
Business Intelligence & Reporting Center of Excellence

APPLYING A REUSE BUSINESS MODEL FOR DELIVERING
HIGHER VALUE TO THE ENTERPRISE

Version 2.0

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Prepared By:



2530 Meridian Parkway
Suite 300
Durham, NC 27713

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QUESTIONS AND COMMENTS

All questions and comments concerning this document should be directed to Mike Crooks at mike.crooks@zencos.com.

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THE IT EFFECTIVENESS CHALLENGE

Many senior executives in Global 2000 companies are concerned about their Return on Investment (ROI) from IT; especially as IT expenditures have continued to grow becoming a significant percent of their company's revenue. Furthermore, IT is being recognized as a driving force behind global market position. Therefore Global 2000 executives are scrutinizing the effectiveness of their IT organization on a microscopic basis.

In order to enhance their competitive position and gain market share, Global 2000 companies are compelled to have their IT initiatives:

- Minimize the gap between the alignment of strategic initiatives and project implementation to bring products to market in a competitive time frame.
- Maximize innovation and effectiveness from their infrastructure and utilization of technology products and services to generate competitive IT ROI's.

To close this gap and maximize IT's ROI, Chief Information Officers and Chief Technology Officers need to gain the credibility within their own companies that they can fulfill the strategic requirements of the business, to specifications and in a timeframe responsive to the competitive global market. Since most IT organizations lack sufficient credibility, many Global 2000 companies are spending millions of dollars with large systems integrators and technology product and service companies to improve their organizational efficiency and productivity. In many cases, a good deal of these expenditures are excessive but driven by individual business units who lack the faith in their IT organization's ability to implement to specification, and on time.

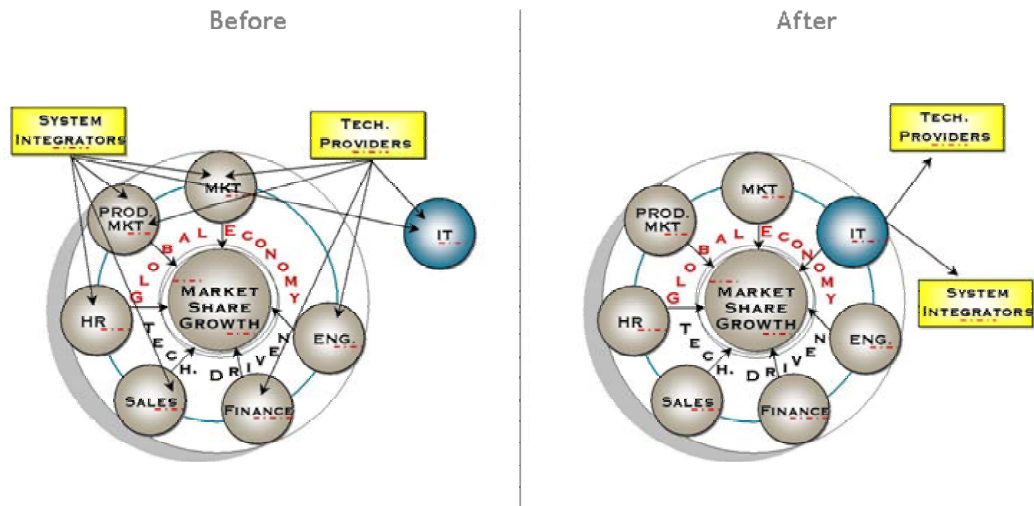
In many cases this approach yields positive short term benefits, but longer term, raises the cost and risk of doing business because it:

- Increases the percent of revenue spent on IT services;
- Institutionalizes IT services from outsource providers; and
- Creates an environment that is too complex and entrenched to respond rapidly to changing market conditions.

The cost of this approach has reached significant proportions and is a threat to the continued competitive cost position of many Global 2000 companies. Thus, the need to establish a better balance between the internal IT organization and external service and technology providers has become a critical issue that can only be mitigated by IT's ability to implement more creatively and effectively. To achieve this, IT organizations have begun to take a path of strategic alignment and transformation, with process, organization and economic models to help establish a partnership-oriented focus between IT and the rest of the business. These transformations can take many forms, such as:

- Meta Group's Enterprise Program Management Offices;
- Gartner's Competency Centers; or
- The 90's trend - Centers of Excellence.

Once a transformation is accomplished, IT becomes the "single point of contact" for the company's effective implementation of IT solutions.



If this balance is in place, Global 2000 companies are turning to their Chief Information Officers (CIO) to help create the business infrastructure to:

- Grow market share;
- Drive organization responsiveness from the boardroom into implementation; and
- Leverage all functional organizational capabilities in a highly effective manner.

Which then must be accomplished at a reasonable cost and in a timely fashion, to enhance the company's overall market viability and thus ROI and Return on Asset (ROA). For those companies who are successful, a multi-million dollar savings can be realized year-over-year.

Conceptually the solution is simple, but in reality the implementation for the IT organization is problematic. Within Global 2000 companies the IT organization must overcome:

- Poorly aligned technical, system, operational, and product capabilities to penetrate desired markets ... to achieve market share growth.
- Sub-optimal investments... to leverage all organizational capabilities in a highly effective manner.
- Traditional thinking and status quo ... to drive organizational responsiveness from the boardroom into implementation.

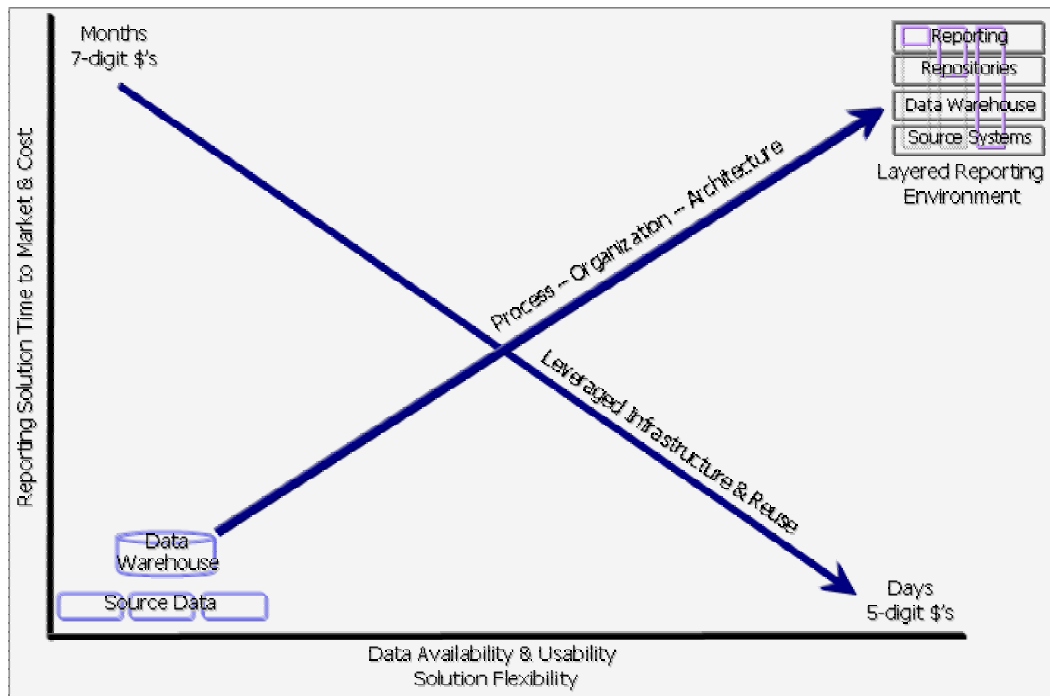
Zencos has witnessed the need to build a strong team, establish guiding principles, and adopt a common environment (people, process, and tools) for Business Intelligence-based reporting solutions within our clients. Once established, these principles and processes can be applied to individual business unit initiatives and projects across the enterprise.

This document describes a series of organization and process models that collectively form the organizational framework of a designed to be a Business Intelligence & Reporting Center of Excellence emphasizing systematic reuse.

Zencos has selected the concept of a Reuse-driven Software Engineering Business¹ (Reuse Business for short) as a basis for implementation of our Business Intelligence & Reporting Center of Excellence. This industry-based model enables organizations to achieve:

- Increased software productivity resulting in reduced development and maintenance costs;
- Reduced time to market thereby enabling the earlier deployment of critical business applications;
- Increased quality of delivered solutions and improved software interoperability; and
- Reduced resource requirements and more flexibility in deploying resources from one project to another.

The following graphic summarizes Zencos' philosophy and approach to enabling enterprise value from the major investments made by Global 2000 companies in Business Intelligence & Reporting technology.



¹ Jacobson I., Griss M., and Jonsson P. *Software Reuse Architecture, Process, and Organization for Business Success*. Addison-Wesley. ACM Press. 1997 ISBN 0-201-92476-5, page 2

THE REUSE-DRIVEN SOFTWARE ENGINEERING BUSINESS

SYSTEMATIC SOFTWARE REUSE

Systematic reuse is the set of planned activities aimed at maximizing the use of existing assets and processes from one organization in the production of solutions to another organization. Although systematic reuse is a simple concept - use previously developed assets for new purposes - it is complex and difficult to implement.

New processes, organizational models, and architectures need to be introduced into an organization if systematic reuse is to be successful. When implemented as a Center of Excellence, the Reuse Business is characterized by the ability to:

- Partner with the business to select the right projects, thus reducing wasteful duplication;
- Deliver solution options to business owners with an emphasis on optimized solution delivery, thus eliminating unnecessary spending and risk; and
- Enable the business to conduct projects better, faster, and cheaper.

Once established, the services of the Center of Excellence can be applied to individual initiatives and projects across business units and throughout IT. Furthermore, the Center of Excellence's operating model and framework for customer engagements enables:

- Reducing complexity and managing diversity across business units to leverage vendor relationships, reduce costs, and simplify management and delivery of solutions;
- Radically improving the ability to represent and respond to changing business needs;
- Integrating Business and IT strategies to identify and capture key areas of competitive advantage;
- Improving solution agility by becoming 'In-house' experts for solutions delivery emphasizing reuse.

The migration to a Center of Excellence-based practice serves as the catalyst and facilitator of economical solution delivery, rather than perpetuating the expensive external consultant-dependant model in use today.

The combination of strategic goals and the immediate need for targeted and rapid establishment of 'in-house' expertise presents an ideal environment for adoption of a Reuse Business.

CUSTOMER-DRIVEN DEVELOPMENT

The following continuous improvement oriented solution delivery model (Figure 1, below) is the Center of Excellence delivery model characterized by being:

- Customer-driven - collaboratively developed during defined customer engagements;
- High Value - prioritized and validated by customer success;
- Leading Edge - innovation, thought-leadership, and market available software to extend library value.

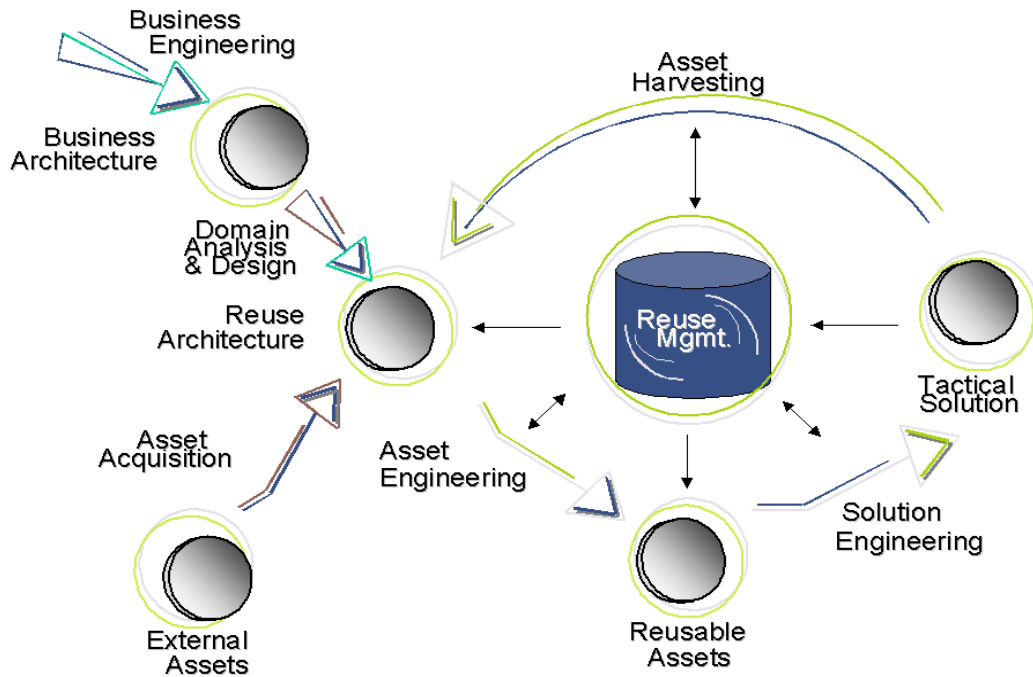


Figure 1. Continuous Improvement Solution Lifecycle

Under this reference model, the Center of Excellence uses the prioritized business models (that describe primary business services of the enterprise) as a primary input to govern and align its capabilities. These models drive the solutions that are needed by the business units. Ideally, the Center of Excellence uses existing assets to assemble the appropriate solutions. To facilitate the availability of the “right assets”, a systematic planning process for identifying, prioritization, and selection is enacted. These assets are managed and supported as products of the Center of Excellence.

CENTER OF EXCELLENCE OPERATING MODEL

The following Center of Excellence-based Operating model (Figure 2, below) is a conceptual representation of the alignment of Center of Excellence within the enterprise:

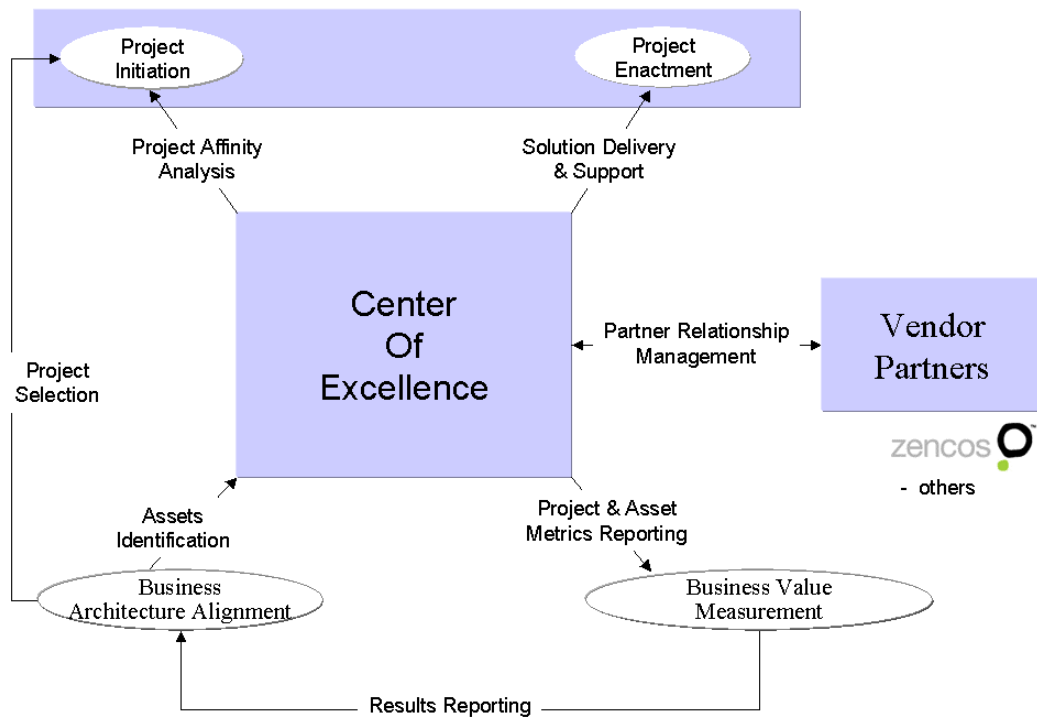


Figure 2. Center of Excellence-based Operating Model

During the establishment of a Center of Excellence, an organization needs to address the following five critical success factors for a service-based reuse and infrastructure management organization to be established:

- Project Initiation - selecting the right projects and early identification of reuse enabled value.
- Project Enactment - executing the projects in an optimal manner.
- Reuse Asset Management - providing reusable assets and support services.
- Business Architecture Alignment - anticipating the right assets to provision.
- Business Value Measurement - reporting results in business recognizable terms (such as ROI).

As part of this effort to leverage reusable assets (knowledge, software, and tools), the Reuse Business uses of a model that embraces an IT philosophy to support the development of reusable services and applications for general consumption, without impacting tactical project schedules is critical. This philosophy must be designed to identify assets with high business value. The Reuse Business helps shift organizations to a business-oriented model that seeks to deliver increasing customer satisfaction and value, while simultaneously improving productivity thus reducing costs.

THE 5+1 ORGANIZATIONAL PATTERN

An effective Center of Excellence model is based on an organizational pattern, as shown below in Figure 3. This pattern is known as the "5+1 pattern"². According to the

² This pattern was developed by Mike Crooks while at Northern Telecom (now Nortel Networks) and published at OOPSLA '95.

5+1 pattern, each organization consists of five primary hubs of activity plus one operational hub. This consists of the following:

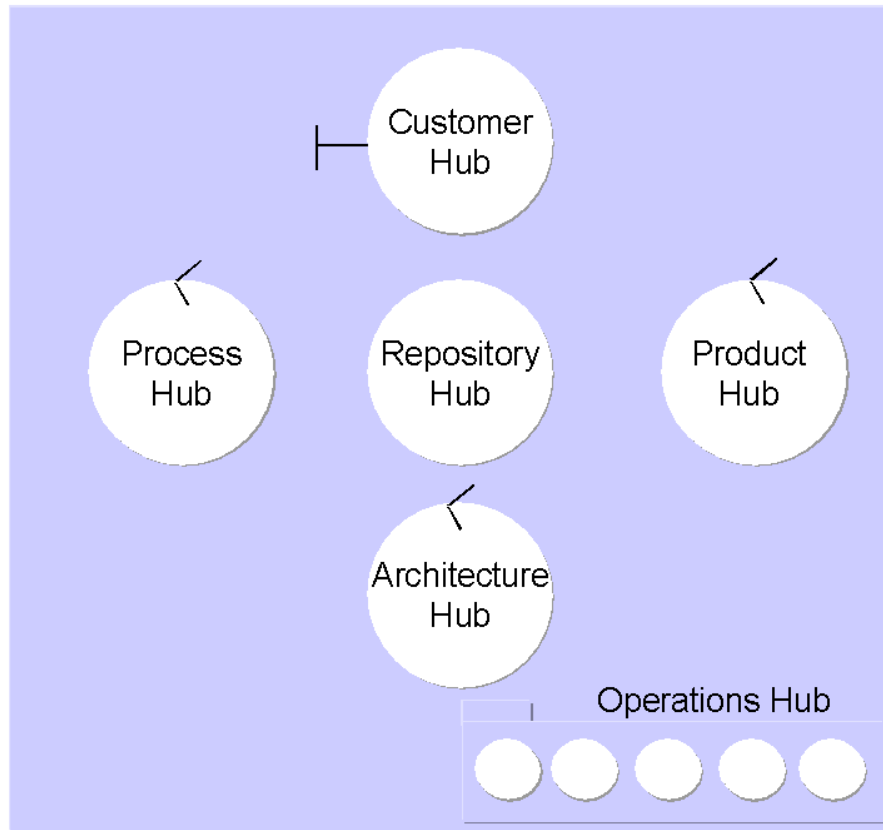


Figure 3. The 5+1 Pattern

- Customer hub - focused on the individuals and groups who receive products and services from that organization
- Process hub - focused on the knowledge assets of the organization. Knowledge assets include processes, practices, standards, techniques, patterns, templates, and background information.
- Repository hub - focused on the storage and organization of the artifacts and assets used by that organization
- Product hub - focused on the construction assets and tool assets of the organization
- Architecture hub - focused on how all assets work together to solve a problem
- Operational hub - focused on the operations of the organization. This is the "+1" of the "5+1 hubs".

The *customer* hub interacts with the organization's customers. Either the *process* hub or the *product* hub, depending on the type of need, fulfills the needs of the customers. The *repository* hub stores the processes and products offered by these groups. The *architecture* hub provides the conceptual framework needed to tie in all *product* and *process* hub activity. The *architecture* hub also interfaces with all internal and external influences.

CENTER OF EXCELLENCE ROLES & RESPONSIBILITIES

In order to establish and maintain a Center of Excellence-based continuous improvement environment emphasizing reuse, the following roles need to be implemented:

Functional Role	Role Responsibilities	Technical Skills & Expertise
Project Services Consultants (PSC)	These consultants are 'the face of the organization.' They support one or more project teams, are lifecycle and methodology experts, and serve as the technical liaison for the software and tool staff for the projects.	<ul style="list-style-type: none"> • Project Management Practices • SDLC Development Expertise (focused on use with the Application Development Environment) • Training, Coaching & Mentoring
Software Asset Engineers (SAE)	These engineers primarily are focused on the use the Application Development Environment, technical support, and software vendor management. Assets managed include and 'technical-oriented' assets (such as: security, error handling, etc).	<ul style="list-style-type: none"> • SDLC Development & New Product Introduction Expertise • Domain & Software Asset Engineering • Quality Assurance & Testing • Software and Technology Architectures (development & deployment)
Tool Asset Support Staff (TAS)	These staff members are primarily responsible for the verification, validation, and packaging of the Application Development Environment for use by the Software Asset Engineers and delivery project teams. These individuals serve as level 2 support for all tools used in the delivery and support of the software assets of the organization.	<ul style="list-style-type: none"> • Quality Assurance & Testing • Familiarity with Technology used to create assets

Center of Excellence Resource Table (continued):

Functional Role	Role Responsibilities	Technical Skills & Expertise
Knowledge Asset Engineers (KAE)	These engineers are responsible for the process, methods, and best practice management and continuous improvement process. Knowledge Asset Engineers serve as subject matter experts for the delivery project teams.	<ul style="list-style-type: none"> • SDLC Development Expertise • Continuous Improvement & Change Methodologies • Quality Assurance & Testing • Familiarity with Technology used to create assets
Reuse Librarian	This person is responsible for the library and the asset management process: populate – certify – publish; This person is also responsible for asset-based metrics collection and reporting.	<ul style="list-style-type: none"> • Classification & Cataloging Expertise • User-center Design Techniques • Business and Technical Architecture Knowledge • Quality Assurance & Testing • Familiarity with Technology used to create assets
Asset Certification Engineer (ACE)	These engineers are responsible for conducting certification tests on assets that have been submitted for inclusion in the reuse library.	<ul style="list-style-type: none"> • Quality Assurance & Testing • Familiarity with Technology used to create assets
Reuse Architect (RA)	These architects are responsible for the asset definition and standards, as well as the asset roadmap planning process: identify – prioritize – provision. This includes assets of all types: knowledge, software, and tools.	<ul style="list-style-type: none"> • Quality & Reusability Practices • Expert level in Technology used to create assets • Business Domain Knowledge • Domain Engineering

The following table defines the general alignment (primary responsibility and one or more secondary responsibilities) of the above roles to the 5+1 models:

Functional Role	Customer Hub	Process Hub	Product Hub	Repository Hub	Architecture Hub	Operations Hub
Project Services Consultants (PSC)	Primary	Secondary			Secondary	
Software Asset Engineers (SAE)	Secondary		Primary		Secondary	
Tool Asset Support Staff (TAS)	Secondary		Primary			
Knowledge Asset Engineers (KAE)	Secondary	Primary			Secondary	
Reuse Librarian (RL)		Secondary	Secondary	Primary	Secondary	
Asset Certification Engineer (ACE)		Secondary	Secondary	Primary		
Reuse Architect (RA)		Secondary	Secondary	Secondary	Primary	

Note: The Operations Hub is the primary responsibility of the Center of Excellence Manager. This is job position, not a role.

PLANNING CENTER OF EXCELLENCE RESOURCES

The following table depicts the likely resource requirements for a Reuse Business-based Center of Excellence. The estimated resource utilization numbers in column two and the rules in column three are based on the implementation of an Expert Service Model for the successful rollout and support of reuse throughout an organization. Note: these numbers are estimates based on the implementation of this model in numerous large IT organizations (staff between 200 and 1000).

(See table on next 3 pages).

Center of Excellence Resource Planning Table:

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Project Services Consultants (PSC)	2	These consultants are senior resources (advanced technical degree or equivalent) in with a varied background in the business domains (either through systems analysis or actual assignments in multiple domains). These individuals also have a working knowledge of the project management, solution delivery, technical architecture, and tools capabilities gained through extensive project experience.	Based on project maturity in the use of the process, tools and assets the following rules should be applied: 1 PSC per first time project 1 PSC per 3 second pass projects 1 PSC per 10 experienced projects
Software Asset Engineers (SAE)	1	These engineers are senior resources (advance degree in computer engineer or equivalent) with a strong background in technical architecture, component architecture, and have acumen for business that has been developed through numerous software development initiatives.	Based on the complexity, granularity, and maturity of software assets the following rules should be applied: 1 SAE per 3 to 5 technical components or application services 1 SAE per 1 to 3 business objects 1 SAE per each enterprise framework 1 SAE for 10 to 20 externally acquired software assets
Tool Asset Support Staff (TAS)	0	These engineers can be new college graduates (or equivalent technical certifications) who have come through a Computer Science curriculum with an emphasis on OOA/OOD and software quality practices. ³	Based on the complexity and maturity of tool assets the following rules should be applied: 1 TAS per 10 to 20 mature software assets 1 TAS per 1 to 3 externally acquired tool assets

³ Software Asset Engineer doubles as Tool Asset Support during initial phase.

Center of Excellence Resource Planning Table (continued):

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Knowledge Asset Engineers (KAE)	1	These engineers are senior resources (advance degree in computer engineer or equivalent) with a strong background in software engineering methodologies and lifecycle models. These engineers also need to have experience in continuous improvement and organizational maturity models (such as TQM, CMM, etc).	Based on the complexity, granularity, and maturity of knowledge assets the following rules should be applied: 1 KAE per SDLC Project Service Consultants serve as subject matter experts and continuous improvements engineers under the guidance of the specific SDLC KAE – occupies 25% of a PSC’s time annually.
Reuse Librarian (RL)	1	This person is a senior resource (advanced degree in technical or library sciences or equivalent) with a varied business domain and increasing experience in technical roles. This person must be skilled in the tools and technology of the COE. Additionally, this person must have a working knowledge of asset definition and standards, as well as the asset management process: identify – prioritize – provision – certify – classify – publish. (This includes assets of all types: knowledge, software, and tools and the associated the library environment).	There will never be more than one Reuse Librarian.
Asset Certification Engineer (ACE)	0	These engineers are junior technical staff (new college graduates in computer sciences or mathematics or equivalent technical certification) with experience in Quality Assurance and a working knowledge of the tools and technology used to create the assets. ⁴	Based on the complexity, granularity, and maturity of assets the following rules should be applied: 1 ACE per 5 to 10 certifications per quarter

⁴ Reuse Librarian doubles as Reuse Asset Certification Engineer during initial phase.

Center of Excellence Resource Planning Table (continued):

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Reuse Architect (RA)	0	<p>These architects are senior resources (advanced computer science degree or equivalent) with varied business domain and increasing experience in technical roles. These individuals must be skilled in the methods, tools, and technology of the COE. Additionally, they must have a working knowledge of asset definition and standards, as well as the asset roadmap planning process: identify – prioritize – provision. This includes assets of all types: knowledge, software, and tools.⁵</p>	<p>Based on the diversity of technology and the breadth of domains the following rules should be applied:</p> <p>1 RA per business domain 1 RA per technology domain</p>

⁵ Reuse Librarian doubles as the Reuse Architect during initial phase.

BUSINESS INTELLIGENCE & REPORTING CENTER OF EXCELLENCE

ROLES & RESPONSIBILITIES

A Center of Excellence is created around a specific solution delivery type and one or many technologies that support the full lifecycle of delivery (analysis through support). The following table depicts the likely resource profiles for an organization to define, deliver, and support Business Intelligence-based Reporting Solutions. The functional roles listed in column one are based on Zencos' experience and the typical roles present within IT Solution Delivery and Support organizations. Although these roles can be combined in actual job positions, they are presented as unique and discrete responsibilities.

Business Intelligence & Reporting Resource Table:

Functional Role	Role Responsibilities	Technical Skills & Expertise
Web Application Engineers (WAE)	These engineers are the primary developers of the web-based applications for Business Intelligence and Reporting for the end users.	<ul style="list-style-type: none"> • OOA/D Practices • SAS AppDev Studio • SAS Java Components • Jakarta Struts • JSP/Servlet Development • JDBC & JNDI • HTML & CSS
Report Engineers (RA)	These engineers are primary focused on the creation of ad hoc reports based on direct requests from business users. The role of these engineers involves the ability to field requests (in person or in writing); analyze and design reporting requirements; and access underlying and supporting data structures from varying sources (staging; repository; and source systems).	<ul style="list-style-type: none"> • Enterprise Guide • SQL • Data Access Practices
Data Management Engineers (SAE)	These engineers are primarily focused on the creation, management, and availability of all data needs for the Business Intelligence and Reporting solutions. The role of these engineers encompasses the load – verify – publish process for current deployed solutions. These engineers are also work in conjunction with the Business Domain and Technical Domain Architects to create, modify, or update data flows from the Source Systems to Staging; Staging to Repository; and Repository to Reporting (OLAP Cubes and Data Marts).	<ul style="list-style-type: none"> • SAS WA and/or ETL Studio • SAS OLAP Cube Studio • Base SAS • SQL • Data Management & Warehousing Development Practices • STAR Schema • OLAP Modeling

Business Intelligence & Reporting Resource Table (continued):

Functional Role	Role Responsibilities	Technical Skills & Expertise
Data Analytics Engineers (DAE)	These engineers are primarily focused on the creation, management, and availability of structured analytics. The role of these engineers requires the ability to conduct data mining and analytics structuring.	<ul style="list-style-type: none"> Enterprise Miner Statistical Analysis Model Sampling
Technical Domain Architect (TDA)	This architect is responsible for creating and maintaining the model of the technical architecture required to deliver and support all Business Intelligence and Reporting solutions. The model created is sometimes referred to as a technology model or data warehouse architecture. The scope of responsibility of this architect is to ensure continuity and alignment of the Source Systems, Staging, and Repository layers of all Business Intelligence and Reporting solutions.	<ul style="list-style-type: none"> Expertise in SAS Tools and Studios Data Modeling & Associated Tools Database & Datawarehousing Architecture & Design Technical Infrastructure Knowledge
Business Domain Architect (BDA)	This architect is responsible for creating and maintaining the model of given business application domains within the enterprise. The model created is sometimes referred to as a domain model or domain architecture. The scope of responsibility of this architect is to ensure continuity and alignment of the Reporting, Repository, and Staging layers of all Business Intelligence and Reporting solutions.	<ul style="list-style-type: none"> Expertise in SAS Tools and Studios Data Modeling & Associated Tools Database & Datawarehousing Architecture & Design Business Architecture Alignment Practices

PLANNING BUSINESS INTELLIGENCE & REPORTING RESOURCES

The following table summarizes the Zencos recommendations for a customer's initial resource needs by role (as defined above) to support the ongoing use of the Business Intelligence and Reporting environment being implemented.

(See table on next 3 pages).

Business Intelligence & Reporting Resource Planning Table:

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Web Application Engineers (WAE)	2	These engineers can be new college graduates (or equivalent) who have come through a Computer Science curriculum with an emphasis on OOA/OOD and web applications.	Based on the complexity reporting applications the following rules should be applied: 1 WAE per 2 to 3 simple applications per quarter 1 WAE per complex application per quarter
Report Engineers (RE)	2	These engineers are primary 'power-user' profile individuals. They should have 1 to 2 years of business experience, but do not require formal programming background. However affinity for technology and aptitude for learning is strongly desired.	Based on the diversity of technology and the volume of business domains requests the following rules should be applied: 1 RE per 3 to 5 business domains (if volume is low) 1 RE per 2 to 3 business domains (if volume is medium) 1 RE per business domain (for high volumes)
Data Management Engineers (DMA)	1	These engineers are experienced data management and data base designers. A Computer Science degree (or equivalent) with a focus on data modeling and diagramming is required. Background should include Data Base Administration and data warehousing experience.	Based on the complexity, granularity, and maturity of data staging and repository environment the following rules should be applied: 1 DMA per 3 to 5 Repositories 1 DMA per 1 to 3 Staging Databases 1 SAE for 10 to 20 CUBES and Data Marts
Data Analytics Engineers (DAE)	0	These engineers are senior resources with advanced mathematics and statistical degrees (or equivalent) and have 3 to 5 years of practical experience as business data analysts. ⁶	Based on the complexity, granularity, and maturity of analytics infrastructure the following rules should be applied: 1 DAE per 3 to 5 analytic models

⁶ There is no immediate need for customers to have a Data Analytics Engineer on staff. However, the need may arise in the future.

Business Intelligence & Reporting Resource Planning Table (continued):

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Technical Domain Architect (TDA)	1	This architect is a senior resource (advance degree in computer engineer or equivalent) with a strong background in technical architecture, data architecture, and has acumen for business.	Usually there is only one TDA in an organization; RA's are used to fill-out needs, however if no RA's are planned then: Based on the diversity of technology and the breadth of business domains the following rules should be applied: 1 TDA per technology domain
Business Domain Architect (BDA)	1	This architect is a senior resource (advanced technical degree with a MBA or equivalent) in with a varied background in the business domains (either through systems analysis or actual assignments in multiple domains). This individual also has a working knowledge of the technical architecture and tools capabilities of the COE.	Usually there is only one BDA in an organization; RA's are used to fill-out needs, however if no RA's are planned then: Based on the diversity of technology and the breadth of business domains and the number of major projects the following rules should be applied: 1 BDA per 2 to 3 business domain (given each business domain requires one major project per year).
Reuse Architect (RA)	1*	These architects are senior resources (advanced computer science degree or equivalent) with varied business domain and increasing experience in technical roles. These individuals must be skilled in the tools and technology of the COE. Additionally, they must have a working knowledge of asset definition and standards, as well as the asset roadmap planning process: identify – prioritize – provision. (This includes assets of all types: knowledge, software, and tools). ⁷	Based on the diversity of technology and the breadth of domains the following rules should be applied: 1 RA per business domain 1 RA per technology domain

⁷ Reuse Architect does multiple duty as the Reuse Librarian and Asset Certification Engineer during initial phase.

Business Intelligence & Reporting Resource Planning Table (continued):

Functional Role	Initial Staffing	Skill Level	Scale-up Heuristics
Reuse Librarian	1*	This person is a senior resource (advanced degree in technical or library sciences or equivalent) with a varied business domain and increasing experience in technical roles. This person must be skilled in the tools and technology of the COE. Additionally, this person must have a working knowledge of asset definition and standards, as well as the asset management process: identify – prioritize – provision – certify – classify – publish. (This includes assets of all types: knowledge, software, and tools and the associated the library environment).	There will never be more than one Reuse Librarian.
Asset Certification Engineer (ACE)	1*	These engineers are junior technical staff (new college graduates in computer sciences or mathematics or equivalent technical certification) with experience in Quality Assurance and a working knowledge of the tools and technology used to create the assets. ⁸	Based on the complexity, granularity, and maturity of assets the following rules should be applied: 1 ACE per 5 to 10 certifications per quarter

Note: 1 FTE is required to fulfill the three roles related to reuse of assets during the initial phase.

⁸ Reuse Librarian doubles as Reuse Asset Certification Engineer during initial phase.

BUSINESS INTELLIGENCE & REPORTING ARCHITECTURE

“Choosing the right architecture is one of the most important decisions a software engineering business can make. Software architecture is important in order to maintain the integrity of systems so that development and maintenance do not result in a patchwork of uncoordinated fixes. A well-articulated software architecture is also key to managing the complexity of software systems, allowing large organizations to work on parts in parallel. With the architecture in place, software engineers can design and implement the system more effectively and more predictably.”⁹

The right architecture is a ‘layered architecture’, in which the software is organized in layers - from the most general up to the most specific. The following diagram, figure 4, is a four-layered generalized representation of such a layered architecture.

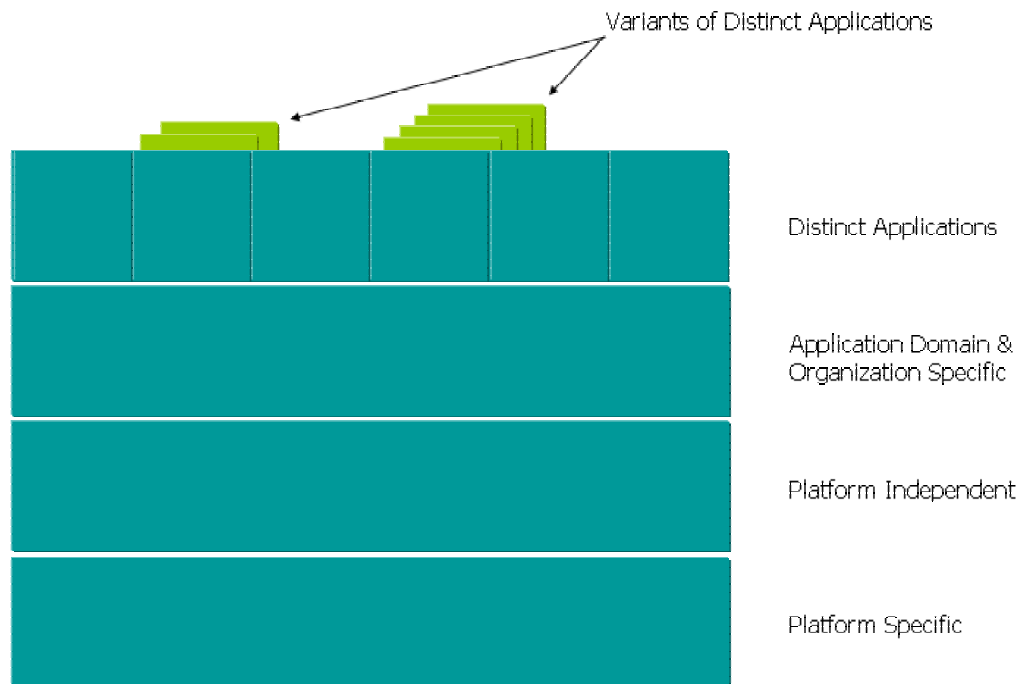


Figure 4. Reuse Business Layered Architecture

The **Platform Specific Layer** contains the software for the actual infrastructure such as operating systems, interfaces, and so on.

The **Platform-independent Layer** offers component systems for utility classes and platform independent services for things like distributed object computing in heterogeneous environments.

The **Application Domain & Organization Specific Layer** contains a number of component systems specific to the type of business.

The **Distinct Applications Layer** contains each application system that offers a coherent set of uses cases to some end users.

⁹ Jacobson I., Griss M., and Jonsson P. *Software Reuse Architecture, Process, and Organization for Business Success*. Addison-Wesley. A1.CM Press. 1997 ISBN 0-201-92476-5, page 171

Like the Reuse Business, a Business Intelligence & Reporting Center of Excellence requires the right layered architecture. The following diagram, figure 5, depicts one such architecture.

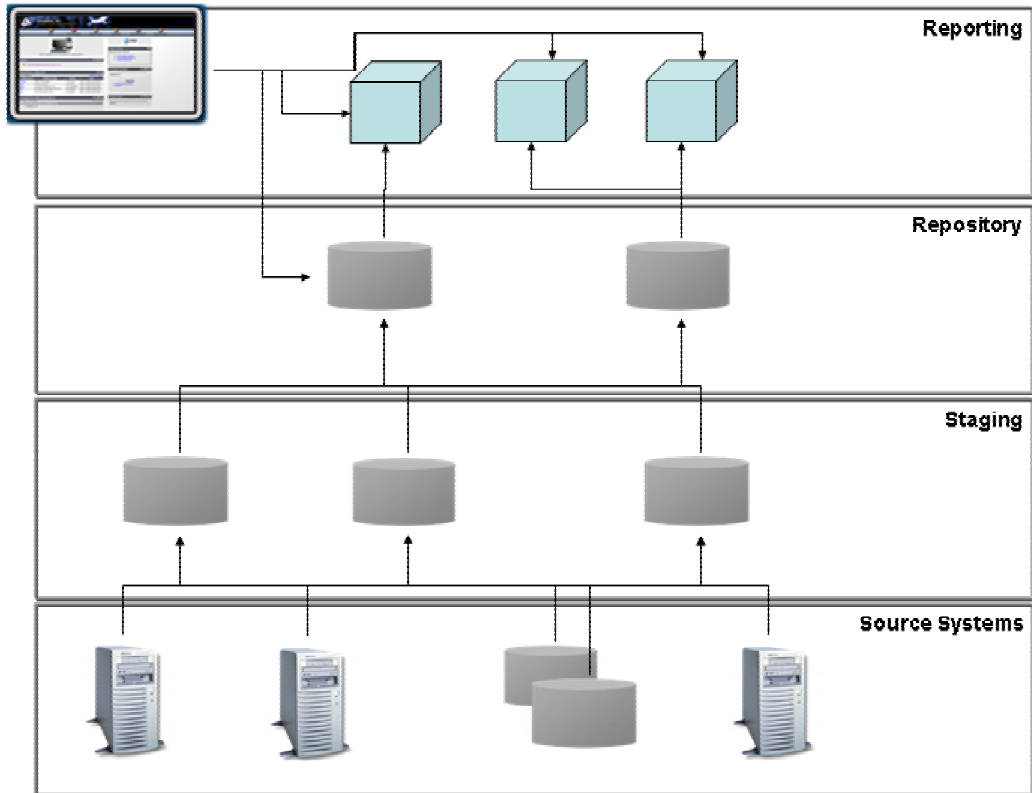


Figure 5. Business Intelligence & Reporting Layered Architecture

The **Reporting Layer** provides the following capabilities:

- Standardized reporting through Dashboards, Scorecards, and Reporting Applications.
- Seamless access to multiple data sources and reporting structures.
- Flexible and dynamic ‘slice and dice’ reporting and analysis enabled through OLAP Cubes.

The **Repository Layer** provides the following capabilities:

- Daily updates from the staging area.
- Consolidation of the data into common dimensions based on ETL processes.
- Data structured in a format that will be available for ad-hoc and loading of an OLAP reporting model.

The **Staging Layer** provides the following capabilities:

- Enables data validation and transformation without burdening the existing operational data stores.
- Supports advanced analytics such as data mining and quantitative analysis.
- Provides an audit trail for ensuring consistency between operational systems and the Data Repository.

The ***Source Systems Layer*** contains the enterprise's certified data sources and can be found in the following sources:

- Transactional Systems;
- Monitoring and Tracking Systems;
- Control Systems;
- Telecommunications and Telephony Systems; and
- Data Warehouses.