



Software Improvement Group



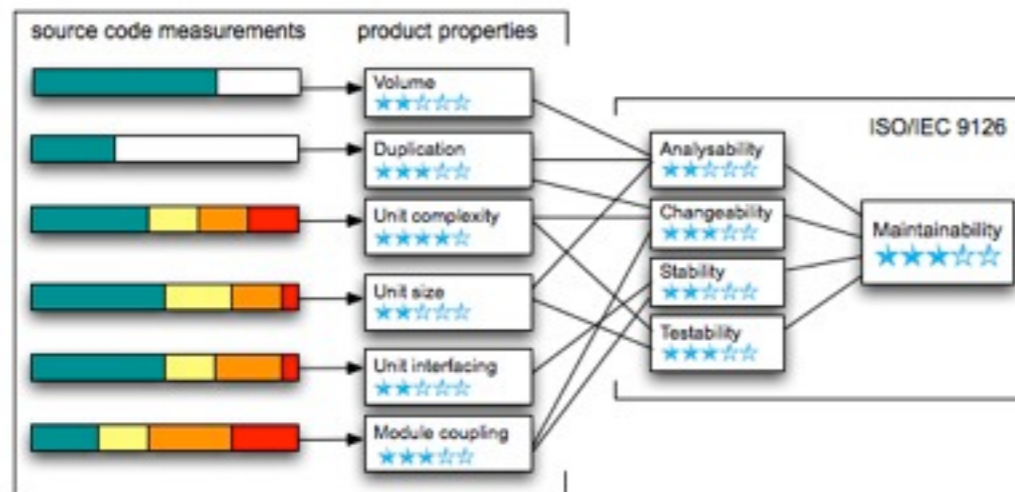
# An Empirical Model of Technical Debt and Interest

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# Poor Quality → Growing Problems

## SIG Quality Model



How much should I invest?

When does it pay back?

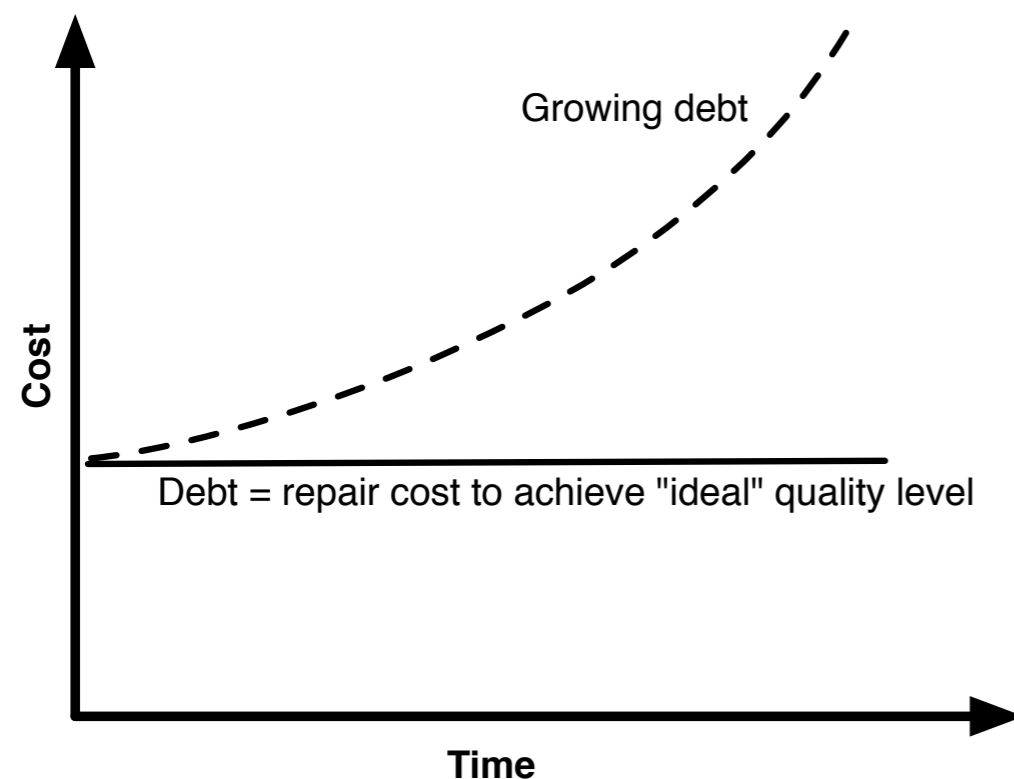
Would I be better-off doing nothing?

Do I have enough resource for maintenance?

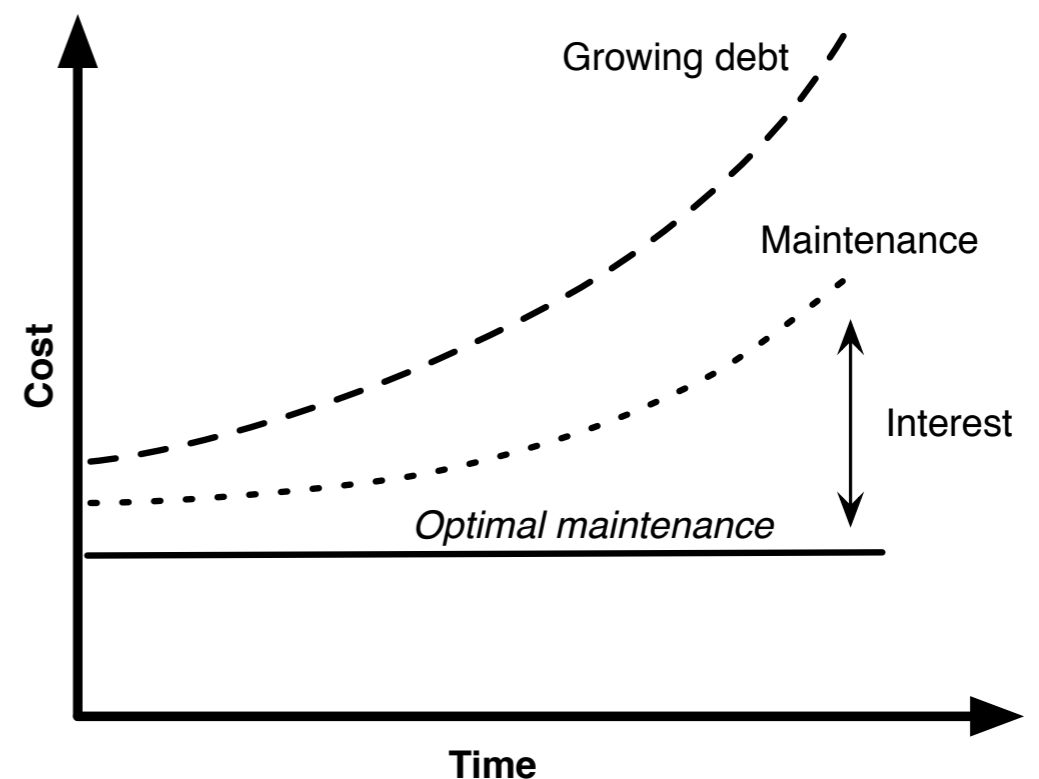
# Technical Debt Model

## Estimate the Cost of Quality (CoC) in software systems

- Repair cost model
- Maintenance cost model



Technical Debt



Interest

# Repair Cost Model



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Estimate the effort to improve software quality

Quality assessment is based on SIG's quality model

Aspects accounted for in the model:

- Rework Fraction (RF)
- Rebuild Value (RV)
- Refactoring Adjustment (RA)

$$RE_{man-months} = RF_{percent} * RV_{man-months} * RA_{percent}$$

Rework Fraction (RF)

	1-star	2-star	3-star	4-star	5-star
1-star					
2-star	60%				
3-star	100%	40%			
4-star	135%	75%	35%		
5-star	175%	115%	75%	40%	

# Maintenance Cost Model

Estimate yearly effort spent on software maintenance

Aspects accounted for in the model:

- Estimated Maintenance Size (EMS)
- Rebuild Value (RV)
- Quality Level Adjustment (QF)

$$ME_{man-month} = \frac{EMS_{percent} * RV_{man-month}}{QF}$$

# Applying Technical Debt Model

## System X

Language	Size	EMS	RA	QL
Java	125.3 KLOC	13%	20%	3 to 4

Repair Cost: 4 MY (EUR 400K)  
 Positive ROI in 7th year (16%)  
 Positive NPV in 7th year: EUR 24K

