

Why Johnny Still Cannot Write Requirements

Ivy Hooks

Abstract

In 1990, the Why Johnny Can't Write Requirements paper was published by IEEE and also presented to a Data Processing Management Association Symposium. During that year INCOSE was formed, Hubble Space Telescope was launched, Iraq invaded Kuwait, Alan Davis published a book on writing software requirements, several requirement management tools were marketed and a few classes existed. A lot has happened in 20 years. Our view of the universe has changed because of Hubble, our understanding of how wars will be fought in the future has changed because of what happened in Iraq and Kuwait, and many more people are on the requirements and system engineering band wagon than even knew it existed in 1990.

We'll explore how things were 20 years ago with updates for the intervening years, to understand where we have been and what has happened in the world, to INCOSE, to SEs and to requirements processes, practices, use of tools and other changes. We'll share your feedback on where you think today's requirements problems lie, for you and for your organization.

We'll look at where you are now by having you take a short quiz on requirements and grade yourself. This will help you understand if you need to learn more of the basics or move on to other topics and give you some ideas to take back to your own organization.

We'll explore what still needs to be done now and how you can go about causing more changes to improve requirements processes and practices to help your organization or company, much more efficiently and effectively, develop or acquire the products that are needed for your success and the success of your customers and users.

Biography

Ivy HOOKS, USA, is CEO of Compliance Automation Inc., a charter member of INCOSE, an internationally recognized expert in requirements, an author and speaker. Ivy has managed and owned a company since 1985, Ivy previous had a highly exciting 20-year career at the NASA Johnson Space Center where she served on the initial Space Shuttle design team and in a number of engineering and management jobs. Ivy holds a BS and MS in Mathematics from the University of Houston and is the recipient of a number of awards.

Why Johnny ^{STILL} ^ Can't Write Requirements

Presented at INCOSE 2010

by

Ivy Hooks

of



Compliance Automation, Inc.

The Requirement Experts

Objectives

- Help you understand the state of requirements prior to INCOSE - 20 years ago
- Provide a 20-year history of the evolution of requirements since 1990
- Address what is needed in 2010 to have defect-free requirements

What's Coming Next

- Pre-1990

1960-1990 major engineering events

◆ Space

◆ Aircraft

◆ Electronics

◆ Computers

◆ Medical

◆ Other

What we had/ didn't have in 1960-80

◆ Had

- Mil Std 490 and 499
- People with experience who mentored
- Discipline
- Awesome engineering leaders

◆ Didn't Have

- Requirement Management Tools (RMT)
- Organizations for SE, RE, BA, and PM
- Much software
- Jillions of programs and projects
- Nearly as much pork-barrel politics

What happened in the 80-90 time period

- ◆ Loss of expertise
- ◆ Desire for instant gratification
- ◆ Smarter than all of history
- ◆ Huge increase in software
- ◆ Huge increase in number of programs and projects
- ◆ Too few awesome leaders

What's Coming Next

- 1990-2010

1990



Requirement State-of-the Art - 1990

- Publications
 - MIL-STDs for systems
 - Two text books for software
 - Why Johnny Paper
- Significant Events
 - National Council for Systems Engineering (NCOSE)
 - USAF sponsored 2nd Software Technology Conference (STC)
- Tools and Training
 - RDD -100 and Document Director and a few others
 - Government and company in-house plus 2 commercial

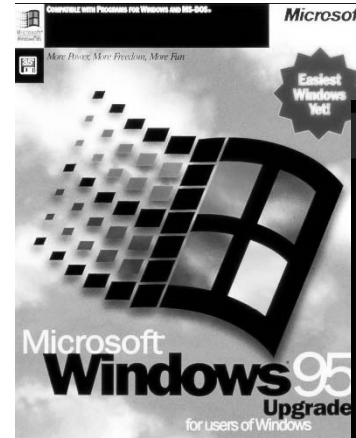
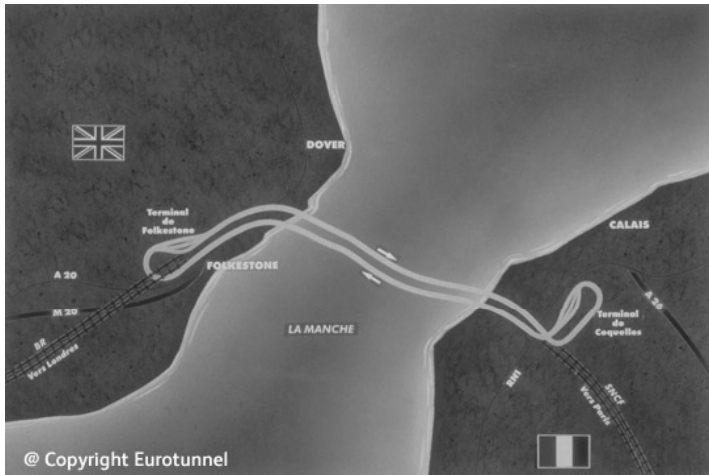
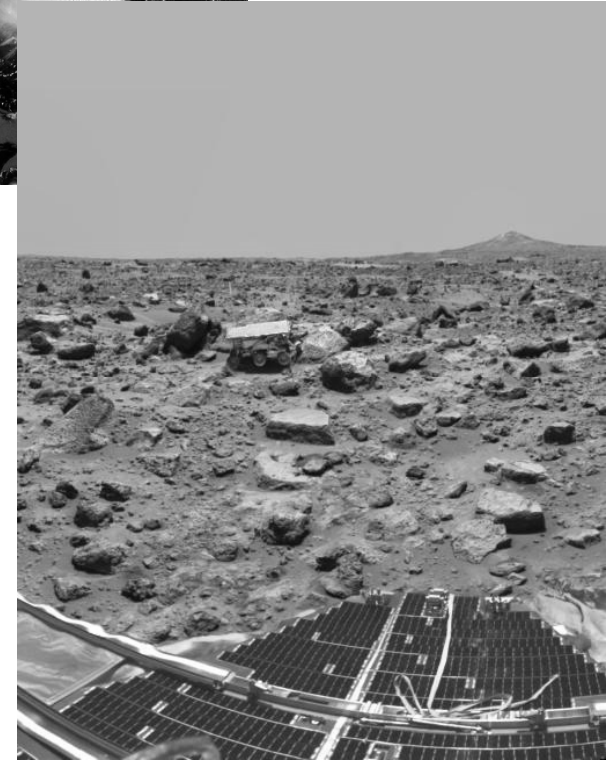
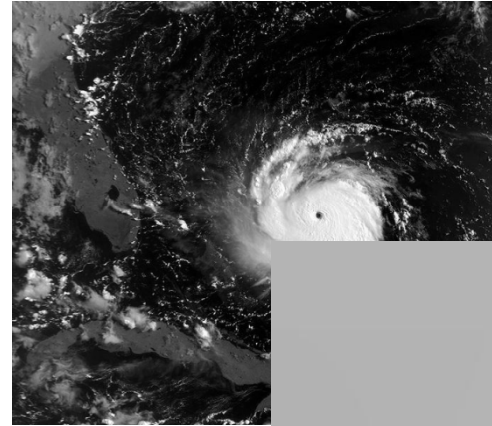
Requirement Thinking - 1990

- GAO recognized poor requirements as contributing to failed products and cost and schedule overruns
- The right *Requirement Management Tool* (RMT) would fix everything
- *Quality* was the buzz word

Why Johnny Can't Write Requirements

- Identified problems
- Identified causes of problems
- Made suggestions for fixing problems
- Identified why Johnny can't write requirements

1991- 2000



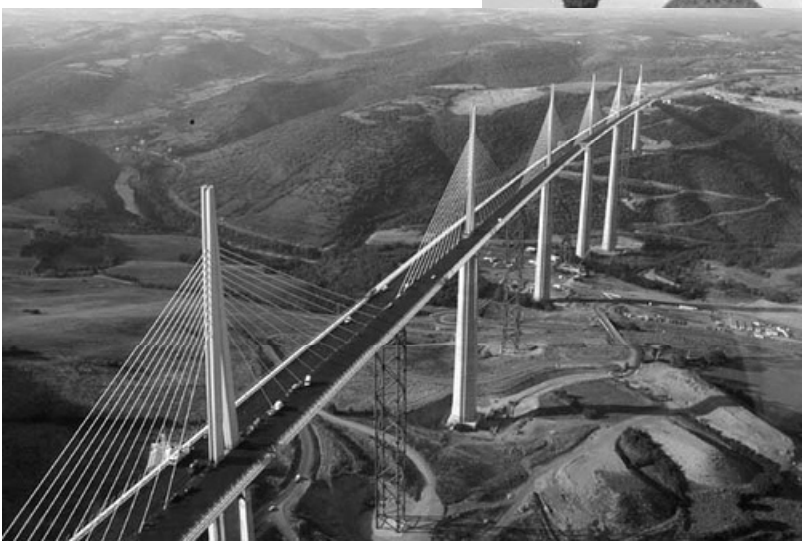
Requirement State-of-the Art - 2000

- Publications
 - IEEE Stds for systems and software specifications
 - At least six significant books
- Significant Events
 - NCOSE becomes INCOSE
 - STC for all DOD
 - ISRE and ICRE formed
 - CMM and CMMI published
- Tools and Training
 - Ten or more tools on the market
 - A few companies adding requirements to list of courses

Requirement Thinking 2000

- Requirements were a big issue in and out of the government
- Standish group reflecting software projects in particular
- GAO still pointing to requirement issues in government projects
- Requirements were divided into software and systems by those addressing them
- The software buzz words: *new method*
- The SE buzz words: *a tool that integrates everything*

2001-2010



Requirement State-of-the Art - 2010

- Publications
 - 6+ more good books on requirements
 - Book of Knowledge for INCOSE and IIBA
 - More CMMI deliveries
- Significant Events
 - ICRE and ISRE merged into RE
 - IIBA formed
 - PMI acknowledged requirements in their BOK
 - STC became SSTC
 - System and software requirements processes are merging

Requirement State-of-the Art – 2010 (cont)

- Tools

- Ian Alexander currently lists over 40 RMTs at his web site-
<http://easyweb.easynet.co.uk/~iany/other/vendors.htm>

- INCOSE website lists 32 RMTs – www.incose.org

- Volere lists even more requirement tools
www.volere.co.uk/tools.htm

- Training

- More training companies adding requirement topic

- More corporations with in-house requirement classes

- More interest in advanced classes

Requirement Thinking 2010

- GAO and others still point out problems
- Auditors and consultants still see some of the same old problems plus new ones
- *Agile* is wrongly interpreted as making requirements obsolete
- *Modeling* is the system and software buzz word
- *Certification* is a corporate cure-all

Requirement Improvements 2010

- Some organizations have significantly improved their requirements
 - Committed to improvement
 - Followed proven practices
 - Practiced discipline with well-defined process
 - Made win-win for all
- Some organizations benefit from use of RMT
- More knowledgeable individuals who
 - Coach and mentor new hires and peers
 - Carry their knowledge to new environments

Requirements 2010 – NETTDIR, AETTDIO

- Scope issues still exist
 - Don't understand problem and solution boundary
 - Understand but do not adequately document
 - Document but not provided to all who need it
- Lack of requirement validation
 - Lack of standards
 - Don't do inspections early
 - Rely on big ugly document reviews by untrained people
- Start design with defect-laden requirements
- Document requirements after the design
- Untrained personnel

NEW bad requirement practices - 2010

- Abandon proven practice – too hard
- Put in place junk process – invented on the fly
- Put in place practices because “RMT supports”
- GIGO
- Assuming “Process” is all that is needed
- Fail to maintain requirements – operate on requirement deltas – impossible to manage changes

Why Johnny Can't Write Requirements - 1990

1. He doesn't know what to do
2. He doesn't understand why he should do it
3. He would rather be doing something else
4. He sees no reward

STILL

Why Johnny^Can't Write Requirements - 2010

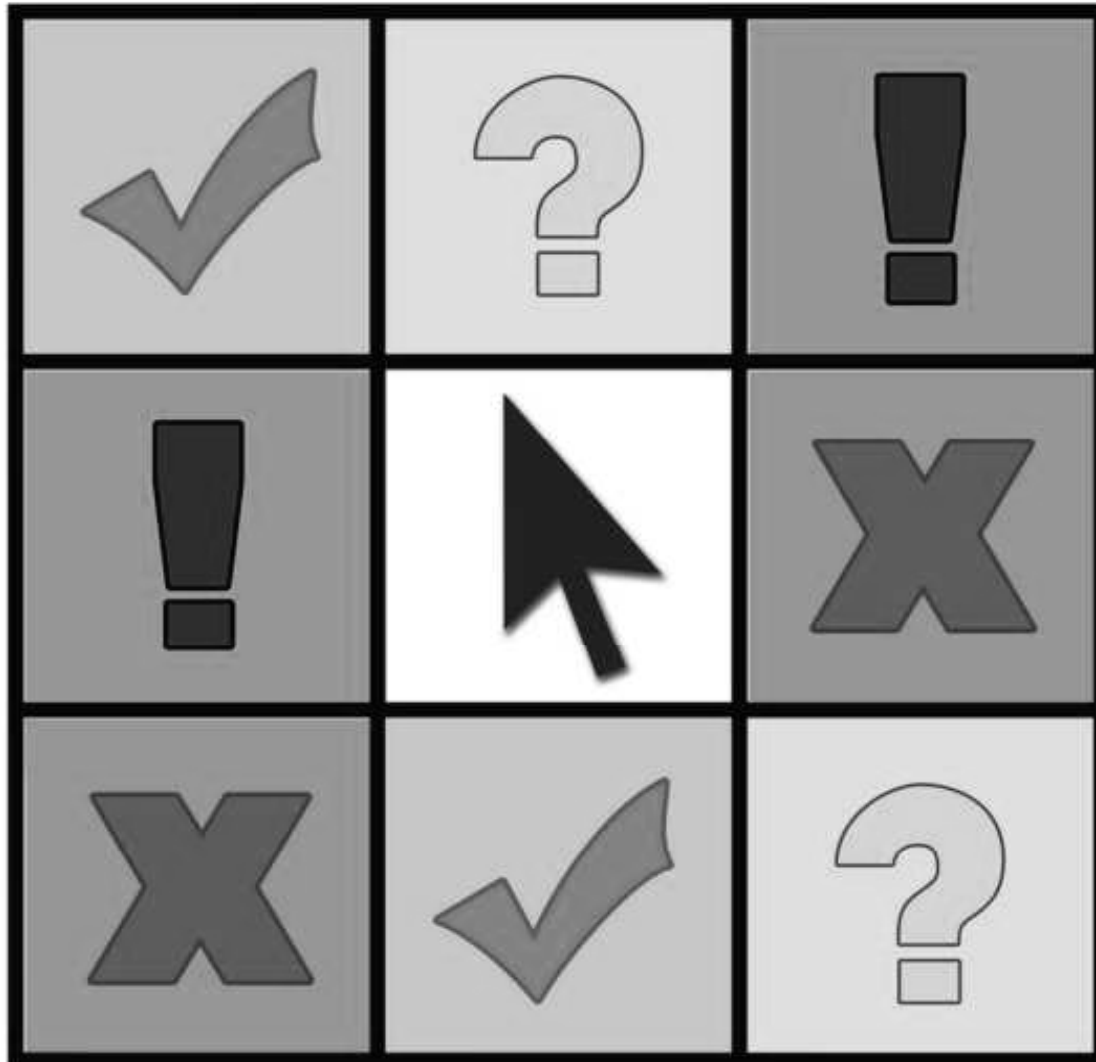
What's Coming Next

- A requirements knowledge test

Grade Yourself

- Questions asking for a number of answers - such as 3 characteristics
- For non-numbers, such as: define need or what's wrong with the requirement
- Give yourself 1 point per correct item.
- Each time you get the number asked for add a bonus point.
- Give yourself 5 points for each part of the question - NGO counts 15 total

How Did You Do?



Are you ready to learn more?

My bad assumptions

- Training alone would fix most of Johnny's problems
- The seriousness of "manager's blindspot"
- The world would continue much as it had in the past
- There were a lot of other organizations that were getting it right
- Process changes would rapidly fix the requirement problems
- That someone somewhere was recording good metrics
- That most organizations did some requirement validation

What's Coming Next

- Validation
- Class Metric

Who Does Requirement Validation?



Writers



Managers



Reviewers

Everyone



Everyone is accountable



Developers

Continuous Requirement Validation Process

- Requirement Writer:
 - Write requirement and attributes
 - Check requirements against standards
 - Submit to gatekeeper for review
- Gatekeeper (person or inspection points)
 - One or more experts
 - Reviews requirements against standards
 - Accepts defect-free requirements for input to database or document
 - Return requirements to author if defects found

Continuous Requirement Validation Process

- Continuous validation holds everyone responsible
 - Requires standards and checklists
 - Requires training
 - Management has to enforce discipline and accountability
- ROI is high
 - Stops the creation of BIG bad documents
 - Most effective way to realize process improvement
 - Reduces time for big reviews
 - Prevents lost time due to rework

Inspections

- Inspections identify potential defects as requirements are being written
 - Done incrementally as requirement document is being developed
 - Uses peers for the inspection
 - Uses customized checklists
 - Author responsible for defect resolution
- ROI is high
 - Defects uncovered early in the process
 - Reduces requirement risk
 - Improves process
 - Reduces formal review time
 - Reduces verification time

Conducting an Inspection

- Minimum of 3 types of participants
 - Moderator - plan and lead effort
 - Inspector(s) - do the actual inspection
 - Recorder - creates defect log
- Develop checklist
- Select and train participants
 - Scope
 - Checklist
 - Assignments
- Ensure requirement document ready for inspection
- Conduct inspection - create defect log
- Author resolves each defect
- Follow-up

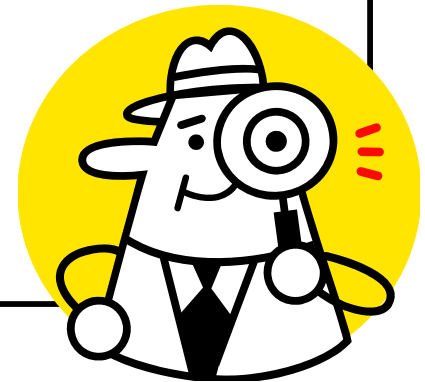
Requirement Inspection

A defect is an instance in which a user's need or expectation is not satisfied

- A requirement defect is anything that can result in that instance
- A requirement defect can create problems through the life cycle - in design, development, verification, or operations that will result in that instance

Activity: Inspection

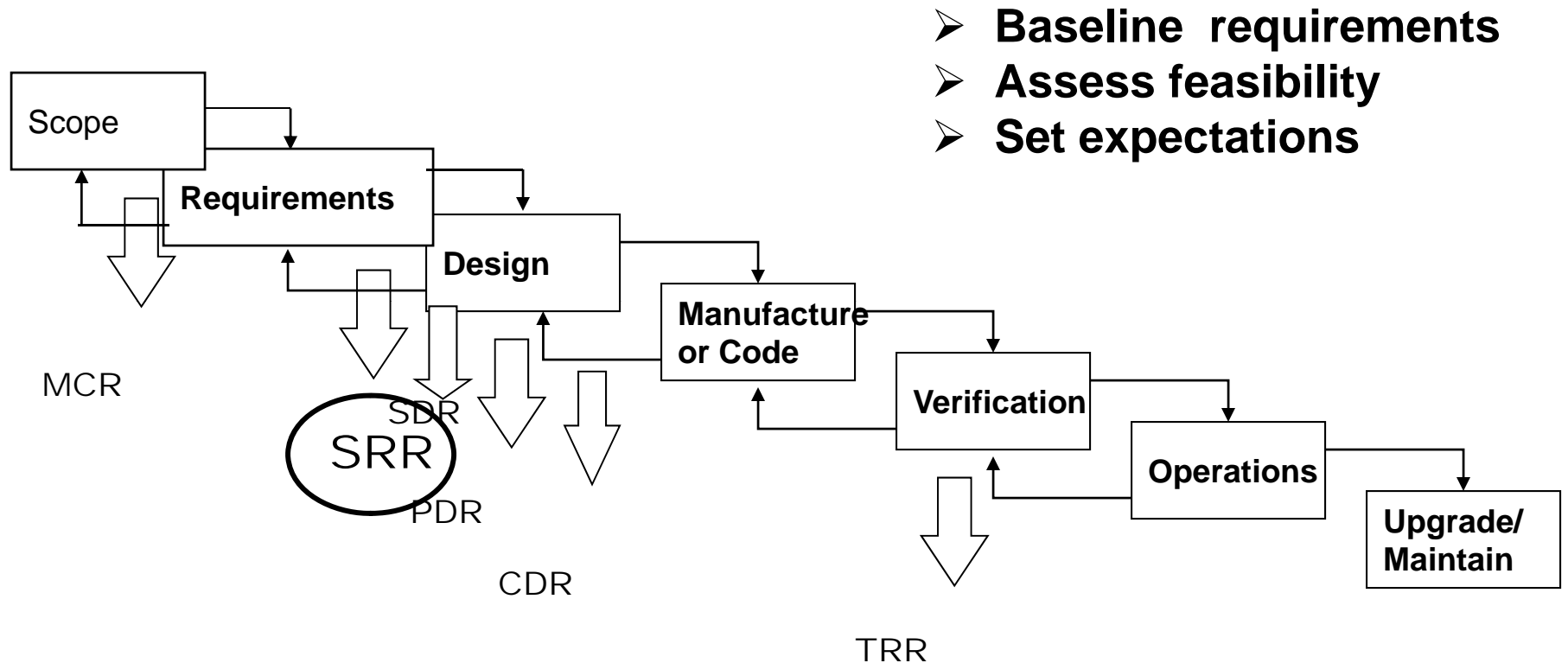
- Use the set of requirements provided
- Use the defect list provided
- List the defects for each requirement



Discrete Validation Process

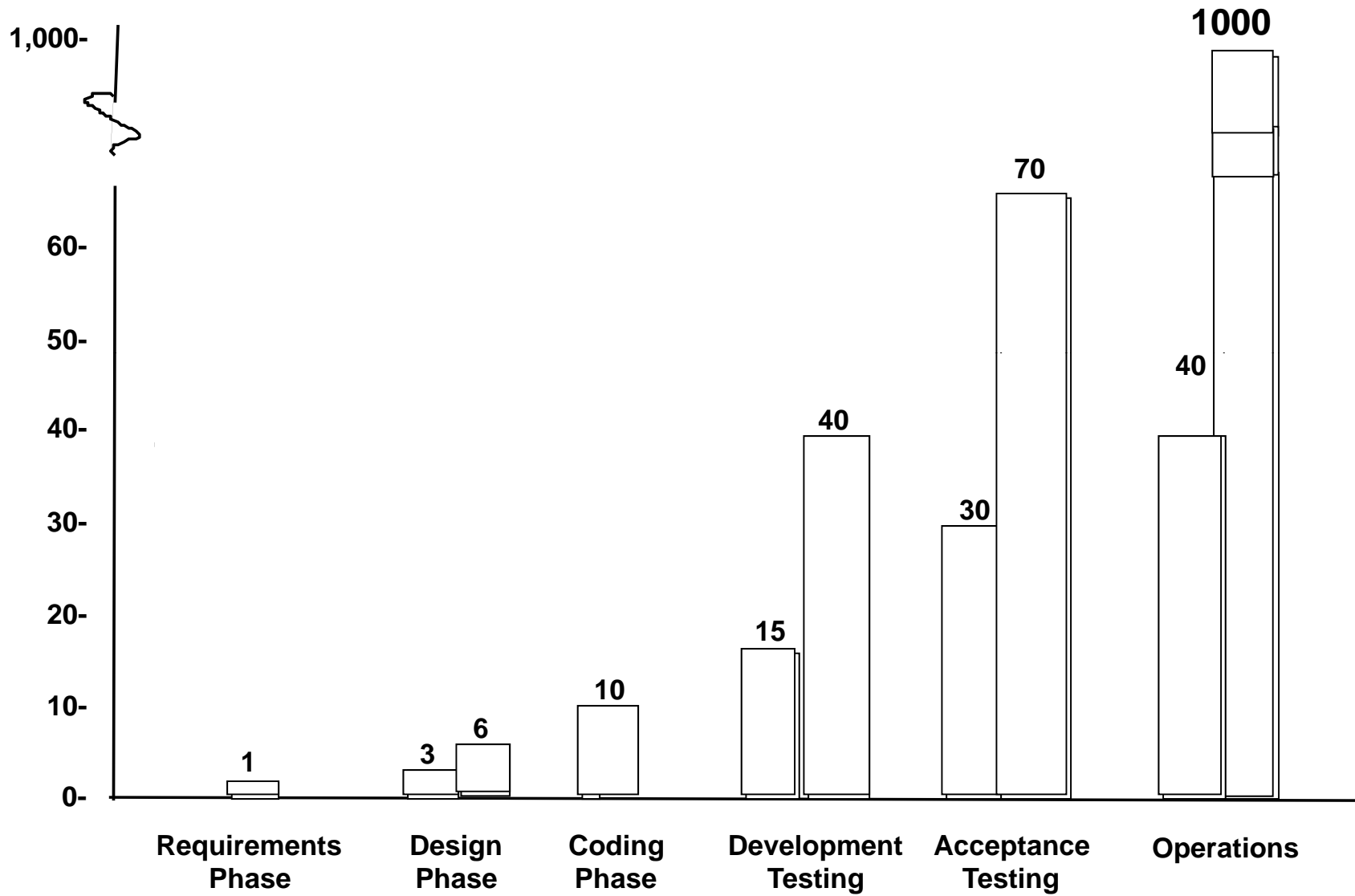
- Key milestone that requires time and resources
 - Formal process
 - Complete document
 - Involves a wide range of stakeholders
 - Requires standards and feedback mechanisms
 - Requires training
 - Management has to ensure responsiveness
 - SRR results in a requirement baseline
- ROI is high IF
 - The right people are involved
 - The products are ready for review
 - The participants know what to do
 - Management ensures compliance

System Requirement Review (SRR)



MCR: Mission Concept Review
SRR: System Requirements Review
SDR: System Definition Review
PDR: Preliminary Design Review
CDR: Critical Design Review
TRR: Test Readiness Review

Cost to fix requirement defects



Class Metric

- Please complete the survey you were given

Where do **YOU** go from here?



As a customer organization

- Use skilled personnel to audit your requirements – before you put out an RFP
- Provide clear scope of your project/product with your requirements – do not make the providers guess at your intent
- Provide rationale for each requirement – why it exists and is what it is – no one can read your mind
- Encourage questions about any and all your requirements

As a provider organization

- If you propose sans customer scope, document the proposal team vision of the customer's scope so you can provide it to the design team
- Do not make assumptions about anything
- Ask questions
- Give the customer your interpretation and request clarification and correction - for scope and for each requirement
- Don't make *customer mistakes* when producing requirements for subcontractors

As an individual

- Become proficient at writing and reviewing requirements
- Insist on others providing you with scope and rationale - or provide your best guess to them
- If you must make assumptions, document and distribute them
- Help others on your team become better at writing defect-free requirements

ACRONYMS

AETTDIO – Always Enough Time to Do It Over

BOK – Book of Knowledge

CMM – Capability Maturity Model

CMMI – Capability Maturity Model Integration

DOD – Department of Defense

GAO – Government Accountability Office

GIGO – Garbage In Garbage Out

ICRE – International Conference on Requirements Engineering

IIBA – International Institute of Business Analysis

INCOSE – International Council on Systems Engineering

ISRE – International Symposium on Requirements Engineering

NCOSE – National Council on Systems Engineering

NETTDIR – Never Enough Time to Do It Right

PMI – Project Management Institute

RE – International Requirements Engineering Conference

RFP – Request For Proposal

RMT – Requirement Management Tool

STC – Software Technology Conference



Compliance Automation, Inc.

The Requirements Experts

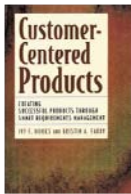
The **Compliance Automation, Inc.** (CAI) team of recognized requirements experts takes pride in implementing quality requirement management processes for our clients. We have trained and supported government agencies, private companies and service organizations since 1990. As your company implements more complex systems, the need for good requirements will be essential to your success and CAI can help.

Products from Compliance Automation, Inc.



Requirements: Best Practices (Video/Audio Series)

We selected major topics from our training seminars to create this series as a refresher for your existing employees or as support for bringing new people up-to-speed. Choose the format that fits your needs: video (DVD), audio-only (CD) or web-based.



Customer-Centered Products

By Ivy F. Hooks and Kristin A. Farry

This highly practical book shows you how to elicit the right requirements at the start of a project, keep the development process on track, and make the right product the first time.



Guide for Managing and Writing Requirements

The Guide provides many of the best practices using examples from two small space programs conducted by the NASA Johnson Space Center. It has been extremely helpful to non-space related industries, such as oil companies and banks, and for hardware and software.

Online Resources

Visit complianceautomation.com for more resources collected and developed by our consultants:

- Whitepapers
- Templates
- Good Requirements Reference Card
- and more!

Consultation and Facilitation Services

Tap into the wealth of experience and knowledge of our senior consultants:

- Process and Requirement Audits
- Moderation of Requirements
- Requirements Facilitation

www.complianceautomation.com

Phone: (830) 249-0308 • Fax: (830) 249-0309

training@complianceautomation.com

217 E. Bandera Road, Suite 200, Boerne, Texas 78006-2991