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# QUESTIONING IN IS DESIGN

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## Abstract

*This paper is about questioning. A database or web page can be thought of as simply a screen full of answers. What was the question? It is argued that ISD (information systems definition, design and development) may be improved by giving more thought to the questions that are likely to be on the audience's mind when they approach a database or a web page. Apart from saving the designers from trying to capture 'everything,' it re-focuses the designer on the audience.*

**Keywords:** Questions, ISD

## Introduction

Crosswhite [1996] points out that Heidegger, Gadamer, Foucault and Meyer all agree that “questioning is in every way prior to other ways of acting”. Foucault writes of the “serious play of questions and answers” and how “a whole morality is at stake, the morality that concerns the search for the truth...”. It seems very symbolic that God asks the first question in the bible and that the Socratic method, from the father of Western knowledge, is a questioning methodology. The European philosopher Myer [1988], has undertaken that most symbolic of human activities, of naming a new area of study centred around questions; problematology. He thinks there has been an oversight by philosophy to appreciate the centrality of questions to problem solving. Crosswhite adds to the making of questions more explicit in epistemology by highlighting the recursion between questions and answers. Not only should questions be encouraged but also previously accepted answers have to be constantly re-questioned. It is a dangerous behaviour of the powerful to quell the process of questioning. Furthermore, the answers to past questions would have resulted in certain behaviours; questions now have to be asked about the present appropriateness of those behaviours.

In Information Systems (IS), Churchman's popular concept of *inquiring* organisations points to acceptance of questions as fundamental to managing IS and/or Knowledge Management (KM) design. However, there is little evidence of Churchman's ideas having significantly altered the pragmatics of Information Systems Design (ISD). One reason for this may be that, while it sounds sensible to advise that organisations should be perceived as “inquiry systems,” such development is problematic without a better understanding of inquiry itself. Questions are usually held out, especially in the education literature, as synonymous with inquiry. Put another way, information system design is centred on knowing what questions the user will ask. If asked casually, many readers would accept that good questions are the key to new knowledge. Yet, how much technology design education is given over to a conceptual understanding of “questions,” especially relative to designing and structuring “answers”. Databases and web pages are about providing answers. A database can be thought of as a box-full of answers. A web page is screen-full of answers. Each has to be built in anticipation of future visitors' questions, yet as Lauer [2000] points out there is little of the ISD literature about questions.

Questions are how users connect to the answers that IS's provide, they provide the context for answers. However, answers also prompt question, if only to ask, “Why is that so?” Often it is not always clear which comes first, the question or the answer and I cannot ask the right question because I don't know what it is I don't know. If the database or web page designer cannot think what questions the user will ask, the answers in a database are so “saturating” as to discourage a search, especially for a busy user. This is reflected in the problems of using search engines.

This paper will argue (provide the answer) that there is a recursion between questions and answers, a dialectic; an appreciation of which is expected to inform improved design of knowledge-based systems. Putting too much emphasis on answers without

due consideration of the questioner and their questions will create ISD problems such as maintenance and out of date information. Answers, without questions, are in danger of becoming cast-adrift-objects. The evidence that will be used to support this claim includes a look at the socio-network nature of human knowledge, the importance of question generation systems and research methodology problems from over emphasising questions.

Over emphasis on answers is seen as positivism or purely objective knowledge in another form. It is believed that ISD will benefit from a clearer understanding about the relationship between questions, answers and knowledge creation. A “theory” of questions [Meyer, 1988], if such a thing is feasible, will not be espoused. Rather the paper presents a probing skirmish with the more grounded issue of questioning relative to ISD.

There are at least three types of questions: “true”, “rhetorical”, and “inquisitional” [Meyer, 1988]. “Please tell me your telephone number” is, on the face of it, a genuine question. “We all hate germs, don’t we?” is a rhetorical question, while a teacher asking, “What is the name of the worlds longest river?” is an inquisitional question. A “true” question is a genuine request for information (knowledge sharing, learning). In a rhetorical question, it is assumed everyone knows the answer so any concerted attempt to communicate the answer would be a waste of effort. Inquisitional questions are asked by people who know the answer in order to test those who may not. In this paper I am only interested in *true* questions, ones which are genuine attempts to acquire knowledge.

That databases can usefully be thought of as just a box full of answers (claims, conclusions, propositions) is supported by thinking of some typical database responses; that Company X owes us \$4000, that Socrates is a male, that you have 20 employees over 65 and that there are 20 articles with the word ‘question’ in the title. The tell-tale sign of being able to put “that” in front of all these suggests they are also claims, conclusions and propositions. It appears self evident that they are also possible answers to the questions, “How much does company X owe us?” and so on. As all database designers know, it is important to know what types of questions are going to be asked. This determines structural design.

Meyer [1994] also reminds his readers that propositions, argument lines and claims are conceptually the same as answers. “Socrates is a man” is the answer to the question, “Is Socrates a man?” This style of logical reasoning is the arrangement of questions to produce derived answers. Which helps explain why rationalism is not a very adventurous way of seeking new knowledge, and apparently is now abandoned even as an inductive routine within expert system rule bases. Meyer goes on to regret that the later work of Plato and Aristotle, now seen as the initial advocates of logical reasoning, did not stick to Socrates’ emphasis on questions. That questions can be supplied with wrong answers and thus are not a guarantee of creating good knowledge seems to be why Plato and Aristotle underplayed their significance. However, Meyer argues that it is the important dialectic interplay between questions and answers that is the key to knowledge recall.

To initiate the discussion about the relationship between questions and answers, consider the claim (answer) that “tallness determines income levels.” As a research question this is, “Does tallness determine income levels?” This question could have resulted in two claims, “Tallness does (or does not) determine income levels.” Having the claim in the form of a question has the apparent advantage that the *direction* of the claim (does or does not) does not have to be stated. This suggests that the question comes before the claim because it required less knowledge to make. However, why does the question about tallness exist? Typically, because there was some previous discussion about tallness that promoted the question. Answers from another question acted to create new questions.

## Socio-Networking Knowledge

An alternative way to gain some insight into the inextricable link between questions and answers is to re-examine our present understandings of human intelligence. Mitroff [2000], a foundational figure in IS and artificial intelligence (AI), recently reminded researchers in AI that, in order to successfully build a machine that will be like human intelligence, it needs at least two attributes. The first is to be able to think about its own thinking. The second is to have had and have access to all the sources of knowledge that a human has. A human needs to be thought of as the product of a socio-network permanently connected by language, that is used to answer questions. Rather than think of a human as a stand-alone entity, they should be imagined as part of a network, which now includes people, and their computerised networked artefacts. Questioning and giving answers can be seen as simply the “protocol” for getting and giving knowledge. I can ask myself a question and, if that entity on my socio-network does not know the answer, I can question a friend.

Using the evolutionary approach, Crosswhite develops this socio-network perspective by arguing that in a child’s development, asking questions comes after guessing answers. Children start by making assertions (answers) and only later, when they can use the learned skill of language communication effectively, learn to question others as a form of gathering evidence. Take the simple

example of a young child trying to satisfy a concern for food. She may have seen food put in to a cupboard. But it is locked. She will make assertions and test them. "If I pull hard the door will open" ... she tries that and it does not work. Maybe next she thinks, "You can get in from the back" ... so she tries that but the back is blocked from view. She is using an argument or dialectic with herself to learn. After learning common language, the child may feel able to ask others what their best guesses (answer) are about how she might get to the food. So she may ask her sister, "How can I get into the cupboard?" Her sister may then supply an answer like, "Try turning the key". The child can then take this on board as an assertion (answer) and act upon it. If it does not work then she can provide an answer back to the sister. Questions and answers are ways of extending one brain into a network of brains in order to come up with new answer-question interactions. As a network, no new knowledge has been gained until an effective action is found.

## **Conceptual Mapping as Question Generation**

It seems important that any IS or KM system be designed to incorporate, as well as a box of answers to anticipated questions, a device to stimulate questions. One of the limitations of data mining is that it is hard to search for something when you cannot think of the question. This has come up with bank databases. While they have a massive record of who transacted what, where, it is not possible to ask the database, "So how can improve the banks profitability?" A more specific question has to be asked. Exploiting the recursion between questions and answers is the basis of graphical representation of data. The presentation of a simple bar chart of (say) companies and their profitability is a presentation of answers to the question, "What are the profits of companies X thro to Z relative to each other?" While the very presentation may prompt an only mildly related question such as, "Is that how you spell 'Xarier Company'?" it is primarily a device aimed at stimulating questions like, "Why is Z Company's profits so much higher than everybody else?"

If graphic displays are called conceptual models, then these need to be seen as question stimulation devices. The software "Netmap" is an example. This graphs the associations between data attributes stored in the database. So, imagine a telephone-calls-made database. It would be possible to graph who has rung whom. Netmap uses a circle layout with, in this case, the phone numbers as nodes around the rim. Why graph the association between attributes? The intent is to present information about the database and thus raise questions such as, "Why are so many people ringing this number after 12 midnight when it is not a registered business?" While the database may not be able to answer the question, the question has been raised.

Hyperlinks appear to work, conceptually, the same way but within and between documents. The words of a document are then related to each other and numerous other documents, such as references. The original document, especially if has a strong argument line, is an "answer" which can act to stimulate questions. The hyperlinks provide a quick way of answering those questions. They are quick because they allow rapid movement from "branch tip to branch tip" of the tree structure of a document filing system. The simple act of speedy linking is also expected to considerably increase the number of questions that will be generated in the user's mind.

## **Research**

The interaction between questions and answers can be further appreciated by considering their relationship to each other as a person learns over time. When undertaking research, a search for an answer, the espoused epistemology is that the first step is to ask questions; intelligence is often espoused as coming up with a very good question. However, this may well be a myth told to "new" researchers. Dillon [1988], as well as Mitroff [1972], some time ago now, studied the actual behavior of scientists. They both found "scientists were seen to encounter the solution (answer) by chance, and then formulate the problem (question)." It is amusing to note that they are called 're-searchers', as if the label was given by someone who thought they were usually searching to explain an answer. Dillon then asks if it is indeed possible to find an answer without having in mind an answer. Kuhn [1970] called this, 'theory informing observations'; Checkland [2000] "action informing ideas".

As Dillon found, when the researcher is clear about her conclusion (argument), she will then need to remember how she convinced herself. What questions does the conclusion (answer) bring to mind? When trying to convince others of her results, she will need to think of what questions they are likely to ask. Her audience may ask many of the same questions as she did, but, if they have a very different background, they are likely to ask very different questions. It may be worth using Kipling's six honest men, (who, where, when, how, what, why) to think of possible questions. Fisher and Forester, (1996), restates these "6 w's" as the requirements for writing a good story; the players, the scene, the plot, the acts, and the message. While these maybe useful aids, the difficult dialectic process of anticipating questions and formulating answers has been identified back to Socrates as about the best explanation of how knowledge is created and validated.

How good ideas (answers), or for that matter good questions, come into our minds is unclear. It seems to be some kind of eureka-experience clash. At a thought level, mixing very novel metaphors seems to help. The equivalent in the physical world occurs when accidents randomly produce something unexpected. Many physical discoveries have been reported as accidents whose significance has been appreciated by experienced (educated) minds. Moreover, the extensive innovation literature [eg Lawson, 1999] has found that real innovation occurs when people with answers (core competencies) casually meet socially with people with totally different core competencies (answers).

If research tends to begin as much with an answer and then working out what question others will ask, it would seem unethical to pretend the research started with questions. Broad and Wane [1982] outline the many frauds that occur in science. They are trying to get scientists to expose their bias upfront, rather than try to hide behind the impartial observer myth. This myth may arise because of a confusion between bias and repeatability, but suffice to say here that pretending that research started as a question, when it was really about proving a casually held belief, may encourage unethical behaviour. The most ethical thing to do may be to present the discovery of an answer as it actually occurred and not insist on a stylised scientific presentation method of starting all research with a clever question.

## Objectivism

Myer [1994] makes the point that the positioning of the subject relative to the object has been the major issue in 20<sup>th</sup> Century social inquiry. This philosophical thought is very relevant to *knowledge* managers. Positivism and the assumption of objective knowledge has quelled appreciation of the role of the subject, the person involved in the knowledge creation (or management). Freud and the post modern movement have, for many, overstated the importance of the subject, but the interpretive movement is trying to find the right balance. The subject involved in doing the knowledge creation appears to have some impact on what knowledge is created. That a table has four legs may not be under dispute, assuming the definitions of table, numbers and legs has been agreed by consensus, but “Why does it have four legs?” is open to interpretation. An engineer may say for balance, a artist may say to harmonise with the image of the gazelle and the economist say because it’s cheaper than five legs.

By concentrating on only answers, an objective view of knowledge is again encouraged. Who asked what question, and why, the context of the answer, is forgotten. All that is recorded is the answer. As Crosswhite [1996] points out if the question was re-asked, then the answer may be different today. For example, Mitroff [2000] points out that the Turing Test as a measure of computer intelligence was very broadly accepted before the concept of computer networks, and computers as communications devices not calculating machines, was firmly established in people’s minds. It answered the question, “How can we measure computer intelligence?” Today, with our emphasis on networks, it seems a very weak answer. As mentioned above, humans are better understood as socio-networked systems, not stand alone calculators. By concentrating on the questions as much as the answer, a more subjective view of knowledge is created. The inquirer as an interpreter is acknowledged.

## Application Pragmatics

Theorising about questioning is insufficient in a discipline as grounded as IS. Therefore, some attempt will now be made to use the theorizing to inform pragmatic IS design. The main aim of this paper was to alert IS designers to give more generic thought to how users (the audience) can ask questions of the system rather than merely be presented with a list of answers. For example, the attraction of expert systems, now somewhat faded, was that you could ask, “Why did you ask me that question?” As questioning has been advocated as an important part of knowledge management, it should be expected that the near perfect marketplace for technology innovation has integrated this human need into technological products. In the sense that the telephone is so much more popular than email, or that so many people resist the use of electronic (push button) telephone answering services is evidence for a demand to be able to question the information source. Elsewhere, the importance of oral communications rather than text based information to people without literacy skill or inclinations has been discussed. This too can be seen as evidence that many people expect to be able question their information source. The ‘tone’ of the information source is used to assess the accuracy of the information [Metcalf, 2000].

Many readers will be aware of such Internet services as “askme.com” and “askjeeves.com”. These are web sites that allow all comers to post questions, asking any interested human to answer. While certain people have nominated as “experts” and copies of the questions are forwarded to them, anybody logged on can offer suggested answers. Questioners are then asked to rank the quality or usefulness of the answers. This is a product that again acknowledges that it is impossible and excessively demanding to expect to be able to anticipate all the questions people have. The supply of an email contact person on web pages is a further example, as is the amount of time and effort put into encouraging buying and selling communities that hold open forums to discuss products. Some of the newer search engines, such as SimpleFind, are trying to make searches more efficient and relevant by first

responding to a keyword search request by asking a few questions of the searcher. It has been found that a few questions can save a lot of unhelpful 'hits', as any receptionist will tell you. The generic use of pop-up menus in web site maps is another way of asking the audience questions.

The attraction of approaches such as askme.com is that it focuses on dealing with actual questions rather than guessed ones. If numerous people ask the same question, such as with a telephone directory, then a "standard answers" or a traditional web page of details can be posted. Indeed, a good many questions can and should be anticipated from experience and these answers presented in pre-prepared web pages. A system like "askme.com" can be operated at either an organizational or at a community level. At an organizational level, encouraging email questions would overload people's patience. Yet having an askme.com type questioning system alongside conventional web pages would allow a measured control of questioning. This would save endless distribution list questions yet also be a means of the relevant person monitoring exactly what questions are on people's minds, at what times. While the questions and answers may not be directly transferred easily into a database or web page, the questioning system can provide input to ISD and maintenance.

## Conclusion

This paper has tried to emphasize the importance of questions in IS and KM design. Rather than debate which comes first, the question or the answer, a more useful way forward may be to argue they have a recursive, and equal, relationship [Hoftstader, 1979], like sides of a coin. Having an answer does not mean you have a question, nor does having a question mean you have an answer, but when you have one, the other is close by. However, the danger lies in forgetting the "other side of the coin exists." By researchers giving dominance to questions and database designers giving dominance to answers, problems can arise. In research, a questioning only epistemology can lead to a dangerous pretence of impartiality, while in IS an answers only epistemology encourages the evils of objective only knowledge. In practical terms, this comes out in analysts wanting to capture "everything" in their databases or post "everything" on their web pages. The end result is a large, outdated and increasingly useless expense. A balance needs to be struck between answering and questioning.

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