



e- Government Interoperability Framework (e-GIF)

A Concept Document on "*why and what*" of e-GIF

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1.0 E-Government: An overview

The adoption of technology by the governments, in one form or another, is not new. If one were to peep into history one would find ample examples of application of technology of the day, in the military operations and civilian public service. We are told of many kings and monarchs in ancient Greece, Egypt, India and China strategically applying science and technology in both civilian and military affairs. However, in the present times we are faced with ICT and other technologies that are dynamic, ubiquitous and powerful to an unprecedented scale. They are transforming our life style and indeed the very fabric of our society. In the wake of these technologies we have seen emergence of a flat globalised and knowledge intensive world.

Where as the business world has been quick to adopt the ICT to transform their business management and customer service delivery leading to significant improvement in their market reach and bottom line, governments have been rather slow. In the last few years we have, however, seen accelerated adoption of ICTs by the governments with the aim to improve their operations and deliver better public service. This has popularized the term e-Government. On a very basic level we could say e-government is an automated government that has adopted ICTs to a large degree in most of its operations. However, this description of e-government would be partially correct and could be even misleading. As the experience of last several decades has taught us the application of ICTs for mere automation of the existing processes in a government or business organization will yield limited results; most



often will only lead to increased over heads and wasted investments. We have seen that unless the organizational structure and processes are changed and adjusted and optimally aligned to work with the technologies being applied there would be no significant outputs forthcoming. In other words there has to be close interplay between the business of the organization and its technology. This has led to the development of such techno-management concepts and techniques like Business Process Reengineering (BPR) and Customer Service Orientation.

Optimizing application of ICTs in the governments pose challenges that we rarely see in the business world. Traditionally, governments have decades if not centuries, of having worked as bureaucracies in tight silos and departments with limited horizontal and lateral communication, following rigid and often inflexible rules and regulation. The typical traditional government officials , especially in the developing world, see themselves as rulers and administrators and rarely as employees engaged to serve the public. This leads to authoritarian culture and rigid top down bureaucratic structure. An organizational environment of this type is totally unsuited for optimal application of technology for development of E-Government mode of functioning. Many of the successful E-Governments in the world such as in Canada, Singapore, NZ, UK and Ireland are based on following basic national policies

- *E-Government to be Citizen Centric and Service Oriented*
- *Government to be treated as an integrated and unified single enterprise.*
- *Government to adopt and apply technology that is optimal for its purposes.*



By the formulation and implementation of these broad national policies these successful governments have sought to place emphasis not only on simply automating their processes but to create suitable background for adjusting their governmental structure and processes in order to optimize the application of technology.

Therefore, in its right sense E-Government is not automating the existing processes, but transforming the government to become more citizen centric and service oriented and to work more efficiently as an integrated single enterprise through the optimal application of technology.

2.0 What is e- GIF?

E-Government Interoperability Framework(or e-GIF for short), includes broad policies, standards and protocols that we adopt and apply all across the government in all its agencies so that the large number of IT systems in the various departments, agencies and other organs of the government can virtually operate as a single large system. In other words the departmental systems must interoperate with each other. The goal of e-GIF is to reach interoperability in all parts of the government.

The next question to follow is why is interoperability important?. To answer this question appropriately in the context of government operation, it is important to take a quick look at some of the concepts of information science and public sector management.

The last few decades have seen unprecedented change in world economic order and social structure with the permeation and adoption



of technology. Knowledge based economies have reached an advanced stage of development in the west and to a large extent also in the emerging and fast developing countries of Asia like China, India and Malaysia. The value of knowledge and information as a resource in the emerging knowledge societies is high.

2.1 Information and Management Process

The value of information as the basis of decision making both in the private enterprise as well as in any government department is obviously high. A manager in any organization knows by experience that he or she cannot take a good decision unless she or he has the information based on which a sound and sensible decision can be made. From the field of decision sciences we know that availability of higher volumes of information and better currency of data leads to better decision making. To put it simply, it means that if we have detailed and most up to date information our decisions would be most accurate. As an extreme case let us say we have no information about a situation and yet we are to make a decision about it, we would be making a decision either through divine intervention or just take a blind decision under 100 percent uncertainty. On the other hand let us assume we have most detailed and almost all the information about a situation we are likely to make a good decision with almost 100 percent certainty about the outcomes. These concepts about decision making (or management processes) and information availability is shown in the Figure 1 given below.

As can be seen in the Fig 1. there is an inverse relationship between level of risk /uncertainty and the availability of information; and a direct relationship between quality of management and



availability of information. This appeals to both our common life experience and logic. By the same logic and based on our own working

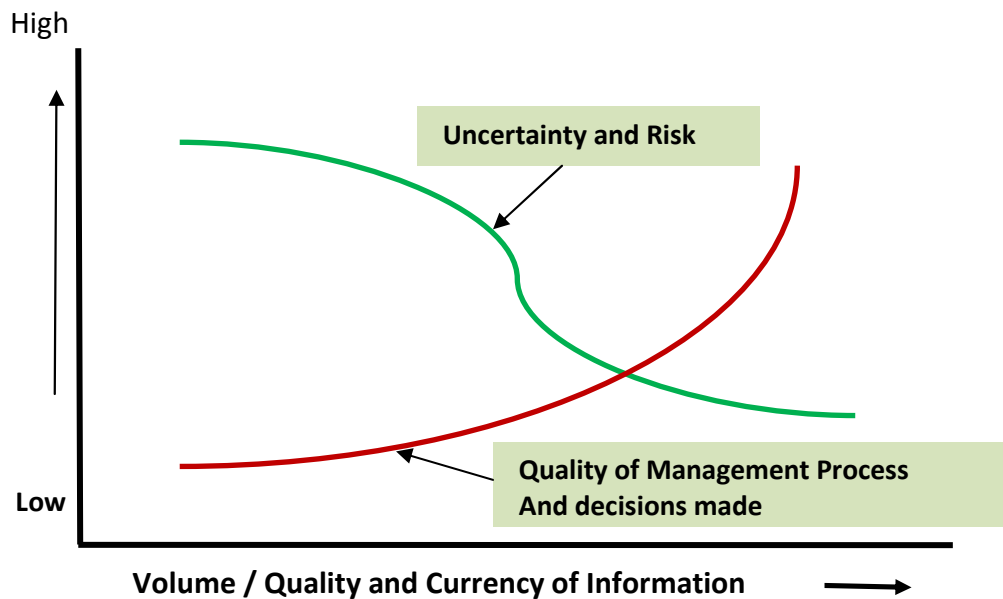


Fig 1: Relationship between information availability and decision making

experience we can also say that customer service in a business organization and public service in a government department suffers in terms of quality and timeliness of service delivery for want of relevant information.

2.2 Management of Information in Public sector.

The management of information in the public sector has always been an important function of the government. It is not a new concept. The departments of the government from very ancient times have been storing information in documents and records and had their own means of sharing information and communication. The function of information management is and has been a part of the government from times immemorial even though until recently we would not call it by the name of information management. Land registration, population census records and many other public information documents were kept to



support the function of the government even in ancient societies. The technology of information management has however undergone changes from the production of images on terracotta, engraving on metal plates, the writings and recording on tree bark and leaves, paper based documenting and recording and now the electronic information management.

The modern information management in the public sector has evolved to a stage that all or at least a large portion of its information is stored in electronic media like tapes, hard disks of computers and servers; processed and transmitted electronically. The use of electronic devices such as computers to retrieve, store, process and transmit data makes these tasks easy and fast. As we all know, the electronic information management takes place by converting the information into electronic zeros and ones. This process of converting physical information kept on paper in the form of text, images or pictures, sound and even video pictures into its electronic form is often termed as the process of digitization. By converting the information into digital i.e electronic form it is possible to electronically store, process and transmit information much more efficiently at very fast speed and at extremely low costs.

As said before, the public sector organizational structure and culture has evolved over time as top down bureaucracies, where information predominant flows vertically within a department and limited laterally between the departments. Therefore each department of the traditional bureaucracy operates in tight compartments according to set rules with limited flexibility.

As computers and IT products and services came on scene in the last few decades we have seen all over the world their penetration in



the government sector. This has happened in Afghanistan too. As compared to the situation ten years ago a large number of government departments today have started using computers and other IT products to manage information like storing information in the form of electronic files rather than physical files, and sending emails rather than posting letters. This indicates that there is an upward trend in the use of IT in government in our country as in the rest of the world, though the rate of penetration in our country is much less than in other countries.

Some of the departments have gone further to develop and buy software programs or applications to process and manipulate information in their departments. That is, the manual functions that they were doing before are now being automated to allow for handling data bits in meaningful manners. For instance instead of processing pay roll manually we have started making payroll electronically, or instead of keeping the record of our employees in the government in physical files we are now keeping that information in electronic files (on computer disks). That is good development since the electronic processing of information is faster and cheaper. Is that how far we can go in the application of technology for information management within the government? The answer to this question is "no"; we have a long way to go, as we will see in the sections that follow.

2.3 Compartmentalized Vs Integrated Information Management

As we have seen the world over the first stage of computerization has remained within departmental walls. That is each department or organ of the government works independently towards digitizing its processes. Good enough; that surely brings some efficiency in the



departments that do so. As their tradition and culture has been to work in departmental silos they don't bother about what their colleagues across the street working for another department of the same government are doing. But these departments soon hit a road block. They realize that though they are digitized and fast the other departments that are downstream or upstream in the process chain are not digitized, or are at a different level of readiness. This would mean that the service which should emerge at the end of the process chain does not fructify. For instance the issue of an industry license to a citizen may have ten process steps in three departments and agencies of the government. If one agency is digitized and other two are not it makes little difference to final outcome. In the other scenario if the three agencies involved in this case are all digitizing but are computerizing in their own way, using technical systems that may not communicate with each other we again would not be any better. Thus we can conclude to say though the computerization activities that focus on departments or part of an enterprise rather than on the enterprise as a whole would be suboptimal and even counter productive in some instances.

I have termed such narrowly focused computerization initiatives as Compartmentalized information management in contrast to Integrated information management, where the focus is the whole enterprise.

2.4 Enterprise Information Integration (EII)

To achieve the most optimal information management system the government has to look at itself as a single enterprise. Departmental and agency level systems are parts of the larger whole. In other words for the enterprise system to work efficiently the departmental sub



systems should all work in unison within the over all system. Systems, whether in computer science, information management, biological, physical or social sciences have the same conceptual meaning. A system is defined as a collection of entities organized and interrelated as a part of a whole. Subsystems could be part of the whole but they themselves could be organized as mini systems within a bigger system.

If the departmental information management systems have to act as a part of the whole enterprise information management system they must be integrated as a part of the whole. From these conceptual and some what abstract ideas let us look at the practical aspects of information management in government enterprise. Each department of the government holds some information in its databases, in its files and so on. This information is used by the people in the departments where it is kept. This information is not in the normal course of a traditional bureaucracy available to people outside the department unless special efforts are made to draw this information. This is a reality with which most of us are familiar.

We could imagine an ideal scenario when all the information within the government were available to all authorized individuals within the government as if it was within their own departmental systems. In such a fully integrated enterprise data systems information would be most efficiently used. There would be no duplication. Decision making of the public officials would be better and faster as would be the overall quality of management. For better information management and consequently better decision making we would seek the integration of all the information resources of the whole government. Consider information about "Land" in the Ministry of Lands being available to Ministry of Agriculture, Ministry of Urban Development and Ministry of



Mines, without the need for each agency maintaining the same or similar databases; or population related information kept at a central data source being available to all the agencies that might need that information. For the Enterprise Information Management system to be at its best it is important that the underlying data or information within the whole enterprise is integrated. In our case the 'Enterprise' would mean the government of the Islamic Republic of Afghanistan. To summarize we could say that *Enterprise Information Integration (EII)* would be a process of information integration in order to allow for handling of data bits from disparate sources in a meaningful manner, to provide a single interface for viewing data within an organization, and a single set of data structures and naming convention. The goal of EII is to get a large set of heterogeneous data sources to appear to a user or system as a single homogeneous data source.

2.5 Enterprise Application/ Process Integration

As in all large organizations the various government departments and agencies must collaborate to provide public services. The actions and activities for many a public services are spread across agency boundaries. That is to say for the same service to be successfully delivered many a times more that one agency is involved. Thus a part of the work on a matter is done in one agency of the government and the rest of the work on that matter or service could be done in other agencies of the government. Of course there may a number of services on which such collaboration is not necessary as all the processes are within one agency. In the delivery of e-government public services that require multi agency collaboration the processes within the individual departments and agencies must be able to communicate with each other or should be so to say virtually integrated, even though the



applications (software for performing business processes) residing in individual departments or agencies use different technological platforms such as different operating system or use different data base platforms. This is often referred to as Enterprise Application integration or process integration (EAI), and is achieved by deploying some process integration tools at a centralized place or the hub to which each departmental systems are connected.

2.6 Other levels of Information Integration

Besides the two important areas of data / information and process integration it is also important that there has to be virtual integration and total compatibility between the departmental and agency technical systems at the physical or network level at the bottom as well as the top level where users gain access to the e-government services. A high degree of uniformity has to be achieved in the users interface with the government and in the delivery of e-government services to them across all the agencies and departments of the government. In other words it would mean that the e-government service delivery all across the government enterprise should follow uniform standard practices to facilitate user access and optimize service delivery.

3.0 Why is Interoperability Important

We come to our original question: why is interoperability important? From the foregoing discussion we have seen that for optimal operation of e-Government it is important that the whole of the government of the Islamic Republic of Afghanistan should operate as a single enterprise. That is to say that there has to be integration of information and information management at all levels in the enterprise. When we say integration we don't mean physical integration but *virtual*



integration. The departmental and agency level systems and databases may remain physically separate in their respective physical locations, but should have the capability to function together. This can only be achieved if the departmental and agency level systems are made to interoperate with each other, communicate with each other, exchange data with each other and virtually operate as parts of a single big system.

4.0 How do we achieve interoperability?

The next logical question would be how do we achieve interoperability or virtual integration across the whole government. One might argue for the establishment of only a single system that would serve the whole enterprise. This is possible but is not a feasible solution considering the large size and complexity of the government. All departments / agencies should have the latitude to develop and deploy local level systems in line with their own departmental mandates, yet all departmental and agency level systems should interoperate with each other as parts of a big system. This is possible if uniform policies, standards and guidelines for interoperability are followed by every organ of the government. In other words we should develop and deploy what we have come to call e-GIF: the e-Government Interoperability Frame work.

5.0 What does e-GIF Consist of:

As mentioned before the e-GIF would consist of policies, standards and guidelines that each department and organ of the government would follow in their information management and IT systems so that the individual departmental systems would interoperate with each other making efficient operation of e-government possible.

The government of Afghanistan intends following a multi tier web based service oriented e-government systems architecture. Therefore it would be essential that the e-GIF should include policies, standards and protocols for all tiers of the e-government systems architecture. The e-GIF should be developed for the various tiers as is conceptually represented in the diagram below:

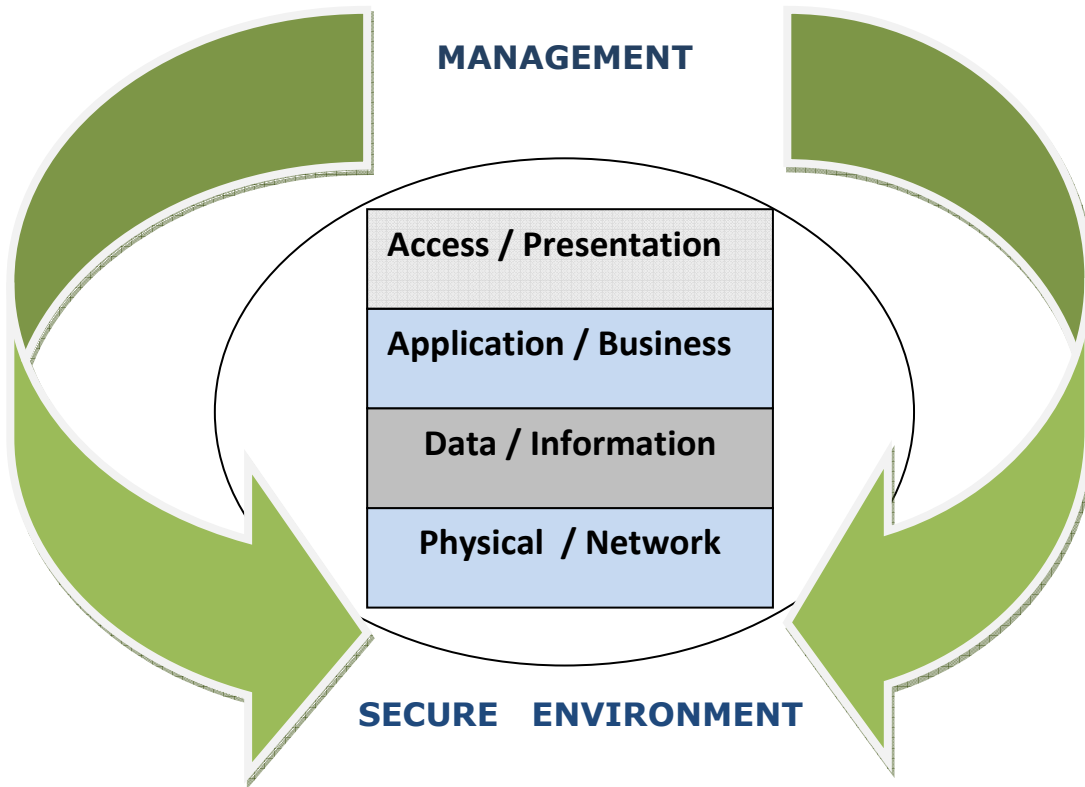


Fig 2: E-Government/ e-GIF Structure

To achieve total integration we need to secure interoperability at all the four levels the physical/ network layer, data/ information level, application or business process layer as well as the presentation and access layer of the e-government system. We have also to focus on the cross cutting area of security and management. As a part of the e-GIF policies, standards and guidelines would need to be established and adopted for all the four tiers of the e-government system. In addition



there would also be a need for the organizational and management policies to ensure dynamic management of the e-GIF and its compliance by all the organizational units in the government.

A brief description of standardization at each individual level in the e-government system is given below:

5.1 Access and Presentation

This is the user end or as is called the user interface of the e-government system. This is where the users, which will include both the internal users in the government such as the government officers, as well as the external users such as the citizens of Afghanistan and other constituents of the government, access the e-government system for seeking information, communication or for getting government service.

The user interface device is invariably the computer, but could be others devices as well such as the telephones (both mobile as well as fixed phones) and the web TVs. When any government wishes to provide service electronically it has to naturally ask the questions how do my constituents access the service. What technology should be adopted for presentation and what technology should be used for service delivery. These are natural questions to ask. And logically if more than one government entity is involved in the provision of any service their presentation and accessibility technologies should be same or should be in the least compatible. Alternatively it is also possible that we have a third entity in the e-government system that clubs the information and service from several serving entities in the government and presents it in a uniform way to the users, like a broker or an integrating agent. This is the e-government system that the government of Afghanistan intends to follow.



Irrespective of the underlying e-government technology, the users should be able to access the e-government information and services using in most cases the web. The national e-government portal that the MCIT intends developing and deploying would be the gateway or the major access point for e-government services. This is expected to be federated with the individual department and agency level portals. Therefore government web pages become the gateway for users to gain access to e-government services. Web sites in a way become the face of the government.

Should there be uniformity in the web page designs, layout and contents of the various departments and agencies of the government? Both from technical and non technical reasons the standardization in the web page design and layout is important. If pages are the face of the government on the web, there has to be uniformity in how the web pages of the same government look. Whether the web page belongs to ministry A or ministry B they should give the same impression to a user and should to a large extent look alike. This is a kind of *branding* the government. In recent times many governments including that of Canada has followed a *Uniform Look and Feel Policy* in the design and development of web sites of its various agencies and departments.

There are of course issues other than mere looks of a web site that need to be considered such as the ease of access and user tools required for accessibility. Most e-government policies including that of Afghanistan include the policy of *universal accessibility*. That means all citizens of the country should be able to access the e-government services. Even people with disabilities, old persons and people with limited education should be able to gain access. The world wide web consortium, promoted by the inventor of www, has developed w3c web



accessibility standards, which will need to be examined for possible adoption. Taking the policy of universal accessibility forward we will obviously need tri lingual websites to cover all the communities and sections of our country. On a more technical level we may say the layout and design would have to be done in ways that facilitates the management of content of the government web sites, increases the ranking of the sites with search engines and importantly facilitates user accessibility.

An important concept with the front end or web site design for e-government is the concept of *E-Clustering*.

5.1.1 E-Clustering

E-Clustering is a direct effort at making the government as citizen centric as possible. The process consists in identifying such e-services that have particular appeal for any citizen group or community in the country. Irrespective of how many agencies or departments are involved in delivering the services to that citizen group or community these are clubbed or clustered together and offered in a convenient way to the citizen group in question. Let us say old pensioners or youths who have special needs for services. The services they need are presented to them in a way that makes sense to them, irrespective of which agencies are involved and what technologies need to be adopted at the back end to make it possible to deliver the services these groups need. The front end at the website level is also done in a way that reflects the E-Clustering policy of the government. Canada, Singapore, Australia and in fact most successful E-Governments have followed the concepts of E-Clustering.



5.2 Application and Business Layer

The application and business layer concerns with all matters that relate to business services to be delivered or business processes aimed at delivering customer service. In the process of service delivery information may be transferred and data exchanged between the source of the information (data bases) and the applications that process that information. There may be data exchange between the departments and across agency boundaries. Considering the crucial role this part of the e-government structure plays it is extremely important that we have agreed standards in this layer that are strictly followed by all organs of the government. I have already touched on EII and EAI. The hub of these processes is this layer and standards are required for data exchange and application integration.

For location and transfer of information across the whole of government organization agreed *metadata standards and schemas* need to be implemented. This may be explained with specific examples. Let us say a customer of the government needs to locate some information, through the search engine in the national portal. This process of search would be facilitated if we have used the same *metadata standards* across all the agencies. We have a number of international metadata standards to choose from such as the Dublin Core, IMS Global Learning Consortium or ACCR2.

Similarly when the business processes or applications located in different departments need to work together with the purpose of delivering any service data must be exchanged across the applications. In the multi tier web e-government model that we have adopted the communication between the applications would in most cases take place



in a hub and spoke manner with an intervening middleware. Application adopters would be deployed to ensure communication between the hub and the individual applications through various XML based standards and protocols such as SOAP and SMTP.

5.3 Data Management Layer

This provides the information and data repository in the form of databases and data-ware houses and business intelligence systems. An ideal situation would have been if all the information could be stored in a single database at one place. This is not a practical solution considering the complex structure and large size of the government. Therefore, we could expect large number of databases and information repositories where from data must be extracted, represented or loaded in many different ways to suit the various applications that these would need to support. On one hand there are technical standards and architecture available for establishment of the Distributed Database Systems Architecture on the other we have data integration, ETL (Extract, Transform and Load) and more recently EII (Enterprise Information Integration) tools available that would permit a great deal of latitude in accessing disparate databases. Thus interoperability would be possible even among data bases built on different platforms.

But the process of data integration and therefore interoperability could be greatly enhanced if the same underlying standards for data management could be followed across the whole government. This could be for instance the XML Schema (a way to define the structure, content and semantics of XML documents), Metadata etc.



5.4 Physical / Network layer

This concerns itself with the transfer of data and management of information while in transit in the network system. Without agreed network protocols and standards all across the enterprise it is impossible for the individual systems within the system to communicate with each other. As internet is the basic platform of the most e-government systems architecture the widely accepted internet protocol, file transfer and mail transfer protocols or standards should be a part of the e-GIF.

5.5 Security Standards and Policies

Information is an important resource that needs to be protected from corruption, loss, accidents, hacking and deliberate acts of sabotage by elements within or outside the government. Uniform policies and standards for data and information protection is therefore essential to be adopted and implemented all across the government. The security standards and practices should conceptually permeate all the layers of the e-government system. For instance agreed and accepted standards for permitting access to individuals and institutions into the e-government system should be implemented by all departments and organs. This is often referred to as the user authentication standards or password standards. Similarly standards would be required for mail or communication protection to ensure that the integrity of the communication is maintained as data gets transferred from one system to another in the e-government enterprise system.



6.0 Organizational, Management and Policy Issues

The development and deployment of the e-GIF is not a once in a life time affair. This framework of policies, guidelines and standards to be followed all across the government will be by its nature a dynamic entity. As new e-services are added or as new technologies emerge there would be need for adding new standards or as some technologies get out of date we would need to delete some standards or change some policies. On the whole we could say that there has to be some kind of organizational system that keeps managing the e-GIF. The obvious candidate for that role would be the E-Government Group within the ICT directorate of the Ministry of Communication and IT. The work of e-GIF monitoring and management is on the whole an interagency responsibility.

6.1 Broad e-GIF Policies Framework

In the development of the policies for e-GIF we need to face the question : *Whether we go with open international standards or follow any proprietary standards or should we develop any specific standards for our own use from ground zero up?*. For example when we focus on the development of metadata standards for content management we have a choice of a number of international standards. However, we have to make sure that the chosen standard is adoptable with Dari and Pashto. In some circumstances we may find that some of the practices have become de facto standards. We will have to carefully examine the possibilities of adopting such practices as standards if it is feasible and in the interest of the government as a whole. Criteria has to be laid out for evaluating and adopting standards. For instance we may think of the following as possible criteria



1. Ease of adoptability and implementation
2. Open and free standard
3. Minimal total cost of development and implementation
4. International and national popularity of the standards
5. Acceptance and support of all stake holders

The established criteria should become a part of the e-GIF and should keep guiding the management of e-GIF. The criteria itself may be however changed in future as new factors may be considered important as criteria for selection of standards.

Compliance Policies Development

The wide acceptance and implementation of e-GIF by all the organs of the government is the goal of e-GIF. Thus adoption and compliance becomes important. How can we ensure compliance.? This a major challenge that we would face. In my view there are some important strategic actions that need to be taken in this regard. First, to ensure involvement of all major agencies in the development of the e-GIF, so that at the end of the day e-GIF is not see as something foreign that is being imposed from outside. Second, complete and full information is widely disseminated about the various standards and policies so that e-GIF is properly understood by all. Lastly legal and regulatory measures are necessary to ensure full compliance.