Requirements Engineering

4th World Conference for Software Quality

Software Productivity Research LLC

SOFTWARE QUALITY IN 2008:

A SURVEY OF THE STATE OF THE ART

Capers Jones
Founder and Chief Scientist Emeritus

http://www.spr.com
cjonesiii@cs.com

September 16, 2008

SOURCES OF QUALITY DATA

Data collected from 1984 through 2008

- About 650 companies (150 clients in Fortune 500 set)
- About 35 government/military groups
- About 13,000 total projects
- New data = about 50-75 projects per month
- Data collected from 24 countries
- Observations during more than 15 lawsuits

SWQUAL08\2

U.S. AVERAGES FOR SOFTWARE QUALITY

(Data expressed in terms of defects per function point)

Defect Origins	Defect Potential	Removal Efficiency	Delivered Defects
Requirements	1.00	77%	0.23
Design	1.25	85%	0.19
Coding	1.75	95%	0.09
Documents	0.60	80%	0.12
Bad Fixes	0.40	70%	0.12
TOTAL	5.00	85%	0.75

(Function points show all defect sources - not just coding defects)

SWQUAL08\18

BEST IN CLASS SOFTWARE QUALITY

(Data expressed in terms of defects per function point)

Defect Origins	Defect Potential	Removal Efficiency	Delivered Defects
Requirements	0.40	85%	0.08
Design	0.60	97%	0.02
Coding	1.00	99%	0.01
Documents	0.40	98%	0.01
Bad Fixes	0.10	95%	0.01
TOTAL	2.50	96%	0.13

OBSERVATIONS

Most often found in systems software > SEI CMM Level 3

SWQUAL08\19

POOR SOFTWARE QUALITY - MALPRACTICE

(Data expressed in terms of defects per function point)

Defect Origins	Defect Potential	Removal Efficiency	Delivered Defects
Requirements	1.50	50%	0.75
Design	2.20	50%	1.10
Coding	2.50	80%	0.50
Documents	1.00	70%	0.30
Bad Fixes	0.80	50%	0.40
TOTAL	8.00	62%	3.05

OBSERVATIONS

Most often found in large client-server projects (> 5000 FP).

SWQUAL08\20

SOFTWARE DEFECT ORIGINS

- 1) Requirements: Hardest to prevent and repair
- 2) Design: Most severe and pervasive
- 3) Code: Most numerous; easiest to fix
- 4) Documentation: Can be serious if ignored
- 5) Bad Fixes: Very difficult to find
- 6) Bad Test Cases: Common and troublesome
- 7) Data quality: Common but hard to measure
- 8) Web content: Unmeasured to date

SWQUAL08\26

INDUSTRY-WIDE DEFECT CAUSES

Ranked in order of effort required to fix the defects:

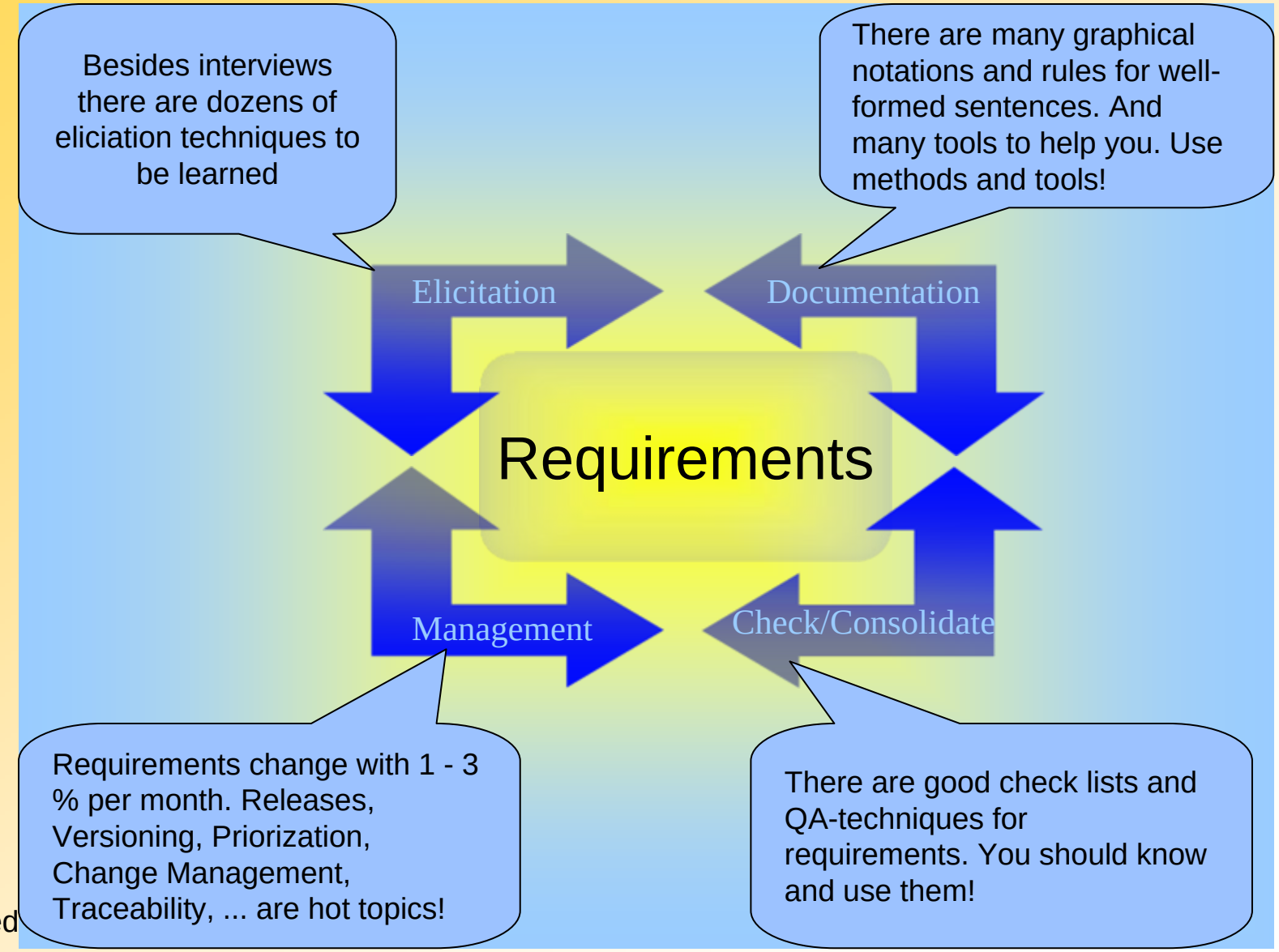
1. Requirements problems (omissions; changes, errors)
2. Design problems (omissions; changes; errors)
3. Interface problems between modules
4. Logic, branching, and structural problems
5. Memory allocation problems
6. Testing omissions and poor coverage
7. Test case errors
8. Stress/performance problems
9. Bad fixes/Regressions
10. Documentation errors

SWQUAL08\35

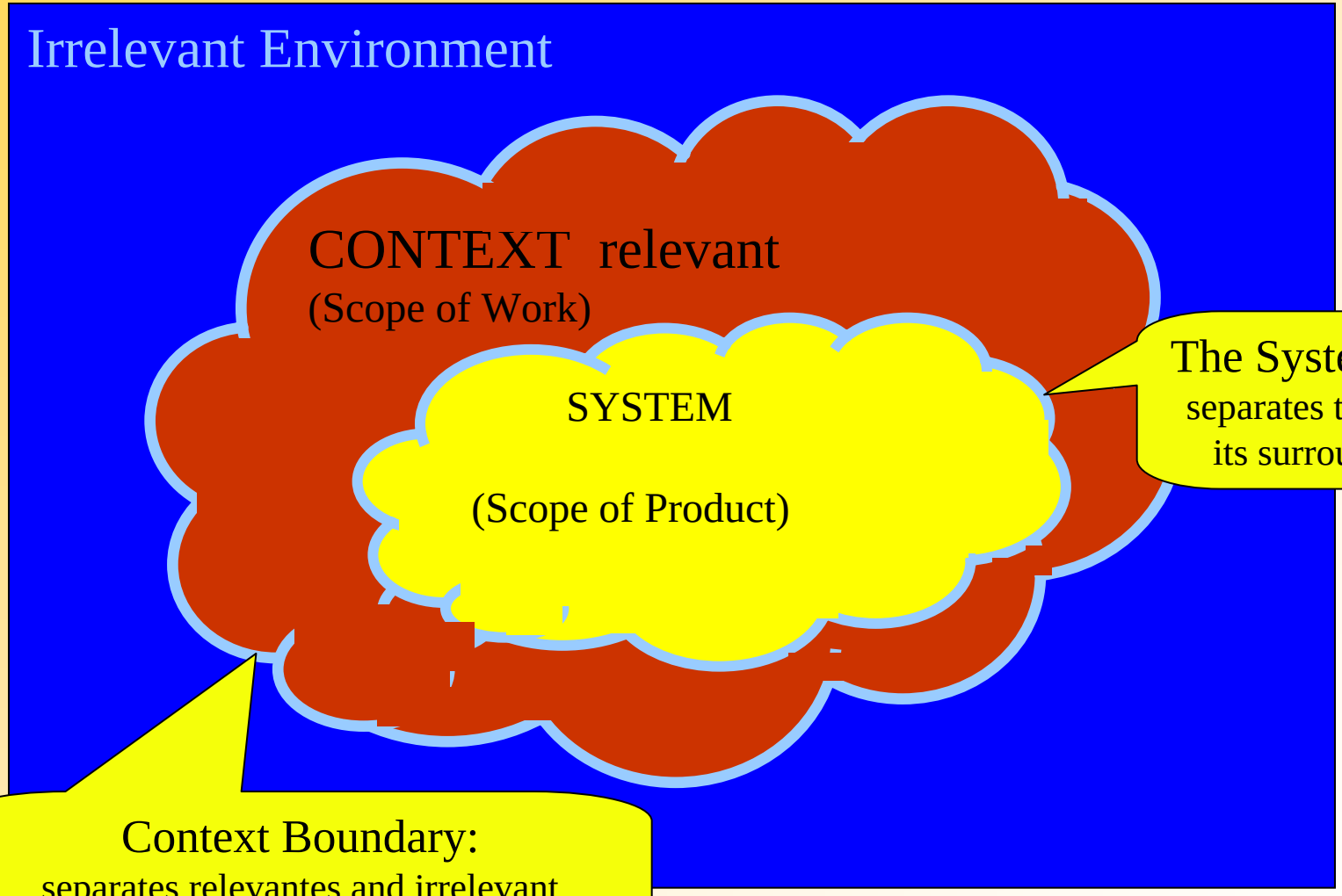
SQZ

Key Knowledge Areas for Requirements Engineers

IREB

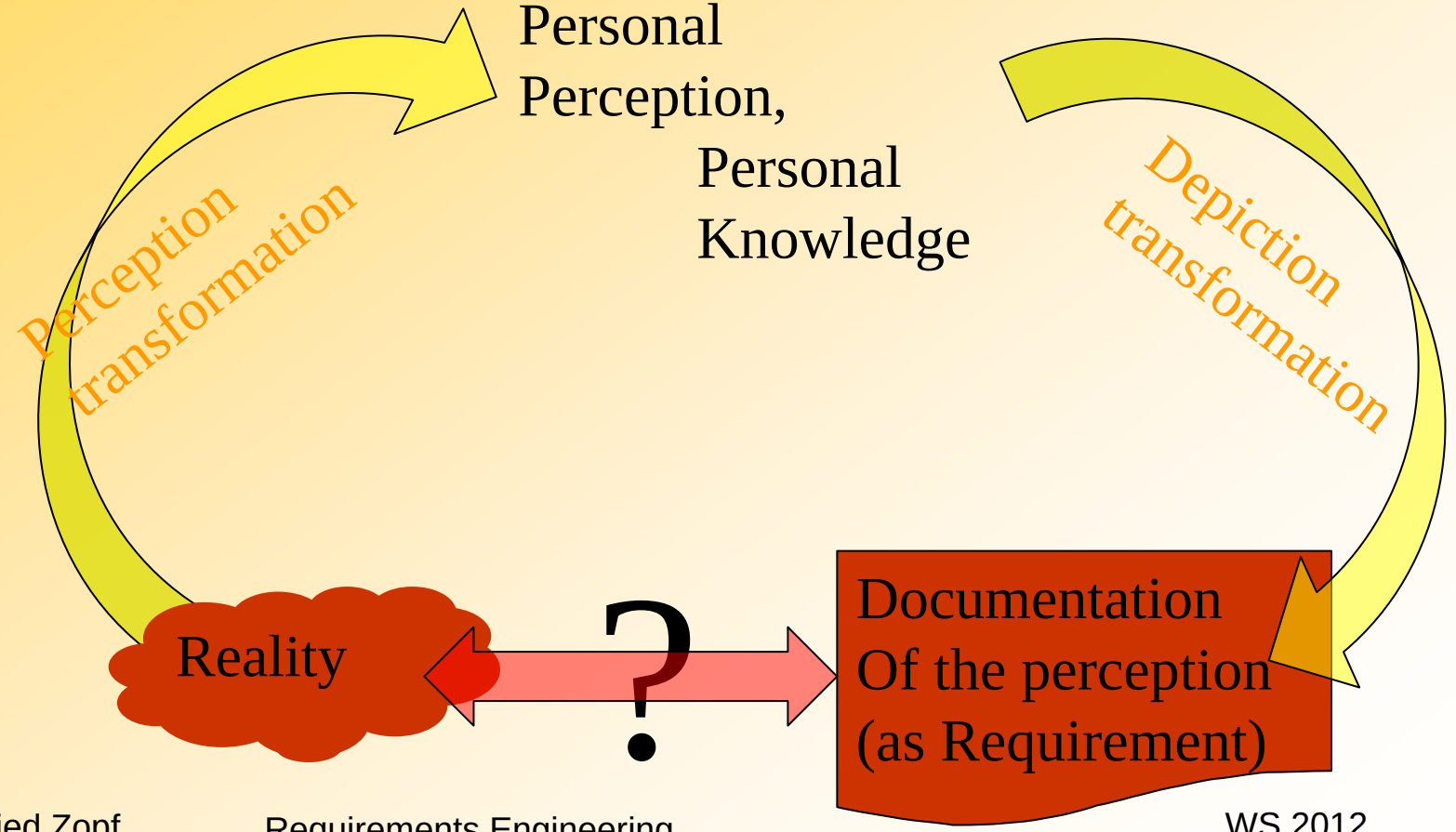


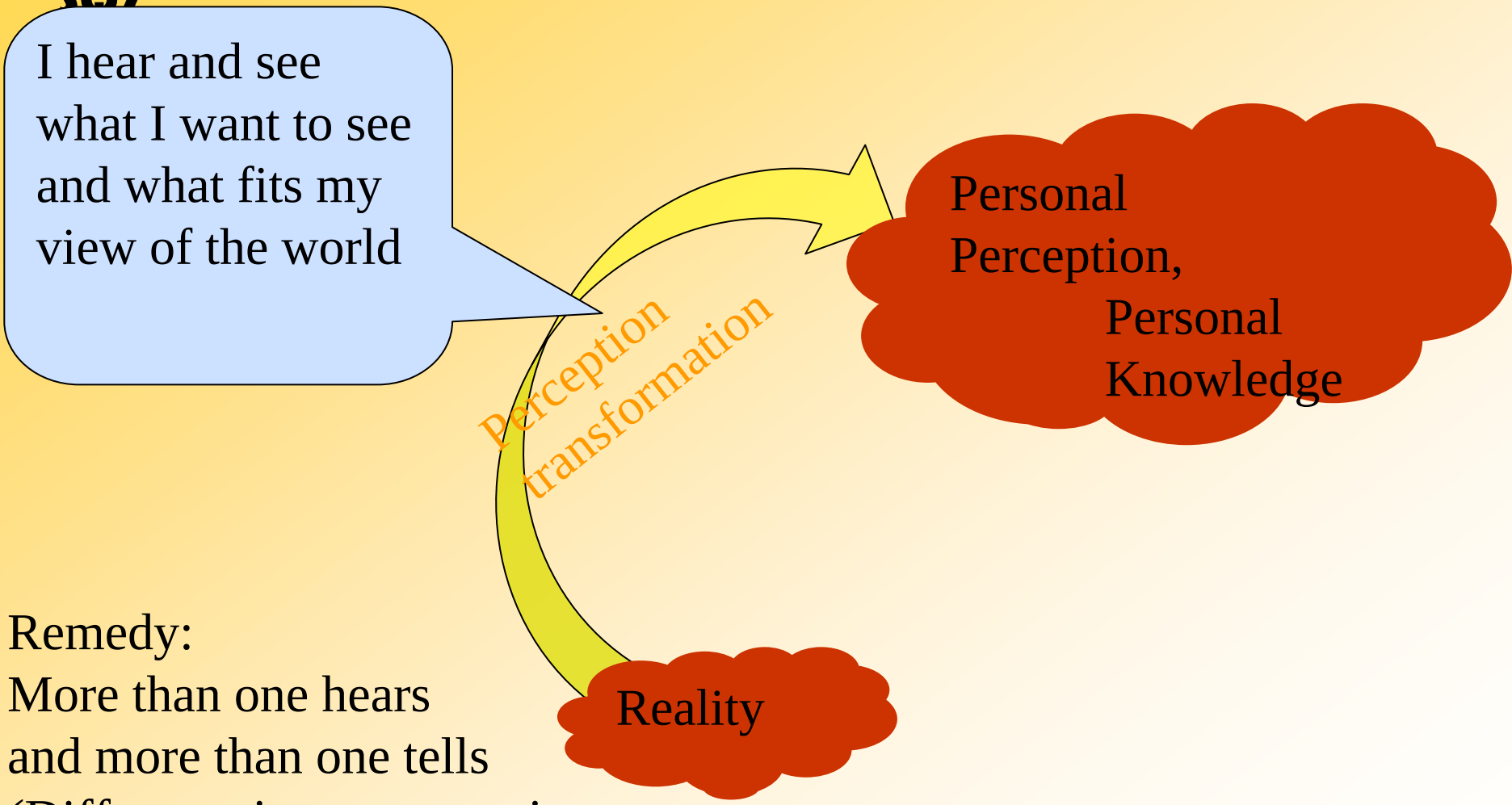
Know Your Boundaries!



SQZ

What is said is not necessarily heard,
what is heard is not necessarily understood





Remedy:
More than one hears and more than one tells (Different views, expressions, Background)

what is heard is not necessarily understood
what is understood is not necessarily communicated correct