Office of the CTO

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SAP Architecture Strategy & Roadmap

Version 1.7
(Limited Scope: SAP Business Suite)

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Disclaimer

Status

- **Signed off** by Architecture & Technology Steering (May 2008)
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Acknowledgements

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1   Introduction and Summary

1.1   Goals and Scope

This **strictly SAP-internal document** outlines **SAP's architecture strategy & roadmap for large enterprises**. Its scope includes both, current customers of SAP Business Suite and net new customers. This version 1.7 is an updated version of the SAP product roadmap for large enterprises 1.5 [1] released in October 2007, and represents a first step in the transition from product roadmap for large enterprises towards long-term architecture strategy & roadmap.

This document outlines the main direction but does not dive into details of the roadmap, application functionality, architecture, implementation, or delivery schedule. It focuses on the applications within the SAP Business Suite and their integration with Application Platform (AP)-based applications in the context of large enterprise customers until 2010, but excludes – in this version – industry-specific topics, SAP Business Objects and business user-related topics like Duet and mobile, on-demand strategy, and SAP's products for midsize companies and small businesses.

The description of the actual product portfolio and release strategy is to be found in [2], architectural guidelines are to be found in [21]

1.2   Assumptions

Large enterprise customers need:

- a stable and efficient business process platform to run their business;
- the ability to adapt and extend it to their needs in an easy and flexible way as well as to innovate quickly at their own pace;
- strategic insight to optimize their business performance.
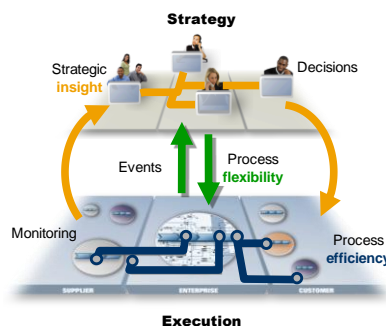
Most customers will have a mixed landscape and will want to extract benefits from all:

- existing and continuous investments in SAP Business Suite;
- technology innovation delivered by SAP NetWeaver;
- business insight through SAP Business Objects;
- fundamental innovation provided by AP-based offerings;
- their investments in 3rd party and legacy systems.

Though openness will remain a key asset – especially for SAP Business Objects –, customers will expect SAP Business Suite, SAP NetWeaver, SAP Business Objects and AP-based solution sets to have higher integration and higher value than independent "best-of-breed" stacks.

To protect and expand SAP's home territory, SAP must further capitalize on the value of the SAP Business Suite and increase differentiation towards SAP's main competitors. With SAP's broad and deep coverage of business processes within and across 26 industries, this can be achieved by emphasizing the strengths of the SAP Business Suite: business processes spanning multiple applications and industry solutions. In other words, by shifting from an application-centric best-of-breed approach towards a business and business process-driven approach. "Light product harmonization with maximal benefit" is required to make the SAP

Business Suite behave, look and feel like a real suite. A holistic harmonization approach is required, from the way customers discover and buy the SAP Business Suite to the way they operate it.

SAP NetWeaver continues to be in service of SAP Business Suite's applications but at the same time needs to provide technical innovation and flexibility around the stable business process platform.

SAP Business Objects will need to be designed to operate in heterogeneous environments – and better integrated with SAP at the same time.

1.3   Overview
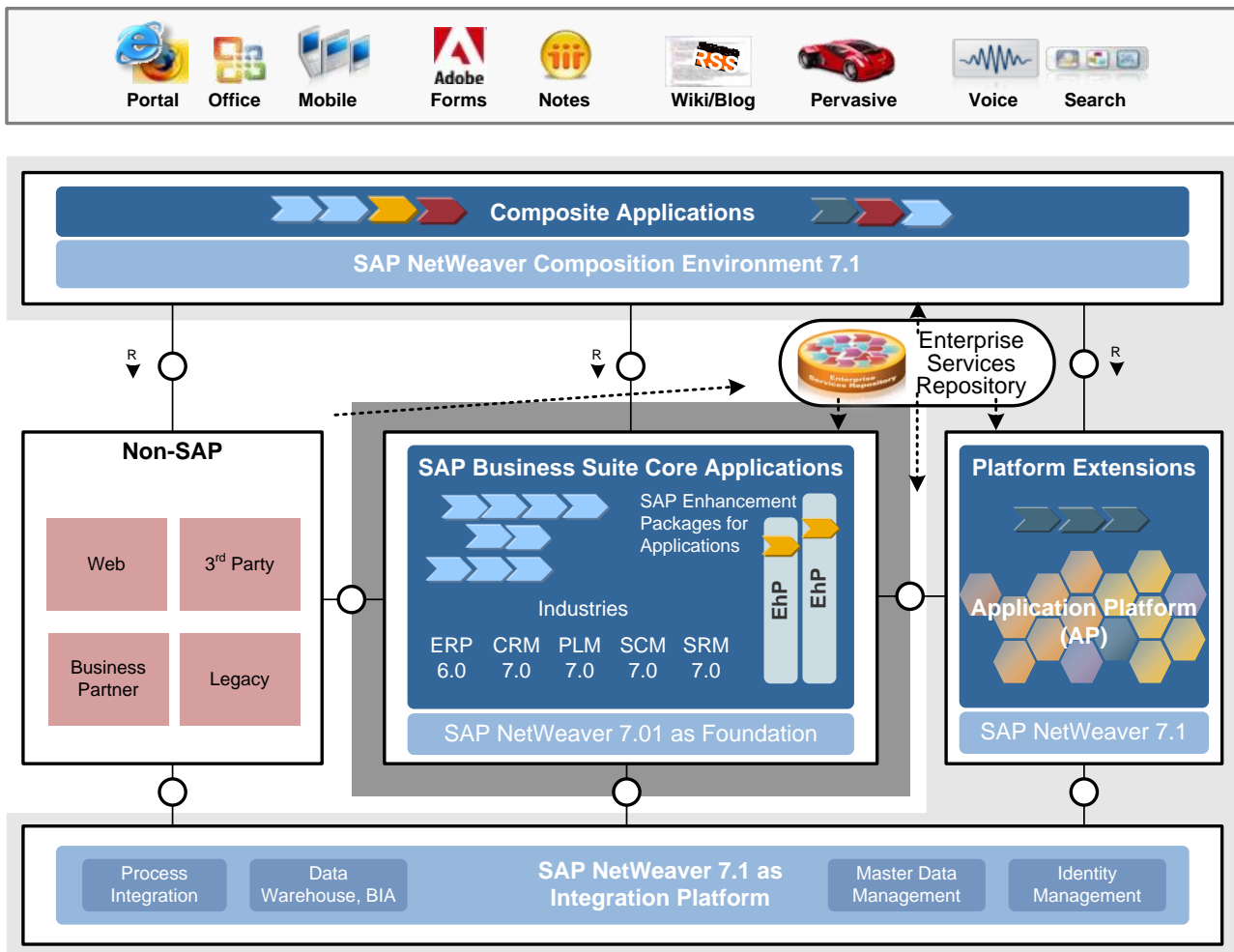
Figure 1-1 Innovation around a Stable Core[1]

The overarching objective of the SAP Business Suite's roadmap is to deliver a stable business process platform while minimizing disruption to customers and ensuring ongoing innovation delivery:

1. Minimum upgrades[2] for establishing the SAP Business Suite's stable core release in 2008 providing stability and reliability for the years to come.

2. Re-definition and harmonization of the SAP Business Suite along end-to-end scenarios, as well as consistency and similar look.

3. Innovation that can be selectively adopted by customers in an evolutionary manner:

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[1] Throughout this document SAP NetWeaver 7.01 and 7.11 refer to SAP enhancement package 1 for SAP NetWeaver 7.0 and 7.1, respectively. More information on enhancement packages for SAP NetWeaver can be found in Section 0.

[2] SAP ERP 6.0 will not be upgraded as part of SAP Business Suite 7.0. The delivery of the other core applications of SAP Business Suite 7.0 is synchronized with the delivery of SAP enhancement package 4 for SAP ERP 6.0.

    a.   Continuous innovation via enhancement packages;

    b.   Innovative business processes using enterprise SOA by evolution and composition on top;

    c.   SAP NetWeaver 7.1 capabilities for composition and integration.

    d.   SAP Business Objects capabilities for business performance optimization.

    e.   Platform extensions[3] running in side-by-side mode. Strategically, platform extensions will be built on AP according to the enterprise SOA by design paradigm. However, platform extensions may also be built according to the Business Suite's programming model, for example for risk mitigation purposes. More information on platform extensions can be found in [10] and [21]

These overarching objectives will be achieved over time as follows.

In 2007, service-enabled SAP Business Suite on SAP NetWeaver 7.0 was delivered, along with technical innovation through SAP NetWeaver Composition Environment (CE) 7.10, SAP NetWeaver Process Integration (PI) 7.10 and Enterprise Services Repository (ES Repository) as a common part of both.

In 2008, a harmonized SAP Business Suite will be delivered by synchronizing the timing of the core application releases, establishing them as stable core, and redefining and harmonizing the SAP Business Suite along end-to-end scenarios.

- SAP Business Suite 7.0 core applications (including SAP ERP 6.0) based on SAP NetWeaver 7.01, adhering to a common release strategy, "harmonized" and oriented towards natively integrated end-to-end processes across application and industry solutions.
- Enhancement package strategy for SAP NetWeaver 7.0 and 7.1.
- SAP NetWeaver CE 7.11 including SAP Business Process Management (BPM, code name "Galaxy") and SAP NetWeaver 7.11 as integration platform for accelerated technical innovation.
- 5-1-2 maintenance for SAP Business Suite 7.0 extending maintenance for SAP NetWeaver 7.0 and SAP ERP 6.0 accordingly.
- SAP Solution Manager 7.0[4] on SAP NetWeaver 7.01 as the default application and lifecycle management solution enabling service and support business and business operations, as well as lifecycle processes and technical operations.
- First delivery of B2B collaboration between SAP Business Suite and SAP Business ByDesign in value networks.
- Out-of-the-box integration for "central payroll" and "financial consolidation preparation" between SAP Business Suite and SAP Business ByDesign in corporate groups. [***This is confidential and purely SAP internal and must not be positioned as SAP Business ByDesign is not offered for large enterprise customers.***]

From 2009 onwards, deliver innovation via synchronized enhancement packages for entire SAP Business Suite, and deliver process extensions based on AP.

- Enhancement packages-based synchronized release strategy for the SAP Business Suite, not only for SAP ERP.
- Broader delivery of productized composite applications.
- Leverage SAP Business Objects for embedded analytics in SAP Business Suite.
- New functionality on AP/enterprise SOA by design, based on SAP NetWeaver 7.1, interoperable with the SAP Business Suite via the side-by-side model.

Currently SAP does not plan to deliver a new release of SAP Business Suite or SAP ERP until **at least 2012.**

2013/2016: end of mainstream/extended maintenance for SAP Business Suite 7.0, ERP 6.0 and NetWeaver 7.0.

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[3] Sometimes also referred to as process extensions, especially in the context of side-by-side AP-based applications where the term platform might refer to Suite or AP.

[4] SAP Solution Manager 4.0 will be renamed to SAP Solution Manager 7.0, due 1st of May 2008.

1.4   Risk and Critical Success Factors

Critical success factors include:

- **Solution/landscape complexity**: using capabilities across the complete SAP Business Suite leveraging innovation provided by SAP NetWeaver, by SAP Business Objects, by composite applications and by side-by-side process extensions based on AP will increase the complexity of the solution landscape. The need for providing cost effective procedures and tools to manage the complete solution, end-to-end, along the business processes, across different systems and technologies is of significant importance to decrease total cost of ownership (TCO) for customers.

- **Total cost of development**: handling of a huge number of interdependent code lines (according to releases/support packages/enhancement packages for applications and technology) is a critical challenge in terms of overall complexity and associated cost of development.

- **Architecture integration between SAP and SAP Business Objects** needs to address both at the same time: better integration while retaining Business Objects' key capability of working well in heterogeneous environments.

- The **side-by-side model** for process extensions based on AP requires detailed architectural and technical concepts (work in progress through the first side-by-side solution, supply base management) and the synchronization of SAP Business Suite and AP release schedules.

- **Enterprise SOA management** as part of solution management is of increasing importance. Managing a services-based landscape from high-level planning down to configuration and monitoring of a single service still represents a new challenge that requires significant investment.

2   Architecture Strategy

2.1   SAP Business Suite

SAP Business Suite is based on SAP NetWeaver and consists of a family of integrated core applications, specific industry applications, and composite applications. The core applications are:

- SAP Enterprise Resource Planning (SAP ERP);
- SAP Customer Relationship Management (SAP CRM);
- SAP Product Lifecycle Management (SAP PLM);
- SAP Supply Chain Management (SAP SCM);
- SAP Supplier Relationship Management (SAP SRM).

The remainder of this chapter outlines the architecture priorities for SAP Business Suite. As a starting point the overall direction for SAP Business Suite and suite themes are briefly introduced. For details on product portfolio and release strategy the reader is referred to [2], for information about SAP solutions to [3] or [4].
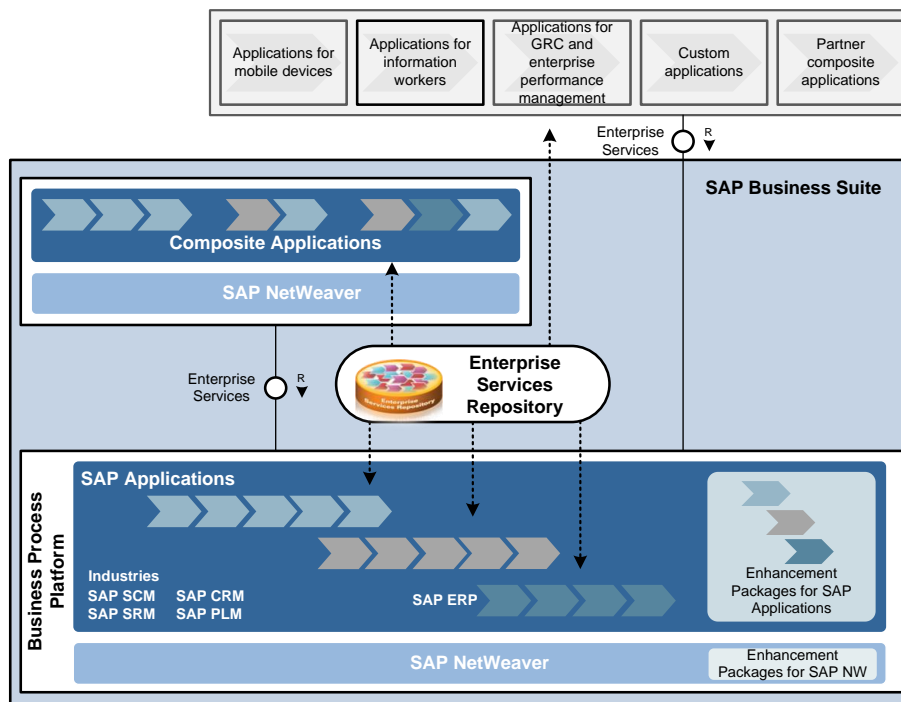
Figure 2-1 Business Process Platform-based SAP Business Suite[5]

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[5] Source: SAP's Release Strategy for Large Enterprises, January 2008, see [2].

2.1.1   Suite Direction

One of the main goals is to come from "a multitude of go-to-market programs and a bundling of applications" to a joint portfolio of go-to-market and development themes for revenue capture.

From Application Centric:
Integrate Software

To Value Centric:
Enable Customers Success
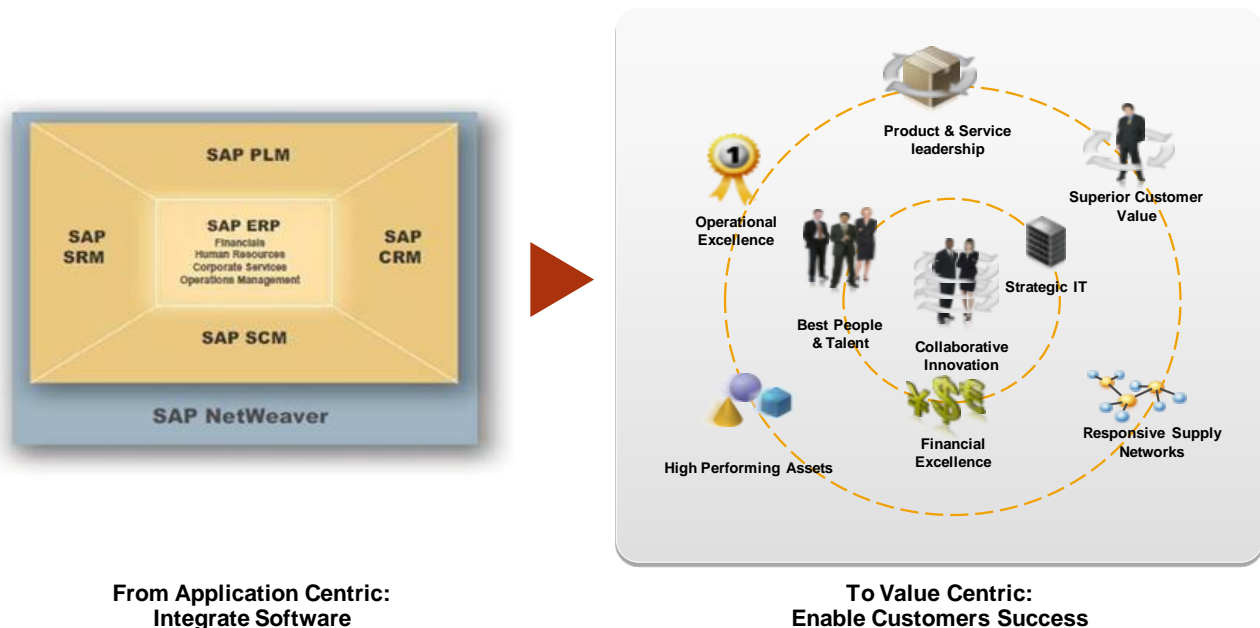
Figure 2-2 Suite Direction at a Glance

"**Themes**" are a set of nine aspirational business concepts around which SAP will organize development, marketing, and sales activities. Themes provide a consistent way of organizing conversations with prospects and customers about how they can use integrated end-to-end business processes to differentiate themselves from their competitors.

The most powerful end-to-end industry business processes are those that:

- are highly relevant for a selected group of "buying centers" – that is, the key influencers responsible for software purchases – in selected industries;
- help SAP's customers to achieve strategic business objectives;
- span the boundaries of traditional applications from our competitors;
- can be supported with the help of our partner products;
- run across organizational boundaries to showcase the power of SAP's platform strategy.

Industry processes that represented major market opportunities for SAP are clustered into nine themes, with each theme representing a key ambition or goal from which a company derives competitive advantage:

- **Responsive supply networks**: continuously adapt to the changing market and customer requirements.
- **Product and service leadership**: creating value for customers through differentiated offerings.
- **Operational excellence:** consistently meet and exceed customer expectations with cost-effective and efficient operations.
- **High-performing assets**: maximizing returns on fixed assets.
- **Superior customer value**: acquiring, maintaining and retaining customer relationships.
- **Financial excellence:** optimizing the financial value chain.
- **Best people and talent**: establishing a world-class and efficient people process.
- **Strategic IT**: minimize cost and risk while driving standardization and innovation.
- **Collaborative innovation:** Bring together the right people, with the right information, at the right time, for a dynamic level of business execution.

A theme identifies those processes for which greater end-to-end software integration is needed, including integration with partner products. Themes also help to understand where and how to create industry-specific versions of software for these processes while maximizing code reuse. Therefore, themes help to go after the biggest opportunities and avoid development in areas where customer adoption will be poor.

More information on themes can be found in [6].

2.1.2   Suite Differentiation

To gain competitiveness within each application area SAP had to fight best-of-breed battles in the recent past – sometimes at the expense of the harmony between the applications. With SAP's current strength in each application area and 26 industries, strengthening the overall suite experience is of significant importance to differentiate from competitors.

KEY PRIORITY ALONG EACH CUSTOMER LIFECYCLE STAGE   **FOCUS AREAS OF SUITE EXCELLENCE**

Stage	Key Priority	Focus Areas of Suite Excellence
Buy	Address Perception of Complexity	→ Refine the story to convey our deep integration capabilities → Develop end-to-end scenario demos → User Interface consistency
Implement	Reduce Customer Implementation Costs	→ Lower implementation costs → Simplify documentation
Use	Provide Suite Experience for Top Processes	→ Identify top end-to-end scenarios highlighting the value of the SAP suite → Provide process integration for these scenarios → Ensure consistent UI look for the majority of suite and consistent behavior for these scenarios → Harmonize data for these scenarios
Manage Upgrade	Reduce Customer Operational Cost	→ Simplify management & deployment → Technology platform: common NW release

Figure 2-3 Business Rationale and Focus Areas of Suite Differentiation

The main goal of suite differentiation is to come from a "bundle of applications" to a harmonized SAP Business Suite. According to the business rationale depicted in Figure 2-3, suite differentiation focuses on simplification and harmonization from the way customers discover and buy the SAP Business Suite to the way they operate it. Product development will focus on two key areas:

- Differentiation in key business scenarios according to suite themes. These key business scenarios namely procurement basics, outsourced manufacturing, sales order management, vendor managed inventory and demand management will be harmonized end-to-end according to common standards including service enablement, user interface harmonization, and harmonization of master data objects between application boundaries.
- Harmonization of use of technologies in selected areas referred to as foundation topics.

For a detailed list of architecture guidelines the reader is referred to [7].

End-to-end Scenario

Harmonization along

Suite Standards

- → **Responsive Supply Networks**
- → **Product and Service Leadership**
- → **Operational Excellence**
- → **High-Performing Assets**
- → **Superior Customer Value**
- → **Financial Excellence**
- → **Best People and Talent**

Process integration & simplification | Data integration & harmonization | User experience harmonization | Service enablement

Easier System Landscape Analysis

through Upgrade Dependency Analyzer

Simplified User Administration

through leveraging Identity Hub

Simplified Installation

through Automatic Connectivity Setup

Simplified Deployment, Operations, and Use
through foundation and cross-topics

- → Foundation for Harmonized User Experience
- → Enterprise SOA Provisioning & Consumption
- → Evolved Master Data Management
- → Lifecycle Management & Deployment
- → Analytics
- → …

Figure 2-4 Suite Differentiation

2.1.3   Foundation Topics

Specific or generic capabilities to enable scenarios across SAP Business Suite are referred to as foundation topics; the enabling technology is delivered by SAP NetWeaver. This section covers certain important foundation topics[6], other cross-topics like AP adoption or enterprise SOA are outlined in subsequent chapters:

- User experience ("UX") harmonization;
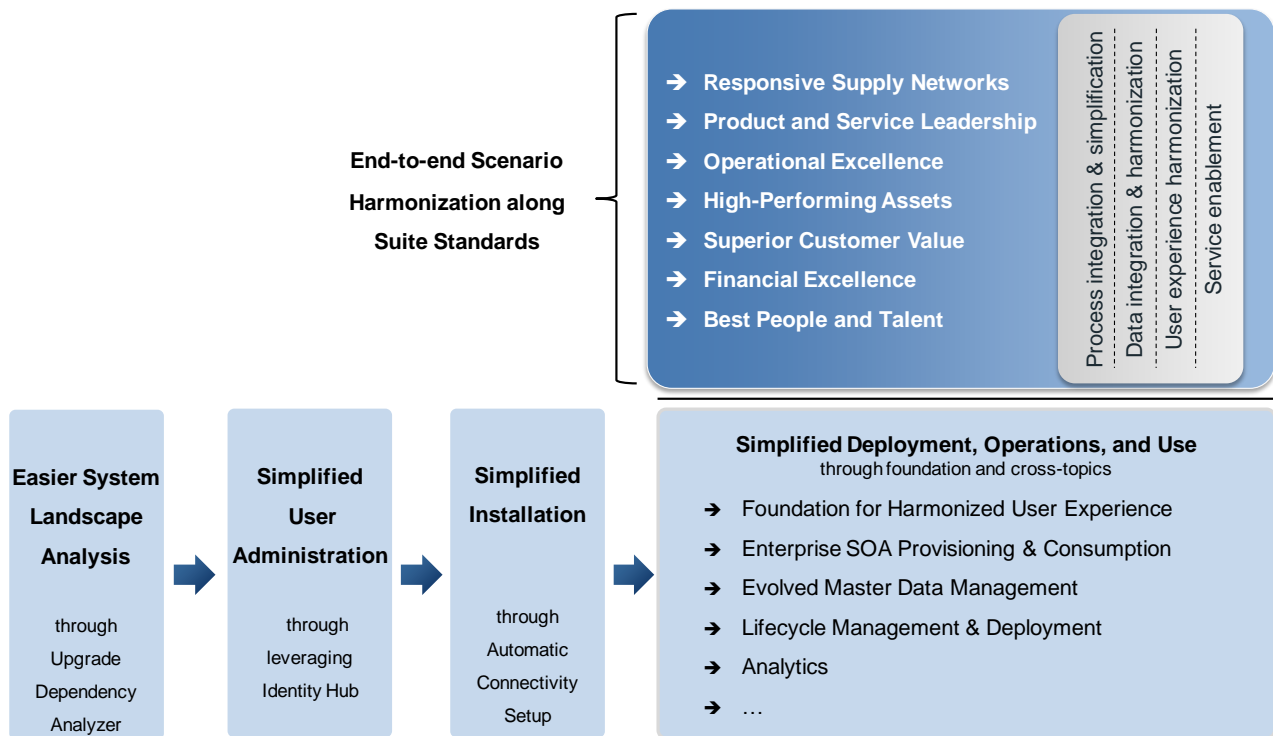- Lifecycle management and deployment;
- Analytics;
- Evolved master data management (codename "Sydney");
- Identity hub;
- Enterprise search;
- Knowledge architecture – Wektra help.

More detailed information about foundation topics can be found at [20]

UX h**armonization** will first of all make all SAP Business Suite solutions easily recognizable as part of the SAP product family. This includes common SAP branding of UI clients, roles and applications ("look like a suite"), common feel for reworked applications selected along scenarios and efficient work with roles crossing the boundaries of individual suite constituents. Top priorities of UX harmonization are (in order of "decreasing coverage"):

- Brand unification: align visual design of product items (for example: splash screens, logon screens, desktop icons, about boxes) and branding of marketing material.
- Common UI look: harmonize visual design of UI clients ("Nova" design) and controls ("Tradeshow" design) achieving a very high coverage across SAP Business Suite's core applications. The relevant UI clients are: Enterprise Portal, SAPGUI, CRM UI client, and SAP NetWeaver Business Client.
- Common navigation: align navigation to and between *selected* applications.
- Common interaction: align interaction behavior within *selected* applications.

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[6] No implications towards portfolio or investment priorities are made here.

- Side-by-side[7] UI harmonization: ensure harmonized interoperability to run side-by-side scenarios.

UX harmonization will be strongly supported by tools and re-usable UI components such as floor plan manager and power lists. The former allows efficient development of consistent application user interfaces supporting central implementation, for example guided activities or tabs, configuration to integrate application screens (also adaptable by customers), or APIs for common functionality like navigation or data-loss handling. Floor plan manager ensures compliance with all UI guidelines at design time. Power list (personal object work list, POWL) is a generic UI building block for control/work center development and ensures a homogenous user interface for object work lists across roles. It is a fast and comprehensive central point of access for users providing them with their personalized work context.

Work related to the adoption of new UI technology includes:

- *Flash/Flex islands*: the ability to create and deploy hybrid applications that combine Flash and HTML in a "best-of-both-worlds" approach. This is in acknowledgement of the fact that, as with Microsoft's Silverlight, some UI components (such as charts) render beautifully for a rich interactive experience with Flash, and other UI components (such as tables) render better in straight HTML. The flash islands technology is planned to be delivered with SAP NetWeaver 7.01 and 7.11. For more detailed information please refer to [19].
- *Spring view*: a business application-oriented, out-of-the-box entry point for end users with a contemporary Web client and clear focus on lean consumption (limited to a subset of capabilities like roles and navigation). The technology is planned to be delivered with SAP NetWeaver 7.12. For more detailed information please refer to [19].

Lifecycle management aims at governing and reducing system landscape complexity which increases the complexity of business processes, of process monitoring and error resolution, and of application and lifecycle management. Top priorities of lifecycle management are:

- Architecture standards helping to avoid the necessity of new system instances and of certain support package levels of central components.
- Ensuring business continuity including massive reduction of planned downtime due to maintenance, enhancement packages, upgrades and enforced restart situations.
- Manifestation of minimal reference landscape which new scenarios need to be validated against.
- Provisioning of different deployment options to reduce the number of stacks; clear guidance on Suite landscape evolution paths for different customer patterns.
- Automation and simplification of administrative tasks; for example, automated check of landscape dependencies, central deployment tools and switch framework, automated technical connectivity and setup, generated documentation.

Analytics has the overall goal to unify, standardize and streamline analytics for the Business Suite with respect to modeling, user experience and content delivery. Key areas are:

- consistent operational analytics across Business Suite with a state-of-the-art fully scalable architectural approach while also providing analytics integration according to enterprise SOA.
- embedded analytical components in operationally driven user interfaces in a context aware fashion to optimize analytics for SAP customers from TCO perspective and to boost process efficiency.
- enabling of fully model driven analytics development with highest flexibility and extensibility.

This will enable SAP growth by providing basic and premium analytics offering to customers by SAP Business Objects adoption and integration.

As long-term goal, **evolved master data management** ("Sydney") aims at improving the processes to create and exchange master data in customer landscapes that consist of a variety of installations of suite applications; furthermore it allows customers to maintain specific business configuration and master data centrally extending and complementing SAP's master data management and Solution Manager offering. Consistent exchange of master and configuration data will in future be addressed for side-by-side AP adoption scenarios and mixed landscapes including SAP Business ByDesign with built-in transformation between Business Suite and Business ByDesign structures. The first master data objects in scope are chart

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[7] See AP adoption, Chapter 2.2.

of accounts, material/product, customer master data and organizational data (companies, reporting line units, cost centers, profit centers). For more information please also refer to chapter 3.4.

Identity hub aims at overcoming single-system focused user and identity management approaches by introducing a central identity hub: SAP NetWeaver Identity Management based on the acquisition of MaXware. The main goal is to enable efficient and secure management of users and authorizations in heterogeneous landscapes (SAP and non-SAP), based on the assignment of roles to an identity which changes over time, and thus complementing existing security functionality like authentication and single sign-on, local role and authorization management, encryption and digital signatures or Web services security. This will increase efficiency for day-to-day identity management-related tasks across the system landscape, and help customers to fulfill legal requirements like compliance, security reviews and audits.

Top priority is the integration of Suite's business objects with SAP NetWeaver Identity Management, for example to be able to use employee information in HCM as data source for central managed identities.

The goal of **enterprise search** is to identify and enable the most important business objects to be used in scenario-specific cross-system search, to improve interoperability, and to unify a programming and delivery model to enable search within and across system boundaries. The result will be a unified architecture for search using one programming model, to deploy enterprise search in every suite system locally and centrally in the system landscape, to include non-suite and 3rd party search sources, and to provide a single point of access to both, structured and unstructured data. This will reduce TCO during setup and operation, empower information workers to search across suite applications in a customer landscape, and reduce development efforts because this architecture is leveraged for all deployments.

Wektra help aims at providing guided and personalized self learning content and services, embedded directly into the user's workplace, reducing knowledge transfer costs, which leads to measurable value and lower customer TCO. First delivery is panned with SAP NetWeaver 7.01 containing help center UI working with Suite Knowledge Warehouse. In the second phase, with SAP NetWeaver 7.02, it is planned to consolidate content infrastructure based on lean Knowledge Productization Services (KTP) store embracing enterprise learning and collaboration built-in support.

2.1.4   Stable Core and Enhancement Packages

The practice of shipping releases every other year is superseded by a new model. The core applications of SAP Business Suite 7.0 (including SAP ERP 6.0) will be delivered as the base releases remaining stable for the following years. Functionality will be shipped in the form of optional enhancement packages that can be used by customers selectively as required for their business. Enhancement packages deliver new functions on top of the core applications of SAP Business Suite 7.0 with minimal impact on existing functionality. Support packages, for base releases and enhancement packages alike, will deliver corrections only.

For ERP, the stable core is SAP ERP 6.0. For CRM, PLM, SCM and SRM the stable core release will be 7.0 – running on enhancement package 1 for SAP NetWeaver 7.0 as foundation (Application Server ABAP)[8]. The business functions available with SAP ERP 6.0 are kept stable within SAP Business Suite 7.0. The other components may introduce changes until the delivery of SAP Business Suite 7.0 in Q4/2008.

Customers can rely on the fact that the core remains stable for the lifetime of the product. Customers who do not install and activate enhancement packages get support packages that are guaranteed to contain no new functionality. Enhancement packages introduce only documented changes with clearly defined functional benefit. Applying an enhancement package must be easy and fast compared to traditional upgrades. Technically an enhancement package is a set of software component versions that are delivered together and can be installed optionally. For applying an enhancement package the existing release upgrade technology is used.

Details, technical rules and description can be found in [8].

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[8] SAP NetWeaver as foundation for SAP Business Suite comprises those parts of the SAP NetWeaver technology platform that are needed to run application systems of SAP Business Suite.

2.2 Integration of SAP Business ByDesign and AP-based Applications for Large Enterprises

This chapter is preliminary and reflects work in progress. Its content heavily depends on the evolving portfolio process and the progress of the side-by-side frontrunner scenarios.

In the context of this document, AP adoption refers to integration scenarios between applications of SAP Business Suite and applications based on AP. Different flavors can be distinguished:

- B2B collaboration in value networks (also known as adoption pattern 1);
- B2B/A2A collaboration in corporate groups (also known as pattern 2);
- Side-by-side extensions to SAP Business Suite (originally known as pattern 3 or 4).

Collaboration in value networks and in corporate groups will provide out-of-the-box integration between SAP Business Suite and SAP Business ByDesign across (value networks) and within (corporate groups) enterprise boundaries. Process extensions for the SAP Business Suite will be applications built on AP that extend the SAP Business Suite's core processes and are integrated in a side-by-side model through enterprise SOA.
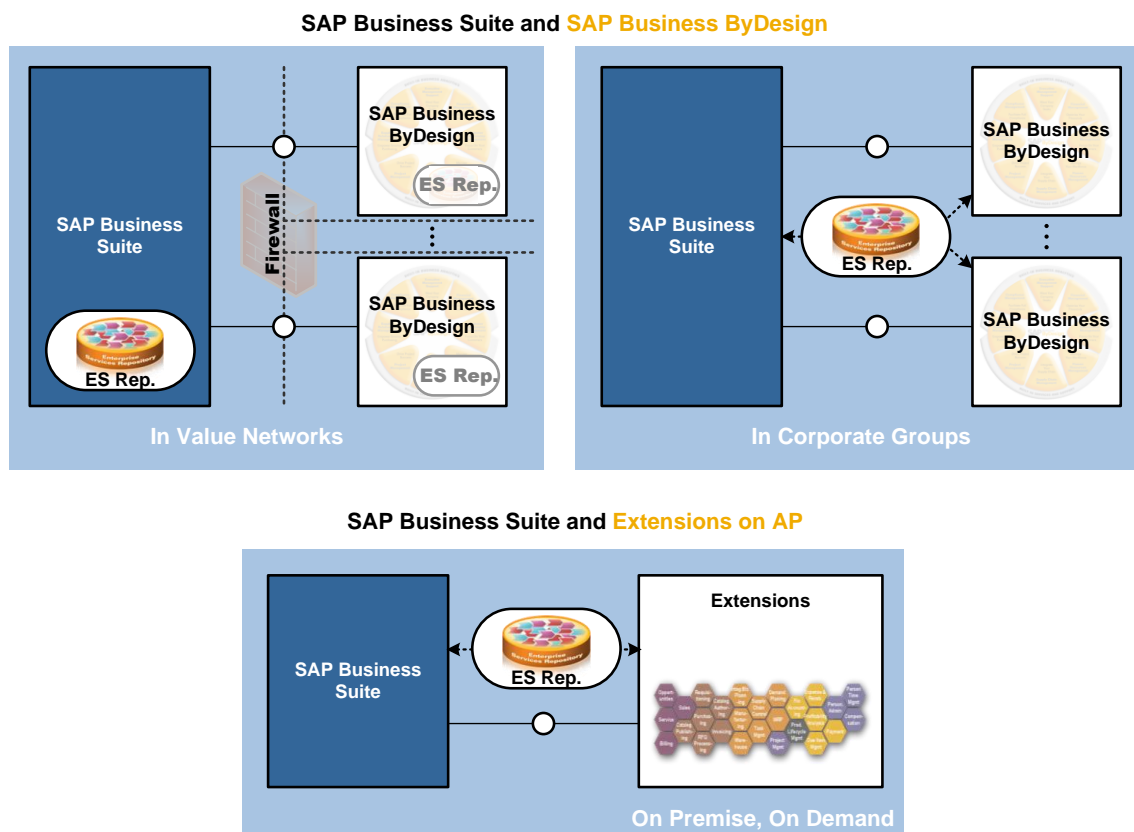
Figure 2-5 AP Adoption

2.2.1 B2B Collaboration in Value Networks

B2B collaboration in value networks refers to electronic exchange of business documents between independent legal companies running their businesses on SAP Business Suite (typically large enterprises) and SAP Business ByDesign (mid-size companies) through B2B messages or enterprise services. The goal is to support B2B collaboration between SAP ERP and SAP Business ByDesign "out-of-the-box" – with easy to configure B2B capabilities in SAP Business ByDesign. Consequently, architecture needs to address:

- B2B interfaces, and mappings between SAP Business Suite and SAP Business ByDesign;
- easy B2B configuration, especially on SAP Business ByDesign side;

- forward error recovery in SAP ERP.

Two very important processes, Order-to-Cash and Procure-to-Pay, are already enabled to a large extent, and service-oriented B2B collaboration between SAP ByDesign (FP 1.1) and SAP ERP 6.0 (enhancement package 3) is possible through a number of services. Additional industry content for these processes will be delivered via B2B service providers, partners and industry content owned by SAP. Forward error handling in SAP ERP will be available with enhancement package 4; easy B2B configuration is work-in-progress.

2.2.2   B2B/A2A Collaboration in Corporate Groups

This work is confidential and purely SAP-internal and must not be positioned as SAP Business ByDesign is not offered for large enterprise customers.

B2B collaboration in corporate groups refers to integration scenarios within corporate groups running their business on SAP Business Suite and one or more of their subsidiaries on SAP Business ByDesign. Centralization scenarios (e.g. central payroll, in-house cash, centralized sourcing), process control scenarios (e.g. financial consolidation) and process execution scenarios (e.g. central supply with ERP, local SAP Business ByDesign based sales) are seen as a sound foundation for corporate groups to collaborate with their subsidiaries.

In addition to B2B collaboration in value networks, the following requirements towards integration exist:

- harmonization of master data (interfaces);
- harmonization of configuration;
- tighter process integration between SAP Business Suite and SAP Business ByDesign beyond "pure B2B messaging";
- analytical/BI integration.

Combined release plans of SAP Business Suite/ERP and SAP Business ByDesign will only allow for a restricted delivery of central payroll and financial consolidation preparation scenarios in 2008. First synchronized delivery of financial integration scenarios might be in 2009.

2.2.3   Side-by-Side Extensions to SAP Business Suite

Side-by-side extensions are applications on AP with their own "solution hats" (not necessarily SAP Business ByDesign) that are integrated through enterprise SOA side-by-side with the applications of the SAP Business Suite. In the current setting, AP-based applications are deployed on-premise[9] running on a separate instance (co-deployment of Suite and AP-based applications on a single instance is not possible with SAP NetWeaver 7.0 or 7.1) based on a loosely coupled interaction model that strongly suggests asynchronous communication.

There is a broad spectrum of categories that could be addressed as side-by-side extensions including dedicated application scenarios (e.g. supplier base management), management of master data ("Sydney"), business network collaboration (e.g. customer or supplier portal), vertical white spaces (e.g. seasonal products), or consolidation (e.g. transportation management as a new AP deployment unit).

Basic coupling between SAP ERP/Business Suite and AP is needed in any case on foundation (e.g. master data) and application level through enterprise services. Depending on the scope and the level of integration of the individual scenario, more architecture topics have to be addressed (see Appendix 4.2 for some of them). Initially, candidates for side-by-side process extensions will focus on processes which can be introduced with lower degree of integration. Currently, the side-by-side architecture for supplier base management allowing to proactively manage the supply base of an enterprise is worked out in more detail.

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[9] In other words, the on-demand side-by-side deployment model (also known as pattern 3) is currently not in focus.

2.3 SAP NetWeaver for Large Enterprises

2.3.1 Technology Innovation Strategy

In the future, a much better suited balance between innovation and risk for disruption will be achieved for large enterprises by dedicated deliveries for:

- **continuous vs. accelerated innovation:** SAP NetWeaver 7.0 will continue to serve as foundation[10] for running the applications of SAP Business Suite at least until 2012, whereas accelerated innovation will be provided through SAP NetWeaver 7.1 capabilities such as ES Repository, Composition Environment, Process Integration, or Business Intelligence that are deployed adjacent to the SAP Business Suite applications;
- **corrections vs. technology innovation:** support packages for SAP NetWeaver will deliver corrections only, whereas technology innovation will be delivered through new SAP NetWeaver releases or through SAP enhancement packages (EhP) for SAP NetWeaver. The latter are similar in spirit to enhancement packages introduced with SAP ERP 6.0 and are discussed in Section 0.

Continuous technology innovation will no longer be delivered through feature packages but through SAP NetWeaver 7.0 enhancement packages; accelerated innovation will be delivered through SAP NetWeaver 7.1 and its enhancement packages. This results in the following delivery channels for technology innovation:

- **Feature packages for SAP NetWeaver 7.0.** SP14 (F) will be the last feature package. Its code line will be maintained through support packages providing only corrections.
- **Enhancement packages for SAP NetWeaver 7.0.** Enhancement packages for SAP NetWeaver 7.0 will substitute the delivery through feature packages after SP14. SP14 will serve as the baseline for SAP enhancement package 1 of SAP NetWeaver 7.0 (also referred to as SAP NetWeaver 7.01) which will provide new functions required by SAP Business Suite 7.0 including SAP enhancement package 4 for SAP ERP 6.0.
- **SAP NetWeaver 7.1 and subsequent enhancement packages.** Capabilities will be delivered for composition and integration (not as foundation for running the applications of SAP Business Suite).

Thus, SAP NetWeaver is used in the SAP Business Suite 7.0 in different roles to which different rules apply:

- **SAP NetWeaver 7.01 as foundation** to run core and industry applications of Business Suite 7.0.
- **SAP NetWeaver 7.0 or 7.1 as integration platform**, deployed adjacent to the applications, to run business processes within the SAP Business Suite and to integrate with non-SAP applications. Examples are Business Intelligence, Enterprise Portal or Process Integration.
- **SAP NetWeaver Composition Environment 7.1 as composition platform** to build and run composite applications. (There are composite applications that do not run on SAP NetWeaver CE.)
- **SAP NetWeaver 7.1 as foundation** to run process extensions in side-by-side mode based on AP (starting 2009).

In combination with these roles, **Enterprise Services Repository of SAP NetWeaver 7.1** is used as key enabler for enterprise SOA, governance and co-innovation. In the remainder of this section, the general strategy regarding enhancement packages for SAP NetWeaver, deployment, Composition Environment 7.1 and the push for accelerated innovation through SAP NetWeaver 7.1 will be sketched completing the roadmap for technology innovation in the near future. Work on the longer-term perspective has only been started, and results will be outlined in a future version of this document.

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[10] SAP NetWeaver as foundation for SAP Business Suite comprises those parts of the SAP NetWeaver technology platform that are needed to run application systems of SAP Business Suite. This includes Application Server ABAP but also other capabilities like local integration engine of PI, local administration capabilities, Web Dynpro, or even Application Server Java with portal core.

2.3.2   SAP Enhancement Packages for SAP NetWeaver

In order to clearly distinguish between delivery of corrections and technology innovation, enhancement packages are introduced for SAP NetWeaver as well. In the future, only corrections will be delivered via support packages whereas new functionality for a given SAP NetWeaver main release will be delivered through enhancement packages.

Enhancement packages for SAP NetWeaver are comparable to enhancement packages for applications. They are complete code lines with their own support packages; thus, main SAP NetWeaver releases (for example 7.0) and their subsequent enhancement packages (for example SAP Enhancement Package 1 for SAP NetWeaver 7.0) are separately maintained through support packages. Maintenance of SAP enhancement packages for SAP NetWeaver follows maintenance of the SAP NetWeaver main release according to standard 5-1-2 maintenance strategy. To control the overall complexity, maximal 3 enhancement packages will be delivered for a SAP NetWeaver main release. Every enhancement package for SAP NetWeaver needs explicit PTC/Board approval. At the time of writing, the first enhancement packages for SAP NetWeaver 7.0 and for 7.1 are in development and the second enhancement packages are in planning.

Enhancement packages for SAP NetWeaver will, in most cases, not use the switch framework due to the resulting complexity for highly reused technology components and engines. Thus, the new functions of a SAP enhancement package for SAP NetWeaver will typically become active by installation or deployment, potentially depending on configuration.

Applications (with or without enhancement packages for applications) always run on a defined SAP NetWeaver code line which is either a SAP NetWeaver main release or an SAP enhancement package for SAP NetWeaver. The latter are strictly downward-compatible in the sense that applications running on a main release or a lower version of a SAP enhancement package for SAP NetWeaver continue to run on a higher version of a SAP enhancement package for SAP NetWeaver without any manual intervention. Detailed compatibility and validation rules between SAP enhancement package for SAP NetWeaver, SAP NetWeaver capabilities and applications are to be worked out in the next months; results will be included in a future version of the product roadmap.

2.3.3   SAP NetWeaver Deployment Strategy

Today, guidance on deployment of SAP NetWeaver capabilities is limited including clarity which capabilities can or must not be deployed together and clear recommendations which capabilities should be "bundled" together. This increases customer uncertainty about appropriate deployment and usage options, and eventually landscape complexity at customer side.

Therefore, a new deployment concept will be introduced over time in SAP NetWeaver borrowing ideas from AP:

- SAP NetWeaver will be structured into functional units. Functional units are configured and activated units of SAP NetWeaver that provide a set of services interacting through explicit communication channels with well-defined interoperability. Depending on the services, the communication channels can be of different types, for example local, client/server, hub ("many clients connected"), or federated ("many instances of same functional unit"). Functional units will be introduced with SAP NetWeaver CE 7.1 but not with all the desired attributes and behavior during this first delivery. More complete utilization of the concept is expected with SAP NetWeaver 7.2.

- Functional units are combined into deployment units that can be operated independently from one another. Delivery on this concept requires some refactoring of SAP NetWeaver; therefore deployment units are planned to be introduced in the next SAP NetWeaver release after 7.1. In this context it also planned to deprecate SAP NetWeaver usage types: deployment units are expected to cover their responsibilities as well.

- The instances of deployment units in a concrete landscape define the roles that the respective systems play in this landscape. Instances of deployment units are hubs if their services can be offered in a shared (and most often central) fashion to two or more systems in a landscape.

This deployment concept will much more clearly describe the units of functionality that can be used, their interoperability and dependencies, and the deployment options. At the time of writing, this is work in progress

which will be introduced in subsequent SAP NetWeaver releases. Results and decisions will be incorporated into a future version of this document.

2.3.4   SAP NetWeaver 7.1: Rules for Accelerated Innovation

Large enterprise customers will receive accelerated technical innovation not only through Composition Environment (see Section 2.3.5) but also through other capabilities of SAP NetWeaver 7.1:

- Business Intelligence (BI) and Business Intelligence Accelerator (BIA);
- (Enterprise Search being an exception in the sense that it is planned to be delivered with SAP NetWeaver 7.01 for embedded search within Business Suite's core applications, and as a software appliance with SAP NetWeaver 7.12 for central search);
- Identity Management[11];
- Master Data Management (MDM);
- Mobile;
- Portal;
- Process Integration (PI; formerly known as Exchange Infrastructure, XI).

SAP NetWeaver 7.1 Identity Management, MDM and Mobile will be used with SAP Business Suite 7.0 for the relevant scenarios.

In case of the more central deployment units – **BI, Portal and PI** – customers must not be forced to upgrade to SAP NetWeaver 7.1 but can continue to run their SAP NetWeaver 7.0 capabilities at the expense that new functionality is not available. To allow adoption of technical innovation at the individual customer's pace, three different adoption approaches (including a mix of those) are recommended for BI, Portal and PI:

- easy adoption comprising BI, Portal and PI on 7.0;
- continuous innovation with BI, Portal and PI on 7.01;
- accelerated innovation through BI, Portal and PI on 7.11 (still under discussion; Portal might be an exception in any case due to the fact that key capabilities like Nova are already made available with SAP NetWeaver 7.0 and its enhancement packages).

The **transition to SAP NetWeaver 7.1** must not disrupt customer business and IT in any case:

- In principle, a technical upgrade provides for the transition from a SAP NetWeaver 7.0 system to a 7.1 system so that the existing 7.0 content (including customer and partner content) and the whole customer landscape continue to function as before.
- Customers will have mixed landscapes in which systems of different releases, especially 7.0 and 7.1, will have to interoperate without disruption. This also includes landscapes where systems providing the same capabilities like Portal or PI are used in different versions.

To ensure **non-disruptive upgrade to 7.1, SAP NetWeaver** must guarantee:

- Strict upward-compatibility of content: 7.0 content must work in the respective 7.1 system without manual intervention.
- Strict downward interoperability: 7.1 systems must support SAP NetWeaver 7.0-based systems, being it application systems or pure SAP NetWeaver systems.
- De-coupled upgrade: the upgrade of a SAP NetWeaver system must not force the upgrade of any other SAP NetWeaver or application system, nor must it force software changes in the application systems. In case multiple SAP NetWeaver capabilities like BI or PI are installed on the same instance without applications, all capabilities can only be upgraded together. If such SAP NetWeaver capabilities run on the same instance along with an application of the SAP Business Suite, an upgrade is not possible.
- Non-increasing TCO: the TCO of a SAP NetWeaver 7.1 system must not exceed the TCO of its 7.0 predecessor if only 7.0 functionality is used.

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[11] Based on the acquisition of MaxWare, SAP NetWeaver Identity Management 7.0 was delivered first in July 2007.

It will not be possible to prevent certain issues, sometimes even caused by external influence (e.g. adoption of new Java versions like Java SE 5 and Java EE 5, affecting all Java-based content). SAP NetWeaver defines detailed compatibility rules along with necessary exceptions.

Application development on the other hand must ensure that activation of functionality of an application enhancement package does not force an upgrade of a SAP NetWeaver system (e.g. SAP NetWeaver PI 7.1 instead of 7.0 becomes mandatory) or the introduction of a new SAP NetWeaver system compared to the reference landscapes for SAP Business Suite 7.0. Exceptions to this rule need approval by the system landscape governance board.

2.3.5   SAP NetWeaver Composition Environment 7.1

SAP NetWeaver Composition Environment's (CE) product vision is to provide an integrated development, modeling, and runtime environment for composite applications that delivers highly productive, lean, and standards-based tools and frameworks to best support reuse of SAP's enterprise SOA assets through the entire software lifecycle of composite applications. It is used by developers, business analysts, and administrators at customer, partner and SAP side who aim to build, modify, and run composite applications on top of SAP Business Suite or AP/SAP Business ByDesign.

In *2007*, SAP NetWeaver CE 7.10 delivered a lean, standards-based development and deployment environment for SOA-based composite applications. Tools and frameworks on services, UI, and process layer support the consumption of enterprise SOA assets to create composite applications. ES Repository and services registry can be deployed with SAP NetWeaver CE supporting the design, extension, provisioning, management, and reuse of enterprise services with business logic implemented in Java EE. State-of-the-art Java EE 5 and Web services standards as well as Eclipse are used or implemented.

In *2008/09*, SAP NetWeaver CE plans to enhance composite process modeling and improve the support along the lifecycle of composite applications:

- SAP NetWeaver BPM ("Galaxy") will be delivered as part of SAP NetWeaver CE 7.11. The mission of this first delivery is a "critical mass" workflow profile for developers:
  - simple human workflows, service orchestration based on Web services, and their combination;
  - state-of-the-art modeling environment in Eclipse based on Business Process Modeling Notation (BPMN);
  - solid architecture foundation necessary to subsequently address more use cases.

  With the advent of Galaxy, Guided Procedures will be kept on the current feature level and will be replaced over time. Even after Galaxy has been delivered, GP still has to be maintained (according to US GAAP).
- Built-in extensibility will support enhancing of composite applications.
- Enhancements for end-to-end supportability, fast error diagnostics, and software logistics (e.g. NWDI deployment on CE with simplified software lifecycle management, one-transport-order integration with ABAP transport infrastructure) will be made.
- Further simplicity and developer productivity to be achieved through extended refactoring, reusable building blocks, full Eclipse adoption for Visual Composer, and a composite designer perspective.

Beyond 2008/09, SAP NetWeaver CE intends to further extend the support of enterprise SOA and facilitate the deployment and management of composite applications in customer and partner landscapes through:

- Situational composites (codename "Eventus") and collaborative runtime information composition. Situational composites are built by combining existing building blocks in a quick and easy way. This empowers end users to get the information they need, when they need it, and removes the role of IT as a bottleneck to meet users' requirements. The first scenarios for situational composites may comprise handling of unexpected events, task collaboration and information composition.
- Software logistics for composite applications as product shipments (e.g. installer, update manager). Synchronized composite-backend change and configuration management.
- Adoption of SCA/CSA (Service Component Architecture; now Composite Service Architecture under OASIS) for composites and business configuration for composites.
- Java EE 6 and latest Web services standards.

2.4   SAP Business Objects and SAP Business Suite

SAP Business Objects delivers the strategic insight necessary to optimize business performance. Combined with SAP Business Suite it uniquely allows customers to close the loop between strategy and execution as shown in the following diagram:
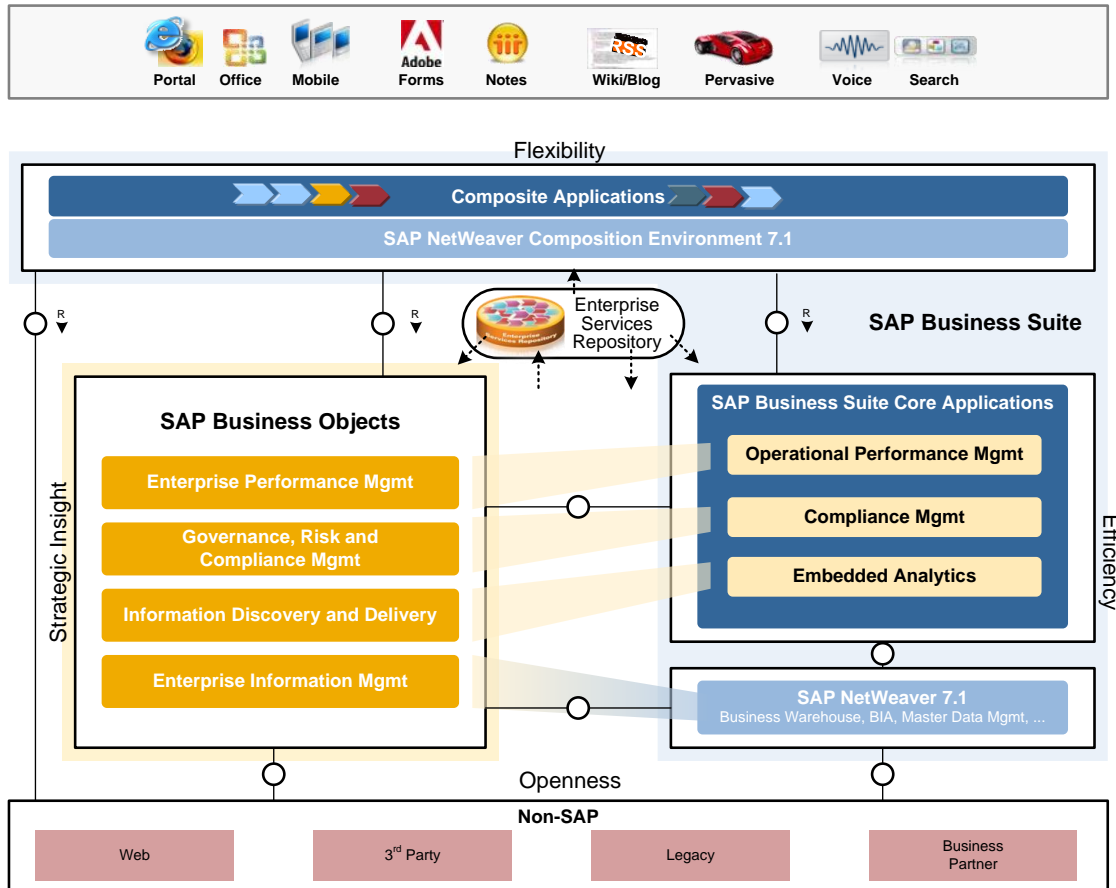
Figure 2-6 SAP Business Objects and SAP Business Suite

Figure 2-6 reveals that certain capabilities of the overall offering are actually implemented as part of SAP Business Suite. In the context of this document which currently focuses on architecture strategy & roadmap for SAP Business Suite, embedded analytics is of key interest. However, the target architecture and roadmap is still work in progress[12] and will be covered in a subsequent version of this document. For 2008, showcases with SAP Business Suite 7.0 are planned; productive use is expected to start in 2009. Nevertheless, the following diagram already outlines some basics of the technology roadmap (readers should be aware that this is an early version that is subject to change).

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[12] This also applies to the question of pricing and packaging.

		Existing solutions	2008	2009	2010
PREMIUM	**Enterprise Reporting**	Crystal Reports	Crystal Reports	Crystal Reports	Crystal Reports
BASE			Crystal Reports Trial	Crystal Reports Trial	Crystal Reports Light
		BEx Report Designer	BEx Report Designer 7.1		
PREMIUM	**OLAP Analysis**	Voyager	Voyager	Pioneer Incl. Excel Analyzer	Pioneer Incl. Excel Analyzer
BASE		BEx Web Analyzer	BEx Web Analyzer	Pioneer Light	Pioneer Light
		BEx Excel Analyzer	BEx Excel Analyzer		
	Dashboards	Xcelsius	Xcelsius	Xcelsius+	Xcelsius+
		Web Application Designer	Web Application Designer		
	Data Quality & Master Data Management	Data Quality	Data Quality	Data Quality	Data Quality
		Master Data Management	Master Data Management	Master Data Management	Master Data Management+

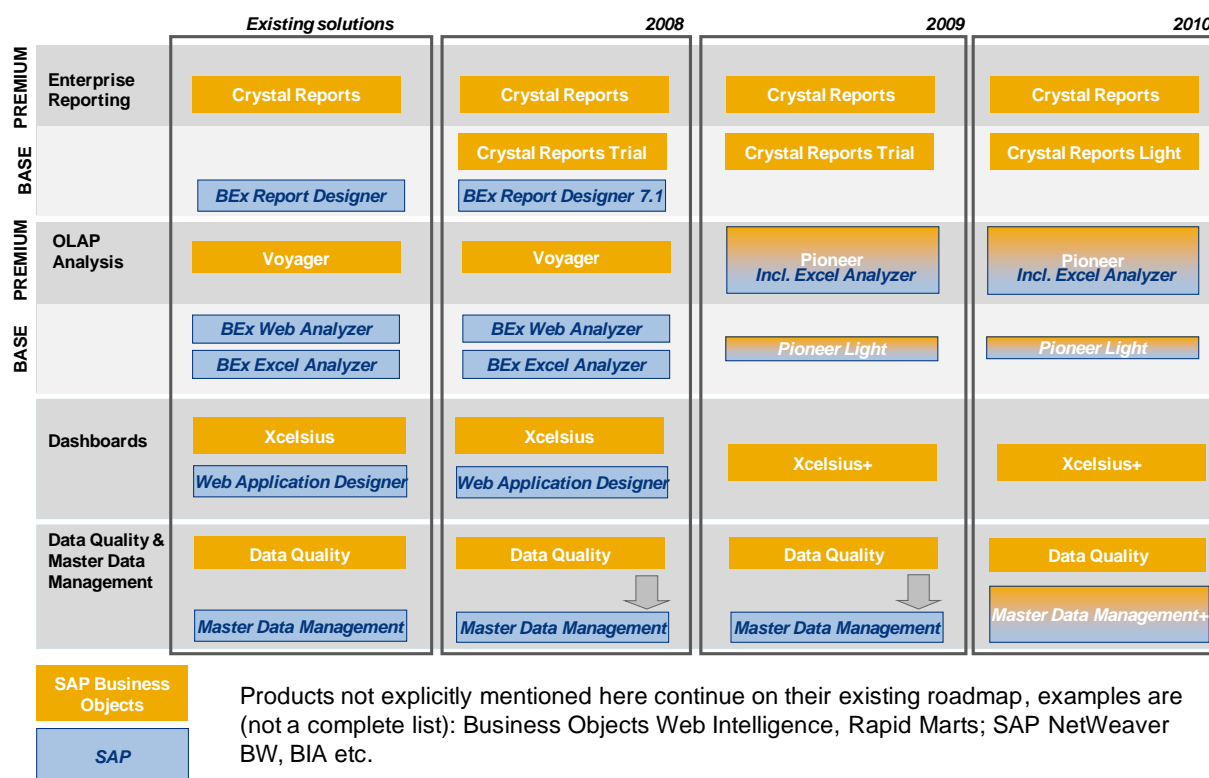| SAP Business Objects	Products not explicitly mentioned here continue on their existing roadmap, examples are (not a complete list): Business Objects Web Intelligence, Rapid Marts; SAP NetWeaver BW, BIA etc.
SAP	

Figure 2-7 Roadmap Basics for Business Intelligence

Enterprise reporting: Crystal Reports will be the flagship product for formatted reporting going forward. SAP NetWeaver BI Report Designer will be replaced with a limited version of Crystal Reports starting in 2010 and will receive no further functionality enhancements beyond SAP NetWeaver 7.01.

OLAP analysis: A new product code named "Pioneer" that will include Excel Analyzer capabilities will be delivered in 2009 providing a superset of capabilities for both, BEx 7.0 and Business Objects' Voyager. Customers using Voyager will be migrated to Pioneer.

A "Pioneer Light" base offering version which basically consists of a limited version of the Excel Analyzer capability contained in Pioneer premium is planned to be delivered in 2009; BEx Web Analyzer will be not be further enhanced beyond SAP NetWeaver 7.01.

Dashboards: Beyond SAP NetWeaver 7.01 no further enhancements of BEx Web Application Designer are planned. On the other hand, Xcelsius will be extended to encompass some functionality of BEx Web Application Designer, in particular data binding functionality. In the near future, "Xcelsius+" (code name) will be the tool of choice for BI dashboards with enhanced visualization capabilities.

SAP NetWeaver Visual Composer and Composition Environment will pick-up further Web Application Design features in order to support modeling, running and personalizing of composites with seamlessly embedded business intelligence. Customers can leverage integrated modeling and a runtime environment that supports analytical as well transactional content components.

As products that complement very well each other, **SAP NetWeaver MDM and Business Objects Data Quality** are foreseen to offer huge value for both customer bases. MDM provides a modeling environment with a central repository, generic cleansing and matching capabilities, synchronization and workflow while Business Objects Data Quality provides first class address cleansing and fuzzy matching of customer data.

In 2008, there will be a loose integration of the two products, meaning SAP NetWeaver MDM being able to consume content from Business Objects Data Quality, data cleansing and de-duping before load into master. By 2010 SAP will deliver tight integration of Data Quality with an enhanced version of master data management; however, Data Quality will continue to be available as a standalone offering.

3 Architecture Cross-Topics

3.1 Release Policy

Release planning is centrally governed and captured in the SAP master plan which comprises pre-defined shipment dates. In addition, synchronized phases like product definition or integration test are mandatory for SAP Business Suite to ensure aligned delivery. The individual releases are planned locally according to the SAP master plan. PTUs can select release dates from the centrally defined release schema according to the category of the shipment date (SAP NetWeaver, core applications, industry application with high integration to SAP Business Suite, or "composite-like application" with low integration to the SAP Business Suite). A release plan change management will be put in place through local and central management to increase plan transparency and management of dependencies.

The general yearly release scheme for large enterprises can be summarized as follows[13]:

- SAP NetWeaver: main releases and other enabling shipments are delivered in Q2.
- Core applications (including ERP) of SAP Business Suite: new releases or enhancement packages are based on the same SAP NetWeaver release or enhancement package, are shipped in Q3 and can consume SAP NetWeaver features provided the quarter before. Optional enhancement packages shipments with focus on single application scenarios will be possible in Q1.
- Industry applications (with high dependency to SAP Business Suite) are released in Q4.
- "Composite-like applications" (with low or without dependency to SAP Business Suite) are free to ship in any shipment window except for the one reserved for SAP Business Suite to avoid bottleneck in validation.
- Applications for GRC and Performance Management: depending on high dependency or low dependency to SAP Business Suite (as outlined above) these applications will either be shipped in Q4 (high dependency) or are free (low dependency) to ship in any shipment window except Q3.
- Content shipments will be delivered with the applications, except for Business Intelligence & SAP Solution Manager content which is shipped quarterly.

More information is to be found in [2].

3.2 Modeling

One key goal for modeling at SAP is to provide an integrated modeling methodology, tooling and governance framework for reference content creation from business to enterprise SOA modeling. Customers and integration partners/ISVs should be able to seamlessly drill through the different layers of abstraction to gain understanding of the solution from high level business scope down to individual signatures of service operations. In 2008/09 the focus will be on process modeling; this implies the integration of content available today in Solution Maps primarily for marketing and pre-sales purposes, in SAP Solution Manager for implementation, monitoring, and support, and in ES Repository for enterprise SOA.

Only the close integration of modeling methodology, modeling tools and modeling content delivery will enable SAP to provide consistent and competitive business process management. The "Modeling@SAP" program addresses these topics and is set up across SAP with involvement from SAP consulting, NetWeaver, Business Suite, industries and AP.

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[13] Exceptions might exist; for example, shipments of SAP NetWeaver 7.11 and SAP Business Suite 7.0 are currently planned for Q3/2008 (instead of Q2) and Q4/2008 (instead of Q3), respectively.
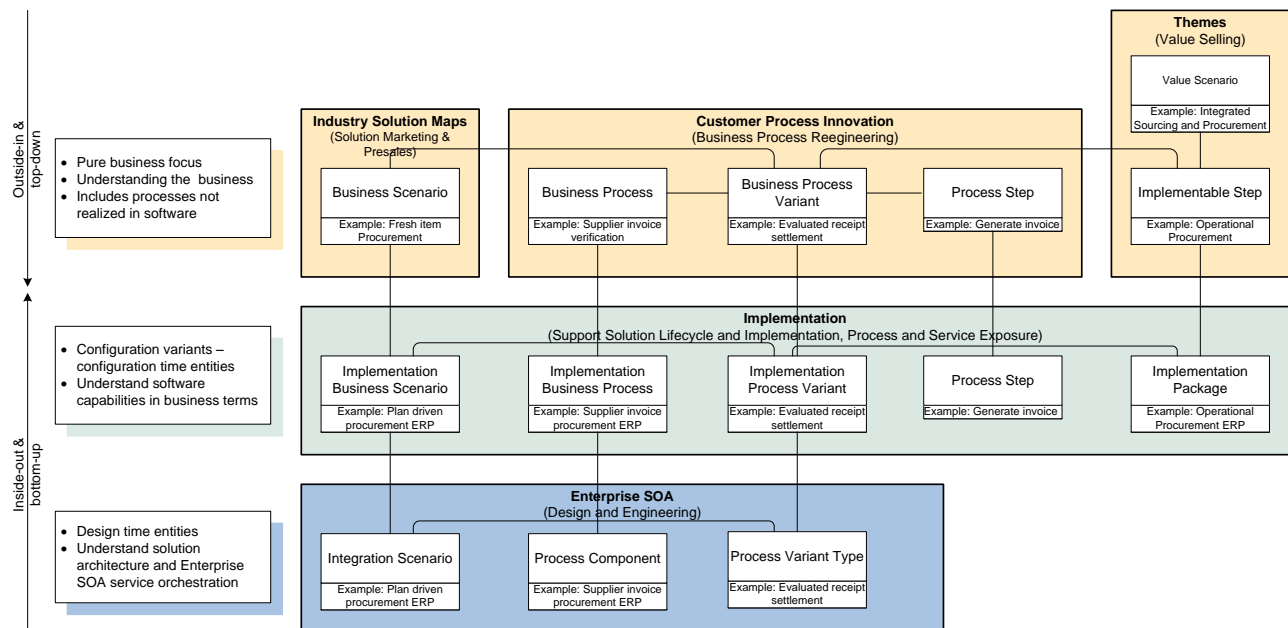
Figure 3-1 Simplified Modeling Metamodel with Sample Entities[14]

Figure 3-1 depicts a simplified version of the metamodel (work in progress with changes being expected). Two main integration aspects need to be addressed:

- "vertical" integration across the different abstraction layers;
- "horizontal" model abstraction across different architectures and implementation approaches in the respective SAP product lines to support customers in setting up side-by-side and composition scenarios leveraging SAP Business Suite and AP-based solutions (incl. SAP Business ByDesign).

3.2.1 Vertical Model Integration

Vertical integration addressed the need for an integrated meta model across the different model layers, clear rules and guidelines how the different entities like enterprise services, process components, processes in the implementation layer and business processes in the business layer should be cut and defined, and the integration of the modeling tool environment to enable a seamless drill down from business models to enterprise services.

The business layer, the upper layer in Figure 3-1, focuses on the business description of processes. It does not consider technical or software solution specific aspects but industry specific aspects. First focus is on two areas in the business layer:

- The customer process innovation area represents industry specific business process maps created by SAP Consulting to support business process reengineering efforts. These process maps serve as starting point for discussions around customer "to-be" processes. The reference content is linked with implementation content in SAP Solution Manager to simplify subsequent SAP implementation projects.
- The themes area represents primarily a marketing and value selling aspect. It defines value scenarios that address a certain business value for a specific buying center. This content is also linked with the implementation content in SAP Solution Manager to ease the accomplishment of the value scenario in an implementation project.

The implementation layer contains the content to support process-driven implementation of SAP solutions for large enterprises by linking scenarios, processes with documentation, transactions and IMG actions.

The enterprise SOA layer describes enterprise services, their structuring and the service orchestration between internal and external components. Its models are captured in ES Repository.

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[14] This is work in progress and changes will be necessary.

3.2.2   Horizontal Model Integration

Horizontal integration addresses the need for a common modeling layer across SAP product lines. Key focus in 2008/09 is to define a common language to expose processes and enterprise services that are offered by SAP Business Suite and Application Platform for the sake of easier process composition, e.g. through SAP NetWeaver BPM.

The core enterprise SOA layer is already aligned by applying the AP enterprise SOA modeling methodology to SAP Business Suite. In the next step, alignment will take place on the "process flow layer" that describes how the process flow is implemented in software and which enterprise services are used. Process flow models will be used to describe specific process variants and their extension points (enterprise services) in the implementation layer. Figure 4-3 shows an example for the supplier invoice process.
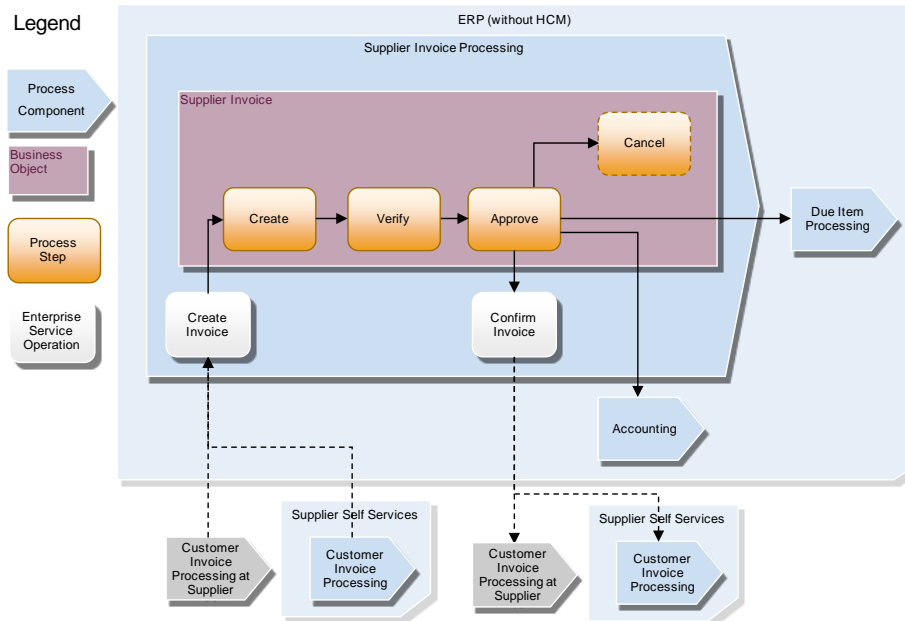

Figure 3-2 Horizontal Model Integration

3.3   Enterprise SOA by Evolution

Enterprise SOA by evolution is one of the key design principles for SAP's offerings for large enterprise customers. Enterprise SOA by evolution allows them to leverage current application investments and get the flexibility to integrate into a heterogonous landscape and to innovate on top. It builds upon:

- clear methodology and governance;
- separation of provisioning of services and consumption of services in all new applications;
- model-driven development for composites.

Enterprise SOA by evolution mainly addresses the following two scenarios:

- The **composition** scenario enables customers, partners and SAP to easily build or use composites on top of SAP Business Suite. iCOD/sCOD (see Section 3.3.3) mainly represent this category; Duet and Atlantic also fall into it.
- The **integration** scenario enables customers to integrate one or more application systems through enterprise services. Business-to-business (B2B) and application-to-application (A2A) integration across and within enterprise boundaries are the classical examples; integration of SAP Business Suite and AP-based applications, as outlined above, fall exactly in this category. Mastering heterogeneous landscapes is another example including 3rd party and legacy system integration.

It is expected that both, composition and integration scenarios are exclusively built on enterprise services[15].

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[15] This does not apply to minor enhancement or changes of existing scenarios that might not yet use enterprise services.

The description of the near-term target architecture for enterprise SOA, especially the consumption part, can be found in [10]. More information about enterprise SOA, the enterprise SOA program and enterprise services is to be found at [11], [12], [13].

3.3.1   Architecture View

The enterprise SOA by evolution target architecture will leverage SAP NetWeaver 7.1 to take advantage of SAP NetWeaver Composition Environment (CE) 7.1 and SAP NetWeaver Process Integration (PI)[16] 7.1as well as the common Enterprise Services (ES) Repository. The latter will be shipped with both, SAP NetWeaver CE 7.1 and PI 7.1 but can be shared at customer side[17]:
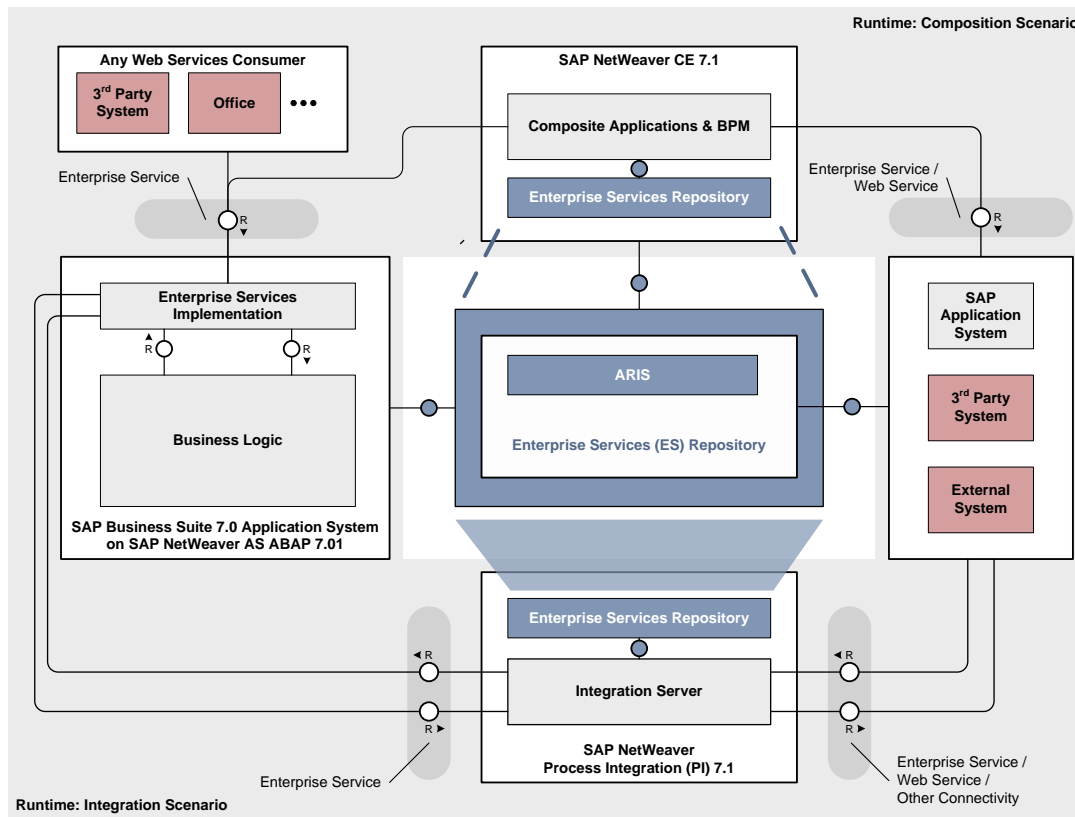

Figure 3-3 Enterprise SOA Target Architecture by End of 2008[18]

SAP NetWeaver PI 7.0 customers need to upgrade to arrive at the target architecture. To avoid a forced upgrade to PI 7.1 for existing customers, CE 7.1 can be used in conjunction with PI 7.0 at the expense that two ES Repository installations are needed, namely

- the existing ES Repository 7.0 as part of PI 7.0 still being used for integration scenarios and offering 7.0 functionality only;
- the new ES Repository 7.1 being used for composition scenarios only.

The general strategy is to support new enterprise SOA capabilities only with SAP NetWeaver 7.1 and selectively with SAP NetWeaver Application Server 7.0 (SP 13-14, and subsequent enhancement packages) – but not with SAP NetWeaver PI 7.0.

In 2008, integration and composition technology will be improved by:

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[16] Previously known as SAP NetWeaver Exchange Infrastructure (XI).

[17] Several variants of deployment of ES Repository do exist and depend heavily on the actual customer situation.

[18] In the future, a simplified landscape without separate PI Integration Server will be possible. SAP NetWeaver PI will provide a lean deployment option for CE to enable composites with integrated connectivity to non-SAP systems and business partners.

- new enterprise SOA capabilities in SAP NetWeaver 7.0 Application Server as the foundation for applications of SAP Business Suite; reliable asynchronous point-to-point communication without PI Integration Server (and based on the Web Services Reliable Messaging, WS-RM, standard protocol) is a prominent example.
- SAP Business Process Management (BPM, codename "Galaxy") as part of CE.

Adoption of these technologies will start in 2008 but the main adoption is expected **in 2009**. In particular this applies to the use of asynchronous point-to-point communication which will also be used for asynchronous notifications of composite applications. In this context, event-driven architecture ("EDA") will be introduced in SAP Business Suite in 2009 to complement enterprise SOA:

- Business events notify the respective subscribers about significant changes in the business state of applications. Hence they will become a key enabler for synchronization of federated business processes (e.g. between core and composite applications), for process performance monitoring, for business activity monitoring ("event resolution"), for replication scenarios (e.g. in mobile, or Duet/Atlantic), and other use cases.
- Event-driven architecture will leverage and complement enterprise SOA. It will comprise the definition of business event types in ES Repository, one event (provisioning) programming model for SAP Business Suite, and publish/subscribe infrastructure provided by SAP NetWeaver comprising the provisioning and consumption side. This architecture will be introduced in a phased approach.
- The necessary business events will (need to) be defined and raised in SAP Business Suite.

3.3.2 Service Provisioning

SAP promotes enterprise services by means of Enterprise Services (ES) Bundles. ES bundles are collections of enterprise services covering end-to-end processes and can be used to extend the functionality of SAP Business Suite. An ES bundle groups enterprise services from a business point of view; from a technical point of view, however, enterprise services are delivered as independent entities within different software components[19] as part of the application delivery via normal releases or via enhancement packages. Each ES bundle provides a set of enterprise services along with documentation of how the services can extend and reconfigure specific business processes. Services can be used selectively; using all services of a bundle is, in general, not mandatory.

Service enabling needs to take the following two important dimensions into account:

- Enterprise services are provided for existing and new functionality within SAP Business Suite. Major new functionality must be equipped with enterprise services.
- Enterprise services are provided in the context of two fundamentally different consumption scenarios. The first includes Duet/Atlantic and B2B/A2A interactions (including AP adoption) where the processes are well-known. In the second scenario services are provided typically for "unforeseen" composition on top.

Service enabling will not stop by end of 2008 but the provisioning strategy will change, with PIC governance still applying to all cases:

1. In general, plan-driven provisioning (SAP provides enterprise service upfront) will be replaced by demand-driven provisioning of enterprise services.
2. Plan-driven enterprise services provisioning can be continued decentrally if and where needed.
3. For strategic topics like suite differentiation, master data services, services for sCOD, or Duet/Atlantic centrally governed plan-drive enterprise service provisioning will continue.

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[19] The decoupling between the business view (ES bundles) and the technical delivery poses a threat to customers today: it is very hard to determine the software components that have to be applied in order to get to the enterprise services of a specific ES bundle. Tool support is needed to improve this situation.

3.3.3   Service Consumption in the Composition Scenario

The composition scenario currently comprises two main strands for service consumption, Duet and Industry Composites Development (iCOD). As iCOD (and its successor, sCOD, Suite Composite Development; see below) is the frontrunner for composition, this version of architecture strategy & roadmap only addresses iCOD/sCOD in the following (more information can be found in [14] and [15]).

iCOD aims at delivering industry-relevant productized composite applications, that simplify, automate or extend business processes. Faster reaction to market needs is the ultimate goal to be reached with model-driven development using SAP NetWeaver Composition Environment on top of the Business Process Platform. Focus areas of iCOD are:

- user-centric, highly collaborative composite applications to improve and accelerate decision making;
- automation of business scenarios and user specific processes to improve process flow, process efficiency and process transparency;
- external collaboration to improve interaction with business partners.

iCOD develops complete products by composing reusable enterprise services offered by SAP Business Suite. The resulting applications are loosely coupled to the underlying applications and have their own lifecycle. The overall strategy is to build composite applications on SAP NetWeaver CE taking advantage of the new SAP NetWeaver Business Process Management (BPM; codename "Galaxy") delivered in 2008 as one key ingredient into CE. The first version of Galaxy will address human-centric processes and service composition but will not address, in its first version, all requirements of composite development. Therefore Guided Procedures (GP) might still be used – but according to the guidance of SAP NetWeaver and knowing that GP will be replaced in near future.

In 2008 and in the above context, iCOD will

- move from pilot projects to productive customer use;
- move to "Suite Composite Development" (sCOD) by shifting its focus from pure industry scenarios to suite composites that complement value scenarios of SAP Business Suite;
- identify new projects within the portfolio process.

Starting with enhancement package 4 of SAP ERP, there are and continue to be pilot projects to build ABAP-based composite applications and platform extensions (see Appendix 4.3). Overall goals are higher effectiveness through platform reuse, platform validation and optimization, and partial portability of platform extensions into the AP world to safeguard investments and to achieve deployment flexibility for customers. At the time of writing, the portfolio analysis to identify candidates and the architecture definition are still work in progress. In 2008 three ongoing pilot projects started with enhancement package 4: Fresh Item Procurement, Student Self Services and Demand Management Foundation.

Finally, 2008/09 will see a consolidation of existing composite xApps. Careful analysis will lead to decisions as to upgrade or re-implement existing xApps to state-of-the art architecture or move them into maintenance mode or to discontinue them.

3.4   Master Data Management

Highly available and high quality consistent data of are key goals of master data management. To achieve this for a customer, the complete the landscape has to be taken into account. This includes SAP products and applications as well as non-SAP products. The maintenance of master data is not an isolated process; it is bounded to business logic and transactional data. This applies to a wide range of functions like validation of changes of master data based on transactional data (for example, deleting a product if no reference exists) or complete business processes (creating a record for a new employee when he or she is hired) including complete solutions to create and change master data (like Product Lifecycle Management).

Master data will be managed by solutions including all application-specific and generic components that are relevant. An example for an application-specific component is the duplicate check in business partner maintenance. One of the generic components is the SAP NetWeaver MDM server. Common capabilities like

data quality, unified reporting and enterprise SOA enablement are based on common functions such as key mappings, value mappings, search and SAP NetWeaver PI-based distribution and routing. The resulting high level architecture is shown in the following block diagram:
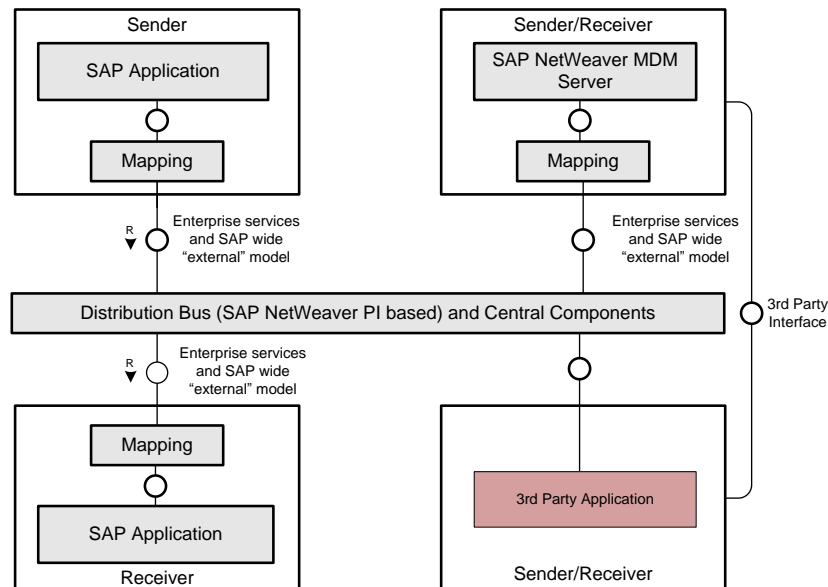

Figure 3-4 SAP Solution Architecture for Master Data Management

The architecture comprises SAP applications that send or receive master data, the SAP NetWeaver MDM server and 3rd party applications. Master data is exchanged and distributed based on enterprise services that build on a standardized enterprise-wide model for master data. This standardized model is called the "external model" because it typically differs from the internal master data model of the respective applications. SAP NetWeaver PI is used to implement a bus for distributing and routing of master data. 3rd party application may be integrated both, via enterprise services or based on 3rd party protocols. All SAP products – applications and MDM server – contain master data-related reuse components such as a mapping component for mapping keys and values.

Master data management can be seen as a continuous universe of use cases not all of which require all elements. Some use cases are better served through a centralized architecture with an MDM hub using capabilities only available in the MDM server; other use cases are better served without a dedicated hub in a decentralized way. With release 7.1, SAP NetWeaver MDM (server) will provide extended flexibility for data modeling and support for complex objects, performance improvements for inbound and outbound processing, change and transport management for data model and integration content, improved administration and lifecycle management, increased compliance and auditing support, additional pre-built scenarios with generic and industry specific content, deeper integration with SAP infrastructure components, and process-specific integration with SAP business applications.

SAP NetWeaver MDM (server) will remain a key ingredient for any MDM solution **throughout 2008**. In addition, a first new solution, namely Financial MDM, which follows the general architecture approach outlined above, will ship in 2008 as well.

For 2009 further solutions referred to as evolved master data management (codename "Sydney") earlier are currently in planning. These solutions will follow the general architecture approach and include the SAP NetWeaver MDM server. Any solution not using the SAP Netweaver MDM server needs approval by the MDM governance board and MDM solution owner.

3.5 Business Process Management and Process Integration

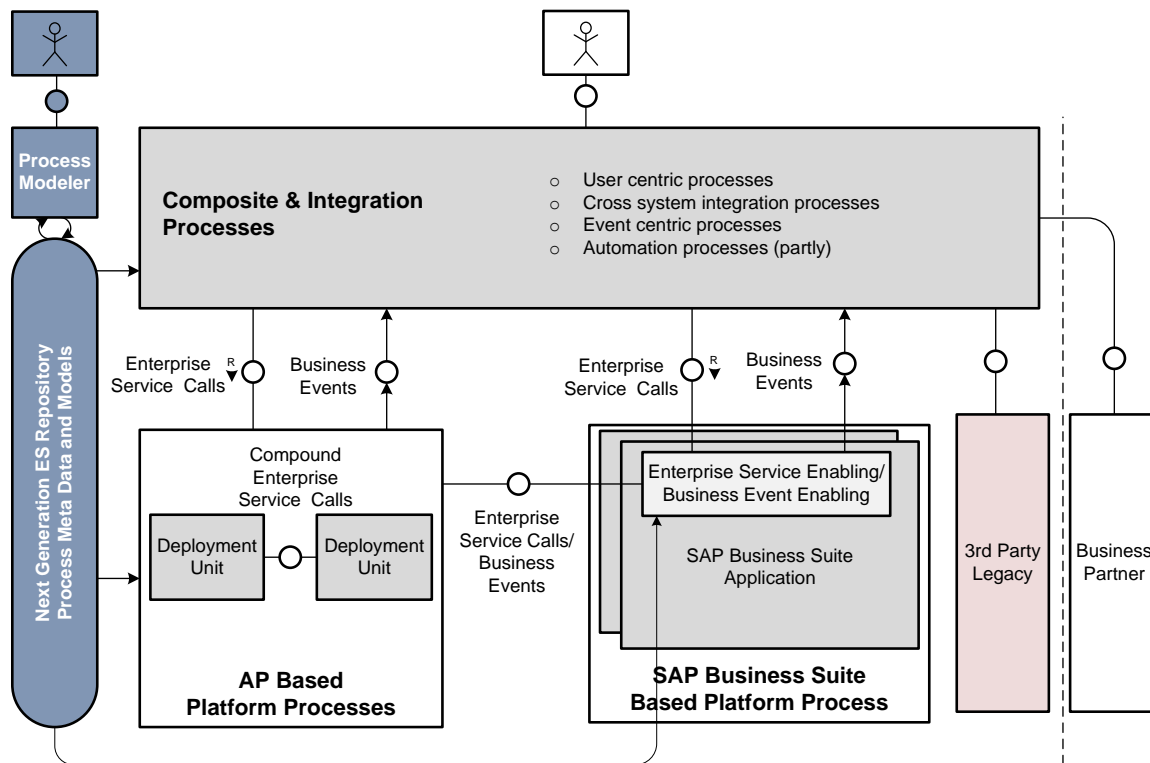In enterprise SOA, composite processes plug seamlessly into platform process.

Figure 3-5 Platform and Composite Processes

Platform processes provide proven standard business practices and are delivered by SAP Business Suite and by AP. Platform processes are built to satisfy a high demand on integration, integrity and legal compliance, and are typically mission-critical. Readers may think of sell-from-stock or make-to-order as examples. The end-to-end complexity of platform processes is high but the number of variants for individual processing steps is limited due to the fact that they represent standard practices. Platform processes are designed as integral part of a business process platform. They can be configured and extended,[20] but they cannot be flexibly recomposed.[21]

Composite and integration processes address the individual needs of customers. They complement or extend platform processes. Due to their specific nature, variation is enormous and can, in general, not easily be anticipated or pre-thought by SAP. For customers, composite processes are not only important to differentiate from competitors ("next practices"), but also to quickly support their business according to their or their business partners' individual requirements. Prominent subcategories of composite processes are user-centric processes, cross-system integration processes, and event-centric processes.

Business processes are executed in a federated way with all types of processes[22] seamlessly interacting through compound enterprise services and business events. In certain cases, a composite process coordinating all interactions may exist; in general, a business process will not correspond to only one composite process. The level of transparency and control of the processes will be different for SAP Business Suite on the one hand and for platform processes in AP or composite processes on the other hand. This is

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[20] Extensions of platform processes can only be done in a governed way in order not to break the platform. Governance refers to who would be allowed to make which extensions where.

[21] In general, new or different platform processes with their requirements towards integration, integrity and compliance cannot be created by simple re-composition of existing parts but require more fundamental re-construction.

[22] This is also true for AP-internal processes when they cross the boundaries of deployment units as depicted in Figure 3-5.

due to the fact that process logic in SAP NetWeaver CE or in AP is mainly described by models whereas in SAP Business Suite it is mainly defined by coding.

In the future, business process management (BPM) and process integration will be moving towards:

- one coherent process modeling methodology for SAP Business Suite and AP/SAP Business ByDesign, ranging from business modeling to enterprise SOA modeling including intermediate levels;
- one integrated toolset (referred to as "next generation enterprise services repository" in Figure 3-5). This toolset will cover composite processes and platform processes in AP even on execution level to a large extent as these processes are mainly modeled; it will address SAP Business Suite to a lesser extent since core processes within the Suite will still remain mainly defined by coding.
- integration of platform and composite processes (across the boundaries of applications, system or deployment units) based on compound enterprise services and business events.
- new SAP NetWeaver BPM (codename "Galaxy") as single technology for composite processes, including cross-system integration processes[23], user-centric processes and event-centric processes. In future Galaxy will also replace cross-component BPM (ccBPM) in PI, when PI is evolved to a pure java runtime in order to match the competition better regarding leanness and performance.

3.6 Total Cost of Ownership (TCO)

Lowering the total cost of ownership (TCO) for SAP's customers is an important effort across all SAP development organizations and cannot be assigned exclusively to SAP NetWeaver, applications or service and support, to name a few. Due to the scope of this document, this section only takes a high-level view onto some important TCO drivers and potential countermeasures. Ongoing projects will drive this important topic to measurable improvements.

Harmonizing the SAP Business Suite must not end on application and process level. Using business processes across the complete SAP Business Suite including composite applications, SAP NetWeaver as integration platform and process extensions based on AP will de facto increase the complexity of the solution landscape at customer side. The need for providing cost effective procedures and tools to manage the complete solution, end-to-end, along the business processes, across different systems and technologies is of significant importance to avoid a further increase of TCO for customers.

Customer feedback reveals that customers perceive the increasing complexity as being caused mainly by SAP and not by their individual environments. The most important TCO drivers in that context seem to be:

- Increasing solution landscape complexity caused by an increasing number of required systems or components and dependencies between them.
- High SAP NetWeaver and solution landscape complexity caused by too big building blocks as well as heterogeneous technologies and procedures across the whole stack.
- Tremendous solution management complexity caused by insufficient landscape-awareness of lifecycle management processes, frameworks and tools as well as missing capability to avoid business interruption.

To avoid TCO becoming an inhibitor for the adoption of the SAP product portfolio, SAP has to govern TCO reduction by multiple means:

- Simplify the solution landscape layout by better reuse of existing infrastructure components and bundling of capabilities.
- Manifest architectural rules and governance to guarantee interoperability between distributed components.
- Ease the use of innovation by lean consumption of SAP NetWeaver capabilities and automated integration.
- Ensure cost effective lifecycle management processes by landscape-aware tools and non-disruptive procedures.

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[23] With Application Platform, process integration between deployment units will normally not involve any composite process at all, hence SAP NetWeaver BPM will normally not be used for process integration within AP.

3.7   System Landscape Architecture & Governance

In the past, independent or local decisions led to complex system landscapes internally and at customer side. Non-interoperability or non-compatibility increased and added to landscape complexity, even to the necessity of several instances of the same product on different versions.

Starting with SAP Business Suite 7.0, system landscape governance will be provided to freeze and reduce system landscape complexity, thereby decreasing customers' TCO and SAP's total cost of development (TCD), as well as to guide customers regarding their systems landscapes. The core of this effort consists of the definition of reference landscapes to align internal development, to be used to validate new scenarios against, and to help customers with clear recommendations.

Reference landscapes are defined in two parts (see Figure 3-6):

- a **core landscape** that ideally covers 80% of all scenarios ("bread-and-butter" scenarios) and that customers would normally upgrade to;
- **extensions to this core landscape** that cover additional scenarios including those for accelerated innovation.
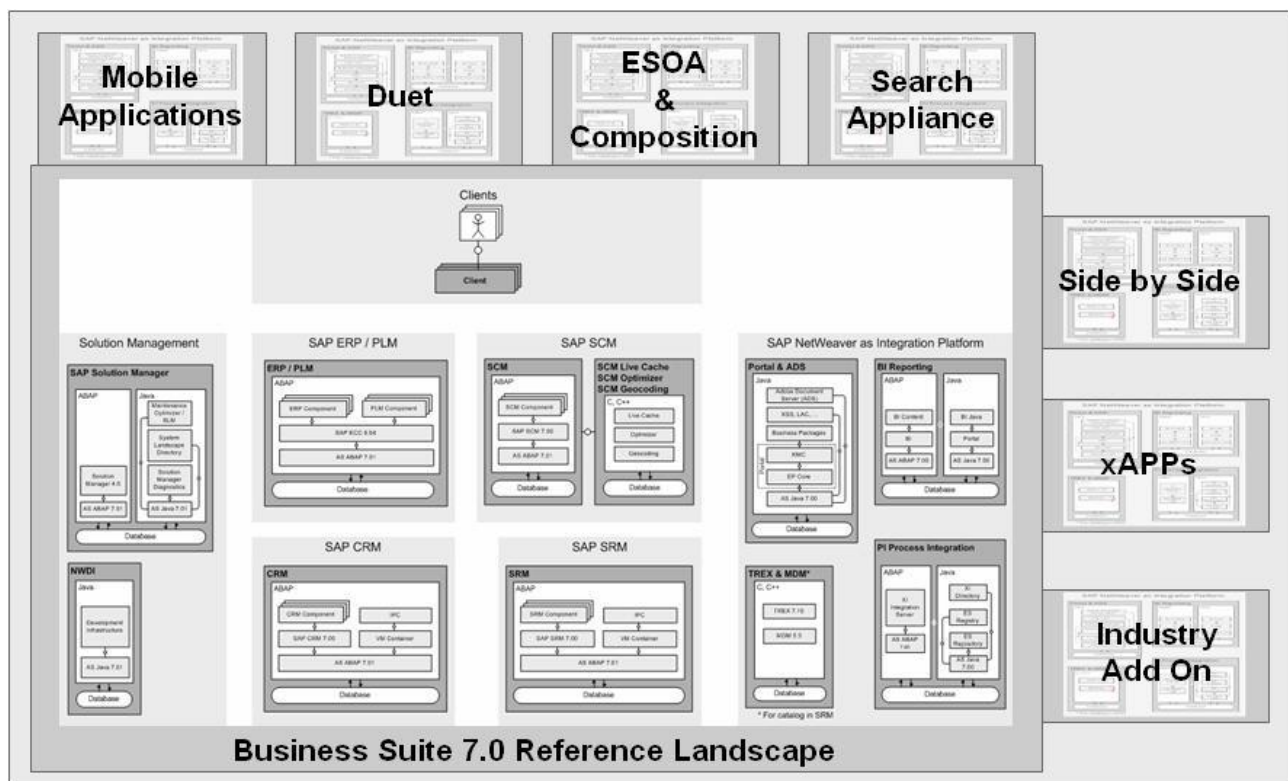

Figure 3-6 SAP Business Suite 7.0 Reference Landscapes

Governance will be applied through these reference landscapes, for example:

- Any increase of mandatory instances or servers beyond the scope of the respective reference landscape for a specific scenario needs approval.
- In general, it is mandatory to support landscapes with only a single (and not multiple) instance of every application or SAP NetWeaver deployment unit. It is not allowed to introduce dependencies leading to several installations of the same application or SAP NetWeaver deployment unit. Such dependencies have to be resolved for the SAP Business Suite 7.0 delivery in 2008.[24]

The following reference landscapes have been defined:

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[24] It seems currently necessary, for example, to install two Portal systems in a minimal landscape due to a dependency between BI and Portal.

- The **startup landscape** for new customers or customers with functional upgrade as a first priority offers existing customers the possibility to perform a functional upgrade based on the most common usage of SAP software product combinations according to the transparency report for ERP and BW. This Landscape is a working assumption where the build, deployment and performance capabilities have to be proven.

- The **landscape for easy adoption** keeps the SAP NetWeaver hubs stable on SAP NetWeaver 7.00 as delivered with SAP Business Suite 2005. The only other required SAP NetWeaver component is SAP NetWeaver Application Server ABAP 7.01 as foundation for the applications of SAP Business Suite 7.0.

- The **landscape for continuous innovation** is built on the principle that the complete landscape including all hubs run on the same SAP NetWeaver 7.01 release on which all new functionality based on the Business Suite 7.0 core processes can be executed.

- The **landscape for accelerated innovation** is built on the principle that SAP NetWeaver hubs run on the latest stable release on which compatibility to the SAP Business Suite reference landscape for upgrade is guaranteed. The focus here is more to follow the newest capabilities of NetWeaver hubs.

For some existing compatibility and interoperability rules see [8], [9]

3.8 SAP Solution Manager

SAP Solution Manager is SAP's comprehensive and central solution for application management and administration:

- As the only support platform used by SAP, it ensures end-to-end mission critical operations for SAP-centric solution landscapes.

- As the end-to-end lifecycle management platform for SAP, ISV and custom developed solutions, it reduces customer TCO in running SAP solution landscapes.

3rd party management tools can be integrated through APIs; integration packages will be offered by SAP Active Global Support (AGS), for example the SAP Solution Manager adapter for SAP Quality Center by HP. Integration of 3rd party managed systems will be done on the basis of individual customer projects with AGS.

SAP Solution Manager 7.0 based on SAP NetWeaver 7.0 is the default application and lifecycle management solution for all large enterprise customers, and will be the main release until at least 2009. To further clarify and simplify branding, SAP Solution Manager 4.0 will be renamed to SAP Solution Manager 7.0 effective May 1st, 2008. This does not impact functionality or release schedules.

First steps towards unified lifecycle management across multiple systems and technologies are already provided by SAP Solution Manager 7.0 and SAP NetWeaver 7.0 based systems, such as

- consolidated transport of ABAP and non-ABAP components;

- end-to-end root cause analysis across multiple components and technologies

- maintenance optimizer to increase simplicity, automation and consistency of change operations;

- delivery and deployment of enhancement packages.

In 2008, the work center approach and a layered architecture have been introduced. SAP Solution Manager 7.0 provides functions, both enabling service and support business and business operations as well as technical operations and lifecycle processes. This is framed by SAP NetWeaver 7.0 as foundation, an overarching role-based access, and a consistent methodology. It will support the execution of the SAP standards for solution operations even further with the work center approach. Work centers group the information and tasks of particular operations processes to facilitate effective work and collaboration and to enable tailored and role-based user environments.

With the advent of SAP's new support engagement, SAP Enterprise Support, SAP customers are entitled to an enhanced edition of SAP Solution Manager which provides additional and extended functions, thus becoming the foundation for SAP Enterprise Support and related services. In its first release in **Q1/2008**, the **SAP Solution Manager Enterprise Edition** focuses on traceability management functions. Those functions facilitate operations in validated and regulated environments and put customers in a position to trace IT requirements and changes to solutions through the entire lifecycle. SAP Solution Manager Enterprise Edition

enhances the existing mature functions in the areas of document, test, change request, and process structure management. Benefits include reduced cost of compliance through enhanced electronic signatures and pre-configured workflows and a significant reduction of test costs in validated environments through improved traceability.

Not all functionality to **administer SAP NetWeaver 7.1 capabilities** can be incorporated into SAP Solution Manager by down porting them to SAP NetWeaver 7.0. For certain SAP NetWeaver 7.1 capabilities like Process Integration or Business Intelligence the administration capabilities are used locally within the respective system and integrated with SAP Solution Manager on UI/work center level and on data level. An exception to the rule is adaptive computing that requires an additional SAP NetWeaver 7.1 Java server for administration.

3.9   End-to-End Supportability

End-to-end supportability is driven to the next level not only by the above roadmap of SAP Solution Manager but also by new SAP NetWeaver capabilities and an extension of the IT Service & Application Management (ITSAM) standard (more information on product standards is to be found at [16]) that needs to be fulfilled by all SAP products:

- SAP NetWeaver provides extensions of tracing and debugging capabilities including enhanced collection and correlation of data for distributed processes across multiple systems and technologies. In SAP NetWeaver 7.1, enhanced supportability is reached by the SAP JVM with extended diagnosis and memory analysis capabilities. Embedded support based on the extensive collection of context data in case of human or system detected errors is initially focused on technology used by SAP Business ByDesign, but will later be extended to other parts of SAP NetWeaver as well.

- Operational standards (for details see [17]) have been aligned with the ITSAM product standard in September 2007. Adoption of the enhanced ITSAM product standard will ensure that root cause analysis as one of the end-to-end supportability challenges is properly addressed.

4   Appendix

4.1   Architectural Building Block View

The following diagram aims at depicting the main building blocks, along with a logical grouping, of SAP Business Suite 7.0 within the scope of this document. It is not a deployment, instance or system landscape diagram but an architectural abstraction to understand the main building blocks. It shows the different interacting applications as well as the different "roles" in which SAP NetWeaver is used. This diagram is not intended to be used for any external communication.
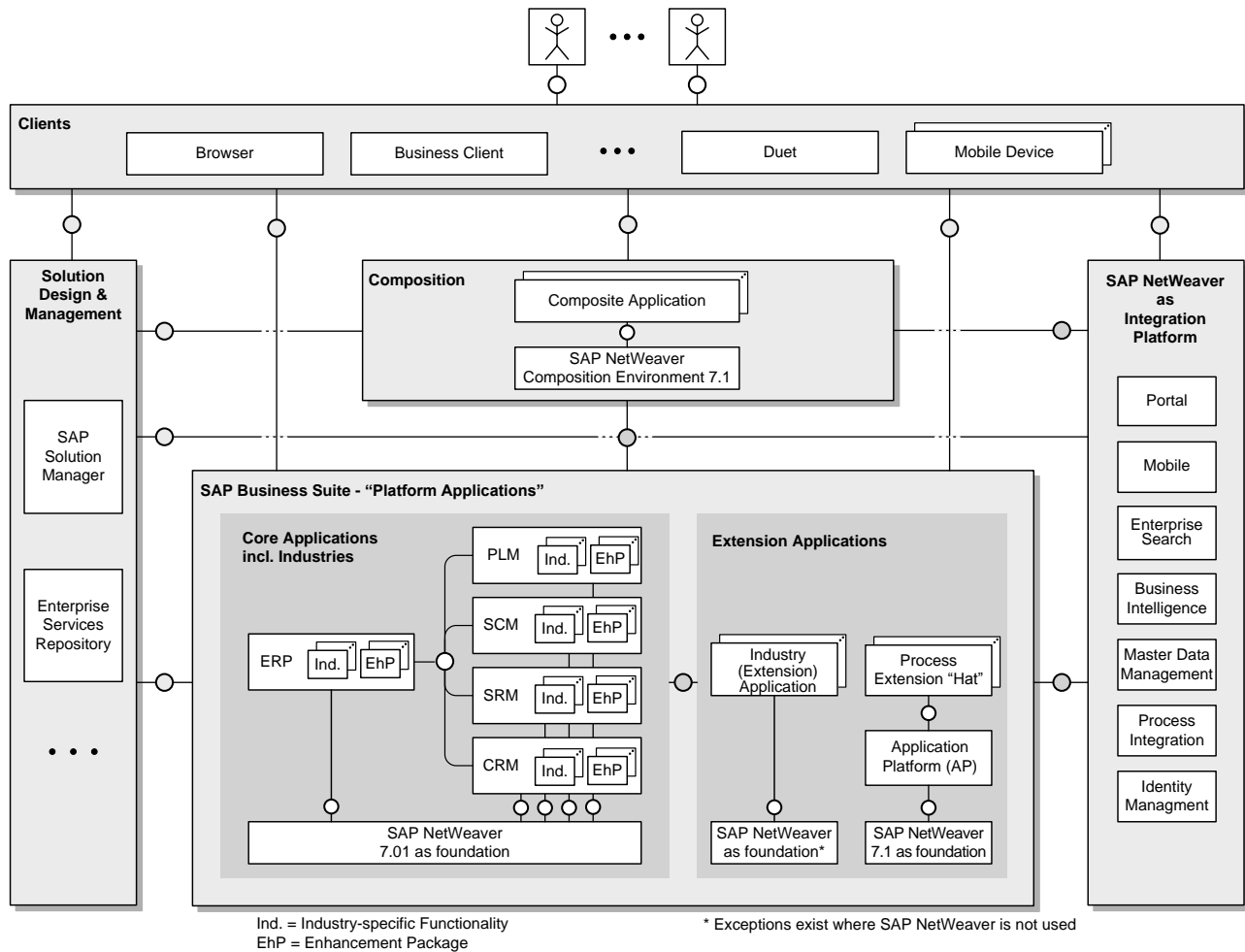

Ind. = Industry-specific Functionality
EhP = Enhancement Package

* Exceptions exist where SAP NetWeaver is not used

Figure 4-1 Architectural Building Blocks of SAP Business Suite

4.2 Architecture Topics for Side-by-Side Integration

The following architecture topics (the list is not necessarily exhaustive) for side-by-side integration between SAP Business Suite and AP-based solutions are currently being addressed in an architecture project:

Area	Topics
High-level Architecture	• Landscape architecture • Integration architecture
User Interface	• UI Technology on top of AP, and for NW/reuse parts • Interoperability between SAP Business Suite and AP UIs • Use of Portal • Homogenous look and feel
Business Configuration	• Business configuration technology on top of AP • Synchronization of business configuration • Integration of AP-based business configuration with SAP Solution Manager and IMG
Identity & Access Management	• User administration & replication • Authorization concept • Role management
Business Process Management & Process Integration	• Process integration including use of SAP NetWeaver PI • Process modeling • Process flexibility • Alignment on/integration with Galaxy, Business Task Management, Business Workflow • Process and status monitor • Batch processing
Lifecycle Management	• Software logistics for on-premise deployment • Release strategy and release synchronization • Operation concepts for on-premise incl. ITSAM and support processes • Multi-client concepts
Analytics	• BI technology (incl. use of data warehouse, TRex, etc.) • BI content
Search	• Fast Search Infrastructure (FSI) • Enterprise Search • Cross-system search
Content	• Terminology • Help

Figure 4-2 Architecture Topics for Side-by-Side Integration

4.3 Basic Architecture Pattern: SAP Application Categories

According to the near-term architecture strategy for enterprise SOA consumption (see [10] for more details) three categories of applications are developed at SAP:
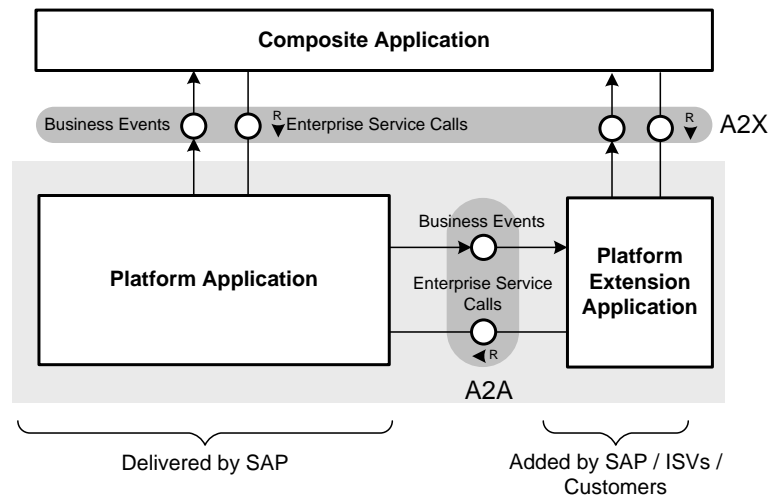

Figure 4-3 Application Categories

- **Platform applications** are intrinsic parts of a specific platform (SAP Business Suite or Application Platform). Platform applications share one lifecycle.
- **Platform extension applications** are developed as separate deployment units with a separate lifecycle, but are intended for platform-like reuse. Platform extension applications consume A2A (application-to-application) enterprise services of the platform and may offer their own services.
- **Composite applications** consume existing platform functionality to address specific user need but are not designed for reuse. Composite applications communicate with the platform or platform extension applications using general purpose (A2X) enterprise services.

More details on architecture guidelines are to be found in [21]

5   Further Reading

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[2]   *SAP's Release Strategy for Large Enterprises*, January 2008
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[3]   *SAP Solutions for Large Enterprises*, www.sap.com
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[5]   *SAP Business Suite Solution Marketing*, Wiki
        https://wiki.wdf.sap.corp/display/BSMktg/SAP+Business+Suite+Solution+Marketing

[6]   *Introduction to Themes*
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[7]   *Suite Excellence Overall Architecture Guideline*, December 2007, Wiki
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[8]   *Stable Core and Enhancement Packages,* G. Muehl, W. Kleis, Version 1.5, September 2007
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        W. Aigner, B. Groene, R. Hammerich, H. Meinert, J. Puzicha, May 2007
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        d/60257198-d1de-2910-778b-b67496e81c3b

[11]   *Enterprise SOA Delivery Program*, SAP Corporate Portal
        https://portal.wdf.sap.corp/go/esoa

[12]   *Enterprise Services*, Wiki
        https://wiki.sdn.sap.com/wiki/display/ESpackages

[13]   *Enterprise SOA*, Internal Community, Wiki
        https://wiki.wdf.sap.corp/display/PTGSOA/enterprise+SOA+Home

[14]   *iCOD – Industry Composite Development,* Wiki
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[15]   *Architecture Guideline for Model-Driven Composite Development in the Composition Environment -
        Development Program: iCOD (Industry Composite Development),* Version: 2.2, August 2007
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        aa3356d48314/Architecture/ArchGuideline_CompDevProg_PTU_IS_Current.doc

[16]   *PIL Product Standards*, SAP Corporate Portal
        https://portal.wdf.sap.corp/irj/portal?NavigationTarget=navurl://8a3ef5fe53d87b12
        965cd600be673910

[17]   *SAP Standards for Solution Operations*, SAP Support Portal
        http://www.service.sap.com/supportstandards

[18]   *Flash Islands project, Wiki*

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[19] *Spring view project, Wiki*
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