Is Brownfield Redevelopment like Perpetual Motion?

Development and re-development of cities will go on forever, or at least as far into the future as we can see! The long-term approach in many cities is to build the new layer on top of the old one, as the archaeologists have shown us at many sites. Not always: on my study trip to Kos this summer, I visited Asklepion, where the Hippocratic' medical school, started in about 400 BC. It was extended by the Romans and continued in use until perhaps 200 AD[1]. After only 1800 years as a brownfield site, it is now a major tourist attraction of the island. Surely this is the ultimate in sustainable redevelopment, delivering improved quality of life, economic and social benefits, and all without significant engineering works, environmental impact, or cash expenditure.

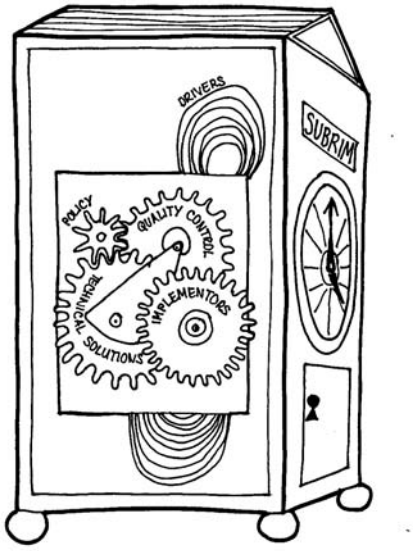
Asklepion

Building over the top is not always acceptable for our new buildings that are heavier and intrude into the subsurface for foundations and extra space. In these cases we are sometimes required to protect the old layers with special foundations to bridge over the areas that can't be disturbed so that they are physically preserved. More recently, there is increasing interest with preservation of chemically unstable remains. Organic materials like wood and leather are biodegraded most slowly in anaerobic conditions, which are achieved when groundwater flows are slow and there is little disturbance that could let oxygen in. However, if a large excavation is opened up, or the water table is lowered to make construction easier, then oxygen can get in easily and decay will accelerate. I'm involved in a multi-disciplinary research proposal to estimate how rapidly these changes will occur on a site in one of the UK's historical cities.

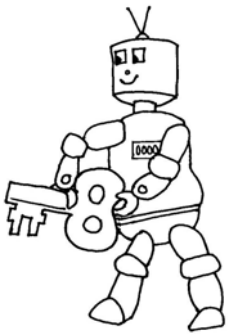
[1] I don't have my guidebook to hand to check dates, as I'm writing this in Hohhot, the capital of Inner Mongolia, on another study tour of ancient and modern brownfield sites!

For most brownfields, preservation is unlikely to be an option and the redevelopment machine will get to work. Can we draw an analogy between the brownfield process and perpetual motion machines? In both, we want useful outputs for the smallest inputs; in the perpetual motion machine we want movement for no energy or matter input, while in cities we want socio-economic benefits for minimal costs to the environment and our purses.

After many false starts, and interesting ideas from colleagues through the SUBR:IM discussion board, Jenny Chambers and I have come with a representation of the brownfield redevelopment process as a machine (See below). Let me explain the workings. The spring represents the **drivers** for redevelopment (sustainability, economics, demand for land, quality of life, and so on). The four cogs represent the four intermeshing parts of the brownfield process. The **implementers**, such as the public sector, investors, developers, consultants and contractors, make redevelopment happen. They use **technical solutions** whether for contaminated land, design of buildings and infrastructure, or for the layout of the city. **Policy,** set by government at all levels, and by the implementers themselves, influences all parts of the process. **Assessment and quality control** make sure that the end product is fit for purpose. None of the cogs can operate alone, and none is more important than the others. And to take the analogy one step further, the grit represents the **disruptors** of the process such as climate change, the global economy, and changing expectations of society. If it is well designed and maintained, the machine will run forever, which is just as well, as the brownfield process is never ending.



Captain SUBR:IM has the key!



And where does SUBR:IM fit? As with perpetual motion machines, this brownfield redevelopment machine seems to get more complex with time. Some of the changes are beneficial, but plenty are not and may slow the machine to halt. SUBR:IM is here to research the design of the machine and its maintenance, and to help it run smoothly. We are opening it up for inspection, understanding how it works, investigating the likely effect of the grit, and proposing new mechanisms. Captain SUBR:IM is an observer, an investigator, and a lubricator – but most of all he is an

inventor, because he wants to make the machine work better and better for the benefit of the planet and society.

And what kind of machine do we want? In amongst all the rhetoric, sustainable development is principally about lower, more efficient consumption. Does this imply a slowly cycling machine, where land-uses are stable, the infrastructure is solid enough to have a long life, and reuse replaces redevelopment? Or is a fast cycling, lightweight model preferable, in which everything is designed to use minimum resources and so be frequently replaced? Modern business generally prefers the lightweight model for its lower upfront costs and flexibility to respond to changing markets. Only if the externalised costs to the environment and society are brought into business's account will they discover the benefits of the reuse over replacement.

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