## Slide 1

Welcome, I am Glenn Cox from Enterprise Informatics and I would like to share with you and discuss a solution relative to many of the problems that occur during the life cycle of constructing a facility that leads to cost overruns and significant cost increases. The types of problems I am referring to are due to **poor quality of information, lack of access to information, lack of communications when changes occur and restricted visibility to information**. Examples of cost increases are missed schedules, non-compliance due to poor communication or the inability to assess the impact a change may have from a regulated or legal source, rework and bad decision due to untrustworthy information or the information needed was not available, and penalties due to late responses to inquiries or not meeting milestones in a timely manner.

For a starting point I would like to share with you a high level overview of how Enterprise Informatics supports information management for the Design and Construction phases of the Life Cycle for a facility being constructed. Our definition of a facility life cycle is Design, Construct, Operate & Maintain, and Decommissioning. For this VodCast, I will be emphasizing only the Design and Construct phases; however there will be reference to the challenges faced when information is being transitioned to the Operate and Maintain phase of the life cycle.

## Slide 2

Let me begin with introducing Enterprise Informatics and what we do. Enterprise Informatics offers a software solution platform for Enterprise Information Management. Since Enterprise Information Management is a term used broadly across the information industry I would like to provide a clear definition before we proceed.

Enterprise Information Management is based on four information management principles.

- The first principle is that information must be **identified** to be managed, therefore to manage information across an enterprise all information assets within the Enterprise must modeled and defined. This means that an Enterprise Information Management system must be capable of identifying information assets that are structured and created in databases across the enterprise such as people, organizations, equipment, documents, processes, functions and information assets that are unstructured and created with word processors, cameras and video recorders such as documents, video files and pictures. The ability to identify information based on attributes is a common and well understood approach. However, to enrich the identification of information assets we need to identify how the information asset both structure and unstructured are related or connected to other information assets across the enterprise. Identifying the relationship of the information asset across the enterprise gives the information asset context and relevance, which supports ease of access and visibility of the information to the consumer or user.

- The second principle is the management of **change.** We all know that the only constant is change and if we do not have the process and governance defined for the management of change, information integrity will be jeopardized resulting in incorrect decisions and untrustworthy information, which will result in a lack of confidence by employees that use the information. This is a common reason why we see information systems being bypassed and not used. When information systems are bypassed and processes not followed there is the creation of small islands of information in disparate repositories such as Access Databases, Excel Spreadsheets, Word Documents and paper in personal filings cabinets. This is now uncontrolled and difficult to find.
- The third principle is **status accounting**, this principle states that every information asset accessed will have its' current status visible. Statuses will differ based on the type of Information Asset. Examples of different statuses are historic, under change, pending change, latest approved, superseded and obsolete. It is very important that the status of an information asset is visible for large scale projects where there are hundreds of contractors sharing and collaborating on information that is created and consumed by multiple organizations.
- The fourth principle is **auditing**. Regulations and compliance requirements often require the identification of information usage such as when, who and why information assets were used or changed. In addition, it is good practice to audit the use and access of information sources to assist internal reporting on how information is being used and the behavior of information usage.

## Slide 3

Enterprise Information Management as defined using these four principles across all information in the enterprise offers organizations significant business value in the form of:

- Easy and fast access to accurate information in the context of how each user needs the information
- Visibility to how information is related across all aspects of the enterprise independent of whom or where it was created.
- Provides relevance to the information relative to the business need
- Enables processes that will ensure the information is governed, secured, controlled and trustworthy.

Trustworthy information with enterprise relevance will enable efficient decision making across all levels of the enterprise.

## Slide 4

As I shared in my introduction we will be focusing on the **engineering and construction life cycle.** This slide represents the high level processes for these phases. Each arrow is representative of a major life cycle process and notice that many of these processes are being executed in parallel. On the left hand side we grouped the processes into their representative Design and Construct phase and for each of these processes we have identified the probable owner for that process. As we step through each of these processes you will see some of the information assets that are created during each process on the upper right side of the slide and you will see some of the applications that Enterprise Informatics has created to support the processes on the lower ride hand side of the slide.

**The first process we address is permitting and licensing**. This process is usually the responsibility of the Owner, though many organizations participate. Examples of activities that take place during this process are the creation of contracts, identification of requirements, geological analyses for site selection, development of license applications, request for permit approvals and development of compliance matrices. Information assets are created from these activities by many different organizations. Examples of information assets created for this process are listed on the right hand side.

It is important to remember that information created throughout this process and all other processes throughout the life cycle of the project are related, connected and interdependent. For example, a requirement that is explicitly defined and embedded within a contract document is validated and verified by codes, standards, and industry regulations that underwrite the requirement. To properly manage the requirement the interdependencies of the codes, standards and regulations need to be identified, managed and made visible throughout the life cycle. As you might expect the creation of this information is done by many different people, from different organizations, with various levels of knowledge and experience. This means that every user of an information asset, with proper access rights, requires visibility to any related information so that they can understand how the information is affected, by a related business process or other connected information assets, throughout the life cycle of the project.

Requirements are governed by various governance models and compliance processes that must be adhered to. To understand how policy changes or compliance rules can affect requirements they should be related to the proper governance policy.

Throughout the project life cycle commitments to regulators and/or contractors will need to be identified, tracked and responded to in a timely manner. Some commitments can be time sensitive and have fines associated with delays meaning a **commitment tracking process** needs to be defined and available.

In today's environment there is demand to increase worker efficiency, minimize risk of a mobile work force, minimize repetition of costly mistakes, reduce costs by working smarter, make new workers

productive faster, make the operation and maintenance process more efficient by having access to information gathered during the design and construction phase. This information needs to be captured and protected against risks associated with a mobile workforce by minimizing the loss of tribal knowledge. To meet these requirements a process to manage knowledge is required.

Throughout this discussion I have referenced the need to interrelate or connect different types of information assets, as shown on the rights hand side. When information is connected the user gains visibility to the context of the information that is being used, this supports fast and easy access for the end user and provides increased knowledge to the user. Understanding the effect of change and managing change are requirements for increasing the integrity of the information, and increases visibility to the user on the status of the information. The ability to assess change requires that information be connected, which is also required to support analysis's needed for Project Oversight.

**The next process we will discuss is the deployment process**, which is synonymous with scheduling activities. This process is normally driven by a tool such Microsoft's Enterprise Project Server or Primavera. The information asset from this process that needs to be managed from a Project Life Cycle perspective is the Work Breakdown Structure, referenced by most people in the industry as the WBS. Note that the process of scheduling starts at the very beginning of the project. Most projects identify the major milestones and relate them to information assets such as requirements, the design basis, licensing, etc. The reason this dependency is important is that there is the business need to understand what impact a change may have or to provide insight for Project Oversight. As an example, for project oversight when a regulations changes you must be able to assess the impact on the schedule or how schedule delays may affect implementation of field changes.

**The next process we identify is the financial process**. The information in this process that is of importance is costs relative to major milestones, this provides visibility for Project Oversight and Project Management. As discussed in prior sections costs can be related or connected to milestones within the WBS, organizations, processes or any information asset where costs have significant impact. Having these connections of related information assets supports the assessment of impact of change.

**The next process we will discuss is the Design process**. For a large Engineering and Construction project this represents the process of designing the facility to fulfill the requirements of the constructed facility. The tools normally used during this process are 3D CAD design tools and is the responsibility of the Architectural Engineering firm contracted to deliver the design basis and blue prints for construction. In many cases the AE firm agrees a contract with the Owner and then subcontracts the construction to an engineering construction firm normally referred to as an EPC. The information from this process would be information such as Functional Breakdowns, Design Basis, drawings, and component definitions which is related to the information from all the other processes in the facilities life cycle.

**The next process is Procurement**. Now that the blueprints are completed and the material needed for construction is defined, it is time to procure the physical equipment, materials and services needed to construct the facility according to engineering procurement specifications. Before equipment is installed, Quality Records ensuring procurement compliance are generated and must be related to project knowledge base, while the catalogued or unique equipment needs to be related to all the information assets identified across the facility life cycle, which would include its location.

**The next process is Construction, which is the building of the facility**. During this process and throughout the life cycle condition reports or incident reports are created to identify and manage exceptions and issues that arise on the project. When an incident or condition occurs you must identify what information assets are related to the incident. To accomplish this, all information assets such as a piece of equipment, a process, a person, a requirement, a procedure or work instruction must be identified and have the ability to be connected to a condition report. The process for resolving the condition or incident must be processed based on specific governance policies and industry regulations. The net result is that there must be a record of how the condition was resolved, when it was resolved and who participated in the resolution.

**The final process that we will cover in the Engineering and Construction life cycle is the Field Engineering process**. During construction exceptions can occur based on the resolution of a condition or by changes in regulations or requirements and some field changes may require engineering modifications. These modifications need to be managed so that the reason for change is captured, the change must be communicated to impacted organizations, history of the change must be documented and maintained for historical purposes to support business requirements. Examples of where this information may be needed is to understand why requirements changed, reasons for increased cost, understanding why delays occurred, and auditing by regulatory agencies. Capturing the information relative to change will be important information to provide insight to owners when they begin to operate and maintain the facility.

This concludes a high level view of the Engineering and Construction phases of the life cycle. Where we have reviewed and discussed information assets, processes, need to identify and manage governance, compliance and change. The common theme throughout this overview was the need to have information connected so that it can be managed collectively to support visibility, ease of use, increase user confidence in trustworthy information and contribute to a more efficient workforce.

## Slide 5

Now that we have gone through an overview of the high level processes for the Design and Construct phases of a Facility Life Cycle, I would like to offer some requirements that need to be considered when looking for an information system that supports facility life cycle information management. The objective for the information system is to provide fast, easy access to trustworthy information, adhere to governance policies, meet compliance requirements and capture institutional knowledge for reuse.

First, is the **capability to identify any information asset** that is used or associated with the facility life cycle. As part of the identification you need to have the capability to connect and relate all information assets.

Second, you need to have **the ability to manage, audit, report and assess the impact of change**. Look for a solution that has certified change processes that follow industry and configuration management best practices.

Third, there needs to be **a process in place that supports the capture of institutional knowledge**. This will protect against knowledge and experience lost do to a mobile workforce and support capture of intellectual assets that can be reused to promote a more effective workforce cultivated through the sharing of experiences, lessons learned and best practices. This means that the solution must have the capability to capture and manage process knowledge and knowledge episodes.

Fourth, is **the ability to identify the governance policies** required for the project and ensure they are connected to the appropriate information assets so that when change occurs governance is visible, enforced and managed. Following your governance policies should ensure that the compliance requirements are met.

Lastly, **understand the information format needed to operate and maintain the facility**. It has been proven that the information format used for design in many cases may be different than the format required to support the operations & maintenance team that manage and operate the plant. The solution must be capable of managing multiple media formats, including paper for the same document and maintain the connection between the changes that occur during operations back to the delivered design basis.

## Slide 6

We have discussed the process and some high level requirements that should be considered. What I would like to share with you is what Enterprise Informatics offers relative to facility life cycle management. Enterprise Informatics offers a set of solutions that are all dependent on the eB platform designed to support Enterprise Information Management solutions.

First, we discussed the need to identify. **The eB solution provides off the shelf capabilities to model the classification or taxonomy for any information asset from the simplest to the most complex**. This classification supports the identification of the information asset but eB provides the capability of connecting or relating any information asset to any other information asset. As we discussed this is important to support the key business objectives.

Second, to support change **eB offers a certified change management process that is certified by the institute of configuration management**. To date we have the highest certification level currently given.

This is called the CMII process. As part of the change management process eB provides an impact analysis feature so a user can assess the full impact of change.

Third, a significant challenge in the industry today is how do organizations capture, manage and leverage their institutional knowledge. **eB offers a knowledge management solution that can identify and connect all the facility's process knowledge for an information asset** as well as supporting the ability to connect and manage knowledge that is related but not considered part of the formal process. Examples of this type of knowledge are lessons learned, best practices, and opportunities.

Fourth, **eB offers a set of applications developed around standards and industry best practices**. This will support quick and reduced costs for implementations, a community that provides input for knowledge sharing and product improvement, and delivers proven solutions that have been already used on large scale project. The applications that are part of our eB for EPC offering are Commitment Tracking, Human Performance, Licensing, Requirements Management, Corrective Action, Document Control, Records Management, Project Portfolio Management, Document Management, Project Oversight, Configuration Control, and Knowledge Management.

Lastly, **eB can manage information in any format for the user**. So if the operations and management team need information in paper or 2D drawing formats, but the design is maintained in the 3D format eB manages the information for these formats. This means we can deliver the right information to the user in the format that is needed while maintaining the connections between operational formats and design formats. Not only do we maintain the connection but we manage the complete life cycle of change.

## Slide 7

I would like to thank you for the time you have spent. I hope you found the information that we have provided has been helpful. I also hope we have created an interest in understanding why Enterprise Information Management is required to manage large complex projects with large volumes of connected information, which is created and managed by hundreds of participating organizations.

If you are interested please contact us at 858-625-3000 or send us an email at info@enterpriseinformatics.com.