Wisdom: The Missing Dimension in Information and Communication Technology (ICT)

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Abstract

The levels of knowledge hierarchy (i.e., data, information, knowledge, and wisdom), are described in the Qur'an, the *aha-dith*, and the literature produced during Islamic civilization's Golden Age. They also have been discussed by western and non-Muslim scholars. However, while implementing and using information and communication technology (ICT), only the first three levels are currently being explored and utilized. Wisdom has not been discussed to any great extent. ICT has designed systems to assist us and has improved our life and work. However, such tools as decision-support systems and executive information systems comprise only data, information, and knowledge.

Comprehensiveness does not guarantee the possession of wisdom. Taking things apart is knowledge; putting things together is wisdom. Muslim scholars of the Golden Age analyzed data, drew relationships and interpreted data to create information, identified and determined the pattern to represent knowledge, and understood the foundational principles for the patterns to implement wisdom. Wisdom must be included if ICT is to be complete. People, organizations, and the nation must strive for wisdom as the ultimate goal: from an information society to a knowledge society to a wisdom society, and from information workers to knowledge workers to wisdom workers.

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Introduction

> Where is the wisdom we have lost in knowledge?
> Where is the knowledge we have lost in information?
> – T. S. Eliot, *The Rock.*

Wisdom is an essential requirement for information and communication technology (ICT) professionals in designing, developing, and implementing better computer systems and communication within organizations. In fact, wisdom is not a new dimension in ICT; rather, it is the highest hierarchy of data → information → knowledge → wisdom. The development of ICT can be seen at each hierarchical level. First comes data processing, data centers, data workers, and even communication with data (e.g., Morse code). Then, people upgrade themselves and their systems by introducing information centers, information workers, the information society, and communicate and exchange information through letter, fax, and e-mail.

Now, most countries are concerned with knowledge centers, knowledge workers, a knowledge economy, and a knowledge society. We share and learn knowledge through the Internet and e-learning. Given this, it is time to move forward and discuss wisdom centers, wisdom workers, and a wisdom society, as well as to explore communication systems at the wisdom level. If wisdom is placed in proper perspective in ICT, most of the problems and misunderstandings in system development and information strategic planning could be easily understood and solved.

However, wisdom has not been discussed and explored to any great extent, especially in the implementation and use of ICT in planning, organizing, and decision making. In fact, only a few articles and materials even discuss it, and those that are related mostly to knowledge management and organizational strategy. Among the very few researchers who directly discuss wisdom in relation to ICT are Jenkins, Por and Molloy, and Lucardie.[1] The reason for this could be that this topic is still in its infancy.

Ideally, an information system requires input, transformation, and output processes, as well as a high user involvement, and comprises the four levels of the knowledge hierarchy (viz., data, information, knowledge, and wisdom). Moreover, the relationship between data information, knowledge, and wisdom from the ICT and the Islamic perspectives must be understood.

This paper discusses wisdom as the most important level in the knowledge hierarchy, and why it is missing in many organizations' design, implementation, and use of ICT. This research involved an extensive review of research reports, opinion papers, conference papers, and system reports on applying wisdom in ICT. It also explored the definition and development of wisdom in the context of ICT, relevant sources that discuss wisdom from different perspectives, and ways for achieving wisdom in designing, implementing, and using ICT.

Definitions

Several definitions of wisdom are assumed to be applicable to ICT. Definitions for data, information, and knowledge precede the definitions of wisdom, as these levels are required for understanding wisdom as the hierarchy's highest level.

Data. Data are strings of symbols or language that, in themselves, are meaningless. Data are simply facts and figures, raw materials and raw events of higher order, and include the process of accumulating facts.[2] Generally, data are defined as unprocessed raw materials and unconnected facts[3] intended for further processing to generate higher order constructs. Data are representations whose meanings are dependent upon the representation of a system (e.g., symbols and language).[4]

Information. Information is data processed (e.g., adding, subtracting, and so on) into a meaningful form. Although it is transferable and can be communicated in some manner,[5] the meaning attached to it depends upon the user's knowledge. Information is also viewed as an understanding of the relationships between pieces of data whose meaning depends greatly upon the context.[6]

Information is data presented in an organized fashion. Data, along with metadata and context, makes information. The relationships, once understood, represent information. However, the relationships that represent data tend to be limited in context, for they are mostly about the past and present and have little, if any, application for the future.[7] Information is also factual collections of data presented by any communication medium.[8]

Knowledge. Knowledge is digested information that is useful and has some value for users. There are two types of knowledge: tacit (knowing how) and explicit (knowing about).[9] Users must have a clear understanding of the digested information and its associated pattern in order to gain wisdom.

Knowledge, as an appropriate collection of information, is gained through perception, learning, and discoveries,[10] and is intended for use.[11] It adds understanding and retention to information, and is the next natural progression after information. Thus, in order to be considered knowledge, there must be patterns between data, information, and other knowledge, together with understanding and cognition,[12] for knowledge is the product of assimilating information through the process of human thought.

Wisdom. Wisdom is the user's ability to make the best and most proper use of knowledge in establishing the basis for decision making and for actually making the decision to achieve the desired goals. It involves exercising wise judgments between right or wrong and good or bad; considering all pertinent factors and their relationships; and being consistent with the universal laws, in this case the Shari`ah and Islamic values. Given these facts, wisdom is clearly more than simply someone's opinion. Without wisdom, the three lower levels of the knowledge hierarchy will collapse, run into errors, or even harm society. As table 1 shows, wisdom is built on data, information, and knowledge.

Table 1. Distinctions between data, information, knowledge, and wisdom.

Level	Definition	Learning Process	Outcome
Data	Raw facts	Accumulating truths	Memorization (Data bank)
Information	Meaningful, useful data	Giving form and functionality	Comprehension (Information Bank)
Knowledge	Clear understanding of information	Analysis and synthesis	Understanding (Knowledge bank)
Wisdom	Using knowledge to establish and achieve goals	Discerning judgments and taking appropriate actions	Better living/success (Wisdom Bank)

Source: Bierly, P. E., E. H. Kessler, and E. W. Christensen. "Organizational Learning, Knowledge, and Wisdom," *Journal of Organizational Change Management* 13, no. 6 (2000): 595-618, Note: The Islamic elements of wisdom is discussed in section entitled "Achieving Wisdom in Designing, Implementing, and Utilizing ICT."

The best sources to illustrate the strong relationship between these levels of knowledge hierarchy and their interdependence are the Qur'an, the *ahadith*, the Prophet's *sirah*, and the history of Islamic civilization.

Wisdom from the Islamic Perspective

Wisdom, if understood as *hikmah*, means a deep understanding of certain things. Originating from knowledge, it is defined as knowing the best action to take using appropriate knowledge and beneficial advice. Thus, being wise also means being knowledgeable.[13]

Ibn `Abbas noted that the Qur'an uses wisdom in the sense of the ability to differentiate between *halal* and *haram*, knowledge followed by action, and putting things in their appropriate places. If it is based on individual capability with good means and ends, those things must lead to the truth.

Wisdom is one of Allah's attributes, and He bestows it upon whom He wills, for: "He grants wisdom to whom He wills; and he to whom wisdom is granted receives indeed a benefit overflowing; but none will grasp the message but men of understanding" (2:269). In other words, wisdom is gained through divine guidance and given to those who try to think and understand the meaning of life.

The Qur'an, as the Shari`ah's primary source, is the main source of wisdom and the book of guidance that covers every aspect of human life. It was revealed so that humanity could learn wisdom: "We have sent it down as an Arabic Qur'an in order that you may learn wisdom" (12:2).

One of the best examples is humanity's creation. The Qur'an explains the creation of the fetus at the data, information, knowledge, and wisdom levels. Such terms as *sperm, clot of congealed blood, fetus, bones, flesh,* and *creature* are data, the input that must go through a set of processes to become an output (another form of creation), which becomes information. Its stage-by-stage process from one level to the next is the knowledge of the process of human creation.

Allah says: "... then We developed out of it another creature, so blessed be to Allah, the best to create ..." (23:14). These are statements of wisdom. The understanding that humanity, the best and most precise member of creation, comes originally from a mere clot of blood and that we should be thankful to Him alone is wisdom.

The Prophet, as related by Abu Musa, described the differences between a knowledge society with wisdom and an information society:

> The example of guidance and knowledge [the Qur'an and the Sunnah] with which Allah has sent me is like the abundant rain falling on the earth, some of which was fertile soil that absorbed rainwater and brought forth vegetation and grass in abundance. (And) another portion of it was hard

and held the rainwater. Allah benefited the people with it, and they uti-
lized it for drinking (making their animals drink from it), and to irrigate
the land for cultivation. (And) a portion of it was barren land that could
neither hold the water nor bring forth vegetation (then that land gave no
benefits). The first is the example of the person who comprehends Allah's
religion (Islam) and gets benefits (from the knowledge) that Allah has
revealed through me (the Prophet) and learns and teaches it to others. The
(last example is that of a) person who does not care for it and does not
take Allah's guidance revealed through me (he is like that barren land).[14]

The first category, soil, explained the knowledge society with wisdom.
Based on this hadith, this society receives and understands knowledge,
from which it creates and generates new knowledge. The second category
of soil describes an information society, in which this society receives the
same knowledge but cannot transform it into new knowledge.

Moreover, Prophet Muhammad mentioned wisdom as the "lost prop-
erty of a believer, it is his whenever he finds it."[15] All people should feel
free to learn, and no group should have a monopoly on knowledge. But
this hadith also means that the believers should be open-minded and learn
and seek knowledge from all acceptable sources.

Prophet Muhammad encouraged Muslims to spread and convey
knowledge and wisdom, since this activity is the best deed.[16] Thus, peo-
ple can receive knowledge and wisdom from pious and learned people.
As Allah bestows wisdom upon certain people, many people cannot see
the secrets and wisdom behind certain things or events. So, whoever has
knowledge and acquires wisdom must convey it to others.

In 18:60-82, the Qur an informs us of Prophet Musa's journey with a
learned man upon whom Allah had bestowed mercy, knowledge with
guidance, and true path. This learned and wise man is often referred to as
al-Khidr,[17] and is here referred to as *he* or *him*. There were secrets behind
his extraordinary acts during their journey, as paraphrased below:

As for the boat which *he* scuttled, it belonged to poor men; for there was
after them a king who seized every boat by force, and thus by doing so
[he] would save their boat from being seized. As for the youth whom *he*
killed, *he* feared that the youth would grieve the latter's pious parents
with obstinate rebellion and ingratitude, and hoped that later Allah would
give them better children. As for the wall *he* repaired, though the city
dwellers refused to treat them with hospitality, it belonged to two
orphans who were entitled to inherit a buried treasure beneath the wall
from their dead father, who was a righteous man.

Referring to this story, in terms of knowledge his actions were considered wrong. Musa could not tolerate them, as his understanding was not at the same level. His acts were based on the wisdom given by Allah. A lesson from this account is that the journey toward wisdom is full of challenges and hardships, and that there are always means to acquire it. Thus, to achieve wisdom and knowledge, one must have patience and perseverance, a high degree of *iman*, and respect and obey the commands of Allah and His Messenger. One also needs cooperation and help from others, especially those who possess wisdom.

Muslim scholars during our Golden Era (viz., the ninth to fifteenth centuries),[18] like al-Ghazali, started the foundation of knowledge with the Qur an and Hadith literature, and then used them as guides in implementing knowledge in a given field with wisdom. In *Tahafut al-Falasifah*, one of al-Ghazali's best works, he identified the philosophers' errors based upon the foundation of wisdom. He criticized Ibn Sina, who developed a philosophical system that was based heavily upon Aristotle's logic.

Even though al-Ghazali also criticized al-Farabi, he can be accepted as an example of those scholars who mastered other fields in addition to their own specialization. Al-Farabi was a philosopher, mathematician, political scientist, psychologist, excellent composer and performer, and astronomer. Scholars like him looked at knowledge as "one," even though they came from different fields, and looked at knowledge in a holistic manner, instead of as isolated units. They made connections between these fields and studied their own field as a complement to other fields, and vice versa. They put things together, and putting things together is wisdom.

Islam makes no such distinction, for it invites its followers to exercise their intellectual capability and use their knowledge to attain the ultimate truth. The Bayt al-Hikmah was established to encourage the pursuit of knowledge and the creation of new knowledge with wisdom. One example of this is the translation of documents of other civilizations into Arabic so that scholars could study their philosophies and sciences and to consider them as Islamic once they confirmed the doctrine of Allah's Oneness, the heart of every authentic revelation from Allah. The translation process made Arabic the language of knowledge, even though the knowledge did not necessarily come from the Muslims and their languages. It also enriched the newly acquired knowledge through wisdom.

Wisdom from Other Perspectives

Wisdom from Western Scholars' Perspective. Some western scholars, among them Huber and Daft,[19] use *information* and *knowledge* interchangeably, because their use in ICT shows a close resemblance and only slight differences. Such approaches in a way equated the two levels and operationally defined knowledge as an inventory of information. According to these approaches, the slight differences were in knowledge being interpreted as useful information and information as data that reduce uncertainty and ambiguity. These approaches overlooked the problem in the equations that the existence of a great deal of information processing does not mean that there is a great deal of knowledge.

Very few western scholars have attempted to understand wisdom in a more correct perspective. For example, Bellinger noted that information relates to description, definition, or perspective (what, who, when, and where); that knowledge comprises strategy, practice, method, or approach (how); and that wisdom embodies principle, insight, or moral values.[20] However, she failed to connect wisdom with God.

Allee, who discussed wisdom as "related to understanding of knowledge, intelligence and effective use of them to achieve goals,"[21] considers wisdom a highly creative and connective way of processing knowledge that distills out essential principles and truths. Wisdom tells us to what we need to pay attention. Por and Molloy, as well as Bierly et al., noted that wisdom is meant for the "truth seeker and pattern-finder that penetrates to the core of what really matters."[22] Therefore, it can be used to maximize the potential of any information and knowledge systems. They also failed to connect their explanation with God.

Ackoff views wisdom as evaluated understanding: an extrapolative, non-deterministic, and non-probabilistic process involving all previous levels of consciousness and specifically special types of human programming (e.g., moral and ethical codes).[23] Moreover, it is the process by which human beings differentiate between right or wrong, good or bad. Ackoff's explanation focused on human capability and human expectations of norms and moral standards.

Matthews defined wisdom as the essential ability to use knowledge in a constructive way, while at the same time having the ability to create new ideas.[24] Little et al. considered wisdom as the capacity of judging rightly in matters relating to life and conduct, soundness of judgment in the choice of means and ends, a sound sense in practical affairs, and knowledge –

especially the higher kind: wise teaching or action. Similarly, they discussed wisdom from a human perspective and capability.

Western scholars have only a limited understanding of wisdom because their educational systems have departed from their religion. They tried to find solutions to ICT problems through tools, machines and computers, and human beings without any reflection upon and connection to God.

Some western scholars realized that wisdom and other spiritual and moral aspects, in addition to scientific knowledge, are important. Bierly et al. stated that wisdom is more than just scientific knowledge, in which science tells us how to do things.[25] However, any specific thing that can be done does not necessarily need to be done in a certain way.

Western thoughts focused on the practicality, or "value-added," quality of wisdom. In his *Nicomachean Ethics*, Aristotle spoke of "practical" wisdom as the ability to deliberate well about what is good and expedient regarding the conduct of the good life. Immanuel Kant, in his *Critique of Practical Reason*, described a higher state of true wisdom concerned with the practical end of humanity's existence on Earth. Tolstoy, in his *War and Peace*, talked about wisdom as not being found in knowledge and science but through considering the whole and explaining humanity's place in it. Salk, in his *The Survival of the Wisest*, wrote that importance is attached to the notion that wisdom is of "practical value" for human survival and for maintaining and enhancing the quality of life.

Some western scholars also realized the important role of wisdom in gaining organizational benefits. Beck argued that wisdom entails the awareness used by the self to relate successfully to the environment.[26] This is a useful definition for the strategist, for it can be adapted easily to achieving and sustaining a competitive advantage within institutional and industrial arenas. Beck went on to argue that wisdom comprises both knowledge (understanding the truth) and action (doing what is good).

If people are wise, to the extent that they know the highest good, they can act accordingly. This is consistent with Rothberg's idea of "socially engaged spirituality,"[27] which refers to integrating our practical lives with our spiritual development so that we might respond to the needs of our time. In this sense, wisdom is not merely a result of inquiring and reflecting upon the relationship between self and society; rather, it is also the embodiment of action taken to transform self and society toward a better whole. As Einstein said: "Science without religion is lame; religion without science is blind."[28]

Wisdom from the Asian Perspective. Asian scholars discussed wisdom with some elements from their religions. For example, a Taoist saying stated that:

> If one is smart and swift without wisdom, one is as though riding on a fat mount but not knowing which way to go. Even if one has talent and ability, if one uses them improperly and handles them inappropriately, they can only assist falsehood and dress up error. In that case it is better to have few technical skills than many…[29]

To the Taoist, too many technical skills and a lack of wisdom leads to a "sophisticated computer system" and less user wisdom. In his *Analects*, Confucius maintained that wisdom entails righteousness and that the wise person studies and knows the Way (or Tao). Knowledge must be combined with action and practice.

These discussions show that wise people make sense of all of these for the betterment of all people, because wisdom gives the ability to make the best use of knowledge for establishing and achieving desired goals and a better life. Learning about wisdom as the process of discerning judgments and action based upon knowledge helps us to make better decisions in today's ever-changing situation.

In conclusion, data are the aggregated and unprocessed raw facts intended for further processing. Information consists of a collection of data related to description, definition, or perspective (what, who, when, and where). Knowledge is the understanding of information, which contains strategy, practice, method, or approach (how). Wisdom is related to understanding and the ability to use knowledge to achieve goals and find the truth, and the ability to make sound judgments by considering such important aspects as moral values and religion, based upon a demanding situation (why).[30]

The sequence from data $\rightarrow$ information $\rightarrow$ knowledge $\rightarrow$ wisdom represents an emergent continuum of processes interrelated to each other.

Development from Data to Wisdom in Organizations

As a society and as an organization, humanity now has too much information, not enough knowledge, and very little wisdom. Unfortunately, increased knowledge does not guarantee increased wisdom.[31] Transitioning from data to wisdom is a pathway to success, and those

societies and organizations that do not accept this challenge will not sur-vive and succeed in responding to change.[32]

In the 1970s, information management replaced data processing to increase productivity and organizational performance. In the mid 1980s, knowledge management superseded information management, while in the 1990s the concept of wisdom was introduced in relation to organiza-tional learning and culture. Among its pioneers are Sternberg, Birren, and Fisher.[33]

This new level of knowledge hierarchy (wisdom) does not destroy the older ones; instead, it is embedded into and complemented by the previ-ous levels to enable further development. The latter levels are introduced to complete the missing part in the previous ones. Mere data is not under-standable, while mere information does not make any sense or provide any value; rather, it creates an information overload. Information that has value and makes sense is called knowledge. But we need wisdom as a deep understanding of knowledge.

In this section, discussions were based on relevant materials. Incorporating western and Asian perspectives into the Islamic perspective was done because they share some common understandings. The differ-ence lies in the connection with God, in which discussion on acquiring wisdom is most often found in Islamic sources.

Wisdom in the Design, Implementation, and the Use of ICT. At pre-sent, the highest level of design, implementation, and use of ICT is at the knowledge level. The importance of knowledge is now obvious, as our economic system has changed from physical capital to intellectual capi-tal, and a higher value has been placed on knowledge products compared to physical products.[34] Information technology (IT) designers should fil-ter and analyze data and present only what can be absorbed and used by its users. Systems must be built based on certain meanings or concepts, and philosophical and wisdom levels of understanding.

Decision-support systems and executive information systems are designed to help their users (viz., managers) make decisions and play their roles in managing and leading organizations. However, at present, these systems are only assisting managers at the informational level, rather than at the interpersonal level. The systems only consist of data, information, and knowledge, for wisdom is absent. We cannot expect wis-dom to be physically installed in computers, given that it is an evaluated understanding that can be possessed only by humans, because it requires a soul and resides in the person's heart and mind.[35] People, whether they

be users or IT professionals, must possess wisdom. Therefore, these systems must be utilized with wisdom.

For example, a knowledge-based system is designed to assist and shape how organizations apply and use ICT. Despite their potential uses and benefits, which surpassed those of the information-based systems and databases, knowledge-based systems have three major weaknesses: they lack a theory of the nature of knowledge, an adequate representation of formalism, and adequate tools.[36] The systems must have the appropriate theory to define the broader view or scope of knowledge so that they can perform knowledge-modeling processes and develop more powerful strategies, methodologies, and tools (i.e., new knowledge with wisdom).

According to Samad, top-management in Malaysia is not using wisdom tools as often as ICT tools at the information and knowledge level. Moreover, as Noordin and Othman write,[37] the college students using the cyber-cafes in the Klang Valley have not yet made it to the knowledge level; rather, they are still at the data and informational levels. These activities were results of the information systems' design and implementation at the data, information, and knowledge levels. Systems designed to explore the wisdom level have not yet been developed in the right perspective. Even though systems today have a vast amount of data, information, and knowledge, they have neither wisdom nor the potential to possess it.

Comprehensive knowledge does not guarantee the possession of wisdom. Knowledge without wisdom can deceive us into thinking that we are wise, which might make us arrogant, and can even block our access to wisdom, for we can be so busy seeking knowledge and designing systems that we have no time to contemplate. However, wisdom is considered the most vital level, for it completes the weaknesses in the lower levels. In Allee's words, "Any framework of knowledge that doesn't include wisdom requires us to operate blindly …"[38]

To gain knowledge with wisdom, we must first realize that taking things apart, an activity that harms society, is knowledge, and that, second, putting things together is wisdom. For example, the vast amount of information on the Internet creates an information overload, because it was invented with no wisdom perspective. While the Internet helps us in our continuing process of globalization, it raises concerns about privacy and security – such crimes as hacking and invading the privacy of others are now commonplace. ICT tools, which should help us improve our society, are used mostly for money, entertainment, and other meaningless purposes, for contemporary societies consider material gain as their primary objec-

tive. The pursuit of knowledge may become harmful, unless it is combined with wisdom, in the sense that, as Ackoff points out,[39] a comprehensive vision is not necessarily present in the pursuit of knowledge. Comprehensiveness alone is not enough to constitute wisdom, for there also must be a certain awareness of the ends of human life.

Applying Wisdom in an Actual ICT Environment. Wisdom involves making the best use of knowledge, experience, and understanding by exercising good judgment in order to make conscious value judgments based on clearly defined criteria. It leads to better and wiser decision making, not only due to objectivity and rationality, but also to considering other aspects (e.g., religion, morals, and ethical codes). Wisdom is an action-oriented concept that is geared to applying appropriate organizational knowledge during the planning, decision making, and implementation (or action) stages. Moreover, according to Jenkins, it is essential for a good organizational structure or strategy, the wise use of technology, and good decision-making and judgments.

In a situation of "complexity multiplied by urgency," Por writes that only wisdom can effectively guide our attention, both individual and organizational, and help us to balance between focusing on current tasks and long-term priorities by offering the power of perspective.[40] This power of perspective can help ICT professionals, especially system analysts and system programmers, develop more effective systems that can focus on current tasks as well as long-term priorities. As wisdom uses knowledge in a constructive way, it encourages new ideas and innovations and presents them in a beneficial and ethical manner.

Bierly et al. assert that organizational learning, knowledge, and wisdom have an impact on competitive advantage, for knowledge alone is not enough for a firm's success.[41] Given that success goes to those firms that make the best use of what they know, and for the benefit of their firms and society at large, Bierly et al. propose organizational wisdom to complete the missing point in the construct of the firm's knowledge-based theory.[42] They concluded that the growing attention given to knowledge management is only transitory and exists only in the value chain. Firms need to shift toward wisdom and transfer it throughout the organization, for a wise CEO will make better decisions and inspire greater loyalty and trust than just a knowledgeable CEO.

There is a need to differentiate between a "knowledge society," which Hansson defines as a society that knows how to achieve its objectives, and a "risk society," one that faces unforeseeable and uncontrollable events in

the future and thus finds it impossible to formulate decision-making processes.[43] Data, information, and knowledge may bring people benefits, but, at the same time, can generate problems, uncertainties, and risks to humanity. Advances in industrialization and technology leads to increased risks due to unpredictable events and chaotic phenomena.

Hansson suggests developing strategies for information-processing and decision-making that emphasize quantitative risk analysis, precautionary principles, reversible decisions options, stake-holder involvement, and participative processes.[44] To deal with uncertainty, we need a better understanding of information flows and their consequences in our society. This is where wisdom can act as a guideline and a preventive measure.

However, in order to move toward this pathway, we must first adapt to the ever-changing nature of the pathway itself, technology, business structure, environment and paradigms. To relate wisdom with ICT in system development, we must include it in decision making, especially in unstructured types of decision-making systems. Moreover, according to Laudon and Laudon, in system analysis and system design we have to include a wisdom aspect so that we can develop appropriate and suitable systems.[45]

Information systems must include wisdom after processing data, analyzing information, and synthesizing knowledge. Information systems must ask the decision makers whether they have consulted such wisdom mechanisms as *salat al-istikharah*, asking Allah to guide them in their decision making after consulting the system for data, information, and knowledge.

Achieving Wisdom in Designing, Implementing, and Utilizing ICT

In every aspect of an information system, wisdom must be the final level if the system is to be complete, as such. Western scholars have suggested several ways to achieve wisdom. Bierly et al. suggested three ways to achieve individual wisdom: through experience, spirituality, and passion; while the way to achieve organizational wisdom is through transformational leadership, organizational culture and structure, and knowledge transfer.[46]

Hannabas tried to relate knowledge with other perspectives, such as Asian philosophical and religious views.[47] To him, decision making without taking such things into account is flawed. He further stressed that knowledge does not operate at one level, and that if it is interpreted merely based on rationality and objectivity, as sometimes happens, it can mislead us too.

Thus, he argued that knowledge should lead to wisdom, which contains self-knowledge and meta-knowledge, if we are to arrive at a coherent understanding of knowledge. He also viewed the progression from knowledge to wisdom as a progression toward truth.

In his study on wisdom creation and exploitation in the Anglian Water Company, Matthews argued that the "Kennovation cycle" (i.e., from data → information → knowledge →wisdom → creativity → innovation → new data and experience) will help the company upgrade its people, service quality, and the process itself.[48] This process can be paired with individual and organizational behaviors to facilitate the development of wisdom and versatility in all of the company's business process.[49] He further explained that wisdom is the critical ability to use knowledge in a constructive way and to discern ways in which new ideas can be created. In addition, he stressed the importance of combining knowledge from new and established sources in organizational development and evolution by including the IT element in its implementation. After explaining the "triple network" concept, in which people networks create knowledge networks assisted by IT networks to generate value as a result of the intelligence of those three elements, he suggested that wisdom should be the ultimate goal for individuals, teams, and organizations. And, from this comes versatility and the path to success.

Ierlant and Russel write that wisdom also is gained through knowledge brought on by study and past experiences and skills.[50] Sometimes it is acquired through insight, understanding, observing, and being aware. Wisdom also can be acquired through successful knowledge creating and management at the individual, team, and organizational levels.[51] Jenkins opines that information systems, knowledge systems, values, and responsible subject matter experts also are considered sources of wisdom.[52]

Computer programmers, system analysts, and other ICT professionals must not only be knowledgeable, but also wise, for there are differences between being knowledgeable and being wise. Bierly et al. stated that "being knowledgeable" is one step toward wisdom, in which one holds justified true beliefs supported by facts, while "being wise" means having knowledge as well as using one's intellect and insight appropriately for a certain condition.

In designing, implementing, and using the system, we must build connectivity and understanding between data, information, knowledge, and wisdom, as illustrated in figure 1. In addition, the highest connectivity and understanding must have a direct link to Allah.

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Figure 1. The connectivity and understanding of data, information, knowledge, and wisdom.
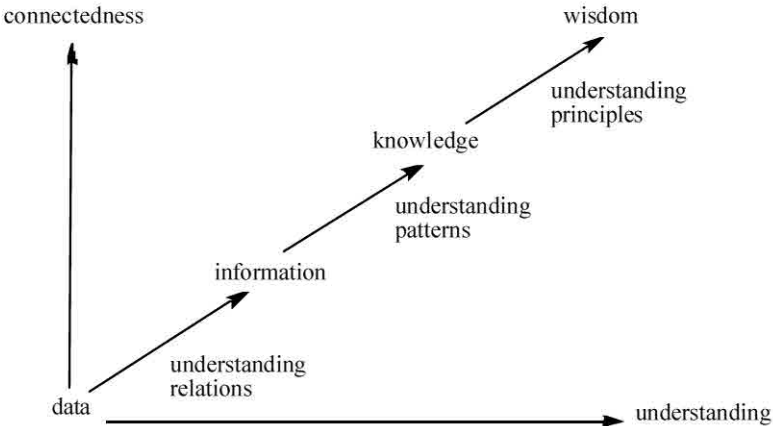
Source: Bellinger, G., D. Castro, and A. Mills, "Data Information, Knowledge, and Wisdom." Available at www.outsights.com/systems/dikw/dikw.htm. (May 13, 2002).

Thus, wisdom is more than scientific knowledge. Science can tell us how to do things, but not whether any specific thing that can be done should be done. This issue became the subject of great debate after World War II (using the atomic bomb) as well as in the fictional "Jurassic Park" debate (whether to bring dinosaurs back to life). With regard to the former example, Oppenheimer's reflection on the atomic bomb test at Los Alamos highlights this distinction between knowledge (if we can do this) and wisdom (should we do this).[53] In short, wisdom takes into account the bigger picture. Maxwell draws a bolder line between knowledge and wisdom: Knowledge is the result of rational inquiry,[54] whereas wisdom includes knowledge but goes further to incorporate "judgment of value ... to help us devise better ways of living, better institutions, customs, and social relations."[55]

Birren, Fisher, and Sternberg et al. said that "a wise person has learned to balance the opposing valences of the three aspects of behaviors: cognition, affect and volition. A wise person weighs the known and the unknown, resists overwhelming emotion while maintaining interest, and carefully chooses when and where to take action."[56]

During the Golden Era of Islamic civilization, Muslim scholars analyzed data, drew relationships, and interpreted data to create information; identified and determined the pattern to represent knowledge; and understood the foundational principles for the patterns to implement wisdom.

The definitions given in table 1 showed that even though wisdom is being discussed, it failed to be linked to Allah, the Creator of all systems. In order to get wisdom, one must receive divine guidance. In other words, in order to get *hikmah* (wisdom), one must receive *hidayah* (divine guidance) from Allah. Not all knowledgeable people have wisdom. Thus *hidayah* must be added to table 1, for the human mind and its capacity for knowledge are limited. The Qur'an classifies intellect into the guided mind (*`aql rushd*) and the conceiving mind (*`aql idrak*), which does not lead to guidance. This is why we need guidance to lead us to wisdom and the right path.

The ideas of data information, knowledge, and wisdom are more than simply a collection. They represent more than the sum of their parts and have a very close relationship in complement to each other. Each level has its own benefits and advantages, and so if they are joined together, they will produce a greater meaning and result.

Our sources and civilization have outlined the requirements to achieve wisdom: purification from associating others with Allah *(shirk)* or superstition, avoiding sin and injustice, following the Qur'an's teachings of and the Prophet's Sunnah, using the authentic and reliable sources, self-criticism *(muhasabah)*, repentance, and perseverance. Islam also encourages humanity to observe and contemplate Allah's creation and search for the truth through thinking, provided that it is in line with the Shari`ah. Many Qur'anic verses stress this point, among them the following:

> It is not (possible) that a man to whom is given the Book, and wisdom and the prophetic office, should say to people: "Be my worshippers rather than God's." On the contrary (he would say): "Be worshippers of Him who is truly the cherisher of all, for you have been taught the Book and have studied it earnestly." (3:79)

> We bestowed (in the past) wisdom on Luqman: "Show (your) gratitude to Allah." Anyone who is grateful does so to the profit of his own soul; but if any is ungrateful, verily Allah is free of all wants, worthy of all praise. (31:12)

In this verse, wisdom refers to a deep understanding of Islamic laws, knowledge, and science, as well as comprehension and contemplation of Allah's creation.[57] In relation to this verse, Luqman, who was given wisdom by Allah, advised his son not to associate Allah with other creatures, as this is considered the greatest injustice, and to treat parents with kind-

ness, perform the prescribed prayers, enjoin what is right and forbid what is wrong, be patient and constant when facing trials, and not to be arrogant.

> This is a Book (the Qur'an) that We have sent down to you, full of bless-ings, that you may ponder over its verses and that men of understand-ing may engage in remembrance. (38:29)

> God did confer a great favor on the believers when He sent among them an apostle from among themselves, rehearsing unto them the signs of God, sanctifying them, and instructing them in scripture and wisdom, while before that they had been in manifest error. (3:164)

In our own time, ICT tools can be used and exploited to speed up the processes of knowledge and wisdom diffusion. This can be done through knowledge sharing with colleagues and others in such learning activities as instruction, sharing, and self-study. Hong and Kuo write that these sharing activities include, among others, study circles, on-the-job training, Internet applications, and attending seminars as well as technology exhibitions.[58]

The learning process and experi-ence (figure 2) must follow from unfil-tered data to information, knowledge, intelligence, and wisdom. Muslim scholars, as they kept themselves more knowledgeable, also kept themselves much closer to Allah. Thus, in their learning process and experience, they were able to achieve intelligence and wisdom (i.e., they were wise and had compassion). Allah has taught humani-ty how to achieve the level of wisdom. The Qur'an refers to them as *ulu al-bab*:

Figure 2. Data to wisdom curve.
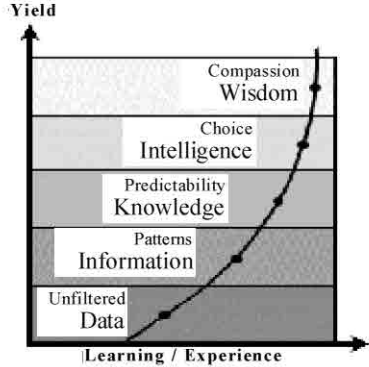
Yield = intellectual dividends per measure of effort invested. Examples: increased clarity, deeper understanding.

Source: Thomson, B. "Designing Knowledge Ecosystems for Communities of Practice: The Data to Wisdom" curve, 1997. Available at: www/co-I-1.com/coil/knowledge-garden/dkescop/dwcurve.shtml. (Oct. 30 2001)

> Men who celebrate the praises of God, standing, sitting, and lying down on their sides, and contemplate the (wonders of) creation in the heavens and the earth, (with the thought): "Our Lord! Not for nothing have You created (all) this! Glory to You! Save us from the penalty of the Fire." (3:191)

Conclusion

The relationship between knowledge and wisdom is complex. Generally speaking, knowledge is necessary but not sufficient for wisdom. One would not be considered wise if one were not knowledgeable, but knowledge does not always make one wise. In a sense, knowledge can be viewed as a double-edged sword with respect to wisdom. On the one hand, it provides people with the raw materials on which to reflect and enables them to derive more global principles and meanings – but only if the knowledge is kept in its proper context and does not "take humanity over," for science (means) can sometimes overpower our spiritual (ends) side. But on the other hand, knowledge can inhibit humanity's pursuit of wisdom if it acts to obscure perspective, just as individual intelligence can make people resistant to positive change. When this happens, it is necessary to unlearn certain things in order to regain perspective.

The importance of knowledge in Islam can be seen from how the Qur'an and *ahadith* stress and encourage people to gain knowledge. This can be seen in the lives of the Companions' and past Muslim scholars' efforts to develop knowledge, which later leads to wisdom. `Ali ibn Abu Talib is reported to have mentioned the benefits of knowledge over wealth. Some of his sayings are given below:

> These minds are receptacles of the secret of knowledge and wisdom, and the best receptacle is the one who can hold the most, and what he/she holds can be preserved and protected in the best way. ... Knowledge is better than and superior to wealth because it protects you and you have to guard wealth. Wealth decreases when spending while knowledge increases the more you make use of it. Anything you get through wealth disappears as soon as wealth disappears, but what you achieve through knowledge will remain even after your death. Knowledge is power and it can command obedience and following; a man of knowledge during his lifetime can make people obey and follow him and he is praised and venerated after his death; remember that knowledge is a ruler and wealth is its subject. Those who accumulate wealth though alive yet are dead to realities of life and those who gather knowledge will remain alive through their knowledge and wisdom even after their death; though their faces may disappear from the community of living beings, yet their ideas and knowledge which they had left behind and their memory will remain in the minds of men.[59]

The journey to achieve wisdom must begin with the input of data, information, and knowledge. Allah taught Prophet Adam the names of

things. In the first verses revealed to humanity (96:1-5), Allah revealed that He wants humanity to become knowledgeable and wise. The pen mentioned in the fourth verse can also mean "computer," another tool for disseminating information and knowledge. As we know, computers are very important tools for ICT.

Wisdom must be included to complete the missing puzzle of ICT. People, organizations, and the nation must end up putting wisdom as the ultimate goal: information society → knowledge society → wisdom society, and information workers → knowledge workers → wisdom workers. Wisdom is no doubt an ideal, but to aim for the ideal is the only way to improve our personality and society in implementing and using ICT.

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