



Software Improvement Group



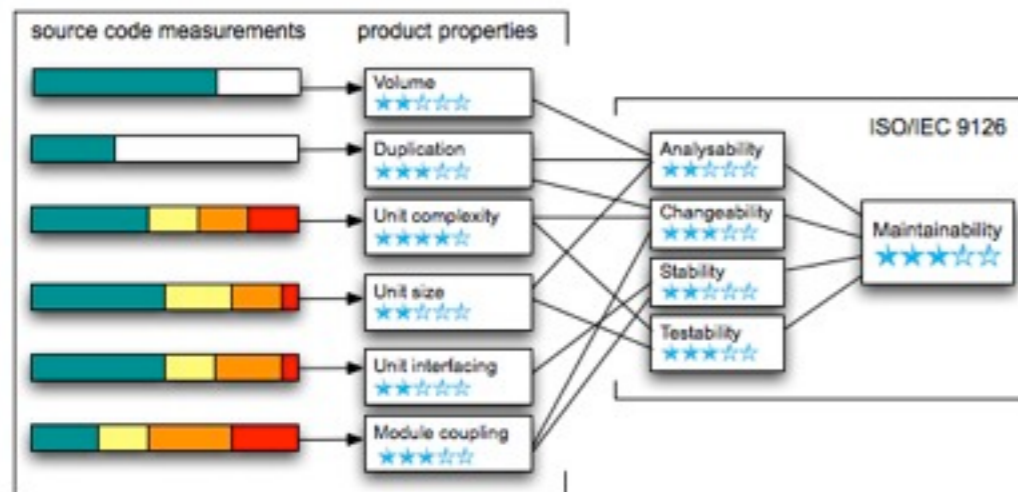
An Empirical Model of Technical Debt and Interest

Ariadi Nugroho, Joost Visser and Tobias Kuipers

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Rembrandt Tower, 14th floor
Amstelplein 1
1096 HA Amsterdam
info@sig.eu
www.sig.eu

Poor Quality → Growing Problems

SIG Quality Model



How much should I invest?

When does it pay back?

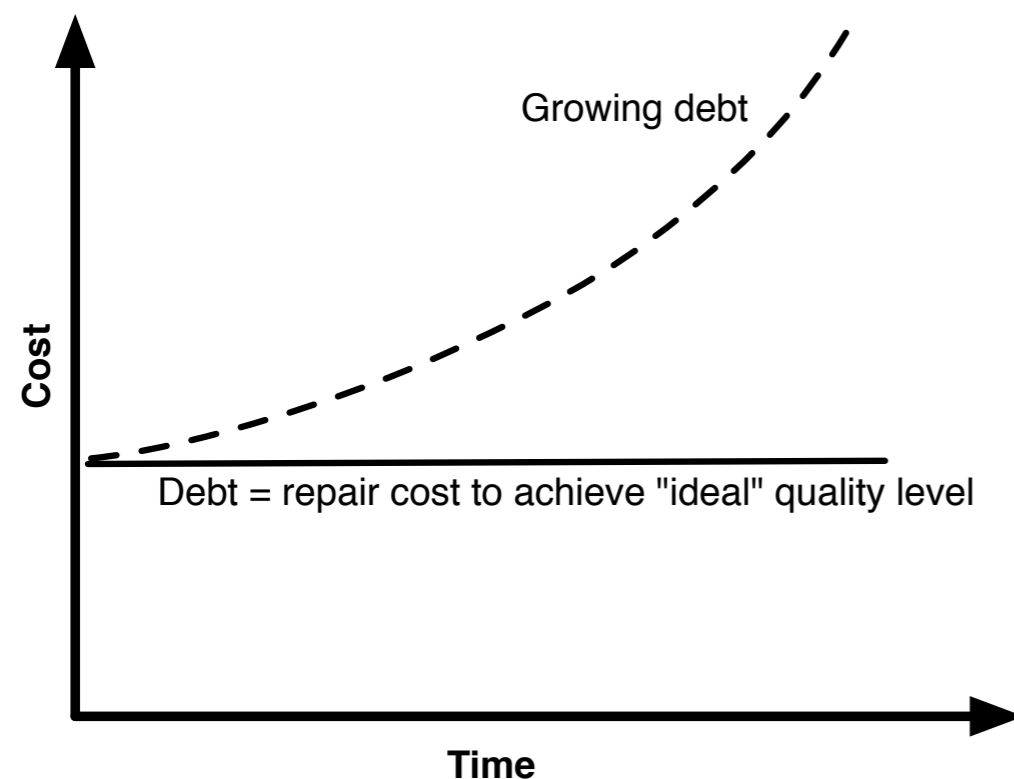
Would I be better-off doing nothing?

Do I have enough resource for maintenance?

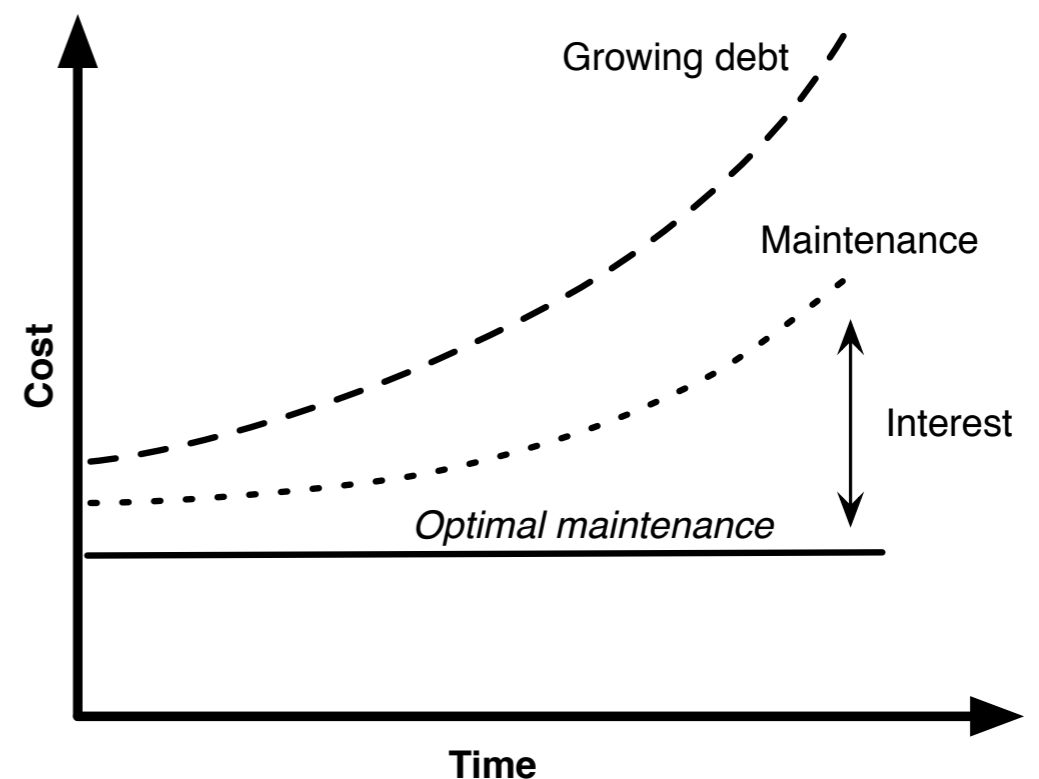
Technical Debt Model

Estimate the Cost of Quality (CoC) in software systems

- Repair cost model
- Maintenance cost model



Technical Debt



Interest

Repair Cost Model



Software Improvement Group

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

