



ROUND TABLE



Societal impacts of information and communications technology

Rahul Dé *

Decision Sciences and Information Systems, Indian Institute of Management Bangalore, Bangalore, Karnataka, India

Received 17 March 2016; revised 5 April 2016; accepted 5 April 2016; available online 22 April 2016

KEYWORDS

ICT for development;
Inclusivity;
Challenges of system development;
Openness and security;
Assessment of projects

Abstract The promise of information and communications technology (ICT) to deliver change is attractive and draws practitioners to experiment and build. Academics and researchers too believe in such benefits but point to certain challenges: changing processes and people to adapt to a new technology, which is invariably an import from a Western nation; the conflicts arising from the changes introduced by ICT, with some groups benefitting over others; and ensuring that the social change that is desired is indeed achieved, while disrupting existing arrangements. The speakers in the panel highlight and provide examples of some of these challenges.

© 2016 Production and hosting by Elsevier Ltd on behalf of Indian Institute of Management Bangalore. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Perspective note to round table

Challenges of ICT-led societal change: reconciling viewpoints

There is an implicit understanding in the popular discourse that information and communications technology (ICT) will deliver change and development for the betterment of our lives. The understanding is often contested when large projects such as the Aadhaar unique identification for all residents in India, or the use of robots in manufacturing, which is gaining ground rapidly, raise problematic issues of privacy and loss of jobs in the popular discourse. The arguments then

turn towards the negatives, the problems that information technology initiates rather than the solutions it provides.

The views of academics and practitioners often diverge along the above lines. Whereas practitioners, those creating and implementing massive ICT projects for potential benefits to society, and their own firms are optimistic and drive forward the change with a view to build, experiment, and then seek results, the academics are cautious. Literature in the Information Systems (IS) field and in the sub-field of Information and Communication Technologies for Development (ICT4D) sees the transformation inherently assumed, with regard to ICTs, as both complex and problematic. Information and communications technologies pose challenges with regard to design, implementation, and evaluation.

Almost invariably, the technology that is considered in a developing country is an import. The technology was most likely designed and built in either North America or Western

* Tel.: +91 80 26993297; fax: +91 80 2658 4050.
E-mail address: rahul@iimb.ernet.in

<http://dx.doi.org/10.1016/j.iimb.2016.04.002>

0970-3896 © 2016 Production and hosting by Elsevier Ltd on behalf of Indian Institute of Management Bangalore. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Europe. It would, as such, address the needs of those developed societies and not necessarily the needs of developing societies. The design and functioning of the ICT artefact, which is largely immutable, remains a challenge for the location for which it is imported and for which it has to be implemented.

The first challenge is that of the imperative of change: people, processes, social conditions have to change to accept the priorities and methods of the technology. The technology may be modifiable, to a certain extent; however, for the most part the local implementers have to play “catch up”. The imperative is often to “leapfrog” or to “modernise” and accept, sometimes without questioning, the technology and the changes it is enforcing.

The second challenge arises when implementers are conscious of the social impacts that the technology can have, and take a cautious approach. Local concerns, local conditions, the ability of populations to “absorb” the change, and the acceptance of new phenomena are taken into consideration to implement the technology. The technology itself is carefully examined and selected to ensure that it is both suited to the local needs and is modifiable for such needs. The challenge in this approach is that power conflicts within the target population will cause some people to benefit from the changes, while others may be denied. Also, unintended consequences may cause certain negative effects (such as loss of privacy).

A third challenge is that of transformation or change in social, political, and economic conditions, which is both suitable and desirable for the nation (Avgerou, 2008). The ICT may enable or support this change; however, the main concern is to ensure that this change is effected. Social and political change often creates deep ruptures in existing conditions, some of which will require drastic modifications in social arrangements. For example, corruption is deeply embedded in many developing countries, and ICT-led change that threatens to displace or reduce corruption is often strongly opposed (De', 2007). Furthermore, giving voice to marginal communities with the use of ICT too gives rise to resistance and is often opposed (De & Singh, 2011).

Despite the above challenges, academics largely agree that ICT does indeed lead to development and change (Walsham & Sahay, 2006). This is accepted as conventional wisdom now, and many governments have set up massive initiatives to implement ICT infrastructure and enhance people's reach and access. Many multi-lateral agencies, such as the World Bank and ITU, measure and report on the extent of this access, thus creating a discourse that supports the virtuous view of ICT-led development.

In the current context (in 2016), nations around the world are facing the deep onslaught of ICTs. Cloud computing, internet-of-things, robotics, social media and analytics are making very deep changes in the manner in which work is done, how people interact, how governments exercise their administrative power, and how private industry grows and changes. These changes require careful thinking and understanding both to absorb their benefits and reject their costs and, what is more, require that the challenges mentioned above are addressed. However, the strong pace of change often does not leave time for reflection or understanding. There is an implicit imperative to play “catch up” and “get on with it”. It is in these situations that great care has to be exercised in addressing the opportunities and challenges that ICT poses.

The speakers in the panel provide examples of the issues that ICT-led development faces and underscore the challenges mentioned above. There remains much to understand and explore in this evolving field of study and research.

Societal impacts of ICT: opportunities and challenges—panel discussion

Anchor: Sourav Mukherji, IIM Bangalore.

Panellists:

Ashwin Mahesh, CEO, Mapunity
 Srinivas Padmanabhuni, VP, ACM India and AVP, Infosys Labs
 Chetan Patil, Founder & CEO, Rakya Technologies
 Pramod Varma, Chief Architect, UIDAI
 Amit Prakash, IIIT Bangalore, formerly Advisor—Social Sector Consulting, Deloitte India¹

Sourav Mukherji: Today, we have with us five industry practitioners to make their remarks and observations on the societal impacts of information and communications technology, the opportunities and challenges. We have Dr. Ashwin Mahesh, who is the founder and CEO of Mapunity, a social technology firm; Mr. Chetan Patil, who is the founder and CEO of Rakya Technologies, which was started with the social mission of saving lives by using technology in critical and time sensitive situations; Dr. Srinivas Padmanabhuni, VP ACM India and Associate Vice President of Infosys Labs; Dr. Pramod Varma, Chief Architect, Unique Identification Authority of India (UIDAI); and Mr. Amit Prakash, Advisor—Social Sector Consulting, Deloitte India.² I will invite each of the panellists to make their opening remarks followed by a question and answer session with the audience. First I would like to invite Dr. Ashwin Mahesh to make his opening remarks.

Ashwin Mahesh: There are a couple of things that I want to say in my opening remarks. One is that we need to be able to do things that we are doing in technology for society in a way that our efforts are directly focussed on the problems rather than our interpretation of the problems. In building technology solutions for many of our social problems, we have not adequately focussed on the nature of the problem. Historically, the solutions that have been built for public problem solving or tackling large challenges in society have failed to recognise the fundamental nature of the problem. We have created technology that is bought by a primary stakeholder and incidentally made available afterwards to other stakeholders. It would be very nice if technology actually evolved out of social norms in a way that it reflected the way people use that technology. But that is not happening in the technology for society and for public problem solving.

¹ The panel discussion was part of the IFIP 8.6: Grand Successes and Failures in IT conference held at the Indian Institute of Management Bangalore. This part of the article carries edited excerpts of the presentations made at the panel discussion. The views expressed by the panellists are personal and academic in nature and not necessarily the views of their organisations. The presentations of the panellists were made in an academic context in an academic institution.

² Prof. Amit Prakash, currently with IIIT Bangalore, was Advisor—Social Sector Consulting, Deloitte India at the time of this panel discussion.

The second thing I want to bring to your attention is the nature of the problem. If you take a simple governance issue such as the traffic or paying your taxes, you will realise there are many players and actors who are impacting the solution. You have a national government that sets a policy, and a state government that controls certain arms. For example, here in Bangalore, the bus services are run by the state government, whereas the metro is run by a consortium of both the state government and the central government; the municipality manages all the roads, and the transport department manages the vehicle data and the driver licensing data. So you have these different stakeholders even within the government who are responsible for different aspects of a single social problem. Therefore, to be able to bring together a solution you have to figure out a way to integrate the outcome orientation across the different government departments, let alone society.

I want to make two suggestions as to how to do this. First, we have to be able to understand the overall direction in which technology is going and ask ourselves whether the solutions that we are proposing today for the problems are in line with the large trends in society, as well as with the large trends in technology. I suspect that the answer is by and large “no”. Technology companies that sell to government usually sell yesterday’s technology because governments tend to be more comfortable with yesterday’s technology. So companies that are selling into yesterday’s technology will forever be undermining the ability to solve the problems of society. How do we overcome this? To understand this we have to ask ourselves, what is the nature of technology that is embraced by the public today? The public is willing to embrace open technology, open data, open platforms and collaborative platforms; the public is willing to embrace platforms that give them voice, and a diversity of options within a large framework. We need to be able to step back and ask whether the way to solve the problems is reflected in the technology itself. For example, if you have a managerial problem in your company, you would put in administrators to work to solve that problem. If it is a technical problem or mathematical problem, you have people with technical competence to address that. But if you have a social problem, who should solve the problem? I believe the answer to this is the entire society because that is what makes it a social problem in the first place. The idea that a social problem can be solved by only a few people is fundamentally weak. If you accept that social problems should be solved by all of society, it follows that the technologies we adopt for those problems must be built to allow the participation of all of society too. There are a few well understood things that can be done to achieve that: integration of different silos; presentation of information in a public way that diminishes asymmetries between government and people outside the government, between decision making power and recipients of that information.

There is also one other trend in social use of technology that we need to think about and that has to do with learning. Universities across the globe are being swept aside by unconventional modes of learning that are either more market facing or more genuine in that they deliver learning better. And why is this important? If you want all of society to be able to participate in solving problems, you need public information platforms that communicate to people in society what the problems are. Therefore the technology platforms have

to embrace public information and public management. You also need public learning. These are two halves of the solution—public solutioning using technology requires public information as a knowledge development capacity and public problem solving on the learning side. Public problem solving on the learning side requires massive re-thinking of our academia, of the things we want people to learn. We must learn that the capacity to find solutions to problems cannot be taught in the conventional ways.

To sum up my presentation on the subject, fundamentally, an absence of public information, public management, open data and standards is holding back technology’s capacities to solve society’s problems and large companies apparently play a part in keeping things this way. Second, the absence of proper learning techniques oriented towards actual solutioning is hindering the capacity of large numbers of people to learn how to solve problems and academic institutions apparently play a part in keeping things this way. Both of these have to change. Thank you.

Sourav Mukherji: Thank you Ashwin for making a provocative start. Now I invite Dr. Srinivas Padmanabhuni, VP, ACM India and AVP, Infosys Labs to make his opening remarks.

Srinivas Padmanabhuni: Following up on Ashwin’s comments about the openness of systems to ensure a level playing field for everyone, I will begin by talking about what we call in software engineering terms, “the non-functional requirements of systems to be billed”. On the one hand you have the functional specific requirement or what the system is supposed to do. Scientists in computer science and software engineering are obsessed with the usual “ities”—availability and scalability—the ability of the software to enable access to a large number of users.

But what I am going to talk about is a set of “ities” which are important from a social perspective. Let me start by clubbing all of them in one word—inclusivity. Today one of the big debates in the IT ecosystem is how to bring inclusivity into the way we build our systems. While the web is the predominant medium of delivery of services and information, it is largely inaccessible to a majority of the people. We are depriving a large chunk of the population of the access to services and information. That is a key dimension that software practitioners have to imbibe when they build systems, and there are multiple ways this is done. First of all, we have to consider that a very “cool” looking gadget, app, or technology may not be the best choice. In building inclusive systems we have to ensure that the IT enabled service or product is available to the larger society. For instance, a gadget with a very interactive user interface would not be appropriate for a visually challenged person unless the text can be read out by a screen reader.

While there are several guidelines and even government mandates and regulations about accessibility which have to be followed strictly, I still think one of the biggest challenges we face is the pace of adoption of cutting edge technologies. In the adoption of rich internet technologies and mobile apps, we have left accessibility far behind. Applications over the web, the mobile or the internet must be built in such a way that a whole section of the challenged community can access it. So my appeal to the community which starts to build applications is to address this concern of last mile rendering to society which not only affects the legal aspect of the question but also the financial.

There is a significant financial benefit that can be brought in by including a whole new base of customers, and I want to dispel some more myths here. By accessibility, we are not only talking about the visually challenged, but all strata of society. An example here is Intuit India's programme called txtweb which is an SMS based gateway to services, and its variant Fasal which is an SMS based platform for farmers to get real time prices of agricultural produce in the market. (txtWeb has since been incubated out.) Such solutions bring an understanding of the end user perspective, instead of looking at a technology for technology's sake.

The second point which I want to bring up is the question of ethics and moral accountability of the software we build. I want to throw a question to the ICT community which builds software. Should software practitioners be subject to licensing? Today we read about aircraft crashing due to failure of systems and X-ray machines not working due to inadequate testing of software. While I do not advocate a licensing regime I would like to say that if we can hold doctors accountable, why can't we do the same for software professionals? It need not entail legal formalism, but at least we can enforce a strict regime on the vendors of ICT to provide certification of having done adequate testing. This would apply more in the context of public solutions which are meant for society at large. For instance, if you are talking about ICT solutions to run the embedded systems inside a metro train, or elevators in buildings, we would have to especially emphasise safety-critical IT systems. Whether it is for public use or for private consumption, the question of software ethics assumes utmost importance. We, as practitioners, must be responsible for the end product that we deliver to society. That accountability has to come from a combination of things. It can be by awareness, through comprehensive and adequate quality assurance (QA) procedures, and by adequate certification of third party vendors.

Last but not the least, I would like to talk about the implications of openness from a security perspective. Today, the IT eco-system is plagued by crime, bots, illegal software, and other crimeware waiting to snoop on transactions, phishing for account numbers and so on. So, can you bring adequate security testing into the way you build your systems? While it would not be possible to preclude all possible attacks, there should be a reasonable certification for people who are delivering end-user centric public solutions that the solutions have gone through adequate vulnerability analysis and checking against the typical concerns. I do not want to talk about privacy here, which is the other side of the coin. But I think privacy issues are more about policy than about technologies.

I am also concerned about the social implications of open platforms today. The social media is an instrument that has been used in a positive way as well as a negative way. People use it to reach out and help others in need; at the same time it may be used to cause socially undesirable viral outcomes. There is a need to increase awareness of implications of what people post on social platforms.

To sum up, I would like to emphasise three points with reference to ICT for social purposes. The first is about accessibility and usability, second about ethics and third about balancing the needs of security and openness. Thank you.

Sourav Mukherji: Thank you Dr. Srinivas for bringing the issues of inclusivity, ethics, and security to the forefront in

looking at impacts of ICT. Next, I invite Mr. Chetan Patil, Founder & CEO of Rakya Technologies.

Chetan Patil: How many of you think that asking a simple question can create history? History was made when C. V. Raman looked at the sea and asked why the sea water was blue—it led to the Raman Effect. We started Rakya by asking a simple question. Later we realised that it is not important just to ask the question, it is equally important to commit to it. So what was that simple question? In 1995, my brother was travelling from Bangalore to Bagalkot, a small town in Karnataka, when he met with an accident. He was taken to the hospital in a crowded tempo and when he reached the hospital there were no medicines. He did not survive the accident and this incident brought up a very important question: Why can't we have a system or a technology where we can take a needy person to a clinical service in the quickest possible way?

The mantra with which we started Rakya in 2001 was "Think big and enjoy the baby steps to success". We were a bunch of hard core C programmers, software engineers working for leading software development companies, with no idea about businesses, various functional units and so on. We knew our limitations. We had 25,000 dollars, which was not enough to start a company in Bangalore. We decided to start in Bagalkot instead.

We broke down this big problem into smaller problems and decided to tackle them. On the supply side, the 11 engineering colleges around Bagalkot and the encouragement of some illustrious principals of colleges and professors was invaluable and helped with access to engineering talent. We worked with the supply side for a year. Then, to understand what was needed to solve this problem, we observed the routine of the hospital closely. We observed that the 15 doctors in the hospital took about an hour and a half to complete their transactions every day. We told the hospital management that we could find a way to reduce the time taken by these doctors to less than five minutes. We came up with a simple solution, an Excel macro. That was our first sale and that is how it started.

We did not venture into the technology at the beginning at all. We started with their operations, literally sitting in their pharmacy department, writing the receipts, processing their insurance claims, and talking to the patients. After a period of one and a half years we got a sense of what they wanted. We ultimately offered the hospital a high quality service.

When we thought of how to leverage our experience of having worked with leading software firms, to make a difference to the people, we understood that it is not just about using high end technologies but the value add that we can bring in. We then entered into the productising stage. We have penetrated quite well throughout India now. The ultimate goal is to move towards working out how fast we can take a patient to a hospital. Once we started understanding the pain points of the patients travelling from a remote village to a taluk, our focus shifted towards better patient care. This included looking at how we could retain their records better, when we noticed many of them carrying crumpled case history records. Today we are carrying around 2 million patient data and we can say that it is adding value though in a very modest way. We have been successful in tier 2, tier 3 and tier 4 cities and we are looking at a global perspective. We have been fortunate to have the support of several eminent people

including Dr. B.S. Katkole, Dr. Meena Chandawarker, Prof Garwad, Dr D. H. Rao, and B V Jagadeesh, founder of Exodus Communications, who are helping us take Rakya to the global scale.

Moving forward I think we are close to having intense technology solutions which will help people. We have already done a proof of the concept of doing air-lift in a very cost effective way. Thank you.

Sourav Mukherji: Thank you Chetan. It is very inspiring and optimistic to know the real work being done in implementing ICT to solve societal problems. Our next speaker is Dr. Pramod Verma, chief architect of the Unique Identification Authority of India (UIDAI).

Pramod Varma: I would like to thank all the previous speakers today who hit on several important pointers which are also driving the technology decisions we make. I am a part of the technology team implementing the UID or Unique Identification Number/Aadhaar Number programme. One of the previous speakers spoke about openness and previous generation technology. That was one of the first and most difficult challenges we had to get through in the system. How do you create an identity that is paperless, cardless, and is just an identity number? People found it difficult to understand the concept. The entire system is geared towards a card, or a piece of paper, of "showing" an identity card to someone. We carry so much legacy with us that dramatic changes in the system have been very difficult, and get pushed back. But we kept a few large technology drivers in mind. The first one is connectivity. We assumed that by the time we finish, most people will actually start using the identity platform. Personally, I think we must move forward and connect everybody with an online identity. So, we created this number as an online identity where there is no paper or card.

The second question was, how do you create an open platform—not a programme or an all-inclusive solution? We did not talk about solutions at all; the concept was very abstract and people were unable to understand what to do with the number. We said that the number, the identity, is only the starting point. It is only the first thing you provide when you ask for a bank account or a SIM card for your phone or for healthcare and so on. I am sure that the doctors Chetan spoke about struggle to identify a patient for the second time—how do you identify if a baby is immunised, whether the same child is immunised five times or you are missing several children. So identity becomes the foundation in every service especially in a large society like India, with a large population which is out of the banking system, completely dependent on government entitlements and subsidies. One of the largest struggles we have been facing is the lack of true identity. We spend huge amounts of money on direct benefits—pensions and job guarantee schemes. But there is no way of actually making sure the money is going to the right people because there is no way to identify the right people. There is no systemic way to figure out whether the same person is getting the benefits multiple times or if a section of the society is completely being excluded. So we planned for an inclusive online identity which will be connected.

The third aspect to consider with UID is that it would be a platform—we said we will only issue an identity and allow verification of that identity through an application programming interface or API. Our solution is extremely simple. All we do is take four attributes of a person and the biomet-

rics. Once we ensure that it is unique, we issue a number. We have not built a solution, but only provided a platform. If you build a platform, innovation will happen outside. People will find great vehicles to drive on their platform. Individual programmes and applications with regard to hospital care, transport, school admission and so on, that involve repeated identity verification and often involve spending large sums of money, can now simply use an open API. Many papers have been published on how they can access it, how is it secure and so on.

Dr. Srinivas Padmanabhuni talked about security and these concerns are inevitable. To my mind, if you don't take care of the security, you don't roll out the programme! But the foundational consideration still is inclusion. For example one of the questions we were asked was, if you are taking fingerprints, then what about people who do not have fingers? That is why the UID is a multi-model identity record which includes fingerprints, iris record and a mobile phone number. UID has launched an online authentication with several modalities. In India, we may find several people who have no biometrics at all. So we also included the mobile phone number, which is an important factor that is often underestimated. So we included these three aspects in our multi-model identity and we kept it extremely simple.

We have covered around 440 million people and we are covering about 1 million in a day³. The entire aggregate data, the metrics, are published on our website and are available as an open data platform. It is completely built on open technologies. Here, we have taken a forward looking approach. The idea of putting up open data did have a lot of resistance but we are not putting up people's individual data, only the aggregate data—the two are very clearly separated out. Further, the data is not something that is put up on a portal; we provide access to the data. You can merge it with health-care data and education data of that particular section of the society and come out with statistics. You may look at health or education significantly differently from other fields. However, that is outside of UIDAI. It is really important that we build a platform and let research and innovation happen outside. We kept to inclusion, simplicity and connectivity—with everything being online.

In some ways, UID is like GIS (Geographic Information System); GIS only gives your location and it was built for that particular purpose. But now we use it for all kinds of innovation such as directions to your hospital, restaurants, schools, and so on. Similarly, the identity platform only verifies your identity. There is no transactional data retained on our system. But we allow others to use this information for external application and innovation. Thank you.

Sourav Mukherji: Thank you Pramod, you made the entire UID project sound very simple. But we know that it is probably the most complex project that you have undertaken in India. Our last speaker to make his opening remarks is Amit Prakash, who is Advisor, Social Sector Consulting, in Deloitte India⁴ and he is also our former student. So Amit, welcome back!

³ (These figures are as of the time of recording of the panel discussion. They have now crossed 770 million.)

⁴ Amit Prakash was Advisor, Social Sector Consulting in Deloitte India when this discussion was held—he is now with IIIT Bangalore.

- How does one assess these projects?
 - As development projects
 - As public service delivery projects
 - As IT projects
- Whose perspective assumes significance?
 - Beneficiaries of the public service: social groups
 - Government: policy makers/programme designers, frontline service delivery personnel
 - Users of the ICT system
- Which indicators to track?
 - Life expectancy at birth (LEB), Nutrition levels, Learning levels, Per-capita income, GINI index, Employment
 - Accessibility, Availability, Transparency, Responsiveness
 - Ease of application use, Data handling, Security, Interoperability, Latency

Figure 1 Assessing online projects for social sector.

Amit Prakash: How do we assess success and failures in technology oriented projects in the social sector, which in the information systems are largely categorised into ICTs for Development (ICTD). I will focus on projects where development of marginalised population groups is being sought through improved public service delivery in social sectors—in health, nutrition, education, livelihoods—through application of ICTs. Some examples of such projects in India are Health Management Information Systems (HMIS), Integrated Child Development Services (ICDS MIS) in nutrition, the District Information System for School Education (DISE), and Bhoomi, for livelihoods.

To tell you a little about these systems, the Health Management Information System is not only a hospital management system but an information system which aids in the management of the entire National Rural Health Mission (NRHM) in India. The management information system (MIS) for Integrated Child Development Services is a flagship programme for addressing the problems of malnutrition across the country. The District Information System for Education has been used for school education in India for a long time. This online system produces school report cards, gives the statistics of teachers and students, enrolment ratios and category of students. Bhoomi looks at improving agricultural livelihoods in the country.

When we look at success and failures in these kinds of projects, what are we looking for? (Fig. 1 gives an overview of how we evaluate online projects for the social sector.)

For instance, do we look at the Health Management Information System as a development project, or as a public service delivery project or a purely IT project? What is the perspective that we take when we evaluate these kinds of projects?

When we evaluate development projects to benefit marginalised population groups, we look at the beneficiaries of these programmes. And when we look at beneficiaries in a context like India, we have to look at social groups within the marginal populations. In India we have scheduled castes and tribes, other backward castes, religious minorities etc. We have to look at all these groups when we look at assessing these projects from a development perspective. If we are evaluating projects from a governance or public service delivery perspective the stakeholders become important. The stakeholders do not always form a homogenous whole. Continuing with the example of HMIS, a policy

maker or a programme designer based in Delhi, for example, will have a different take on how that project should be assessed from an auxiliary nurse midwife (ANM) who is responsible for the immunization of children at the ground level. There are different kinds of functionaries within the hierarchy who will have different motivations while looking at these projects. When we are assessing these projects, whose perspective are we considering when we are looking at it from a governance perspective? Further, if we are looking at the HMIS as an ICT system, we have ICT designers and IT users, with their own perspectives.

The multiplicity of perspectives would probably lead us to track certain indicators. If we consider Bhoomi as a development project, then we would ask if it has led to income improvements or to more sustainable livelihoods for the small and marginal farmers that it targets. If we are looking at HMIS as a development project, we would be concerned more about whether it has led to improving the health indicators, improving institutional deliveries and so on. If we are looking at it as a governance project, the governance indicators would start coming in—issues such as accessibility, availability, transparency, and responsiveness. If we look at projects from an IT perspective, we would be looking at issues of security, of application use, data handling, inter-operability, latency and so on.

All these different dimensions go into determining whether a project can be assessed as a success or a failure and much depends on the perspective from which you are looking at it and how the stakeholders view it.

Social projects are interdisciplinary in nature so we are concerned with development, with governance, and with IT as a technology. Therefore, these considerations must be taken into account not just when we assess or evaluate the projects but also when we design them. When we design projects, especially in a country like ours, we do not have a theory of change, or programme logic; we do not look at or articulate why a particular programme has been designed and the mechanism by which it is going to bring about the changes that we seek. We say that through this use of technology we are going to make public services available to everybody in the country. But then how does it actually operate? That is largely missing. So, when we design projects for the social sector, we need to have a programme logic, we need to understand that these projects are inter-disciplinary in nature,

and we must look at development, governance, and at IT systems. We need to consider these aspects while assessing such projects as well.

Sourav Mukherji: Thank you Amit. In any social project, impact assessment is always a very big challenge and thank you for throwing some light on it.

To sum up, the first two speakers laid out before us the various challenges of large scale ICT projects especially with the aim of making societal impact; the next two speakers Chetan and Pramod told us that despite all those challenges there are very interesting initiatives that are going on. We saw an entrepreneurial effort by Chetan as opposed to the huge UID project which is a public-private partnership. So we are indeed making some headway, despite all the big challenges. Finally Amit talked about how to measure impact and how such impact measurement fits into delivering a better project. We have had a very nice sequence of presentations. We have some time now for the audience to ask the panellists questions.

Q: What, according to you, are the barriers between academia and the industry and how can it be bridged?

Ashwin Mahesh: I have not seen too many academics in the practice space, but with regard to IT in India I think the way the curriculum is set in the learning institutions does not lend itself to useful participation in the applied space. I do not mean this only as a problem for the academic world, it is also a problem for the industry. Especially in software development, there is no sequential transition from learning software programming to going on to get a software programming job. It is almost as if you learn a lot of other things and you incidentally learn logic, mathematical deduction, and algorithms, after which you learn syntax and some code. People are not learning programming in any academic space. Equally the problems exist in reverse too that if a large number of these information systems and applied interventions through technology are happening through the use of programming, then what is stopping the universities and the learning institutions from teaching that? You have got a cycle of learning which is broken now because the speed at which the learning environment is changing is so fast, that the normal pace at which learning is transmitted in the academic institutions is simply not enough to keep pace with it. So you have to have a system inside the academic institutions which reflects the speed at which the industry need is changing.

Srinivas Padmanabhuni: We have been working with some leading institutions where every course has around 40% project work including problems given by industry, after which the students give feedback to the professors on what the curriculum should be. It is very important to include industrial internship and industrial projects in the academic curriculum, especially in a fast changing area like computer science and IT. Even if it is not an interaction sponsored by an industry, students should just talk to the industry practitioners about the real challenges out there. A simple example would be to go to the open data platform. How many people know that the Government of India has opened up its data, and UID has opened up its data? You can conduct research on information systems that are running interesting analytic programmes with a view to applying it in the social welfare area. You could start outside-in; start from a social problem, then look at the infrastructure, and at the analysis of the ways in which systems have been used. This is a way

to bring industrial relevance to the course structure. I am not questioning the paradigms of learning and delivering content, mentioned by Ashwin but there are success stories and there are some institutions which are very forward looking, which have significant industry interaction without necessarily being tied to industry sponsorship. There are enough opportunities for industry academia interaction in terms of getting a handle on real problems for a range of research and student projects.

Ashwin Mahesh: Relative to the scale of the need we are not near a solution that produces the outcome or the solution in the same scale.

Pramod Varma: I am not from academia but I don't think we ask ourselves what we are doing and why we are doing it, but we focus on how to do it. We must focus on what the problem is that we are trying to solve and why are we solving it, rather than how we are solving it. Even at school, teachers must aim at the approach rather than the results.

Amit Prakash: While I do agree that academic institutes probably have not kept pace with practice, there are also certain areas where practice has not kept pace with whatever research that has already been done. I definitely see that in e-governance and ICTD. People designing e-governance policies are largely from a computer science background. You hardly find any sociologists, anthropologists, or social-scientists designing ICTD policy for the country.

Q: In one of your first points, Ashwin, you asked whether in these projects we are addressing the fundamental issue and Pramod during his talk said identity is one of the fundamental issues for delivering. Is identity really the issue?

Ashwin Mahesh: I don't think UID is per se tackling the fundamental deficit of information asymmetry among the different stakeholders which tends to privilege the government and underprivilege the citizens. Although UID is putting out its own data, it is not necessarily contributing to a larger framework of open data at the moment. All this might evolve over a period of time, but it is still too early. I do not want to get too judgmental about it. However, I think the simplicity of UID, of saying that all we really do is confirm authenticity of identity has a reason. The goal there was to not get involved with how and who uses UID, because the minute you get involved with how it is being used, you end up privileging the system towards the particular kinds of users who use it first. UID is fundamentally seen as a government project whereas there is no reason why the authentication of identity needs to be a government project. Supposing the government did not use UID at all, would there still be a need for UID, would there still be a value for such a thing and how would we be able to take it forward? It is up to the government to decide whether authentication of identity is useful or not, and to the extent that it serves a government purpose, as identified by the government, it will go forward with it. When that ceases to be the case, we may not go forward. I think that risk is deeply woven into the way UID is being done.

Pramod Varma: The good thing is that the identity authentication is open to non-government agencies also, it is not used only by the government. The issuance of the identity at a national level for a billion people is a government project, it is a mandate for the government. But today several non-government organisations such as private banks and public banks, and other agencies are using the identity authentication. For example, Chetan's healthcare system could use

it—it's an open API, and when a patient walks in, this will make it possible to confirm the patient's identity in any part of the country and transport his/her medical history, and so on. So identity today is allowed to cater to more than the government agencies. That is how it was originally designed and now it is starting to happen. But it is in the very early stages and still has a long way ahead.

Q: I would like to go back to the topic which is societal impacts of ICT and bring a new dimension to this topic. I think IT is impacting society in a different way today. Just as there was the turmoil of the Industrial Revolution about two hundred years ago, there is the turmoil of the information revolution in society today, and we are a part of that turmoil. One aspect of the turmoil is that there is a lot of resistance to IT. For instance, inside companies when you implement a simple system like payroll, there is turmoil. That impacts the corporate harmony, and in turn affects society. Could the practitioners on the panel comment on the impact of IT in general, in the turmoil that it is causing today.

Pramod Varma: Generally speaking, all technologies that have a broader reach have some negative impact. If you look at the Internet, there are privacy issues. The information revolution is travelling too fast, and we have still not studied the larger impact of a digitised society or a fully connected society—what it means to us, what it means to our life. I think it is a good area of study to take up.

Srinivas Padmanabhuni: The positive aspect is that over the last 15 years, many students have come from remote

places to institutions such as the IIMs for studies, and that credit goes to IT, to information penetration. Today a person studying in a remote place is equally empowered as an urban person. If he wants to do it, he will be able to do it, but that was not the case 15 years back.

Sourav Mukherji: I thank all of you, especially all the panel members for taking time off and participating in this discussion.

References

- Avgerou, C. (2008). Information systems in developing countries: a critical research review. *Journal of Information Technology*, 23(3), 133–146.
- De', R. (2007). Antecedents of corruption and the role of e-government systems in developing countries. In *The electronic government 6th international conference, EGOV 2007, Proceedings of ongoing research* (pp. 167–174). Regensburg, Germany. Trauner Verlag Schriftenreihe Informatik 24, September 3–7.
- De, R., & Singh, J. B. (2011). Scarcity, exit, voice and violence: the state seen through e-government. In *Electronic Government: 10th International Conference, EGOV 2011, delft, The Netherlands, August 29–September 1, 2011, Proceedings* (Vol. 6846, p. 273). Springer Science & Business Media.
- Walsham, G., & Sahay, S. (2006). Research on information systems in developing countries: current landscape and future prospects. *Information Technology for Development*, 12(1), 7–24.