

Electronic Governance in Indian Cities

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Information Technology (IT) has had a large transformative effect on many aspects of society – it excels at reducing overhead, increasing efficiency, replacing ad hoc human processes with structured electronic versions, and providing greater transparency. All of these problems plague government services in the developing world. India, as a leader in the IT service industry, has also been a pioneer in applying IT to governance. In this paper, we describe Electronic Governance (EGov), examine and evaluate some of India’s EGov systems and, using lessons learned, present some recommendations for future work.

1 Electronic Governance

Electronic governance (EGov) is, in its most general form, the use of Information Technology (IT) by the government to aid in the delivery of government services. There are two distinct forms of EGov:

Internal Government Functions (IGF)

These systems are designed and deployed with the aim of computerizing and optimizing internal government functions. These systems can cut down on processing latency, reduce the number of intermediary states, and substantially reduce labour costs. Deployment may in fact completely alter the control flow and data flow without changing the customer-facing interface.¹

Citizen/Government interaction (CGI)

CGI systems provide new, computerized interfaces for citizens to access government services. These interfaces elide the need for users to make multiple trips to designated offices, fill out complicated forms, and pay bribes.²

¹Keniston, 23.

²Ibid.

In order to be successful, EGov initiatives require the cooperation and support of various levels of government and the bureaucracy. For CGI systems, legislation needs to be passed to enable electronic delivery of services, and to codify privacy practises. In a country such as India, with devolved authority and overlapping scopes of influence, this often results in complicated negotiations and turf wars between different factions.³

Indian governments are derided by most citizens as inefficient, rude, out of touch, and incompetent. Most processes require the citizen to visit to multiple remote offices. Informal, unstandardized, and un-audited processes coupled with corrupt and underpaid civil servants makes the system ripe for corruption. Despite the fact that the state collects large amounts of data from citizens, it cannot adequately make use of these data. Most are stored in paper-form in geographically disparate government offices. Searching the data for specific items of interest is usually intractable, and extracting important trends from the data is impossible.⁴

Businesses generally shy away from areas with inefficient government services and corrupt bureaucracies. Poorer members of the population are also disproportionately affected by inefficient government because they tend to be heavily reliant on government services. To attract skittish businesses and satisfy the electorate, Indian governments are trying to “reshape themselves into market friendly entities.”⁵ In addition to their obvious advantages – reducing the costs (including corruption) borne by citizens by codifying processes and integrating audits into government procedures – successful EGov systems quickly revamp governments’ image.⁶

2 Description and evaluation of EGov deployment efforts

Since the late 1980s, India has deployed thousands of EGov initiatives, ranging from small-scale projects such as deploying Internet kiosks in villages to large-scale projects such as wholesale rearchitecture of property tax systems in various states.

Despite the pervasive use of EGov by urban populations, most of the systems that have been studied in depth are primarily rural-focused.⁷ There is no rationale for this in the literature; we surmise that most researchers exploring this area are focused on the plight of the poorest citizens, and they tend to live in

³Haque, 232, 242-244.

⁴Ibid., 240.

⁵Kuriyan and Ray, 1.

⁶Haque, 240.

⁷Pandurangan.

the villages and countryside. This is unfortunate, since much can be learned from a thorough examination of the successes and failures of EGov in urbanized areas. Although city-dwellers do generally tend to be more affluent and educated than their rural counterparts, rural Indians' education and incomes are slowly increasing and they are rapidly urbanizing. Lessons learned from deployments in cities today will enable the government to avoid repeating costly errors in programs that will affect the lives of exponentially more people in the years to come.

Ideally, software systems have high abandonment and failure rates close to their inception, and rarely fail after that. However, in reality (see Figure 1), failure rates often spike soon after a system is deployed due to unexpected changes. Unless proper corrective efforts are put in place, evaluating a system for a short while after deployment is *inconclusive*.⁸ Thus, it is critical that EGov systems be judged by usage patterns and benefits provided over the long-run, and not simply their immediate results.

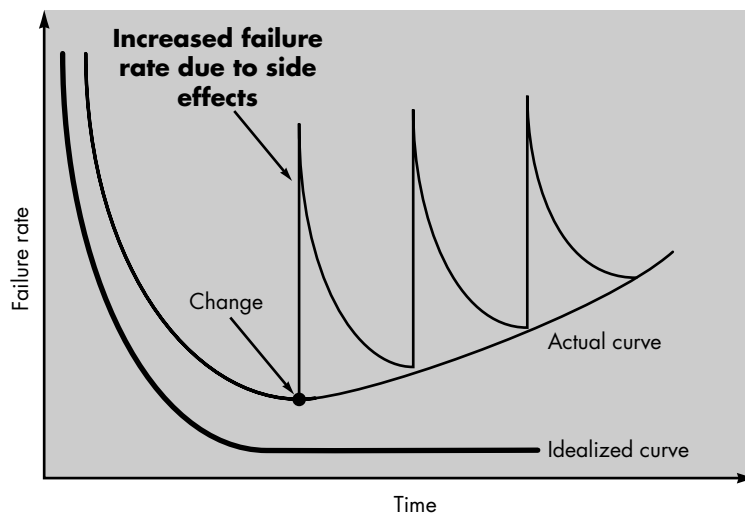


Figure 1: Ideal and real failure rates of software systems. Source: Pressman, 8.

In developing countries, the importance of longitudinal analysis is compounded by unstable political contexts. Even when examining the rural deployments of various EGov systems, the literature is surprisingly deficient in any substantial rigorous analysis of their success or failure. For the most part, research is marred by selection bias, unscientific sampling, and most critically is bereft of any longitudinal analysis.

⁸Pressman, 8.

Additionally, most studies are excessively reliant on anecdotal stories.^{9 10}

In this section, we will first present an overview of national efforts at defining EGov standards. Subsequently, we will focus on two major types of deployed EGov systems, Internet kiosks, and a revamped property tax systems, because they are the best described and analysed in the literature.

2.1 Federal government standards

The federal government in India, has for many years, recognized the drawbacks of having siloed data and inefficient processes. After many years of decentralized and uncoordinated EGov processes, in late 2008, the Department of Information Technology[DIT], a government ministry, published a document containing guidelines for the adoption of technical EGov standards.¹¹ It stated aims are (emphasis ours):

- a) To ensure smooth flow of information between citizen, business and Governments (State and Central) by having *interoperable systems which are scaleable* for future transaction volumes and frequencies;
- b) To make requirements and specifications available in the public domain[;]
- c) To promote reduction of effort (cost by variety reduction) and risk leading to economic solution;
- d) To protect consumer interests by facilitating adequate and *consistent quality of Information and Services* with *human centric design* of systems;
- e) To provide users a common terminology and framework for communicating technologies across different domains;
- f) To avoid Vendor lock-in. ¹²

The focus on scalability, data and service quality is heartening – these are indeed necessary conditions for the development of any successful EGov platform. However, we believe that the DIT has omitted or glossed over certain aims of critical importance from their list:

Corruption and auditing

In addition to (a), and (c) above, a major benefit of EGov systems is a reduction in corruption brought

⁹Pandurangan.

¹⁰Keniston, 3.

¹¹India.

¹²Ibid., 3.

about by standardized business processes. The lack of a central policy aim concerning audit logs¹³, enforcement, or access control will, in our opinion, substantially impair EGov systems built on these standards.

Political realities

There is no mention of managing the political ramifications of the establishment of such standards. As we will see in Section 2.2.2, the entrenched power structures, bureaucrats, and politicians are as much, if not more, responsible for failures in EGov systems than technical deficiencies. Although not purely in the technical domain, anticipating and circumventing actions by powerful agents with Byzantine motivations must be a central aim of EGov deployments.

Languages

The document makes no mention whatsoever of the language of access. Although one could argue that handling multiple languages is part of “human-centric design”, building interoperable IT systems that support multiple languages is a gargantuan undertaking that requires a great deal of forethought and attention. “[T]he absence of standardized code, agreed upon fonts . . . in local languages . . . continues to bedevil the most brilliant efforts of Indian linguists and computer scientists.”¹⁴ In a country where 95% of the population does not speak English, glossing over this detail is inexcusable.¹⁵

Connectivity

There is no mention of services that could be provided to citizens lacking full web access or a fully-functional browser. Historically, “IT for the common man has [had] technological prerequisites[:] . . . connectivity, computers or other similar devices, and software.”¹⁶ Fewer than 30 million Indians currently have access to the Internet. However hundreds of millions of Indians possess mobile phones with SMS access, and many already use their phones to transfer money and pay for services. Why not deliver EGov services over the same medium?

Avoiding over-generalization

The incentive to produce beautiful, generic, designs in software systems is always compelling. How-

¹³An audit log is an unalterable record produced by a software system that describes all changes made to its data. For each change, one log entry is recorded, describing the change, time of change, user who made the change, and other relevant information.

¹⁴Keniston, 7.

¹⁵Ibid.

¹⁶Keniston, 5.

ever, this goal is often fraught with peril; generic software is “almost never applicable to local communities.”¹⁷ Although this may be well-understood by participants in the planning process – Indian IT companies generate substantial revenue by providing customized versions of generic services (such as call centres or dictation services) to foreign companies – EGov systems need to be designed to support a great deal of customization. This should be one of the core goals of the standardization process.

The DIT document also contains a detailed description of the process by which a specific set of standards will be conceived and chosen; time-lines are imposed on the various expert committees, with ultimate responsibility for the production and maintenance of standards vested in an “Apex body headed by [the] Secretary [of the] DIT”. Expert/specialist committees and working groups are filled with members from various central government agencies, and elite academic institutions and industry. The document also requires a period for public commentary on the draft specifications before they are fully formalized.¹⁸

The composition of these committees is also quite encouraging. If properly incentivized and insulated from political reprisals, government officials and bureaucrats will be able to provide information about processes and procedures, academics will provide state-of-the art IT design and CS knowledge, and industrial leaders will provide pragmatic advice gleaned from building successful large-scale systems in the past.

2.2 Kiosk systems

Throughout India, various governments have attempted to set up Internet-enabled “kiosks”, mostly in rural areas. These kiosks are used to provide access to CGI EGov services, provide some low-cost computer education, and Internet access. Each kiosk is manned by one or more trained employees who help citizens access services by maintaining the computers performing data entry for the illiterate and those uncomfortable with computers, as well as validating and handing out receipts. By using the EGov systems set up by national, state, regional, and local governments, it is hoped that local citizens can avoid expensive and arduous trips to regional processing centres. Depending upon the jurisdiction, different approaches have been taken to develop and deploy such kiosks, with varying results.¹⁹ Here, we will focus on schemes in Kerala, and Andhra Pradesh(AP), as well as a failed system in Tamil Nadu.

¹⁷Keniston, 16.

¹⁸Ibid, p. 4-15.

¹⁹Kurian and Ray, 4.

2.2.1 Kerala and Andhra Pradesh

Kerala, a state in the southwest of India, is exceptional due to its extremely high literacy rates (upwards of 90%) and historically communist government. Recently, the state government has begun shedding some of its fear of market-based solutions and has taken a pragmatic approach to the private sector with its EGov kiosk project, known as Akshaya. Although more interventionist than the projects in AP, Kerala's kiosks operate on a Public Private Partnership model. Private entrepreneurs own and operate the kiosks, but the government maintains a strong voice: it helps to select locations, defrays some start-up costs, provides content, and subsidizes training. The state committed to maintaining a functional interface to its services for three years to entice entrepreneurs to buy in.²⁰

Over the course of three years, users and proprietors of the kiosks were interviewed, leading to some interesting conclusions. Most users of the kiosks were in fact middle class, both in terms of their income (well over the median per capita income for the rural sector), as well as their education and lifestyle. This served to disappoint some populist factions in the state who had hoped that most of the benefits would accrue to the poorest of the poor.

Interviews with entrepreneurs were also telling. Since the government was very visibly involved, less sophisticated entrepreneurs (or those who viewed this program as a social welfare project) assumed that it would provide them with sufficient training to make a successful business, as well as various forms of direct aid, such as writing off loan interest. When this was not forthcoming, some went out of business. Others, who viewed this primarily as a business opportunity, were far more successful at making profits. However, they focused mainly on the more wealthy, ignoring the poor in the community.²¹

Local political spats impacted the use of the kiosks; for example the Muslim League and Communist parties disagreed on the participation of entrepreneurs, and the inclusion of minority owners. Both parties knocked the program for not providing proper benefits to the "masses"²²

Interestingly, the governmental subsidies for computer training were quite contentious. One entrepreneur, who had a private computer training and Internet access centre, described the evaporation of his business after being undercut by new government-backed Akshaya entrepreneurs. He claimed that despite his ability to provide higher quality services more efficiently, he could not compete with the Akshaya kiosks once they came into the region.²³

²⁰Kuriyan and Toyama, 1-5.

²¹Ibid., 4.

²²Ibid., 5.

²³Ibid., 6.

In AP, the government saw “the kiosk projects primarily as [a means for improvement] in service efficiency, and [did] not make a concerted effort to target the poor”. The income data for the kiosks in AP matched those collected in Kerala, though the comparison should be viewed sceptically due to the lack of correction for the biased samples. The state was completely hands off – neither subsidies nor financial guarantees were provided to entrepreneurs.

In some AP kiosks, entrepreneurs were required to proxy their requests through intermediaries. These middlemen cultivated the notion (in many cases true) that their cooperation was required for any change in access patterns. This stifled innovation and frustrated the entrepreneurs.²⁴

2.2.2 Tamil Nadu

In 2001, Tamil Nadu deployed a similar set of kiosks to 39 villages. These kiosks were to offer various EGov services, including procurement of birth certificates, old age pension applications, death certificates, and the payment of some state fees and bills. However, between November 2001 to November 2002, it was found that only twelve reliably provided them. Seventy-four other similar villages had no access to kiosks, and thus were forced to use old-fashioned paper methods. Kumar and Best undertook an excellent longitudinal study to evaluate the benefits these kiosks provided *over time* (using the un-wired villages as a sort of control).²⁵

When first deployed, the kiosks provided marked benefits to local citizens – savings both in time as well as cost. By eliminating unnecessary trips to remote offices and increasing efficiency, the kiosks saved 1-4 days for each birth or death certificate application, and one day for each old age pension certificate. Additionally, by having a fixed fee for use, and one well-known local proprietor running the service, citizens were no longer required to pay bribes to various officials at the remote offices. One man saved 200 Rupees for a death certificate application, and another avoided paying a 100 Rupee bribe to the official for a birth certificate. Detailed statistics show that villages which had functioning kiosks made more use of government services. Qualitative observations demonstrated that this gain was due to the reduced cost and easy of use of the local outlets.²⁶

By 2005, however, none of the kiosks remained in use. The reasons were varied, but in 2003, the main champion of this project in the state government was transferred to another post, and was replaced by another official without a similar vested interest in the system. At this point, village and regional officials,

²⁴Kurian and Ray, 3-5.

²⁵Kumar, 2-5.

²⁶Ibid., 6-7.

who were opposed to this system on the grounds that it undermined their authority and source of bribe income successfully shut down the system, by refusing to process applications and requiring citizens to visit the remote offices once again.²⁷ The transfer of cooperative officials, and the Byzantine nature of bureaucrats holds implications for EGov in India that *cannot* be overstated. This is “the single most important problem” for EGov systems in India.²⁸

Srikanth Nadhamuni, co-founder of “EGovernments Foundation,” a Bangalore-based provider of EGov suites for various governments has faced this problem for years. He believes that the most effective way to solve this problem is to require that governments sign contracts with software providers. Despite being an NGO, his company no longer provides services to the governments for free, and always insists on signing an explicit contract with a payment scheme. This has the effect of creating a paper trail and legal consequences for the government if it backs out or reneges on its responsibilities. “You can’t take the word of a good man in the government who’s a champion . . . it hurts us more than a mediocre institution that has signed a contract [because the champions are subject to reprisals and transfers.] . . . You want them to pay you even if it’s only \$1. . . . [Get it] in the system. All that is traceable. ” Contracts should generally be signed with people two levels above those who rely on bribes for their income as they are often more insulated from those social pressures, he says.²⁹

2.3 Land Registration / GIS systems

The EGovernments foundation has developed numerous systems for IGF and CGI deployments. One of the most successful is its contribution to the complete revamping of Karnataka’s property tax system, known as Bhoomi. Previously housed in vast paper archives distributed across the state, this massive undertaking created detailed GIS maps and collected and sanitized data about all properties in the state. Information available includes ownership information, street/property numbering, assessed values, and historical tax payment information. An entire Internet-based tax payment system was also implemented and deployed throughout the state. This system was so successful that it “cut down time spent on paperwork relating to property registration from 45 days to half an hour.”³⁰

Users loved the system; nearly 80% of users found Bhoomi to be easier to use than the manual system. Whereas 80% of users were able to conduct their business without meeting any official, 61% using paper

²⁷Ibid., 10.

²⁸Pandurangan.

²⁹Ibid.

³⁰Financial Express.

methods had to resort to in-person help. Although “two-thirds of users of the manual system had paid a bribe, . . . only 3% of Bhoomi users needed to bribe an official.”³¹ It is, of course, possible that the manual system was merely correlated with the increase in bribes (suppose more complicated transactions required the use of the manual system, and more complicated transactions independently garner more bribe money). This seems unlikely, but the raw data should be analysed to rule this out.

This was a huge success from the government’s perspective as well, as it substantially increased revenue; many owners had bribed officials to remove properties from the tax books or to record payments when none were made. Rigorous audit logs and access controls now prevent this kind of activity. Similarly, local officials can no longer be bribed to illegally change the owner-of-record – a scheme that was often used to defraud the poorest farmers of their land.³²

The success of this system lends hope to the belief that EGov systems can play a substantial role in the future of governance in India.

3 Recommendations

India has a multitude of deployed EGov systems with results varying from complete failures to amazing successes. Despite the fact that there is an acute need for better analysis of results, we believe that there is sufficient data to draw some basic conclusions about aspects of EGov systems that are lacking.

Our recommendations for future work are organized in three main focus areas: building EGov solutions that receive consistent and stable government support, enabling access for people who do not have Internet access, and processing notifications.

3.1 Government buy-in and consistency

As discussed in Section 2.2.2, including and motivating entrenched interests to participate is critical to an EGov initiative’s success. This happens at two points: when the system is first proposed, and once the system has been deployed. If, during the planning phase, the eventual decision makers are not consulted, substantial unanticipated changes could be imposed later on in its lifecycle. Imposing changes after development and release of a product generally costs 60-100x as much as if they were required during the design phase. (See Figure 2)³³

³¹Chawla.

³²Pandurangan.

³³Pressman, 14.

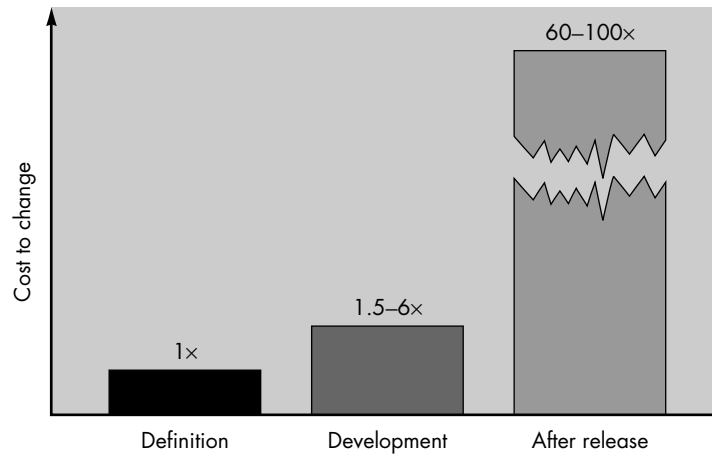


Figure 2: Cost of changes in IT projects. Source: Pressman, 14

Historically, despite the benefits it would offer businesses and citizens, the uptake on comprehensive data collection and management systems is less than stellar.³⁴ Tighter integration with GIS systems for data mash-ups would be ideal, but is very difficult to achieve because of the lack of accurate GIS data.

Politicians are very interested in, and will remain committed to, systems that makes their jobs (both getting re-elected, as well as serving their constituency) substantially easier. Current GIS systems, and data collection and analysis systems are not well-used because they provide too much unfiltered data to be useful – busy bureaucrats and legislators do not have the time (and many do not have the skill) to analyse large amounts of data and draw conclusions; “[t]oo much data is more useless than bad data.”³⁵

Thus, an ideal IGF system would pull in structured data feeds from other important departments, synthesize them (and perhaps perform some rudimentary machine learning processing) and present a distilled visual summary of a few important pieces of information. While over-summarizing can be dangerous if it leads to incorrect inferences, on the whole, the system would be very beneficial to the government. If real-time data are available, important trends can also be analysed and delivered. This is, no doubt, a complicated endeavor, but financial companies and other governments have built similar systems before. (One good example of this in the developed world is London Metropolitan Police Service’s crime mapping service, which superimposes crime statistics on an interactive map of the city.³⁶)

³⁴Pandurangan.

³⁵Pandurangan.

³⁶Metropolitan Police.

When presented with such a system, reluctant politicians will believe that, once deployed, it will enable them to quickly identify problems that plague their electorate. This aligns well with both their selfish, as well as altruistic interests. Its use in day-to-day government activity will ensure that their support is stable and will likely survive changes in personnel.

3.2 Universal access

The vast majority of Indians do not have access to the Internet. However hundreds of millions have access to phones with Short Message Service (SMS) capabilities. Private companies have leveraged this; numerous widely-used services (including banking transactions, and peer to peer payment systems) are available over SMS.³⁷

Certain government services should be no different. There is no reason small fees could not be collected over mobile phones. As phones with limited data capability become more common, simplified mobile-compliant interfaces to EGov suites should be built (none currently exist). This would maximize the reach of government services, and improve its performance in the eyes of the disenfranchised.

3.3 Notifications

In his work exploring the workings of democracy in developing countries, Heitzmann³⁸ points out that the “notification” issue is a major impediment to removing inequalities in society. His thesis is that even if they are treated fairly by the law, poor and uneducated citizens are at a substantial disadvantage because getting informed about decisions and information important to them is very costly.

A system that allows users to sign up for alerts based on a set of interests (analogous to a publish/subscribe model used in Computer Science), should be built and deployed throughout urban and rural areas. Users could express interest in different types of events (such as street closures, notices about public consultations, elections, judicial actions on properties of interest) using a limited phone interface. Updates would be broadcast to users via SMS whenever salient information became available. As long as the government, or some other trusted organization, publishes data effectively, users would be able to cheaply stay abreast of information that is important to them. Government employees could also make use of such notification services to alert them to emerging conditions requiring their attention, complaints from citizens, or instructions from their superiors.

³⁷personal experiences

³⁸Madon, 177.

4 Conclusions

EGov systems hold much promise in the quest to reduce inefficiencies in government and deliver more services more effectively. We have seen that when properly deployed and maintained, they provide tremendous benefits for both citizens as well as governments. Data show that they can even substantially reduce government corruption. However, many drawbacks still remain. EGov systems mainly benefit the middle class. Building tighter integration with GIS systems, building systems that do not require full Internet access and developing a simple event notification system should provide benefits to a wider range of citizens.

Most critically, EGov systems require strong support from governments and bureaucracy to overpower the corrupt agents in the system. Their support is needed not only during the initial stages but throughout the entire lifecycle of the system. Solving this problem is substantially more difficult and important than any technical challenges – the best strategies so far are to build systems that both citizens and governments will find indispensable, sign binding, long-term contracts with governments, and publicly evaluate the systems over the long-run.

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