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TOWARDS DOUBLE DESIGN: CREATING DURABLE AND ADAPTABLE BUILDINGS

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ABSTRACT

Background and aim: Long-life and long-usefulness are to be achieved by recognising the processes of functional obsolescence and structural degeneration and embracing uncertainty as an essential component of the future. Applying the Double-Design concept envisages designing buildings that will not only last a long time but, by incorporating adaptability and flexibility, continue to be useful for as long as they last. The exploration addresses a research gap in that while there are several studies of flexibility and adaptability, there have been no efforts to expand their scope to the limit.

Methods and Data: The work explores the possibility of designing for multiple uses over time with a distinction made between "hard" compatibilities between different clusters of activities (uses) and "soft" compatibilities, which relate to each successive transformation of function within a Double-Design framework. The analysis of hard compatibilities is summarised, while the significance of architectural and engineering design in managing uncertainty is supported by a detailed longitudinal study of a university in UK.

Findings: The exploration confirms the feasibility of implementing Double-Design regarding resource conservation. It is consistent with a movement towards high-performance buildings that invite greater user engagement.

Theoretical / Practical / Societal implications. Architecture, the construction industry and Architectural education need to emphasise a building's lifetime rather than just its first day of use. The public interest regulations guiding design must cover ethical principles embracing resource use and the environment. The concept is physically feasible, but several aspects of the professional and social mindset must change.

KEYWORDS: architectural design, building life expectancy, building performance, sustainability

1 BACKGROUND

Architecture carries a banner for the values and needs of its custodians and finds itself out of touch when those values and needs change. With some ingenuity, the inherited estate may sometimes be turned to good use to serve the incoming requirements and the changing values they represent. Yet a strategic choice remains: is it better that new buildings should be designed and built for their initial purpose only, to be killed off, demolished, abandoned as soon as that purpose has run its course (Cairns & Jacobs, 2014), or should they be designed to last and to be used productively well beyond the first use so that architecture may serve more readily the changing needs of society over an extended period (Kincaid, 2002)? Considering the common-sense aim of avoiding waste, the built environment must be designed to last as long as possible and guarantee its functional usefulness for as long as it lasts physically. This approach is called Double-Design which is envisaged as a response to the changing demands made upon architecture. Rather than designing for a single use, Double-Design allows for multiple changes of use, and while these principles are developed for application to new-build projects, they apply equally to reuse projects.

Physical compatibilities among the spatial needs of different activities can be identified, and designs can be based upon the highest common factors arising from this analysis. The implementation of Double-Design would affect the way design and building are undertaken in the future. Each new building would be required to respond to changes within its initial use and to accommodate different future uses.

This paper summarizes some key insights gained from a full PhD thesis which in itself reflects on a lifetime spend in architectural design practice. The structure of the paper

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is that of an exploratory essay that visits some of the key findings (Cassidy, 2023) (Cassidy, 2025).

2 FUNCTIONAL OBSOLESCENCE AND STRUCTURAL DEGENERATION

All buildings are subject to the powerful operatic processes of functional obsolescence and structural degeneration that apply respectively to the uses to which they are put and to the materials of which they are made.

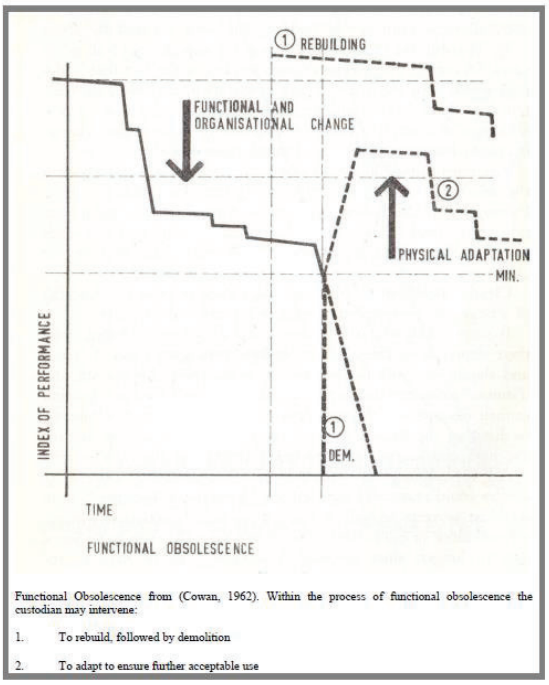

Figure 1: Functional Obsolescence (Cowan, Peter, 1962).

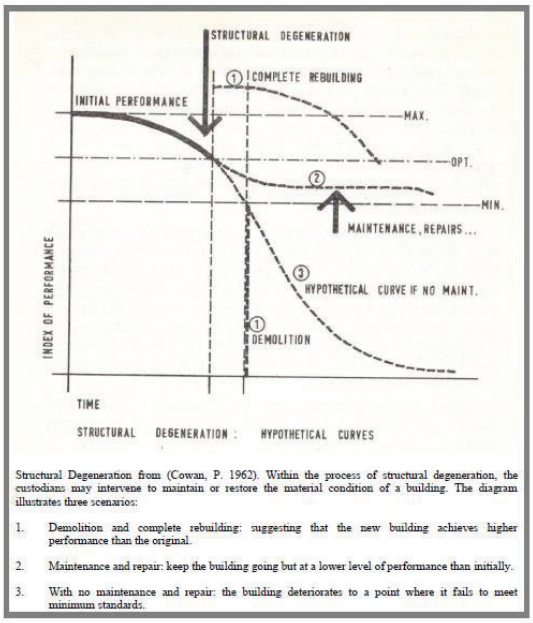

Figure 2: Structural degeneration (ibid.).

There is a renewed interest in adaptability and flexibility as design concepts that will contribute to a *longevity of usefulness* to complement a *longevity of physical lifespan*. The ease with which some older, more generously proportioned buildings are readily reused provides an obvious clue to how design needs to change. Some traditional forms of construction, stone for example, long considered too expensive, may also facilitate long life and return to serious consideration.

The alternative must also be considered. Can buildings or some of their components be designed with intrinsically sustainable materials that do not need to last so long? The counter-argument to Double-Design, is to deploy sustainable or recyclable materials and demolish/reuse them when structural degeneration or functional obsolescence kicks in. This approach might not achieve the smooth transition enabled by Double-Design from one use to another within a long-lasting space. It would rely upon comprehensive reconstruction to change use rather than upon interior adaptation, as with Double-Design. Indicative costs for buildings in use suggest that the longer-life options represent better value for money.

Schmidt and Austin provide a far-reaching analysis of adaptability that starts from a belief that: “a chasm remains between a perception of what architecture wants to be (in isolation as a finished and static sculpted work) and the reality of what architecture is (continually shifting in form and purpose to accommodate changing needs)” (Schmidt & Austin, 2016, p. xx). The Open Building movement led by Habraken has also laid the foundations for this exploration (Habraken, N.J., 2011). The work upon which this paper is based goes beyond current published research in examining the possibility of designing for very long-life buildings that would be able to accommodate many different uses with easy transitions between them. Each use would be able, by virtue of the inherent flexibility and adaptability, to deploy the best information and advice to support each new fit-out design. Although current research covers to some extent some of the issues considered here, architectural practice remains firmly within a short-term cost-based environment. This will need to change if Double-Design is to succeed.

The distinction proposed by Groak between adaptability (capable of different social uses) and flexibility (capable of other physical arrangements) is helpful. Both play a part in helping to enable buildings to last longer in productive use (Groak, 1992, p. 5).

Flexibility has been explored by the Open Building movement in the USA and internationally. Habraken’s separation of the supports of a building from the infill is an essential contribution (Habraken, 2011). As Kendall argues, “Buildings are increasingly complex. Social change is accelerating. Given these circumstances, it is important to design and construct multi-unit buildings to avoid conflict, reduce dependencies among and between parties […] and thus achieve maximum autonomy or

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freedom of decisions for each individual unit" (Kendall, 2004, p. 1).

Differing attitudes to the expected life and value of architecture characterise the sustainability debate, yet space itself is rarely mentioned. The buildings for which architecture is responsible comprise both space and materials. While it is taken for granted that some existing buildings can be reused productively, this cultural phenomenon has not influenced the design of the new stock. There have been few studies looking for the characteristics of buildings that render them suitable for productive reuse.

Forensic architecture is concerned primarily with the avoidance of decay and deterioration (Harris, 2001: Richardson, 2001: Ransom, 2002; Douglas, 2006: Watt, 2007) and through the creative analysis of positive interventions to achieve reuse (Kincaid, 2002: Wong, 2017). In addition, concern for the treatment of historic buildings provides a further, more specialized motivation (Grimmer, 2017).

Environmental concerns have influenced the development of high-performance buildings in which the quality of materials may be selected on the basis of long-term value.

3 PROBLEMS AND CHALLENGES

The work that architects undertake has a long-lasting impact, yet the focus of their attention on designing and the focus of their training in preparation for a professional career lies with satisfying requirements defined at the start of a project, with little consideration for long-term functionality and scant recognition of the inevitability of change. Hence, time and space are central to what architecture is about. Double-Design is especially relevant because architecture must be seen as occupying time as well as space. If Double-Design is to be fully implemented, the time dimension has to be central to the commissioning of buildings. As well as forming part of the evaluation/testing of new designs, the themes of change and growth and re-use must play a much more critical role in the briefing for new buildings and in evaluating the suitability for reusing existing buildings. The idea that buildings can be designed for multiple future uses recognises that the political, social and economic context of architecture changes over time. The distinction between place and space, together with the philosophical interdependence of space and time show that while the design process produces a fixed place, this place is the container for activities that are far from fixed and subject to varying degrees of uncertainty. The design process is focused on producing something spatial that is finite at its time of inception and construction but, thereafter, subject to the exigencies of use and transformation. The dichotomy is that of a building as object, fixed in time, and of a building as a container of human activities that occupy time as well as place.

Most of the commentaries regarding architecture and its place in the world have been written from an exo-architectural perspective, from outside looking in, and in many cases, from the outside looking in and back. It has proved difficult for journalists, architectural historians, and even architects to make the long-term use of buildings as compelling to the public as an iconic image. If architecture is to be improved, it is by understanding better the endo-architectural processes, what happens within the design process itself. The way in which architects navigate the information that guides design decisions is especially important.

Buildings are replaced over time. Despite the suggestion that the city is going to benefit from the additions of some kinds of spaces more than others, there does not seem to have been any attempt to ensure that this message gets through to those with the power to commission new space. The market-driven decentralized commissioning process relies upon the custodians and their architects to take into account the potential contribution that space can make to future activities. There are currently no incentives for custodians to look beyond their immediate and known requirements when starting a new project.

4 UNCERTAINTY

Considering the extraordinary diversity of changes of use observed throughout the building stock and throughout the world, it is tempting to be overwhelmed by the uncertainty that inevitably attends the start of a project. But while changes and the sequence of their occurrence cannot be forecast with accuracy, a range of possible changes in use could be suggested and, given that for each of those there is a set of requirements that can be defined, an environment could be designed to accommodate different activities throughout the physical life of the building.

Uncertainty is a condition confronting organizations and institutions, yet awareness and perception of the condition are experienced, communicated, and reacted to by individuals. Therefore, it is a surprise to find very little understanding of the interdependence of individual and institutional uncertainty. Anderson et al. address this question, suggesting that: "Uncertainty is fundamentally a mental state, a subjective, cognitive experience of human beings rather than a feature of the objective, material world. The specific focus of this experience, furthermore, is ignorance – i.e., the lack of knowledge. It is a higher-order metacognition representing a particular kind of explicit knowledge – an acknowledgment of *what* one does not know, but also *that* one does not know" (Anderson et al., 2019, p. 2). Importantly, far from the threat usually described, they show that uncertainty can have positive benefits (Anderson et al., 2019, p. 7). From a wider perspective, Kelly suggests that it is: "Impossible to be certain of anything except that everyone suffers as a consequence of being born. What is usually overlooked is that uncertainty, when consciously faced and perceived in the context of life's totality, is the creative aspect of being […]The process can last for many years, even a lifetime, but with the knowledge that the uncertainty of living is

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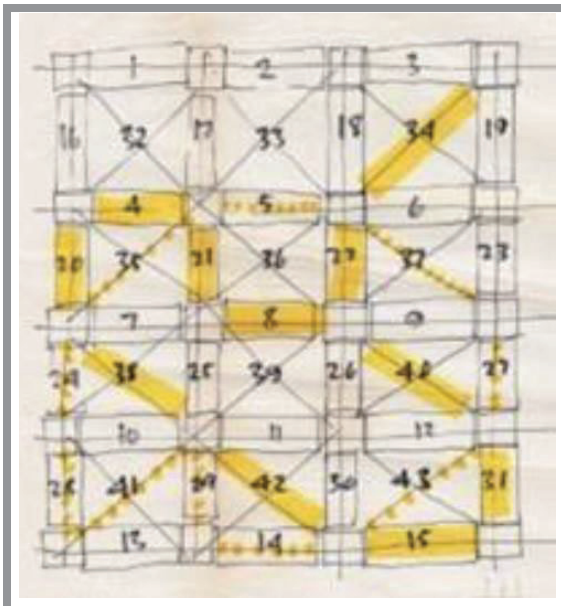
gradually being transformed to a higher octave of truth" (Kelly, 2018).

Designing for change brings organizational benefits if moves and disruption can be avoided. For some organizations working in exceptionally competitive environments, the speed at which a change can be affected may be critical to their survival. Looking at businesses, it may be imperative for them to introduce innovations quickly so as not to have to go through an elaborate change of use process. This accords with business models of decision-making in dynamic organizations (Lyneis & Sterman, 2009).



Theoretical diagram of grid design for university science complex showing possible interconnections between buildings. Narrow buildings can be multi-storey while 'courtyards' can accommodate 'lumpy' buildings like workshops and lecture theatres.

Figure 3: Diagrammatic design grid (YRM Architects).

A longitudinal study of a large and successful university building provided dramatic evidence of the way in which uncertainty affects the way it is necessary for buildings and their occupants to respond to change. The diagrammatic grid planned initially was intended to allow for both growth with connectivity and a high degree of internal flexibility. The unexpected events arising within the institution included:

Recruitment. The quality, effectiveness and ambition of employees are influential. The need to respond, sometimes very rapidly, to opportunities arising from the availability of special people and special money (investment, research funds, etc.) has a significant impact on campus development. There was a regular assessment of the academic marketplace regarding national and regional interests, which inevitably informed decisions about priorities. Opportunities for merging with other existing institutions arose when the momentum of the new institution was recognized.

The outcome of disputes. The refusal of newly appointed senior staff to respect the provisions for growth that were already part of the campus plan significantly impacted the connectivity of departments as the university expanded.

Changes in the administrative setup and decision-making machinery influenced changing priorities through patronage and funding. With campus growth, the mechanisms by which functional requirements are identified and communicated were divided into two parallel processes with separate teams responsible for space allocation and space procurement. This sophistication is matched by a changing balance between centrally timetabled space and locally controlled space. The allocation of space to solve short-term problems leads to complications when the temporary occupants demand changes to the fabric and service provision of their "temporary" home. The "host" is forced sometimes to struggle to get back their "lost" territory over decades. There were several examples in which changes of use took place in response to unexpected demands.

Technical decisions were made in light of the best available knowledge at the time. The central computer facility was initially located less than 200 yards (183 m) from places it served. As soon as technical advances outgrew this constraint, the space occupied was re-allocated to a succession of other uses. Space and environmental services needed to be updated as equipment was replaced.

Unexpected events arising from aspects of the external environment outside the control of the institution include:

Finance. To a large extent, the development of the campus reflects the timing of funding and the control exercised by the funding authority. Since the funding authority is itself subject to national financial allocation, the campus development was frequently at the mercy of what seemed to be arbitrary investment cuts and delays. The lack of funds at critical times led, in extreme instances, to staircases and toilets being converted to offices and laboratories. The change from being wholly publicly financed to being reliant upon diverse sources of finance affected every aspect of campus growth. Opportunities for private investment in campus buildings could not be overlooked.

Land and town planning. The need to assemble land from different donors and achieve development approved by local planning authorities influenced campus growth and traffic and pedestrian movement patterns.

Implementation. Many factors may influence the implementation of projects. These include design issues, contractor performance and financial stability, strikes, material availability and so on.

Regulations. The retrospective application of improved standards of health and safety affected both space and services provision.

Despite the turbulence, these institutional buildings have continued to work and it is not difficult to see that the unpredictability experienced would apply in some

measure to many other projects, public and private, residential and commercial. It is essential to recognize the interdependent impact of these factors. The changes in university funding during the 1980s, referred to by Troiani and Carless (Troiani & Carless, 2021), encouraged an opportunistic approach to campus planning that was not consistent with continuing support for an established planned pattern, however rationally that was based upon a sensible appreciation of needs.
The example of Warwick University science buildings is not proposed as a prototype for Double-Design; rather it supports the basic idea that building morphology has an important role to play in establishing longevity.

5 KNOWLEDGE / RESOURCES / ENVIRONMENT

The design process must be fully understood if it is to be improved as a mechanism for society to manage uncertainty. This is the case whether decision-making for design assumes rationality (Simon, 1972), acknowledges complexity (Webber & Rittel, 1973) or relies upon regulatory prescription (RIBA, 2013). Given the legal and moral obligations of the architect, the importance of information and the recognition of its significance and its limitations cannot be over-emphasised.
Design professionals receive information from their clients and from their own searches. This traditional pattern of GIVEN and TAKEN information is disrupted when sources of information and the associated guidance are suspect. Professions that sign up for independent and honest service to the public will need, in such circumstances, to find a more robust and ethical basis for decision-making.
The politicisation of the narrative concerning news and priorities, its control, and its communication and promotion through mass media provide an unreliable information environment (C. P. Smith, 2021). The extent to which the objectivity of science is subverted by sponsorship further damages any hope for objectivity (Wall Street Journal, 2024) (Funding Sponsorship Bias, 2023). In the face of evidence supporting and opposing several current environmental themes, an initial approach has been to seek higher-order heuristics and, thus, find a more secure basis for decision-making in ethical principles. Yet the issues here are not related solely to the environment or to design but to the nature of the world we live in and the world of information we inhabit. Navigating these treacherous waters to seek truth needs to be approached with an open mind. The oversimplified dualism of correspondence-based philosophy is being challenged by those who see coherence in the mechanisms of perception and what is being perceived. The most persuasive and pragmatic solution relies upon a more open and holistic worldview in which different realms of knowledge, while overlapping and complementary, can nevertheless be applied to decision-making on an everyday basis. The intellectual context for this is suggested by McGilchrist, who argues that "(i) ancient spiritual truths, (ii) neuroscience, (iii) physics and (iv) the best kind of philosophy all lead us towards a world that makes sense as a whole: they bring things together, not drive them apart into their separate silos again. We need, he argues powerfully, to start seeing tables, mountains, nature, the cosmos and ourselves as facets of some ultimately connected, not sundered, state of affairs" (Read, 2022, p. 10).
Envisaging human society as an organism seeking its own sustainability creates an attractive metaphor for viewing the pursuit of truth. This is the idea behind wild systems theory, which, according to Jordan: "reconciles scientific and cultural narratives by first asserting that all of reality is inherently interrelated. Meaning, therefore, is this ubiquitous web of interrelations; choice is the means by which we navigate it, and selves are the patterns of interrelations we embody and manage over the course of our lives. Because such meaningful selves emerge step by step out of the trajectory of lived life, they are story-like; that is, they are narratives. And because these narratives always reflect a constellation of choices and chance, they are wild. In short, we are wild narratives" (Jordan, 2024). Here, we have a philosophical framework able to accommodate all forms of truth. It must be mapped to navigate the terrain of design. Our spectrum of cognitive abilities needs to match the many different domains of knowledge so that choices can be made with the confidence arising from a comprehensive understanding of the system whose interconnectedness strives for survival. In navigating successfully, we must be prepared to use the best information available in each situation and, recognising uncertainty and change, still be ready to make choices. We need both left- and right-hemisphere brain function but need to end with right-hemisphere holism "which has been dangerously eclipsed by left-hemispheric mono-maniac reductionism") (Read, 2022, p. 2).(Pinto et al., 2017) (Enns, 1997).

5.1 ENGAGEMENT/PARTICIPATION

While an allowance for user participation may help to humanise the experience of architectural space, it may also be necessary to dramatise and symbolize the differentiation of urban forms. The demands made of architecture go beyond the “purely functional” and must include other forms of satisfaction (de Botton, 2007). The application of “Double-Design” must not preclude the experienced pleasures that attend an architecture of variation (Spuybroek, 2009) as well as an architecture of eccentric intervention (Maudlin & Vellinga, 2014). As Vischer suggests, in seeking to develop a user-centred theory of the built environment, psychological comfort is included in the rating of how well the built environment performs as well as physical comfort and functional comfort (Vischer, 2008). These ideas support the value of manifest occupancy which could become an important element in the implementation of Double-Design.
Considering the central importance of interaction in any understanding of what architecture is about, it seems surprising that little attention has been paid to the active

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encouragement of "user participation" concerning completed buildings. If we are to listen to the interests and wishes of building users, perhaps there need to be limits to the decisions left to the architects. Gone are the days when great architects designed everything in a building, from the door handles to the curtain rails. The architect Candilis put it well: "It is impossible for each man to construct his house for himself. But the architect must make it possible for each man to make his house his home. We must design the habitat only to the point at which man can take over" (Candilis, 1962, pp. 559–602). But how to establish exactly where that point is? A starting point is to assess the potentiality for participation for different building types.

There is evidence that offering users more control over their local environmental conditions brings a wide variety of benefits, not least in the current context of concerns about energy consumption. However, it would be ironic if the ready availability of control devices gave rise to the sacrifice of personal autonomy and the handing over of absolute control to the manufacturers of the devices. Studies are already identifying the public concerns and lack of trust in such technologies. As Wilson et al. say, in their analysis of the benefits and risks of smart home technologies: "Both prospective users and actual early adopters also express caution towards ceding autonomy and independence in the home for increased technological control. These broader sociotechnical risks are perceived more strongly than the privacy and data security concerns that have affected smart meter rollouts in the EU" (Wilson et al., 2017, p. 82).

Empowering the users of buildings to control their own comfort and environment is an intrinsically good thing with obvious benefits to the users themselves, to their employers and to the manufacturers of all the devices that support that empowerment. The involvement of users with the fabric of the building, with the local environment and with the furniture arrangements are all seen as helping to prolong the usefulness of the building so that it lasts functionally as long as it lasts physically.

6 PUBLIC INTEREST

Most countries in the world seek to protect their citizens from harm and to keep them safe, and they try to achieve this by means of regulation "in the public interest". Recent tragedies in the UK have demonstrated what happens when these regulators are weakened or compromised (Waite, 2022). For Double-Design to be fully implemented, against a backdrop of liberal economics and short-term thinking, it will need to be required by law so that all development takes place on a level playing field. The public interest will need to be redefined to accord with today's priorities.

As Arendt pointed out: "If the world is to contain a public space, it cannot be erected for one generation and planned for the living alone; it must transcend the life-span of mortal men" (Arendt, 1958, p. 55). Even before the onset of environmental concerns, the idea of societal altruism was commanding scholarly attention. Arguing that sociological theory had provided uncritical support for economic concepts like the rationality of self-interest, Monroe introduces a search for an alternative approach to the classical microeconomics of Adam Smith. She suggests that: "Only by understanding how people see themselves in relation to others can we begin to build a science of politics that allows for the complex interrelationship between the human needs to protect and nurture our self-interest *and* the needs for human sociability. Political science is a discipline looking for a new paradigm, a discipline ready for a new paradigm. Psychology and identity provide that paradigm through a theory of perspective on self in relation to others. (Monroe, 2001, p. 166). Other studies focus on the incompatibility of economic growth and sustainability and argue for a new approach to education that will emphasise this as a factual starting point. As Kopkina & Bedford say: "Just as the civil rights movement and rejection of racism and sexism have become mainstream in education in most institutional contexts across the world, so can an understanding of the need to halt environmental destruction be understood and widely shared and supported by both social movements (e.g., environmentalism, animal welfare/rights) and translated into the curriculum" (Kopnina & Bedford, 2024, p. 10). It is important that a clear academic understanding is emerging that accommodates the urgent redefinition of 'public interest'. The environmental argument for change is set out in an activist blog: "Sharing things and helping other people may damage the economy, but it's a great way to decrease our environmental footprint. Since the earth's resources are finite, competing to out-consume one another is a self-destructive course of action. This, however, is the natural outcome of capitalism, with its focus on money at the expense of all else ('Environmentalism & Altruism,' 2020).

7 HARD AND SOFT COMPATIBILITIES

The successful development of Double-Design requires an assessment of compatibilities covering practical criteria like floor-loading, floor-to-floor heights and plan depths. These physical compatibilities supporting functional changes of use are hard and the compatibilities supporting other transformations (which may be within an existing use or to secure a different use) are soft. The hard compatibilities cover the physical features of buildings, while the soft compatibilities allow for the essential manifestations of occupancy that contribute to the value of the experienced environment. The fundamental distinction between hard and soft compatibilities is that hard compatibilities are established at once and last for a long time. In contrast, soft compatibilities can be allowed, even encouraged, to merge, compete with, replace, and complement their predecessors without disrupting the long-term built infrastructure. While the application of the hard achieves the heavy lifting, the soft speaks of serving

the needs of specific uses, of meaning, feelings and the symbolic expressions of occupancy.
The hard compatibilities between different building uses have been assessed by analysing their basic physical requirements and assessing how much "spare" capacity would need to be incorporated to allow for other uses. Input data to this assessment has been taken from government guidance as well as published advice.

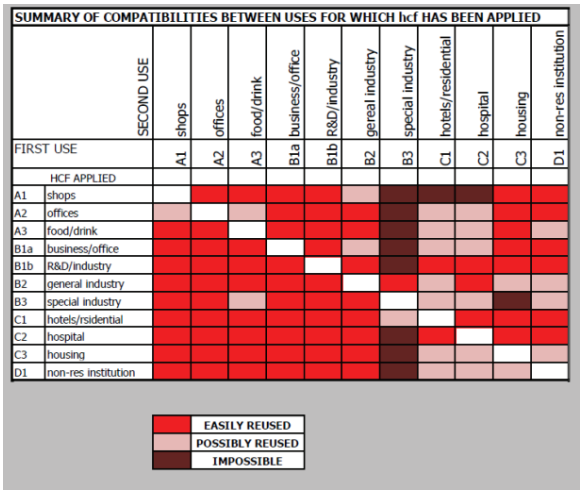

Figure 4: Summary of the outcome of physical compatibility analysis

7.1 RECONCILING HARD AND SOFT COMPATIBILITIES

Figure 4 indicates the potential value of a physical environment that incorporates the highest common factors covering floor-loading and the like. Having established a designed capacity to accommodate future changes of use, it is possible to factor in stated concerns about material conservation. With resource conservation as an unambiguous driver of the Double-Design idea, it is possible to envisage a framework that neatly encapsulates important aspects of the analysis:

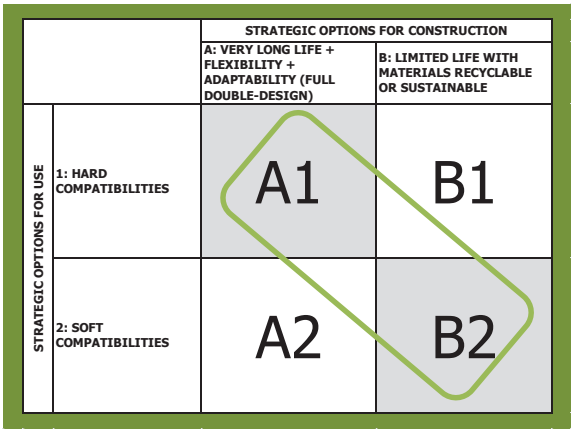

Figure 5: Strategic options for use and construction

7.1.1 A1 PLUS B2:

while A1 provides the long-lasting infrastructure securing compatibility of physical factors (floor loading, floor-to-floor heights and the like), B2 can provide the shorter-term interior design environment, the design for which can incorporate feedback and research intelligence specific to a particular use. The strategic combination of A1 and B2 is indicated as the optimum arrangement providing a robust 'infrastructure' within which soft requirements may change. This approach suggests that materials with an intrinsically long life must be deployed to achieve the desired longevity while shorter-life materials are used to match shorter-life functional and psychological requirements.

7.1.2 B1 alone

Limited life construction options using recyclable and sustainable materials may meet some design criteria but make no contribution to the overall lifetime-materials equation nor the ease of transformation from one use to the next.

7.1.3 A2 alone

It is possible to imagine examples, like some works of religious significance, in which soft compatibilities (the indicators of manifest occupancy) may be achieved through long-life construction. These will be exceptions to the general expectation that psychological needs will be met using shorter-lasting solutions.

8 DOUBLE-DESIGN SUMMARY

Figure 6 illustrates how the flow of given and taken information affects the management of functional obsolescence and structural degeneration over building life.

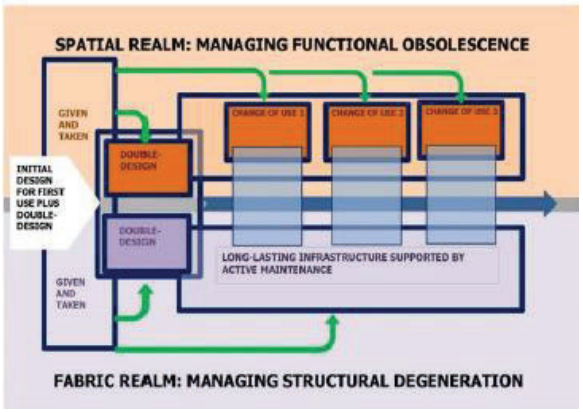

Figure 6: Managing Double-Design

Double-Design suggests that buildings should:

- last as long as physically possible using intrinsically long-lasting materials for the supporting infrastructure

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- be designed with adaptability and flexibility to be useful for as long as they last physically
- allow for a succession of different uses
- use possibly short-life and/or recyclable materials for fit-outs as uses change
- allow for growth and change
- allow for uncertainty
- allow for the best information and advice to support each successive change of use
- allow for each successive use to express its occupancy

By designing from the start for future changes of use, fewer resources will be consumed over the life of the building, there will be less waste of material and that transformations of use in response to changing needs will be achieved efficiently and without wasting time. Architecture would be designed to accommodate unknown future uses and the custodians and users of buildings would be empowered and enabled to play their full part in ensuring the usefulness of buildings for as long as they last physically.

Double-Design is intended to achieve interventions that will be beneficial to future custodians and users, whoever they turn out to be (Harvey, 1996). The long-term value of an increasing percentage of built space incorporating flexibility and adaptability will contribute to the democratisation of space, and of cities.

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