

KIST Newsletter

• Volume 1
• Issue 1
• February 2016

Our Initiative *Innovative Growth*

Educators, more than ever, need to provide ample opportunities to enthusiastic learners and introduce young intellectuals to systemic learning of higher calibre. Increased student involvement and interaction among students and teachers is valuable, and even imperative, both for intra-college and inter-college initiatives especially team project work. Sound understanding of any discipline is enriched through exhibitions, and competitions that often reflect academic excellence and institutional worth.

The KIST FAIR 2016 is no exception. It offers a fusion of the triad – Science & Technology, IT, and Management – a powerful admixture for individual, institutional, social, and national development. We motivate students by promoting an inter-disciplinary approach and enhancing innovation or discovery for urgent societal and national needs. Clearly, such youth-based programmes nurture talent. Notably, we are also keen to share insights into Science, IT, and Management with all our well-regarded visitors as we further the rapid transformation of the College through commitment to our vision.

Today, Nepal seeks solutions to serious natural or man-made problems. Further, its economy needs to do far better, cutting down on debt and dependence. Only with the true application of knowledge, skills, competence, and creativity can we tackle such significant issues. Self-reliance – sustainability – feasibility, now and later, are the answers achievable by properly using available renewable resources & deft indigenous technology. Here, the importance of youth power in tackling current, or long-term, problems is evident. With all the profound SciTech changes, it is essential for the educated youth to be aware of the revolutionary soft-power of blended learning to manage praiseworthy goals.

KIST is growth oriented. It focuses on appreciating the breadth and depth of scientific knowledge applicable to management practice and its relevance to students' lives. Science-based management and leadership define progress. Decision-making should come from the best available knowledge.

We expect that students will choose specialized areas for studies and build their information base through the right mix of theory and practice, entrepreneurial skills, and a sound work ethos. They need to develop a global perspective as they endeavour to assume leadership in innovative practice. This should assist them to choose appropriate careers, cope with fast technological change, and prepare them for a challenging corporate world.

This institution shall pursue excellence through courage – commitment – collaboration – whatever the obstacles. We are a land of possibilities . . . We, the young and the old, need to make Nepal one of opportunities. *A new tomorrow awaits you at KIST!*



In this Issue

- Successful Implementation of e-Government in Nepal **2**
- Natural Science Meets Philately **6** • Knowledge Management & Knowledge Networking for Skills Development **7** • Ants – Ecosystem Engineers **9**
- SciTech: Research News **10** • Learning Online **11**

Successful Implementation of e-Government in Nepal

Prof Dr Subarna Shakya

The e-Government presents a new and innovative approach to addressing traditional problems of government services utilizing Information and Communication Technologies (ICT). The author focuses on the challenges that need to be taken into account while facilitating the complex relationships between the government and its constituents so as to enable interaction, transaction, and delivery of governmental services. An integrated approach to developing a successful one-door system portal, the e-Government has been introduced for efficient knowledge management and personalised services. The main practical challenges facing the setting up and functioning of the Government Integrated Data Centre (GIDC), which is the basis for e-Government implementation, or recommendations to overcome obstacles, in Nepal, are covered.

1. INTRODUCTION

Successful implementation of an e-Government should be able to attract citizens who are already connected online, move people online who are not already there, and enable the transformation necessary to the e-Government at three levels: Government-to-government, government-to-business, and government-to-citizen.

An e-Government is also the technology to deliver public services in ways that citizens and businesses want them, using the Internet and other technologies as enablers. So an e-Government is much more than building a web site. It is the infrastructure that governments today are building to transform the way they complete their missions. The e-Government directly affects cost effectiveness in government and public operations as well as enables significant savings in areas such as public procurement, tax collection, and customs operations because of better and continuous contacts with citizens, especially those living in remote or less densely populated areas. Enabling the transformation to an e-Government requires a broad vision of realising and incorporating the perspectives of various parties involved in the process and those expected to benefit from such a transformation. There are mainly three groups (citizens, businesses, and government) involved in enabling the transformation to an e-government and their perspectives should be taken into account.

1.1 What is an e-Government?

The term “e-Government” refers to the use by government agencies of Information and Communication technologies that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be controlling corruption, increased transparency, greater convenience, revenue growth, or cost reduction.

Three essential elements of the e-Government system architecture

- e-Government Applications: application and services software components
- IT Platform: data centre, application servers, and storage
- Government Communications Infrastructure : physical network components

1.2 Why an e-Government?

The available images allow citizens or business and government employees to think about things such as access to information (24 hours a day, 7 days a week), about filing taxes electronically, about registering cars, or paying fees from their location of choice.



The momentum for new service delivery models is building throughout government. No government wants to be left behind in the movement to improve governmental efficiency through electronic delivery of information and digitalized services to citizens. The vision of digital government created by these images is powerful and compelling. The

focus should be on the vision, but attention should also be given to the complex realities of implementing that vision. Digital government initiatives, of whatever type, are complex mixtures of technological, managerial, and policy-related challenges.

Developing a successful e-Government provides the following benefits [3]:

Deliver electronic and integrated public services. More than just offering services online instead of in-line, organisations can provide value-added and integrated services. Rather than visiting several different offices, or several different websites, to obtain government permits, citizens and businesses can complete all transactions from a single point of access (one-door system), available 24 hours a day, and 7 days a week.

Bridge the digital divide. Governments can help make access to new technology available to the less fortunate in society as well as provide computer literacy education such as e-education, especially to the young and elderly people.

Achieve lifelong learning. The concept that education does not end when a person finishes school can be realised through the widespread use of e-learning. A society of knowledge workers will continue to access sophisticated and personalised education tools online.

Rebuild government-customer relationship. Rather than providing services in a uniform way to all citizens, governments can use new technology to treat citizens as individuals and provide personalised services. Citizens become more in charge of their relationship with government and regain their trust and confidence in the public sector.

Foster economic development. Governments can help businesses to move online and assist them to use online tools. By being online, businesses can leverage the advantages of being localized, such as being close to customers, while they grow and expand their markets worldwide. Local skills and employment prospects can be improved.

Create a more participative form of government. Ultimately, e-government can lead to direct democracy. For instance, at the local level, municipalities can support online debates, discussion forums, and internet voting to inform the decision-making processes.

2. SKILLS REQUIRED FOR A SUCCESSFUL IMPLEMENTATION OF AN E-GOVERNMENT IN NEPAL

Every e-Government project needs to nurture five kinds of skills to achieve success [1]. Such skills are hard to separate in practice, but they do represent distinct abilities that are worth understanding: Analytical skills, information management skills, technical skills, communication and presentation skills, and project management skills.

2.1 Analytical skills

Analysis and interpretation skills are necessary at every stage of an e-Government project, or any project, for that matter. They start with problem definition, the process by which an organization describes current symptoms and uncovers the processes, policies, and practices that are contributing factors. In this stage, process analysis, system audits, stakeholder analysis, customer satisfaction surveys, performance reviews, and statistical trending are needed. After that, analysis of user needs, business process alternatives, work flow, and information flow become more important. Research into what other people and organizations are doing to solve similar problems is also critical. These analyses help to design and build the system or find solutions. When a new system is prototyped, tested, and implemented, the importance of the analytical skills of system users' increases.

2.2 Information management skills

Information management skills are very important in any organization. Skilled staff knows that the content, quality, format, storage, transmission, accessibility, usability, security and preservation of information contribute to its value. With so many factors to consider, information management skills show up in many job types.

- Program managers and staff are likely to have the skills and knowledge that ensure valid content, clear data definitions, solid meta data, and associated data quality.
- Information Communication Technology (ICT) professionals have to be counted on to create the formats, files, and databases that

we use to represent and organize information. They also handle the interfaces and security features that assure both usability and integrity.

- Program specialists closely work with researchers to construct data definitions, design data collection processes, and institute quality control measures. These activities ensure that data are suitable for the analyses required.

2.3 Technical skills

Depending on the type of e-government challenge an organization is facing, higher-order technical skills will probably be required to implement the chosen solution. These skills are the prerequisites to understanding and using an e-Government.

2.4 Communication and presentation skills

There is also the requirement to make oral presentations to users. Such oral presentations are often made to non-technical management personnel. Personnel must thus be able to organize ideas or facts and present them in a language easily understood by users. Good communications alongside satisfying replies to questions is essential to convince the management about the usefulness of IT-based systems.

Meetings with stakeholders can explain how they will be affected and encourage their buy-in and participation. Newsletters, e-mail lists, and formal reports are all ways to communicate about a project. Presentation skills extend to more than preparing and delivering a talk, with or without visuals. They also comprise the ability to take complex data and distil it into information that is useful for a particular audience. Information needs to be categorized, summarized, and turned into briefings that convey important facts without oversimplifying or drawing conclusions that go beyond underlying, supporting data.

2.5 Project management skills

Project management skills include the ability to plan, organize, estimate and allocate resources, negotiate, track progress, measure results, troubleshoot, and communicate. Project management includes handling matters related to scope, time, cost, quality, and risk. No matter what is the size of the project, these skills will be needed to guide the work needed to a successful outcome of an e-Government.

3. DEVELOPING A SUCCESSFUL IMPLEMENTATION OF AN E-GOVERNMENT IN NEPAL

Successful e-Government projects not only attract those citizens who are already connected to the Internet, but they are also able to move people online. To achieve this, the ability to provide value-added services to citizens and businesses, hosted on the e-Government infrastructure, is the key. An integrated government service network that needs to be developed to reach the citizen in the physical world is also the best way to reach the citizen in the virtual world. Somebody who uses bank information or services on the Internet should be able to pay bills and taxes through online financial institutions. Somebody who buys fishing gear from an e-Commerce site should be able to buy fishing licenses from the same web merchant.

3.1 Knowledge management in an e-Government

For the adopted integrated model of developing a successful e-Government to function appropriately, there is a need to establish a knowledge management approach to the e-Government. Knowledge in this context comprises factual, structural, and procedural components as well as knowledge in the computer science sense of data modeling and artificial intelligence, i.e. rules, objects, frames, and relationships. Recent web-based systems have shown the clear need for an integration of different systems and components.

Good management of available knowledge has always paid off for public administration. Knowledge, after all, is the only basis for the decisions and actions of an administration. The strongest public administrations have always been those that have well-documented processes and structures. If, in addition, the information that needs to be provided by a citizen is clearly specified, an administrative process can be automated to a high degree, limiting human interaction to the actual decisions and consultations of citizens.

It is essential that administrative processes and structures are very well-documented. This knowledge forms the basis for a decision that might lead to three different results: The introduction of technology with or without a change, an adaptation of processes to assure the efficient use of technology, and the decision that technology does not solve the problem.

Administrative knowledge, which is of a highly complex nature, needs to be looked at from multiple viewpoints including processes, data structures, and rules (prescribed, allowable and prohibited states and behaviours). These viewpoints are not distinct. For example, from the execution of processes, essential structural knowledge and relationships can be derived. Rules may form part of process definitions. However, it is not possible to express all the knowledge through any single view.

Not all administrative knowledge is of equal formality. Informal knowledge channels, which exist in public administration just as they do in the business world, are the most difficult ones to support, mainly because they are not easily visible. Some of the more advanced integrated systems have found ways of getting round the problem by introducing several informal channels, such as discussion newsgroups, discussion forums, and unstructured or semi-structured workspaces.

It is worth observing that not all government activity is strictly administrative. Others, more physical activities, include on-site inspection and monitoring, face-to-face human service provision (teaching, health care, or advice) and collecting money (licences, fees, or duty). Possibly, advocates of a certain type of political correctness would probably want to contract these to private enterprises [6].

3.2 Efficient personalized services in a successful e-Government.

When sending applications online (filling in forms and sending them directly), personalisation can help in automatically filling in parts of forms and collecting additional certifications which are required and available online somewhere. Also, merging multiple forms into a single one could be done. For efficient personalized services, aspects of security and transactional processing require more attention. Details on payment or secure identification can be stored in the same way as data for personalisation where both need to be protected.

3.2.1 Personalisation of e-Government portals

Several key issues must be taken into account when implementing personalisation for an e-Government portal. Users, from absolute novices to experienced professionals, possess an extremely broad range of level of knowledge on computers ranging. Also, classifying them according to this can be very difficult. Personalisation must be very reliable. There might be liabilities if wrong advice or hints are given, especially since it is an “official” site. Otherwise, users will be extremely unwilling to provide information not already available to public administration. Data can be partitioned and its use can be restricted to certain authorities.

3.2.2 Integrating data from different sources

One of the advantages of e-Government portals is that a huge amount of information is potentially available to be integrated into personalisation. However, both legal and technical hurdles must be overcome in advance. First, selection of the content must take place, e.g. which parts are unsuitable for personalisation, or are

undesirable. Second, information must be classified according to its potential use. The parts that must not be used include: legal reasons (privacy), those requiring special permission (sensitive data and requiring explicit permission), ordinary data (but permission is needed), and free data (only indirectly related to persons or anonymous, e.g. aggregate data, or explicitly permitted or required by law). Only the last class may be used immediately. All other types require explicit legal permission and must conform to exceptions in privacy laws, or citizens must give consent. Observing the behaviour of users is useful for regular visitors. An example of useful personalisation is a Hot List containing those pages used regularly. Also, changes in the behaviour can be taken as hints that some data is no longer valid and need to be updated, removed, or marked as “suspect”, fulfilling the obligation to assure the correctness of information used [7].

4. INFRASTRUCTURE DEVELOPMENT

The success of e-governance initiatives depends a great deal on sound ICT infrastructure. Therefore, due emphasis ought to be given on the development of the e-Government infrastructure in the country. Infrastructure needs to be built up for all aspects of e-Governance, be it delivery of services by government or access of services by citizens or even for automation at government departments. Also, the government should ensure a coordinated development of infrastructure in various parts of the nation to avoid another divide between the ICT-enabled and the non-enabled.

It is therefore suggested that an e-Government Master Plan (eGMP) [8] may be worked out by the developing nations for building a National e-governance Infrastructure and all the future infrastructure development efforts should be in accordance with the eGMP. Since the ICT changes at a fast pace, it is not advisable to make all the investment up front, even if resources are available.

4.1 Government Integrated Data Centre

In the era of e-governance, government is expected to deliver its services to the citizens on 24*7 basis. To achieve this, the government has to set up a sound and stable infrastructure operational round the clock. Internet Data Centre is a facility which provides extremely reliable and secure infrastructure for running Internet operations on a 24*7 basis. It shall not at all be cost effective if each department starts setting up its own data centre as running a high class Internet Data Centre needs a lot of recurring resources. It is, therefore, suggested that the government may set up a high grade Data Centre at a National level to be used by all entities of the government. All departments should, in turn, establish high speed connectivity with the data centre so that they can manage their applications from their own premises in a secured manner.

In cases where the country is large and the government feels that one Internet Data Centre may not suffice, it could decide to set up multiple Data Centres. However, the number of data centers should be optimized to the extent possible primarily due to the high recurring operative costs as well as scarcity of skilled resources. It is suggested that the decision to set up a data centre should be driven by demand and not by political or geographical boundaries within the country. As the pace of the e-government picks up nationwide, besides delivery of services, Government may also have to set up data centers to share the large scale/special purpose resources for development of the systems.

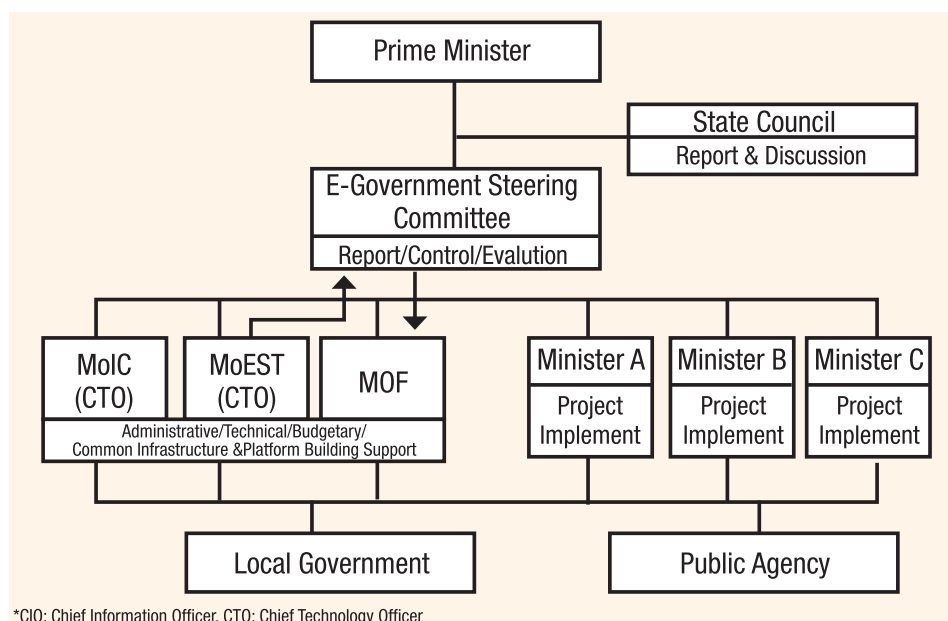
Besides providing computing and storage resources on demand, another important aspect/role of Data Centre is to provide data protection. Therefore, Data Centres need to have strong state-of-the-art backup and recovery and vaulting solutions in place. The data digitized and gathered by the government in the process of governance is very

valuable and the government cannot afford to lose this data at any cost, even due to natural disasters. Hence, the government has to consider setting up a Disaster Recovery Centre in a geographically different location, preferably in a different seismic zone. In case a government has multiple data centres; they can be connected to act as a back-up for each other.

With the cooperation from KOICA (Korean International Cooperation agency), republic of KOREA the Government Integrated Data Centre (GIDC) was established in Nepal [9]. The GIDC implementation agency is National Information Technology Centre (NITC). Presently first phase of Data Centre, an Internet data centre (IDC) is running. The Government Integrated Data Centre (GIDC) which is the foundation of e-Government implementation in Nepal

4.2 Organization Model

According to the KOICA report [9], it is suggested that for the effective implementation and operation of the Government Integrated Data Centre The e-Government Steering Committee coordinates all the ministries. The GIDC handles all the information of ministries, facilities of web hosting, the Internet & e-Mail, and the storage of e-Government applications.



Organization Model (KOICA Report, Nepal GIDC Construction and Operation, 2008)

5. CHALLENGES IN ESTABLISHING A GOVERNMENT INTEGRATED DATA CENTRE (GIDC)

This is the first data centre established in Nepal. The operation of this data centre is very challenging because it needs e-Government law, a migration plan, and experts who need to work 24 hours 7 days a week.

By providing services to other organizations, the Government data centre could create a business model which would be a 'win-win' situation for all parties. Organizations can focus on their core business and not merely on the day-to-day tasks of keeping a server healthy, secure, and running at peak performance. The security system is challenging because it is very costly.

Some of the challenges for services that can create business value to the data centre are:

- Server Co-location and Connectivity
- Web and Mail Server Hosting

- Data Backup and Storage Area Network
- Server Security and Hardware Firewalling
- Streaming Media Services
- Server Monitoring Services
- Clustering and Load Balancing
- Disaster Recovery Services

6. CONCLUSION

The success of e-Government implementation requires fundamentally changing how government works and how people view the ways in which government helps them.

Political leadership, vision, and commitment are required for successful e-Government implementation. Strong leadership can ensure the long-term commitment of resources and expertise and the cooperation of disparate factions. Governments will have to explore new relationships among government agencies as well as partnerships with the private sector to ensure quality and accessibility of this e-Government. In order to develop this citizen-focused vision, policymakers must keep the ordinary citizen in mind when designing systems. To implement

e-Government policies successfully, we need a Government Integrated Data Centre (GIDC) to centralize the flow of information and networks.

Importantly, political stability, and commitment, is needed to develop a successful e-Government.

References

1. LaVigne M (2001). Five kinds of know-how make e-Government work contact: Center for Technology in Government, e-Government 2001, www.netcaucus.org/books/egov2001/.
2. Layne K and Lee J (2001). Developing Fully Functional e- Government: A Four Stage Model, *Government Information Quarterly* 18, pp. 122-136.
3. Pardo T (2000). Realizing the Promise of Digital Government: It's more than building a Web Site, *Center of Technology in Government*, University of Albany.
4. Reynolds M and Regio M (2001). E-Government as a Catalyst in the Information Age, Microsoft E-Government Initiatives, *E-Government*, www.netcaucus.org/books/egov2001/.
5. Ronaghan S (2002). Benchmarking e-Government: A Global Perspective, *Assessing the Progress of UN Member States*, *Division for public Economics and Public Administration*, United Nations.
6. Quirchmayr G and Tagg R (2002). An Architectural Concept for Knowledge Integration in Inter-Administration Computing, in Wimmer, M. (ed.), *Knowledge Management in e-Government*, International Federation for Information Processing (IFIP), Laxenburg, Austria, pp. 67-77.
7. Sonntag M, Mühlbacher J and Reisinger S (2002). Personalization of Web-based Interfaces for Humans and Agents Applied to E-Government Portals, in Wimmer, M. (ed.), *Knowledge Management in e-Government*, International Federation for Information Processing (IFIP), Laxenburg, Austria, pp. 210-222.
8. e-Government Master Plan Consulting report (2006). Government of Nepal.
9. KOICA Report (2008). Nepal GIDC Construction and Operation.

Prof Dr Subarna Shakya is a Professor at the Department of Electronics and Computer Engineering, Central Campus, Pulchowk, Institute of Engineering, Tribhuvan University, Kathmandu, Nepal. Email: drss@ioe.edu.np

Natural Science Meets Philately

The Postage Stamps of Nepal

Prof Dr Ramesh Shrestha

The stamps of Nepal are known worldwide. Philately, in the broad sense, means the study of postage stamps, postal history, and other related items covering many thematic fields including almost all disciplines of science.

Thematic philately, in Nepal, about Natural Science began in 1907 and has won universal acclaim. The Nepal Postal Service authority

paise, NRe 1.00 and NRs 2.00, and NRs 5.00 respectively.

Ever since 1960, the postal administration of Nepal has been issuing numerous postage stamps, with exclusively biological themes showing the fauna and flora of this Himalayan wonderland. They include the Anopheles Mosquito for the theme 'Fight Against Malaria' (1962), Cow – the cow & yak (1973), Pipal – tree (2001), and Orchid (2007). There were commemorative issues on the 49th Birthday of King Mahendra – the Impeyan Pheasant (1968) – and for the Agriculture Year depicting Fish (1970).

Some of the sets incorporated themes like Fish (1993), Mushrooms (1994), Butterflies & Birds (1996), Snakes (1998), Herbs (2001), Insects (2002), Fruit (2005), Mammals (2005), and Turtles of Nepal (2011) to mention a few of the salient postage stamp topics among many others that keep being issued yearly since the Nepal Philatelic Bureau has a rich tradition of commemoratives, collectives & definitives.

Of much attention were the National Park stamps – the Sagarmatha National Park (1985), Royal Shuklaphanta Wildlife Reserve (1988), Rara National Park (1989), and Chitwan National Park with a rhinoceros (1991).

There were some themed stamp series, with new images issued in different years, like Flowers (1969 / 1976 / 1997 / 2000 / 2003), Butterflies (1974)



Shree Pashupati stamps (1907) bearing fauna, the black buck (*Antelope cervicapra*) and cobra (*Naja naja*)

issued a set of four stamps bearing the image of Lord Shree Pashupati Nath. The Lord is seen holding a trishul in his right hand, a black buck (*Antelope cervicapra*) in the left hand, and wearing a snake cobra (*Naja naja*) and necklace of rudraksha beads (*Elaeocarpus sphaericus*) around his neck. The four stamps had different postal rates with denominations – inscribed values or stamp prices – of 2, 4, 8, and 16 paise respectively. Of social significance, these intricately designed stamps were reissued, over the years to come, in 1930, 1935, 1941 – 1946, and 1949.

A purely biological theme, however, on the postage stamps of Nepal first appeared in 1959 – 60, when a set of stamps was issued displaying some popular wild animals and birds of the country. This instructive and interesting group comprised the Musk Deer (*Moschus chrysogaster*), Greater One-Horned Rhinoceros (*Rhinoceros unicornis*), Impeyan Pheasant (*Lophophorus impejanus*), and the Crimson Horned Pheasant (*Tragopan satyra*) with denominations of 8, 12



followed by Butterflies of Nepal (2009), Wildlife (1975 / 1984 / 2000), Birds (1977 / 1979 / 1992), Animals (1995 / 1999), and Biodiversity (2004 / 2006 / 2008 / 2012).

Importantly, the Natural History Museum (NHM) has been helping the Nepal Postal Services Department through thematic suggestions, technical advice, and even stamp designs. Since 2013, stamps with natural science themes, therefore, invariably contain the logo of the Museum. For instance, the Fossils of Nepal Series (2013) illustrates the molar teeth of *Ramapithecus sivalensis*, an extinct primate, skull of *Hexaprotodon sivalensis* (an extinct hippopotamus), molar teeth of *Giraffa punjabiensis* (an extinct giraffe), and skull of *Archidiskidon*

contd. page 8



Knowledge Management & Knowledge Networking for Skills Development

Dr Bhawani Shankar Subedi

Emerging trends of research on skills development put emphasis on the need for and importance of Knowledge Management and Knowledge Networking initiatives for the benefit of stakeholders – providers, beneficiaries and partners. Working alone does not produce as much as working in teams. A knowledge base helps create much-needed synergy among stakeholders. The sharing of best practices and experiences certainly helps to create a suitable environment for Knowledge Management and Knowledge Networking in skills development initiatives.

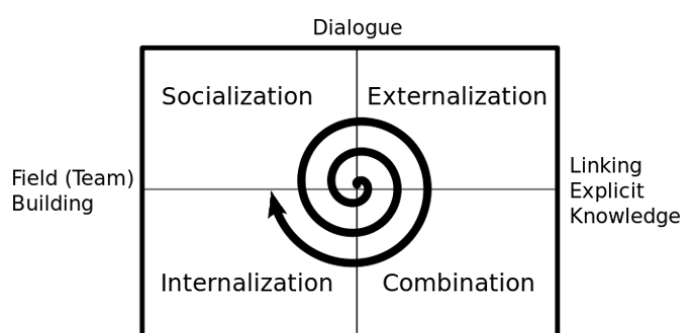
Conceptual Definitions and Frameworks

Knowledge Management (KM) is the process of capturing, developing, sharing, and using organizational knowledge effectively. KM refers to a multi-disciplined approach to achieving organizational objectives by making the best use of knowledge. Knowledge Management and Networking are a very powerful combination for managing knowledge in the future. It focuses on organizational objectives such as improved performance, competitive advantage, innovation, sharing of lessons learned, integration, and continuous improvement of organizations. Knowledge Management efforts overlap with organizational learning and may be distinguished from that by a greater focus on the management of knowledge as a strategic asset and a focus on encouraging the sharing of knowledge. KM is an enabler of organizational learning.

Knowledge Networking (K-Net) can be interpreted as functional and professional relationships among those individuals, groups, or organizations, as well as between collectives of organizations. In all these cases, the network construct demands that description and analysis does not concentrate only on a section of the relationships existing between the network participants and network relationships, but also comprehends the network in its entirety. Such networking can

be seen as a specific set of linkages among a defined set of actors, with the additional property that the characteristics of these linkages as a whole may be used to interpret the performance and behaviour of the actors involved. Consequently, the term network designates a social relationship between actors. Actors in Knowledge Networking can be persons or groups, but also collectives of organizations, communities, or even societies. The relationships evolving between actors can be categorized according to contents (for example, products or services, issues and challenges, program information and even emotions based on the frequency of interactions and closeness of the relationships – including the intensity and frequency of communication).

Domains of the Knowledge Management Spiral



The 'Knowledge Spiral' as described by Nonaka & Takeuchi (1995)

Research suggests that a successful KM effort needs to convert internalized tacit knowledge into explicit knowledge so as to share it, and the same effort must permit individuals to internalize and make meaningful any codified knowledge retrieved from the KM effort. Specifically, for knowledge to be made explicit, it must be translated into information.

Problems & Issues in the Context of Nepal

Over 400,000 youngsters (aged 16–25 years) enter into the labour market every year (ADB/SDP Mission Report, 2014). These unskilled young people end up as low-paid labourers. Currently, more than 30, 00,000 young people are working abroad, and the data those who migrate illegally are not available. More than 82% of young people migrate as unskilled workers and are often underpaid or otherwise exploited in foreign countries (ILO Nepal 2013/014 Study).

The existing policy of Nepal on skills development focuses on creating training and employment opportunities for the youth and adults who were taken out or not admitted to school, are illiterate, or have not obtained any kind of skills either through Technical Vocational Education or the Training (TVET) system. The policy seeks to expand such opportunities of TVET on a national scale. It aims to provide skill-oriented and labour market-oriented education and training, expand training opportunities (a contemplated fourfold increase over ten years) and ensure access and inclusion of women, Dalits, ethnic groups, Madhesi or deprived communities over the country. Groups unable to afford training fees may participate in entry training and a policy providing financial assistance will be put in place (TVET Policy, 2012). However, gaps and limitations exist in the implementation of the national policy.



The most marginalized children and young people in Nepal are those who have never been to school or have dropped out of school and remained unemployed. The National Population & Household Census, 2011 shows that the percentage of out-of-school children and young people is 19.6% & 30.9% in the hilly districts & Terai districts respectively. Children and young people between 13 – 22 years of age who are marginalized, and thereby, eventually deprived of education and training opportunities, are the most vulnerable. Recent reports of the Department of Education (DoE) show that many young people, especially girls, drop out of school due to economic and social reasons. Also, of the total population of the age group between 6 – 24 years, 8.7% have never attended school. Among these never-attendeers, 30% reported that their parents did not want to send them to school. Other reasons percentage-wise cited, by these reports, were they had to work at home (25.5%), were themselves not willing to attend (17.2%), were too young to attend school (7.2%), school education was too expensive for them (7.3%), because of some disability (3.4%), and that their school was too far away (3.1%). Similarly, there were additional reasons given percentage-wise: Children and young people drop out because of poor academic progress (22%), help needed at home (22%), because of their early marriage (17%), parents did not want to send them to school (7%), and that school education was too expensive for them (7%) (Education Flash Report, 2014). These are the very young people who have to shoulder the responsibility of earning for their families but have neither appropriate skills nor access to financial means to generate income for their own subsistence.

Evidently, formal education is an important factor in human capital formation. So, social equity and access to quality education and skills development opportunities are essential for a dignified living even though economic and social backgrounds are critical determinants in this issue. Therefore, other matters being balanced, skills-based training and vocational preparations are necessary for all young people as they contribute to livelihood improvement.

Rationale for KM & K-Net Initiatives

Technical Vocational Education and Training (TVET) provisions in Nepal are scattered and often uncoordinated. Technical Training Providers

(TTPs) do not have a common platform for sharing their problems and issues and for finding solutions to the problems identified. The lack of baseline data and effective Monitoring and Evaluation (M & E) of TVET programmes and services, nevertheless, are troublesome issues. In most cases, stakeholders are unaware of who is doing what, and success stories worth emulating are rarely shared among policy makers, providers, and beneficiaries.

Knowledge Management (KM) and Knowledge Networking (K-Net) initiatives intend to bring together the primary stakeholders by sharing data bases, opportunities and challenges – including lessons learnt, best practices, or success stories. Such a knowledge base needs to be shared among stakeholders and regulating bodies to ensure quality and relevance of skills development interventions imparted as preparation for skills upgrading in occupations that invariably lead to improved employability, productivity, and the income generating capacity of the target groups.

Need for Institutionalizing the Initiatives

It is equally important to institutionalize Knowledge Management and Knowledge Networking efforts for creating and disseminating the existing as well as emerging knowledge base. Most problems and issues can be addressed collectively. Regulatory issues can be addressed and administration can be converted into service to the development partners and stakeholders. Efforts that have been initiated till now have not been properly institutionalized. Sustainability is often questioned without institutionalization of KM and K-Net efforts that would otherwise lead to quality assurance of skills development provisions.

Overall, the necessity for institutionalizing Knowledge Management & Knowledge Networking is clear as they are continuous processes and such livelihood-relevant activities MUST continue as an essential part of lifelong learning skills.

Dr Bhawani Shankar Subedi, MPhil (Leadership Studies), PhD (Education), is currently the National Programme Manager of Support to Knowledge and Lifelong Learning Skills (SKILLS) Programme, Ministry of Education / UNDP, Government of Nepal.

Natural Science Meets Philately ...

planifrons (an extinct elephant inhabiting the Sivalik hills). They are valued at NRs 50.00 each. Similarly, twelve stamps on the Moths of Nepal, priced NRs 10 each, were issued in 2014. In the same manner, an extraordinary series of stamps with six different extinct elephants of Nepal was issued in 2015 at the behest of the NHM.

Notably, all this postal information passes on the knowledge of Natural Science to the general public specially amateur stamp collectors or serious philatelists and also imparts sound basic knowledge through a combo of the scientific and the philatelic to students.

It is likely that many students, thus inspired, can choose exciting careers in diverse, and ever-growing, fields, related to the study and conservation of Nature, and sustainable use of natural resources, that are now open to sensitive and explorative young minds!



The author Prof Dr Ramesh Shrestha, an expert & well-known writer in his field, is a Professor of Zoology and is currently the Chief of the Natural History Museum, Tribhuvan University, Kathmandu, Nepal.

Ants – Ecosystem Engineers

Indra Prasad Subedi

Ecosystem engineering is one of the important factors that affects the distribution and abundance of organisms besides food availability, presence of enemies, competition, and climate. What exactly is ecosystem engineering? It's the creation, modification, and maintenance of habitats, and micro-habitats, by organisms called ecosystem engineers like the modest yet ever-present and ever-toiling ant.

Ecosystem engineers – a term meant for key species who greatly affect other organisms – alter the distribution of large numbers of animals and plants, and modify biodiversity. They maintain the health and stability of the environment they inhabit. Ecologically, they manage resources for organisms by causing physical state changes in biotic or abiotic materials.

Human beings hugely impact, and engineer their own ecosystems too while beavers, termites, earthworms, and ants – all ecosystem engineers – modify the soil and enrich its productivity. For instance, the bioturbating activities of termites, earthworms, and ants produce structures that can last long periods of time – outlasting these organisms themselves – and affect soil organic matter dynamics alongside soil physical processes. They even seem to counterbalance man's disruptive actions . . .

Ants, in particular, are a large proportion of the animal biomass worldwide and contribute to various ecosystem functions through their daily activities. They play many ecological roles – aerating the soil, cycling nutrients, and influencing plant defense or seed dispersal. A little known fact, ants actually turn more soil than earthworms do! Also, they are vital food for numerous reptiles and birds. They help in distributing organic matter by moving dead insects too. In furtherance of their role, some ant species support colonies of plant-feeding insects, such as aphids or plant hoppers, even protecting them from predators but eat consume the sugar-rich honey dew that aphids secrete or even eat them when in need of protein.

Ubiquitous ecosystem engineers and generalist predators, ants affect ecological communities via both pathways. By moving of soil by nest building activity and by collecting food they affect the level of nutrients in the soil thereby impacting the local populations of many animal groups, from decomposers to species much higher up the food chain. By preying on a wide range of other animals, including larger prey attacked by vast numbers of ant workers, they balance their ecosystem. The abundance and territoriality of ants influence other terrestrial arthropod groups either directly or indirectly. On the contrary, a low density of ants in an area increased the diversity and density of other animals, particularly herbivores and decomposers. No wonder ants have been used as indicators of ecosystem health and function.

Ants are soil engineers. Through their nesting habits, ants are agents of bioturbation: Mixing soil horizons and creating avenues for water and gas exchange through the tunnels and chambers that make up their nest architecture. These activities result in soil production and alter soil chemical, physical, and biotic profiles. Ants' movement of materials from above and below the ground concentrates nutrients and minerals in their nests and associated soil. The nest structure above the ground is carefully engineered as well. By creating soil or other mound structures, the ants may prevent plant colonization and change soil temperature and moisture profiles. Parasitic, commensalist, and mutualist organisms share these nests and change the soil communities.

Ground ants create and modify habitat for other organisms and modulate the availability of resources by creating the biomantle. The funnel ant (*Aphaenogaster longiceps*) supplies more than 80% of the soil moved to the surface by soil fauna according to a study. Additionally, ants have high spatial and temporal ecosystem impacts because of their high population density, the length of time they remain at local sites, their erosion-resistant mounds, the durability of their constructs, and



because of their effects modulating water flux along with soil fabric and texture.

Significantly, as ecosystem engineers, ants act as facilitators increasing species diversity, particularly in physically or biotically stressed systems. They facilitate the development of other organisms in their own mounds, including unique plants that otherwise would not exist, and even increase the numbers of some microorganisms. Research informs us that in the mounds of Harvester Ants (*Messor ebeninus*) the incidence of plant species is higher than on adjacent soil. Further, when it comes to restoring grasslands, ecologists may have another way to evaluate their progress – ants. The more diverse the ant population, the closer a restored section of grassland is to its original state. When it comes to native grasslands, ants are indeed natural ecosystem engineers.

However, it is important to remember that most ecosystem engineers influence the distribution and abundance of other organisms in many ways, not just by engineering. For example, European wood ants (*Formica rufa*) affect other animal species in many ways. When wood ants build their nest mounds, they create new micro-habitats which greatly increase the abundance of litter-dwelling earthworms. Further, these wood ants attack songbirds in trees near their nesting mounds by using territorial defense behavior (interference competition) in order to drive birds away. Finally, when wood ants prey on other invertebrates, causing a decrease in arthropod populations within the wood ant territory, a trophic interaction occurs. Thus, wood ants alter the abundance and distribution of many different animal species using a variety of mechanisms, only one of which is ecosystem engineering.

Ecosystem engineers have been proposed as a means to restore a given area to its previous state. While some form of human intervention may also be necessary with today's level of development, ideally these

colonised surface, as they act collectively as ecosystem engineers. All these are key components of ecosystem engineering which makes the natural landscape more heterogeneous, and more appealing.

So, the paramount role of the ant cannot be disregarded. Human beings ought to learn from the role of ants in preserving Nature and try to change their ways to conserve the environment.

Vive la these entomons of the Nepalese Himalayas – lowlands or highlands!

References

Bartel RA, Haddad NM and Wright JP (2010). Ecosystem engineers maintain a rare species of butterfly and increase plant diversity. *Oikos* **119**: 883-890

Folgarait PJ (1998) Ant biodiversity and its relationship to ecosystem functioning: a review. *Biodiversity and Conservation* **7**: 1221-1244.

Frouz J and Jilkova V (2008). The effect of ants on soil properties and processes (Hymenoptera: Formicidae). *Myrmecological News* **11**(11): 191-199.

Haemig PD (2012). Ecosystem Engineers: wildlife that create, modify and maintain habitats. *Ecology. Info* #12

Investigación y Desarrollo (2014). Earthworms, ants, termites: The real engineers of the ecosystem. *ScienceDaily*. Retrieved January 18, 2016 from www.sciencedaily.com/releases/2014/10/141023154945.htm

Kovar P, Vojtisek P and Zentsova I (2013). Ants as Ecosystem Engineers in Natural Restoration of Human Made Habitats. *Journal of Landscape Ecology* **6**(1): 18–31.

Sanders D and van Veen FJ (2011). Ecosystem engineering and predation: the multi-trophic impact of two ant species. *Journal of Animal Ecology* **80**(3): 569-76.

South Dakota State University (2014). Restoring grasslands: Ant diversity indicates restored grasslands. *ScienceDaily*. Retrieved January 18, 2016 from www.sciencedaily.com/releases/2014/06/140609140500.htm

Wright JP, Jones CG and Flecker AS (2002). An ecosystem engineer, the beaver, increases species richness at the landscape scale. *Ecosystems Ecology* **132**: 96-101.

Indra P Subedi is a zoologist with special interest in Myrmecology and has been teaching zoology over fifteen years. Presently, he is the Secretary of the Nepal Zoological Society.



engineers would be non-human agents. Soil invertebrates allow the soil to absorb processed organic matter such as leaves, wood, trunks, and branches that helps to nourish crops; they also maintain an ecological balance and provide greater fertility without using chemicals. In addition to being able to assist in restoration ecology, ecosystem engineers such as ants would be a helpful agent in invasive species management. Evidently, ants generate a considerable shift in the quality of the

SciTech: Research News

Discovery of 'Jurassic butterflies':

A new study identifies a Jurassic age insect whose behavior and appearance closely mimic a butterfly - but whose emergence on Earth predates the butterfly by about 40 million years.

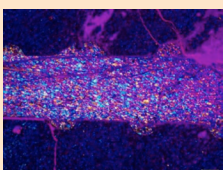
Source: Indiana University



Research may explain mysterious deep earthquakes in subduction zones:

Geologists may have finally explained what triggers certain earthquakes that occur deep beneath the Earth's surface in subduction zones, regions where one tectonic plate slides beneath another. The researchers have shown strong evidence that water squeezed out of a mineral called lawsonite could trigger these mysterious quakes.

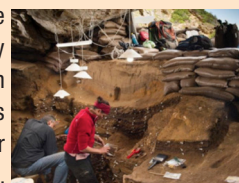
Source: Brown University



Humans evolved by sharing technology and culture:

New findings from Blombos Cave show that Stone Age man in Africa exchanged technology to a large extent. The more contact between groups, the stronger technology developed. The exchange of tools can explain humans journey from Africa to Europe. Blombos Cave in South Africa gives vast knowledge of our early ancestors as early as 100,000 years ago.

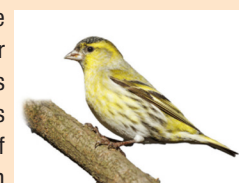
Source: The University of Bergen



Small birds prefer flying in company:

Until now, scientists had observed that some large birds are sociable among each other. However, a new study has confirmed that this unique characteristic can also be seen among smaller birds such as the Eurasian siskin, a bird which is able to form bonds that last for a number of years as well as travel long distances in the company of these birds. This intimacy may favor reproduction in addition to facilitating the process of adjusting to a new place.

Source: Plataforma SINC



Courtesy: ScienceDaily

Learning Online

The KIST Advantage

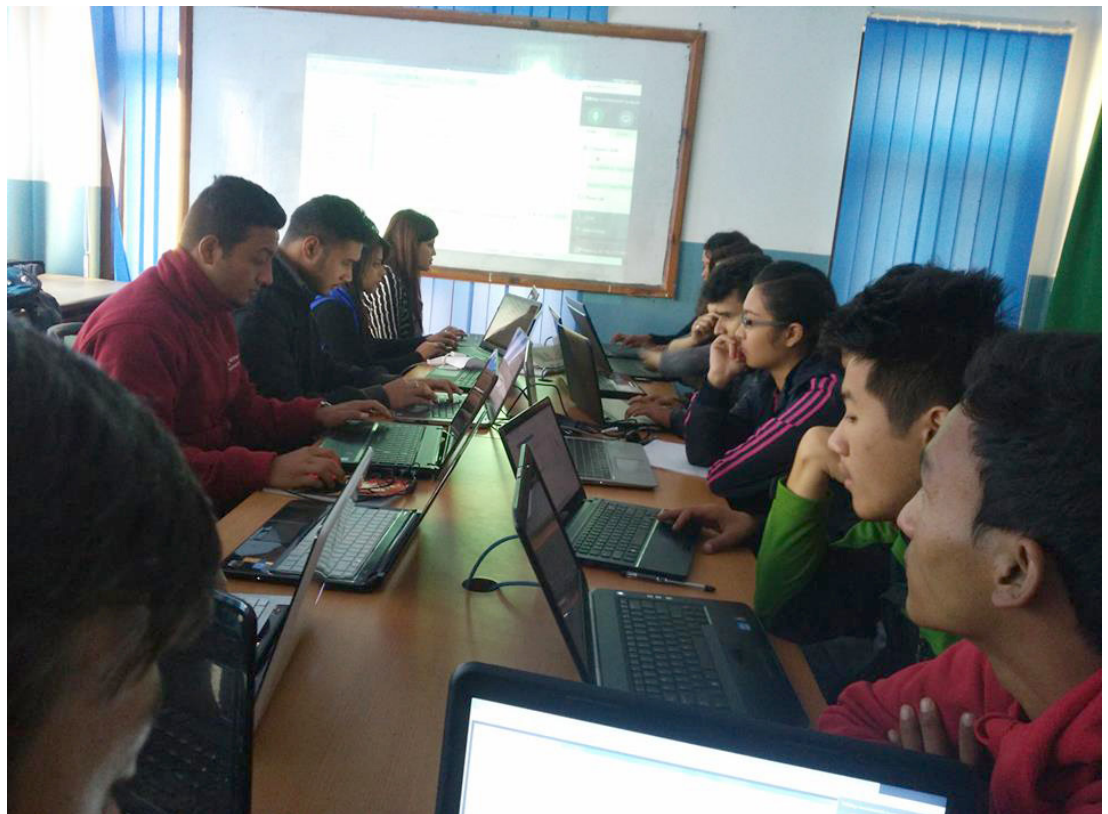
Dilip Yogi

Virtual classes are common in technologically developed countries. Ongoing advances in technology aid in the easier delivery of virtual classes day by day. Greater access to computers, high-processing computers, increased internet bandwidth, and easily accessible wifi have made the virtual classroom a practicable concept. Today, there are classes online given by Nepalese, or other, professionals located outside the country.

A few weeks ago, KIST gave the writer an opportunity to conduct a virtual computer science class from the USA. Having being educated there, the writer felt interested in sharing experiences with Nepalese students and professionals. At first, it was not sure if it would be feasible to conduct such classes given all sorts of technical and timing limitations. Nonetheless, the first class online at KIST, a pioneer in Nepal for modern education, with a handful of students gave much needed encouragement. In the process, it was decided to include other colleges of Kathmandu as well. The idea was to use some online tools to hold classes via the Internet. There were instances, as these classes were given, when it seemed that such classes might not be very practical but eventually the outcome turned out to be positive. Certainly, it is an exciting prospect that such classes can indeed be delivered.

Today, Nepalese professionals have a huge global network. There are Nepalese professionals working in different positions in top organizations, high or low, in nearly every country. Undoubtedly, such professionals are highly qualified and have a vantage point of looking at the world job market that may prove beneficial both to the Nepalese within Nepal and the Diaspora itself. Many of the professionals have Master's or even PhD degrees in their respective fields. These professionals who live far from their beloved home country are almost always longing to find a way to help Nepal and its people. The world has seen the display of the unified strength of internationally-placed Nepalese professionals during our recent earthquake rescue missions. Given a good platform, these professionals will positively help to advance the Nepalese education sector and simultaneously improve the skills of professionals within Nepal.

If such virtual classes are done systematically, they can bring a revolution to the education sector of the country. Nepalese professionals will have a sense of purpose in their lives and derive much satisfaction even if are working abroad and not in the nation. Great opportunities for Nepalese educators would arise for them to tap in a great pool of qualified resources. A virtual class undermines the problem caused by geographical distance between an instructor and prospective students. Virtual classrooms make it easy for students to access learning materials whenever or wherever they want or need. Multimedia including audio and video recording of class materials or homework assignments can



aid student learn things on their own and at their convenience. Self-study is the call of the future.

As a working professional in US, the writer has always thought about how knowledge can be used to improve skills of the Nepalese students, professionals, and the general public. The evident lack of skilled professionals is a daunting issue for Nepal and is a big blow to the productivity of the country. Classes online can reduce that problem to some extent as they can be carried out for almost every area of study or skill. In particular, for IT courses fairly effective virtual classes can be given for perhaps all subject topics. Creating a system to support for such classes may incur some investment upfront but in the long run it is likely to be beneficial to all concerned – instructors and learners, educational institutions and Nepalese society itself.

Dilip Yogi is a Senior Software Engineer at CenturyLinkInc, St. Louis, Missouri, USA.

KIST FAIR 2016

Fostering Talent
SCIENCE • IT • MANAGEMENT
6 February 2016, Kathmandu

Hundreds of students along with their parents or guardians are likely to attend this key event on Saturday, 6 February 2016, at KIST premises.

The College Fair, planned and presented by the host institution, exhibits imaginative Projects of KISTians and student teams of the participating colleges.

Event Highlights

Inter-College Science & Technology Projects Competition – over 12 reputed +2 colleges of Kathmandu valley to participate in the Fair

Intra-College IT Projects Competition – over 12 exhibits of KISTians

Intra-College Management Projects Competition – over 12 exhibits of KISTians

KIST Imagineering Competition – First-time-ever Intra-College Competition displaying imaginative engineering concepts & designs for the country's future

Welcome!



KIST
COLLEGE & HSS

PO Box 20828, Kamalpokhari, Kathmandu
Tel: 4434990, 4434178, Email: info@kist.edu.np
www.kist.edu.np

Commitment to Excellence