5th World Congress for Software Quality



Approaches to Developing Quality Skills of Systems Engineers

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FUJITSU ADVANCED SOLUTIONS Ltd.

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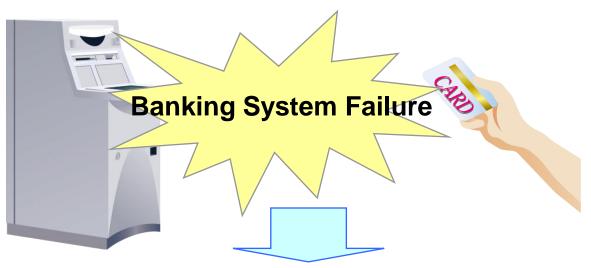
Agenda



- 1. Background
- 2. Problems
- 3. Investigation of reasons for increase in failures
- 4. Hypotheses
- 5. Verification
- 6. Solutions
- 7. Results
- 8. Future developments and challenges
- 9. Summary

1. Background







30 minutes system down



Bad reputation



2. Problems



Significant increase of serious system failures

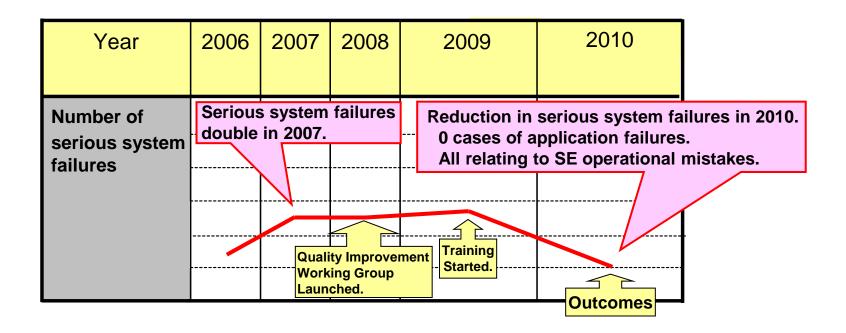


Figure 2.1 Trends in the occurrence of serious system failures

3. Investigation of reasons for increase in failures FUJITSU



3.1 Method of investigation



Interview-based

+) Reflects the direct views of systems engineers

) The small number of interview samples

Questionnaire-based

(+) A lot of interview samples

(-) Doesn't reveal what systems engineers really think

3.2 Method of interview

1. Pre-interviews

Formulate hypotheses

2. Main interviews

Verify the validity of hypotheses

3.3 Interview format

1. Interview question sheet

Avoid divergence of interview skills

2. Interview analysis sheet

Increase awareness from interview

4. Hypotheses



There is a high correlation between customers' quality awareness (CQA) and engineers' quality skills (EQS).

- 1. When CQA is high, EQS is also high.
- 2. When CQA is low, EQS is also low.



5.1 Low-career engineers

Low-career engineers: Engineers with less than five years of experience

Regardless of CQA, EQS remains low. (a) (b)

		Engineers' quality skills (EQS)	
		Low	High
Customers' quality awareness (CQA)	High	(a)50%	(c)0%
	Low	(b)50%	(d)0%

Table 5.1 Distribution of low-career engineers (Number of people)



5.2 Mid-career engineers

Mid-career engineers: Engineers with more than five years of experience

When CQA is high, EQS is also high. (c) When CQA is low, EQS is also low. (b)

		Engineers' quality skills (EQS)	
		Low	High
Customers' quality awareness (CQA)	High	(a)12%	(c)48%
	Low	(b)24%	(d)16%

Table 5.2 Distribution of mid-career engineers (Number of people)



5.3 Correlation analysis between serious system failures and the working environments

When both **CQA** and **EQS** are high, there are no serious system failures. (c) When either **CQA** or **EQS** is high, the incidence rate for serious system failures decreases. (a) (d)

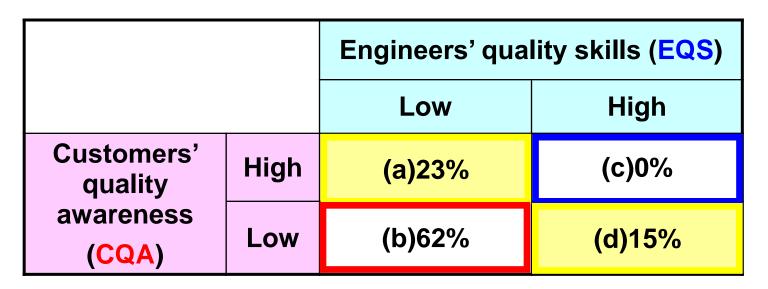
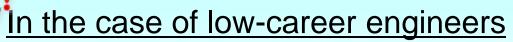


Table 5.3 Distribution of serious system failures in 2007 (Number of cases)



5.4 Conclusion



- Regardless of CQA, EQS remains low.

In the case of mid-career engineers

- When CQA is high, EQS is also high.
- When CQA is low, EQS is also low.



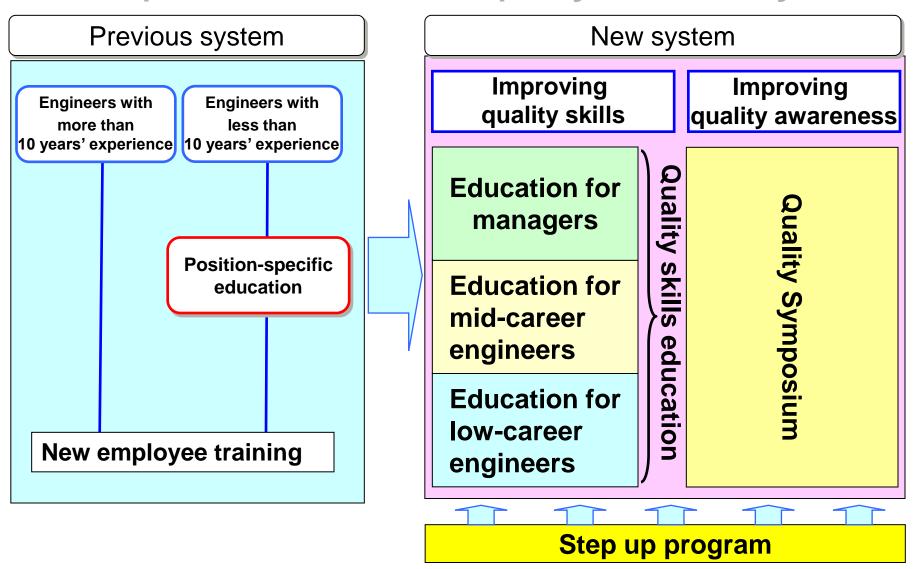
1.In order to reduce serious system failures, improvement of EQS is required.



2.Quality education system should be designed according to the engineer's career.



6.1 Implementation of a new quality education system





6.2 Solutions to issues



6.2 Solutions to issues



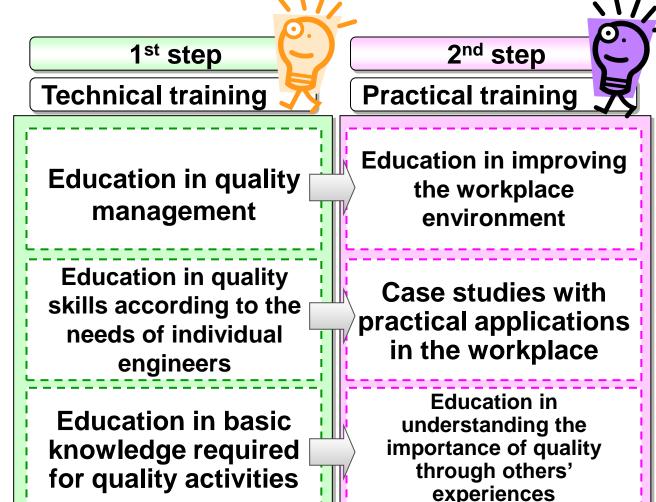
(1) Career-based education

Education for

managers

Education for mid-career engineers

Education for low-career engineers





6.2 Solutions to issues



6.2 Solutions to issues



(2) Quality Symposium

We hold the Quality Symposium to improve quality awareness and quality skills.

- presentations about good quality practice in each department.
- key note speeches by outside experts.
- the introduction of useful reference tools.



The improvements made to the Quality Symposium

Theme

A timely topic relating to quality issues in that year

Content

Coverage of successful cases



Management

A questioner is placed in the audience to kick-start the question-and-answer process.



(3) Step up quality program

Company side

Step up quality program





Employee side

Self-Improvement

Practical training	Technical training	
Education for managers	Training for new managers	
Education in improving organizational qualities	Education in quality management	
Education for mid- career engineers	Additional essential training depending on each person's function	
Quality analysis case studies	Lecture on quality management	
Root cause analysis case studies	Lecture on operational management	
<u> </u>	Lecture of review and test skills	
Education for low- career engineers	Training for engineers with less than 2 years of service	
Failure case studies	Method of writing a technical fault report	
Lecture on the study of failure Lecture about our QA system	Lecture on SDEM	
	Lecture on test skills	
Quality management system	New employee training	

Goal for engineers

Improvement of organizational qualities

Skills to create a qualityconscious workplace

Mastering intermediate quality awareness and skills

Quality and fault analysis

Reviewing skills

Testing skills

Fast and accurate fault reporting

Appropriate system operation

Learning basic knowledge about quality management

Our QA System

Method of writing a technical fault report

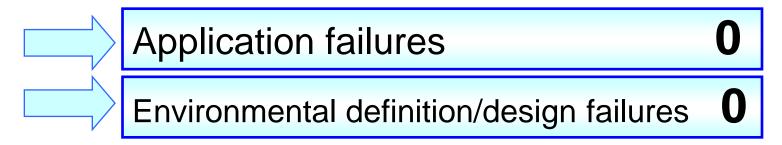
Flow of software development

- Process of QA
- Importance of quality

7. Results



7.1 Reduction of failures



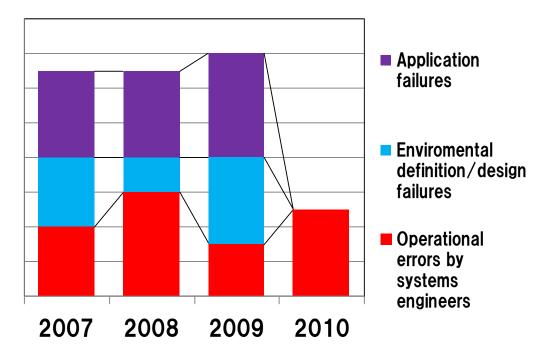


Figure 7.1 Trends in the occurrence of system failures caused by employee error

7. Results



7.2 Results of participant questionnaire

(1) Quality skills education

(a) Low-career engineers



mostly well-received

(b) Mid-career engineers



4.27- 4.75 (max of 5)

(c) Managers



More than 70%
"extremely useful"
or "useful"

(2) Quality Symposium

Participants feel that successful case studies are the most useful of all the programs.

7. Results



7.3 Follow-up questionnaire

We conducted a questionnaire three months later, targeting 70 engineers who had taken the mid-career training course. More than 50% of participants positively feel the training course is practical for their tasks.

Evaluation perspective	Positive response	
Knowledge	80%	
Action	50%	
Awareness	60%	

Table 7.2 Results of follow up questionnaire (Number of people)

8. Future developments and challenges



(1) Eliminate operational errors



Seek new approaches

(2) Implement additional training courses



"Quality of maintenance and operations"

"Quality relating to system infrastructure"

9. Summary



- (1) Problem
 Serious system failure increase.
- (2) Action
 Interviews with systems engineers.
- (3) Solutions
 - (a) Quality skills education
 - (b) Quality symposium
 - (c) Step up quality program
- (4) Benefits

Application failures 0

Environmental definition/design failures 0

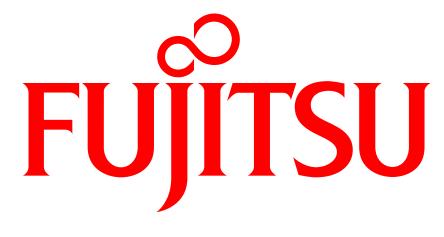








Thank you for your attention!!



shaping tomorrow with you