Analyzing maintenance collaboration in multiple overlapping SAP instances

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Abstract

This paper presents a methodology for analyzing maintenance collaboration across multiple overlapping SAP instances. The problem domain is characterized as follows. Two SAP projects are in the realization implementation phase in the US Navy. The first project focuses on Aviation Program Management, and the second project focuses on Aviation Supply Chain Management. After a prototype implementation, the Navy realized that collaboration across the projects is complex, especially in the areas of Asset Tracking, Configuration Management, and maintenance. There is a strong desire to collaborate across the solutions if collaboration is cost-effective. The research hypothesis is the following. It is possible to develop and execute a methodology for analyzing the gaps and overlaps across multiple SAP software instances to assess collaboration potential. We conclude that it is possible to provide an analytical framework for analyzing overlapping SAP instances, but we also conclude that collaboration, in this case is not cost-effective, and that the two projects should be merged into a single SAP[16] solution.

Keywords

Collaboration, Asset Tracking and Configuration Management, Enterprise Solutions.

INTRODUCTION

This paper presents a test of hypothesis[17] via an analysis of collaboration potential across multiple overlapping SAP projects. Two SAP projects are in the realization phase of implementation in the US Navy. The boundaries for the projects were specified from a functional as opposed to a business process perspective. The first project focuses on Aviation Program Management, and it is known as the SIGMA project. The second project focuses on Aviation Supply Chain Management, and it is known as the SMART project. After a prototype implementation, the Navy realized that there is significant boundary overlap, especially in the areas of Asset Tracking, Configuration Management, and

[16] Both solutions were version 4.6c of the R/3 software.
[17] The word hypothesis, as used in this paper, simply means an assertion that could be true or false.

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maintenance. There is a desire to collaborate across the projects if collaboration is cost-effective.

One should note that enterprise definition is the source of the problem. SAP is designed as an enterprise solution, encompassing all business processes within enterprise boundaries. One could argue that the interoperability problem would not exist if the enterprise were the US Department of Defense, or perhaps, just the US Navy. Complexity and political realities have such alternatives to be considered, must less being analyzed by a formal trade-off analysis. The defense enterprise is so large that it is almost impossible to define any enterprise wide solution, and that was certainly the case for these Navy projects.

The research hypothesis is the following. It is possible to develop and execute a methodology for analyzing the gaps and overlaps across multiple SAP software instances to assess collaboration potential. The constraints imposed on the testing of the hypothesis by the project sponsor are the following:

- The results must be presented so that senior management can easily understand the implications of the analysis.
- The results must be presented at a level of detail that is technically precise, enabling support for new scoping or configuration decisions.
- Lengthy interviewing and design efforts are not allowed. The analysis must be accomplished using existing project data (i.e., reports, models, drawings, etc.).

The hypothesis was tested using a new methodology that was developed on the SIGMA and SMART projects.

The structure of the solution is the following. The Accelerated SAP (ASAP) methodology is enabled by the Question & Answer database (Q&Adb). The Q&Adb provides direct access to the R/3 reference hierarchy, and reflects the hierarchy to the transaction code level for all business processes that are in scope. The reference hierarchy in an SAP solution is the decomposable structure of the business processes that are executed by the software. We developed a second view of the hierarchy, which we call the Solution Map View, a term that is borrowed from an SAP sales support tool. The Solution Map view is a simple functional view of the detailed processes from the reference hierarchy; hence, providing the mechanism for presenting the results to senior managers.

The solution relationships are described with the aid of Figure 1. Using the Business Process Master List (BPML), the Business Process Procedures (BPPs) as managed in the Q&Adb, and other documentation, we construct and reverse engineered a Q&Adb to provide the following:

- A Solution Map of the configuration, which may be displayed relative to a complete R/3 Solution Map (this is the presentation to senior managers), and
- Detailed business process models of the configured (i.e., customized) business processes, which may by displayed relative to the R/3 reference model (this is the technical detail that is necessary for addressing collaboration potential). These business processes are the actual processes that were configured by the implementation team.

The model links a function-oriented view (i.e., the solution maps) of the two software solutions to the business processes that are implemented by the software.

The resulting business process models are used for resolving collaboration issues across the two projects.

Since the solution is built from the Q&Adb, minimal interviewing and modelling is required as long as the ASAP methodology was followed. This meets the requirement of using existing project data.

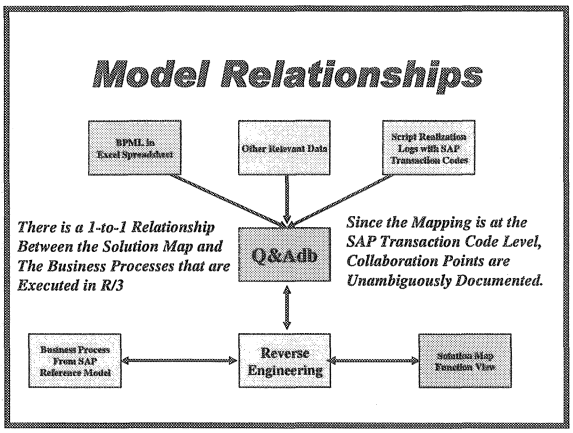

Figure 1 - Model Relationships for Testing Hypothesis

This methodology was successfully implemented on the SIGMA and SMART projects; hence, testing the primary hypothesis. The details of the solution, the implementation domain, and the testing of the hypothesis will be presented in the following sections

THE PROBLEM DOMAIN

At the request of the SMART and SIGMA Program Directors, we focused on understanding, documenting, and analyzing the SMART and SIGMA solutions as they are enabled by the SAP software, providing a pure functional assessment, from an SAP R/3 perspective, of the collaboration possibilities across the SIGMA and SMART solutions and how that collaboration might be improved.

In order to accomplish such an assessment, an unambiguous baseline for comparing the solutions is required. Since different contractors and contracting methodologies were used across projects, the raw project documentation is not comparable. This is a typical situation when trying to make comparisons across ERP solutions. Different contractors approach problems in different ways, and different contracts require different deliverables.

However, the projects do have one thing in common, the R/3 software. Hence, we mapped the disparate documentation from both projects to the R/3 reference model, constructing business process hierarchies for SIGMA and SMART. These business process hierarchies form the comparable baseline for our analysis. Hence, we know we are comparing "apples to apples," since both projects are mapped to the R/3 reference model.

METHODOLOGY

SAP project details, including business process scope, are usually documented in the Q&Adb. Our approach uses modern tools, provided by IDS Scheer, Inc., to "reverse engineer" the Q&Adbs from the Navy projects, revealing their Solution Maps and C-Business Scenarios for the project scopes that were defined during the ASAP implementation phase by the implementation teams.

The above approach is only approximate; however, this level of detail is sufficient to support an objective discussion of functionality overlaps and gaps. The approach is described with the aid of Figure 1. Project documentation is produced during all ASAP phases. If one strictly follows SAP's recommended methodology, this project information is stored and managed in the Q&Adb. For example, in the Blueprinting Phase the consultants lead interviews or construct models to document project scope. Once the scope information is stored and analyzed in the Q&Adb, a macro is executed that generates a Business Process Master List (BPML), which is a first cut at transactional scope (i.e., the business processes to be included in the implementation as well as the SAP transactions that are enabled by these business processes).

In reality, the process is never so pure. Consultants have adapted the ASAP methodology to meet their own needs, and it is often the case that the Q&Adb is never fully populated. In short, the BPML is often generated by other means, which was precisely the case for the SMART and SIGMA implementations. We had various data sources, including the BPMLs for both projects. We loaded much of this information into the Q&Adb to support our analysis.

Once the project information is in the Q&Adb, we used a modern methodology and supporting toolset to analyze the information. The toolset is called ARIS for MySAP.com, based on the ARIS architecture developed by Scheer. Using a bi-directional interface with the Q&Adb, we used the ARIS toolset to "reverse engineer" the Q&Adbs to produce two types of project documentation:

- Solution maps for easy summary presentations to senior executives, and
- Business process models for detailed study and analyses by implementation teams and others who need to understand the details of SAP enabled business processes.

Each of these presentation formats is described below.

The approach that we selected has major advantages over paper-based documentation generated from drawing tools, such as Visio. Since ARIS for MySAP.com operates directly on the Q&Adb, all documentation is precisely linked to the R/3 reference model. That is, since the business functional scripts are mapped at the transaction level, the resulting solution maps and business process models are directly related to each other, as well as the R/3 software. This provides a precise view of business process scope relative to what has actually been configured by the project teams.

The second advantage relates to configuration management and consistency of documentation across SMART and SIGMA. Since all documentation is stored in a repository, changes are immediately reflected across all business process and other

views. For example, if an object is contained in ten business processes in multiple organizational views, a single change to the object is immediately reflected in all views where that object occurs. This is in direct opposition to drawing tools (like Visio), where each drawing that contains the object must be manually updated. In addition, if SMART and SIGMA are documented using the same methodology, and both are directly mapped to the R/3 reference model, unambiguous comparisons across the projects are possible. All the business process information can be easily published and modified through the Internet, supporting work at multiple locations.

Analysis of collaboration alternatives still requires manual input. For example, if there is documented business process overlap across the two projects, someone still has to make a decision about how the overlap will be resolved. However, with our approach, at least you know that you have overlap, and you can analyze the implications of various resolution strategies. In short, there is no "silver bullet" for resolving project boundary issues. In the end, the senior executives must understand the boundary issues and the implications of resolving one way versus another, and finally, someone has to make a difficult decision. Our approach only provides documentation to support that decision.

Solution Maps

Solution maps are simple functionally matrices that indicate functionality that is supported by the R/3 software solution. An example of a solution map is presented in Figure 2.

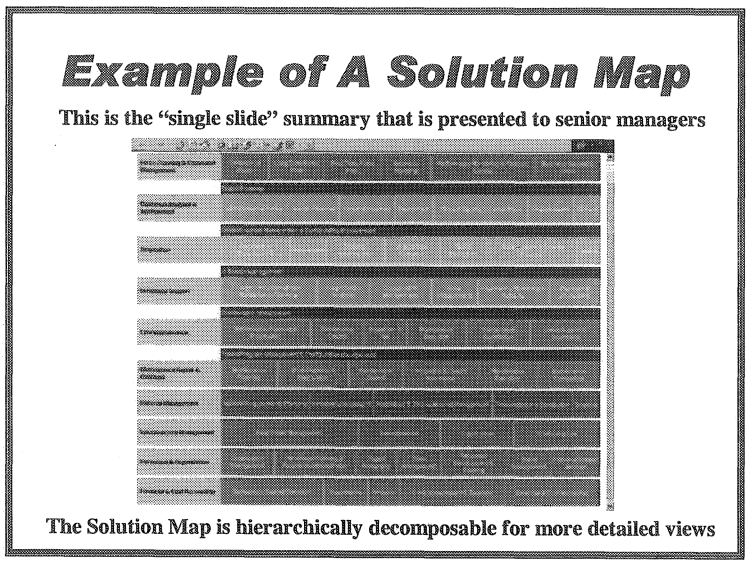

Figure 2 - High-Level SAP Solution Map

Solution maps are used by SAP as a pre-sales tool. They are used to show customers the functionality that is "covered" by a particular industry solution. The

"cells" in the matrix are decomposable, providing views of more detailed functionality. As one "drills down" to lower levels, SAP provides an indication of functionality availability as:

- SAP component available,
- SAP component available with future releases,
- Future focus,
- Partner product available, and
- Partner product available with future releases.

Since SAP uses solution maps as a sales tool to senior executives, it seems reasonable that the format is valuable for providing a management overview for a particular solution. In fact, that is our reason for using solution maps to document SMART and SIGMA functionality.

The problem with SAP solution maps is that they are not linked directly to the R/3 software. For example, a random cell selection in the SAP Defense Solution Map is labelled "Achieve Personnel & Material Readiness to Redeploy." While there is some useful information in the title, a picture of the steps in this business process would be extremely valuable. The process could be studied for "gap-fit," or at later stages the picture could be used to support configuration or even training. Hence, the independent solution maps do not contain enough detail to support the needs of the implementation team. While they do provide some information to managers, solution maps (from an SAP perspective) are primarily used to support the sales process. Our contribution is that we use ARIS for MySAP.com to directly link the solution maps to the business processes that are enabled by the software, and use the gained visibility to test our hypothesis.

Business Processes

A Business process is a sequence of functions that are executed by organizational units, according to appropriate process logic, using the necessary data. This ensures that an overriding task (relating to certain objects) is completely carried out (Kirchmer, 1999). Business processes in SAP are documented in the R/3 reference model. Consider the presentation in Figure 3.

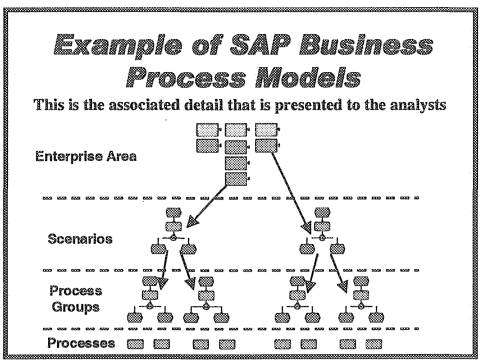

Figure 3 - Business Process Structure in SAP

Within SAP, business processes are defined according to levels, with each level providing more detail. As in the solution maps, as one navigates to lower levels, more detailed information is revealed to support analyses. At the lowest level, the SAP transaction level, the execution of the software is precisely defined.

There is a one-to-one relationship between the business processes and the solution maps, but the one-to-one relationship is not provided by SAP. We used ARIS for MySAP.com to define this relationship. We create the solution maps in ARIS and "link" them to the business processes in the reference model through the reference structure in the Q&Adb. That is, for every business process that is configured in SIGMA or SMART, we can "back out" a solution map representation. If we had fully populated Q&Adbs (as called for in a pure ASAP implementation), the mapping is straightforward. Since SMART and SIGMA used other means to derive the BPML, it took longer, but we were still able to produce the result.

Solution Maps and Business Process Views

The one-to-one mapping between business processes and solution maps allows one to view projects in different ways. Figure 4 presents three ways that are useful for SMART and SIGMA.

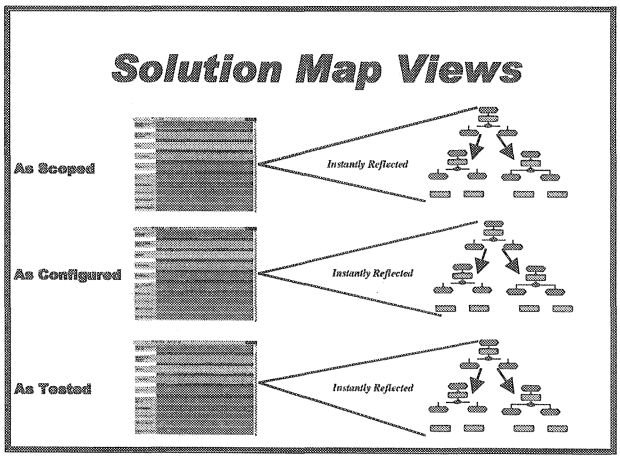

Figure 4 - One-to-One Relationship between Solution Maps and Business Processes

The scoped business processes are included in the BPML that was delivered as part of the Blueprinting phase. We can present the scope of both projects as solution maps or business processes. Since we have access to the Business Functional Scripts (i.e., the Business Process Procedures), we can present the actual configuration as business processes or solution maps. As the test scenarios mature, we can do the same presentations for the "as tested" views.

This provides a simple way to present project progress to managers, since this type of information is not available in a typical DoD program "roadmap." Configuration progress can be mapped against scope, or solution maps could be constructed to align with implementation schedules so that progress can be

monitored over time. There are a number of possibilities for providing useful information.

ANALYSIS

Our analysis of the detailed SMART/SIGMA business process architecture is included in this section. We provide:

- An unambiguous analysis that is based on project documentation as opposed to meetings, and
- A methodology for managing the implementation of the desired alternative, and a strategy for fixing as opposed to just analyzing the current configurations.

Our analysis does not include political constraints, but only the constraints of the SAP software. We focus on the proper implementation of the software to achieve maximum benefits from the software solution at the lowest cost. The foundation of our analysis requires an agreement on some observations about how the projects were originally scoped relative to the R/3 architecture:

- The project boundaries were functionally defined as opposed to organizationally defined.
- While this was rectified in some areas, certain aspects of the original scoping still exist across SMART and SIGMA; e.g., the divisions of O-, I-, and D-level maintenance functionality[18].
- Some interfacing is unavoidable; i.e., some legacy systems are mandated on the Navy by external organizations [e.g., Defense Financial & Accounting Services (DFAS)].
- Some interfacing is avoidable; i.e., Navy interfacing to Navy.

While these observations are not controversial, they do present some interesting challenges for the implementation teams. Our analysis focuses directly on these challenges.

Before presenting the analysis, we state the results. Our results indicate that maintenance activities should not be artificially divided across two instances of the R/3 solution; i.e., we argue against collaboration across the current boundaries. Our recommendation is that all maintenance activities be moved into an aviation instance, preserving the natural business process boundaries of the R/3 software. The supply instance should focus on wholesale logistics and other NAVSUP-specific business processes; hence, creating a solution scope that is similar to a private sector supply chain solution. NAVSUP and NAVAIR employees can collaborate across the two realigned instances while preserving current organizational boundaries. This result is based on the following observations, which are described in detail in this section:

- The current SMART and SIGMA boundaries "fragment" the defense solution as identified by SAP's defense customers, and

[18] This is standard Defense Department terminology for Operational, Intermediate, and Depot maintenance.

- The current SMART and SIGMA boundaries create significant and avoidable technical problems that drive complexity and cost, while creating significant risk.

If our analysis is correct, then the only question is: how should the project boundaries be realigned so that they align with the boundaries of the R/3 software? As a precursor to this analysis, we note that some realignment methods are more complex and costly than others. For example, one could move functionality from one project to another; hence, avoiding complex interfacing. This would reduce cost and complexity, but it presents a political challenge. Other methods would preserve the current functional allocation, but would require complex interfacing to enable the R/3 solution across the artificial boundaries.

Our recommended solution is based on our knowledge of the R/3 architecture, the SAP Defense Solution Map and associated business process hierarchy, and our knowledge of how difficult it is to interface with R/3. In the analysis that follows, we will show that

- Current SMART/SIGMA boundaries split the integration instance, creating the need for complex Enterprise Application Integration (sharing of business process logic as well as data).
- The two individual projects do not represent a complete solution. However, the combined projects have good solution coverage.
- The mapping of a product scenario demonstrates the complexity of the sharing of business process logic and data.
- Any complex Enterprise Application Integration is self-imposed; i.e., it is Navy interfacing with Navy, unlike mandated interfaces with other defense organizations.
- Our proposed solution does not require organizational realignment. It only requires that NAVSUP/NAVAIR employees share the same computer system.
- NAVSUP visibility into supply requirements is guaranteed, since the NAVSUP Item Managers (i.e., purchasing agents) operate in a combined aviation instance.
- Cost and schedule issues will have to be worked, but the cost of interfacing cannot compare with the cost of not interfacing.
- The resulting solution is a "best practice" private sector model.

Analytical Details

For the analytical details, we address the assertions in the list at the end of the previous section.

Complexity

Our assertion is that Current SMART/SIGMA boundaries split the integration instance, creating the need for complex Enterprise Application Integration (sharing of business process logic as well as data).

The R/3 system is delivered as componentware. When the basis layer is implemented a complete scope of R/3 functionality is available, and each module is activated as required by the scope of the implementation. The business processes

and data are engineered as part of the integration[19]. Any un-natural divisions of these business processes result in an artificial "break" in the data and business process architectures. For example, since production units are aligned with cost, if sub-functions of Production and Planning (e.g., MRP) are removed from the solution, then complex interfacing is required in order to make the software work as a complete solution. The current divisions in the maintenance areas of SMART and SIGMA fall into this category.

Keller and Teufel (1998) provide the business process functionality of a Plant Maintenance Solution as implemented across an organizational entity. SMART and SIGMA have divided this business process functionally, with part in SMART and part in SIGMA. To provide a complete R/3 solution, the functionality must be re-combined. The current plan is to use some form of interfacing; e.g., a SAP Master Data Hub has been suggested as one possible solution. We argue that this EAI solution (or any other EAI solution) is too complex and should be avoided. Our logic is described below.

EAI versus B2B

These definitions drive the discussion:

- Interfacing [i.e., Enterprise Application Integration (EAI)]: This is the sharing of data and business process logic across hetero/homogeneous instances through message-oriented-middleware (MOM). EAI may be managed by SAP (e.g., ALE) or through solutions provided by private vendors (e.g., IBM, WebMethods, etc.) (EAI is sometimes called Application-Centric Interfacing)
- Business-to-Business (B2B) Connectivity: This is the passing of data (not business process logic) through agreed-upon implementation conventions of standards; e.g., EDI, XML, etc. (B2B Connectivity is sometimes called Data-Centric Interfacing).

EAI typically deals with the integration of applications and data sources within an enterprise to solve a local problem (e.g., interfacing the existing SMART and SIGMA projects is a good example). EAI lacks the features to B2B connectivity, such as community management, trading partner profile management, sophisticated security mechanisms, and support for industry standards, such as Open Buying over the Internet (OBI), Extensible Markup Language (XML), and Electronic Data Interchange (EDI).

In contrast, B2B connectivity is used to pass information to external constituents, such as suppliers and customers. B2B connectivity could support any number of business requirements, such as sharing information with trading partners to support a supply chain or collaborating on a product design. B2B connectivity includes many features that are absolute requirements for interacting with external claimants, but it typically does not include the deep business processes integration that is required when interfacing enterprise systems. The differences between EAI and B2B are significant, even though they both may employ middleware, such as message brokers, to exchange information among various systems. Linthicum (2001) provides a good discussion of these differences.

[19] Integration is a confusing word, and we will provide a detailed description shortly.

These are some of the distinguishing characteristics:

- B2B typically focuses on the sharing of information with external constituents, such as customers and suppliers.
- B2B typically resides outside of the integration domain, but functions in near real-time and with limited end user influence.
- B2B typically passes information using accepted industry standards, such as XML or EDI; where EAI considers the proprietary business process configurations within enterprise software products.
- B2B allows users who understand relatively little about internal business process logic to pass information across organizations, where EAI requires a detailed knowledge of the business processes as they are configured in the interfacing systems.
- B2B requires that trading partners agree on implementation conventions of industry standards. If agreement is reached, information can be easily passed.
- B2B assumes that the source and target enterprise systems cannot be altered; hence, the passing of information is "non-intrusive" in the sense that the business process logic of the interfaced systems is not affected.
- B2B requires advanced security requirements, because the organization is sharing information with external constituents.

SMART and SIGMA, as currently configured, "divide" an SAP instance; i.e., all maintenance requirements could be met in a single SAP instance if the NAVSUP and NAVAIR organizational models would allow it. Since SAP is comprised of integrated business processes, when these integrated processes are divided into two parts (i.e., SMART and SIGMA), the interfacing required to make the solutions work together is complex. Since SMART and SIGMA artificially (from an R/3 perspective) separated the integrated business processes, a solution that accommodates business process integration must be used to put them back together. By definition, this is EAI, and SAP's solution is ALE[20].

Specifically Addressing Interface Complexity

To demonstrate the complexity of the maintenance interfacing under the current implementation plan, we mapped a collaboration scenario to the current solution and documented the interface complexity. The particular reparable item that we were asked to examine is a gyroscope. We were provided with all of the materials related to the "Gyroscope LEAN Mapping Study."

This is a typical repair flow for an avionics component that has been determined to be beyond capability of maintenance (BCM) at the local I-level maintenance facility (AIMD). Approximately 70% of the repairable components that fail at the O-level are successfully repaired at the local I-level. The gyroscope flow is typical of what happens the other 30% of the time. One could argue that this particular gyroscope bounced back and forth more than usual between the Naval Depot (NADEP) and the Defense Logistics Agency (DLA), but there is sufficient evidence to make our point. We have mapped the flow to the SMART and SIGMA

[20] The solution is ALE, because both projects are SAP.

configurations, and we have documented that at least five complex interfaces could be eliminated if all of maintenance was in an aviation instance.

The item was tracked through a standard O-, I-, and D-Level maintenance process, and documented the flow using LEAN mappings. LEAN mapping shows the path of a specific part as it moves from task to task, with the intent of capturing the "life experiences" of a specific part. While LEAN maps are useful for understanding flow, they do not map to the SAP software, so it is impossible to define the interfaces between SMART and SIGMA, as well as external interfaces. To examine the complexity of processing the gyroscope under the current SMART and SIGMA configurations, we mapped the example to the as-scoped solution maps. This mapping provides insight into the complex inter-and intra organizational process flows that support O-, I-, and D-Level maintenance.

The maintenance process crosses several Naval (NAVSUP, NAVAIR) and DoD (DLA) organizational domains. Since these organizations are in the process of implementing the SAP Enterprise Resource Planning system, the analysis also provides a high-level estimate of the type, and the number of R/3 system transaction codes that would most likely be executed if the SAP system were to support the complete gyroscope repair process. The results follow, along with our interpretation of the results.

Gyroscope Business Process Analysis

The complexity of the Gyroscope business process is indicated in Figure 5, which summarizes two lean maps provided by a third party. The gyroscope maintenance process is analyzed from three different views:

- Organizational hand-offs (includes all organizations that "touch" the gyroscope),
- Project hand-offs (hand-offs between SIGMA, SMART, and DLA), and
- Application System hand-offs (all systems, including legacy).

We documented, with the business process architecture, 41 organizational hand-offs, 26 application system hand-offs, and five complex project hand-offs. These five project hand-offs are Navy-to-Navy SAP hand-offs that could be eliminated by realigning the project boundaries.

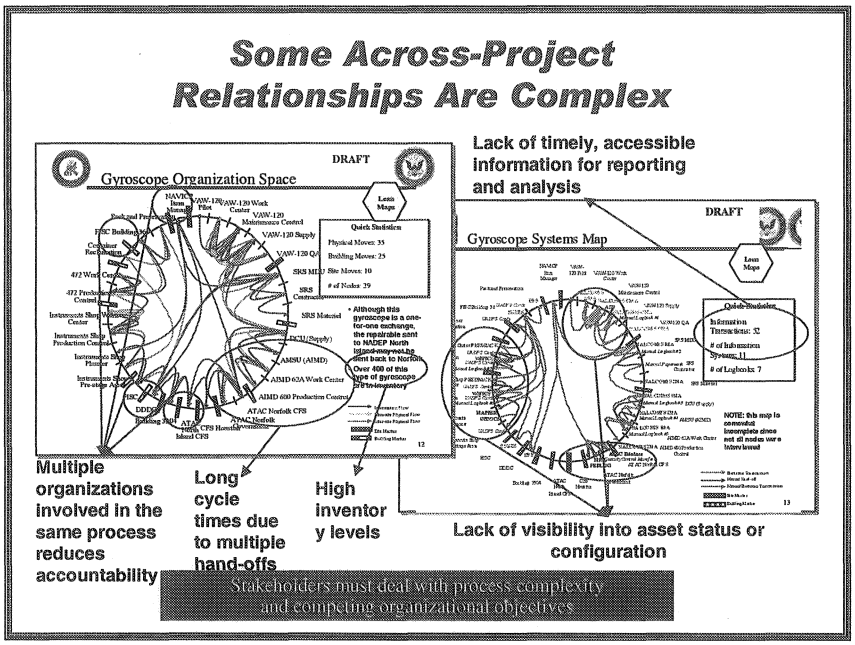

Figure 5 - Lean Maps Describing Gyroscope Complexity

The business process hand-offs between SMART and SIGMA will have considerable impact on the implementations. Every time the gyroscope is moved from one domain to another the material master data must be synchronized with the systems that are participating in the cross-functional repair process. Each transfer potentially requires the synchronization of technical, human resource, financial and document flow data and thus makes the interface requirements among the systems very complex. Given that interfacing is a very expensive proposition, it would be more practical to have all maintenance related data reside in just a single R/3 instance, and thus reduce the need for complex interfacing requirements. A single instance would affect the gyroscope example in the following ways:

- Eliminate hand-offs between SMART and SIGMA,
- Reduce inter-system transactions,
- Possibly reduce the number of outside interfaces,
- Standardize the numbering system (i.e., material numbers),
- Streamline scheduling and capacity planning, and
- Reduce the complexity of matching spare parts supplies with demand while increasing the accuracy of demand planning.

THE BUSINESS CASE

The cost of EAI is difficult to estimate given the available information. Our findings support a wide body of industry and academic research that concludes that interfacing R/3, even if you choose the ALE layer, is difficult. The problem is that

the interfacing is at the application level, and the location in the business process defines the context for the data that is being passed. Enterprise Development (1999)[21] provides a good discussion of these difficulties. Hence, the construction of such interfaces requires significant knowledge of the R/3 architecture, and as argued in Appendix B, this is one reason for maintaining a business process architecture.

Bass and Lee (2002) provide general guidelines on the cost of EAI. "EAI costs come in three components: architecture, integration, and operations. Architecture costs are capital costs related to the initial deployment such as the integration development, execution, and operations environments. They include the license cost negotiated with the vendor, the cost of new hardware required for integration, and the cost to implement architectural software and hardware. Roughly 80 percent of architecture costs are incurred within six months of implementation, while additional expenses may be incurred for hardware or licenses as usage spreads. The complexity of the EAI software and the number of discrete businesses drive architectural costs. The architectural investment is much higher for an EAI solution than custom integration. Integration development costs are separate from architectural costs and are often capitalized. They include development of interfaces and collaborations between systems. These costs are variable and driven by the number of interfaces developed. Integration costs with EAI are generally between 25 and 40 percent lower than with custom integration."

Interfaces on the DLA SAP project cost about $1 million each[22]. EAI software licenses are expensive, and even though the maintenance cost is lower than custom developed interfaces, the cost is still significant. Hence, the pure SAP-to-SAP interfaces are probably on the lower end of the previously presented range; i.e., closer to $5 million than $15 million. Since the SAP-to-SAP interfacing cost of single aviation instance is $0, the business case is compelling.

CONCLUSIONS

We conclude that it is possible to provide an analytical framework for analyzing overlapping SAP instances and implementation projects. This framework permits the unambiguous comparison of gaps and overlaps, since the SAP R/3 reference model is the common basis for comparison, and the configured business processes of each project are mapped to the reference model at the SAP transaction code level. It automatically triggers the shift towards a business process-oriented implementation.

The Navy realizes that there is room for improvement as the current projects have gained considerable knowledge about the implementation of packaged software. Project boundaries were drawn before executives understood the meaning of integration (or more formally, business process integration), as it is defined in modern commercial enterprise systems. Given this hard earned knowledge, it is

[21] This article has no published author, hence it is listed in the references by its title: "Integrate with R/3."

[22] VADM Ray Archer made this comment at a meeting of the Enterprise Integration Change Management Working Group in February 2002.

appropriate to reassess and understand how the SMART and SIGMA SAP projects can better align with NAVSUP and NAVAIR business practices.

Our hypothesis test was successful, and we believe that the same methodology can be used across other organizations, even if they are not using the SAP software. Of course, transaction-level mappings would not be possible, but most collaboration issues can be resolved at the business process level.

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