

Participatory processes for designing and implementing information and communication technology tools for the WASH sector

Authors

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Abstract

Over the last two decades there has been an explosion of new ways of communication and information exchange that connect people through technological innovations such as computers, the internet, and mobile phones. As communication technologies keep expanding, so too do their applications to solving our daily problems with faster, more accurate, or more accessible data. The application of such information and communication technologies (ICTs) to bridge information gaps in the Water, Sanitation, and Hygiene (WASH) sector is attracting much attention and has been considered to be one of the best and fastest ways to increase sustainable provision, use, and management of WASH facilities. While the tools and their application vary greatly, reviews of some WASH sector ICT tools have revealed that they were often developed without end users in mind. This article gives a brief opinion on the use of participatory processes for designing and implementing widely acceptable, usable, and sustainable ICT tools for the WASH sector. If users' needs and preferences are incorporated throughout system design and development, it can assist in ensuring sustained system uptake and relevancy.

Keywords

Information, communication, technology, tools, WASH.

Introduction and purpose

For the past three decades, the effort to provide potable water and adequate sanitation and hygiene facilities to those with the greatest need has increased tremendously. Although the situation has improved for people around the world, it is estimated that currently just under 1 billion people still lack access to potable water and 2.5 billion to adequate sanitation. In the year 2000, the United Nations established Millennium Development Goals (MDGs) to improve people's lives and the world they live in by 2015, including a target to halve the proportion of people without access to water, sanitation, and hygiene (WASH) facilities. This MDG target compelled stakeholders in the WASH sector to work collaboratively to find new and innovative ways with synergy

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in order to reach the goal. Thus, funders began investing heavily in projects that aimed to contribute to progress toward the MDGs. New policies and implementation strategies also have been developed to reach the MDG goals, including constructing new WASH facilities or rehabilitating old ones, or employing participatory management strategies to ensure WASH facilities and natural resources are sustained.

Among the strategies being employed in the WASH sector are those leveraging information and communication technologies (ICTs) to address issues related to information sharing, transparency, inclusive coordination, and accountability. The rapid evolution and emerging ubiquity of innovations such as the internet, mobile phone technology, and social networking applications present opportunities wherever improved information and increased communication are necessary or desired. ICTs are being employed heavily particularly when they have the potential to increase efficiency and reduce costs over the long term, where activities such as in-person coordination or physical information sharing can be costly, time-consuming, and difficult to implement.

Despite these efforts, with corresponding billions of dollars in funding, studies have shown that WASH interventions are failing at an alarming rate or are simply left unused or not sustained, raising questions on the validity of statistics on the progress being made toward MDGs, as well as the appropriateness of the methodologies and implementation processes of the WASH interventions. With this concern being raised within the sector, a variety of research and collaborative efforts have been developed to identify and address the issues. Sustainability issues in WASH are as varied as the solutions, including inadequate planning, lack of stakeholder involvement, poor management of resources and communication among stakeholders by government agencies, lack of appropriate operational infrastructure to meet ongoing service delivery needs, failure to implement financial structures to meet full life-cycle costs, poor or non-existent monitoring of efforts to identify the point or source of challenges, and failure to disclose challenges when they are identified.

The importance of community-based, demand-driven approaches for sustainability of development projects, including those in the WASH sector, has been well researched and discussed. (e.g. Whittington et al., 1993; Whittington et al., 2000; UN-ESA, 2006; Mara et al., 2007). However, recent reviews of WASH sector ICT tools have revealed that users remain an overlooked factor in the design and development of the tools (Palaniappan et al., 2008; Palaniappan and Hutchings 2009; Hutchings et al., 2012). While the Field Level Operations Watch (FLOW) for monitoring functionality of WASH facilities, developed by Water for People but housed and managed by Akvo, has received high acceptance and use due to the participatory user training and flexibility to customise, a similar tool developed by SkyFox Limited based in Ghana to report field functionality and facilitate ordering of spare parts for broken WASH facilities is still unknown to many potential users after several years of development. This is partly due to the non-participatory process involved in the development and dissemination of the tool (Patrick Apoya, Per Comm, 2012). In order to improve the design and

implementation of ICT tools and thereby improve the probable sustainability of the interventions, there is need for communities and WASH stakeholders to be more involved in ICT tool development.

This paper reviews how a participatory approach can be employed to improve the design and implementation of ICTs.

Participatory design and development approach

ICT tools have gained prominence in every field – from crisis and disaster management, to natural resources development and management, from the provision of expert information for non-experts to advocacy, service provision, governance, and monitoring and evaluation in the WASH sector. Furthermore, WASH-oriented organisations and programmes are developing ICTs without in-house software engineering or technical expertise. For example, over the past four years the Pacific Institute, a nonprofit research organisation, has developed four ICT tools, including the Community Choices System and WASH SMS for international target users in the WASH sector.

For the development of both of our WASH ICT tools, we employed participatory design and development techniques to ensure that stakeholders' needs and preferences guided the design of the system so that the resulting ICT tools were useful and beneficial to the target users. This involved:

1. Identifying and categorising the primary and secondary stakeholders or target audience.
2. Engaging each of these groups through open-ended discussions and information-gathering sessions in a safe environment to find out about their challenges, needs, and views on potential solutions, as well as to educate them on their own roles and the roles of other agencies in improving the issue or situation of interest.
3. Identifying a solution that addresses the challenges and meets the needs identified by the stakeholders.
4. Laying out a clear timeline that illustrates when and how each stakeholder will be involved in solution design and development and what they can expect to see and be asked to provide.
5. Providing capacity-building information or meetings to ensure equal understanding and usage of the system among all stakeholders;
6. Soliciting feedback and participation in testing on preliminary design and prototype iterations several times over a certain period.
7. Forging commitments among the stakeholder groups to provide needed information and support, to maintain collaborative management of the system, and to contribute to sustaining the system along with others.

Identify the Target Audience

It is important to identify which stakeholder groups comprise the target audience by first identifying all of the stakeholders or players, then analysing their role in the situation or their relative power to influence change. The full list of stakeholders can

usually be identified by asking each known stakeholder group a series of questions about who is responsible for the problem, what other groups are experiencing the same or related issues, and what are all the organisations or agencies that have the power to provide solutions to your needs, improve your situation or be involved in providing a solution. In the preliminary research to make technical information about simple, low-cost water and sanitation technologies available through the Community Choices project, we discovered that there was a gap in providing this information to people at the community level, as has been done in the medical community and construction sector. When we inquired from the community members and other stakeholders, other intermediaries were identified such as government staff that worked with communities or staff of community-based organisations.

Engage the target audience

Engagement or learning sessions are venues for individual stakeholder groups to share and learn information about challenges, needs, preferences, and other information that could be influential in designing, evaluating, or selecting potential solution options, and are best gathered directly from the target users rather than other sources. These sessions can take the form of focus group discussions, community-led group discussion, facilitated meetings, practitioners meetings, symposia, conferences, and workshops. The results can be used not only to inform solution design, but also to educate other stakeholders about the real challenges, needs, and priorities of other groups. Figure 1 is a sketch of the participatory process we employed at the Pacific institute to develop our ICT tools.

In order to engage stakeholders effectively, it is best if implementing staff are locals or work as community-based local partners on the ground. Community-based organisations understand better the target audiences' economic, social, cultural, and political environments, and often have already been working with the communities and other stakeholders on related or similar issues. In developing the Community Choices System, the Pacific Institute partnered with five local NGOs working in Ghana and Burkina Faso to conduct learning sessions and pilot testing.

Identify the right solution:

All too often, solutions are identified before the stakeholders and their real issues are identified. But a solution can only be appropriate if, at the very least, it addresses the challenges and meets the needs identified by the stakeholders that must take action or are experiencing the issue. ICTs facilitate information sharing and communication. If more communication or more accessible information will not help solve the identified problem, then an ICT tool is not the right solution.

Figure 1: Participatory flowchart for developing ICT tools.



Photo 1: Testing Community Choices System for making choices on WASH technologies in a community.



At another level, the technology must also be assessed for its appropriateness among the target users. A web-based decision-making support system will not be useful to target users that do not have access to computers, or prefer other ICTs. A mobile phone application design based on a smart phone operating system will also not be useful to target users who cannot afford smart phones. We learned a lot about these challenges in the learning sessions with communities when participants suggested that we should create a paper version of the Community Choices System to attract wide usage in rural communities where access to computers is limited. This informed us to develop a paper version that was also piloted in Burkina Faso. Photo 1 shows households being walked through both computer and paper versions of the system to make choices.

Explain what is next

Most people have not been involved in designing a software application that they will use themselves. To this end, laying out a clear timeline for all stakeholders that

illustrates when and how each stakeholder will be involved in solution design and development and explaining the basic process and phases of tool design and development, and what they can expect to see, and be asked to provide, helps to set appropriate expectations about what is being done by the solution's developers. It helps to know how long it will take, and will also ensure they understand their integral role in the larger picture of development.

Build capacity among all stakeholders

Again, due to lack of experience in software development, people often have a hard time imagining software systems and how they might function or be used. While showing examples or similar systems can be helpful, they can also narrow the flexibility of a stakeholder to provide input that is creative rather than just comparative. Developing simple prototypes is the best way to demonstrate the essential features and functions of the potential tool, enabling stakeholders to gain a good understanding of how the tool will work while also providing a relatively clean palate for thinking of additional features and design. For example, prior to developing Community Choices for Water Treatment, static renditions were introduced during six community sessions in Burkina Faso and Ghana. The communities drew our attention to low literacy levels in the communities as a major communication barrier. Informed by their concerns before the development of the software, we were able to identify the need for a more picture-heavy system and other potential formats such as paper as most suitable to meet their needs.

Capacity building can also be conducted to: review baseline information about the stakeholders' situation, such as demographics, environmental resource information, and so forth; analyse the power structures, something now always done even among government agencies; develop plans for how information will be used; share case studies, successes, and failures of other similar situations and solutions; and develop basic ICT skills such as downloading documents from a website.

Testing, Monitoring, and Evaluation

The stakeholders should not only see a preliminary design or prototype demonstration of the tool, but they should be engaged to utilise and test prototype iterations and provide evaluations and feedback several times throughout the development phase. The tool should then be refined with the suggestions and input from the stakeholders, or a discussion should take place or explanation given to address why a particular suggestion cannot or will not be implemented. The refined version should at some point be tested in the natural environment, with all stakeholders involved.

It is important to set monitoring indicators that track the stakeholders and the user experience of the target audience, but also the effectiveness in providing information and communication to address the identified issues. Through the feedback during testing, it is possible to track the usefulness of the tool to the users even before the tool is fully implemented. Monitoring and feedback will provide information on whether users get satisfaction from using the tool, whether the system is functioning as intended,

and other users' information, such as whether the users are utilising the system as planned. For example, in Cheshei community in northern Ghana, a community resident has become an agent of information sharing by educating every person in the community and nearby communities on how to treat water at point of use with Moringa seed. On average, ten new community members monthly are reached with the information she got from the Community Choices System.

Forge commitment

Finally, forging commitments among the stakeholder groups will ensure that stakeholders remain connected to and involved in the system. These commitments can formalise agreements to provide needed information and support, to continue to work together to maintain the tool, and to contribute to sustaining the system along with others.

ICT tools developed without establishing partnerships with local teams are bound to be deficient under many circumstances. Project management teams (PMTs) established during the initial design phase can help to facilitate organisation of development activities, identify where to hold sessions and who to contact, and can also form the basis for collaborative agreements for managing the system into the future. Project management teams usually comprise staff from the lead organisation and local partners, who need to be involved and participate actively in the initial stages of the design of the tools. They can also involve representatives from primary stakeholder groups.

Lessons Learned

While we have long experienced the challenges and benefits of the participatory approach in our advocacy and community-based research projects, there are some lessons we have learned that are unique to the participatory development of ICT tools.

Localisation: There is the need to develop ICT tools that are customised to fit the local context in numerous ways, even going beyond use of local language or terminology. Colours, visualisations, and layouts can also be localised to fit the preferences of the target audience. The interactions can be localised based social hierarchy that impacts who has access to technologies or who is allowed to express dissent. Economic, socio-cultural, and environmental factors should be considered. Embedded in socio-cultural factors are language and literacy levels of the end users. Hutchings et al. (2012) identified three broad factors that should be considered in ICT tool design: the way the application will function given social context and information need (social design); the appropriateness of the technology platform to meet information needs (technical design); and the aspects that ensure an effective support structure for longevity and sustainability of the application (programme design). Any one of these factors can change based on local context. Iterative testing and development is a key technique for gathering suggestions and preferences for localisation. Our experiences in developing Community Choices for Water for West African countries and WASH SMS in Indonesia show that communities across regions and countries can share the need for similar tools for similar ends, but the details and features of those tools can vary greatly.

Training for data usage and outreach for general user uptake: the quality of data collected using ICT tools depends on users' understanding of the purpose and function of the tools, as well as their preparedness to use the tool once it is released. While attention is often paid to developing tools that are easy to use and require a minimum level of training, ICT tools are sometimes implemented without users having a clear understanding of what should be done with the information or interactions. In our research we also encountered WASH ICTs which have involved stakeholders throughout the design and development process, but did not conduct outreach to advise the involved stakeholders and broader community of when the system would be launched. During the launch day, hardly anyone used the system.

Software can provide flexibility and options: while research and advocacy tool outputs are often limited by the formats by which they are shared (downloaded PDF or printed material), ICTs can often provide options for customisation not available through other media. This can either assist in meeting the different needs and references of many stakeholders, or complicate tool design with too many choices. In the development of the Community Choices system, for example, we found the system connects users to information on technologies and technical and funding agencies as well as supply chain, but cannot be adequately used in countries where there is no information on local supply sources. This makes the tool not serve its full purpose in such countries except for learning about the WASH technologies.

Discussion

In order to ensure wider acceptability and usage of the tools created, developers of WASH ICT tools should address users' needs and preferences by engaging the target users for as long and as often as possible. Research has shown that when users are consulted from project initiation through to implementation, the finished product is more likely to be sustained. On the other hand, if users are not well consulted, tools may provide part of the solution, but not address all associated needs. Users should have trust that they can solve their problems through the tool or use of the tool, and to build this trust, they should be consulted throughout the design and development process. The Pacific Institute has benefitted from applying user consultation and participatory approaches in the development of both Community Choices and WASH SMS. Unfortunately, such consultations can be very expensive and time-consuming to implement.

Despite the increase in mobile phone and internet usage around the world in the past decade, people in the developing world face low literacy rates, sometimes speak multiple languages even within the same region or city, and often lack time and knowledge to search for what is needed. WASH ICT tools must address these unique contextual factors – including multiple languages and users with low literacy. ICT tools have the capability to translate text to different languages, display pictures, and play and respond to voice and text messages to meet the needs of the local socio-economic

conditions. Participatory approaches help to gather information to make appropriate design decisions.

The tools developed should also connect users to other resources that meet other related needs. Providing information for other resources and tools helps users understand the purpose or limitations of the current system, but immediately bridges that gap by connecting them to tools that do fit the purpose. Users become allies in spreading information about the usefulness of tools among those who need them once they have become aware of it. This has been addressed in the case of the Community Choices System where the tool addresses communities' and practitioners' needs in implementing new technologies by connecting users to funding and technical groups for assistance with contact information for funders, suppliers, and support organisations. More than ninety households were connected to NGOs and suppliers to support them in implementing point-of-use water treatment systems in northern Ghana and Burkina Faso in 2012 using the Community Choices System.

There is no doubt that ICT tools have great potential to solve many challenges in the WASH sector, but the biggest challenge is whether the developers can make these tools accessible. Currently, there are more than 4 billion users of the internet – however, not all these people know where to find information and which information is good for his/her need. There is the need to identify technical groups and locations where useful ICT tools for the WASH sector can be evaluated and housed for the general public.

Furthermore, national and local government sectors provide good platforms to house tools that are relevant to their citizens and should be invited to the development stage of ICT tools. If ICT tools are developed to create enabling environments for countries to meet their planning, management, and development goals, the countries' national institutions for water and sanitation issues will offer the platform for disseminating, managing, and sustaining the tools for their citizenry.

Conclusions

The paper has shed light on our experiences using participatory approaches to develop and disseminate ICT tools for WASH. Our experience indicates that involving users in project planning, design, development, testing, and dissemination could positively impact the sustainable use of the developed tools. This level of involvement can help build a user's sense of ownership of, and trust in, the finished product. Also from the discussion, it is clear that ICT tool developers should address a variety of factors, including users' context and individual needs, as well as connecting users to additional, similar resources. Therefore, various challenges associated with developing, use, and dissemination of ICT WASH tools should be addressed through participatory processes with the target audience before the tools' development.

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