

5th World Congress for Software Quality



shaping tomorrow with you

Approaches to Developing Quality Skills of Systems Engineers

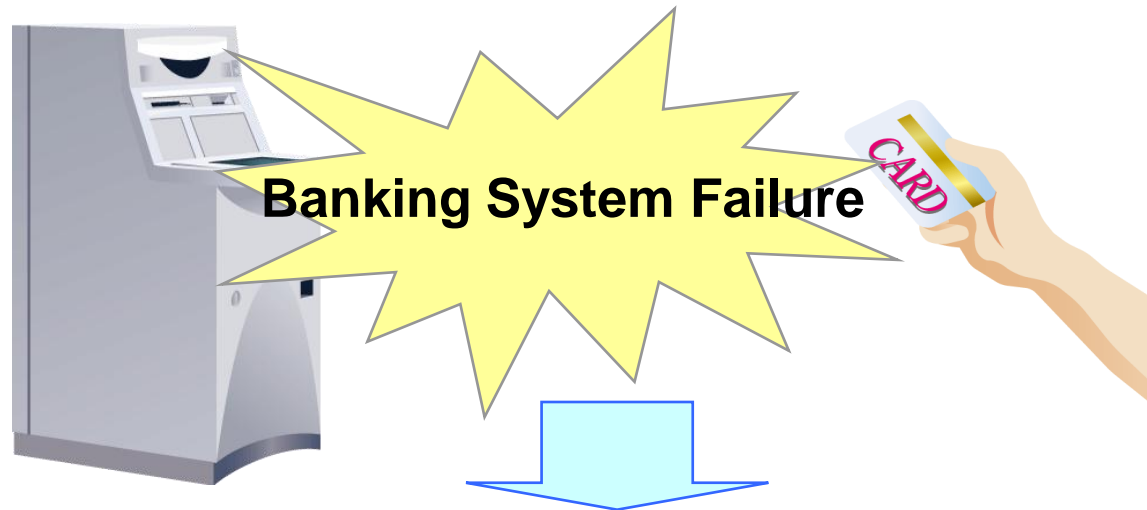
November 1st, 2011

FUJITSU ADVANCED SOLUTIONS Ltd.

Takako Maehara

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



Significant increase of serious system failures

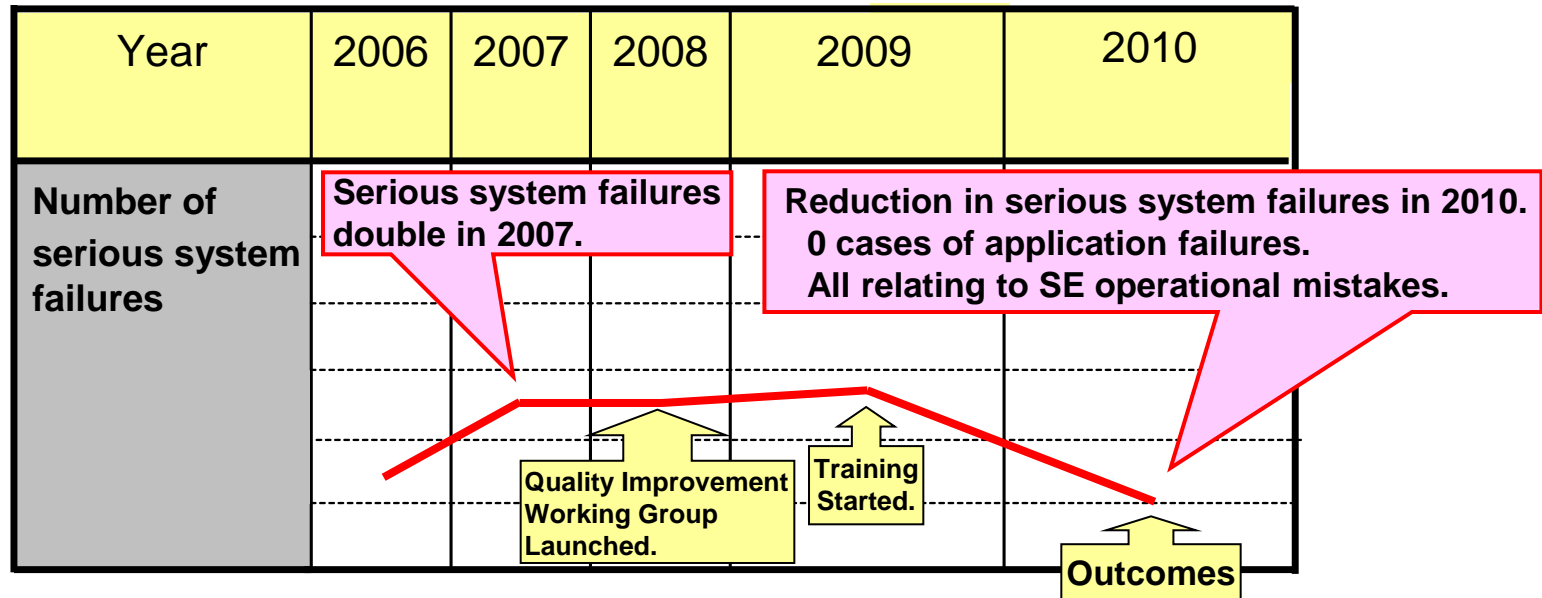


Figure 2.1 Trends in the occurrence of serious system failures

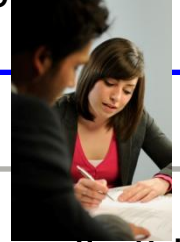
3. Investigation of reasons for increase in failures

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

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. Verification

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)

		Engineers' quality skills (EQS)	
		Low	High
Customers' quality awareness (CQA)	High	(a)23%	(c)0%
	Low	(b)62%	(d)15%

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

5.4 Conclusion



In the case of low-career engineers

- Regardless of **CQA**, **EQS** remains low.

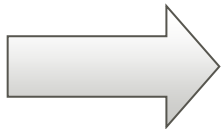
In the case of mid-career engineers

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



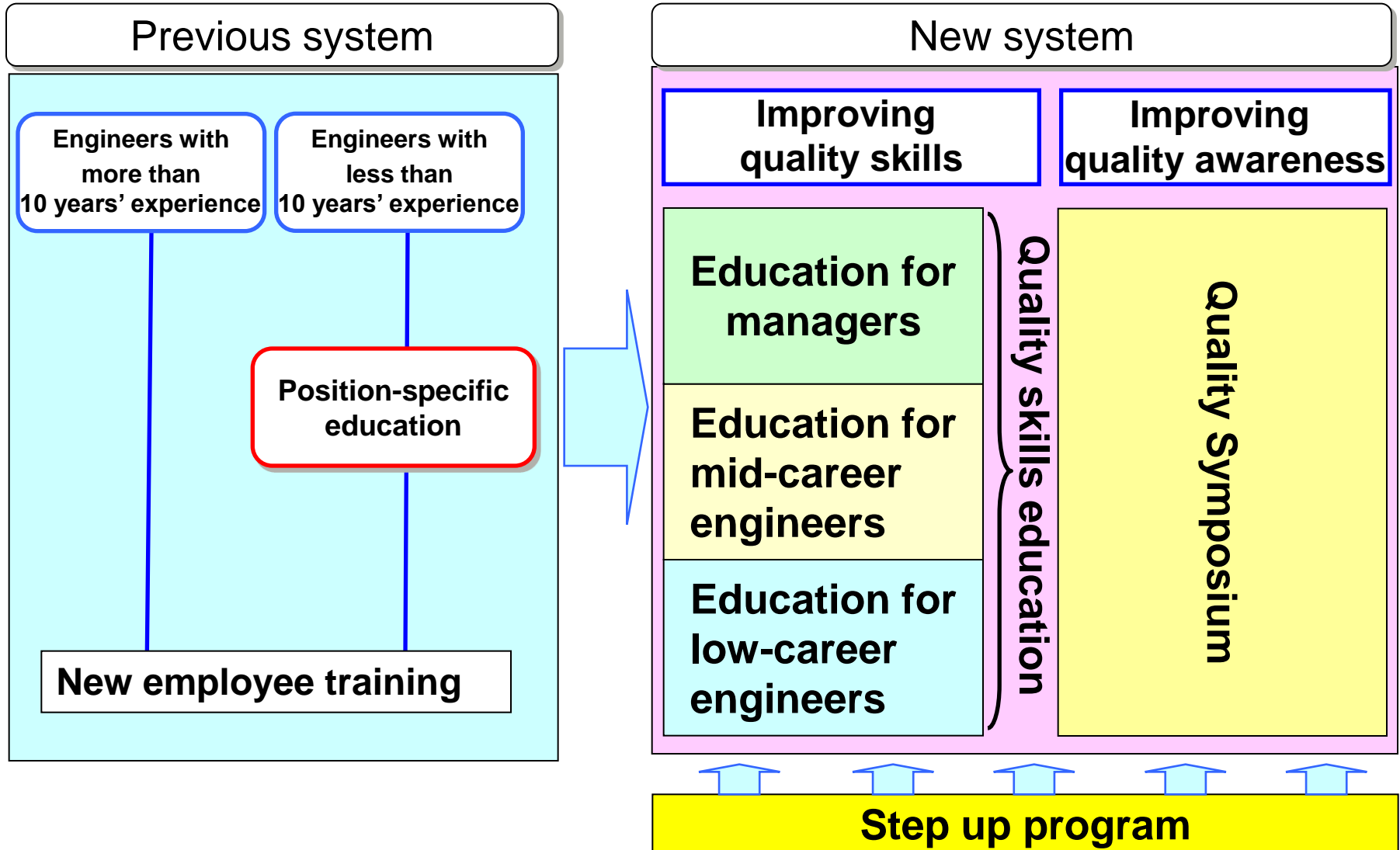
1. In order to reduce serious system failures, improvement of **EQS** is required.

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

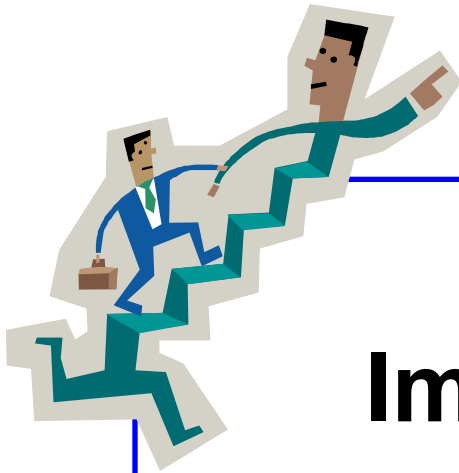


6. Solutions

6.1 Implementation of a new quality education system

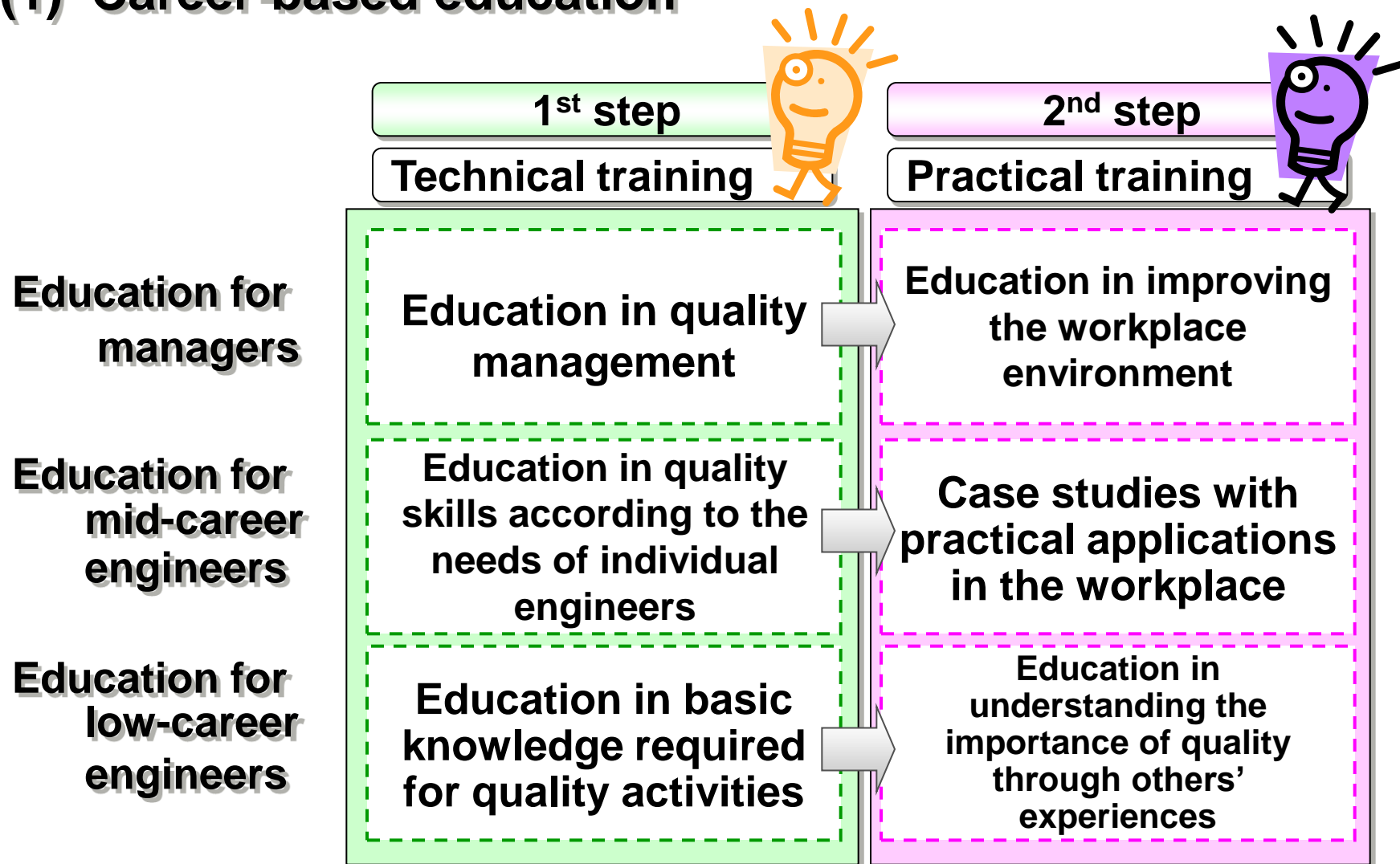


6.2 Solutions to issues

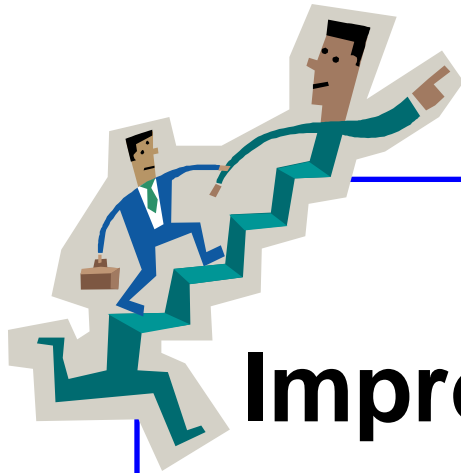


Improving quality skills

(1) Career-based education



6.2 Solutions to issues



Improving quality awareness


(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

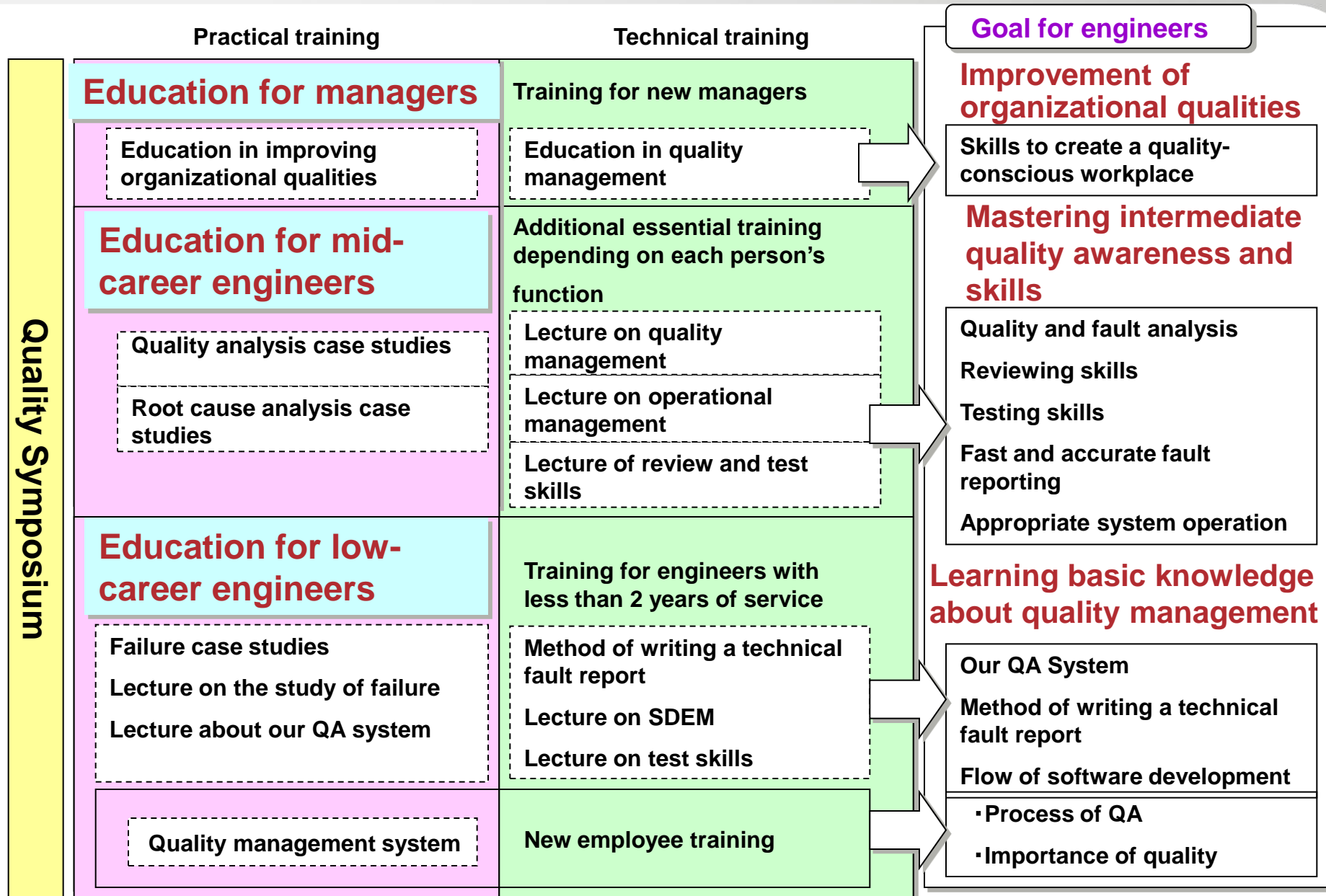
Stimulation

Employee side

Self-Improvement



6. Solutions



7.1 Reduction of failures

➡	Application failures	0
➡	Environmental definition/design failures	0

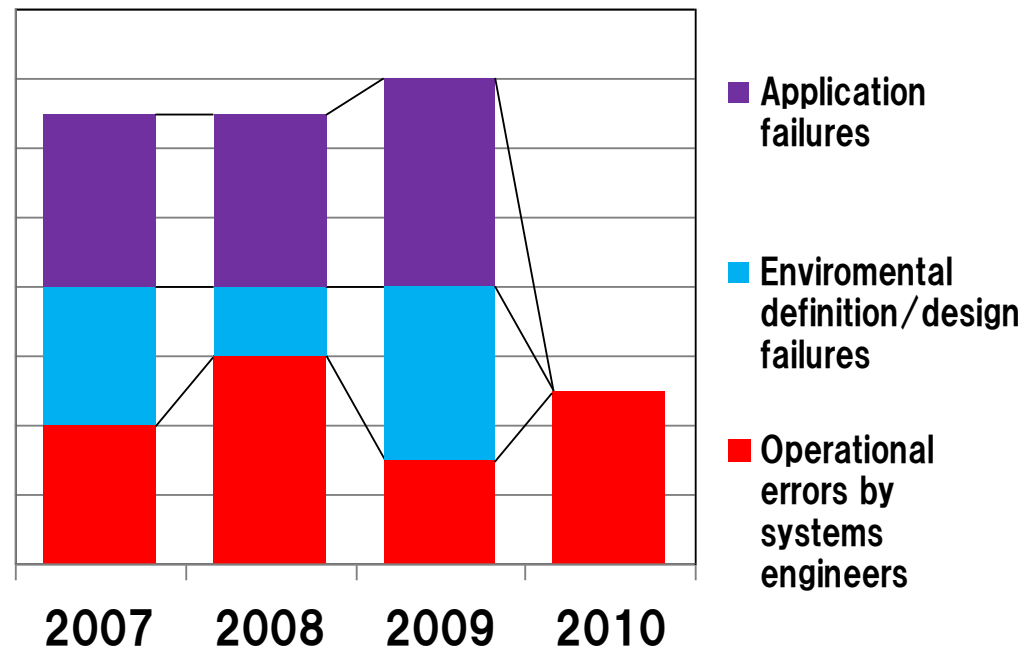
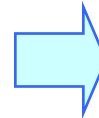


Figure 7.1 Trends in the occurrence of system failures caused by employee error

7.2 Results of participant questionnaire

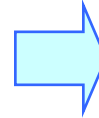
(1) Quality skills education

(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.

7.3 Follow-up questionnaire

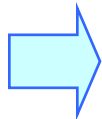
- © We conducted a questionnaire three months later, targeting 70 engineers who had taken the mid-career training course. More than 50% of participants positively feel the training course is practical for their tasks.

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

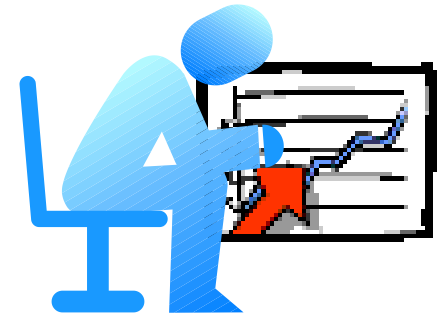
(b) Quality symposium

(c) Step up quality program

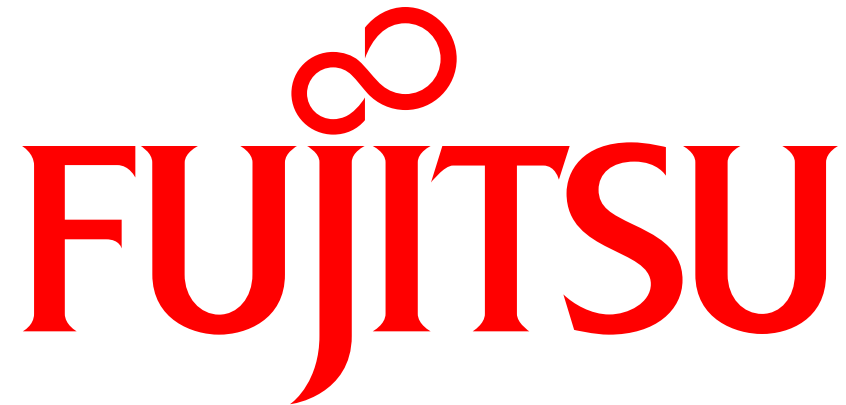
(4) Benefits

Application failures 0

Environmental definition/design failures 0



Thank you for your attention!!



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