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DESIGN AND SUSTAINABILITY IS ABOUT MORE THAN PROTECTING THE ENVIRONMENT

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ABSTRACT
Design and sustainability is about more than protecting the environment, although that's part of what is in fact a three-way equation - the so-called 'triple bottom line' - which takes in people and profit as well as environmental considerations. Truly sustainable design doesn't exploit the workforce or lead to other unwelcome social consequences, and it has the minimum environmental impact, but it doesn't sacrifice the profitability of the business either. All three considerations must interact. For instance, a product may be made from 'green' materials which are sourced locally and so don't require a business to burn up resources to get them to the manufacturing plant. But if the business uses poorly paid workers and the product fails, the result will be an exploited workforce with poor employment prospects, and a large consignment of unwanted product heading for the nearest landfill.
Sustainability requires commitment and an appreciation of the wider issues on behalf of both the designer and their client. Products that on the surface promote sustainability may not address deeper problems. For example, a product that recycles plastic cups doesn't tackle the wider issue of plastic cups being wastefully produced in the first place. Design is just one aspect of sustainability, but designers are powerful in that their specifications inform other stages such as procurement, manufacture and delivery. However the designer can't be the only one aware of sustainability - businesses and organisations need to work as a whole.
Key words: design, sustainability, environment

1. INTRODUCTION
This has led to increased interest in areas of study such as design and sustainability and corporate social responsibility. At the same time, design is widening its own remit to include areas such as the use of emerging technologies and service and experience design, which recognise that design methods aren't just limited to the design of a tangible product. So clearly, if 'things' are not designed with care and attention to clients' needs then the provider will have problems. This experience included : There is a lot more to design than mere technical calculations.An incomplete design which does not take everyone's viewpoint into consideration is a recipe for trouble. It is the designer's reponsibility to seek out these viewpoints.A solution must be close-to-optimum to start with, as retrospective fixes are never wholly satisfactory. The necessity for novelty in design is obvious where a number of competing providers of the same 'thing'coexist by continually providing new 'things'. Computer-'things' are a case in point - provider **A** first launches a completely new type of memory, provider **B** counters by making it half the size, provider **C** attacks via a drastic price cut enabled by a novel manufacturing technique, provider **D** edges ahead with a much faster operating system, and so on. Nobody can afford to stand still; nobody can exist by slavish copying; novelty is a necessity for good design, for survival. Survival = Good design = Creativity
It is useful to view design in the context of a typical artefact which evolves from initial conception, through the distinct stages illustrated, to eventual obsolescence. Various people are involved in the various stages - the designers, the manufacturers, the salespeople, the operators, the maintainers and the eventual dismantlers of an artefact are all completely different folk carrying out completely

different tasks.Design is the springboard for all subsequent stages, and so it is at the design stage that the later satisfaction of each and every one of these folk is, or is not, effectively set in stone. That is why the 'feedback of anticipatory ideas'is highlighted in the sketch, as it is vital that designers foresee - in every last detail- the interaction of the planned artefact with all these people, and endeavour to fulfill their wishlists. A designer must put herself in other folks' shoes, close her eyes and realistically imagine their interactions with the artefact. Do not get carried away by technicalities. Remember always that it is people who make decisions to purchase; it is people who have to live with your design. A designer's primary goal is the satisfaction of people, not of elegant mathematical expressions.Sometimes it may be high on impossible to please everyone, but you'll never-never know if you never-never have a go at trying to please them. That's why we design.Also shown in the sketch are some facets of the design process which it is useful to introduce at this point A feasibility studyis a report describing in broad but realisable terms the optimum solution. An important component of a real life feasibility study is the solution's cost, but detailed costing is generally not expected in this course. Operations researchis the name given to the branch of mathematics which models industrial and commercial processes such as queuing, distribution, scheduling &c. Detail designcompletes all details necessary for the next stage, manufacture, details which are omitted in the deliberately broad-brush treatment of the feasibility study. In practice a solution must first be confirmed as feasible and the decision made to proceed with it, before detailing commences. If a design lies at the cutting edge of known practice or science then it may not be possible to accurately model certain aspects of its behaviour. Further research and development(R&D) involving experimentation must then be conducted before these aspects of the design can be finalised with confidence. Industrial design deals with artefacts' aesthetics, safety and ergonomics among other things. The principles of ergonomicsare used to optimise human-machine interaction when designing eg. the controls of a bobcat (a mini bulldozer) so that the operator and the bobcat are essentially seamless with the operator's eyes, two feet and hands integral non-fatigued components of the control loops for turning, accelerating, reversing, braking, blade lifting, blade orienting and so on.

2. CORPORATE SOCIAL RESPONSIBILITY

Sustainability and corporate social responsibility overlap somewhat, but the latter also encompasses ideas such as fair trade and human rights and links them to economic success. It is becoming more common for companies to produce reports along with their financial statements indicating their performance in this area and in some countries it is mandatory. Pressure is mounting for businesses to be more transparent and 'just' in their practices. Boycotts on companies that egregiously exploit workforces or pollute the environment are becoming more common. Companies that ignore this area may find themselves the targets of attacks in the media. Books such as No Logo by Naomi Klein and Fast Food Nation by Eric Schlosser have raised public awareness, while internet exposÃ©s can generate unwanted bad publicity.

It's in a company's interest to put its own house in order and be seen to do so. Being seen as a leader in responsible practice can form a powerful element of a business' brand identity and values, and design has a role in communicating this both internally and to current and would-be customers in a way that will increase competitiveness. Most people these days exist by providing 'things'to others; in the case of engineers these 'things' are technical muscle-power or know-how, or physical artefacts - that is solutions to buyers' or hirers' particular problems. If these clients are not completely satisfied with the 'thing' provided then they will dismiss the provider, go somewhere else for their next 'thing', and tell everyone about the provider's unsatisfactory 'things'. New technology presents both an opportunity and a challenge to designers and their clients. Emerging technologies make possible what was once impossible, and those who adopt early can achieve a competitive advantage.

3. EMERGING TECHNOLOGY

The adoption of new technology does present a danger as well. Those who adopt without doing the necessary customer-focused research, either because they're scared they will lose out to their rivals or because they're enamoured with anything that's new, stand to make expensive mistakes. Technology is there to serve the consumer, not the other way round. Businesses must also be prepared to look outside their niche markets. Developments in the IT sector can impact all sorts of businesses. For example the internet has made communication between global branches of businesses much easier as well as providing an interface between the business and the customer. Designers have a vital role to play in finding ingenious and unexpected applications for new technologies. Design and sustainability is about more than protecting the environment, although that's part of what is in fact a three-way equation - the so-called 'triple bottom line' - which takes in people and profit as well as environmental considerations. Truly sustainable design doesn't exploit the workforce or lead to other unwelcome social consequences, and it has the minimum environmental impact, but it doesn't sacrifice the profitability of the business either. All three considerations must interact. For instance, a product may be made from 'green' materials which are sourced locally and so don't require a business to burn up resources to get them to the manufacturing plant. But if the business uses poorly paid workers and the product fails, the result will be an exploited workforce with poor employment prospects, and a large consignment of unwanted product heading for the nearest landfill. Sustainability requires commitment and an appreciation of the wider issues on behalf of both the designer and their client. Products that on the surface promote sustainability may not address deeper problems. For example, a product that recycles plastic cups doesn't tackle the wider issue of plastic cups being wastefully produced in the first place. Design is just one aspect of sustainability, but designers are powerful in that their specifications inform other stages such as procurement, manufacture and delivery. However the designer can't be the only one aware of sustainability - businesses and organisations need to work as a whole. It's only recently been recognised that services as much as products have to be designed. The process is much the same - the designer has to find out what it is the customer wants and needs and then provide it. A well designed service can provide a great competitive advantage for a business, even if that business isn't a service provider. For example, a customer service department that reacts swiftly and efficiently to complaints has a much better chance of keeping customers.

4. EXPERIENCE AND SENSORY DESIGN

Both experience and sensory design recognise that design is about more than the end-product. Experience design is an extension of customer-focused design. Instead of asking what the customer wants at the start of the process, the designer asks what kind of experience they should have. This tends to reinforce a brand - for example a Niketown shop is more about pushing the Nike brand than it is about selling trainers. Similarly, Priestman Goode's designs for the interior of the new Virgin trains were about projecting a particular image of Virgin as well as providing comfort for the passengers.There are three distinct types of operation in the design process, and they are:The formulation of ideas for possible solutions to the problem,The analysis of these ideas to see if they will work,The selection of one solution as the “best”, on whatever criteria one wants to use.The first step is the creative one: how creative depends on the novelty and the difficulty of the problem. It involves formulating some possible solutions to the problem. There is no immediate requirement that all these solutions be workable, or even sensible.The essential element in this process is that of synthesis. What the designer is doing is bringing together:Technical knowledge, in the form of basic principles, often from a wide range of fields,Past experience, with similar projects and aesthetic sense.They combine these into a mix which fits this particular situation, and so come up with one or more solutions that might work. The strategies used to do this are many and varied, and are learned by example from other professionals, and by experience. They involve things like recasting a problem into different forms to bring out similarities with known problems, breaking the problem into smaller, more tractable pieces, doodling, and many others. There are a number of features about this which makes the design process very difficult to emulate on the computer:

The fact that no design follows exactly the same processes, because of the differing requirements,The variety of sources which can be tapped for general principles, and the fact that the precise application of these may differ and the aesthetic requirement.

5. CONCLUSIONS

All of these make it impossible to write down the rigid set of rules required be a computer before it will perform. However, this does not stop us using a computer to assist us with the hackwork.To achieve this goal it is required that we regard planning and construction of manufacturing production systems as a qualified design task of central importance which must be carried out in conjuction with the design of products to be manufactured. This design work requires skilled, well educated and experienced manufacturing system designers equipped with efficient tools. It is their responsibility to see to it that the new manufacturing production systems accurately meet the functional requirements as defined by the products to be produced. Furthermore it is their task to include human factors in the design and thereby anticipate the psychological and physiological needs of the workers and production planners. In addition the lead time for this design work must be competitively short.Discover whether rapid prototyping is compatible with your current practices and what your firm must do to use it successfully.Learn about new applications and productivity-building techniques from exclusive interviews with expert users. For example, find out how to create short-run and production tooling using rapid prototyping and how to improve accuracy and output of existing systems. You'll also learn what cost and time savings you can expect from these new methods. Feature-based modeling refers to the construction of geometries as a combination of form features. The designer specifies features in engineering terms such as holes, slots, or bosses rather than geometric terms such as circles or boxes. Features can also store nongraphic information as well. This information can be used in activities such as drafting, NC, finite-element analysis, and kinematic analysis. Furthermore, feature-based packages frequently record the geometric construction and modification sequences used in building the model. Some versions of solid-modeling software use primitives or boundary representations as the building blocks for modeled parts. With primitives, elementary shapes are combined in a building-block fashion to create a new shape. . For example, a circle representing a bolt hole may be constructed so it is always concentric to a circular slot. If the slot moves, so does the bolt circle. Parameters are usually displayed in terms of dimensions or labels and serve as the mechanism by which geometry changes.The designer can change parameters manually by changing a dimension, or by referencing them to a variable in an equation that is solved either by the modeling program itself or by external programs such as spreadsheets. Parametric modeling is most efficient in working with designs where changes are likely to consist of dimensional changes rather than grossly different geometries. Design is the application of creativity to planning the optimum solution of a given problem and the communication of that plan to others. Apart from the communication aspect therefore, we understand the essence of design to be problem-solving, though the type of problem encountered in design is not like a typical textbook mathematics problem for example in which the unique 'correct' solution is guaranteed by following, automaton-like, a series of learned solution steps.

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