

Technical Debt Is Not Free

Chad Green

Senior Systems Architect

Jasper Engines & Transmissions

Level: Introduction

Next Generation Skills
for Developers



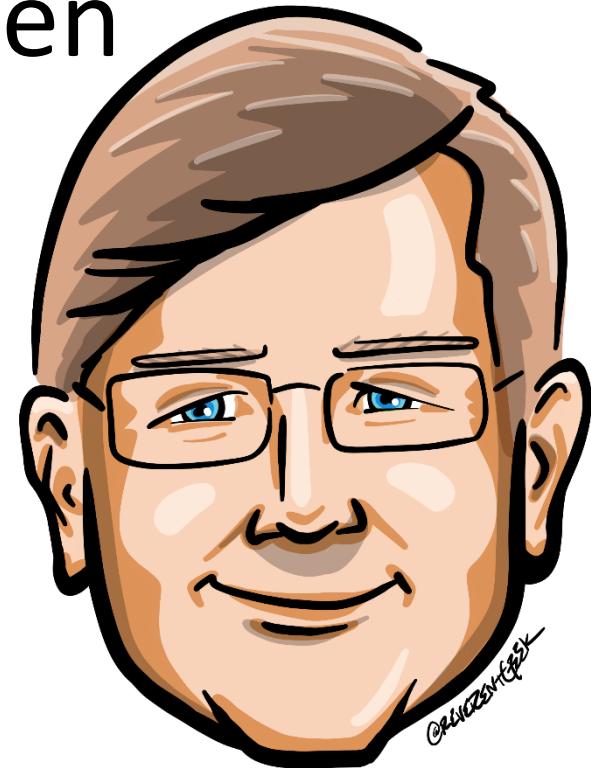
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Agenda

- What is Technical Debt
- Pros and Cons of Technical Debt
- What Causes Technical Debt
- Types of Technical Debt
- Technical Debt Identification
- Tracking Technical Debt

Technical Debt Is Not Free

WHAT IS TECHNICAL DEBT?



What is Technical Debt?

A story as old as time



What is Technical Debt?

A story as old as time



What is Technical Debt?

A story as old as time



What is Technical Debt?

A story as old as time



What is Technical Debt?

A story as old as time



What is Technical Debt?

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What is Technical Debt?

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What is Technical Debt?

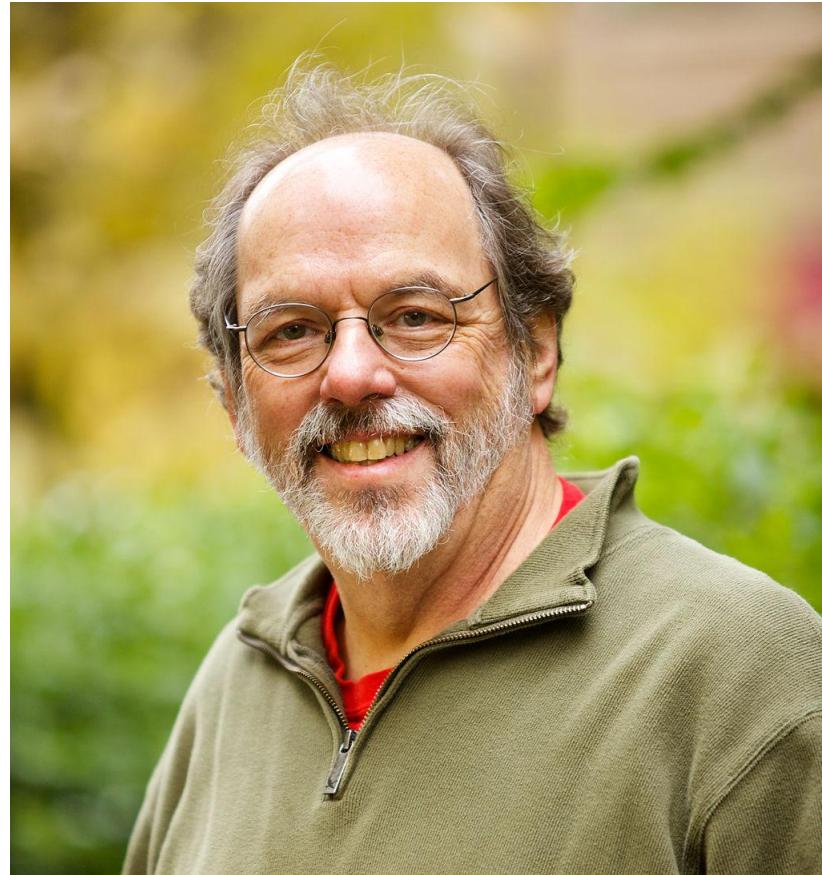
First described by Ward Cunningham in 1992



What is Technical Debt?

First described by Ward Cunningham in 1992

The danger occurs
when the debt is not
repaid



What is Technical Debt?

First described by Ward Cunningham in 1992

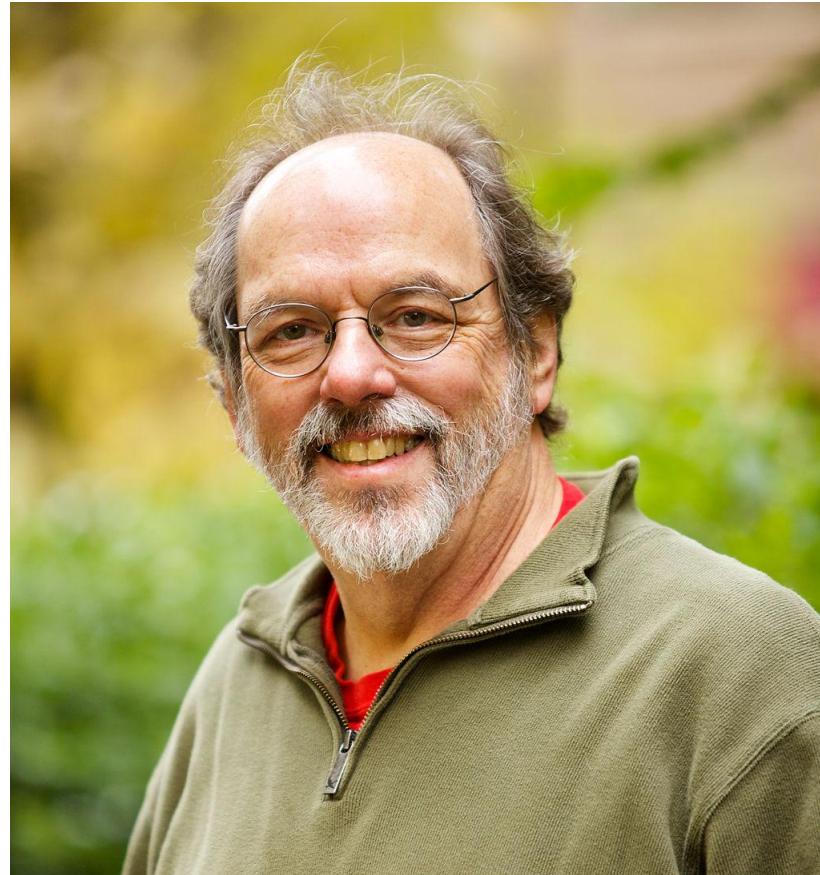
Every minute spent
on not-quite-right
code counts as
interest on that debt.



What is Technical Debt?

First described by Ward Cunningham in 1992

...brought to a stand-still under the debt load of an unconsolidated implementation



What is Technical Debt?

Common definition comes from
Martin Fowler



What is Technical Debt?

Common definition comes from
Martin Fowler

quick and dirty way



What is Technical Debt?

Common definition comes from
Martin Fowler

incurs interest
payments



What is Technical Debt?

Common definition comes from
Martin Fowler

extra effort that we
have to do in future
development



What is Technical Debt?

More academic definition

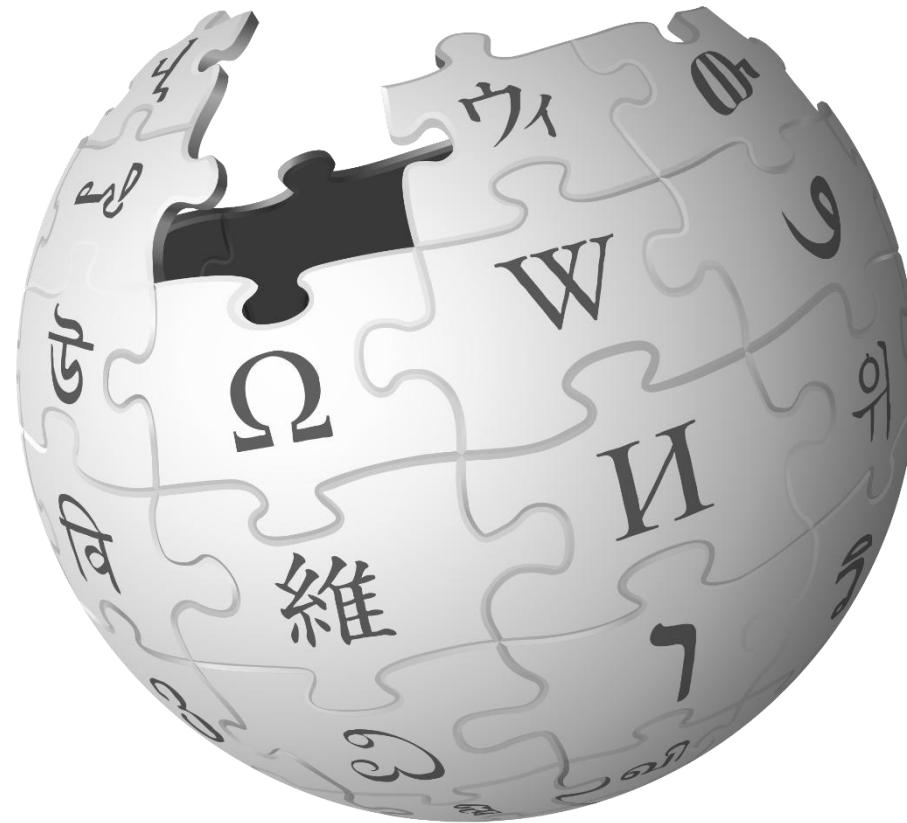
implied cost



What is Technical Debt?

More academic definition

rework



What is Technical Debt?

More academic definition

choosing easy



What is Technical Debt?

More academic definition

better approach



A more reasonable definition

A state of unnecessary complexity, duplication, subpar code, or otherwise deficient code that introduces risks in the form of time, quality, security, team morale, or other forms. Typically the results of past action or inaction.

Matt Eland

killalldefects.com/2019/12/23/defining-technical-debt

Technical Debt is Bad

Technical Debt can be Bad

Technical Debt can be Devastating

Technical Debt can be Useful

Technical Debt can be Beneficial

Technical Debt is not Free

Technical Debt Example

No User Roles

Technical Debt Example

No User Roles

Permission for Specific
Requirement

Technical Debt Example

No User Roles

Permission for Specific Requirement

Differentiation of Users

Technical Debt Example

No User Roles

Permission for Specific Requirement

Differentiation of Users

Yet Another Permission Change

Technical Debt Example

No User Roles

Permission for Specific Requirement

Differentiation of Users

Yet Another Permission Change

Another Technical Debt Example

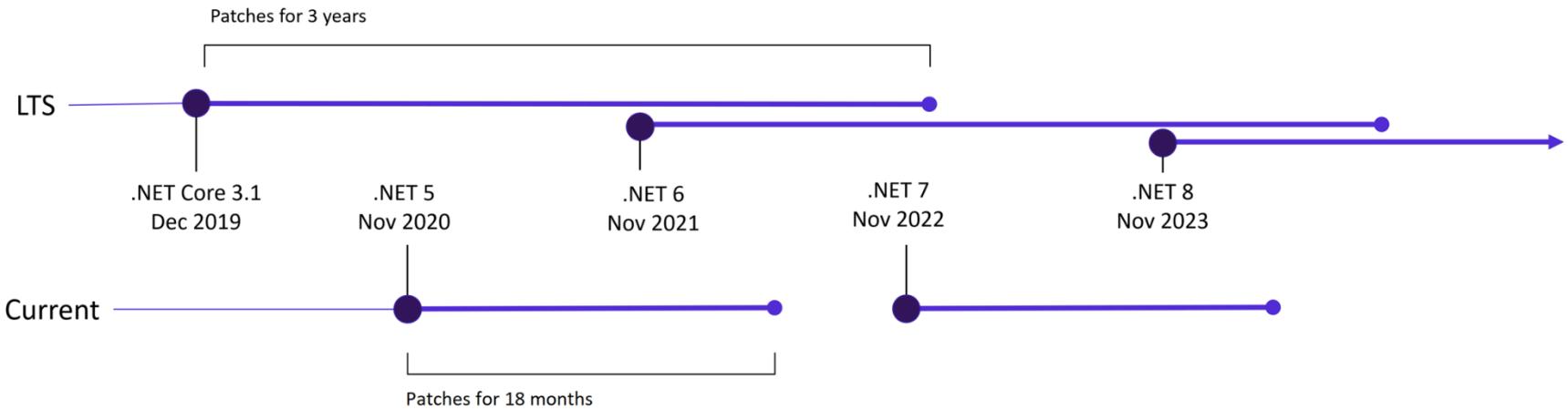
.NET 5

Current Release

.NET 6

LTS Release

Another Technical Debt Example



Technical Debt Is Not Free

PROS AND CONS OF TECHNICAL DEBT

Technical Debt Pros

Supplier

- Faster time to market
- Short term competitive advantage

Customer

- New features faster
- Short term capital preservation

Technical Debt Cons

Supplier

- Degradation of quality
- Limits ability to innovate
- Longer development cycles
- Less responsive to market changes
- Customer churn
- Developer churn

Customer

- Higher upgrade costs
- System compatibility issues
- Poor end user experience
- Less responsive to market changes
- Poor IT morale

Technical Debt Is Not Free

WHAT CAUSES TECHNICAL DEBT?

Insufficient up-front definition

What causes technical debt?



Business Pressures

What causes technical debt?



Lack of process or understanding

What causes technical debt?



Tightly-coupled components

What causes technical debt?



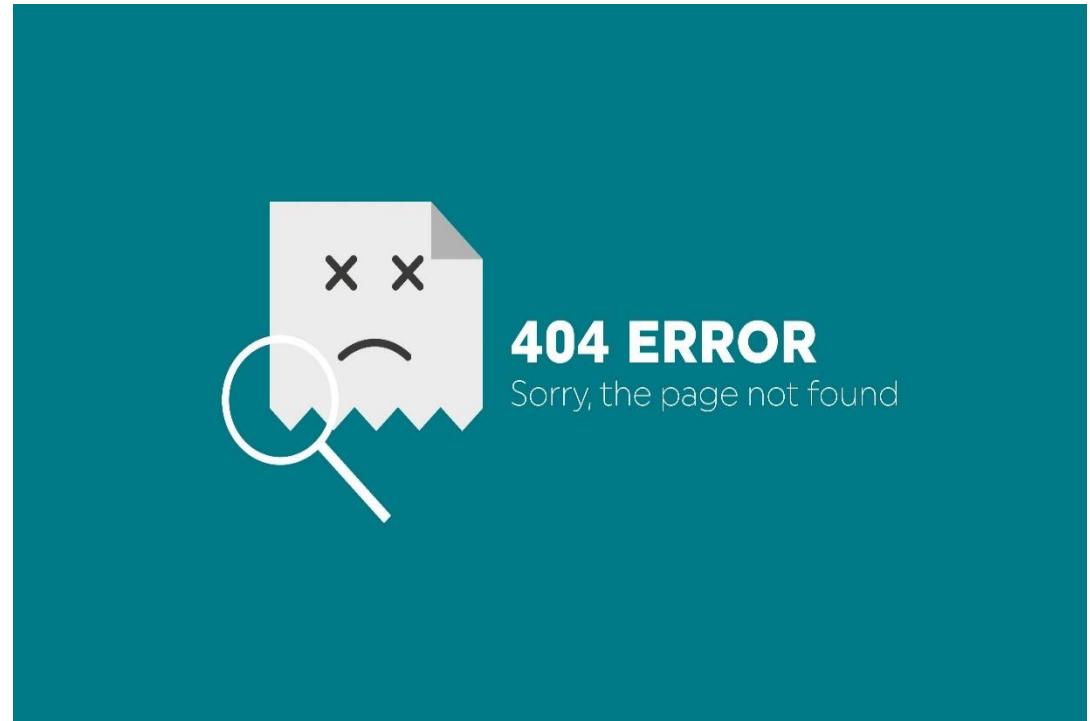
Lack of a test suite

What causes technical debt?



Lack of documentation

What causes technical debt?



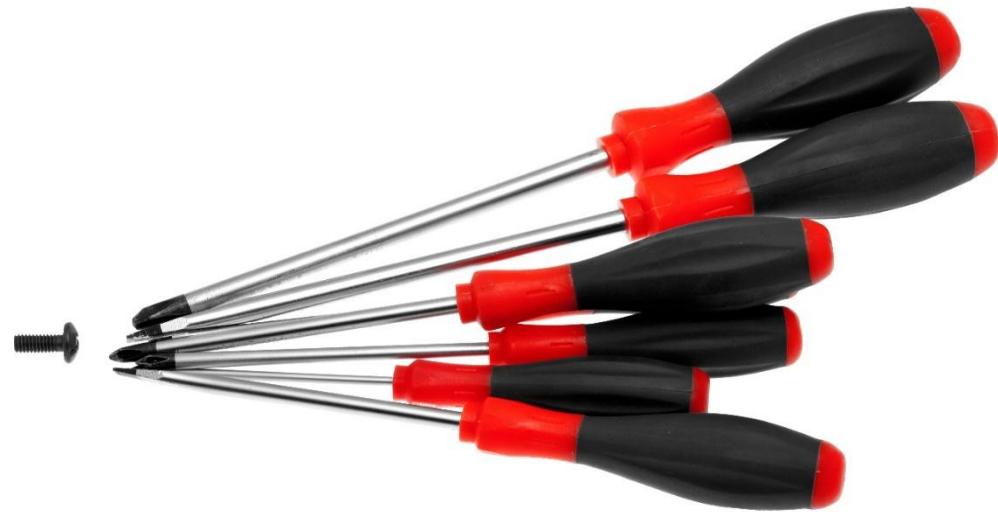
Lack of collaboration

What causes technical debt?



Parallel development

What causes technical debt?



Delayed refactoring

What causes technical debt?



Lack of alignment to standards

What causes technical debt?



Lack of knowledge

What causes technical debt?



Lack of ownership

What causes technical debt?



Poor technical leadership

What causes technical debt?



Last minute specification changes

What causes technical debt?



What causes technical debt?

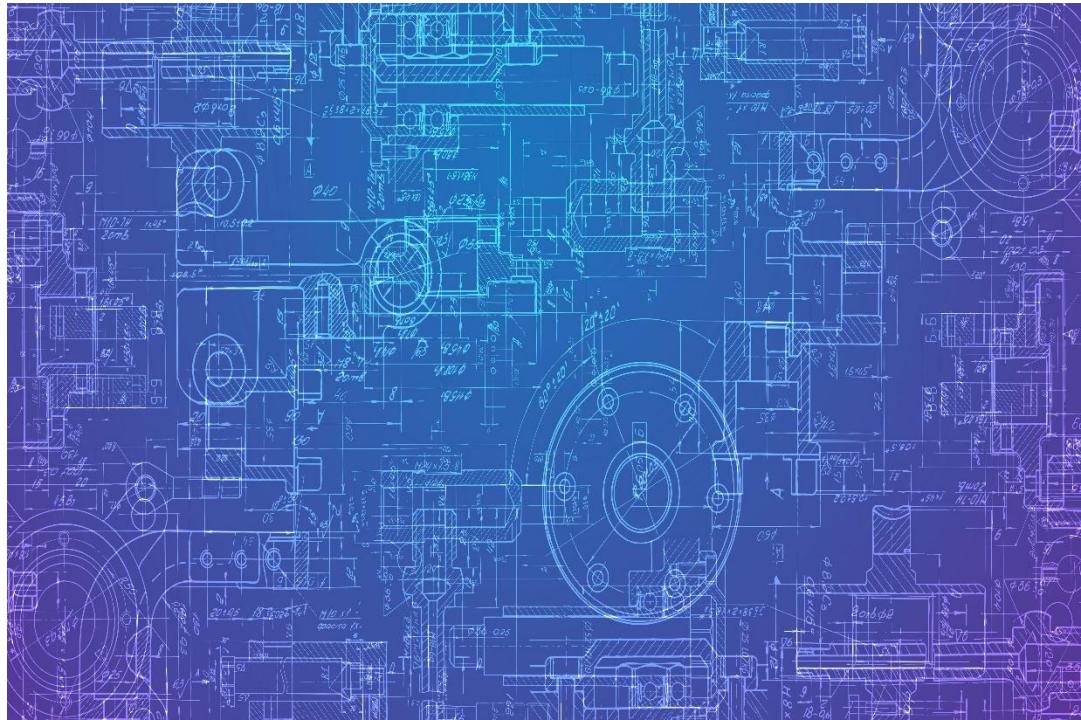
- Insufficient up-front definition
- Business pressures
- Lack of process of understanding
- Tightly-coupled components
- Lack of a test suite
- Lack of documentation
- Lack of collaboration
- Parallel development
- Delayed refactoring
- Lack of alignment to standards
- Lack of knowledge
- Lack of ownership
- Poor technical leadership
- Last minute specification changes

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TYPES OF TECHNICAL DEBT

Architecture

Types of Technical Debt



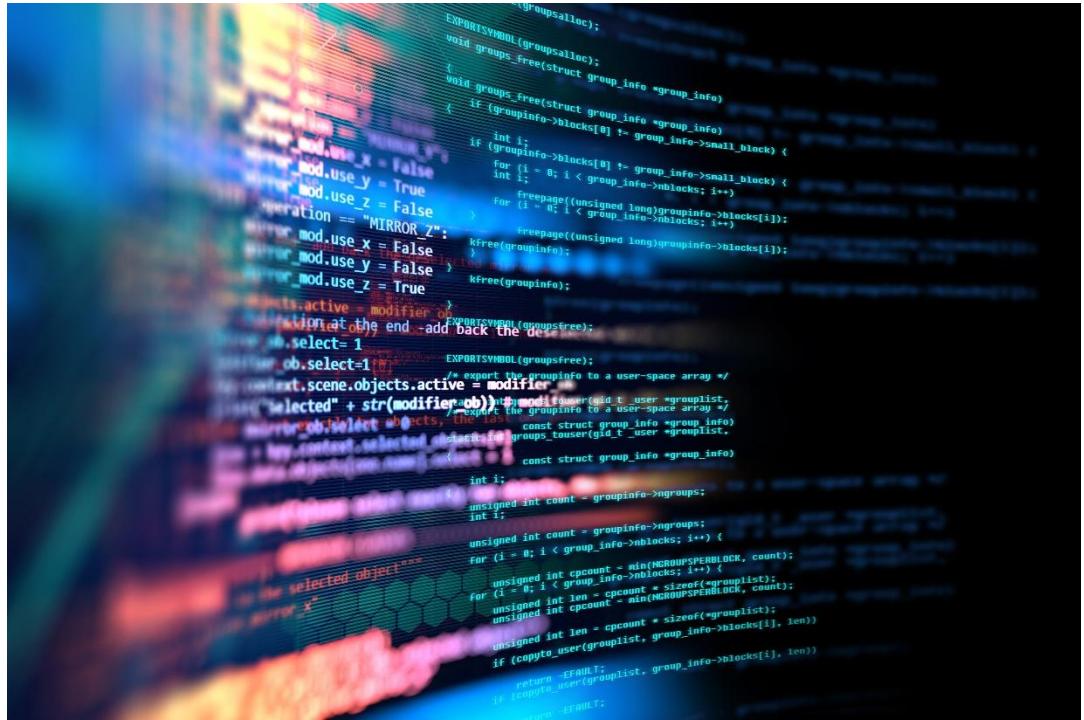
Build

Types of Technical Debt



Code

Types of Technical Debt



Defect

Types of Technical Debt



Design

Types of Technical Debt



Documentation

Types of Technical Debt



Infrastructure

Types of Technical Debt



People

Types of Technical Debt



Process

Types of Technical Debt



Requirement

Types of Technical Debt



Service

Types of Technical Debt



Test Automation

Types of Technical Debt



Test

Types of Technical Debt



Types of Technical Debt

- Architecture
- Build
- Code
- Defect
- Design
- Documentation
- Infrastructure
- Process
- Requirement
- Service
- Test Automation
- Test

Technical Debt Is Not Free

TECHNICAL DEBT IDENTIFICATION

Technical Debt Identification

Code Quality

Clarity

Technical Debt Identification

Code Quality

Maintainability

Technical Debt Identification

Code Quality

Documentation

Technical Debt Identification

Code Quality

Refactoring

Technical Debt Identification

Code Quality

Well-Tested

Technical Debt Identification

Code Quality

Efficiency

Technical Debt Identification

Code Quality

Technical
Deficiencies

Have other teams built similar solutions?

Technical Debt Identification

Code Quality

Technical
Deficiencies

Are there inconsistent user experiences?

Technical Debt Identification

Code Quality

Technical
Deficiencies

Are solutions using the same reusable
frameworks?

Technical Debt Identification

Code Quality

Technical
Deficiencies

Are best practices being followed?

Technical Debt Identification

Code Quality

Technical
Deficiencies

Are deployments taking too long?

Technical Debt Identification

Code Quality

Technical
Deficiencies

Are limits being exceeded, or
are users seeing errors?

Technical Debt Identification

Code Quality

Technical
Deficiencies

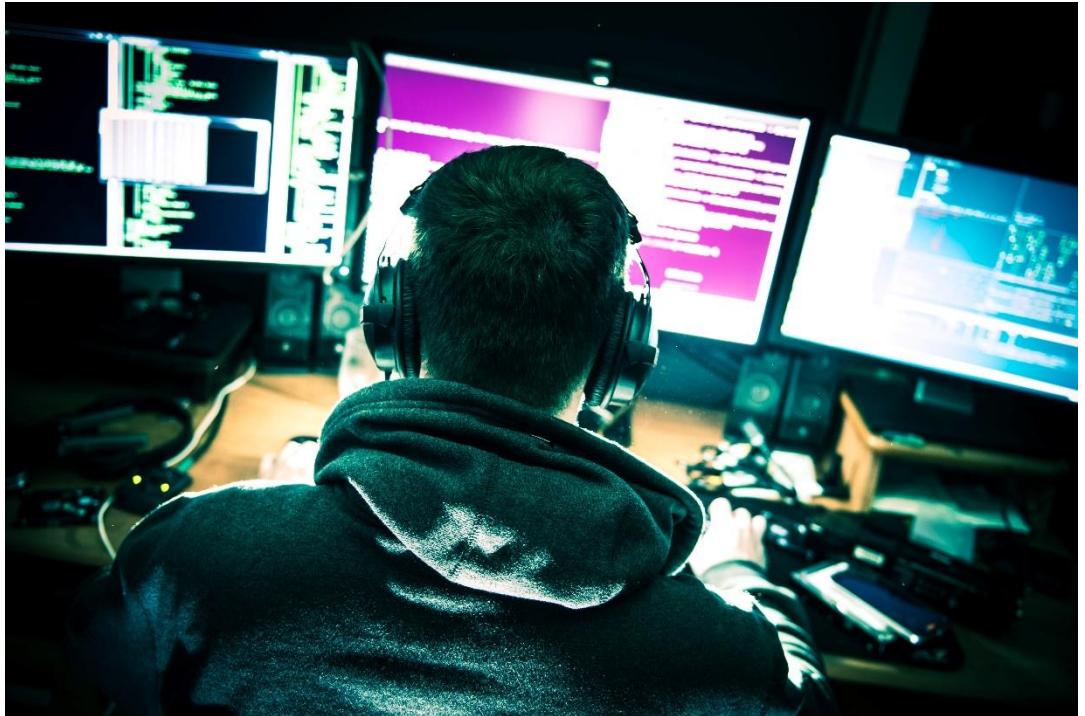
Business
Misalignment

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OPPORTUNITIES TO IDENTIFY TECHNICAL DEBT

Coding

Opportunities to Identify Technical Debt



Manifesto for Software Craftsmanship

Not only working software,
but also **well-crafted software**

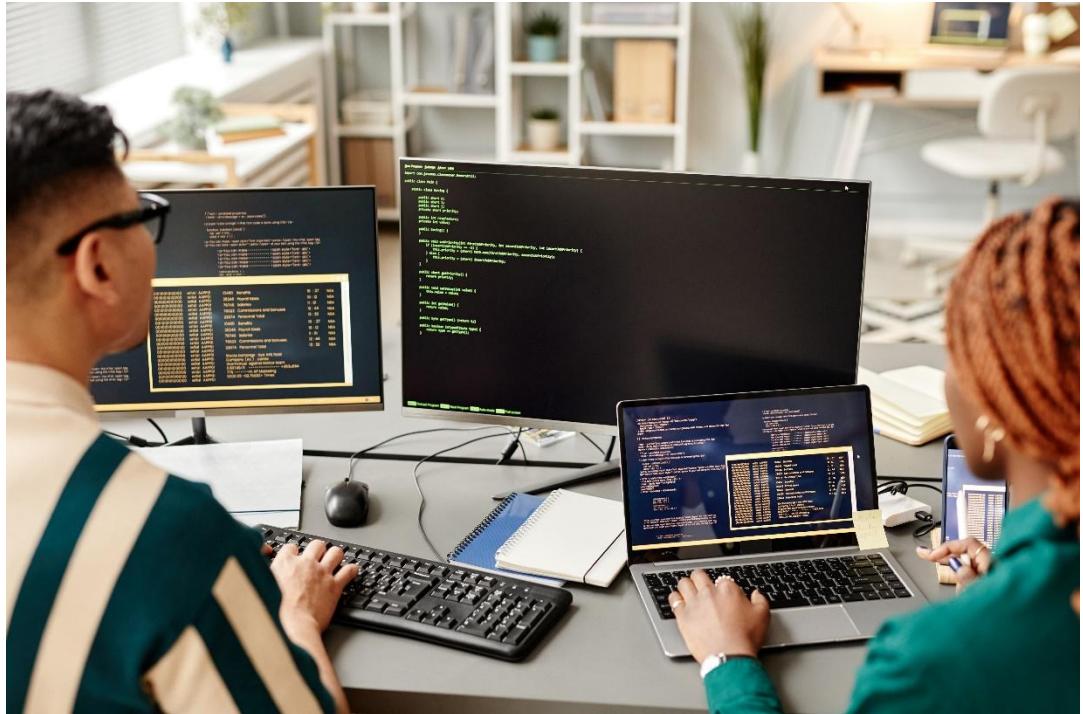
Not only responding to change,
but also **steadily adding value**

Not only individuals and interactions,
but also **a community of professionals**

Not only customer collaboration,
but also **productive partnerships**

Code Reviews

Opportunities to Identify Technical Debt



Code Analysis Tools

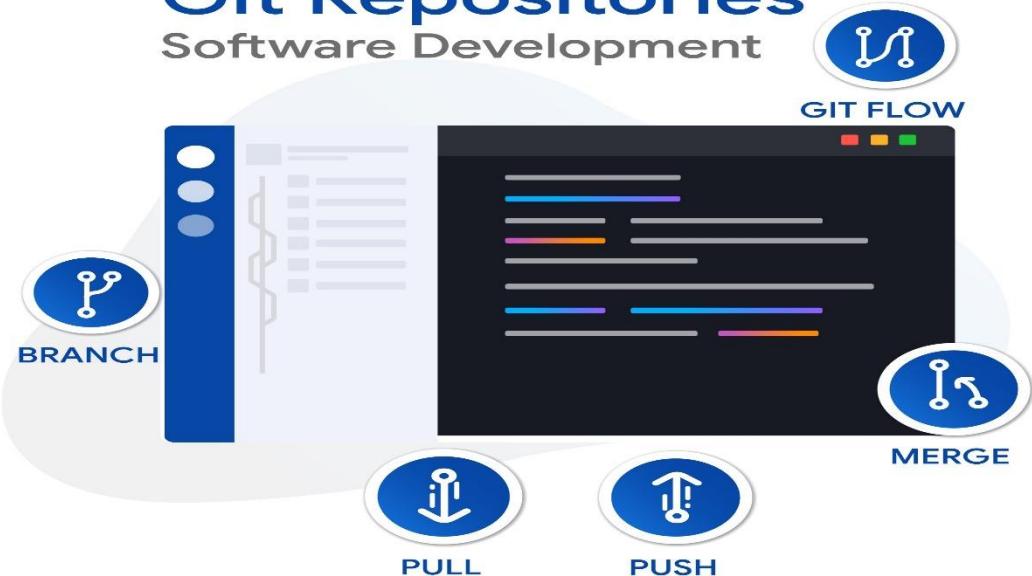
Opportunities to Identify Technical Debt



Pull Requests

Opportunities to Identify Technical Debt

Git Repositories Software Development



Stand Up

Opportunities to Identify Technical Debt



Sprint Review

Opportunities to Identify Technical
Debt



Often hidden in plain sight

Opportunities to Identify Technical
Debt



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RECODING TECHNICAL DEBT

Recoding Technical Debt



- User Story
- Product Backlog Item
- Requirement
- Issue

Recoding Technical Debt



- User Story
- Product Backlog Item
- Requirement
- Issue
- ~~Bug~~

Key Information to Record

- Problem Statement

We need to refactor our SSO.

Key Information to Record

- Problem Statement

In 22Q4, 20% of system outages were due to the single-sign-on service straining under scale constraints. Given our focus on the enterprise segment, we are taking some time this quarter to ensure that part of the system is ready for use to continue to scale up this segment.

Key Information to Record

- Problem Statement
- Story Points
- Criticality
- Complexity
- Reward
- Remediation Cost

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TRACKING TECHNICAL DEBT

Tracking Technical Debt



Tracking Technical Debt



Technical Debt Register

- Product
- User Story #
- Title
- Criticality
- Complexity
- Reward
- Remediation Cost
- Technical Debt Score

Product	User Story #	Title	Criticality	Complexity	Reward	Remediation Cost	Technical Debt Score
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
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19	19	19	19	19	19	19	19
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76	76	76	76	76	76	76	76
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89	89	89	89	89	89	89	89
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91	91	91	91	91	91	91	91
92	92	92	92	92	92	92	92
93	93	93	93	93	93	93	93
94	94	94	94	94	94	94	94
95	95	95	95	95	95	95	95
96	96	96	96	96	96	96	96
97	97	97	97	97	97	97	97
98	98	98	98	98	98	98	98
99	99	99	99	99	99	99	99
100	100	100	100	100	100	100	100

Technical Debt Score

R : Reward

Cr : Criticality

Co: Complexity

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Technical Debt Score

R : Reward

Cr : Criticality

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Co: Complexity

Technical Debt Score

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Id	Criticality (CR)	Complexity (CO)	Reward (R)	Score
1451	5	1	5	1.6

Technical Debt Score

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Id	Criticality (CR)	Complexity (CO)	Reward (R)	Score
1451	5	1	5	1.6
1452	1	5	1	-0.4

Technical Debt Score

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Id	Criticality (CR)	Complexity (CO)	Reward (R)	Score
1451	5	1	5	1.6
1452	1	5	1	-0.4
1453	3	2	3	0.75

Technical Debt Score

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Id	Criticality (CR)	Complexity (CO)	Reward (R)	Score
1451	5	1	5	1.6
1452	1	5	1	-0.4
1453	3	2	3	0.75

Technical Debt Score

$$(R \times .2) + (CR \times .15) - (CO \times .15)$$

Id	Criticality (CR)	Complexity (CO)	Reward (R)	Score	Rank
1451	5	1	5	1.6	1
1453	3	2	3	0.75	2
1452	1	5	1	-0.4	3



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TECHNICAL DEBT RATIO

Technical Debt Ratio

(Remediation Cost / Development Cost) x 100%

Project	Remediation Cost	Development Cost	Technical Debt Ratio
Project 1	12.1	3,633.12	0.33%

Technical Debt Ratio

(Remediation Cost / Development Cost) x 100%

Project	Remediation Cost	Development Cost	Technical Debt Ratio
Project 1	12.1	3,633.12	0.33%
Project 2	702	18,728.55	3.75%

Technical Debt Ratio

(Remediation Cost / Development Cost) x 100%

Project	Remediation Cost	Development Cost	Technical Debt Ratio
Project 1	12.1	3,633.12	0.33%
Project 2	702	18,728.55	3.75%
Project 3	1,058.25	9,593.37	11.03%

Technical Debt Is Not Free

SUMMARY

Technical Debt Is Not Free

- What is technical debt?

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt
- Types of technical debt

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt
- Types of technical debt
- Identifying technical debt

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt
- Types of technical debt
- Identifying technical debt
- Recording technical debt

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt
- Types of technical debt $(R \times .2) + (CR \times .15) - (CO \times .15)$
- Identifying technical debt
- Recording technical debt
- Technical Debt Score

Technical Debt Is Not Free

- What is technical debt?
- Pros and cons of technical debt
- Causes of technical debt
- Types of technical debt
- Identifying technical debt
- Recording technical debt
- Technical Debt Score
- Technical Debt Ratio

(Remediation Cost / Development Cost)
x 100%

Thank You!

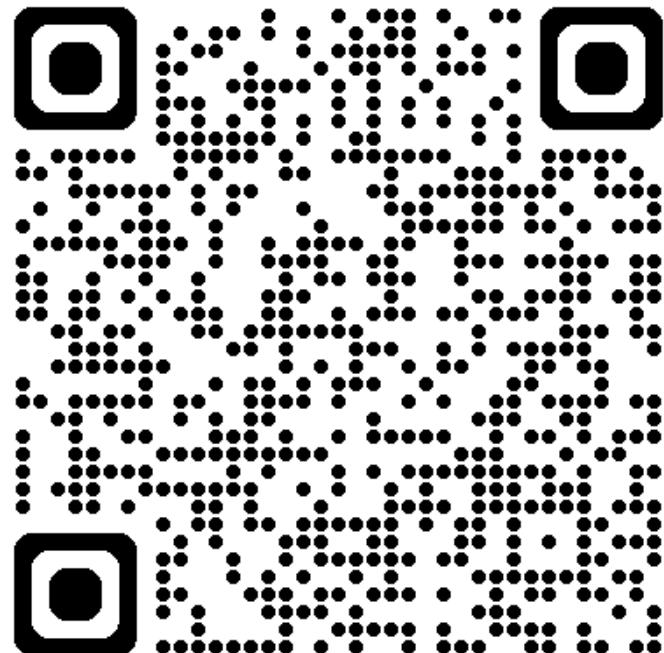
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