CMMI Around The World

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John D. Vu
Senior Scientist
Carnegie Mellon University

Global IT Capability Benchmarking

- **Conducted by Carnegie Mellon University's Institute of Software Research, International (ISRI) in School of Computer Science**
- **Using the Capability Maturity Model Integrated (CMMI) as framework**
- **Informations collected from:**
  - **The Software Engineering Institute (SEI) record of appraisals**
  - **Survey questionnaire to software organizations**
- **5 Senior researchers visited 75 global companies from 1999 to 2004:**
    - **Interviews:**
      - **Senior Management**
      - **Project Management**
      - **Technical Leads/Architect**
      - **Programmers/Analysts**

Global IT Capability Benchmarking Goals

- To Determine:
  - The IT capability of software industry worldwide
  - The implementation of CMM/CMMI worldwide
  - Global Software & Technology trends
  - The strengths & weaknesses of software industry among regions & countries
  - Opportunities for technology collaboration & training

Capability Maturity Models (CMMs)

Created at Software Engineering Institute (SEI) a federally funded research lab at Carnegie Mellon University (CMU)

Frameworks for software and systems improvement

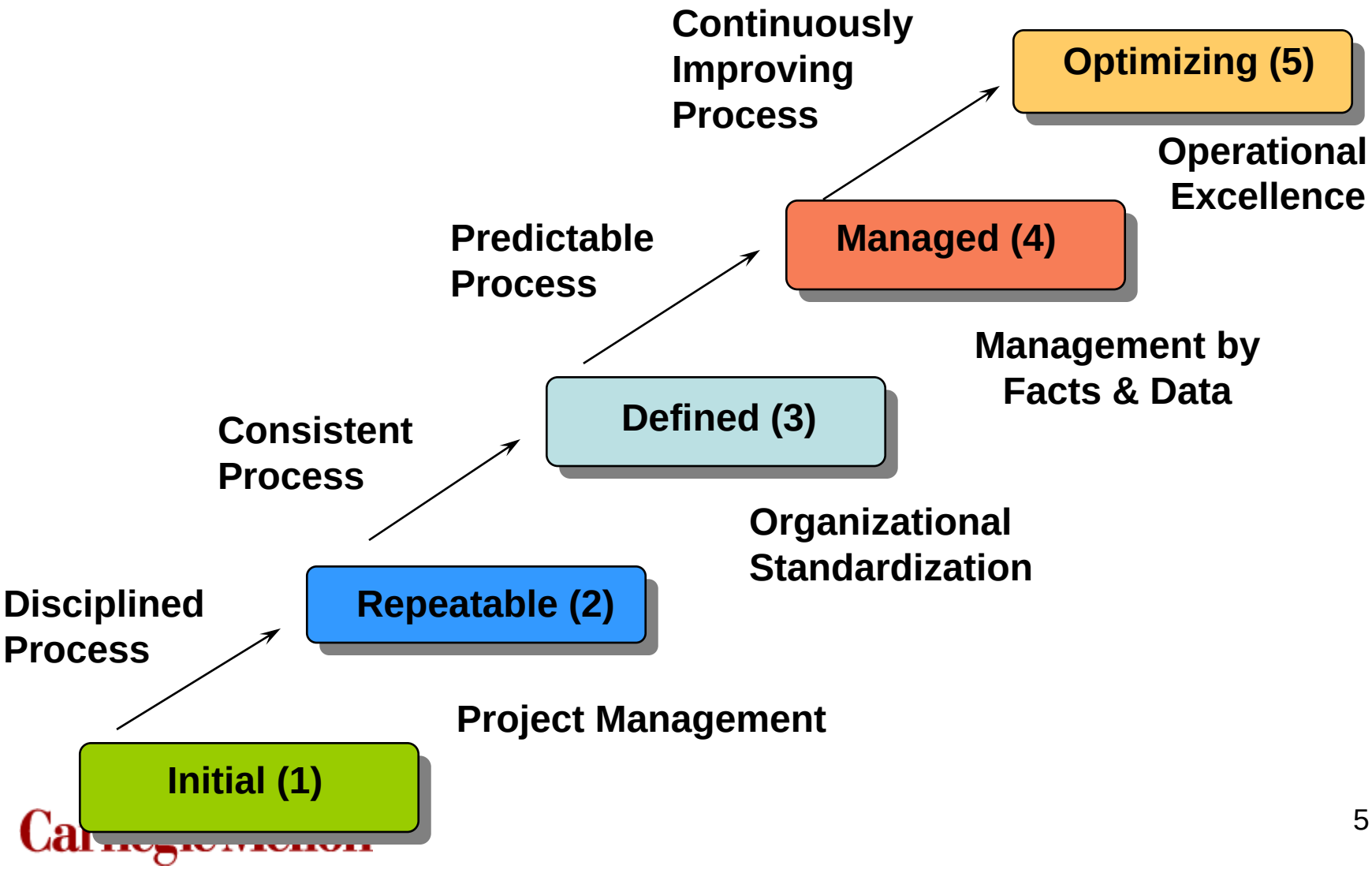
A model to compare organization's capabilities

A tool to select contractors by U.S Department of Defense (DoD)

History:

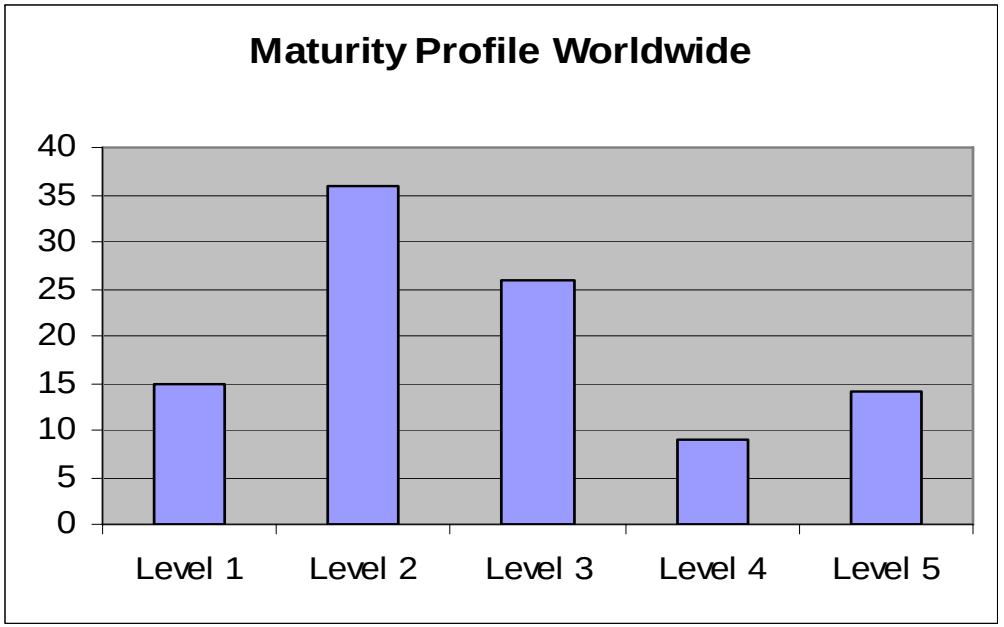
- Software CMM (1989);
- System CMM (1994);
- People CMM (1996);
- CMM Integrated (CMMI) 1999;
- Acquisition CMM (2002)

Maturity Levels



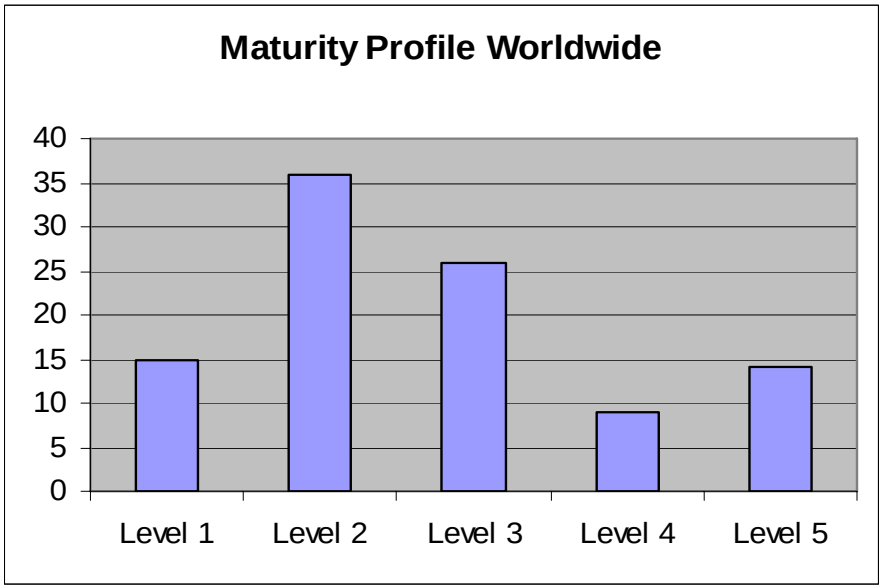
Global CMM/CMMI Usage

- CMM/CMMI is widely used worldwide:
  - Over 3500 appraisals conducted (1992- 2004), more than half were outside the U.S.
- CMM/CMMI in regions around the world:
  - Asia/Pacific
  - Western Europe
  - Eastern Europe
  - S. America
  - Australia

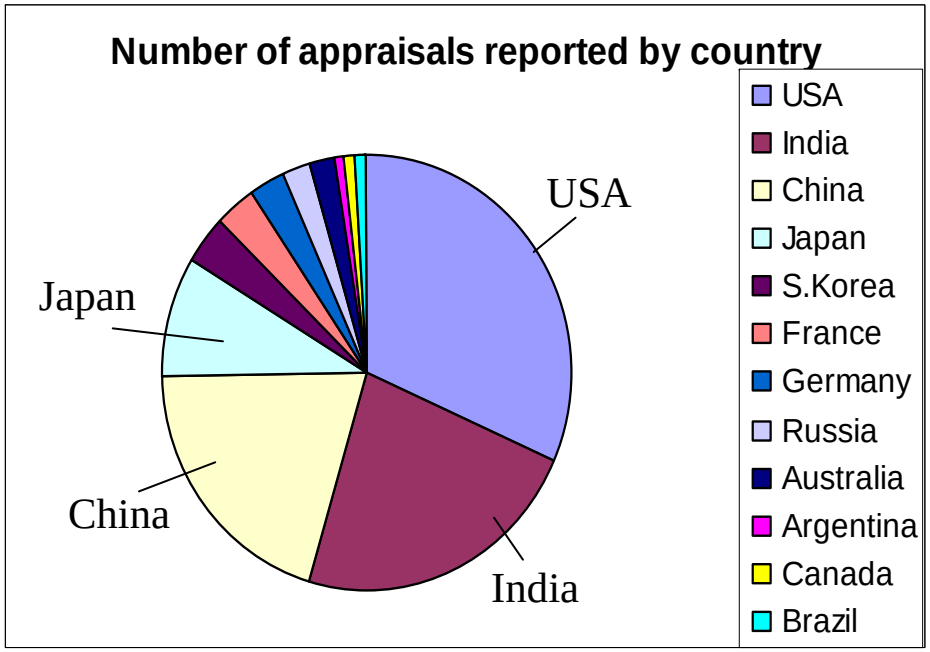


Source: CMU ISRI Benchmarking 2004

Worldwide Maturity



Source: The SEI list of appraisals 2005



Asia/Pacific Region

- **Fastest growing software industry in the world**
- **Grow rate > 30% annually over the past 5 years**
- **Highly educated & motivated workforce (India, China, Japan ..)**
- **Strong Engineering & Manufacturing focus (Japan, S. Korea, China)**
- **Well-established infrastructures (Japan, S.Korea, China, Singapore)**
- **Strong government support**
- **Many countries adopt "India's IT Model" as the growing vehicle for economic prosperity**
- **Highly entrepreneur & innovative**
- **Some countries are well adapted to international business but many are still experiencing language and cultural issues**
- **Some Geo-political risks**

Source: CMU ISRI Benchmarking 2004

India's Software Industry

- **Outsourcing powerhouse: Demand exceeds supply**
- **IT continues to grow at the rate > 20% annually**
- **IT business continues to increase > USD $ 48B annually**
- **Highly educated and motivated IT workforce**
- **English speaking & well adapted for global business**
- **Most IT works (78%) are for outsourcing, limited internal use**
- **Strong IT infrastructure in some areas but supporting infrastructures (i.e. road condition, rail, port, phone, electricity quality of living) still need improving**
- **IT industry is strongly supported by central government but varies with regions and local areas**
- **Cost of doing business has increased steadily over past five years**
- **Begin outsource to other countries (China, SE Asia) to reduce cost and move up the value chain (e.g. Brokerage of outsourcing)**
- **Begin to get into Research & Development (Highest value)**

Source: CMU ISRI Benchmarking 2004

India's CMM/CMMI Profile

Maturity Levels	CMM	CMMI
Level 5	43	64
Level 4	28	82
Level 3	86	56
Level 2	No reported Data	No reported Data

Source: CMU ISRI Benchmarking 2004

Future Trends in India Software Industry

- **Continue to grow rapidly, growth rate will exceed 20% annually**
- **IT service revenue > USD $ 60 B by 2006**
- **Move up in high value chain:**
  - **Becoming software outsourcing brokerage powerhouse**
  - **Establishing more Research & Development (R&D) Centers**
  - **R&D as a percentage of GDP increases to 5% by 2010**
  - **Encouraging more local intellectual property development to influence and dictate global standards**
  - **Focusing on open-source software and moving to influence global software markets**
  - **Begin to sell products in the west that were originally targeted at local market (power of scalability)**
- **Extensive collaboration with various countries:**
  - **Overseas R&D Collaborations**
  - **Faculty exchanges with global universities**
  - **Joint research & product developments**

Source: Gartner's report 2005

China Software Industry

- China's State Council issued "No 18 Document" spurred the growth of software industry
- China Torch Program – a guiding direction designed to develop new high technology industry in China (1988) and create a favorable environment to revitalizing the country through science and education
- In 2004, there were 53 national Science and Technology Industrial Parks (STIP) and the number continues to grow
- There are over 9,000 software companies in China (Dec 2004)
- While many companies are small (less than 50 employees) the number of larger companies (over 2,000 employees) are growing

Source: CMU ISRI Benchmarking 2004

China's Software Industry

- China's IT industry has developed rapidly, with growth rate > 32% annually over the past 5 years
- Software exports increase 7 folds over the past 5 years
- Sales revenue increased > USD $12B
- Software exports increased > USD $1.5B
- 90% of IT work are done for internal consumption but outsourcing work is increasing
- Strong IT infrastructure and manufacturing
- Becoming a strong IT outsourcing powerhouse, could compete directly with India, Eastern Europe within next 2 years (By 2006)
- IT industry is strongly supported by government with lots of investments from external corporations (IBM, Microsoft, Oracle etc.)
- Goal for 2007: 5 millions Software Engineers
- Massive IT education & training underway

Source: CMU ISRI Benchmarking 2004

China's CMM/CMMI Profile

Maturity Levels	CMM	CMMI
Level 5	9	5
Level 4	8	12
Level 3	46	16
Level 2	98	28

Source: CMU ISRI Benchmarking 2004 & China Software Industry Association

Future Trends in China Software Industry

- Continue to grow rapidly, growth rate will exceed 20% annually
- IT service revenue > USD $ 3 B by 2006
- Accelerating Engineering & Technology capabilities
- Near-term goals:
  - Achieve 5 million software engineers by 2007
  - Improving both IT and manufacturing capabilities by 2007
  - Achieving world-class capabilities by 2008
- Extensive collaboration with various countries for mutual benefits:
  - Overseas Science Parks in Russia and Singapore
  - Faculty exchanges with global universities
  - Joint research & product developments
- More capital funds available for investing & fueling growth:
  - International Business Incubators & Innovation Fund
- China High Tech products will enter international market - 2008

Source: Gartner's report 2005

Doing Business in China

- Zero Duty: All 251 items related to IT products
- Standards: All software products development (i.e. operating systems to 3G) must follow strict government standards
- Tougher Intellectual Property Rights laws: Passed in Dec 2004, focus on protect intellectual property
- "Brand" recognition: Acquisition of key "Brand" as a growth strategy:
  - Acquisition of IBM PC by Lenovo,
  - Acquisition of RCA and Phillips TV by TCL
- Experienced returning expatriates or "Sea Turtle" (Hai-Gui): A reverse brain-drain phenomenon with many talents returning from oversea with technical knowledge about working in western markets
- Fast growing talents: 2 millions software programmers and 3 millions software engineers are currently working in China's software industry (2004)

Source: CMU ISRI Benchmarking 2004

Japan's Software Industry

- Most IT work (97%) are strictly done for local consumption due to specific customization to support consumer electronics, business, and manufacturing
- Hierarchical organization structure prohibits innovation and entrepreneurship
- Highly educated workforce but focus more on localization
- Very high quality software products with special attention to details but very costly - can not compete globally
- Begin to outsource IT to China in 1999 to reduce cost and focus on core competency
- Dependence on Government's long term planning & direction which is not effective in the fast changing technological world

Source: CMU ISRI Benchmarking 2004

Japan's CMM/CMMI Profile

Maturity Levels	CMM	CMMI
Level 5	8	3
Level 4	12	16
Level 3	24	48
Level 2	17	12

Source: CMU ISRI Benchmarking 2004

Future Trends in Japan's Software Industry

- Continue to focus on hardware and manufacturing
- IT industry continues to support local consumption and not for export, except game & entertainment softwares
- Invest heavily in foreign countries by forming partnership with local software companies using their large capital resources
- Near-term goals:
  - Independent from foreign software technology licenses, patents and royalty payments but
  - Continue to collaborate with western countries on new technologies, especially in biomedical technology
- Continue collaboration with various countries for mutual benefits:
  - Faculty exchanges with global universities
  - Students exchanges
  - Joint research & product developments

Source: Gartner's report 2005

Western Europe

- Software industry is steady at > 8 % growth rate annually
- Highly educated & technological sophisticated (Ireland, Scandinavia)
- Strong Engineering & Telecommunication focus
- Strong standardization of processes, infrastructures, services
- Very protective of legacy systems & enterprise applications
- Governments are still the largest consumption of software
- Very high overhead cost due to bureaucracy & liberal laws
- Outsource “Near-shore” among Western & Eastern Europe
- Cultural diverse (Languages, legal, business practices etc.)
- Economic equation has different results – some fare much better than others
- IT Polarization: Scandinavia and Ireland are very active where France and Italy are more conservative

Source: CMU ISRI Benchmarking 2004

Eastern Europe

- Software industry is still immature
- Highly educated & large untapped talent pool
- Strong Engineering & Mathematical focus
- Theoretical but limited practical experience/innovation
- Lack IT infrastructure & support environment for business
- Governments are the largest consumption of software
- Low labor cost but not well adapted to international business yet
- Receive some outsourcing works from Western Europe
- Cultural diverse (Languages, legal, business practices etc.)
- Economic uncertainty due to growing pains – change is difficult
- Political uncertainty - Several social models and directions resulting in high risks business environments
- High unemployment among IT labor force
- Lack of project management & relationship management

Russia's Software Industry

- Elite education system & highly skilled workforce
- Technical innovation & complex problem solving
- Strong Engineering & Manufacturing focus
- Large legacy systems & enterprise applications
- IT industry is still under-developed
- Lack of government support & limited range of services
- Few software companies are doing business globally:
  - **LUXOFT**
  - **EPAM**
  - **IBA**
- IT infrastructure is slowly maturing
- Limited investments from Western countries due to perception of political, economical and legal risks
- Archaic Information systems except in defense industry
- Limited project management & relationship management

Russia's CMM/CMMI Profile

Maturity Levels	CMM	CMMI
Level 5	2	1
Level 4	2	1
Level 3	No reported Data	No reported Data
Level 2	No reported Data	No reported Data

Source: CMU ISRI Benchmarking 2004

Australia's Software Industry

- Australia's software industry is steady at > 4% growth rate
- Strong education systems & innovative workforce
- Well-developed business environment
- Strong Government support & well-established IP laws
- Current in software technologies & management skills
- High overhead cost due to social & liberal laws
- Most companies are small (< 60 people) & limited resources
- Historic links with UK
- Brain-Drain issue: Many IT people migrate to UK
- Limited external investments & venture capital funding

Australia's CMM/CMMI Profile

Maturity Levels	CMM	CMMI
Level 5	0	0
Level 4	0	0
Level 3	6	2
Level 2	3	2

Source: CMU ISRI Benchmarking 2004

Industry News

- **“By moving IT and service industry to countries with lower labor costs, companies can focus on creating higher value jobs”**

  Source: Vivek Agrawal - McKinsey Co. 2004

- **“Most software suppliers in India now have standards equal to or higher than those of U.S companies. Of companies around the world that achieved the CMM Level 5, half of them were in India”**

  Source: Kaushik Bhaumik – McKinsey Co. 2004

- **“Offshore Outsourcing market will continue to grow 20% annually throughout 2008”**

- **“Offshore outsourcing has already exceed USD $100 billion dollars in 2004”**

  Source: The Meta Group December 2000

Industry Trends

- **Major growth in outsourcing market globally**
- **Market increases 74% from USD $19 Billion in 1999 to > USD $100 Billion in 2004**
- **More companies are committed to longer and larger contract despite some negative publicity on high level contract difficulties**

Source: IDC 2003 report

- **Three out of four business leaders surveyed said they already outsource software or will outsource by the end of the year (2004)**
- **For those who already outsourced:**
  - **45% to India**
  - **18% to Canada & Europe**
  - **18% to China**
  - **8% to Russia & E. Europe**
  - **6% to S. America**
  - **5% to S. E. Asia (Singapore, Malaysia, Philippines)**

Source: University of Michigan Business School Study 2004

Questions

- Is higher CMMI levels a key factor in getting outsourcing business?
- Is education and continuous training & learning the key factor to software business success?
- Is government supports the key for foreign investment and long term growth?
- Is having highly qualify technical workforce the foundation to establish a software industry?
- Are compliance with international standards, Intellectual Property laws, trade control regulations the key to build a software industry to compete globally?

The answer is YES, YES, YES, YES, and YES

Conclusion

- Software industry is a lower cost entry market with significant return, if do right.
- Software outsourcing trend will continue to increase due to business conditions (e.g. cost, quality, skills, access to market)
- Some countries will move fast in the value chain and occupy a key advantage in software industry
- Continuous education & training are the keys to succeed in the fast changing world

Questions & Answers