Presentation

Bio

P R E S E N T A T I O N

T K 1

Thursday, February 15, 2001
8:30AM

THE STORY SOFTWARE DEFECTS TELL ABOUT PROJECT MANAGEMENT

Robert Grady
Hewlett-Packard Co., Retired

International Conference On
Software Management & Applications of Software Measurement
February 12-16, 2001
San Diego, CA, USA

The Story Software Defects Tell About Project Management

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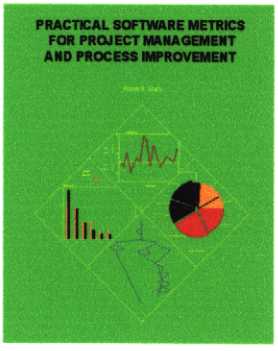
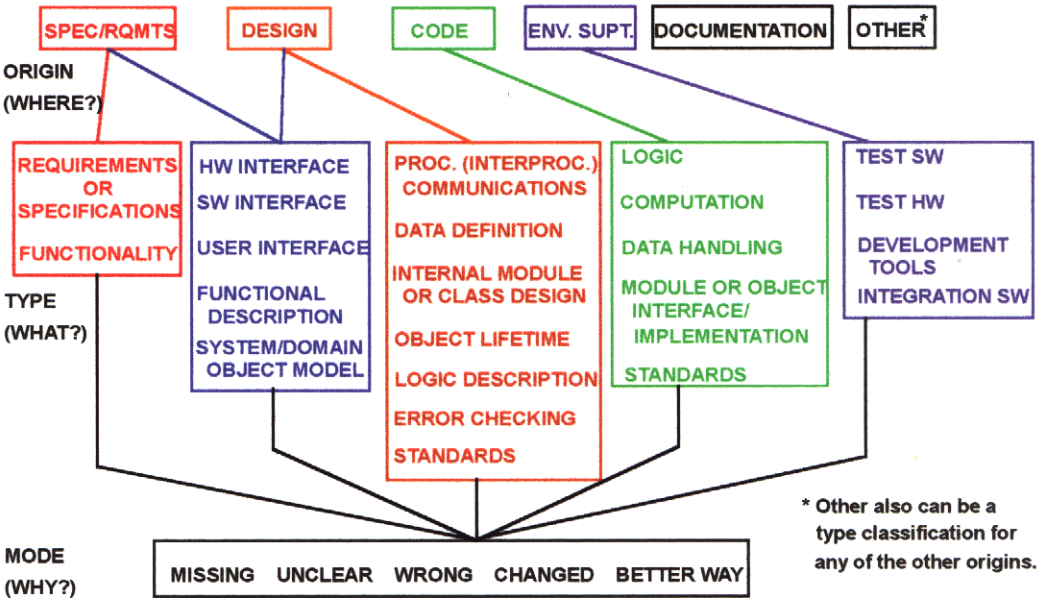


Outline

- **Brief Introduction to Two Models:**
  - Defect Categorization
  - Myers-Briggs Personality Preferences
- **The Story Software Defects Tell About Project Management**
  - Planning
  - Organizing
  - Leading
  - Controlling

Categorization of Sources of Software Defects (with Object-Oriented Changes)



One-Shot Root-Cause Analysis Workshop Outline

GOAL: Use insights gained from defect-analysis data to improve our development and support practices.

8:15 - 8:30 Breakfast

8:30 - 9:00 Overview of Defect Analysis

9:00 - 10:00 Review defect categorizations and pie chart. Choose 2 defect areas.

10:00 - 10:15 Break

10:15 - 11:00 Create Cause/Effect groupings for 2 defect areas.)

11:00 - 12:00 Develop and present recommendations for improvement.

12:00 - 1:00 Lunch and make-up time.

Myers-Briggs Type Indicator* of Personality Preferences

Energy

Extrovert (E) ⟷ **Introvert (I)**

Likes being with people, opens up easily, develops ideas while talking, adapts to social situations

Drained of energy by groups, likes developing ideas alone, finds conversations and interruptions distracting

Information Gathering

Sensing (S) ⟷ **Intuition (N)**

Likes facts and first-hand experience

Quickly develops "big picture"

Decision Making

Thinking (T) ⟷ **Feeling (F)**

Uses logic to make decisions

Makes choices by considering effects on people

Planning/Spontaneity

Judgment (J) ⟷ **Perceptions (P)**

Decisive, likes measurable end points, fixed time limits and plans with checkpoints and contingencies

Likes flexible approaches, responds spontaneously to new ideas and situations

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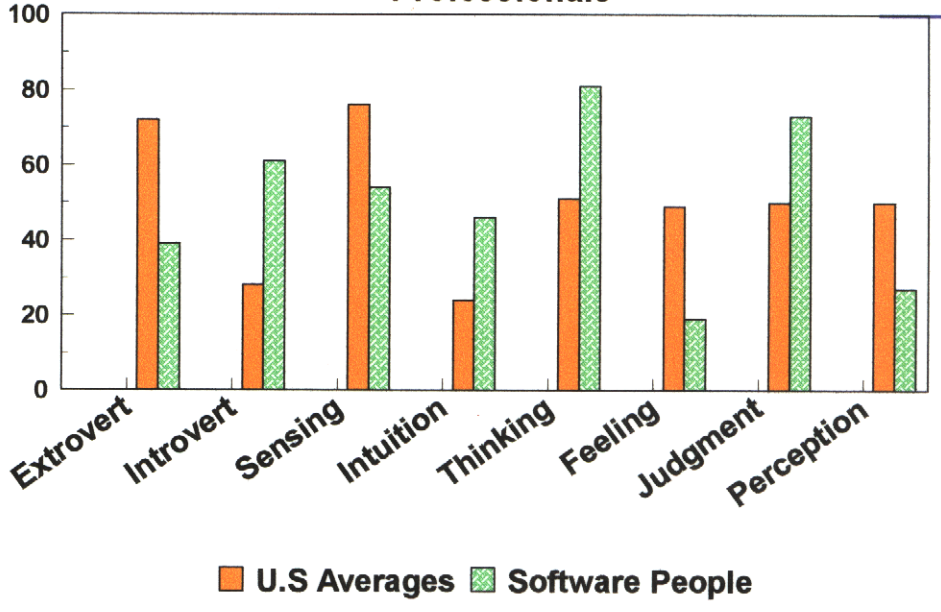
Myers/Briggs Results: U.S. Averages vs. Software Professionals



Note: These averages come from a workshop held by Process Enhancement Partners, Inc. at the SEPG Conference in San Jose, CA, March, 1997.

Bob's Definitions

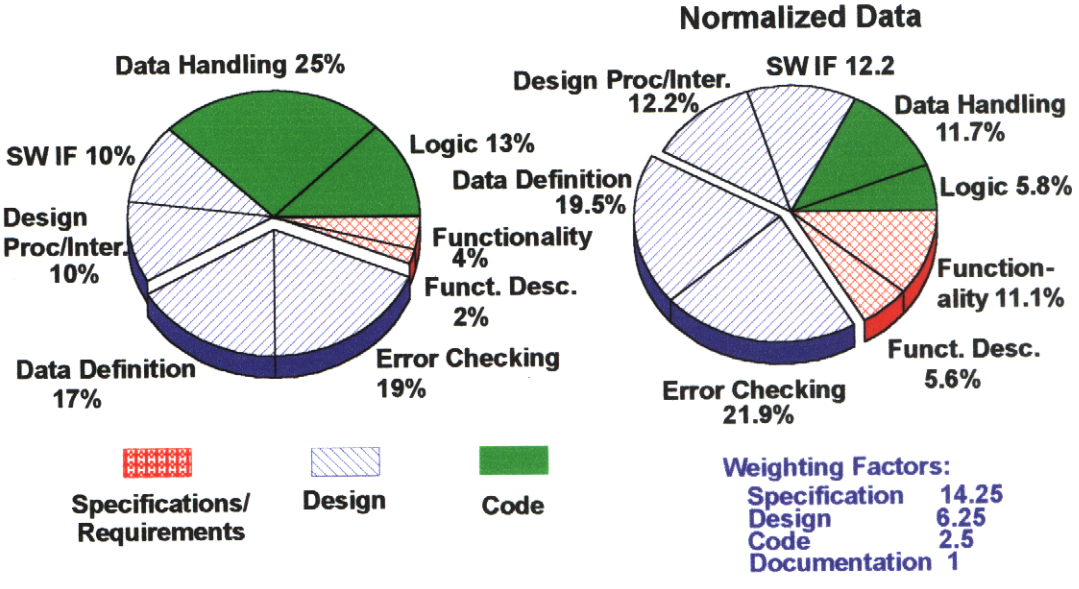
PLANNING: defining and documenting the resources, schedules, time assumptions, and constraints that a project will operate within in ways that management, the project team, and partner groups can effectively understand and work with.

ORGANIZING: (to be defined later)

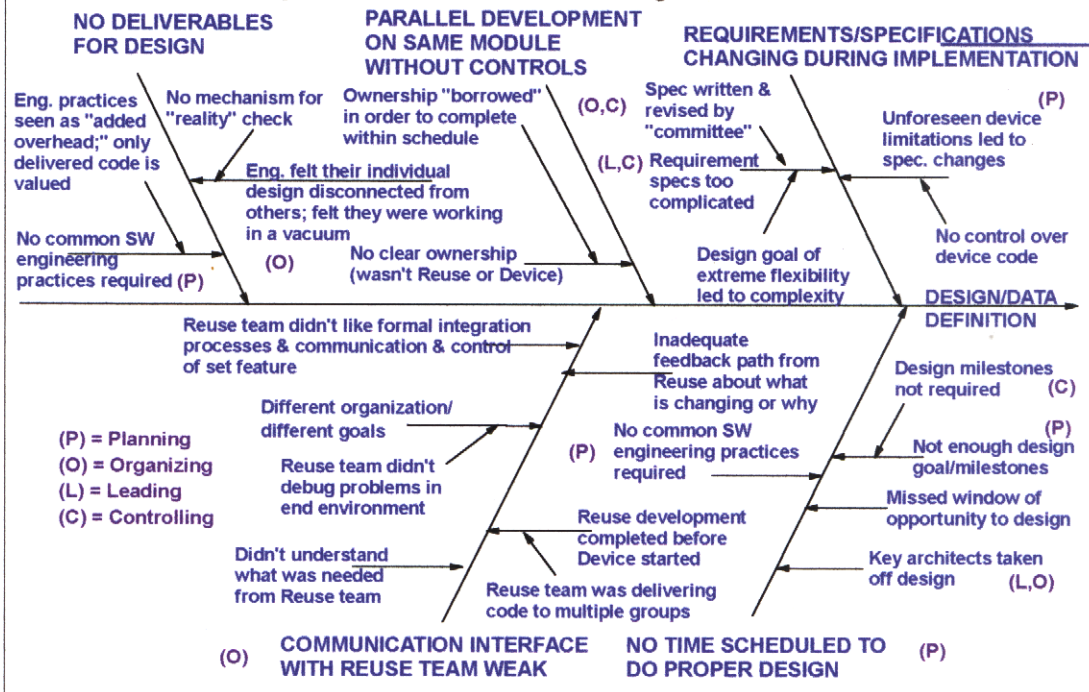
LEADING: (to be defined later)

CONTROLLING: (to be defined later)

Top Eight Causes of Defects



Fishbone Diagram for the Causes of Design/Data Definition Defects



Planning Fishbone Items

Plans
- No time ++++++++++++
- Planning inadequate
- No plan
- Lack of long-term planning
- Realized something too costly during implementation
- Interrupt driven
- Lack of checkpoints
- Not enough design goals/milestones
- No common software engineering practices required +
- Tech marketing staffs only after previous product ship

Schedules
- Not scheduled ++++
- Scheduling need
- Better scheduling and earlier
- Don't perceive schedule impact
- No time scheduled to do proper design
- Schedules set

Resources
- Lack of resources
- Resource limits

Myers-Briggs Type Indicator* Applied to Planning Needs

Energy

Extrovert (E) ⟷ **Introvert (I)**

- Likes discussion and presentation planning formats
- Prefers written plans

Information Gathering

Sensing (S) ⟷ **Intuition (N)**

- Likes details and justifications, either verbally or written
- Wants to see "big picture;" happy with presentation format or simple, high-level written plan

Decision Making

Thinking (T) ⟷ **Feeling (F)**

- Wants to see logic behind plans, decisions, assignments, schedules
- Likes to see how plans optimize effects on people; probably needs verbal reassurances

Planning/Spontaneity

Judgment (J) ⟷ **Perceptions (P)**

- Decisive, likes measurable end points, fixed time limits and plans with checkpoints and contingencies
- Likes minimal plans with flexible approaches that can be adapted to new ideas and situations

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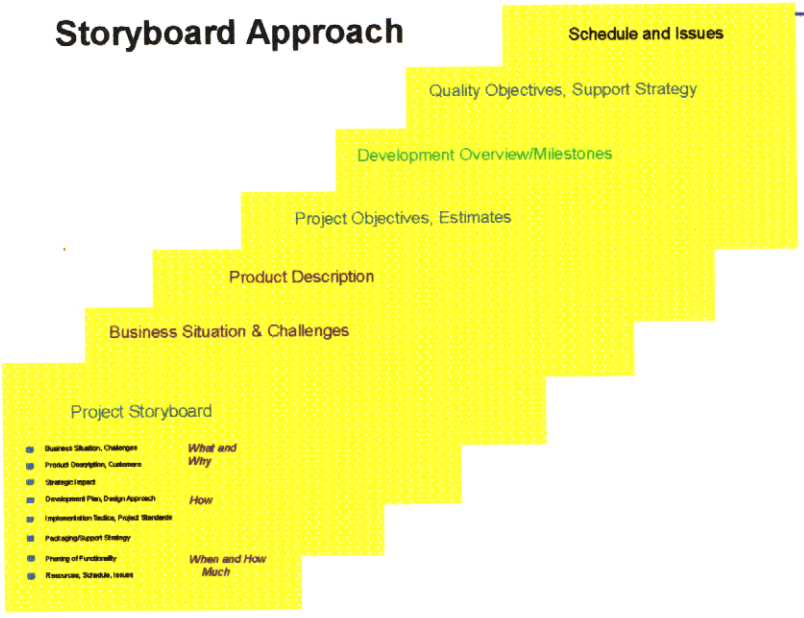
Project Presentation/Plan Outline

What and Why	**Problem Being Solved or Opportunity**
	Product Description
	Customers
	Strategic Impact
How	**Development/Purchase/Evolution Plan**
	Design Approach
	Project Standards
	Implementation Tactics
	Packaging/Support Strategy
When and How Much	**Phasing of Functionality**
	Estimates and Resources
	Schedule
	Issues

Storyboard Approach



Some Project Planning Views and the Myers-Briggs Preferences They Might Best Match

Planning Views	Sensing (S)	Intuition (N)	Thinking (T)	Feeling (F)	Judgment (J)	Perceptions (P)
Product View		▲		▲		▲
Effort Estimates	▲		▲		▲	
Organization Chart		▲		▲		
Schedule Summary		▲			▲	
Pert Chart	▲		▲		▲	
Gantt Chart		▲		▲		

Note: Extrovert (E) and Introvert (I) are excluded, since each planning view can be tailored to meet the E or I needs.

Bob's Definitions

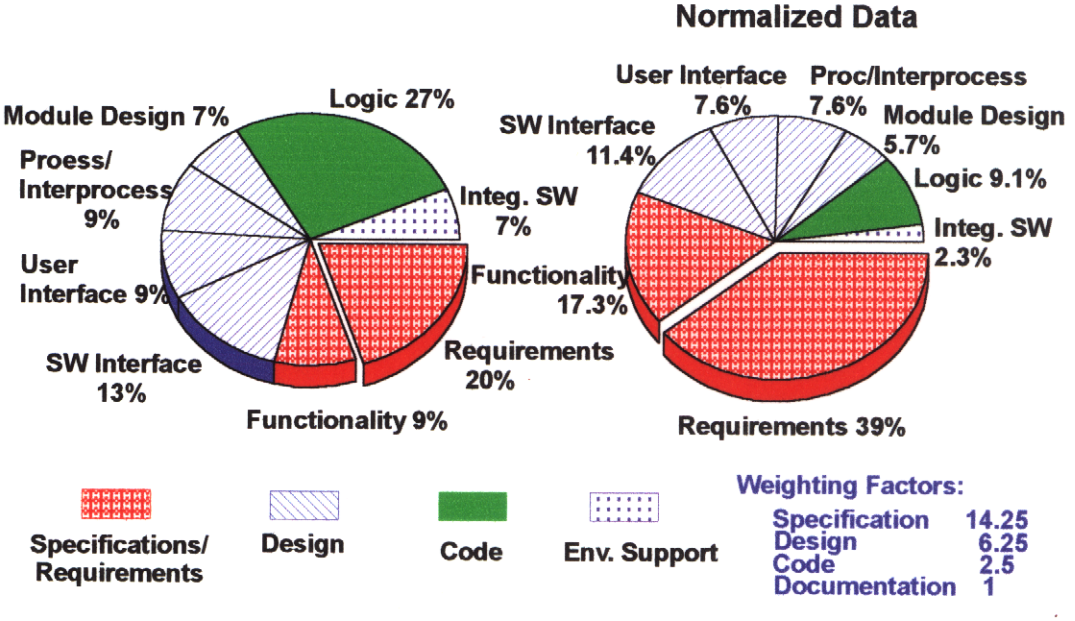
PLANNING: (defined earlier)

ORGANIZING: grouping the project people and tasks into an effective operating whole where responsibilities are understood, progress and barriers are quickly understood and acted on, and the team is excited and motivated.

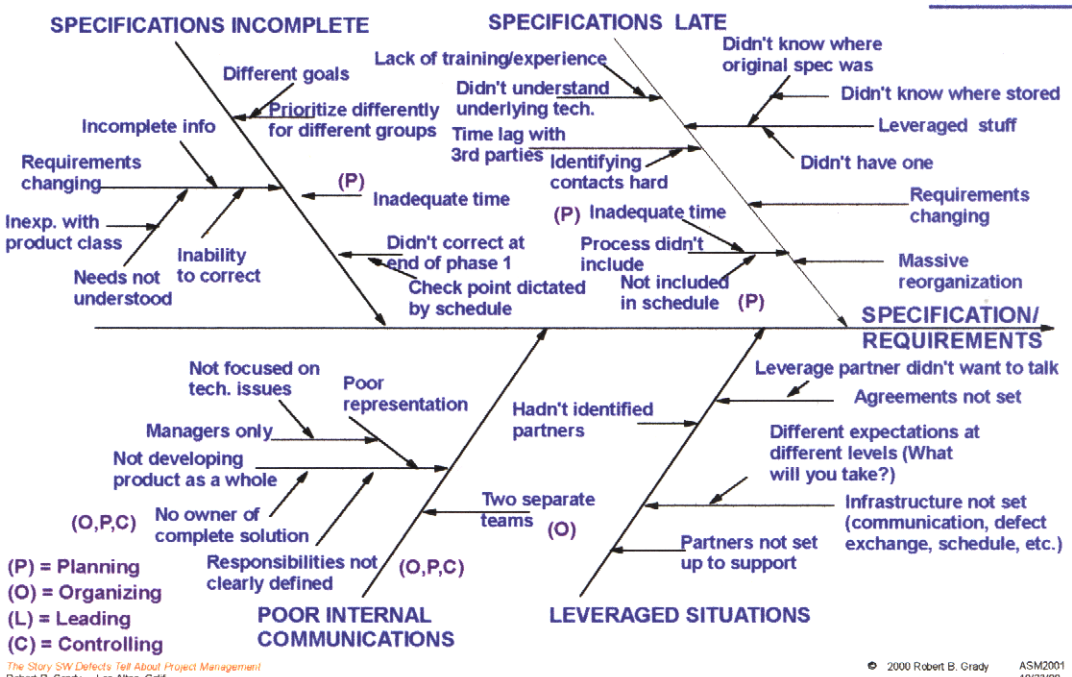
LEADING: (to be defined later)

CONTROLLING: (to be defined later)

Top Eight Causes of Defects



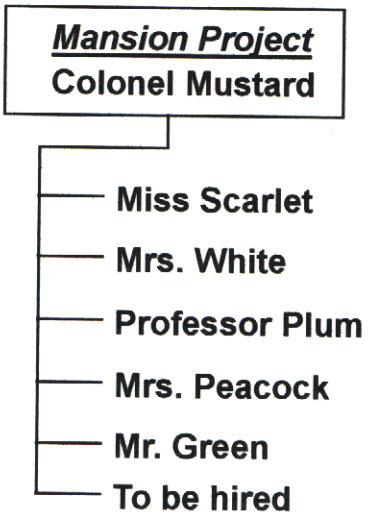
Fishbone Diagram for the Causes of Specifications/Requirements Defects



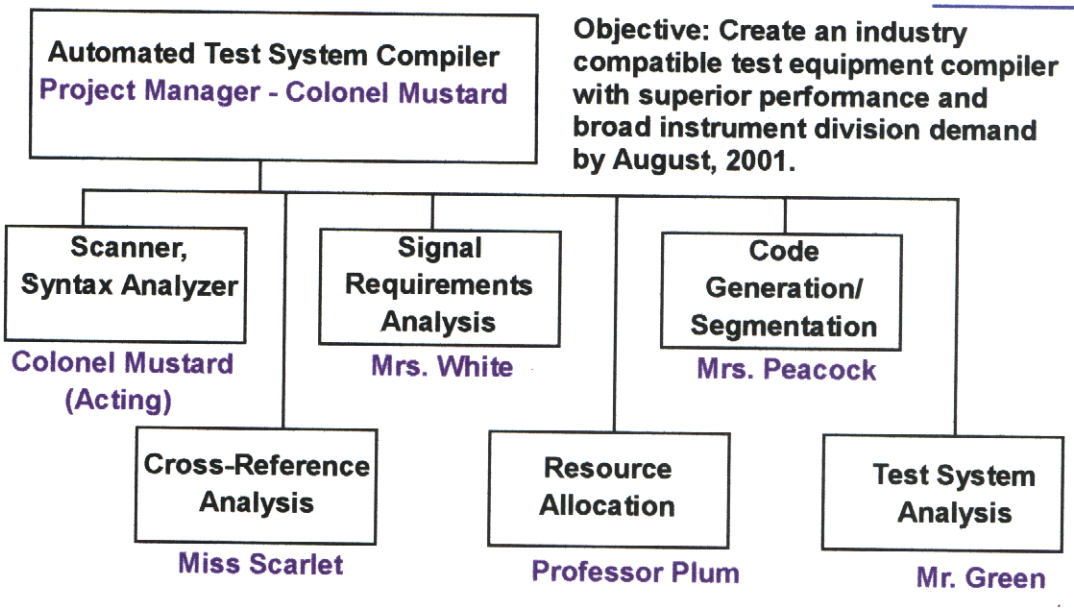
Organizing Fishbone Items

Ownership	Owners changed several times
	No owner of complete solution
Responsibilities	Not clear who is responsible
	Leaders overloaded
	Not a fun job
	Responsibilities not clearly defined
	Spec written and revised by committee
	Too informal
Communications	Design was disconnected from others
	People felt like they were working alone in a vacuum
	Inadequate project communication
	Communication/interface weak
Division of Labor	Two separate teams
	Poor organization
	Division reorganization

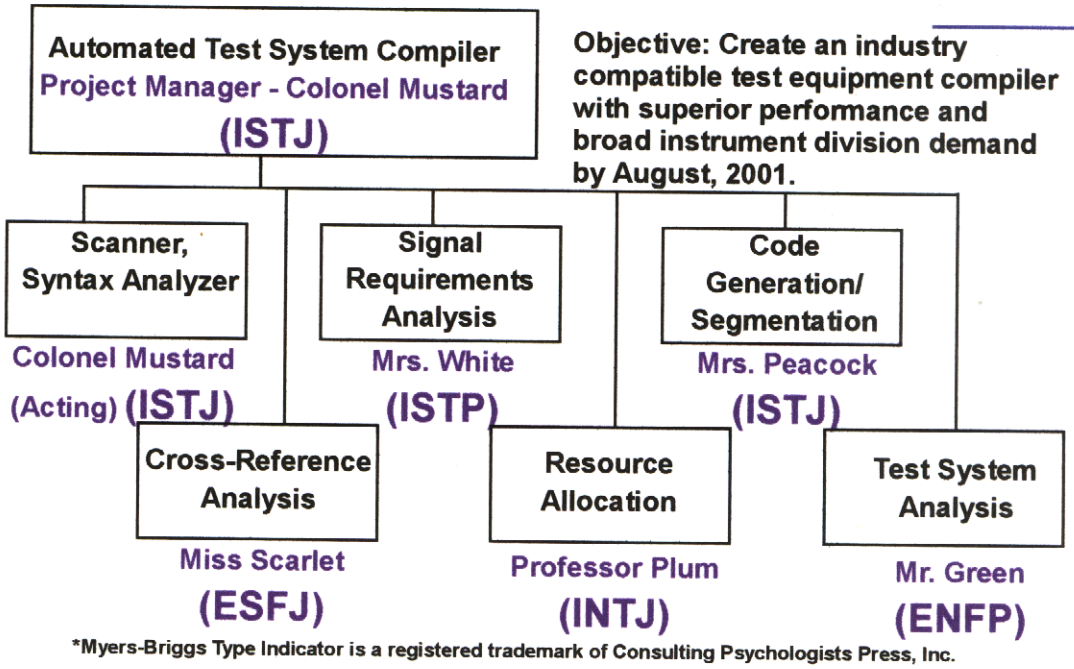
Traditional Organization Chart



Improved Organization Chart



Organization Chart Showing Myers-Briggs Preferences*



*Myers-Briggs Type Indicator is a registered trademark of Consulting Psychologists Press, Inc.

Bob's Definitions

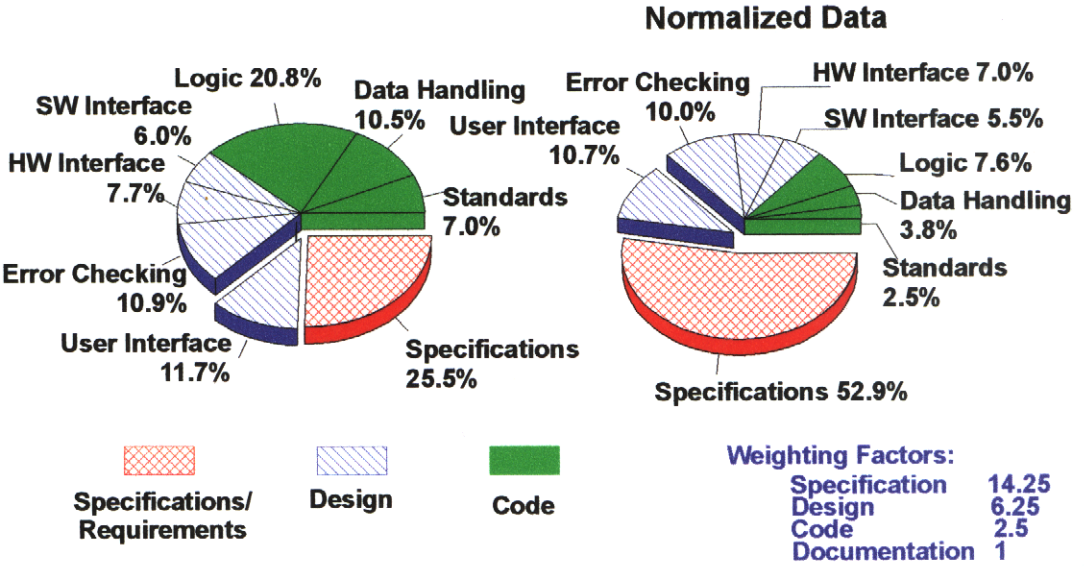
PLANNING: (defined earlier)

ORGANIZING: (defined earlier)

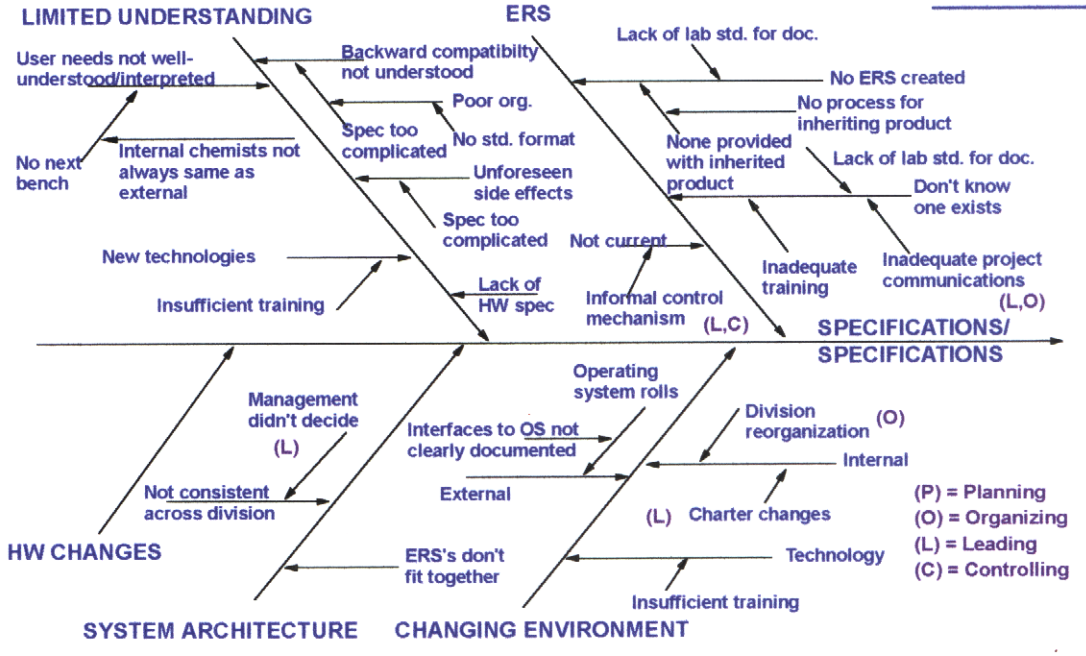
LEADING: developing and sustaining an exciting shared vision; creating, communicating, and making or supporting timely decisions against a clear set of project goals, objectives, and priorities.

CONTROLLING: (to be defined later)

Top Eight Causes of Defects



Fishbone Diagram for the Causes of Specifications/Specifications Defects



Leading Fishbone Items

Vision	Lack of vision
	Lack of leadership
Decisions	Changing mind
	Management didn't decide
	Charter changes
	Late decision
	Little/no discussion
Priorities	Didn't understand importance +
	Priorities change
	Lack of priority +
	Short-term mentality
	Conflicting goals
	Conflicting priorities
Agreements	No agreement
	Agreements not set
	Inadequate project communications
	Leverage partners didn't want to talk

Personality Preference Influences on Key Leadership Issues

Leadership	Key Personality Preference Influencers
Vision	Sensing/Intuition (S/N), Thinking/Feeling (T/F) - development of vision; Extrovert/ Introvert (E/I) - communication of vision
Decisions	Thinking/Feeling (T/F) - how made; Judgment/Perceptions (J/P) - form taken
Priorities	Judgment/Perceptions (J/P)
Agreements	Extrovert/Introvert (E/I), Thinking/Feeling (T/F) - gaining agreement; Judgment/ Perceptions (J/P) - form of agreement

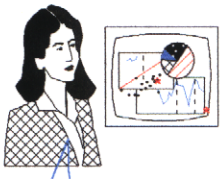
Thomas Jefferson's Vision for the Lewis and Clark Voyage of Exploration

"The object of your mission is to explore the Missouri river, & such principal stream of it, as, by it's course and communication with the waters of the Pacific ocean, whether the Columbia, Oregan, Colorado, or any other river may offer the most direct & practicable water communication across this continent for the purposes of commerce."

MARKETING ANALYST VISION

MARKET ANALYSIS

Bob, I've got some great ideas for you! In reviewing some industry date, I've found a trend developing...



HP DIRECT ORDER ANALYSIS

Anne, I've been watching sales in the HP Direct channel steadily increase over the past year. Let me show you how these figures break down by client.

PROMOTION ANALYSIS

Sue, comparing the order performance before and after your promotion dropped, it is clear this promotion boosted sales in the HP Direct channel.

LIST PULLING

List pulls are so much easier. Now I can select the label format, clean the list, and tag the database with the promo code all in one step.

TARGET AUDIENCE SELECTION

Bob, based on analysis of previous promotions, here is the optimal profile for your target audience...

...Bob, good news! 23,000 prospects met our criteria. Accounting for seasonality, I anticipate a 36% response rate with a 4.3% order rate.

PREDICTIVE ANALYSIS

Bob's Definitions

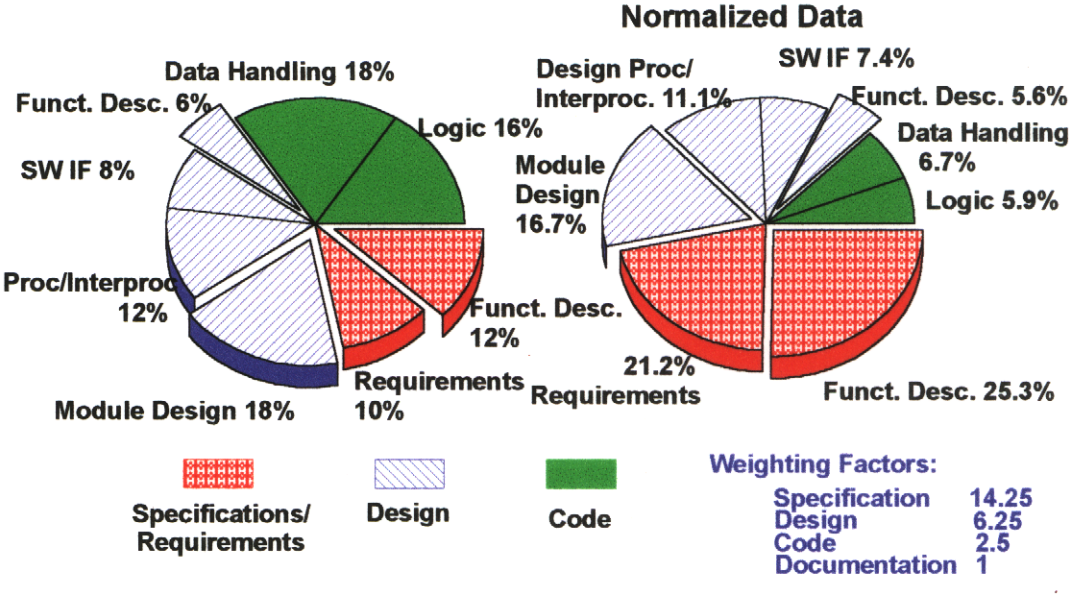
PLANNING: (defined earlier)

ORGANIZING: (defined earlier)

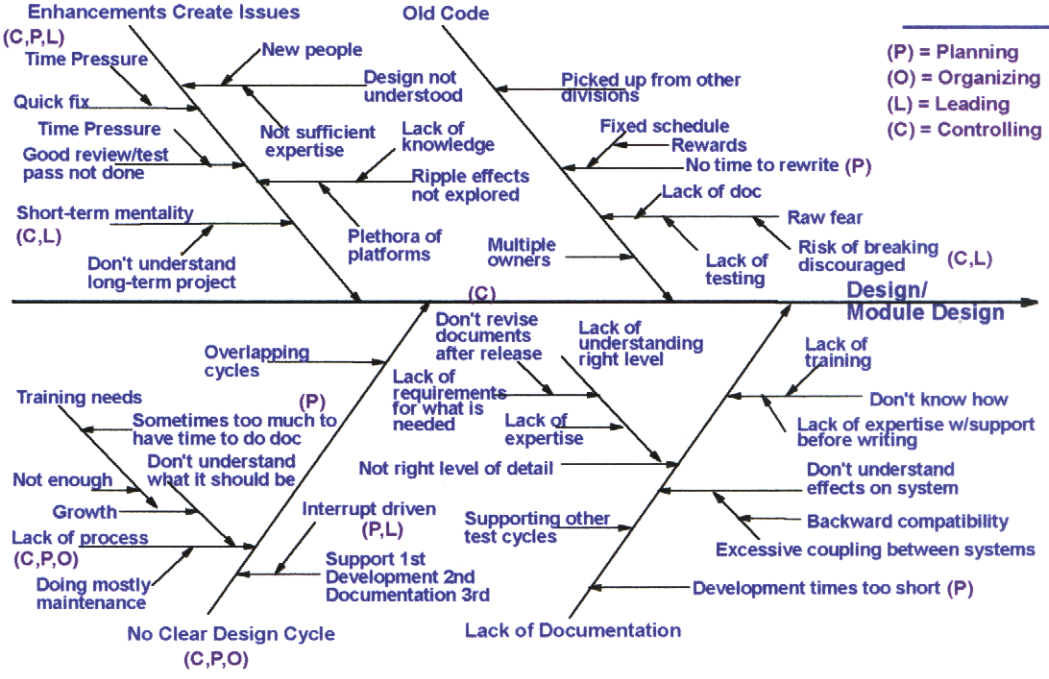
LEADING: (defined earlier)

CONTROLLING: defining a set of agreed-upon project practices, creating key checkpoints and objective measures for tracking progress and completion, and providing timely, visible feedback of progress to the team, management, and partner groups.

Top Eight Causes of Defects



Fishbone Diagram for the Causes of Module Design Defects



Controlling Fishbone Items

Checkpoints	Not enforced or required
	Lack of checkpoints
	No clear design cycle
	Time pressure
	Schedule not set
Priorities	Low priority relative to other work
	Don't revise documents
	Short-term mentality
	Lack of timely updates
	Lack of change management
Responsibilities	No one assigned to it
	Informal control
	Responsibilities not clearly defined
	Partner changed spec without telling us
	Spec written and revised by committee
Rewards	Risk of breaking discouraged
	Rewards
	Lack of rewards

Inverted Myers-Briggs* Personality Preferences More Suggestive of Control Beliefs

Judgment (J)

Decisive, likes measurable end points, fixed time limits and plans with checkpoints and contingencies

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Likes flexible approaches, responds spontaneously to new ideas and situations

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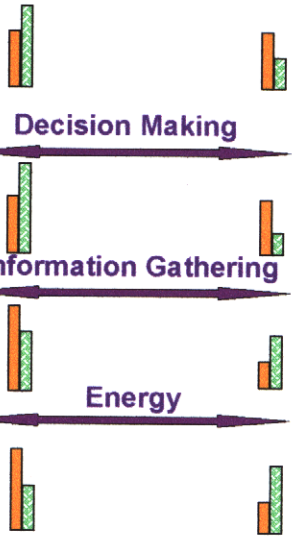

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Public and Private Data

PRIVATE (to individual)	PRIVATE (to project team) PUBLIC (to team members)	PUBLIC (to company or lab)
Defect rates (by individual)	Defect rates (beyond individual)	Defect rates (by project)
Defect rates (by module)	NCSS/module	NCSS (by product)
Defect rates (under devel.)	Estimated NCSS/module	Effort (by project)
Number of compiles	Number of reinspections	Calendar times
	Defects/module (prerelease)	Defects/module (postrelease)
		Effort/defect (average)

The Story Software Defects Tell About Project Management

PLANNING: not enough time to do things right the first time; key defect prevention activities not scheduled.

ORGANIZING: ownership is unclear; responsibilities are undefined or intentionally shared; important information isn't shared.

LEADING: vision isn't clear, exciting, or sustained; decisions are postponed or reversed; priorities or basis for priorities are unclear; closure on agreements isn't reached.

CONTROLLING: checkpoints and priorities weren't defined or adhered to; rewards weren't identified, given, or in support of doing things right the first time.

Selected References

Defect Analysis/Root-Cause Analysis

1. Grady, R., *Practical Software Metrics for Project Management and Process Improvement*, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1992, Chapters 11 and 12.
2. Grady, R., *Successful Software Process Improvement*, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1997, Chapter 11.
3. Card, D., "Learning from Our Mistakes with Defect Causal Analysis," IEEE Software, (Jan.-Feb. 1998), pp. 56-63.
4. Hevner, A., "Phase Containment Metrics for Software Quality Improvement," Information and Software Technology, Vol. 39, (1997), pp. 867-877.

Myers-Briggs Personality Preferences

1. Briggs, I. B., *Gifts Differing,* Palo Alto, CA: Consulting Psychologists Press, Inc., 1980.
2. Hirsh, S., and J. Kummerow, *Introduction to Type in Organizations*, Palo Alto, CA: Consulting Psychologists Press, Inc., 1990.

Limited Myers-Briggs Related Data About Software Developers

1. Mogilensky, J., "Personality Types and Process Improvement: An MBTI Workshop," SEPG '97, Process Enhancement Partners, Inc., (March 20, 1997).
2. Hildebrand, C., "I'm OK, You're Really Weird," CIO Magazine, (Oct. 1995), pp. 86-96.
3. Hardiman, L., "Personality Types and Software Engineers," IEEE Computer, vol. 30, no. 10, (Oct. 1997), p. 10.

Lewis and Clark

1. Ambrose, S., *Undaunted Courage*, New York: Touchstone, 1996.

Bob Grady

Software development, project management, and process improvement, all backed up with software metrics, were key professional interests during Bob Grady's 28-year career at Hewlett-Packard Co. He managed projects in the areas of compilers, measurement and control systems, firmware, and manufacturing automation and information systems, and consulted extensively in many HP divisions over a wide range of software and business opportunities. He started HP's Corporate Software Engineering Lab in 1983, and while he managed it during the period of 1983-1986, he and Deborah Caswell established and led the company-wide software metrics program in HP.

Since retiring, Bob has continued to consult on a limited basis with a particular continuing interest in defect root-cause analysis. He is a member of the IEEE Computer Society, and he has written and coauthored numerous papers and articles on software subjects, including the books *Software Metrics: Establishing a Company-Wide Program* (1987)*, Practical Software Metrics for Project Management and Process Improvement* (1992), and *Successful Software Process Improvement (1997), all published by Prentice-Hall*. A native of Chicago, Illinois, he received his B.S.E.E. from MIT in 1965 and his M.S.E.E. from Stanford in 1969. Prior to joining HP, he worked for Ford Aerospace Corp.