Risk and Sustainability: Captain SUBR:IM's mission to explore new definitions and to seek out new ideas and concepts.

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Risk has been defined in many ways, and, curiously, the way people define this widely used concept has significant repercussions for the way we "deal with" risk. Sustainability is an equally ambiguous term, with myriads of definitions and different meanings to different people in different contexts. Similarly to risk, the way sustainability is perceived and defined affects the measures taken to achieve it. Actually, in the negotiation of risk we often negotiate across different underlying definitions of risk, and the values we attach to it; in the same way as we too easily negotiate across different underlying definitions of sustainability and its respective values. This is particularly problematic, or interesting, in the area of contaminated land and urban regeneration decision-making, where different definitions or perceptions, of risk and sustainability are being applied by different people to discuss, and hopefully address, the same site and the same problems. In short, when it comes to both concepts, we too easily haggle about the underlying ethical values that define these concepts, which typically makes for dysfunctional decision-making and consensus-building.

The similarities and contexts of these two concepts, risk and sustainability, are analysed here with regard to contaminated land and urban regeneration, and a new theoretical paradigm regarding the interrelation of these two concepts is boldly proposed.

Defining Risk:

There are four broad ways in which people define risk, the first and second are broadly evidential, whereas the third and fourth are largely experiential in their heuristic method:

1. **Technically**, risk is defined as the statistical probability for an event to occur, often multiplied by the magnitude/ scope of the event.

Risk= [Probability * Magnitude of event]

With the corollary that includes perception or some form of social response:
Risk= [Probability*Magnitude* Outcry]

This is different to hazard, where the probability is not known or uncertain. We can find this first definition in probabilistic risk assessments, but it is also evident in the reports from site investigations, the CLEA model, toxicology generally, as well as the trigger/target/baseline values of different models. In fact, it underlies the majority of engineering-based approaches to remediation, including the site sampling strategy, and thus the complex decision-making process to remediate and subsequently regenerate the site. This is particularly relevant to the UK approach to restoring sites

according to "suitability for use" (Syms, 1997), where technically defined risk is considered when developing risk management strategies.

Because of its perceived objectivity and its technical background, it is also typically favoured by regulatory agencies, Local Authorities (LA) seeking guidance for action (or not) and lawyers. This perceived objectivity is seriously criticised in the literature (for example NRC, 1996, Slovic, 1987) because even though it is much more based on physical evidence than the later definitions of risk, it still involves value judgments made by experts, which, as argued by Ball (2002) and Ozonoff (1998), are equally biased as lay people. For instance, choices regarding the survey strategy, the sampling procedures, the translation of contamination results into remediation strategies, based on the experts perceived acceptability of risk still involve the value judgments of the professionals involved (Ball 2002). So, polemically, the difference in the risk assessment between lay person and site surveyor is not so much the absence of value-based assumptions, but the experience and amount and nature of information that is being used in the assessment.

2. **Economic definition of risk**. Here, risk is defined by means of an economic interpretation of the likely damage attributed to an event. This is based largely on the Polluter Pays Principle, which, suggests that the polluter should pay for the pollution caused, so that economically, pollution, should be reduced to an optimal level by making consumers pay the full price for the pollution associated with the product. This is based on the idea that markets are best at allocating resources as long as prices reflect full costs of the commodity and as long as the market is not structurally distorted. Given that the debate as to who pays is a legal one, and given that, economically, there is no difference between making the polluter pay or compensating the polluted – the Coase Theorem - economic risk assessment of contaminated land typically includes issues of liability related to:
    - The clean-up costs themselves
    - Liability for the remediation
    - Loss of earning through project delay or reduced prices
    - Compensation to third parties
    - Future liability for residual contamination
    - Legal recourse for specific aspects of the regeneration process
    - Etc

3. **Psychologically**, risk is subjectively defined by individuals, based on personal circumstances, backgrounds and institutional as well as cultural factors (Renn 1998). Risk here is not expressed as a technically-derived number, a probability assessment, but rather a qualitative and typically holistic (as opposed to reductionist), evaluation of something being "risky", "dangerous", "threatening" or "hazardous".

Though there is a relationship between the technical assessment of risk and the psychological perception of it, one should not assume that they are proportional in all cases. Equally, a psychological evaluation of low risk is not necessarily the same as a risk acceptance, whereas technically derived low probabilities of risk are often seen as sufficient evidence for defining a risk as "residual" or "background" implying approval for accepting risk as "inevitable" "normal" or the like (Roth et al 1990).

4. **Sociological and cultural definition of risk**. Here, risk is being defined through social and cultural factors, which provide a sense-making framework of the situation (Renn 1998, Slovic 1987). Crucial for this discussion the ability to develop a shared interpretation and understanding based on shared interpretation of cultural patterns, such as hierarchical, egalitarian, individualists, fatalists and autonomy (Thompson et al 1990). A key proponent of this is the German Ulrich Beck, who in his seminal "Risk Society" argues that we, as a society, and through our individual activities and tacit as well as open acceptance - and taking- of risk, define collectively the levels of risk we, deem acceptable (Beck 1992).
For example, the current drive within environmental regulation to broaden its scope across the entire value chain of products (End of life Directive, REACH, WEEE, IPPC, IPC as well as take-back regulation etc) can be seen as an attempt by regulars, driven by society or political considerations, to ensure that the allocation of hazardous waste risk across the supply (and use) chain of a product is considered from product design onwards. Closer to home, the consideration of contaminated land and its associated management across its life cycle is another example from the Landfill Directive. From the above, it is understandable that the assessment and management of risk has important implication with regard to sustainability, which will be discussed below.

Risk and Sustainability

From the above (brief) definitions of risk, a number of points and insights can be deducted, which should support Captain's SUBR:IM's Quest. They will be presented here:

To begin, it is important to note that lay people, typically define risk according to the psychological and sociological definition. It is therefore recognized that these different definitions of risk are not mutually exclusive, but do co-exist- Captain SUBR:IM's parallel universe, if you will. Slovic (1987) argues that lay people assess risk in a more holistic way which takes into account social environmental and economic impacts of risk related decisions, rather than narrowly focusing on the technical aspect of risks relating to health impacts. Hence, this is more in line with the concept of sustainable development, as it allows a balancing or a trade-off between different aspects of risk, and it sees risk not in a reductionist, compartmentalised manner. In a study undertaken by Weber et al (2001) with regard to the assessment of acceptability of heavy metal soil contamination and decontamination strategies it was concluded that lay people tended to assess the acceptability of risk bearing in mind the perceived sustainability of the remediation strategy particularly being concerned with long term impacts and risks to future generations.

However, to suggest that, therefore, technical risk assessments (including site surveys and their resulting remediation strategies etc) can be "packaged" into risk communication strategies that are successful would, sadly, ignore the lack of evidence that risk communication, as proposed by theorists and consultants alike, is actually working. There are many examples of success, but things are not as simple as to suggest a direct link between intensity or types of risk communication and "success" in converting technical risk information into socially acceptable remediation strategies.

It is probably fair to suggest that risk decision-making, as currently undertaken in the UK, and beyond, is one-dimensional considering predominantly the technical aspect

of risk, as defined by experts, thus failing to take a multidimensional holistic assessment, which also integrates lay peoples perceptions of risk. It is further argued here, that this has significant implications with regard to the sustainability of brownfield regeneration projects: For example, when considering to remediate a site, technical risks will be assessed and, based on the results, a risk management plan potentially incorporating a remediation strategy will be implemented. However, due to the nature of the technical risk assessment the social, environmental and economic direct and indirect risks will not have been considered when designing the risk management strategy. This omission can have serious repercussions, as even technically perfect remediation strategies have to be subsumed under their socio-economic, regulatory and public policy context. Thus the failure to look holistically at the risks involved jeopardize the sustainability of the project. It is thus proposed by Vegter (2001) that with regard to risk management decision-making, sustainability should be part of the factors in the equation, rather than basing decisions purely on technical elements of risk. This would then also provide the intellectual basis for integrating risk-based information under the planning mantra of sustainable development.

This view is strongly supported by the authors, however, a step back is taken to consider this view form another angle. Grays & Wiedemann (1999) point out that risk management and sustainability have much mutual relevance and could each benefit from more intensive exchange. By analysing, the most popular and original, definition of sustainable development "*development which meets the needs of the present without compromising the ability of future generations to meets their own needs"* (WCED, 1987: 43) we identify two important elements relating to risk. Firstly, by definition sustainability is concerned with the future and decisions which affect the future. However, the future, is unknown, to most of us, and therefore decisions regarding the future involve uncertainty and thus risk with regard to unknown implications of current decisions. This uncertainty has been addressed through the Precautionary Principle which states that "*in order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation*" (Principle 15, UNCED 1992)[1]. The Principle, in a way, can also be interpreted as an approach to managing long term risk. However, in the sustainability literature risk is not directly expressed as an element of sustainable development.

Sustainable development, like risk, is an ambiguous term and means different things to different people. Inherent to each persons understanding of the term are their values, it is what you value that you want to see sustained. The same is applicable to risk, as what only what is valued can face a risk and thus needs to be protected. To illustrate by way of a hypothetical example: a rare species of fly, which is harmful to humans will be potentially eradicated by a development of a hospital on a site, which consists of the fly's' only remaining habitat. It is unlikely that consideration of the sustainability or of the risk of the development will be considered with regard to this fly as it is not valued by humans. From the above it is understood that decision

[1] The same Declaration also states in Principle 10 that *Environmental issues are best handled with participation of all concerned citizens, at the relevant level*, which is an interesting notion for the remediuation debate and the apparent supremacy of technical definitions of risk in the decision-making process as well as for participative models generally..

making both with regard to sustainability and risk are based on human values. Captain SUBR:IM (Kirk's) "Future Directive" has a lot to answer for.

Finally, a practical examination of brownfield regeneration projects and their relation to sustainability and risk demonstrate an important interrelation. A developer, looking to develop a brownfield site, according to current practice, will not consider the sustainability of her project unless it is demonstrated to her that failure to do so involves risks, as defined in the same way as it is dominantly defined by developers. If the risk, to a developer, is not defined in her terms – economically - it is less likely to be considered. For example, failure to consider potential risks of contamination and to mitigate against them could result in jeopardising the project. Hence, risk plays a central role in sustainable development, and has been used so far to promote the consideration of sustainability.

However, risk in itself is not made explicit in the definition of sustainability. It is thus boldly proposed that an explicit link is made between sustainability and risk. The Venn diagram, popularly representing sustainability we feel lacks a dimension, that of risk (Figure A).

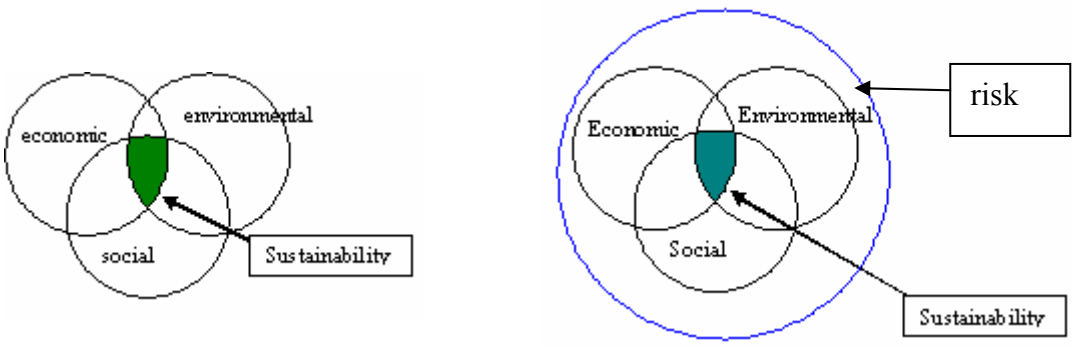

Figure 1: Adding the dimension of risk to sustainability

By creating this link between sustainability and risk and making it explicit, not only will it allow for risk to be considered holistically according to all the above definitions, but it will also bring realism to the decision making process with regard to sustainability. The uncertainties of decisions will be made explicit, with regard to sustainability and thus measures can be justified to manage the risks involved.

Normative Conclusions:

Firstly, Captain SUBR:IM, in her eternal quest to seek out new contaminated sites, to explore new remediation and regeneration strategies and to boldly go where remediation has never taken place so far, really should consider the different definitions of risk in the various stages of her quest. In fact, regeneration can and perhaps should be seen as a complex negotiation process between different "risk takers", "risk acceptors" and "risk regulators". This process should, at the normative level, be guided by both, sustainable development and risk (in its various definitions) as integrated concepts.

Secondly, in the – economic, social and often political deliberation process, the "actual" level of risk – in its technical definition - seems to matter less than the acceptability of risk. This is not to suggest that such deliberation is to happen in an

"evidence-void" negotiation, but that the technical assessment of risk is but one way to inform the debate substantively. "Truth", then, is less important than "acceptable"?

Following from that, thirdly, there is a substantive case for much closer integration between the various projects Captain SUBR:IM is to represent within our group: Apart from each of us being competent in our own field, it is necessary to recognise the various implicit definitions of risk each of us employ and then appreciate that only the totality of all definitions of risk provide a holistic picture of risk on a particular site. After more than a decade of working with, and towards, sustainable development, which equally requires each of us to look (and think and act) beyond the at times narrow confines of our subject discipline to attain an integrated and holistic understanding of the problem area, we should have some experience in this.

Finally, if we see regeneration as a risk-based deliberation and implementation process where different definitions of risk and sustainable development interplay, then this may call for a different approach to our own work, where a discipline-based approach that applies methodologies to narrowly-defined problem areas, may have to give way to a problem-based approach, which first tries to identify (collaboratively) what the problem is, and then evaluates which disciplines can contribute through their specific methodologies to the "solution" of the problem.

No mean feat for a Captain, but women are supposed to be better at this anyway…

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