Knowledge In Real World Situations: A Diagrammatic Funnel Model

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ABSTRACT:

A practical drawing-board style knowledge model is devised which can be used in an evaluative as well as a tracking mode by a wide variety of actors in the stress of real world situations, rather than being elaborate and satisfying theoretical and academic canons. A distinction is made between prior and dynamic knowledge stocks. As an illustration, the model is applied retrospectively to three cases.

Keywords: *Prior knowledge, Dynamic knowledge, Absorptive capacity.*

1. Introduction

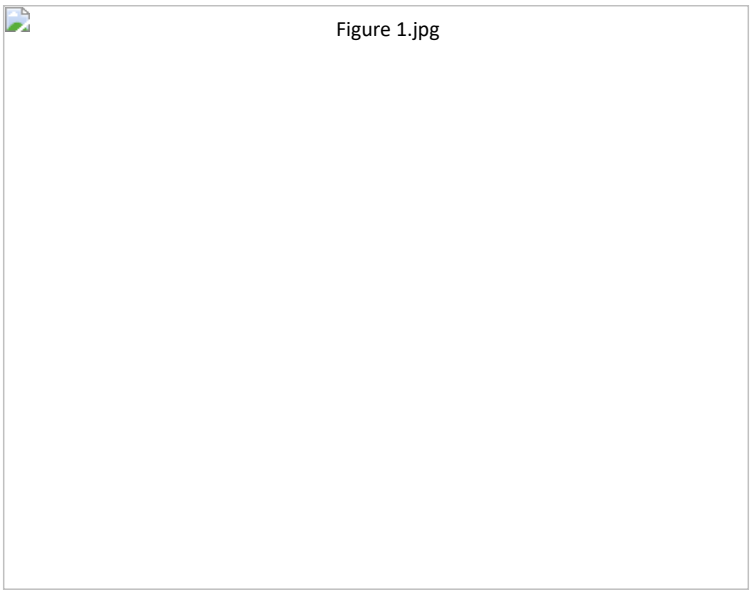
This article has practical and pragmatic objectives which are founded on the authors' own experience in the information and knowledge management fields, and on knowledge management theory. Specifically its three objectives are to:

- Devise a practical drawing-board style knowledge model which, although it can be used in an evaluative as well as a tracking mode, is usable by a wide variety of actors in the "heat and dust" of real world situations more than in the calm of post-hoc reflection;
- Give the model a novel distinction between prior and dynamic knowledge stocks, partly founded on an original development of selected key papers in the literature;
- Show application of the model retrospectively to three case studies.

2. Theoretical And Practical Foundations: Knowledge And Events

In the two decades or so that Knowledge Management has been so called, a panoply of writings on the subject has developed. Authors such as Davenport (1998), Malhotra (1998), Nonaka and Takeuchi (1995), Skyrme & Avidon (1997), Sveiby (2001), Awad & Ghaziri (2004), Tiwana (2000), Stewart (1999) etc have enriched the evolution of Knowledge Management thinking and methods. As will be seen in this article, however, we have found the work of Choo (2004, *q.v.*) and McKenzie & van Winkelen (2004*, q.v.)* to be especially potent for our purposes. The familiar sequence data-information-knowledge-action found in the literature is manifestly insufficient to reveal the realities of business life - one good reason being that the world is not populated with data. C.W.Choo articulates this truth in two models. The first of these (Choo, 2004, p.132) begins with organisational or environmental signals that something has happened which deserves attention and possible recording as data. This is shown in Figure 1 below.

Figure 1: A Signal-Sensitive Knowledge Model (After Choo, 2004)



Later in the same book (p.250), Choo proposes Sense Making, Knowledge Creating and Decision Making as three stages which would follow the signals. We found this convincing. It is crucial to remain aware, however, that the signals Choo saw as the start points of the sense-making process may occur either within the organisation or beyond it. Furthermore, we contend that events, not signals, are the real starting points; that change of state is introduced initially through the signal emitted by an event occurring within some enterprise domain or in its environment. It would seem from the literature that the concept of *event* within the domain of enterprise is little recognised despite its significance and potential impact. Perhaps this so because "action is always just a tiny bit ahead of cognition, meaning that we act ourselves into belated understanding" (Weick et al, 2005, pp. 419). So managers may not feel encouraged to follow the contours of the real life landscape of human interaction, often preferring to stay on the better understood and safer "mule-tracks" (Keen, 1981) of formal information systems. What kinds of events give rise to what kinds of information signal? This is dependent on the various kinds of event that may occur. In section 2.1 we identify three different wide types of event: this is not a full taxonomy of events, its purpose is to highlight key distinctions that are important to the analysis carried out later in the article.

2.1. Selected Types Of Event

2.1.1. Tipping Events And Trigger Events

In human or scientific situations, events representing tipping points are those at which momentum for change becomes unstoppable. Gladwell (2000) defines this effect as "ideas and products and messages and behaviours which spread like viruses do". Two recognizable but hard-to-model tipping points would be: the point at which a street disturbance turns irrecoverably into a riot; or that at which the melting of polar ice-caps can no longer be reversed. A similar concept, trigger events, "can come from inside the organisation or from the industry at large. They affect your prospect's business, they arouse their interest and cause them to consider taking action." (Inflexion-point, 2009). Trigger events "precipitate new behaviours and new thoughts by managers and others as they try to understand what is happening" (Isabella, 1992, pp. 59).

2.1.2. Described Events And Experienced Events

The significance of events can be influenced by a number of factors. These factors will impact on how systems, and particularly managers, respond to events that may be triggers for actions. Additionally, how the event is presented will have an influence on how it is weighted (Barkan et al, 1998; Erev, 1998). When the events are described rather than experienced there appears to be less weight given to risk (Weber et al, 2004, and especially Hertwig et al, 2004). Although there are critics of the distinction between described and experienced events (Fox & Hadar, 2006) this line of research indicates the complexity of assessing the ways in which events will impact on systems.

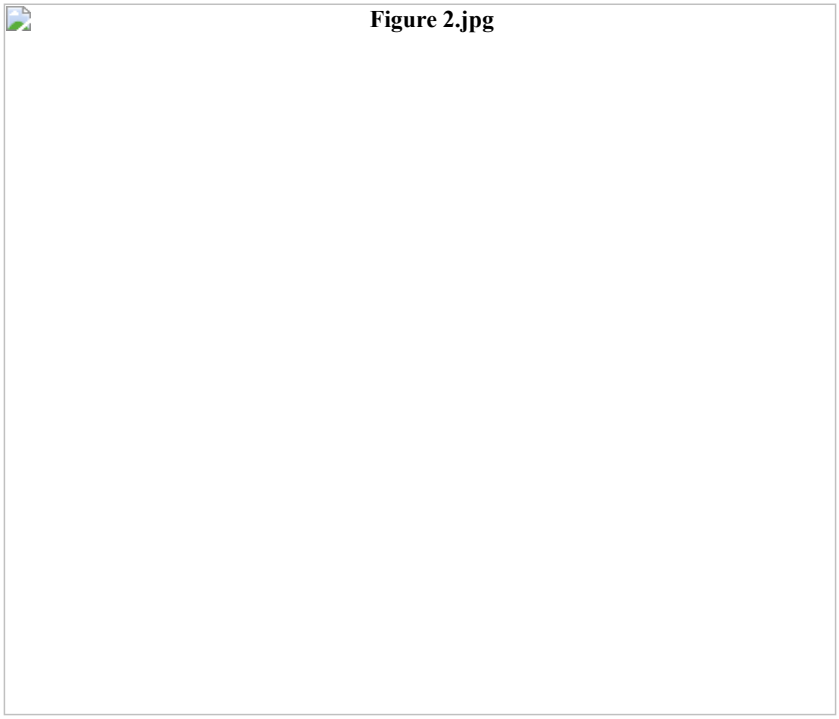
2.1.3. Critical Incidents

Critical Incident Analysis (learning from and through critical incidents) is an established technique in nursing and in social work practice – see, for instance, Crisp et al (2005), Jasper (1989) – in which the integration of experience with reflection is a keynote, and in which practitioners are challenged to consider their own ability to observe. It is notable, however, that the technique first became well known in 1954 (Flanagan, 1954) for its use in training United

States Army Air Force personnel to focus attention on those aspects of behaviour which are believed crucial in formulating a functional description of activities and clear instructions to the observers. The concept of Critical Incidents is significant to section 3 and to the rest of the article.

To underpin the construction of a new Knowledge Funnel, we create in Figure 2 a composite visualisation of the analyses in section 2.

Figure 2: An Event-Sensitive Knowledge Model (Source: The Authors, Adapting Choo)



3. Toward A Knowledge Funnel

It could understandably, if unkindly, be claimed that the models touched in Section 2 occupy a pleasingly comfortable, rational academic space. The purpose of this article, however, is to devise a model which is usable by participants in untidy situations, and to illustrate in outline how it could have been used in three situations: two of commercial stress – decisions by the Coca Cola company – and one of life-threatening stress – the 7/7/2005 London suicide bombings, which were publicly reported by Her Majesty's Coroner in 2011.

For our model we propose in Figure 3 a 'Knowledge Funnel' template, adapting and developing a conceptual framework 'Funnel' from McKenzie and van Winkelen (2004: p.35). To this we apply Choo's three Knowledge Stages (Sense Making, Knowledge Creating, Decision Making) to define the state of the knowledge actors in interaction with their environment. Reinforced by Bessant et al (2009), the Sense Making and resultant Decision Making stages can be any combination of Search strategies relevant in the environment. Validation can occur if a deferential culture or /filter exists – personalities can depend on the organisation and specialisations (Leonard-Barton's T – Leonard-Barton, 1992).

In addition to Choo's stages, we include an 'Action' stage based on the work of Freeman and Soete (1997) definition of Innovation (i.e. first successful application of knowledge), leading to an *a posteriori* knowledge stage – 'Absorbing' (similar to Nonaka's Internalisation stage in his SECI model). The idea of knowledge stocks, discussed by Senge (1990), added to Cohen and Levinthal's 'Absorptive Capacity' concept, provides the iteration stage in which residual learning is held in an individual's or in the collective memory. Further iterations through the model by actors therefore adapt the inputs of new or familiar environments and would utilise retained knowledge at all stages (Kolb's Learning Cycle – Kolb, 1984).

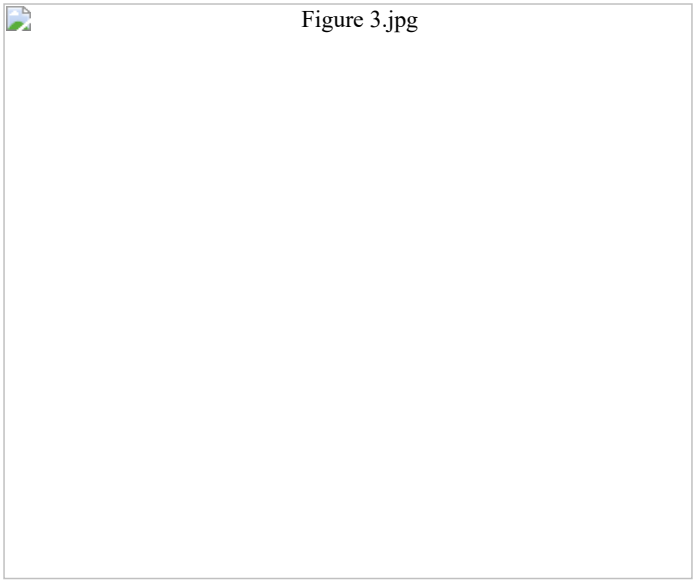
In the Knowledge Funnel model we identify the following eight stages:

1) Trigger Events: can be cumulative
2) Resultant Signals
3) Search: for data/information
4) Validation: of the data, addition of context
5) Sense Making: cognition and knowledge creation, calling upon the Absorptive Capacity of the organisation's people and systems
6) Decision Making: using two stocks of knowledge: Prior Knowledge existing and being cumulated in the organisation over time; and Dynamic Knowledge being created and modified during the Action
7) Action: as a result of the decision making
8) Evaluation: incorporating revalidation of the data/context in stage 4

Each of the stages takes place in the context of real interpersonal interaction in the real world, giving five key questions to be answered by the organisation's decision makers:

- How do we Search – do we make Sense of Signals?
- Do we have Absorptive Capacity (and is it easily retrieved)?
- How do we Validate – Socially, Statistically, Autocratic or SME Opinion?
- How do we approach Decision Making? Who does it? Relying on prior knowledge?
- What Action Plans do we formulate and is Evaluation built in?

Figure 3: Knowledge Funnel Template



3. Case Studies

We now use two short case studies on a well-known company (Coca-Cola) to illustrate how two of its product innovation efforts can be understood with the help of the Funnel tool, and a third case (the 7th July 2005 suicide bombings in London) to suggest how the Funnel might be applied in time-limited situations.

3.1. Case Study 1: New Coke 1984 (NC, 1984)

After nearly a century of public sale and consumption, expanding from America to reach a global market, the Coca-Cola soft drink had become a staple household brand of carbonated beverage and a by-word for the now defunct word "soda". The iconography associated with the Coca-Cola brand was easily recognisable and was used in various retail locations throughout the world. However, in the mid-1970s, the long-time rival company Pepsi-Cola began the Pepsi Challenge. The premise of the Challenge was simple: consumers would be offered two brands of Cola to try – X and Y. Having tasted each, they would be asked which they preferred, at which point the brands would be revealed to be Pepsi and Coca-Cola. Many consumers were shocked to find that they had selected Pepsi rather than the better known Coca-Cola brand. Comments such as: "I really didn't know there was a difference" and "I didn't think these things were true" were broadcast in television advertisements. The advertising campaign seemed to resonate with consumers – Pepsi began to outsell Coca-Cola through direct supermarket sales and Coca-Cola executives became increasingly worried. So, in 1983, Project Kansas was launched by Coca Cola to develop a solution to the problem – a new formula created to suit the new shift in consumer tastes. Trials, testing and sampling were extensive – the estimated cost was $4 million over two years (Dubow & Childs, 1998) - and included interviews with almost 200,000 consumers. The new formula was preferred to "old" Coke by 53% to 47%. Convinced that this result was significant, the Coca-Cola company redesigned the can and packaging in preparation for the new product to be launched. (It was reported that 96% of Americans were aware of the New Coke launch - more than knew the name of the American President). Sales rose as consumers tried the New Coke product, but some public reactions were fiercely against it. Mass protests began on city streets, pickets were seen pouring New Coke down street drains. The Coca-Cola company began to receive angry phone calls, letters and, tauntingly, even funeral wreaths at the company headquarters. It was reported in the press that, while on holiday in Monaco, some senior Coca-Cola executives decided to reverse the decision of New Coke after seeing an old Coca-Cola bottle in a small restaurant, the executives later commenting, "We realised what we were doing; we were not just selling sugar water, we were selling tradition." When the executives returned to North America, the old Coca-Cola formula and packaging were reinstated, adding the word "Classic" to the label to emphasise the difference. After reinstatement, Classic Coca-Cola began to see large sales (greater than before the launch of New Coke) and market share regained to more than 50%, continuing to the present time.

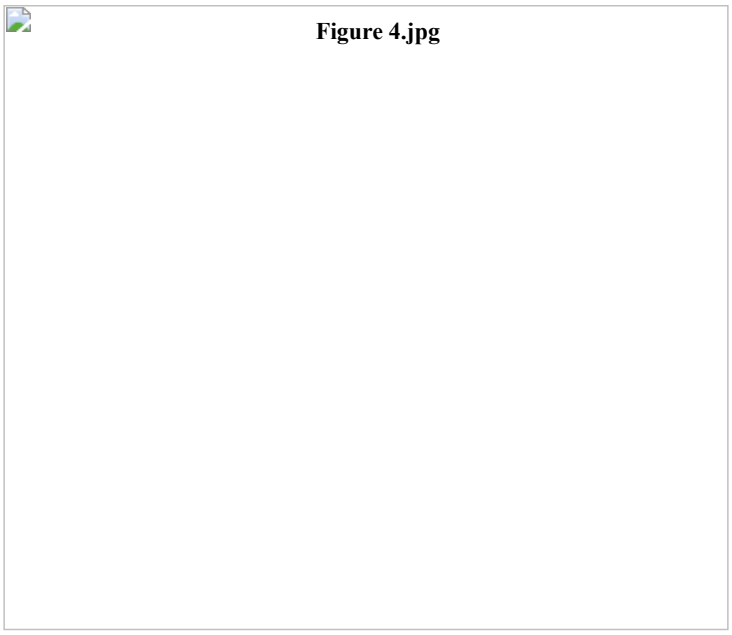
3.1.1. Case Study 1 Analysed With The Funnel

The situation in which The Coca Cola Company found itself was based upon the reports and sales data coming from a supposed real world interaction, particularly the advertisements showing Pepsi winning 'Taste Tests'. Thomas Oliver (1987) demonstrated, however, that Pepsi had, in reality, steadily been gaining market share since the 1950s.

Sense Making in Project Kansas has been seen by Schindler (1992) as flawed (despite the $4m cost of the Project) in having a directed and leading question bias called the 'wrong-question' explanation: rather than asking "Which flavour do you like better?" a more relevant and real world question to ask would have been "How would you feel if we discarded Coca-Cola's current taste and replaced it with this new taste?" Most telling was that the final results of Project Kansas taste tests of New Coke vs Pepsi Cola were 55% vs. 45% of 200,000 participants (Dubow & Childs, 1998), indicating that public preference would still have been for the most part fairly equal. Decision Making was flawed in several ways: the CEO Robert Goyzueta had had previous success in 1982 with the replacement of the diet drink 'Tab' by a new variant 'Diet Coke'; the Coca-Cola company had also been changing the secret formula of the main Coke drink steadily over some decades in the 1960s to reduce the level of caffeine in the drink down to a third of its original content. However, there still remains a disconnect: the decision to replace their core "cash cow" product with an unknown variant, all the while being perceived as under threat from Pepsi. Finally, initial reactions to the product and to growing user groups were largely ignored in what some may call an arrogant fashion – when asked if New Coke "Will be a success?" at a press conference, the response was "This IS a success - the consumer made it, we didn't". Later reports of a public backlash and lethargic initial sales would also be met with comments such as 'Wait until New Coke sinks in' and 'This is just part of the process', suggesting an over reliance on the data from Project Kansas and not enough focus on real world indicators.

Figure 4 illustrates how the key elements of the New Coke case can be brought together in our Funnel model. Of course the entries are not exhaustive, but enough are given to show how the Funnel "drawing board" can be used to reveal key features of a complex decision making situation.

Figure 4: New Coke



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3.2. Case Study 2: Coke Zero 2005.

Following the fiasco of New Coke, in 2004 the Coca Cola Company began the launch of Coke Zero in individual markets, beginning with the USA.

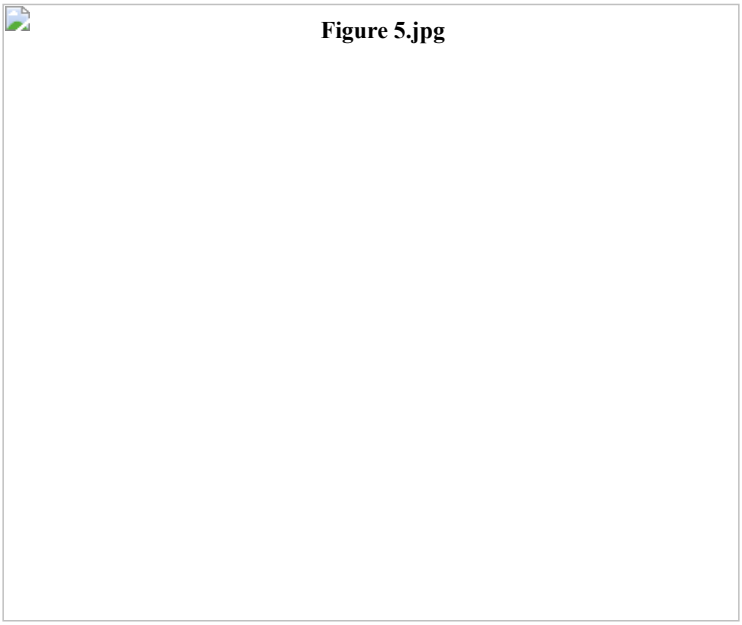
Development of the product was rather more directed than previously – focussing on the leading supermarket retailers in order to develop a new product and strategy aimed at a particular demographic segment. As the International Herald Tribune reported: “Last year, Coca-Cola was preparing to introduce a new diet soda, to be called Coke Zero. But executives at Wal-Mart Stores, the largest U.S. retailer, thought they had a better idea”. They wanted a drink that contained Splenda, an artificial sweetener that had been selling extremely well at Wal-Mart, especially to women. Coke Zero was sweetened with aspartame,

an older, low-calorie sweetener. So Coke executives went back to headquarters and in May introduced a new drink called “Diet Coke with Splenda”. The company used the name Coke Zero on another new drink a month later. Coke's new game plan underscores Wal-Mart's growing power in the grocery business. With nearly 2,000 supercenters in the United States and plans for 280 more this year, Wal-Mart is the country's largest food retailer, according to Retail Forward, a research firm in Columbus, Ohio. “Figures from food and beverage companies indicate that Wal-Mart represents 14 percent to 18 percent of all food and beverage sales.” The launch was subdued by comparison to the fanfare of New Coke, with each market delivering a specific regional campaign and regional celebrity endorsements.

3.2.1. Case Study 2 Analysed With The Funnel

Now at the end of 2011, the product Coke Zero has only recently been released in the last of all the Global markets in which the Coca-Cola Company operates, which limits the opportunity to evaluate the launch. However, the funnel template gives us a tool to deconstruct the process, revealing significant differences from the New Coke case. The first notable difference is the lack of direct threat triggered from the Real World environment, in contrast to the growing (yet unfounded) perception by the company of encroachment by its main rival. In the Coke Zero situation, early development of a new product stemmed from reports and sales data from the U.S Walmart stores, showing a clear trend of male shoppers buying Diet Coke, a product which continues to be marketed at female consumers. Small trials were conducted using focus groups to observe the behaviour – research pointed towards a younger male demographic that was health conscious and concerned with the content of sugar in soft drinks. It could have been predicted that the Coca-Cola Company, having previously had success with development of a female user market-segmented drink (Diet Coke), and failure with a core product replacement (New Coke), would develop a new product in the core portfolio. Added to the existing competency of production and global marketing programs, the Coca-Cola Company also continued to develop their new product with sales trials at certain Walmart stores in the US. The result was Coke Zero, subsequently dubbed ‘Bloke Coke’ in the UK because of the marketing specifically directed at young males; the overall strategy being very reminiscent of a more mature application of between 3rd and 5th Generation Rothwell (1994) innovation process. Now in December 2011, global sales have slowly begun to increase, however it seems that the Coca-Cola Company is being patient and listening to the market intently for the time being. The situation can be visualised using the knowledge funnel, as shown by Figure 5.

Figure 5: Zero Coke



3.3. Case Study 3: 7th July 2005 Bombings In London.

In this third case, widely known as 7/7, four suicide bombers killed 52 people, and injured more than 700, in a coordinated attack on three London underground (Tube) trains and a bus on 7th July 2005. Three bombs were exploded circa 08.50 on tube trains outside Liverpool Street and Edgware Road stations, and another on a tube train travelling between Kings Cross and Russell Square. An hour later a bomb was set off on a bus at Tavistock Place near Russell Square. Three of the bombers (Hasib Hussain, Mohammad Sadique Khan and Shehzad Tanweer) travelled from their homes in and close to Leeds – a city 175 miles north of London – in one or two hired cars to Luton about 30 miles north of London where they met the fourth bomber Germaine Lindsay. All four then caught the same train to Kings Cross terminus in London, where they went off in their different directions: Hussain to Tavistock Place by bus, Khan to Edware Road by tube train, Tamweer to Liverpool Street by tube train, Lindsay to Russell Square by tube train. Each man was wearing a large rucksack full of explosives.

On the day, initial reports from the transport companies announced the damage as the result of a "power surge". Subsequently some CCTV footage was released but was inconclusive as to identities. Not surprisingly, the incidents were a fertile breeding ground for conflicting information, conspiracy theories and disinformation (internal police documents are not designed for publication). The official Home Office narrative was later challenged, for instance by "The July 7th Truth Campaign" (J7) in 2007 and various blogs etc, but an official inquiry ensued and we turn to transcripts of the Coroner's Inquests into the London Bombings of 7 July 2005 (HM Coroner, 2011), as the source from which we can explore how use of the Knowledge Funnel could have helped to make sense of the situation as it unfolded, and still could. For triangulation we have also consulted the plethora of information on the J7 website, notably its timeline section.

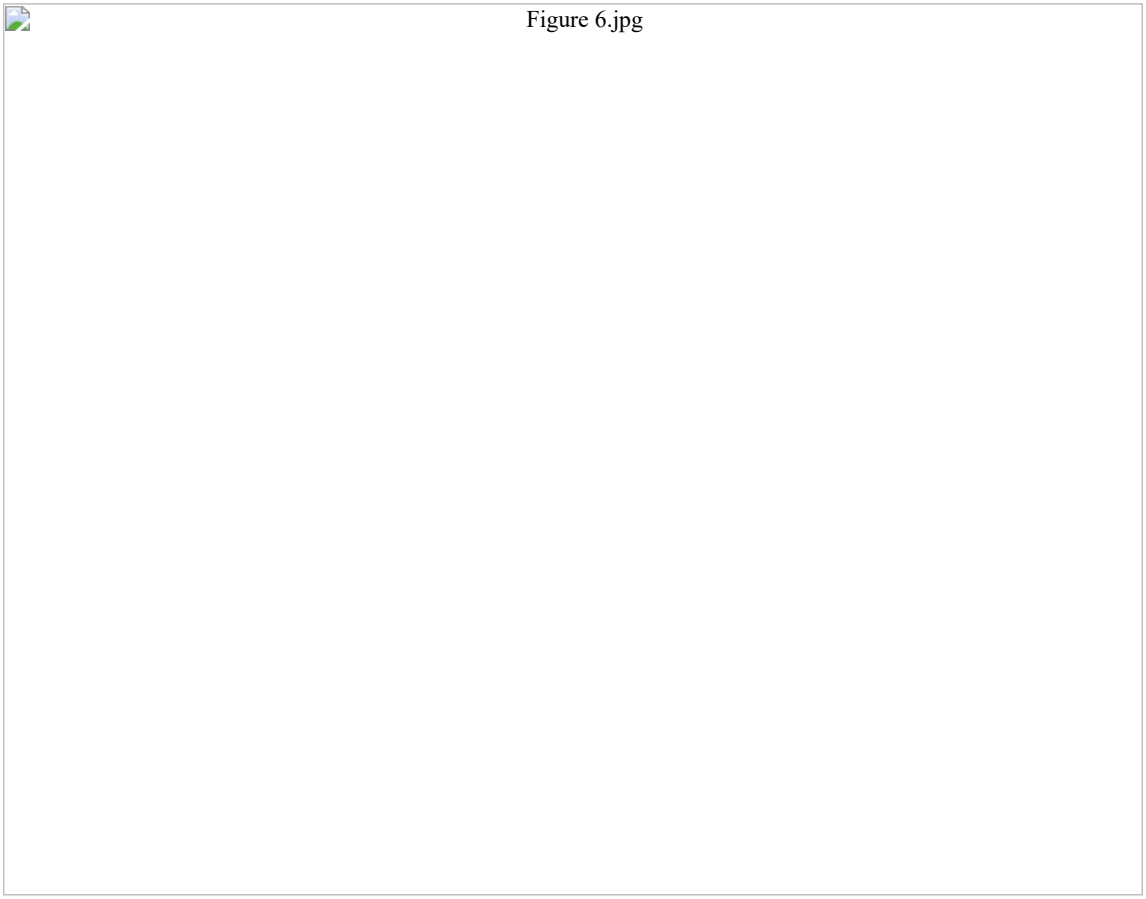
3.3.1. Case Study 3 Analysed With The Funnel

We identified five actor groups (police, transport staff, emergency services, government, media) and noted the time points for each at which they appear to have been concerned with information search, sense making, real world interaction, decision making, or action. It must be observed straight away that inter-group communication issues were a major feature of the case – we have treated those as part of the Real World Interaction cloud by each of the actor groups, albeit as impediments to accurate interaction.

In figure 6, as a further example of the tool, we show indications of how the Funnel might have been seen by transport staff, specifically staff of the Network Control Centre. Numbers in brackets are paragraph numbers from the Coroner's Inquests report (H.M Coroner, 2011). It became abundantly clear from our careful examination of the voluminous report that problems of detecting, understanding and reacting to events on the day were not primarily deficiencies of information technology, real as those deficiencies were later shown to be; rather they were a matter of the limited capacity of disparate individuals and units to absorb the many, often conflicting, messages flowing around the sites of the atrocity.

Of course we would not claim that use of the Knowledge Funnel would have been a "magic bullet" that would have revealed all, but we do suggest that its availability as a compact and-easy to handle sketch pad could have led to improved focus on key issues.

Figure 6: 7th July 2005 Bombings In London



4. Discussion And Conclusions

In this article the tool has been presented in retrospective situation analysis mode. We envisage its use for real-time monitoring of dynamic situations, for which use there is no discernible limitation on the kind of organisation to which it is suited. One might take a leaf out of the Pavitt playbook. Pavitt's taxonomy (Pavitt, 1984) of innovating firms has become one of the classics in its field. Although the Pavitt taxonomy, and those produced by others such as Malerba (2005), shows pronounced variation in innovative performance from sector to sector and between firms, Pavitt and Malerba both make the observation that innovation can come from key personnel, learning by doing, interacting (in the real world) etc. Such an observation is consistent with the detail and spirit of our Knowledge Funnel models herein reported. The present simple analysis is merely for the purpose of highlighting points of concern in a robust way.

Indicative conclusions in relation to the article's objectives are:

- Devise a practical drawing-board style knowledge model… It can be seen that his "delivered tool" objective was met, but on its own that would not have been anything special. The value of the tool as presented in this article emerges in association with the next conclusion;

- Give the model a novel distinction between prior and dynamic knowledge stocks, partly founded on an original development of selected key papers in the literature…We are cautiously confident that this enhancement of the Funnel is at least partly novel and is well founded;

- Show application of the model retrospectively to three case studies…We chose the three cases to represent two from business and one time-sensitive and urgent example from public life. We do not in any way claim that the tool has been applied with great thoroughness, the purpose within the article being strictly illustrative.

The authors intend to merge the toolset reported in this article with a cognate stream of research into Knowledge Timeline Analysis in military and commercial decision making.

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