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*Invisible success: Problems with the grand technological innovation in higher education*

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## ABSTRACT.

This paper investigates a ‘grand’ educational technology innovation through theoretical lenses inspired by Cervero and Wilson’s work (1994; 1998). Through taking this approach it is possible to show how ideas about the form of the innovation and perceptions of its ultimate ‘success’ or ‘failure’, varied between stakeholder groups. The project was pedagogically effective and popular with students, but was difficult to ‘sell’ to academics, had no senior management sponsor, and was unable to bring about cultural change in the institution despite the capital funding designed to do just that. Although many pedagogical lessons were learnt, and have since been applied in other learning spaces around the host campus and elsewhere, these successful disseminations of changed practice were not in accordance with the objectives of key stakeholders. Therefore, they went unconsidered when decisions were taken about the project’s sustainability: hence the notion of ‘invisible success’. The project’s ‘failure’ is only apparent when viewed from certain perspectives; nevertheless, these perspectives are those of the powerful (or in Bourdieu’s terms (1986; 1988), those possessing *capital* and *academic power*) and are the consequence of deeply-rooted structural features in HE, which include funding models, risk-averseness, and fragmented responsibilities.

## KEYWORDS

Architectures for educational technology systems; interdisciplinary projects; learning communities; evaluation methodologies.

**1. Introduction***1.1 Project approach and objectives*

This paper reports on an empirical study of a ‘grand’ educational technology innovation, meaning a large-scale, one-off build of an innovative, technology-rich teaching space. The paper views the innovation not through a pedagogical lens, that is, assessing its impact on the teaching and learning process, but instead focuses on the diverse objectives of, and negotiations between, the stakeholder groups who sponsored, designed, used and supported the innovation.

This approach is that of Cervero and Wilson (1994; 1998) and other members of their intellectual stable (e.g. Benson, 2002; Benson & Whitworth, 2007; Umble, Cervero & Langone, 2001; Watkins & Tisdell, 2006). It responds to Selwyn’s (2010) call for the study of educational technology to move beyond a focus on pedagogy and into an examination of the social and political structures which allow for these innovations to emerge and, ultimately, must sustain them if they are to lead to changes in practice. The approach acknowledges that educational technology innovations are explicitly political. Educational planning emerges as different stakeholder groups negotiate interests. Stakeholders have objectives they wish to fulfil, which may be overarching, that is, shared by all stakeholders with an interest in the outcomes, but may be specific to the group, or to individuals (Benson, 2002). Objectives are not necessarily educational. Planning decisions are as often made to fulfil financial, personal or political objectives. Consequently, an innovation may become a political artefact, its success dependent not just on its intrinsic characteristics but on the relative strength of pressures brought to bear in its favour or against it (Berg & Östergren, 1979).

Every innovation is therefore *shaped*, first within the micro-level context from which it emerges, and then within the other organisational and social spaces it encounters as it is developed and disseminated. These spaces include formal planning meetings as well as more informal ones such as out-of-work discussions, or reflective enquiries made by teachers, whether alone or in communities of practice (Wenger, 1999). Learners may also generate their own contexts (Luckin, Clark, Garnett, Whitworth, Akass, Cook et al, 2010), to which teachers and institutions may have to respond. It is

the multiplicity of these micro-level contexts which give innovation its emergent character (Whitworth & Benson, 2010).

However, this also makes it difficult to produce unified theories of innovation. Only studies which *combine* attention to the innovation and its organisational context can assess what has influenced the success or failure of an innovation in that context (Downs & Mohr, 1976, p. 706). What is innovative or emerging in one location may not be so in others (Veletsianos, 2010). Innovations in e-learning must therefore be studied not only with respect to their technical characteristics but their social ones. What were the motivations for introducing the innovation? What objectives did stakeholders seek to fulfil? What organisational structures permitted the innovation to be generated, developed, implemented, evaluated, diffused and sustained? What factors promoted its use, or otherwise worked in its favour? Conversely, what retarded adoption of the innovation? Some answers to these questions will be found in the technical form of the innovation, or its pedagogical qualities; but often the answers must be sought elsewhere, in the politics and social structures of the organisation. These questions drove the research described here.

### 1.2 *The grand innovation in higher education*

Innovation can be characterized in various ways. Firstly, innovation can be seen as a product - a *specific* innovation - and a broader “strategic choice” (Child, 1972), a contributor to organizational competitiveness. Secondly, specific innovations may be radical or routine. As Gooley and Towers (1996, no pagination) say:

radical innovations ‘produce fundamental changes in the activities of the organisation and represent clear departures from existing practice’ whereas routine innovations ‘result in a lesser degree of departure from existing practice in an organisation’ (Damanpour, 1988, p. 550)... Routine innovation integrates into existing social contexts whereas radical innovation results in new organisational structures and procedures.

Thirdly, innovation may take place at different scales, from large to small, and complex to simple (Downs & Mohr, 1976, p. 702). Large innovations require substantial capital investment, though may remain directed by a small group or individuals. Smaller-scale developments make use of existing technologies, off-the-shelf software applications and other low-cost solutions.

Here, the term ‘grand’ innovation refers to specific, single, large-scale projects within a university. There is no reason why the use of educational technology requires grand innovations, nor even that its use should necessarily be “innovative” where this “implies premeditation and some level of private or public explanation and justification” (Hannan & Silver, 2000, p. 63). Therefore, grand innovations form only a subset of educational technology practice.

Though educational technology is often cited as something which should lead to radical changes in practice, rather than the maintenance of existing routines (e. g. Laurillard, 2002), the grand innovation may be radical or routine. In fact, radical innovations are difficult for mature, large, professional organizations like universities (Mintzberg, 1989). Gooley and Towers (1996, no pagination) describe universities as “ocean liners”, difficult to turn or stop:

...despite the intentions of enterprising (or perhaps deviant) individuals, the investment in infrastructure... tend[s] to maintain distance education towards the status quo.... We are not saying that education providers are change-averse... only that their organisational structures tend to contain the way that the new media are appropriated.

Hemmi, Bayne and Land (2009, p.19), discussing the appropriation of ‘Web 2.0’ technologies into HE, agree that universities have a “tendency to constrain and contain the possibly more radical

effects of these new spaces”. Riskier aspects of an innovation can be emasculated by embedding it in a traditional pedagogical and/or governance structure.

However, while the loosely-coupled (Weick 1976) structure of universities may act as a brake on large-scale innovation, it simultaneously allows new practices to emerge relatively freely at lower levels. Mintzberg observes (1989, p. 188) that “the professional organization is, paradoxically, extremely stable at the broadest level and in a state of perpetual change at the narrowest one.” Rather than “ocean liners”, a more cogent metaphor may be the *flotilla*; individual units of varying form moving in the same general direction but at different speeds and degrees of freedom. These are the many contexts from which innovation can emerge, coalescing from practices in multiple locations simultaneously (Marion, 1999, pp. 260-1; Veletsianos, 2010, p. 19; Whitworth & Benson, 2010).

When these different units or innovations interact, however, then the outcome of this interaction must be formally or informally negotiated (Cervero & Wilson 1994; 1998; 2005). Negotiators engage in this process with differing abilities to shape the negotiations and thus have their objectives fulfilled. Two main types of negotiation occur at the “table” (which may be a literal table, that is, a committee or planning meeting, but may also be a metaphor for more informal discussion and bargaining): *substantive* negotiations, in which the actual content of decisions is formulated, and *meta*-negotiations, which set the parameters for substantive ones by establishing who can sit at the table, what power they have once there, what criteria will be used for judging between competing approaches, and so on (Umble et al, 2001).

Both types of negotiations can be directed by those stakeholders who are able to wield *capital* in the pursuit of their interests. The term is that of Bourdieu (1988), who studied the competing cultures that emerged within universities. Bourdieu recognizes that in the systems he studied, there are different means of acquiring power. What he calls “academic power” is “founded principally on control of the instruments of reproduction of the professorial body”, for instance, boards of examiners for doctoral qualifications, appointments committees, and so on (1988, p. 78). Academic power is founded on capital which has been acquired within the university, and is “socially codified” within the structures of career progression (1988, pp. 78-9), being based on conformity to existing practice (1988, pp. 83-4).

Combining the notions of capital and negotiation leads to the hypothesis that the ability to have one’s interests substantively represented and negotiated in planning would be retarded for radical innovations that challenged the status quo. At least, a senior sponsor of the innovation, someone with a protected right to sit at the table (protected, that is, from meta-negotiations) would be needed. Thus, a strategic commitment to innovative practice does not provoke innovation *per se*. It may open up some kind of institutional space in which innovations can be located and justified (Gunn, 2010). But within these spaces, innovations will be judged against criteria of success or failure *which are themselves negotiated* (Cervero & Wilson, 2005), a process likely to be influenced by institutional stakeholders who can bring capital to bear. This may well be a more significant influence on the innovation’s sustainability and dissemination than its pedagogical effectiveness, as the case study will now demonstrate.

## **2. Material and methods**

### **2.1 Setting**

The *Generate* project was a collaboration between two universities (which will remain completely anonymous here, as will individuals), but the research took place at only one of these institutions.

Though the original funding bid was jointly written, the management and development of the two halves of Generate then separated, and this paper will not discuss events at the second location.

Generate built a technology-rich teaching space known henceforth as the ‘Atrium’. The Atrium combined technologies such as multiple data projectors, writable surfaces, interactive sound and lighting, and movable furniture and walls. Many computers were embedded into the space and used to drive the projectors; laptops were also available for students’ use. The space was very flexible. As furniture and even the walls were movable, the configuration was adaptable; with many projectors in the space there was no ‘front’, or focus, for students’ attention. The aim of the design was therefore to produce a technology-driven (but not technology-dependent), totally flexible space, which could be configured for a wide range of innovative teaching and learning experiences such as immersive environments, observations of teaching practice, collaborative work, exhibitions and presentations. Generate also encompassed a team of learning facilitators who worked with teachers to help them adapt existing, and develop new, teaching practices within the Atrium. Generate, therefore, was a sociotechnical system, combining human and technological elements. It should be stated that the point of this article is not to assess the impact of the Atrium on teaching practice, nor any technological aspects of the design. Several papers have already been published about this aspect of the project, but because of the need to disguise its identity, they cannot be referenced here.

The present author became involved with the evaluation of Generate as a result of work undertaken as part of the learner-generated contexts research group (see Luckin et al, 2010) and studies of e-learning innovation in HE inspired by Cervero and Wilson’s negotiation-based models of planning (Benson & Whitworth 2007, Benson et al, 2008, Whitworth & Benson, 2010). The research was unfunded beyond the reimbursement of traveling expenses, and no limitations were placed on the use of research data beyond the requirement that the institution, project and individuals remain anonymous in publications.

## 2.2 Methodology

This is a mixed methods case study, developed using grounded theory (Strauss & Corbin, 1990). Prior to the start of the evaluation, no particular hypothesis about Generate existed to drive the work or develop research questions. This approach is congruent with Downs and Mohr’s view of innovation, described above, which precludes any overarching hypotheses about the grand innovation in HE. As Randolph (2008, p. 36) says, grounded theory encourages the researcher to “wander in a specific direction”. The research field may seem completely open, but the researcher is *guided by the perceptions of others* in their navigation across it. Thus, interviews conducted in the first phase of the work shaped later phases, as did documents such as the original funding bid which were offered as supporting evidence. Through analysis of these early interviews and documents, later phases of the work were designed to test whether the values and objectives supposedly embedded in the Generate sociotechnical system were in fact in evidence.

This methodology precludes claims that the study is generalizable. As with any case study, such a claim would have limited validity. However, evaluations of this kind, when publicized and disseminated, can feed into “organizational memory” (Özdemir, 2010), and provide data for those interested in the management and sustainability of grand innovations. Generate received funding from an extensive pot designed to support teaching and learning in higher education in the host country, and over 60 projects of a similar scale received funding, though not all resulted in grand technological innovations. Generate’s host is a typical research-intensive HE institution, and though the innovation itself is unique, the funding model, design process, and other project features such as its duration and scale are of kinds which are commonly seen. As with any case study it is therefore a “specific case designed to illustrate a more general principle” (Cohen, Manion & Morrison, 2010, p. 253).

### 2.3 Methods

The principal research method was the interview. A series of 13 interviews, lasting between 30-45 minutes, were conducted with key personnel. Two protocols were used (see the appendix).

*Protocol one* drove six interviews with Generate staff - the entirety of the academic and support team (two part-time administrators were omitted) - plus two interviews with other individuals who, though external to Generate, had been directly involved in its design and the bid process. These additional interviews gave insight on the institutional perspective, outside that of the project team. *Protocol two* was used in five interviews with teachers (users of the Atrium).

Interviews were recorded but not transcribed because of resource and time limitations. Instead, detailed notes were taken during the interview on a laptop and the audio files used for later reference and to confirm the notes. These notes are what were later coded. Where direct quotes have been used in this paper, these have been taken directly from the audio recordings.

This project was, as stated previously, not driven by a desire to assess the teaching impact of the Atrium, but how it was negotiated, at the design stage and subsequently. Therefore, though no context-specific themes were developed until after the first pass of coding, the following themes did drive the initial coding, and were developed with reference to Cervero and Wilson (1994; 1998) and Benson (2002):

- Who drove the project (people or visions)?
- Learning processes and decision making
- Routes of dissemination, awareness and support: ways in which users' involvement was facilitated.
- Perceived benefits of the Atrium
- Actual activities undertaken in the Atrium
- Problems or constraints with the Atrium or their use of it.

Interviews were cross-referenced with the bid document (see §3.1). This document was coded using the same categories. Observations of teaching sessions accompanied each protocol 2 interview, but because of space limitations, these have been referred to only briefly.

A limitation of the research is that no interviews took place with anyone who had *not* used the Atrium, though both protocols did address factors that might retard use of the innovation as well as promote it. Nevertheless a bias in favour of the Atrium and the viewpoint of team members can be expected. Results should be read with this potential bias in mind.

Where individuals filling specific roles have been referred to by others, job titles are used to identify them, e.g. 'Project Director', 'Learning Facilitator'. However, where I am referencing interviews I use only numbers to further preserve anonymity, prefixed with 'Int' for 'interviewee' (e.g. 'Int 4').

As anonymity precludes reference to other published accounts of the use of Generate, in journals or conference papers, these have instead been treated as documentary data in the same way as the bid document, and coded as such.

Table 1 below summarises the four project phases, in each case showing the research 'object' which was treated as the result of each phase, empirical characteristics of which were observed and analysed in order to triangulate the research interviews.

[Table 1 here]

### 3. Results

#### 3.1 Phase One: Writing the bid

*Pace* Cervero and Wilson (1994; 1998), this phase of the study focused on negotiations between different stakeholder groups. The most obvious outcome of the first phase of negotiations was the funding bid. Support structures, including criteria of success or failure, were also negotiated at this stage. Ultimately, tensions between the results of these two parallel negotiations prevented Generate from being sustained.

These negotiations did not take place in a void, but in a setting defined both by the institutional context of the university, and the call for proposals, which prescribed a funding model. Generate was a response to a funding stream intended to reward existing excellence; a large proportion of money won would be allocated to capital build. This latter point, particularly, influenced the bid from the start, as some form of physical space “had to come in [to the bid] early on” (Int 8).

When asked who or what initiated the Generate project, all interviewees named individuals (see Table 2). Some mentioned institutions, such as the funding body, which was “looking for something innovative around the learning and teaching agenda” (Int 1). No institution, department or division was named as an initiator, though some were mentioned as involved in phase 2, the design (§3.2). Only one interviewee cited an institutional process or value, that being a general desire “to have a space that facilitated the creative process, as other spaces around the university were seen to be blocking it” (Int 2).

However, in the bid document, there is a clear departmental focus visible on page 4:

This proposal relates predominantly to undergraduate and postgraduate teaching in design, engineering, innovation, artificial intelligence and computer science, as well as providing a platform for creativity in other subjects.

Interviewees (Int 1, 8) agreed that a primary motivation for the original bid was to further the teaching taking place in the design and engineering departments. The notion that Generate could offer new ways of working to other departments around the university did not emerge until phase 2.

The bid document outlined the proposed institutional impact as follows (detail of bullet points omitted):

[Generate] will support improved teaching and raise standards by enhancing the delivery of blended-learning through:

- Freeing teachers and learners from the constraints of the traditional classroom....
- Providing teachers with effective tools to engage modern learners....
- Enabling teachers to enrich learning opportunities....
- Supporting externalisation of learning....

Fully technology-enabled, but not technology-driven, [Generate] will provide teachers with a versatile space that can be used in a variety of configurations to support more innovative and effective teaching and learning.

[Generate] will improve student learning by:

- Increasing learner engagement through effective use of compelling multimedia experiences....
- Grounding learning in experience....
- Personalising outcomes through self-directed learning....
- Creating a collaborative environment....
- Supporting reflective learning....



A “primary mechanism” by which activity in the Atrium would be promoted and disseminated was the Creativity Development Fund (CDF). This would be open to all potential users of the Atrium, to resource innovative projects using the technology and to generally fund dissemination. Thus, there were three main elements to the bid, for which funding was requested at roughly the ratio 6: 3: 2 - the physical space of the Atrium; the support team; and the CDF/dissemination.

Evaluation was clearly discussed in the bid document. Page 9 raises points about the evaluation of the creative process and the intention to conduct long-term studies on matters such as how the environment affected creativity. On page 10 it also says that Generate “will develop a student-centered culture over a five-year period”.

See Table 3 for a summary of objectives expressed by different stakeholders: though note that the task of assembling these objectives cannot be completed only with reference to the bid-writing process.

### 3.2 Phase two: The design

Once funding was received, building of the technology and the support team could begin. However, the bid document - the crystallization of the first phase of negotiations - did not much influence the build. Negotiations continued and the bid document became one resource for further planning rather than a clear guide for it. As one interviewee said, “after the money was secured, ideas drifted” (Int 6). Success and failure criteria continued to shift.

This was partly the result of changes in personnel, and partly because new interests became involved as the project moved from bid to reality. When asked who participated in this second phase, there was less agreement from interviewees than around who *initiated* the process (§3.1). The two senior academics were mentioned 6 and 7 times in §3.1, but only 3 and 2 times, respectively, in this phase. 5 interviewees mentioned the present Project Director, who took over the role when one of the original principals died (this individual was mentioned twice).

[Table 2 here]

While there is relative unanimity on who initiated the process, there is less certainty about who participated actively in the design. This may reflect differing memories; some names may not have been mentioned (at either stage) because the interviewee did not consider them relevant. These responses can be triangulated with the qualitative content of interviews. Using these data it is apparent that whereas the bid could be written by a small number of people acting autonomously, translating this into the built Atrium required broader interactions, whether with individuals possessing special skills (e.g. Technology Facilitator 1 and Academic 4), or because of constraints imposed by the funding model, which demanded involvement of certain groups (e.g. the Estates department).

These multiple new contexts and actors which combined to shape Generate did not include several individuals - fifteen, in fact - named as “core personnel” in the “interdisciplinary bid”. These people did not participate actively in the design process nor became part of the team once the Atrium was running. The best conclusion to draw from this discrepancy is that these people appeared on the bid to give it credibility with the external funders, as the funding model was aimed at rewarding existing excellence rather than innovative potential as such.

User-centred design contributed to certain aspects of the build, for example, the interface panels (Int 6). But no interviewee mentioned users being consulted directly about other elements, or about the

build generally. A “learning space consultant” facilitated a workshop which “was intended to help people think in new ways about how the design might go forward” (Int 5), but this person was not subsequently asked to help with the project.

Decisions like these involved negotiations over who did and did not participate in the build. As well as the learning space consultant, the involvement of the architects had to be negotiated around the planning table, with the Project Director (hereafter, PD) in favor of their involvement, but Estates feeling it was unnecessary (Int 1). The PD also had to ‘assert his influence with Estates and [the builders] to take directional control of that process.’ (Int 1). In Umble *et al*’s terminology (2001). these are meta-negotiations; negotiations about who should shape the substantive negotiations, that is, the actual content of decisions.

All interviewees agreed that, as the build progressed, the vision of the PD came to the forefront. The PD took over when Academic 4 died, and this “led to a greater learning focus in the design rather than as before, a music, informatics, performance, fun style” (Int 3). The design of the Atrium was most strongly influenced by the pedagogical objective of the project: the support of a social constructivist approach to teaching (see §3.1). The original ‘product design’ emphasis of the project, evinced in the bid document, faded over time to be replaced by *flexibility* as the key driver (Ints 1, 2, 4, 6, 10). The Atrium was designed in ways intended not to create particular behavior in the space (Int 5), to be both technology-rich yet not technology-dependent (Int 6). Of all the pedagogical objectives manifested in the actual design, this was most apparent.

The PD’s influence is also visible in the relative importance of physical space and the underlying technology in the design. Because the technology was harder to model in advance, whereas the physical space could be envisaged in models and diagrams, ‘it was easier for [the Project Director’s] physical model to influence how they did the technology, even if it would have been better the other way around.’ (Int 6).

When it came to getting the Atrium built as it was designed, several interviewees acknowledged that there were “huge barriers”, “lots of barriers” (Ints 1, 4, 8). Budgetary, technical and architectural constraints came into play: interviewees referred to many, but I will concentrate here on those which are relevant to the interests of this study.

A particular difficulty involved the university’s central departments such as IT services, Estates and the university procurement system having to break out of established patterns of work. The funding model “worked against innovation because it was an old-fashioned model, assumed you knew what it was you wanted to build; it could not take account of emerging research” (Int 1). The capital build element of the funding went straight to Estates and “short circuited academics from the design driving seat” (Int 1). The design required technologies to do things that had not been anticipated before (Int 3, 6) and “people were being asked to deliver to a high specification in areas that were new to them” (Int 5), but the university’s procurement system demanded the use of approved suppliers, even when they could not meet innovative specifications. Thus, the university systems were “set up to build carbon copies of spaces that already existed on campus” (Int 4); “estates and contractors will fall back on what they are familiar with” (Int 3).

### 3.3 Phase Three: The Atrium in use

Analysis of this phase made use of all interviews, using both protocols, and these data were triangulated with the observations and published reviews of activity within the Atrium (see the note which ends §2.3). For reasons of space, I concentrate on data which examine how use of the innovation accorded with its objectives.

By this stage, the negotiations had crystallized into technology, support structures, and success/failure criteria. The overall *intended* uses of the Atrium were “to support the teaching and learning of creativity, and creativity in learning and teaching”, a quote that three interviewees (Ints 2, 3, 4) gave verbatim, suggesting this is an overarching value. The intention was that the Atrium change the relationships between teachers and learners (Int 8, the bid document), making it easier to engage in collaborative activities.

Some interviewees thought all intended uses were well supported. They drew attention to a preponderance of group work within Atrium sessions and elements of the design which were frequently used, such as the write-on walls combined with data projection (allowing students to annotate projections). Performances and exhibitions worked well and immersive environments have been popular. Student feedback is very strong; the Atrium is well-known across campus, and popular (Ints 3, 5). When asked (in protocol 2) what it was about the Atrium that made them want to use it in teaching, interviewees cited the flexibility of the room, that it was relaxing, and could inspire creativity. Four out of five noted that it offered facilities and resources unavailable elsewhere. These included complex affordances, such as the immersive environment, and the annotation of projections. However, they also referred to simple things, such as the availability of laptops in a teaching space, and the division of the class spatially, with different activities going on in different areas (instead of the traditional way to divide a session, that is, temporally). One teacher explained that there was no other room on campus which gave her and her students the chance to use ICT facilities in a room which also allowed for informality, movement around the room and a modicum of socialisation (Int 13).

All interviewees recognized that effective use of the Atrium flowed from tutors’ having spent time therein prior to the class, “playing with possibilities” (Int 9) and working directly with Generate staff to develop the session. Such work is meant to be a requirement of booking the Atrium for teaching. The learning and technology facilitators are an integral part of Generate, but their role is not to tell teachers how to run their sessions. Instead, use of the Atrium is *negotiated* through discussion, example and demonstration. Facilitators must learn what the teacher wants to do; similarly, the teacher should be learning about the possibilities of the Atrium. Reflection on earlier sessions - whether the teacher’s own or those of colleagues - is essential. Therefore, the support structures are as important as the technology for determining whether Generate meets its objective of changing teaching practice.

However, this sociotechnical system does not always work properly, for reasons beyond bugs or technical glitches. Interviewees from both groups identified “teacher inertia” as a factor. Most are time-poor; they lack chances to prepare or are unwilling to undergo the learning processes which are demanded. The requirement to work with facilitators is seen as “an obligation, a hurdle to overcome to get the room booked” (Int 2). Or, they are “unwilling to alter the power relationship between teacher and learner” (Int 2). It is “stressful to do a whole course in there” (Int 5) because of the amount of preparation required and the challenges posed to established ways of working. Two of the five teachers interviewed (Ints 10, 11) said that they had pre-formed ideas of what they wanted to do, and used the space accordingly, as opposed to exploring the possibilities of the Atrium, by themselves or in collaboration with Generate staff. Eyecatching demos are useful because the “white box”, the Atrium in its neutral state, is not inspirational: but they can constrain possibilities. A demonstration of an immersive environment that looked like an aquarium resulted in “everyone wanting the fish thing” (Int 4). Imagination and/or active learning are required by teachers to make effective use of the space; at the same time, the Generate staff “want to know what you want to do before they tell you what is possible” (Int 13). These tensions mean that the Atrium is often used in a fairly “pedestrian” way (Int 13).

This seems evidence of a tension between what interviewees, particularly (but not only) members of the Generate team, believe the Atrium to have been designed for, and what they saw happening within it: in other words between objectives and reality. Attention was drawn (by three interviewees) to the overuse of presentational styles of teaching; an insight supported by observations. There was disappointment that the Atrium was often used as a “lecture theatre without seats” or a “computer lab without seats” (Ints 3, 6). This illustrates one of the problems with a radical innovation. The Atrium is so different from other environments that it is not always possible to transfer sessions easily into or out of it. Of the teachers interviewed, two said that their session could be run elsewhere, but others said it either could not be, or it would be difficult and/or would lack the impact of the Atrium.

In summary, no consensus emerges on the success of the Atrium. There is recognition of achievements, but also of limitations: “people have done well at including pockets of creative activity in their previous style” (Int 4), but there has been little widespread change, and what has been done is only rarely usable outside the Atrium. For all that Generate, its technological and social aspects, was intended to promote the new and creative, it proved difficult to make anything other than small, iterative changes to existing practice whether at institutional or individual levels. It is popular with students, and pedagogically effective, but even these successes have not led to the widespread dissemination of the innovation: most academics either remain unaware of it, or unable to use it in full due to time and resource constraints.

### 3.4 Evaluation and dissemination

Use of the Atrium is recorded through photographs and semi-structured interviews with teachers and other users. The team “anecdotally notice interesting quirks about how people have worked with the technology and will report back to others” (Int 4). Student feedback is solicited. But though these techniques provide useful feedback, they are limited as evaluation. Little *professional development* through reflection by staff has taken place: “Learners say they like the nice room, the food, the beanbags etc. - but what is needed is more than this, staff doing reflective stuff afterwards, and observations.” (Int 5). Nor has there been a co-ordinated and systematic program of evaluation. The evaluation strategy kept changing and the project team “never agreed on any systematic evaluation: the opportunity was therefore missed to do longitudinal, deep evaluation” (Int 5). There were “weaknesses in steering, a lack of clarity about priorities and details of deliverables” (Int 1).

This is, in part, a function of the original design objectives. The individuals identified in §3.1 as the project principals largely “wanted to use the... funding to advance their courses” (Int 1), and had a relatively narrow definition of creativity, evinced by the bid’s emphasis on their discipline areas. When the project remit widened, these narrow objectives were difficult to translate into an evaluation strategy. Because of limited time, the project team were forced to concentrate on internal activities - teaching facilitation, maintaining the technology and administration. Time for outreach and evaluation were lacking (Ints 2, 7).

Dissemination of the Atrium’s benefits has largely been through word of mouth (via tutors and students) and other forms of informal networking. Five of the eight protocol 1 interviewees drew attention to this. Because the Atrium is eye-catching, and almost unique, it is frequently showcased at university open days, conferences in the city, and other events. It has featured in the local press, a number of conference presentations and academic newsletters, and public exhibitions. Yet most interviewees were ambivalent about the success of this work. Despite the effective word-of-mouth, Generate “has not been espoused by the university as a whole. Partly this is because of a change in senior management” (Int 1). The university’s head of Teaching and Learning, named as a key individual on the original bid, left shortly afterwards, and her replacement never adopted Generate as a keystone of the T & L strategy (Int 1).

What could be expected from dissemination in this case? *Pace* Rogers' standard model of the diffusion of innovations, protocol 1 interviewees were asked whether Generate could be considered an "early adopter" of this kind of technology. Two interviewees (Ints 4, 13) agreed that more spaces like this were needed. But three (Ints 3, 5, 6) said it was inappropriate to repeat the experiment elsewhere. The design was context-specific, and expensive. Political will was lacking to repeat the process elsewhere, to fund it and go through the long process of design and negotiation. "Lip service is paid to innovation, but it is easier to build what you know" (Int 7).

"Quieter" (Int 1) lessons have been learnt from Generate. The PD acted as a consultant on new building projects around campus, which included "simple things, like writing on the walls, redundant technology - the things that translate well into a smaller-scale space" (Int 4). Interestingly, these tend to be aspects that some interviewees criticized in reviews of the Atrium-in-use, as not fulfilling the space's potential, but: "If we just give people a comfy space and some laptops they can work in more interesting ways" (Int 5). Lessons were also learnt by the technology developers. Much of the technology was highly innovative at the time and thus bespoke, e.g. a video mixer. These technologies were often used differently from the manufacturers' assumptions. Subsequently, they have been remade in different ways, or commercialized. In this way the technologies have spread, as have certain organizational features or values of Generate, such as allowing people to try things out without criticism, and generally, the notion of a holistic creativity centre and highly flexible technological configurations (Int 1).

But small-scale lessons like this, incorporated into new-build classrooms in universities or elsewhere, do not normally cite their inspiration, particularly not when it is "someone else's little empire" (Int 1). In terms of which funders and managers - the holders of capital in these institutions - are most likely to take account, Generate's impact was limited.

All in all, the support structures described in the original bid never became rooted in place at senior management level. Throughout its five-year lifespan, Generate remained sustained only by its original funding. This had significant consequences at the end of the project.

### *3.5 Summary: the various measurements of success or failure*

Generate's objectives were not all defined at the start of the project. Some only become apparent - even to their holders - as the grand innovation unfolded and turned from an idea, to a bid, a funded project and a technological reality. Table 3 summarizes these diverse objectives and notes how they emerged from the data.

[Table 3 here]

### *3.6 Phase 4: The future, or lack of it*

Since data collection was completed in September 2009, the funding stream ended and the university was obliged to make decisions about Generate's future. The evidence in this section is drawn from informal conversations and published statements from the university management and other sources.

The Atrium will remain in use primarily as a performance studio and retains its identity as a 'headline' space for the university, useful in recruitment, business and community engagement work. But the social element of the team - the support structures designed to help teachers adapt ways of working to the Atrium's technological configuration - has been completely dissolved.

There remains technical support for teachers or any other users of the space but this has now been centralized and is now located some distance away. There is no requirement to talk over possibilities with a consultant/facilitator before booking the space. Thus, while the technological elements of Generate have been retained, the *direct* social support structures have been abolished; at best, these structures are more detached from the Atrium than they were before.

#### 4. Discussion

This discussion will focus on the following issues:

- \* how, from its earliest stages, the generation of this innovation was negotiated between different stakeholders with different objectives;
- \* how this led to conflicting views of ‘success’ or ‘failure’ which were never resolved;
- \* and how the criteria of success which were ultimately applied to Generate were those of stakeholders with high levels of capital (Bourdieu 1986) within the institution; not those of the users, the team members, or the funders.

All interviewees named individuals as the driving force behind Generate, whether in its early stages or subsequently. Even the bid document, written for an institutional audience, makes reference to individuals and their qualities as being at least as important to the project as the qualities of the host institutions, and interviewees made very little reference to the institutions, their values and structures, as significant. This suggests that even grand innovations emerge from the interactions and negotiations between individuals and are manifestations of individuals’ efforts to meet their own objectives (Cervero & Wilson, 1998).

Once the bid was successful, the funding model and the build’s complexity obliged individual innovators to interact with institutional divisions such as Estates. Here, the Generate case supports the insights of Umble et al (2001) regarding the importance of *meta-negotiations* in planning practice - negotiations over who can and should be represented at the planning table. The funding model and the outcome of meta-negotiations obliged the original innovators to negotiate with bodies such as the Estates department, and unexpected events (e.g., the death of a principal) also forced changes in visions and, consequently, further negotiations. These shaped the sociotechnical system; they also embedded certain tensions and contradictions in it, such as the failure to agree an evaluation strategy.

The need to interact with stakeholders outside the core forced the team to use representations and metaphors which were not particularly innovative. They were combinations of existing arrangements or old models of learning re-imagined around the new technological possibilities of the Atrium. Those who had to approve the project, internally (managers) or externally (funders), needed the proposal couched in terms they would understand. This is a tension, or contradiction that may mitigate against truly radical innovations. The effect continued even after the Atrium was built and put into use; the aquarium exemplar is an example. As one interviewee (Int 6) said about the Atrium, “until you’ve seen it [i.e., stakeholders have some kind of analogue]... it is hard to imagine what can be done with it.” This implies that past experience *subtly but unavoidably* influences present and future innovations: that technologies, and the organizational forms and values from which they emerge, are co-dependent and thus co-evolutionary (Andrews & Haythornthwaite, 2007). From the funding model and the tendency of contractors and the Estates department to want to “build what they know” to the way exemplars may constrain practice rather than inspiring changes in teaching, co-evolution mitigates against much more than slow, incremental change - too slow for the five-year funding horizon in place here.

One of the Atrium’s successful elements was the redundancy of its technology. The Atrium was *technology-rich but not technology-dependent*. This was prefigured in the bid and successfully

implemented to add to the Atrium's flexibility. However, it must be remembered that Generate is a *sociotechnical* system. The principles of redundancy and flexibility are much less apparent with regard to the "skinware", which was stretched to its limits. Staff were overworked throughout the project. At best, they had time only to work within the Atrium and were able to do little outside it. This had two interrelated impacts. First, that outreach was difficult; second, that they could not build up much capital (Bourdieu, 1986). Both mitigated against Generate creating a 'power base' in the university, meaning, high-level sponsorship of the innovation that transcended the objectives of its original proponents, demonstrating that Generate had come to represent interests and potentially fulfill the objectives of senior management. Generate fell between stools at senior management level: once a key supporter of the project (the former Head of Teaching and Learning) left, the project lost capital and thus status within the institution.

Thus, there are tensions between the *anticipated radicalism* of the innovation and the need to use and describe it in routine ways in order to establish it within the institution and promote its use. Interviewees often expressed frustration that so much teaching time in the Atrium was devoted to activities which could, or should, have been undertaken in other, less technologically-rich spaces. Yet there was simultaneously a belief that the Atrium was underused. It is difficult for an innovation to be truly radical, despite its intentions. Generate's aspirations were to effect a cultural shift, but they may have over-promised, having unrealistic expectations about what could be achieved. At the individual and institutional level there were counter-pressures which pulled it back towards familiar routines. Using Berg and Östergren's model (1979), and as supported by Mintzberg (1989) and Weick (1976), in loosely-coupled professional organizations, although pockets of innovation emerge frequently, there are more counter-pressures weighed against the dissemination of new practices than in favor of them.

Referring back to pages 12-13 of the bid document (see §3.1), and as summarized in table 3b below, Generate fulfilled several of its anticipated objectives; but the main one it missed is arguably the most significant. It did not, as promised in the bid, "free teachers from the constraints of the [traditional] classroom", firstly because practices in these classrooms subtly but unavoidably influenced practices in the Atrium, and secondly, whatever was done within the Atrium was transferrable elsewhere only with difficulty. Nor is there evidence of a "student-centered culture" having emerged over the project's five years. Arguably, the attempt to do so was damaged from the start in that no funding was *directly* allocated to such an end.

Dissemination outside the host institutions was relatively successful, but only when measured in terms that are not those of the powerful stakeholders. Few publications emerged into the research literature which assessed the Generate experience. But should we expect them? This was a *learning and teaching* project. The currency of L & T is more the workshop, the seminar, the exemplar - on these grounds the project *was* successful. But this is 'invisible success'; it has tangible impact, but is harder to see, because it does not produce outputs valued by management - published, peer-reviewed research, citation, follow-on funding, and so on.

Therefore, as Gooley and Towers predicted, the organization proved resilient to change. What can be asked is - in this case - why? Berg and Östergren look at pressures and counter-pressures for and against innovations at the design and implementation stage, but their model is here taken one step further, examining factors which promoted and retarded *use* of the innovation, even after the design phase was complete.

Factors that *promoted* use of the Atrium:

- \* Novelty
- \* "'Wow' factor" (Int 13)

- \* Being able to undertake activities which could not be done elsewhere, even when these were relatively simple (e.g. using laptops in an environment which promoted socialisation)
- \* The Creativity Development Fund (but this was never as significant as anticipated in the bid)
- \* Good word-of-mouth

Factors that *retarded* use:

- \* Labour-intensive
- \* Limited transferability of practices
- \* Tutor inertia
- \* High workload of Generate staff
- \* The desire to promote only radical practices
- \* Fragmented ownership: no senior sponsor once original Head of T&L left

At this point it is useful to return to the earlier table and observe whether the objectives of each group were, first, met during the project, and second, accounted for when deciding whether Generate would continue past the end of its funding. It is acknowledged that no access was available to the decision-making fora in this case, even retrospectively, but this is essentially a moot point; power in an organization like this can be adequately assessed in the content of final decisions. (The 'source of data' column has been omitted.)

[Table 3b here]

The right-hand column illustrates the notion of 'invisible success'. Even where stakeholder objectives were partly met, this was an incidental consequence of the managers' decision to fulfill their own objectives but not those of others. The political structures of the university caused *opacity*; an inability to see, or at least account for, certain objectives and concomitant evidence of success in meeting these objectives. (cf. Blaug, 1999). Ultimately, those aspects of the Atrium which have been sustained are purely the technological parts of the system and none of the social.

It is therefore difficult to claim that the grand innovation that was Generate has succeeded even though its technology has survived. The literature predicts that organizational learning about the technology will suffer without support structures. In Tagliaventi and Mattarrelli's terminology (2006), there is no longer "operational proximity" of users and support staff, something they believe damages the possibilities for organizational learning about new technologies. Lessons have been learnt, about the technology, the form of teaching, and the design of educational space, and some of these have diffused through the HE sector via exemplars, conference presentations and workshops. As one interviewee put it, "many seeds have been planted" (Int 1). But traditional measures of impact struggle to allow for these.

## 5. Conclusion

All grand educational technology innovations are risky, but that does not mean they are doomed to fail. Generate's example suggests that definitions of 'success' and 'failure' depend on the perspective one occupies in the organization, and are therefore open to negotiation. Large-scale, one-off innovations are frequently *proposed*, but to become a reality they need sponsorship. Generate emerged from individual visions, then needed to secure other sources of support to become a reality (external funding, for example, or the Estates department). When a grand innovation, such as a new course management system, emerges from the centre, sponsorship is already built into the strategic apex and technostructure (Mintzberg 1989) and the management can bring other forces and pressures to bear such as widespread training programs, contractual requirements on academics to change behaviour, and other ways to 'sell' the innovation to faculty



(e.g. Gigliotti-Guridi, 2003). These are no guarantee of success either, but they are at least substantial pressures in favor of the change (cf. Berg & Östergren, 1979).

This conclusion - that an innovation which is centrally sponsored is more likely to succeed than one which is externally sponsored - may seem rather self-evident. The distinctive contribution of this paper is that it shows the *mechanisms within the HE institution through which this happens*. It shows the continuing relevance of Bourdieu's idea of capital to the functioning of higher education institutions, and links this with Cervero and Wilson's negotiation-based program planning model: a link which has only been made occasionally (Watkins & Tisdell, 2006) and not at all when it comes to discussing educational technology innovations. The holders of capital in Generate's host institution did *not* significantly influence the original negotiations but they *did* define criteria of success and failure which were not those of the innovators or the project team. Generate's success was "invisible" against these terms, and as the project team had not been able to build capital, their own criteria of success were not accounted for in the final decision. Meta-negotiations were therefore considerably more significant in the final phases than substantive ones.

The relative failure of Generate was caused by a particular configuration of organizational pressures and counter-pressures, some of which were internal to the design of the sociotechnical system and some external, inherent in loosely coupled professional organizations and the funding model for grand innovations of this kind. The design of this case study makes it impossible to generalize, but though grand innovations are not doomed to failure, they will, at best, struggle to maintain themselves past the end of their core funding *if they do not acquire capital* through which they can align their own ideas of 'success' with those of the strategic apex. Without this, the innovation may seem more like an 'invasion', something which causes irritation in the system and will thus be neutralized.

This is a pessimistic conclusion yet it helps explain why higher education institutions seem so risk-averse with technology, and why so few grand technological innovations are truly radical. Yet it also supports the view of Marmot and Hamilton (2006, p. 27) who observe that:

Many institutions do not have the resources to rebuild even on a small scale and will therefore have to meet future needs with little more than they already have. How can existing spaces be repurposed effectively to meet changing requirements? How adaptable are existing spaces to teaching and learning innovations?... it is worth remembering that most problems can be solved by relatively small investments in existing property that can be delivered quickly.

Generate's example - or rather, counter-example - suggests this view has some validity, and that multiple, small investments are more useful than grand innovations. These lock resources in one place and precisely because of their distinctiveness, cannot provoke activity which can transfer to other locations when the technology and/or funding are no longer available. Such a concentration of resources, loses its emergent character and can easily be neutralized by tendencies in HE institutions to adhere to the status quo.

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## ***Appendix***

*Interview Protocol One* (staff and planners: used in 8 interviews):

### Part 1: The design process.

- Who initiated the Generate project?
- At what point did the idea of the creativity Atrium enter the bid? Why did it do so?
- Who designed the Atrium? Who was involved in this process?
- Were you involved in this process and if so, in what way?
- Who approved the design? How was this approval process organised?
- Why was it designed in the way it was? What were the intentions?
- Were there any barriers or obstacles in the way of getting the Atrium built as it was designed?
- Were any modifications needed as the building took place? If so, what were they and why were they needed?

### Part 2: Use of the space

- What role does the Atrium play in the wider work of Generate?
- What are the intended learning and teaching uses of the Atrium?
- What are the actual learning and teaching uses of the Atrium?
- How do the members of the team interact with users to create specific sessions within the Atrium?
- How is the use of the Atrium evaluated?

### Part 3: The space as an innovation

- How are the benefits/experiences/messages of the Atrium disseminated throughout the university?
- And more widely?
- Is this an innovation which could spread?
- Could Generate be considered an “early adopter” of this technology/innovative solution?
- How does Generate fit into the strategic goals of its host organisations?
- How do you see the Atrium evolving in the future?
- How do you see the team evolving in the future?

*Interview Protocol Two* (teachers and users: used in 5 interviews):

- How did you first become aware of the Atrium?
- What was it about the Atrium that made you want to use it in your teaching?
- To the best of your knowledge, what are the capabilities of the space?
- How have you worked with Generate staff to develop this particular session?
- What resources are needed for this session?
- What has been generated prior to the session? What will be generated within the session?
- Are there any constraints that have affected your planning? Are there any things you would have liked to have done in the space but have not been able to? If so, why?
- What are your expectations of the session?

- Do you have a lesson plan? What types of activities are going to occur? Why?
- Are you going to repeat this session? If not – why?
- Can you use any techniques or materials developed here in other sessions, held away from the Atrium?

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## HIGHLIGHTS

- \* I investigate a grand technological innovation in a higher education institution.
- \* My interest is in how the innovation was negotiated.
- \* Criteria of success and failure were also negotiated, rather than being pedagogical.
- \* Ultimately the innovation's success was judged only by those possessing capital.

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<b>Phase</b>	<b>Involved</b>	<b>Negotiations resulted in</b>
One	Writing the bid	The bid document, support structures
Two	Design	The Atrium as built (including social elements)
Three	Atrium in use	Practice
Four	Future planning	The 2010 decision

**Table 1: Summary of project phases**

Individual or institution	Mentioned as initiator by:	Mentioned as designer by:
Academic 1	7 interviewees	2 interviewees
Academic 2	6	3
Academic 3 [deceased]	4	2
Project Director [took over when academic 3 died]	1	5
Technology Facilitator	0	3
Academic 4	0	3
Architects	0	3
A “learning space consultant”	0	1
University Estates department	0	5
The funding body	1	0

**Table 2: Named participants in the initiation and design phases**



Stakeholder group	Objective	Source of data
Management	Build a 'headline space'; strengthen recruitment, prestige, business engagement	Interviews (protocol 1), bid, strategic vision statements
Students	Exciting space, effective teaching	Interviews (protocols 1 & 2), observations
Academics	Easy transition to new ways of working	Interviews (protocol 1 & 2)
Generate team	Continuance of roles; diffuse lessons learnt; ongoing testing of new technologies; support the creativity/learning and teaching nexus	Interviews (protocol 1)
Original bid writers	Change ways of working; student-centred culture; advance own careers/courses	Interviews (protocol 1), bid
Funders	Recognition and reward of excellence; eventual sustainability of project	Call for proposals, bid

**Table 3: Differing objectives of stakeholder groups**

Stakeholder group	Objective	Objective met <i>during</i> project?	Accounted for in <i>final</i> decision by host institution?
Management	Headline space; strengthen recruitment, prestige, business engagement	Yes	Yes
Students	Exciting space, effective teaching	Yes	Partly (Atrium still exists, but withdrawal of facilitation makes it less likely to be used in this way)
Academics	Easy transition to new ways of working	No	No
Generate team	Continuance of roles; diffuse lessons learnt; ongoing testing of new technologies; support the creativity/learning and teaching nexus	Yes	No
Original bid writers	Change ways of working; student-centred culture; advance own careers/courses	Partly	No
Funders	Recognition and reward of excellence; eventual sustainability of project	Yes	Partly (the technology only)

**Table 3b: Were differing objectives met and accounted for?**