Data Standardization for e-Governance a Practical Approach

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ABSTRACT

The goal of democracy and a demand that is already being made and will be made by the citizens with increasing urgency is to speed up the transition from being ruled to being governed and then to direct participation of citizens in Government. E-Governance is the only practical way to achieve the above. Most existing e- Governance initiatives replicate business applications and the actual delivery of government services is largely un-explored. There is an urgent need to establish a national e-Governance roadmap, design and scale up the transition into e-Governance rapidly. The transition needs to be carefully managed. For any scalable e-governance initiative, which should be delivered with reasonable "technical" cost and minimum rework, standardization is a must. This paper explores what needs to be standardized and how. It also describes an approach to the first step in standardization–viz implementation of data standards thru a Service Centric approach.

1. E-Government?

From Electronic Democracy (Here It Comes, Ready Or Not) by Tracy Westen, Congressional Internet Caucus USA "Over the past 200 years, this country has invented a new form of governance -- a remarkable departure from the monarchies and dictatorships of the past. This new system of government enabled citizens to control their own destinies through the intermediaries of elected representatives. The success of this new form of representative democracy depended, in turn, upon fairness, equality and trust: fairness of the legislative process, the equality of the electoral process, and trust in both. Today the public increasingly distrusts representative government. In the next two decades, we will all have a chance to become Founding Fathers again. We will have the opportunity—perhaps the obligation—to create new hybrid forms of participatory democracy, to chart a new course between the "impulsiveness of the mob" and the "elitism of unresponsive representatives."

How and when this new hybrid will emerge, and what "checks and balances" we will create, is not yet known. What is known is that the debate will occur. And that it will be conducted electronically." The eventual goal is to transition in the best possible way from being ruled to being governed, thru a process of e-Governance, to direct participation of citizens in Government.

Let us examine the delivery of Governance and where there is a need for e-Governance

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2. Delivery of Governance – The How; Need for e-Governance

2.1 Delivery of Government functions.

a Steps normally used in the delivery of governance functions:

- Achieve Policy Consensus
- Legislate the principals and norms for provision of services and specify financing
- Determine the Central Government's role in production / delivery of the service
- Determine the local Government's role in production / delivery of the service
- Role of Civil Society and NGOs

A key objective is to avoid over centralization and control by a large administrative system with no direct accountability to the local political representatives

b The delivery "How"

- *Legislative Framework:* Through acts and rules. In a federal structure there is a hierarchy of rules with an objective to avoid unclear concurrent assignments, to ensure the principle of subsidiarity.
- *Departments and governance structures:* Governance is delivered though an administrative apparatus for planning, budgeting service provision and monitoring.
- *Interfaces:* At the simplest level all governmental functions are delivered as services. The term service is used in the broadest sense to include a bounded delivery activity between any two or more interfaces described below.
  - i) *Government to Citizen Interface (G2C):* Governments are looking to cut down on operating costs and improve delivery of services to citizens and employees. The focus is slowly shifting towards giving distributed service through online web based applications. "Government-to-Consumer the online non-commercial interaction between local and central Government and private individuals, rather than the commercial business sector G2B. For example Government sectors become visibly open to the public domain via web portals thus making public services and information accessible to all." Up till now G2C interactions have been substantially in the domain of information dissemination.
  - ii) *Intra-Government Interfaces:* As will be clear from the discussion below, delivering e-Government services require extensive collaboration and a substantial fraction of the interactions occur between government departments. It is also essential from the point of view of security and individual privacy that all information is not accessible at one place enabling someone to get complete access to all information about a person or entity by getting access into one location.
  - iii) *Inter-Government Interface (G2G)*: Similar to Intra Government interactions, interactions between local and central governments and between groupings of governments are substantial in number and likely to increase exponentially.
  - iv) *Government business Interface (G2B):* This is the simplest interface and for this reason perhaps has developed more substantially than others. G2B is very similar to B2B and can apply the same business rules as B2B. However there is a challenge in developing G2B interfaces when there is a public private partnership in delivery of a G2G or a G2C service.

It is therefore important that there is a strong collaborative framework for e-governance activities. A look at some current e-Governance applications will indicate the current state of e-Governance.

Most existing e-Governance initiatives are either simple information sites or replicate business applications and the actual delivery of government services is largely un-explored. Also the initiatives do not seem to

follow a planned transition and are scattered individual applications.

2.2 Is e-Governance really an effective strategy to deliver government functions?

Listed below are some of the important parameters, which the citizen has come to demand of the government especially if s/he finds other governments delivering services better on some or many of these parameters. It seems that e-Governance is the only practical way to meet increasing citizen expectations.

Important parameters of delivery

- Ease of access: e-Seva is a perfect example of citizens demanding this of more and more services due to ease of access.
- Speed
- Accuracy
- Security: Certain aspects of security were automatically assumed when services were delivered in the traditional way. However even though citizens increasingly demand the speed of e-delivery they would not be willing for a trade off on security. This is a special area for attention in the process of migration to e-governance.
- Breadth of delivery: Citizens will demand more information and more services as communication and information improve through technology.
- Evenness of delivery: e-governance interfaces usually ensure evenness of delivery by separating the delivery form the interface thus reducing personal biases, vested interests etc.
- Standard of delivery (Predictability, homogeneity): It is generally expected that technology improve the standard and quality of delivered services.
- Cost of delivery: In most cases, e-Government is the only way by which many services can be delivered at convenient locations at an affordable cost
- Reliability: If managed well e-governance can provide reliability unmatched by other traditional methods
- Privacy considerations: One of the key fears – further fuelled by sensational stories in the media – is that individual privacy is compromised in the electronic realm. These fears may sometimes be founded on a kernel of truth. However a properly distributed, well-protected network will ensure that the risks to privacy are managed and contained.
- Transparency: e-Governance will usher in an era of transparency to improve collective problem-solving. Problems referred to include the local, regional and global, the economic, ecological and political; illegitimate concentrations of and sometimes abuses of power, to give all people an opportunity to control more in their own lives, to allow the much bemoaned lack of social responsibility to be reduced by allowing more participation in public affairs, to give especially the young a valid impression that they will not spend their lives as passive bystanders and "election fodder"

For any scalable e-governance initiative, which should be delivered with reasonable “technical” cost and minimum rework, standardization is a must.

3. Reasons for Standards

3.1 Interoperability / Collaboration

Government is all about collaboration between departments, regions etc. A key problem is

- How to present users a coherent view of information stored in radically varied ways on systems that were created and have been optimized for a variety of purposes and of base technologies;
- How to make this coherent view both easy to use for non technicians and adaptable to the various purposes that users might have; and

- How to do all this efficiently.'

To develop a successful "e-government" service requires technical integration between the public portal, and government agencies and service providers at the back end. A service like the e-Seva needs a substantial collaboration between several agencies at the back-end for it to be delivered effectively. The user does not have to see or deal with these behind-the-scenes collaborations but the efficiency with which the service is provided will depend very heavily on these collaborations. Today, government services are provided through a variety of channels, including retailers, banks and the post office. Public agencies have agreements with service companies so, for example, citizens and businesses can pay their bills and taxes at their local bank.

An integrated government service network needs to be developed to reach the citizen in the physical world is also the best way to reach the citizen in the virtual world. Somebody who banks over the Internet should be able to pay their bills and taxes through their online financial institution. E-government systems usually have several organizations participating to deliver a service. Online transactions with the public through a government web site are only a small part of the complete set of activities where one or more government departments work in partnership with a service provider acting as a distribution channel deliver the service to the citizen. The service provider, may in turn, work with different Web merchants and public portals to reach the citizens. As the number of services increases the nature and scope of the collaborations and also the number of collaborating parties increase exponentially.

3.2 Scalability

Governments deal with different aspirations of citizens. It is our hypothesis that the scalability in e-Governance should address the diversity and interconnectedness of the activities in delivering governance services. While there are adequate systems that can deal with scalability for a uniform but large-scale operation, the challenge of e-governance is to provide a very diverse and comprehensive set of services with uniformity across different domains and locations to a heterogeneous cross section of people.

3.3 Change Management

Changes in policy must immediately be translated into changes in service. Quick and accurate responses to change are essential in the delivery of e-Governance services.

3.4 Control

Especially when we are dealing with an activity as broad as e-Governance it is essential to maintain control on the all aspects at the highest level and provide a reliable and well-managed e-governance.
Standardization is the only way to manage and maintain control on:

- Delivery - across multiple domains, locations and services
- Speed – of response; of change management to reflect changes in policy quickly.
- Quality – of services providing uniformity, consistency, accuracy and reliability.

One of the abiding complaints of all those who interact with government is the variability of experience and inconsistency in service delivery. Standards with clearly defined ownership, published communication process and a thought out change process are essential for the above. It is also important in ensuring that the process of standardization proceeds in an orderly manner and difficulties and errors identified at that time are corrected.

To scale up e Governance across sectors and geographical locations standardization is especially important. Before any comprehensive effort can be taken up for a national e-Governance program, what needs to be standardized and how are described in the next section – strategies for standardization

4. Strategies for standardization

For a government not to be hostage to a technology or platform it is also very important to have appropriate strategies for standardization. Strategies for standardization should naturally flow from the objectives of e- Governance and it is necessary to examine the nature of Governance services to construct the conceptual framework.

4.1 Nature of Government Services

Services are a bundle of transactions: Several governmental transactions can be bundled to form a service. Though governmental services can be fairly complex, most governmental transactions can be factored into fairly uniform and simple primitives, which can be bundled into collections to represent a governance service.

Are most services restricted within domains or do they cut across domains?: Most services cut across domains. During a series of workshops conducted with IEG for several departments of the Government of AP, we found that while typically the process of delivering services required a set of repetitive activities, almost all services required data from several domains. This, more than anything was the cause of a large part of the complexity in delivery and delays in delivery. Most services require a series of verifications across domains and data from varied sources. Validation rules can be logically bundled for communication purposes but require separate actions to complete, as the sources are different. This leads naturally to a possibility of common service architecture and a hierarchy of standards. See our paper on "Defining e-Governance Services" (Table 1).

4.2 What kind of standards?

The process of standardization should ensure that in the most orderly manner, the broadest objectives of standardization are realized. For this to happen the following are the sequential steps:

Data Standards – Mandatory: The first and perhaps the simplest items to standardize are data elements. Data standardization is also the prerequisite to systematic development of governance applications. This is the natural first step and usually the only standardization activity taken up by most governments. However there is a need for other standards in order to ensure that the government retains control on both the technologies and the platforms – with the key decisions taken by the government and not automatically delegated to vendors of services.

Architecture Standards – Strongly recommended to be generally enforced: The Government of AP is working in this direction in establishing defined architectural standards. These will go a long way ensuring consistent implementation of e-governance.

Technologies and tools – Recommended lists to be published regularly: In addition to the above two, we strongly feel that recommended lists if technologies and tools be tested and published through a continuous evaluation process. This we feel is an essential requirement for a Government agency to ensure that it has an effective control on the quality and consistency of delivery.

General process and quality standards – Review and compliance tracking: To ensure that all the above are effectively managed, a network of quality assurance agencies and auditors is required bound together by process and quality standards. The above four aspects are the principle elements of an integrated well managed e-Governance program which is controlled efficiently and scalable through implementation by multiple agencies and vendors. Such an approach would enable the government to maintain key control while widely disseminating implementation aspects to different agencies. We describe below our experience in developing a generic approach to data standardization.

4.3 Data Standards

Is there a best approach to the standardization process?

Data Standardization is an activity of a fundamental nature. It therefore requires that the participants in any exercise to define standards at any level, obtain a clear conceptual understanding of the nature and need for standards. In a pilot exercise of this nature done with IEG for 8 departments of the government of AP we developed a robust conceptual framework, which integrates the concept of data standardization with the key purpose of defining the standards by the government viz. providing a well-delivered set of governance services. In addition, the framework provides a method to adequately discover all the relevant elements to form an immediately usable set. This is described below:

Service Centric Approach

Consists of a generic framework for discovering applicable data elements. The framework developed incorporates the following principles:

- Work in all government departments can be defined in terms of services or functions
- For each service the department is either a generator or consumer of data
- This data is gathered in structured forms or as unstructured information
- The departmental officials are the key domain experts who hold the knowledge about this data

A systematic effort is required to mine this knowledge and capture it for efficient use. A pictorial presentation shown in Figure 1.

How to (steps in the process): This translates into a very simple process for collecting sets of immediately usable data elements. In other words the process for collecting data is as follows:

- Start with Service
- Refer input forms (Applications etc)
  - Identify Elements
  - Identify Gaps
    - Refer Acts, GOs, Guidelines, Rules
  - Generate Additional Elements
- Review Delivery Process
  - Generate Additional Elements
- Look at Output (Actual License; Permit etc.)
  - Generate Additional Elements
- Identify and List Associated Services

Principles of the process

- Use services as a boundary to determine a “complete” set of elements for standardization
- Recognize the hierarchical structure of standards – Incrementally build the set of generic standards by identifying generic and specific elements.
- Categorize and classify elements by identifying underlying categories
- Standardize within categories to reduce variance (both of elements and services)
- Re-factor, reduce variances, and standardize delivery of services

Some observations during implementation

- Many Data Elements needed more precise definition, for example, A seemingly simple element like “Applicant Name” is sometimes used for entities other than individuals so is actually more than one element where both the name of the organization and the name of the representative need to be defined. So it was necessary to more precisely define the element based on the context.

- Based on the application of the service centric approach Prof Subba Rao came up with a standardized model of a government Service which was converted into a standard Schema
- With this we were able to categorize the elements into specific groups viz:
  - Identifiers
  - Declarations
  - Output
  - Payments

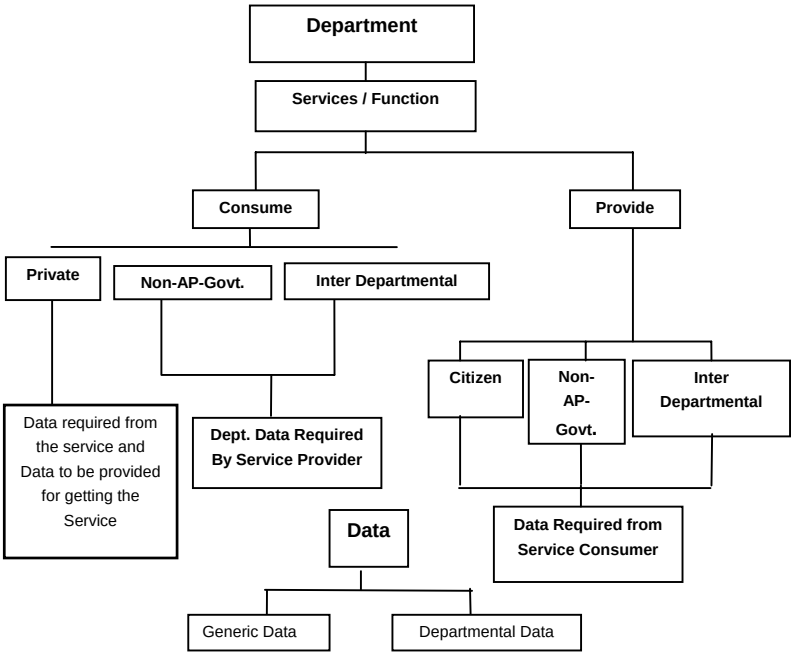

Figure 1: Systematic effort to mine knowledge

So we now have a grid to verify the completeness of work done and to indicate the elements of delivery of the services.

Table 1

Data Classification → / Standard Service ↓	Identifiers			Declarations		Output			Payments		
	Person	Company	Location	License / Permit	Physical	Person Based	Entitlements	Constraints	State of Dept	Amounts	Instruments
Inputs											
Completeness											
Validations											
Process											
Verification											
Physical											
Documentary											
Signoffs											
Recommendations											
Outputs											
Documents											
Actions											

This categorization combined with the classification into Generic elements and others gives a robust framework to define and limit the elements into a very conveniently manageable set. We now have a generic framework not only for data standardization but also for standardized definitions of government services factored into recognizable elements. The process of classification is in progress with a data set of about 13,000 elements identified.

4.3.4 Reasons for effectiveness

Standardization and transition can be parallel. This is key to success of a standardization process of this nature. To quote Mark LaVigne of University at Albany

In our research and practice, we have found these general data quality rules, formulated by Orr (1996), to be useful:

- *data that are not used cannot be correct for very long*
- *data quality in an information system is a function of its use, not its collection*
- *data quality will not be better than its most stringent use*
- *data quality problems tend to become worse with the age of the system*
- *laws of data quality apply equally to data and meta data*
- *variations among the data sources' attitudes, policies, and practices contribute to uneven data quality*

Perhaps the key issue with using a domain centric approach to standardization in e-governance is the nature of the problem. Most services cut across domains and interoperability requires standardization across domains. This has been the key cause of the mixed results of most standardization exercises undertaken by various governments. This has also let to a situation where vendors call the shots – mandating the use of standards required by the technology rather than that ideally suited for the services themselves.

- *Activity can be modular:* A service centric approach enables quick spawning of services across locations and in many cases domains.
- *Pilots are possible:* Using this approach it is possible to pilot standardization / implementation exercise and review the effectiveness of the approach in a reasonable time frame.
- *Effectively bridges the domain / technical divide using inter-functional groups:* The process of development of applications can be parallel to the development and implementation of standards. In fact it is recommended that the standardization process parallels the system analysis phase in the development of the e-governance application. Using this approach the application can be designed to be flexible on the data, which is owned by other domains through a process of clear separation of data owned by the application domain and data owned by other domains.

4.3.5 Why other approaches leave gaps

In a domain centric approach: Application of standards can be done only after a substantial body of work has been completed. In the interim applications are developed haphazardly and expensive migrations are required at integration across domains and applications. Inter domain interactions/conflicts have to be resolved separately and don't form part of natural workflow

"Anyone who uses the information needs to know about its context in order to use it well. But this knowledge is not always available in the form of explicit meta data, because meta data standards generally do not require this type of information. It usually resides in the working knowledge gained through years of experience managing those programs and services, not with the technologists who develop e-government systems.[viii]*"*

4.3.6 How to build on the work done by others

The service centric approach allows a high degree of flexibility in adopting work already done by others in different domains. By the nature of the process of implementation and the interaction of multi functional teams with different perspectives, varied information and multiple domains it is possible to bring a broader perspective into the activity. In the implementation of the service centric approach it is essential to identify and incorporate – as feasible – work already done by others.

5. How do we scale-up into all India? - Multi level pilot and scale up strategy

i) Use one state as a pilot

AP has already implemented this process on a pilot basis with 8 governmental departments and the results of the pilot are expected shortly. A detailed report has been submitted to IEG on the exercise and it is being extended to other departments.

- In AP the exercise was extended to development of a set of generic web services to implement departmental services through web services. In this process an attempt was made to factor the services and develop architecture to define applications as bundles of services.
- The implementation infrastructure is in the process of being defined.

ii) Scale-up to other states

Use some departments of other states to replicate the model (2 or 3 departments with small inter functional teams of technical and domain specialists and one representative fro the pilot state augmented by students or fresh graduates for collection and documentation) This will be the seed core group

iii) Form a national apex body for standards

Such a body could be advised by a group comprising of Government domain experts, consultants and industry representatives and mandated to come up with periodic reports. Use Consultants to consolidate and classify prior to adoption.

iv) Go for large scale sensitization through workshops

While the definition of standards need not be completely replicated across different states, it is necessary to sensitize ant train the domain experts in this area so that they appreciate and own the standards. In this process a *common language* is developed and change management and enforcement is done in a more orderly way. During this process it is also possible to build the cadre of officers required to effectively implement e-governance

v) Export standards where definitions are common

As indicated a service centric approach is both modular and scalable. Standards can be easily transported from one location to another.

6. Concluding Remarks

While much is talked about e-Governance so far most of the applications and computerization in governments replicate those which already exist in private businesses. Where attempts have been made to provide government services as e-Governance they have been very well received. However the efforts have been scattered and if we look at the Indian efforts in this area, a common thread is not evident. When we explored the delivery of Governmental Services and their nature we found they could be factored effectively and could be generalized –enabling the definition of a process to effectively identify, describe and standardize both services and data. This allows an integrated approach to e-Governance. For really effective e- Government, an integrated approach is possible and is the crying need of the day. To achieve this an integrated approach is necessary for quick replication across the country and scalability. To do this

requires a broad based national effort with a large number of players participating. The first need is to standardize the approach; data; architecture and come up with clear guidelines on technologies and set up a quality framework. The service centric approach described above is a simple and effective way to achieve to start the process of standardization.

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