Software Engineering for Outsourcing and Offshoring

Bertrand Meyer
ETH Zurich / Eiffel Software

Peter Kolb
ERNI Management Services

ETH course, Winter 2005-2006

Tract handed out at entrance to Siemens main site, Munich, May 2004
Themes

- The outsourcing proposition
- The technical (software engineering) issues of outsourcing software: requirements, design, V&V, maintenance, configuration management...
- Management aspects: the role of process models
- Putting everything in place for successful outsourcing

Topics

- The outsourcing phenomenon: facts & figures
- Requirements engineering
- Outsourcing strategy for a company
- Cost model for outsourced projects
- CMMI for supplier outsourcing
- Quality assurance, V&V
- Outsourcing project management
Our goal in this course

We want you to:

- Understand the specificities of software outsourcing, and the technical challenges raised by outsourcing
- Know how to organize, participate in and manage an outsourced project
- Understand the effect of the outsourcing phenomenon on the industry and manage your own career accordingly

Project (& grading)

Based on project (2 people):

- Write requirements for outsourced project (of your choice)
  
  15 December (20%)

- Examine and critique other group's project
  
  20 January (40%)

- Provide revised requirements document
  
  5 February (40%)
A profound transformation

Massive transfer of development towards specialized suppliers, largely in low-wage countries

Outsourcing is not new; offshore development is a major new trend, affecting everyone in the information technology

A profound transformation

Started with manufacturing

Then electronic design

Then low-level service jobs

Then call centers, customer support...

Then implementation-level programming

Then...
Four key elements

- Strategy
- Process
- Technology
- Communication
Plan

The outsourcing proposition (part 1)

The technical issues

Management and communication

Putting everything in place for successful outsourcing

Plus: an exercise

Overview

Worldwide IT services revenue (2003):

about $555 billion

IT industry, total:

about $900 billion
IT Services market (Gartner)

<table>
<thead>
<tr>
<th>Region</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia/Pacific</td>
<td>28,223</td>
<td>29,081</td>
<td>30,751</td>
<td>33,257</td>
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<tr>
<td>Eastern Europe</td>
<td>5,115</td>
<td>4,984</td>
<td>5,326</td>
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<td>Japan</td>
<td>64,805</td>
<td>65,210</td>
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<tr>
<td>Latin America</td>
<td>18,768</td>
<td>17,411</td>
<td>17,705</td>
<td>18,788</td>
</tr>
<tr>
<td>Middle East and Africa</td>
<td>8,973</td>
<td>8,802</td>
<td>9,332</td>
<td>10,000</td>
</tr>
<tr>
<td>North America</td>
<td>255,242</td>
<td>252,450</td>
<td>261,543</td>
<td>276,258</td>
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<tr>
<td>Western Europe</td>
<td>158,447</td>
<td>158,316</td>
<td>160,348</td>
<td>165,442</td>
</tr>
<tr>
<td><strong>Total Market</strong></td>
<td>539,573</td>
<td>536,256</td>
<td>555,176</td>
<td>584,164</td>
</tr>
</tbody>
</table>

Source: Gartner Dataquest (June 2003)

Outsourcing “primary source of growth”

“Replaces internal IT spending and is often funded outside of IT budgets, so growth in outsourcing is possible even in the face of flat IT budgets”

US imports of software and services

US Commerce department figures:

- **$77.4 billion** in 2003
- Up **$7.9 billion** from 2002

Exports during same period: **$131 billion**, up **$8.4 billion**
The global market

IT outsourcing:

2000: $56 billion

2005 outlook: $100 billion

(Source: ComputerWorld, 30 July 2001)

Percentage of offshoring

Percentage of offshoring in IT budgets (Forrester):

2000: 12%

2003: 28%
When they say it’s not about the money...

... then it is about the money.

It’s about the money

In the better economic times, companies outsourced IT to get access to scarce IT talent. But in today’s down economy, saving money has bubbled to the top as one of the primary reasons for making outsourcing deals.

Computerworld, March 18, 2002

Right now, in this economy, cost savings is No. 1 criterion.

Tim Barry, Senior VP of Application Outsourcing, Keane, 2002
The offshoring proposition

- Low salaries
- Skilled workforce
- Good university system
- Good communication infrastructure
- Stable political structure
- Efficient business conditions
- Entrepreneurial culture (greed?)
- No insurmountable cultural barrier
- Language skills
- (Often) exile community in the client country
- Culture of quality and qualification (CMM, ISO...)

The role of qualification

*CMM (the Capability Maturity Model) and its derivatives, such as CMMI, as well as other standards such as ISO 900X, have been a key enabler to the takeoff of offshore development*
Other relevant aspects

Work ethics

Language skills

Time zones

India

Official policy to support outsourcing, IT ministry
University infrastructure, Indian Institutes of Technology: 75,000 IT graduates a year
English widely known
Technical salaries: $5,000 to $12,000, average $5,800
IT parks (Bangalore...), excellent infrastructure
Key role of Indian technical diaspora in the US
Strong emphasis on qualification (CMM, ISO)
Strengths so far: call centers, finance, application development

Outsourcing and software exports: $9.6 billion in 2003; targeted to $50 billion by 2008 (NASSCOM)
Russia

Good university system, strong on mathematics and basic science.
3rd largest population of scientists and engineers per capita
Technical salaries: $6,000 to $10,000
Business climate volatile, bureaucracy
Infrastructure: OK in Moscow and Petersburg. Telecoms still expensive
Strengths so far: research, advanced software development, Web

IT outsourcing revenue: about $200 million, growing 50% a year

China

50,000 technical graduates per year
Technical salaries: $3,000 to $8,000
Intellectual property issues remain
Infrastructure good in major cities
Strengths so far: transaction processing, low-level software development & maintenance

IT outsourcing revenue: about $2 billion, $5 billion in 2005, $27 billion in 2007 (Gartner)
Ireland

- Technical salaries: $25,000 to $35,000
- Favorable tax structure, $330 million technology-education fund
- English language
- Strengths so far: service centers, call centers (Dell, HP, Microsoft...)

IT outsourcing revenue from US: $8.3 billion

An example of a successful outsourcing infrastructure in a developed country

Challengers

- Philippines
  - 15,000 tech graduates/year, labor slightly higher than India, government support
- Mexico
  - Close to US, NAFTA
- Brazil
- Israel
- Eastern Europe: Poland, Rumania, Bulgaria, Czech Republic, Hungary
- South Africa
- Egypt
- Thailand
The next generation?

Vietnam
Ukraine
Baltic republics
Ghana
...
Effect on US jobs (Forrester)

315,000 service jobs shifted offshore by end of 2003
(less than 1% of affected categories)

Projected: 830,000 by end of 2005 (1.6%), 3.4 million by 2015

Offshoring “almost mandatory” for Business Process Outsourcing

Turning into key issue in US presidential election

11 May 2004

US state adopts anti-BPO bill
(source: Rediff)

The state of Kansas has adopted a bill seeking to bar outsourcing telephone enquiries about its food stamp program to India and other countries.

The Department of Social and Rehabilitation Services signed a contract with eFunds Corp in September 2002 to handle food stamp benefits and take clients’ calls. In its 2003 annual report, eFunds said it has two customer call centers in India and that about 3,100 of its 5,400 employees are outside the United States. Outsourcing became an issue in the legislature when it was revealed that Kansas’ calls about food stamps were answered by workers not in Kansas but in India.

The measure would require SRS to renegotiate its $1.7 million-a-year contract with the Arizona-based eFunds Corp. The agency said it does not know whether contract costs will increase if calls are answered in Kansas.

In March, Senator Mark Taddiken (Republican) persuaded fellow Senators to add a ban on outsourcing of food stamps work to a bill on next fiscal year’s budget. Under his proposal, the ban would have taken effect on July 1. But SRS secretary Janet Schalansky told legislators that the ban would raise the cost of eFunds contract by about $640,000 as a centre will have to be set up in Kansas.
### Forms of outsourcing

<table>
<thead>
<tr>
<th>Internal (to lower-cost divisions)</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same country group</td>
<td>Offshore</td>
</tr>
<tr>
<td>Specific</td>
<td>Business process (BPO)</td>
</tr>
<tr>
<td>Operation (e.g. computer facilities)</td>
<td>Transfer</td>
</tr>
<tr>
<td>Selective</td>
<td>Total</td>
</tr>
<tr>
<td>Tactical</td>
<td>VS</td>
</tr>
<tr>
<td>Transitional</td>
<td>Strategic</td>
</tr>
<tr>
<td>Client-supplier</td>
<td>Partnership (joint venture)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>New product</td>
</tr>
<tr>
<td>Development/operation</td>
<td>Research</td>
</tr>
</tbody>
</table>

### Arguments for outsourcing

- **Cost**
  - Access to expertise
  - Focus on core business

- **Speed**
  - Business process reengineering (aka change)

- **Control**
  - Quality improvement
Arguments against outsourcing

Loss of control, dependency on supplier
Loss of expertise
Loss of flexibility
Loss of jobs, effect on motivation

Outsourcing risks

Loss of personnel and expertise
Loss of user input and business-related information
Leaks of intellectual property
Failure of third party
Disappearance of third party
Changes in business climate not addressed by contract
Insurmountable cultural differences, language problems
Communication costs, time difference, ...
Insufficiently precise contract
Contract not covering evolution
Rising costs out of modifications
Insufficient quality, detected late
Privacy issues
Security issues
Plan

1. The outsourcing proposition (part 2: Exercise)
2. The technical issues
3. Management and validation techniques
4. Putting everything in place for successful outsourcing

*Plus: an exercise*

An exercise: the Valicert case

- (by Peter Kolb)
**Exercise - 1**

**Why every job doesn't translate well overseas**

*Computerworld, March 22, 2004 by Scott Thurm*

- When sales of their security software slowed in 2001, executives at ValiCert Inc. began laying off engineers in Silicon Valley to hire replacements in India for $7,000 a year.
- ValiCert expected to save millions annually while cranking out new software for banks, insurers and government agencies. Senior Vice President David Jevans recalls optimistic predictions that the company would "cut the budget by half here and hire twice as many people there." Colleagues would swap work across the globe every 12 hours, helping ValiCert "put more people on it and get it done sooner," he says.
- The reality was different. The Indian engineers, who knew little about ValiCert's software or how it was used, omitted features Americans considered intuitive. U.S. programmers, accustomed to quick chats over cubicle walls, spent months writing detailed instructions for overseas assignments, delaying new products. Fear and distrust thrived as ValiCert's finances deteriorated, and co-workers, 14 time zones apart, traded curt e-mails. In the fall of 2002, executives brought back to the U.S. a key project that had been assigned to India, irritating some Indian employees.

**Exercise - 2**

- Founded in 1996, ValiCert specializes in software to securely exchange information over the Internet. Banks use ValiCert's software to safeguard electronic funds transfers; health insurers use it to protect patient medical records. Although still unprofitable, ValiCert conducted an initial public offering in July 2000, in the dying embers of the dot-com boom. In two months, the stock doubled to $25.25.
- In 2001, however, sales growth slowed, as corporate customers reduced technology purchases. ValiCert had projected that it would break even with quarterly revenue of $18 million, according to Srinivasan "Chini" Krishnan, founder and, at the time, chairman. Quarterly expenses had grown to $14 million, but revenue was stalled at less than half that figure. Executives began considering shifting work to India. The "motivation was pure survival," says Krishnan, who left the company after the Tumbleweed merger.
- India was a natural choice because of its large pool of software engineers. Moreover, both Krishnan and ValiCert's then-head of engineering grew up in India and were familiar with large tech-outsourcing firms.
- Some, including Jevans, harbored doubts. The Apple Computer Inc. veteran says he preferred "small teams of awesome people" working closely together. Nonetheless, that summer, ValiCert hired Infosys Technologies Ltd., a specialist in contract software programming, to supply about 15 people in India to review software for bugs and to update two older products.
- With no manager in India, ValiCert employees in the U.S. managed the Infosys workers directly, often late at night or early in the morning because of the time difference. ValiCert also frequently changed the tasks assigned to Infosys, prompting Infosys to shuffle the employees and frustrating ValiCert's efforts to build a team there.
- Within a few months, ValiCert abandoned Infosys and created its own Indian subsidiary, with as many as 60 employees. Most employees would be paid less than $10,000 a year. Even after accounting for benefits, office operating costs and communications links back to the U.S., ValiCert estimated the annual cost of an Indian worker at roughly $30,000. That's about half what ValiCert was paying Infosys per worker, and less than one-sixth of the $200,000 comparable annual cost in Silicon Valley.
To run the new office in India, ValiCert hired Sridhar Vutukuri, an outspoken 38-year-old engineer who had headed a similar operation for another Silicon Valley start-up. He set up shop in January 2002 in a ground-floor office in bustling Bangalore, the tech hub of southern India. The office looked much like ValiCert's California home, except for the smaller cubicles and Indian designs on the partitions. There were no savings on the rent. At $1 per square foot, it matched what ValiCert paid for its Mountain View, Calif., home offices, amid a Silicon Valley office glut.

Misunderstandings started right away. U.S. executives wanted programmers with eight to 10 years of experience, typical of ValiCert's U.S. employees. But such "career programmers" are rare in India, where the average age of engineers is 26. Most seek management jobs after four or five years. Expertise in security technology, key to ValiCert's products, was even rarer.

By contrast, Vutukuri quickly assembled a group to test ValiCert's software for bugs, tapping a large pool of Indian engineers who had long performed this mundane work.

But the Indian manager heading that group ran into resistance. It was ValiCert's first use of code checkers who didn't report to the same managers who wrote the programs. Those U.S. managers fumed when the team in India recommended in June 2002 delaying a new product's release because it had too many bugs.

By midsummer, when Vutukuri had enough programmers for ValiCert to begin sending bigger assignments to India, U.S. managers quickly overwhelmed the India team by sending a half-dozen projects at once.

Accustomed to working closely with veteran engineers familiar with ValiCert's products, the U.S. managers offered only vague outlines for each assignment. The less experienced Indian engineers didn't include elements in the programs that were considered standard among U.S. customers. U.S. programmers rewrote the software, delaying its release by months.

In India, engineers grew frustrated with long silences, punctuated by rejection. Suresh Marur, the head of one programming team, worked on five projects during 2002. All were either canceled or delayed. Programmers who had worked around the clock for days on one project quit for new jobs in Bangalore's vibrant market. Of nine people on Manur's team in mid-2002, only three still work for ValiCert. "The first time, people understand," he says of the project's roadblocks. "The second time, people understand. The third time, it gets to be more of a problem."

In the U.S., executives lurched from crisis to crisis, as ValiCert's revenue dipped further. Each quarter brought more layoffs. By year's end, the California office, which once employed 75 engineers, was reduced to 17; the India office, meanwhile, swelled to 45. U.S. engineers "felt the sword of Damocles was swinging above their cube," recalls John Thielen, a product manager.

Executives knew they could save more money by exporting more jobs. But they were developing a keener sense of how critical it was to keep core managers in the U.S. who knew ValiCert, its products and how they were used by customers. "Even if you could find someone" with the right skills in India, says Krishnan, "it wouldn't make business sense to move the job."

Frustrations came to a head in September 2002, when a prospective customer discovered problems with the log-on feature of a ValiCert program. The anticipated purchase was delayed, causing ValiCert to miss third-quarter financial targets. The India team had recently modified the program, and the glitch prompted U.S. managers to question ValiCert's entire offshore strategy.

Relations had long been strained between the U.S. and Indian product teams. John Hines, the Netscape Communications Corp. veteran who headed the tight-knit U.S. product team, thrives on quick responses to customer requests. As his team shrank to six engineers from 20, Hines was assigned three engineers in India. But he viewed the Indians' inexperience, and the communication delays, as more of a hindrance than a help. "Things we could do in two days would take a week," he says.

Vigouroux admits to a touch of "panic" at this point. ValiCert's cash was running low. "We didn't have a lot of time," he says. He conferred with Hines, who said he wanted to be rid of India, even if it meant a smaller team.
Exercise - 5

Questions on the ValiCert Case

1. Please describe:
   - What went wrong?
   - What were inappropriate expectations and decisions taken?

2. What would you propose to ValiCert at this stage, based on what you have learned in the course?

Plan

1. The outsourcing proposition (part 3)
2. The technical issues
3. Management and validation techniques
4. Putting everything in place for successful outsourcing

Plus: an exercise
Preparation for Outsourcing

(by Peter Kolb)
Objectives

This module will enable the participant to:

Prepare a decision basis for software outsourcing and offshoring.

Content

- Categories for Software Outsourcing
- Strategy for Outsourcing
- Gartner Cost Model for Software Outsourcing

- Summary
IT Outsourcing Categories (Gartner)

- Business process outsourcing (BPO):
  - Transaction Management Services
  - Transaction Processing Services
  - Human Resource and Payroll Services
  - Finance and Accounting Services (billing, payment)
  - Operations Management Services
  - Call Center Services
- Application development and maintenance (ADM)
- Infrastructure Services
  - Data Center Services
  - Network Services
  - Desktop Services
  - Helpdesk Services
  - Asset Management Services
  - Security Management Services
  - Storage Services

Content

- Categories for Software Outsourcing
- Strategy and Decision for Outsourcing
- Gartner Cost Model for Software Outsourcing
- Summary
Strategic Approach to Application Outsourcing

- Medium size enterprises act more tactical than large enterprises:
  - 40% seek intermediate results/benefits through outsourcing (compared to 30% in large enterprises)
  - 60% look for long-term payback (compared to 70% in large enterprises)

- Application outsourcing strategies
  - Technical issues
    - Improve service levels to end users
    - Access to critical technical skills and resources
    - Upgrade applications quality, processes and methods
  - Business issues
    - Reduce cost
    - Ensure scalability of resources to business needs
    - Focus on core business

Source: Gartner, 2003

Identify Candidates for Software Outsourcing

<table>
<thead>
<tr>
<th>Unique</th>
<th>Repeateable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task features</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>ERP integration</td>
<td>User interface design</td>
</tr>
<tr>
<td>Report creation</td>
<td>Prototype systems</td>
</tr>
<tr>
<td>Migration from legacy systems</td>
<td>Application management</td>
</tr>
<tr>
<td>Well specified requirements</td>
<td>Customization of products</td>
</tr>
</tbody>
</table>

Level of user interaction: Low → High
Application Outsourcing Inhibitors

- Top three inhibitors to outsource
  - High costs associated with outsourcing
  - Security issues
  - Cost savings not realized

- Top fear
  - Loss of control and cost guarantees

- Other things to consider
  - Cultural differences, language
  - Geopolitical and social instability
  - Intellectual property protection
  - Loss of technical expertise and business knowledge

Source: Gartner, 2003

Vendor Selection

- Identification of Outsourcing Candidates
  - Recommendations 63%
  - Past direct relationships 57%
  - Presence at industry conferences 40%

- Vendor Selection Criteria
  - Quality and Cost

- Decision makers
  - Medium size enterprises: IT Managers
  - Large enterprises: group of CIO, IT manager, BU manager, procurement officer

Source: Gartner, 2003
Content

- Categories for Software Outsourcing
- Strategy and Decision for Outsourcing
- Gartner Cost Model for Software Outsourcing

Summary

The Application Development Outsourcing Cost Model

- Typical questions when searching best resources for a project:
  - Should the enterprise use its own staff or the staff of an external service provider (ESP)?
  - Should the staff be located on-site (co-located with the enterprise users), off-site (in the same country) or offshore?
  - If offshore, in what countries?
The Application Development Outsourcing Cost Model

- In search of cost-efficiency of software sourcing, you need to answer to the following questions:
  - Why shouldn't they simply select the ESPs with the lowest billing rates?
  - Do off-site/offshore development realities, like geographical distances, time-zone differences, electronic, rather than face-to-face communication, complicate and, thus, result in less-cost-effective software outsourcing? And if so, to what degree?
  - Can domestic ESPs successfully compete against foreign ESPs from countries with lower (often much lower) billing rates than are available in your western country?

Driving Inputs to the Application Development Outsourcing Cost Model
The Application Development Outsourcing Cost Model: Realistic Expectations

Saving Factors

- Billing Rates as Saving Factor
  (billing and cost of labor in units relative to 1.0):
  - U.S. enterprise — 1.0 (reference)
  - In-sourced — 1.0 (Indian ESP working in the U.S.)
  - Offshore — 0.3 (Indian ESP support from India)

- Effectiveness factor
  (expertise in development, project management and business domain):
  - U.S. enterprise — 0.46
  - Offshore ESP — 0.70 (typical for most Indian ESP)

Additional Cost Factors

- Communication factor
  (complexity of conducting off-site / offshore development):
  - U.S. enterprise — 0.95
  - In-sourced — 0.78 (Indian ESP working in the U.S.)
  - Offshore — 0.46 (Indian ESP support from India)

Example:

<table>
<thead>
<tr>
<th>Off-site (% of efforts)</th>
<th>0%</th>
<th>50%</th>
<th>75%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
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<tbody>
<tr>
<td>Design</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Construction</td>
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<tr>
<td>Unit test</td>
<td>65</td>
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<td>System test</td>
<td>30</td>
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<td>10</td>
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<tr>
<td>Deployments</td>
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<td>5</td>
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<td>5</td>
<td>5</td>
<td>37</td>
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<table>
<thead>
<tr>
<th>Time (months)</th>
<th>25</th>
<th>4</th>
<th>7</th>
<th>4</th>
<th>3</th>
<th>3</th>
<th>23</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (draft + final)</th>
<th>15</th>
<th>52</th>
<th>40</th>
<th>28</th>
<th>10</th>
<th>15</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (%)</th>
<th>9%</th>
<th>21%</th>
<th>33%</th>
<th>13%</th>
<th>12%</th>
<th>10%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (on a phase x off-site)</th>
<th>0</th>
<th>12.8</th>
<th>34.3</th>
<th>14</th>
<th>3.6</th>
<th>0</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (on-site + off-site)</th>
<th>0</th>
<th>9%</th>
<th>21%</th>
<th>9%</th>
<th>2%</th>
<th>0%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (main efforts + efforts on a phase x on-site)</th>
<th>10</th>
<th>18.2</th>
<th>14.7</th>
<th>6</th>
<th>14.4</th>
<th>15</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Allocation of Efforts Across Phases (on-site efforts)</th>
<th>10%</th>
<th>13%</th>
<th>4%</th>
<th>10%</th>
<th>10%</th>
<th>5%</th>
</tr>
</thead>
</table>
The Realistic Picture of Savings

<table>
<thead>
<tr>
<th>Cost of the project if executed by an enterprise</th>
<th>Savings if executed by an ESP</th>
<th>Cost of the project if executed by an ESP</th>
<th>Project cost ratio = cost if executed by an enterprise / cost if executed by an ESP</th>
<th>Cost of labor ratio = enterprise’s fully loaded cost of labor / ESP developer’s offshore billing rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 percent</td>
<td>43 percent</td>
<td>100 percent – 43 percent = 57 percent</td>
<td>100 percent / 57 = 1.75 times less expensive to execute with an ESP than to develop on its own</td>
<td>ESP’s offshore billing rate is three times lower than a U.S. developer’s fully loaded cost of labor</td>
</tr>
</tbody>
</table>

How Effectiveness Compensates for High Billing Rates

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Billing Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.70</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
</tr>
</tbody>
</table>

Increased effectiveness in western countries can outrange cheap labor cost in India

Outsourcing within the U.S.

Outsourcing to India

<table>
<thead>
<tr>
<th>Savings</th>
<th>India</th>
<th>U.S.</th>
<th>U.S.</th>
<th>U.S.</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>37%</td>
<td>25%</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
<td>31%</td>
</tr>
</tbody>
</table>
How to Become More Effective?

- **Technical Improvements**
  - IT education – increase percentage of developers with formal IT education
  - Software certification – have certified developers, e.g., in Microsoft technologies, Java, ...
  - IT training – systematically train your people to keep them up to date

- **Process Improvement**
  - Follow the (software) process improvement models (CMMI, Spice, ...)

- **Management Improvement**
  - Project leader training
  - Introduction and certification of new roles: configuration manager, quality manager

Plan

1. The outsourcing proposition (part: case study)
2. The technical issues
3. Management and validation techniques
4. Putting everything in place for successful outsourcing

*Plus: an exercise*
Project Management for Outsourcing

(by Peter Kolb)
Objectives

This module will enable the participant to:

- Plan and execute Software development projects with subcontractors
- Set up the right processes to achieve project success

Content

- Software Outsourcing in the view of Supplier Agreement Management
- Project Management Overview
- The Process of Supplier Agreement Management
  - Definitions, Goals, and Practices
  - Sub-goals and Sub-practices and Recommendations for
    - Determine Acquisition Type
    - Select Suppliers
    - Establish Supplier Agreements
    - Execute Supplier Agreement
    - Accept, transfer, and integrate the Acquired Product
- Summary
**Project Management Overview**

- Project Planning
- Project Monitoring & Control
- Supplier Agreement Management
- Risk Management

**Sub-Goal 1** Establish Supplier Agreements

*Agreements with the suppliers are established and maintained.*

**Sub-Goal 2** Satisfy Supplier Agreements

*Agreements with the suppliers are satisfied by both the project and the supplier.*
**Outsourcing = Supplier Agreement Management**

- Supplier Agreement Management addresses the need of the project to effectively select and manage those portions of the work that are conducted by suppliers.

- A Supplier may take many forms:
  - In-house or external organization that develops, tests, or supports products or components that play a role in the delivery to customers.

**Buyer / Supplier Relationship**

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users</td>
<td>Requirements, Software and support services</td>
</tr>
<tr>
<td>Customers</td>
<td>In the diagram, Customers are not directly related to Supplier Agreement Management.</td>
</tr>
<tr>
<td>Users</td>
<td>Software Products based on negotiated contract</td>
</tr>
<tr>
<td>Internal Organization</td>
<td>Product Responsible Unit or IT Organization</td>
</tr>
<tr>
<td>External Organizations</td>
<td>Supplier, Outsourcing Partner, Sub-Contractor</td>
</tr>
</tbody>
</table>

Internal or External Outsourcing: Requires the same Supplier Agreement Management to receive a quality product.
Supplier Agreement Management: Process Overview

Determine Acquisition Type

- Buy (modified) COTS products or services
- Have it custom-made through a contracted external company
- Have it realized by another in-house development unit
- Obtain components from customers

Remark:
It’s possible to have a combination of the above
### Supplier Selection Process

1. From Budgetary plan / Project Plan identify software skills / activities to be outsourced

2. Search for prospective partner profiles (scan existing and potential new partnerships)

3. Evaluate with few selected prospective partners
   - company profile and business data (vendor rating)
   - generic requirements for performing required activities

4. Audit supplier’s competence and processes

5. Collect data in a supplier score sheet and compare with benchmarks (e.g. already existing suppliers)

6. If score exceeds acceptable limits, make umbrella agreements like MBA

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### Select Outsourcing Partner

<table>
<thead>
<tr>
<th>Item</th>
<th>Sub-Contractor 1</th>
<th>Sub-Contractor 2</th>
<th>Sub-Contractor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Company Reference Items</td>
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<tr>
<td>1.1 Market Reputation</td>
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<td>1.2 Infrastructure</td>
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<tr>
<td>1.3 Business focus</td>
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<tr>
<td>1.4 Skill profile: Management, Engineering</td>
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<td>1.5 Process focus</td>
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<td>1.6 Confidentiality</td>
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<td>1.7 Performance Records</td>
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<td>1.8 Price</td>
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<tr>
<td>1.9 Internal Assessment</td>
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<tr>
<td>Project Specific Items</td>
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<tr>
<td>2 Domain Score Rating</td>
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<td>3 Prior experience on similar</td>
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<tr>
<td>4 Timeline</td>
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<tr>
<td>5 Location/ease of execution</td>
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<tr>
<td>6 Effort</td>
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<tr>
<td>6.1 of subcontractor</td>
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<tr>
<td>6.2 of acquirer</td>
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<tr>
<td>7 Project Cost</td>
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<td></td>
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<tr>
<td>7.1 base cost</td>
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<tr>
<td>7.2 taxes and credit</td>
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<tr>
<td>7.3 payment method</td>
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<tr>
<td>8 Guaranteed quality</td>
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<tr>
<td>9 Warranty</td>
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<tr>
<td>10 Training and Support</td>
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<tr>
<td>11 Deliverables</td>
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<tr>
<td>12 Risk, deviation sought</td>
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</tbody>
</table>
Establish Supplier Agreement  (1 of 3)

- Establishing and maintaining the supplier agreement provides the supplier with the project needs, expectations, and measures of effectiveness.

The supplier agreement typically includes:
- Frame Agreement (Master Business Agreement)
- Statement of work, plans, requirements
- Terms and conditions
- List of deliverables, schedule, and budget
- Defined acceptance process with acceptance criteria

Establish Supplier Agreement  (2 of 3)

Agreements for Project Execution
- Identify critical dependencies between the project and the supplier
- Agree on processes, procedures, guidelines, methods, templates, etc. that will be followed
- Agree on the form, frequency, and depth of project oversight; and define evaluation criteria to be used in monitoring the supplier’s performance

Agreements for Managing Change
- Identify project and supplier representatives responsible and authorized to agree to changes to the supplier agreement
- Agree on the process for handling requirements change requests from either side
Establish Supplier Agreement (3 of 3)

Agreements for Handling the Product

- Identify warranty terms, ownership, and usage rights for the acquired product

- Identify the supplier's responsibilities for ongoing maintenance and support of the acquired product

Planning for Quality

- **Time Schedule**
  When/how often: reviews, metrics collection, reporting?

- **Resources for QA Activities**
  Who will act as reviewer, tester? Which test environment?

- **Reviews and Audits**

- **Tests**
  Which tests? (modules, integration, UI and usability, stress and field tests, acceptance …)
  Who is responsible for each test?
  How is it planned and documented?
  Which processes and tools to use for tests?

- **Standards, Procedures and Tools**
  Review Process, Document templates, Coding rules, …
  Design tools, Development and test environment, Configuration management tools, …

- **Metrics**
  Which data will be captured and monitored for the project?

- **Deviation Handling**
  How to document and handle deviations in the project? (faults, misunderstandings, technical issues, …)
  Escalation procedure depending on type of deviation (e.g. design mistake found during testing)

- **Quality Records**
  Which data and documents will be stored for the project? (review reports, error lists, …)
Management and Technical Reviews with Supplier

- Periodic reviews are conducted between the project’s management team and the supplier’s management team to review progress as defined in the supplier agreement.

  Technical reviews typically cover:
  - Performance of the project (technical, cost, schedule, staffing)
  - Technical issues are communicated and resolved
  - Clarification of the end user or project’s customer needs

Planning for Reviews and Audits

- What will be reviewed?
  (Requirements, architecture, design, process, management plans, …)
  - Which documents will be reviewed?
  - What is the process of a review?

- What will be audited?
  (configuration audit, process audit, …)

- Who is responsible?
  - … that reviews and audits are carried out?
  - … that review records and approved documents are collected?
    (to control that all planned reviews have been performed)
Checks for a Project Status Report

- Overview
- Expected Benefits
- IP Issues, if any
- Performance measures
- Deliverables in time period
- Risks
- Organization
- Schedule – plan vs. actual
- Cost – plan vs. actual
- Quality – plan vs. activities performed, metrics
- Documentation – plan vs. actual
- Issues and concerns

Acceptance Procedure on Supplier Delivery

Acceptance reviews, tests, and configuration audits must be conducted for the acquired products to achieve formal acceptance.

Activities in detail:

- As part of the planning and contract agree at project start on the acceptance procedure and criteria
- During project execution monitor the progress and fulfillment of requirements (functional, performance, quality, usability) through reviews, functional and physical audits, or prototypes, to avoid late surprises
- At the delivery stage perform agreed acceptance procedure to confirm that the acquired work product satisfies the requirements and commitments.
Transition of the product to the Acquirer

- Monitor the transition of the acquired product from the supplier to the project.

Activities in detail:
- Ensure that the appropriate facilities to receive, store, use and maintain the acquired product are available
- Ensure that appropriate training is provided to assist in the transition (for using and maintaining the product)
- Ensure that the storing, distribution, and use of the acquired product is performed according to the terms and conditions specified in the supplier agreement.

Supplier Agreement Management - Summary

<table>
<thead>
<tr>
<th>Sub-Goal 1</th>
<th>Specific Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish Supplier Agreements</td>
<td>Determine Acquisition Type</td>
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<tr>
<td></td>
<td>Select Supplier</td>
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<tr>
<td></td>
<td>Establish Supplier Agreement</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Sub-Goal 2</th>
<th>Specific Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfy Supplier Agreements</td>
<td>Execute Supplier Agreement</td>
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<tr>
<td></td>
<td>Track Progress</td>
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<tr>
<td></td>
<td>Manage Changes and Configur.</td>
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<tr>
<td></td>
<td>Technical/Management Reviews</td>
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<tr>
<td></td>
<td>Check Quality</td>
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<tr>
<td></td>
<td>Accept Acquired Product</td>
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<tr>
<td></td>
<td>Acceptance Test</td>
</tr>
<tr>
<td></td>
<td>Transition Product</td>
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Plan

1. The outsourcing proposition
2. The technical issues
3. Management and validation techniques
4. Putting everything in place for successful outsourcing

Plus: an exercise

Exercise Session 2: ValiCert Case

(by P. Kolb, B. Meyer)