Assessment of Fusion for HEUG Institutions

Technical Advisory Group
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Purpose & Introduction

The HEUG Technical Advisory Group (TAG) has been gathering information about Oracle Fusion Middleware and Applications and has been discussing many of the factors that will affect each institution's strategic plans. This document is intended to summarize what we have learned and the conclusions we have reached. Our hope is that this information will prove helpful to institutions as they develop their strategy for administrative systems.

This document does not address PeopleSoft 9. The TAG felt that the issues around the transition to PeopleTools 9 were much clearer than those around Fusion, and that most institutions did not require input from the TAG on those matters. We instead focused this document entirely on the transition to Fusion. PeopleTools 9 is only discussed as it relates to some of the Fusion Middleware issues.

The TAG is very pleased that Oracle has been forthcoming with information about their directions for infrastructure and applications. Oracle seems genuinely interested in sharing their strategy and gathering input from their customer base. Unfortunately, there are still many aspects of Oracle's plans that are not yet finalized. Therefore some of the conclusions that we present in this document could be incorrect if plans significantly change in the future.

The conclusions represented in this document are those of the members of the TAG. They are based on our collective technical background, information we have gathered from research organizations and information that has been presented to us by representatives of Oracle Corporation.

Executive Summary

At the heart of Oracle's long-term business strategy are two separate but intertwined efforts. First, Oracle is redesigning and developing a new "superset" suite of applications comprised of the best features and functionality of legacy Oracle EBS, JD Edwards and PeopleSoft applications – initially termed Project Fusion, Oracle now refers to these as the "Fusion Applications." Second, Oracle is developing a state-of-the-art middleware infrastructure on which these applications will be built. This new middleware represents a major extension and upgrade of the Oracle infrastructure that is currently used by its EBS applications.

The TAG believes that the overall technical direction that has been presented by Oracle is excellent. Oracle is a demonstrated leader in technology and middleware, and we believe their long-term vision is appropriate for most higher education institutions. Their commitments to services-based applications, and to sophisticated service architectures are appropriate especially for larger institutions with complex system interdependencies.

While we agree with Oracle's technical direction, we have some questions about their ability to deliver all of their vision in the first version of Fusion. The TAG believes that, despite the impressive number of engineers and strategists working on Fusion, it is inevitable that some functionality will be

postponed for later versions of Fusion. These decisions on scope will affect the acceptance of Fusion by PeopleSoft and Oracle customers. Oracle's Fusion roadmap calls for several phases that will culminate in complete functionality in the 2009 timeframe. It is likely that the early versions will be predominantly focused on new customers but will contain "complete" modules (e.g. budgeting) that may be deployed in current customers' environments.

Higher Education's adoption of Fusion Applications and Fusion Middleware will be greatly influenced by the cost of conversion and the cost of ownership. The TAG believes there are several factors that could affect the cost of moving to Fusion including fit/gap analysis, reapplication of customizations, process redesign, end-user change management, and the retooling of IT personnel skill sets. Each institution should closely evaluate these factors before committing to Fusion as their administrative system platform.

Fusion will be built on a completely different set of tools than PeopleSoft. Development tools like PeopleCode, SQR, nVision, and Application Engine will no longer be used for application development. It's important that each institution understand this shift is underway, and realize that further investment in coding in these technologies will have to be redeveloped if and when they move to Fusion. Fortunately, Oracle has established a long support cycle for PeopleSoft applications, so institutions can take their time in deciding their future. Ultimately PeopleTools will be unviable and institutions will have to shift to another platform.

Oracle has begun laying out a roadmap that institutions can follow to move to Fusion Middleware. Allowing organizations to gradually move to the Fusion technologies should allow for a smoother implementation of the Fusion Applications when they become available. Given the pricing information that is presently available, it appears that Oracle's licensing approach could discourage some institutions from following the Fusion roadmap in the short term. Instead of adopting the Oracle middleware stack gradually over the next couple of years, these institutions may instead choose to delay adoption hoping that better licensing conditions will be available or alternative middleware products may be supported in the future.

Section 1: The Path to Fusion Architecture

The technology platform Oracle plans for the Fusion Applications is quite different from what underlies PeopleSoft. Familiar technologies such as App Designer, SQR, and Crystal Reports will be replaced by a set of tools based on a web services architecture, using standards such as WSRP, XML, and XSL. This will mean major changes in how our organizations implement, maintain and enhance our ERP applications. The following attempts to summarize what those changes are and make some recommendations on how to understand the changes and make them successfully.
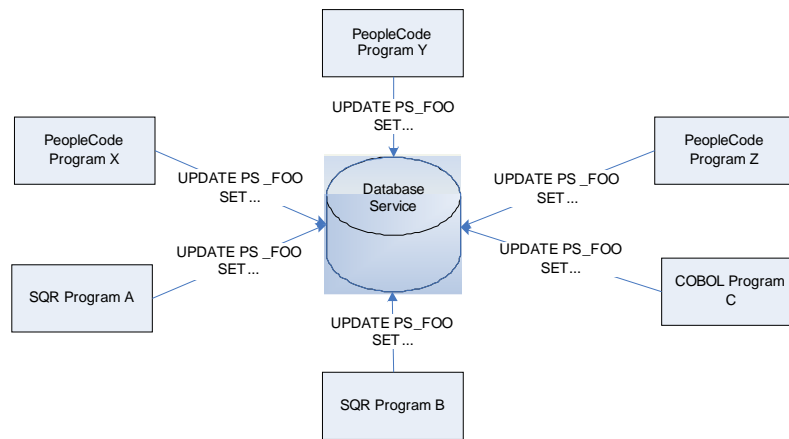
Service-Oriented Applications
The Fusion Applications will be built upon a service oriented framework which is radically different than the data-centric design of the PeopleSoft architecture. In a data-centric architecture, there is a single service: the database. The database is the "service" in charge of managing access to the data. Any PeopleCode program, COBOL module, or SQR script can access any data element available from the service. Because the entire dataset is available, many different programs could be accessing and/or directly updating the same data elements simultaneously without restriction.   This very flexible system has some inherent weaknesses, for example:

- Modifications – In order to insure data consistency, it is often necessary to make changes to several PeopleCode programs, an SQR or two, and maybe even a COBOL program, for a single "modification."
- Integration and Workflow – When changes are made to specific data elements, other systems are often interested in those changes or other actions need to be triggered as a result of the change. The online PeopleTools environment is capable of capturing and reacting to these events when changes are made online. However, changes made directly to the database via batch programs (SQR, COBOL, etc.) are unable to leverage these features. Each batch process would have to be modified to implement the desired behavior. The only way to catch all of the
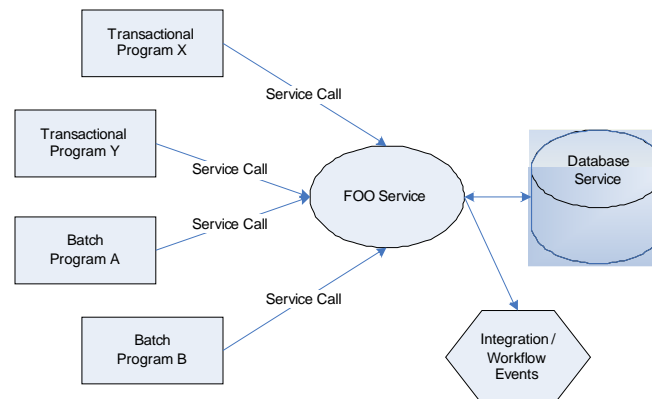
changes made to a set of data would be to modify the database service, usually by implementing triggers.

- Auditing – The field and record audit capabilities of the online system aren't invoked when changes are made via batch programs.

PeopleSoft Data - Centric Design

A service- oriented design attempts to shield data behind the programs that are responsible for maintaining it. If you want to retrieve or modify some piece of data, you must ask another program to do it for you, instead of asking the database to provide the same service. In essence, the "service" is moved up to the application code layer. The program in charge of managing a specific data set is the sole source for access to that data, and all attempts to read or manipulate that data set must use the service. This includes online, transactional operations, as well as batch- oriented processes. The best example of a service in PeopleSoft is the Component Interface technology, which wraps a collection of data elements and code into a service that can be consumed internally by other PeopleCode programs. The Component Interface can also be exposed to external systems by way of several programming APIs, Integration Broker messaging, or as Web/SOAP Services in the latest versions of PeopleTools.

Hypothetical Service Oriented System

The services model simplifies code maintenance, because customizations can be more easily targeted to services than to code that's dispersed and scattered among several different technologies and files. When a single interface is used to expose and manipulate data, that interface can also be used to audit changes and trigger workflow transactions, regardless of how the change was initiated.

The PeopleSoft 8.9 application releases make limited internal use of efforts to introduce a service oriented design into the applications. These services are embodied as Component Interfaces and internally-published Integration Broker messages. PeopleSoft has stated definitively that these services were targeted only to internal, online applications, and that efforts to make these services available externally would be targeted for the 9.0 application releases.

The Fusion Applications will be built using a services-oriented framework running on Oracle Fusion Middleware components, such as the Oracle Application Server, Enterprise Service Bus, and BPEL Process Manager. It appears that the services will be implemented as internally-available Java objects and externally addressable web services.

Middleware Changes

PeopleSoft was able to make a very smooth transition from client-server to browser-based applications. The mechanism that allowed the transition to happen so smoothly was their use of BEA Tuxedo middleware. The Application Server technology built using Tuxedo expanded from a simple third-tier to on-the-fly HTML generation. PeopleSoft added a Java-based web server between browser clients and the Tuxedo-based processing engines. This architecture was surprisingly effective and very scalable, allowing small businesses and multinational corporations to implement and grow a hardware infrastructure that met their needs.

Some features of the Fusion Middleware product family are being introduced in the PeopleTools product line. PeopleTools 8.47 saw the inclusion of Oracle Application Server (OAS) as an optional replacement for WebLogic or WebSphere at the web-server tier of the architecture. The name of the product has caused some confusion among customers, but it should be clear that Oracle Application Server is *not* a replacement for the Tuxedo or any of the programs at the Application Server tier of the PeopleTools architecture. The confusion is due to the fact that the term "application server" is overloaded, meaning different things to different people. In the Java realm, an application server is a middleware component that implements features of the Enterprise Edition of Java, such as a servlet engine or Enterprise Java Bean container. WebLogic, WebSphere, and Apache Tomcat are also considered to be Java application servers.

Looking forward, Oracle intends to deliver even more Fusion Middleware products with future releases of PeopleTools. The most notable of these products is XML Publisher, which is the heir-apparent to Crystal Reports and SQR-generated reports (see Tool Changes, below.) XML Publisher is tentatively scheduled for inclusion with PeopleTools 8.48, which will be the version of PeopleTools used by the PeopleSoft 9 applications. Oracle is also promising significant PeopleTools feature enhancements that will allow PeopleSoft customers to leverage other Fusion Middleware components, such as the BPEL Process Manager or Oracle Enterprise Manager, should they choose to license them.

It is very clear that BEA Tuxedo will not be a part of the Fusion architecture. It's still unclear exactly which components of the Fusion Middleware stack will be used by the Project Fusion applications. Certainly, Oracle Application Server will be one of the core components, as will XML Publisher. It also seems likely BPEL Process Manager will also be included. Whether the Enterprise Service Bus, Oracle Internet Directory, Business Activity Monitoring, the Data Hub products, or other specific products will be used seems uncertain at this point.

For customers running a database technology other than Oracle, the company has not yet committed to any long-term position or support strategy.

Batch Processing

All indications are that SQR will not have a place in the Fusion architecture. Customers who have invested heavily in customizing delivered SQRs or creating custom SQR libraries will find themselves faced with the prospect of rebuilding that functionality should it not be found in the new generation of applications. The functionality of SQR as a "pixel-perfect" reporting tool will be replaced by XML Publisher.

The entire concept of batch processing as it is known today will change dramatically. COBOL and SQR batch jobs have traditionally been very data-centric, and are somewhat difficult to fit into a service-oriented design pattern. Oracle is working to determine an appropriate replacement for batch processing and scheduling. While some business processes, such as payroll calculation and processing, are inherently periodic, many other business processes currently handled by batch jobs may easily be converted to real time transactions through event-driven design and orchestrating the execution of service requests. Moving the overall application design to a more event-driven, real time processing model reduces the overall dependency on batching-up work to be processed at some scheduled time.

Infrastructure Transition

Oracle has been actively working on integrating Fusion Middleware with the PeopleTools 8.4X toolsets. This integration will allow PeopleSoft customers to gain experience with the Fusion Middleware, and stabilize their deployments, before they begin the transition to the Fusion applications.

The following table describes the basic roadmap to the Fusion Middleware based on currently announced Oracle support plans.

PeopleTools Version	Supported or Certified Components	Implications
PeopleTools 8.46	Oracle Internet Directory BPEL Manager	Very little integration available, but customers could integrate the Oracle directory and the current version of BPEL manager with PeopleSoft. Only schools that already have these products, or have a commitment to these products already will want to worry about integration with this version of tools.
PeopleTools 8.47	Oracle Container for Java (OC4J) Portal 10.1.2 Oracle Single Sign-on (SSO) Oracle Integration	Integration in this tool set is more complete and includes several products (OC4J and Oracle Integration) that will be important parts of the transition to Fusion. The most logical step would be for schools to decommission WebLogic and WebSphere, and implement OC4J. Note, BEA Tuxedo will be needed for all PeopleTools versions, but will not be part of the final Fusion architecture. Schools that want to be more aggressive could begin the deployment of the Oracle Enterprise Services Bus (ESB) and BPEL orchestration. PeopleSoft applications won't likely leverage these directly in any meaningful way (that will happen in Fusion), but schools could use them to assist with integration with other campus systems. Single Sign-on deployment would only make sense for some customers, but not those with other SSO solutions. Transition to Oracle Portal may make sense for some schools, but is probably only compelling if your school is committed to moving to the Fusion Applications in the future.

PeopleTools 8.48	Business Activity Monitor (BAM)	Use of XML Publisher will make sense for nearly every school. Reports may not be transportable to Fusion due to data structure changes, but some formatting and layout will be able to transition.
	Enterprise Manager	
	Discoverer	
	XML Publisher	Use of analytical tools such as Discoverer and Data Hubs will make sense for customers that see Oracle as the provider of their Business Intelligence tools.
	Data Hubs	
		Enterprise Manager is already in use by many schools with their Oracle databases, so extending its use will be a logical step.
PeopleTools 8.49	Unknown at this time	The TAG expects integration with the Fusion Middleware to improve in PeopleTools 8.49, but the exact plans of Oracle are unknown at this time.

The rate at which a school adopts Fusion Middleware will need to be based on the school's commitment to the Fusion applications. If an institution is considering the future adoption of Fusion applications, then taking small steps in the infrastructure will make sense, even before a final decision is made. If a school is fully committed to moving to the Fusion applications, then a more aggressive transition to the Fusion Middleware is justified.

It should be noted that Oracle regularly publicizes its "hot pluggable" approach to architecture. This means that Oracle believes that its customers can choose to plug in different vendor products throughout the infrastructure. While the TAG believes that some substitution of products will be possible, it is likely there will be some inherent benefits of running the Fusion applications on the Fusion Middleware in the same way that Microsoft Office runs best on Microsoft Windows.

Developer Tool Changes

Oracle Fusion will introduce a completely different set of tools and technologies for application development than were available in PeopleSoft. The table below provides a rough mapping of PeopleSoft development tools and technologies to their planned Fusion counterparts. As with other parts of this document, the TAG recognizes that some Oracle plans have not been finalized, so this mapping could change.

PeopleSoft Developer Tools	Oracle Developer Tools	Notes

Application Designer	JDeveloper with Fusion extensions	Oracle is positioning JDeveloper as a full-feature Integrated Development Environment (IDE) which will be the control center for all Fusion application development.
		JDeveloper will have robust integrated version control, much more powerful than Change Control locking in current PeopleTools releases.
		JDeveloper will store customizations in "layers", preserving the originally-delivered functionality, locale-specific functionality, and all generations of changes.
		It will also offer "shaping," which will customize the look, feel, and availability of features within the environment based on roles and permissions granted to the user. For example, a business analyst could have access to a different set of features in JDeveloper than a Java developer.
		JDeveloper will feature several declarative interfaces that will be metadata driven (like PeopleTools) that should simplify Java development, but Java will be at the heart of all applications.
		Oracle Java coding is built entirely around the Oracle Application Development Framework (ADF). So Java developers will need to become very familiar with these proprietary classes and functions.
Application Engine	Java in JDeveloper	Oracle's declarative interfaces along with Java will be used for development. It is not clear at this time if any specific features or functions of Application Engine will be adopted.
SQR – Batch processing	Java in JDeveloper Oracle Warehouse Builder	Oracle's direction for batch processing has not been clearly stated, but it seems likely to be based on the same tools as the online transactions.
		Many institutions use SQR for Extract/Transform/Load (ETL) processing. Oracle's ETL tool, Warehouse Builder, can be leveraged for this purpose.

SQR – Reporting	Oracle Report Center (Discoverer) XML Publisher Word Add-In	Discoverer is a reporting tool which is more comparable to Crystal Reports, but could be used for some SQR reports. XML Publisher will have procedural capabilities which would allow advanced processing that is often part of SQR reports.
Query	Oracle Report Center (Discoverer)	This functionality will be replaced by Oracle's traditional query tool.
nVision	Unknown	It's not clear how Oracle plans to address this functionality. It may be that enhancements to XML Publisher or Discoverer provide this functionality.
Crystal Reports	XML Publisher Oracle Report Center (Discoverer)	XML Publisher will provide the most advanced formatting options, including integration in to advanced templates in productivity tools like Microsoft Word. Discoverer will provide traditional query support.
Report Manager	Unknown	Oracle will have a Metadata Store (MDS), and this might be where this type of information ends up residing. Exactly how it will be presented to users is not clear.
PSADMIN	Oracle Enterprise Manager Enterprise Manager Plug-In	OEM will be the systems management tool for all Fusion Middleware components. In PeopleTools 8.48, Oracle will provide the plug-in to allow management of PeopleTools components from OEM.
Change Assistant	Oracle Warehouse Builder	Oracle appears committed to support the "A2B" upgrade approach that PeopleSoft had been pursuing before it was acquired. This approach will use Oracle's Warehouse Builder (OWB) product as the supporting ETL tool. OWB will include a Patch Analyzer tool to help determine impact of patches.
Workflow Engine	BPEL Process Manager	Oracle's BPEL product provides process orchestration in accordance with the BPEL standard. Oracle is also enhancing its tool so it will also include workflow management tools which provide operational support for process orchestration.

Recommendations for the Road to Fusion

Each institution will need to evaluate Fusion Middleware and applications based upon their own unique situation. The TAG suggests that institutions consider doing the following:

- *Gain expertise in Java, XML, XSLT, SOA and related technologies.*

   It appears these technologies will not only dominate Oracle's product suite, but the entire enterprise administrative application space for the foreseeable future.

- *Assess license cost.*

The HEUG Board should make licensing costs a high priority issue when they work with Oracle. Meanwhile, member institutions may need to address licensing independently because of their unique license agreements with PeopleSoft and Oracle.

Institutions should seek clarity from Oracle on what parts of the Oracle technology stack will be included under their current licenses, and the exact constraints that exist on the usage of the products. Institutions should also seek clarity on if any software requirements exist for Fusion that will change licensing requirements when/if they move to the Fusion applications.

- *Monitor Oracle's approach to batch processing closely.*

   HEUG institutions currently have significant batch processing activity, and much of this relies on SQR. At this point Oracle has not articulated its approach to batch activity. This is an important operational area, and HEUG institutions should continue to provide input to Oracle on their needs in this area.

- *Gain experience with Oracle tools.*

   Many of the Fusion Middleware components can be downloaded for free, as long as they are not used for production systems. This provides institutions the ability to begin learning about the technologies without making large financial commitments. The TAG recommends that member institutions download JDeveloper, XML Publisher and other tools and begin the process of understanding their strengths and weaknesses.

- *Start deploying Fusion Middleware.*

   When licensing issues are resolved, begin the transition to the Fusion Middleware in your PeopleSoft environment. The final cost of your transition to Fusion applications could be reduced if you have already established a stable Fusion Middleware infrastructure and developed the pertinent expertise.

Section 2: Upgrades and Maintenance

Before the acquisition of PeopleSoft by Oracle, one of the major areas of concern for HEUG institutions was the high cost and large effort associated with PeopleSoft upgrades and maintenance. In response to input from the TAG and other groups, PeopleSoft made significant changes to its maintenance process over the past years, most recently as part of their Total Ownership Experience initiative, and was poised to develop a new upgrade approach as well.

Even though most institutions will first focus on the transition to Fusion, ultimately the approach for Fusion-to-Fusion patches and upgrades will be a large driver in the cost of ownership of Fusion, and the viability of the applications and infrastructure at HEUG member institutions.

As expected, Oracle's attention is currently focused primarily on the PeopleSoft-to-Fusion and Oracle eBusiness Suite-to-Fusion conversions, but they have described the principles they would like to incorporate into upgrade and maintenance of Fusion. These include:

- *Fusion Life Cycle Management*

   Oracle's goal is to create a single, highly-automated change management system for maintaining the Fusion product line. All application maintenance will be centrally managed from Oracle Enterprise Manager (OEM) using plug-in modules. Approvals workflow will be built into the process so that moves to production only take place when authorized. The change management system will also be used for packaging customizations and migrating them to production. All maintenance history will be preserved and auditable for Sarbanes-Oxley compliance.

- *Near zero downtime upgrades.*

   Oracle strategists understand the difficulty of taking down business systems for several days or even hours to accomplish routine or major maintenance. They plan on designing (from the beginning) an approach which will support hot patching of systems, and a near-zero downtime for upgrades. The model being discussed includes an "A2B" upgrade approach

instead of the "upgrade in place" model that had been used by PeopleSoft in the past. Such an approach would allow for a very short upgrade outage that would consist primarily of the "switch‑over" to the upgraded database. Historical and static data could also be converted ahead of time, so that only current transactional data would need to be converted when switching over. The Oracle Warehouse Builder (OWB) tool would be used to extract, transform and load data during upgrades.

- *Components‑ based upgrades.*

  One advantage of a service‑oriented architecture is that applications can potentially be upgraded on a component‑by‑component basis. For example, an institution might be able to upgrade its purchasing system at one time, and then upgrade its general ledger later. A staggered approach to upgrades could drastically alter the cost and impact of upgrades. The details of how incremental upgrades might work will depend on the final design of the applications and infrastructure. As is the case with PeopleTools upgrades today, this flexibility may not extend to upgrades of the technology stack underlying the applications,

In summary, Oracle has articulated a vision for upgrades and maintenance which aligns with the thoughts of the TAG. The real issue is their ability to deliver this vision, particularly in early versions of Fusion.

Section 3: The Cost of Moving to Fusion

Conversion Costs

If moving from PeopleSoft to Fusion was the same effort as a normal PeopleSoft upgrade, then there would be little concern today in HEUG member institutions. PeopleSoft upgrades are not easy, but they are well understood by PeopleSoft customers, and have become part of their regular production support plans. With no experience yet in the public domain there is an understandable concern that instead of an upgrade, institutions may in fact be facing an effort more akin to a re‑implementation.

In order to get a better handle of the cost and efforts of moving to Fusion, the TAG has identified five major factors which they believe will be significant drivers in the overall cost and effort of the transition. These factors are:

1) Conversion of data.

   Every upgrade or transition to new software includes a data conversion effort. This usually involves the execution of hundreds of conversion programs to convert table structures and data values into the new application schema.

2) Transition of infrastructure.

   The PeopleSoft supported infrastructure components (e.g. Tuxedo, WebLogic, Integration Broker) will not be part of the Fusion infrastructure. Therefore in order to adopt the Fusion applications, institutions will need to replace much of their administrative systems technical infrastructure.

3) Reapplying of customizations and extensions.

   To some extent, each PeopleSoft customer has customized the system to meet some of their unique business needs. As part of the move to Fusion, each institution will need to reevaluate these customizations and determine if they need to be reapplied to the new Fusion applications.

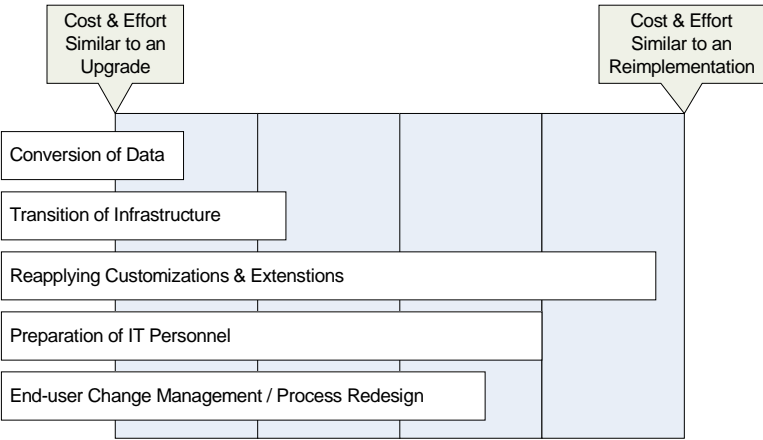4) Preparation of IT personnel.

   The new infrastructure, new development tools and new applications will require new skills from technical support organizations. Training and retooling of staff will be necessary to implement and support the systems appropriately.

5) End‑user change management and process redesign.

   Most institutions have modified their business processes to align with PeopleSoft applications. These business processes will need to be reassessed and aligned with the Fusion applications.

Any significant changes will require traditional end-user change management efforts such as training, documentation and consulting.

The TAG has tried to take each of these five factors and compare them to the effort and cost associated with a standard PeopleSoft upgrade and a total reimplementation. The results of this analysis are depicted in the diagram below.

Cost & Effort Similar to an Upgrade			Cost & Effort Similar to an Reimplementation
Conversion of Data			
Transition of Infrastructure			
Reapplying Customizations & Extenstions			
Preparation of IT Personnel			
End-user Change Management / Process Redesign			

The following table lists the key factors that were used by the TAG to determine these ratings.

	Reasons it will be more like an upgrade	Reasons it will be more like a reimplementation
Conversion of data	Oracle has complete access to PeopleSoft and Fusion data definitions, and should be able to leverage this knowledge for an effective conversion. Oracle has a suite of tools (e.g. Data Warehouse Builder) which they can use to enhance the conversion process. Oracle can take conversion into account for some of their application design decisions (perhaps simplifying complex conversions).	Large scale changes are expected to data structures due to the merging of two separate application suites (Oracle EBS, PeopleSoft). Upgrades don't usually include such large scale changes, and instead usually just feature incremental data structure changes.

	Reasons it will be more like an upgrade	**Reasons it will be more like a reimplementation**
Transition of infrastructure	PeopleSoft and Fusion are based on some standard web architecture components (e.g. web servers) and although different vendor software may be used, these fundamental pieces remain unchanged. Oracle will begin supporting the Fusion Middleware suite in PeopleTools 8.48 and 8.49. This will provide a transition path for schools. Transition therefore doesn't have to be a "big bang" but could occur over several years. No database layer changes are expected. (Although schools that use Microsoft SQLServer may have some concerns in this area.)	Many new software products (e.g. BPEL, EBS) will be added to the infrastructure which will add to the overall complexity of the environment. Overhead of services architecture may lead to higher performance needs which could translate to larger and potentially more costly hardware.
Reapplying customizations and extensions	Oracle is investigating conversion utilities to support transition. Oracle is making XML Publisher available in PeopleTools 8.49. This might make some reports transportable to Fusion (if underlying data structures don't change). New applications could better align with business processes reducing the need for customizations.	Fusion toolset is radically different than PeopleSoft toolset, so code from PeopleSoft applications will not be applicable in Fusion. This is true not only of PeopleCode, but of SQR, nVision, App Engine and all development tools. Programming conversion utilities have historically provided minimal value. Due to large scale application changes, previous analysis and design work will at a minimum, need to be reviewed and re-evaluated, and may have to redone. Early versions of Fusion may be incomplete and require more enhancements until more mature version is available.

	Reasons it will be more like an upgrade	Reasons it will be more like a reimplementation
Preparation of IT personnel	No changes at database layer. Oracle is making XML Publisher available in PeopleTools 8.49. This will make it possible for staff to get some experience before the move to Fusion.	The shift to Java as the primary development tool will require significant training for existing PeopleTools programmers. Since it is likely that most PeopleTools programmers do not have significant experience with Java, we expect this transition will be similar in magnitude to the switch from mainframe programming to PeopleTools that occurred during most implementations. New infrastructure components will require new technical skills, and support procedures.
End-user change management and process redesign	Oracle appears committed to support of some fundamental PeopleSoft concepts (e.g. effective dating, set ids). Some PeopleSoft processes will be incorporated in Fusion. (Student Administration is likely to have the most processes incorporated in the Fusion applications due to the large customer base and strong product.)	The merging of Oracle eBusiness Suite and PeopleSoft applications will likely result in significant change from the PeopleSoft processes. New interfaces, flows and processes will require redesign of training materials. Test scripts (automated or manual) will need to be reviewed and many rewritten.

Every institution should apply their own weighting to these factors in order to assess their overall cost and effort. For example, an institution that has many experienced Java developers may not consider the factor of "Preparing IT personnel" as important as an institution that currently only does PeopleTools development. Institutions may also be able to contain costs by extending their transition over many years, and avoiding a big-bang implementation.

Licensing Costs

The transition to Fusion will require a major shift in the underlying technical infrastructure and applications for PeopleSoft customers. These changes will also likely lead to licensing issues for many HEUG institutions. At the present time it is impossible for the TAG to accurately assess how licensing costs will change, but the following list describes the information that has been gathered at this point, and some of the conclusions that have been drawn by the TAG.

Applications covered by your existing PeopleSoft license

The TAG has not thoroughly investigated application licensing issues. The TAG does believe that given the current information available, Institutions should presume that all existing application functionality will be covered by their current license. Institutions would only have to license new applications if they add functionality.

Infrastructure covered by your existing PeopleSoft license

Like the application space, there are many questions still open about infrastructure component licensing. Given the information available today, the TAG believes Oracle will require institutions to license additional software which is used by or with the Fusion applications.

Oracle has announced that all PeopleSoft customers are eligible for an "Application Specific Full Use" (ASFU) license of some Oracle products (e.g. Oracle Java Container, JDeveloper, TopLink, Enterprise Manager). We are not sure at this time if other products will be added to this list. Oracle has also announced that some products are currently not included in the ASFU. These include BPEL Process Manager, Integration, Discoverer, and Server Identify Management/Single Sign- on. Oracle has publicized a "special" package price for these products for PeopleSoft customers.

The TAG is concerned that licensing of infrastructure software could become a large expense for all or some HEUG institutions. The TAG has not received conclusive and definitive communication from Oracle, and there are several open issues. These issues include:

- *PeopleSoft Workflow functionality is being replaced primarily by functionality in BPEL Process Manager. Will BPEL Process Manager be covered under our current licenses?*

    The TAG has not received a definitive answer on this issue yet. At the present time the answer appears to be "No, BPEL Process manager is not covered in our current licenses." The TAG believes this would be problematic, and that the HEUG Board should challenge this position. Institutions should make sure this product is included in their license before agreeing to any modification of their terms.

    The TAG is also worried that workflow is not easily contained within one application, and often requires integration of multiple applications. If Oracle adopts the "ASFU" model, then having a workflow which routes something to non- Oracle application may not fall within the license agreements. This might render the limited license unusable in some situations.

- *Service orientation is a key to Fusion, and the Enterprise Services Bus (ESB) is the heart of processing services. Will the ESB be covered under our current licenses?*

    Again the answer appears to be "no." The TAG doesn't understand how an institution can run the Fusion applications without the ESB. Again, the HEUG Board should pursue this issue and that Universities should be careful before modifying the terms of their current licenses with Oracle.

    Even if Oracle does eventually agree to include the ESB in the normal ASFU license, the TAG is concerned that the nature of messaging technologies will make the license ineffective for an enterprise system. For example, it is not clear how service messages for enterprise systems that come from departmental systems would be covered under ASFU license terms. A narrow interpretation of the ASFU license would indicate that these messages would not be covered under the license, and that a broader license would need to be purchased.

- *Oracle's license approach may have the affect of discouraging some PeopleSoft customers from transition to Fusion Middleware in the next few years.*

    The TAG believes it's in Oracle's best interest to have HEUG institutions move to the Fusion Middleware with the next few releases of PeopleTools. If schools begin the transition to this middleware, it will make their eventual move to Fusion applications easier. Unfortunately Oracle's currently announced licensing strategy appears to discourage institutions from adopting Fusion Middleware for use with their PeopleSoft applications. Oracle is requiring that customers purchase some Fusion Middleware components that the TAG believes should be covered as part of the ASFU license.

Oracle has thus far not addressed these types of concerns, and it is not clear how this will be handled in the future. At this point the TAG recommends that Universities build additional licensing costs into their Fusion transition plans. We also recommend that the HEUG Board work with Oracle to help establish an understandable and supportable licensing strategy for Fusion Middleware and applications. The TAG recognizes that Oracle needs to receive fair compensation for their software products, but the TAG also believes that HEUG institutions should receive all core components as part of their existing PeopleSoft licenses.

Operating Costs

There is very little information currently available regarding the cost of ownership for the Fusion application and middleware suite. That said, the TAG has compiled a list of indicators which institutions may want to consider as they try to forecast ongoing costs. These indicators are:

- *Oracle is working on simplifying Java development.*

  The shift to Java as the development environment could significantly increase the operating expenses associated with enterprise systems. Oracle recognizes this and has shown a commitment to create "declarative" interfaces which leverage underlying metadata. These interfaces will allow many components to be built without direct Java coding. The TAG believes the overhead on developing raw Java code will be much more than PeopleCode, so declarative interfaces could help contain operating costs. The TAG believes Oracle has the right goals in this area, but it is not clear how much the programming environment can be improved with the first release of Fusion.

- *Service architecture will add complexity.*

  Fusion will be the first version of Oracle applications which relies heavily on service orientation. The overall complexity of the applications architecture and infrastructure will increase, and early versions of Fusion are likely to be less mature and robust until these technologies have time to evolve. This could lead to increased operational costs, especially in the first release of the Fusion applications.

- *Centralized management tools.*

  Oracle is committed to leveraging the Oracle Enterprise Manager tool as the control center for the Fusion Middleware and applications. Providing an effective and centralized management tool could help drive down the cost of managing the infrastructure.

- *Increased licensing costs.*

  As discussed above, institutions may have additional ongoing license fees associated with new middleware components.

Overall the TAG believes the cost of ownership of Fusion will be larger than PeopleSoft, but our conclusion is not based on many specific facts. If Oracle can successfully address several issues, the cost could be similar. The TAG believes it is unlikely that the overall cost of ownership will go down, especially in early versions of Fusion.

> **About the TAG**

The Technical Advisory Group (TAG) is the HEUG product area group (PAG) responsible for the Oracle technical products which affect enterprise systems. Members are selected by the HEUG Board, and serve three year terms. The members of TAG are:

> Criss Laidlaw, Williams College (2006 Chair)
>
> Paul Czarapata, Kentucky Comm. & Tech. College Sys (2006 Vice Chair)
>
> Tina Thorstenson, Northern Arizona University
>
> Terry Blishak, University of Louisville
>
> Rob Brennan, University of Western Ontario
>
> Jack Duwe, University of Wisconsin
>
> Kristal Jackson, University of Central Florida
>
> Lisa Kiracofe, James Madison University
>
> Steve Lewis, Gettysburg College
>
> George Mansoor, California State University System
>
> Aaron Neal, Indiana University

Corey Pedersen, University of Utah

Chris Rigsby, University of Minnesota

Bill Wrobleski, University of Michigan

Richard Yantis, Texas Christian University

Ken Yelton, University of Missouri System

Traditionally the TAG has met twice a year with PeopleSoft/Oracle strategists. The most recent meeting was in January 2006. During this visit the TAG met with over twenty different Oracle Product strategists to discuss the directions for Fusion Middleware and Project Fusion.

TAG also holds monthly conference calls and responds to issues generated by member institutions. If you have further questions about the TAG and/or this document, please contact us at tag.pag@list.heug.org.

Asynchronous Javascript and XML (AJAX)   Often referred to as "Web 2.0." A set of technologies for making web page content more dynamic, avoiding page refresh delays. For example, AJAX can allow the update of one part of a page while leaving the rest of the page as is and also support drag and drop on a web page.

Business Process Execution Language (BPEL)   A standard used for orchestration of services. Oracle's instantiation of this standard is the "BPEL Process Manager." This product is based on BPEL standards, but also incorporates many proprietary workflow features from Oracle.

Enterprise Business Suite (EBS)................Oracles current (non-Fusion) applications. Oracle plans on incorporating the "best of" EBS and PeopleSoft in their Fusion applications.

Enterprise Service Bus (ESB)......................Oracles messaging software which serves as the backbone for its overall service architecture. The "traffic cop" which handles requests and assures they are routed to the correct systems and guarantees they are received correctly.

Java EE...Java Platform, Enterprise Edition (Java EE) is the industry stand for developing portable, robust, scalable and secure server-side Java applications, Building on the foundation of JAVA SE (Server Edition), Java EE provides web services, component model, management, and communications API's that make it the industry standard for implementing service-oriented architecture (SOA) and web 2.0 applications.

JDeveloper...Oracle's application development environment. It is a full-featured environment which will include declarative interfaces to simplify Java development, and specialized functionality like code version control.

MetaData Store (MDS)................................Repository for all Fusion application and reporting metadata. There can be one MDS for the entire enterprise or separate ones per application.

Model-View-Controller (MVC)...................A software architecture that separates an application's data model, user interface, and control logic into three distinct components so that modifications to the view component can be made with minimal impact to the data model component. See

http://java.sun.com/blueprints/patterns/MVC-detailed.html

Oracle Container for Java (OC4J)............... Oracle's Java run-time environment.

Oracle Enterprise Manager (OEM)............. Oracles system management control center. System management for all layers of the Fusion infrastructure will occur within OEM.

Oracle Warehouse Builder (OWB)............... Oracle's Extract, Transform, and Load (ETL) tool. Used both for upgrades and for reporting data extraction

Service-Oriented Architecture (SOA).......A set of loosely-bound application services that can be monitored, managed, and modified; Application services are exposed through a standardized interface; Services communicate across the internet using secure WS (Web Services) protocols; All Service descriptions reside in a central service repository; A service encapsulates business logic for a single activity. (From Services-Oriented Architecture, by Thomas Earl 2005)

eXtensible Markup Language (XML).........A flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. XML is a formal recommendation from the World Wide Web Consortium (W3C).

eXtensible Stylesheet Language – Formatting Objects (XSL-FO)

XSL-FO is a page description language that is used to generate precise printed formats such as PDF with an XML notation. Oracle's XML Publisher product transforms XML documents into XSL-FO.

eXtensible Stylesheet Language Transformation (XSLT)

A language for transforming XML documents into other XML documents. XSLT is designed for use as part of XSL, which is a stylesheet language for XML.

Web Services for Remote Portlets (WSRP)   Standard dynamic plug-ins for portal pages. WSRP defines how to plug remote web services into the pages of online portals and other user-facing applications. This allows portal or application owners to easily embed a web service from a third party into a section of a portal page (a 'portlet').