findings and then raised specific issues that they had found interesting. Worksheets in particular allowed instant access to a level of acquaintance with each of the different spaces under study for all parties (see figure 16). As a visual form of information they served as reference material and representation of knowledge gathered. Reporting teams reflected aloud in critique sessions on the situation under scrutiny.

Students in other teams also used the worksheets to refer back to points made in the report, pointing at or indicating particular images to illustrate a comment or to refer to what the reporting team had said.

All students were encouraged to ask questions, give feedback and make suggestions to each other.

As the weeks progressed the students became familiar with all of the projects that were happening concurrently. If an issue was raised in a project, for instance when the Pedestrian Enlightenment team could not engage passing pedestrians in interviews/conversations, the whole class reflected on the issue and proposed possible solutions.

Figure 16. Sample worksheets.

Both understanding the problem and finding a solution were a learning exercise for everyone. Over several iterations the students learned to interpret and create meaning from the situations they were studying.

Journals were kept throughout the project life by all teams: they were a hybrid scrapbook/diary where all dates and activities were logged, communication between the team was documented, interesting articles, module notes, interviews, print-outs of project blog pages, papers, and a miscellany of data were pulled together in one place. It is fair to say that students have been proud of these journals, as they are a testament to the huge amount of information gathered, to team reflection, and to progress over the project life. The fact that the team had created a single artefact enforced communication among team members, as contributions from each member were evident to the others. During group discussions both the worksheets and the journals meant that the data that the team had gathered was apparent to all team members. In practice, the journal in particular was central to converging information when developing key observations and objectives, as students found that the information they have gathered was at hand in one location.

## 6. Conclusions

In this paper we have provided an account of a design course which combines a number of different design methods and techniques over a single semester. While the course is ambitious in intent, we have been heartened by the ability of our students to learn, adapt and use a variety of methods and techniques to address a specific topic, and develop reasonable prototypes within this time frame. And indeed, almost all our students have managed to perform quite interesting evaluations of their prototypes within the time.

Facilitation by the tutors was undoubtedly a key element, but we believe that the mix of methods, and the general framework structure that we provided to help integrate them within the Interactive Media for Public Spaces module resulted in very positive feedback, and impressive results. Having students move through a complete design cycle, from choosing a site, through observational studies, interviews, scenario generation, story-boarding, prototyping, and evaluation was a powerful reinforcement for the students themselves, who could not only see their own progression through the process but also that of their colleagues. Accomplishing all of this within the space of 14 weeks, with only a couple of hours' formally scheduled contact time, has been a revelation to us, the tutors. The project work produced in this module is testament to the huge energy and enthusiasm that the students have for this course, where they can choose their project site and are given the means to work through a complete design cycle.

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