


# Reflection on Software Process Improvement

**Keynote for SEPG Conference in Japan - 2005**

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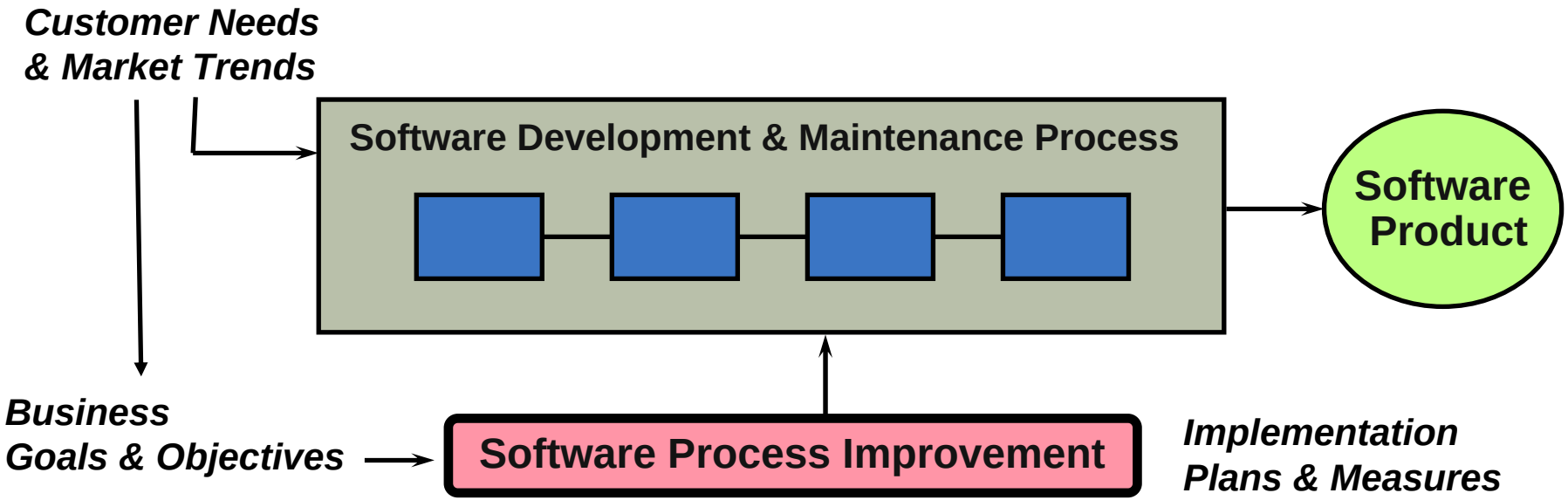
# Context






**Software Development & Maintenance Process:**

**The development & maintenance of software products that meet the needs of customers and markets**

**Software Process Improvement:**

**The application of technology and disciplines to improve software development and maintenance processes to achieve business goals and objectives**

# The SW-CMM



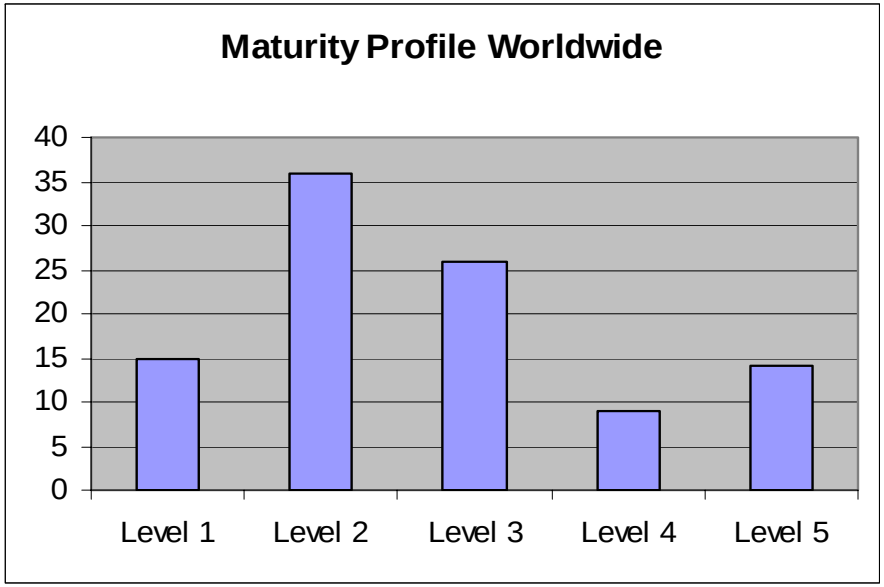
**The Software CMM has become the de-facto standard for assessing and improving software processes**

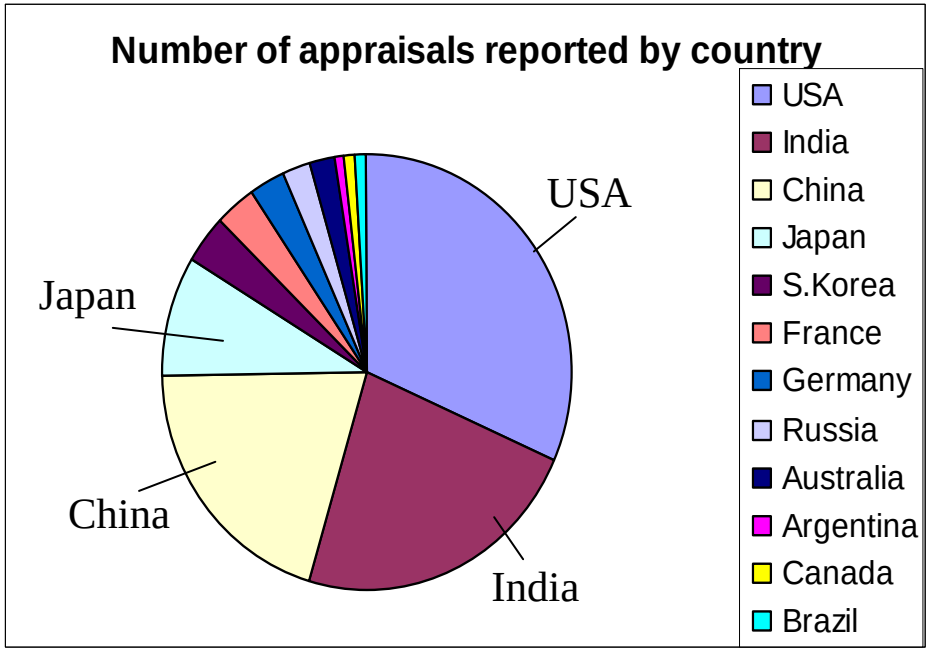
| | |
|---|---|
| **SW-CMM (earlier versions)** | **– 1988** |
| **SW-CMM V1.1** | **– 1991** |
| **CMMI V1.0** | **– 1998** |
| **CMMI V 1.1** | **– 2001** |

**Process Improvement using CMMs is > 15 years**

# Worldwide Maturity






**Source: The SEI list of appraisals 2005**

# Failure To Improve



## Industry data found that

- **72% of organizations report little or no success in software improvement after an appraisal**
- **83% of organizations abandon their improvement efforts in the first 3 years**
- **57% of organizations that abandon improvement efforts restart them in the future**
- **Less than 1% of organizations claiming success in process improvement report improvement data**

**Source: Software Industry Benchmarking Study 2001**

# Why Do So Many Improvement Efforts Fail ?



1. **Over-emphasis on having appraisal but not much attention to the commitment of making improvement happen**
2. **Focus mostly on maturity levels without clear direction and measurable objectives**
3. **Lack of a skilled infrastructure to coordinate and manage improvement activities**
4. **Confusion between terminology and actual practices**
5. **Deployment of improvement solutions is poorly managed**

**Source: Software Industry Benchmarking Study 2001**

# Some People Still Believe that...



**“The goal of process improvement is the maturity level”**

**Many organizations confuse maturity levels with improvement objectives**

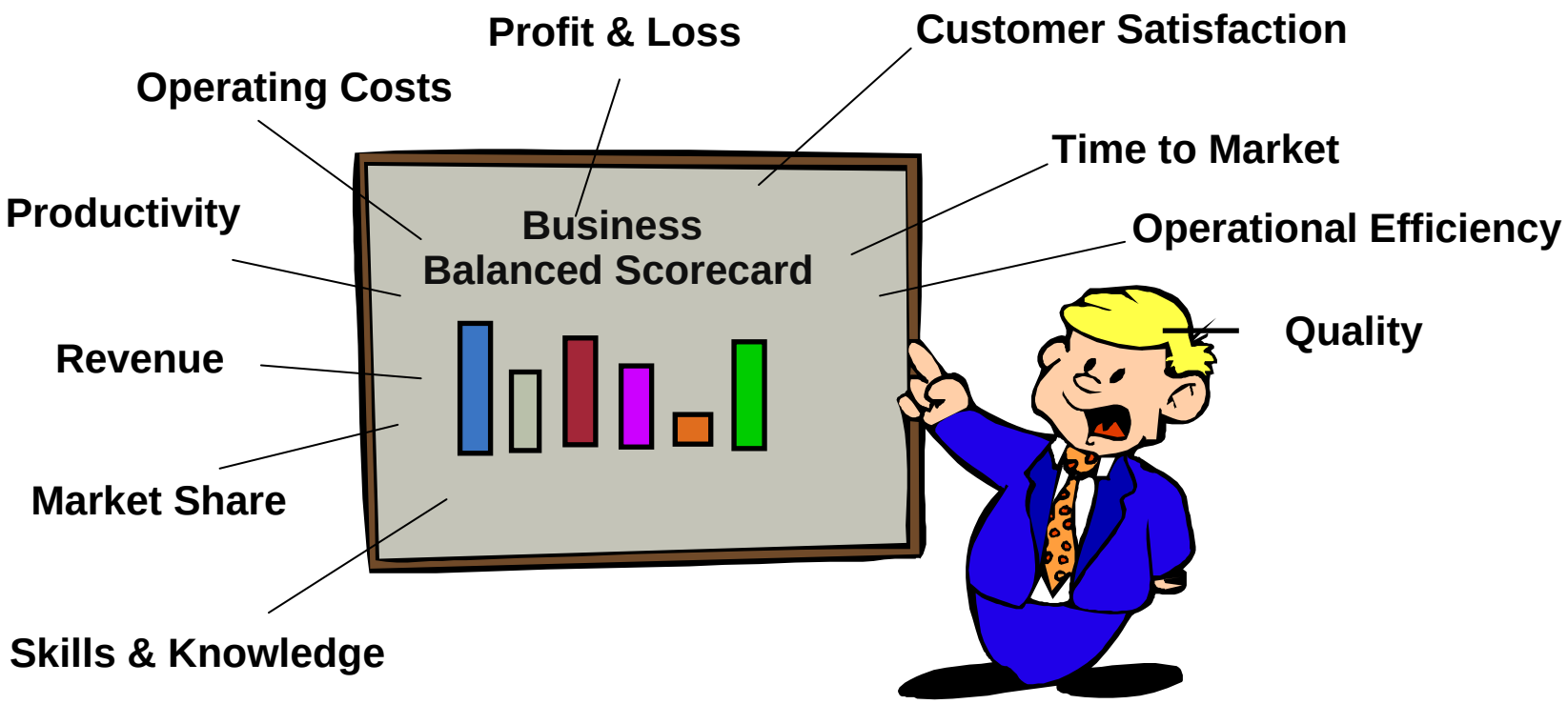
**Some organizations believe the maturity level is the “miracle” that can make improvement happen**


John Vu

# However, The Fact Is...



**Maturity levels are meaningless if they cannot be explained in terms of business objectives**



# Some People Still Believe that...



**“The main activity of the Software Engineering Process Group (SEPG) is to conduct appraisals”**

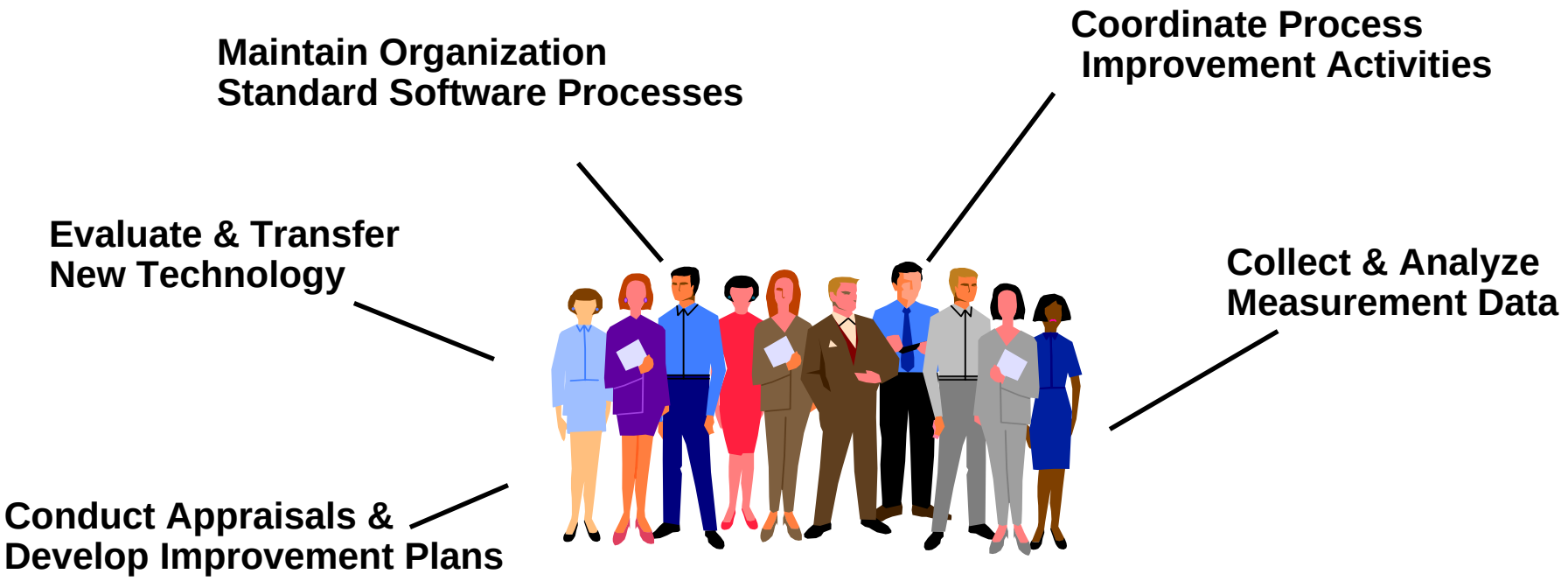
**Many Software Engineering Process Groups over-emphasize conducting appraisals and do not focus enough effort on making improvement happen**

**“Appraisals are Us” symptom**

# However, The Fact Is...



**The Software Engineering Process Group (SEPG) is a group of highly skilled change agents who facilitate and coordinate all improvement activities of an organization**



# Some People Still Believe that...

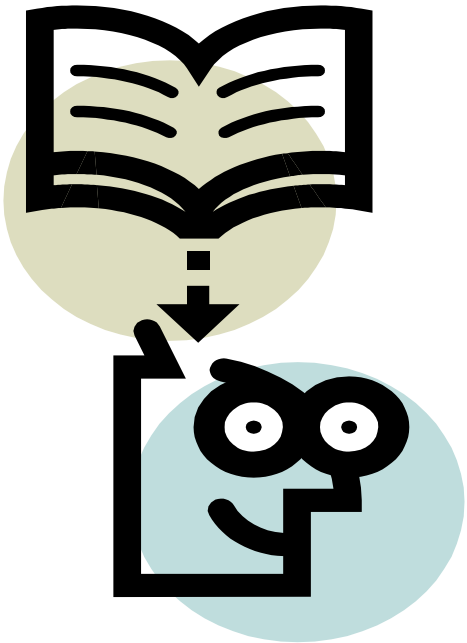


**“Highly skilled people are needed to do real work. Any available people can do process improvement”**

**Many organizations select people who may not have the right skills and motivation for leading process improvement.**

**Without actual engineering and improvement experience, many rely solely on book knowledge, and will focus on writing plans without spending time solving the organization’s critical issues.**

**Improvement can become a documentation exercise.**



# However, The Fact Is...



**Process Improvement requires the most experienced and skilled people in the organization.**

**SEPG members need to be communicators and motivators; they must have the skills and experience to do their job successfully.**

**SEPG members must be senior engineers selected from successful projects to deploy process improvement.**

**SEPG is a challenging job that requires "Change Agent" skills and should never be treated as a dead-end job.**

**SEPG is NOT on the job training.**

# Some People Still Believe that...



**"Just document every CMMI practice, select a few small projects to represent the organization, and then we can pass the appraisal and claim that the entire organization has achieved a high level of maturity"**

**This "improvement by documentation by a small sample of projects approach" does not solve critical organization issues.**

**The organization is only interested in a maturity level and is not serious about real improvement. This "business as usual" attitude will not change anything.**

**CMMI is NOT a cook book or a requirements specification.**

# However, The Fact Is...



**The appraisal process is more than reviewing documentation. Processes must be practiced, used, measured and continuously improved to achieve the organization's business goals and objectives.**

**Process improvement is about solving critical problems not achieving meaningless maturity levels.**

**SCAMPI appraisals must focus on both process compliance and organizational performance.**

**The SCAMPI method requires organizations to disclose the scope of the appraisal and, improvement results must be measured as part of the business value stream.**

# Some People Still Believe that...



**“There is no need to improve the process. Just throw a few “good people” at the problem and it can be solved”**

**There is a notion that a few “good people" can do a far better job than the rest.**

**These “super human beings” know how to solve problems intuitively; be able to code thousands lines of code per day and the organization will do just fine.**

**Where can you find these few “good people”?**

# However, The Fact Is...



**Being able to staff your project with the best people is good, but to support them with a stable work environment and effective management systems is far better.**

**Project management requires skills, experiences and effective processes to make things happen**

**Most projects fails because of wishful thinking, unrealistic schedules and forever-changing requirements**

**People need a stable environment and effective processes to be productive**

# Some People Still Believe that...



**“Organizations can improve faster and achieve higher maturity levels by buying more tools”**

**Some organizations believe that they can improve by having more tools.**

**Some tool vendors claim their tools can get an organization to a higher level of maturity.**

# However, The Fact Is...

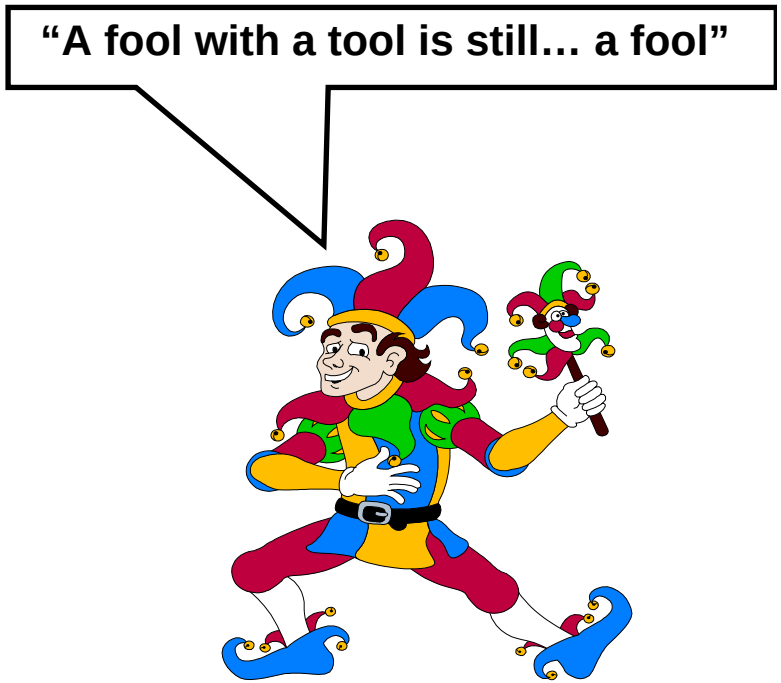


**Automation of poorly defined processes will produce poorly defined results much faster.**

**It takes time, skill, and resources to improve an organization's processes.**

**Unplanned process automation is wishful thinking.**

**Process improvement should be made in incremental steps and should NOT be automated until it is fully institutionalized.**



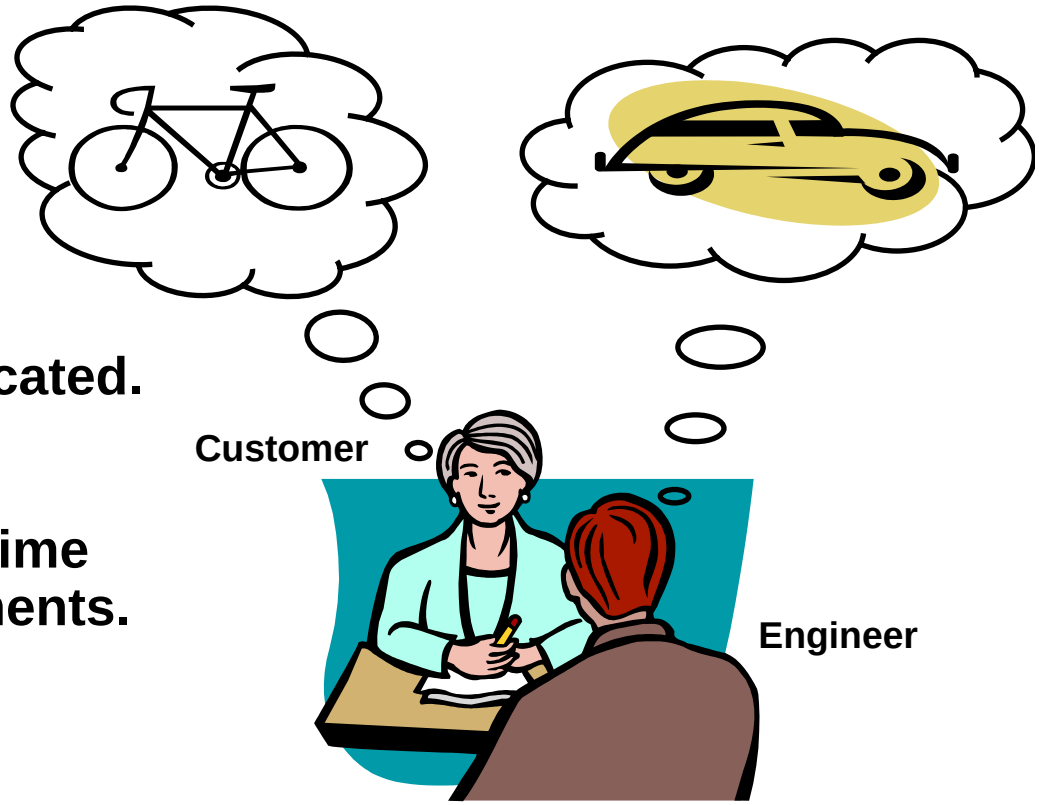
# Some People Still Believe that...



**The software requirements are not clear, but we can work out the details later.**

**Most software requirements are ambiguous and poorly communicated.**

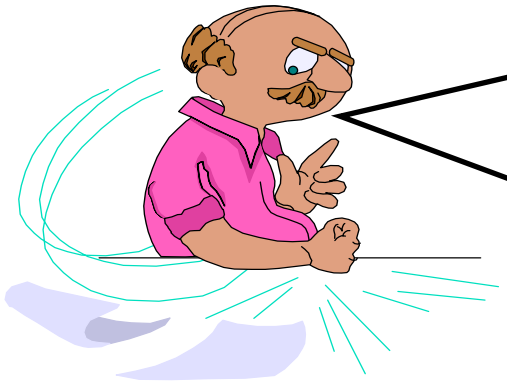
**Many engineers want to start the project quickly and not take the time to work out the detailed requirements.**



# However, The Fact Is...



**Work closely and cooperatively with the customer to establish and maintain a firm requirements base. Ensure all requirements are expressed in simple unambiguous terms; quantifiable and verifiable.**



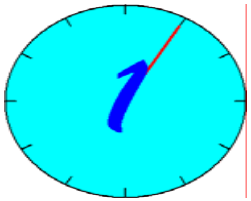
**All requirements must be:**

1. **Documented**
2. **Clear and concise**
3. **Understood**
4. **Testable**
5. **Usable**
6. **Traceable**
7. **Verifiable**

# Some People Still Believe that...



**Software test cases and test scripts need not be defined until the testing phase.**



**Because most projects are late due to efforts in defining interfaces & functional requirements, many engineers defer test cases and test scripts to later phases.**

# However, The Fact Is...



**Test cases and test scripts must be developed during the requirement phase to verify the requirements.**
**Customers must review and agree to the test cases and scripts.**
**Engineers must focus on getting good verifiable software requirements before starting preliminary design.**

**If you cannot test it, you do not understand the requirements**

# Some People Still Believe that...



**Software schedules are generated by experienced managers or professionals, therefore they are realistic and achievable.**

**Software personnel have a tendency to be optimistic.**

**Lack of historical data can lead to over or under estimation.**

**Schedule estimate is the root cause of most software project failure.**

# However, The Fact Is...



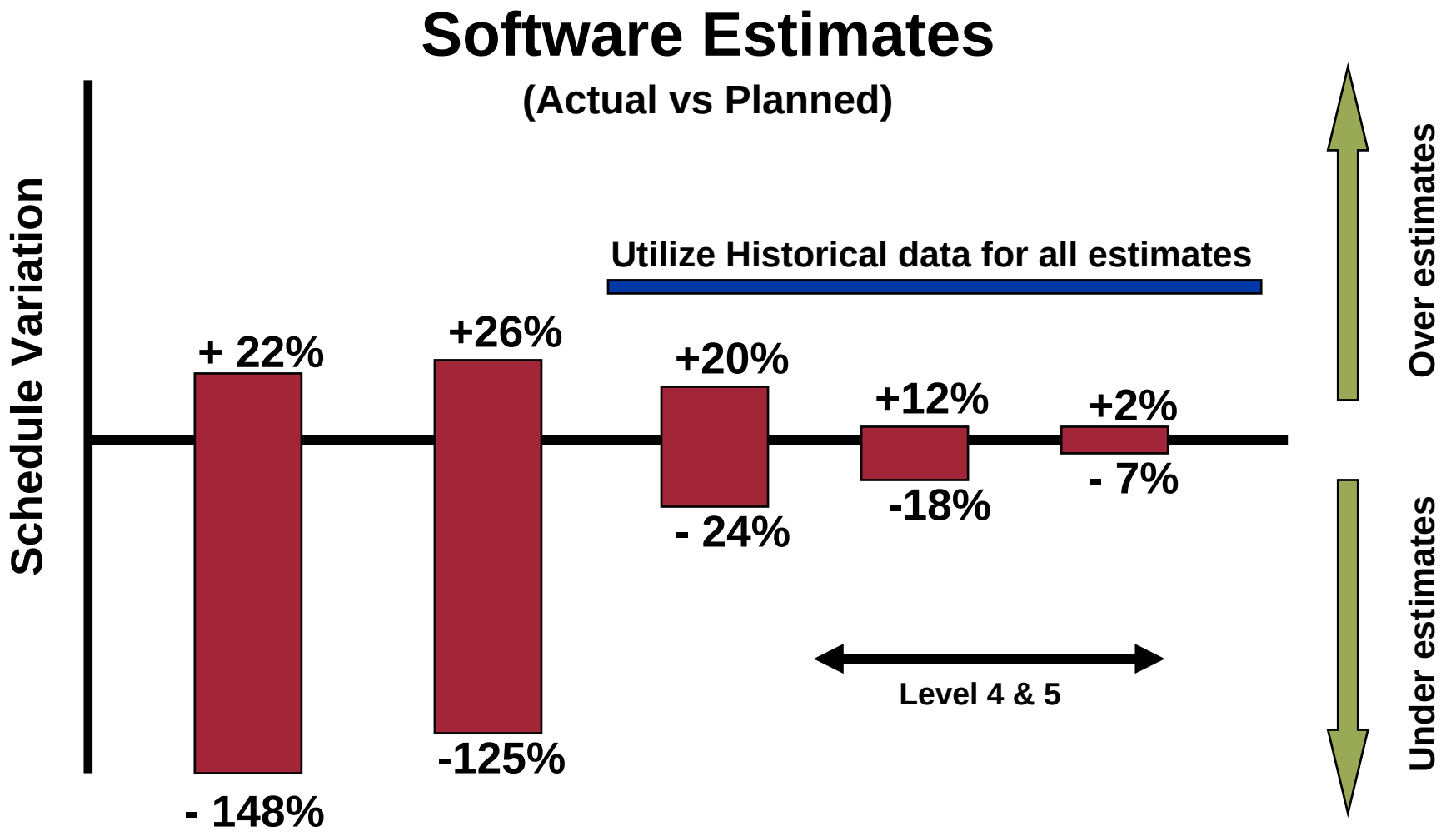
**Need to ensure that software schedules have sufficient detail, are independently estimated, and have adequate management commitment.**

**Follow a planning process that achieves a complete definition of all deliverables and tasks and all associated interdependencies.**

**Maintain a disciplined approach and use historical data.**

# Historical Data For Estimates






**Source: Software Industry Benchmarking Study 2001**

# Some People Still Believe that...



**Software project managers were selected for the job and do not need any help.**

**Many people believe that most software project managers are fully prepared in all areas.**

**Project managers are too busy to take time to consult with outside personnel.**

**It is difficult to recognize potential problems when you are busy with cost and schedule pressures.**

# However, The Fact Is...



**An advisory board should periodically review the software development activities.**

**An advisory board consisting of people with experience from similar projects can help identify potential problems early on.**

**An effective way to capitalize on Lessons Learned.**

**The board should meet periodically to review technical progress as well as project schedule and budget status.**

# Project Management Infrastructure



**Organization Management**
**(Senior Managers)**

**-Set policy & direction**
**-Provide resources**

**Technical Advisory Board**
**(Technical Leaders, Project Managers)**

**-Track progress & risks**
**-Support technical issues**
**-Advise project team**
**-Collect lessons learned**

**Project Managers**

**-Manage project**
**-Report progress**
**-Deliver products**

# Some People Still Believe that...



**The only software developmental activity that needs attention is coding.**

**Coding is only a small part of the software development activities. It is not an area where projects get into trouble, but it is where many problems (created earlier) start to show up.**

**Projects never fail because people can not code. Coding is never the root cause.**

# However, The Fact Is...



**Organizations must monitor all of the life cycle activities, and use metrics where appropriate.**

**Monitoring activities includes:**
- **Planning**
- **Tracking**
- **Measuring**
- **Validating**
- **Verifying**

**Assure the project uses metrics to measure performance, quality, schedule and functionality.**

# Some People Still Believe that...



**An organizational standard software process is not needed for our "unique" software project.**

**Many projects incur unnecessary cost re-inventing the software process.**

**Many engineers do not want to comply with established standards for "creativity" reasons.**

**Many engineers do not understand the benefits of following standard processes.**

# However, The Fact Is...



**Organizational standard software processes are established to ensure project consistency, improve product quality, avoid unnecessary project costs and reduce risks.**

**Established organizational standard processes do not prevent “creativity” since engineers can tailor them to fit the project as appropriate.**

**Identify project “unique standards” as additional to (not replacement for) the organization standard software processes.**

# Some People Still Believe that...



**Reusing software is easy.**

**Adapting existing software components to new applications is easy; If it does not fit, modify it until it fits.**

**Any code can be reused since it's "modularized" already.**

**Many engineers do not fully understand the software reuse concept.**

# However, The Fact Is...



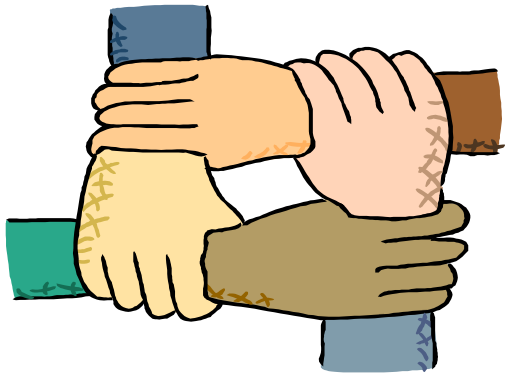
**Prior to deciding to reuse software, you must ensure that it meets the requirements, without modification.**

**Opportunistic reuse:**

**Adapt existing software components to new applications by modifying them. It is not cost effective since you still have to modify and test it.**

**Systemic reuse:**

**Reuse "well-defined" and "well designed" software components without any modification.**



**Develop a contingency plan if the reused software does not function as expected.**

# Some People Still Believe that...



**It is acceptable to select software subcontractors or suppliers solely on their reputation within the industry.**

**Lack of supplier selection criteria based on good technical and business sources.**

**Assume today's capability of suppliers is the same as their past reputation.**

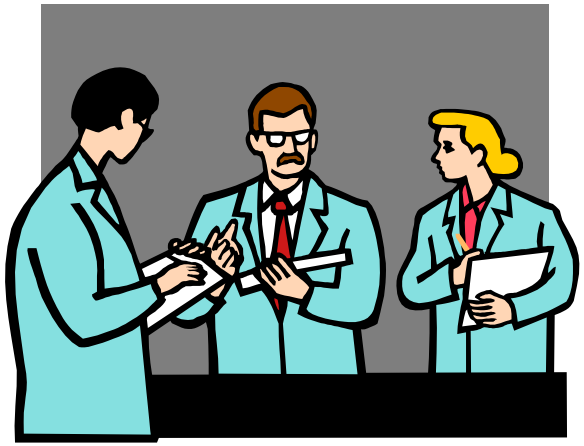
# However, The Fact Is...



**Select subcontractors and suppliers based on their proposals, qualifications and past performance.**

**Define supplier selection criteria based on technical, business and past performance data.**

**Review supplier proposals to ensure their technical understanding of requirements.**



# Some People Still Believe that...



**Software subcontractors and suppliers are dependable and do not need to be managed.**

**Many organizations do not monitor or manage software subcontractors.**

**Lack of communication between the project manager and subcontractor can lead to wrong assumptions.**

# However, The Fact Is...



**Treat subcontractors and suppliers as an integral part of the team and manage the subcontracted product development as if it was another component of the organization.**

**Integrate subcontractor personnel with the project team, where appropriate.**

**Manage the subcontractor's performance from start to finish.**

**Conduct frequent reviews, and use metrics to monitor subcontractor performance.**

# Some People Still Believe that...

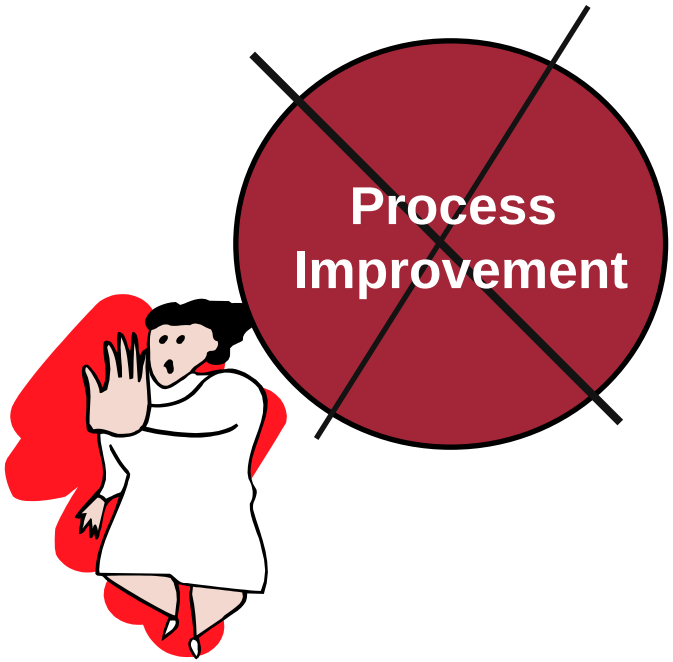


**Process improvement can wait until we have time, and when our people are not busy.**

**Many managers are too busy to address critical issues or take the improvement activities seriously.**

**Process Improvement is not applied in the context of the business but perceived as an additional burden.**

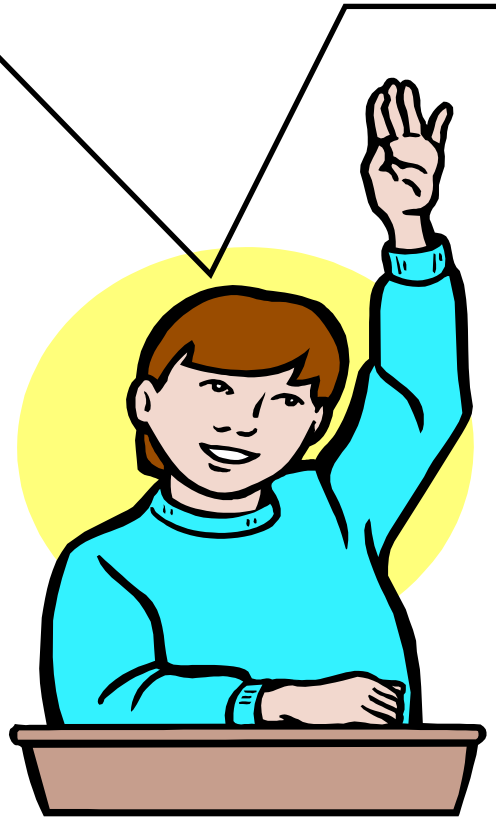
**A clever "resistance to change" tactic to postpone improvement indefinitely.**



# However, The Fact Is...



**If you do not do it now – when will you improve ?**



**Software process improvement is critical to the success of the business.**

**Process improvement is the key discriminator of who will survive in the fast changing times.**

**If you do not improve, your competitors will…**

# What To Look For in Process Improvement?



1. **Can the organization demonstrate actual business *benefit* of process improvement ? (improvement trends or r*esults?)***
2. **Which projects *follow* (or not follow) the standard processes?**
3. **Are these processes being *verified independently* that they are used and controlled at the project level?**
4. **Is day-to-day *decision making* based on measurement data (where appropriate)?**
5. **How are business goals *prioritized* and intergroup *conflicts* resolved?**

# So … Your Organization Is Appraised At Level 5



## Has Your Organization Experienced:

- **Business Value Increased?**
- **Project Performance Improved?**
- **Quality Improved?**
- **Cost Decreased?**
- **Customers' Satisfaction Increased?**
- **Employees' Satisfaction increased?**

## If NOT – Why?

# Question:



## Is Your Organization Investing In Process Improvement For The Wrong Reason?

# We Believe:



# Improving
# In
# Software Development
# Is
# The Business's Most Important Challenge !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