

Paralysis by Analysis? The dilemma of choice and the risks of technology evaluation

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When we observe the typical outcomes of technology management and investment appraisal and technology (Irani *et al.*, 2001; Remenyi *et al.*, 2000) there is still a wide variation in how evaluation of technology is carried out and the results that are achieved. What has been learnt so far however (Sharif *et al.*, 2005), is that as organisational goals and circumstances change, so do / should the appraisal process. However, the process and nature of evaluating and making technology decisions requires continual experience and applied knowledge in order to succeed. But I fear that there is a real risk of trying to do too much, to over-analyse, to over-evaluate; thereby intrinsically increasing complexity and widening choice and uncertainty. To highlight this, consider the following scenario.

Recently, I have decided to upgrade my existing cathode-ray tube (CRT) TV, in preference for a much more fashionable and cinematic flat panel display. My current set works perfectly and has not given me any problem in the 5 years I have owned it. However, being an avid movie buff, and noting the march of progress and technology in general, means that only a large flat panel display will now do. The choices available to me include either investing in plasma or LCD technology: each has its own advantages and limitations, and seeing as LCD display screen sizes are relatively small in comparison to their plasma TV counterparts, I am inclined to purchase a plasma display instead. Being technologically aware myself, I have also noted that the imminent arrival of digitally broadcast programmes and films (sometime in 2006), needs to be considered also. In the US and parts of the Asia-Pacific, this is already happening, with the UK now soon to catch on. Coupled with this, is the emergence and rise of high definition (HD) television sets, which seek to increase the available resolution of the displayed image, in order to effectively display purely digital signals. This will mean that any image seen on an HD "ready" screen will be at twice (or greater) detail than present display technology allows (as long as the broadcast signal has been recorded in digital HD format that is - the image as I have seen, is quite simply stunning). As such, taking these novel innovations into account and wishing to hedge against future technological developments, I have decided to invest in an HD ready plasma TV. This rather mundane state of affairs may look trivial, but in fact provides an interesting view into the whole concept of technology evaluation and investment.

Choosing a TV may appear straightforward but due to the growth and availability of flat panel TVs in the UK over the last 2 years, almost all electrical retailers and specialist shops stock a wide, and very definitely, bewildering array of displays. This may seem like a cut and dried, meaningless exercise – but I wanted to see whether or not the choices available to me for investing in technology, would be and could be assessed in

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the context of the concept of technology evaluation. As is well understood, the purpose of any evaluation process is to identify a relationship between the expected value of an investment and a quantitative analysis of the benefits, costs, and risks. So, having noted my basic requirements and having spent some time researching all the different technology on offer, shows that really only five things matter in my investment decision (in some form of ranked order): screen size, screen resolution, display interconnections, guarantee / after sales service and price. Cost is the last of these items, as the entry point for all of these forms of TV are within the same price range – there is little price variation around the median screen size of between 32” – 42” across the main screen manufacturer models available in the UK (unless of course it is purchased online, where the savings can be substantial). The benefits I see as being: aesthetics, technology features, and definite “feel good factor”. The only risks that could be encountered would be that I could get an equivalent or better unit in the future, for far less money (I would be of course, paying a premium for tomorrow’s technology today).

Experts in technology investment and adoption will immediately inform you within which demographic you would fall into based upon this stance: a desire to always invest in the latest and greatest technology (i.e. be an early technology adopter); become a witness to technological developments and only participate when the barriers to entry – be it cost or availability – are sufficiently beneficial to you (i.e. be a technology follower); or delay investing in technology until it becomes absolutely essential to do so (i.e. be a technology laggard – or in an extreme case, a luddite). Whilst I would say that I am clearly not a luddite in any sense, I don’t think I would also describe myself as a 100% early adopter either – therefore, and in this case, I am merely a follower. Modifying these views of technology adoption within my context, provides me with three similarly distinct choices. Should I just get the most feature-packed display (hedging against future technology developments) and pay a premium for doing so? Or should I invest in a cheaper, non-digital, non-HD ready plasma display, that will be as obsolete as my current TV in the wake of the soon to come, all-digital broadcast revolution? Or should I just be quiet and be content with my monaural, 4:3 aspect ratio CRT box? Choices, choices, choices.

I decided to investigate how my personal preferences (such as screen size, interconnections, screen resolution and price) would affect the investment choices available to me, as a series of modelling exercises. Initially, I decided to model the whole situation using a Fuzzy Cognitive Mapping (FCM), attempting to link all known causes and effects of this scenario together via weighted causal links (Kosko, 1991). As an extension to this, I even tried to apply the strategic planning method of Morphological Analysis (MA) too (Zwicky, 1969), to understand the complexity of the situation. I then also decided to dabble with Systems Dynamics theory, through the application of the concept of System Archetypes (Senge *et al.*, 1994), to see what I could find.

The FCM I created showed it was not a good idea to consider a display with digital inputs (in preparation for digital TV and other future digital signals), implying negative causality towards HD inputs. This was even though I expressed a preference for considering all TVs which had these input terminals. This surprised me, although it did provide an answer of sorts: nothing is ever a foregone conclusion. An alternative view arose when I carried out a morphological analysis of the situation. By classifying each aspect of my decision-making task and cycling through all the permutations of the plasma features and decision criteria, I found that I needed to consider screen size, the

guarantee / warranty coverage supplied, screen resolution, price and finally the inclusion of digital signal inputs. Finally, I then tried analogising this situation via the application of systems theory. This showed that the decision path that I was on, was equivalent to the “Attractiveness Principle” archetype. That is, the situation imposes a dilemma into deciding which of the limiting options to address first – hence trying to decide which of the available options is more “attractive” in light of the perceived future benefits that will result from the initial decision effort. Simply put: which one of the options available to me looks addressable (i.e. attractive), based upon what I know about the problem in hand, before I tackle the rest of the decision-making task?

These experiments basically confirmed that deciding upon what sort of TV to get, was not an easy task in the face of competing, though at times necessary, technology choices. By reducing all the variables involved in this scenario, I had effectively reduced all of these inputs into some critical decision factors which should allow me to choose the right TV. According to the results of my respective deliberations, I shouldn't consider buying a TV with digital inputs; that I should in fact consider functionality over features (what it does versus how it does it); and I was approaching the whole situation in terms of a type of “beauty contest” amongst TVs. Most of these answers appear to be quite plausible. However, I *really do* want lots of features within a HD ready television, for no other reason than I want the latest technology. As can be seen, this sojourn into modelling my flat panel TV quandary, shows that over-analysing the array of technology and investment choices, poses an even greater dilemma than the actual problem being addressed (unless of course you simply focus on parameters of price or aesthetic looks or number of features). That dilemma is one of trying to listen to different levels of reasoning in preference to instinctive desires. The choice of TVs available to me (based upon screen size, resolution, digital / HD capability, features, aesthetics, price, guarantee, branding etc), at one stage became overloading, with many products seeming to offer the same benefits and risks with little discernable difference between them (cost and availability being the only differentiators). Should I buy a high tech gadget or one which will just do? Or should I wait for the digital TV revolution to fully take off in the UK before purchasing a unit? Should I care? Does anyone care? Probably not. But the point raised is this. How do you choose the right technology at the same time as risking making a “bad” mistake and investing in the “wrong” technology (relative to my personal preferences)? I had at this stage already decided on a display that I wanted to get but I was at once in a state of confusion: some sort of paralysis by analysis you could say. I stepped back from my own situation and considered this. If I perceived making such a technology choice was difficult for me, how complex and difficult must investing in new technology be for organisations? It must be infinitely worse, given that there are a myriad other factors to consider also: organisational bureaucracy, strategy, individual preferences, costs (inevitably), risks (assuredly), and benefits.

Most successful, agile and adaptive organisations, tend to always want to be leaders in technology adoption. There are many more who are followers, and perhaps it is only small or medium sized businesses which may tend to be called laggards (due to the prohibitive cost barriers to entry, perhaps). In a quest to attain competitive advantage and technological superiority (over competitors, partners, friends or family), I am certain that *technology choices must be constrained in order to limit the increasing complexity of evaluating them*. And this must surely ring true for other objects, artefacts and concepts as well as TVs. At the same time however, the simple act of carrying out

evaluation, of making critical technology investment decisions, is only useful if the results of such deliberations are *acted* upon, as this quote notes:

“Visions are the vehicles that transport us across the boundaries of current reality to the boundless hopes of a future seemingly beyond our grasp. What once we deemed impossible becomes not only possible but probable when we live out our vision through actions.” (Anon)

Decisions have to be made in order to learn from them, so that better decisions can be made in the future. Resilience to failure and avoidance of risk therefore actually reduces the capability to learn and discern good choices from bad choices – without this, there is little or no reference point for success / failure. This is a strange paradox, but a paradox nevertheless. So, therefore, what are the inherent risks involved in evaluating technology?

Many times, the evaluation of technology is hampered by a poor classification of what the situation itself is – as such it is useful to know if such decision making scenarios fall into being a mess, problem or puzzle (Ackoff, 1974): is it a complex, undefined problem (a mess) ; a well formulated issue but without a single solution (a problem); or is it well defined problem with a specific solution that has to be worked out (a puzzle)? The extant literature on the subject of evaluation does not tend to assist much in these sorts of definitions either. Furthermore, as has been experienced countless times also, there is usually a lack of consistency in knowing about what constitutes an evaluation technique in the first place. Whilst academics may produce thoughtfully prepared frameworks and philosophical treatises on the subject, practitioner may prefer “quick and dirty” metric or scorecard techniques (much like the beauty contest approach I used for assessing flat panel TVs described previously). Hence there needs to be an understanding of both heavyweight and lightweight techniques – the use of which may ultimately abate the effects of over-analysis of investment opportunities. This level of knowledge is also crucial to knowing when, where and who is impacted by the effects of the evaluation itself – and thenceforth, of knowing what “good” and “bad” evaluation results look like. Thus, acting upon the decision that is reached is just as important as knowing what, when, where and how to evaluate. At all costs, I believe the act and the process of evaluation must not take precedence over the decision which results from it.

And did I get my TV? That decision, I have yet to take...

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