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STRATEGIC ASSET MANAGEMENT



Fig 1: Example for a 'Snakes and Ladders' game board

November 12, 2012

GAMES FOR LEARNING

In an earlier issue, I noted that, whilst firmly believing in the value of academic research, none of the participants in my LinkedIn forum could give examples of such research.

So here are three excellent examples presented at the CESUN (Council of Engineering Systems Universities) Conference in June this year. The theme of the conference was effective design and Governance of engineering systems.

Academic papers share certain characteristics that are extremely valuable for practitioners: they strive for meticulous research; they present their findings for peer review; and they take a broad approach to their subject, not confined by organisational or political demands.

The three papers - all involving games, role playing and simulations are:

Page 3. Snakes and Ladders – identifying risks to asset management strategy by Melinda R. Hodkiewicz,

Page 8 The Management Game - Asset Management by Martine van den Boomen, Johan Duifhuizen and Thomas Staverman, The Netherlands

Page 8 Boats in a Sandbox: Using Role Play Simulations to help seaports prepare for the risks and uncertainty associated with climate change. by Todd Schenck, PhD Candidate, Department of Urban Studies and Planning, MIT

Each paper is individually fascinating - and has much that you can apply.

Also: Page 2: Editorial - On Statistics

So enjoy!
Penny

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Editorial: On Statistics

The US elections have come and gone and anyone who has been following the results will know of Nate Silver. He is the statistical analyst who correctly predicted 50 out of 50 state results by careful statistical analysis, over many weeks, of the polling figures. At a time when all the pundits were claiming that the results were 'too close to call' (unless they were extreme Republicans, in which case it was 'a landslide for Mitt Romney') Nate Silver's analysis argued that the probabilities lay in Obama's favour. The essential word here is 'probabilities'. His achievement has been lauded as a win for science over opinion - and he has increased the profile of statistical analysis.

I am currently reading his book, "*The Signal and the Noise - how most predictions fail, but some don't*", and would recommend that you do, too. (How much of a stretch is it from predicting whether a sports team will win by analysing its likelihood of injury, to predicting service performance by analysing the likelihood of asset failure?)

Progress in Asset Management, as in other fields of study, is dependent on understanding what our experience and information are telling us. Without an understanding of statistics - especially probability - it is all too easy, for example, to assume, if assets have exceeded 'their economic life' that they are overdue for renewal. (See SAM 345 for why this is a costly error to make.)

Over the past few months I have been speaking with a number of leading strategic asset managers about how we can make it easy (or, at least, easier) to improve asset management by better use of statistical analysis.

Nowadays, computers take the hard work out of number crunching so all you really need to do is to know * what technique to use for what problem, * what its limitations are, and * where to go to get step by step directions.

I am seeking the advice of those in the field as to:

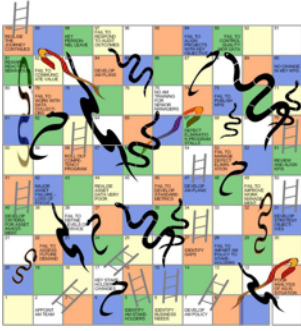
- the most useful techniques for different types of asset manager
- examples of the benefits of their use in practice
- and/or advice on their limitations

I am also looking for those who consider their knowledge of statistics makes them an excellent subject for testing the work that the others come up with.

I would like to hear from all of you.

Penny

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GAMES FOR LEARNING. PART ONE: Snakes and Ladders – identifying risks to asset management strategy

Melinda R. Hodkiewicz, School of Mechanical and Chemical Engineering, University of Western Australian, Nedlands, WA 6009, Australia

Access full paper here; <http://cesun2012.tudelft.nl/wiki/index.php/AllPapers>

Snakes and Ladders - a board game modified for learning

‘Snakes and ladders’ is a game in which chance (the dice) and uncertainty (the lay of the board) impact the achievement of goals. Here it is adapted and used as a teaching tool in the executive development class “Asset Management for Managers”.

The game allows executives to create their own board identifying what ‘ladders’ they need to put in place to implement asset management in their organisation. They also need to identify the ‘snakes’ that can impact success. An additional challenge is to decide where on the board to place their snakes and ladders as some snakes have a greater impact at certain stages in strategy deployment.

Why do efforts to improve AM fail?

The “Snakes and Ladders” approach arose out of an earlier¹ (2009) attempt to see why efforts to improve AM Planning so often failed.

Examination of many case studies suggested that there were a large number of events or circumstances that, in practice, often delay or derail asset management improvement efforts. Let us call these ‘snakes’.

Examples of snakes (risks) include

- Departure of key personnel responsible for the AM improvement effort
- Loss of focus and support of the leadership team if improvement takes more time than anticipated
- Failure of the leadership team to demonstrate behaviours set out in the AM Policy
- Failure to take whole of life considerations into account in decision making
- Rewarding reactive over reliability oriented behaviour
- Starting too many AM improvement initiatives

What do the ladders represent in this analogy? They represent the processes that need to be put in place to establish, operate and maintain elements of the asset management system.

¹ Hodkiewicz, M., P. Burns, et al. (2009). Asset Management – A game of snakes and ladders. ICOMS Asset Management Conference, Sydney, Australia.

Examples of 'ladders' include

- Establishing an AM team
- Developing an AM policy
- Setting AM objectives
- Establishing processes for AM plan development and use
- Identifying AM competencies and associated training requirements

For AM to work well it needs to be adopted as a philosophy throughout the organisation, however

“Often asset management seizes the imagination at the top - but fails to get through to the bottom where the work on the assets is actually done. Sometimes the troops are enthusiastic but fail to win over the decision makers at the top; or the drive comes from technical people in the middle but they fail to make the necessary financial and risk arguments to convince senior management.”

Understanding and Commitment from the executive is key but long term planning may not come easily

“Executives tend to come from operational, maintenance or financial backgrounds, often experienced only in the in-service phase of the asset life cycle. While this experience serves them well in meeting year to year organisational objectives, the pressures of meeting short term performance goals means it is difficult to learn to make whole of life decisions. As a result they often do not have experience in how to turn organisational strategic intent into actions at the asset level to ensure these assets deliver value to the organisation over the long-term.”

The following views about Asset Management were commonly heard by Melinda in her discussions with operational and maintenance managers and executives across a range of industries:

- *We've been managing assets for years already, why do we need an asset management system?*
- *Asset management is just a new word for maintenance*
- *Assets exist to meet today's goals. Someone else will have to deal with the consequence of operating assets outside or at the limits of their technical specifications; it will be after I have moved on.*
- *It is more acceptable to respond effectively to failures rather than waste time putting in place expensive and perhaps unnecessary preventative measures to prevent them.*
- *Capital is difficult to justify, we will buy the cheaper unit and deal with any problems using operating expenses*
- *It is just too difficult to engage with design and EPCM contractors to ensure reliability, maintainability and related through life concepts are built in and budgeted for at the design stage.*
- *Who really wants to know the true financial cost of ownership of the assets? Best just look at it like the accountants do.*

- *We already do all of these processes, why do we need a new system?*
- *This is all about generating more unnecessary paperwork for auditors; remember when we put in ISO9001, what did that achieve?*
- *We tried something like this three years ago, people got excited about it, but it never delivered and now the asset management group has been disbanded.”*

The Teaching Challenge

A proportion of these views usually surface, either overtly in asset management executive education courses or through a kind of passive resistance to the ideas. Nevertheless it is unusual that these views stay unchanged over the length of an executive education course and therefore the challenge, at the end, is to get all the participants to actively engage in developing a strategy for either establishing or improving the management system for managing their assets.

Hence the use of a game

In seeking to engage executive education course participants in strategy development we want to give them a safe learning environment to make suggestions and to be honest about the issues facing asset management in their organisation.

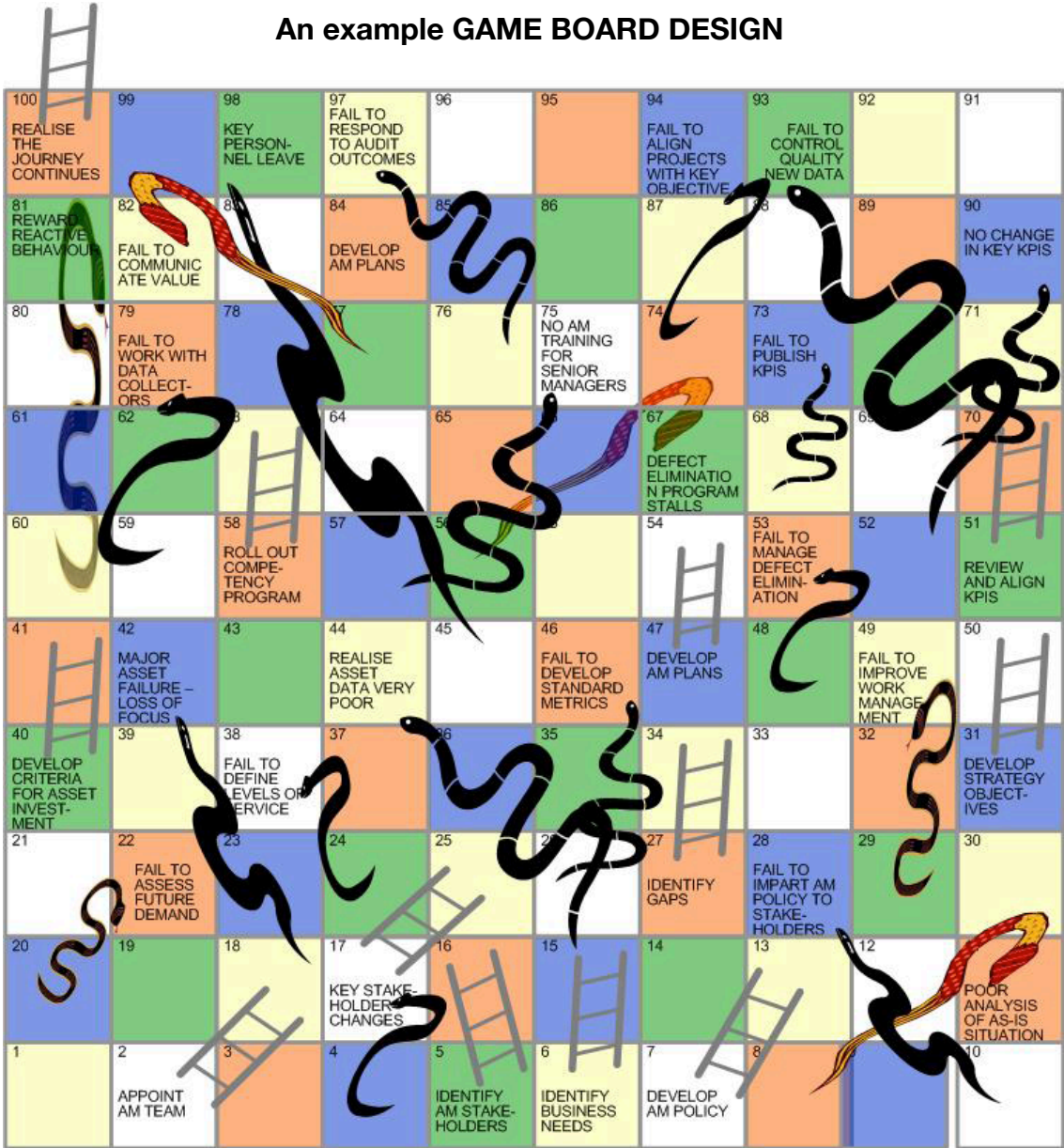
In the learning environment, participants design the game board

The game of Snakes and Ladders involves a game board of numbered squares and ladders and snakes connecting specific squares. The object of the game is to navigate from the start (bottom square) to the finish (top square) helped by the ladders and hindered by the snakes. How does this snakes and ladders analogy help with developing asset management strategy? Once you identify the ladders, which represent the activities that make up your plan, you need to consider when they can be deployed. If you are starting to develop a new asset management system, it is likely there will be a number of people and processes you need to put in place before you can, for example, start developing AM plans. Each activity is represented by a ladder, where does it go on the board? Should it go down at the bottom as it must be done early on or further towards the top, in other words later in the development and implementation process?

Similarly what are the risks that this activity can be derailed or delayed? These are represented by a snake. Participants have to decide where the snake goes. At some stages of the development and implementation, the ‘snake’ can have dire, and at other times fairly mild, effects. A second consideration is how long the snake is. Long snakes, can take you all the way back to the beginning. In a number of games, participants have selected long snakes when considering the consequence of key people who lead the AM effort leaving or a loss of interest and support from senior management.

The use of a game board which has a time element, with higher-numbered squares on the board representing time into the future, allows participants to consider how long after one initiative starts they need to wait before starting another.

The time dimension forces recognition that process and system improvement initiatives contain 'delays', interruptions which make the benefits of actions occur gradually



The Results

The game was played on the final day of a 3 day executive development program to bring together all that had been learnt in the course. Participants were divided into groups of 3 or 4 and oriented to the game board, the different sizes of snakes and ladders and given stick-on notes and pens. The aim of the exercise, development of the game board, is explained by the facilitator. Initially they tend to individually identify snakes and ladders and place them fairly randomly on the board. After a while they then start to engage with each other about where the snake or ladder is, and how significant it should be (its size). This usually leads to an exchange of views often accompanied by anecdotes about their experience (particularly of the snakes). The facilitator allows about 30 minutes to develop the board and following this there is a debriefing about the decisions they have made.

The outcomes of this exercise are that participants

- Identify and agree on a sequence of activities that they need to do in order to progress development of the management system, in other words they have developed a strategy.
- They identify a number of the risks to the strategy, when in the development process they are most likely to occur and how significant the consequences might be.
- Following this exercise, participants spend the remainder of the session documenting their strategy for improvements to the asset management system with associated timelines and assigned responsibilities.

Reaction of Participants

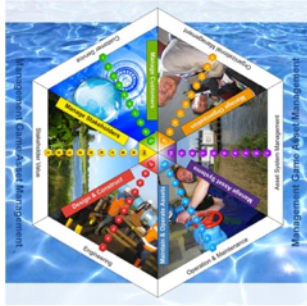
The game was consistently identified as a highlight of the three day course in the “What did you find most valuable about the program?” part. The section below describes the advantages and challenges of this ‘develop a game’ approach over traditional class room approach to strategy development. It draws on participants’ written and verbal feedback from participants and the author’s observations.

- The game board provides explicit focus on the time element involved, some activities must be in place, before others can be initiated.
- Participants realise that some risks have more serious impacts at some times than others. For example, once you have a functioning system in place with good processes, you are likely to be less vulnerable to a key person leaving.
- Participants share stories about their experiences as they play the game, this contributes to peer-peer learning.
- There is a realisation that cannot do everything at once. Too often executives set too many goals over too short a time line and underestimate the resources required to deliver. As a result of playing the game, participants tend to select only a few activities to focus on in the short term.

Finally, some conclusions for extending the Learning Experience

One of the limitations of this case study approach is that the results do not support generalization but are specific to the context of the cohort (executives and manager) and to asset management strategy.

Challenges in coordinating the game are around getting everyone to engage with it. There are sometimes those who struggle to play a game in a work environment and subtly or otherwise try to disrupt things. This is a problem for game playing in general in the executive education environment rather than with the snakes and ladders game in particular (de Freitas 2006). It can also be difficult if you have representatives from a range of organisational levels in the same organisation. Depending on the culture of the organisation and personality of the leaders in the group, this can stifle discussion particularly on cultural and organisational barriers to new strategy elements.



GAMES FOR LEARNING: PART 2. **The Management Game - Asset Management**

**Martine van den Boomen, Johan Duifhuizen and Thomas Staverman,
The Netherlands**

Full paper: cesun2012.tudelft.nl/images/0/02/Boomen.pdf

I am including this game in “Games for Learning” because it rather nicely bridges the gap between our first game “Snakes and Ladders” and the next “Boats in a Sandbox” but I will deal with it very briefly as a fuller coverage can be found in SAM 346, July 23 2012.

Like Snakes and Ladders, the Asset Management Game is a board game, but here the aim is to play, rather than design the game. It is also a role playing game, as the different players assume the roles of asset manager, asset owner, etc. The objective is to help each player see the challenges that affect others and, through this, to develop a more cohesive approach for their organisation. In this, it has some similarities with the next paper to be examined, ‘Boats in a sandbox’, which also focuses on roles and integration but goes further than any one organisation in its attempt to tackle the problem of climate change as it affects the development of ports.

The AM Game was developed for use in the Dutch water industry but its great advantage is that it can be customised, so it could be very instructive in a local government setting.



GAMES FOR LEARNING: PART 3 Boats in a Sandbox: Using Role Play Simulations to help seaports prepare for the risks and uncertainty associated with climate change.

Todd Schenck, PhD Candidate, Department of Urban Studies and Planning, MIT

Full Paper; <http://cesun2012.tudelft.nl/wiki/index.php/AllPapers>

This is the most ambitious of the three papers presented in this issue. Todd Schenck’s paper describes the problems facing seaports in the face of climate change and the procedure he is following. These few excerpts will give you the flavour of what he is attempting.

A question of cooperation

‘The questions I am broadly interested in are whether, and how, sufficient cooperation across sectoral boundaries and among various stakeholders can be engendered to permit effective responses to highly uncertain risks. I am exploring these questions by examining the climate change-related risks facing major seaports. Many ports are expected to face sea level rise, storm surge and other challenges.

I will explore how port planners and other stakeholders are trying to work across traditional policy subsystem boundaries to handle these risks.'

The Challenge facing Seaports

Ports have traditionally been constructed on the assumption that they will operate within relatively narrow bands of climatic variability, including sea level fluctuations. Extreme weather events and sea levels outside these design dimensions can cause critical disruptions, millions of dollars worth of damage and lost revenues. Ports do, of course, attempt to account for variability. The Netherlands has, for example, constructed the massive Maeslant Storm Surge Barrier to protect both the port and the wider Rotterdam region from storm surges. To make choices about major investments of this kind, however decision makers must know which threats and degrees of variability to take into account.'

Dealing with Uncertainty

While climate variability has always been a factor in port planning and design, the assumption has been of relatively static conditions over the medium and longer terms. The weather is highly uncertain, but the probability of a one-in-a-hundred year flood is expected to stay constant at 1% each year. Furthermore, where and how risks are factored into what are complex decision-making processes is highly institutionalized. Climate change alters the already tenuous degree of certainty, as conditions are expected to be dynamic over the long run and there is a great deal of uncertainty in the nature and degree of change. It may also introduce new threats or variables that need to be accounted for.

Those responsible for maintaining and extending regional infrastructure are accustomed to being able to muster all the information they need within their respective domains of responsibility. That will not work when it comes to climate change risks. While important work is being done to advance the notion of flexibility in design, the challenges posed by climate change are further complicated by the fact that existing policymaking frameworks and institutional arrangements are ill-suited to dealing with dramatic uncertainties that cross traditional sectoral lines of responsibility or require participation and agreement among a broad array of stakeholders. Adequately assessing possibilities outside expected design dimensions requires levels of cooperation and an ability to tap multiple sources of knowledge.

How can ports prepare?

A critical question is how seaports can incorporate climate change adaptation planning into their institutional environments. Given their critical role and the longer-term nature of the planning they engage in, one might expect ports to be early adopters of climate change adaptation planning. The comprehensive survey done by Becker et al. (2012) suggests that many port managers are generally aware that climate change may pose significant threats, but are doing little to prepare.

Stakeholder engagement in port planning

An equally important corollary question to how ports can prepare for climate change is how various stakeholders are responding to and engaging in the adaptation process.

Each adaptation option is bound to garner support from some and opposition from others, depending on their interests. The construction of hard infrastructure, like seawalls and storm surge barriers has, for example, often faced opposition from environmental groups due to the associated ecological damages and disruptions. In contrast, port authorities and shipping interests often champion such infrastructure projects due to the protection and relative stability they provide. Various political and citizen groups may oppose, based on the high costs, or support, based on the jobs created and sense of accomplishment associated with completing large-scale infrastructure projects. Environmental groups often favor allowing nature to run its course and reclaim areas vulnerable to sea level rise and storm surges, an option typically untenable to shipping companies and ports with millions of dollars invested in fixed infrastructure.

Managing Tensions

Insofar as climate change is (or may soon start) accelerating the extent and rate at which controversial adaptation-related projects are being initiated, I assume that tensions among stakeholders are increasing. How can these tensions be managed as ports adapt? This is a question of stakeholder engagement and collaborative management.

On a related note, it is quite possible that accounting for and responding to climate change is a 'hot potato' that stakeholders are aware of, but that no one wants (or knows how) to handle. In fact, a survey conducted by Becker et al. (2012)² suggests this, with 86% of respondents agreeing that climate change adaptation is important, yet a minority feeling confident in their own knowledge and even fewer engaging in adaptive measures. Because responsibility for newly emerging threats is often unassigned, it is all too easy for stakeholders to assume that someone else will take the necessary action. To what degree are stakeholders aware of the risks associated with climate change, but expecting others to take responsibility for them? Are processes being initiated to collectively identify the risks and apportion responsibility? These are questions of institutional design.

The Research Plan

I plan to employ a case-based methodology, engaging directly and extensively with participants. RPS exercises shall be developed that can be used with port managers and other stakeholders as diagnostic tools to help them collaboratively explore how they can and do manage uncertainty and dynamic risks, like those associated with climate change. The foci will include: Assessing if and how the uncertainty associated with climate change poses any unconventional challenges, particularly to existing decision-making processes; discussing how new risks and uncertainty may be incorporated into institutions and streams of decision-making; discussing how the interests and perspectives of various stakeholders impacted by both climate change and proposed responses might be addressed; and considering potential tools for decision-making in the face of risks, like scenario planning.

² Becker, A., S. Inoue, M. Fischer and B. Schwegler (2012). Climate Change Impacts on International Seaports: Knowledge, perceptions, and planning efforts among port administrators. *Climate Change*, 110:5-29