KNOWLEDGE MANAGEMENT IN THE WATER SECTOR

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ABSTRACT

The Water Community in Solution Exchange (WCSE), India, is a Value Network that connects with the local communities and administration for design and implementation of societal water projects. This paper portrays WCSE in the perspective of, what the authors label, a Web 2.0 based Value Network dedicated to societal Water projects (W2W). It distills WCSE's experiences into a W2W management viewpoint by integrating the two distinguishing features of a W2W-Water and Web 2.0. Depiction and analysis of a case study of water initiatives facilitated through WCSE addresses the Water project dimension as distinct from general project management axioms. Synthesis of Value Network theory and personal insights of WCSE officials validated by a dipstick survey of its members leads into the Web 2.0 dimension. In conclusion, it presents an abstracted management framework annotating the process elements that sustain and nourish the growth of a W2W.

KEYWORDS: Knowledge networks, Value network, Web 2.0, W2W

INTRODUCTION

Solution Exchange (SE) is a Value Network that harnesses the Web 2.0 platform and the internet to address development tasks in India. The United Nations Country Team in India established SE as a moderated electronic (e-) forum in early 2004. The forum consists of multiple Communities of Practice (COP) with each community focusing on one of the MDG. The Water Community of Solution Exchange, India (WCSE) is a COP dedicated to achieving MDG #7 - 'Ensure environmental sustainability'. It focuses on providing all rural and urban habitations with drinking water and sanitary facilities. This moderated e-forum connects with the local communities and administration for the design and implementation of ingenious solutions to water problems.

The paper captures WCSE's experiential learning into a replicable management framework for use anywhere. There are two basic dimensions to reckon with. Societal water projects are unique because they address the access rights to a scarce resource and beneficiaries invariably subsist at the fringes of society. Therefore, conventional project management axioms will have to be seasoned to succeed against the odds of societal inequalities. Secondly, an e-Value Network has its own technology challenges and if managed properly, can yield geometrically higher benefits.

We conceptualize the project/programme management framework for Web 2.0 enabled Value Networks dedicated to Water issues (W2W), such as WCSE, as being impacted by both the Water and Web dimensions. We would first underscore the theoretical foundations of Value Networks and then proceed to analyze one water initiative primed by WCSE. Discussing the key lessons learnt from the projects in the perspective of WCSE's experiential learning, we progress to present an abstracted management framework annotating the process wise critical action points that can sustain and nourish the growth of a W2W.

WCSE - A VALUE NETWORK

Theoretical introduction to Value Networks

In the early 1930s, Dr. Jacob Levi Moreno, a self-published psychologist, introduced the 'sociogram', - a cluster of individual points, or 'nodes', connected by straight lines - the first formal attempt to map out the relationships within a group of people. Professor J. A. Barnes of the London School of Economics in a

paper, "Class and Committees in a Norwegian Island Parish" (1954) coined 'Social Network' as a "a set of points, some of which are joined by lines" to form a "total network" of relations. In the current context, a Social Network is a structure comprising individuals or organizations called 'nodes', which are linked by relationships around a common theme.

Etienne C. Wenger, an educational theorist and practitioner, states COPs are formed by people involved in a process of collective learning in a shared domain of human endeavour. The COP members share a concern or a passion for something they do and learn how to do it better as they interact regularly (2006).

Therefore, we can conclude a COP is essentially self- governed, supported by a core team of facilitators/moderators. The facilitator/moderator provides the platform or infrastructure for discussions/communications and ensures focus by keeping discussions on track. When the core team establishes the links between the nodes by setting the theme, focus and agenda around subject matter knowledge and expertise, such networks evolve into Knowledge Networks. Members share subject matter and so co-create knowledge. These knowledge networks, with high caliber moderation have the potential to evolve into internationally acclaimed reference points. IEEE would be such an example.

Knowledge Networks that go beyond the mere exchange and enhancement of knowledge, to provide significant and specified economic value are called Value Networks. Value Networks are defined as "any web of relationships that generates both tangible and intangible value through complex dynamic exchanges between two or more individuals, groups, or organizations." Any organization or group of organizations engaged in both tangible and intangible exchanges can be viewed as a Value Network, whether private industry, government, or public sector (Allee, 2002).

The value provided by a network can be measured in different forms, either directly through monetary gain for example, or indirectly by speeding up interactive exchanges and thereby reducing the resources and cycle time required for any process. Value Networks can engender virtual collaboration between groups of members and reduce transaction costs, for example, the cost of organizing a face-to-face event that can be nearly eliminated if done virtually through such a network through e-discussions. A Value Network can be visualized as having three layers with the members (*product user*) at the center who derive value by collaboratively leveraging technology to create a user-led ecology in the enveloping Internet system (Figure 1).

The progression from Knowledge to a Value Network requires concerted and long-term efforts by a team of facilitators or moderators. In the beginning, all networks strive to achieve critical mass to serve their basic intent – generating and sharing knowledge. In the second stage, there is a steady stream of content, discussions, and knowledge products, and acquisition of fresh members. Thirdly, networks start focusing on selected themes for discussions and collaboration, identifying champions to take these forward and building strategic linkages with other institutions and networks. In the next stage of evolution, members seek out others with common interests to develop collaborative projects, build on each other's knowledge to further their development goals and influence government projects and policy. At this point, it is possible that institutions or
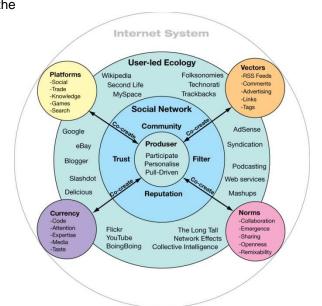

**Figure 1. Value Networks Map
Source: *Smart Services CRC Pty Ltd***

individuals from other networks also join the activities. It is in this evolution process that Web 2.0 technology plays such a vital part.

Web 2.0 refers to applications that use the web as a platform to harness the distributive collective intelligence of its users. In Web 1.0, the application service provider model dominated where content was generated and distributed from a node.

The key attributes that distinguish Value Networks on Web 2.0 platform are:
- **User-Contributed Value:** User participation and contribution is considerable in enhancing the value of the network. More the user participation, more the power of the network.
- **Long Tail:** Access to multiples of niche groups within the overall network, which aids a customized approach.
- **Network Effect:** Disproportionate increase of value brought by addition of each new user.
- **Decentralization:** Users bear a lot of influence on the network's policy, governance, and usage issues.
- **Co-Creation:** Users participation in content creation is substantive
- **Remixability:** Modularity and flexibility allows users to ingeniously combine components to create value.
- **Emergent Systems:** Relative usage patterns of various groups within the network direct the overall value context of the network.

Danah Boyd uses the term 'g/localization' to describe the mobilization and migration of knowledge and expertise across geographies and time zones this feature (Boyd, 2006). She says Web 2.0 is about making global information available to local social contexts and giving people the flexibility to find, organize, share, and create information in a locally meaningful fashion that is globally accessible.

Water Community, Solution Exchange

Non Government Organizations (NGOs) and the UN system have many decades of joint development experience in India. Thus, WCSE started off with the twin advantages of a known pedigree and a wealth of stored information on past societal projects.

WCSE seeks to supplement academic research with experiential information or tacit knowledge gleaned through discussions from practitioners, based on their work. This involves identifying members with expertise in the given area, contacting them for their inputs, editing (where needed) the comments and feeding it back to the network.
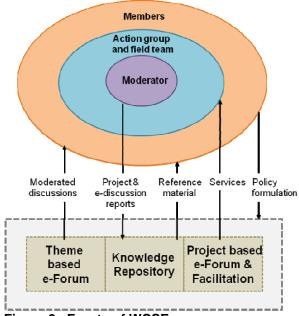

There are three primary facets to WCSE (Figure 2). The moderated e-discussions are theme-based, aimed at expansion of subject matter knowledge and the facilitation of water projects. The moderator abstracts a 'consolidated reply' from these discussions and archives them in the Knowledge Repository. Some members walk the extra mile join up with the field project team as the virtual wing of the project action group. The project details, metrics, and lessons learnt are also archived in the Knowledge Repository.

Figure 2. Facets of WCSE

The Community works through UNICEF and the ministry concerned, the Ministry of Rural Development. It has over 3,600 members, who belong to various organizations including NGOs, universities, research institutes, consulting firms, and government water boards (Figure 3). About 8% of WCSE is from other countries including the USA.

Figure 3. Membership Profile of the WCSE

With UNICEF as the facilitator, the WCSE has at its core, a resource team of 2 consultants consisting of a moderator and a research associate. This team, along with a resource group comprising thought leaders an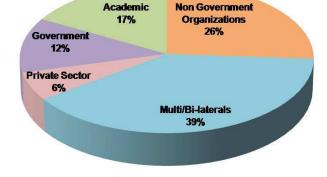d senior practitioners, establishes the criteria for the issues that will be tackled by the group, convenes an action group as necessary to take on projects, and also evaluates performance.
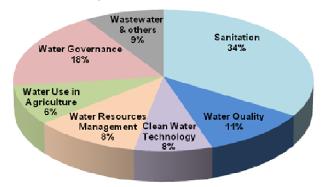

Figure 4. Sector Wise Portfolio of Issues

Some of the issues that have been successfully addressed by the forum are eco-restoration of streams and rivers, fluoride contamination of drinking water, available solid and liquid waste management technology options, combating salt-water ingress in coastal areas, and agricultural water management techniques (Figure 4).

Since its inception in 2005, WCSE has responded to approximately 170 queries. Some of the discussion threads have evolved into projects in which WCSE has not only provided a solution set but has also participated during the solution implementation phase.

It is important to note that water initiatives by the WCSE are different from the regular project management framework in that they strictly aim to be pilot projects. The mandate of WCSE is not full life cycle project implementation but facilitation that extends to networking, knowledge extraction from focused e-discussions, linking up different sets of participants (the government, experts, NGOs, academia and private sector) and successful pilot project.

Moderated e-discussions happen to share knowledge and achieve a specific goal, or facilitate its achievement. Figure 5 shows a typical initiation of e-discussion about a new project. The forum acts as a powerful 'pull' factor for people to participate actively (as against being passive information recipients) in the discussions and events of WCSE. They are also good examples of the utility and power of collaborative knowledge building.
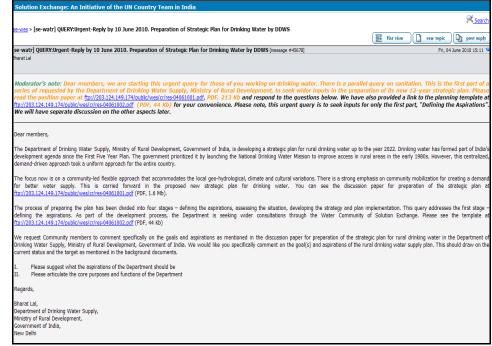

Figure 5. Beginning of a New Project

The key functions of WCSE are informing policies and programs, facilitating water projects up to proof of concept and pilot project phase, promoting individual and institutional learning, building networks of practitioners, and furthering existing domain knowledge.

METHOD- CASE STUDY

Case Study - 'Mazhapolima' Well Recharge Project, Kerala, India

Kerala is a coastal state in South India where about 71% of the households depend on household wells for drinking water. Despite an annual average rainfall of 3,000 mm (national average is 1,000 mm) over a 3-4 month monsoon season, 70% of these wells go dry the rest of the year, resulting in severe water shortage (Census of India 2001).

The District Collector (DC), the State Government appointed head of administration, Thrissur political district, Kerala, being a member of WCSE, was aware of its potential for knowledge mobilization and finding collaborative solutions to water issues. Inspired by various e-discussions in WCSE, in May 2008, the DC drew up a project outline to use rainwater harvesting for recharging household wells to augment lean season water availability.

The project aimed at recharging the household wells using rainwater collected from rooftop rainwater harvesting (RWH) structures. The district has about 450,000 open wells, accounting for replacement investment value of about of Rs. 18 billion (USD 350 million). By recharging the wells, the project hoped to make use of the existing assets to store water and enhance groundwater reserves.

In August 2008, the DC approached WCSE with his project outline and in consultation with the moderator floated a carefully drafted query eliciting inputs on simple technology options, social marketing tools, and innovative financing options from WCSE members. In a period of 3 weeks, 43 responses were generated by WCSE. The resource team structured the responses into a solution set consisting of national remote sensing maps (to guide choice of suitable locations with high recharge potential), technology options together with cost information for rooftop RWH structures, and referral to NGOs that provide training for

villagers in the design and construction of RWH structures. The need for an education campaign consisting of street plays and door-to-door campaigns specifically aimed at educating women on concepts such as groundwater recharge, and aquifers was highlighted.

The DC incorporated the solution inputs and evolved 'Mazhapolima', a participatory well recharge project. Mazhapolima was highlighted at the Annual Forum of WCSE in 2008 and Arghyam, a NGO and a partner of WCSE, offered to support the project with a grant for research and advocacy. A core team representing the Government of Kerala, WCSE, and Arghyam was constituted to run the project under the DC's guidance. This core team was responsible for the overall monitoring and evaluation of the project. Specific tasks included monitoring water quality in the wells, community mobilization, and planning and documentation of the individual rainwater harvesting schemes.

The project was piloted through a selected Panchayat Raj Institution (PRI; local government unit) of 600 households. Based on the learning thereof, the process elements were refined and the project was extended to the rest of the district. In the period from May 2008-April 2010, about 5,770 wells in 37 PRIs have been recharged with rainwater collected using rooftop RWH structures, at an average cost of Rs 3,000 (USD 60) per well.

This project intervention has resulted in the reduction of the time taken by a villager to collect water during the dry months from 1.5 hours to a few minutes a day. Women in India, as in most parts of the developing world, spend a lot of time collecting drinking water. With water available at home, they save time and energy and invest it in earning additional income, educating their children or leisure.

Mazhapolima was highlighted again on WCSE and a thematic workshop organized in Thrissur in June 2009. Senior government officials participated and based on inputs from the core team, the State Government decided to implement the project in all water deficit districts in Kerala.

Five key discriminating factors that impacted Mazhapolima and that have contributed to its success are commitment from the Government and PRIs, participatory approach, involvement of women's self-help groups, social marketing tools, and simple technology options.

Commitment from the Government and PRIs. In the initial stages of the project, the DC took a pro-active interest in the e-discussions and also helped guide it. This enabled WCSE members to answer the specific queries. It also helped him extract more information from members based on their replies and perceived expertise. Thus, instead of merely being a recipient of information, the DC directed the discussion to his advantage. This helped him to gain additional information on sources of finance for such a venture, critical in a state where people will not spend their own money on a service they perceive as being the government's responsibility.

Recognizing the criticality of political willingness from PRIs, the project was initiated in collaboration with the PRIs. The PRIs were responsible for water supply, and the project supported them to discharge their duties effectively. The project encouraged innovation and diversity, and gave the PRIs the freedom to follow their own implementation arrangements.

Participatory Approach. The project was community driven and adopted a bottom-up approach. It was tailored to trigger community strengths, social capital, and traditional wisdom.

There was a tremendous pent up demand in service level (quantity) and quality, and this demand was converted into willingness to make minor investments to reap rich dividends. All the RWH structures were built by local laborers who were trained by NGOs in construction. The cost of the structures was met by the households (Figure 6).

Figure 6 Local Labor Involvement in Construction

Involvement of Women's Self-Help Groups. Mazhapolima was implemented with active participation from Kudumbashree, a statewide network of self-help groups consisting of women from socio-economically backward families. These women were trained to design, construct, and maintain the RWH structures. The town of Chelakkara in the northeastern part of Thrissur, for example, had a strong network of women teams that helped construct these structures. The self-help groups were also involved in the social marketing of the project, and were envisioned to become eventually the main implementers of the project.

Social Marketing Tools. The project made use of a comprehensive Information-Education-Communication program consisting of community workshops and meetings, school campaigns, door-to-door campaigns, and mass media to generate awareness. Of these, household level and mass media campaigns were the most effective. The community workshops and meetings were well attended by the village officers, but not all the local people showed up for these meetings. The household level campaigns that were organized by the NGOs were the most successful in reaching the local people, and also enabled direct feedback. The media was invited to all the meetings and this ensured extensive publicity.

Simple Technology Options. Informed choice of the household was facilitated by trained technical task teams/ resource teams at PRI level. Also critical to the project was the thrust on the menu of technical choices open to the households and regions according to their capacity and need. The choice of technology had to be simple and also customized to the local terrain (Figure 7).

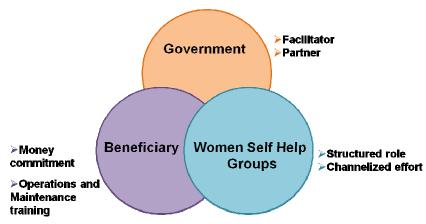

Figure 7. Customized Technology

Figure 8. Lessons from Mazhapolima

Figure 9. The Government in Partnership with NGO and Local Community

Impact on Project Management Axioms. Distillation of these key elements leads us to conclude that transformational role definitions relating the Government, the beneficiary, and women could discriminate a successful societal water project (Figure 8).

(1) Role of the Government: One of the key aspects that contributed to the success of Mazhapolima was the complementary partnership that developed between the Government, WCSE, and NGOs (Figure 9). The Government played the role of a facilitator and provided the necessary financial backing, whereas WCSE and the NGOs contributed in evolving sustainable solutions incorporating locally adoptable technology, monitoring and evaluation tools, and in social marketing efforts.

The success of the project points to the need for a paradigm shift in the role played by the Government from that of a provider to a facilitator and partner.

(2) Role of the Beneficiary: A comprehensive approach to enlist community participation through consultative discussions, training, and well-executed awareness campaigns was the hallmark of Mazhapolima.

Above all these, getting the households to invest their money and physical labor in the project by the fostered a sense of ownership of the assets created. Complemented with training in the operation and maintenance of these assets, the community could continue to reap the benefits long after the withdrawal of the external agencies.

(3) Role of Women Self-Help Groups: Projects such as Mazhapolima benefit women the most since it saves them a lot of time and labor in fetching drinking water. This is the primary reason why they were most willing to participate.

Any social project should place the women in cynosure to ensure lasting benefits for the families.
The presence and involvement of an organized self-help group, 'Kudumbashree', played an enormous role in factoring the role of women in a structured way and in channelizing their efforts.

DISCUSSION

The case study analysis point to the discriminators of successful societal water projects to be (1) active partnership by the Government, (2) evangelistic subscription to the cause by the PRI (local government), (3) ownership of the project by the beneficiary community (which happen to be women in the rural low income communities), (4) context sensitivity by external agencies like the NGOs, and (5) initiation of school children.

The case study also validates the transformational potential of WCSE. The W2W management framework can be viewed as a union of two sets of process elements:

(1) **Creation elements**, that draw on the personal experiences of the principal Moderator and archived documentation, constituting (a) Vision, (b) Mission, (c) Funding, (d) Stakeholder commitment, (e) Core team selection, (f) Role definitions, and (g) Process design; and
(2) **Operation and solution delivery elements**, that draw on the grassroots field experience, constituting (a) Process of transition from brain storming stage to solution design, (b) Social marketing tools, (c) Subscription to the solution by all stakeholders, (d) Coordination of efforts (on site, off shore, and the virtual groups), (e) Guidance during implementation, (f) Milestones review mechanisms, (e) Project impact value metrics, and (g) Knowledge repository.

We now elaborate on these management process elements by embellishing the conclusions, from the case study, with the personal experience of the Moderator of WCSE supplemented by a dipstick survey of the WCSE members.

Vision A W2W's vision must extend beyond email discussions into forming a formidable knowledge bank. In facilitating projects, it should hand off after the pilot project phase. It is thus a network that promotes collaborative knowledge building for catalyzing fresh developmental projects. It is also an impartial (not neutral) network to help practitioners in that particular fieldwork more effectively. However, to remain meaningful in the long run, a W2W should create a powerful context. For instance, WCSE is dedicated to the MDG.

Similarly, in the field, the water projects should be part of a larger canvas that aims at alleviating poverty and societal inequalities.

Mission At its inception, WCSE was meant to aid progress towards MDG 7 concerning provision of drinking water and sanitation. WCSE has since expanded its mission to address broader issues of water governance, competing uses of water and its impacts on climate change.

The key functions that enunciate WCSE's mission now are:
- To be the leading source of information and link between policy makers and those working at the grassroots
- To promote action research as a means of demonstrating workable solutions in water and sanitation drawing upon the practical expertise of its members
- To provide contextualized information in water and sanitation (as against abstract, highly specialized knowledge available in academic research papers)

The case study demonstrates how these have panned out. The Mazhapolima well recharge project shows how a series of interventions by WCSE paralleled the development, implementation, and evolution of a water security program. There were studies on the potential of rainwater harvesting, but Kerala had no tradition of the practice given its (once) abundance of water. There was nothing to string together the concept of rainwater harvesting for well recharge, solution design, and implementation paid for by people themselves. There was also no way of knowing if the solution was workable until experts evaluated it, or got the results to where they mattered (to the government) for scaling up. WCSE's role went beyond passive information sharing, as happens on most e- networks. It actively sought input on rainwater harvesting, social mobilization techniques, and financing options, which were used to design and initiate the project. It brought in an external agency for technical inputs and evaluation, and based on this evaluation, the state government decided to expand Mazhapolima to a water security program across

Kerala. Collaborative knowledge building is a non-linear process and often, the final outcome is hard to measure. In the Mazhapolima case, even though it has become the template for water security projects, the final outcome will rest on the long-term measurement of improved water availability and the resultant betterment to the quality of life of people. For the moment, we will consider the government decision to scale up the program as value validation.

Mazhapolima had measurable (quantified) outcome metrics, which is an absolute must for planning, budgeting, monitoring, and control.

The upshot is that the W2W must have its own clarity on the mission and also ensure that measurable mission metrics govern the facilitated projects for reaping enduring benefits. As can be seen, while the vision is non-negotiable, the mission is impacted by the members who bring in new themes for discussions and action. Proper feedback mechanism is needed to let the members and the moderator to continue to evolve W2W governance policies and procedures.   Indeed, a throwback to the 'decentralization' attribute of a Value Network.

Funding The WCSE does not fund projects. This is because the rest of the UN system supports the government and to a lesser extent, NGOs, for project design and execution. Lack of project support raises a fundamental question on defining the role of WCSE in any action research project.

One way to look at monetary contribution of W2Ws like WCSE is to consider replacement cost. For example, what additional research costs would the Government of Kerala have incurred to develop Mazhapolima if WCSE did not exist?

WCSE provides for funds limited to its facilitation part. Donors, on the lookout for worthwhile projects to support, find ideas through WCSE. While, WCSE can mobilize support in both cash and kind, it is up to the action group to draw upon it.

The governments do provide monitory support for societal projects from their development budget. However, a W2W should endeavor to complement this by linking up potential donor agencies with the project team for funding. It should limit its monetary participation to the costs of facilitation so as to avoid dilution of its fundamental mission.

Stakeholder Commitment Mazhapolima project underscore the PRI commitment levels.

The role of the majority beneficiary segment (the women in our case) as a committed participant is also abundantly clear. To ensure sustained commitment, the community should be involved in the entire project life cycle starting from awareness creation right through to asset maintenance.

These aspects have to be stressed upon by the W2W at the inception of the project. We opine that W2W should aid this process not only by sensitizing the principal stakeholder to the need for inclusive commitment from all other stakeholders but also by using the network to get political/governmental buy-ins as appropriate. Each such buy-in results in tremendous value created by the 'network effect'.

Core Team Selection WCSE's core resource team comprises two people, a moderator with 20 years experience, and a research associate with 8 years experience. Several of the operational issues overlap, but the Moderator takes the strategic decisions while the research associate executes the day to day functioning of the Community. A resource group, or think tank, comprising of prominent professionals in their own fields, supports the core team. It provides strategic direction; helps decide new subjects for action research and the broad themes for the year.

UNICEF in India facilitates WCSE. UNICEF's technical staff working on water and sanitation provides technical guidance to the core team in the queries, action research, and in designing face-to-face interactions. However, as WCSE's ambit is wider than UNICEF's water mandate, it works with other UN agencies as well. What is significant is that while UNICEF provides this support, it does not claim ownership and interfere with the functioning of the Community.

From a W2W point of view, this is critical since the sponsor agency should not be seen to be dominating it to the detriment of open debate. UNICEF's tacit support enables WCSE to seek out new sources of support and partnership.

As evidenced by the involvement of Arghyam in Mazhapolima, it is imperative for a W2W to enlist potential participants in the network, in anticipation of projects. It is also vital to initiate discussions around potential themes to sustain the interest of the network members.

A W2W enjoys the relative ease of identifying, selecting, reaching out, and co-opting these small but significant contextual groups from its 'long tail' in selecting a project action team.

Role Definitions The subtle but telling shift in the role of the state government from being just a sponsor to an active partner evidenced in Mazhapolima is a strong pointer to success. When the bureaucracy is seen wetting the hands in the fields, the commitment levels of other participants including the local community raise significantly.

Involvement of multiple agencies including the virtual ones is a potential mine field if role definitions lack clarity.

Management wisdom would dictate that for any project, an organization chart, as it were, with command structure, clearly spelt out roles, accountability, and appraisal system should be cast upfront. However, in managing part virtual teams like W2Ws, difficulties arise because the stakeholders could be space and time distanced, and culturally diverse with different languages and value systems. In our opinion, the Moderator's role is more an art than science. We dare say that the success of a W2W is totally predicated on the Moderator's personal talents. The best that can be done is to spell out the roles with as much clarity as circumstances would allow and that too at the initiation of the project. It behooves a good W2W at least to state its own role with total clarity and transparency.

Process Design The technology adopted by a W2W has to work in the background and not demand users' time and mindshare. Email fits this need. Nearly every development practitioner has an email account and uses it as often as time and net infrastructure allow. Of late, leading email providers have incorporated Indian languages on their platforms overcoming one more barrier to access; even so, most contributions are received in English. In terms of carrying the digest to the local community, our survey points to adoption of local language translations as more meaningful.

The other reason to use email is to 'push' discussions and their responses to the community. Members read the messages when they can and respond when they have time. WCSE has the option of providing members with digests, either weekly or daily, but this is hidden to draw members into debates. This had helped to take Mazhapolima action research forward.

Websites offer more functionality but demand more user time. It is possible to provide a virtual meeting room on demand, complete with a calendar, library, and video/voice conferencing but members have to be technologically savvy to use these features. These options are more appropriate for academic discussions in preparation of a paper, policy brief, or manual. For a W2W, it would suffice if the technology facilitates the resource team and the members to trawl the existing sea of content and repurpose it for different user groups.

Alongside new technology, there is a need to train a team of volunteers to manage some of the 'low intensity' discussions. This would free the moderator's time to focus on action research and in-depth papers that add value to the discussions.

We therefore advocate that a W2W be more synchronized to the members who live and often work in low-density internet environments. The temptation to make the W2W as cutting edge Web 2.0 showcase should be avoided at all costs. Subscribing to the 'decentralization' attribute, the W2W should embrace technology only just a little ahead of the end beneficiary community.

The case study vindicate the application of customized locally adoptable technology and techniques as a critical success factor. Adequate training in operations and maintenance comes through as an important intervention process to ensure long-term asset preservation by the community.

Process of Transition From Brain Storming Stage to Solution Design In providing solutions based on inputs from the Community members, the resource team works closely with the member who posed the query. This helps tailor the final knowledge product to the needs of the query poser instead of merely being an agglomeration of information. For example, the team worked with the District Collector during the Mazhapolima discussion to draw responses from members, or get members to elaborate on their responses. It approached domain experts in areas such as community mobilization for their inputs. It also approached experts in rainwater harvesting for technical know-how. This made the knowledge product more relevant and usable by all working on the project.

The e-forum has thus proved to be extremely effective in quickening the pace of iterative discussions between members spread across geographies aiding quick transition from ideation to action. The physical meetings, strategically timed provide the extra push required, put a face to a name as it were, to win commitments from the proponents.

A W2W should strategize the combination of physical meetings as appropriate to the project.

In terms of value network attributes, the members contribute value ('user-contributed value'), innovatively mix, and match current discussions with reusable knowledge components from the repository to develop the solution ('remixability') and derive synergistic value ('network effect').

Social Marketing Tools Mazhapolima points to the potential of the media and door-to-door campaigns in generating awareness amongst the local community. In all three projects, students were involved early on, and they enormously helped carry the message to their parents and the community.

In future, given the spread and reach of internet, and the audio/video transmission across 3G broadband, W2Ws in the developing nations, would see many of the action points regarding communication, education, and customized promotional literature reach the beneficiary community in cyber speed with full fidelity. Given the computer literacy of schoolchildren, enlisting them in W2W forums would have a salutary effect in molding future citizens. Going a step further, W2W could develop interactive e-Courseware on Water for adoption by schools and link up summer job opportunities with on-going projects. Growing a 'long tail' of such niche segments would enormously help the W2W to 'remix' and offer imaginative campaign ideas on the fly.

Subscription to the Solution by All Stakeholders The major stakeholders in the societal water project analyzed in this paper are the PRI, the local community, particularly women, Government, and NGOs .

The local government unit, PRI in our case studies, has enormous influence on the scheme of things since it is very often the only conduit for fund flow into the village, be it from the Government or aid-agencies. In addition, the officials belong to the socially dominant community group.

Getting the PRI to don such an evangelistic role could require delicate interventions by social scientists to work through their inherent social prejudices especially when the major beneficiaries happen to be the social outcasts like women, low caste, or the poor.

The use of participatory approaches has been a key feature in getting buy- in from the community in general and women in particular. Women were enthusiastic about construction and maintenance of the assets, and desired to be involved in the projects. The monetary partnership of the beneficiaries is another key take away. We conclude that even a token contribution goes a long way in establishing ownership to the solution. If not money, at least contributing physical labor could be sought.

Stakeholders such as the Government in case of Mazhapolima, were WCSE members, and participated in e-discussions and periodic WCSE workshops, and were able to effectively leverage the WCSE platform during the solution development and implementation phase.

A W2W should provide a user-friendly platform to engage with the stakeholders from the very beginning, and ensure continued subscription by simultaneous updates on all aspects of the project to all the stakeholders.

Coordination of Efforts (on site, off shore, and the virtual groups) A W2W project requires sustained effort on the part of the project champion and the core action group. Actual research and coordination can be done virtually but this has to be supplemented by meeting face-to-face to sign off on an all important project phases.   Prescient thinking during core team selection and role definitions can substantially ease coordination during the project. The W2W should maintain strict version control on the project discussions to ensure that all participants are on the same page at any given moment.

Guidance During Implementation The Water Community and proponents of the Mazhapolima group worked closely together. There were frequent interactions between the resource team of WCSE and the field action groups, even leading to on-site training workshops. The resource team of a W2W has to take a proactive interest in any action research or discussion. Failing this, the initiative does not take off. The size of the team is less relevant than its domain knowledge and willingness to engage.

As 3G networks permeate to the beneficiary communities, W2W could imaginatively add e-workshops, e-classrooms for continuous learning and self-help FAQ bank for better guidance. The 'user-contributed value' enriches the process of close monitoring and guidance, and the 'network effect' enables the project team harvest rich dividends.

Milestones Review Mechanisms   In general, societal projects suffer from lack of proper review mechanisms because of the multiplicity of agencies involved. If a command structure is put in place right in the beginning and the roles and more importantly accountability is well defined, the reviews at key pre-identified milestone phases enables the project to stay on course and deliver within the budgeted cost and timelines.

In the Mazhapolima project, the Government partnered with an external unbiased agency, Arghyam, to provide monitoring and evaluation. The project stresses the importance of having a proper review mechanism in place.

While conducting reviews and sharing results, a W2W should maintain transparency of reviews. It is indeed a difficult call with government bureaucracy and external agencies coming under a common review mechanism. However, it is pertinent to note that transparency also encourages good governance.

Project Impact Value Metrics Knowledge leads to awareness and then to action (practice). WCSE fits into different slots in this continuum, from the obvious role of creating knowledge, to raising awareness among practitioners. The less obvious contribution is at the level of actual action in the field and the difficulty of attributing this to WCSE. Often, this is a question of ownership, where the doer may not acknowledge WCSE's inputs. Occasionally, it is a question of using the inputs from a discussion intelligently by translating them into action.

In the case of Mazhapolima, WCSE's inputs provided an impetus to the project at different points in the project life cycle and the proponents clearly acknowledged them. This made tracking and planning further interventions easy. WCSE worked with the government as a strategic facilitating partner to help design, execute, and scale up the project.

Social upliftment being the ultimate objective, the impact values of a W2W intervention cannot be captured in quantitative project metrics. Often, a qualitative and insightful evaluation by a mature assessor is called for.

Knowledge Repository The result of the e-discussions is a dense concentration of theme wise knowledge, backed by a large body of references. Some of these references are published and peer reviewed but a large number are papers written by members based on their own research.

However, what is critical for a W2W is to set taxonomy in place with required descriptions, different levels of keywords, contributors, etc. The first important step is to get the Meta data definitions right. However, the difficulty with an evolving network like WCSE is that, the taxonomy changes with time as new areas are added and old ones discarded. For instance, WCSE used to include discussions on climate change but since a separate Community has been launched on that area, it has stopped covering those issues. On the other hand, discussions on water quality have become more important. Thus, the taxonomy has to evolve with the Community and a rigid framework will be self-defeating. The resource team has to periodically review and update the classifications for the Community. While a total overhaul is neither possible nor advisable, incremental changes are necessary to reflect new discussion areas.

The advantages of a working classification system are quick retrieval of relevant information. This can expand the role of WCSE to become an electronic database of information on water. If members and the resource team are able to find specific interrelated information, WCSE's utility greatly increases. The possibilities of using such information are immense – position papers, policy briefs, manuals, compendia, who's who, problem hotspots (such as of water quality), handbooks of solutions to water and sanitation related problems, etc. These all grow out of the basic knowledge products of consolidated replies and the monthly community updates.

The principal role of the moderator of a W2W and his/her core team is content management and abstracting thereof reusable knowledge components. Hence, we would suggest involvement of experienced Knowledge Management professionals in the initial design and also that the core team gets trained for making on-course changes without jeopardizing the basic design. Application of Data Analytics tools to mine the repository data would enable the W2W to discern the contours of 'emergent systems' that will shape future missions.

CONCLUSION

An ADB post-evaluation study of 57 rural development projects had identified poor local adoptability of the solution, lack of ownership by the local government and community, lack of incentive to the project staff, and disproportionate capture of the benefits by the influential groups leaving out the marginalized majority as the key reasons for such water projects failing to deliver sustainable benefits (ADB, 2000). Similar findings and conclusions by management gurus have resulted in the advocacy and application of participatory bottom-up approaches to societal projects. In general, our conclusions are in alignment to this perspective. However, a note of caution has been struck by a report by the Operations Evaluation Department of the ADB that did not find a clear correlation between the use of participatory approaches and project success (ADB, 2004).

In management of virtual projects, a Sloan School Paper titled "How to Manage Virtual Teams" (Siebdrat, 2009) points to high degree of task-related processes as a primary key to successful management. We encourage the W2Ws to maintain focus on projects and guard against being led into becoming a mere forum for academic debates and discussions.

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