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How much does software quality

?

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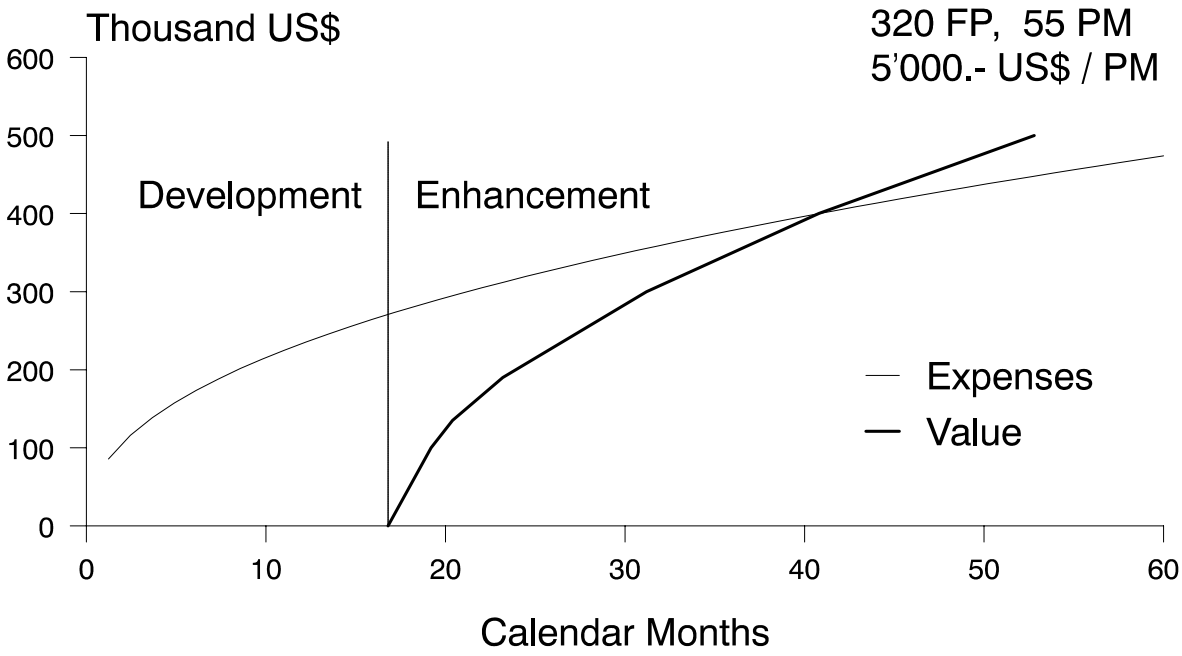
Cost of software quality

Cost of quality for the supplier:

Is the purchaser ready to pay that?

How does the purchaser see it?



Capers Jones: Applied Software Measurement, p. 160

What can the supplier do?

→ either increase the value

for the same price provide

- more useful functionality in the same time frame
- the same functionality in less time

→ or decrease the expenses

for a lower price provide

- in the same time the same value, i.e. decrease the cost of development

How can the supplier achieve it?

speed up development
→ increase efficiency
→ do more simultaneously
→ do less

decrease cost of development
→ increase efficiency
→ do it with cheaper resources
→ do less

efficiency = output / time

resources from Slovenia — topics for another conference

simultaneous defect detection

less work to do — topic for defect removal strategy

What type of work can be omitted?

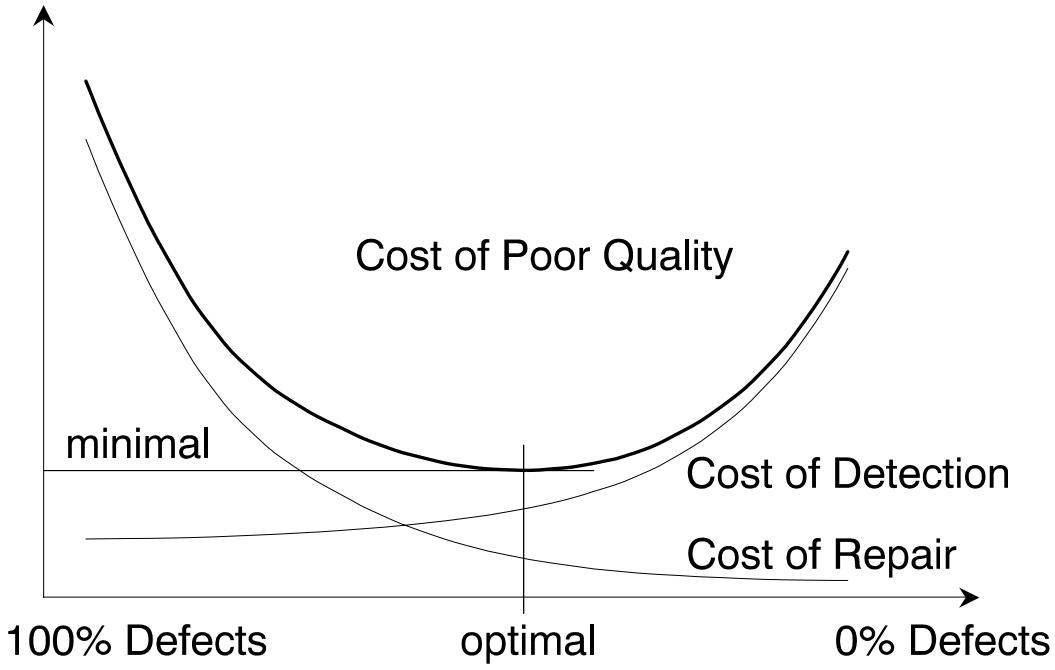
requirements specification	requirements review	requirements repair
design specifications	design reviews	design repair
coding	code reviews	code repair
	unit testing	code repair
	integration testing	design & code repair
	system testing	requirements & design & code repair
user documentation	documentation review	documentation repair
configuration management		
project management		

Universal laws of repair avoidance

1. don’t make mistakes
2. if it so happens that you can’t avoid mistakes
   then do your best to detect the defects you produced
3. repair the defects applying rule 1

approach	→	defect detection
justification	!	it prevents propagation of defects (if they are repaired)
the only thing is	?	it’s not for free

How much might defect detection cost?



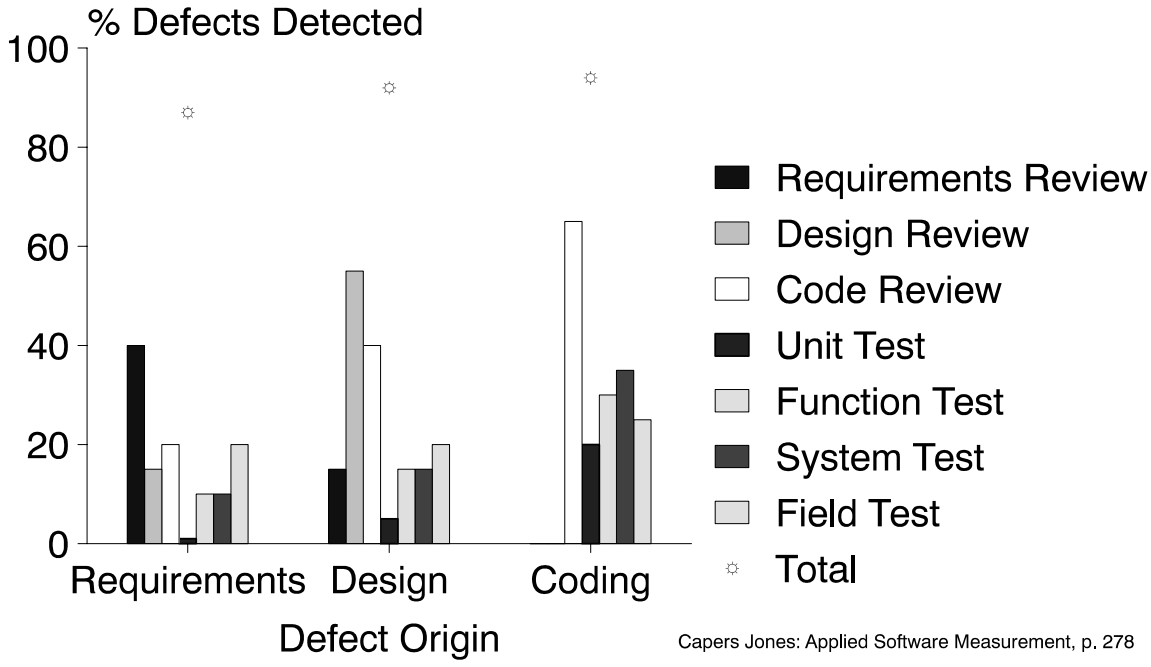
Where is the optimum?

„Interestingly, a cumulative defect removal efficiency of 95% appears to be a powerful nodal point for software projects. Projects which achieve overall removal efficiencies approximating or exceeding 95% tend to be optimal in three other aspects as well:

1. they have the shortest schedule for projects of their size and type
2. they have the lowest quantity of effort in terms of person-months
3. they have the highest levels of user satisfaction after release.“

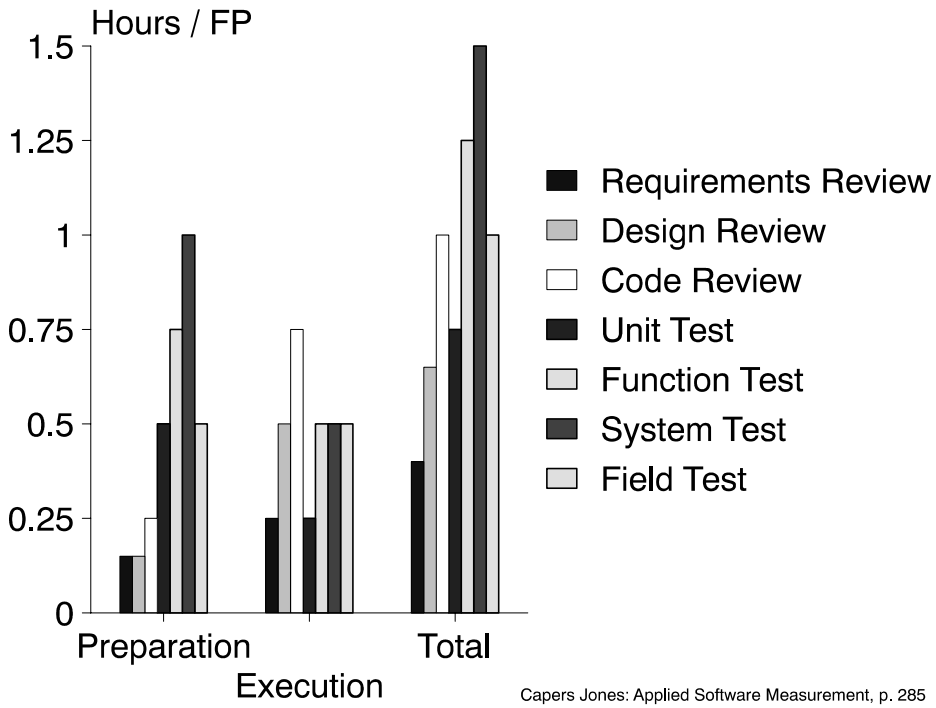
Capers Jones, Applied Software Measurement, p. 166-167

Effectiveness of defect detection techniques



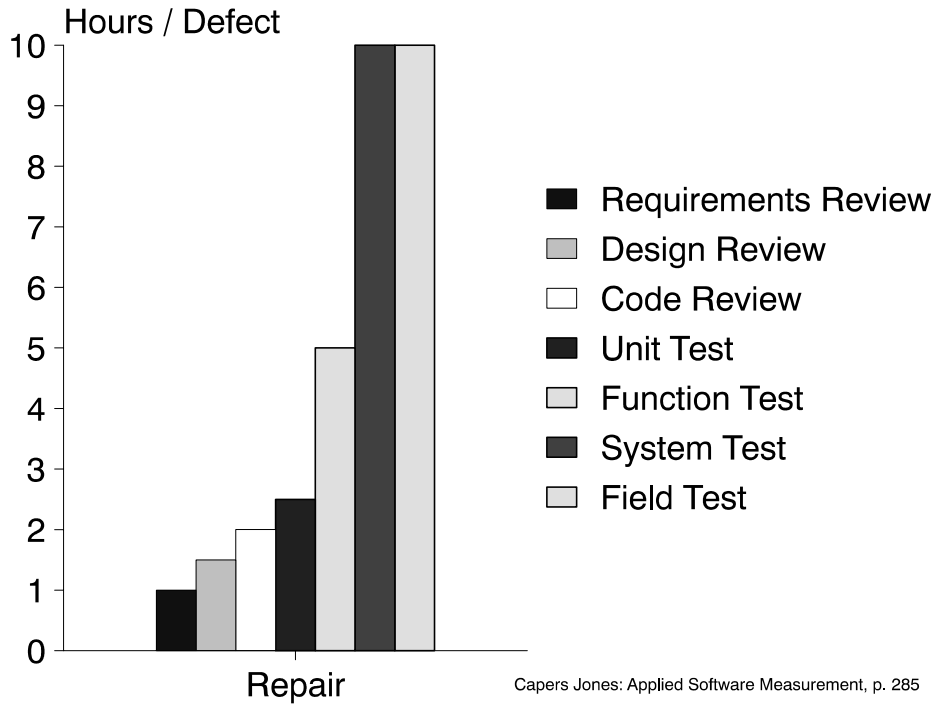
Capers Jones: Applied Software Measurement, p. 278

Yes, but reviews are expensive, aren't they?



Capers Jones: Applied Software Measurement, p. 285

And how is it with the cost of repair?



Capers Jones: Applied Software Measurement, p. 285

It looks like reviews are really efficient

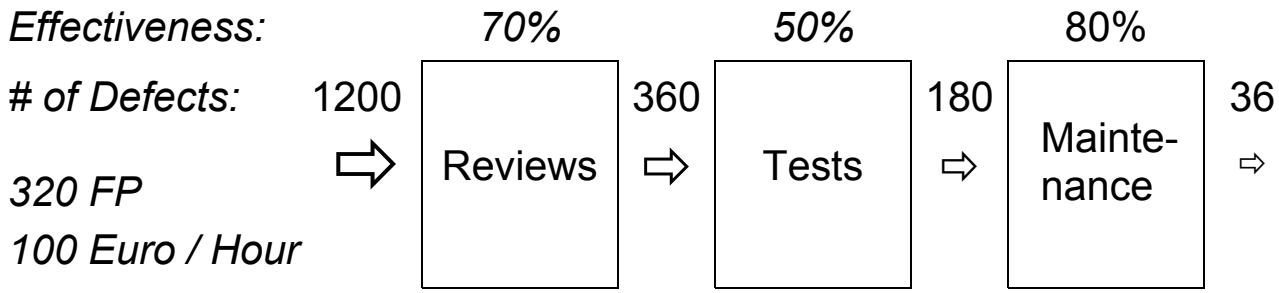
Indeed, they are!

	Reviews		Tests
Cost of Defect Detection	1	:	1.5 .. 2
Cost of Repair	1	:	1 .. 5 (at least)
Defect Detection Effectiveness	1.5 .. 2	:	1

Traditional way of doing things

Effectiveness:		30%		70%		80%	
# of Defects:	1200		800		240		48
320 FP	⇨	Reviews	⇨	Tests	⇨	Mainte-nance	⇨
100 Euro / Hour							
Detection / FP		0.25 h		1.25 h		-	
Detection Cost		8'000		40'000		-	
Repair / Defect		1 h		3 h		6 h	
Repair Cost		40'000		168'000		115'200	
Cost of Poor Quality		48'000		216'000		115'200	

A better way to do it



Detection / FP	*0.75 h*	1.25 h	0
Detection Cost	*24'000*	40'000	0
Repair / Defect	1 h	3 h	6 h
Repair Cost	*84'000*	*54'000*	*86'400*
Cost of Poor Quality	*108'000*	*94'000*	*86'400*

Net result

	traditional	a bit better
Defects Detected in Reviews	30 %	70 %
Defects Detected in Tests	70 %	50 %
Defects Detected Before Delivery	80 %	85 %
Defects Detected in First Year Maintenance	80 %	80 %
Cost of Defect Detection	48 kEuro	64 kEuro
Cost of Repair Before Delivery	208 kEuro	138 kEuro
Cost of Maintenance (Repair only)	115 kEuro	86 kEuro
Cost of Poor Quality	371 kEuro	278 kEuro

Change in Cost of Poor Quality - 25 %

Conclusions

1. Quality costs 100% or 0% (it depends on your point of view)
2. What really matters is the cost of poor quality
3. Key figures for project controlling (among others):
   - defect removal efficiency before delivery =

     $$\frac{\text{cost of defect detection and repair before delivery}}{\text{\# of defects removed before delivery}}$$

   - defect detection effectiveness before test =

     $$\frac{\text{\# of defects detected in reviews}}{\text{\# of defects detected in reviews and tests}}$$