



# Xebia

# REBUILD OR REFACTOR? THAT IS THE QUESTION!



RENE VAN OSNABRUGGE  
XEBIA

# REBUILD OR REFACTOR

**YOU HAVE A 20 YEAR OLD CODE BASE**

**IT IS A MIXTURE OF C++ , .NET 4,6, WPF AND ASP.NET  
WEB FORMS**

**THERE IS ALMOST NO DOCUMENTATION**

**YOU HAVE A LARGE USER BASE**

**AVAILABILITY NEEDS TO BE HIGH 99.5%**

**THERE IS ALMOST NO ONE THAT UNDERSTANDS THE  
CODE ANYMORE**

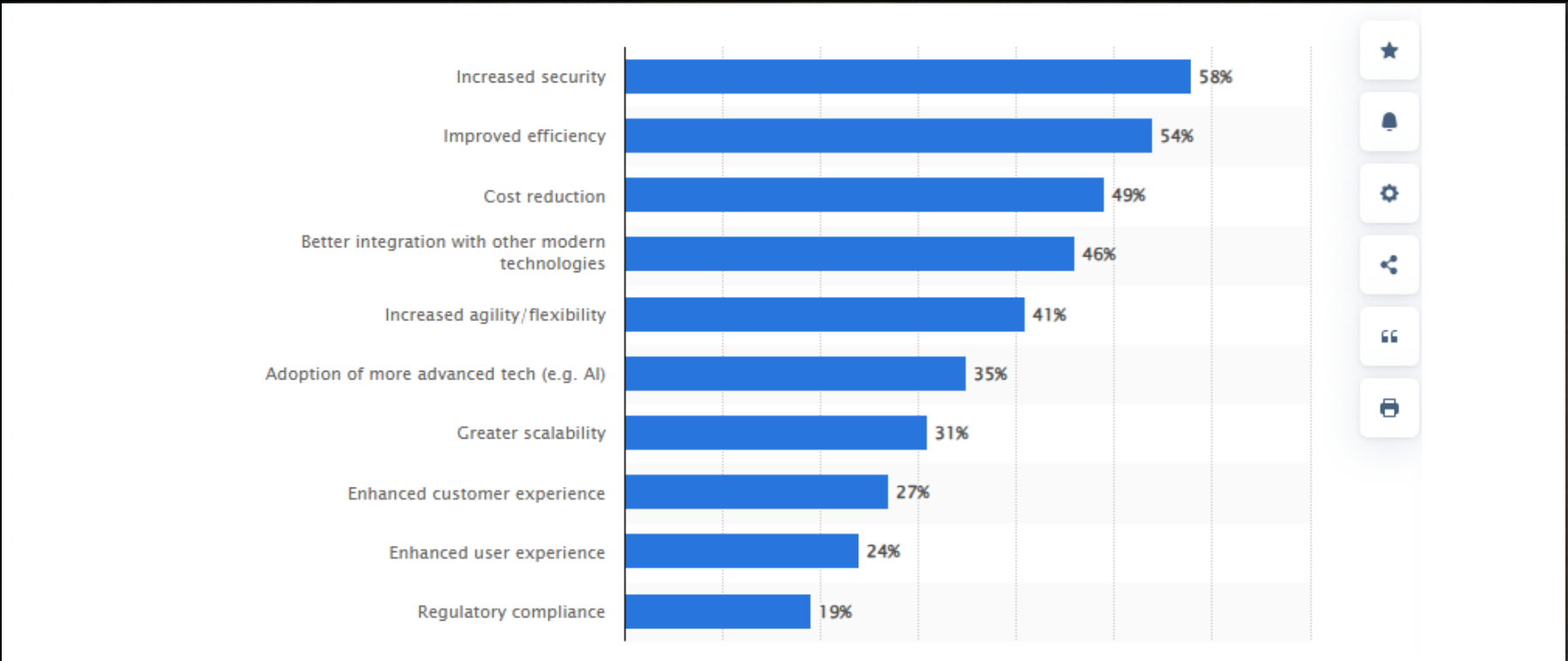
**PEOPLE WALK AWAY BECAUSE OF THE DIFFICULT  
CODE**

**LOTS OF BUGS! 85% OF TIME IS MAINTENANCE**

A circular hedge maze with a statue in the center, set against a sunset background. The maze is composed of multiple concentric rings of hedges, with a central path leading to a statue. The background shows a line of trees and a sky with soft, golden light from the setting or rising sun.

# ALWAYS START WITH WHY

WHY  
HOW  
WHAT



**BECAUSE....**



**HOW TO DECIDE?**

**THE  
MANAGER**



**WE CANNOT  
CHANGE  
ANYTHING. THE  
MESS IS TOO  
BIG! WE NEED A  
REWRITE!**

**ASK THE DEVELOPERS**



**THEY SHOUT TECHNICAL DEBT" BUT THEY ACTUALLY SHOUT .. I DO NOT WANT TO READ SOMEONE ELSE THEIR CODE .. JUST REFACTOR A BIT!**

**Is that some sort of code?**

**ASK MANAGEMENT**

# PEOPLE ARE BAD INDICATORS



- PEER PRESSURE
- TIME RESTRICTIONS
- PERSONAL PREJUDICE
- THE PAST
- EMOTIONS
- MOTIVATIONS
- PERSONALITY TRAITS

A large parking lot filled with cars at sunset. The sky is a mix of orange, yellow, and blue. A large black rectangular area is positioned above the cars, possibly representing a screen or a sign. The text "THEY SUFFER FROM COGNITIVE BIAS" is overlaid on the bottom of the image in a bold, yellow, sans-serif font.

**THEY SUFFER FROM COGNITIVE BIAS**

# CAN YOU RECOGNIZE THE EXAMPLES?

## **OVERCONFIDENCE BIAS**

**WE HAVE DONE THIS BEFORE, THIS TIME WE CAN DO IT 2X FASTER**

## **CONFIRMATION BIAS**

**I READ ABOUT THESE PROJECTS USING AZURE THAT FAILED, CLOUD IS NOT FOR US**

## **ANCHORING EFFECT**

**I THINK WE NEED 3 MONTHS, WHAT DO YOU THINK?**

## **OVERGENERALIZATION**

**REFACTOR NEVER SOLVED ISSUES BEFORE**



**REBUILD**

**REFACTOR**

**LET'S APPROACH IT FROM THE RATIONAL SIDE**



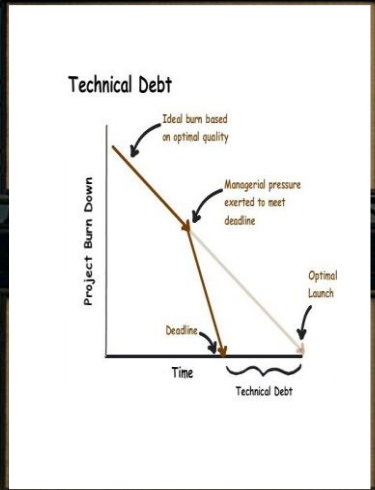
# THE CASE FOR REBUILDING

- SEVERE **TECHNICAL DEBT**
- (HEAVILY) OUTDATED TECHNOLOGY STACK
- SECURITY VULNERABILITIES
- INABILITY TO SCALE
- BUSINESS NEEDS HAVE CHANGED
- COST OF MAINTENANCE IS EXCEEDING VALUE
- DEVELOPER BOTTLENECKS
- BETTER MODERN TOOLS AVAILABLE

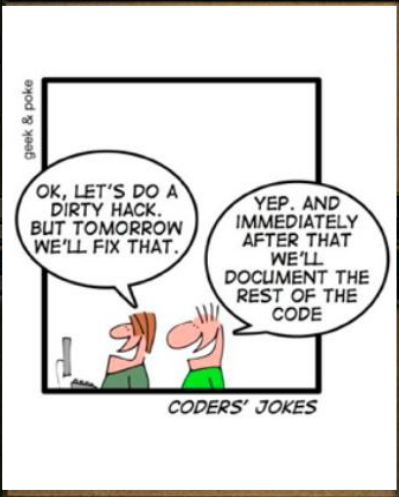
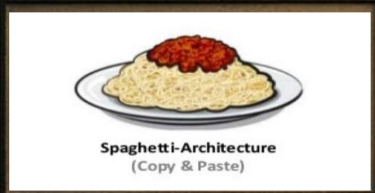
# THE CASE FOR REFACTOR

- REDUCES **TECHNICAL DEBT** INCREMENTALLY
- LOWER RISK
- PRESERVES BUSINESS CONTINUITY
- FASTER TIME TO MARKET
- FAMILIARITY WITH EXISTING CODE
- COST-EFFECTIVE
- AVOIDS SCOPE CREEP
- LEVERAGE EXISTING FEATURES
- MINIMIZES USER DISRUPTION

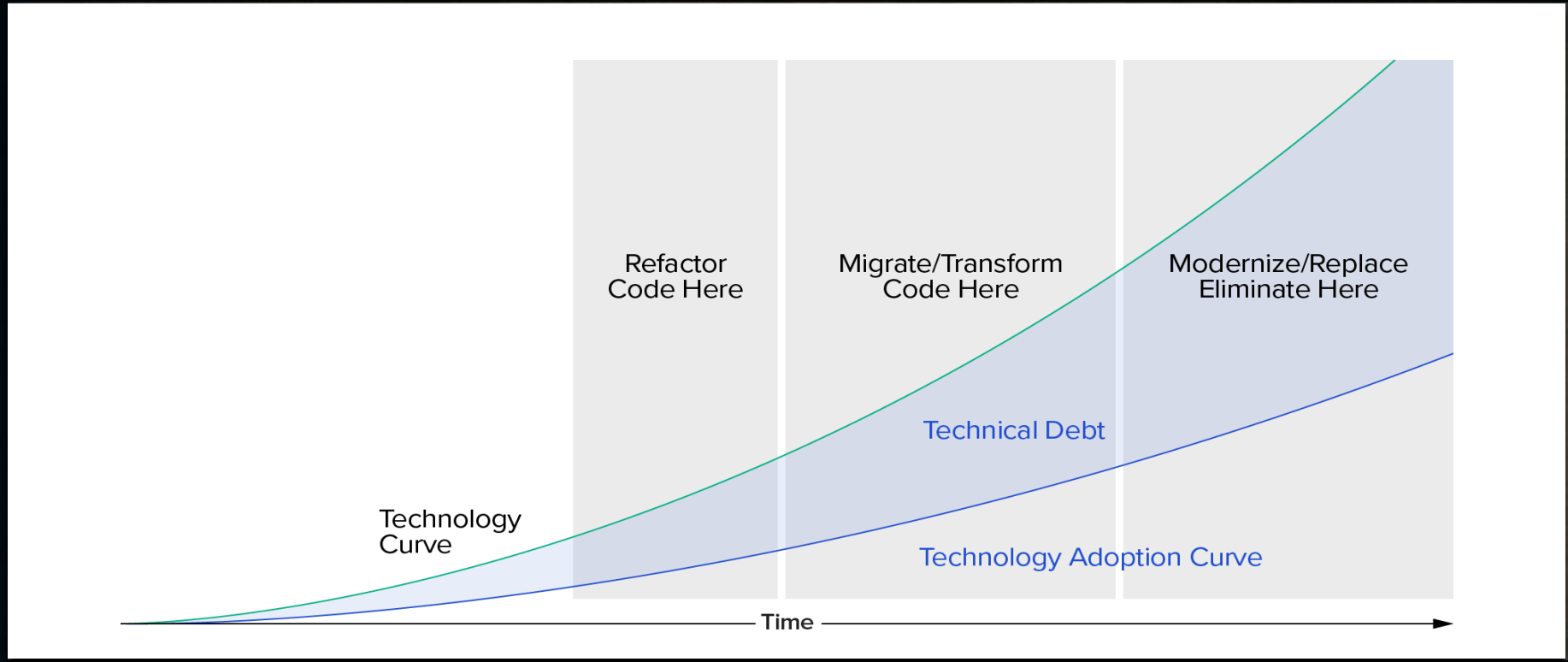




**TECHNICAL DEBT**



**THERE IS A COMMON DENOMINATOR**

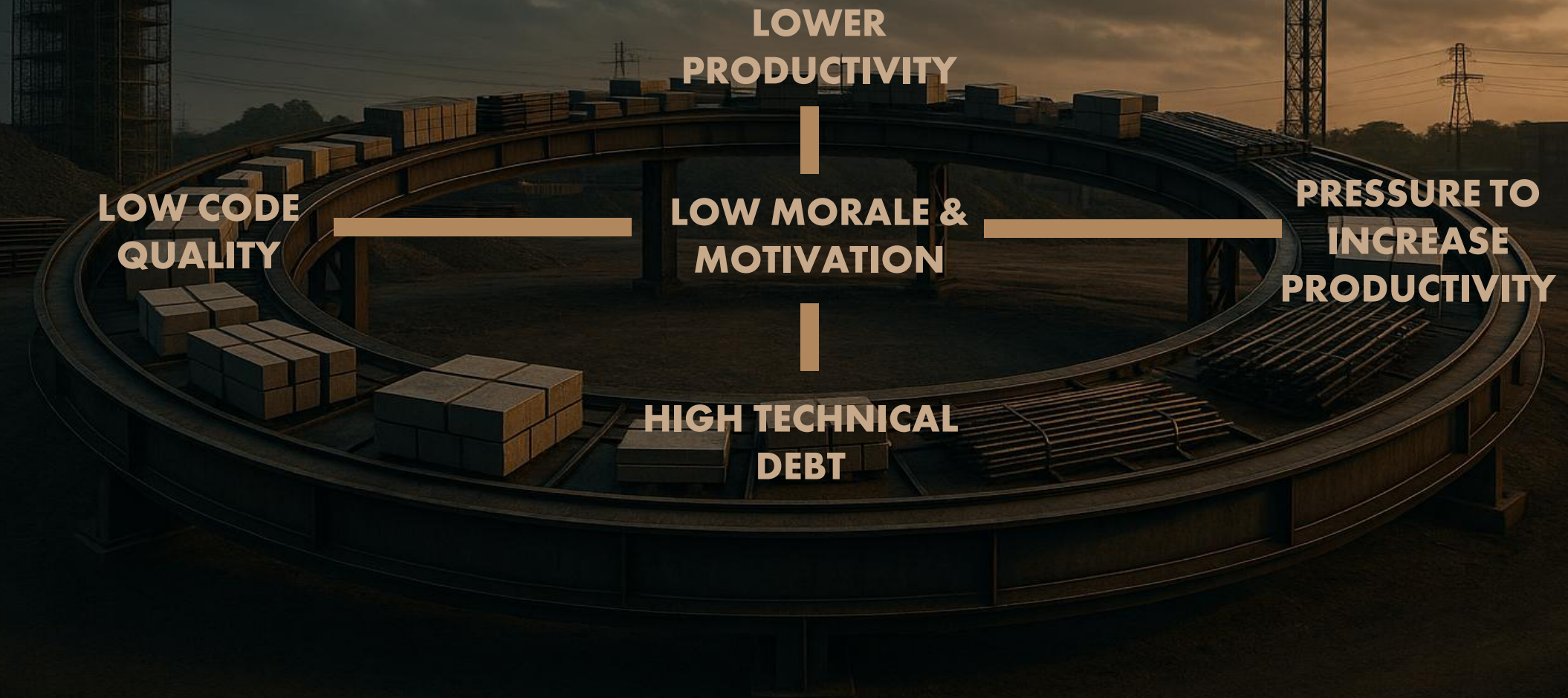


# WHAT IS TECHNICAL DEBT

# CAUSES FOR TECH DEBT

- ★ **TIME PRESSURE**
- ★ **MISALIGNMENT**
- ★ **PASSING OF TIME**
- ★ **BUSINESS PRESSURE**
- ★ **LACK OF KNOWLEDGE**
- ★ **BAD ARCHITECTURE DECISION**
- ★ **HUMAN FACTORS**
- ★ **INCORRECT IMPLEMENTATION**
- ★ **LACK OF ANTICIPATION**

# IT IS A VICIOUS CYCLE



**DELIBERATE**

**UNINTENDED**

**RECKLESS**

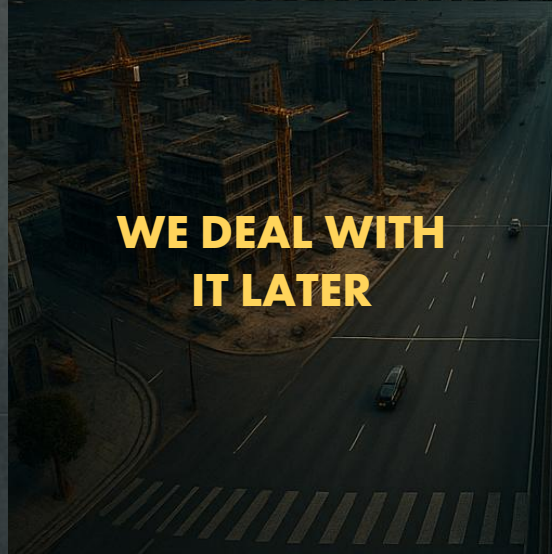


**WE DON'T  
HAVE TIME**



**WE DON'T  
KNOW HOW**

**CAREFUL**

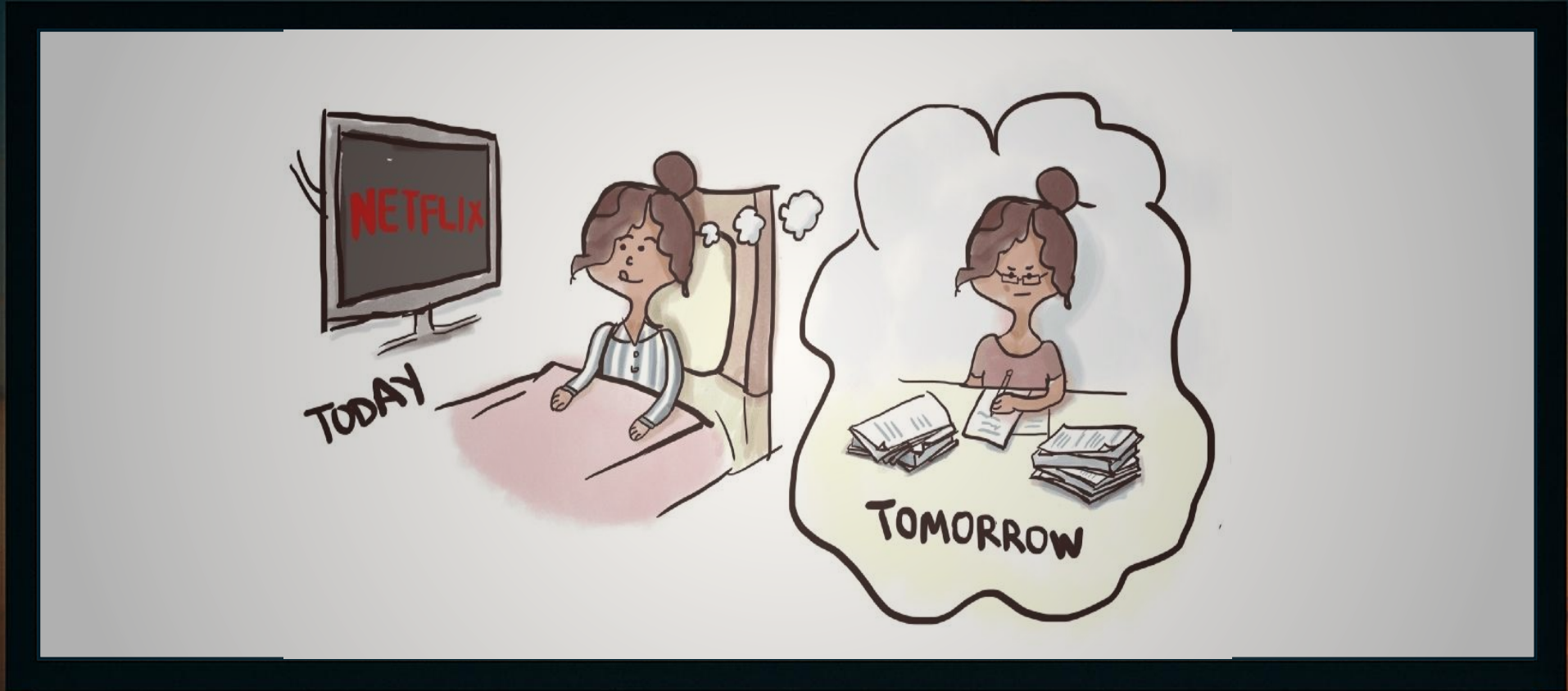


**WE DEAL WITH  
IT LATER**



**WE SHOULDN'T  
HAVE DONE THAT**

**HOW DOES TD GROW?**



# THE PRESENT BIAS

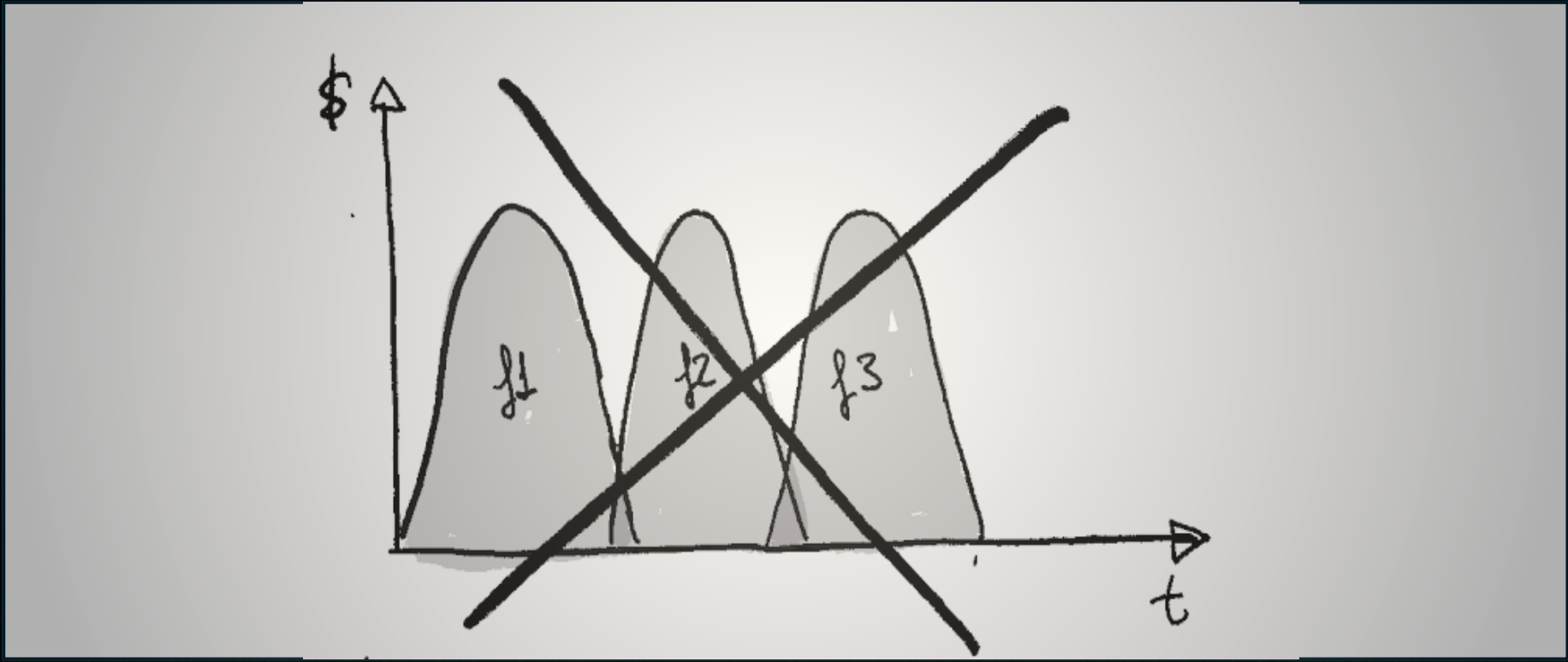
A multi-story building with a fire escape at night. The building is dark, and the fire escape is illuminated by a small light on the roof. The text "CAN WE ESCAPE IT?" is overlaid in a glowing, orange-yellow font at the bottom of the image.

**CAN WE ESCAPE IT?**

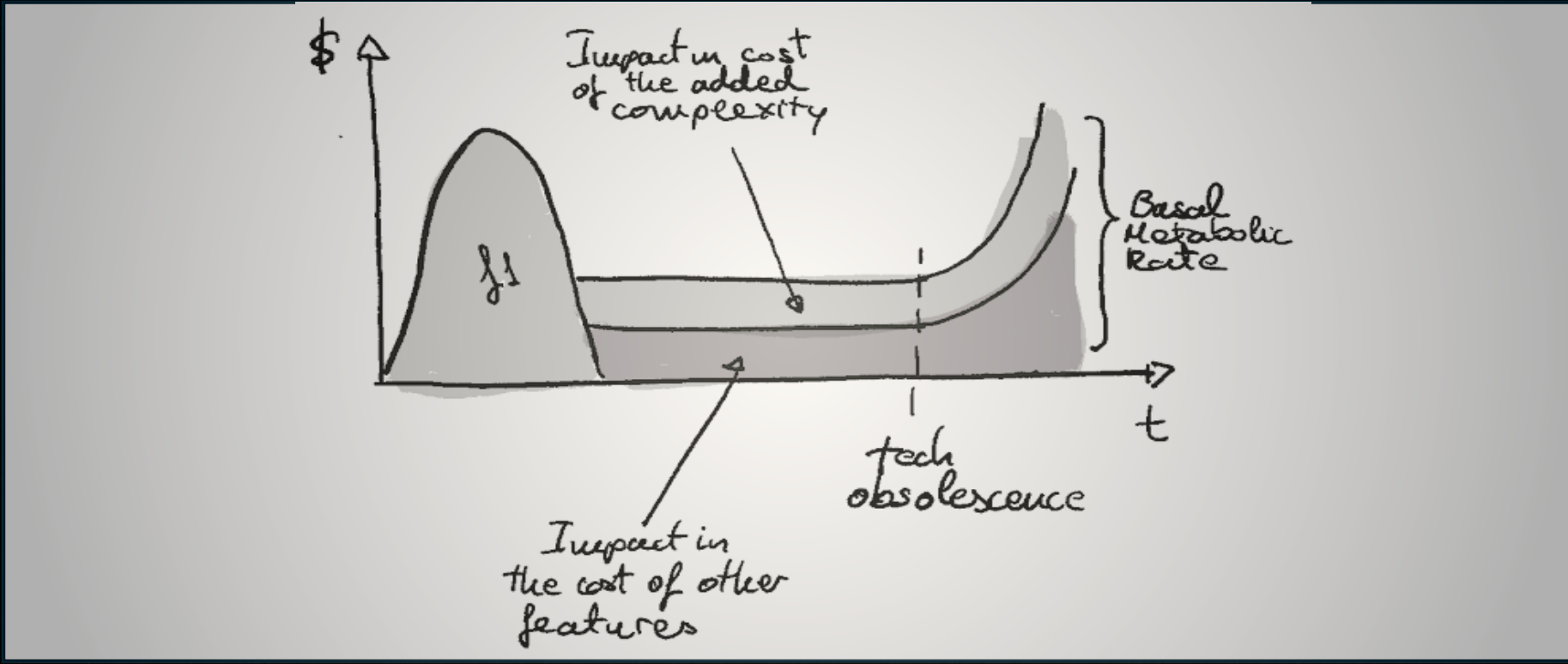
# THE BASAL METABOLIC RATE



**THE ENERGY NEEDED TO  
MAINTAIN ALL BODILY  
FUNCTIONS AT REST**



# THE BASAL COST OF SOFTWARE

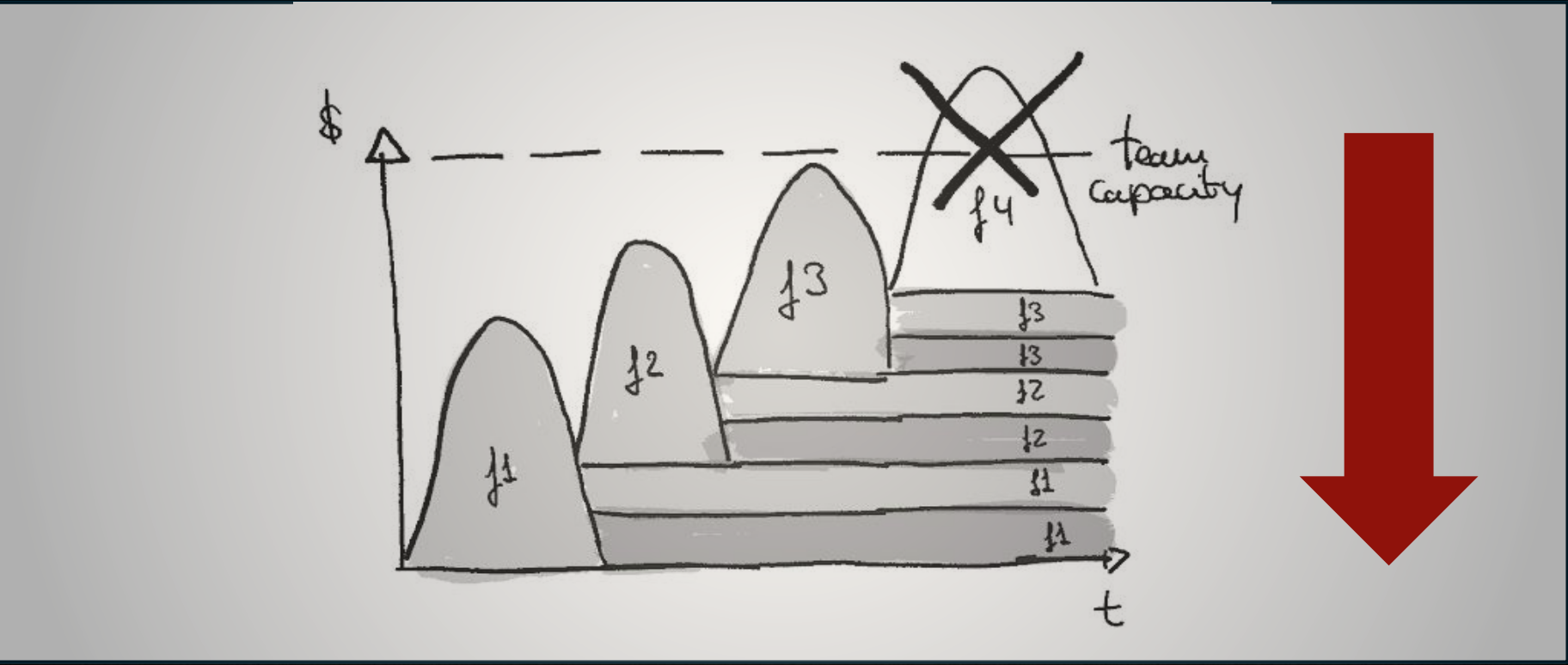


# THE BASAL COST OF SOFTWARE

# WHY THESE COSTS FOR FINISHED FEATURES?

- **NEED TO KNOW WHERE THE CODE IS**
- **NEED TO KNOW THE DEPENDENCIES IN THE CODECASE**
- **NEED TO UPDATE THE TOOLS/FRAEMWORKS**
- **COMPATIBILITY ISSUES**
- **REGRESSION**
- **NEW JOINERS NEED TO LEARN MORE**





# THE BASAL COST OF SOFTWARE

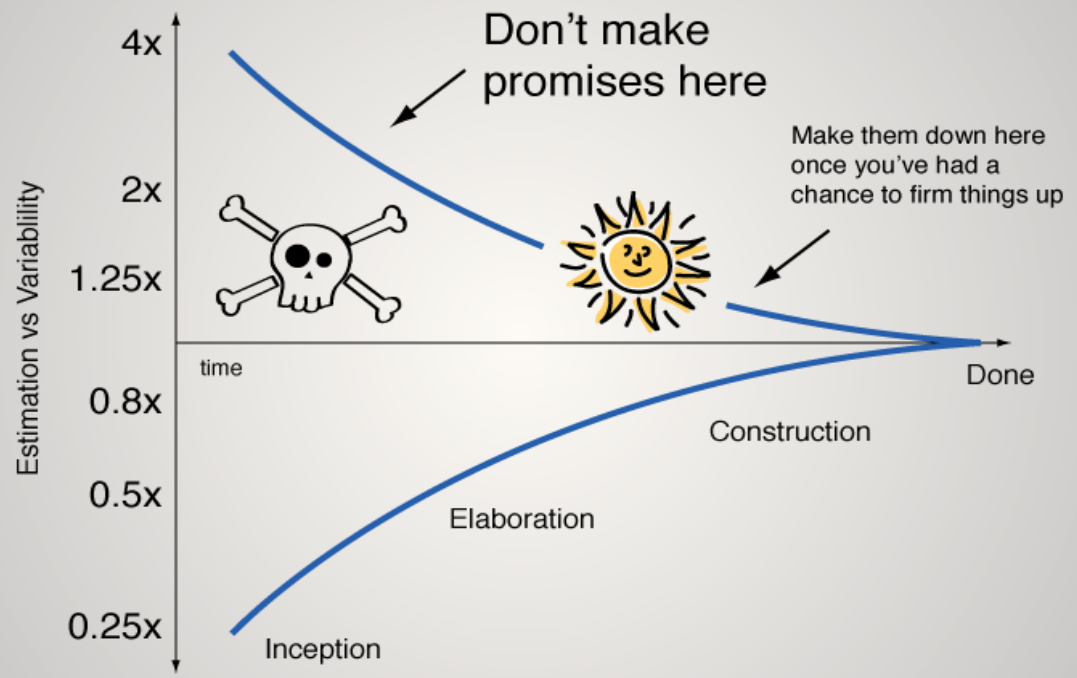
# WHAT CAN WE DO TO LOWER THIS ?

- **CONTINUOUS REFACTORING**
- **DEDICATED TIME IN SPRINTS**
- **CLEANING SPRINTS**
- **BOY SCOUT RULE**
- **STATIC CODE ANALYSIS**
- **CODE REVIEWS**
- **KNOWLEDGE SHARING**
- **PAIR PROGRAMMING**



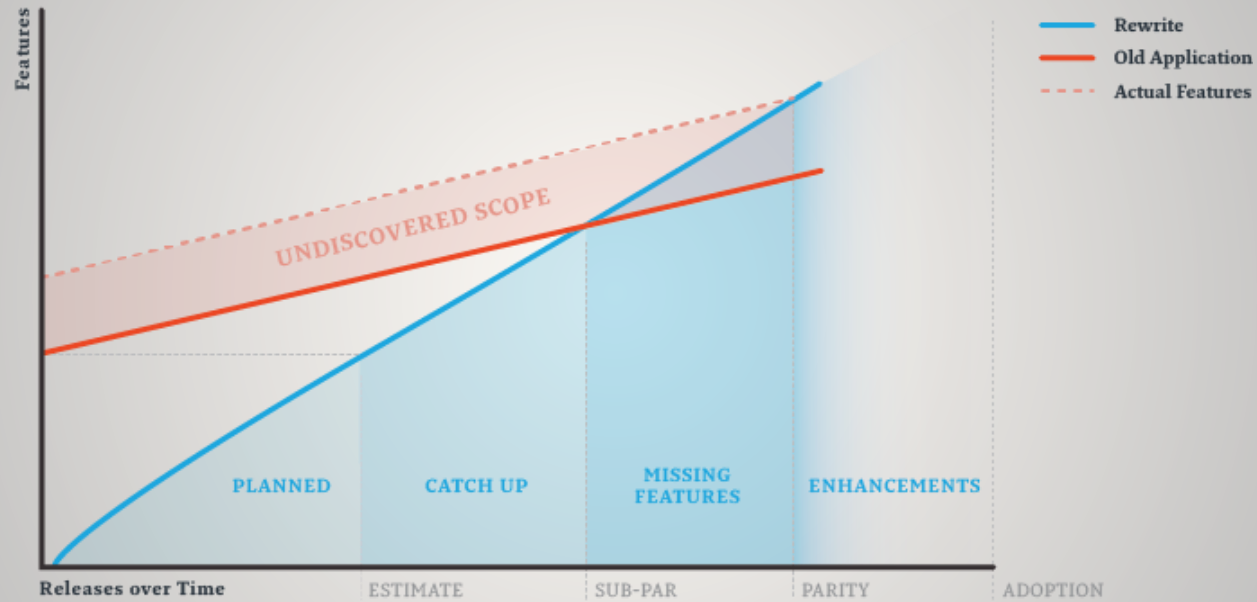


**IS REBUILD BETTER?**

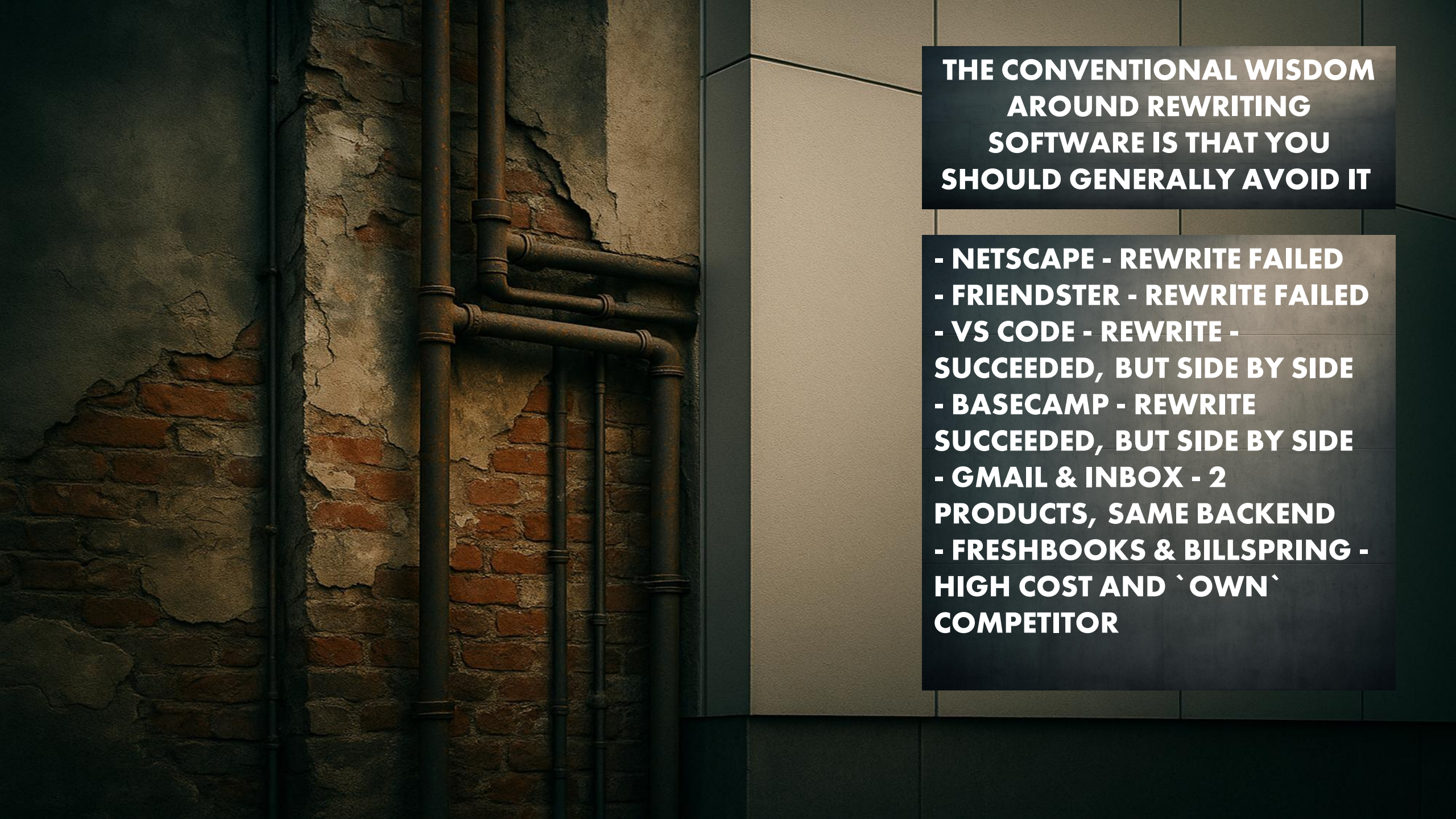


# CONE OF UNCERTAINTY

# THE TRUE COST OF A SOFTWARE SYSTEM REWRITE



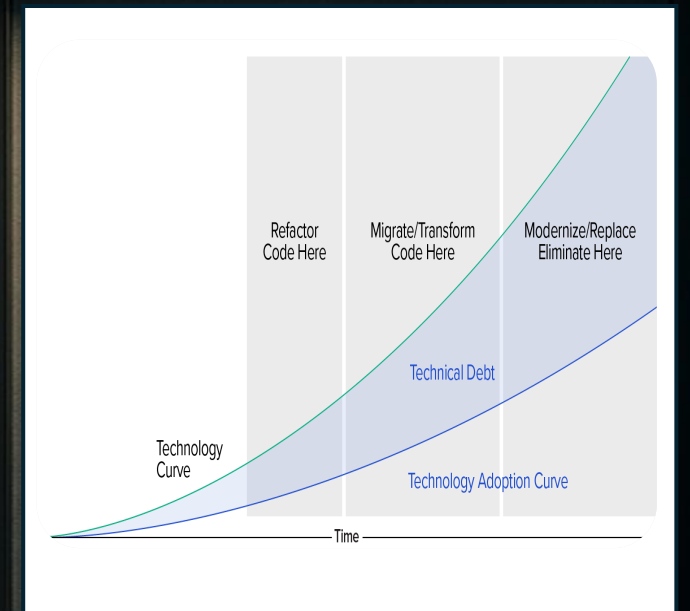
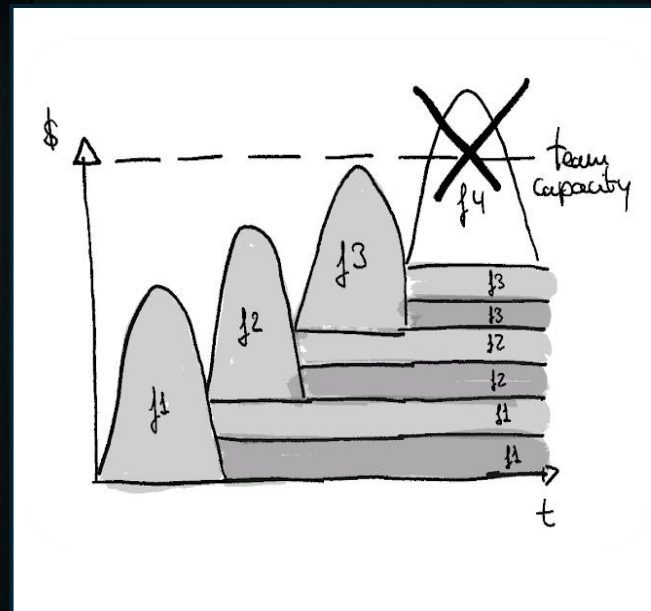
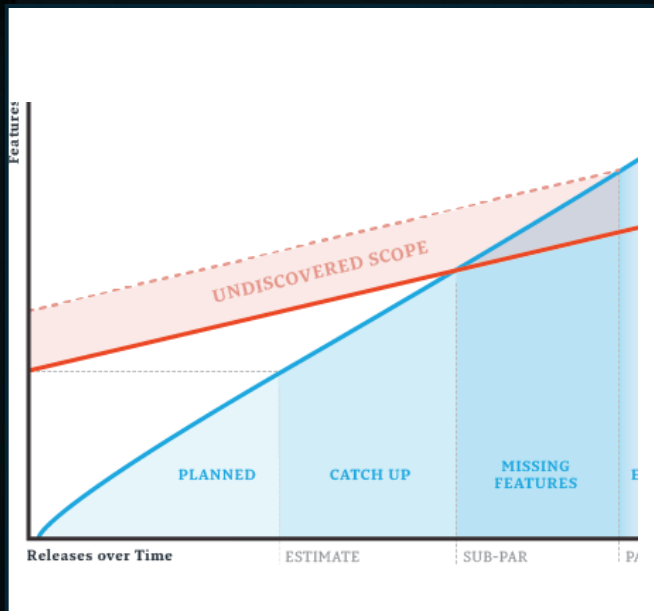
**THE TRUE COST OF REWRITE**



**THE CONVENTIONAL WISDOM  
AROUND REWRITING  
SOFTWARE IS THAT YOU  
SHOULD GENERALLY AVOID IT**

- NETSCAPE - REWRITE FAILED
- FRIENDSTER - REWRITE FAILED
- VS CODE - REWRITE -  
SUCCEEDED, BUT SIDE BY SIDE
- BASECAMP - REWRITE  
SUCCEEDED, BUT SIDE BY SIDE
- GMAIL & INBOX - 2  
PRODUCTS, SAME BACKEND
- FRESHBOOKS & BILLSPRING -  
HIGH COST AND `OWN`  
COMPETITOR

# THIS IS WHAT WE KNOW FOR SURE (TECHNICALLY)



**REVENUE**

**AND THEN THE  
BUSINESS CASE**

**RISK**

**COST**

REVENUE OPPORTUNITY

**GUESS**

COST TO MODERNIZE

**GUESS**

OPERATING COST BENEFIT

**GUESS**

COST TO MODERNIZE

**GUESS**

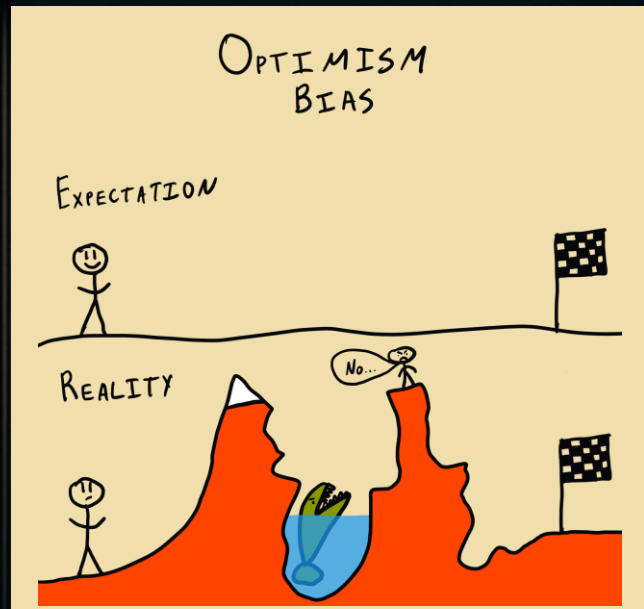


# RE\* COST IS NOT ONLY RE\* COST

- **REBUILD / REFACTOR COST**
  - **TIME / MATERIAL / PEOPLE**
- **NON - REBUILD COST**
  - **WASTE**
  - **EFFICIENCY LOSS**
  - **MORAL**
- **BASAL COST OF SOFTWARE**
- **SIDE BY SIDE MAINTENANCE**

**NON REBUILD COST = BUG FIX  
TIME + SUPPORT TIME + LOWER  
PRODUCTIVITY**

# SO IT IS STILL A HARD CHOICE



# BACK TO THE START

**YOU HAVE A 20 YEAR OLD CODE BASE**

**IT IS A MIXTURE OF C++ , .NET 4,6, WPF AND ASP.NET  
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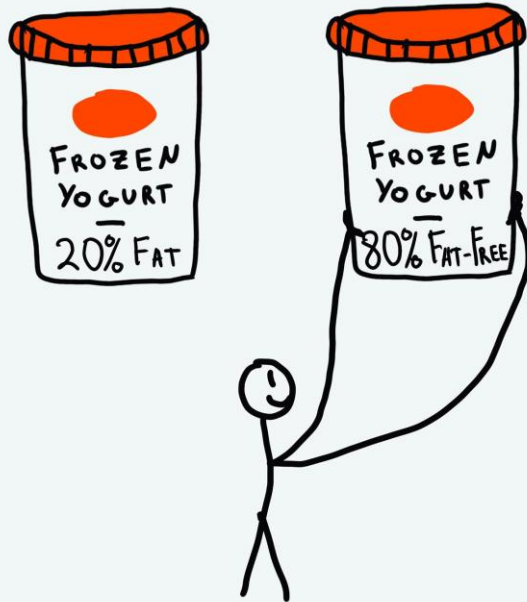
**LOTS OF BUGS! 85% OF TIME IS MAINTENANCE**

# **THIS WAS NOT FAIR!**

- **BUT IT HAPPENS ALL THE TIME IN YOUR BUSINESS**
  - **WHAT WOULD A REBUILD COST ME?**
  - **SHALL WE DO MICROSERVICES OR A MONOLITH?**
  - **SHALL WE OFFSHORE THIS OR DO IT INHOUSE?**
  - **SHOULD WE HIRE PEOPLE OR FIND CONSULTANTS?**

# FRAMING EFFECT

## FRAMING EFFECT



© thedecisionlab.com

DECISIONS ARE  
INFLUENCED BY  
HOW CHOICES ARE  
PRESENTED

PEOPLE TEND TO  
CHOOSE FROM  
THE GIVEN  
OPTIONS

THE WAY INFO IS  
FRAMED ALTERS  
PERCEPTIONS OF  
RISK AND BENEFITS.

BETTER INFORMED  
PEOPLE MAKE  
BETTER CHOICES

The image features a dramatic sunset sky with dark, heavy clouds. In the foreground, several construction cranes and the skeletal frames of buildings under construction are silhouetted against the bright orange and yellow light of the setting sun. The cranes are tall and have long horizontal jibs. The buildings are multi-story, with visible rebar and scaffolding. The overall scene is industrial and evocative.

**CRITICAL THINKING IS KEY**

# THERE ARE MORE THAN 2 OPTIONS

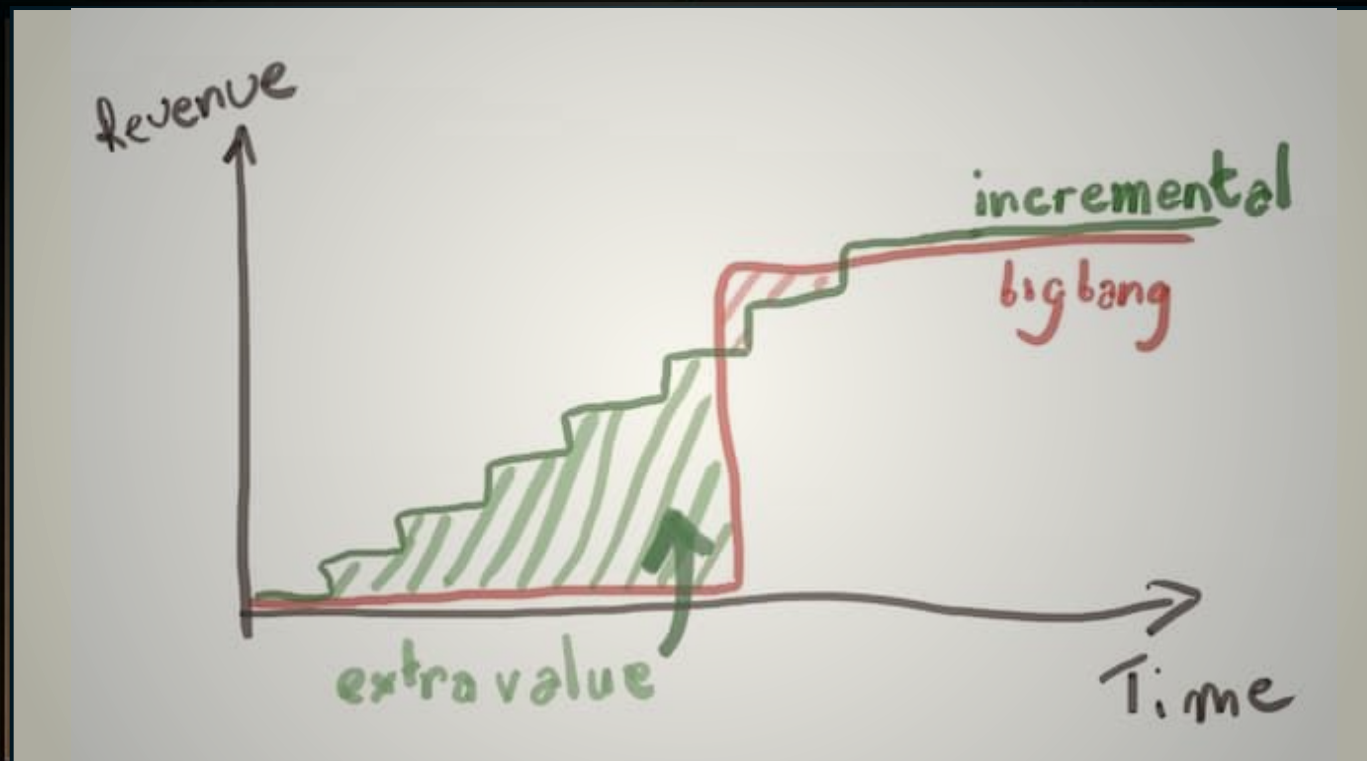
THE 5 R MODEL APPLIES HERE AS WELL

- ★ REHOST (LIFT AND SHIFT)
- ★ REFACTOR (REARCHITECT)
- ★ REVISE (REPLATFORM)
- ★ REBUILD (REENGINEER)
- ★ REPLACE (RIP AND REPLACE)
- ★ RETIRE

# CONTINUOUS MODERNIZATION (GARTNER)



**INSTEAD OF A DISRUPTIVE RIP-AND-REPLACE APPROACH,  
FOCUS ON CONTINUOUS MODERNIZATION TO OPTIMIZE  
LEGACY APPLICATIONS BY ADDRESSING SPECIFIC BUSINESS  
OBSTACLES.**



**REWRITE IS ESSENTIALY BIG BANG**



**USE THE PRESENT BIAS AS A COMPASS**



Piet Jansen

Home

Search

Your Library

Create Playlist

Liked Songs

Instrumental Deep House Mi...

Muziek ijshockey u13

Ondergevaardeerde The Cure

Keep It Together Radio

Chill Vibes 2022

Embrace Chaos

Chill thuis

Iconic Soundtracks

Xpirit Epic Conference Music

Your Top Songs 2021

Placebo, Oasis, Interpol

Morning music

Tonnie up-tempo

DEEP HOUSE 2022

Dordrecht Lions Home Game

Dordrecht Lions Pre-Break...

NHL warm up/game music

KINK 1500

to do listen

Ondergevaardeerde U2

radio show

uitzoeken

Install App



## Good afternoon



Anniversary: 1978 - 2018 Live In Hyde Park London



Chill Vibes 2022



Muziek ijshockey u13



Dordrecht Lions Home Game

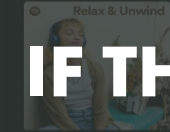


Instrumental Deep House Mixtape 2022



Xpirit Epic Conference Music

## Discover something new



Relax & Unwind

Let your worries and cares slip away.



Atmospheric Sci-fi Soundtracks

Enter another dimension of classical music with...



Discover Weekly

Your weekly mixtape of fresh music. Enjoy new...



Best of ESNS

Spraakmakende en beste artiesten uit de...



Weird Goodbyes (feat. Boniver)

The National



Chasing Yesterday

Noel Gallagher's High Flying Birds



Achtung Baby (Deluxe Edition)

U2

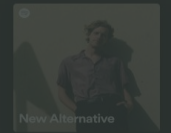
SHOW ALL

## The Dutch Alternative



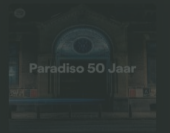
Alternative All Lined Up

Indie, Alternative en Rock met een randje...



New Alternative

De nieuwste indie, alternative en rock...



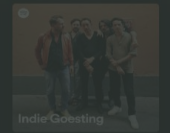
Paradiso 50 Jaar

Meer dan 50 jaar Poptempel Paradiso de...



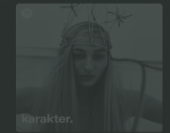
Lowlands Best of

28 jaar Lowlands Festival door 280 Lowlands...



Indie Goesting

Altijd zin in de beste nieuwe indie, rock en...



karakter.

edgy muziek met een rand uit eigen land...

IF THIS WAS ONE MONOLITHIC CODE  
BASE  
WHAT DO YOU DO?



2:28

5:27





Home

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Instrumental Deep House Mi...

Muziek ijshockey u13

Ondergevaardeerde The Cure

Keep It Together Radio

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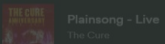
to do listen

Ondergevaardserde U2

radio show

uitzoeken

Install App



# LIBRARY



## Good afternoon



Anniversary: 1978 - 2018 Live In Hyde Park London



Chill Vibes 2022



Muziek ijshockey u13



Dordrecht Lions Home Game



Instrumental Deep House Mixtape 2022

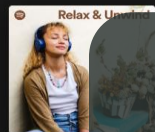


Xpirit Epic Conference Music

Piet Jansen

# PROFILE

## Discover something new



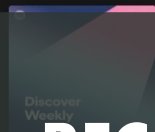
Relax & Unwind

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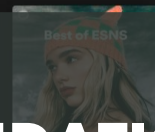
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Your weekly mixtape of fresh music. Enjoy new...



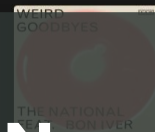
Nothing But Thieves

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opraakmakende en beste artiesten uit de...



Goodbyes (feat. The National)

The National



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Noel Gallagher's High Flying Birds



Achtung Baby (Deluxe Edition)

U2

SHOW ALL

# RECOMMENDATION

## The Dutch Alternative



Alternative All Lined Up

Indie, Alternative en Rock met een randje...



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De nieuwste indie, alternatieve en rock...



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Meer dan 50 jaar Poptempel Paradiso do...



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# MUSIC PLAYER



Spotify

- Home
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- Ondergevaardeerde The Cure
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- to do listen
- Ondergevaardserde U2
- radio show
- uitzoeken
- Install App
- Plainsong - Live

Piet Jansen

# REPLACE

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Alternative All Lined Up

New Alternative

Paradiso 50 Jaar

Lowlands Best of

Indie Goesting

karakter.

0:00 ————— 0:27

# REHOST

🔍 📁 🔄 ⏪ ⏩



**INVERSE  
CONWAY  
MANEUVRE**

**FRONTEND  
INTEGRATION**

**RE  
BUILD**

**RE  
FACTOR**

**NEW**

**RE  
HOST**

**RE  
PLACE**



**EVENT BUS**

**EACH SERVICE ITS OWN CHOICES**

# IS THIS THE FULL MODEL?

THE 5 R MODEL APPLIES HERE AS WELL

- ★ REHOST (LIFT AND SHIFT)
- ★ REFACTOR (REARCHITECT)
- ★ REVISE (REPLATFORM)
- ★ REBUILD (REENGINEER)
- ★ REPLACE (RIP AND REPLACE)
- ★ RETIRE



**NO! BECAUSE THE MODEL HAS THE WRONG  
ASSUMPTION**

**TIME**

**SOFTWARE CHANGE  
IS EXPENSIVE**

**RISK**

**PEOPLE**



**THERE IS A NEW “R” ON THE BLOCK**

**REVIBE**



# AI CHANGES THE PHYSICS

**UNDERSTANDING** ↓

**BUILDING** ↓

**MIGRATING** ↓

**REFACTORING** ↓

**COMPLEXITY ≠ GONE**

**FRONTEND  
INTEGRATION**

**RE  
BUILD**

**RE  
FACTOR**

**NEW**

**RE  
HOST**

**RE  
PLACE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE IS NOT A NEW "R" IT IS AN ADDITION**

**FRONTEND  
INTEGRATION**

**RE  
BUILD**

**RE  
FACTOR**

**NEW**

**RE  
HOST**

**RE  
PLACE**

**PERSONAL  
SOFTWARE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE**

**REVIBE**

**AND THERE IS A NEW POSSIBILITY**



**ONLY BUILD WHAT  
REQUIRES ENGINEERING**

# **WRAP UP – THE REAL DECISION MODEL**

**WHAT IS HARD?  
WHAT IS CHEAP?  
SHOULD THIS EXIST?**



A construction site featuring several tall cranes and buildings under construction. The scene is set against a dramatic, cloudy sky with warm, golden light. In the foreground, a building is completely encased in a dense network of metal scaffolding. Two construction workers wearing yellow hard hats are visible on different levels of the scaffolding. In the background, modern glass skyscrapers rise against the sky, some also showing signs of construction.

# THANK YOU

**Xebia**

**RENE VAN OSNABRUGGE**  
**GLOBAL CONSULTING DIRECTOR**  
**RENE.VANOSNABRUGGE@XEBIA.COM**