

A large, semi-transparent blue graphic of a level tool is centered in the background. The level tool is oriented vertically and features a central bubble level and two side vials. The background is a solid dark blue.

The Business Case for Better Software Practices

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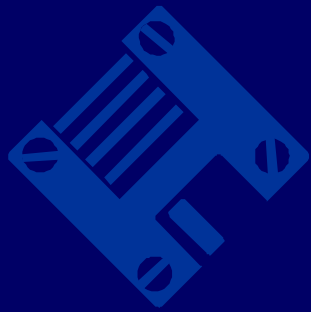
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Construx

Delivering Software Project Success

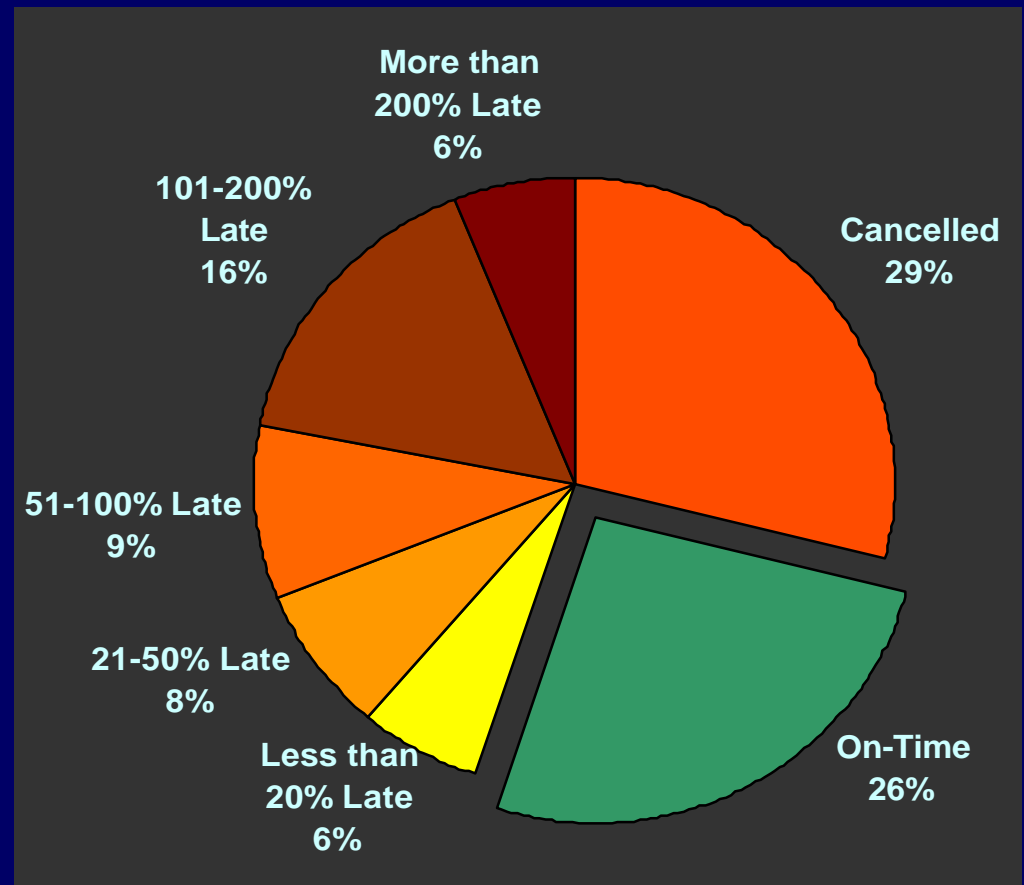


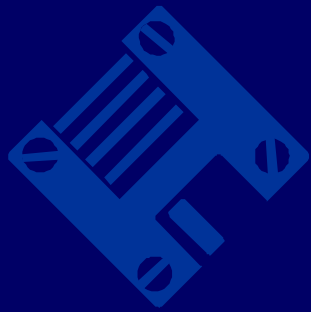
Opportunity



Disappointing Project Outcomes

- ✍ Average schedule overrun may be as high as 100%
- ✍ About one-quarter of all projects are cancelled
- ✍ Reasons for these outcomes are complicated





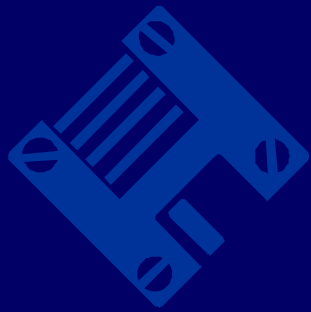
Disappointing Project Outcomes (cont.)

✍ Actual inefficiencies

- ✍ Average developer reads less than 1 professional book/year and subscribes to no professional journals
- ✍ Most projects are run somewhat inefficiently

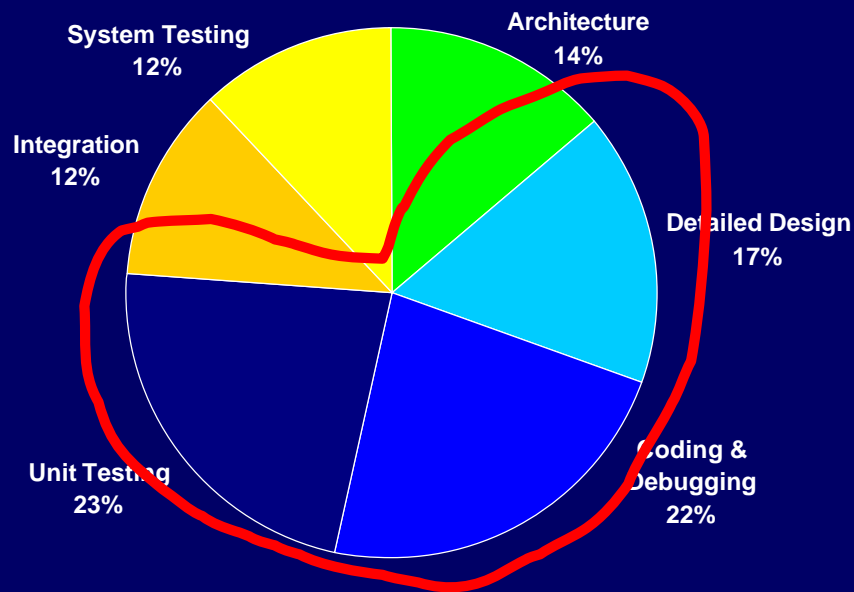
✍ Perceived inefficiencies

- ✍ Management & customer expectations are often unrealistic and unachievable
- ✍ Some management and customer actions actually undermine effective project performance



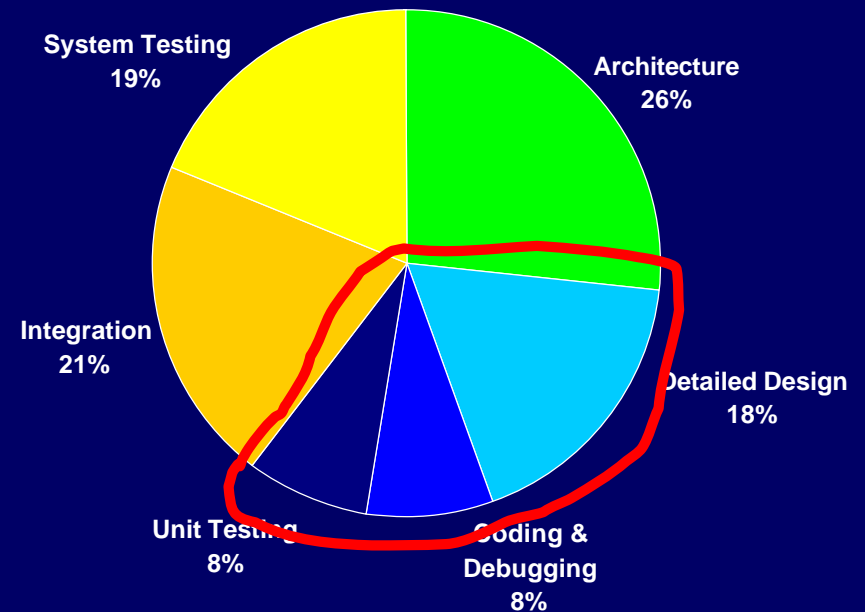
Lack of Understanding of Small Projects vs. Large Projects

Cost Breakdown on a Small Project (2KLOC)

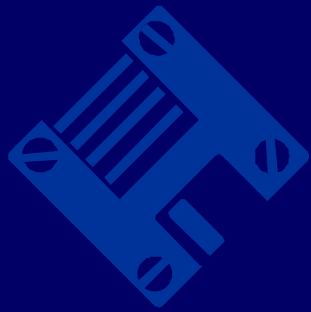


Construction = 2/3 of Effort

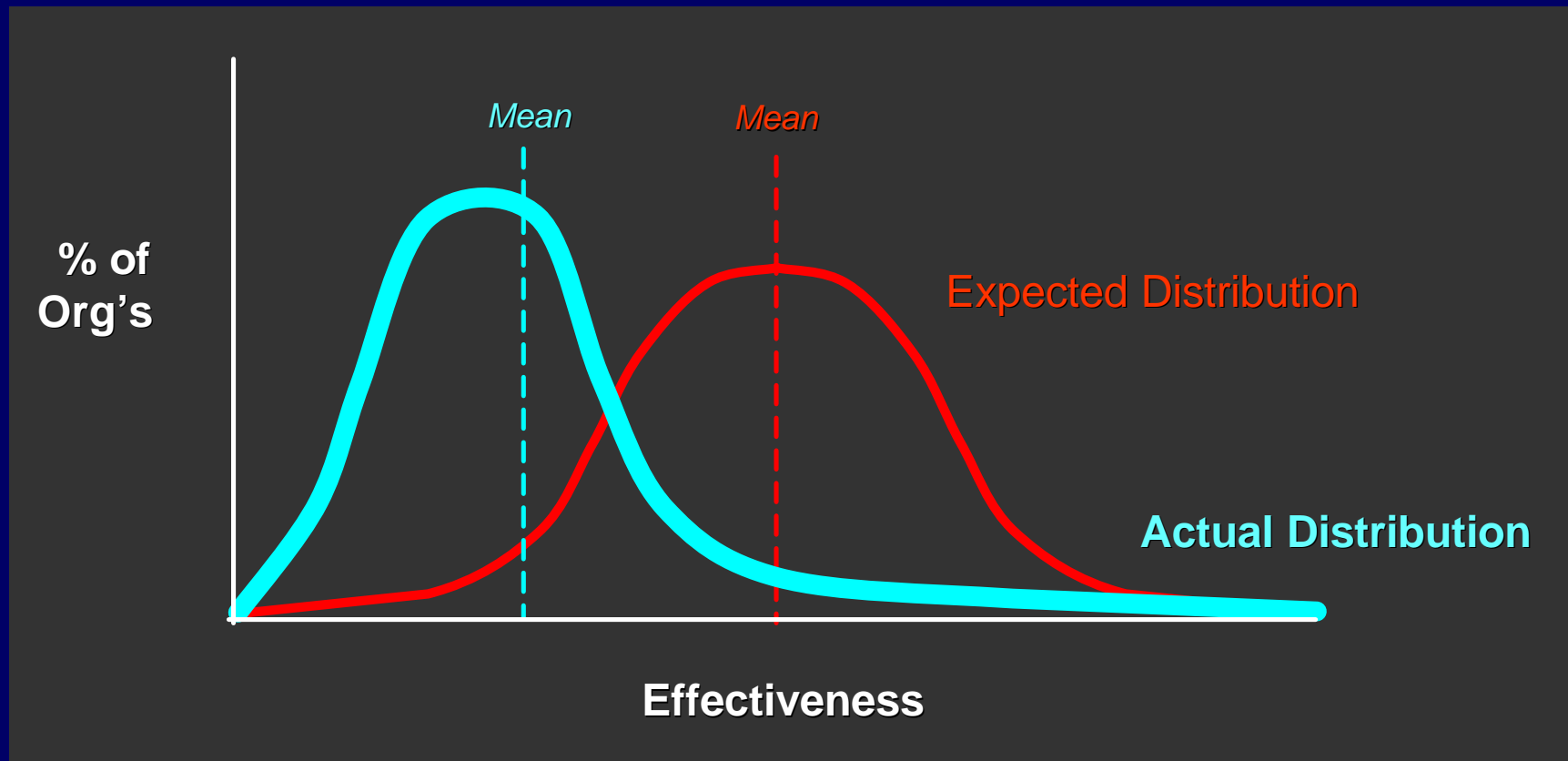
Cost Breakdown on a Large Project (500 KLOC)

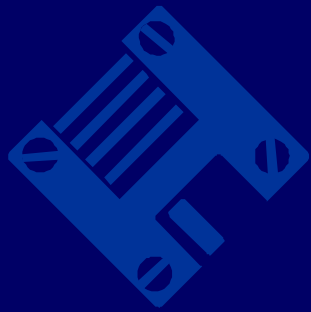


Construction = 1/3 of Effort



Average Practice is Close to the Worst Practice



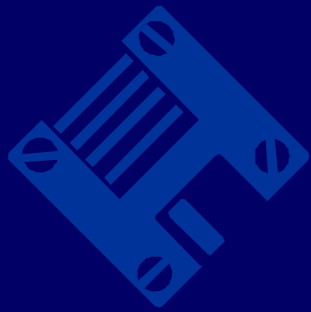


What Prevents Companies from Seizing the Opportunity?

- ✍ **Too much time spent fighting current fires to prevent future fires**
- ✍ **Successful small projects lead to complacency--leading to unsuccessful large projects**
- ✍ **Improving operational efficiency is not a priority during gold rushes**
- ✍ **Fatal attraction to silver bullets**
- ✍ **Haven't seen the business case for better practices!**



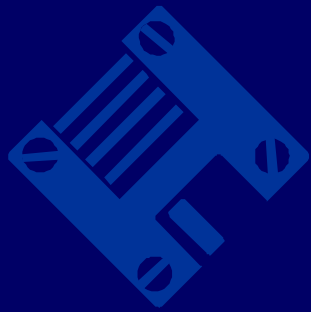
Quantifying the ROI



ROI

- ✍ **Improved software practices pay an average ROI of 5-to-1 (including false starts), and continued improvement is sustainable for many years**
- ✍ **The best organizations have sustained ROIs of 9-to-1 on software improvement initiatives for many years**

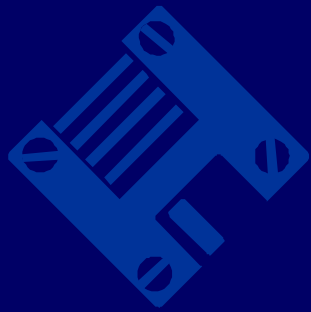
Source: James Herbsleb, et al, "Benefits of CMM Based Software Process Improvement: Initial Results," Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.



ROI for Selected Practices

Practice	12-month ROI	36-month ROI
Formal code inspections	2.5	12
Formal design inspections	3.5	10
Cost and quality estimation tools	2.5	12
Long-range technology planning	1.0	10
Productivity measurements	1.5	6.0
Process assessments	1.5	6.0
Management training	1.15	5.5
Technical staff training	0.9	5.0

Source: Capers Jones, Assessment and Control of Software Risks, Prentice Hall, 1994.

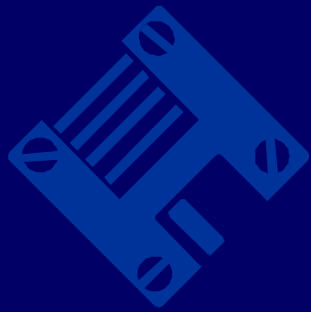


ROI Implications

- ✍ **Size of investment required varies**
- ✍ **Payback periods vary**
- ✍ **Not all investments are possible initially--
some larger ROIs are dependent on
previous investments with smaller ROI**



Where Does the "R"
Come From?

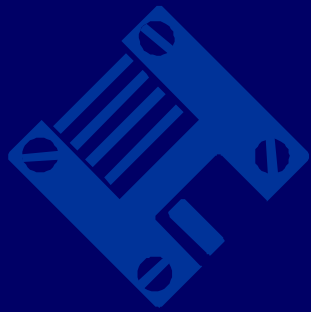


Where Does the “R” Come From?

- ✍ Depends on understanding where costs come from
- ✍ Depends on numerous, specific, detailed strategies for increasing “R”

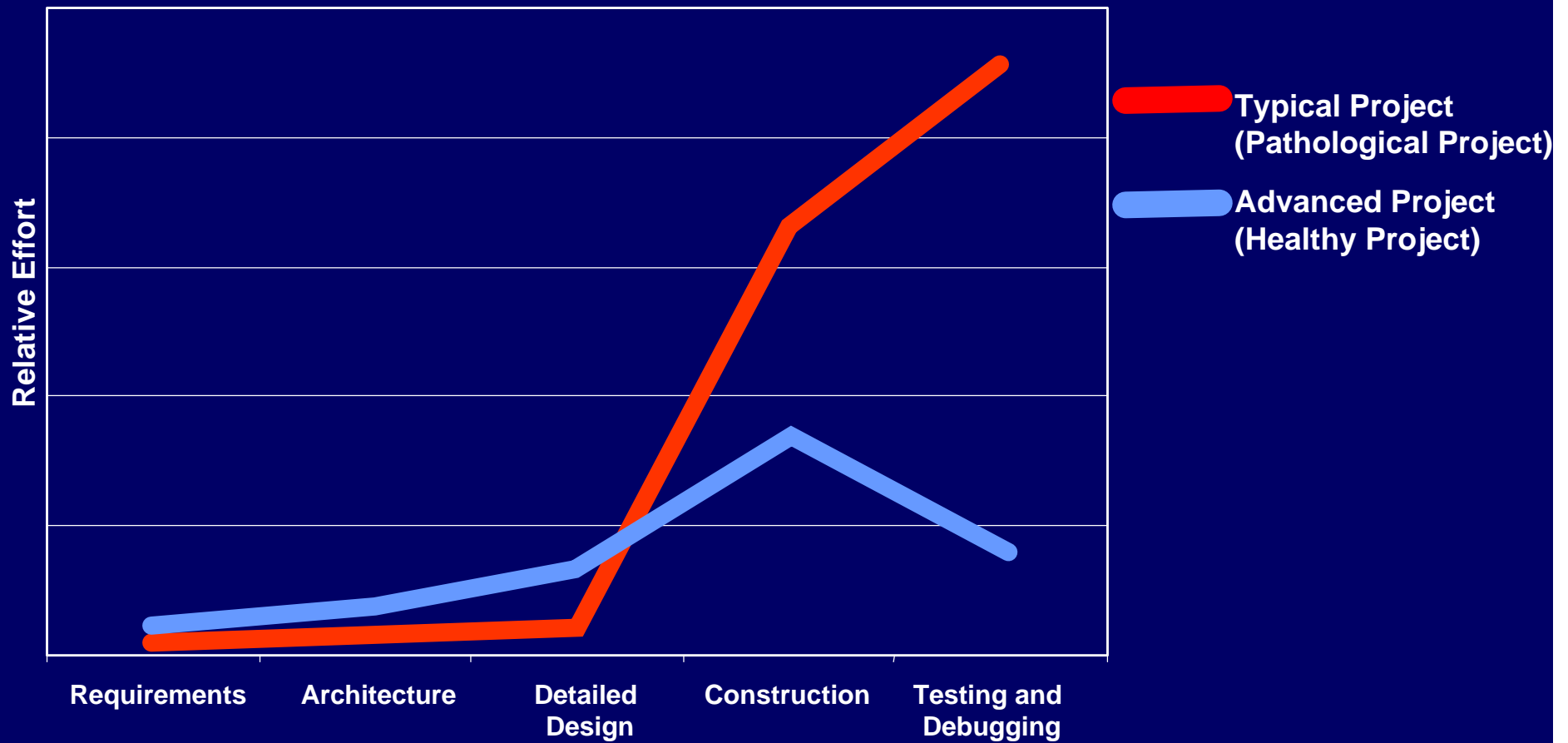


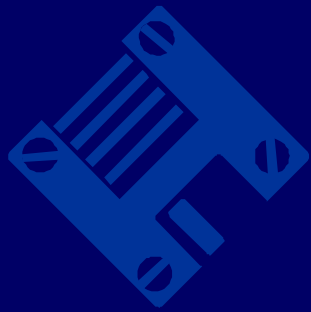
Where Do Costs
Come From?



Where Costs Come From:

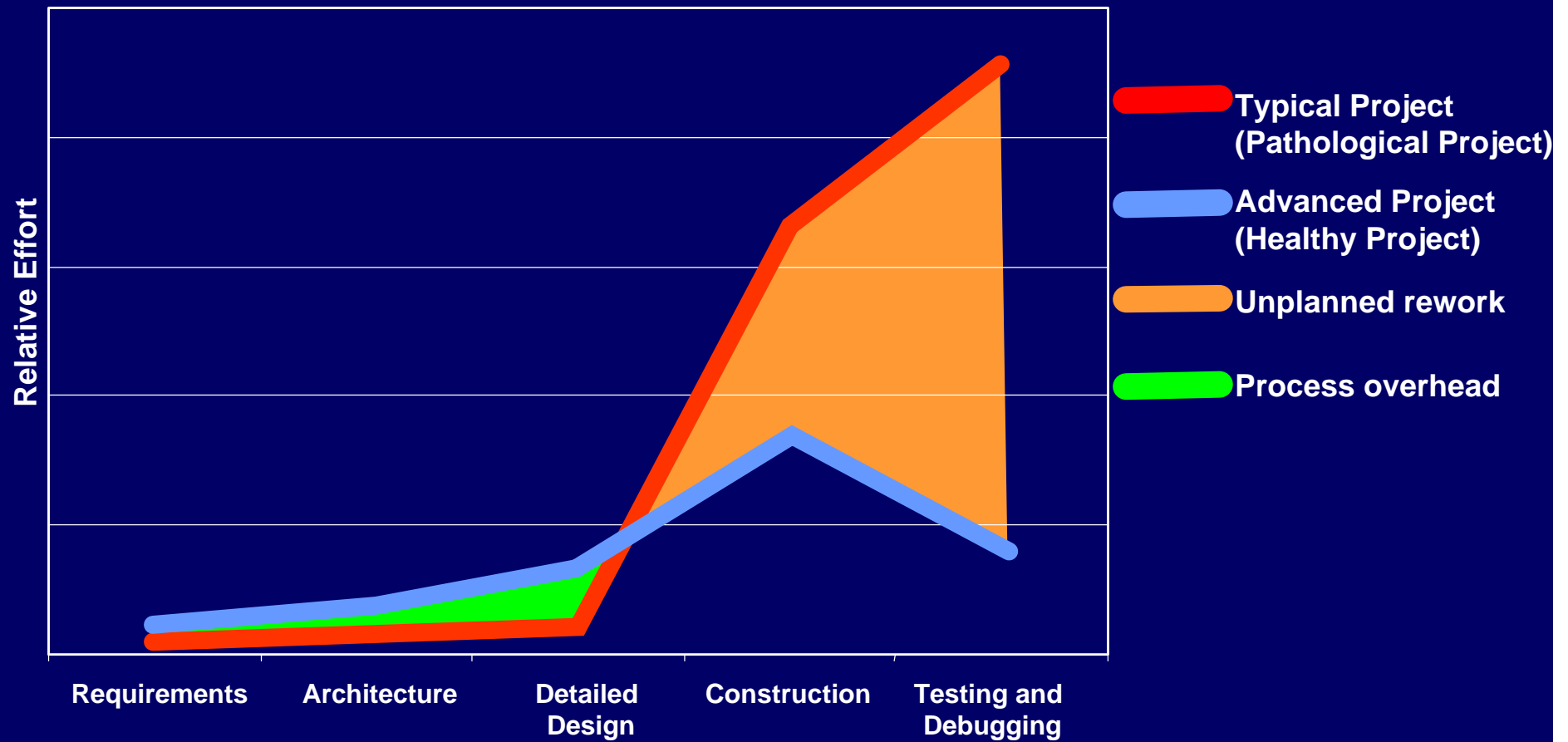
Lifecycle Cost Profile

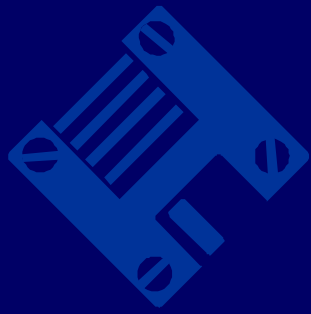




Where Costs Come From:

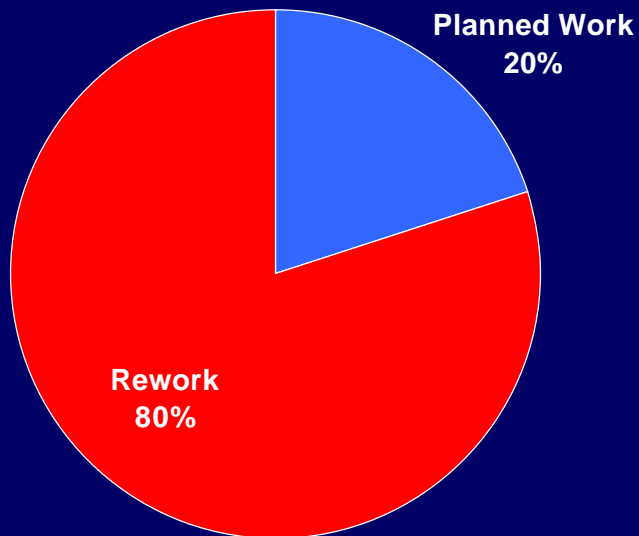
Lifecycle Cost Profile (cont.)



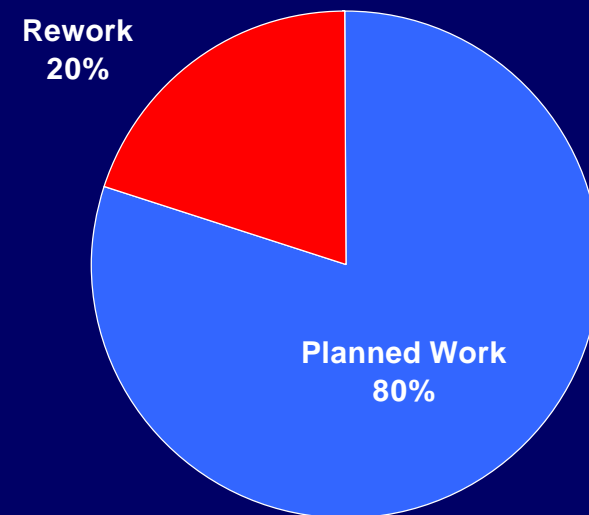


Where Costs Come From: Activity Breakdown

Cost Breakdown for an Average Project

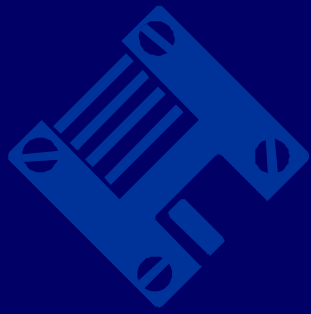


Cost Breakdown for an Expertly-Run Project





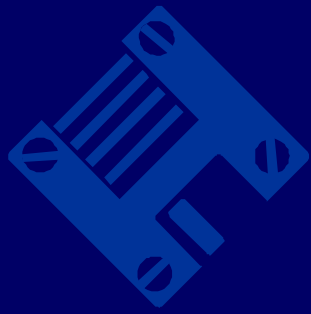
Now ...
Where Does the "R"
Come From?



Reduced Cost

- ✍ **Improving software practices reduce costs an average of ~35% per year**
- ✍ **The improvement is sustainable for several years, and the potential is much higher**
- ✍ **The best organizations have sustained cost improvements of 55%+ per year**

Source: James Herbsleb, et al, "Benefits of CMM Based Software Process Improvement: Initial Results," Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.

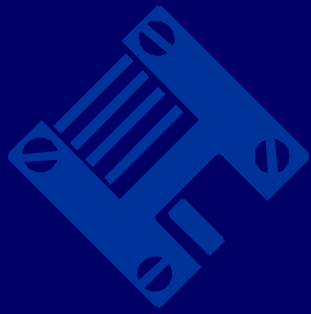


Improved Quality

- ✍ **Poor quality is the single largest cost driver for most projects**
- ✍ **Improved software practices improve quality an average of ~40% per year**
- ✍ **This improvement is sustainable for several years, and the potential is much higher**
- ✍ **The best organizations have sustained quality improvements of 70%+ per year**

Sources: Steve McConnell, Rapid Development, Microsoft Press, 1996.

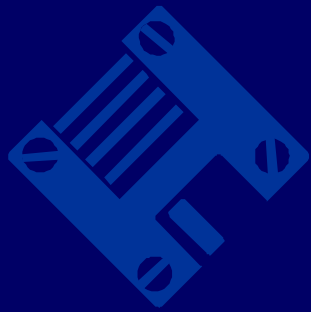
James Herbsleb, et al, "Benefits of CMM Based Software Process Improvement: Initial Results," Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.



Improved Cycle Time

- ✍ **Improved software practices shorten schedules an average of ~15-20% per year**
- ✍ **This improvement is sustainable for several years, and the potential is much higher**
- ✍ **The best organizations have sustained schedule improvements of ~20-25% per year**

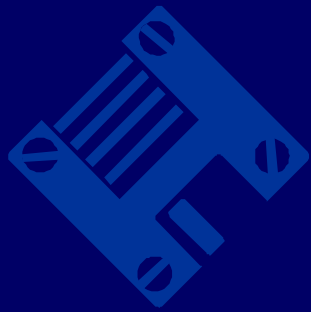
Source: James Herbsleb, et al, "Benefits of CMM Based Software Process Improvement: Initial Results," Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.



Better Predictability

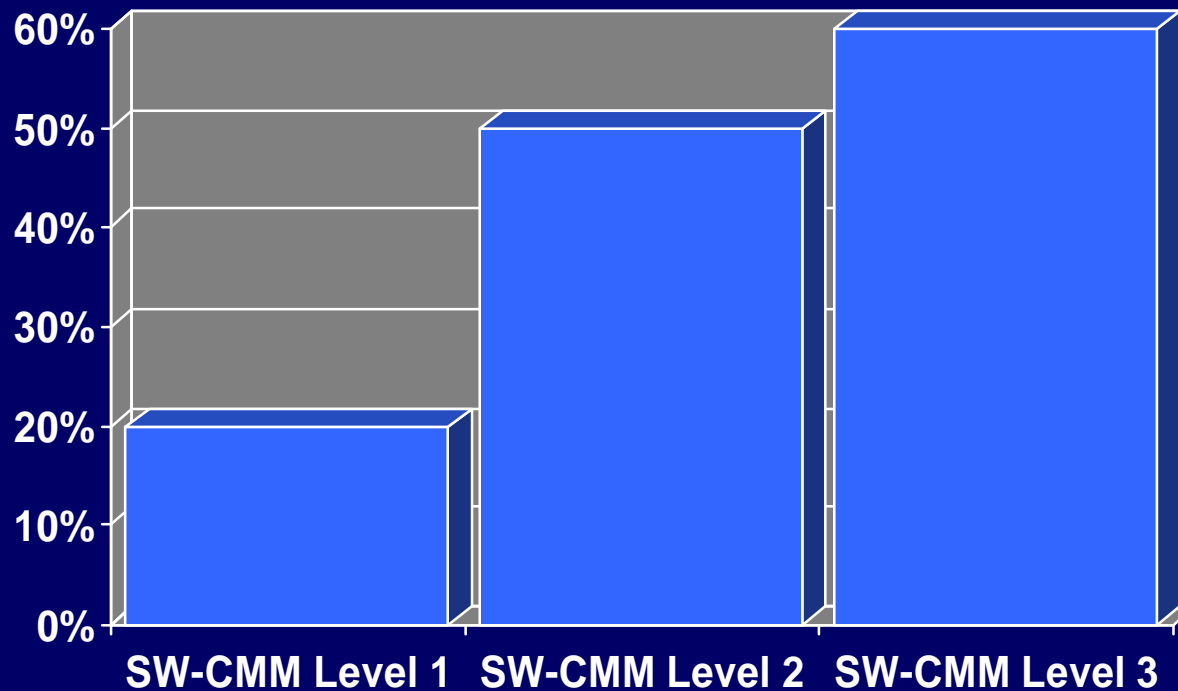


Source: Dr. Patricia K. Lawlis, Capt. Robert M. Flowe, and Capt. James B. Thordahl. "A Correlational Study of the CMM and Software Development Performance," Crosstalk, September 1995.

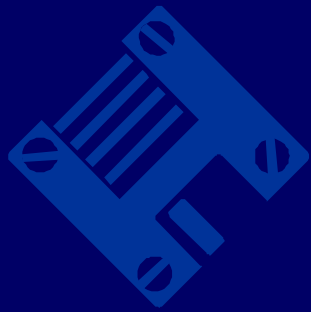


Enhanced Morale

Percentage of Employees Who Rate Their Own Morale as "Good" or "Excellent"



Source: James Herbsleb, et al. "Software Quality and the Capability Maturity Model," *Communications of the ACM*, June 1997, pp. 30-40.



Summary

- ✍ **One benchmark: Improving from CMM Level 1 to CMM Level 2 will ordinarily cut the cost of the average business systems project in half, shorten its schedule by 17%, and improve quality 50%.**
- ✍ **The best results are significantly better than these figures**
- ✍ **These results assume comprehensive improvements not limited to process (e.g., training in better practices)**

Sources:

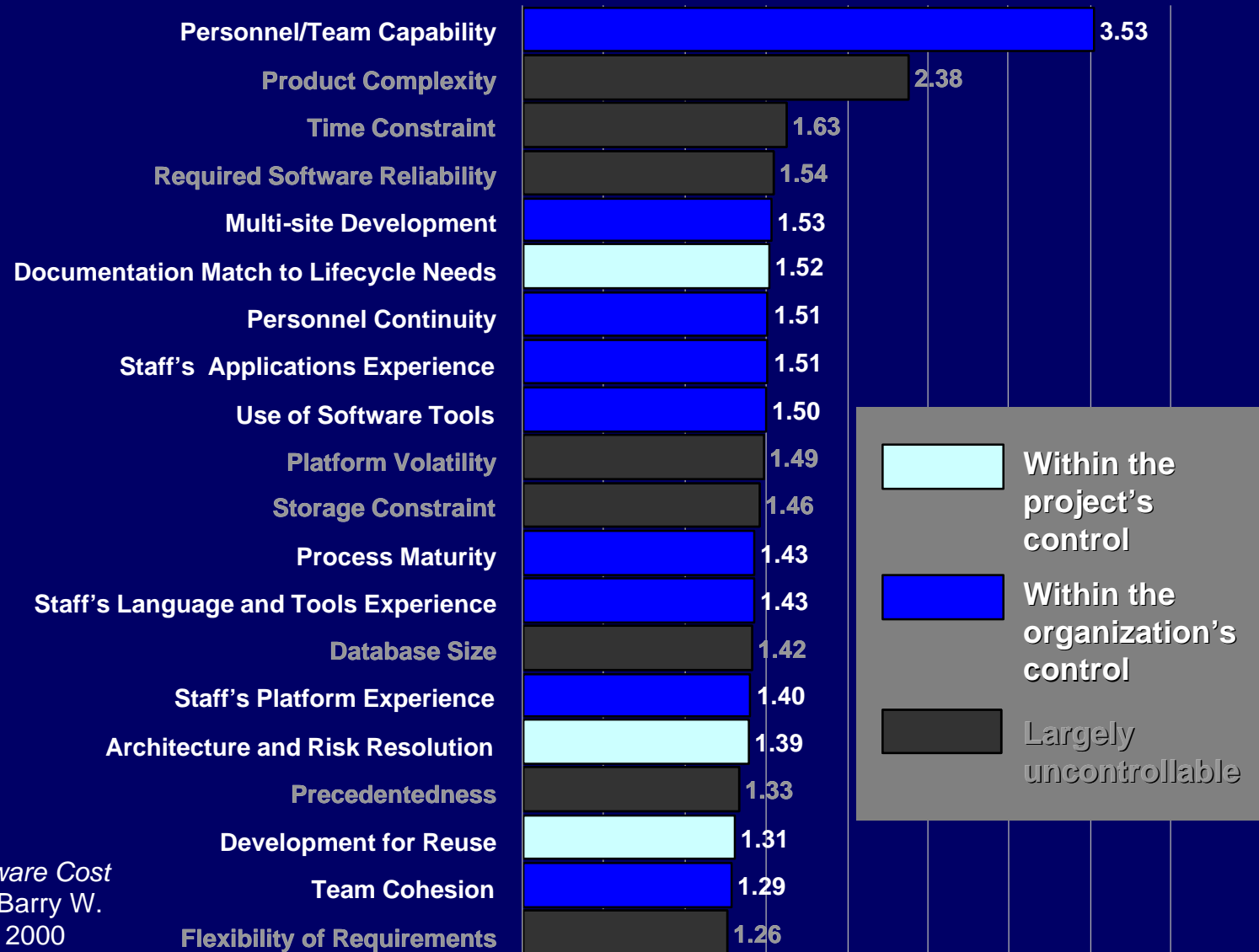
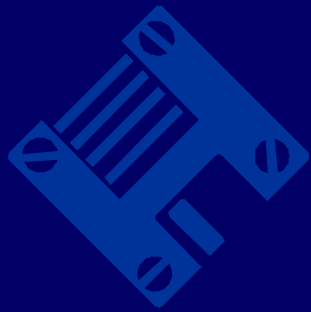
Lawrence H. Putnam, "Linking the QSM Productivity Index with the SEI Maturity Level."

"Process Maturity Profile of the Software Community 2000 Year End Update," Software Engineering Institute, March 2001.

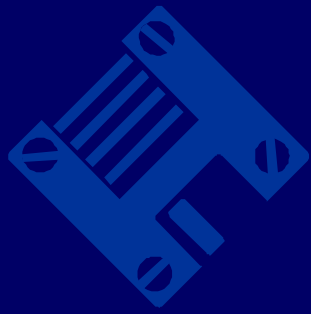


Strategy

Where's the Leverage?

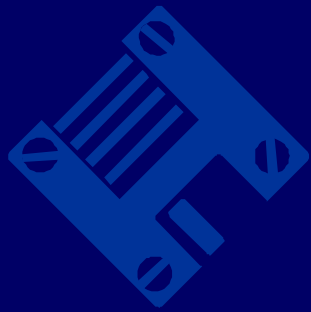


Source: Adapted from *Software Cost Estimation with Cocomo II*, Barry W. Boehm, et al, Prentice Hall, 2000



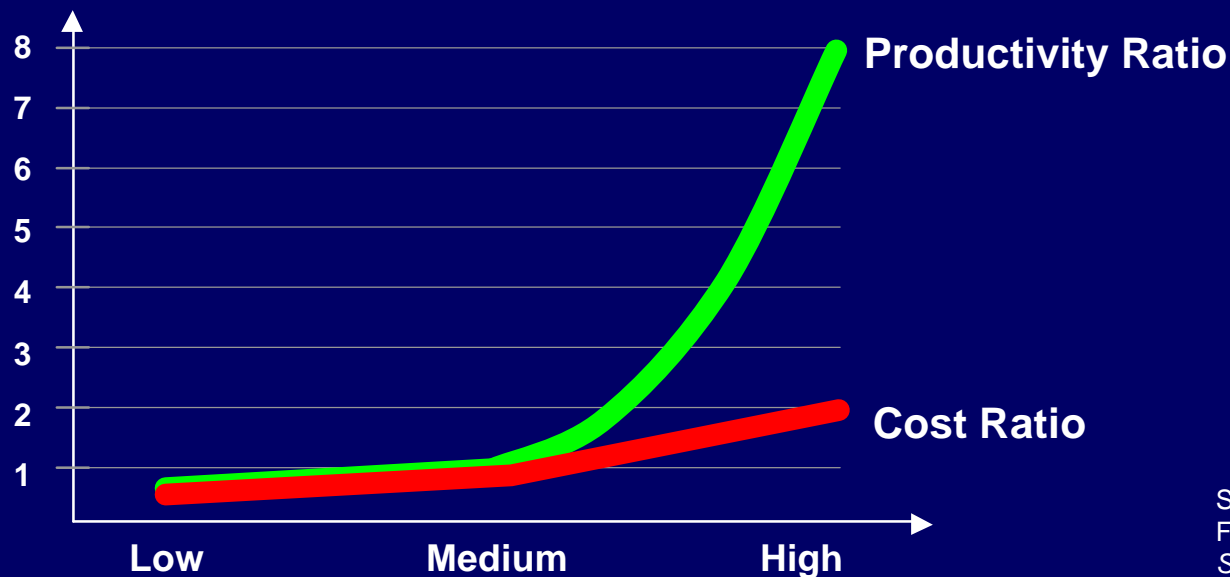
Organizational Focus

- ✍ **Few factors are readily within the control of a single project**
- ✍ **Few factors are totally outside the control of both the project and the organization**
- ✍ **Leverage for improved software practices is mostly at the organizational level rather than the project level**

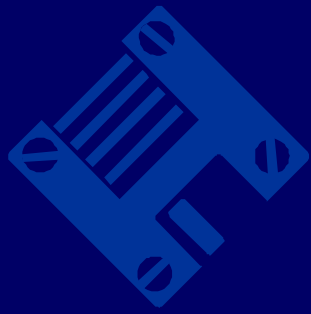


Professional Development Synergy

- ✍ Study focused on company improvement initiatives in staffing, training, and work environment
- ✍ *Low* and *Medium* investment produced proportionate
- ✍ *High* investment returned a 4-to-1 or 5-to-1 payback

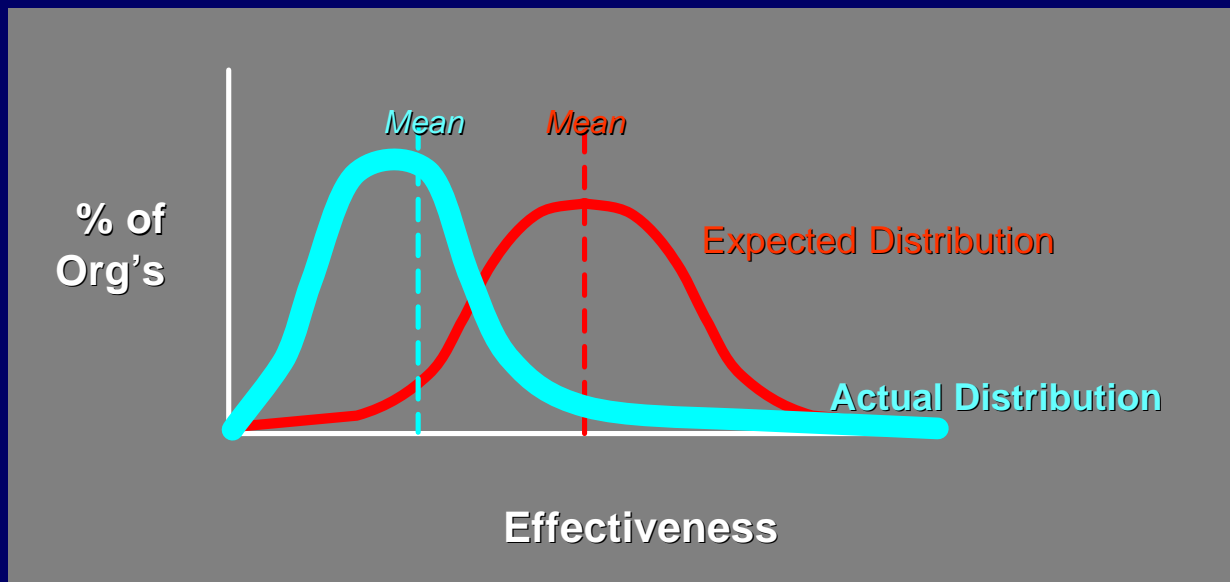


Source: Neil C. Olsen, "Survival of the Fastest: Improving Service Velocity," *IEEE Software*, September 1995.

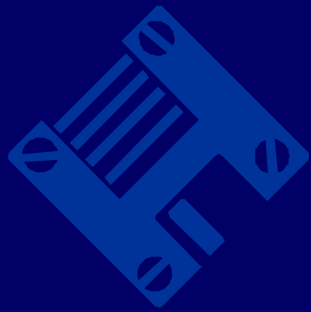


Where Is the Point of Diminishing Returns?

✍ Remember this graph?



✍ The point of diminishing returns is way out there

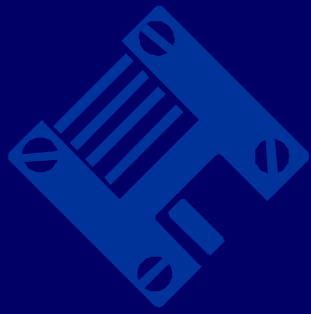


Confirmation from the SEI

“The largest organization and the smallest organization spent the two highest dollar amounts per software engineer. These two organizations also had the two highest business value* figures.”

* Benefit/cost ratio

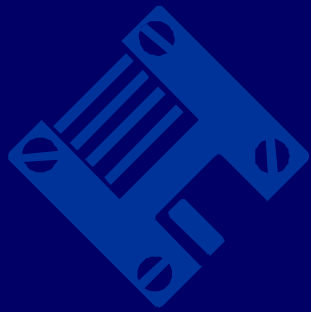
Source: James Herbsleb, et al, “Benefits of CMM Based Software Process Improvement: Initial Results,” Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.



Reports from Process-Intensive Companies

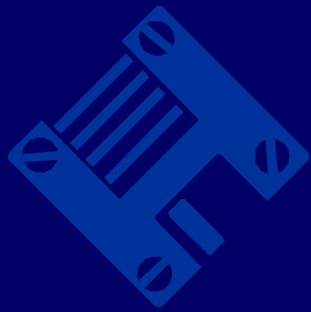
- ✍ **Telcordia (Largest organization assessed at CMM Level 5):**

“Our software business has doubled, our profits have grown, and we have measured customer satisfaction at better than 95%. Our on-time delivery is 98% to 99% over the last three years. Our employee turnover rate is in low single digits.”



Focus on Low Hanging Fruit

- ✍ **Lots of proven practices are available**
- ✍ **Risk of not using these practices is substantially higher than of using them**



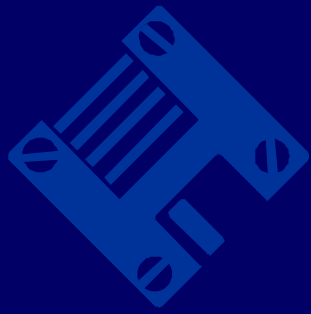
Low Hanging Fruit (year first available)

✍ Project planning and management practices

- ✍ Automated estimation tools (1973)
- ✍ Evolutionary delivery (1988)
- ✍ Measurement (1977)
- ✍ Productivity environments (1984)
- ✍ Risk-management planning (1981)

✍ Requirements engineering practices

- ✍ Change board (1978)
- ✍ Throwing away user interface prototyping (1975)
- ✍ JAD sessions (1985)



Low Hanging Fruit (cont.)

✍ Design practices

- ✍ Information hiding (1972)
- ✍ Design for change (1979)

✍ Construction practices

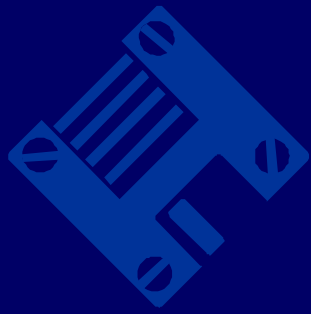
- ✍ Source code control (1980)
- ✍ Incremental integration (1979)

✍ Quality assurance practices

- ✍ Branch-coverage testing (1979)
- ✍ Inspections (1976)




✍ Process improvement

- ✍ SW-CMM (1987)
- ✍ Software Engineering Process Groups (1988?)



Where to Start

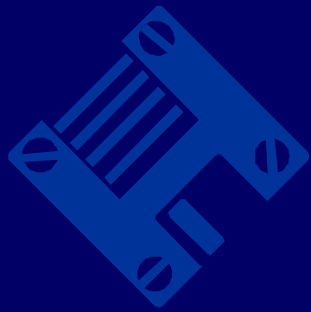
Generalities:

-  Requirements, project planning, project tracking, quality assurance, configuration management subcontractor management
-  These are the SEI CMM-SW's Level 2 KPAs
-  Construx's consulting experience bears this out as a generality

Specifics vary greatly



Scoping the Investment Required

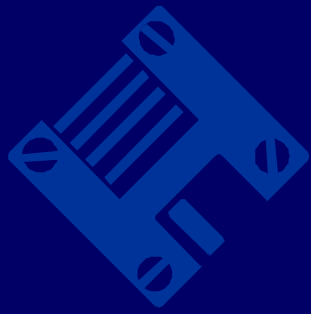


Schedule Required

- ✍ **The average time required to improve from CMM Level 1 to Level 2 is two years. One-quarter of companies make this jump in less than 18 months**
- ✍ **The average time required to achieve this improvement has steadily dropped as richer support has become available**

Sources:

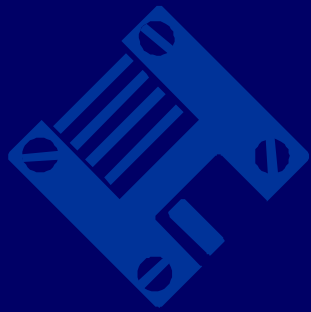
*Lawrence H. Putnam, "Linking the QSM Productivity Index with the SEI Maturity Level."
"Process Maturity Profile of the Software Community 2000 Year End Update," Software Engineering Institute, March 2001.*



Investment Required






- ✍ **The average investment is 2.0% of fully burdened labor costs, i.e., \$2000-\$3000 per employee per year**
- ✍ **This investment includes the direct costs of training, coaching, and facilities improvements**

Source: James Herbsleb, et al, "Benefits of CMM Based Software Process Improvement: Initial Results," Pittsburgh: Software Engineering Institute, Document CMU/SEI-94-TR-13, August 1994.








Construx Services

Consulting

-  Project Reviews
-  Requirements Workshops
-  Project Planning
-  Coaching
-  Organizational Assessments

Training

-  Public Seminars
-  Onsite Seminars
-  Training Needs Assessment
-  Customized Curriculums
-  Executive Briefings

Software Projects