

An Innovative Knowledge Sharing System for Collaboration in the Public Sector: The Case of a South African Government Department

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Abstract—This study proposes the implementation of a collaborative environment to capture meaningful knowledge within the South African Government in an efficient manner. Several departments within the public sector apply knowledge management to some degree, but only within their respective units and sharing of information outside of the unit or project teams is not a common practice. Hence, the duplication of work and lack of innovation and all other elements key to the development of a competitive edge in capturing, preserving and dissemination of expertise and knowledge across teams. This study uses throw-away or rapid prototyping methodology to serve as a basis for deriving a system specification. This prototype gives end-users a concrete impression of the system's capabilities. Employees value access to the knowledge using the system. As they work, they learn, or generate new knowledge using information obtainable via the system which draws on past and present experiences as confirmed by the users.

Index Terms—Knowledge management, collaborative data, web application, government department

I. INTRODUCTION

SERVICE delivery improvement remains one of the critical priorities across all spheres of Government. In order to ensure such improvement, public sector needs to introduce relevant interventions such as knowledge management and use ICT solutions as an enabler for knowledge sharing. The development of a meaningful and Innovative Knowledge Management (KM) System will promote timeous access to relevant information and expertise and go a long way to enhance effectiveness of service delivery within government, including the Department of Arts and Culture (DAC). KM will further promote a learning organisation by ensuring that employees share existing knowledge with others within the department and create new knowledge. This study develops a knowledge management system that identifies and captures the key knowledge sources and intelligent output within DAC, in order to support the key information needs of the

organisation and its employees. The loss of institutional memory due to staff turnover also leads the public sector to embrace KM practices. Managers and supervisors could become more efficient and effective as they execute their mandate and useful information will assist them to make informed decisions.

Knowledge Management (KM) is about improved communication, learning and knowledge sharing and can be applied to any human endeavour. On African continent storytelling played a significant role in conveying knowledge in traditional cultures between people and between different generations. Knowledge management is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers [3].

Central repository for all records, reports and document of the department is vital and employees are encouraged to file contents of value on the centralised systems. If the computer's hard drive crashes or gets stolen the information will be recoverable as it will be saved on the network.

Moreover, loss of information when personnel leave or retire will be minimised if not prevented, as observed by Jashapara [5] as a key feature of KM. The primary research question for this study is: How can we implement an innovative knowledge management system to improve knowledge sharing of collaborative data within the DAC?

This research question is broken down into the following secondary research questions, namely: What are current Knowledge Management practices in the DAC? What steps to follow in order to develop and implement innovative Knowledge Management System from collaborative data? How can users get involved in the knowledge sharing project?

The answers to the questions would allow the Department of Arts and Culture to acquire, develop, enhance & retain knowledge in the department, and enable employees in the department to share best practices, lesson learned, and historical data with one another, and to work together to generate new collaborative knowledge through innovative means. Knowledge sharing can help improve employee performance. More importantly, DAC relies heavily on the expertise of consultants who provide "rented knowledge" to different private and government entities. This knowledge is often lost due to lack of a well-structured and developed

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system of knowledge management.

II. LITERATURE REVIEW

A. Introduction

A review of past and current literature that relate to this study will enable us to indicate the state of discussion and efforts with regard to this study. Ultimately, the review of related literature will enable us to indicate the uniqueness of this study despite previous efforts. We begin with Knowledge Management initiatives in Government with the shift to innovation and knowledge as the primary source of value results in the new economy being led by knowledge workers. Government departments are creating and leveraging knowledge, data and information at an unprecedented pace [14].

B. Knowledge Management Initiatives in Government

South Africa is part of the global village and needs to become more competitive with its counterparts. Public Sector has to be innovative to meet the expectations of the citizens. It can only achieve these by embracing knowledge economy as well as the principles of *Batho Pele* (*people first*) and to serve the nation with complete competence and excellence. The South African Government has already recognised Knowledge Management as an essential element for an effective and efficient public service. Initiatives by the government to drive KM practices within government departments and entities include the establishment of a Knowledge Information Management (KIM) work group within the Government IT Officers (GITO) council where the focus was primarily on IT systems to facilitate KM. According to the Government Information Technology Officers' Council (GITOC) there are already a number of KM practices within government departments such as Department of Public Administration (DPSA). However, these practices are not all-inclusive of KM processes.

Government departments already share knowledge but at times information is ambiguous for people to use effectively and there's lack of collaborative data. Through KM, departments can systematically capture and organise the wealth of knowledge and experience of staff, clients, stakeholders, beneficiaries and partners, thereby leveraging and making readily accessible the knowledge and expertise that already exists within the department and create new useful knowledge. In so doing, institutional memory is built through preserving, developing, using and sharing knowledge, which is not lost when experienced employees leave government or retire. The Department of Public Service and Administration has also recognised the need to put KM into operation within government departments [14]. Kgomo in [16] stresses an urgent need for the National Knowledge Management Framework that can steer learning and the management of knowledge across three spheres of government to ensure efficient policy development and implementation with a view to make South Africa a better place for all.

C. Contextualizing Knowledge Management

Knowledge management (KM) is not just to become

more knowledgeable but to be able to create, transfer and apply knowledge with the purpose of better achieving organisation's objectives. According to Jashapara [5] Knowledge Management (KM) can be described as the application of management functions to the processes associated with an organisation's knowledge resources. It encompasses both the management of information (explicit knowledge) and management of individuals with specific abilities (people with tacit knowledge). Knowledge management entails all of those processes associated with the identification, sharing and creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organisational learning." KM involves methodically creating, maintaining and allowing access to the extensive knowledge repositories within an organisation. This allows organisations to be better suited to deliver customer services due to a greater understanding of the organisation's internal processes and functioning.

D. Knowledge Components

To clearly understand the concept of KM, it is crucial to firstly distinguish the meaning of data, information and knowledge [11]. In most cases the terms data and information are interchangeably used with the word knowledge.

Data are facts, words, numbers, names and figures that indicate activity and translation to which it is applicable. Data must be processed first before it can serve as useful information for a decision. Information is usable, relevant data that in a processed from unprocessed state is usable for good decision making. Information must communicate insight in a matter or predict something that would not otherwise become known. Information is the basis from which knowledge originates, and knowledge is the basis from which insight originates [5]. Information integrity should be maintained throughout the organisation. It must be available to the decision makers in the most suitable form, such as paper, computer files, telephone conversation, video clip, audio-visual, newsletter, journal, report, strategic document and more. Knowledge can be defined as information acquired through experience, practical ability or skill with its evolution illustrated in figure 1 below.

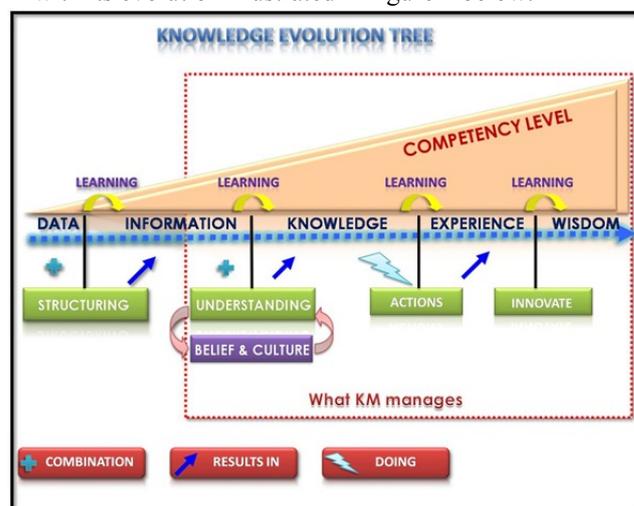


Fig. 1. Knowledge Evolution Tree

Research by Jashapara [5] noted that knowledge sharing is a core component and a critical success factor of knowledge management. Therefore, efficient and effective knowledge sharing frameworks should be conceptualised to act as a guide within organisations. In an era where decisions must be made promptly on daily basis, it is imperative to select the best decisions based on available information and knowledge. Knowledge sharing has in the recent years received attention both from academia and business community ([8], [9]). Knowledge sharing is one of most important component of knowledge management cycle through which knowledge is shared amongst individuals, and or amongst groups and also through which new knowledge is created [5].

Evidence has shown that knowledge sharing has been recognized as an important component of knowledge management through which new knowledge is created. The promotion of knowledge sharing in an organization is an essential challenge that most organisations are facing in today's business environment. One of the most known approaches to deal with knowledge sharing is the one proposed by Nonaka [11] that involves socialization, externalization, combination and internalization.

III. RESEARCH METHODOLOGY

The research project follows a positivist research design model but will involve some elements of interpretive participatory research [2]. The positivist research design employed involves methodologies like prototyping used in the development phase. This considered as very reliable [4].

A. Prototyping

A prototype is a sample system built to test and learn about the processes that it can perform. It is mostly designed to test a newly designed product to increase the quality of usability, and it acts as a specification of a running system instead of a theoretical one. Prototyping's main idea is to build and understand the requirements before a design or coding can proceed. By doing that, one gets the actual feel of the system before it is developed based on the requirements of the desired system.

In terms of an information system, prototypes are employed to help system designers build an information system that is easy to manipulate for end users. It is an iterative process that is part of the analysis phase of the systems development life cycle (SDLC). Prototyping refers to building web application prototypes which display the functionality of the product under development but may not actually hold the exact logic of the original application.

A trial web-based communication is built for the Department so that users or employees can interact with it to experience the feel of the future platform. Prototyping helps users to have a version of a complete and working product or application instead of a brief description of how the system will look like in the future.

System development life cycle provides a system used to build and monitor application software. SDLC is a complete process for developing information systems and oversees all the steps and activities involved in the development of a

new system. Employee involvement and the right implementation methodology when developing software are critical to the success of the organization.

(i) Planning Phase: During this phase the following question is addressed, why build the system? It is the fundamental process of understanding why a Knowledge Management System should be developed and determining how the project team will go about building it. During this phase meetings were held with Chief Directorate Marketing officials to identify business value, develop system request, conduct a feasibility analysis, develop work plan, assign project team, and manage the project. The deliverable is the project plan with all the requirements and functionality that needed to be delivered for Knowledge Management System development project.

(ii) Analysis Phase: The analysis phase is a process that answers questions of what the system will do (requirements gathering), who will use the system, when and where will the system be used. We analyze current practices, gathered information to discover what problems the Marketing Unit expects the system to solve for them, and what their real needs are. We evaluated alternative solutions and verified that a KMS approach is appropriate and developed the user requirements specification which were signed off by the project team.

(iii) Design Phase: The design phase determines how the system will operate or work (in terms of software, hardware, and network infrastructure), the user interface, and the specific programs, databases, and files that will be required. During this phase we design the information architectural design of the knowledge management system, its usability and how the system can 'connect knowledge' to allow officials to obtain relevant knowledge without having to go through the hassle of searching for information that is scattered in the system. We create graphic design or interface design, database design and program design. The deliverable will be system and functionality specification.

The conceptual design describes the general capabilities of the intended system, and the required resources. Looking at the complexity of the system that is informed by user requirements and the limited budget, Drupal Content Management System is highly regarded [1], [3] and proposed as appropriate solution. Drupal is an open-source software maintained and developed by a community of hundreds of thousands of users and developers". The design of the prototype also includes the creation of the page template, content layout and the customisation which is performed based of the approved wireframes and requirements.

(iv) Coding Phase: The coding phase is done using the PHP web programming language. PHP is an Open Source language readily available on the web.

Throughout the project the preliminary versions of the system is demonstrated to the marketing team for inputs and proceed to refine this prototype based on received comments. We continue with this cycle of presenting to the marketing team, obtaining inputs and refining the features until a satisfactory level is reached.

B. Interpretive Case Study

An interview process has been adopted to serve as a conversation between the researcher and the participants in

the study. IT staff, department’s managers and employees are considered for data gathering phase [6].

Also, Olivier [12] states that a questionnaire method is useful as a collection instrument because it provides detailed solution to the problem of distance between subjects and researcher. Questionnaires can be self-administered and easy to analyze. The questionnaires were given to all employees participating in the web-based platform to obtain their views on the system. Each participant received the same questions on the questionnaire and gave their own experience on interaction with the system.

IV. SYSTEM DEVELOPMENT RESULTS

The sitemap that outline the information architecture of the system [7] include buttons for Marketing, Resource center, Events, Gallery and Blog. These all emanate from the home page.

Home Page

Figure 2 represent the Knowledge Management System. The user will be presented by this home page when typing in the URL or clicking Knowledge Hub link on the intranet. User will view content on the web application without login

but to perform activities such as commenting on post, creating blog post, loading pictures, providing project status they must be registered and login with username and password.

Login

Marketing team will be able to view the system without login in but to post documents, make comments and blogs they will have to register and login. The Administrator will register the user and assign user roles. User will be presented with the screen to enter username and password.

Blog page

Managers and employees will be able create blog, edit and delete their own content as long as they have rights. Blogs are used to communicate notes, facts, projects and other useful information. This is shown in figure 3 next page.

Project Calendar page

Marketing team will post current projects with background information and set due dates. This is illustrated in figure 4.

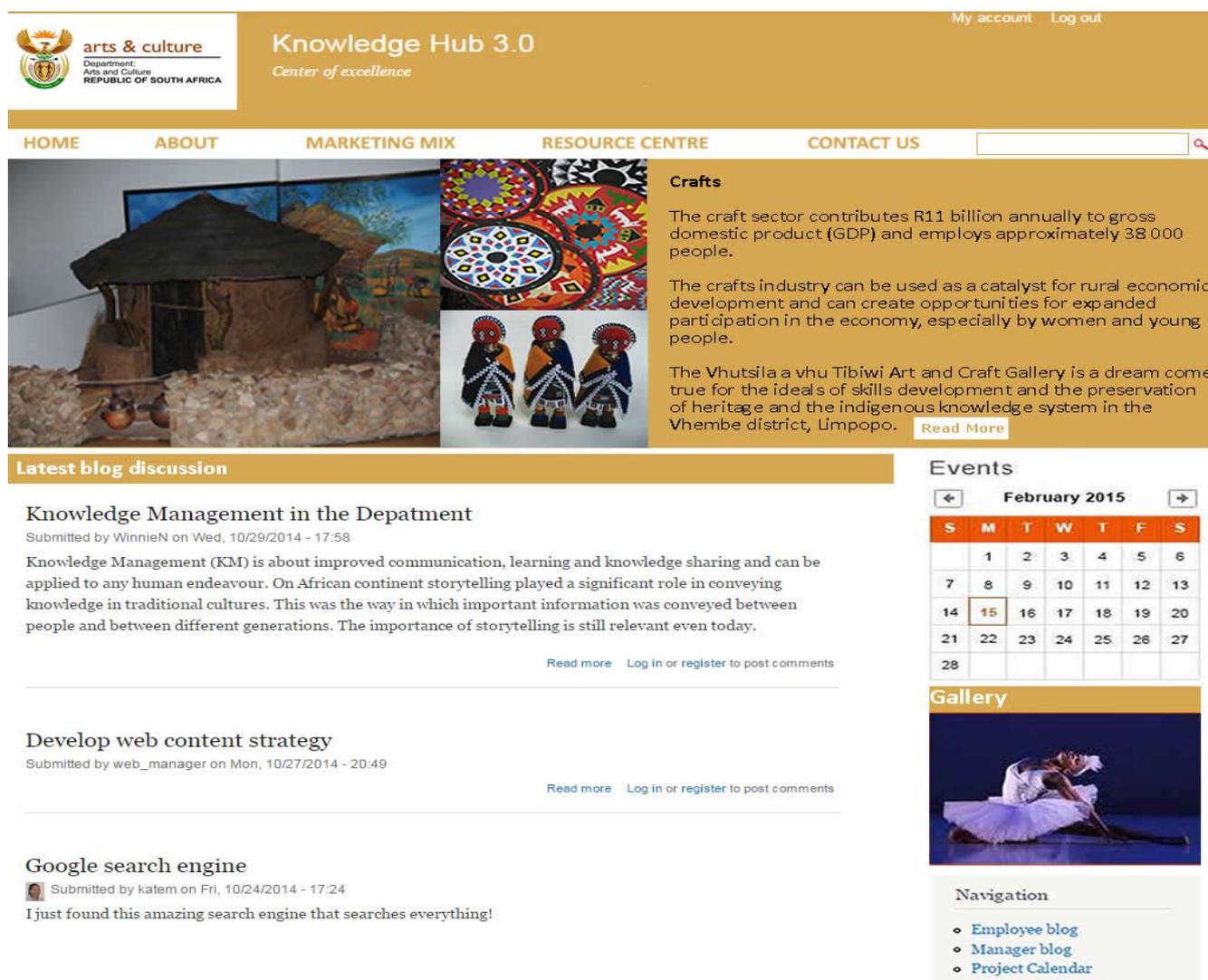


Fig. 2. Home Page for the System

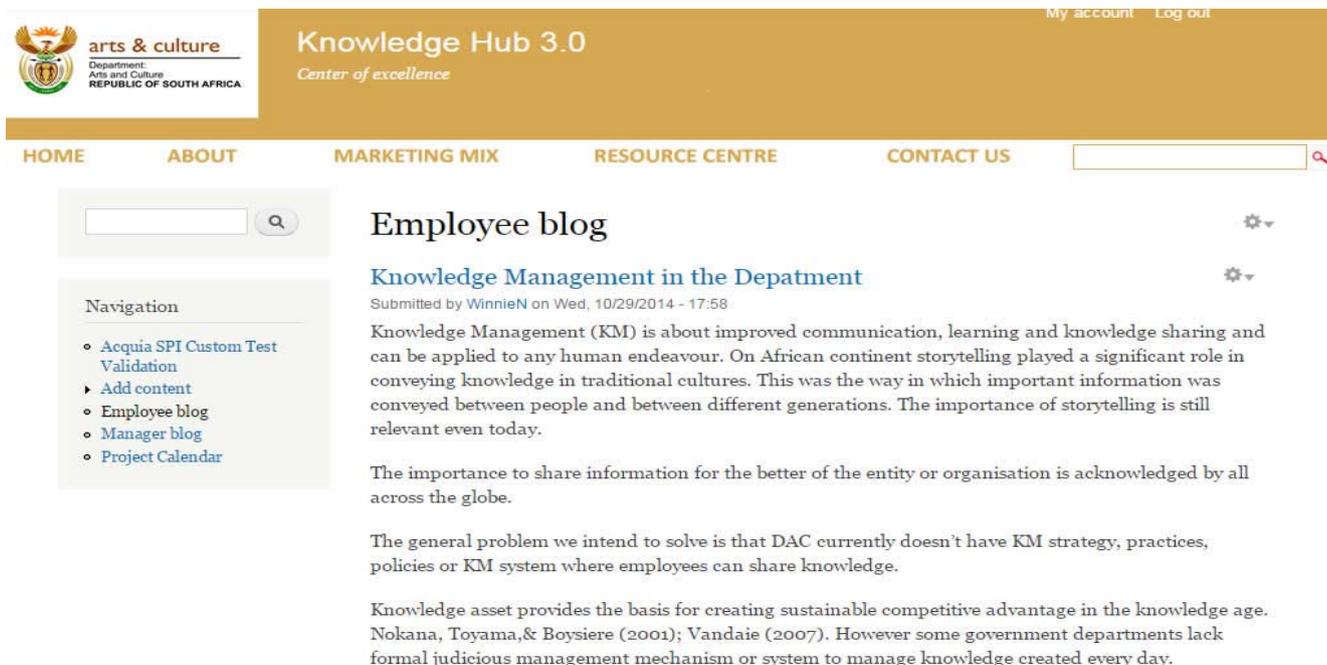


Fig. 3: The Blog Page

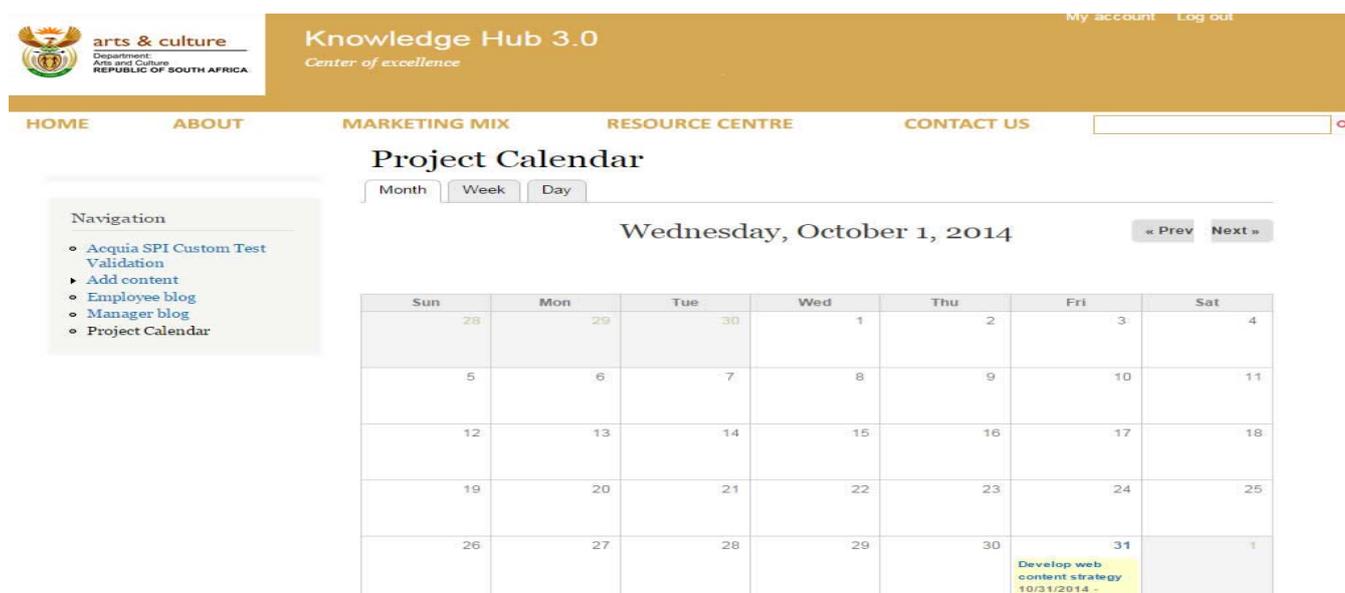


Fig. 4. Project calendar for the system

The web application will also have other pages such as:

- Photo gallery page where employees share pictures of events
- About page provides background about the functions of the unit
- Marketing mix page allow employees to share strategic documents
- Resource centre page enables colleagues to share information about registered events and project reports
- Events calendar list all current and upcoming events
- Contact us page provides contact details of marketing team.

V. CASE STUDY RESULTS

We use qualitative methods to obtain as much data and information as possible for this study. In this study, focus is partly on the perceptions and practices of the employees regarding knowledge management within the department.

A. Observation Results

We observed employees as they execute their duties to assess awareness of KM and knowledge sharing in the Marketing Unit. The Chief Directorate of Marketing colleagues understand KM to some degree and recognise the significance of tacit knowledge and have established the necessary mechanisms to capture and store such. The chief directorate arrange weekly meeting every Monday morning for about two hours to discuss events and projects.

Moreover each sub-directorate hold its own weekly meeting where employees are encouraged to develop concept papers, marketing and events strategies and plans as

well as project report at the end of a project where the success factors as well as challenges are highlighted and shared with the team. Project managers share their project experiences and ways in which they dealt with a specific issue. However not all sub-directorates share their plans with everyone in Marketing, some only share with their immediate colleagues.

Also, in Events Management sub-directorate they have developed training manual detailing how to run a successful event and each events employee is presented with a soft and hard copy including new employees as they are taken through the induction phase. This allows the transfer of knowledge [10] from the experienced to the less experienced among the events management and insures that their tacit knowledge is exchanged among all the employees. The challenge with this team is that their files are stored on their systems as well as on the network drive that is shared by the team only and not every project report is stored there.

reached.

B. Interview and Questionnaire Results

Furthermore, interviews are used to collect raw primary data from the respondents. The interviews are structured to ensure uniformity in the questions posed to each respondent. DAC leadership and employees acknowledges that there are no formal internal systems or procedures to capture tacit knowledge. However, the department recognises the importance of this knowledge and intends to invest on it in the future.

The benchmark was conducted with other national departments which have incorporated KM into their departments such as Department of Communication (former GCIS) and Department of Rural Development and Land Reform. The departments have very similar reasons for implementing KM programs. They all aim to enhance their departmental performance, improve internal efficiency and service delivery, facilitate communication among individuals and departments within or outside their organizations and to better store their knowledge capital through proper ICT solutions.

There was a sign of interest when employees were interacting with the new web-based platform. The interviews showed positive results that made the system to be the most wanted tool within the department. The employees were fascinated by the easily accessed information; they also got a platform to express their outputs and started sharing some other valuable information as enabled by the system-mediated communication [17].

Testing the interactivity of the system [7] was divided into 3 sessions due to availability of some employees. Each session had four participants, and all these three sessions were held on the same day which was on the 25th of June 2014. In each group we had a person who was given the right to post announcements.

After all the tasks and activities were performed, participants were given questionnaires to fill in. Participants found the questions had been straightforward and they understood them. In order for that to be confirmed, interviews were conducted to get a broader explanation of the participants' experience with the platform and to ensure that they understood what they had filled in the questionnaire. All in all, over 81% of the participants were

okay with the tasks/activities and were happy with the platform developed.

VI. CONCLUSION

Knowledge Management system from collaborative data could improve service delivery in the department. Throwaway prototyping is used as appropriate methodology for the development of the knowledge management system. This enabled reliability as a high priority, because it combines detailed analysis and design phases with the ability for the project team to test many different approaches through design prototypes before completing the design.

Everyone in the Department should intuitively appreciate the value of knowledge. The employees throughout the Department value access to the knowledge using the system. As they work, they learn, or generate new knowledge using information obtainable via the system which draws on past and present experiences.

REFERENCES

- [1] G. Bexell, and E. Johannesson, "Adoption of a Communication Platform for Lund University," in *Lund Journal*, 2nd ed. vol. 3, 2005, pp. 5-12.
- [2] A. Cornwall, and R. Jewkes, "What Is Participatory Research?," *Journal of Education*, Vol 23, No. 7, 1995, pp. 123-135.
- [3] C. Ellis, and J. Wainer, "Groupware and Computer Supported Cooperative Work". *Computers and learning*, Vol. 2, No. 6. 1999.
- [4] N. Golafshani, "Understanding Reliability and Validity in Qualitative Research", *Educational Research Journal*, Vol.8, No. 2.
- [5] A. Jashapara, *Knowledge Management An Integrated Approach*. 2nd ed. 2011, New York: Pearson
- [6] F. Kargl, P. Papadimitratos, M. Buttyan, E. Muter, B. Schoch, T.V.. Wiedersheim, and P. Hubaux, "Secure Vehicular Communication Systems: Implementation, Performance, and Research Challenges", *Technology in action*, Vol 2, No. 5, 2009, pp.24-29.
- [7] A. Mangstl, "An interactive web-based platform in support of Agriculture and Rural Development," *Agricultural practice*, Vol. 8, No. 4, 2007, pp.12-17.
- [8] R. Margolies, "The computer as social skills agent". *T.H.E. Journal*, Vol 23, No. 7, 1991, pp. 17-24.
- [9] A. Markham, "Life Online Researching real experiences in virtual space". *Virtual Computing*, Vol 3, No. 2, 1998, pp. 12-18.
- [10] M. G. Moore, "Is teaching like flying? A total systems view of distance education". *American Journal of Distance Education*, vol.7, No 1, pp.1-10.
- [11] I. Nonaka, "The knowledge-creating company". *Harvard Business Review*, November - December (1991), pp. 96-105
- [12] M. S. Olivier, *Information Technology Research: A Practical Guide*, 3rd edition. 2009, Pretoria: Van Schaik..
- [13] D. I. Poole, *The social impact of the telephone*. Cambridge, MA: MIT Press. 1977.
- [14] H. Purkitt, "Developing Web-Based Platforms to Promote Research and Communication about Tourism and Climate Change in Southern Africa," *Tourism and Technology*, Vol. 3, No. 23, 2011, pp.66-74.
- [15] S. C. Scholz, and D. Wallach, "User-Centred Design: Why and How to Put Users First in Software Development", *System Development journal*, Vol. 4, No. 8, 2004, pp.63-72.
- [16] C. J. Steenkamp, and A. van der Walt, "Web phenomenon applied as ICT platform in support of business model innovation," *Business Transactions*, Vol. 12, No. 2, 2004, pp.16-25.
- [17] E. Williams, "Experimental comparisons of face-to-face and mediated communication: A review," *Psychological Bulletin*, Vol. 84, No. 5, 1977, pp.963-976.