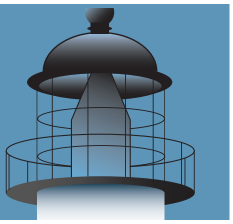
# RULE OF TEN

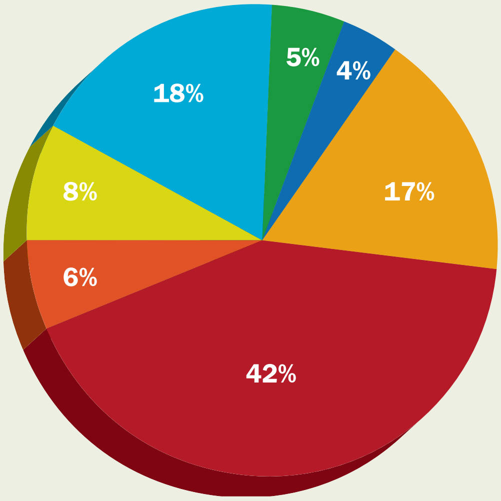


Software bugs are far more prevalent than hardware errors. In fact, software failures account for more downtime costs than hardware failures by a ratio of more than 3-to-1. It is also true that software bugs account for far more actual downtime than hardware failures. Yet many companies spend a great deal of money and time on hardware quality, but spend little time and money to ensure software quality. Even for those companies that do devote considerable resources to inspect their code, the effort is so complex that errors are still inevitable. That said, quality hardware is relatively easy to implement, whereas quality software is at best difficult to implement. In fact, companies that do not spend the time and money up front to correct bugs end up paying for it in downtime and corrective efforts after the code is released. In the worst case, it can cause the loss of customers or revenue. In this paper we discuss the Rule of Ten and how it applies to a quality application.

## LEVELS AND COSTS

The Standish Group has outlined four quality assurance levels within the software development cycle as the first part of the Rule of Ten. Level 1: unit testing and inspection after requirements, design, and coding; Level 2) system testing after combining units and integration with systems; Level 3) user acceptance testing (UAT) after integration and prior to production; and Level 4) released to production. The Rule of Ten states that after each quality assurance level it will cost 10 times more in terms of time and money to correct and fix a defect as in the prior stage. If it takes $100 to fix a defect at unit testing, it takes $1,000 at system testing, $10,000 at UAT, and $100,000 at production. Thus the Rule of Ten.

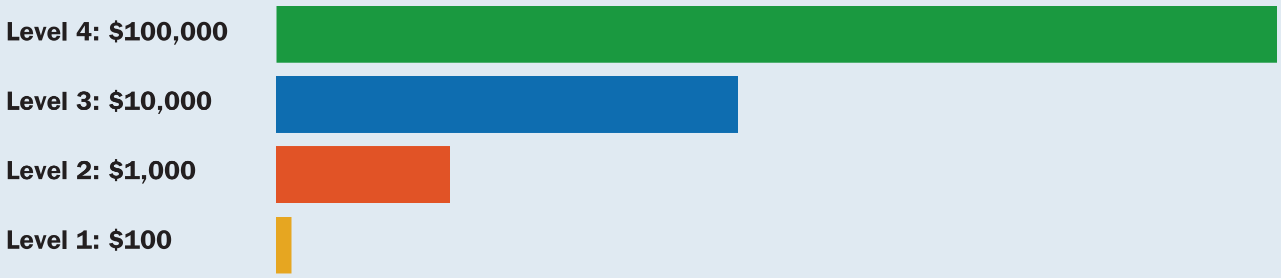
### CAUSES OF DOWNTIME



🟩 Operator Error 5%
🟦 Hardware Failure 4%
🟧 Infrastructure Software Failure 17%
🟥 Application Bug or Error 42%
🟧 Network 6%
🟨 Viruses, Hacker, etc. 8%
🟦 Environment & Other 18%

*The above chart shows application bugs to be the leading cause of downtime from our 20 years of primary research.*

### COST BY LEVEL



*The above graphic shows the cost to fix a defect by level of quality assurance.*

# ENDURING DEFECTS

The second part of the Rule of Ten is that after each level you will have 10% of the remaining defects left in the application. In other words, you will find and correct 90% of defects in unit testing and have 10% remaining defects going into system testing. In system testing you will find and correct 90% of the remaining defects, with 10% of those remaining defects going into user acceptance testing. Therefore, at Level 2 you should have found and corrected 99% of the total project defects. In user acceptance testing you should find and correct 90% of the remaining 1% of defects. Going into production you should have 99.9% clean code. This is generally the very best you can do.

| RULE OF TEN | | | | |
|---|---|---|---|---|
| | Defects | Defects Found | Cost to Fix/Detect | Cost |
| **UNIT TESTING & INSPECTION** | 15,000 | 13,500 | $100 | $1,350,000 |
| **SYSTEM TESTING** | 1,500 | 1,350 | $1,000 | $1,350,000 |
| **UAT** | 150 | 135 | $10,000 | $1,350,000 |
| **PRODUCTION** | 15 | 14 | $100,000 | $1,400,000 |
| **Total Cost of 500,000 lines of code** | | | | **$5,450,000** |

*The above chart shows the defect rate and cost to fix 500,000 lines of code using the Rule of Ten.*

# 80% EFFORT

If your quality assurance program has a 90% effective rate then only .1% of defects will make it into production. However, if your quality assurance program has less than a 90% effective rate then the drop in effectiveness will increase the cost. Just dropping the effective rate to 80% will quadruple the cost, according to the Rule of Ten. Reducing the effective rate will also cause a tenfold number of defects that make it into production, with a corresponding increase in costs. Instead of a 99.9% clean application, the application will be 99.2% clean with .8% of defects. The only level that is less expensive than the 90% efficiency rate is Level 1: unit testing and inspection. At the other three levels the costs skyrocket.

| RULE OF TEN | | | | |
|---|---|---|---|---|
| | Defects | Defects Found | Cost to Fix/Detect | Cost |
| **UNIT TESTING & INSPECTION** | 15,000 | 12,000 | $100 | $1,200,000 |
| **SYSTEM TESTING** | 3,000 | 2,400 | $1,000 | $2,400,000 |
| **UAT** | 600 | 480 | $10,000 | $4,800,000 |
| **PRODUCTION** | 120 | 108 | $100,000 | $10,800,000 |
| **Total Cost of 500,000 lines of code** | | | | **$19,200,000** |

*The above chart shows the defect rate and cost to fix 500,000 lines of code with the Rule of Ten, but with an 80% QA efficiency rate.*

## SKIPPING STEPS

Many organizations are using their user base as the last step in the quality control process. In some cases this has worked very well and cut the QA cost. However, in other cases this could be a recipe for disaster. Using the Rule of Ten, this means that 1% of the defects could fall into production by cutting out user acceptance testing. In a million lines of code this means 300 defects could be in the production application. While many users and customers may tolerate poor quality, the cost to fix these defects still could be great. In addition, many users might not be so tolerant and may move on to a higher-quality product. This is especially dangerous if the product is a commodity that can be easily replaced. The quality of the staff has a major effect on the percentage of errors and quality of code. Another major effect is how management addresses quality. If management demands high quality, they will get a high-quality product. If the staff does not think that management cares about quality, then the team will not produce a quality product.

**RULE OF TEN**

| | Defects | Defects Found | Cost to Fix/Detect | Cost |
|---|---|---|---|---|
| **UNIT TESTING & INSPECTION** | 15,000 | 13,500 | $100 | $1,350,000 |
| **SYSTEM TESTING** | 1,500 | 1,350 | $1,000 | $1,350,000 |
| **UAT** | 0 | 0 | $10,000 | $0 |
| **PRODUCTION** | 150 | 135 | $100,000 | $13,500,000 |
| **Total Cost of 500,000 lines of code** | | | | **$16,200,000** |

*The above chart shows the defect rate and cost to fix 500,000 lines of code using the Rule of Ten, but skipping the UAT Level.*

## THE AGILE EFFECT

If you are doing agile correctly, about 50% of the cost of the project will be in quality control. On the other hand, the cost of the project will be 50% of the cost of a similar project using waterfall or other methodologies. This is because with agile the quality is embedded into the process. Users are part of the team, which means that user acceptance starts at the first story card and test routine. The team creates the test before the code. A product owner ensures that the right things are being built in the right priority. Programmers work in pairs and catch each other's errors. There are constant reviews and retrospectives. Refactoring takes care of a lot of design and requirements problems. The product is delivered in small releases, and if the product is not right then only few weeks are lost and the team starts over having learned a valuable lesson.

## ADDITIONAL RESOURCES AND RESEARCH

There are a few research reports cited or utilized within this research report. These reports are:

- CHAOS Manifesto 2013: Think Big, Act Small
- The State of Readiness
- The True Cost of a Project

CHAOS Tuesday

These reports are available to CHAOS University Members and some can be purchased separately in our online store at standishgroup.com. Many of the subjects within this report are subjects of CHAOS Tuesday, our Internet radio program. These shows include:

CHAOS Tuesday #29: User Acceptance Testing

CHAOS Tuesday #14: Trade-offs

CHAOS Tuesday #10: Agile Quality

CHAOS Tuesday #5: Collaborating

CHAOS Tuesday #1: Retrospectives

# VALUE-BASED PROJECT MANAGEMENT

Value-Based Project Management (PM) is the process of fashioning a project ecosystem that puts more focus on creating value and innovation for the organization versus project success. The Standish Group's Value-Based PM appraisal and benchmark focus on how to shape your project environment to allow the organization to concentrate on value versus the artificial and inadequate measurement of the traditional "triple constraints" (cost, time, and quality).

Value-Based PM is not a new process or methodology, but it looks at ways to reduce the burden of the existing system and environment to increase speed and risk, while reducing control and cost. Value-Based PM is a balance between innovation and governance with respect to value. Value-Based PM looks at the true cost of a project and that relationship to value. There are three user steps in the Value-Based PM appraisal and benchmark:

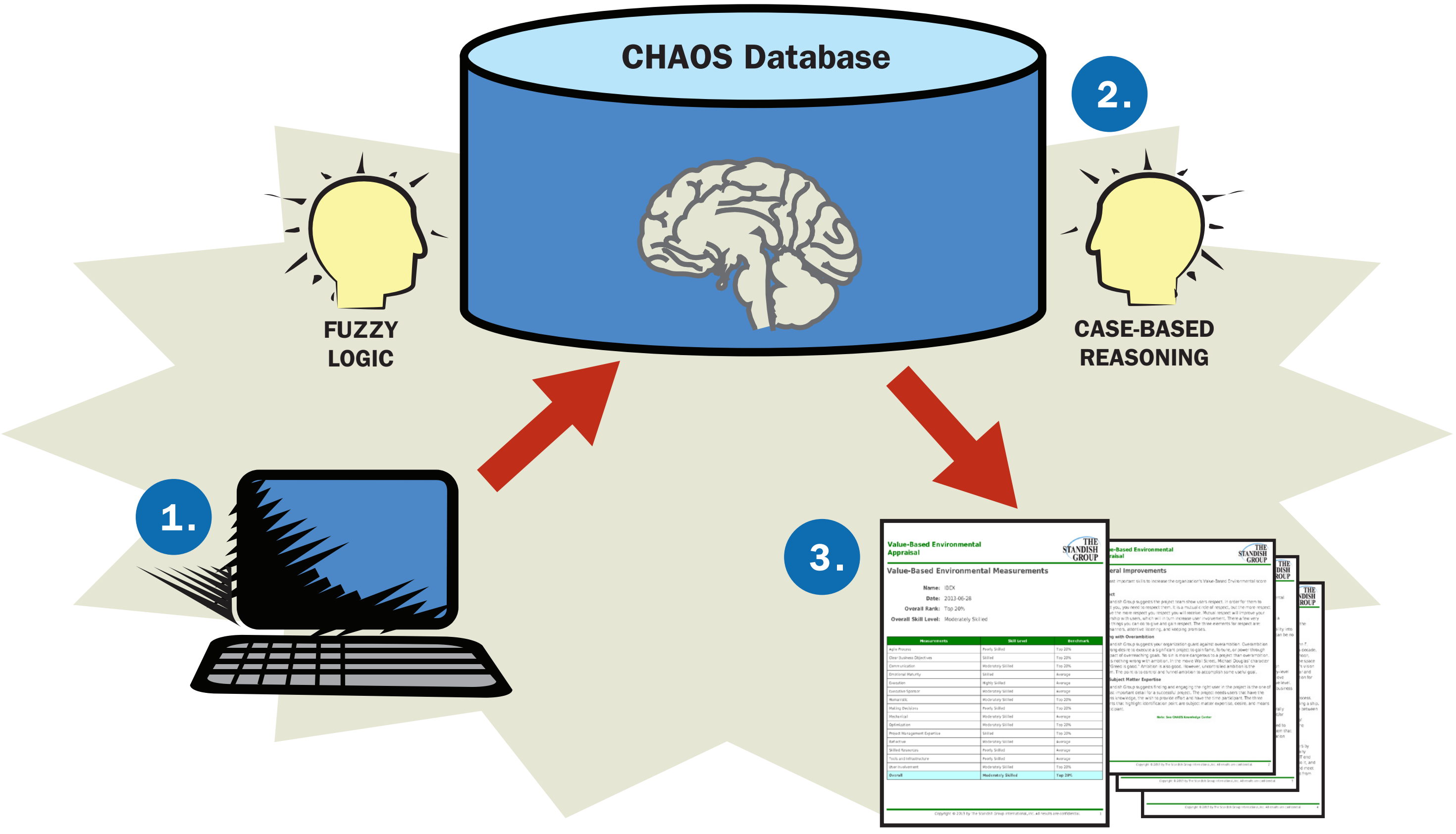
**STEP 1:** Current PM Methods Review: is a two-hour overview of the current PM methods and practices with two Standish advisors. Standish will have special interest in tools and artifacts used in the project management process.

**STEP 2:** Environmental Workshop: is a two-hour session with a cross-section of people familiar with the project delivery environment. The session covers 100 value-based skill questions. The session is moderated and scored by a Standish advisor.

**STEP 3:** Post-Project Appraisals: are one-hour reviews of 25 of the most recent projects completed. These post-project appraisals look at 25 different attributes that are in the CHAOS database. These attributes include the method of creation and implementation, as well as the number of different people, departments, executives, users, and others who would be involved and have use of the project. The business applications are considered.

We then take the output from these three events and match them against our database of 50,000 projects, 1,000 organizations, and our value-rating index. The output is a value appraisal, benchmark, and a recommendation on steps the organization can take to increase the project portfolio value.

## ValueCHECK DIAGRAM



Value-Based Environmental Appraisal

THE STANDISH GROUP

Value-Based Environmental Measurements

**Name:** IBEX
**Date:** 2013-06-28
**Overall Rank:** Top 20%
**Overall Skill Level:** Moderately Skilled

| Measurements | Skill Level | Benchmark |
|---|---|---|
| Agile Process | Poorly Skilled | Top 20% |
| Clear Business Objectives | Skilled | Top 20% |
| Communication | Moderately Skilled | Top 20% |
| Emotional Maturity | Skilled | Average |
| Execution | Highly Skilled | Average |
| Executive Sponsor | Moderately Skilled | Average |
| Humanistic | Moderately Skilled | Top 20% |
| Making Decisions | Poorly Skilled | Top 20% |
| Mechanical | Moderately Skilled | Average |
| Optimization | Moderately Skilled | Top 20% |
| Project Management Expertise | Skilled | Top 20% |
| Reflective | Moderately Skilled | Average |
| Skilled Resources | Poorly Skilled | Average |
| Tools and Infrastructure | Poorly Skilled | Average |
| User Involvement | Moderately Skilled | Top 20% |
| **Overall** | **Moderately Skilled** | **Top 20%** |

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