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Training and Services for Project Success

Triple Your Chances of Project Success

Risks and Requirements

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Overview

- Risk and Requirements
- Winning Product vs. Risk
- Scope Risks
- Requirement Risks
- Requirement Management Risk
- Parting Thoughts

NASA OIG

- "Program risks increase when contracts are awarded before developing a sound business case and clearly defining requirements;"
  - Placing "the project at risk of significant cost overruns, schedule delays, and performance shortfalls."

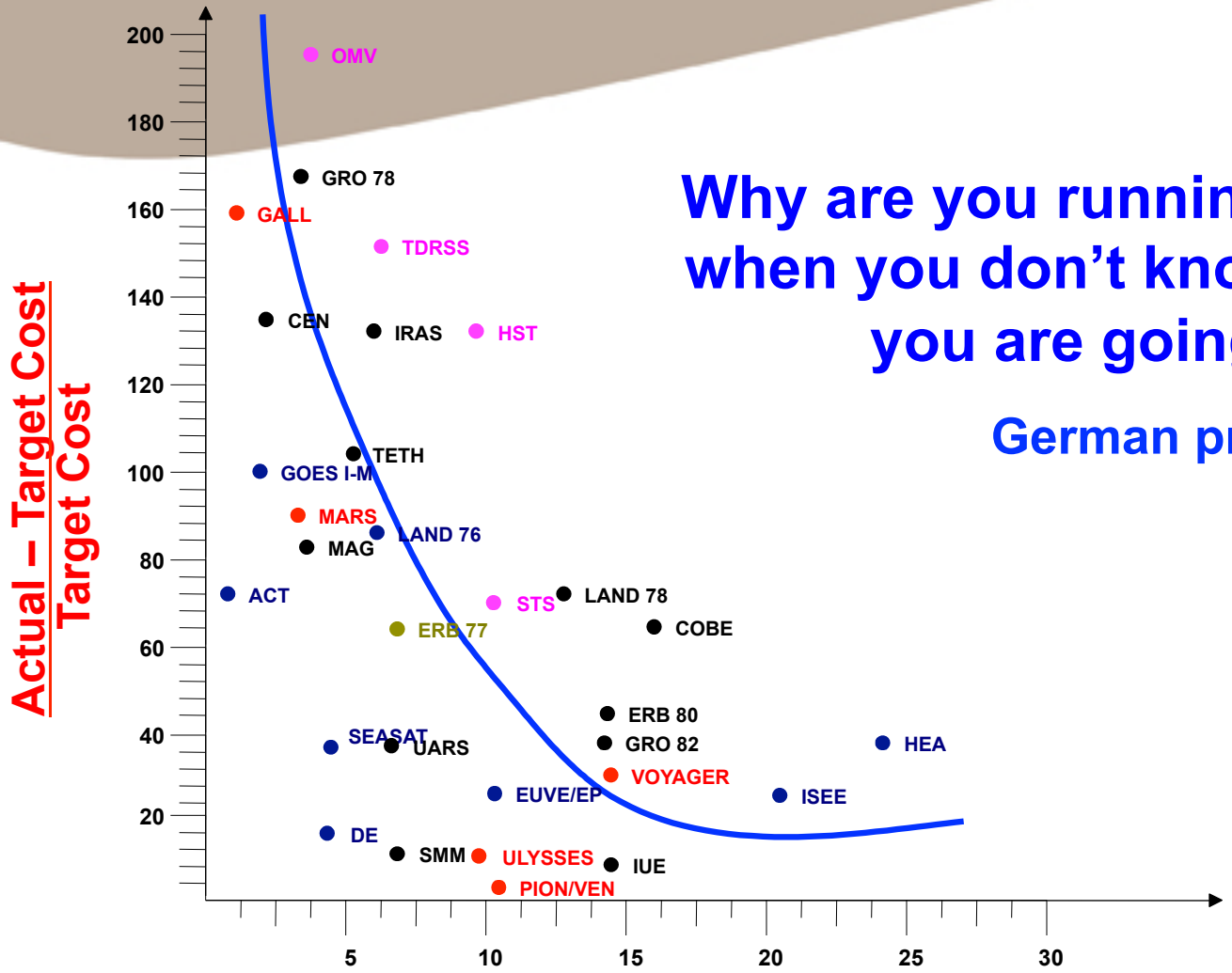
GAO

- If Programs do not match requirements with resources, cost overruns and schedule delays are likely to occur

Standish Group CHAOS Chronicles 2003 report

- Losing sight of requirements is often the first step on the road to projects that come in over budget, are late, do not meet specifications or are canceled.

Effect Of Requirements Definition Investment On Program Costs



Why are you running so fast when you don't know where you are going?

German proverb

Requirements Definition and Preliminary Design Target Total Cost

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Importance of Best Requirement Practices on Project Success

- "The companies using best requirements practices will estimate a project at $3 million and better than half the time will spend $3 million on that project.
  - Including all failures, scope creep, and mistakes across the entire portfolio of projects, this group will spend, on average, $3.63 million per project."

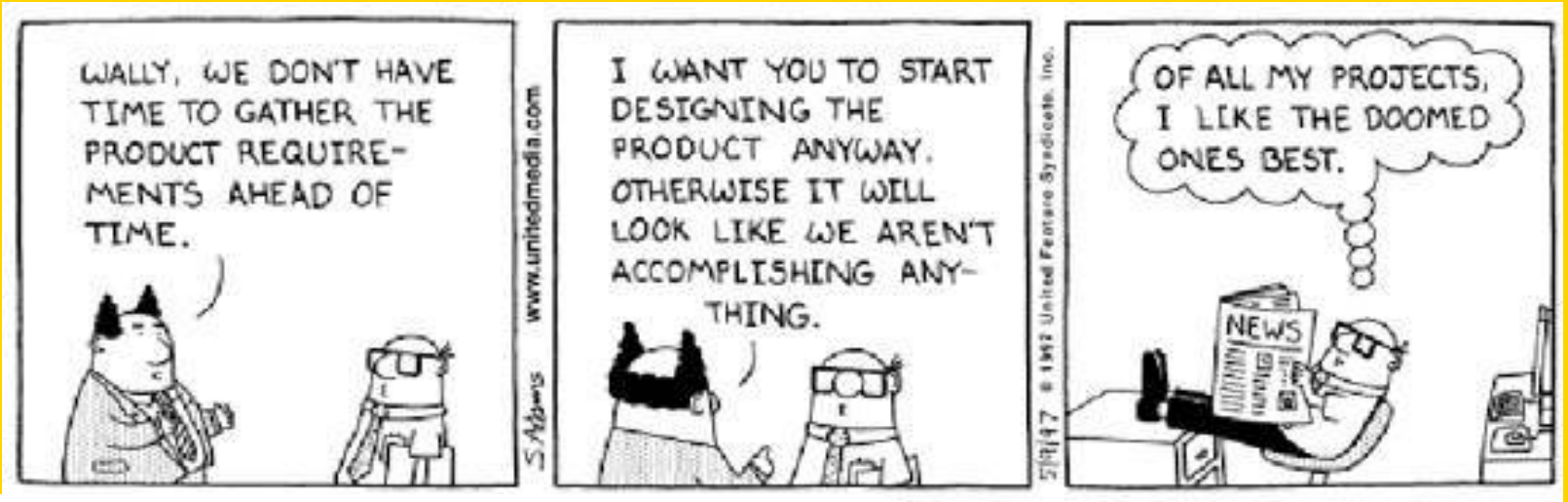
- "The companies using poor requirements practices will estimate a project at $3 million and will be on budget less than 20% of the time.
  - 50% of time, the overrun on the project both in time and budget will be massive.
  - Across the entire portfolio of successes and failures, this company with poor requirements practices will (on average) pay $5.87 million per project."

2008 Study by Keith Ellis, IAG Consulting of 100 companies with projects in excess of $250,000

Setting Yourself Up for Failure

- Project success is “improbable” for 68% of the companies Ellis studied
- While these companies indicated they recognized that requirements are important to project success, they still failed to take effective actions to insure a good set of requirements.
- By doing so, they tripled their chances of project failure

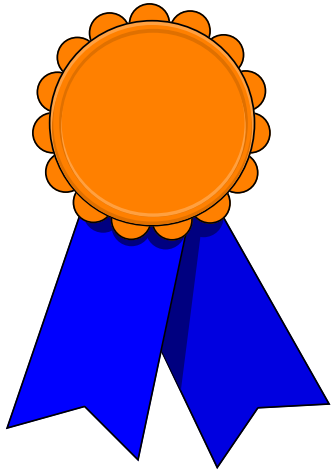
2008 Study by Keith Ellis, IAG Consulting of 100 companies with projects in excess of $250,000



Management is often one of the reasons for bad requirements

A Winning Product

- Delivers what's needed
- Within budget
- Within schedule
- With desired quality



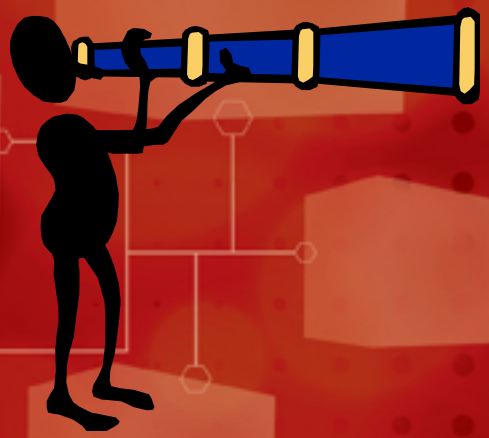
Risk: Anything that can prevent you from delivering a winning product!

What are risks?

- Risks are something that could have an impact on your product or subsystem (hazard or threat)

- Two major components
  - Likelihood
  - Impact/Consequence

Scope Risks



Scope Risk Factors (Before Requirements)

- Failure to define Scope
- Failure to define Need, goals, and objectives
- Failure to involve relevant stakeholders
- Failure to identify drivers and constraints
- Failure to define a feasible concept to meet the stakeholder needs
- Failure to define product boundaries and external interfaces
- Failure to baseline scope before writing requirements

Consequences of Scope Risks (1)

- Product purpose/use not well understood
- Stakeholder's expectations not met
- No agreement on criteria for success
- Vague or undefined desired outcomes
- Lack of direction/Lack of vision
- Possible conflicts due to a lack of a single clear vision
- Battles due to differing visions
- Constant/Uncontrolled Change
- Insufficient knowledge to write requirements
- Increased time to develop requirements
- Missing requirements

Consequences of Scope Risks (2)

- To many assumptions
- Incorrect information/incorrect requirements
- Inconsistent, incorrect, and incomplete requirements
- Non compliance
- Lack of robustness to handle off-nominal cases
- Could fail to work when interacting with other systems
- Do work you don't need to do
- Scope creep
- Rework
- Cost & schedule impacts
- Leave out work you should have done

Fail System Validation

Identify Scope Risks

- Do we have product boundary questions?
- Have we missed a key stakeholder?
- Have we missed a product life-cycle phase?
- Are there areas of strong disagreement?
- Are there technical issues?
- Are there schedule issues?
- Are there cost issues?
- Are there any resource availability issues?
- Are there too many uncertainties?

Yes = High risk

No = Low risk

Mitigating Scope Risk

- Develop a clear vision
  - Identify the Need
  - Define clear goals and objectives
- Identify and involve relevant stakeholders
- Identify and manage drivers and constraints
- Develop operational concepts
- Identify and manage external interfaces
- Identify and manage scope risk
- Baseline Scope (before writing requirements)

Requirement Risks

Requirement Risk Factors

- Requirement not necessary
- Requirement not verifiable
- Requirement not attainable
- Requirement can be understood more than one way (ambiguous)
- Requirement(s) incomplete
- Requirement reflects implementation
- Requirement(s) subject to change
- Requirements not allocated (flowed down)
- Requirements not traceable to a parent

Consequences of Requirement Risks (1)

- Increased requirement management cost
- Work performed that is not needed
- Less resources for needed requirements
- Increased project cost
- Wrong implementation
- Incorrect verification (verify wrong thing)
- Stakeholder expectations not met
- Wasted effort
- Cost & Schedule impacts
- Performance expectations not met (technology not mature enough)
- Requirement(s) can not be implemented
- Requirement(s) not be implemented
- Non-compliance with drivers and constraints
- Non-compliance with changed standards
- Could fail to work when interacting with other systems

Consequences of Requirement Risks (2)

- Real requirement not addressed and not flowed down (allocated) properly
- Parent requirement not properly implemented
- Could be at the wrong level
- Solution space restricted by implementation – better solution not defined
- Rework
- Possible conflicts or inconsistencies
- Wrong requirement(s) implemented
- Missing requirements at lower levels
- Could miss an internal interface
- Incomplete change assessment
- Gold plating – requirement not needed

Fail System Verification

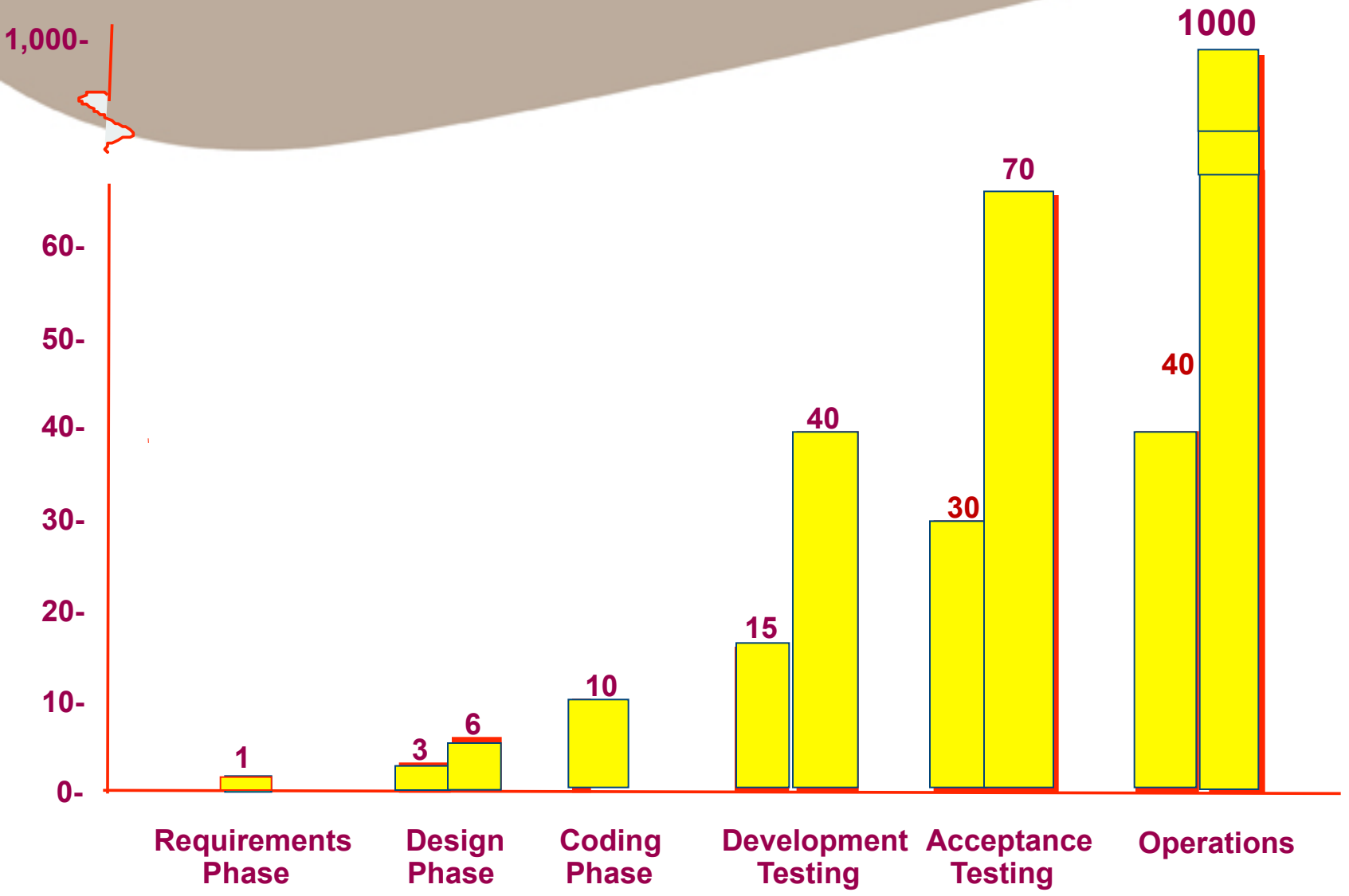
Something to Think About

A quick and inexpensive way to improve testing

Bell Labs and IBM studies have determined 80% of all defects are inserted in the requirements phase

— Testing Techniques Newsletter

Cost to fix requirement defects



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Mitigating Requirement Risk

- Define and enforce a requirement development process
- Follow the rules for writing good requirements
- Include key attributes: rationale, traceability, verification method, allocation, priority, risk
- Train your requirement writers, management, developers, testers, reviewers on how to write defect free requirements
- Practice continuous requirement validation
- Identify and manage requirement risk
- Baseline Requirements

Requirement Management Risks

Requirement Management Risk Factors

- No official process
- Have a process but process not followed
- Not enough time and resources allocated to define and baseline scope
- Not enough time and resources allocated to develop and baseline requirements
- Poor change management

Consequences of Requirement Management Risks

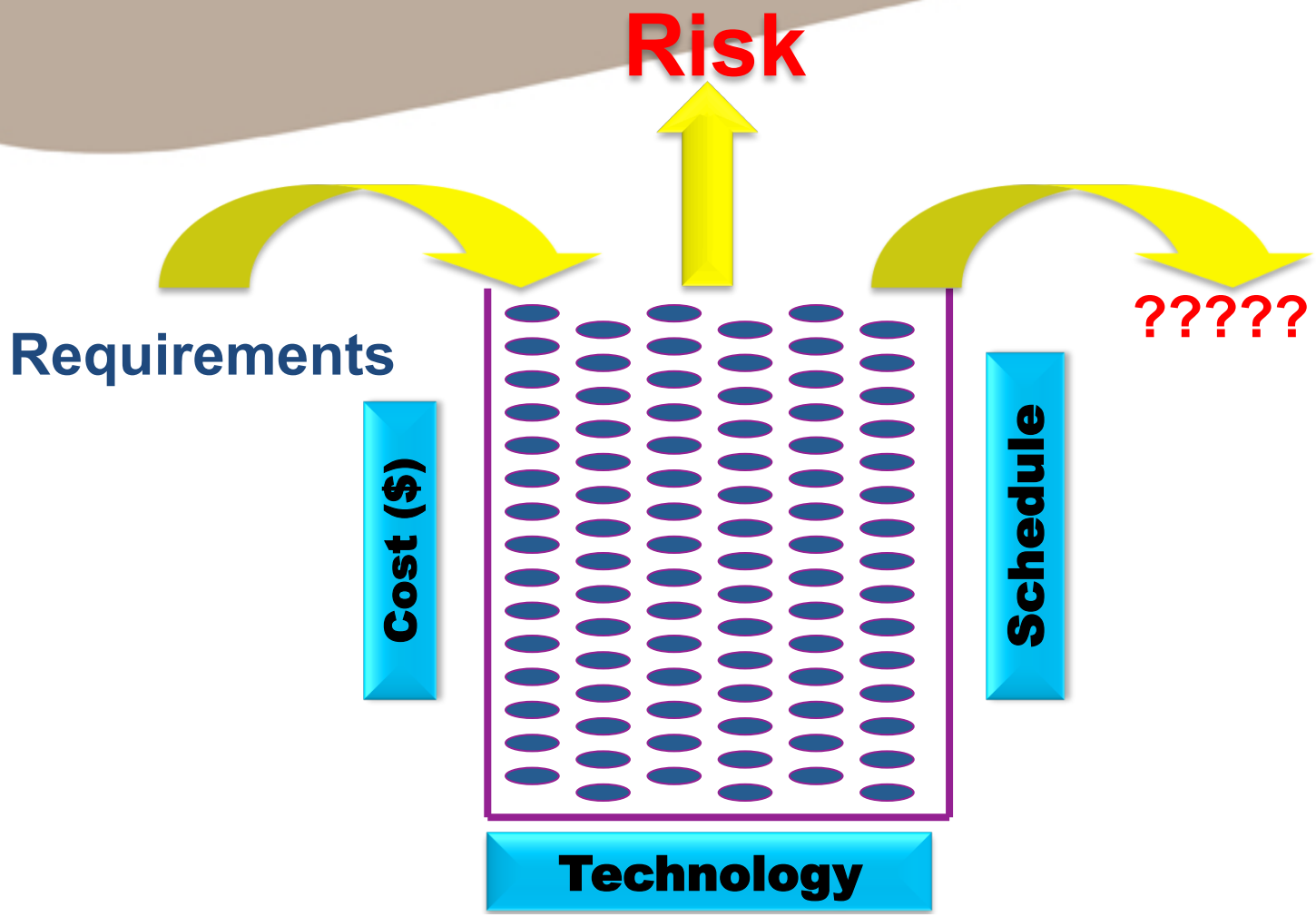
- Wasted resources
- Scope risk factors
- Requirement risk factors
- Lack of feasible concept to meet stakeholder expectations
- Lack of/poor/incomplete direction to developers
- Uncontrolled change
- Unnecessary rework
- Cost and schedule impacts
- Stakeholder expectations not met

Failure to deliver a winning product

Mitigating Requirement Management Risk

- Allocate sufficient time and resources to define and baseline Scope
- Allocate sufficient time and resources to develop and baseline requirements
- Use requirement attributes to manage requirements
- Develop and enforce a formal requirement development and management process
- Train team in your requirement development and management process
- Manage change

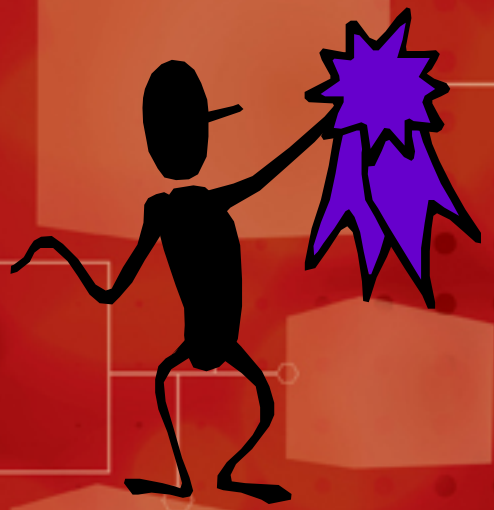
Managing Change



Mitigating Change Risk

- Do the best job you can the first time
  - Define and baseline your scope before writing requirements
  - Do not baseline a bad document
  - Put as much rigor in the baseline as in the changes that will follow
- "Design for change"
- Establish criteria for change

Wrap up



Parting Thoughts

- Address scope and requirement risk at the beginning of your project.
  - Identify and involve your stakeholders
  - Identify drivers and constraints and external interfaces.
  - Develop operational concepts that are thoroughly thought out in the beginning of a project to allow the writing of better and more comprehensive requirements.
- Develop, implement, and enforce a formal requirement development and management process that includes continuous requirement validation.
- Pay particular attention to your change management process.
- Train your team and enforce the requirement development and management process through project leadership.
- Allocate the time and resources needed to do the job right – the first time.

Triple your changes of project success

Putting Requirement Risk in the Proper Perspective

Not to put too much pressure on you….

- The Requirements Document is probably the single most influential piece of paper that we have control over in the entire Program.
- This is our chance to make sure that we are asking for what we really want. Let's get it right.
- This is a big, fat, hairy deal. If we don't get this right, folks 20 years from now will be shaking their heads and saying, "What were those yahoos thinking?"
  - I'll be around and don't want to go to that meeting.

CxP EVA Suit PGS Team Requirement Kickoff Mtg 5/2007

No Surprises

"People who write bad requirements should not be surprised when they get bad products

But they always are."

Ivy Hooks

Parting Thought

“Putting forth the same effort, or using the same approach, then expecting different results is...insanity”

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BIOGRAPHY

- Lou Wheatcraft has over 40 years experience in the aerospace industry, including 22 years in the United States Air Force. Over the last 10 years, Lou has worked for Compliance Automation (dba Requirements Experts), where he has conducted over 140 seminars on requirement development and management for NASA, Department of Defense (DoD), and industry. Lou has had articles published in the International Council of Systems Engineering (INCOSE) *INSIGHT* magazine and in DoD's magazine, *CrossTalk.*
- Lou has made presentations at NASA's PM Challenge, INCOSE's International Symposium, and at the local Project Management Institute (PMI) and INCOSE Chapter Meetings. Lou has a BS degree in Electrical Engineering, an MA degree in Computer Information Systems, an MS degree in Environmental Management, and has completed the course work for an MS degree in Studies of the Future.
- Lou is a member of INCOSE, co-chair of the INCOSE Requirements Working Group, a member of PMI, the Software Engineering Institute, the World Futures Society, and the National Honor Society of Pi Alpha Alpha. Lou is the recipient of NASA's Silver Snoopy Award and Public Service Medal and was nominated for the Rotary Stellar Award for his significant contributions to the Nation's Space Program.