CHAPTER 1

Evaluating e-government

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ABSTRACT

Return on investment is not the primary objective when e-government projects are conceived. They are mostly driven to achieve operational efficiency and effectiveness in service delivery. Governments run with tight budgets, hence there is an increasing demand to re-examine their spending priorities. Further, e-government programmes are subjected to scrutiny to find out whether they are delivering the payoff as has been promised or not. This paper focuses on the various parameters for evaluating the success of e-governance projects. A flexible framework is suggested to choose an appropriate strategy to measure the tangible and intangible benefits of e-government. E-government being a new phenomenon, at most places, e-government projects are still found to be in a nascent stage; hence proper information flow for calculating 'return on e-government' considering tangible and intangible benefits cannot be fully ascertained. Moreover an assessment of the same is not completely possible.

There are three kinds of situations that require evaluation in e-government. One is the e-environment; second is evaluating the performance of an e-government programme or project; and third is the overall impact of e-government on general government functioning, economic development and citizen servicing. Accordingly, we need three kinds of approaches of evaluation such as:

- E-readiness assessment of states or region
- Hierarchy of measures taken by the e-government programme or project
- Overall impact of e-government

E-readiness Assessment of States or Region

Current practices of assessments are found in three directions:

1. *Assessing e-Business Readiness* (*The Economist Intelligence Unit* (*EIU)'s e-business readiness rankings*): EIU's rankings is a guide to the relative preparedness of the world's main markets for the e-business era. For perhaps the first time since the technology bubble burst, the global economy is beginning to feel comfortable in a digital skin. Spending on information and communications technology (ICT) is growing again with some buoyancy in developed markets. In emerging markets, expansion of connectivity –

individuals' and organisations' access to voice and data communications – continues on a rapid ascent. Broadband internet access, meanwhile, is beginning to reach critical mass in several countries and is becoming a catalyst for other improvements in the digital economy. The 2005 edition of the Economist Intelligence Unit's e-readiness rankings, produced in co-operation with IBM's Institute for Business Value, reflects the increasing importance of broadband to a country's digital development. As a result, the world's most developed broadband markets have registered significant score increases over 2004, although only some have moved up in the rankings.. Of the 65 countries covered, Denmark tops the list. India (49th) and China (54th) remain on the lower rungs of the e-readiness ladder, but are making growing contributions to the global digital economy on the strength of a strong ICT skill's base (India) and a prodigious ICT manufacturing sector (China).

2. *Assessing e-Government* (*assesses the internet, democracy, and service delivery by state and federal governments*): This is a study by Professor Darrell M. West of Brown University. His team evaluated government web sites based on two dozen criteria, including disability access, existence of publications and data bases, presence of privacy and security policies, contact information, and the number of online services. The 2006 study reviewed 1,782 government web sites in 198 countries. A variety of different sites were analysed, including executive, legislative and judicial offices as well as such departments and ministries of the government as health, education, foreign affairs, interior, finance, natural resources, foreign investment, transportation, military, tourism and telecommunication. By evaluating the aforementioned features as well as others including PDA access, user fees, and foreign language translation, researchers rated each country on a zero to 100 point scale. Researchers found that 94 per cent of web sites have online publications and 72 per cent have links to data bases. Only 26 per cent (up from 18 per cent in 2005) show privacy policies and 14 per cent present security policies (up from 10 per cent in 2005). While Korea, Taiwan, Singapore, US and Canada are at the top 5, India and China are ranked 76 and 77 in the ranking.

3. *Assessing e-readiness (the ability for a nation/ region to benefit from Information and Communications Technology (ICT) [taken from Comparison of E-Readiness Assessment Models, Final draft, v. 2.13, 14 March 2001* (*http://www.bridges.org/ereadiness/report.html*]): It is increasingly clear that for a country to put ICT to effective use, it must be 'e-ready' in terms of infrastructure, the accessibility of ICT to the population at large, and the effect of the legal and regulatory framework on ICT use. Developing country can use e-readiness assessment to help measure and plan for ICT integration. (http://www.bridges.org/ereadiness/index.html)

Ideally speaking, a comprehensive e-readiness assessment should encompass the first two assessments into it. They become different because of the choice of a definition, coverage of variables, level of detail and

scope in the assessment. Literature reports many tools (see below) that use widely varying definitions for e-readiness and different methods for measurement. They can be divided into two main categories: those that focus on the basic infrastructure or a nation's readiness for business or economic growth (can be described as 'e-economy' assessment tools), and those that focus on the ability of the overall society to benefit from ICTs ('e-society' assessment tools). These two categories are not mutually exclusive. However, 'e-society' tools incorporate business growth and use of ICTs as part of their larger analysis, and consider business growth necessary for society's e-readiness. E-economy focused tools also include some factors of interest to the larger society, such as privacy and universal access. These rough categorisations are as follows:

E-Economy

- WITSA e-Commerce Survey
- APEC's e-Commerce Assessment
- McConnell International's e-Readiness Report
- Mosaic's Global Diffusion of the Internet Framework
- Crenshaw & Robinson's Cross-National Analysis of Internet Development

E-Society

- CID's e-Readiness Assessment Guide
- CSPP's e-Readiness Assessment Guide
- The various models for evaluating e-readiness from 'digital divide' reports
- CIDCM's Negotiating the Net Model

These tools use four main methods to assess countries' e-readiness: questionnaires, statistical methods, best practices, and historical analyses. The right tool depends on the goal of the assessment. It is important to understand that there are many states/central government ministries in the 'early' stages of e-readiness, which may have to undergo massive economic and political changes to become e-ready. Also, it may be faulty to use a single standard of measurement for all entities. There is no single social, political, or economic model that can be called the most successful at harnessing information technology. A solution to both of these problems could be to base the primary assessment on states/ central government ministries within a particular region or social/economic/political group. The assessment tool could be adapted for the region, and recommendations could be made based on similar experiences elsewhere. Additional data points and recommendations on how to become e-ready could be drawn, with caution, from the best practices and other examples seen in developed countries.

Though India has not been ranked high on these scores, there are several policy initiatives by Government of India (GoI) that will promote and

enhance the use of IT in governance. There is now a separate Department of Information Technology to promote IT in the country. The government has also approved the policy of allocating 2–3% of the budget for IT in each ministry. The World Bank has announced its support of India's initiative through a loan of $500 million over the next four years. The loan is for a network project to inter-link all the states and union territories under the National e-Governance Action Plan (NEGAP) which itself was launched in 2006 with an estimated investment of Rs.25000 core in the coming few years. In the Tenth Five Year Plan (2002–07), the Government of India has given adequate importance to e-governance by suggesting an India Portal – a portal of all government web sites so as to provide one-stop non-stop delivery of public services and dissemination of services. However the real challenge is that nearly 70% per cent of the Indian population is rural and the want of the telecommunication infrastructure makes providing the benefits of e-governance an uphill task.

In 'India: E-Readiness Assessment Report 2003 for States/Union territories' submitted by NCAER to the Department of Information Technology, Ministry of Communication and Information Technology, the Government of India in the year 2004 has classified the states into five categories: leaders, aspiring leaders, expectants, average achievers, under achievers and laggards (Table 1).

Table 1: Ranking of Indian state governments for e-readiness

Category	States	
	2004–2005	**2003–2004**
Leaders	Karnataka, Maharashtra, Tamil Nadu, Andhra Pradesh, Chandigarh	Karnataka, Maharashtra, Tamil Nadu, Andhra Pradesh
Aspiring Leaders	Kerala, Gujrat, Goa, Delhi, Punjab	Gujrat, Goa, Delhi, Chandigarh
Expectants	West Bengal, Pondicherry, Madhya Pradesh	West Bengal, Uttar Pradesh, Kerala
Average Achievers	Uttar Pradesh, Chattisgarh, Orissa, Sikkim, Himachal Pradesh	Madhya Pradesh, Punjab, Pondichery
Below Average Achievers	Mizoram, Jammu & Kashmir, Assam, Uttaranchal, Jharkhand,	Haryana, Rajasthan, Himachal Pradesh, Uttaranchal, Chattisgarh, Orissa, Mizoram, Tripura, Meghalaya, Andaman & Nicobar Inlands

Least Achievers	Lakshadweep, Manipur, Tripura, Arunachal Pradesh, Andaman & Nicobar Inlands, Bihar, Daman & Diu, Dadra and Nagar Haveli, Nagaland	Assam, Jharkhand, Lakshadweep, Bihar, Jammu & Kashmir, Sikkim, Arunachal Pradesh, Nagaland, Daman & Diu, Manipur, Dadra and Nagar Haveli, Nagaland

Source: INDIA: E-Readiness Assessment Report, 2003 and 2004

This index plays an important role in benchmarking best practices by various Indian state governments and trying to replicate these best practices in other states. In this year 2004–2005, Chandigarh and Punjab has improved comparatively more than their 2003–2004 rating. Chandigarh has become a leader and Punjab has moved from the average achiever to the aspiring leader category. Uttar Pradesh has moved down from the expectant to the average achiever category. Sikkim, Assam and Jharkhand have also shown improvement in 2004–2005.

The e-readiness index is developed based on six broad parameters – network access, network learning, network society, network economy, network policy and e-governance. Each of these parameters is represented by a set of indicators and these indicators are again represented by a number of sub-indicators.

Hierarchy of Measures for an e-Government Programme or Project

This section is based on one of the author's paper titled 'E-government evaluation: A framework and case study', *Government Information Qtly*, Symposium issue, Dec (2003).

Methodologies may be classified in terms of the degree of hardness or softness (i.e., based on the clarity and nature of the influential variables) of a problem situation. Clearly defined problems are structured problems while poorly articulated or unclear problem situations are categorised as ill structured problems. Identifying the methods that match the underlying characteristics of a problem situation represents an issue that needs to be considered, especially in a complex situation. Operations research (OR), management science (MS) and applied systems disciplines have been traditionally offering quantitatively based, hard techniques. However, during the 1970s and 1980s a variety of qualitative, soft and critical methods were developed. According to Mingers[1] the typical assumptions made by a hard OR/MS method are: that there is a single decision maker (or at least a consensual group) with a clear objective – if there are multiple objectives these are usually reduced to a single metric; that the nature of the problem is agreed upon, even though a good solution may be difficult to find; that the most important factors can be quantified and reliable data collected;

that a model, often mathematical or computer-based, can be used to generate solutions, and that this does not need to be transparent to the client(s); that the role of the OR person is one of an expert analyst; and that future uncertainties can be modelled using probability theory. On the other hand, soft methods can be characterised by the fact that these assumptions cannot be generally made. Typically, there might be several decision makers or stakeholders involved, with different opinions and possibly conflicting objectives and definitions of the problematic nature of the situation; there may be difficulties in quantification of many important factors; transparency and accessibility of the model will be very important, thus often ruling out mathematical models; the OR person's role will often be one of a facilitator with a group of participants; and uncertainties cannot be simply reduced to probabilities.

One important implication of this distinction is that these two different types of methods require quite different skills and orientations in their practitioners. Hard methods would demand a good analytical mind with mathematical and computing skills, while soft methods require people skills and the ability to facilitate often stressful and contentious workshops. According to Wolstenholme[2], no map or model is ever a complete analysis and there is always a need for further speculation beyond the insights reached by their use. Furthermore, in applying any problem solving method, there is a need to create a balance between the need to remain sufficiently quantitative to be applicable and rigorous and sufficiently flexible to be relevant in terms of both audience and method. This allows the possibility of combining methods or techniques together in a particular intervention, a practice known as multi-methodology. Thus after a period of concern about the choice of methodology, we are now moving towards a pluralistic approach of combining together several methods within an intervention/ multi-methodology[3].

E-government projects may be characterised by hybrid systems. In fact, a large part of e-government projects are soft systems, which are often prone to perceptual inconsistencies among designers and users. This often leads to failure of an elegant system. The system also has to match the ongoing changing pattern of relations or interactions within government organisations, businesses and citizens. Here a combination of hard and soft systems methods would be suitable in addressing problems of evaluating e-government projects. In general, any approach to evaluation of e-government projects needs to have a few important characteristics including the ability for understanding and modelling complex problems, the ability to incorporate multiple views of the problem, and the ability to learn from mistakes. The literature on e-government offers few approaches, which have been found useful in selective evaluation. These are arranged in a broad category of methods for ease of understanding and methodological choice for determining information and servicing values attributable to the several aspects of e-government benefits. The sociological evaluation of the benefits of these projects has also been emphasised. We have selected a few of the

methods that are well known and easy to apply. However the framework is open to include other methods (not mentioned here) in its range depending upon finding a satisfactory application. A broad categorisation is as follows:

i. Hard Measures
Cost–benefit analysis
Benchmarks in e-government

ii. Soft Measures
Scoring method
Stages of e-government
Sociological angle

iii. Hierarchy of Measures
(6 levels)

Hard Measures

Here information is viewed as valuable when a message changes a decision maker's expectations about the events in a manner that facilitates decisions and improves the expected payoffs. The information is weighed against a backdrop of cost–benefit analysis. It seeks to find answers to questions like how much money is being spent to acquire the information and how much benefit in monetary terms is being obtained. This issue has been dealt with most thoroughly in information economics, which finds its base in statistical sampling concepts, Bayesian statistics and statistical decision theory based research papers that appear mainly in accounting journals.

The main drawback of this approach lies in its operationalisation. Information and related services in e-government being an intangible organisational resource, it is sometimes impossible to quantify the cost and value associated with obtaining and using it. Some benefits related to e-government such as improvement in communication with the users, better appreciation of the role of the information system (IS) within the organisation and better integration with business planning are difficult to assess using objective measures. Since the utility of information and related services is not direct, it has value only in so far as 'better' decision are made or they lead to an increase in resources or a decrease in cost.

Most importantly, improved organisational performance such as increase in transactions, ROI etc., is produced by a multitude of activities that take place concurrently. Thus, it is very difficult to measure or split the proportion of outcome as value contributed by information systems of e-government. Information can also have a psychological value if the user does not necessarily make better decisions but has more confidence in the correctness of his decision. Though the role of information at the strategic level is very crucial, and measurement of its worth in monetary terms is an

impractical proposition. The trend henceforth would be to investigate the diffusion of IT solutions in terms of its impact on organisational effectiveness in performing and servicing the user better.

The key measurement criteria for measuring tangible benefits under hard measures are:

Cost–Benefit Analysis

For any organisation, prudent investment and deriving benefit in monetary terms is a very critical decision[4]. Public finance has considered important differences between goods provided by the government and goods owned by individuals – governmentally provided goods are often public goods, each person may be able to consume them at a price less than the marginal social cost, and the level of provision is determined by collective decisions rather than by markets[5]. There have been attempts to examine information technology (IT) capital investments (including software) and capital stock to check whether these investments are justifiable, by calculating the marginal benefits and costs of IT related investments[6]. There is strong evidence that IT investment is not meant to cut costs but to achieve better customer service and quality[7].

IT infrastructure in e-government is a long-term investment decision and involves a current outlay followed by a series of benefits over the life of the project. The evaluation of cost–benefit can be done in the traditional way or by following the time adjusted/discounted basis method. The average rate of return (ARR), the conventional method of appraisal, is unsatisfactory to the extent that it is based on accounting profits and ignores the time value of money. The payback method, which shows the recovery period of the original outlays, is superior to the ARR method in that it is calculated using cash flows. Nevertheless, it also ignores the time value of money and disregards the total benefits associated with the projects. Still it is useful as a measure of the liquidity of investments. The discounted cash flow methods in the net present value (NPV) approach satisfies all the attributes of a good measure of appraisal in e-government projects as it considers the total benefits as well as the timings of the benefits. The NPV method has the merit of consistency in assumptions relating to re-investment of funds released by the projects.

In this method, one important aspect is to determine the cost of capital by which future incremental cash flows are to be discounted. The cost of capital means the weighted average cost of capital of all long-term sources of finance. The cost of capital can be explicit or implicit. The explicit cost of capital is associated with the raising of funds. When the funds are internally used, the cost is known as implicit cost in terms of the opportunity cost of foregone alternatives. Investments in infrastructure, training, etc., are noted. Extra business transactions and savings due to man-hours caused by streamlining of operations are calculated and translated into incremental revenue. Based on incremental revenue, the payback period is calculated

by dividing investments with incremental revenue generation each year. The break-even period is calculated by discounting the amount earned as incremental revenue at the rate of cost of capital, which would be the same for the organisation by which the organisation is earning. There may be four types of specific costs, namely cost of debt, cost of preference shares, if any, cost of equity capital, and cost of retained earnings. The measurement of the overall cost of capital involves the choice of appropriate weights to each of these elements.

In the domain of e-government, computation is easy for many government organisations (public sector enterprises), which are listed and which raise debt and equity capital from the market,. However there are several governmental organisations, which are not listed and which mostly depend on central or state government aid to run their business operations without any implicit or explicit obligation to pay back the aided amount. The computation of cost of capital for these organisations by the traditional means given above might prove irrelevant or inadequate. In organisations, which are not listed but which generate revenue streams adequately to fund their own investments, the cost of capital should be that of retained earnings only.

In the e-government scenario, capital investment is made mainly to improve the quality of service unlike manufacturing organisations where the investment is mainly on machines in order to produce goods. In that case the payback period or break-even period can be computed easily. But for any service organisation where productivity of employees or better service of the organisation is concerned, the traditional cost–benefit analysis might not give a true picture. The biggest drawback about this system is that the true monetary value of benefits such as increased quality, faster service, flexibility, better customer or citizen service or improved working conditions for employees cannot be ascertained.

Benchmarks in e-Government Projects

Evaluation of e-government efforts is sought by the management to provide strategic guidance for government organisations. A brief review of the same is reported by Kaylor et al.[8] citing some interesting research[9]. These efforts share a general concern of identifying objective measures by which we might assess the quality of e-government. Most of these studies have often focused on content analysis or measures of usage. Benchmarking is a superior option as it provides a method of evaluating performance against best practice while also providing strategic guidance. Kaylor et al.v[viii] suggested a rubric for benchmarking implementation among cities nationwide using a broad range of functional dimensions and assigning municipalities 'e-scores'.

One form of benchmarking is through metric benchmarking[10], which provides numeric measures of performance, like

- IT expenses as a per cent of total revenues

- Per cent of downtime (when computer is not available)
- CPU usage (as per cent of total capacity)
- Per cent of IS projects completed on time and within budget as part of e-government projects

In the Indian context, this might not be possible as most of the projects are in the rudimentary stage and only a few are operational. Therefore comparing these starting projects with similar organisations in India or abroad would be a challenge since this form of information might not be available or the obtaining information might be difficult. A practical approach would be to experiment with the idea of 'Best Practices Benchmark' as suggested by Kaylor et al.[viii] Here emphasis is on assessing performance rather than numeric measures of performance. It mainly deals with IT infrastructure and compares the best practices in servicing provided by similar type of organisations and work areas. Grading is done from the perspective of implementation rather than the perspective of 'end-users'. Table 2 lists select activities of the municipalities, which though exhaustive, are not inclusive. They are assigned score on a four point scale (called e-score) as given below:

- Information about a given topic exists at the web site (1)
- Links to relevant contacts (phone or email address) exists at the web site (2)
- Downloadable forms available online on a given topic (3)
- Transaction or other interaction can take place completely online. (4)

Table 2: Functions and services of municipalities

S.No.	Payments	Permits	Services	Licenses
1.	Utilities	Building	Complaints	Bike
2.	Taxes	Parking	Payment details	Dog
3.	Fines	Street vendor	Information request	Taxi
4.	Permits	Sidewalk dining		Business
5.	Registration			

Based on the scores various municipalities can be graded. Figure 1 describes the result of a study for the New Delhi Municipal Corporation (NDMC). It is worth noting that in such a short span of time, NDMC has scored better than the municipalities of Detroit and Cleveland. However, the population of the NDMC area far exceeds that of Detroit where a small-scale e-government is in operation with far fewer complexities for civic amenities. If we compare the NDMC data with similar big cities, at least in terms of population and complexities, like New York and Seattle, NDMC's score is abysmally low (15) compared to them (86–89). This means that to be at par with these leading cities, NDMC has to perform exceptionally well. It is expected that after full implementation of the e-government project, when many transactions can be done online, NDMC's score will rise substantially. A more prudent approach to benchmarking would have

been to compare NDMC with other municipalities of India in order to generate a benchmark among Indian municipalities.

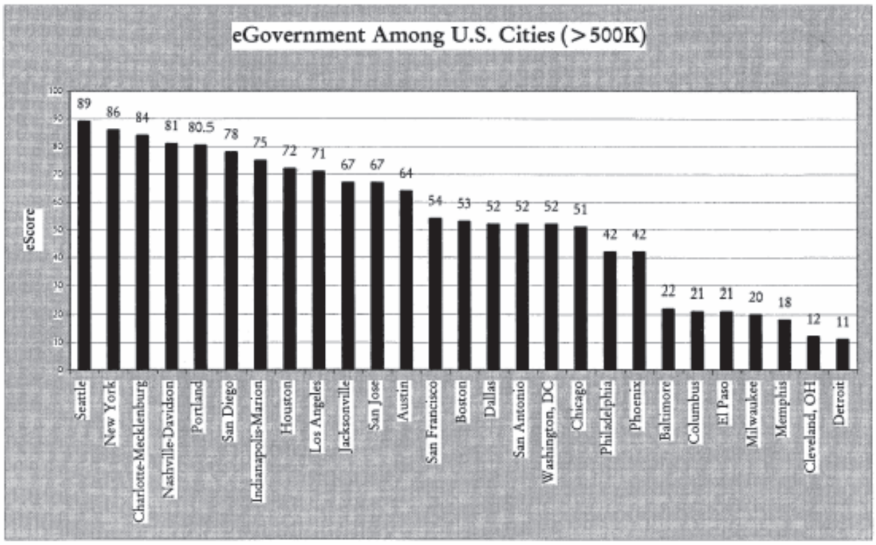

Fig. 1 *Adapted from the 'Gauging e-government: A report on implementing services among American cities by Kaylor et.al.*[8]

Soft Measures

Researchers have realised that though the normative approaches are theoretically elegant they nonetheless present formidable operational difficulties in real-life situations. Furthermore, the significance of qualitative benefits is often ignored when an evaluation of these systems is made from an economic point of view. This may result in the neglect or rejection of many potential new systems which offer high returns but from intangible benefits. Benefits such as improved decision making, customer or citizen satisfaction and employee productivity contribute significantly to higher performance. In view of this, an effort at finding a compromise solution to evaluate e-government is the need of the hour. Soft approaches employ multi-dimensional attribute measures of information value, which is relevant in the context of e-government. Simultaneous consideration of multiple attributes facilitates the understanding of the extent and depth of the problem.

Scoring Method

Scoring methodologies are used in many evaluation situations. It focuses on key organisational objectives. To use the scoring methodology[11], the analyst first identifies all the key performance issues and assigns a weight to each

of them. Finally the weighted average of all the attributes is calculated. The organisation with the highest score is judged the best service provider in comparison to similar organisations.

This approach can incorporate both tangible and intangible benefits. If there is a strong connection between a benefit accrued due to investment in IT infrastructure of e-government, it will influence the final score even if it does not have a monetary value. Thus the scoring model helps solve the problem of assessing intangible benefits by linking the evaluation of these benefits to the factors that are most important to organisational performance. The approach can also take risk into account, by using negative weights for factors that reduce the profitability, operability and user satisfaction.

Stages of e-Government

A literature survey of the area demonstrates that the experience of e-government initiatives has been chaotic and unmanageable. The problems present a number of challenges for public administrators. To help public administrators take an organisational view of transforming a traditional administrative organisation to an e-government, Layne and Lee[12] describe different stages of the development of e-government with particular reference to the United States of America. The four stages of development outline the structural transformations of governments as they progress toward an electronically-enabled government and how the internet-based government models become amalgamated with traditional public administration implying fundamental changes in the form of government. The underlying theory of this growth model will be applicable to other governments as well.

Based on technical, organisational and the managerial studies of several examples, e-government is found to be an evolutionary phenomenon and therefore e-government initiatives should be accordingly derived and implemented. In this regard, the four stages of a growth model for e-government are described as: (I) cataloguing, (II) transaction, (III) vertical integration, and (IV) horizontal integration. These four stages are explained below in terms of the complexity and different levels of integration involved. The stages are also depicted in Fig. 2 with the stage at which NDMC is in right now mapped in.

Stage I: Cataloguing (online presence, catalogue presentation, downloadable forms) In this stage, governments create a 'state web site'. They do not have much internet expertise, and prefer to minimise risks by doing a small project. Parts of the government's non-transactional information are put on the site. Usually at first, the index site is organised on the basis of functions or departments as opposed to service access points. Consequently, if the citizen is unsure of which department he or she is searching for, a search for the necessary agency will be required before being able to obtain the information about the process.

Stage II: Transaction (Services and forms are online, working data base supporting online transactions) This stage empowers citizens to deal with their governments online anytime, saving hours of paperwork, the inconvenience of travelling to a government office and time spent waiting in line. Registering vehicles or filing state taxes online is only the beginning of such transaction-based services. Consequently, instead of simply having the availability of downloading a form, and then having to take that form to a state facility, the form can be completed interactively online.

Stage III: Vertical Integration (local systems linked to higher level systems, within similar functionality) Information is made available through the citizen's local portal. The citizen-user will be able to access the service at the state or centre level from the same entry in the local portal, because the local systems are connected to upper level systems, directly or indirectly.

Stage IV: Horizontal Integration (systems integrated across different functions, real one-stop shopping for citizens) The horizontal integration of government services across different functions of government will be driven by visions of efficiency and effectiveness in using information technology, but pulled by citizens' demands for an 'inside-out' transformation of government functions to more service-oriented ones. Here e-government offers the best hope for improved efficiencies through administrative reform because of both its vertical and horizontal integration. Such integration will facilitate 'one-stop shopping' for the citizen. Each organisation may have to give up some power to move to this stage.

Sociological Angle

Whenever new technologies come into the picture, especially in governmental organizations, there is fear among the employees about job loss in terms of the Voluntary Retirement Scheme (VRS) although direct retrenchment is still only a distant possibility in the public sector in countries like India. This might be true in many other countries as well. Increased transparency brought in by more automation might not be acceptable to a certain section of the employees who will always resent these initiatives. Moreover, the apathy involved in the assimilation of new technologies must not be underestimated.

An opinion survey would be useful to gauge the responses of employees' adaptability and responsiveness to the new systems. The area that could be looked into include the bureaucratic hurdles faced in moving toward an alternative delivery arrangement, the level of transparency and accountability of the employees in new collaborative arrangements, and the likely road ahead for e-government (a resistance to change or regressive deployment, status quo or incremental change, and radical adaptation for a digital world).

The responsibility of selling the benefits of e-government to the employees lies with the top management. Accordingly, the HR department can be

sensitised (as e-government is foremost a top-down approach) to make employees knowledgeable about the benefits of e-government as well as giving them the necessary training.

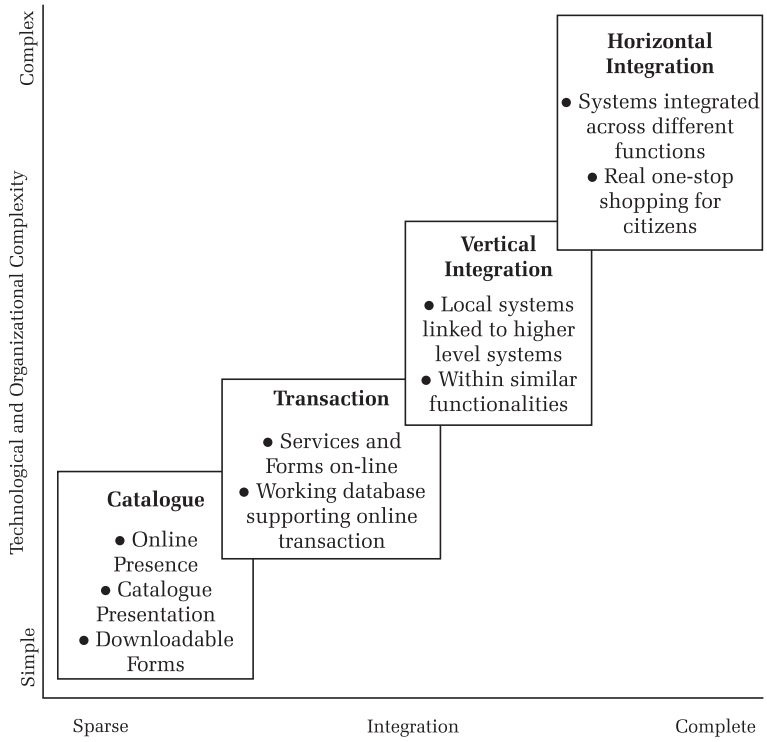

Fig. 2: *Adapted from 'Developing fully functional e-government: A four stage model' by Layne & Lee* [9]

Hierarchy of Measures

A good method is required to determine the criteria for evaluation, to develop the means to measure the variables for which criteria are established and then test these with the help of the relevant data. We can consider three types of valuation. The *first* would address the value of an organisation-wide infrastructure. Factors such as a communication network, a standardised data management approach and an IS architecture impact and benefit to the entire organisation must be evaluated in this context. This is one of the more difficult things to evaluate because benefits stem not from a network but from the applications it supports. The *second* would consider the applications implemented to support specific or multiple functions within an organisation. IT does not directly produce value. The value is in its impact

upon the organisation. The *third* area of concentrated IT support is at the level of the individual user. It can be very diverse in terms of the amount of use and the ability of the user to take advantage of the type and amount of available computer-based support. This diversity makes assessing the value of IT use very complex. No single measurement tells the complete story. A combination of measuring tools is desirable, among them counting transactions, industrial engineering kind of evaluations and interviewing those who are actually involved, including both direct and indirect personnel and managers. These measurements may not be precise from an accounting standpoint, although they represent information that can be used to satisfy senior officers. Feltham[13] defined numerous characteristics of information to which we may attach quantitative as well qualitative measures. This has been developed into a flexible framework for choosing an appropriate strategy in a continuum of quantitative to qualitative approaches for determining information value attributable to the several aspects of 'return on information'[14]. Return on information focused on viewing the role of information strategically. This refers to developing a functional view of the organisation, identifying specific functions at various levels of management to analyse how IS/IT is able to improve that function and develop measurements of performance for that. A similar approach can be devised for measuring the 'return on e-government".

This concept is useful in the context of corporations, such as SAP A.G., which used a logo statement to drive home the point that enterprise software like SAP R/3 should be viewed strategically. It is generally felt that the enormous success of this enterprise resource planning (ERP) package can be explained by such a positioning strategy. It is clear that we can generate a significant return on information, the value of which would be more than the investment by developing a strategic view of information. The telecom industry is a good example of this. One piece of information derived from several bits of data gave a new direction to the whole industry – it was found that the cost of billing constituted half the entire operating cost. This included the cost of metering, bill posting and money locked up for months when the process of collecting bills is underway. So, any scheme that could reduce the cost of billing would naturally lead to a great pull up on the bottom-line. This single piece of information led to many imaginative schemes such as calling cards, credit card calling and fixed rate billing. In fact, fixed rate billing as an option has now practically become the de-facto standard in the US. Internet-based business opportunities are also following the paths of the telecom industry and moving in this direction. This is also the case with the computer hardware industry, which has realised the need for promoting energy saving devices. The green PC movement led to the offshoot of the idea of 'sleep mode' for monitors, disc drives, etc., saving hundreds of megawatts of power.

It is tempting to use a more general approach in determining the value of e-government. A flexible framework or hierarchy of measure, offering a continuum of choices would help. The framework 'return on e-government' refers to developing a functional view of the government organisation,

identifying specific functions at various levels of administration to analyse how IT is able to improve those functions and develop a measurement of performance for them. After measuring the tangible and intangible benefits pertinent to e-government, an evaluation framework may be evolved to fit the evaluation criteria in a more generic approach to determining the value of an information system with regards to e-government. This can be fit into hierarchy measures as 'return on e-government', attributable to IT applications for governance, both tangible and intangible as shown in Table 3. While using the framework suggested in Table 3, it must be examined which level of measure is applicable in a specific context. The first preference is obviously for the measure of net return in dollar terms. The next best option is to explore identifying specific costs that are increased due to the installation of the new system. This may provide a conservative evaluation of the sub-division of benefits. If we fail to measure changes in costs and revenues, an attempt should be made to measure the improvements in the performance of administrative and managerial functions, i.e. improvement in the quality of planning and control. If the above schemes fail, we may consider measuring the quality of decisions that contribute to planning and control. As we go up the management hierarchy, development of measurement of performance becomes difficult as it deals with complex functions, particularly at the strategic level where much information is qualitative and probabilistic.

Eventually, what comes to the fore is not how to quantify the contribution of e-government, but to consider how useful the information and services are in the context of its use. Information and services, which are useful, have value. Usefulness can be defined in terms of the performance of its attributes such as validity, accuracy, clarity, reliability, timeliness, relevancy, sufficiency, message content, freedom from bias, comparability, scope of multiple users, data base and cost. These contribute to the value of information and services. A conglomeration of these attributes represented by a composite quality index, define 'e-government performance index'. An illustration is presented in Table 4 for NDMC.

Table 3 Measurement hierarchy attributable to 'Return on e-government'

Hierarchy in the performance	Change that is measured
level 1 Return on investment	Rupees/Dollars
Level 2 Total costs and revenues	Rupees/Dollars
Level 3 Improvement in quality of	Time required to work out plans, *planning and control* Cost of planning, Managerial time required for control, Degree of automation, Forewarning, Cost of control.
Level 4 Quality of decisions	Frequency of failures/reversal of decisions, Number of alternatives examined, Time required for decisions, Number of decisions, Availability of decision support systems, Cost of decision.
Level 5 Value of information	Usefulness (in terms of validity, accuracy, clarity, frequency, sufficiency, timeliness, reliability, relevancy, message content and cost).
Level 6 System characteristics	Number of people required, equipment and facilities, response time, frequency of breakdowns, inputs, outputs, number of forms, number of operations, number of storages, sizes and quality of data bank, size and quality of model bank, flexibility, simplicity, degree of automation, scope of business components that are related by the MIS, user satisfaction, error rates, persistent problem areas, ease of maintenance and modification, unplanned-for impact on company performance, savings, cost, etc.

Table 4 Measuring performance of e-government

Hierarchy		Performance
Level 1	ROI	Fundamentally, NDMC is a service organisation and does not need IT to be competitive. Also, IT cannot be considered in isolation, hence ROI cannot be properly justified. Moreover all the benefits cannot be quantified in monetary terms. Hence they cannot be justified in terms of the initial investment made.
Level 2	Total costs and revenues	Initial investments made by NDMC to CMC is Rs 2 crore payable in installments after each module is implemented. This cost excludes the hardware components. This amount is funded entirely in-house as NDMC is cash rich. It is estimated that due to improved operations, automation and proper documentation and transparency, incremental revenue will increase over the years, but exact figures are yet to be estimated. Due to automation, the time requirement for a certain job is less leading to improved employee productivity. There would, therefore, be a savings in manpower (if this is estimated on a man-hour rate, which is calculated by dividing total revenue earned, divided by the number of employees). The revenue streams have to be discounted at actual internal rate of return for NDMC by which they make their investments.
Level 3	Improvement in quality of planning and control	Managerial decision taking time has improved significantly so far with the degree of automation almost 85%. But there is no change in hierarchical control of decision making. As information flow is comparatively fast and accurate, planning and control have improved.

Level 4	Quality of decisions	Tax processing, processing and issue of birth and death certificates have improved significantly. Time required to take any decision has reduced to one quarter of the original time. Frequency of decision making has also increased. But exact calculation about time savings could not be done, as there is no attempt to maintain systematised time sheets. Certain data are common and available throughout all departments – this centralised data base system allows faster data access thereby reducing decision making time.
Level 5	Value of information	Due to automation, information generated is more frequent and the time required less. However in terms of validity, reliability, relevancy, and message content, although it is assumed to be better, the exact value of information in the prescribed terms cannot be ascertained so far.
Level 6	System characteristics	IS for e-government has contributed greatly in the performance of NDMC so far with select modules: ➢ More and better user interface ➢ Grievances now directly reach the appropriate authority who is supposed to address the issue ➢ Reduction in time for any business operation ➢ More transparency ➢ Process improvement whereby lag time is reduced to almost half ➢ Better collection of revenues in terms of tax and approval ➢ Online downloading of forms and in many cases online filling of taxes too ➢ All relevant information available online

A Multi-Criteria Approach

The Government of India (GoI), through the Department of Information Technology (DIT), is keen to create a rational framework for assessing e-governance projects on various dimensions. The need for such a framework arises because of the recently announced (18 June 2006) National Action Plan on e-governance with an ambitious outlay of over Rs.25,000 crores involving public and private investments over the next four years. A significant portion of the National Action Plan involves replication of successful projects across different geographical areas of the country. A reliable and practical approach of appraisal, hence, would go a long way in such efforts. A reliable appraisal would also instill confidence in various stakeholders including bankers and private sectors, ensure correct review and direction and widespread replication of successful projects.

An early attempt by DIT was made through the Indian Institute of Management Ahemdabad and National Institute of Smart Governance (NISG) who came up with an E-governance Assessment Framework (EAF) in May 2004. It had postulated various project categories like Government to Citizen (urban and rural), Government to Business and Government to Government respectively. Also categorisation was done on the basis of project size.

As part of the Computer Society of India (CSI) – Nihilant National E-governance Awards during 2005, our team at IIT Delhi evaluated over 100 entries for Best Project in the Government to Citizen Category. Based on the experience of that assessment span, we realised that a number of factors in the EAF Framework need to be re-modelled. This includes some of the following:

i. **Re-grouping** Though one may still argue that retaining the factors has an important implication – that of projecting the most important attribute in the right thrust and perspective – re-grouping was found to be needed. For eg., cost effectiveness, sustainability and commercial functionality had some factor mismatch. Another such parameter was the factor of extent to which the scalability, security, architecture, reliability etc could be tested by an external audit body. Once these factors are grouped together under external audit-ability, it is much easier for the judges to give appropriate rankings. Before the evaluation, the framework is given to the judges for their opinion on the weightages to be attached to various factors. Right grouping would minimise any human judgment error due to assumptions that certain indexes may have covered the assumed factor while in reality it may have not.

ii. **Overlap** Some factors that have been covered in one heading need not be taken in another group again. For eg. time saved per transaction for the user and indirect cost reduction are not entirely distinct. There are a few more instances that have been spruced in the new model.

iii. **Difficult to measure** Some factors at first sight seem easily comprehensible but on interpretation, ambiguity might arise on how to measure or capture that variable. Since the model has not given detailed instructions on scale or measurement capture, certain difficulties arose in measuring those variables.

iv. **New Factors** Some aspects of e-governance that have been extremely crucial in a global evaluation perspective, do not find place here. Few examples include extent of integration (across services, departments – vertical and horizontal). Some other aspects about technology include its maintainability. While there are multinationals specially designing computers and peripherals suited to the Indian dust and heat, the overall aspect of maintainability of infrastructure was not touched upon.

It has become most important for e-governance initiatives to be accurately measured because of the amount of time, effort and resources the government is investing in them. After having cited the reasons the E-governance Assessment Framework needs updations and changes, we now go on to explain the elements of the alternate framework in greater detail. We also explain the implementation strategy in detail and illustrate it with an example. We then compare the result of having used a simple EAF framework and the modified framework suggested below.

A framework for evaluation may broadly contain the following five factors:

- Citizen-centricity (efficiency, user convenience, services provided and value addition)
- Technology (architecture, standards, security, scalability, reliability, external audit-ability, maintainability)
- Sustainability (internal/organisational, external, cost-effectiveness)
- Replicability (functional, technical, commercial)
- Integration (services, vertical, horizontal)

These factors are further explained in Tables 5–9. Further, the factors and sub-factors that come under each of the above parameters are also explained.

Citizen-centricity gauges the extent to which the governance succeeds in treating the citizen as the focus of its actions. The author calls it citizen-centricity instead of service orientation as in EAF because the author believes that governance is not just here to serve the citizens, but to involve and transform them. A service measure would see the extent to which the service provided to the citizen through this project covers the entire gamut of the citizen needs in that area for eg., if a form available online has to be downloaded, printed, filled and then the payment made at some facilitation centre, then the service provided is not complete. It would have been complete if the payment also could have been done online. To calculate this score, the percentage of service provided is compared to what it ought to provide for the transaction to be complete. The percentage of fully execut-

able service is graded as 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100%.

Technology parameter tests the technological soundness of the project. The Alternate Delivery Channel in case of Breakdowns determines the extent to which users can depend on the system's response in case of breakdowns (power, connectivity, hardware, software).

Sustainability gauges the sustainability of the project manifested through internal or organisational stability, external sustainability and the financial sustainability of the project.

Table 5 Factors explaining citizen-centricity

Efficiency	User convenience	Service provided	Value addition
Percentage compliance to specified service levels This score measures the extent to which the system complies with the stated and displayed service levels that it issues, for eg., for an issuance of a Birth Certificate, once the consumer applies for it, the system may state that the actual issual time is 17 hours that evening. The consumer can then, instead of waiting there endlessly, continue with his work and come back at 17:00 hours. This score will measure the percentage times the system complies with the stated delivery parameters. The % of compliance is graded 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100% **Total user time saved** This score will measure the total time saved at the user end. Time saved at the government end is measured in by the sustainability: cost-effectiveness parameter. To calculate this score, the time saved for the user by all the projects is compared among themselves and against the one being used as a benchmark. The score is normalised using the formula:	**Availability of the system 24 × 7** This measures the extent of availability the system has. First the desired ideal availability of the system for the service it provides is determined: for e.g., is it 24 × 7 or is it just during the day? Then the actual availability including down times and break times is calculated as a percentage of required availability. The % availability of the system is graded 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100%.	**Alignment of services provided to user needs** Observing the services and the finer nuances of the service and the extent to which they are in sync with the behavioural pattern of the user. **Extent of process re- engineering for removal of non-value added actions** **Percentage of service chain that can be fully executed at centre or on web.**	Decrease in corruption This score has to be captured by interview or survey. Specific areas to be determined are • Instances of payment of bribes in the past, before implementation of project and after implementation. • Is the end result perceived to be fair and just (issue of driving license for instance)? • Is the end result perceived to be fair and just (issue of driving license for instance)?

Efficiency	User convenience	Service provided	Value addition
(Current project time saved – Minimum of time saved by project) / (Maximum of time saved by project – Minimum of time saved by project). Then the score obtained is mapped from 0 to 1 to 1 to 5 as 0–0.2 and graded as 1 and so on. **Total user money saved** This score will measure the total money saved at the user end. Money saved at the government end is measured in by the sustainability: cost-effectiveness parameter. To calculate this score, the money saved for the user by all the projects is compared among themselves and against the one being used as a benchmark. The score is normalised using the formula: (Current project money saved – Minimum of money saved by project) / (Maximum of money saved by project – Minimum of money saved by project). Then the score obtained is mapped from 0 to 1 to 1 to 5 as 0–0.2 and graded as 1 and so on. **Number of intermediaries removed** This score will measure the total number of intermediary agents removed between the user and the government bringing in more transparency and speed to the system. To calculate this score, the number of intermediary agents	**Use of local language interface** Extent of translation of information into local language is measured in this score. Score varies from 0 to 5 depending on finesse of translation and ease of understand ability. **Simplicity of usage** This measures the simplicity and ease of navigation through the entire range of options available. Interface must be designed such that even a first-time user can easily navigate through and get his work done. **Usefulness of help menus** The documentation and layout of help		• Does the citizen who does not have a known person at any point in the entire project service chain, feel he is at a disadvantage in any way? Scores 1–5 are given based on the responses to the question above. **Increase in transparency** This measure must also be captured through survey or questionnaires given to citizens. Sample areas that need to be captured are as under: • Does the citizen have access to the status of his records at every given stage where there is a waiting?

Efficiency	User convenience	Service provided	Value addition
removed by each of the projects is compared among themselves and against the one being used as a benchmark. The score is normalised using the formula: (Current project number of intermediaries removed – Minimum of of intermediaries removed by project) / (Maximum of intermediaries removed by project – Minimum of intermediaries removed by project). Then the score obtained is mapped from 0 to 1 to 1 to 5 as 0–0.2 and graded as 1 and so on. **Percentage increase in usage** This measure is used to gauge the increase in the usage of the system due to it being delivered in a more convenient and user-centric manner. This is calculated as a percentage of number of transactions done per day after and before the project. The % increase in usage is graded as 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100% **Percentage target users reached** This measure is used to capture the reachability and popularity or awareness among the target users. It is calculated as a percentage of number of users reached among the target users. The % target users reached is graded 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100%.	menus must be lucid and easy to understand		• Does the citizen know all the factors that affect the end result or any action occurring in the service chain? • Is the citizen made aware of his right to information through the use of prominent notice boards or clauses stated clearly on the site or form? • What per cent of citizens are aware of the above privileges he enjoys and what per cent of them actually exercise it? Scores 1–5 are given based on the responses to the questions above.

Efficiency	User convenience	Service provided	Value addition
			Increase in government citizen interaction One of the final objectives of e- governance is to increase the interaction between the government and the citizen and make the citizens active participants in policy making decisions. This can be initiated by posting relevant information and facilitating (discussion forums, feedback forms, online pop-up surveys, email contacts, blogs) interaction between the government and the citizen. Scores 1–5 are given depending on such initiatives and the extent of their use. **Extent of process re-engineering for removal of non-value added actions**

Efficiency	User convenience	Service provided	Value addition
	Knowledge of service provider/staff This measure is used to capture the extent to which the staff of the service provider at the service delivery station is familiar with the services packaged for different user groups. A survey or a small interview may be used to determine the exact score. **Convenience of location** This measure is also a comparative measure of the location convenience offered by the project. In case of services that are to be rendered to the urban online, this shall not be applicable.		A number of procedures may exist in the system that does not by themselves add any value to the process output. They are present as a consequence of some other part of the link not performing to its best for e.g., in a manual system of admissions, checking and then verifying marks list of student applicants is a non-value add. This can be completely eliminated if the data base consisting of student performance data can talk to the admission related data and the marks verification can be done automatically. This sort of re-engineering scope that computerisation and automation bring along with them must be

Efficiency	User convenience	Service provided	Value addition
			completely leveraged. This measure is to capture the extent of business process re-engineering scope that the project has and to what extent it has been leveraged in this instance. The % of re-engineered processes is measured against the processes that could have been and graded 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100%.

Table 6 Factors explaining technological soundness

Architecture	Standards	Security	Scalability	Reliability	External Audit Ability	Maintain Ability
Comprehensiveness of architecture This measure is to capture if the architecture designed is adequate for handling all the services. The architecture is graded low if it is over-designed or under-designed **Conformance to national/international architecture** This measure captures the extent to which the architecture conforms to national and	**Compliance with open Standards** This measure is to determine the extent of use of open standards like those based on TCP/IP, HTTP, CORBA, DCOM, ODBC etc. It is graded high for maximum usage. **Design and adoption of meta-data standards** This measure is used to capture if the system is based on meta-data standards like XML etc. It is graded high for maximum usage.	**Extent of compliance with security architecture** In this measure, it is determined if the system security design conforms to BS 7799. If yes then the design is graded as 5, otherwise it is graded a score ranging from 4 to 1 depending upon the presence and extent of the security policy document published by the project team	**Database integrity and scalability** There should be no replicability or redundancy of data. Also the data base architecture should be such that future integration, both vertically and horizontally across services, functions and departments across states should not be a problem. The system is graded high if any integration that can be done with other services has been initiated or completed.	**Accuracy of results** In this measure, the system that produces highly accurate results should be given a score of 5. Accuracy will be based upon third party audits and error logs of the system. **Consistency of results** This measure gauges the consistency with which the system offers reasonable response times.	**System for architecture compliance and audit** This measure is to determine if there is there a system in place for conducting third party audit of the systems to elicit conformance/continued conformance to the architecture originally designed. (The score is awarded as follows:Yes –5; No – 0)	**Ease of installation** This measure ensures that in case of new software or re-installation of software, the procedure is as simple as possible to enable the service staff at the citizen facilitation centre or the direct user himself to be able to rectify it. Scoring must be based on the requirements of the software and the implementation done.

Architecture	Standards	Security	Scalability	Reliability	External Audit Ability	Maintain Ability
international standards. Will the architecture be able to talk with other systems and will it be easy to operate and decode? It is graded low if there is any mismatch that will require further work to bring it up to the defined standard. **Extent of use of open-source systems** The system is graded high if it uses open-source systems in back end and front end i.e. for operating system, DBMS or data base		**Privacy of user data, present and known to users** This measure tries to ensure that user data is completely secure. Especially in cases where the complete transaction happens online and the user needs to give personal information and credit card details, utmost security is required. Also the web site must prominently display the message about privacy and security policy to reassure the user about his data safety.	**Degree of scalability of project** Scalability of the project depends on the APIs available and their documentation. The project is graded high if it shows rigour along thist line. **Scope for enhancements of HW interfaces** This measure tries to capture if both hardware and software design permits integration of new devices. The project scores high if it has a better enhancement scope.	This is to be assessed from the system logs. Percentage number of times that the system has been consistent is calculated and the system graded 1 for 1–20%, 2 for 21–40%, 3 for 41–60%, 4 for 61–80% and 5 for 81–100%. **Alternate delivery channel in case of breakdowns** This aspect determines the extent to which the users can depend on the system's response in case of breakdowns [power,	**Open standards compliance enforcement mechanism** This measure is to determine if there is there a system in place for conducting third party audit of the systems to elicit conformance/continued conformance to the architecture originally designed. (The score is awarded as follows:Yes – 5; No – 0)	**Extent of parameterisation for customisation** This factor measures and scores depending on the extent to which the user end system is customisable through parameters only (not through additional programming) (0–5). **Technology made according to Indian weather and usage standards** Because of the use of the system in remote areas where availability of qualified skilful technicians may be a

Architecture	Standards	Security	Scalability	Reliability	External Audit Ability	Maintain Ability
management systems, web server technology etc		It is graded 1 to 5 depending on the extent to which security measures have been taken – a score of 5 is given if credit card payments are accepted online and no case of loss has been reported. **Extent of user and financial authentication procedure** If financial transactions are being carried out on the web, then the system is graded 5 else if none, then 0. Intermediate scores are given according to the extent of transaction safety involved.	**Scope to work with alternate power and connectivity** Considering the climate and usage conditions of the Indian sub-continent, the ability of the terminal to withstand high temperature and dust is significant. Work cannot be stopped just because of frequent power cuts that may happen in less developed regions. Hence the scope to work with alternate power or having a power back up and connectivity is essential. Higher the ability to manage in these conditions, better the score.	connectivity, hardware, software).	**Security standards compliance mechanism** This measure is to determine if there is there a system in place for conducting third party audit of the systems to elicit conformance/continued conformance to the architecture originally designed. (The score is awarded as follows:Yes –5; No – 0)	little difficult, remote logging and maintenance must be an enabled feature that can be easily activated through the use of secure passwords. (The score is awarded as follows:Yes –5; No – 0)

Table 7 Factors explaining project sustainability

Internal	External	Cost-effectiveness
Organisational structure to support the project This score is given based on whether the organisation structure and hierarchy has been created by reforming the conventional structure and is functioning effectively. Effective functioning would imply pre-decided decision flow and information flow clarity. Score ranges from 1 to 5. **Extent and adequacy of employee training** Unless the employees across the organisation are trained effectively and efficiently, investing in technology and infrastructure will provide no returns. This also involves overcoming user resistance to the new system and the change that follows. Availability of time and resources spent on training employees to reach a comfort level is measured by this factor. A small	**Period of continuous functioning** This measure captures the extent of continuity of the project and scores it accordingly. If the project functions for 3 years or more after its launch with growth, it must be assigned a score of 5. If the project has stopped functioning within 3 years of launch, it is graded –10 and –5 if the numbers show a decline. **Strength of PPP arrangement** This measure determines the strength of the private partner and its relationship with the government. It scores based on the effectiveness with which the private partner executes the project (Score 5 if time, cost and quality parameters have been met. Else assigned proportionately lesser scores).	**Reduction of cost to government** The cost reduction or money saved by the user has been measured in the citizen-centricity efficiency sub-factor. By this measure, the extent to which the project has resulted in reduction of cost over time to the government is gauged. To calculate this score, the money saved by government in each of the projects being compared is calculated against the one being used as a benchmark. The score is normalised using the formula: (Current project cost reduced – Minimum of cost reduced by any project) / (Maximum of cost reduced by a project – Minimum of cost reduced by a project). Then the score obtained is mapped from 0 to 1 to 1 to 5 as 0–0.2 and graded as 1 and so on. **System of collection of user charges** For this measure, a system is graded 5, if the charges provide a good stream of revenue adequate to ensure financial sustainability (0–5) **Extent of increase in Revenue** In this measure, the extent to which the project has resulted in revenue increase over time to the government is gauged. To calculate this score the revenue increase to government in each of the

Internal	External	Cost-effectiveness
interview or questionnaire test to the users would help determine their comfort level with the new system. **Role clarity and employee buy-in** One must also ensure that each person's roles and responsibilities are crystal clear to him in the changed environment to be able to produce good results. A survey to determine the extent of role clarity and employee buy-in would help score in this factor. **Employee involvement in design and implementation** This measure tries to capture the degree of sense of ownership of the project by government employees (0–5) **Continuity of top champions of the projects** Continuity of top champions is a huge growth impetus and knowledge source. Harnessing		projects being compared is calculated against the one being used as a benchmark. The score is normalised using the formula (Current project revenue increase – Minimum of revenue increase by any project)/(Maximum of revenue increase by a project – Minimum of revenue increase by a project). Then the score obtained is mapped from 0 to 1 to 1 to 5 as 0–0.2 and graded as 1 and so on. **Mechanism to recover capital cost** If provision is made for complete recovery, the project score 5. Else it is graded proportionately less **If PPP, extent of commercial viability to private partner** This measure indicates that extent to which the private partner finds the venture commercially viable. This is proportional to the cost sustainability of the project. If there is high commercial viability for the private partner, the project is graded 5

Internal	External	Cost-effectiveness
this brain power can be a significant reason for future impetus to the project and its replicability in other areas. This is measured by assigning a score 1 for each year of continuity and for less than one year a score of 0 Existence of user groups and service reviews This measure is based on the existence and effectiveness of a system for reviewing the system operations periodically and incorporating user feedback (0–5)		

Table 8 Factors explaining project replicability

Functional	Technical	Commercial
Degree of generic processes introduced This measure captures the extent to which the project addresses issues not specific to geography (state/district etc.); whether it can be implemented anywhere in the country (0–5) **Extent to which project results in a product** This measure captures the extent to which a product has been and/or can be developed out of the project for easy replicability and commercial viability (0–5) **Extent of other projects that has been replicated in this project (not to be scored)** This indicator is purely for information sake at present – to know if the project has effectively re-used any component of another project and how successful it was it.	**Extent to which project results in a product** This measure gauges the extent to which a product that can be replicated as a package in its entirety is created out of the project. **Extent of other projects that has been replicated in this project (not to be scored)** This indicator is purely for information sake at present – to know if the project has effectively re-used any component of another project and how successful it was it. **Multiple platform deployment feasibility** This measure captures the extent of feasibility of the application software on multiple platforms and scores accordingly range from 0 to 5. **Quality of project documentation** The scoring for this measure is based on availability of system documentation in the standard format Better the readability, more the score ranging from 0 to 5.	**Availability of commercial arrangement for replication** This measures whether the commercial arrangement with the developer/PPP partner permits replication. The projects are graded 5 for Yes and 0 for No. **Attractiveness of transaction costs to induce replication** This score measures whether the transaction costs and other commercial terms are attractive enough to induce replication. The projects are graded 5 for Yes and 0 for No. **Mechanism for marketing the project** Is there a mechanism in place for marketing' the project and implementing it in other geographies on commercial basis? The projects are graded 5 for Yes and 0 for No.

Table 9 Factors explaining integration

Service	Vertical	Horizontal
Links to similar and complementary services This looks at the number and quality of links to various other similar and complementary sites. For complete and well-placed working links, the project is given a score of 5. If there are no links, then it is graded 0. **Extent of grouping of services** The extent to which the grouping of services is in line with the user's behaviour pattern is observed. The more complete the grouping whenever they are needed, the higher the score. In case, the project being assessed is a stand-alone service, then this score need not be considered.	**Extent of vertical integration** This measures whether if a citizen logs in from the city portal, the functionality is integrated with that of the state and also of the country for e.g., if a person owning a particular city driving license travels to other states, his license data should be portable from one state data base to the other with relevant indicators activated or deactivated. This sort of integration within one department across hierarchy is called vertical integration. In cases where vertical integration is possible for the project under consideration, it is graded 5 if provision is made for it and integrated, else it is graded 0. **Ability to access the service at the state or national level from the same entry in the local portal** **Percentage of services that have been integrated** This measures the number of services or departments that can be integrated relating to a project.	**Complete one-stop shop for every government service** A project is awarded a score of 5 if any policy or intent document is present, that outlines how the current selected project will enable horizontal seamless integration in the future.

The variety, scope and size of e-governance projects are very large. It is not possible to create a framework that is applicable to all possible projects. It is therefore proposed to confine the current exercise to the projects falling in the following four categories:

- Government to Citizen in the Urban Environment (G2C-U)
- Government to Citizen in the Rural Environment (G2C-R)
- Government to Business (G2B)
- Government to Government (G2G)

The projects can further be categorised on the basis of the investments made. Table 10 brings out the limits for categorisation in respect to pilot projects and rolled-out projects separately. The investments could be by the public or private sectors. In terms of priorities, it is desirable to focus the initial efforts on large projects.

Table 10 Categorisation of projects

Category of project	Pilot project	Rolled-out project
Small	< Rs 3 Cr	< Rs 10 Cr
Medium	Rs 3 to 10 Cr	Rs 10 to 50 Cr
Large	>Rs 10 Cr	> Rs 50 Cr

Implementation Strategy

What is now required is to develop a theoretically sound approach for determining the rankings of the different evaluation methods based on the parameters or the importance of each factor as derived from expert judgment from a given set of options. A methodology using an analytic hierarchy process (AHP) is suggested as a means of formalising the process of determining the suitability, ranking and contrasting of the system. The AHP is a powerful and flexible decision making process which helps people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. By reducing complex decisions to a series of one-on-one comparisons, and then synthesising the results, AHP not only helps decision makers arrive at the best decision, but also provides a clear rationale of why it is the best. Designed to reflect the way people actually think, AHP was developed in the 1970s by Dr. Thomas Saaty, while he was a professor at the Wharton School of Business. It continues to be the most highly regarded and widely used decision-making theory. The AHP process is useful for systematically evaluating qualitative criteria. It also attempts to resolve conflicts and analyse judgments through a process of determining the relative importance of a set of activities or criteria.

The AHP has been applied to a variety of business decisions and processes requiring a high degree of subjective judgment. Although the AHP

process is a subjective weighting technique that relies upon the judgment of the decision maker, it does so in a manner that is more systematic and consistent than traditional subjective decision-making.

The AHP can be summarized in terms of three basic components. First, the principal problem is decomposed into a hierarchy. The top level of the hierarchy represents the overall objective of the process. For e.g., the top level can be the most suitable car in a given segment for a given set of potential customers. Once the top level of the hierarchy has been defined, then the overall objective of the process is broken down into components. These factors compose the second level of the hierarchy. Subsequently, each element in the second level spans a group of sub-elements in the third level. This process is repeated until the final level is reached. The final level represents the array of possible outcomes. In this case, the array of possible outcomes is the weightings of various assets held in a portfolio.

Within each level of hierarchy, the relative importance of all elements derived from a single element in the next higher level must be determined. For example, suppose element 1 in level 2 is decomposed in level 3 into three sub-elements, A, B, and G. The AHP determines the relative importance of these three sub-elements by constructing a complete set of pair-wise comparisons among them. A nine-point scale is used for these comparisons. A score of 9 signifies the highest level of importance for an element relative to other elements, and a score of 1/9th signifies that the element is much less important. If a comparison of A to B is assigned 1, A and B are considered of equal importance. The comparison of B to A would be assigned the reciprocal value. Interpretations for the pair-wise comparisons are summarised in Table 11. A complete set of such scores constitutes a pair-wise comparison matrix. At the final level of the hierarchy each possible outcome must be considered relative to a single sub-element of the previous level.

In the third and final phase of the AHP, the pair-wise comparison matrices are evaluated by solving for their eigenvalues. The eigenvalues represent the weighting functions for each set of pair-wise comparison matrices. Each set of lower level eigenvalues are then scaled by the eigenvalues corresponding to the next level in the hierarchy. Continuing the process of eigenvalue extraction and weighting through the levels of the hierarchy leads to a global weighting scale. The global priorities for the final level reflect the decision maker's relative weights for the alternatives

Table 11 Interpretations for the pair wise comparisons for AHP

Ratings of absolute importance	Explanation
Factor A to Factor B	Two factors contribute equally to the objective and are of the highest importance.
Factor A to Factor B 3	Experience and judgment moderately favour A over B

Factor A to Factor B 5	Experience and judgment strongly favour A over B
Factor A to Factor B	A is strongly favoured over B and its dominance is demonstrated in practice.
Factor A to Factor B	The evidence favouring A over is the highest possible.
Factor A to Factor B 2,4,6,8	When compromise is needed.

Reciprocals If Factor A has one of the above numbers assigned to it when compared with activity then B has the reciprocal value when compared to A.

Setting up a problem as a hierarchy is an efficient and intuitive way of dealing with complexity and identifying the relevant components of the problem. AHP is flexible in allowing decision makers structure a hierarchy to fit individual needs and preferences. In addition, used in a group setting, AHP to may help to isolate areas of disagreement so that more attention can be focused on them in order to achieve consensus.

Table 12 shows the rating scale that was used for the expert judgment during the evaluation of frameworks.

Table 12 Rating scale for expert judgment in AHP

Value	Description for expectation	Description for perception
9	The parameter is of utmost importance	The parameter is taken care of and the satisfaction levels are very high.
7	The parameter is important	The parameter is taken care of properly and the satisfaction level of the beneficiary is high
5	The parameter is somewhat important	The parameter is moderately taken care of, and satisfactory performance is observed.
3	The parameter is less important	The parameter is not taken care of properly, and unsatisfactory performance against that parameter is observed.
1	The parameter is least important	The parameter is not taken care of at all, and absolutely unsatisfactory performance is noted against the parameter.

The experts were asked to evaluate each of the models based on the three parameters which were found to be the most important. For each of the parameters, marks out of 10 were given.

In the present case of illustration, inputs were taken from the experts and acknowledged persona in the e-governance sector. The number of such inputs was small, and only averaging was done on the inputs thus received. The inputs were used to identify the parameters and also define the impact of one of the parameters with respect to the other. That is, the relative importance of the parameters. Each of the experts consulted were asked to rate the relative importance of each of the parameters. These were averaged out in fractions and then converted to the relations as depicted. We can use the relevancy test shown in Table 13 to choose factors that may be applicable to our sort of project. This test is usually done for projects with a heavy technological inclination – a lot of factors need not be included in our project.

Table 13 Table for relevancy test

Factor	Sub-factor	Sub-sub-factor	Relevant?		Supporting data/evidence/ document/
			No	Yes	
Citizen-centricity	**Efficiency**	Percentage compliance to service levels specified			
		Total user time saved			
		Total user money saved			
		Number of intermediaries removed			
		Percentage increase in usage			
		Percentage target users reached			
	User Convenience	Availability of the system 24 ×7			
		Use of local language interface			
		Simplicity of usage			
		Usefulness of help menus			
		Knowledge of service provider/ staff			
		Convenience of location			
		Single window interface			
	Services Provided	Alignment of services provided to user needs			

		Extent of process re-engineering for removal of non-value added actions			
		Percentage of service chain that can be fully executed at centre or web			
	Value Addition	Decrease in corruption			
		Increase in transparency			
		Increase in demand			
		Availability of information			
		New services provided			
		Increase in government citizen interaction			
Technol-ogy	**Architecture**	Comprehensiveness of architecture			
		Conformance to national/international architecture			
		Extent of use of open-source systems			
	Standards	Compliance with open standards			
		Design and adoption of meta-data standards			
	Security	Extent of compliance with security architecture			
		Privacy of user data, present and known to users			
		Extent of user and financial authentication procedure			
		Data base integrity and scalability			

		Degree of scalability of project			
	Scalability	Scope for enhancements of HW interfaces			
		Scope to work with alternate power and connectivity			
		Scope to handle increased number of users			
	Reliability	Accuracy of results			
		Repeatable			
		Reproducible			
		Meets SLA parameters			
	External Audit Ability	System for architecture compliance and audit			
		Open standards compliance enforcement mechanism			
		Security standards compliance mechanism			
	Maintainability	Ease of installation			
		Extent of parameterisation for customisation			
		Technology made according to Indian weather and usage standards			
		Remote system maintenance ability			
		Alternatives in case of system breakdown			
Sustain-ability	**Internal / Organisa-tional**	Organisational structure to support the project			

		Extent and adequacy of employee training			
		Role clarity and employee buy-in			
		Employee involvement in design and implementation			
		Continuity of top champions of the projects			
		Existence of user groups and service reviews			
	External	Period of continuous functioning			
		Strength of PPP arrangement			
	Cost-effectiveness	Reduction of cost to government			
		System of collection of user charges			
		Extent of increase in revenue			
		Mechanism to recover capital cost			
		If PPP, extent of commercial viability to private partner			
Replic-ability	**Functional**	Extent to which project results in a product			
		Extent of other projects that has been replicated in this project (not to be scored)			
	Technical	Extent to which project results in a product			
		Extent of other projects that has been replicated in this project (not to be scored)			
		Multiple platform deployment feasibility			

		Quality of project documentation			
	Commercial	Availability of commercial arrangement for replication			
		Attractiveness of transaction costs to induce replication			
		Mechanism for marketing the project			
Integration	**Services**	Links to similar and complementary services			
		Extent of grouping of services			
	Vertical	Ability to access the service at the state or federal level from the same entry in the local portal			
		Percentage of services that have been integrated			
	Horizontal	Complete one-stop shop for every government service			
		Seamless integration			

Arriving at Weights per Factor

a. For the project concerned, with the help of experts, relevance test is conducted and the factors based on which to evaluate the genre of projects is selected.
b. Once the factors are selected, the hierarchy which the factors follow is obtained.
c. A team of experts assigns weightages to each set of factors at every level of hierarchy. i.e for a set of four sub-factors falling under one main factor, the experts assign them weights such that the sum of weights equals 20.
d. Using this, the relative weightages table of AHP is arrived at.
e. From this, the normalisation table is obtained by dividing each cell by the sum of the elements in that column.
f. The factor weight is obtained by averaging each row.
g. A confidentiality test is conducted to ensure consistency in assigning weights. For eg, if sustainability is 3 times as important as replicability and replicability is as important as technology, in that case, sustainability cannot be anything but three times as important as technology. But in normal weighting course, due to human error, certain inconsistencies may creep in. This is verified through the consistency test.

Scoring each Factor

a. For each project, scores ranging from 0 to 5 for each of the relevant factors selected is assigned.
b. The composite score is calculated by multiplying the scores by weights attached to each factor.
c. The hierarchy is moved up and the final project score is calculated

Implementation Flowchart

To implement the above framework, we use the analytic hierarchy process which is a participative decision-making tool. Setting up a problem as a hierarchy is an efficient and intuitive way of dealing with complexity and identifying the relevant components of the problem. AHP is flexible in allowing decision-makers to structure a hierarchy to fit individual needs and preferences. In addition, used in a group setting, AHP may help to isolate areas of disagreement so that more attention can be focused on them in order to achieve consensus. Refer to Tables 5–9 for the marking scheme for the AHP to be applied. This comparison is used to indicate the relative importance between two parameters taken as a pair at a time. The implementation flowchart for project assessment framework is shown in Fig. 3

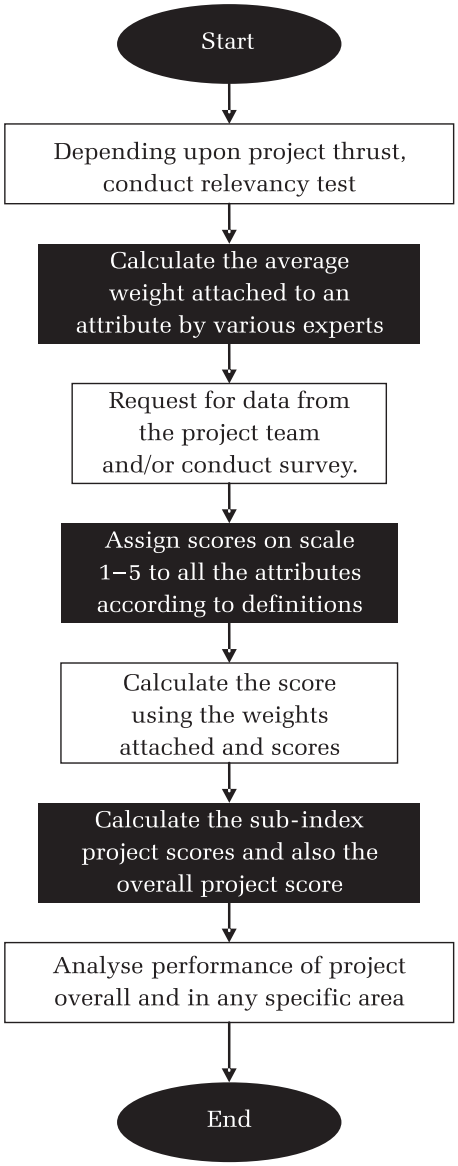

Fig. 3 *Implementation flowchart for project assessment framework*

Illustrative Example

After the relevance test was conducted, the factors arrived at for evaluating a simple project were selected. The hierarchy tree obtained is as follows (Fig. 4):

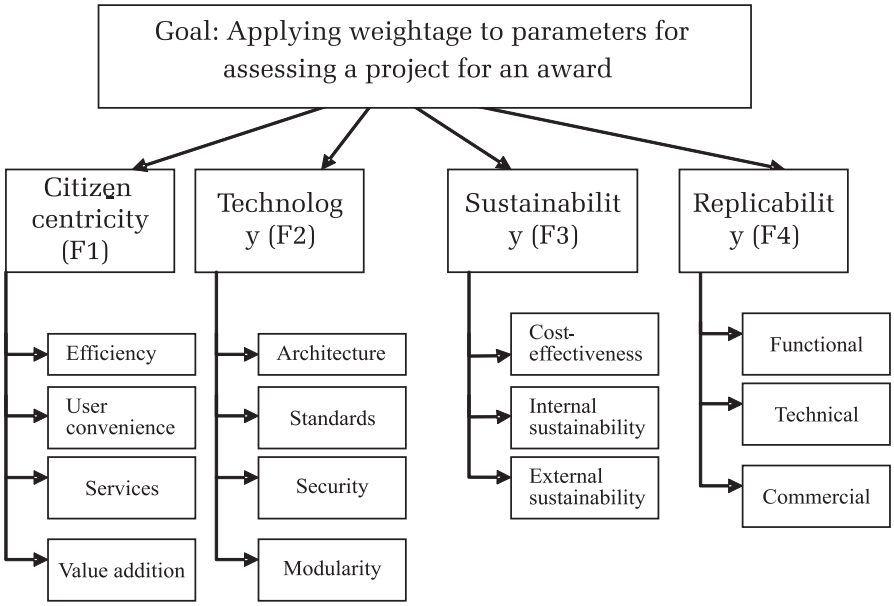

Fig. 4 *Relevant factors hierarchy for project assessment*

Based on the above, an evaluation sheet (Table 14) is formed using which the assessor can assign scores to the projects. At the same time, the core team needs to calculate the weightages attached to each of the chosen factors in the hierarchy.

Table 14 Sample evaluation sheet for project assessment

Factor	Sub-Factors	Rating 1 2 3 4 5	Remarks
Citizen-centricity (F1)	Efficiency: Speed of delivery of service	( ) ( ) ( ) ( ) ( )	
	User convenience	( ) ( ) ( ) ( ) ( )	
	Services	( ) ( ) ( ) ( ) ( )	
	Value adds	( ) ( ) ( ) ( ) ( )	
Technology (F2)	Architecture	( ) ( ) ( ) ( ) ( )	
	Standards	( ) ( ) ( ) ( ) ( )	
	Security attributes	( ) ( ) ( ) ( ) ( )	
	Modularity of the software	( ) ( ) ( ) ( ) ( )	

Sustainability (F3)	Internal sustainability	( ) ( ) ( ) ( ) ( )	
	Cost-effectiveness	( ) ( ) ( ) ( ) ( )	
	External sustainability	( ) ( ) ( ) ( ) ( )	
Replicability (F4)	Functional	( ) ( ) ( ) ( ) ( )	
	Technical	( ) ( ) ( ) ( ) ( )	
	Commercial	( ) ( ) ( ) ( ) ( )	

Each of the experts is asked to assign weights to the factors at all levels of the hierarchy:

These are averaged and the weightage of each factor is obtained (Table 15).

Table 15 Sample weightages of major factors

Weightages of major factors

PART (V) OVERALL WEIGHTAGES (F5)

Please allot 20 points among the following 4 parameters. Note that he total should be 20

Citizen-centricity	6.5
Technology	4
Sustainability	5.75
Replicability	3.75
Current Sum	20
SUM SHOULD BE =	20

From the above, with the help of ratios, pair-wise comparisons among factors are derived (Table 16).

Table 16 Pair-wise comparison among major factors

P5	Citizen-centricity	Technology	Sustainability	Replicability
Citizen-centricity	1	3	1	3
Technology	1/3	1	1/3	1
Sustainability	1	3	1	3
Replicability	1/3	1	1/3	1

From the above, the normalised matrix is obtained by dividing each cell with the sum of the elements of that column (Table 17).

Table 17: Normalised matrix for major factors weights

Citizen-centricity	0.3750	0.3750	0.3750	0.3750		0.3750
Technology	0.1250	0.1250	0.1250	0.1250		0.1250
Sustainability	0.3750	0.3750	0.3750	0.3750		0.3750
Replicability	0.1250	0.1250	0.1250	0.1250		0.1250

The final result is the project evaluation, a sample of which is shown in Tables 18–21.

Table 18 Sample project evaluation: Part A

Project title	**1. Citizen-centricity**				
	Efficiency	**User convenience**	**Services**	**Value addition**	**Weighted (1a,1b,1c,1d)**
	1a	**1b**	**1c**	**1d**	**Weighted (1a,1b,1c,1d)**
Samadhan	4	5	5	5	4.7031
Akshaya	4	4	5	4	4.246
KAVERI (Karnataka valuation and e-registration	5	5	5	5	4.9995
e-Krishi Vipanan (ekvi)	4	4	4	5	4.2103
Municipal corporation resource planning (MCRP)	4	4	4	5	4.2103
e-governance and citizens' charter	5	5	5	5	4.9995
e-Gram Suvidha	4	4	3	3	3.5425
e-Sagu: Web-based agricultural expert advice dissemination system	4	5	4	4	4.246
CaseiInformation system (district courts computerisation)	4	4	4	4	3.9996

Table 19 Sample project evaluation: Part B

Project title	2. Technology				
	Architecture	**Standards**	**Security**	**Modularity**	**Weighted (2a,2b,2c,2d)**
	2a	**2b**	**2c**	**2d**	**Weighted (2a,2b,2c,2d)**
Samadhan	3	2	4	3	3.2
Akshaya	4	4	4	4	4
KAVERI (Karnataka valuation and e-registration	4	3	4	4	3.8
e-Krishi Vipanan (ekvi)	4	4	4	5	4.2
Municipal corporation resource planning (MCRP)	5	4	4	5	4.4
e-governance and citizens' charter	4	3	2	2	2.6
e-Gram Suvidha	4	4	4	4	4
e-Sagu: Web-based agricultural expert advice dissemination system	4	4	3	5	3.8
Case information system (district courts computerisation)	4	3	4	5	4

Table 20 Sample project evaluation: Part C

Project title	3. Sustainability			
	Internal sustainability	External sustainability	Cost effectiveness	Weighted (3a,3b,3c,3d)
	3a	3b	3c	Weighted (3a,3b,3c,3d)
Samadhan	5	4	5	4.8302
Akshaya	5	5	5	5
KAVERI (Karnataka valuation and e-registration	4	4	4	4
e-Krishi Vipanan (ekvi)	3	3	5	3.8858
Municipal corporation resource planning (MCRP)	4	3	4	3.8302
e-governance and citizens' charter	4	3	4	3.8302
e-Gram Suvidha	5	4	4	4.3873
e-Sagu: Web-based agricultural expert advice dissemination system	4	3	4	3.8302
Case information system (district courts computerisation)	4	4	4	4

Table 21 Sample Project Evaluation:Part D

Project title		Overall Rank
	Weighted (4a,4b,4c,4d)	
	Weighted (4a,4b,4c,4d)	
Samadhan	4.5	4.5374875
Akshaya	3.5	4.40475
KAVERI (Karnataka valuation and e-registration	3.5	4.2873125
e-Krishi Vipanan (ekvi)	4.75	4.1547875
Municipal corporation resource planning (MCRP)	4.5	4.1276875
e-governance and citizens' charter	2.75	3.9798875
e-Gram Suvidha	3.75	3.942425
e-Sagu: Web-based agricultural expert advice dissemination system	3.5	3.941075
Case information system (district courts computerisation)	3.5	3.93735
PKI project	3.75	3.8643

Thus we see that composite scores have been identified for each of the ten projects with relevant factors in the evaluation frame. We can change the set of parameters based on which to evaluate depending upon the purpose of the project.

Re-valuation of the E-governance Assessment Framework, led us to reassemble some of the factors and add a new category called integration based on our review of projects for the CSI–Nihilent National E Governance Awards 2005. We also proposed and illustrated a detailed methodology to capture the scores without any assumption or pre-conceived notion error.

Overall Impact of e-Government

The overall impact of e-government can be felt on many aspects that include saving taxpayers money, government's time, support for small businesses, dissuading corruption, promoting participation in government and also streamlining government operation. But this impact of e-governance cannot be measured adequately by using the traditional cost–benefit analy-

sis and return on investment calculations. Usage of e-government services determines the return on investment. People's awareness about e-government services must be increased extensively to ensure higher usage and maximise the return on investment. This has to be coupled with a continuous assessment of the level of acceptance of citizens with the help of preference polls, customer satisfaction surveys and online trend monitoring.

Due to the tight budgetary situation felt by all governments universally, there was a need to measure the overall impact of e-governance – a proposition generally found to be difficult. Also government CIOs require guidelines on the subject. This necessitated the US government to constitute an Intergovernmental Advisory Board (IAB) consisting of three federal, three state and three local government chief information officers, IT experts in GSA and Federation of Government Information Processing Councils. GSA is a centralised agency in USA for federal procurement and property management. The objective of the IAB was to identify the quality that make as e-governance programme exceptionally valuable to its sponsors, and how these sponsors measure the payoff delivered. The IAB report was released in May 2003 in 'High Payoff in Electronic Government: Measuring the Return on E-Govenmnent Investments'. This report defines 'high payoff' as a value for taxpayers by cost saving, economic development, synergies achieved through integration of government processes, strengthened democratic processes, and service to citizens and other constituent groups. It offered the following measures :

- Financial: Reduced costs of government operations/enhanced revenue collection. Web-enabling customer service processes eliminates paperwork and printing
- Economic development
- Reduced redundancy: Consolidating and integrating government systems
- Fostering democratic principles.
- Improved service to citizens and other constituencies.

The above categories are broad and to measure the performance of specific programmes will require a specific tool for each different value. Any e-government programme should address at least one of the above categories. More successful ones will provide benefits in more than one area. The alignment of the performance objectives of the programme and that of its sponsors, with the nature of benefits determines the appropriate metrics. These might include

- Financial measures, such as return on investment, cost–benefit analysis, including net present value and internal rate of return
- Indicators of public approval and acceptance, such as customer satisfaction measures and e-government take-up, or adoption rates
- Benchmarking
- Balanced scorecard measures
- Business cases

- Portfolio analysis and risk management.

The measures suggested above at best serve the purpose of being treated as a broad framework of evaluating an e-governance programme. Looking for hard numbers to determine government project viability is never recommended; so is the case with the e-government projects since these are primarily driven with the aim to deliver better service to citizens/business/interest group constituency. It is, therefore, prudent to deal with e-government project case-by-case and take into account the quality, speed and comprehensiveness of the service to citizen, economic deficiency, and alignment with government's strategic/political priorities. In any evaluation approach, importance of factors such as risk of changing technology, potential overruns of cost and changing requirement of the users, cannot be over-emphasised.

Concluding Remarks

Evaluation of e-government is necessary but approaches are not standard. Choice of an evaluation method would depend on what aspect of e-government we want to evaluate. There are three broad identifiable scenario of evaluation: e-readiness of the context, performance of specific e-government projects or programmes and overall impact of e-government on various developmental factors. Several approaches have been attempted by the researcher who recommends the choice to be dependant upon a particular situation. An overall evaluation could be ascertained in the broader framework discussed in this chapter. The framework provided is by no means optimal. Based on other ideas and research, the framework can be changed for which the grading and subsequently, various qualitative aspects of measurements could change.

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