Enterprise Resource Planning - ERP

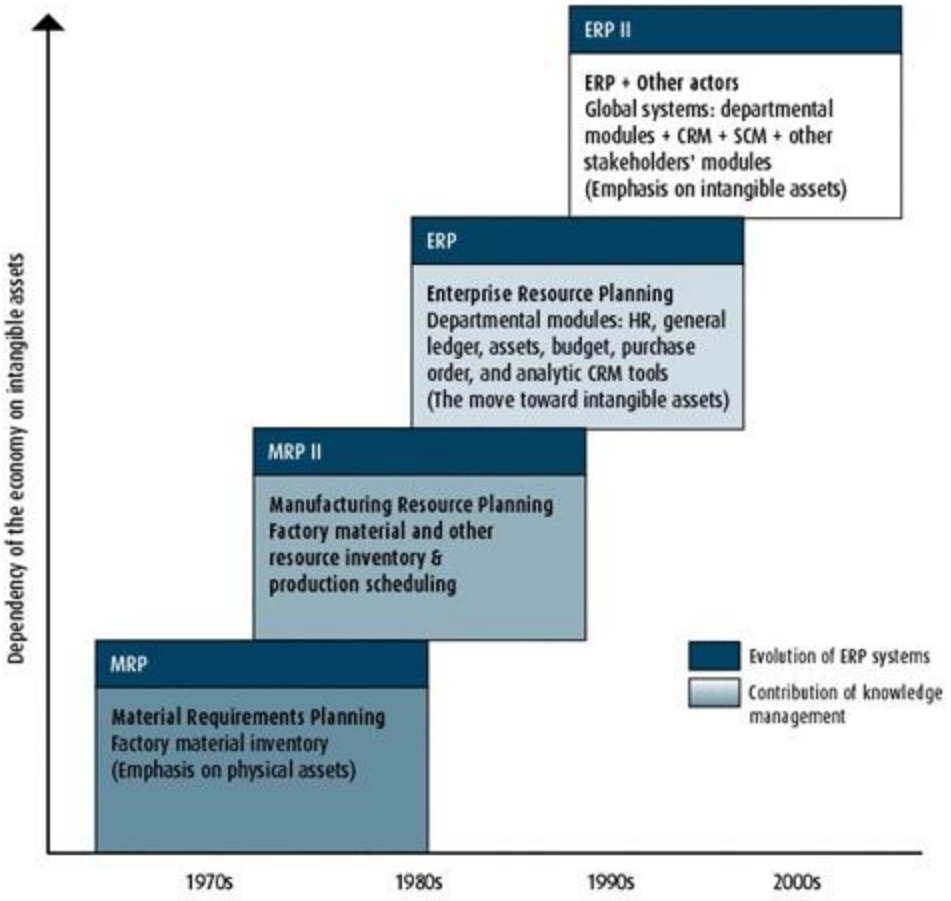
SIT 400 MIS

What is ERP?

- The practice of consolidating an enterprise's planning, manufacturing, sales and marketing efforts into one management system.[1]
- Combines all databases across departments into a single database that can be accessed by all employees.[2]
- ERP automates the tasks involved in performing a business process.[1]

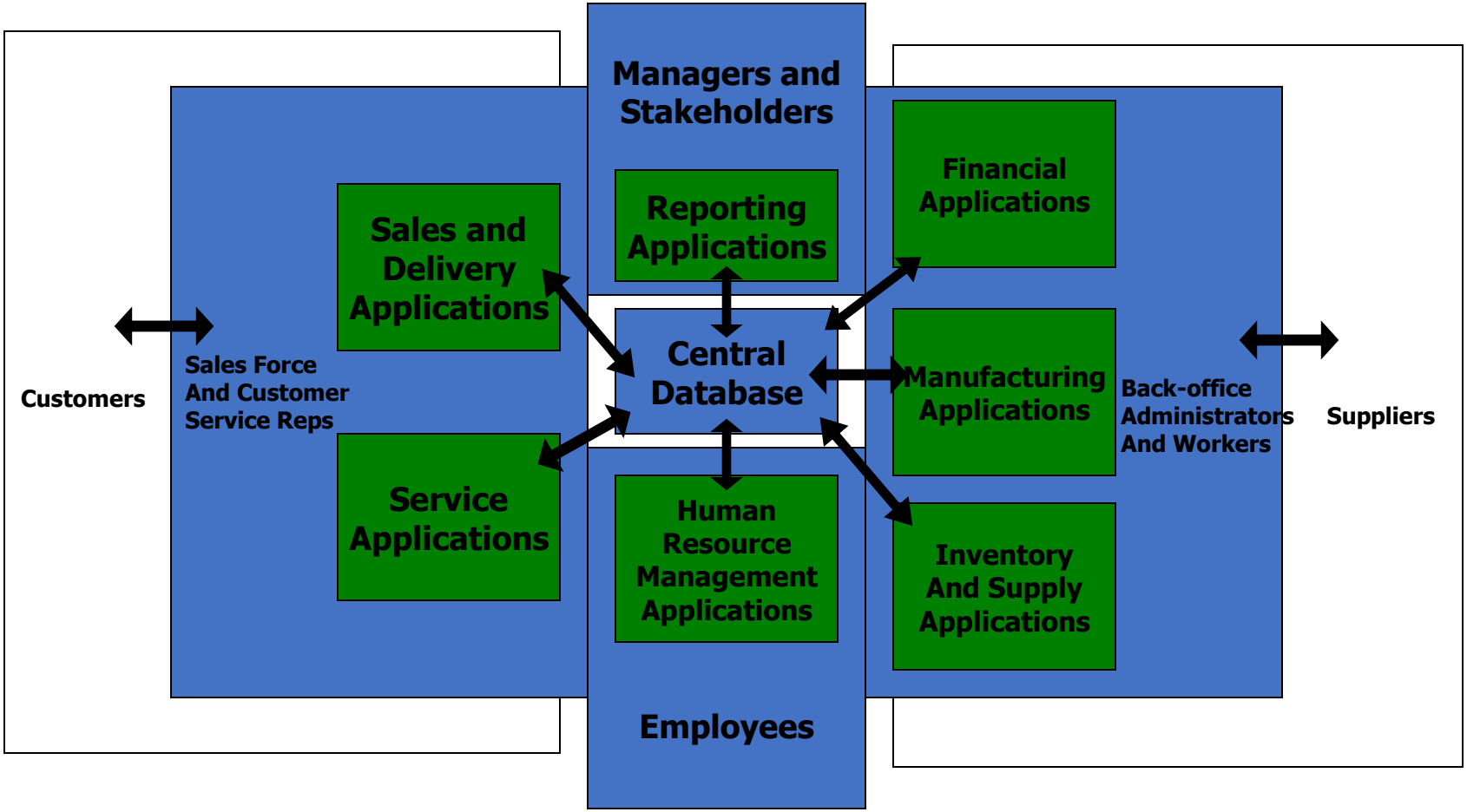
Sources:
1. http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002
2. CIO Enterprise Magazine, May 15, 1999.

Evolution of ERP



Source: http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002.

How Do ERP Systems Work?



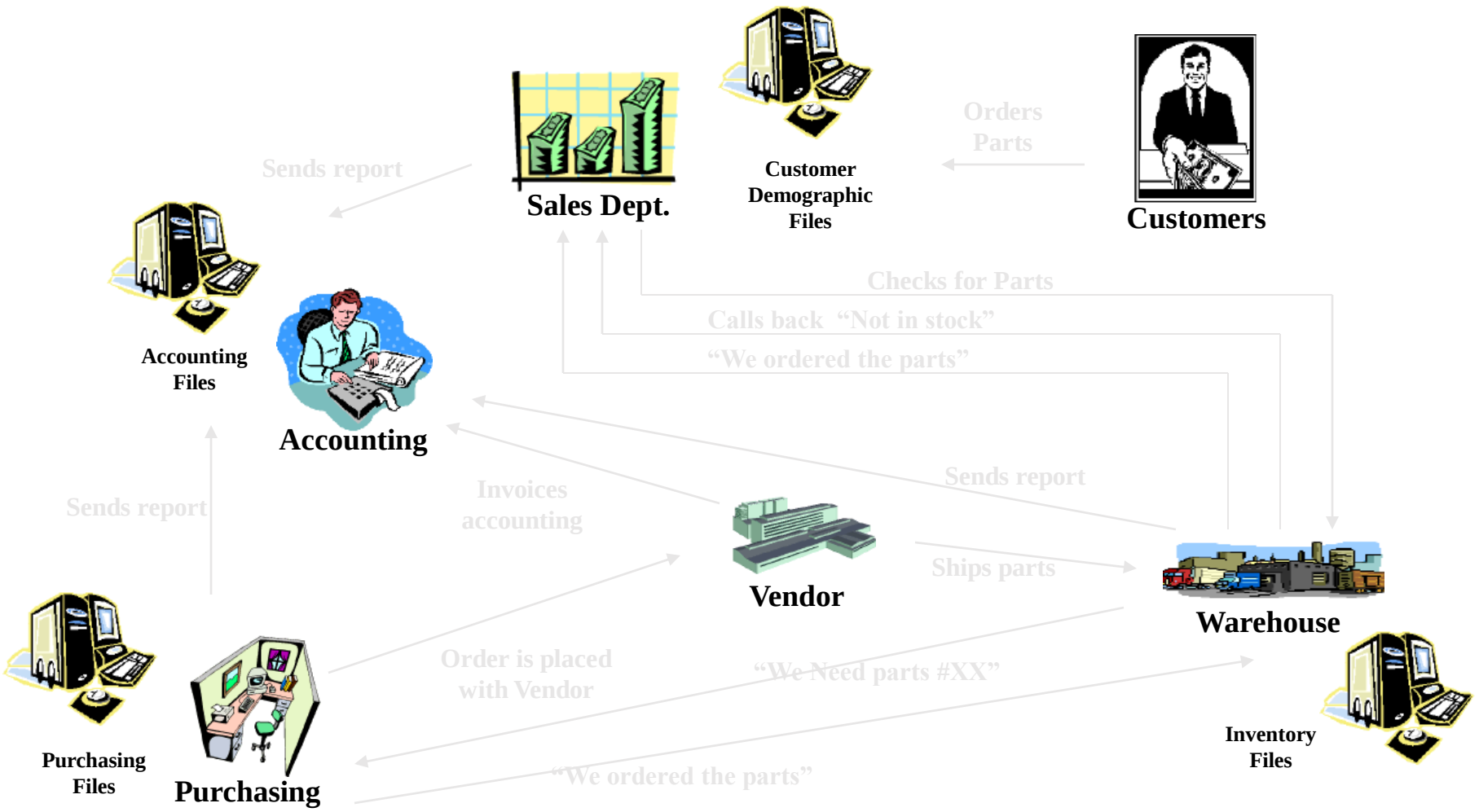
Source: Davenport, Thomas, "Putting the Enterprise into the Enterprise System", Harvard Business Review, July-Aug. 1998.

ERP Components

- Finance: modules for bookeeping and making sure the bills are paid on time. Examples:
  - General ledger
  - Accounts receivable
  - Accounts payable
- HR: software for handling personnel-related tasks for corporate managers and individual employees. Examples:
  - HR administration
  - Payroll
  - Self-service HR
- Manufacturing and Logistics: A group of applications for planning production, taking orders and delivering products to the customer. Examples:
  - Production planning
  - Materials management
  - Order entry and processing
  - Warehouse management

Source: http://www.computerworld.com/printthis/1998/0,4814,43432,00.html, viewed September 19, 2002.

An ERP Example: Before ERP



An ERP Example: After ERP

Customers

Orders
Parts

Sales Dept.

Inventory Data
If no parts,
order is placed
through DB

Accounting

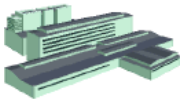
Financial Data exchange;
Books invoice against PO

Database

Order is submitted
to Purchasing.
Purchasing record
order in DB

Books inventory
against PO

Order is placed
with Vendor



Vendor

Purchasing

Warehouse

Ships parts

And invoices accounting

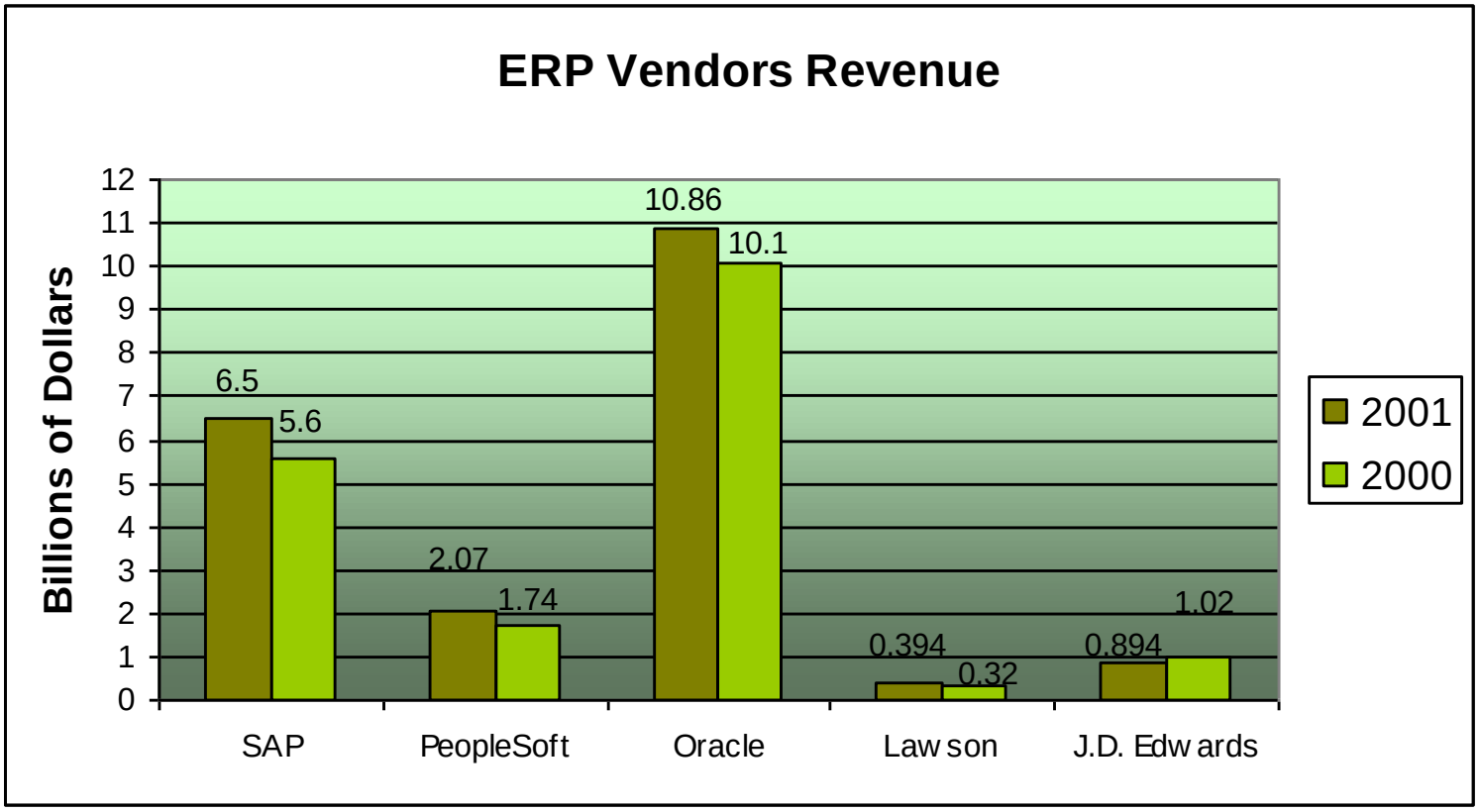
Who are the main ERP vendors?

- Baan
- JD Edwards
- Oracle
- PeopleSoft
- SAP

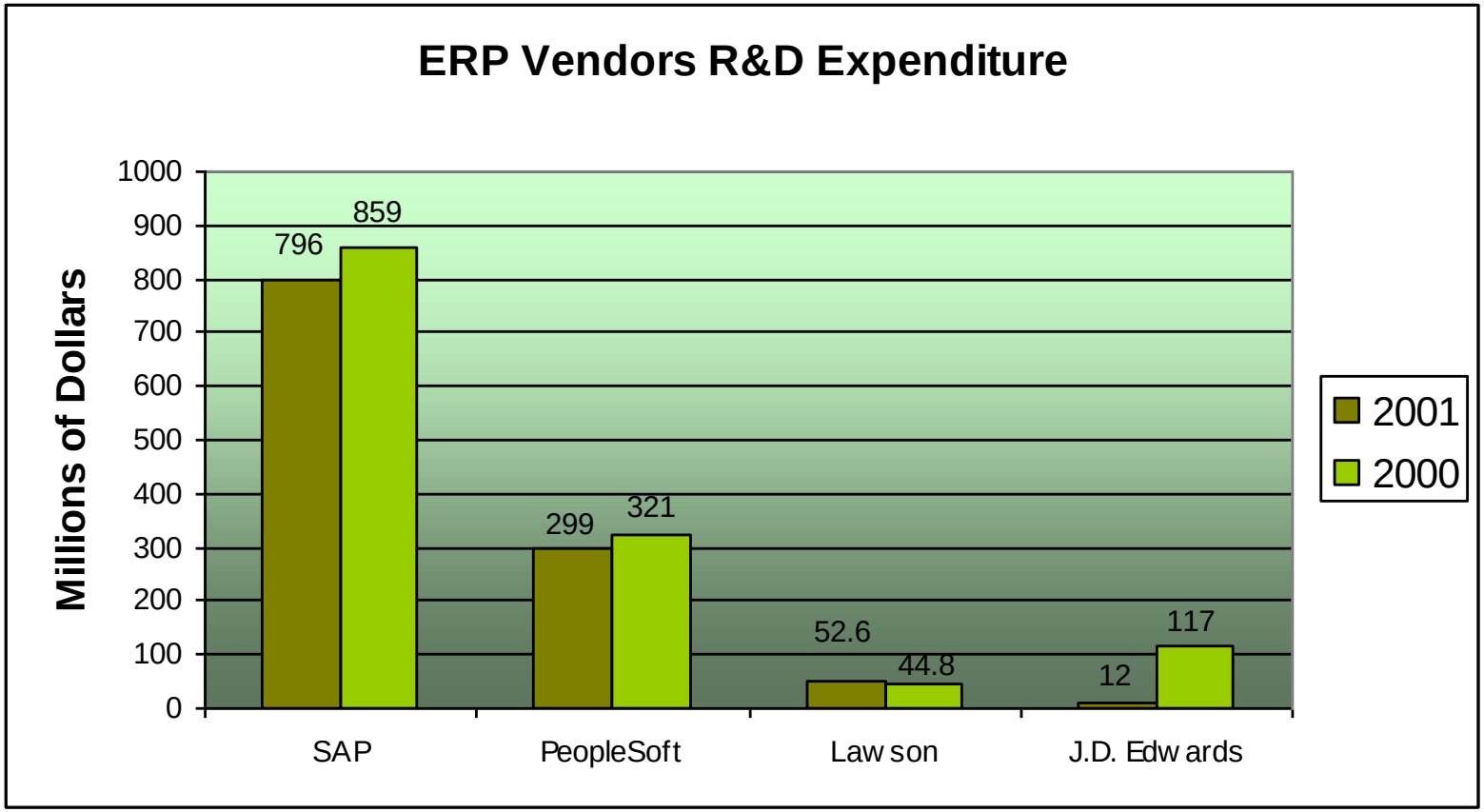
ERP Vendors and Industries They Serve

Who Does What ERP vendors and the industries they serve	Aerospace/ Defense	Automotive	Consumer Package Goods	Electronic	Industrial/ Manufacturing	Oil/Gas	Pharmaceuticals
Baan **Baan Series**	✓	✓		✓	✓		
One World, One World Software		✓	✓	✓	✓	✓	✓
Oracle Corp. **Applications**	✓	✓	✓	✓	✓	✓	✓
PeopleSoft, Inc. **PeopleSoft 7.5**		✓	✓	✓			
SAP **R/3**	✓	✓	✓	✓	✓	✓	✓
% Planned Penetration	10-15	5-10	35+	40+	35	30	20
Source: Benchmarking Partners Inc.							

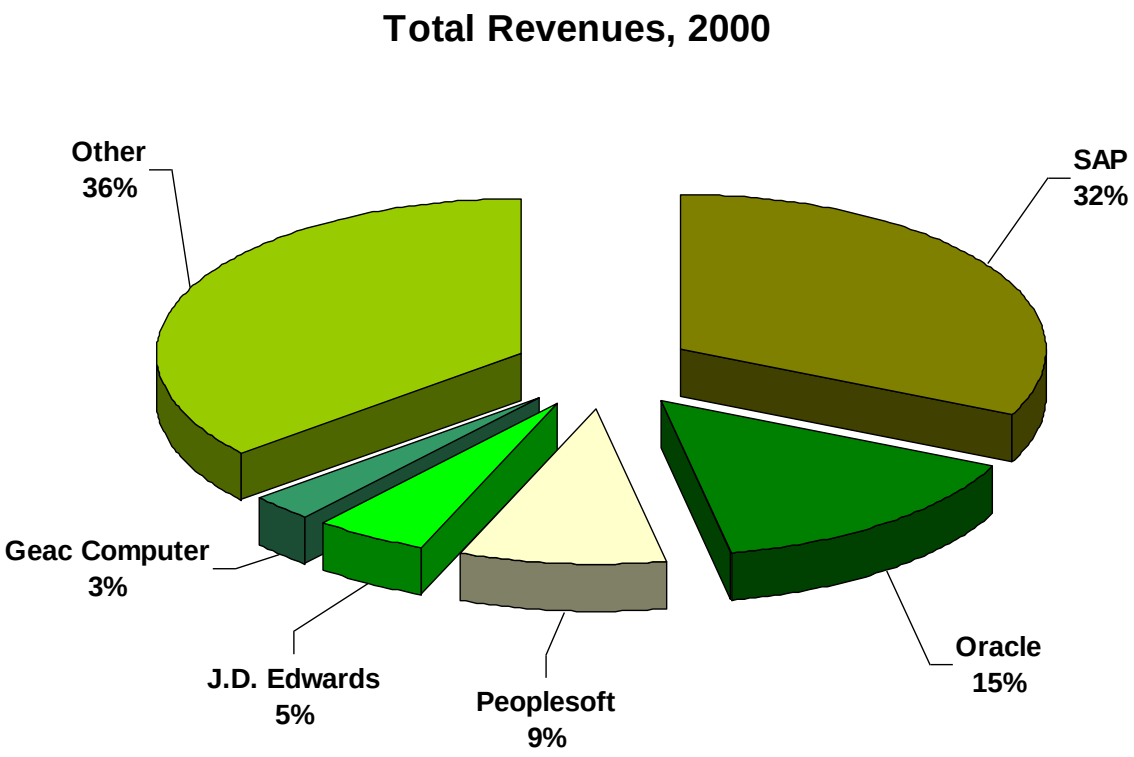
Revenue and Profits of Major ERP Vendors



Revenue and Profits of Major ERP Vendors

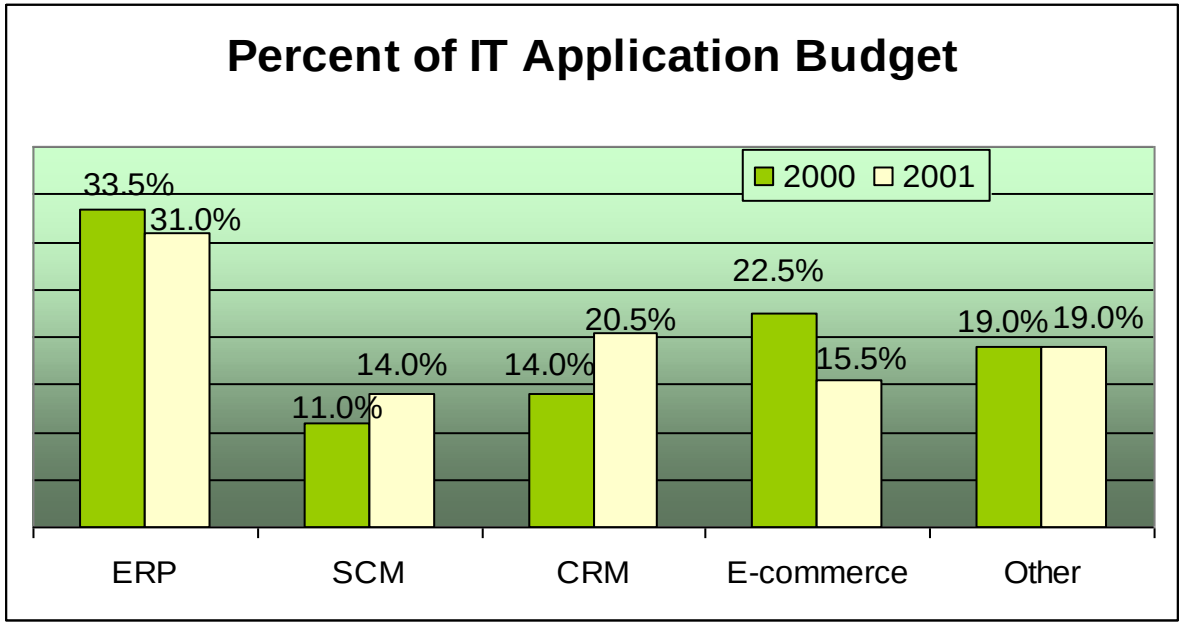


ERP Market



Source: AMR Research, 2001.

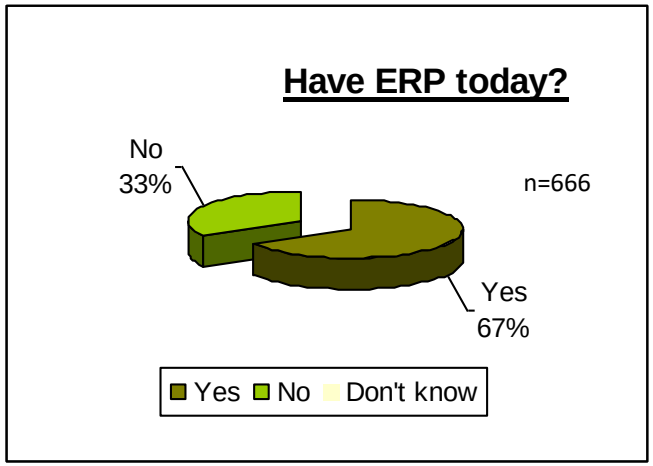
ERP Investments



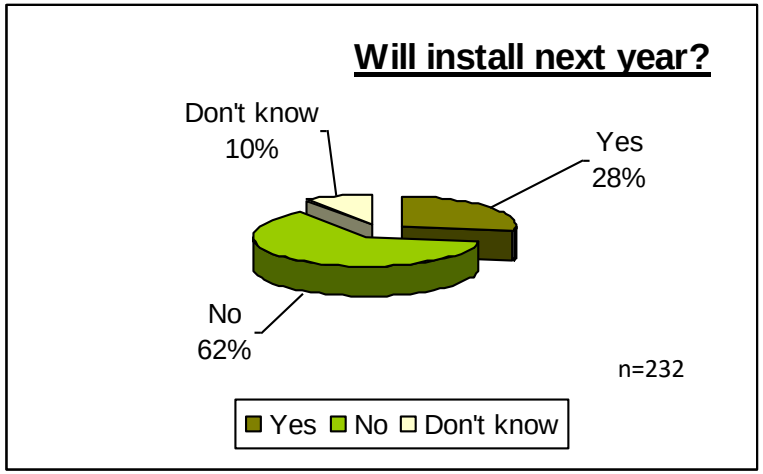
Roughly 65% of companies surveyed already have ERP in place. Of those, many are still actively spending to upgrade existing systems and to take advantage of new web-oriented features.

Source:
AMR Research Survey of 686 companies with annual revenues ranging from <$50M to >$1B, October 2001.

ERP Investments



Source: AMR Research Survey of 686 companies with annual revenues ranging from <$50M to >$1B, October 2001



Why ERP?

3 Major Reasons:

- To integrate financial data.
- To standardize manufacturing processes.
- To standardize HR information.

Source: http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002.

ERP Project and Time

- Real transformational ERP efforts will usually run between 1 to 3 years, on average.
- Short implementations (3 to 6 months):
  - small companies,
  - implementation limited to a small area of the company, or
  - the company only used the financial pieces of the ERP system.
- The important thing is not to focus on how long it will take but to understand why you need ERP and how you will use it to improve your business.

Source: http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002.

Total Cost of Ownership of ERP

Total cost of ownership (TCO) is a model developed by Gartner Group to analyze the direct and indirect costs of owning and using hardware and software. TCO essentially helps a company determine whether it wins or loses from specific technology implementations.

- Metagroup study among 63 companies surveyed showed that:
  - the average TCO was $15 million (the highest was $300 million and lowest was $400k),
  - the average TCO per user was $53,320.

Source: http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002.

Total Cost of Ownership of ERP

- It also found that:
  - it took 8 months after the system was in to see any benefits,
  - but that the median annual savings from the system was $1.6 million per year.

Source: http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002.

Hidden Costs of ERP

- Training
- Integration and testing
- Data conversion
- Data analysis
- Consultants
- Replacing best and brightest staff after implementation
- Implementation teams can never stop
- Waiting for ROI
- Post-ERP depression

Source: http://www.cio.com/summaries/enterprise/erp/index.html, viewed September 19, 2002.

Benefits of ERP Systems

- Improving integration, flexibility
- Fewer errors
- Improved speed and efficiency
- More complete access to information
- Lower total costs in the complete supply chain
- Shorten throughput times
- Sustained involvement and commitment of the top management

Benefits of ERP Systems (cont'd)

- Reduce stock to a minimum
- Enlarge product assortment
- Improve product quality
- Provide more reliable delivery dates and higher service to the customer
- Efficiently coordinate global demand, supply and production

Risks with ERP Implementation

- Expensive (can costs 100 thousands to millions of dollars)
- Time-consuming (can take months to years)
- Great risk for the organization
- Transfer of Knowledge
- Acceptance with the company

Case Study

Nestlé USA

Nestlé Background

Nestlé
Good Food, Good Life

- Found in 1866, Switzerland.
- World's largest food company, # 50 in Fortune magaz Globe 500
- Nestlé USA was incorporated in 1990; Home Office in Glendale, CA.
- 33 manufacturing facilities, 6 distribution centers and 17sales offices around the country, 17,300 employees nationwide.
- $ 11.1 billion in Sales (2001)
- "…America's most admired Food Company for the fourth consecutive year" - *Fortune Magazine, February 2001*

Source: http://www.nestle.com/all_about/at_a_glance/index.html , viewed October 14, 2002, and http://www.ir.nestle.com/4_publications/pdf/financial_report/final_2001/consolidated_accounts_2001.pdf, viewed October 14, 2002.

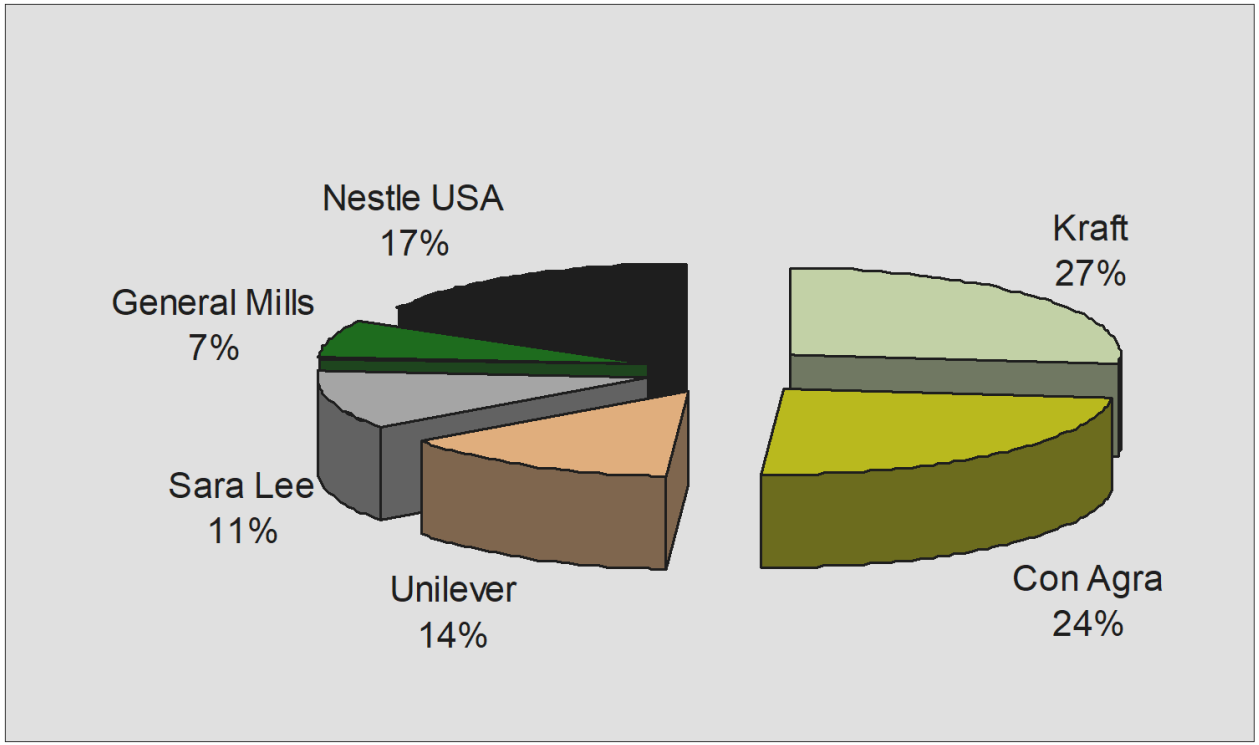
Nestlé's products and brands

Milk products, dietetic foods, infant foods, chocolate and confections, refrigerated and frozen items, ice and pet foods

Source: Weller, Joe, "Introduction to Nestle in the USA", http://www.ir.nestle.com/home-frameset.asp?largeur=1024, viewed October 14,2002.

Competitive Market

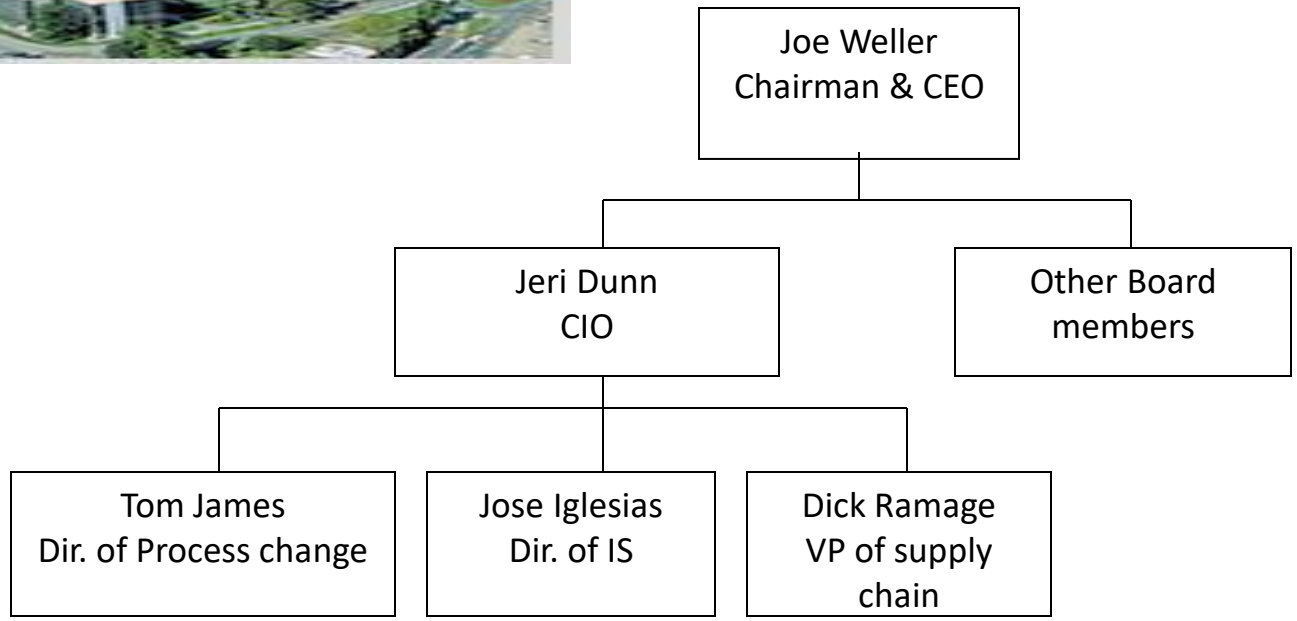
USA Food Market in 2001



Source: Weller, Joe, "Introduction to Nestle in the USA", http://www.ir.nestle.com/home-frameset.asp?largeur=1024, viewed October 20,2002.

Organizational Chart

Nestlé
Good Food, Good Life



Ben Worthen, " Nestlé's ERP Odyssey", May 15, 2002 Issue of CIO Magazine

Business Challenges

- After the brands were unified and reorganized into Nestle

  in 1991,. Divisions still had geographically dispersed.
  - For example, Nestle USA's brands were paying 29 different prices for *vanilla* - to the same vendor.[1]
  - Nine different general ledgers and 28 points of customers entry.
- Years of autonomous operation provided an almost "insurmountable hurdle".
- "… Nestle was the world's NO. 1 food and beverage company– but one of the least efficient "[2]

Source:

1. Ben Worthen, " Nestlé's ERP Odyssey", May 15, 2002 Issue of CIO Magazine;
2. "Nestle: An Elephant Dances", http://www.businessweek.com/2000/00_50/b3711064.htm, viewed October 20, 2002.

Project Scope – "BEST"

- Five SAP Modules – purchasing, financials,

  sales and distribution, accounts payable and accounts receivable and Manugistics' supply chain module
- From October 1997 to 1st Quarter of 2000.
- $210 million budget
- 50 top business executives and 10 senior IT professionals

Source: Worthen, Ben, " Nestlé's ERP Odyssey", May 15, 2002 Issue of CIO Magazine.

Project Objectives - *"One Nestle, under SAP"*

- Transforming the separate brands into

  one highly integrated company.
- Internal aligned and united, establishing a common business process architecture
- Standardizing master data

Source: Worthen, Ben, " Nestlé's ERP Odyssey", May 15, 2002 Issue of CIO Magazine.

Process of SAP Implementation

- The new business process confused
  most of employees, then resistance grew into rebellion in 2000.

- Reconstructed in June 2000 and completed in 2001.

Source: Worthen, Ben, " Nestlé's ERP Odyssey", May 15, 2002 Issue of CIO Magazine.

Conclusion of Nestlé Case

Changes and success

- Common database and business processes lead to more trustworthy demand forecast.
  - A comprehensive account planning tool.
  - Nestle can now forecast down to the redistribution center level.
  - Nestle has improved forecast accuracy by 2%
- Higher factories utilization
  - fewer factories = big gains in factories Utilization
  - Reduce inventory level

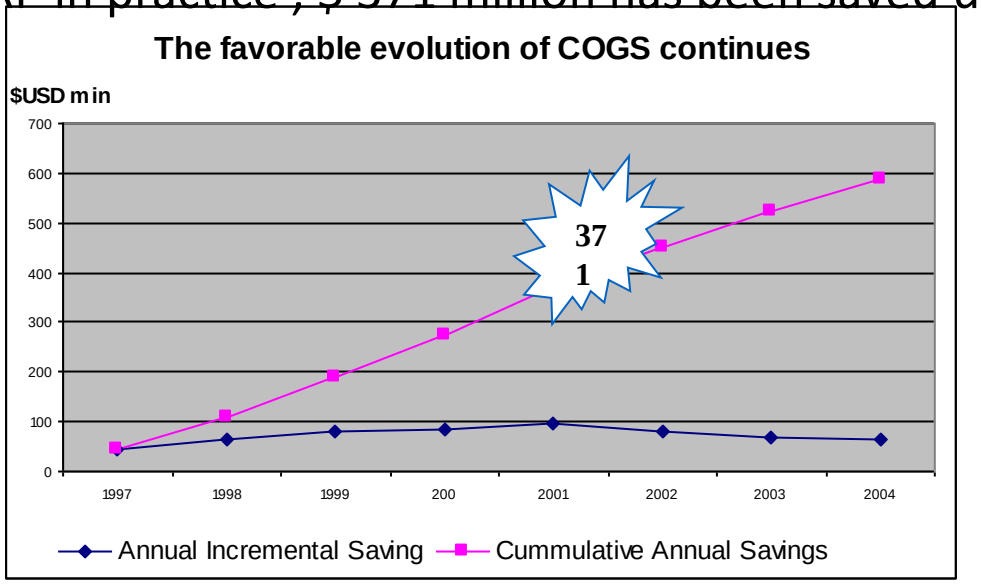
Source: Brownson, Jim, and Mitchell-Keller, Lori, Nestle USA,
Case study: supply chain: Nestle Integrated CRM and SCM Optimize Enterprise Effectiveness,
http:www.dci.com/Brochure/crmny/sessions.asp?trackid=1190, viewed on November 06, 2002.

Conclusion of Nestlé Case

Nestlé
Good Food, Good Life

- Saved $$$

- With ERP in practice , $ 371 million has been saved until 2001.



58
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Source: Weller, Joe, "Introduction to Nestle in the USA", *http://www.ir.nestle.com/home-frameset.asp?largeur=1024*, viewed October 20,2002.

Conclusion of Nestlé Case

Lessons learned by Nestlé

- Don’t start a project with a deadline in mind.
- Update your budget projection at regular intervals.
- ERP isn’t only about the software.

  “No major software implementation is really about the software.” Former Nestlé CIO Jeri Dunn says, “You are challenging their principles, their beliefs and the way have done things for many many years”
- Keep the communication lines open.
- Remember the integration points.

Source: Worthen, Ben, “ Nestlé's ERP Odyssey”, May 15, 2002 Issue of CIO Magazine.

Nestlé in the Future

The Global Business Excellence Program

Supported by SAP, contracted in June 2000 and by IBM in July 2002.

- To be completed by the end of 2005
- To save cost around CHF 3 billion, with benefits realized from 2003.

Source: http://www.idealliance.org/news/2002/mem0307.asp, viewed on November 1, 2002.

Case Study

Agilent Technologies

What is Agilent Technologies?

- Agilent Technologies is the world's leading designer, developer, and manufacturer of electronic and optical test, measurement and monitoring systems.
- Separated from Hewlett Packard and became a public company in 1999
- World HQ in Palo Alto, CA

Source: http://we.home.agilent.com,viewed, viewed November 3, 2002.

Around the World

- Agilent has facilities in more than 40 countries and develops products at manufacturing sites in the U.S., China, Germany, Japan, Malaysia, Singapore, Australia and the U.K.
- Approximately 37,000 employees throughout the world

Source: http://www.agilent.com/about/index.html, viewed November 3, 2002.

Products and Services

Agilent operates in three business groups:

- Test and Measurement
  - Test instruments and systems, automated test equipment.
- Semiconductor Products
  - Semiconductor solutions for wired and wireless communications, information processing.
- Chemical Analysis
  - Life sciences and analytical instrument systems.

Source: http://www.agilent.com/about/newsroom/features/2002june04_oneit.pdf, viewed November 3, 2002.

Agilent revenue for 2001

- Test and Measurement: $5.4 billion
- Semiconductor Products: $1.9 billion
- Chemical Analysis: $1.1 billion
- Total revenue: $8.4 billion

Source: http://investor.agilent.com, viewed November 3, 2002.

Agilent's Customers

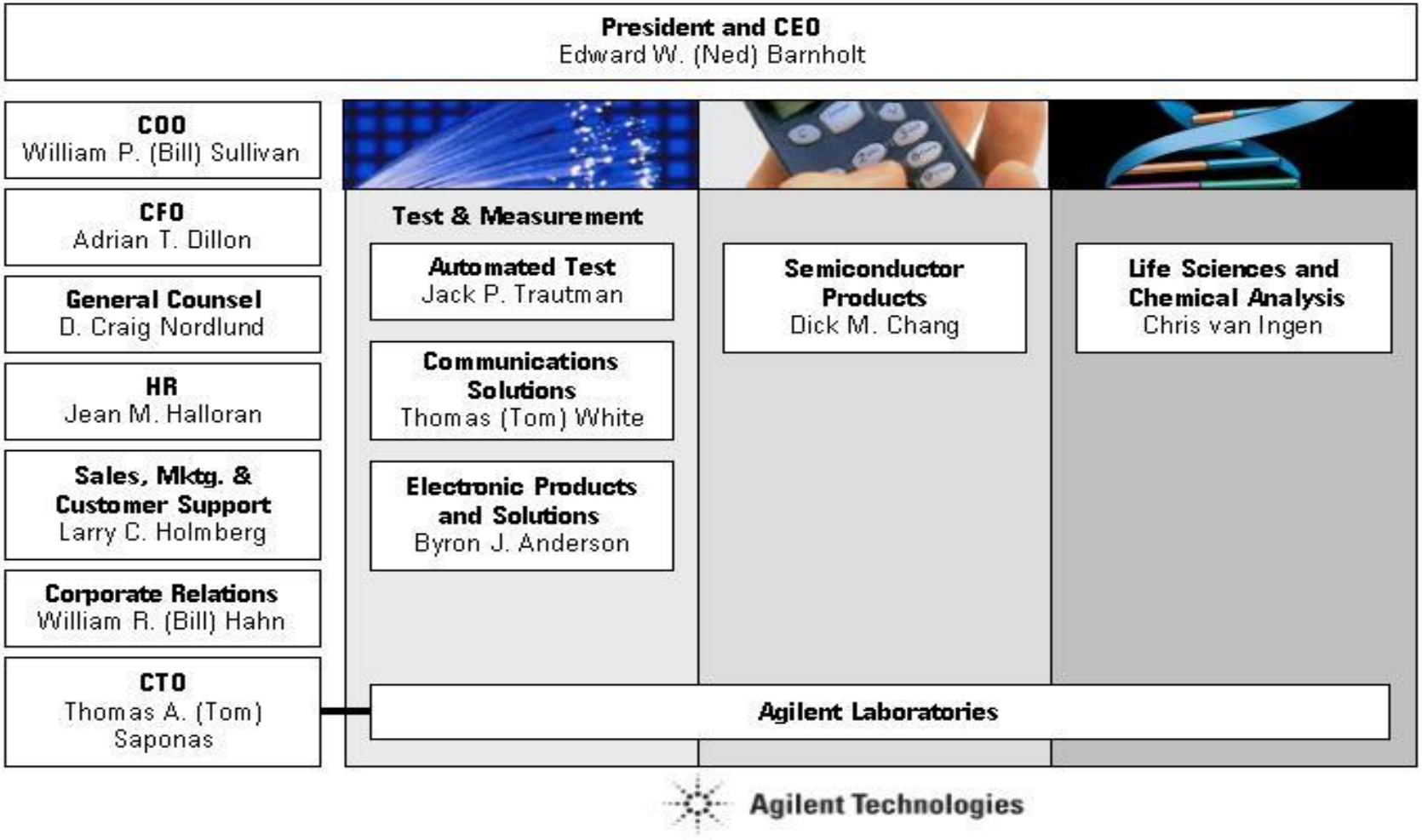
Served customers in more than120 countries around the world[1]

- Electronic component manufacturers
- Pharmaceutical companies
- Chemical companies
- Communication companies[2]

Source:

1. http://www.agilent.com/about/index.html, viewed November 3, 2002;
2. http://www.agilent.com/about/newsroom/features/2002june04_oneit.pdf, viewed November 3, 2002.

Agilent's Organization



Source: http://www.agilent.com/about/newsroom/execs/org/index.html, viewed November 3, 2002.

Project Scope

- Oracle's li E-Business Suite software
- Started September 2000 till 2004
- Budget
- roughly 100 Oracle consultants to install the program

Source: Songini, Marc L., "ERP effort sinks Agilent revenue" Computerworld, Framingham, August 26, 2002.

ERP Project Objective

- “One IT” organization
- Supply chain capability; for example,
  - Suppliers
  - Customers
- Migrating 2,200 legacy applications that it inherited from HP to Oracle

Source: Gaither, Chris, “Watching Oracle For Signs Of Strength” Boston Globe, Boston, Mass., September 16, 2002.

One IT Project (Before)

- IT spend was 8-10% of sales
  - 80% for business operations
  - 20% maint. & upgrading legacy systems
- Further autonomy over the IT portfolio would have led to 50% cost increase

Source: http://www.agilent.com/about/newsroom/features/2002june04_oneit.pdf, viewed November 3, 2002.

One IT Project

- Marty Chuck, CIO, developed a Vision for One IT organization in August 2000
- Moved more than 2,500 IT professionals in the different site, regional and divisional IT organizations

Source:
http://www.agilent.com/about/newsroom/features/2002june04_oneit.pdf;
http://www.agilent.com/about/newsroom/features/2002june08_chuck.html, viewed November 3, 2002.

One IT Project Objective

- To consolidate a large number of independent operating groups into a single worldwide IT function
- To share information quickly and efficiently
- To drive the operational costs down by more than 20%
- To combine all IT budgets

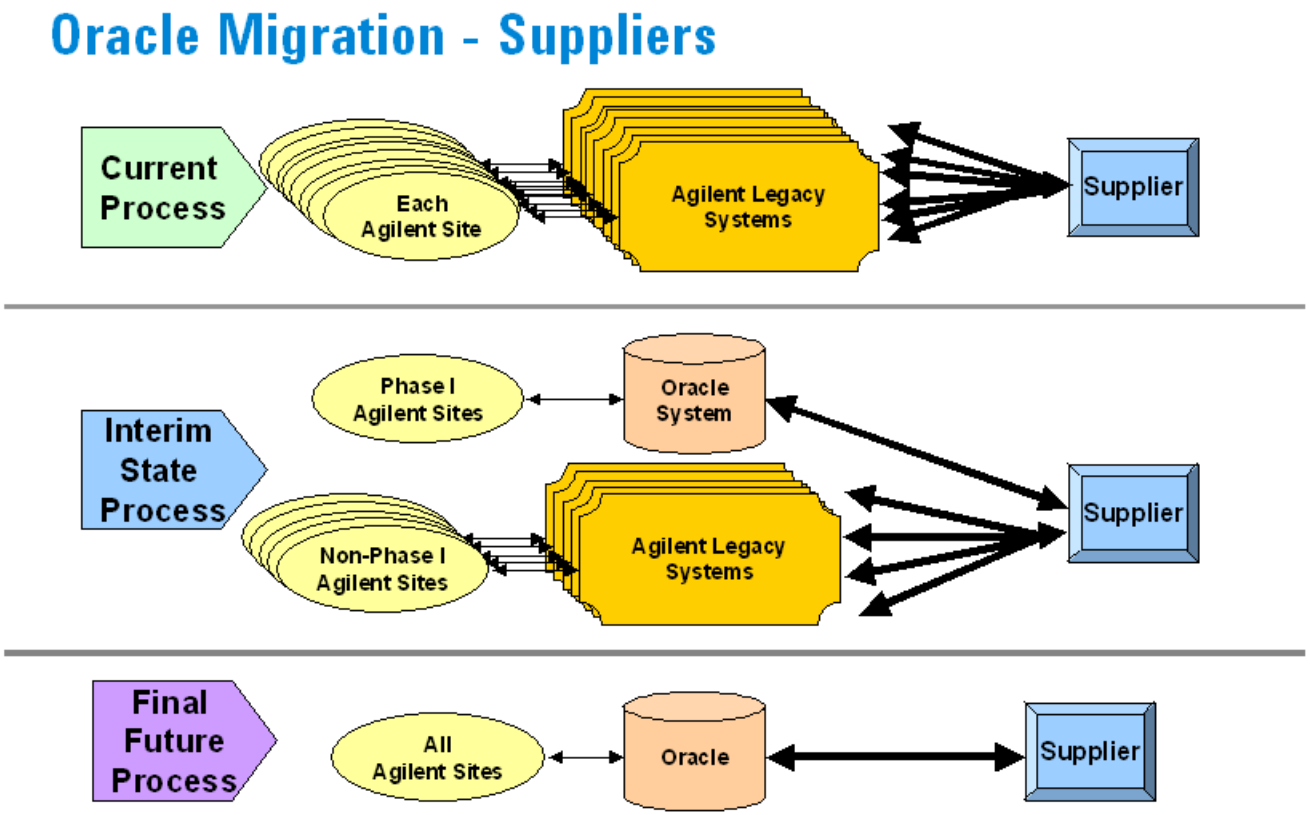
Source: http://www.agilent.com/about/newsroom/features/2002june04_oneit.pdf, viewed November 3, 2002.

Changes in Supply Chain Process: Supplier

- Migrating from all existing ERP systems to a single Oracle-based infrastructure system
- The use of bar code for materials received from suppliers
- The use of Evaluated Receipt Settlement (ERS)

Source: http://www.agilent.com/supplier/default.html, viewed November 3, 2002.

The process of migrating ERP systems to Oracle



Source: http://www.agilent.com/supplier/generalinformation.shtml, viewed October 31, 2002.

Evaluated Receipt Settlement (ERS)

- An automated invoice and payment system
- How does ERS work?

Step 1	Step 2	Step 3	Step 4
Agilent raises an ERS Purchase order or BPA release and sends this to the supplier	The supplier delivers the goods to Agilent Agilent books the goods into their inventory system	The Self Billing Invoice (SBI) is created based on the Purchase Order price and Goods receipt quantity The SBI is sent to the supplier and Agilent Buyer	Agilent pays the supplier against the SBI invoice within the agreed payment terms

Source: http://www.agilent.com/supplier/downloads/ERS_supplier_guide.pdf, viewed November 3, 2002.

Changes in Supply Chain Process: Customers

- Real-time information about inventory and order status
- Easier to understand invoicing and pricing
- Improved visibility on product delivery lead time

Source: http://www.tmintl.agilent.com/model/index.shtml, viewed November 3, 2002.

Troubles with Project Everest

Because of the consolidation of its 2,200 software systems to under 20, confusion meant lost order and revenue.

- An $88 million reduction in third-quarter orders

  Of that, $38 million was lost and $50 million will be pulled through the fourth quarter.

- $105 million in lost revenue and $70 million in operating profit

Source: Shah, Jennifer B., "Agilent's ERP Rollout Expensive Glitches" EBN; Manhasset, August 26, 2002.

Troubles with Project Everest

CFO Adrian Dillon said the problem was twofold:

- Software bug

"As we began to hit sort of a 50 percent ramp of normal capacity, we began to get conflicts in priorities of systems instructions. When we had those conflicts that inevitably shut the system down."

Source:
FD (Fair Disclosure) Wire, August 19, 2002 Monday, Transcript 081902ag.735, Q3 2002 Agilent Technologies Earnings Conference Call - Final; http://www.pressi.com/int/release/51627.html, viewed November 3, 2002, and Shah, Jennifer B., "Agilent's ERP Rollout Expensive Glitches" EBN, Manhasset, August 26, 2002.

Troubles with Project Everest

- Mistakes converting backlog.

  "The other problem we had was converting backlog from legacy to new systems, especially for our highly configured products in our test and measurement operation."

- Extra $35 million to cover costs of ERP and CRM rollout.

Source:
Shah, Jennifer B., "Agilent's ERP Rollout Expensive Glitches" EBN; Manhasset, Aug 26, 2002, and http://www.pressi.com/int/release/51627.html, viewed November 3, 2002.

Lessons Learned by Agilent

- ERP implementations are a lot more than software packages.
- People, processes, policies and culture are all factors that should be taken into consideration when implementing a major enterprise system.
- ERP disasters are often caused by a user company itself.

Source: Songini, Marc L., "ERP effort sinks Agilent revenue" Computerworld, Framingham, August 26, 2002.

Lessons Learned by Agilent

- Study ERP well before implementation

"The disruptions after going live were more extensive than we expected" –CEO Ned Barnholt

Source: Songini, Marc L., "ERP effort sinks Agilent revenue" Computerworld, Framingham, August 26, 2002.

Best Practices and what ERP holds for the Future

ERP Implementation

- Biggest IT project that most companies ever handle,
- Changes the entire company, and
- Has repercussions in all departments and divisions of the organization.
- It is essential that all the key players understand the scope of the project.
- This is an **IT-Related** Project.

Source: http://www.integratedsolutionsmag.com/articles/2000_03/000309.htm, viewed November 5, 2002.

Best Practices of ERP Implementation

- A Business Strategy aligned with Business Processes
- Top-Down Project Support and commitment
- Change Management
- Extensive Education and Training
- Data Clean up and Data Integrity
- Implementation is viewed as an ongoing process

Best Practices of ERP Implementation

- A Business Strategy aligned with Business Processes
  - Business strategy that will give you a competitive advantage
  - Analyze and map your current business processes
  - Develop your objectives
  - Evaluate your business strategy and ERP plan before you commit to software acquisition and installation.

Source: http://www.rmdonovan.com/pdf/perfor8.pdf, viewed November 5, 2002.

Best Practices of ERP Implementation

- Top-Down Project Support and commitment
  - CEO[1]
    - support implementation costs
    - champion the project, and
    - demand full integration and cooperation.
  - Most knowledgeable and valuable staff[2]

Sources:
1. M. Michael Umble, "Avoiding ERP Implementation Failure", Industrial Management, Jan/Feb 2002;
2. http://www.integratedsolutinsmag.com/articles/2000_03/000309.htm, viewed November 5, 2002.

Best Practices of ERP Implementation

- Change Management
  - Changes in business procedures, responsibilities, work load.[1]
  - As a result, ERP implementations are times of high stress, long hours, and uncertainty.[1]
  - Mid-level managers must[2]
    - facilitate continual feedback from employees,
    - provide honest answers to their questions, and
    - help resolve their problems.

Sources:
1. Yakovlev, I.V., "An ERP Implementation and Business Process Reengineering at a Small University", Educause Quarterly, Number 2, 2002;
2. Umble, M. Michael, "Avoiding ERP Implementation Failure", Industrial Management, Jan/Feb 2002.

Best Practices of ERP Implementation

- Extensive Education and Training
  - General education about the ERP system for everyone.
  - Massive amount of end users training before and during implementation.
  - Follow-up training after the implementation.
  - 10 to 15% of total ERP implementation budget for training will give an organization an 80% chance of a successful implementation.

Source: Umble, M. Michael, "Avoiding ERP Implementation Failure", Industrial Management, Jan/Feb 2002.

Best Practices of ERP Implementation

- Data Clean up and Data Integrity
  - Clean-up data before cut-over.[1]
  - "Near enough is no longer good enough."[2]
  - To command trust, the data in the system must be sufficiently available and accurate.[3]
  - Eliminate the old systems, including all informal systems.[3]

Sources:
1. http://www.bpic.co.uk/checklst.htm, viewed November 5, 2002;
2. http://www.projectperfect.com.au/info_erp_imp.htm, viewed November 5, 2002;
3. M. Michael Umble, "Avoiding ERP Implementation Failure", *Industrial Management*, Jan/Feb 2002.

Best Practices of ERP Implementation

- Implementation is viewed as an ongoing process
  - Ongoing need for training and software support after implementation.
  - Ongoing need to keep in contact with all system users and monitor the use of the new system.
  - Ongoing process of learning and adaptation that continually evolves over time.

Source: Umble, M. Michael, "Avoiding ERP Implementation Failure", Industrial Management, Jan/Feb 2002.

ERP Implementation Phases

4 Major Phases:

- Concept/initiation
- Development
- Implementation
- Closeout/Operation and maintenance

Source: "ERP Implementation and Project Management, Production and Inventory Management Journal, Alexandria, Third Quarter 2001, FC Weston Jr.

Conclusion

- The benefits of a properly selected and implemented ERP system can be significant.
  - An average, 25 to 30% reduction on inventory costs; 25% reduction on raw material costs.
  - Lead-time for customers, production time, and production costs can be reduced.
- BUT cost of implementing can be quite high and risks are great.

The Future of ERP

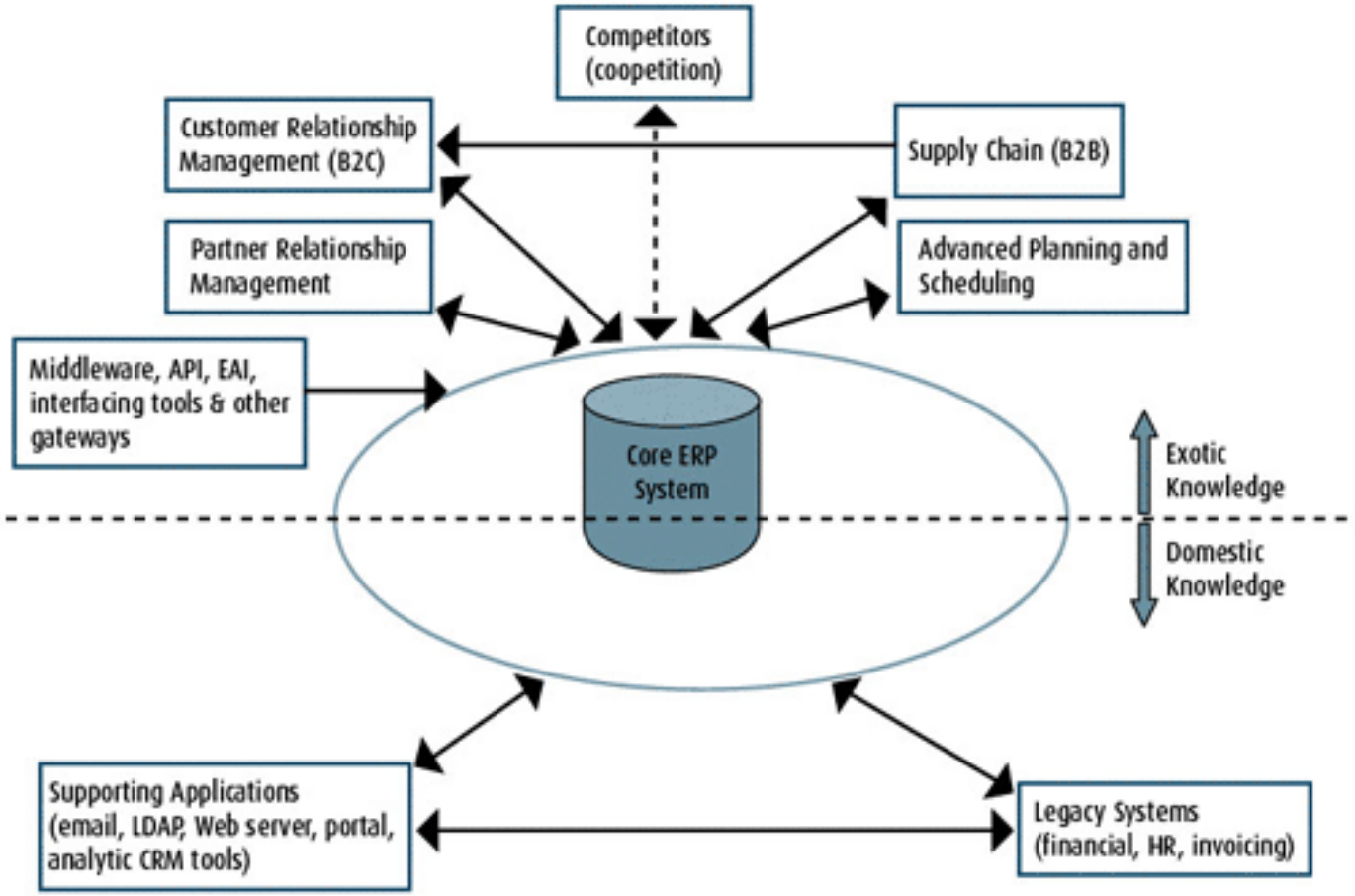
ERP II

- **Integrates the front and back office to enable an "information visibility**" strategy that pushes the right information to the right people at the right time through the right communications channels.
- A competitive strategy that **integrates a centralized, core ERP system with highly specialized solutions.**
- In 2001, $4 billion (or 20%) of the $20 billion of total vendor revenue was spent on extensions to the ERP system. In 2006, AMR predicts this percentage will increase to 50%.

Source:

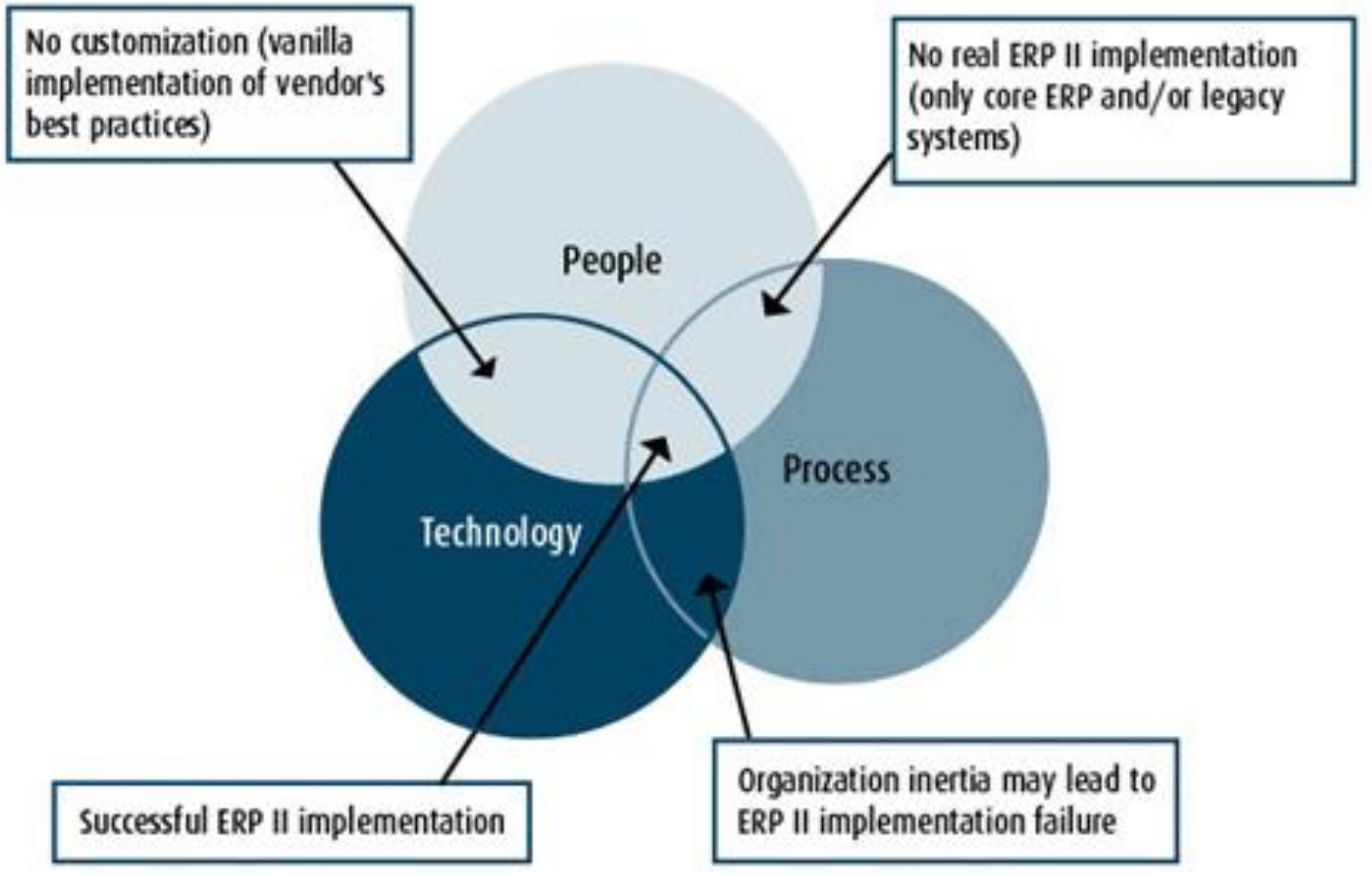
1. http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002;
2. http://www2.cio.com/metrics/2002/metric381.html, viewed September 19, 2002.

ERP II Architecture



Source: http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002.

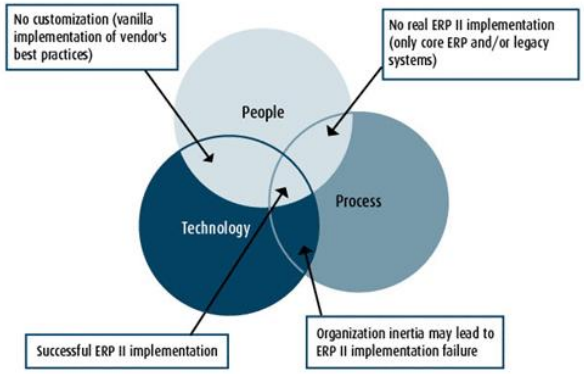
ERP II: A Revolutionary Change



Source: http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002.

ERP II: A Revolutionary Change

- Technology
  - Technology goals aligned with internal business processes and those of diverse part customers, suppliers, and distributors.
- Business Process
  - Implementation cannot be made without a change of business processes.
- People
  - ERP II implementation success depends on the business community's cultural acceptance of the system.



Source: http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002.

Conclusion

- To achieve competitive advantage in the global economy, organizations are extending their ERP system beyond the firm.
- Future growth of the industry lies in adding extensions.
- Integration, scalability and flexibility issues.

Source:
http://www.intelligententerprise.com/020903/514feat2_1.shtml, viewed September 19, 2002, and Bartholomew, D., "Benefiting from the Boom", Industry Week, Cleveland, July 2002.

End

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