

# Enterprise Architecture Repositories White Paper

Prepared for the US Dept. of Education

Prepared by Pearson Government Solutions

Date \_\_\_\_December 30, 2003\_\_\_\_\_

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**Notes on Enterprise Architecture Repositories**  
**Draft 1.0**  
**30 December 2003**  
**(Comments to T. Hardgrave)**

## **1. Introduction**

This whitepaper discusses several issues related to using Popkin System Architect (Popkin SA) as the Federal Student Aid (FSA) and Department of Education (ED) Enterprise Architecture (EA) information repository. In addition, the whitepaper offers an alternative design that addresses some of the current limitations.

## **2. Definition of Enterprise Architecture**

For the purposes of this document, the definition of Enterprise Architecture includes the following areas:

- Capital Planning and Investment Control (CPIC)
- Business Process Modeling (BPM)
- IT Infrastructure

Details for each item appear below.

At a minimum, the EA should include the information required to define all three of the above items.

### **2.1. Capital Planning and Investment Control (CPIC)**

In general, capital assets are land, structures, equipment, and intellectual property (including software) that are used by the Federal Government and have an estimated useful life of two years or more.

Capital planning and investment control is the process for developing and executing plans on a year-to-year basis to manage the capital assets of an organization.

In the Federal Government, this specifically means the process of creating and managing the Exhibit 300s and related documents required by the Office of Management and Budget (OMB).

As OMB's Federal Enterprise Architecture is evolving, this means that the Exhibit 300s and related documents must conform to the Reference Models defined by the Federal Enterprise Architecture.

## **2.2. Business Process Modeling (BPM)**

Business Process Modeling is the process of understanding the details of the business processes that are the raison d'être for the organization.

For modern information systems, often the initial event of the business process begins when a customer logs onto a website. This, in turn, starts a process that is finally resolved when the customer's web request is satisfied. For legacy systems, identifying the initial event may be more difficult.

The overall idea is that an organization will enumerate its business processes and create a diagram that depicts the process from the initial event to the closing outcomes. Often this process-diagram (or workflow diagram) starts at the left and proceeds to the right with loops and iterations as required. People will perform some of the work depicted by process steps; computers will perform others. It is important to make that distinction as well as assign expected elapsed times and costs to each step in the overall process.

There are a variety of vendors that provide graphical BPM tools.

## **2.3. IT Infrastructure**

The IT infrastructure for an organization encompasses, at least, the following inventories:

- Servers
- Installed Software Packages
- Databases
- Networks
- User Interface Technologies

One overall idea in an Enterprise Architecture is to map each item in an inventory back to the business-process that requires the item. In this way, it is easy to justify an upgrade in a hardware or software item when the business-process requires an enhancement due to growth in usage, performance problems, planned changes, etc.

In addition, for example, sometimes a software package will require a change because the vendor is dropping support for the current version. It is important to be able to quickly discover which business-processes will be affected. Using the mappings, the EA can simplify the discovery of that information.

## **3. The EA Information Repository**

### **3.1. The Ideal EA Repository**

The ideal case, of course, is that an organization could have one EA Information Repository and everyone in the organization could access it to get information and make

updates to the EA as appropriate. Unfortunately, none of the vendors of EA repositories are yet at that level of sophistication.

This section discusses the limitations of one of the more advanced EA repositories, Popkin System Architect (SA).

### **3.2. Limitations of Popkin SA**

Popkin System Architect from Popkin Software ([www.popkin.com](http://www.popkin.com)) is a mid-maturity software product. That is, the product is mature enough to provide many features that one would expect in an EA product, but the product is still missing some key pieces needed for a complete EA offering. The important shortcomings include:

- Configuration Management
- Multi-dimensional reporting

Each of these is discussed in more detail below.

#### **3.2.1 Configuration Management**

Configuration Management (CM) is the process of managing changing configurations for a complex development process (e.g. a software project). The exact definition depends on the methodology embraced however almost all methodologies include the following in CM:

- Version Control
- Release Management
- Change Management (e.g. issue-tracking)

Some methodologies also package Quality Assurance (QA) with CM.

To a large extent, an organization's EA project behaves like a software development project in that a variety of developers may all be changing the EA at the same time, but for reporting purposes, management would like to see some consistency in each release of the EA. That is, EA needs both version control and release-management disciplines and will probably require issue-tracking and QA as well.

One major limitation with Popkin SA is the lack of any of the components of CM. The implications of the lack of CM include:

- Limited Number of People Updating the Repository
- Coordinated Read-only Releases

That is, because it is not possible to prevent people updating from interfering with one another, a manual process must be installed to compensate for the lack of CM. One approach is to have a very small group of users with update privileges. Presumably the

members of this group will manually coordinate with one another to be sure they do not interfere with one another. Experience with software development projects over a number of years suggests that this approach will be both expensive and risky.

Another approach is to have multiple working repositories called “sandboxes”. At the prescribed time (e.g. daily) the sandboxes are then rolled up into the master repository. This approach requires that the configuration of each sandbox is carefully controlled to ensure that rollup is possible. Depending on the number of sandboxes involved, this can also be an expensive and risky approach.

Since the master repository cannot be updated while reporting is taking place (due to possible inconsistencies), multiple read-only releases will be required for consistent reporting.

A different approach to CM is covered under the alternative design.

### **3.2.2 Multi-dimensional Reporting**

Most organizations have hundreds of variables involved in their business processes. That is, the combinations of possible reports is far too large to be covered in a few “standard” reports. That, in turn, means managers need a “slice-and-dice” reporting capability that allows them to drill-down as needed to discover information essential to the running of the business.

More details on that topic are covered in:

*The Multidimensional Manager—24 ways to Impact your Bottom Line in 90 days*  
( <http://www.cognos.com/solutions/applying>)

The slice-and-dice reporting capability is typical of On-Line Application Processing (OLAP) reporting capabilities commonly used by Chief Financial Officers (CFO) to verify that the financial statements for the organization make sense.

Popkin SA has some reporting capabilities. However, it does not include a comprehensive multi-dimensional slice-and-dice reporting facility. Such a facility would be very useful to report across the various reference model data included in each Exhibit 300.

## **4. An Alternative Repository Design**

Figure 1 shows the proposed alternative design for the FSA EA Repository. Figure 2 shows the proposed alternative design for the ED EA Repository. In both figures, the primary mechanism for delivery of information to the end-user is via an EA website. The websites will be discussed in more detail below.

Figure 1 shows that the primary repository is held under a Configuration Management (CM) File System similar to the version-controlled filesystem concept underlying ClearCase. (ClearCase was originally developed by Atria but is now part of the IBM Rational suite.) The specific detailed structure of the filesystem is yet to be determined, but presumably there would be directories for (1) CPIC, (2) BPM and (3) IT Infrastructure in accordance with the definition of Enterprise Architecture given above. The obvious advantage in this approach is that many people within the organization may store a variety of artifacts in a variety of formats without either interfering with one another or forcing inconvenient conversions to Popkin. For example, Popkin will only input particular kinds of Visio diagrams.

CM packages (e.g. ClearCase) also provide comprehensive tools that help the user understand history and differences in versions of various artifacts. For example, the diff-command will show the line differences in two versions of an ASCII file and the history-command will show when and who checked-in version of the artifact from its original creation. There are options on most commands to limit output to relevant ranges.

DBA Studios (e.g. Sybase PowerDesigner, Embarcadero E/R Studio, SypherLink) provide comprehensive database diagramming capabilities as well as reverse-engineering from existing databases and complex capabilities to analyze entities to create to-be database designs from as-is database designs.

Popkin System Architect (SA) is the Enterprise Architecture repository discussed above.

OLAP Reporting tools (e.g. Applix TM1, Cognos, BusinessObjects) provide the multi-dimensional, slice-and-dice reporting functionality commonly used by CFOs and finance departments to detect operational problems and justify expenditures based on other non-monetary variables. Applix TM1 also has an Excel-add-in that is attractive to user already comfortable with MS Excel.

Figure 2 shows the alternative EA Repository design for the the Department of Education. It is very similar to Figure 1 except that inside the CM file structure it shows how the FSA CM file structure would roll-up into the ED CM file-structure in parallel to other POCs including Office of Elementary and Secondary Education (OESE) and Office of Special Education and Rehabilitative Services (OSERS). Presumably each POC would have artifacts for CPIC, BPM and IT Infrastructure although most of the data would be much smaller than that for FSA.

This design calls for two EA websites: one for FSA and one for ED. They could be combined with an overarching website that directed traffic as appropriate – or the ED website could serve as the overarching website.

Data can come to either website from any of the following sources:

- The CM File Structure
- Popkin SA
- The OLAP Tool

For example, within FSA, the Technology Infrastructure Blueprint (TIB) documents the IT Infrastructure using Visio diagrams, tables and text. To recreate these documents in Popkin would require substantial effort and would result in a lower quality product. This design allows the direct migration from the CM File Structure to the FSA EA Website. It adds the additional advantage that the TIB will now be held in a more versatile CM tool than is now the case.

# Alternative FSA EA Repository Design

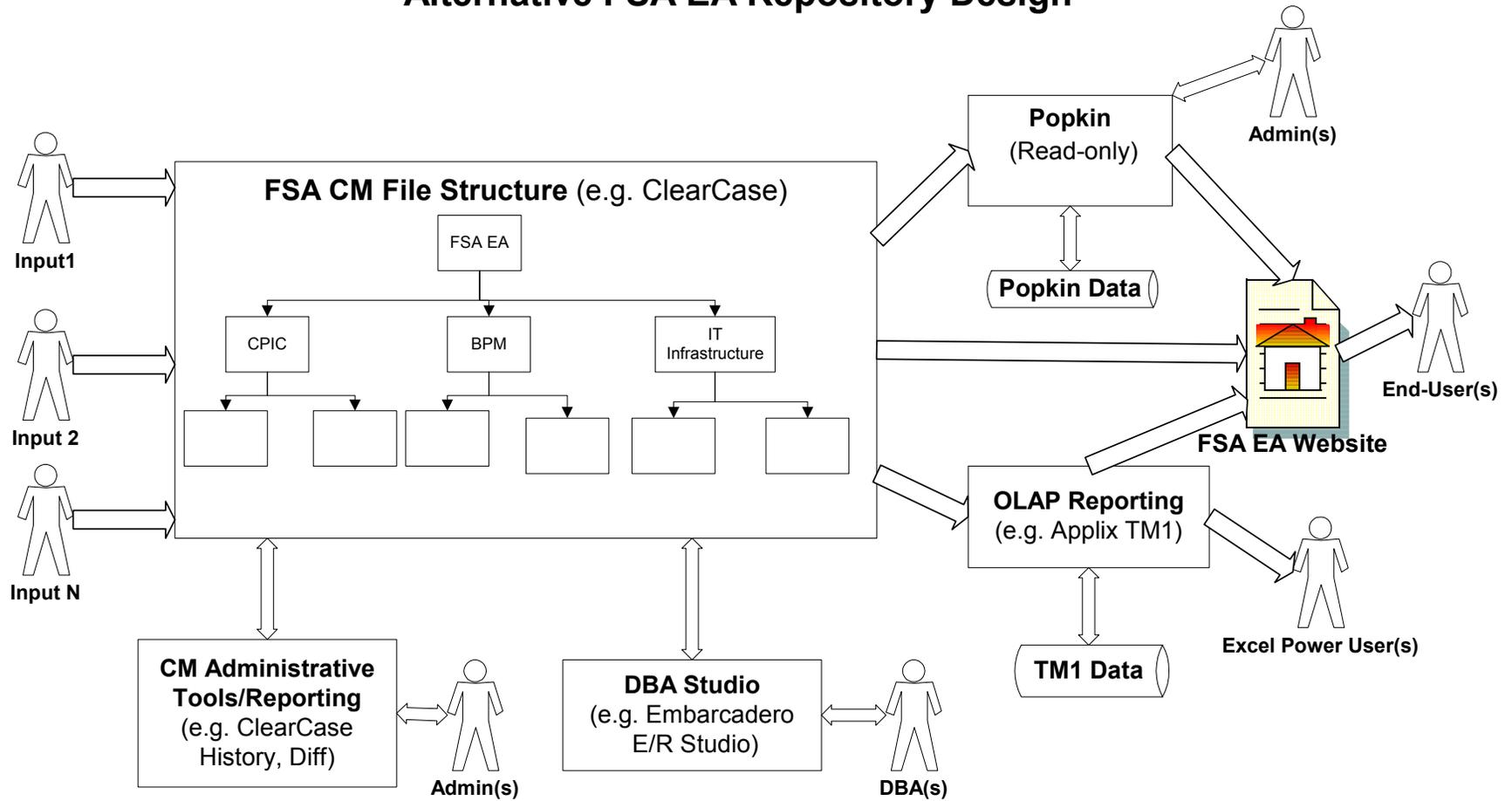


Figure 1

# Alternative ED EA Repository Design

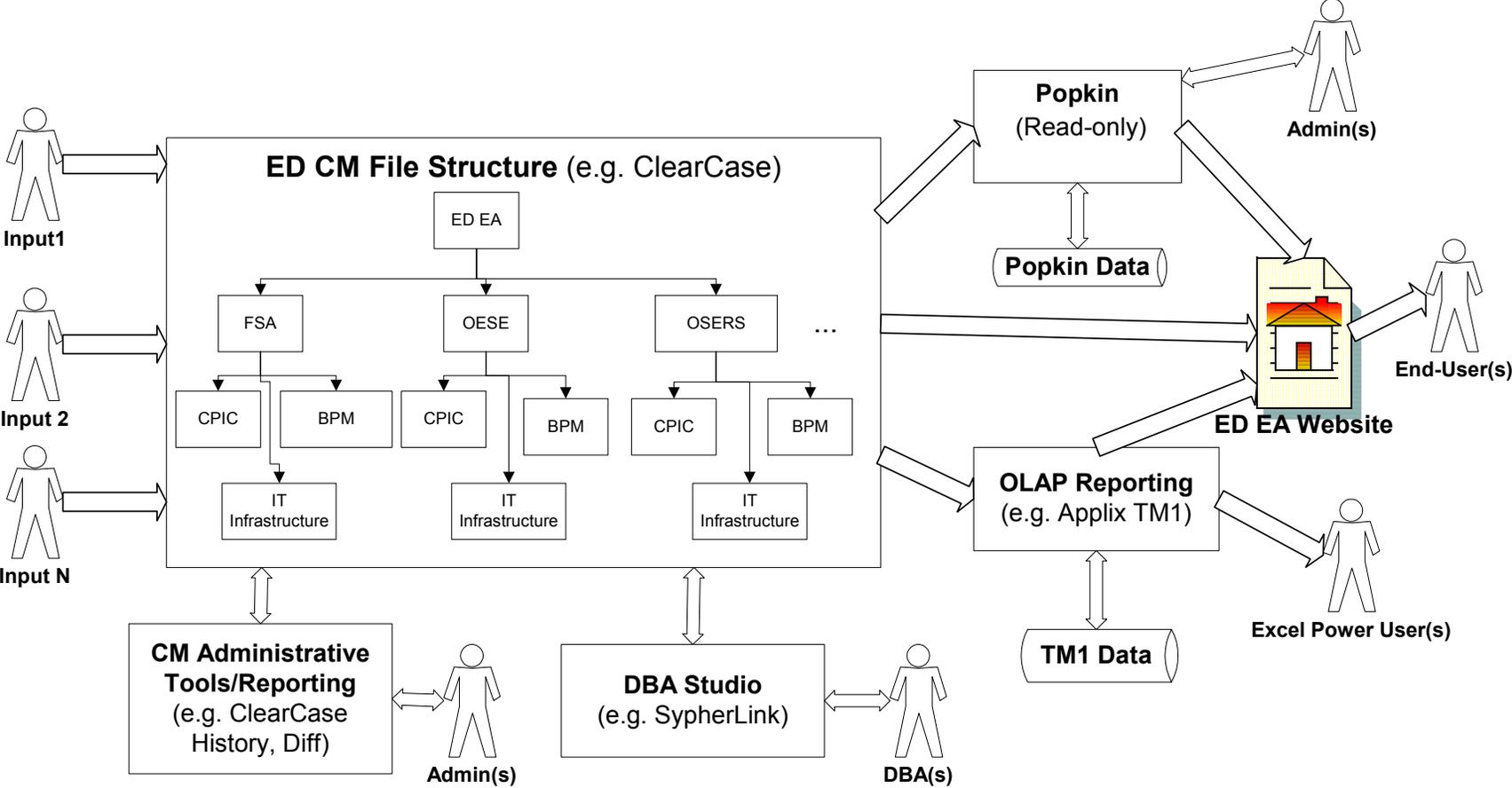


Figure 2