# e-Government Interoperability Framework (e-GIF) and Public Sector Management : Some concepts

## by

### Ravi Raina
E-Government Consultant
Ministry of Communication and IT
Government of the Islamic Republic of Afghanistan

July 2008

E-Government has become a buzz word in government circles. In Afghanistan we don't hear of it much since it is still a new concept for public sector governance.  But I am sure in due course, hopefully sooner than later, we should be frequently talking about it, not only within the government but in our society at large. E-Government, as know, is not computerization per se but is a fundamental change in the mode and system of governance, in which computers and Information communication technology happen to play a significant and indeed an indispensible part.

In last five years I have had the good luck of interacting with and advising some twenty governments in the developing parts of the Asian and African regions, on E-Government issues. I have been surprised at the extent to which the concepts of E-Government are misunderstood. E-Government in most of these countries  is being equated with digitization and computerization. In some of these countries the government officers assigned to attend meetings on E-Government are most often  technicians and engineers since it is thought that electronic-government or E-Government as the name indicates, should relate to use of electronics in government. Therefore electronic engineers are thought of to be the best people to get involved in E-Government. While engineers have an important part to play in the success of E-Government it is primarily government leaders and senior government officers who have to make a strategic shift towards E-Governance. The traditional system of public

sector management and public delivery must undergo a drastic shift under E-Government mode of functioning. That is why, in my view, exposure of senior government leaders and managers to E-Government and its other related concepts is indispensible.

## Purpose of this Document

This short document has been written to give an over view to the senior government officers in Afghanistan to the concepts of E-Government and E-GIF in the context of their day to day work on public sector management and public service delivery. The document is not targeted to technologists so the use of technical words is minimized and important technical issues are explained in common day to day language.

## Importance of Information for Management

In the document: "Concepts of e-GIF " that has been already circulated to you the relationship between information and decision making or management has been explained. I am not going to repeat these concepts. We may however summarize to say that there is a direct co-relation between the availability of needed information and good decision making and the quality of management. Therefore information management assumes great importance in all kinds of organizations, including and particularly the public sector.

## Review of the Management Hierarchy and Processes

As we all know, the governments in all parts of the world follow a Pyramidal organization structure (except in emergencies or for certain specialized purposes). This is also the case in Afghanistan. The organizational pyramid in public sector could be represented by the diagram given below.  It can be seen that there are mainly three management levels: Strategic or top level, Middle Management Level and the Junior Management or Operational Level Management level. The tasks of these three levels is well defined.
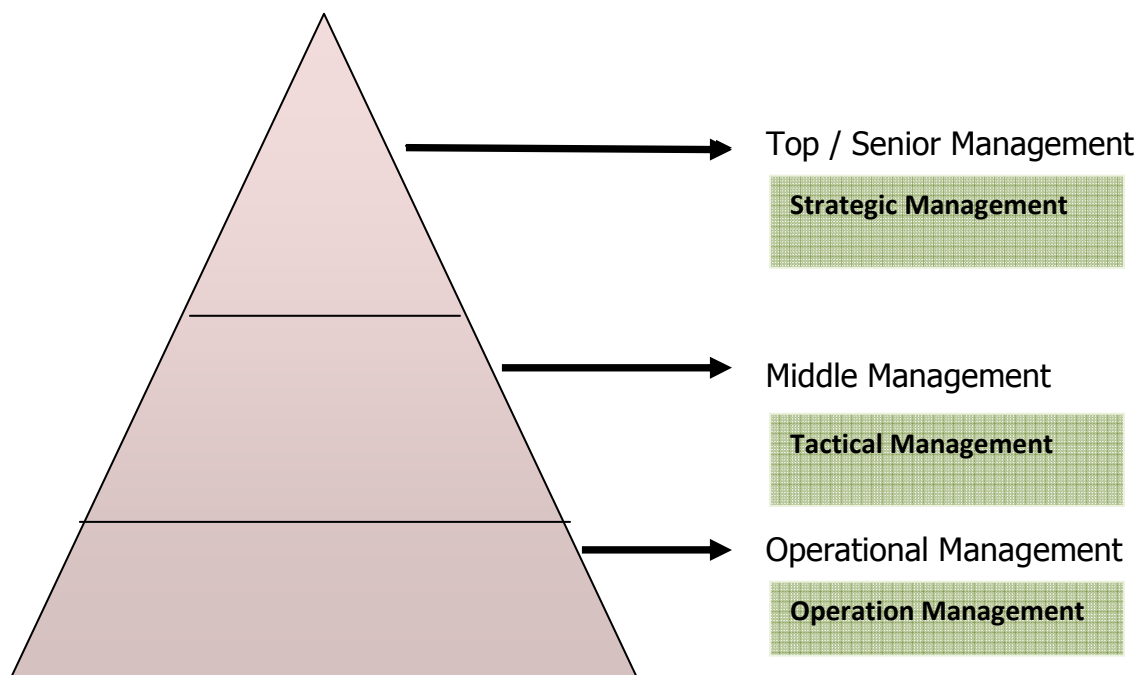


**Fig 1 : Organizational Structure and Management Processes**

## Information Needs at Various Levels of Management

The needs of information at various levels of Management in terms of how much details are required and how frequently it is required and how much up to date it should be. This variability in the needs of information at various levels of management is shown in the table below:

| S.No | Management Level | Volume of Information required | Aggregation Required | Frequency | Currency |
|------|------------------|-------------------------------|----------------------|-----------|----------|
| 1 | Top Management | Low | High | Low | Low |
| 2 | Middle Management | Medium | Medium | Medium | Medium |
| 3 | Operational Management | High | Low | High | High |

Table 1: Information Needs at various levels of Management

The properties of the information required at the various levels of management varies depending on the nature of the job undertaken. For instance the top management undertakes strategic management tasks which require aggregated information and not so frequently versus the manager at the bottom level that has to handle day to day tasks. The operational man at the bottom would need most up to date information,

may be every hour-sometimes in real time and would need as many details as can be possibly obtained.
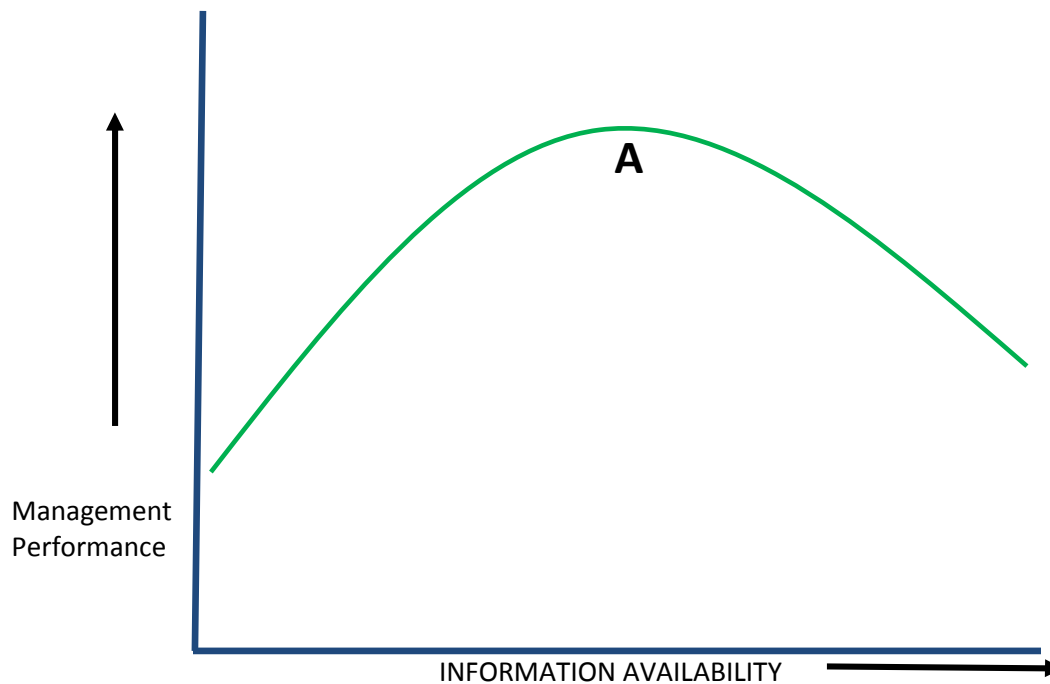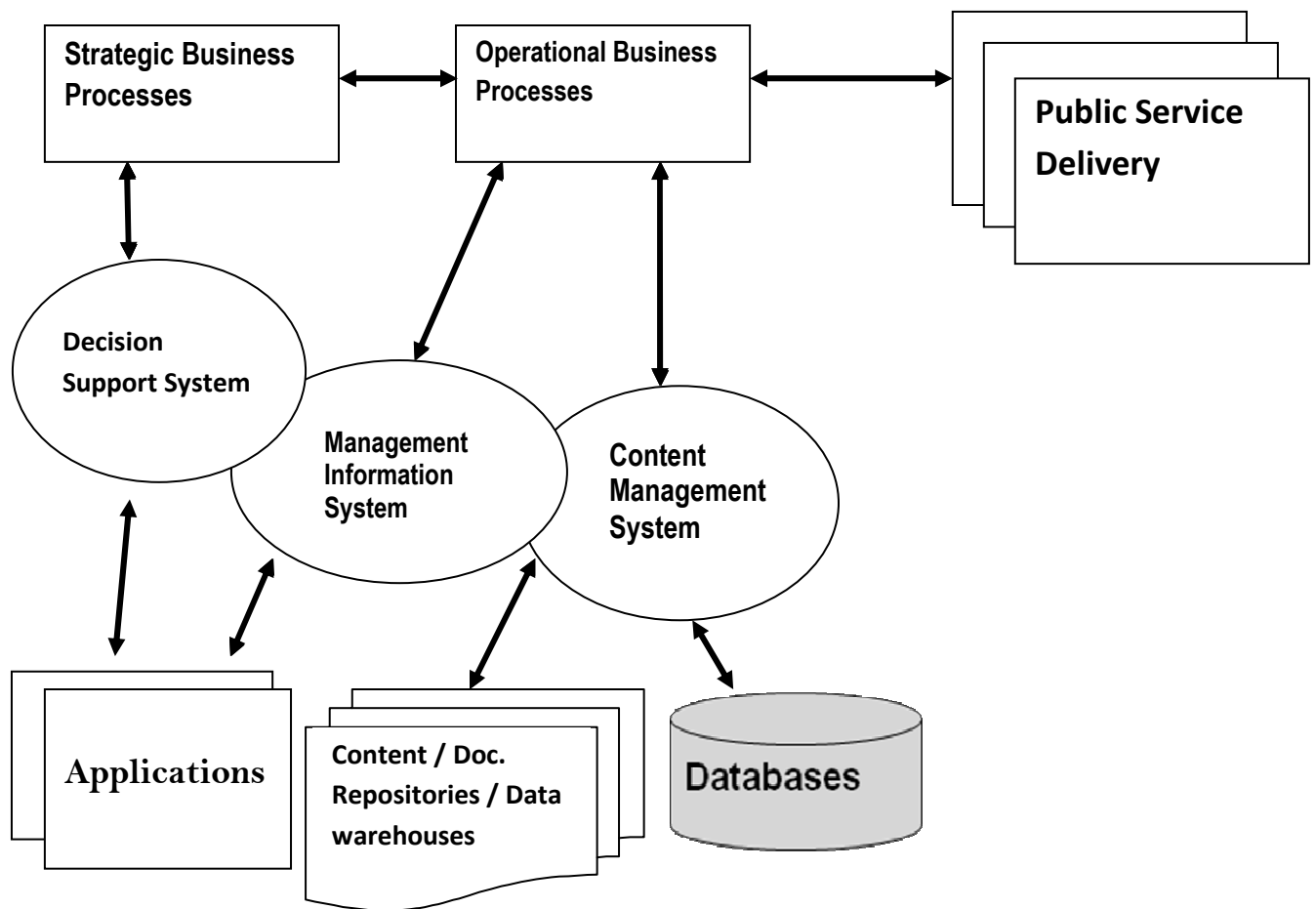
Fig 2: Management Performance Vs Information Availability

The management performance is expected to increase as the availability of the right information increases but could reach a point of maximum when you have all the information you need for making the best decision possible ( Shown as A in Fig 2). Beyond that point there would be no marginal benefit for having additional information. In fact there

would be costs involved in handling too much information and may lead to lowering of management performance.

## MIS, Decision Making and Management Process:

Without going into details I would like to high light in the diagram below the close relationship between the management processes in an enterprise and its information management system (EMIS). Indeed, the EMIS should be a part of the overall management system and the decision making process of an organization. If close alignment is not achieved between the EMIS and Management Systems in the enterprise the results would be sub-optimal.

```
┌──────────────────┐      ┌──────────────────┐              ┌──────────────────┐
│ Strategic Business│◄────►│ Operational      │◄────────────►│ Public Service   │
│ Processes         │      │ Business Processes│             │ Delivery         │
└──────────────────┘      └──────────────────┘              └──────────────────┘

   ╭──────────╮      ╭──────────────╮      ╭──────────────╮
   │ Decision │      │ Management   │      │ Content      │
   │ Support  │      │ Information  │      │ Management    │
   │ System   │      │ System       │      │ System       │
   ╰──────────╯      ╰──────────────╯      ╰──────────────╯

 ┌────────────┐   ┌─────────────────┐   ┌──────────────┐
 │Applications│   │ Content / Doc.  │   │  Databases   │
 └────────────┘   │ Repositories /  │   └──────────────┘
                  │ Data warehouses │
                  └─────────────────┘
```

## Traditional Vs computer based Information Management:

We are all familiar with traditional methods of information management in the public sector with paper based systems of keeping files and record and storing them in racks and racks of paper files. I have touched on the information management systems in the public sector, traditional and the modern, in my previous concept paper: e-GIF Concept Paper, where in we have seen the information storage media changing from metals and minerals to paper and to the computers and other electronic devices.

The advantage of the electronic means of information management are:

1. Large Volumes of Information stored on a very small space

2. Less space is needed

3. Retrieval is easy

4. Searching is easy and fast.

5. Information transmission is fast and reliable.

6. Virtual Integration of information possible.

7. Reaching large number of people possible, easy and fast.

8. Various tools available for manipulating information as we wish

## Reviewing the Present Day ICT Scenario in the Context of Public Sector Management.

We are familiar with the developments in the computer technology as well as in the telecommunication technology that has given us now the power to do things and undertake tasks that would have been unthinkable in the past. From our perspective the following tools of ICTs have had significant impact on public sector management

1. Computer hardware costs are falling

2. Computer hardware sizes are falling and capacity is increasing as costs are falling

3. Telecommunication Networks becoming more powerful thus faster transmission of information possible.

4. Internet provides an easy, fast, convenient and economic means for information transmission.

5. WWW, world wide web provides a means of linking information sources and documents globally.

6. Technologies developed for information and process integration on the web using internet as the back bone.

7. Search Technologies Developed that makes searching for needed information fast and convenient.

Traditional public sector management has concerned itself with issues of law and order, public health, infrastructure building, public education, tax collection, trade and commerce development, agriculture and industrial development, international relations etc. In the

developing countries, especially in a country like Afghanistan, the issues of security and development are of paramount importance. Therefore beside the routine administrative tasks we have to undertake number of development oriented tasks as public sector managers. How far can ICTs help us in undertaking these tasks efficiently? This is the question that every public sector manager must answer.

At the very basic level ICTs would help us communicate faster with each other and with our constituents as telecommunication develops and more number of people have fixed telephones and mobiles. With the availability of computers at prices we can afford we will be able to undertake routine tasks that we have been doing manually by using computers. For example we could keep all records in computer files rather than physical files, or we could use software applications for specific tasks that we need to do as a matter of routine. Payroll may be an example, stores management may be another. Thus we will get some degree of efficiency and convenience in our work by adopting computers. However, is that how far we can go by adopting ICT? No the real potential of ICTs is yet to be realized. Let us take a look at the following:

### Data Bases ( Information Storage)

Traditionally we have been keeping information in paper files. Manually searching and retrieving the files we want. Using the files for a while and keeping the files back in our physical storage. As new

information is generated in a department or agency such as in the case of a new business being registered by the Ministry of Trade. A new file is opened for this new business. This is probably the stage at which most of our agencies are at present.

As ICTs are progressively adopted the routine information storage tasks as well as many other tasks are now transferred into computers. That is instead of keeping information on paper files we will now keep them in electronic files or digital files. We can now have most information available in our computers. This definitely brings efficiency to our work as we can quickly search for the files we want and quickly get the information we want.

All the above tasks are however centered in a single department or agency. As we all know the information that one department has may be and in most must be definitely, also kept in the other departments of the government. Take the case of a single business. Its file would be kept by the ministry of trade, ministry of environment, ministry of revenue and the local city government office. Thus separate information silos have been created for the same entity at more than two locations in the government. In the stand alone computerization environment each department maintains its own databases or information stores.

Evidently this is not an ideal situation. Logically one would say that the ideal situation would be when we could have access to all the databases in the government all at once, or we could maintain one single

information store which would be accessible to every one in the government and to the extent permissible even should be accessible to citizens as well.

We are now close to the ideal situation that we have describe above. We have now the means of networking the computers in a single department to create what we call the LAN, the local area networks and at a even higher level of development we could even interconnect these local networks into a bigger networks to form what we call WAN: Wide area network. The biggest of these networks is the INTERNET- which is a global network of computers.

Databases (information stores) would be available or accessible to the computers and devices which are connected to a network we have mentioned above. We may not even physically interconnect the computers, we may create what is come to be called a Virtual Private Network (VPN) by using the internet as a base.

It is not only in the governments that access to information all across an organization is important, even businesses with multiple offices and departments would ideally like to have access to all its information all at once. This has come to be called **Enterprise Information Integration** (EII). I have explained a little bit about EII and other related concepts in my previous document. Those of you who are a little more interested in technology may take a look at an interesting article on EII and other related concepts which I am attaching here as Annexure 1. The central

theme of this article is the need and importance for integrating information at the enterprise level. In our case it would mean that the information that we are keeping in our various departments and agencies must be integrated and brought into use as a single resource of the government as a whole. By integration is not meant the physical integration but virtual integration.

## Business Process Integration

The other important concept that we need to understand as managers and decision makers is that as we adopt technology in managing our operations we will be sooner or later called upon to align the automation of our departmental business processes with one another.

As I mentioned before departmental and stand alone automation may bring us some advantages in terms of faster turn around or reduced cost of operation, but the real and major advantages would flow only if the business processes in different departments of the government can be virtually integrated.

As in a large business organization in our government also a single issue or subject would receive attention in more than one department, most often cutting across the agency boundaries. Take for example the licensing of a business. Application must be received by the Ministry of Industry and Commerce, Clearance to be obtained from the Ministry of

interior, Clearance also to be obtained from the Ministry of Environment, Approval of the business plan to be obtained in the local administration office ( where the business is likely to be located). Thus on the same subject file more than two departments are likely to work. Once automation of the business processes occurs in the individual departments these processes at the agency level need to be aligned and integrated. We have now several work flow and business process management tools available from a number of vendors which could be deployed to secure this integration.

## The Role of EGIF

The concepts of information integration at the level of data bases and information stores and at the level of applications and business processes described above does illustrate the importance of such integration. However such integration would be possible and feasible only if the ground is prepared for such integration to take place. E-Government Interoperability Framework ( e-GIF) provides such a ground, through the provision of standards and guidelines that every one in the government must follow so that integration of information and processes could be undertaken without difficulty as we move from stand alone computing to distributed computing and eventually to the integration of automated business processes.

## Enterprise Information Integration– What Was Old Is New Again
## 05/10/2004
**By Beth Gold-Bernstein, Chair, e-biz Q Virtual Conference Series**

Enterprise Information Integration (EII) is simultaneously an old and new idea. Data integration was the earliest form of integration. Data warehouses and data marts were developed to create an aggregated view of corporate information residing in disparate systems, and to give business users better access to corporate information.
The workhorse of data integration has been ETL tools. They were created to *e*xtract the information, *t*ransform it into a consolidated view, and then *l*oad it into a data warehouse in a batch mode. The data volumes involved were generally large, the load cycles long, and information in the data warehouse typically a day to a week old. For synchronizing data across operational systems, operational data stores were created, which enabled the real-time update of information.

But the problem with each of these solutions was the need to physically move large volumes of data from source systems to multiple consolidated data stores including the data warehouse, distributed data marts, operational data stores, and analytical multi-dimensional databases. While these consolidated data sources continue to be important to organizations, latencies and inconsistencies are pretty much a given with such an architecture.

### EAI vs. Information Integration

The batch ETL solutions of the past were not capable of meeting the real-time integration needs of the new breed of online systems. Information that is days old is not acceptable for real-time solutions. While the ETL tools continue to serve a valuable function in organizations, they became the step child of integration.

The newer Enterprise Application Integration (EAI) solutions came along and solved the data latency problem by synchronizing changes across systems in real time. However, EAI less adequately addressed the need to aggregate and consolidate data and information across the enterprise. EAI can effectively move data among systems in real time, but does not define an aggregated view of the data objects or business entities.

Enterprise Information Integration (EII) is simultaneously an old and new idea. Data integration was the earliest form of integration. Data warehouses and data marts were

developed to create an aggregated view of corporate information residing in disparate systems, and to give business users better access to corporate information.

.                                    **Annexure 1        page 2 of 5**

For example, a customer service representative on the phone needs to be able to answer a customer's question in real time, without having to figure out which system is involved. This requires the ability to make a query across distributed data sources as if they were a single database. EAI does not address this problem at all. Enterprise Information Integration (EII) does.

### Data Integration vs. Information Integration

Along with the movement to real time, the need to integrate different kinds of information has also become more important. For example, a Web site or portal could aggregate data from multiple databases and synchronize updates to all of them, as well as present other types of unstructured data such as graphics, audio and video. While data integration generally focuses on structured data, managed by databases, the term information integration includes both structured data and unstructured electronic media. Enterprise Content Management (ECM) provides these capabilities, and may also provide some application integration and workflow capabilities, redundantly providing these integration services also provided by other technologies in the infrastructure. Some of the emerging EII tools will handle both structured and unstructured information. Further, most also provide metadata management solutions in more open repositories. In other words, EII is fast becoming the part of the infrastructure that manages the information across the enterprise.

### Information Integration Solutions

Information integration can be used for the following kinds of applications:

- Creating a single view of a customer or other business entity
- Enterprise data inventory and management
- Real-time reporting and analysis, and creating management dashboards
- Updating a data warehouse
- Creating a virtual data warehouse
- Updating common information across information sources
- Creating portal applications containing both structured and unstructured data from disparate systems
- Integrating unstructured data, including documents, audio, video and other electronic media, into applications.

- Providing an infrastructure for enterprise information management, including all forms of digital media

**Annexure 1      page 3 of 5**

Information Integration simplifies the creation of all these applications by enabling the information so that it can be accessed and managed as if it came from a single data source.

## Markets Merging

Enterprise information integration is an emerging market sector. EII provides the data aggregation capabilities of the old ETL tools, combined with access to real-time information that EAI provides. The market includes the extract, transform, and load (ETL) tools popular for batch data synchronization, as well as the emerging EII and ECM solutions. Many of the ECM solutions have also added workflow and business process management, so those markets are also overlapping. Moreover, some EAI vendors are adding EII capabilities, because their customers are demanding it. Yet another category of solutions is integrated platforms that will do it all. The bottom line is that most large organizations at some point will need it all. The questions is how to make it all work together, and leverage the analysis, design and implementation from one integration project to the next. A good place to start is metadata management.

## Metadata Management

In addition to providing real time access to aggregated information, EII provides an infrastructure for integrated enterprise data management. While the graphical EAI data mapping tools are easy to use and speed the integration process, the information they capture is valuable corporate information required for enterprise data quality management. The analysis required to capture the metadata to drive data transformations, is the same information required for enterprise information management.

In an ideal world, the metadata repository would manage the data that is used by the transformation engine. In the real world, semantic metadata is in multiple places, and not centrally managed. Metadata management is an issue for long-term quality of distributed information. An Aberdeen research report states that database administration costs now dominate the TCO (total cost of ownership) of applications below the 500-user level, and they continue to increase in importance for all sizes of applications (?Enterprise Information Integration: The New Way to Leverage E-information?, July 2003, Aberdeen Group). This is a pressing need that EAI tools were not designed to address, but one that the enterprise needs to address to ensure long-term quality of corporation information. After all, it is of little value to

provide real-time access to inaccurate information. Merely creating a canonical data format will not be sufficient to create long-term value.

## Annexure 1      page 4 of 5

**Best Practices for Information Integration**

As with most technologies, success depends more on how you use it than which product you buy. Managing enterprise metadata as a valuable corporate asset will go a long way toward creating long-term value, agility, and reuse from integration efforts. The ultimate value of real-time information access will depend largely on the accuracy of the information itself. There are a number of ways an organization can improve accuracy, increase reuse, and maximize the investment made in discovering and defining aggregated data definitions:

**Conduct design reviews:** A metadata model represents an aggregated definition of data from different systems in a canonical format. The only way to ensure the common definition is correct is to have the model verified by all the stakeholders ? those who have knowledge of each of the systems, and those who need to utilize and integrate the data.

**Create an enterprise metadata repository:** To ensure long-term value, an enterprise metadata repository, based on standards, provides a platform for storing, accessing and managing metadata, and access to information across the organization. It is the Rosetta stone to disparate enterprise data. The repository can grow over time, on a project-by-project basis. However it needs to be actively managed to ensure integrity and data quality, and maximize reuse.

**Manage metadata at an enterprise level.** It is not sufficient to simply create canonical data formats. The work of researching, defining and verifying the intent and meaning of data in systems, which forms the foundation for integration, needs to be managed and leveraged. It represents a considerable investment and a valuable and reusable resource for the organization. While different projects may work with different data, a centralized group, such as an integration competency center, can track and manage how the metadata is used across projects.

**Move toward semantically rich metadata.** The more meaning the metadata contains, the less work the programmers need to do. Semantically rich metadata enables electronic transactions to be implemented across systems without needing to add application or database code to ensure the integrity of the data. It is the key to enabling e-commerce faster and cheaper than ever before. The standards bodies, including the OMG and the W3C, are currently working on semantic metadata standards. The Semantic Web is an example of such an effort.

**Annexure 1     page 5 of 5**

**Conclusion**

Metadata management is another old idea that is new again. In the very early days of distribut ed systems, organizations started their efforts by defining an enterprise data dictionary. Unfortunately, many of these efforts failed because they were too large in scope, and there was no underlying integration infrastructure to automatically convert data from one format to another. The data dictionaries gathered dust on the shelves until the efforts were disbanded.

Fast-forward to the present, when companies are creating metadata throughout the organization, but failing to manage it on an enterprise level. These efforts may succeed in the short run, but fail to meet future needs. Creating an enterprise information architecture and strategy, and managing aggregated enterprise data at an enterprise level, will ultimately provide those companies willing to make the investment with the largest long-term ROI and greatest agility for meeting new business requirements. While there is a large number of integration technologies and solutions on the market, the emerging EII tools provide an excellent foundation for data consolidation and aggregation, and providing accurate and timely enterprise information to whoever needs it, when they need it, and where they need it