KNOWLEDGE NETWORKS FOR CAPACITY BUILDING: A TOOL FOR ACHIEVING THE MDGS?

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"International institutions, country donors and the broader development community are rapidly coming to the conclusion that knowledge is central to development – that knowledge is development" [1].

BACKGROUND

In the last fifteen years more than US$1000 billion were invested in the water sector[2]. To achieve the targets of Vision 21, the current annual expenditures of around US$75 billion need to be further boosted to reach a level of about US$180 billion in 2025[3]. However, there was no corresponding investment in the local capacities to manage such infrastructure[4]. Up to one quarter of the investments made in water-related sectors by developing countries during last decades has been ineffective due to lack of governance and management capacity[5]. There is a growing consensus among policy-makers in the developing world that this lack of 'capacity' is a primary constraint on sustainable development and management of water services[6].

A good, illustrative example of the effect of capacity building can be taken from recent experiences with a pilot project in Indonesia[7], where Water User Associations (WUAs) were empowered through capacity building and where appropriate regulatory changes were made. Where conventional rehabilitation projects traditionally have had an Economic Rate of Return (ERR) of 10-18%, an economic analysis showed that, when an enhanced capacity of the WUAs was realized, the ERR rose to 30-40%. The conclusion seems to be justified that the social capital of the water sector is the "heart of the matter" while the works are the "vehicle" through which the capacity is built.

DEFINITIONS
Capacity Development

The definition of capacity building is still in a stage of formation[8]. Some development agencies use a narrow definition focused on strengthening organizations and skills, while others use a much broader definition that encompasses the level of capacity of individuals to the extent of the whole of society[9].

According to UNDP, capacity development is the process by which individuals, organizations, institutions and societies develop abilities (individually and collectively) to perform functions, solve problems and set and achieve objectives[10]. Within the water sector Capacity Building is defined as the

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[1] World Bank. 1998. Knowledge for Development, World Development Report no. 21, World Bank, Washington, DC. http://www.worldbank.org/wdr/wdr98/index.htm

[2] World Bank. 2004. Water Resources Sector Strategy: Strategic Directions for World Bank Engagement. Policy Paper 28114. The World Bank. Washington

[3] Cosgrove, W.J. and Rijbersman, F.R. 2000: World Water Vision: Making Water Everybody's Business. World Water Council, Earthscan Publications Ltd., London.

[4] Grey, D. and Sadoff, C. 2005. Water Resources, Growth and Development: A Working Paper for Discussion Prepared by The World Bank for the Panel of Finance Ministers The U.N. Commission on Sustainable Development. 18 April 2005. Washington

[5] Alaerts, G.J. 1999. Capacity Building as Knowledge Management: Purpose, definition and Instruments. In: Alaerts, G.J., Hartvelt, F.J.A. and Patorni, G.M. (eds), 1999. Water sector capacity-building: Concepts and instruments. Proceedings of the Second UNDP Symposium on Water Sector Capacity-Building, Delft, The Netherlands.

[6] Alaerts, G.J., Hartvelt, F.J.A. and Patorni, G.M. (eds), 1999. Water sector capacity-building: Concepts and instruments. Proceedings of the Second UNDP Symposium on Water Sector Capacity-building, Delft, The Netherlands.

[7] World Bank. 2003. Water resources and irrigation sector management project. Appraisal Document. The World Bank. Washington.

[8] Lusthaus, C., Adrien, M.H., and Perstinger, M. 1999. Capacity Development: Definitions, Issues and Implications for Planning, Monitoring and Evaluation. Universalia Occasional Paper. No. 35, September 1999. Montreal. Canada

[9] Whyte, A. 2004. "Human and Institutional Capacity Building: Landscape Analysis of Donor Trends in International Development." Report to the Rockefeller Foundation. New York.

[10] UNDP. 1997. Capacity development, Technical advisory paper 2. New York, United Nations Development Programme – Management Development and Governance Division, Bureau for Policy Development. New York.

process to provide individuals, organizations, and the other relevant institutions with the capacities that allow them to perform in such a way that the sector as an aggregate can perform optimally, now as well as in the future[11]. In that sense, a nation's capacity can be defined as the combination of three distinct levels:

- An appropriate policy and legal framework (the enabling environment),
- Effective, flexible and adaptive organizations (institutional capacity), and
- Individual capacities (human resources).

Three levels of capacity building, its activities, outputs and goals are described in the figure 1.
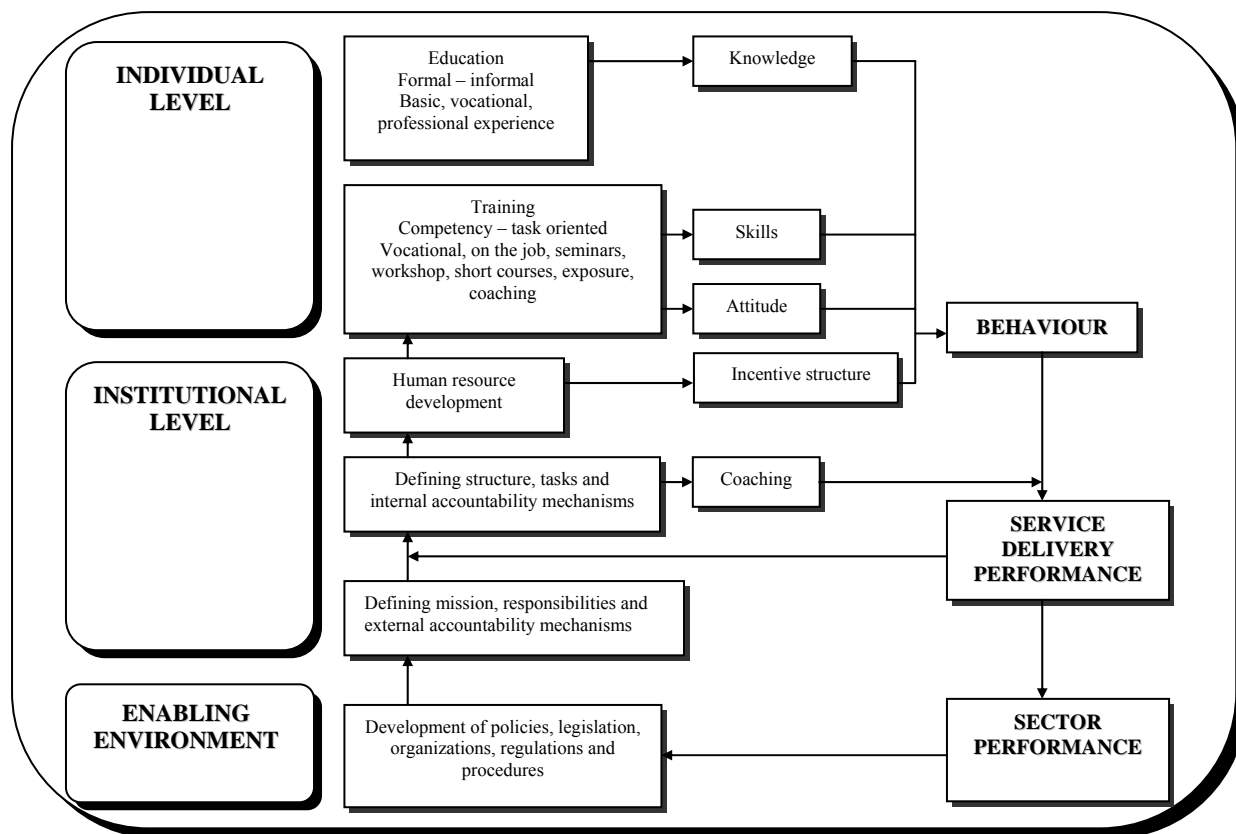

Figure 1. Capacity development: Levels, activities, outputs and goals[12]

Capacity requires a broad and holistic view on the central concerns of management to:
- manage change,
- resolve conflict,
- manage institutional pluralism,
- enhance coordination,
- foster communication, and
- ensure collection, analysis, and sharing of data and information.

Knowledge Management
As knowledge plays a central role in capacity building it is found useful to take advantage of the theory and practices of Knowledge Management. Also here the definitions and theories of knowledge tend to be embedded in vague and general terms as knowledge is difficult to observe as an empirical phenomenon[13]. Probably the most authoritative definition is provided by Nonaka, who defines

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[11] Alaerts, G.J., Hartvelt, F.J.A. and Patorni, G.M. (eds), 1991. A Strategy for Water Sector Capacity Building. UNDP/IHE, International Institute for Hydraulic and Environmental Engineering Report-24, New York/Delft.

[12] Van Hofwegen, P. 2004. Capacity-building for water and irrigation sector management with application in Indonesia. Capacity Development in Irrigation and Drainage Issues, Challenges and the Way Ahead. FAO Water Reports, 26. Food and Agriculture Organization of the United Nations. Rome

[13] Visser, M. 2002. Managing knowledge and action in organizations; towards a behavioral theory of organizational learning. EURAM Conference. Organisational Learning and Knowledge Management. Stockholm. Sweden.

knowledge as "justified true belief that increases an entity's capacity for effective action" following a concept introduced by Plato. He distinguishes between "explicit" knowledge and "tacit" knowledge. The first form of knowledge "can be expressed in facts and numbers and can be easily communicated and shared in the form of hard data, scientific formulae, codified procedures, or universal principles." The second form, however, "is highly personal and hard to formalize. Subjective insights, intuitions and hunches fall into this category of knowledge." Nonaka further distinguishes two dimensions of tacit knowledge: a technical dimension, consisting of skills and know-how, and a cognitive dimension, consisting of mental models, beliefs, values and perceptions[14][15][16]. Weggeman[17] regards knowledge as an artificial production factor (commodity) on the same level as natural resources, labour and capital. Knowledge is considered as a property of individuals and defined as "a (personal) capability that is the product of Information, Experience, Skills and Attitudes a person possesses at a given moment: $K = I \times ESA$". The I (information) corresponds to explicit knowledge, while the ESA (experience, skills and attitudes) constitute the more implicit, tacit dimension of knowledge.

The term of Knowledge Management (KM) was for first time addressed at a 1986 European management conference sponsored by the International Labour Organisation of the United Nations[18]. Knowledge management focuses on conceptualizing the processes of knowledge creation, and refining and developing practices to manage them[19][20][21][22]. In spite of its growing popularity, there is no universally agreed definition yet. Box 1 highlights some of common definitions on KM[23].

Box 1. Some Definitions On Knowledge Management

For Liebowitz and Wilcox (1997)[24] Knowledge management is the explicit control and management of knowledge within an organization aimed at achieving organizational objectives. Knowledge management entails:

- Formulating a strategic policy for the development and application of knowledge,
- Executing the knowledge policy with the support of all parties within the organization, and
- Improving the organisation where knowledge is not optimally used or is not adapted to changing circumstances.

According to Beijerse (1999)[25] Knowledge management is achieving organizational goals through the strategy-driven motivation and facilitation of (knowledge) workers to develop, enhance and use their capability to interpret data and information, experience, skills, culture, through a process of giving meaning to these data and information. While for Wiig (1997)[26] it is the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets

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During the last decades knowledge management has enjoyed an increasing popularity across disciplines and industries all over the world. Management scholars begin to proclaim the possibility of

[14] Nonaka, I. 1991. The knowledge-creating company. Harvard Business Review 69(6), 96-104

[15] Nonaka, I. and Takeuchi, H. 1995. The knowledge-creating company; how Japanese companies create the dynamics of innovation. New York: Oxford University Press

[16] Nonaka, I. and Konno, N. 1998. The concept of "Ba"; building a foundation for knowledge creation. California Management Review 40(3), 40-54

[17] Weggeman, M.C.D.P. 1997. Kennismanagement. In-richting en besturing van kennisintensieve organisaties. Schiedam, The Netherlands. In Beijerse, R. 1999. Questions in Knowledge Management: defining and conceptualising a phenomenon.

[18] Wiig, K.M. 1997. Knowledge Management: Where Did It Come From and Where Will It Go? Expert Systems With Applications, Vol. 13, No. I, pp. 1-14

[19] Nonaka, I. and Takeuchi, H. 1995. The knowledge-creating company; how Japanese companies create the dynamics of innovation. New York: Oxford University Press

[20] Sveiby, K.E. 1997. The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets. San Francisco: Bennet-Koehler Publishers, Inc.

[21] Davenport, T.H. and Prusak, L. 1998. Working knowledge: How organizations manage what they know. Boston, MA: Harvard Business School Press.

[22] Leonard-Barton, D. 1995. Wellsprings of Knowledge. Building and Sustaining The Sources of Innovation. Boston, MA: Harvard Business School Press.

[23] He, J.W., Lee, J.N. and Hsu, C. 2003. The Evolution of Knowledge Management: Current and Future Application in China. In: Proceedings 7th Pacific Asia Conference on Information Systems, 10-13 July 2003, Adelaide. Australia

[24] Liebowitz, J. and Wilcox, L. (eds.) 1997. Knowledge Management and Its Integrative Elements. Boca Raton: CRC Press.

[25] Beijerse, R. 1999. Questions in Knowledge Management: defining and conceptualising a phenomenon. Journal of Knowledge Management. Volume 3, Number 2, pp. 94-109. MCB University Press.

[26] Wiig, K.M. 1997. 'Knowledge management: Where did it come from and where will it go?' Expert systems applications, Vol. 13, no. 1, pp. 1-14.

KM becoming 'the most universal management concept in history' (Takeuchi, 2001[27] as reported in Zhu, 2004[28]).

Knowledge creation
Starting point is the well-known SECI (Socialization–Externalization–Combination-Internalization) model of cyclical knowledge creation. Nonaka et al. adopt an epistemological dimension in their model, distinguishing between tacit and explicit knowledge that are continuously converted in a social learning process. The interplay between the two types of knowledge leads to processes of knowledge conversion, expansion, and innovation.

Knowledge is created in a continuous cycle of socialization, externalization, combination, and internalization, in which knowledge is produced (see Figure 2). Socialization is the process of creating new tacit knowledge out of existing tacit knowledge through shared experiences, for example in informal social gatherings. Socialization leads to sympathized knowledge. Externalization is the process of converting tacit knowledge into explicit knowledge, for example concept creation in new product development. Externalization leads to conceptual knowledge. Combination converts explicit knowledge into more complex and systematic sets of explicit knowledge, called systemic knowledge. This is where databases and computer-supported analysis comes in. Internalization, finally, is the process of turning explicit knowledge into tacit knowledge, for example by training. This type of knowledge is called operational knowledge.
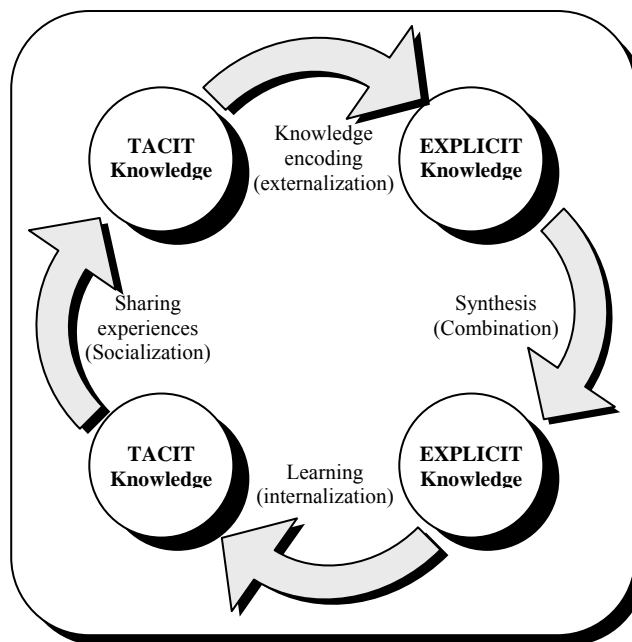

Figure 2. Types of knowledge and the knowledge creating process (conversion)[2930]

KNOWLEDGE MANAGEMENT FOR CAPACITY DEVELOPMENT
Knowledge is intimately linked to all three levels of capacity previously discussed, and its knowledge base relates to the acquisition, archiving and analysis of the already huge and still growing amount of data and information. These data are encapsulated explicitly in every human artefact: databases, documents, models, procedures, tools, and its knowledge base also includes implicit or tacit knowledge inherent in people, namely their skills, experience and natural talents to understand, create and apply

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[27] Takeuchi, H. 2001. Towards a universal management concept of knowledge. In Nonaka, I. and Teece, D. (Eds.) Managing Industrial Knowledge, pp 315–329, Sage, London.

[28] Zhu, Z. 2004. Knowledge management: towards a universal concept or cross-cultural contexts? Knowledge Management Research & Practice (2004) 2, 67–79. doi:10.1057/palgrave.kmrp.8500032. Published online 27 May 2004

[29] Nonaka, I. and Takeuchi, H. 1995. The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. Oxford University Press.

[30] Nonaka, I. , Toyama, R. Konno, N. 2000. SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation. Long Range Planning 33, 5-34.

knowledge. In this way implicit knowledge becomes a synonym for capacity-to-act or a competence to solve problems. This emphasizes that implicit knowledge is contextual, and it underlines the importance of local, traditional or indigenous knowledge.

The differences between KM and CB are more related to the environment in which they used and applied. KM operates in an environment with relatively strong institutions and where knowledge is considered a constraining factor for further development and improved efficiency of the organization, CB primarily deals with environments with weak institutions and poor governance. Thus, KM tends to be oriented to industrialized economies and mature corporations, while CB focuses more on developing countries where the challenges are as much a matter of effectiveness as of efficiency. CB will therefore have a greater interest in public administration and behavioral sciences than KM, and will have lower propensity to rely on more powerful ICT as the contextual knowledge to properly benefit from ICT may not always be available. Nonetheless, the basic questions are the same, i.e., how decision-making processes can be improved, and how tasks can be executed properly, by applying appropriate knowledge that has been collected in raw form or acquired through sharing in networks.

For capacity development, knowledge management offers a number of new opportunities. Over the past years, increasing attention has been given to the role of information and knowledge in enhancing the capacities of organizations and the sector. Organisations within the water sector are becoming more conscious of the use of knowledge within them and also how it is to be shared with the outside world: other organisations and individuals. This focus on knowledge is certainly not out of place because capacity development initiatives are comprised of knowledge-based practices[31]. It is recognised that information and knowledge can contribute to improving the performance and effectiveness of both individuals and organizations, provided that there is a basic capacity in place to manage this resource. The capacity to manage information and knowledge needs to be viewed as an integral part of organizational capacity building strategies. As knowledge is becoming the main source of an organization's competitive edge, so will be the access to knowledge.

ICT as a catalyst for Networking

Many emergent phenomena of our present world are the direct consequence of the enormous advances made in Information and communication technologies (ICT) during the last 50 years. For example, globalisation, which is seen as such a threat to many local communities, owes its pervasiveness to the world-wide networks that provide instant communication, including Internet. Along with the disadvantages come the advantages of the 'death of distance'[32] as a determining factor in human communications. More routinely, there has emerged the ability to access data, information and knowledge in ways that would have astounded our grandparents. Video conferencing is commonplace. We can work and learn together in a collaborative way remotely from each other. New e-learning tools mean that we can experience a sophisticated, interactive learning experience in the comfort of our own homes. Gradually we are seeing the take up of the merger between television, the mobile phone and the computer. This all provides huge changes for the next generations of learners.

However, universal access to data, information and knowledge clearly does not yet exist, and for many developing countries, it is still a distant aspiration. Access to ICTs, notably the telephone, mobile phone, internet and broadcast networks, remains unequally distributed. There are, for example, more computers in Brazil, more fixed line telephones in Italy, more mobile phones in Japan and more internet users in France, than in the whole continent of Africa. Yet the population of Africa and the needs of its people greatly exceed those of these other countries[33]. However, despite problems, access by developing countries to the World Wide Web is growing fast. Latin America is a clear example. It shows a rapid growth in connections to the World Wide Web with more than 100 million connected to Internet at the turn of last century. However, the challenging question is how much can or will be made of the Internet for educational purposes and learning. Despite the incipient development of ICT in Africa, a successful case of a network in southern Africa (WaterNet) is described in the Box 2.

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[31] Cummings, S., Heeks, R., and Huysman, M. 2003. Knowledge and Learning in Online Networks in Development: A Social Capital Perspective. Development Informatics. Working Paper Series. Paper No. 16. Institute for Development Policy and Management. University of Manchester. Manchester. UK.
[32] Cairncross, F. 1997. The Death of Distance. Harvard Business School Press.
[33] ITU. 2004. World Telecommunication Indicators Database. International Telecommunication Union. Geneva.

Although technology alone is not enough, Information and Communication Technology (ICT) is crucial to support knowledge management activities. ICT for knowledge management includes in principle three kinds of systems: systems to support knowledge storage, like knowledge and information systems, systems that help to improve knowledge processes, and systems that improve organisational learning. Besides there are also systems that can combine the functionality of more than one of the systems mentioned above such as groupware systems, internet and intranet, and Lotus Notes.

Box 2. WaterNet

WaterNet is a UNESCO-IHE supported regional network of university departments and research and training institutes specialising in water. Its mission is to enhance regional capacity in Integrated Water Resources Management (IWRM) through training, education, research and outreach by sharing the complementary expertise of its members, based in Botswana, Kenya, Lesotho, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

Strategy:

A network for capacity building in IWRM

- Raising awareness
- Stimulating regional cooperation
- Increasing accessibility to training and education in IWRM
- Stimulate and strengthen research in IWRM in Southern Africa

Results so far:

- To raise awareness, an annual Symposia has been held since 2000. Its number of participants have been increased from 45 in 2000 to 150 in 2003 whereas the number of scientific papers increased from 30 to 90 in the same period. The best papers are published in Physics and Chemistry of the Earth, an Elsevier international peer reviewed science journal.
- A modular Master Degree Programme with five specialisations (water resource management, hydrology, water and environment, water for people and water and society) has been developed. Water managers from 11 countries have been awarded with 83 full Master Scholarships to pursue it.
- English language courses have been offered to ease the access to the courses delivered to participants from non-speaking English countries of the area.

- Collaborations with WSP-SA and Cap-Net to facilitate training for GWP-SA's Country Water Partnerships in compiling IWRM plans committed to be set in the WSSD action plan from Johannesburg.
- Research is being stimulated through WaterNet's symposia, staff exchange between institutions in the region, the Master thesis research projects supported from the WaterNet Fellowship Fund, and the collaboration with WARFSA (Water Research Fund for Southern Africa) resulting in some synergies in research support.

Source: WaterNet (2005)
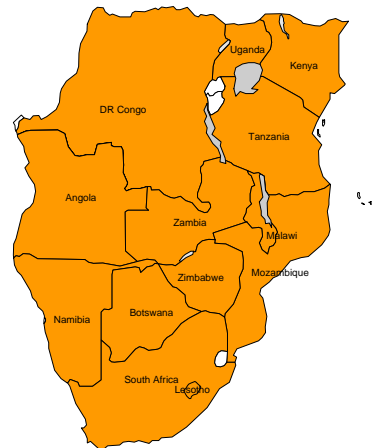
NETWORKING FOR SOCIAL LEARNING

The network paradigm is a seductive vision to solve all the above ills in one go: why not connect the North with the South and cross-connect all the involved actors with networks? With such linkages, activities could be coordinated, knowledge could be shared between North and South as well as within and among the countries of the South, best practices could be exchanged, and common standards and procedures developed. Many have succumbed to this alluring vision and countless networks exist in the development sector[34].

With the growing recognition that most learning is informal, and that connecting people can help sharing knowledge, the focus has become on human groupings under various labels, like communities of ideas[35], communities of practice (CoPs)[36], formal knowledge networks and virtual teams[37], knowledge networks[38], thematic networks[39], virtual knowledge communities[40], international networks

[34] Resource Centre for Development, Skat Foundation. 2004. International networks for knowledge sharing: lessons learnt Unpublished paper, 10pp http://www.skat-foundation.org/publications/pdf/ks-network-summary.pdf

[35] Engel, P.G.H. 1997. The social organisation of innovation, a focus on stakeholder interaction Royal Tropical Institute: Amsterdam, 239pp

[36] Wenger, E. 1997. Communities of practice: learning, meaning and identity. Cambridge University Press: Cambridge, 318pp

[37] Willard, T. 2001. Helping knowledge networks work, Version 1.0, International Institute for Sustainable Development: Winnipeg https://doc.telin.nl/dscgi/ds.py/Get/File-23047/social_capital_gigacscw_final.pdf

[38] Box, L. 1990. 'From common ignorance to shared knowledge: knowledge networks in the Atlantic Zone of Costa Rica' Wageningse sociologische studies No. 28, Wageningen University: Wageningen

[39] International Institute for Communication and Development (IICD) website. http://www.iicd.org/thematics/

for knowledge sharing[41] and thematic groups[42]. Learning, particularly social learning in groups and organisational learning is the key. Social (or collective) learning, fundamental to how development practices are improved, is key for these networks. They have emerged nowadays as a principal organizing concept in sharing knowledge. The physical interaction of participants is usually found to be essential in launching such communities or networks, but once they are launched, technology can extend the reach of a network around the globe. ICT is becoming a catalyst in this process. ICT makes it possible to get access to global information in a way that was never possible before[43].

Organizations and groups of professionals are taking advantage of the opportunities offered by the new technology to initiate these communities and networks. They are used to upgrade the quality of the activities, outputs and impact of organisations, to facilitate a collective learning process, and to contribute to a 'shifting up' to an international audience[44]. An example of the growth in the number of communities can be demonstrated with the example of Cap-Net (http://www.cap-net.org), a UNDP project for capacity building in Integrated Water Resources Management (See Box 3).

Box 3. Cap-Net

Cap-Net is an international network made up of autonomous international, regional and country networks and institutions committed to IWRM capacity-building. The networking concept is being used by Cap-Net to bring cooperation and coherence to scale up capacity-building in water management. To date, the programme has trained 550 trainers, who have in turn impacted thousands of decision-makers, water managers, and fellow capacity builders – exponentially increasing capacity in IWRM. The programme has addressed issues such as legal and institutional reform, conflict resolution, IWRM planning, gender and water, and other aspects of IWRM are to follow.

Source: Cap-Net[45]

- 20 geographic networks and 4 thematic networks affiliated with Cap-Net.
- Over 1,000 member institutions organized in regional and country networks.
- 55 planned network training events and education programmes.
- 9 operational topic or geographic e-discussion groups on capacity-building in Integrated Water Resources Management (IWRM).

According to Engel[46] one of the main problems constraining the development of sustainable solutions is the one-sidedness of many social and institutional learning processes. Many theories and practices promote linear and exclusive ways of thinking and one-dimensional 'rationalisation' rather than empowering people to apply multiple rationalities, so that they can adapt themselves effectively to rapid changing circumstances. Innovation however has to be approached as a process of interplay among social actors from relevant social practices. This interplay is a diffuse social process which

[40] Cummings, S., van Dam, H., Hardon, A., Hessels, P., Kooijman, M., van Leent, M., Pumplin, P. and Minnee, T. 2005. 'Information management partnerships for development: some experiences and virtual perspectives' IAALD Quarterly Bulletin In press

[41] Resource Centre for Development, Skat Foundation. 2004. International networks for knowledge sharing: lessons learnt Unpublished paper, 10pp http://www.skat-foundation.org/publications/pdf/ks-network-summary.pdf

[42] World Bank website. World Bank Institute Thematic Groups. http://www.worldbank.org/ks/

[43] Cummings, S. and van Zee, A. 2005. Communities of practice and networks: reviewing two perspectives on social learning KM4D Journal 1(1): 6-21 www.km4dev.org/journal

[44] Engel, P.G.H. 1997. The social organisation of innovation, a focus on stakeholder interaction Royal Tropical Institute: Amsterdam, 239pp

[45] Cap-Net. 2005. Annual Report Project No. GLO/02/115 2004. United Nations Development Programme. http://www.cap-net.org/file_aboutCapnet/3_1_Annual_Report_2004.doc

[46] Engel, P.G.H. 1997. The social organisation of innovation, a focus on stakeholder interaction Royal Tropical Institute: Amsterdam, 239pp

leads to new or modified problem definitions and practical solutions. It can be qualified as networking in-and-between relevant social practices. Over time, this process of networking may lead to the gradual development of a pattern of more or less durable relationships among a number of social actors who perceive each other as relevant. Therefore, we need to introduce the concept of networking[47]. Advantages of this are that the concept of networking entails explicit recognition of ourselves as social beings, and it is connected to our concern for sustainability, since this can only be achieved where people have worked out a way of interacting with each other.

The interest in networking for learning has been growing during recent years. The term 'network' is now a buzzword in the field of international development[48]. Creech and Willard[49] recognise four fundamental drivers behind this interest:

- The emergence of ICTs in the 1980s and 1990s has made (global) networking much easier. Global information exchange and learning with people from different parts of the world has become accessible for large parts of the world.
- A sense of urgency: the growing complexity and inter-relatedness of major social, economic and environmental problems and the failure of some of the former approaches to solve issues like HIV/AIDS, environmental degradation and poverty alleviation makes multi-stakeholder and widespread learning unavoidable and highly needed.
- A sense of frustration: among public and academic actors because of the lack of impact that relevant research has had on public policy recently.
- Due to the private sector experiments with knowledge management and the impact on the private sector, the public sector and civil society organisations have also become interested in it.

NETWORKING FOR DEVELOPMENT

Recent field research by Pinzás and Ranaboldo[50] points out that networking knowledge for development produces its most significant results if the network develops itself into a space for innovation, experimentation and learning. The sum total of learning-oriented networking initiatives in any particular field or region provides civil society with a critical 'cortex' that enables it to go beyond the intuitive and beyond individual interests. It helps channelling the knowledge and experience gained through local initiatives, into higher levels of shared understanding and improved policy advocacy. In a way, it provides the meshwork of thinkers and doers that permits civil society to learn from experience, to develop its own knowledge base and to transform it into original policy proposals, without having to adhere to 'one-size-fits-all' approaches and solutions. In that sense learning-oriented networks represent civil society's answer to the challenges of the emerging knowledge society (see also Engel and van Zee[51]). Donors should recognise this central role of networking initiatives in boosting the knowledge base, learning processes and the civil society actors' capacity to generate and advocate proposals, and relate their funding to the relative importance they attach to it. Capacity development, institution building, advocacy and societal change, to name just a few, are unthinkable without a considerable investment in improving networking and learning among relevant development actors. Donors should invest in learning-oriented networking amongst their partners because they want to enable civil society both globally and locally to play a strong role in shaping the ideas and knowledge that determine our future. Besides, such investments are vital to sustain their own learning; sponsoring learning-oriented networking can not be lacking in donors' global knowledge for development strategies[52].

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[47] Engel, P.G.H. 1993. 'Daring to share: networking among non-government organisations' In: Linking with farmers, networking for low-external-input and sustainable agriculture ILEIA: Leusden

[48] Perkin, E. and Court, J. 2005. Networks and policy processes in international development: a literature review Unpublished paper

[49] Creech, H. and Willard, T. 2001. Strategic intentions: managing knowledge networks for sustainable development International Institute for Sustainable Development: Winnipeg, 150pp

[50] Pinzás, T. and Ranaboldo, C. 2003 ¿La union hace la fuerza? Estudio sobre redes en el desarrollo sostenible ICCO: Lima and La Paz

[51] Engel, P.G.H. and van Zee, A. 2004. Networking for learning: what can participants do? European Centre for Development Policy Management: Maastricht

[52] Cummings, S. and van Zee, A. 2005. Communities of practice and networks: reviewing two perspectives on social learning KM4D Journal 1(1): 6-21 www.km4dev.org/journal

Networking among scientists and professionals has become the new model to tackle capacity building and offers great challenges to developing countries. But access to global information without knowledge of the local situation and context has little sense. Therefore creating international networks of professionals and communities of practice that share best practices and lessons learned from both the South and the North could be a very efficient way to this end. When they function well they provide suitable knowledge 'just in time' and 'just enough', and the beneficiaries have a much stronger sense of ownership.

Moreover through such networks, developing countries can learn directly from each other by sharing indigenous knowledge and recent development successes and failures as well as from donor-country experts. In this way the traditional "expert → counterpart" model assuming a one-way flow of knowledge from the North to the South will be replaced by the two-way flow of knowledge, which allow professionals in developing countries to "scan globally and reinvent locally"[53]. At the same time it allows development institutions in the North to become more responsive to demand and knowledge flows in the South.

KNOWLEDGE NETWORKS
The "knowledge network" advantages over other individual or collaborative approaches to change are:
- Knowledge networks emphasize joint value creation by all the members within the network: moving beyond the sharing of information to the aggregation and creation of new knowledge;
- Knowledge networks strengthen capacity for research and communications in all members in the network; and
- Knowledge networks identify and implement strategies to engage decision makers more directly, linking to appropriate processes, moving the network's knowledge into policy and practice.

Knowledge networks tend to be more focused and narrowly-based than information networks; more cross-sectoral and cross-regional than internal knowledge management networks; more outward-looking than communities of practice; and they involve more partners than some strategic alliances.

Several operating principles are characteristic for Knowledge networks:
- They are purpose driven.
- They are working networks.
- They require institutional commitment beyond the participation of individuals and experts with regard to accountability, continuity and commitment of resources
- They are built on expertise, not just interest.
- They are cross-sectoral and cross-regional.
- They develop and strengthen capacity in all members.
- They are communications networks.

Main Building Blocks

Hereafter some essential conceptual and system elements for the development of a network will be elaborated. The first concept is the notion that "providers" and "consumers" of knowledge should be brought together to enhance an effective knowledge transfer process. Maybe the most important building block of Knowledge Networks is the so-called "community of practice". It is argued that this is the place where knowledge is generated, shared and disseminated. The third building block is the concept of Internet-based learning and education. With respect to dissemination of knowledge it is observed that both formal education and (informal) learning are changing rapidly due to the availability of modern ICT tools. Finally the concept of an internet-based, interactive platform is introduced as a promising knowledge management tool to offer functionalities and to deliver services to the members of the network.

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[53] Fukuda-Parr, S., C. Lopes, K. Malik. 2002. Capacity for Development. New Solutions to Old Problems. UNDP, Earthscan, London. http://capacity.undp.org/books/book1.htm

**Box 4. Nile Basin Capacity Building Network (NBCBN)**

The Nile Basin Capacity Building Network for River Engineering (NBCBN-RE) was established in 2002 as a regional knowledge network to strengthen the human and institutional capacity of the Nilotic States to manage the water resources in the Basin. Members are water sector individuals and institutions from all 10 Nile Basin countries. Over 200 water professionals are collaborating in 13 Communities of Practice.

Special focus is on building an environment for stimulating and supporting collaborative applied research. In parallel to the node (in-country) development activities, the network supports the development of joint regional research clusters in which in principle professionals from all 10 Nile basin countries are participating. Six country nodes act as the host institution for a particular regional research cluster: Egypt (GIS and Modelling), Ethiopia (River Structures), Sudan (River Morphology), Tanzania (Hydropower), Uganda (Environmental aspects) and Kenya (Flood Management).

Regular research cluster events are being organized in each of these hosting countries. In between these face-to-face events, the researchers continue to interact over a custom-designed platform; (http://www.nbcbn.com).
This virtual meeting space allows people to work collaboratively, independently of when and where they work.
Source: Luijendijk et al. (2000)[54]
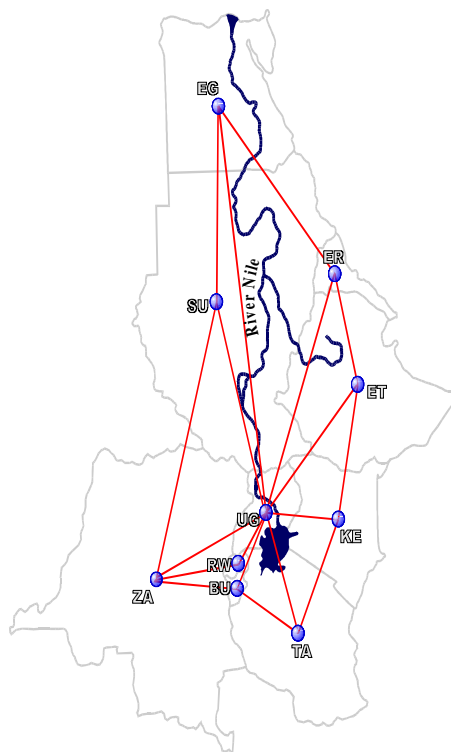
Building block 1: Providers and consumers concept

For every knowledge network it is essential to know where and what the problems are. Moreover it is equally important to get access to places where relevant knowledge is generated and produced. In both cases it is necessary to get direct access to the main players in the field: the water professionals active in both public and private water sector institutions (ministries, research institutions, water utilities, consultants and contractors) and local capacity builders (universities, poly-techniques, professional organisations, research and study teams). In other words, the success of the network depends on a sound interaction and communication between the 'providers' and the 'consumers' of knowledge.

Effective communication can only be achieved if the provider presents knowledge that the consumer has a desire to receive and in a form that the consumer can assimilate. Internet has opened up new opportunities for a two-way communication and collaboration. The establishment of a network will be in support of this opportunity. In particular, services can be tailored to meet the needs of the individual and the group. This feature is probably one of the most important benefits of Internet, and lies at the heart of the network initiative.

Main building block 2: Community of Practice

Knowledge Networks are primarily networks of people, who share a common interest, exchange ideas, and help each other. They often develop among people with a common (professional) background, but they can form around almost anything. Networks in general often have little sense of common identity. Although individuals within a network may meet frequently person-to-person, the whole network rarely meets or sees itself as a whole. Real interaction between people takes place in smaller groups called: "Communities of Practice" (CoPs). Communities of Practice are the places where real value is produced through sharing ideas, insight, information, experience and tools. (Wenger et al) Communities of practice are groups of people that gather around a common interest or theme, and deepen their knowledge by interacting on an ongoing basis.

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[54] Luijendijk, J., Boeriu, P. and Saad, M.B. 2000. Capacity Building in water sector in Africa. Proposal for a Nile river Network. In: Symposium proceedings "The Learning society and the water-environment". Paris, 2-4 June 1999.

Such communities are where people are attracted to share a common (technical) interest, where they learn, teach and trust each other, and invent and develop a common sense of purpose. In practice, all kinds of communities exist that have emerged of their own accord. They can consist of three, 20 or maybe 30 people that have found themselves drawn to one another by a force that is both social and professional.

A special type of communities of practice is the "distributed" community of practice. These communities cannot rely on face-to-face meetings and interactions since they link people across time zones, countries, organizational units, languages and cultures. They rely heavily on (ICT) technology. Since members have less contact it is more difficult to build trust and personal relationships, which are key for these communities to function. Communities of practice are seen as one of the most important drivers for building capacity of both individuals and organizations.

CoP's are becoming an important KM tool for an increasing number of multi-nationals (HP, BP, Chevron, Ford, Xerox, Shell, World Bank, etc). It is considerd as one of the best models to share "Soft Knowledge" through sharing experiences, and working knowledge. The CoP model is especially attractive for research groups and is an excellent model of adult learning.

The life cycle of a community of practice involves in principle five stages of development as indicated in the diagram below (Figure 3).These stages can be evaluated according to the three structural elements of a CoP: domain, community and practice[55].
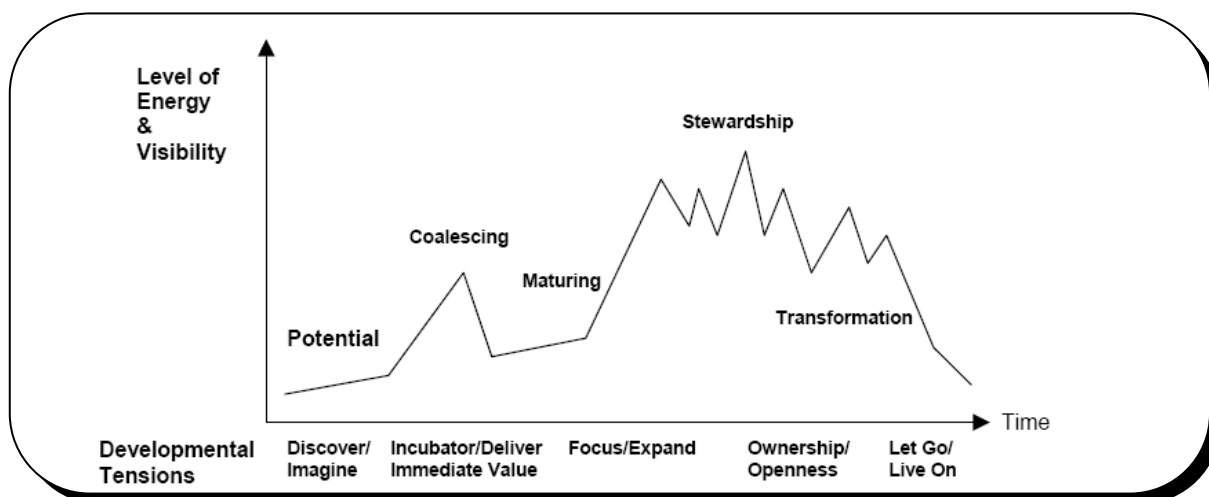

Figure 3. Stages of community Development[56]

Potential stage
CoPs continually evolve, but typically they start as loose networks that hold the potential of becoming more connected. During this initial stage a community must define its domain and its focus and make sure that the topic scope is broad enough to bring in new people and new ideas.

Coalescing Stage
Generating energy in the community is imperative so that members build connections and coalesce into a community. During this stage, the domain issue becomes one of generating energy about the topic(s) and the mutual value of sharing both tacit and explicit knowledge in that domain.

Maturing Stage
Once formed, the community membership and knowledge base grow through sharing knowledge and experience. When mature, communities go through cycles of high and low activity. During this stage the community's relationship among other domains and the total organization is defined.

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[55] Wenger, E., McDermott, R., and Snyder W. 2002. Cultivating communities of practice: A guide to managing knowledge. Boston, MA: Harvard Business School Publishing.
[56] Wenger, E., McDermott, R., and Snyder W. 2002. Cultivating communities of practice: A guide to managing knowledge. Boston, MA: Harvard Business School Publishing.

Stewardship Stage

During this stage communities face the main issue of sustaining momentum through the natural shifts in its practice, members, technology, and relationship to the organization. It continuously addresses its function in terms of relevance and strategic direction. The community must be vigilant in keeping the "tone and intellectual focus of the community lively and engaging" by introducing new topics, controversial speakers, joint meetings, or vendor and supplier sessions on new technologies.

Transformation Stage

Transformation occurs when a community comes to a natural or unnatural end because of "changing markets, organizational structures, and/or technology renders the domain irrelevant. The community may find greater value in merging with another CoP or splitting.

Main building block 3: Internet-based Learning & Education

One of the major changes that can be observed in the emerging knowledge society concerns the notions of learning, education and training. For centuries learning, education and training were clearly distinct activities, whereas nowadays there is a growing sense in which the boundaries between them are much less well defined. This is apparent as education and training programmes focus more on learning through problem solving, while the notion develops that professionals are destined to life-long learning. As both education and training are dealing with the conversion of knowledge, principles of knowledge sharing, group learning, collaborative working, group decision-making and e-learning can be applied to both students and professionals when it comes to learning. The challenge is how to make use of the Internet to open up new possibilities for learning.

Main building block 4: Knowledge platforms

Applying web-based knowledge management tools towards communities of practice will allow the basic functions to be handled more efficiently, and will allow the communities of practice to evolve into more holistic entities. True knowledge management platforms provide information/knowledge on critical work processes, while at the same time providing a medium to exchange and share ideas and thoughts about particular information/knowledge. Implementation of knowledge management platforms provides people and businesses with the opportunity to break through bottlenecks in information flow.
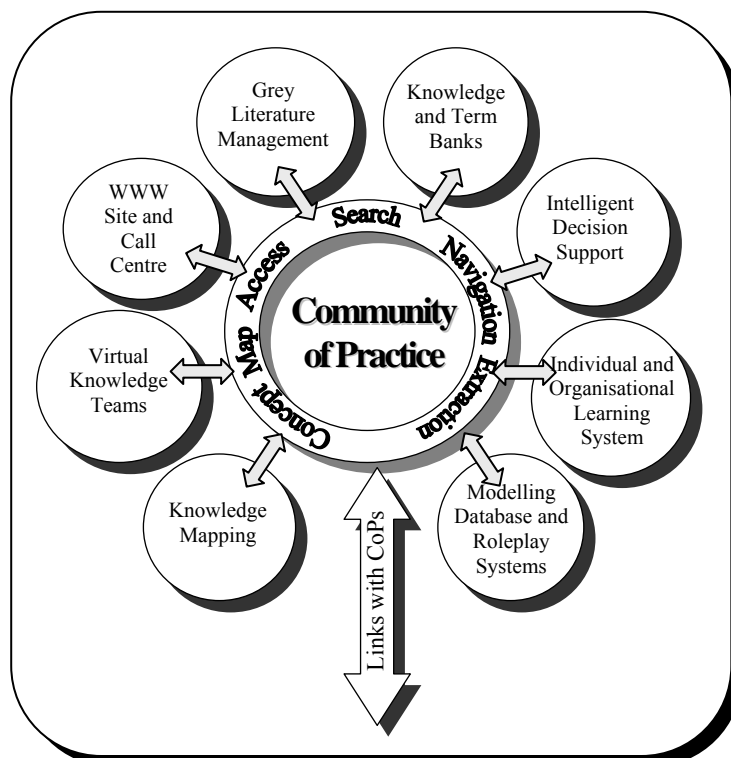

Figure 4. An example of a possible generic environment for communities of practice

However, to realise the benefits of a knowledge management platform, it is essential to break the barriers that depend on exclusive access to information: *people will need to share information rather than protect it*.

A well-managed platform becomes a place where people and information come together and generate new ideas, new ways of learning and education, new product-market combinations, and furthermore, more time for creativity. An example of a possible generic platform is shown in Figure 4.

It is envisaged that different communities of practice will develop their own platform with an appropriate set of functions. The closer the relations are between people the less they will require many of the functions from the platform. Although a community of practice is seen as the most powerful connection between people added value will be created when different communities of practice can be linked. In that case use can be made of the knowledge and information that is available in other communities. However, this will require more and better functions and asks for a better connecting infrastructure.

In thinking of more global and distributed networks one question is whether communities of practice can be scaled up through improved electronic communications. The other even more important question is whether a family of local communities can be developed towards a local, regional and eventually a global community structure or network. This is what UNESCO-IHE attempts with its global knowledge network (See Figure 5).
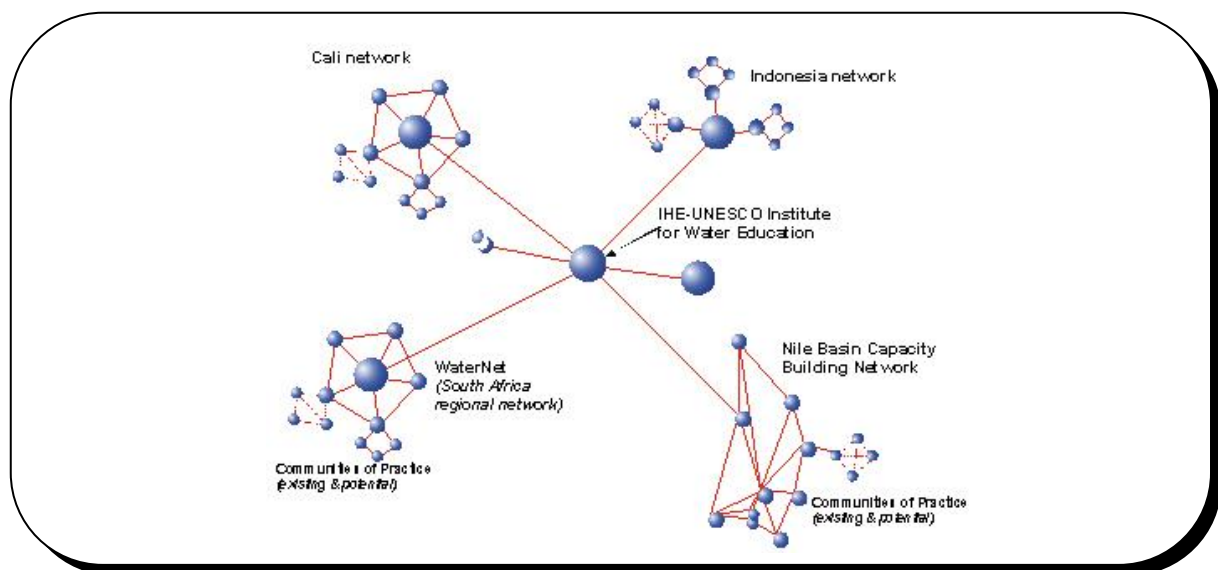

Figure 5. General Knowledge Network for Water Education and Research

KNOWLEDGE NETWORK APPROACH

As indicated in the previous chapters the mechanism to attain the project objectives is through activating the knowledge and learning cycle and facilitating a network development process for professionals so that it will contribute to the realisation of the international and regional development goals and to a sound socio-economic development of countries.

The main challenge for developing (and developed) countries is to enhance the speed of knowledge flow from the places where knowledge is available and generated (researchers) to the places where this (new) knowledge will be applied (users). In most developing countries the main parts of the knowledge chain are weakly developed: hardly any research tradition and culture, low level of co-operation among researchers and water-related sector professionals, weak water curricula at higher education level, seldom or none training opportunities in the region for mid-career professionals, and absence or low capacity of the private sector institutions and NGOs. It all can be summarized as a structural lack of capacity in the water-related sectors.

Box 5. CKNet-INA

The Collaborative Knowledge Network is a collaborative knowledge network consisting of 10 universities in Indonesia concerned with the human resources capacity building in the field of infrastructure, water and environmental management (IWEM). The overall main objective of the network is to strengthen the performance of the water sector in Indonesia and to support the Water Sector Reform activities. The particular focus is on building the capacity of Indonesian universities to deliver demand oriented training courses in the management of water resources and irrigation at national, regional and local level. Capacity Building programmes are implemented to enable the CKNet-INA partners to deliver demand responsive programs to strengthen the capacity of both professionals and institutions active in the water sector. It has established a communication network among network partners to mediate and facilitate the knowledge sharing activities among network partners in order to create and maintain an enhanced and up-to-date knowledge base in the field of IWEM in Indonesia. In the long-term it will expand the network by the creation of linked networks in every province in Indonesia.

Source: CKNet-INA (2005)

Through the creation and strengthening of the knowledge network and its related Communities of Practice the knowledge cycle process will be activated leading to a faster flow of knowledge towards the end users in the region. The network identifies, mobilizes and activates the individual and organisational capacities in the different institutions and countries, facilitates the process of sharing knowledge and experiences between people not only from the region but also with experts from the North, creates and supports opportunities for knowledge dissemination (training, education, workshops, seminars, etc), and guides people to become involved in the application of knowledge in the real, knowledge driven world, where quality is key to success.

The CoP's of the knowledge networks are considered as the places where knowledge on specific water issues is shared, created and to a certain extent disseminated. The network itself oversees and cares about the whole knowledge cycle process and has as its main function to deliver the infrastructure to connect the geographically dispersed knowledge elements. The ultimate challenge for the network will be to bring knowledge into application and so to contribute to improvement of the performance and innovative capacity of the water-related sectors. Figure 5 illustrates this concept by focussing on the value chain of both knowledge and people.
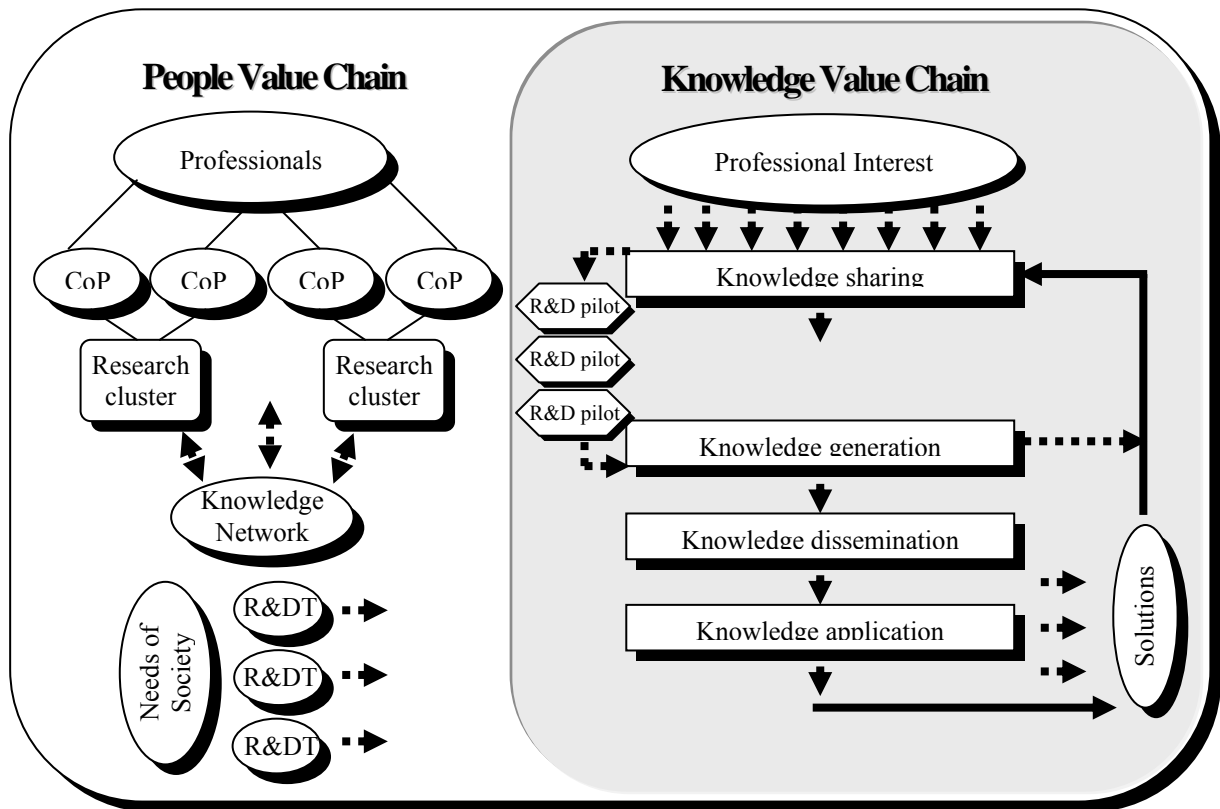
Figure 5   Knowledge flow through Networks, CoP's and project teams

In this network approach, typical Capacity Building components like Education, Training and Applied Research are integrated. The strength of knowledge networking is that it starts immediately with the places where the main knowledge exists: the professionals. These people will group in communities that will form together the back-bone of the network. This bottom-up approach is the main reason for the success of the networking concept. Experiences with the establishment of such networks have learned that once a certain level of trust, confidence, commitment and transparency have been reached the network will evolve quite fast. This is contrary to experiences with the traditional top-down approach. However, at a certain moment in the development process a more formal institutional embedding is needed to make the network more effective in delivering added value for the sector institutions and the water sector as a whole. Therefore it is crucial that at a certain moment more formal partnerships are formed between the capacity building institutions and with the professional sector institutions. This process is illustrated in the figure 6.
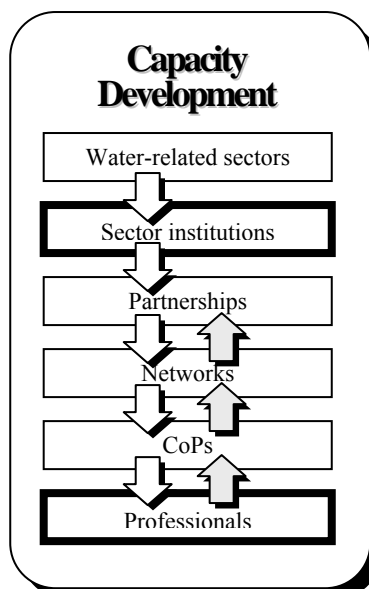

Figure 6. Institutional Framework for Capacity Building

LESSONS LEARNED IN NETWORKING

In developing knowledge networks associated with UNESCO-IHE the following lessons are considered essential:

- Network and communities should clearly define its domain
- CoP's form the main building block of a knowledge network
- Networks should focus on already existing communities
- CB networks should involve all water sector institutions
- Strategic partnerships create the environment for co-operation
- Joint applied research has a high potential for building capacity
- Networks should be open and easy to access
- Networks require co-ordination
- Effective network and community coordinators are key
- Building distributed communities require extra attention
- Critical success factors for network and community development

Participants from these networks have given value to different success factors included in the Box 6.

Box 6. Success factors in UNESCO-IHE associated networks
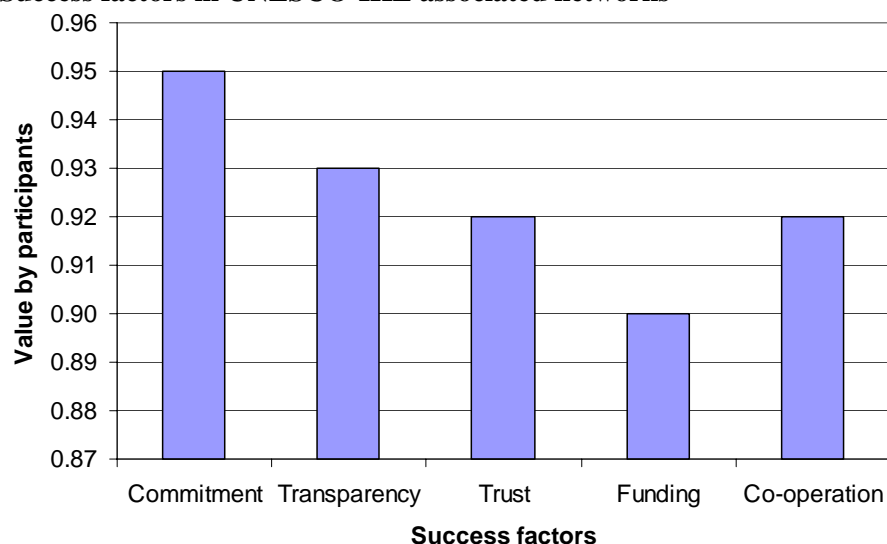
CONCLUSIONS

Knowledge management tools such as communities of practice and learning networks are important elements to support capacity development activities. Strategic partnerships within the water sector create the environment for co-operation. Activities intended to increase the knowledge base such as applied research under knowledge sharing circumstances has a high potential for building capacity among partners. It is crucial that all stakeholders are involved in these networks for capacity development, and that there is a high level of commitment of related institutions to successfully implement shared activities.

In spite the various types of building blocks required to successfully create, operate and maintain knowledge networks, Communities of Practice are the main building block of any of them. Therefore, attention must be paid to critical success factors such as the clear definition of their domain, their effective coordination network and the extra attention required while building distributed communities, as most of the presented cases are.

POTENTIAL OF KNOWLEDGE NETWORKING FOR ICID

The International Commission on Irrigation and Drainage (ICID) has all the elements required to be(come) and to function as a knowledge network. Hence, its potential is enormous. Yet, currently only a few percent of the potential target group is reached through its extremely valuable regional,

international and thematic meetings. However, the challenge is to extend the professional collaboration in between these face-to-face meetings. Therefore the authors of this paper suggest recommendations at three levels:

For ICID as a whole
- Make a dynamic Knowledge Map (better access to both explicit and implicit knowledge)
- Initiate and facilitate distributed CoP's
- Promote a better use of ICT

For its Working Group on Capacity Building, Training and Education (WG-CBTE)
- Promote and facilitate countries and communities to undertake Capacity Demand Assessment studies
- Collect and systematise case studies and best practices
- Develop capacity indicators and benchmarks at local level
- To promote on-line learning

For ICID members countries, organisations and individual members
- To contribute (with comments, cases and best practices) to the base-line document on Capacity Building and Social learning and to share and present "local actions" while suggesting (for co-convening) sessions in the Fourth World Water Forum (WWF4) to be held in Mexico.