Asia-Pacific
Economic Cooperation

**2008/SMEWG/SYM/013**
Agenda Item: 7.1

# The Challenges of Building Capacities and Skill Sets for an IT Outsourcing Partner

Purpose: Information
Submitted by: USA

**APEC Symposium on Improving Market Access for ICT Outsource SMEs**
**Hanoi, Vietnam**
**27–29 October 2008**

# The Challenges of Building Capacities and Skill Sets for an IT Outsourcing Partner

By: Hoang Nguyen (PacificLinks Foundation, USA)

ABSTRACT:

At the beginning of this century, many people still thought that IT Outsourcing is a fad, a marketing ploy. Several years ago, a number of visionary leaders of the industry and business world started recommending that IT Outsourcing be taken more seriously, in the context of corporates' strategic thinking. The concept of 'partner' has been used more frequently to indicate the preferred roles to be played by IT Outsourcers.

We are now in 2008, and many outsourcing relationships are still struggling or broken up all together. Root causes of this not-so-rosy situation are complex, and stakeholders are still trying to draw good lessons from the experiences.

From an IT practitioner's own experiences, the presenter will try to understand the challenges an IT Outsourcer would face. The analysis and comments are mainly focused on the required skillsets of the development team that an IT Outsourcer would need to bring to the partnership. Given the current state of the Vietnamese IT industry as well as the preparation of its workforce, it is the presenter's hope to contribute into the serious discussions of how to prepare for a strong IT industry, in which outsourcing is a crucial component.

# OUTSOURCING PARTNERSHIP: THE CHALLENGE

The Challenges of Building Capacities and Skill Sets for an IT Outsourcing Partner

**APEC Symposium on Improving Market Access for ICT Outsource**
Hanoi- 2008

Hoang Nguyen
Pacific Links Foundation
Oct. 2008



## The Global Search For Talent

- A study presented (in 2006) to the U. S. National Academies -- the nation's leading advisory groups on science and technology -- suggested that more and more research work at corporations will be sent to fast-growing economies with strong education systems, like China and India.
- Also, it stated: "multinational corporations were global shoppers for talent"

(NYT February 16, 2006)

- Its applicability to IT R&D



## Is Low-Cost Still A Factor?

- "Cheap labor" advantages of offshore outsourcing are on the way out
- Contributing the (local) talents
- Cutting cost by raising the efficiency of the development process and the quality of the delivered solutions.
- Outsourcers to out-perform in-house development departments?



## Expectations

- The "Partnership" model
- Roles of a solution provider
- To be able to take part in the full (and complex) development cycle process
- The verticalization of skillsets
- Build expertise for one industry at a time

## Do SW Development the Right Ways

- The *impossible* triangle: Time - Cost - Quality
- Know our weaknesses using the industry's benchmarks and norms.
- Know our strengths and the competitors' on the "Cost" issue.
- The Challenges are still on "Quality" and "Time"
- Survive (and exploit) the "Interdependencies"



## Can We Make It?

- Current state of the industries:
  - The talent pool
  - The “still developing” IT industries of some developing countries
- The well accummulated knowledge base of the global IT industry
- Benefits of a young workforce



## Where The IT Industry Is Small

- Focus on Quality, Quality and Quality
- Specialization (coupled with effective education & training) of our IT workforces
- Strength of Cooperations/Alliances: Coopetition.
- Building for the Future: The IT industry alone won't be able to make it.
- A healthy local market helps in talent development



## Thank You For Your Attention.

**Your Thoughts and Comments?**

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**2008/SMEWG/SYM/014**
Agenda Item: 7.2

# The necessity of a collaboration tool in outsourcing projects, a case study with EPM

Purpose: Information
Submitted by: Vietnam

**APEC Symposium on Improving Market Access for ICT Outsource SMEs**
**Hanoi, Vietnam**
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Entire Project Monitoring System

# The necessity of a collaboration tool in outsourcing projects, a case study with EPM

Pham Huy Hoang
Technical Director
hoangph@evsoft.com.vn

Hà Nội 10/2008



## Agenda

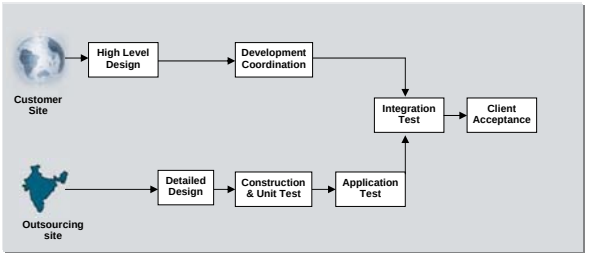
- Outsourcing overview
  - Global Delivery Model
  - Outsourcing software development
  - Collaboration in outsourcing
- A case study with EPM
  - Theoretical Approach
  - Applying EPM system
  - EPM process based on PMBOK methodology
  - Mapping EPM's functions with PMBOK's knowledge areas
- Zoom-in for Project Management with EPM
  - Project Working Environment
  - Human Resource Management
  - Work-load Estimation
  - Planning & Progress Checking
  - Requirement Management with Change
  - Communication Management
  - Quality Management
  - Security Management
- Q&A





## Outsourcing Global Delivery Model

| Customer site | Outsourcing site |
|---|---|
| Project Scoping, User Requirements | Technical Design |
| Functional Design | Coding, Development |
| User Testing | System Testing |
| Deployment | Regression, Performance Testing |
| User Acceptance | Documentation |

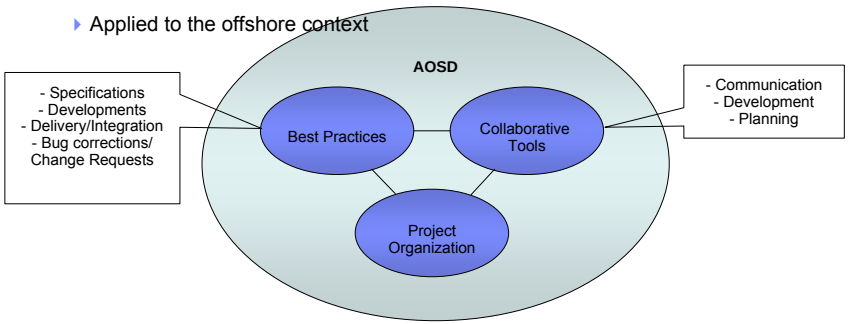







## Outsourcing Software Development

- Visibility at all levels
  - Code, Quality, Productivity, Risk management
- Based on XP, RUP and Open Source practices
  - Applied to the offshore context



## Outsourcing Centre Management: A Summary

| Phases | Activities | We | Client |
|---|---|---|---|
| Project identification | Initiation | | 🗐 |
| Requirements | Planning | 🗐 | 🗐 |
| Design | Execution | 🗐 | |
| Test plans | Reporting | 🗐 | |
| Coding & unit testing | Monitoring | 🗐 | 🗐 |
| System testing | Delivery | 🗐 | |
| Integration | Approval | | 🗐 |
| Implementation | Closure | 🗐 | |





## Collaboration in outsourcing

- Multiple partners take part in project.
- Communicate by phone, mail, chat
- Daily report, weekly report, productivity report (Excel)
- Track progress realtime is necessary

→Need a collaboration tool that is used in both side.

- **EPM is a solution !!!**





# A collaboration tool in outsourcing, A case study with EPM

- Theoretical Approach
- Applying EPM System





## Theoretical Approach

- Influence from IBM Rational Unified Process (RUP)
- Use Case-oriented: Functional Requirements are firstly mapped into Package/STRQ/FEAT/UC
  - STRQ (Stakeholder Request): general requirement at high level
  - FEAT (Product Feature): product is break-down into concrete features
  - UC (Use Case - also called Software Feature): how user and system interact when accessing to FEAT
  - Sample…

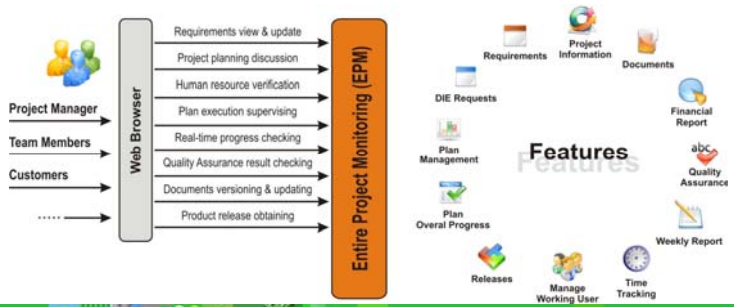
**Sample of mapping**

| Func.-oriented | → UC-oriented |
|---|---|
| *Package* | → *Package/STRQ* |
| *Menu/Sub-menu* | → *Package/FEAT* |
| *Screen* | → *FEAT/UC* |
| *Screen interaction* | → *UC* |

- Requirement change, work-load estimation & human resource management, planning & progress checking, quality control, discussion management, etc… are internally managed based on the project's requirements "tree" STRQ/FEAT/UC
- When necessary, project management reports are mapped back into partner's requirements structure in order to submit to partner

# Applying EPM system

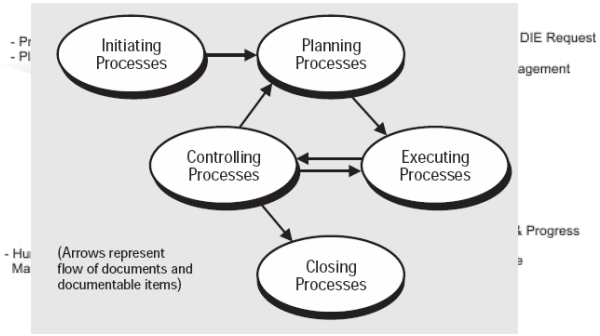
- Entire Project Monitoring System
  - Copyright by EVSoft Co. Ltd., 2006-2008
  - Based on PMBOK methodology
  - Providing environment for both side
  - Supporting efficient project management tasks with low cost
  - Customizable in order to adapt to different partner's software development process
  - Support multiple languages





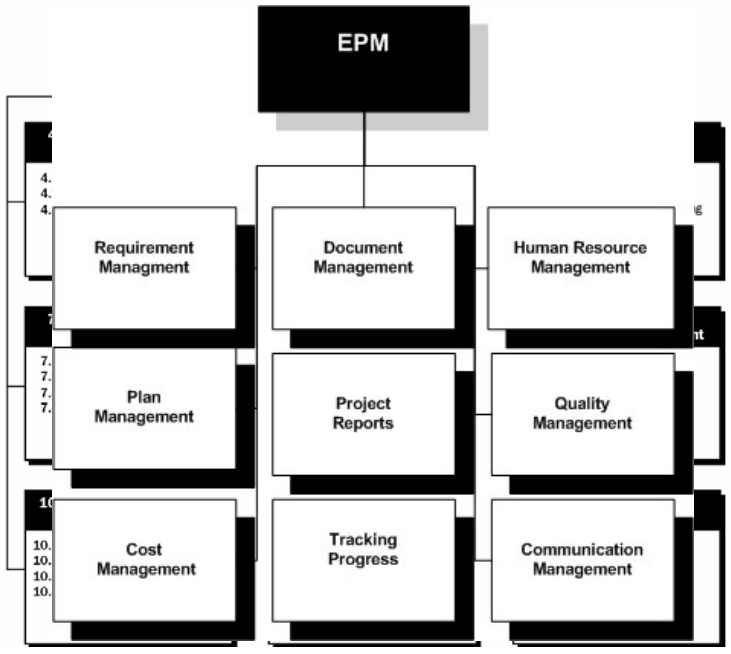



# EPM process based on PMBOK methodology




- **Plan:** Initialize a plan schedule, tasks and assign to members
- **Do:** Execute the tasks and update result status
- **Check:** check the progress based on each task, generate reports
- **Action:** manage human resource, tasks, schedule and re-cycle new plan







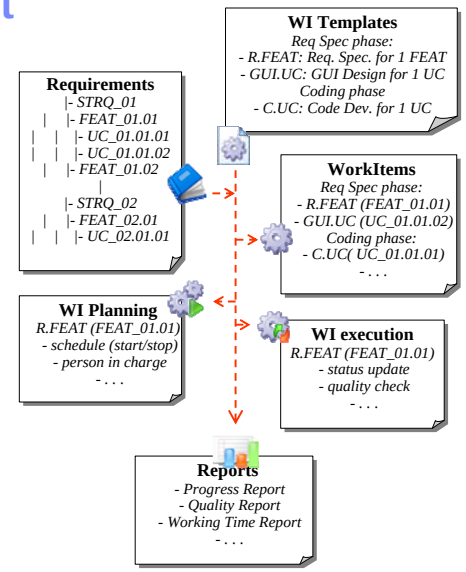



# Mapping EPM functions with PMBOK's knowledge areas

| Knowledge Area \ Process Groups | Initiating | Planning | Executing | Controlling | Closing |
|---|---|---|---|---|---|
| 4. Project Integration Management | | 4.1 Project Plan Development | 4.2 Project Plan Execution | 4.3 Integrated Change Control | |
| 5. Project Scope Management | 5.1 Initiation | 5.2 Scope Planning<br>5.3 Scope Definition | | 5.4 Scope Verification<br>5.5 Scope Change Control | |
| 6. Project Time Management | | 6.1 Activity Definition<br>6.2 Activity Sequencing<br>6.3 Activity Duration Estimating<br>6.4 Schedule Development | | 6.5 Schedule Control | |
| 7. Project Cost Management | | 7.1 Resource Planning<br>7.2 Cost Estimating<br>7.3 Cost Budgeting | | 7.4 Cost Control | |
| 8. Project Quality Management | | 8.1 Quality Planning | 8.2 Quality Assurance | 8.3 Quality Control | |
| 9. Project Human Resource Management | | 9.1 Organizational Planning<br>9.2 Staff Acquisition | 9.3 Team Development | | |
| 10. Project Communications Management | | 10.1 Communications Planning | 10.2 Information Distribution | 10.3 Performance Reporting | 10.4 Administrative Closure |
| 11. Risk Project Management | | 11.1 Risk Management Planning<br>11.2 Risk Identification<br>11.3 Qualitative Risk Analysis<br>11.4 Quantitative Risk Analysis<br>11.5 Risk Response Planning | | 11.6 Risk Monitoring and Control | |
| 12. Project Procurement Management | | 12.1 Procurement Planning<br>12.2 Solicitation Planning | 12.3 Solicitation<br>12.4 Source Selection<br>12.5 Contract Administration | | 12.6 Contract Closeout |

# EPM WorkItem Concept

- The smallest piece of work to construct complicated project plans
- Can be automatically generated based on a set of WI Templates in associating with requirements (STRQ/FEAT/UC)
- Can be assigned to a project member in order to process
- Quality can be checked based on the project regulation
- Status can be tracked real-time in order to build the whole plan/project progress report at any time
- ➔ EPM can be customized to support different software development processes from different partners thanks to the capability of freely defining WI Templates & WI-based Reports








# Zoom-in for Project Management with EPM

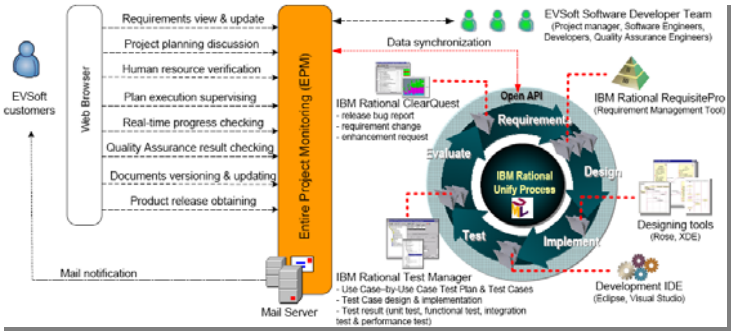
- Working Environment
- Human Resource Management
- Work-load Estimation
- Planning & Progress Checking
- Requirement Management with Change
- Communication Management
- Quality Management
- Security Management





# Working Environment

- EPM provides insite & outsite management environment & report
- Documents and source code sharing is not covered by EPM
- Testing environment is also not covered by EPM
- Data synchronization between development/testing tools with EPM can be automatically or manually





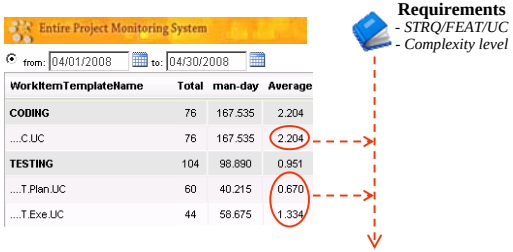



# Human Resource Management

- Project member roles
  - Project Manager (PM): plan, progress & report
  - Software Engineer (SE): architecture, design & code review
  - Programmer (PG): code development & unit test
  - Quality Assurance Staff (QA): integration test & performance test
  - Communicator: Japanese translating, customer communicating
- Sharing human resource with partner (mostly for out-sourcing project)
  - Project members outside and inside should be able to easily collaborate
  - Checking & reporting working productivity of all project members
- Sharing HR information with partner/customer (mostly for man-day based maintenance project)
  - Project members as well as their working hours can be real-time checked in EPM system
  - Working productivity and quality of each member also can be checked at EPM system

# Work-load Estimation

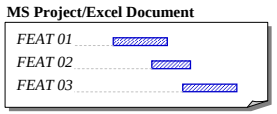
- WorkItem-based with requirements list (STRQ/FEAT/UC)
- Complexity of each UC/FEAT is estimated by 4 levels (*simple*, *normal*, *complicated* and *very complicated*) for each Design, Coding and Testing phase (sample)
- Average man-day required to carry out each UC/FEAT WorkItem is calculated with "similar" project by EPM system
- Total work-load is calculated with the UC/FEAT list (with the complexity level) and average UC/FEAT WorkItem man-day

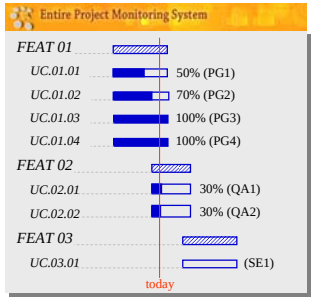


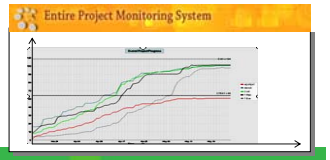

**Requirements**
- *STRQ/FEAT/UC*
- *Complexity level*

# Planning & Progress Tracking

- High-level Planning
  - Normally used to discuss and agree with customer
  - Constructed at FEAT level, with FEAT's WorkItem (concrete enough but not too detail)
  - Activities duration are calculated as work-load estimation
  - Sample
- Detail Planning
  - For carrying out the tasks that already agreed with customer
  - Implementation of high-level plan, at UC level, with UC's WorkItem
  - Registered into EPM system & assigning plan's WorkItem to project member for updating status & tracking progress
  - Sample
- Plan Progress Tracking
  - Real-time plan progress tracking based on the WorkItem status update
  - Man-day before/behind schedule calculating
  - Progress report as customer request (sample)
- Overall Project Progress Tracking
  - Number of FEAT completed by total FEAT
  - Number of UC coded/tested by total UC
  - Sample



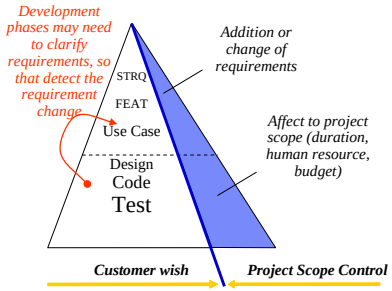








# Requirement Management with Change

- Requirements Management
  - Structures by STRQ/FEAT/UC tree
  - One STRQ is satisfied by a number of FEAT, one FEAT is satisfied by a number of UC
  - Change of STRQ level may affect to all related FEAT/UC (affect much to project scope)
  - Change of FEAT level may affect to only related UC (acceptable)
  - Change of UC level must be taken into account when executing the development phases (design, code, test)



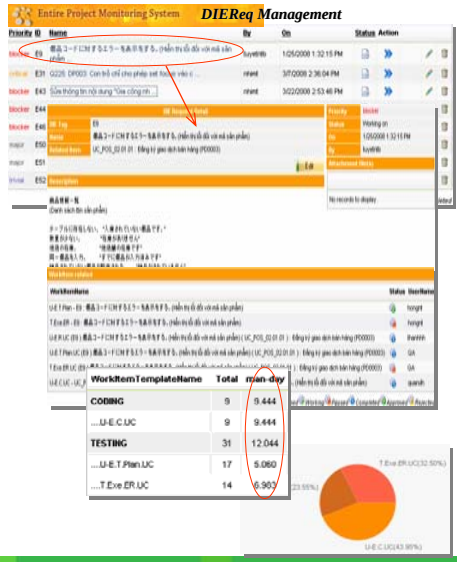

- Philosophy of Requirement Change Management accepted by EVSoft
  - Always keep the original requirements (for controlling the project scope) but accept requirement change
  - Project scope change (duration, human resource, budget) must be estimated and notified to customer
  - Final project scope change (mostly man-day added) is re-calculated and reported to customer is necessary
  - ➔ how to ???
- **EPM is our solution !!!**



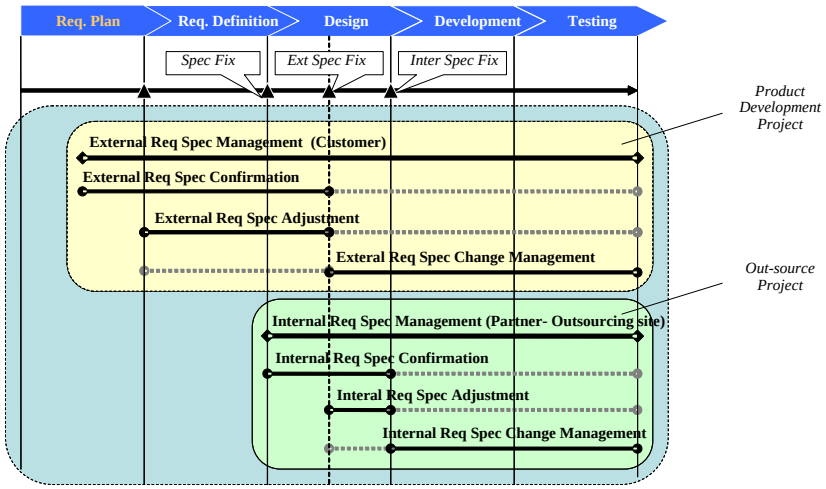


# Req. Management with Change (2)

- EPM DIERequest Concept
  - Defect: bug reported by customer
  - Internal Request (IR): EVSoft internal req.
  - Enhancement Requirement (ER): additional requirement or change of existing requirement
- Requirement Change Process
  - Requirement change request can be received from and confirmed with customer in many ways, but finally submitted to EPM as a DIERequest (ER)
  - Related requirements (mostly FEAT/UC) are associated with ER in order to manage the change scope
  - Appropriate WorkItems are generated with related FEAT/UC and assigned to appropriate project members
  - The plan to process ER (based on related WorkItems) is notified to customer and the progress can be tracked
- Requirement Change Report
  - List of Enhancement Requirement related to each FEAT/UC (sample)
  - Status of each Enhancement Requirement
  - Total man-day provided to process Enhancement Requirements



# Planning for Req. Mgnt. with Change








# Communication Management

- EVSoft's objective in Communication Management
  - To define the regulation and operate communications timely and correctly for all information occurred in the Project
  - But, if necessary, flexible and appropriate communications will be acceptable according to the information security policy
- Communication Methods
  - Meeting
  - Question & Answer (Q&A)
- Communication Control
  - Q&A can be carried out with EPM Discussion feature (supporting email notification)
  - Or, follow the partner's communication standard flow (sample) and Q&A sheet (sample)
  - But, always keep communication log in EPM
  - If necessary, EPM can support *Special Q&A sheet export* feature to export the discussion contents to a specific template
- When necessary, all communication log related to one requirement (STRQ/FEAT/UC/ER) can be easily retrieved from EPM

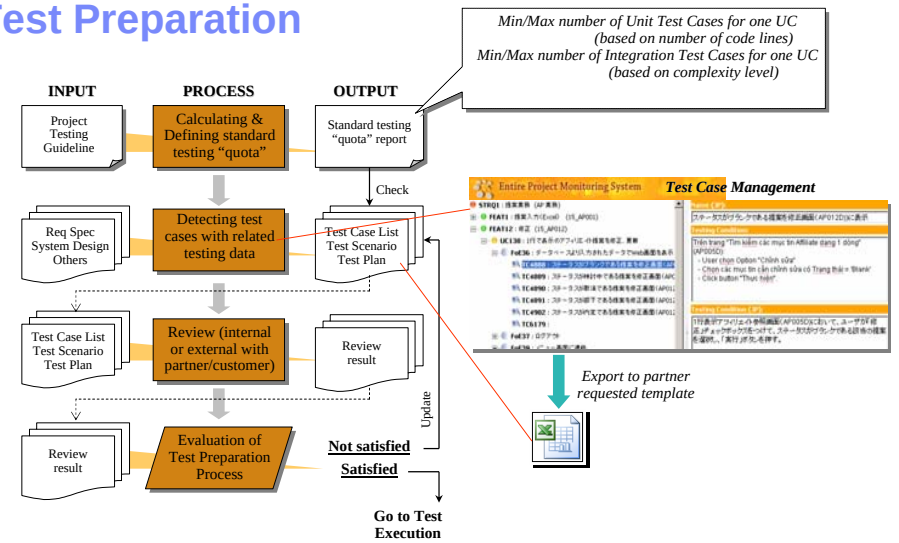
# Quality Management

- EPM's objective in Quality Management
  - Develop the system meeting to customers' requirements and to improve the customer satisfactions
  - Detect as soon as possible the risk points that lead to "wrong system development"
- Quality Management is carried by 4 items
  - Review
    - To confirm whether the outputs of each development phase have been developed correctly or not (even the system is not developed yet).
    - Review can be at the Req Spec phase (with customer), at design phase (with out-source partner), at coding phase (internal), at integration test phase (with customer/partner)
    - From experience, requirement change requests are mostly issued at Review. Depended on the related FEAT/UC already developed or not, these issues will be treated as requirement adjustment or enhancement requirement
  - Testing
    - To check if the system (or a part of) has been developed correctly or not
    - Unit Test at coding phase, by PG
    - Integration Test & Performance Test at testing phase by QA
    - Product Test at Delivery phase, at the customer's site, within customer's environment
  - Quality Control
    - To analyze results from every Review or Test
    - Quantitative and Qualitative methods
    - Decide the appropriate solutions to improve the quality
  - Delivery/Acceptance Testing
    - To confirm with customer that the whole product has been developed correctly as customer's requirements

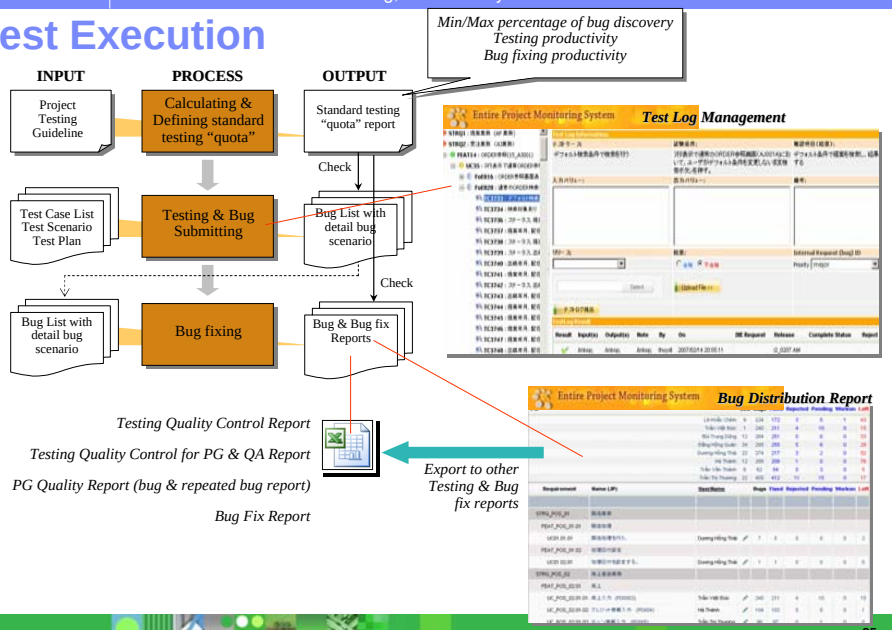




# Test Preparation



# Test Execution

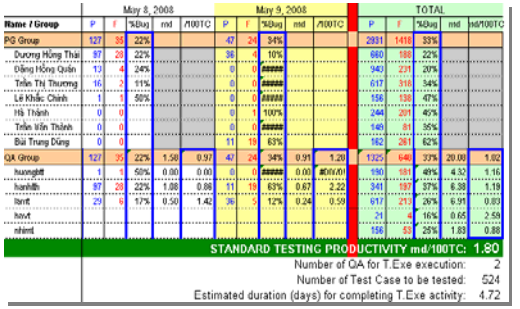




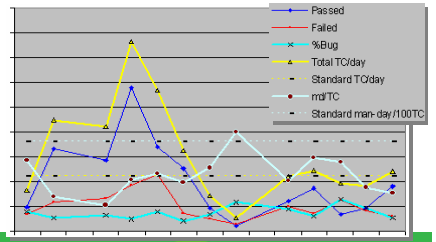



# Quality Control - Quantitative Method

- Number of TC/UC
- Bug discovery rate (number of TC test failed/total TC/UC)
- Testing productivity (man-day for testing 100TC)
- PG's bug rate
- PG's repeated bug rate
- Etc…




| PG | Passed | Failed | %Bug | x1 | x2 | x3 | x4 |
|---|---|---|---|---|---|---|---|
| | 2822 | 1032 | 27% | 806 | 107 | 4 | 0 |
| Đặng Hồng Quân | 1184 | 191 | 14% | 163 | 14 | 0 | 0 |
| Dương Hồng Thái | 678 | 193 | 22% | 161 | 16 | 0 | 0 |
| Trần Thị Thương | 311 | 103 | 25% | 83 | 10 | 0 | 0 |
| Hà Thành | 133 | 99 | 43% | 76 | 10 | 1 | 0 |
| Lê Khắc Chính | 243 | 198 | 45% | 121 | 34 | 3 | 0 |
| Bùi Trung Dũng | 160 | 185 | 54% | 155 | 15 | 0 | 0 |

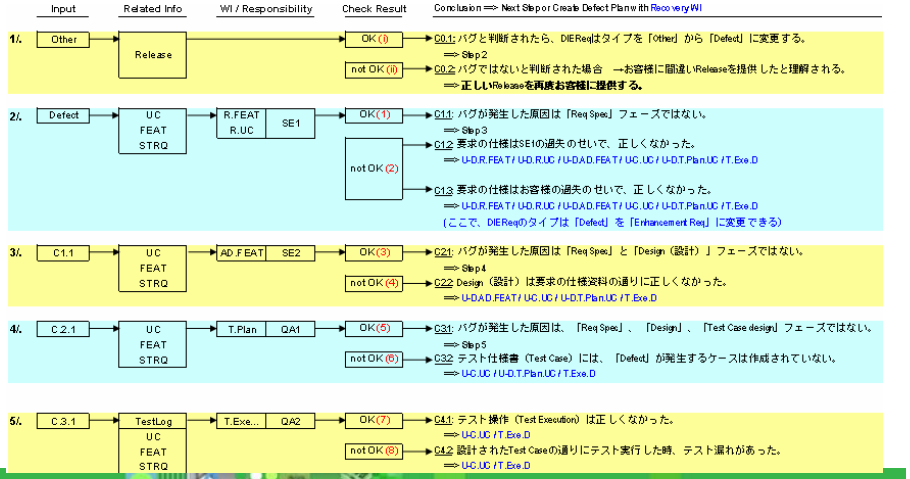







# Quality Control - Qualitative Method

- Mostly for bug reported from partner/customer
- Bug analysis process & result (sample)



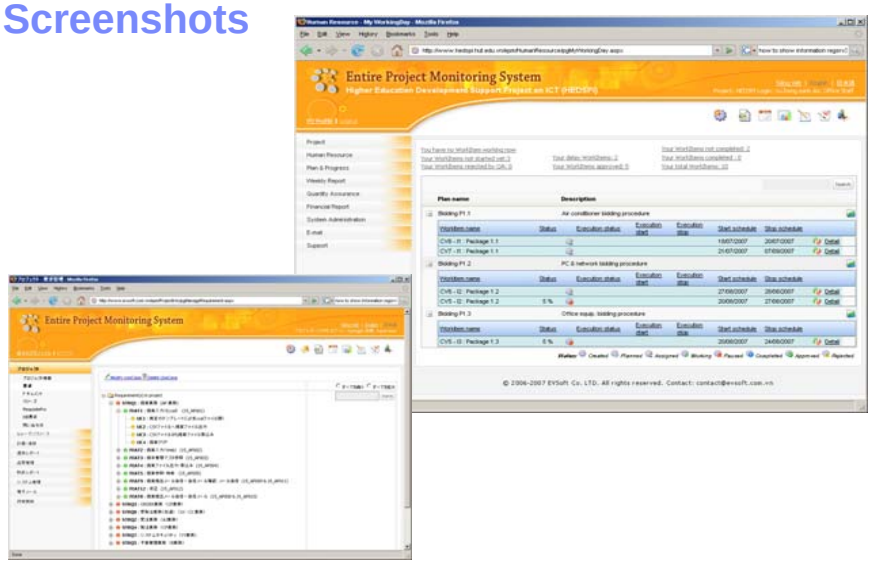





# Security Management

- To be followed fully conditions for confidentiality defined in contract customer
- Information Management
  - Receiving and Creation
    - Respecting security level requested from customer/partner: "Strictly Confidential", "Confidential", "Confidential – Company Internal only", "Confidential – Group only", "Important"
    - Restriction un using portable media such as FD, CD-Rom, USB-Key etc.
  - Storage
    - Data or information stored with encryption.
    - Not copy the information so much if unnecessary.
  - Distribution
    - Electronic-data must be sent with password (if sending through the external network)
    - In case of using postal services or fax transmission, tracking and confirming of receiving is necessary.
  - Usage
    - In case of leaving the desk or going back home, confidential information shall not be kept on the desk or public space.
    - Prohibited to use lap-top PC in "project network zone" as customer/partner requested
- System Management
  - Common Issue: project data shall be stored in the shared file system. Not in the individual PC client
  - Password
    - Password shall be difficult to guess by third parties.
    - Password shall be controlled confidentially.
    - Prohibite to know other members passwords and use these passwords.
    - If the confidentiality of password can not be kept, password shall be changed time by time.
    - Prohibite to note the password on the paper.
  - Anti-Virus
    - Anti-virus system must be used at server as well as every project member PC
    - Daily update virus database
  - Other security issues
    - Firewall is applied to protect access from outside
    - VPN can be established with partner if necessary

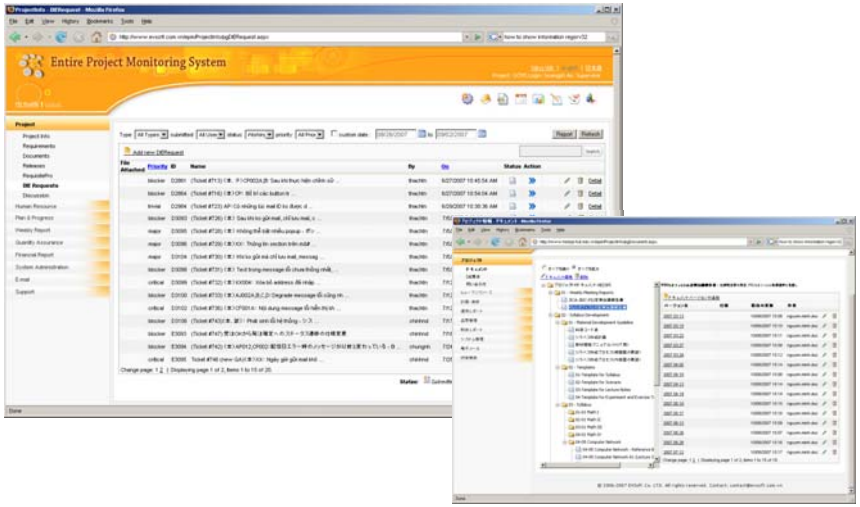
# Screenshots







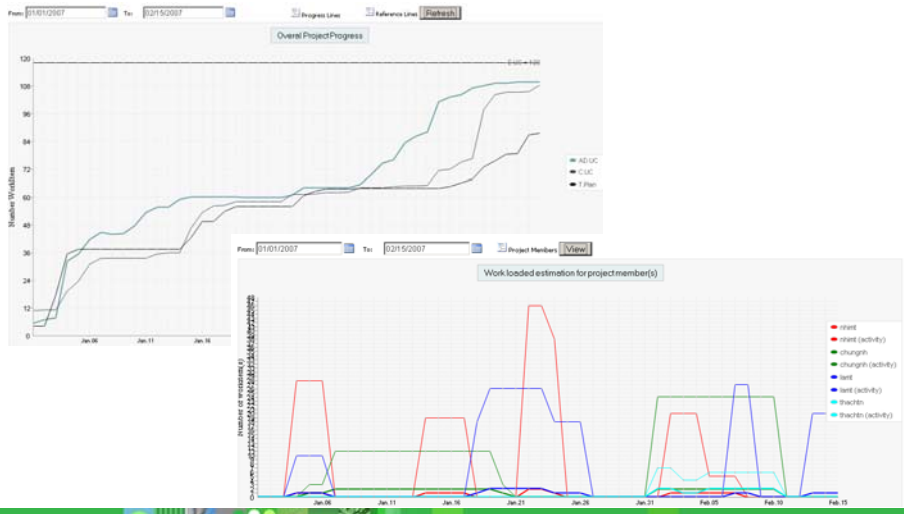

# Screen shots








# Screen shots





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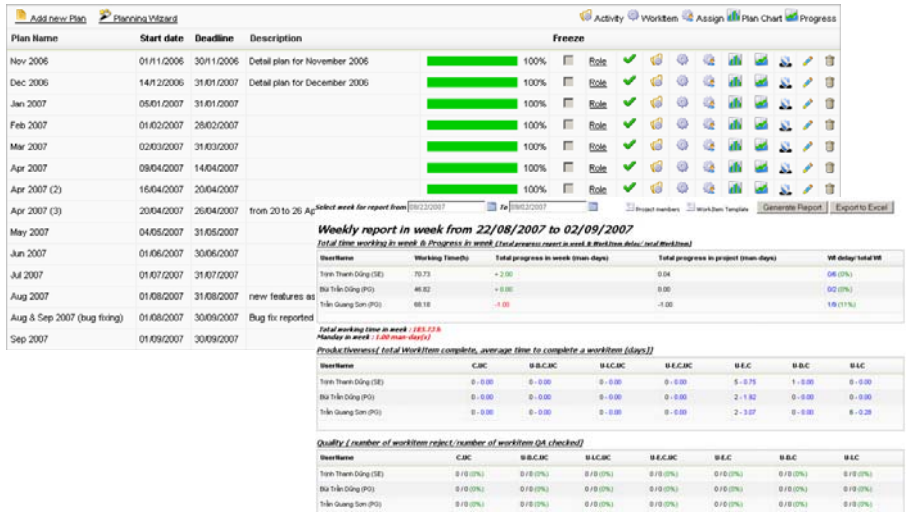

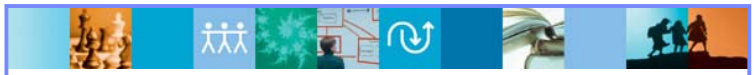

# Questions

# Thank You

Asia-Pacific
Economic Cooperation

**2008/SMEWG/SYM/015**
Agenda Item: 7.3

# Moving up the value chain in the global context of software outsourcing process

Purpose: Information
Submitted by: Vietnam

**APEC Symposium on Improving Market Access for ICT Outsource SMEs**
**Hanoi, Vietnam**
**27–29 October 2008**

# Moving up the value chain in the global context of software outsourcing process

Nguyen Truong Thang
[1]Institute of Information Technology (IoIT)
[2]Japan Advanced Institute of Science and Technology (JAIST)
thang@jaist.ac.jp



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  - Automotive Industry: An Illustration
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- Competitive Edge
  - Customer Perspective: Battle of the IT Supply Chains
  - Outsourcing Vendor Perspective: Moving up the Value Chain
- Critical Factors in Supply Chain
- An Approach: Moving up the chain via Q factor




## Offshore IT Outsourcing Trends

- Global scale: the whole business process instead of discrete pieces of work
  - By InformationWeek 500 list of business technology innovators
    - 2004: 43% do offshore IT outsourcing
    - 2007: 67%
  - According to the consulting firm NeoIT
    - 75% of the world's 2000 largest companies
    - Offshore: Current 20% may scale up to 40% of their IT budget
- Cost: still the most important factor
- More collaborative client-provider relationship
  - Result-based contracts
  - More critical work to be outsourced: e.g. Business process outsourcing (BPO)
    - BPO in InformationWeek 500: 17% (2004) vs. 40% (2007)



## Risks for Clients

- Outsourcing more critical work → How to foster new IT leaders [system work, company knowledge]??
  - Teradyne: architecture design, project management, etc. (20%)
  - HCL: infrastructure, desktop support, application development (80%)
- Better vendor management skill
- Reverse effect from outsourcing destinations
  - Talent shortage
  - Rising wage + high employee attrition
    - Attrition: 12% or more among IT service providers
    - E.g.: Infosys (lost 11,000 out of hired 30,964 in 2007); TCS (3,200 among 12,500 in a single quarter)
  - Providers: Keeping up human resource and work quality with the growth of business

# Strategies of Clients

- From technical level to broader business outsourcing process
  - Clients - providers: comparative (even absolute) advantage in different segments of value chain
- Result-based outsourcing contract: shorter, more incentives
- Closer relationships with offshore providers
  - Helping the vendors to keep ***skilled and experienced*** workers
- Work allocation: sharing more information with vendors
  - Client: high value-added services
  - Vendor: low-level services but ***moving up***
  - Difficult decision on "core" and "external" parts??
- Employee and outsourced worker: blur distinction
  - Outsourcing is still better than hiring!!



# Global Offshore Outsourcing Process

## Synergy of the two sides: client and provider

**How outsourcing providers, especially SMEs, utilizes this trend for their own sakes??**

⇓

**An answer: analyzing the supply chain of clients and moving up the chain appropriately by minimizing the reverse risks of clients**

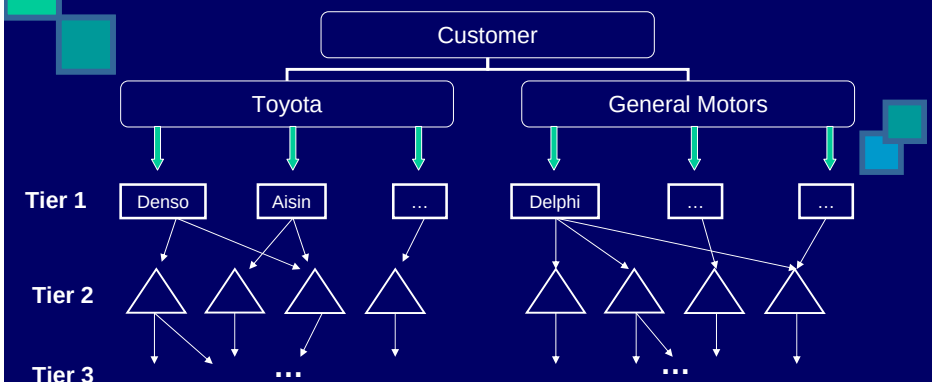


# Supply Chain

- Traditional (GM, Ford): price-based sourcing
  - Revealing as little information as possible
  - Avoid losing edge to the suppliers
- Automotive supplier partnership: Win-Win
  - Toyota, Honda
  - Manufacturers and suppliers: long-term commitment
  - Improving each other's capabilities
  - Collaborating openly on lowering costs + raising overall performance
  - Competition:
    - not Toyota vs. GM
    - Toyota's supply chain vs. GM's supply chain



# Supply Chain



# Supply Chain

- IT industry: the same competition style will hold??
  - 1st tier IT suppliers start to increasingly outsource pieces of their own projects
  - The process keeps going until there is a multi-tier IT supply chain
- Often, supply chain is close to "value" chain
- The higher level in the chain, the more power and value-added innovation a company possesses
  - Companies, especially SME, are encouraged to move up the chain for
    - Better skills, technology, bargaining power
    - More experience on large scale projects
    - Cost cutting via economy of scale



# Competitive Edge on Client Side

- Focusing only on "core" technology
  - "Comparative advantage" principle
  - More critical works are outsourced
    → Difficult decision: which parts are core, which parts could be outsourced
    → Nurturing IT leaders of their own
- Slimming the management workload
- Taking advantage of their suppliers
  - More freedom in selecting suppliers among many
- "Collaboration": a must for any success in the globalization process
  - Dynamic organization instead of conglomerate structure



# Competitive Edge on Vendor Side

- Improving skills and experiences
- Flexible among various clients
- For SMEs, big projects are important
  - Possibility of high value-added services
  - Economy of scale
- "Collaboration": a must for any success in the globalization process
  - SMEs act as satellites of the big client (Tier 1 or 2)
- The higher level in value chain, the more competitive a company
  - "Moving up the supply chain"



# Critical Factors

- Software: specific type of manufacturing products
  - Software development: parallel with manufacturing
  - Complying all major critical factors for success
- Key performance indicators:
  - Quality [Q], C [Cost], D [Delivery], S [Security] and S [Service]
  - Rooted at QCD in lean manufacturing
  - Measuring business activity
  - Offshore outsourcing: C is still the main goal
- Competition: mainly considering within these 5 indicators

# Critical Factors

- QCD can be used in various environment:
  - Supply chain
  - Engineering
- Benefits of QCD:
  - Straight forward
  - Applicable to both simple and complicated processes
- QCD in supply chain: how to measure the 3 aspects
  - Q: best defined as the no. of errors within a process of the chain
  - C: obviously important → via internal inventory control and accounting
  - D: timeliness of software delivery w.r.t an agreed schedule



# Critical Factors

- QCD metrics:
  - Directly related to the measurement of supply chain activity
  - Valuable mechanism into finding areas for improvement
- QCD strength and weakness:
  - Strength: simple and best method for the environment in which information and physical flows
  - Weakness: not the best method for certain service industry such as IT consulting



# An Approach

- For Vietnamese SMEs in IT industry
  - Mainly quality assurance and simple application development
  - Low-tech: human-based testing
  - Cheap and labor-consuming works
- Problems/concerns in supply chain of [Japanese] clients:
  - Software quality [Q]: delivered not as good as expected
    - Common to the world's software industry
    - Outsourcing at the lowest parts in the software chain
  - Cost [C]: utilizing cheap labor in Vietnam



# An Approach

- Resolving reverse effects on clients' risks
  - Talent shortage: via top-ranked academic institutions in Vietnam
    - Quality vs. quantity
  - Rising wage + high employee attrition
    - Working environment and promotion
  - Keeping up human resource and work quality with the growth of business
    - Working environment and culture in the firm
    - Technology and expertise
- An approach:
  - Focusing on Q factor of the whole supply chain
  - Climbing the chain appropriately
  - R&D for more advanced technology: international collaboration
    - Academic institution (JAIST, IoIT), outsourcing provider (IoIT) and industrial partners (NANO, …) in Japan
  - Applying world-level technology into a particular clients' concern

# An Approach

- Japanese IT market:
  - 2nd largest single market in the world
  - Industry-based economy sector is large compared with the U.S
  - Embedded software: priority
  - Quality: major concern for all businesses
- Typical software chain: involving people, process and technology
  - Outsourcing may span all 3 areas
  - Unlike US and European businesses, Japanese companies currently outsource mainly in technology area
  - People: language barrier
  - Process: different working environment and culture?



# An Approach

- Technology aspect in software chain
  - New ideas/application projects, data analysis etc.
  - Project management
  - Architecture design, system design
  - Application development
  - Quality assurance: testing, verification
  - Maintenance: infrastructure, desktop support etc.
  - …
- Automatic software quality-enhancing tool
  - Quality assurance activity in the chain, specifically code development
  - Static code analysis: MISRA-C based code checker
  - Run-time unit testing: JUnit-like dynamic testing



# An Approach

- Static code analysis: catching post-compile violations
  - MISRA-C: embedded software programming standard
  - Making source code safer and more comprehensible
- Run-time unit testing: catching possible run-time errors
  - Weaving the testing code right at the module to be checked
- In the future, moving up the chain
  - Evaluating quality of system and architecture design
  - How??
  - Availability of technology??
  - Willingness of information sharing from clients??



# Conclusion

- New era of IT offshore outsourcing: ***globalization***
- Supply chain
- Attaining competitive edge:
  - Client perspective
  - Outsourcing provider
- Critical performance indicators on value chain
- An approach for SMEs
  - Ensuring Q factor in the higher levels of supply chain

# References


- “Get a Grip”, Mary H. Weier, InformationWeek – Research & Reports, 2007.
- “Enterprise 2.0: Battle of the IT Supply Chains” – The Software Abstractions Blog, 2008
- Quality, Cost, Delivery – Wikipedia
- Using QCD in Supply Chain - http://www.bizbodz.com/ Supply-Chain/ General-Supply-chain/ QCD-Measures-and-the-Supply-Chain.asp