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Rematerialisation as a Prospective Project

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I want outline here why rematerialisation needs to become one of the key material practices of the Sustainment[1] and why it should have a major place in the development of design thinking and many design practices.

Two main areas of design and technological development provide fitting targets for rematerialisation.

The first concerns those modes that have removed environments and objects from our sight, touch and experience.

These 'technologies of removal' can be found across a variety of designed things and systems, ranging from heavy industrial plant, to sophisticated agricultural equipment to small robotics. All of these technologies are guided by complex and precise electronic sensory systems, which either dramatically reduce or eliminate altogether, the need for human physical interaction. It is not being argued that they should be abandoned and that we return instead to earlier forms of hand craft and physical labour (although in some instances this is appropriate) but rather that new ways of gaining a closer proximity to the 'matter of the world' are urgently needed.

The technologically engendered demise of a great deal of physical labour, including the rise of industrial automation, the massive spread of information technologies into workplace and home, along with the ever increasing profusion of both screen based forms of entertainment, and processed food diets, are all contributing to a growing 'crisis' of public health. There are the more familiar indicators of more sedentary lifestyles (such as increased levels of obesity) but there are also other consequences now being identified by the medical profession, like: reduced cardio-vascular health and the dramatically increasing numbers of people (including children) suffering from diabetes. Our mental ingenuity at finding ever more novel ways to relieve physical effort far outstrips the slower evolutionary time of our physicality. Human bodies, historically adapted over tens of thousands of years to lives of gathering, hunting, farming and labouring now, in the space of just a few generations, occupy environments designed primarily for mental or at most, physically minimal activities. These designed worlds of today remove us from our historically produced physicality. Likewise, taking burdens off our hands has meant a loss of skills associated with directly making, or working, with materials, which is also a loss of experiential knowledge of materiality.

The advance of technology has facilitated the human capacity to appropriate 'the standing reserve'[2] (all natural resources, and more), leading to a massive rate of increase in raw material appropriations and materials manufacture. At the same time, there has been an accompanying reduction in physical labour and a diminishment in the kinds of material encounter that were integral to, for example, the use of hand tools (both on the land and in the workshop). Environmental disjuncture occur when the world is so technologically mediated: so often, on the land, the building site, factory or even the office, if there is not a machine to do the job, it does not get done.

The second, linked direction of design and technological development that now, in reverse fashion, invites to be rematerialised, refers to those modes of dematerialisation in which technology is far more backgrounder.

What is being identified here is the loss of calculative, tactile and judgemental skills with the coming of a dependence upon technologies and services that fold into an environment and thereafter reduce the ability of human agency. Two very different examples will suffice to concretise the point.

The first example is the computerised operational control systems that now manage the functionality of a vast array of mechanical devices – building heating, cooling and ventilation systems; internal combustion engines of all sizes; printing presses; office equipment; machine tools and so on. Effectively this development removes the technology from being worked on by anyone

except a contracted service engineer. Even then, the engineer's actions are directed by information produced by his or her electronic diagnostic equipment. More often than not, this equipment simply instructs the engineer to remove and replace a replaceable modular component. Thus, no matter who stands before the particular item of technology, it remains unengageable, and so at a great distance from them. Clearly, the dependence being created is not just technological but also economic, and obviously, without the opportunity to employ and pass on manual mechanical skills associated with repair and maintenance, they will continue to disappear. In such circumstances, the loss of skills is tantamount to a loss of freedom and control over the immediate environment.

The second example is a variant of the first, but in a very different setting. It is the displacement of cooking skills by pre-prepared meals, fast food and the increased propensity of a significant percentage of urban populations to eat out.[3] The loss of cooking skills has significant health and dietary implications, not least because it is generally associated with reduced intake of fresh foods and increased intake of processed foods.

In both of these examples, the aim of rematerialisation is a taking back of control over one's interaction with the world. Skills are not merely functional, utilitarian practices but, as already implied in relation to touch, they are sensory and informational engagements with the matter of one's immediate environment.

Of course, it is not possible to revert to the culture and economy that supported, replicated and harboured skills of the past. Rather, the imperative of the Sustainment repositions the value and use of skills. Increasingly, in the technologically hegemonic age, skills demand to be seen as having a conservational function – not, however, to be understand purely in relation to the conservation of the biophysical but, inseparably, of the self in a world in which making, and artifice in general, are ethically decisive in terms of the form of one's world and being.

Rematerialisation is not just about matter, it is also about time.

The time of contemporary technology is not a stable temporality, an event of occurrence (being) or measure – rather it is unceasing acceleration. While 'we' do not have the means to halt this dynamic, it is possible to recognise that time has been made plural and thus the increasing importance of creating 'slow time' and conserving 'long time'.[4] The former is the time of human experiential comprehension (and so directly linked to the speed at which 'we' move), the latter refuses the duration of a human life as a measure of time whether the life of an individual or of the species in total. In this context, rematerialisation can be thought of as making in experiential time with a sense the destiny of the made.

One of the strengths of rematerialisation is that it confounds any division between the conceptual and the practical – which so often falls out as the knowledge of different constituencies. The concept cannot materialise without the idea or the action that it informs.

Rematerialisation: Illustration by Example

Rather than continue in the abstract, rematerialisation will be exposited via some examples which are at varied levels of proto-realisation. They are presented in terms of binary oppositions merely as a heuristic. Realistically, actual relations are, or would be, much more graduated. That the examples presented are just a scattering evidences the extent of what is yet to be thought, as much as what, at the start, has been considered. Likewise, the outlining of what is presented is equally partial.

From Manic Innovation to Rediscovery

The thrust of design activity within industry is unevenly apportioned.

Comparatively, only a small amount of design time goes into the creation of original products. Unless extremely simple, entirely new products are expensive to get to market as they often, require the setting up of new tooling, complex manufacturing systems, and major marketing campaigns. Thus, the vast majority of design effort goes into innovation in the 'evolution' of already existing products. At the same time, there is a constant and powerful impetus to symbolically and functionally make an enormous number of products redundant by design (style against style). This in many ways is still bonded to the idea of built-in obsolescence, first given profile by Vance Packard in the 1950s.[5] Of course, the idea has been modernised and made far more sophisticated – rather than depending upon a product rusting away in a short space of time, or wearing out quickly, destruction is now produced by a manufacturer managing to diminish 'sign value'. Symbolic elevation or devaluation now rides alongside technological evolutionalism as part of the repertoire of design-led product change. Most overtly, the style of 'the latest' is heavily promoted as a means to communicate being 'up-to-date', progressive and successful; the new always has to devalue 'the old' (the car, truck, cell phone, printer, photocopier, computer, software, camera, washing machine, microwave, power tool, cash register, running shoe, sail boat etc., etc. all fall into this cycle). This combines with a projection of constant performative and economic 'improvement' in the product's technology – it is made, for instance, cheaper, faster, more efficient (but equally, more disposable, harder to repair, especially by the user, and dependant upon electronics/software that can easily be engineered into the past by 'the latest'.[6] Office technology demonstrates the lunacy of this approach. Models of fax machines, printers, PCs, photocopiers

are being superceded even before the catalogues offering earlier models have arrived in the market place. Alongside 'sign economy' style-led redundancy, we now have redundancy induced by the sign of performance – the machine may work well, still look good, but be deemed not productive or fast enough.

The impression is often given that the adopted developmental direction of a particular technology, material or artefact was the sole or logical path. Yet frequently historical excavation reveals other options and exposes economic or political interests, conflicts and actions that set the direction that was followed. Histories as diverse as those of steam power, word processing, wrought iron, vehicle steering systems and prefabricated building construction are but a few of myriad examples. The rematerialisation opportunity here is to revisit the past to disclose the latent potential of abandoned options. This can give a new agenda to the history of design and technology, as well as opening up a third way between new creation and endless innovation of the same.

From New Construction to Retrofitting

Architectural, building and service engineering professions focus overwhelmingly on new construction. This gets reinforced by design educators and the media. However, designing and constructing, for example, more energy and water efficient *new* buildings, adds to overall building stock while doing little to reduce the negative impacts of what's already there and likely to be around for a while longer. The task of the rematerialising this existing built fabric is gigantic – besides reducing its energy load, it has to be able to withstand the coming climate (many parts of the world, including Australia are already experiencing more heat, increased wind speeds and more violent storms that bring hail damage, landslides and flash floods). Furthermore is the challenge, in large urban centres, of how to deal with increasingly high levels of heat islanding.[7]

From the Untouched to the Work of the Hand

Monitoring technologies and sensors are increasingly employed to inform us about the state of the material environment. This development tells us how environmentally disengaged we moderns have become. Knowledge of how working with materials mediated the relation between the 'environment', human and the non-human has been in decline for years. Once the timber cutter knew the best time of the year, weather and state of growth of a particular tree species in order to cut it for a specific application (like the axel of a farm wagon, the spoke of a wheel, the shaft of an axe or the mast of a boat). This knowledge was passed from one generation to another. Likewise, the machinist read the sound of the cutting tool on steel, the colour of the swarf, the smell of the

cutting oil. Now with super alloys, composite moulded, extruded materials, numerically controlled machine tools, robotics and the like, the hand and touch as the link between the seen, sensed and sense become redundant. Yet the ramifications of the loss go by unrealised.

It's true that it is not possible to return to the pre-industrial functions of touch and the hand. Sensor technologies are no doubt important and here to stay – to think otherwise is a romantic fallacy. At the same time it is important that touch be given a great deal more attention, re-valued and be incorporated into the project of materialisation. Why? Well simply because the care of things (which is crucial for sustainment) demands the feeling of and for things that touch brings. No longer can the touch that senses be assumed to belong to embodied knowledge that is transmitted by induction into a craft as a tactile activity. What is now needed in 'our' image-saturated techno-culture is an induction into learning how to touch the world. The vast difference between the feel of leaves, timber, ash, the machined surfaces of metals, soil, rock, concrete, paper, seeds, flour, and vast array of other things, is a crucial learning counter-experience, especially for children who are being inducted into the growing sensory deprivation of a constantly expanding urban synthetic, mono-materiality.

From Consumer Banality to Producer Pleasure

The production of food, certainly in affluent nations, is mostly completely taken-for-granted. Food has become dematerialised for urban dwellers: industrialised agriculture produces fruit and vegetables in which appearance often takes precedence over nutritional value, while grains, milk and the like increasingly have to meet the requirements of food processing and often, junk food industries.[8] The end products (frequently cheaper than fresh foods) combined with sedentary lifestyles, as noted above, are having dramatic and negative impacts on the health of millions of people. Ironically, nutritional poverty is a feature of poor quality diets of the overfed under classes of wealthy nations as it is for the underfed of the world's impoverished nations.

In opposition to these developments, food has to be recuperated as a sustaining entity that we are in touch with as producers, cooks and consumers. For example, the sense of attainment of growing food begs to be made part of the general experience of everybody – be it via formal education or self-discovery. This needs to be made to converge with awareness of the environment in which the food is grown and the pleasure of production and consumption of a meal. Here any distinction between the care of the environment and of the self dissolves. Food also has the potential of being returned to be one of the

most powerful and transformative means of understanding the sustainment of our being-in-the-world.

Obviously, it is not realistic to expect high density urban dwellers to all start becoming volume food producers, but it is both possible and critical for them, as indicated, to have food production and food preparation as a key element of their educational experience. The old adage that 'you are what you eat' demands to be reinvigorated and expanded, not least to embrace the inter-relation between the health of the body and the land.

Rematerialisation, as framed by the production of food, can be seen to embrace:

- much of the organic movement's emphasis on the health of the soil and the abandonment of synthetic chemical herbicides, pesticides and fertilisers;
- the reintroduction of seasonality, localism (and thus reduced energy expended on food transportation), taste and nutritional value over appearance, and staples as the organisational principals of the fresh food industry – the motor powering the marketing of food has to be sustainment rather than the current dominant commercial motives;
- the acquisition of practical gardening skills as a rewarding form of experiential learning; the use of hand tools and simple agricultural machinery as prosthetics that give a sense of direct environmental engagement (such practices of environmental proximity are advocated notwithstanding that they would only make a very small contribution to food production – what they do have the capability of doing is increasing the critical pressures on how food is produced *en masse*; and,
- learning to cook, not just as a skill attached to the pleasures of culinary consumption, but as a practice that conserves the nutritional value of produce.

The imperative to 'feed the world' is totally at odds with the continual abandonment of the land in almost every nation as the momentum of urbanisation continues unabated. A global crop science conference in Australia in September 2004 concluded that world food production had to quadruple and the only way this could happen was via the widespread adoption of genetically modified crops. Questions of rich-world surplus, the conservation of agricultural land and organic soil health seemed to have fallen by the wayside in this big chemical company dominated industry. Likewise, the rematerialisation of food production is totally at odds with techno-science industrialised agriculture, which often leaves environmental disaster in its wake – land clearing, large scale irrigation, mono cultures, over-cultivation, chemically intensive farming and now, genetic modification. All these, and

more, practices arrive with the claim to be responses to the global imperative. Quite clearly many agricultural technologies are extremely important, but, for the sake of sustainment, they must be incorporated into food production regimes that combine all that can be gathered under the agenda of rematerialisation together with equitable distribution systems.

From Abuse to Reuse

Waste is not a material category but an economic and cultural (low) value projected onto matter.[9] It follows that the transformation of the status of a material is able to be affected by how and what value is brought to it. There is no necessary correlation between utility and market worth, nor ecological systemic exchange function and economic exchange value. For instance, the value of gold, or diamonds, centres on rarity and historically posited symbolic value rather than usefulness, whereas the exchange value of water (in common with many other 'natural resources') in no way indicates its absolute material value. All value becomes open to question when placed before the imperative of the Sustainment, for sustainment (being in/and time) is the normative reference of value (although it is a long way-off of being recognised as such).

We are inducted into cultures which, by any measure of sustainment, are deeply inscribed with structures of error. These are manifest as modes of valuing, that prompt us to live with, and act on, a great deal of the matter of the world abusively – this in so far as we (make) waste much of what should be highly valued. Finite quantities of minerals that took millions of years to form are combusted in but a few seconds, and the matter that remains is given no value, often because of ignorance or vested interests. Slag, as a blast-furnace by-product from iron making, is a good example.

Slag is a solidified 'waste' resulting from the fusion, post reduction to a molten state, of limestone and impurities. It performs a crucial function in the chemistry of the manufacturing process of iron. Slag is actually a cementitious material very close to cement in its qualities – in fact, with just a small percentage of Portland cement added as a setting accelerant, it can be use as cement. Likewise, it can be used as an aggregate in concrete. In contrast to the actual non-renewable energy-intensive manufacture of cement, and its linked greenhouse gas (ghg) emissions, slag is rated as having zero ghg emissions as they are credited to the iron. One could equally view the slag/iron relation as two materials for the energy expenditure of one. Having made these observations it might seem surprising that often, vast amounts of slag end up in waste heaps. Why? Principally because of the competitive relation between the iron/steel and the cement industry (which make by far the most prolific manufactured materials on the planet) and the way markets are carved up. There

is also the additional factor of that much of the iron/steel industry is loath to move outside its core business.

The rematerialisation exercise in the context of such waste turns on (re)claiming devalued materials and demonstrating the value of their sustaining utility, while equally exposing the misplaced positing of value with the unsustainable. To do this clearly requires unity between designed practical action and its conceptual underpinning.

The Ephemeral and the Eternal

The point can be made briefly. The ephemeral and the eternal are neither adequately thought nor engaged.

So much that can materially endure is employed in the making of ephemeral things (plastics being an obvious example). Conversely, so much that should be created with the ambition of being eternal is reduced to, and made with, ephemeral things (for instance, products that could serve many, many generations – and in so doing symbolically communicate 'things of value to sustainment').

Rematerialisation here is acting in the light of the judgement of what should pass away quickly (with its materiality recovered or reinvested in the production of the 'natural resource' from which it emanated) or to ensure that what is created legitimises the destruction, which brought it into being by getting as near to the eternal as possible.

Against this backdrop, one clear action is to strive to know when and how to move from a transitory aesthetic (fashion) to one that endures (beauty as the eternal elegance of change seen in the objectification of sustainment). Let's take an obvious example – clothing.

Our wardrobes are full of short-life clothes that we do not wear (these clothes may lack durability, be symbolically located in a style that for many people makes them unwearable, or simply no longer fit). Quality clothing may be of durable fabrics, it be well made, but it is not often conceived to be easily altered/adjusted to a changing body. Certainly it will not conform to a set of eternal style design rules (as they do not exist!) that go well beyond the notion of the 'classic.' A clothing industry that combined short life recyclables with long life 'eternals' could be viable, if smaller that its current form.

Rematerialisation would without doubt have a major impact on the total workforce. Exactly what these impacts would be is very hard to estimate at this early stage of contemplation, but one could expect numbers engaged in new manufacture to significantly reduce but this to be offset by a proliferation of labour-intensive rematerialisation activities. Certainly, the continual and global ramping up of the unsustainable by an economy dependent upon perpetually increasing volumes of manufactured

goods is a pattern that must be broken (a pattern that 'eco-efficiency' is completely unable to deal with).

From Stasis to Movement

Our final example confronts the remaking of the body by ontological design means.

As identified at the beginning of this article, the spread of sedentary ways of life is an expression of the unsustainable. Rematerialisation in response to this would mean the designing of situations to demand the movement of bodies. There are many examples: 'walking cities' (cities without cars); slow elevators /fast stairs; walking-stimulating buildings; physical education as elemental to education at all levels; physical activities designed into *all* occupations that are not physically active. The objective of this designing is to make physical movement a structural feature of everyday life for everybody, rather than (or as well as) being an add-on done in leisure time. Emergent architectural projects suggest that this structuring, fundamentally an ontological design strategy, is an idea that will have its time.[10]

Concluding Remark

Quite clearly, the issue of rematerialisation has to be taken beyond more examples, and a more thorough exposition of them. It is, as already noted, an agenda of massive proportions replete with design challenges and opportunities. One can imaging new design courses, new institutions, vast research programs, new industries, new occupations, economic structures and so on. None of this imagining is utopian. It is all grounded in existing material needs and abilities. It can be realised (by degree) and it is a tangible means to get from where we currently are to where we need to be if we are to sustain what we value. But will it happen?

Notes

1. For an explanation of 'the sustainment' see Tony Fry 'The Sustainment and its Dialectic' in *Design Philosophy Papers: Collection One* Ravensbourne: Team D/E/S Publication 2004, pp. 33–45, or other 'Voice of Sustainment' essays in earlier online issues of DPP.
2. On this concept see Martin Heidegger 'The Question Concerning Technology' in *The Question Concerning Technology and Other Essays* (trans William Lovitt) New York: Harper and Row, 1977, pp. 3–35.
3. While 'eating out' during the working week is, in some cases, counter-balanced by procuring fresh produce and cooking gourmet 'slow food' at weekends, this is a pattern found only amongst a small percentage of affluent urban dwellers – though one that is probably growing, evidenced by the

increasing demand for organic produce and the popularity of weekend 'farmers' markets'.

4. The idea of 'the slow' is a spreading concept that has grown out of the 'slow food movement' that started in Italy and now exists globally (it aims to embody care, sociality and environmental responsibility).
5. See Vance Packard *The Waste Makers* Harmondsworth: Penguin Books, 1963.
6. To take just one product – a basic refrigerator manufactured in the 1930s often still functioned fifty years later, while a modern 'high performance' fridge may have a life of only 10 to 15 years.
7. Heat islanding is a phenomenon that has been known for over a century. It can be a problem for any city of reasonable size. Basically, what it refers to the radiated heat coming from the exposure of the city's thermal mass, especially, brick, stone, concrete and asphaltic concrete (roads and reinforced concrete flat roofs being the most significant heat absorbers) to solar insolation; and exhausted heat from machinery, vehicles and heating, ventilating and cooling (HVAC) systems. This combination of the urban environment's materials and its technologies produces a significant temperature differential between the inner city, suburbs and surrounding rural areas. This difference can be between 2°C and 12°C (and is often at its most dramatic at night). While not just caused by global warming it is, and will increasingly be, worsened by it.
8. Anecdotally, a dairy farmer friend recently lamented that food technology research into the 'stretchability' of pizza cheese, is determining the value of her milk by the dairy processing company that buys it.
9. On waste, see Tony Fry & Anne-Marie Willis *Waste Not Waste* Sydney: Ecodesign Foundation, 1996.
10. The idea of encouraging more workplace movement is spreading steadily, sparked in part by a growing obesity epidemic". John Pagrazio, president of the *American Institute of Architects' Academy of Architecture for Health.* July 2004. As CNN reported in July 2004, the new Kansas office campus of the Sprint Corporation has its parking, conference rooms and cafeterias all scattered around a campus, with covered walkways linking its 21 buildings – all this to structure walking into workplace life. It also has a three-story fitness centre, a gymnasium, two jogging trails, recreation fields, an indoor winter garden and onsite retail stores. Likewise, the Robert Wood Johnson Foundation employed a similar approach when they expanded and renovated their headquarters in Princeton, New Jersey.