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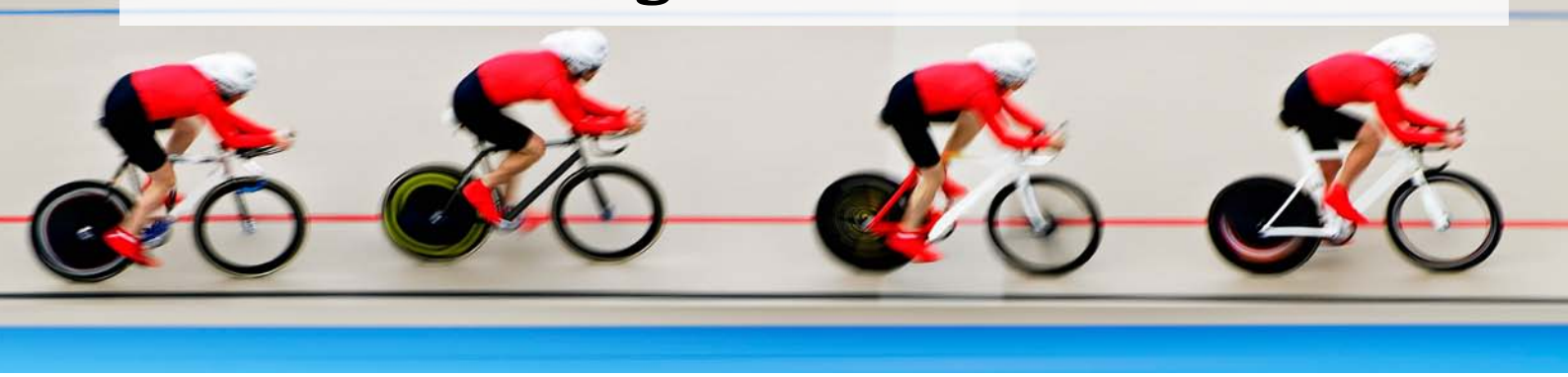


Dear Reader,

Innovation is a necessity as well as an agile process. With innovation, products, services, processes, and business models can improve significantly. New markets and growth can be achieved. Most important, if companies do not innovate, history has shown that they are bound to fail.

Although it is difficult to continuously guarantee new innovation, organizations can proactively support processes and build an environment in which innovative ideas can grow. Co-innovation is key. Collaboration with partners and customers is therefore a central pillar of SAP's research strategy.

With the first issue of the new biannual SAP Research Magazine, we would like to illustrate SAP Research's approach to innovation and how we analyze trends and anticipate change in business IT. The Business Web is one example. The aim is to bring the mobile Internet to real business use, combining high ambitions and collaboration with early adopters on versatile real-world application scenarios.

Enjoy your reading,

HERVÉ COUTURIER
EXECUTIVE VICE PRESIDENT, HEAD OF SAP RESEARCH

FEATURE

Taking Business to the Cloud
In the business environment of the future, consumers, governments, and business users will rely on the Internet to network with each other. Data will be managed in real time and delivered on easy-to-use, mobile platforms.

With this vision, SAP Research is focusing its efforts on the Business Web, a secure cloud infrastructure that aims to change the way we do business.

Learn more on page 2.

EVENTS

Turning Heads at SAP® TechEd
SAP Research impressed attendees at this year's SAP® TechEd 2011 conferences with demos and presentations that provided an insightful look into the group's exciting topics and resulting innovations.

In Las Vegas, SAP Research Brisbane and Sydney took first place in the Demo Jam with IdeaWall, a mobile app that captures and shares notes using a whiteboard, iPhone, and projector.

Learn more on page 6.

CONTENTS

ABOUT SAP RESEARCH

SAP Research is the global technology research and innovation unit of SAP. Its activities span from collaborative research projects with academic and industrial partners to specific innovation projects with individual customers. The best-validated results and technologies are further developed into prototypes and potential business opportunities within SAP.

Find out more at www.sap.com/research.
See a list of scientific articles at www.sap.com/research/2011_publications.

SAP RESEARCH

A Vision Becomes a Reality: The Business Web

SAP Research is working on a prototype of the Business Web, a business environment that leverages cloud computing and could position SAP at the center of the emerging mobile enterprise application market.

There are two inflection points in enterprise software – cloud computing and mobility – both of which dramatically change the way we conduct business. More and more business will be offered as services, and software solutions will be easier to consume and more readily available.

New applications and services will enable businesses to target millions of consumers via the Web and mobile channels. Events and information from millions of connected devices and machines will be extracted to provide real-time insights and decision making. Applications and services will connect enterprises together in trading networks and will offer end-to-end solutions to the business.

Today's enterprise systems are not apt tools for this shift in the application market. What kind of infrastructure is needed? What are the pieces to the puzzle, and how can they be put together to achieve sustainable business models in the new world of enterprise computing?

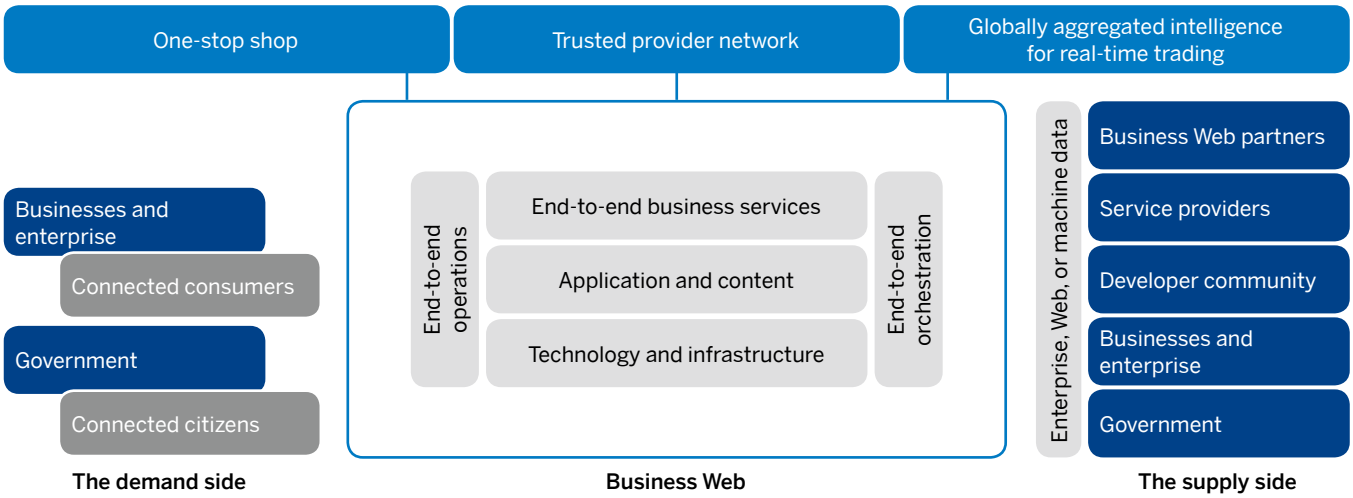
SAP Research's answer is the Business Web. Based on prior efforts in which we investigated the Internet of Services and the Internet of Things, the research group is working together with partners on a cloud platform and business environment. The goal of the Business Web is to combine SAP's business process management technologies – including SAP® HANA™ appliance software – with the benefits of cloud computing and enterprise mobility based on research results and partner innovations. Collaborative projects such as PrimeLife, ADiWa, and THESEUS/TEXO, funded by the German Federal Ministry of Economics and Technology and dealing with software for the evolving Web-based service economy, are strong contributors.

"The Business Web is envisioned as a real business cloud that complements and extends existing and planned SAP solutions," says Hervé Couturier, executive vice president and head of SAP Research. "Our view is that such a cloud offers a network of trusted service providers, the necessary security, connectivity for mobile consumption, and ease of participation via tools and services." This environment specifically allows for and supports the upcoming new **business-to-business-to-consumer** (B2B2C) scenarios as well as **machine integration** (B2M, M2M). "We will drive the Business Web initiative in the coming years, making sure that it is part of SAP's future cloud offerings," adds Couturier.

Network of Trusted Providers

To develop the first prototype, SAP Research has teamed up with Ericsson, Deutsche Telekom, Intel, HP, and the midtier software vendor GlobalLogic. The project began at the end of 2010,

The Three Business Models of the Business Web



and the strength of the Business Web vision is already being validated in a couple of application scenarios. "Collaboration with early adopters will be a prerequisite implemented to guarantee a realistic business setting and market relevance," states Couturier.

One of the foreseen advantages of the Business Web platform is that various applications for both businesses and consumers can be offered on the cloud, which is expected to make them cost-effective and scalable. In addition, it is envisioned that the Business Web will allow businesses easy access to their back-end systems that can provide product catalog and customer relationship management data while also offering crucial data security.

Supporting a new kind of applications and services means:

- Customer connectivity (B2B2C)
- Machine awareness (M2M, B2M)
- Interconnected trading networks
- End-to-end solutions

True Business Cloud

As a "true business cloud," the aim of the Business Web is to serve two different target groups with one and the same cloud solution. On the one hand, a **one-stop shop** is planned in which companies can get all of their needed applications, services, and content, thus providing a unique entry-way for business software on the cloud. On the other hand, the Business Web will be a platform for service and content providers to develop, offer, and operate their solutions and services, reaching out to a huge number of customers in need of business software on the cloud.

The Business Web could enhance SAP's existing on-demand platforms, such as the SAP Business ByDesign™ solution. SAP researchers have designed the Business Web as a platform that supports diverse JAVA development and deployment models, lowering the entrance barriers for many small, independent software vendors.

Planned use cases cover precision retailing, supply chain management, logistics, and mobile technologies for emerging economies. An asset-tracking scenario is devoted to the Internet of Things paradigm. Researchers have developed a prototype to monitor the status of ice cream cabinets or vending machines. Naturally, the goal is to ensure that there is always enough ice cream in stock and that it is of the highest quality, avoiding such issues as breaks in the cooling chain. To achieve this, the Business Web team is working on a proof of concept that the envisioned platform can handle the hundreds of thousands of monitoring sensors worldwide, process the data produced, and provide real-time information about the ice cream freezers.

The first examples of prototypic Business Web applications were presented in November 2011 at the SAP TechEd Madrid conference and received enthusiastic feedback from SAP customers and partners.

www.sap.com/businessweb

MOBILE BUSINESS OF THE FUTURE

By **2013**

mobile phones will overtake PCs as the most common Web access device

20+% boosts in sales revenue

are seen by organizations that deploy mobile sales solutions

1 out of **5**

enterprises in the United Kingdom and United States used 20 or more professional mobile apps in 2011

90%

of all organizations will support corporate applications on personal devices by 2014

Empirical data sources: SAP Mobility Toolkit, Kelton Research, and VDC Research

Driving Green at SAP

SAP Research made headlines with its electric car fleet in Germany that gave SAP employees the chance to explore the mobility of tomorrow.

With the Future Fleet project, SAP took to the road to test electric company cars and explore the IT needs for sustainable mobility in the future. The field test lasted from February to September 2011 and offered more than 500 SAP employees the chance to get behind the wheel of 27 e-cars. The cars were charged solely with renewable energy at four SAP locations around Walldorf.

SAP Research developed a software prototype to administer the e-cars and demonstrated that IT plays a key role in enabling electric mobility. The research prototype facilitates easy and convenient reserving, charging, and billing. Before booking a car, the software even evaluates the charge levels of available vehicles to find one that meets the required range.

Future Fleet was supported by the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU). The regional utilities company MVV Energie provided the charging infrastructure. Different to e-car initiatives at SAP premises in the United States and India, SAP Research teamed up with social scientists to also examine the cars' handling, user acceptance, and environmental benefits.

As part of SAP's commitment to sustainability, the company is planning further e-mobility projects that build on the knowledge gained from Future Fleet. Several electric Mercedes A-Class cars have already joined SAP's car fleet in Walldorf.

www.futurefleet.de

Business in Your Pocket

A small shop owner in a remote, rural community or urban settlement in South Africa is not a typical SAP customer, but that may soon change thanks to new mobile technologies.

Traditional business software often does not meet the needs of very small businesses in emerging economies like India or South Africa. Such solutions are simply too complex and costly for small shops in these areas. However, one of SAP's flagship research projects is addressing the needs of very small businesses in these untapped markets. By developing a small "Business Web," researchers from South Africa and Germany are creating enterprise software that is truly mobile. You only need a mobile phone to start a business in your pocket.

On-Device Business Services

The prototype focuses on key services, such as procurement, sales management, and deliveries. Shop owners can access a supplier's product catalog on their mobile phones, check availability, select goods and quantities, place an order, and choose a payment method. Purchased items are then sold to local customers. Suppliers (MetCash), mobile networks (Vodafone), and 100 small-scale retailers are piloting the application.

The hope is that millions of very small businesses will be able to conduct their daily operations using mobile devices. SAP will focus on making these applications affordable and accessible even to the smallest retailers, utilities units, and family businesses. These vendors are the backbone of their economies, and their profits will energize the markets of developing regions dramatically.

"SAP's engagement provides very small businesses with easy-to-use, affordable mobile business services. It is evident that SAP stimulates growth to support socioeconomic development in emerging economies."

Prof. Dr. Jan Eloff, Meraka Institute, Pretoria

SAP HANA: Accelerating Business Analytics

The SAP HANA platform helps industries analyze huge volumes of data at a revolutionary rate. It is also stimulating IT research.

Since its release in June 2011, the SAP HANA platform has been stirring up the IT world. Using in-memory computing technologies, it can process massive amounts of data in the blink of an eye: 500 billion data records within one minute, complex information within seconds, and reports and files instantaneously.

SAP Research is working intensively on innovations that use SAP HANA's core business power and explore new kinds of applications focusing on analytics, speed, and smart items.

Improvements in the Manufacturing Industry

One promising research project is dedicated to improving yield for the semiconductor manufacturing industry. Researchers from the Business Intelligence and Mobile Computing & User Experience practices teamed up to create a prototype for predictive analysis in an Internet of Things setup.

Semiconductors are widely used in everyday electronic devices. However, their fabrication is highly competitive and increasingly complex, involving around 500 to 1,000 process steps and taking up to eight weeks. In order for companies to be competitive, their microprocessors and chips need to have significant yield. Yield is the percentage of functional dies produced per silicon wafer.

SAP Research is developing a tool that monitors and optimizes each of the delicate assembly steps into a non-disruptive manufacturing process, avoiding such problems as random or systematic defects, misprocessing, and design issues.

Speed, Durability, and Analytics

Relying on SAP HANA's speed, durability, and in-memory computing architecture, the software obtains predictive analytics for the entire manufacturing process within a split second. The contrast to former methods is striking: usually, it takes several days to collect data from the different systems and create reports.

SAP is gradually adapting SAP HANA, bringing success stories from various industries to life. One of them is SAP Smart Meter Analytics software, which was launched at the SAP TechEd 2011 conference in Las Vegas.

This software helps utilities companies analyze the massive amounts of data produced by smart meters in real time. It offers efficiency benchmarking, customer segmentation, and insights into consumption profiles of entire neighborhoods or large cities. Yet, SAP Smart Meter Analytics also empowers customers, giving them self-service access to energy data and the ability to critically monitor their consumption profiles.

Consequently, industries can support consumers in substantially lowering their ecological footprints and improving their energy utilization by adopting more sustainable energy-use practices with planned capabilities.

Based on the progress it has already made, SAP Research will continue its efforts in the field of in-memory computing and real-time analytics.

www.sap.com/hana

The External View with…

Prof. Dr. Wolfgang Wahlster,
CEO of DFKI* and member of the SAP Research Advisory Board

The SAP Research Advisory Board will provide guidance and consultation with regard to IT trends and on strategic research questions in computer science to the SAP Research leadership team.

"SAP Research is definitely a thought leader in the ICT (information and communication technology) community. It has been an important partner in several lighthouse research projects, bringing forward new technologies and setting standards for co-innovation and exploitation of research results.

SAP has shaped and driven research agendas for such eminent topics as the Internet of Services, the Internet of Things, and the Business Web. I am happy that SAP is one of the industrial shareholders of DFKI, the largest center of excellence for contract R&D in artificial intelligence and future ICT worldwide."

* German Research Center for Artificial Intelligence

Events

REVIEW

SAP TechEd and SAPPHIRE® NOW

The SAP TechEd conference is SAP's premier technical education conference. More than 6,500 customers and partners were on-site in Las Vegas and 3,000 via live streaming, making it the largest SAP TechEd ever.

September 12–16, 2011, Las Vegas, Nevada

Among the highlights from SAP Research were demos in the areas of real-time executive forecast analytics and cloud computing, as well as the Supplier InfoNet solution. Networking sessions detailing the SAP Co-Innovation Lab's work with partners were also held. The InnoJam was co-organized by SAP Research colleagues with the theme "Gamification," in which participants applied game mechanics to SAP applications to make them more entertaining. Finally, SAP Research's IdeaWall mobile app, which combines the use of a whiteboard and wall, an iPhone, and a projector to capture and share sticky notes online, won the Las Vegas Demo Jam. The app is being developed in Australia with logistics provider Linfox and Australia Post.

November 8–11, 2011, Madrid, Spain

SAP TechEd Madrid was for the first time colocated with the SAPPHIRE® NOW conference. In addition to the Business Web, SAP Research contributions focused on real-time visualization for business intelligence (BI) and mobile BI as well as model-based testing of on-demand applications.

October 19–21, 2011, Bangalore, India; November 15–17, 2011, Beijing, China

In Asia, SAP TechEd was held in Bangalore and Beijing. At the Bangalore event, the Security & Trust practice demonstrated how a customer's private data can be protected in the SAP cloud using an access and usage control service. Globemaster took first place in the Bangalore Demo Jam. This prototype developed by researchers in Australia empowers anyone to explore geographical information in a fun way using common objects and combined with other SAP software systems.

At a manufacturing workshop for customers and partners hosted at SAP offices in Beijing, directly following SAP TechEd and SAPPHIRE NOW, the SAP Co-Innovation Lab successfully presented the "Manufacturing COIL" demonstration to a select local audience. "Manufacturing COIL" demonstrates the integration of the full SAP manufacturing stack with the production automation layer. This demonstration has been codeveloped with Beckhoff, a well-known German provider for automation technology.

OUTLOOK

CeBIT 2012

March 6–10, 2012, Hanover, Germany

In March all eyes will be on CeBIT 2012, the digital industry's major international event. IT leader Brazil will be the partner country of the event. With "Managing Trust" as the keynote theme, CeBIT will build on 2011's focus, "Work & Life with the Cloud." More than 4,200 companies participated in CeBIT 2011, SAP among them with our latest innovations. Don't miss us in Hall 4.

Big Irons: Next-Generation Enterprise Supercomputers

Running out of CPU and memory may soon become a thing of the past, as we are at an inflection point for enterprise computing, where new architectures will enable the full potential of in-memory computing technology.

Bringing the latest in high-performance computing to the enterprise at an improved total cost of ownership and supporting the near-term needs of the SAP HANA appliance software were the initial goals of researchers in Palo Alto who were building systems based on next-generation server architectures for in-memory computing.

Current Approaches
Their creations, Big Irons, are powerful 450-kilogram machines with 10 to 20 terabytes (TBs) of memory and large numbers of cores, built in two types.

Type 1 is a more traditional high-performance cluster for powering large-scale SAP HANA implementations that require a large memory footprint to handle as much as 50 to 100 TBs of customer data.

Type 2 is a research-oriented, coherent, shared memory-based system that makes use of modern advances in symmetric multiprocessing and extremely fast interconnects. This architecture enables the creation of a mainframe-like supercomputer in which a single instance of the operating system (OS) runs on a cluster of commodity nodes and the OS sees all of the memory of the entire nodes as one coherent unit.

Future Impacts
"Both approaches echo an inflection point in the IT industry, where we can expect dramatic performance improvements and cost and time savings in terms of IT systems and big data management," says Ike Nassi, former head of SAP Research's Technology Infrastructure practice.

The team has already been architecting and delivering multiple Big Iron Type 1s and Type 2s since September 2010. These are broadly used for advanced development by the SAP HANA teams and in demos to showcase SAP HANA features. Type 2 systems have also been deployed for SAP Labs' IT department as well as SAP Research in Belfast for use in SAP Research's Business Web initiative.

USDL: Enabling the Internet of Services

In its efforts to drive the Web-based service economy, SAP Research collaborated in a W3C incubator group that included HP, Open University, and Siemens to create the Unified Service Description Language (USDL). USDL is a platform-neutral language for describing services, allowing them to be comparable and tradable, leading to higher quality and transparency. Specifications required by consumers, service providers, and platform operators were considered. USDL is made up of a set of modules, each addressing different aspects of service description.

The USDL editor and model are available as open source. With several marketplaces speaking USDL, customers benefit in that their services must be described only once and can be deployed anywhere across these numerous markets. USDL development will be continued from 2011 until 2014 within the FI-WARE project. Learn more at www.internet-of-services.com and www.fi-ware.eu.

Supplier Networking Redefined

Social networks help us keep informed about friends and colleagues. The same holds true for supplier information.

Information is the key to supply chain optimization, and thus the Global Business Incubator group of SAP created Supplier InfoNet, a cloud-based, on-demand solution that manages comprehensive supplier data.

Supplier InfoNet allows customers to monitor their supply companies' performance in multiple-enterprise supply chains. Relevant operational data, such as delivery times and quality of components, is extracted and aggregated in industry-specific pools. Proprietary machine learning–based models then predict a supplier's performance over time.

Information about potential risks in the supply chain, including multitier disruptions, is displayed using a social network approach in which instant alerts appear throughout the system. Additionally, external news and market developments are combined with the raw data to create real, practical insights into potential risks.

Early Success
Presented at the SAPPHIRE NOW conference in Orlando and at the SAP TechEd 2011 Las Vegas conference, Supplier InfoNet has received praise from the media, customers, and IT insiders. In only nine months since being developed as a prototype, and following a successful pilot phase with companies including Powell Electronics and industry supplier Dresser-Rand, Supplier InfoNet has become an important part of SAP's procurement solutions.

Find SAP Research on the SAP Developer Network site at www.sdn.sap.com/irj/sdn/research.

www.sap.com/contactsap

Creating Vibrant Innovation Networks

Co-innovation embodies the vibrant meeting point of science, business, and society. To design, test, and realize complex ideas, collaboration with customers and partners is essential.

SAP Research has embraced this vision and demonstrates its energetic approach to co-innovation and applied research with living labs: hands-on, real-life settings to expand on trends with industry partners and customers. Its two newest labs were launched in 2011, namely, the Future Logistics Living Lab in Sydney, Australia, and the Future Energy Center in Karlsruhe, Germany.

Impacting Industries

At the Future Logistics Living Lab, co-founders SAP, NICTA, and Fraunhofer, along with 18 partners, develop solutions aimed at saving costs and increasing the efficiency of logistics networks, focusing particularly on business network orchestration. The lab seeks to provide new means to fast-track the development of new technologies and their integration into key areas of an end-to-end supply chain. "Over the next three years we expect the lab to mature as an incubator and to be a place for fresh ideas and partners that people want to work with," says John Ansley, resident of supply chain solutions at Linfox. In 2012 SAP will launch a living lab in Singapore, also focusing on transportation, logistics, and urban management.

Turning Ideas into Prototypes

However, its living labs are only one example of SAP's broad co-innovation initiative. The global Co-Innovation Labs act as a liaison between research, industry, and modern society to capture, conceptualize, and develop ideas into prototypes and advanced technologies.

SAP Co-Innovation Lab partners, such as Cisco, F5, HP, Intel, NetAPP, and VMware, are selected according to their innovative capability and collaborative drive. The focus of the SAP Co-Innovation Lab prototypes is to enhance already existing SAP software systems with new ideas. SAP typically provides the system environments, legal framework, and software architecture, while partners enrich the research and prototypes with their industry or regional expertise.

Hand-in-Hand Research

The activities of SAP Research's living labs and the SAP Co-Innovation Lab team go hand in hand. While the living labs address specific industry fields and applied research, the work of the SAP Co-Innovation Lab is centered on practical partner co-innovation, the results of which usually find customer adoption within 6 to 12 months.

SAP RESEARCH LIVING LABS

- Future Energy Center, Karlsruhe, Germany
- Future Factory Initiative, Dresden, Germany
- Future Logistics Living Lab, Sydney, Australia
- Future Public Security Center, Darmstadt, Germany
- Future Retail Center, Regensdorf, Switzerland
- Center of Technologies for Emerging Economies, Pretoria, South Africa

www.sap.com/research/livinglabs

CO-INNOVATION LABS

- Bangalore, India
- Palo Alto, USA
- São Paulo, Brazil
- Seoul, South Korea
- Tokyo, Japan
- Walldorf, Germany

http://coil.sap.com

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