Pictures of Knowledge Management, Developing a Method for Analysing Knowledge Metaphors in Visuals

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Abstract: Knowledge management (KM) is difficult to pin down. It means different things in different organisations. The deliberate use of metaphors has been used to communicate what KM is about. This metaphorical communication can be even more enriched using visual as well as language mechanisms: "a picture paints a thousand words" suggests we can capture more resonances of a complex subject like KM through visuals than through a description alone. In addition, visuals are perceived to transcend the limitations of language, which can be an obstacle to communication. Yet, no method currently exists that we can use to identify KM metaphors used in visuals. This paper describes our search for a method to analyse metaphors used in visuals about knowledge management. Our objective was threefold: 1) identifying new metaphors for KM in visuals that can enrich KM theorizing, 2) developing a way to identify which visuals are the most powerful in communicating KM theory, and 3) improving the use of visuals as a way of assessing students studying KM. We found that analysing metaphors used in KM visuals is possible using a method that focuses on the dominant metaphors in a visual.

Keywords: knowledge management, intellectual capital, visuals, metaphor, analysis

1. Introduction

Knowledge management (KM) is a complex topic involving people, relationships, systems and processes, language and knowledge, all of which in themselves are complex subjects. Various schools of thought have been proposed to describe the different ways of looking at knowledge management (Andriessen 2006). The meaning of KM changes for every organisation because each requires different things from it. Knowledge managers need to adapt the strategy to subtleties in the context (McKenzie & Van Winkelen 2004). Snowden (1999) has suggested that metaphors are powerful ways to communicate KM in context without the need to resort to complex formal definitions that struggle to capture the interdependencies and subtleties of the subject.

This paper is about the explicit use of metaphor as a means of thinking about and communicating knowledge management ideas. The potential of metaphors for communicating and stimulating creativity may be further enhanced when combined with visuals. It has been said that "a picture paints a thousand words" so we may be able to capture more resonances of a complex subject like KM through visuals than through description alone. In addition, visuals are perceived to transcend the limitations of language, which can be an obstacle to communication. Pictures based on metaphors for knowledge management may be very rich communication and thinking devices for business and education. This visual metaphor study is part of understanding how to craft and interpret an effective visual representation of KM. The potential of visual metaphors is that inherent polarities and contrariness are processed whole by the right brain, rather than the left (where words are processed linearly). Split brain studies suggest that the right brain processes complex patterns holistically. As a result, visual metaphors for knowledge management might be helpful in exploring and communicating the complex interdependencies of knowledge management. For us, the use of visual metaphors for knowledge and knowledge management is attractive in three different contexts:

- The use of metaphor by KM theorists who use them as 'thinking devices' to construct KM theories. Andriessen (2006) has identified that metaphors are a very important ingredient in many KM theories.
- KM practitioners who want to dialogue with people in organizations about KM and its application. For example, Moser (2004) has organised workshops on KM in which participants had to draw different metaphors for knowledge management. Three metaphors were identified: the metaphor

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of a library, the metaphor of the contested treasure, and the metaphor of a canalisation system. The metaphors helped to reveal the differing perspectives of the participants on KM and bring out deeper, shared understanding.

- The use of metaphor in KM education. An example can be found at Henley Business School in the UK. Over the past eight years, a data set of so called poster assignments where students are deliberately asked to communicate through visuals has been created. One small element of the final assessment of their KM studies, asks MBA students to prepare a poster that captures and communicates the essence of knowledge management in their organization to someone who knows nothing about this subject. The poster consists of a combination of visuals and text. The intention is that constructing the poster will stimulate the student to use both sides of the brain in making sense of the topic and applying it to his or her own situation.

The power of visual metaphor is that it can create multiple interpretations whilst providing a common and natural focal point for discussions around similarities and differences in interpretation. Visual metaphors are equivocal and when shared, this multiplicity of meaning might lead to alternative ideas and creative insight.

However, if a picture says more than a thousand words, what is it trying to tell us? Answering this question is useful in all three contexts described above. For KM research it is relevant be able to capture in language some of the additional meaning embedded in visual metaphors for knowledge management. According to Andriessen (2006) the KM field needs new metaphors to unleash itself from industrial thinking. For KM practice, analysing metaphors in visuals is helpful because it can help us identify which visuals are powerful in communicating KM ideas and creating a shared understanding of how KM can be applied in a particular context. Having access to a set of proven rich pictures on KM could help KM practitioners in getting their message across in their organizations. For KM education the analysis of visual metaphors may help improve the process of assessing students studying KM.

To achieve these objectives, we need a method for analysing knowledge metaphors in visuals. Such a method does not yet exist. In this paper we try to develop a method that can be used to systematically analyse visual metaphors for knowledge and knowledge management. The method is tested against visuals from the Henley corpus of KM posters. The aim is to come up with a practical method that can be used in the analysis of visual elements in knowledge management in the three contexts described above. The paper is structured as follows. First, we look at literature to identify methods and methodologies for analysing visuals. Second, we describe an initial design of a method, which we tested with one of the posters. The test was not successful so we describe a redesign of the method which we tested on an additional poster. This proved to be more promising. We end with conclusions regarding the usefulness of the method and propose an agenda for further research.

2. Literature review on methods for analysing visual metaphors

Metaphor research is an important strand in applied linguistic research (Cameron & Low 1999). One of the major developments in this kind of research is the analysis of metaphorical language in real discourse. Approaches have been developed to identify and classify metaphors used in texts (Andriessen & Gubbins forthcoming;Schmitt 2005;Steen 2007). Textual analysis has been used to identify metaphors used in knowledge management. Using a limited sample of three influential articles on KM, Andriessen (2006) identified 22 different metaphors for knowledge, including “knowledge as stuff, “knowledge as thoughts and feelings”, and “knowledge as an organism”. This textual analysis followed a two step approach. This approach has subsequently also been used to analyse metaphors used in texts on social capital (Andriessen and Gubbins, forthcoming).

The first step in the analysis of metaphoric language is identifying when a word or phrase is being used metaphorically, which means if (a) it can be understood beyond the literal meaning in the context; (b) the literal meaning stems from a source domain of sensory or cultural experience; and (c) this literal meaning is transferred to the abstract target area (Schmitt 2005). For example, in the phrase “to store knowledge”, the literal meaning of verb “to store” is to physically put something into safekeeping. This stems from an area of physical experience. However, this meaning is transferred to the abstract target area of knowledge. The Pragglejaz group (2007) has developed a similar approach that has the advantage that it offers a set of criteria by which analysts may identify a word’s literal meaning (which they prefer to call “basic meaning”).

The second step in the analysis of metaphoric language is the identification of the prominent conceptual metaphor from which the metaphorical use of a word or phrase arises. In the case of "to store knowledge", we immediately understand the meaning of the metaphorical phrase because we are familiar with the conceptual metaphor of "knowledge as stuff" from which the metaphorical use of the verb "to store" arises. Sometimes it is difficult to identify the metaphorical concept of an individual word. However, by looking at the other individual metaphors surrounding the word, in most cases the source domain becomes clear.

Our aim was to discover and analyse metaphors in visuals. Since visuals can come in any shape and form and do not constitute a symbolic system of communication like language, we are confronted with various challenges. These challenges are similar to those faced by Cienki and Muller (2008) when they analysed the metaphorical content of gestures. First, it entails the interpretation of a visual, and of the concept it might represent, in terms of a word or phrase. As with gestures, the relation between form and meaning is not conventionalised. Second, with pictures it is even more difficult than in the case of written text to label the proposed mapping from source to target domain, in the formula "target domain as source domain" as in the above example of "knowledge as stuff". Much more interpretation of the meaning of the visual is involved.

In the literature, we found little reference to concrete methods for analysing visuals and their metaphorical content. Schachtner (2002) has studied metaphors in images in his/her empirical study of the microstructures of medical practice. Through a combination of both qualitative interviews and drawings of thirty practicing doctors of medicine she shed light on the use of three metaphorical concepts on illness, disease and health: illness as a cause-and-effect chain that differs from the norm, illness as failed life-management, health as de-velopment. She found that metaphors are important structuring elements for the development of the diagnosis and treatment. Unfortunately Schachtner does not describe her method for analysing the drawings.

Guillemin (2004) uses a similar approach in 'Understanding Illness: Using Drawings as a Research Method'. She studied drawings by patients in a research on menopause and heart disease. She argues that drawings offer a rich and insightful research method to explore how people make sense of their world. 'The use of an integrated approach that involves the use of both visual and word-based research methods offers a way of exploring both the multiplicity and complexity that is the base of much social research interested in human experience' (Guillemin 2004, p. 273). Like Schachtner, Guillemin used drawings as a research tool in addition to interviews. The interviews were crucial in the interpretation of the drawings. She stresses that interpretation of the drawings is not a value free activity. She quotes Rose (2001) who states that 'visual imagery is never innocent; it is always constructed through various practices, technologies and knowledges' (p. 32). The power of many forms of art to generate novel perspectives is rooted in this use of ambiguous and often unnamed imagery, so that the viewer can extract meaning unconstrained by words.

From this limited literature research we conclude that there exists no ready available method for analysing metaphors in visuals that suits our purpose. The literature does indicate that a combination of visual and text-based analysis is needed to determine the intended meaning of visuals.

3. Initial design of a method for analysing metaphors in visuals

We therefore decided to develop our own method. Our initial design was based on the method for analysing metaphors in texts as described by Andriessen and Gubbins (Andriessen & Gubbins forthcoming). We paraphrased this method to make it suitable for visuals (see table 1):

The first difficulty emerges at step 3. In a text we can highlight all text related to the target area. However, a visual often contains several elements that first need to be identified. To tackle this problem we developed three approaches: firstly look for parts of the visual that are separate from other parts, secondly look at whether the visual is built up from smaller elements, finally check whether the elements contain even smaller components.

Table 1: Paraphrasing Andriessen and Gubbins (forthcoming) to create a method for analysing metaphors in visuals

	Analysis of text	Analysis of visuals
1.	Identify the target area for metaphor analysis	Identify the target area for metaphor analysis
2.	Create sample of relevant texts	Create sample of relevant visuals
3.	Highlight all phrases related to the target area	Identify visual elements and components, checking: for visual elements not connected to other visuals whether visual is built up from smaller elements whether an element contains smaller components
4.	Identify metaphors Is the text used metaphorically? What is the source domain?	Identify metaphors Is the visual element used metaphorically? Is the visual element related to the target? What is the source domain?
5.	Cluster collective metaphorical concepts	Synthesise collective metaphorical concepts
6.	Count the number of phrases associated with each metaphorical concept	Count the number of visual elements associated with each metaphorical concept

Once the separate elements in the visual are identified, we can start identifying metaphors by looking at each element individually and asking ourselves: Is the visual element used metaphorically? Is the visual element related to the target? And, what is the source domain? The result should be a list of visual elements that are used metaphorically, and the source domain on which they are based. In step 5 we wanted to group those source domains to identify the collective metaphorical concepts. Finally we intended to analyse the importance of each metaphorical concept by to count the number of visual elements that refer to a particular concept. We tested this initial design against one poster from the Henley corpus (figure 1).

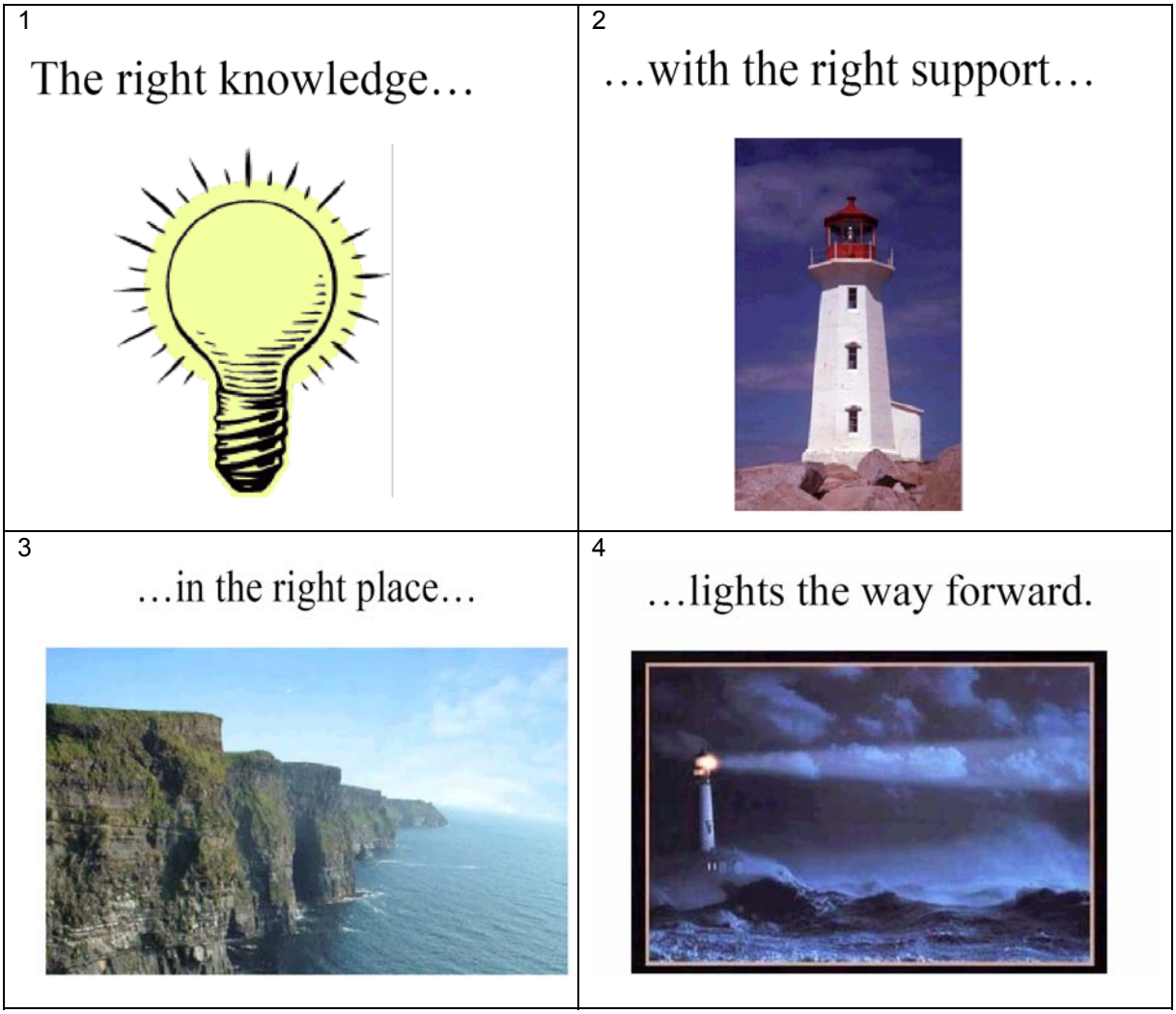

Figure 1: Poster that was used to test the initial design poster created by Elizabeth Flux

The poster was accompanied by a supporting text. We used the method by Andriessen and Gubbins (Andriessen & Gubbins forthcoming) to analyse the metaphors in the text which proved straightforward. However, analysing the four visuals proved to be much more difficult. The first problem we encountered was that it is not clear what constitutes a visual element. The first picture in the poster portrays a light bulb. This can be seen as one visual element, however it consists of a glass bulb and a screw and small stripes indicating light. It can also be seen as a piece of technology. The fourth picture is even more complex as it contains a lighthouse, a light beam, clouds, big waves, raindrops etc. The analytical procedure we proposed to use leads to a large amount of detailed descriptions and we found ourselves somewhat lost in the abundance of visual details without any guidance as to what elements are really important. This leads to the second problem. By deconstructing the poster into visual elements and their components we created fragmentation that prevented us seeing the "wood for the trees". The overall meaning of the picture was lost by focussing on the elements that it contains. In addition, we forgot to include the text in the titles in the analysis, which in this case is crucial for the interpretation of the poster and for identifying the underlying metaphors. The third problem was how to decide whether the visual is being used as a metaphor and to what conceptual metaphor the visual is referring. With visuals, the relation between form and meaning is not conventionalised so it is difficult to derive the intended meaning of the author. The intended meaning can be different from the perceived meaning of the analyst. What was helpful was that the poster was accompanied by a text describing intended meaning of the visuals, however, our method did not make enough use of this information when analysing the visuals.

We concluded that this way of deconstructing the visuals in an attempt to 'let the metaphor emerge out of the visual' was not the best approach. Using this method, the analyst has no guidance to interpret the visual and derive its meaning, let alone to decide on the underlying metaphor. The analyst gets 'lost in interpretation' and fragmentation. Deconstruction is suited to left brain verbal activity, right brain interpretation of the communicative power of the whole requires a newly designed method that starts with a holistic interpretation based on a systematic metaphor analysis of the accompanying text of the poster and overview of the visuals.

4. Second version of the method

What was needed was a 'search light' the analyst can use to help identify relevant visual elements and interpret them. Our solution was to start the analysis by looking for one or more 'dominant' metaphors in the poster, both in the texts coming with the poster and in the visual elements of the poster. For example, a dominant metaphor in the poster in figure 1 is the *knowledge as light* metaphor, which is closely related to the *knowing as seeing* metaphor (Lakoff & Johnson 1999). The dominant metaphor can be found by analysing and counting the metaphors in the text and looking at the visuals with a 'bird-eye's view'. Using the *knowledge as light* metaphor as a guide helps us to identify the relevant visual elements in the poster (the light bulb as a whole and not its elements, the light house stabilised by the rocks etc.). With *knowledge as light* as dominant metaphor in figure 1, it is likely that we should interpret the second picture as a tower supporting the light. The physical support in the source domain of the light house is then used metaphorically in the target domain of organizations expressing the importance of supporting organizational knowledge through knowledge management. As we can see, using a dominant metaphor not only helps identifying which visual elements are important but also interpreting them.

Table 2: Second design of a method for analysing metaphors in visuals

1.	Identify the target area for metaphor analysis
2.	Create a sample of visuals
3.	Analyse the metaphors in the text: 3a. Highlight all phrases related to the target area in title of the poster, the visuals and the accompanying text. 3b. Is the phrase used metaphorically? 3c. What is the source domain?
4	Identify dominant metaphor(s) 4a. In the text by counting the number of phrases associated with each metaphorical concept 4b. In the visuals by looking with a birds-eye view at the visuals
5	Identify and describe visual elements that fit the dominant metaphor 5a. What elements in the visual are related to the source domain of the dominant metaphor? 5b. Is this somehow supported by the text?
6	Apply the visual elements in the source domain to the target domain and derive meaning 6a. What is the meaning of the visual element when applied to the target domain?

	6b. Is this somehow supported by the text?
	Repeat 5 & 6 for all dominant metaphors
7	Identify and describe visual elements not yet covered by the dominant metaphors: 7a. Decide whether visual elements are used metaphorically 7b. Identify metaphor used 7c. Derive meaning

This approach leads to a method for analyzing metaphors in visuals as described in table 2.

We tested this procedure against a second poster (figure 2). From analysis of the text and a bird-eye view on the visuals (step 3 & 4) it is clear that the dominant metaphor used in this poster is *knowledge as water*. We identified 20 visual elements in the poster that are related to the source domain of water (step 5). Step 6 resulted in a rich list of entailments of the water metaphor and related statements about knowledge (see table 3). Step 7 was not necessary as there were no visual elements in this poster that were not covered by the *knowledge as water* metaphor.

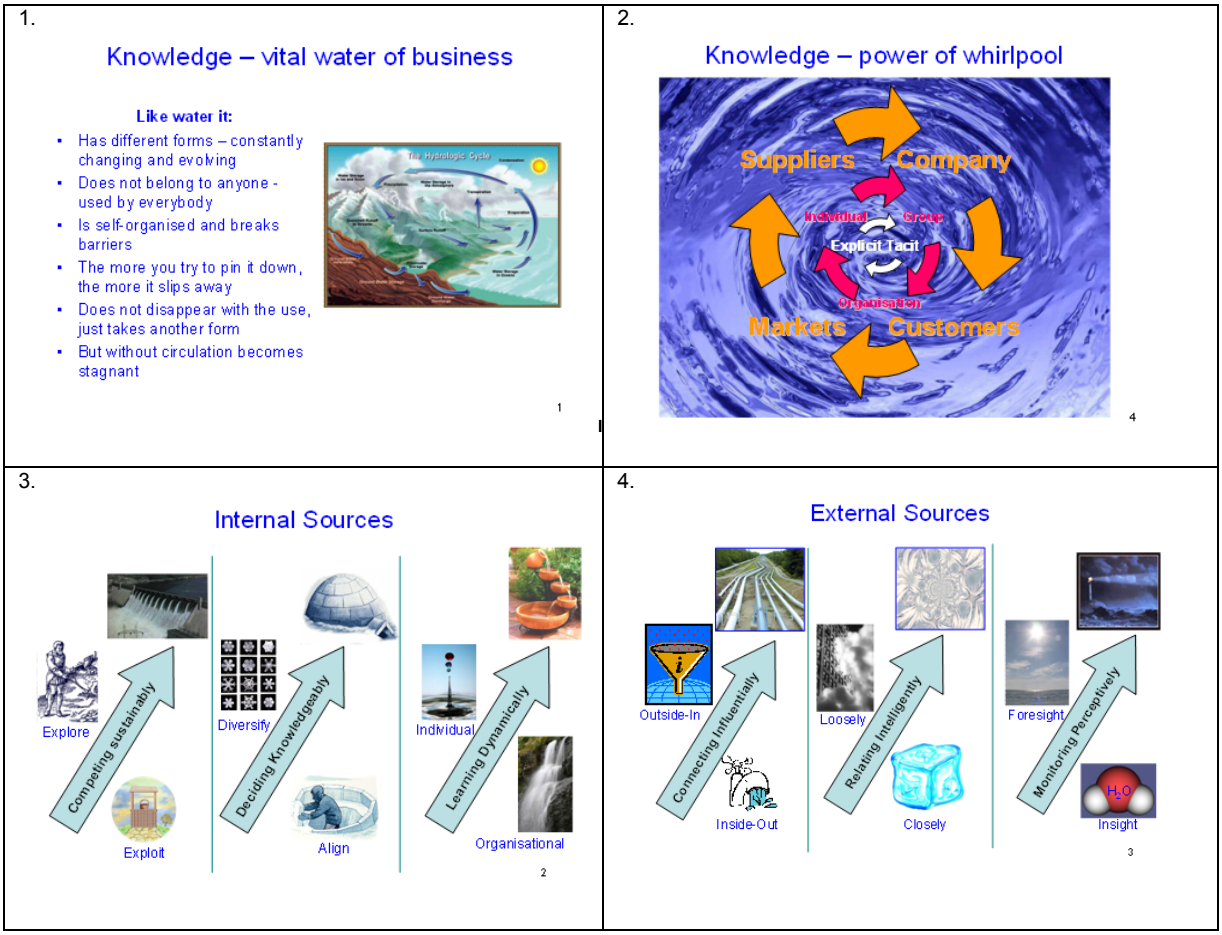

Figure 2: Poster #2 that was used to test the second design poster created by Sergej Todeush

As metaphors and visuals can mean different things to different people, the four authors of this paper decided to individually do the interpretation and compare the results of step 3 — analyse the metaphors in the text — and step 6 — interpreting the visuals by applying the visual elements in the source domain to the target domain. The purpose of this was to harvest as many interpretations as possible.

With respect to step 6 — interpreting the visuals by applying the visual elements in the source domain to the target domain — we found that a picture does indeed say more than a thousand words. In an attempt to describe what they saw, the analysts created rich descriptions of the metaphors. Each analyst in part sees something different. This divergence gives tremendous insight into the array of entailments of a particular metaphor. We did find that it was important that the analysts had in-depth knowledge of the KM field. When mapping a characteristic of water to knowledge, knowledge of the KM is used to interpret the meaning of the mapping. In the end we identified 30 entailments of the

knowledge as water metaphor. Unfortunately, in this paper we only have room for 10 entailments (see table 3.

5. Discussion and conclusions

Visual metaphors for knowledge and knowledge management can be very rich in meaning, as illustrated by the analysis of poster #2. This paper shows that trying to grasp some of that meaning in words can be done systematically by a group of analysts that have a background in knowledge management theory. Our method for analysing metaphors in visuals on KM produced a rich linguistic description of characteristics and implications of knowledge and KM based on the knowledge as water metaphor. We even found that when one looks at the textual analysis one sees more entailments, so the longer you look, the more you see from the imagery.

Table 3: Mappings from source to target domain in poster #2

Source domain: entailment of the water metaphor	Target domain: Meaning regarding knowledge, knowledge management, intellectual capital and learning
Water can transform in form: liquid, gas, ice	Knowledge can transform in form: tacit vs. explicit, individual vs. group vs. organisational.
This is a cyclical process in which water is refreshed	Knowledge conversion is a cyclical process from tacit to explicit to tacit in which it is refreshed.
Water does not belong to anyone and is used by everybody	Most knowledge does not belong to anyone and is used by everybody.
Water is self-organised and breaks barriers	Knowledge is self-organised and can flow through organizational barriers.
The more you try to pin down water, the more it slips away	Knowledge cannot be pinned down. The more you try to manage it, the less it is of use.
Water does not disappear with use, it just takes another form	Knowledge is not consumed with use.
Water can be accessed from a well. A well is a narrow conduit with a common route of access. It just requires a container to access it. The well is a deep storage for a precious resource.	Sometimes knowledge can be accessed from one source and exploited like a reserve.
New water sources can be discovered using for example like a divining rod that makes use of different resonances.	New sources of knowledge can be discovered using sensory as well as cognitive input. This is an art that requires the combination of different mental connections.
Water flows can be controlled using a dam	Knowledge flows can be managed. It can be stored up and released when needed.
Water flows can generate energy	Knowledge has potential energy (value). Knowledge management can help harnessing this energy through structural capital. Competitive power comes by releasing enough knowledge to the outside world.
One form is water is snow. Snow can be used to construct igloos	Knowledge is used to identify patterns in data. It helps in lining up the way people see things. Chunks of knowledge can selected and aligned by the user to make decisions. This requires expertise. Knowledge management is a human construction of raw materials into a form that is suited to the conditions in which it is to be used. It creates a structure that aligns different people constructively for better decision making – though it is a temporary alignment. Meaning may melt when structures are removed.
Snow crystals come in many forms and their form is dependent on the initial conditions in which they are formed	Knowledge is socially constructed and each person interprets and makes sense of the same events/experiences/information based on the context in which they absorb it.
Snowflakes can be compacted	Knowledge can be embedded into larger mental structures if the conditions are right.
Eskimos have many words for snow in its different conditions	We need to recognise different forms of knowledge.
A flow of water can create a waterfall	In organizations there is often an overwhelming flow of knowledge to manage. Organisations need knowledge to flow freely and strongly in order to spread learning.

Water can flow through a bedrock	The bedrock (foundational knowledge) can be eroded by new learning, which may or may not be a good thing but will change the course of the organisation
Water falls in droplets	Individuals contribute small amount of knowledge to the organisation. This knowledge is dropped into a calm mental pond and it creates ripples, which if fed can spread leading to individual learning. Like individual learning, little drops or insights can submerge in the pool and can be lost/wasted.
Water can also flow in a controlled way, for example in a water fountain or a cascade	Knowledge management is about deliberately creating a structure which channels and cascades little pools of individual learning into a larger waterfall of new learning which will cycle round the business. In this way, individual knowledge is amplified by grouping people (for example through Community of Practice).The recycling process creates the context for the next learning cascade.
Water runs from a tap	Regulating the flow of knowledge from inside out is necessary if the organization is not going to waste knowledge resources. We must control the amount of knowledge that is allowed to leave the organisation.
Taps bring the life give resource into our homes. We need to drink from the tap at certain times	Knowledge from outside brings new knowledge into the business. We need new knowledge on a regular basis.
Water can be funnelled	We must control the speed of the flow knowledge that is allowed to enter the organisation. Finding routes to gather the breadth of external knowledge and channel it into the business is critical to innovation. Filtering what one absorbs and what one does not is key to not being overwhelmed by a flood of potential information.
Water can be transported through a pipe system	Knowledge management is about purposefully channelling resources across the knowledge landscape through suitable conduits that get the knowledge to where it is needed, both inside and outside the organization.
Another form of water is ice, for example in ice cubes, in which the bonds are tightly connected	Deeply packed knowledge is accessible through close social bonds.
Ice can be applied to hot problem areas	Deep tacit knowledge can be applied to hot problem areas.
Another form of water is steam. Steam is loosely connected molecules some of which are in transition from one state to another.	Knowledge billows through loose networks, spreads easily, fluid and changeable in configuration, but is hard to harness and apply.
A beautiful form of ice is in fern frost. The beauty of crystallising structures like frost is that it is rich in different patterns, spreads across surfaces more easily than chunks of ice, adapting to the surface it hits, but it is still more tangible	Knowledge management is about creating connections/ relationships that are flexible and rich. A unique mix of relationships create a unique pattern for the firm and act as a source of advantage. Fragile though, needs to change as the competitive dynamics change.
Looking closely at water you see H2O molecules	It is important to look close up, in detail of what is happening within the business and how knowledge is making a difference to performance. Insight through measurement is about uncovering the molecular underpinning which allows knowledge to create value.
Looking at water as a gas from a distant one sees clouds. Foresight is unpredictable like the weather, it's hazy and misty takes many forms and measuring its paths is not easy.	In knowledge terms gaining foresight through measurement of intangibles is like navigating by the stars when the clouds come over.
Water is an important element in a storm	Finding a path through challenging conditions through having a good knowledge strategy. Knowledge management creates structures that can enlighten the storm clouds, cut through the risks that water can bring when in the form of a stormy sea. Monitoring the contribution of knowledge to value by casting light on the rocks is critical to both survival. It also shines a way forward (foresight) and guides travellers from afar.

Water can create a whirlpool.	A knowledge spiral. As you go deeper you suck in the sources of novelty and difference into a vortex of knowledge sharing, which is what powers the business capability. Increasing knowledge energy by funnelling external knowledge through the internal elements of the organisation and interchanging tacit and explicit knowledge (Nonaka's SECI spiral) to create new knowledge.

A next step would be to test how useful this result is in the three contexts identified: further developing KM theory, identifying what visuals are powerful in communicating KM ideas, and improving the use of visuals as a way of assessing students studying KM. The meaning regarding knowledge, knowledge management, intellectual capital and learning identified in these posters is not necessarily new or insightful. However for those new to KM, it may communicate more succinctly about the complexity of the topic. Further research is needed to check the results of the analysis with existing KM theory and to test whether this meaning and the metaphor it is derived from is helpful is particularly valuable. Similarly, at this point, the overview of derived meaning does not necessarily indicate that the visual is powerful in communicating KM ideas. This would need to be tested with experts and non-experts. And finally, further research is needed to identify ways this result can be used in education. For example, it might be useful to have students apply our methodology in a learning conversation. However as a mechanism for improving assessment one might suggest that the more recognised resonances integrated into the whole picture, the more the student has internalised the interdependencies of KM.

This research has made a useful contribution in extending the analysis of metaphors in relation to KM. Inevitably, as both metaphors and visuals are multi-interpretable, this exercise results in a rich description that is highly influenced by the personal background of the analysts. From a positivist perspective this would be highly unfavourable. However, from a social constructivist point of view the multiplicity of meaning that comes from different interpretations is beneficial, because when shared they might lead to alternative ideas and creative insight about the application of knowledge management. It would be interesting to explore our findings with the author of the poster to determine the extent to which these meanings were intentional. Previous approaches to analysing visuals did suggest that interviews can be an important part of the process and the accompanying written text was certainly helpful in this analysis. However, the very nature of metaphors would suggest that the author may well not be able to fully articulate their intentions.

We are very much aware that meaning is lost in the process of putting a visual into words. A visual communicates meaning in a non-linear way using several metaphors at once. In one picture it can communicate connections and relationships that written language is unable to do. It is equivocal and may inspire different ideas in different people. Our rich linguistic description of the metaphor can therefore not replace the visual, our aim has simply been to provide a method that can then be used to better understand the potential multiple roles visuals could play in KM.

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