

# A Collaborative Approach To 21<sup>st</sup> Century Business Technology Education

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## **Abstract**

*This paper reports on the University of Wyoming's Master of Science in e.Business degree Program and experience from the first two years of its operation. The Program was initiated in response to the chronic shortage of graduates with skills in both business and technology. The program is a rare cooperative effort between the College of Business and the Department of Computer Science in the College of Engineering.*

*We discuss the basic structure of the Program in terms of its interdisciplinary nature, accelerated delivery, educational objectives, team-oriented approach, classroom environment, involvement of business community, and skill sets emphasized. The primary tracks of study and courses within each track are explained. Demographic data on admitted and enrolled students is also presented. Challenges and plans for the future of the Program are also discussed.*

## **1. Introduction**

The University of Wyoming's Master of Science in e.Business degree is designed to educate e.Business managers, consultants, and entrepreneurs. The primary goals of the Program are to prepare graduates to manage technology-based organizations, integrate technology into existing organizations, and create new products, processes, and services that leverage technology to improve performance. The Program is funded by the Solomon D. Trujillo Center for e.Business in the University of Wyoming's College of Business.

## **2. Basic Structure of the Program**

### **2.1 Interdisciplinary Program**

The Program is a rare collaborative effort between the College of Business and the Department of Computer Science in the College of Engineering. Approximately one-half of the courses are taught by Computer Science faculty and the other half are taught by College of Business faculty. Accordingly, one-half of the courses are similar to those in computer science and the other half of the courses are similar in structure and content to courses offered in a college of business.

### **2.2 Accelerated Program**

Another distinctive characteristic of the Program is the accelerated pace of the Program. The entire Program requires only 11 months and includes five terms or "half-semester". The first four terms are comprised of 20 courses, of 1.5 semester credit hours each. The last term is dedicated to experiential learning in which students complete a practicum or internship related to their coursework. The five-term concept is new for the University of Wyoming; most courses are offered in a 15-week semester.

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*Readers with comments or questions are encouraged to contact the authors via email.*

### **2.3 Educational Objectives**

The Program is designed to educate students in both business and information technology in an effort to prepare them to become technology-savvy business professionals. The students are not expected to be experts in either business or computer science. Rather, they are prepared to work in an organizational setting as managers, integrators and consultants.

In the Program students work with a wide variety of technologies and become adept at applying information technology for strategic and competitive advantage. Students gain an understanding of how technology can be used to reduce costs, increase revenues, and more effectively and efficiently utilize resources. They learn techniques for business process design, creating new systems, improving and integrating old systems, web-enabling systems and processes, and evaluating and recommending system alternatives. A common misconception of the Program is that students are trained to develop web sites or run “dot coms”. The goals and focus are actually much more extensive and the majority of first-year graduates are working in a variety of roles, where they use their combined skills in business and information technology.

### **2.4 Team-Oriented Approach**

The coursework requires students to work individually and in teams of four to five students. The teams are formed by the Program’s Director at the beginning of each eight week term, and the same teams are used in all courses in the term. This ensures balance between business and information technology skills held by individuals. The coursework requires students to work both individually and in teams. The students learn from each other and delegate their responsibilities appropriately. This format appears to achieve an equal balance in workload for students, resulting in positive “peer pressure”: students motivate each other.

### **2.5 Classroom Environment and Instructional Resources**

Students take all of their coursework for the first four terms in the same classroom. The classroom is designed for teamwork and efficient exposure to technology in a wireless environment. The room is available 24 hours a day and students access the room with entry cards. Students are required to purchase the same model laptop computer prior to entering the Program. The room is available 24 hours day and students have access to the room with entry cards.

### **2.6 Business Community Involvement**

A key element in making the Program a success is the involvement of business professionals and the business community. The Program is launched anew in June of each year with a Technology Summit Conference. Business leaders come from the local community, state, region and elsewhere. The leaders speak on a variety of technology-based issues, meet the students, and network with each other. This has been a tremendous success, bringing business leaders together in a state with a small business community and significant distance between business communities. In addition, the practicum requirement of the Program has resulted in improved relationship building between the University and the business community.

Throughout the year, a variety of business professionals visit the classes and share their experiences relating to technological challenges, best practices, successes, failures, career development, and planning for future trends. In the second year of the Program, many first-year graduates returned to the University to share their experiences with current students.

### **2.7 Skill Sets Emphasis**

The Program emphasizes a variety of skill sets at varying levels of proficiency. Students develop skills in the following areas: oral and written presentation, group discussion, teamwork, project management, research, hands-on work with software applications, programming, web-application development, content management,

database modeling, process design, software evaluation, business case analysis, critiquing real-world uses of technology, and evaluation of both financial and non-financial performance.

### **3. Program Tracks**

Courses within the Program are grouped into distinct tracks. Within each track, courses are scheduled in an orderly chronological progression, ensuring that students are familiar with the basics before undertaking more advanced work. This progression is particularly important given the varied backgrounds of students in the Program: for example, a student with an undergraduate degree in computer science or business administration may be familiar with the content of one or more courses, or even of an entire track. Likewise, a student with little or no background in business administration or computer science may initially lack familiarity with the content of all the courses in the entire Program.

This variety of backgrounds affords unique opportunities and poses distinct problems: classroom teaching, assignments, and other interactions must simultaneously address the needs of both the novice and the expert. Students become proficient at solving remarkably diverse problems, and they routinely demonstrate their ability to contribute as group members to the work at hand. Group work has been one of the most successful aspects of the Program as evidenced by group and peer evaluations.

Following are descriptions of the five tracks in the Program: *e*.Business Management, Technology Essentials, Internet Programming, Data Administration, and *e*.Marketing and Logistics. Table 1 shows how the courses including the practicum are organized into five Program terms.

#### **3.1 *e*.Business Management**

The following courses are included in the *e*.Business Management track:

- Introduction to *e*.Business
- Business Process Design
- Internet Law and Regulation
- *e*.Business Financial Planning and Management
- *e*.Business Performance
- Internet Business Models and Strategies

Material in the *e*.Business Management track is similar in many respects to general courses commonly taught business schools, with content specific to *e*.Business.

The Introduction to *e*.Business course describes what *e*.Business is, how it is conducted and managed, and its major opportunities, limitations, issues, and risks. Students explore basic business-to-business (B2B) and business-to-consumer (B2C) models. They also become adept at recognizing how technology assists an organization strategically and the associated effects on individual behavior. Organizational and business barriers, together with legal and regulatory implications, are considered.

The Business Process Design course provides an overview of key issues surrounding business process design and its application in both traditional and *e*.Business environments. Students learn how an information system or technology infrastructure supports business processes. The course takes an Enterprise Resource Planning (ERP) approach, applying the approach to all sizes and types of organizations. Inherent in the course is a business process perspective of organizations, value chains, and information technologies.

The Internet Law and Regulation course corresponds to an MBA course in business law. The course explores the legal and social issues confronting businesses participating in the global Internet economy. Students have the opportunity to consider how regulatory trends can affect *e*.Business models and create barriers as well as opportunities.

The course in *e*.Business Financial Planning and Management presents financial statement comprehension including statement interrelationships, formulation of financial strategies, and management of a business to optimize financial performance. Students learn how to evaluate financial information from both a user and a managerial perspective. They learn many of the basics taught in introductory accounting and finance courses, such as evaluation of financial statements, ratio analysis, and general review of internal and external financial information. Students also evaluate an organization within the environment or industry or general market in which it operates. Factors affecting the competitive environment, economic climate, general outlook, governmental regulations, labor relations, and potential litigation are also heavily incorporated into the course. The students learn financial planning and management concepts as they relate to both brick-and-mortar businesses and pure *e*.Businesses.

The *e*.Business Performance course demonstrates how performance measurement techniques can be applied to investments in technology and strategic *e*.Business initiatives. Students gain an understanding of the importance of evaluating technology investments and become adept at using both financial and non-financial performance measures. Incentive alignment and design of performance measurement systems is also discussed.

The Internet Business Models and Strategies course is a capstone course that students take in their fourth term. While the phrase “Internet business models” may have been new in the last decade, the history of these business models is an important part of this course, particularly due to the significant economic changes that have occurred in the Internet economy. Students examine *e*.Business strategies and models from the early days of the commercial Internet to the present. Emphasis is on the student’s ability to identify an organization’s business model, scope, and revenue/resource streams. Students also evaluate an organizational strategy based on the firm’s competitive space and the macro environment factors that influence it. They complete analyses commonly used in MBA courses, including, for example, SWOT (strengths, weaknesses, opportunities and threats) analysis of business models and strategies.

### **3.2 Technology Essentials**

The following courses are included in the Technology Essentials track:

- Networking
- Internet Services
- Computer Security
- System Reliability
- Electronic Payment Systems

Course content in the Technology Essentials track follows a traditional computer science approach with the exception of the Electronic Payment Systems course. Since working knowledge of Internet technology is required for even the simplest of business activities to be conducted over the Internet, students acquire hands-on experience with a variety of software in this track.

The Networking course explores the concepts and practices involved in business computer networks. Specific emphasis is placed on the role of networking in Internet-enabled organizations. Students become familiar with networking technology and protocols and learn to evaluate, analyze, and recommend network solutions.

The Internet Services course focuses on web server software. Students learn how to write moderately complex web applications using JAVA servlets. They work with software solutions that assist in developing and maintaining a sophisticated web site. Upon completion of the course, students are able to write simple enterprise applications and understand the issues and goals of enterprise software. This course takes a server-based approach to JAVA, rather than the client-based approach of the JAVA programming courses.

The Computer Security course covers methods and strategies for assuring confidential transfer of information across networks. Students become knowledgeable in recognizing and assessing security threats and develop an organizational plan that incorporates these issues.

The System Reliability course works in concert with the security course and addresses issues related to designing safe, secure, reliable and enduring systems. Students also gain experience in conducting risk analysis, hazard analysis, and error detection as well as studying the design processes needed to build reliable systems.

The Electronic Payment Systems course treats a wide variety of topics concerned with the techniques and systems used for Internet-based payments. Students gain familiarity with the important business and technology elements of electronic payment systems (EPS) and trends in the area. The overall management of EPS is discussed along with the major opportunities, limitations, and risks.

### **3.3 Internet Programming**

The following courses are included in the Internet Programming track:

- Introduction to Internet Programming
- JAVA I
- JAVA II

The Internet Programming track requires extensive hands-on development work. Many students in the Program have not had exposure to programming, and for these students, this aspect of the Program is the most challenging because of the short time period. Students with a non-technical background sometimes have a tendency to become frustrated because they do not feel they are mastering aspects of the programming concepts. When this occurs, it is important to remind students that the goal of the Program is not to prepare them to be programmers, but rather to give them the skills to work with, or manage, programmers and others. For students with a computer science undergraduate degree, this is perhaps the least challenging portion of the Program. Students with a background in programming typically become team leaders (by chance or by design) for the programming assignments, directing and assisting those students who lack a background in programming.

In the Introduction to Internet Programming course, students study HTML, CSS, JavaScript, DHTML, and ASP. Students learn languages and standards needed to do useful work with the Internet.

The JAVA I and II courses cover object-oriented programming, control structures, arrays, classes, inheritance, graphical user interfaces, class libraries, servlets, JDBC, multithreading, and other aspects of JAVA.

### **3.4 Data Administration**

The following courses are included in the Data Administration track:

- Database Management Systems
- Web-Based Data Management
- Information Retrieval and Analysis

Coursework in the Data Administration track connects the business and the computer aspects of *e*.Business, requiring the students to work simultaneously in two very different environments. In addition to knowing and applying technical material, students learn to deal with strategy issues.

In the Database Management Systems course, students gain experience at modeling the enterprise by capturing business statements and converting them into a correct logical data model with a Computer Assisted Software Engineering (CASE) tool. After validating the model, students generate Data Definition Language (DDL) which they export to a Database Management System (DBMS) to build a physical two-tier relational database. Students then use Structured Query Language (SQL) and Open Database Connectivity (ODBC) to insert, update, and delete data. The work of the Database Administrator (DBA) is discussed.

Assignments in the Web-Based Data Management course require the students to web-enable the relational databases built in the prior term. The students study general aspects of web site design, including ergonomics and navigation, build nontrivial sites, and install them on a server. The students gain hands-on experience with web development, HTTP server, and application server products. Additionally, object-oriented databases are discussed.

The Information Retrieval and Analysis course emphasizes the use of enterprise data for strategic purposes. Students study data marts, data warehouses, data webhouses, On Line Analytical Processing (OLAP), Customer Relationship Management (CRM), data cleansing, data mining, text mining, data visualization, and other topics in business intelligence.

### **3.5 e.Marketing and Logistics**

The following courses are included in the *e*.Marketing and Logistics track:

- Internet Marketing
- Customer Relationship Management
- Supply Chain Management

The *e*.Marketing and Logistics track covers content commonly taught in business schools, emphasizing the specific needs of *e*.Business. The approach is similar to that of the *e*.Business Management track, focusing more on the commerce or transactional side of *e*.Business. Unlike a typical brick-and-mortar enterprise, an *e*.Business may buy, sell, and service products without ever having any products in its physical possession. This “virtual” handling of products creates a need for strategies and policies which might not be appropriate for a different enterprise. In addition, as brick-and-mortar businesses become more Internet-enabled, their traditional physical delivery systems change and need to be updated to reflect *e*.Business initiatives or strategies.

The Internet Marketing course provides students with an understanding of emerging global customer demand driven by web technology. The course content includes relevant marketing concepts similar to what would be included in an MBA marketing course, but links new concepts as they relate to the Internet revolution, such as customization and community building. Students recognize the organizational challenges that both brick-and-mortar and pure *e*.Business firms face, such as distribution channel conflict, legal problems from marketing decisions, and balancing organizational resources and individual skill sets. Students apply what they learn in this course by critiquing the Internet-based marketing plan of an actual business.

The Customer Relationship Management (CRM) course explains the basics of CRM and how the use of technology can dramatically change the way a businesses manages its relationships with its customers. Students identify and recommend opportunities related to the core elements of CRM including marketing, sales force automation, and customer support. In addition, students become skilled at recognizing challenges that both new and established organizations face as they implement CRM solutions. Students gain hands-on experience with CRM software, analyzing and critiquing a CRM solution.

The Supply Chain Management (SCM) course addresses the processes and systems necessary to develop and manage successful supply chains. The emphasis is on interrelationships between entities and how to effectively balance the supply chain to benefit all organizations and elements involved. Students see how technology can make a supply chain more efficient and effective.

## **4. Student Profiles**

Student statistics are presented in Table 2 for full-time degree students only. In the academic year ending 2002, all students participated full-time. In the academic year ending 2003, several part-time students were accepted into the Program. Some of the part-time students expect to complete work on their degrees in a future year. Others intend to take only a few courses, never becoming degree candidates. Part-time students are not included in Table 2 and only the more interesting facts are discussed below.

#### **4.1 Admissions versus Enrollments**

The class of 2002 included a significantly greater number of full-time students than the class of 2003, and a larger fraction of admitted students remained enrolled in the class of 2002.

#### **4.2 Gender and Age**

The classes of 2002 and the classes of 2003 each consist of about one-third female students. This fraction remained the same for both admission and enrollment. The age of enrolled students is not statistically different for each class: approximately 28 years for the class of 2001 and 26.5 years for the class of 2002.

#### **4.3 Undergraduate Degree Field of Study**

The class of 2002 included a much broader selection of undergraduate degrees than the class of 2003. The number of students holding undergraduate degrees in finance or accounting decreased, as did the number of students holding undergraduate degrees in sciences or engineering other than computer science. The number of students holding undergraduate degrees in computer science doubled, from two to four.

#### **4.4 Graduate Degree Field of Study and Level of Degree Achieved**

Members of the class of 2002 held five graduate degrees, including three MBA degrees. Only one member of the class of 2003 holds a graduate degree, in English.

#### **4.5 Entrance Examination - Average Total Score**

Both the average Graduate Record Examination (GRE) scores and the average General Management Admission Test (GMAT) scores for both admitted and enrolled students decreased from the class of 2002 to the class of 2003.

#### **4.6 Work Experience**

Members of the class of 2003 displayed a more homogeneous record of work experience, with no student having less than one year of experience. Overall, students in the class of 2002 displayed considerably more experience, with nearly half having more than five years.

### **5. Vendor Support**

Software and hardware vendors have contributed greatly to the success of the Program by donating software, time, training, and expertise. Without their generous support, course delivery and quality would be seriously compromised. Products and services have been received in a number of forms from a variety of vendors. The products and services are applicable to organizations of all sizes from small businesses to large corporations.

Significant educational discounts and donations of software and licenses have enabled students to gain hands-on experience with fully functional office productivity and development products. One vendor has very generously provided at no charge a fully functional suite of database, business intelligence, and Internet development products to be used for both teaching and research purposes. Another vendor has provided fully functional software and a significant number of licenses for integrated software development projects. In addition, an enterprise resource planning system was implemented in the second year of the Program. Table 3 provides a summary of the major categories of software used in the Program.

Several vendors have provided servers and other hardware at significant discounts, as well as training at no cost. Most notable are two server computers which enable the Center to offer for student use several software products which would not otherwise be available in the university community.

Depending on license terms, the products and services acquired by the Program are also available for use by the other programs in the College of Business, the Computer Science Department, and other schools and departments. We anticipate that cooperation with other university entities will increase as faculty members continue to develop and refine the manner in which they use the software and hardware in the *e*.Business courses they teach.

Another type of support benefiting the Program is the time of experts in the field. The Program was designed to encourage face-to-face visits and speakerphone visits with vendor specialists. Additionally, experts who have nothing to sell have donated their time to assist students.

### **5.1 Overall Program Challenges**

The primary challenges with delivery of the Program deal with obtaining funding for faculty and finding faculty qualified to teach the diverse courses. Another key challenge is keeping the technology current and balancing the hardware and software resources needed for adequate course delivery.

### **5.2 Future Plans**

Plans for the Program involve further development of options for students in other degree programs, for example, undergraduate students in the Colleges of Business, Engineering and Health Sciences. In addition, training for certificate programs and establishment of an *e*.Business research center are being considered.

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**Table 1 - Course Sequencing by Track**

	<b>TRACK</b>				
	<b><i>e</i>.Business Management</b>	<b>Technology Essentials</b>	<b>Internet Programming</b>	<b>Data Administration</b>	<b><i>e</i>.Marketing and Logistics</b>
<b>Summer</b>	<ul style="list-style-type: none"> <li>&gt; Introduction to <i>e</i>.Business</li> <li>&gt; Business Process Design</li> <li>&gt;<i>e</i>.Business Financial Planning and Management</li> </ul>		<ul style="list-style-type: none"> <li>&gt; Introduction to Internet Programming</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Database Management Systems</li> </ul>	
<b>Fall I</b>	<ul style="list-style-type: none"> <li>&gt;Internet Law and Regulation</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Networking</li> </ul>	<ul style="list-style-type: none"> <li>&gt; JAVA I</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Web-Based Data Management</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Internet Marketing</li> </ul>
<b>Fall II</b>		<ul style="list-style-type: none"> <li>&gt; Internet Services</li> <li>&gt; Computer Security</li> </ul>	<ul style="list-style-type: none"> <li>&gt; JAVA II</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Information Retrieval and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Electronic Payment Systems</li> </ul>
<b>Spring I</b>	<ul style="list-style-type: none"> <li>&gt;<i>e</i>.Business Performance</li> </ul>	<ul style="list-style-type: none"> <li>&gt; System Reliability</li> <li>&gt; Internet Business Models and Strategies</li> </ul>			<ul style="list-style-type: none"> <li>&gt; Supply Chain Management</li> <li>&gt; Customer Relationship Management</li> </ul>
<b>Spring II</b>	<ul style="list-style-type: none"> <li>&gt; <i>e</i>.Business Practicum</li> </ul>				

Table 2 - Student Profiles  
Full-Time Student Statistics

	2001 Admitted	2001 %	2001 Enrolled	2001 %	2002 Admitted	2002 %	2002 Enrolled	2002 %
<b>Gender</b>								
Female	13	38%	11	34%	7	33%	6	35%
Male	<u>21</u>	<u>62%</u>	<u>21</u>	<u>66%</u>	<u>14</u>	<u>67%</u>	<u>11</u>	<u>65%</u>
Total	34	100%	32	100%	21	100%	17	100%
<b>Age at Admission</b>	28.75		28.15		28.25		26.5	
<b>Undergraduate Degree Field of Study</b>								
Business Management/Administration	6		6		5		5	
Finance or Accounting	6		6		1		1	
Marketing	2		2		3		3	
Economics	2		2		0		0	
Languages (Spanish, English)	2		2		1		0	
Communication	1		1		0		0	
Sciences (Biology, Chemistry, Geology, Geoscience)	4		4		1		1	
Social Sciences (Politics, Humanities)	2		1		2		2	
Marine Transportation	1		1		0		0	
Elementary Education	1		0		0		0	
Statistics/Mathematics	2		2		0		0	
Computer Science or Info. Systems	2		2		4		4	
Engineering (Civil, Chem., EE, Computer)	5		5		1		0	
Architecture	1		1		0		0	
Art	0		0		1		0	
Law	0		0		1		0	
eCommerce	<u>0</u>		<u>0</u>		<u>1</u>		<u>1</u>	
Total	37		35		21		17	
<b>Graduate Degree Field of Study</b>								
MBA	3		3		0		0	
M.S. Natural Science	1		0		0		0	
M.S. Geology & Geophysics	1		1		0		0	
M.S. Electrical Engineering	1		1		0		0	
M.A. English	1		0		1		1	
M.S. Sociology	<u>0</u>		<u>0</u>		<u>0</u>		<u>0</u>	
Total	7		5		1		1	

<b>Level of Degree Achieved</b>									
One Undergrad	31		29		21		17		
Two Undergrad	<u>3</u>		<u>3</u>		<u>0</u>		<u>0</u>		
Total	34		32		21		17		
<b>Country of Origin</b>									
U.S.	26	76%	24	75%	16	76%	13	76%	
India	2	6%	2	6%	0	0%	0	0%	
Bangladesh	1	3%	1	3%	0	0%	0	0%	
Estonia	1	3%	1	3%	0	0%	0	0%	
China	4	12%	4	13%	1	5%	0	0%	
Grenada	0	0%	0	0%	1	5%	1	6%	
St. Lucia	0	0%	0	0%	2	10%	2	12%	
Sri Lanka	<u>0</u>	<u>0%</u>	<u>0</u>	<u>0%</u>	<u>1</u>	<u>5%</u>	<u>1</u>	<u>6%</u>	
Total	34	100%	32	100%	21	100%	17	100%	
<b>U.S. State of Origin (residence prior to start)</b>									
Colorado	1	3%	0	0%	0	0%	0	0%	
Iowa	1	3%	1	3%	0	0%	0	0%	
Montana	1	3%	1	3%	0	0%	0	0%	
Nevada	1	3%	1	3%	0	0%	0	0%	
Texas	0	0%	0	0%	3	16%	3	19%	
Utah	1	3%	1	3%	0	0%	0	0%	
Vermont	1	3%	0	0%	0	0%	0	0%	
Washington	1	3%	1	3%	0	0%	0	0%	
Wyoming	<u>27</u>	<u>79%</u>	<u>27</u>	<u>84%</u>	<u>16</u>	<u>84%</u>	<u>13</u>	<u>81%</u>	
Total	34	100%	32	100%	19	100%	16	100%	
<b>Entrance Exam - Average Total Score</b>									
GRE	1724		1736		1640		1711		
GMAT	568		568		567		547		
LSAT	NA		NA		144		NA		
<b>Work Experience</b>									
Less than 1 year	9	26%	9	28%	0	0%	0	0%	
Between 1 and 3 years	5	15%	5	16%	7	33%	7	41%	
Between 3 and 5 years	3	9%	3	9%	5	24%	4	24%	
Over 5 years	<u>17</u>	<u>50%</u>	<u>15</u>	<u>47%</u>	<u>9</u>	<u>43%</u>	<u>6</u>	<u>35%</u>	
Total	34	100%	32	100%	21	100%	17	100%	

**Table 3 - Categories of Software Used in the e.Business Program**

**Office Productivity**

- Word processor
- Spreadsheet
- Project management
- Browser

**Enterprise Resource Management**

- Human resource management
- Supply chain management
- Customer relationship management
- Workflow management

**Data Management**

- Data modeling
- Database management
- Data cleansing
- Data mining
- Text mining
- On Line Analytical Processing (OLAP)
- Data warehousing

**Software Engineering**

- Development environment
- Requirements management
- Modeling
- Project management
- Testing
- Web site development

**Operating System**

- Application server
- HTTP server
- License server