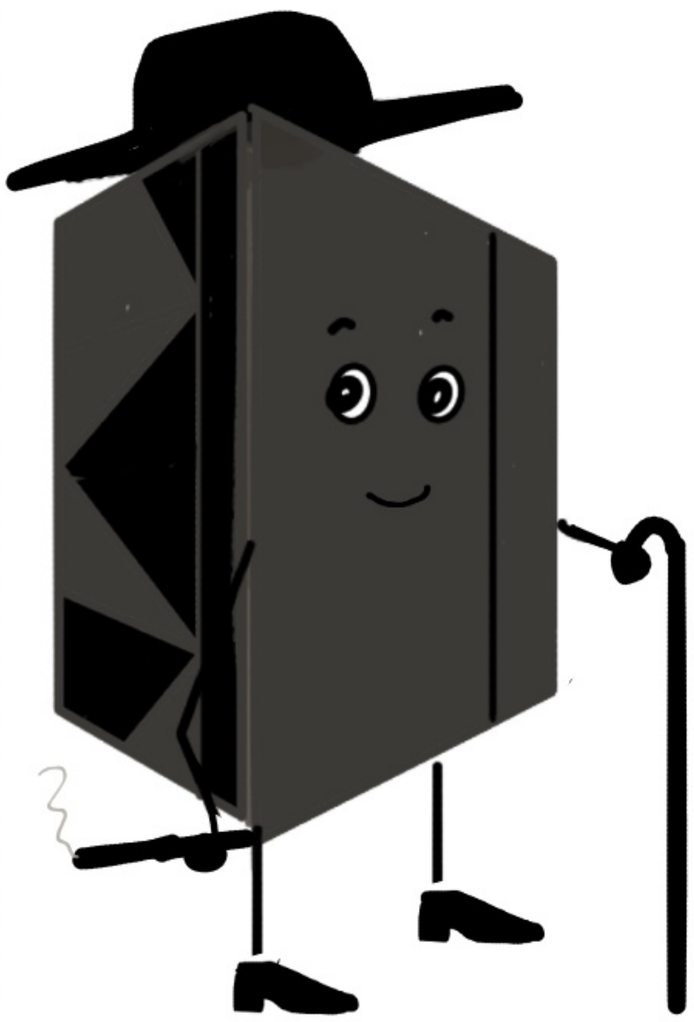


MAINFRAME MODERNIZATION

By

Aishwarjali Venkatramanan

ACKNOWLEDGEMENTS

MANY COLLEAGUES AT THOUGHTWORKS HELPED ME PUT TOGETHER THIS ILLUSTRATED GUIDE TO MAINFRAME MODERNIZATION AND I WANT TO THANK THEM.

I HAVE USED THEIR TIME IN PERSON, ON CALLS, TALKS ARTICLES AND PODCASTS TO FORM AS CLEAR A GUIDE AS I COULD, AND I KNOW I COULD NOT HAVE DONE IT WITHOUT THEIR EXPERT KNOWLEDGE AND KIND FEEDBACK.

FOR THEIR VERY GENEROUS HELP, MY GRATEFUL THANKS TO :

- SHODHAN SHETH
- VISHWANATH NAGARAJARAO
- JAMES LEWIS
- TOM COGGRAVE
- KEN MUGRAGE

INTRODUCTION

WHILE AI AND ITS MANY FORMS HAVE CAPTURED THE ATTENTION OF THE WORLD, MAINFRAMES CONTINUE TO PREVAIL.

THERE ARE ROUGHLY A FEW HUNDRED BILLION LINES OF COBOL LIVE IN PRODUCTION AND A FEW THOUSAND COMPANIES USING MAINFRAMES FOR THEIR ENTERPRISES.

IN THIS BOOK, WE LOOK AT WHERE MAINFRAMES ARE RELEVANT AND WHY MAKING CHANGES TO THE APPS THEY RUN IS A DIFFICULT CHALLENGE.

WE ALSO LOOK AT A RANGE OF APPROACHES AND DISCUSS IN SOME DETAIL A BUSINESS-ALIGNED APPROACH.

MAINFRAME MODERNIZATION IS MORE THAN A TECHNOLOGY PROBLEM AND HOPEFULLY THIS BOOK HELPS YOU SEE WHY.

SCOPE

A BIT ABOUT MAINFRAMES

- WHAT IS IT
- WHO USES IT
- SOME OF ITS FEATURES

MAINFRAMES IN CONTEXT

- CHANGE IS DIFFICULT
- CODEBASE
- TECHNOLOGY
- KNOWLEDGE
- TESTING
- SECURITY
- OPERATIONAL COSTS
- IMPLICATIONS

ON MODERNIZING MAINFRAMES

- WHAT IS MODERNIZING?
- REASONS FOR MODERNIZATION
- DECIDING VALUE AND FIT
- WHAT MAKES IT HARD
- WHAT CAUSES DELAYS
- HOW TO APPROACH
- TOO MANY 'R's!

3 APPROACHES

- A RADICAL ONE
- A FAMILIAR ONE
- AND ONE IN-BETWEEN

FOUR PARAMETERS TO WEIGH AND HOW IT HELPS

MAP YOUR CAPABILITIES

A SIMPLIFIED DECISION PATH

- BUILD
- BUY
- REHOST
- RETIRE
- RETAIN

CHOOSING TO MODERNIZE

- BREAKING UP THE PROBLEM
- FINDING SEAMS
- MANAGING RISKS/UNCERTAINTY
- USING AI
- INCREMENTAL MODERNIZATION

CONCLUDING THOUGHTS

OUT OF SCOPE

REFERENCES

A BIT ABOUT MAINFRAMES

WHAT IS A MAINFRAME?

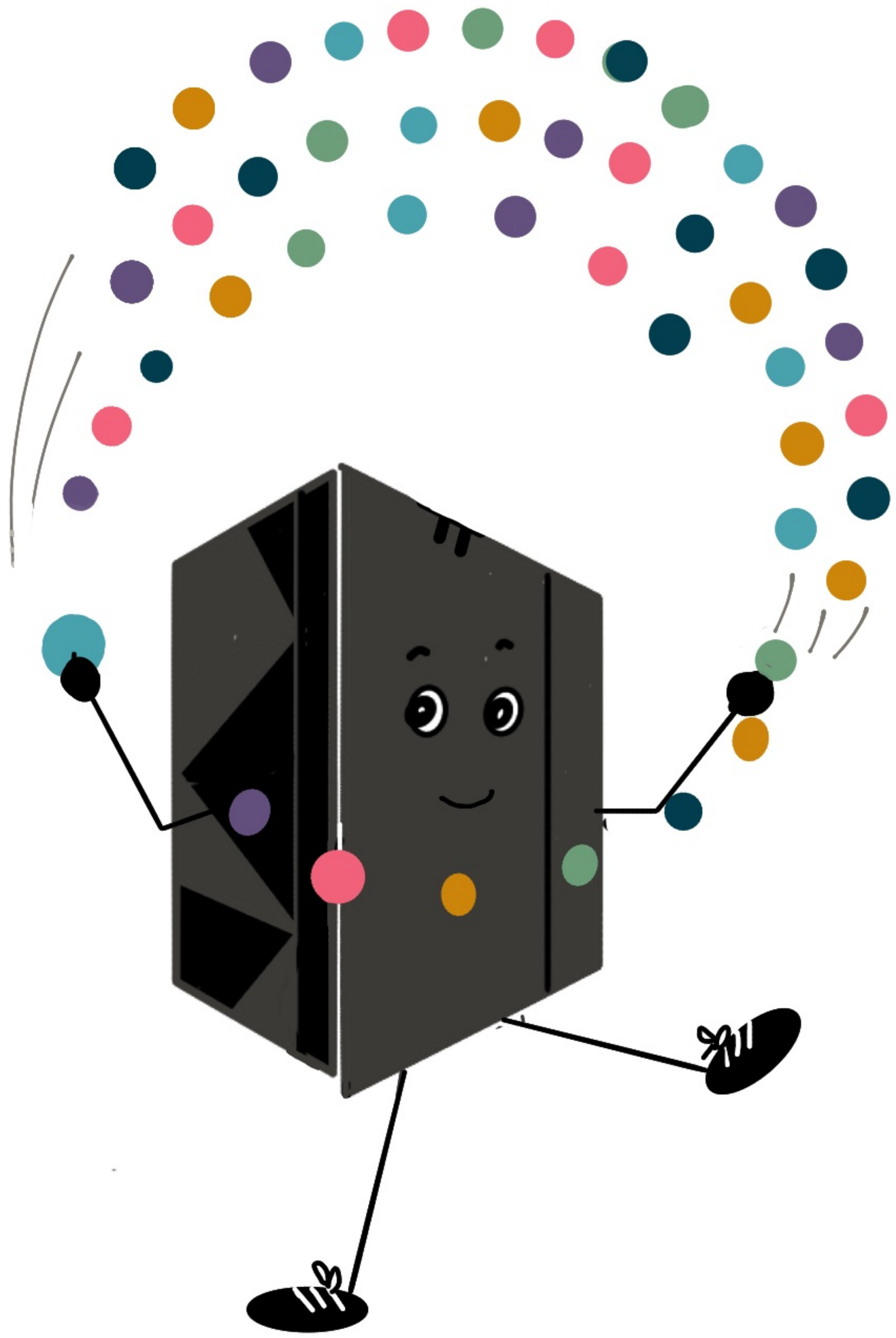
A MAINFRAME IS A DATA SERVER THAT IS DESIGNED TO PROCESS UP TO A TRILLION WEB TRANSACTIONS DAILY WITH THE HIGHEST LEVELS OF SECURITY AND RELIABILITY.

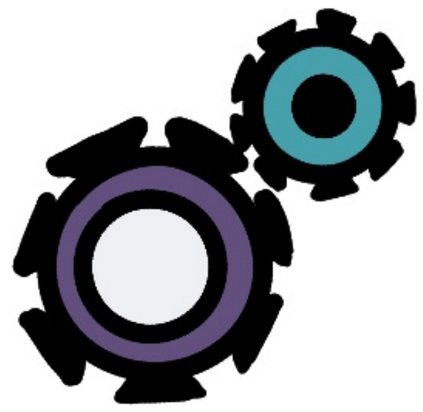
- IBM

WHAT CAN IT DO?

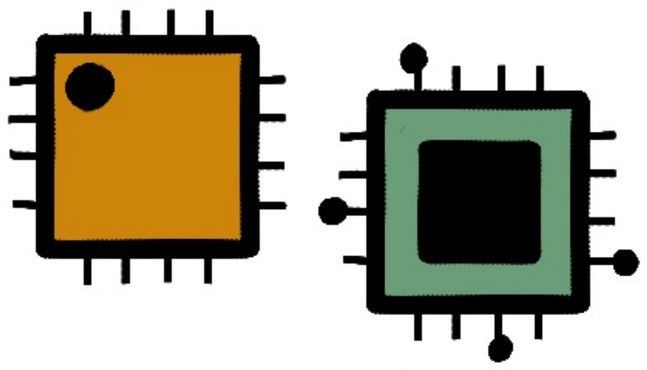
THIS HIGH-PERFORMANCE COMPUTER CAN PROCESS

MILLIONS OF TRANSACTIONS PER SECOND





WITH A LARGE NUMBER OF DATA PROCESSORS



AND A LARGE AMOUNT OF MEMORY

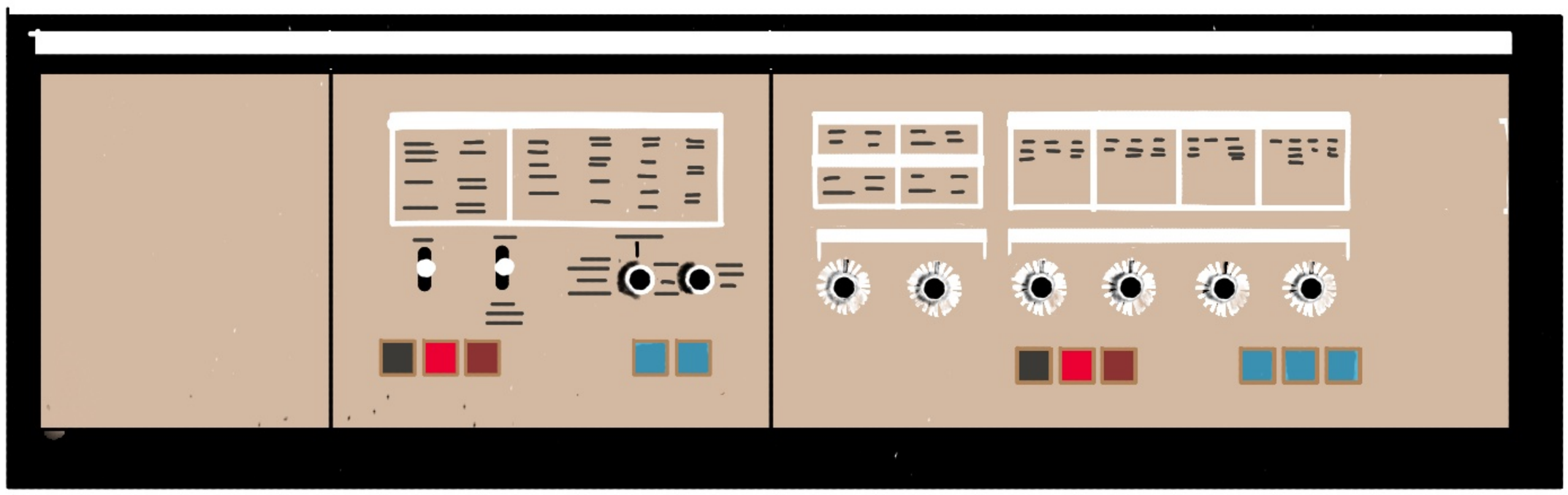
– AND –

IS RESILIENT, AVAILABLE SECURE & RELIABLE

INVENTED IN

MAINFRAMES APPEARED COMMERCIALLY IN THE 1960s.

FOR THE FIRST TIME, HARDWARE AND SOFTWARE WERE SEPARATE



IBM SYSTEM 360

MAINFRAME MANUFACTURERS

HONEYWELL

RCA

GENERAL ELECTRIC

AMDAHT

NATIONAL SEMICONDUCTOR

HITACHI

SIEMENS

IBM [outlasted them all]

BURROUGHS

SPERRY UNIVAC

GROUPE BULL

HEWLETT-PACKARD

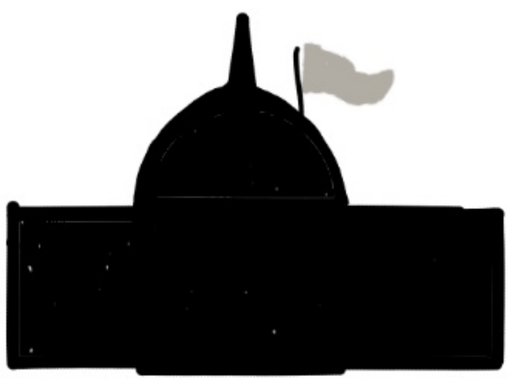
FUJITSU

UNISYS

WHO USES IT?

BANKS

RETAILERS



GOVERNMENTS

HEALTHCARE SERVICES

AIRLINES

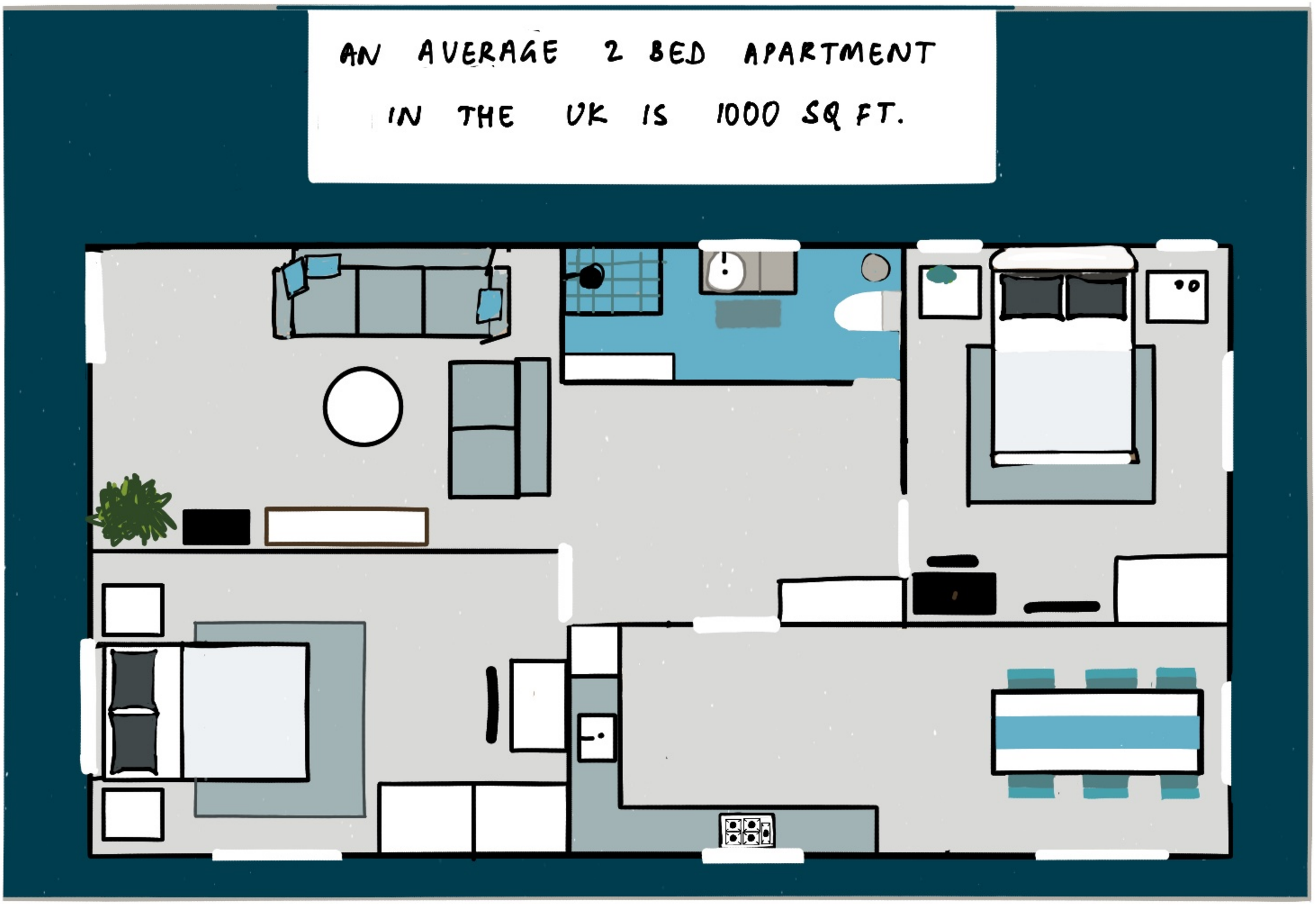
FORTUNE 500 COMPANIES

IT IS POWERFUL

TODAY'S MAINFRAMES

- PROCESS 18000 MILLION INSTRUCTIONS PER SECOND
- STORE SEVERAL PETABYTES OF DATA STORAGE
- RUN OVER A 100 PROCESSORS
- HANDLE ~70-80% OF PRODUCTION IT WORKLOADS

IT IS BIG



A MAINFRAME COULD

OCCUPY AN AREA

AS LARGE AS

10,000 SQUARE FEET.

TODAY'S MAINFRAMES ARE

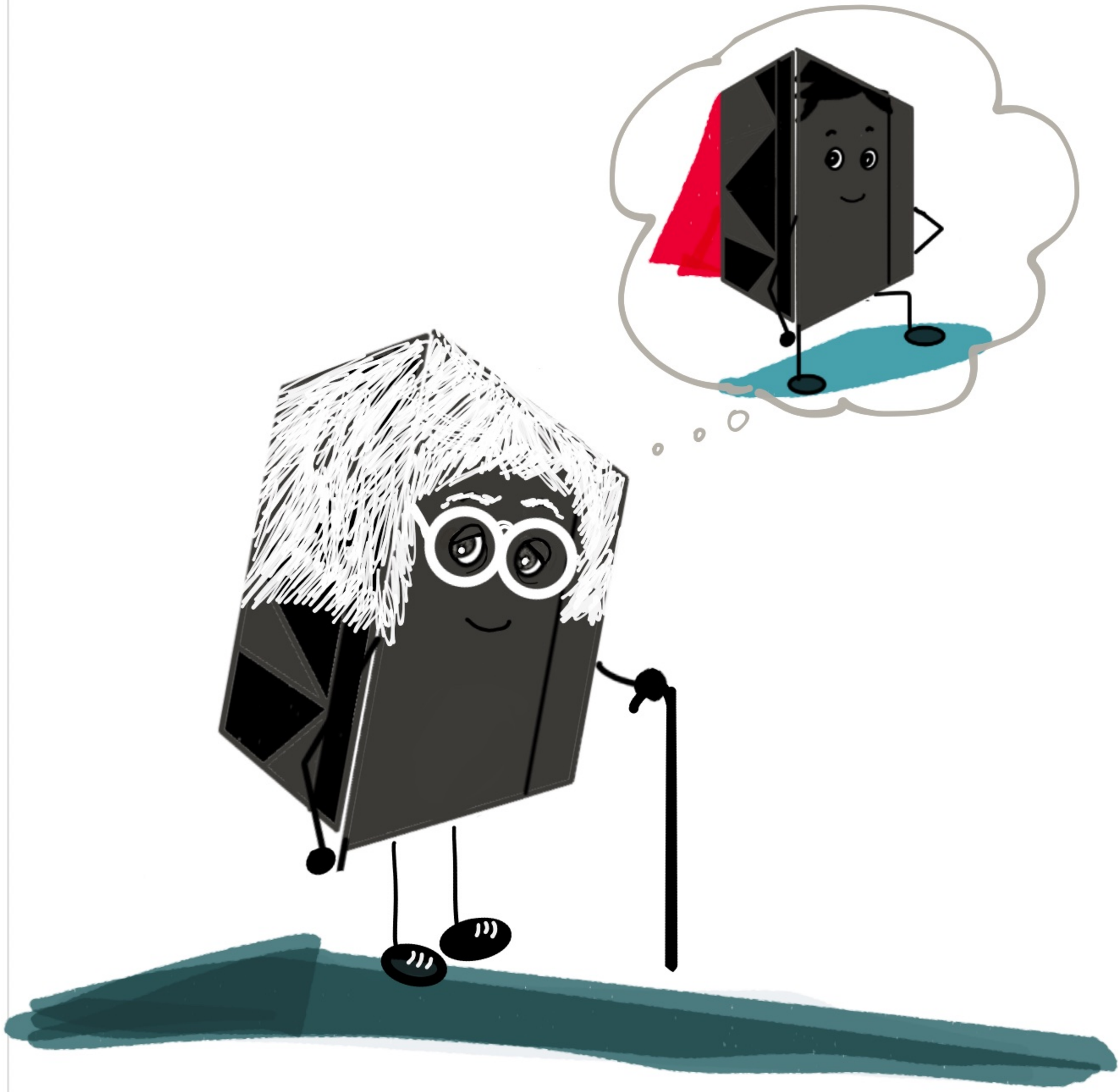
A BIT SMALLER, AT 27 SQ FT,

THE SIZE OF A FRIDGE

WEIGHING 1000 KG AND

EVEN SHRINKING

ISN'T IT ANCIENT?



WE DO TEND TO THINK OF MAINFRAMES AS TECH FROM A BYGONE ERA AND POSSIBLY NOT IN USE IN THE AGE OF CLOUD AND AI.

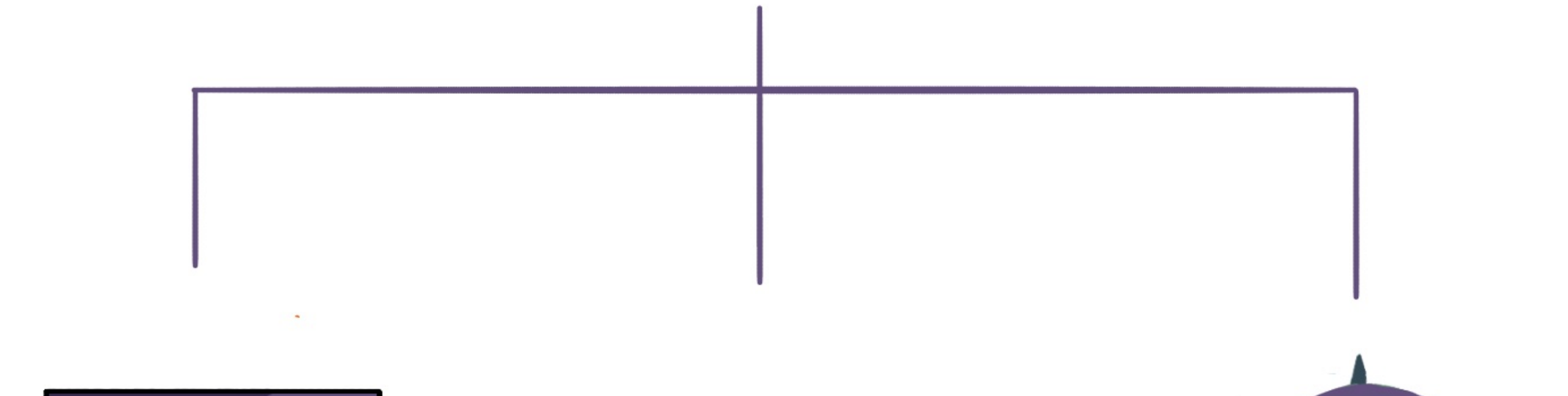
THIS IS, OF COURSE, NOT TRUE.

MAINFRAMES AND YOU

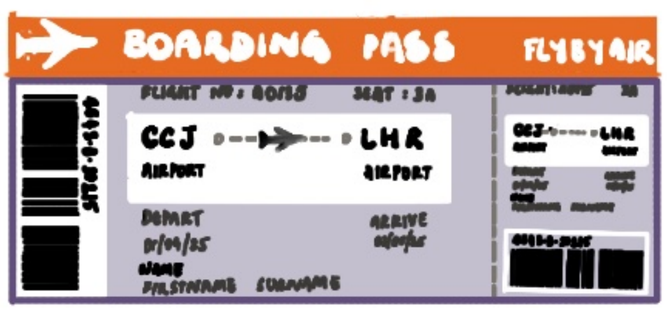
"I PREDICT THAT THE LAST MAINFRAME WILL BE UNPLUGGED ON MARCH 15, 1996"

- INFOWORLD ANALYST

IF YOU HAVE



WITHDRAWN CASH FROM AN ATM

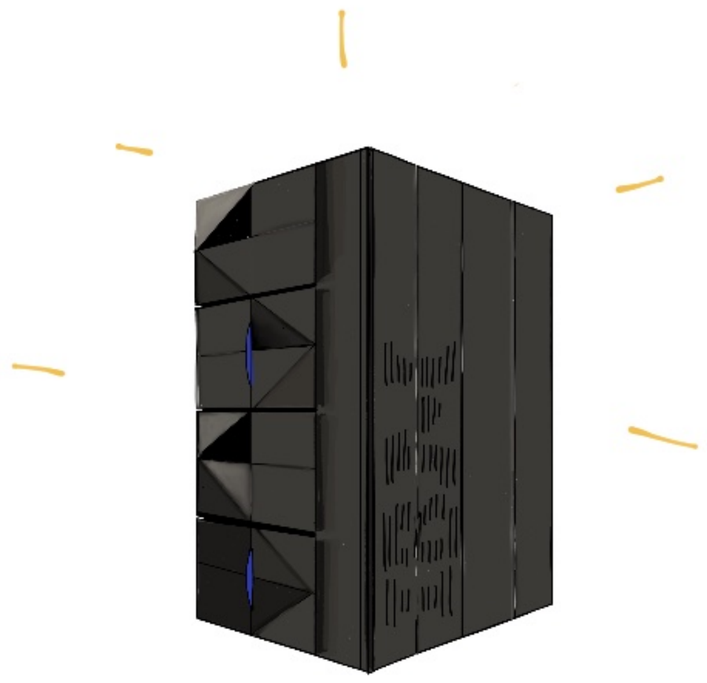


BOOKED AN AIRLINE TICKET

PAID FOR INSURANCE

CHANCES ARE, A MAINFRAME WAS BEHIND YOUR TRANSACTION

TODAY'S MAINFRAMES



ARE FEATURE RICH

HIGH SPEC

~ 200 CPUs

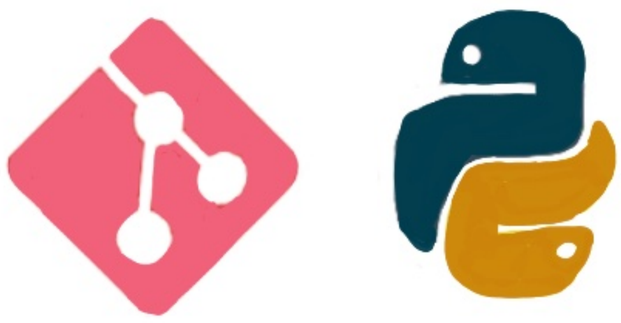
~ TERRABYTES OF RAM

~ PETABYTES OF SECONDARY STORAGE

LOW OR MIN DOWNTIME

AIM FOR
UNDER 5 MINS OUTAGE
A YEAR

MORE 'MODERN'



SUPPORT
MOST MODERN DEV TOOLS

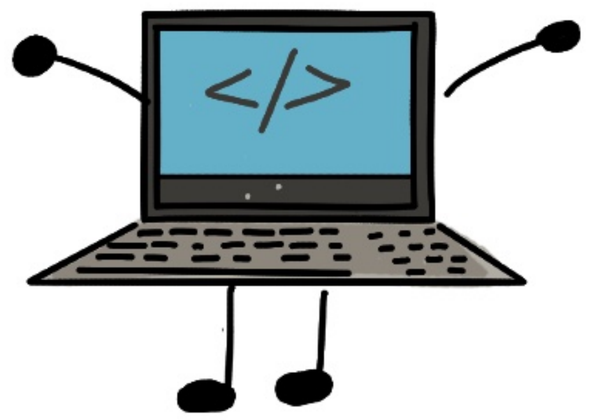
CONTEXT

SETTING

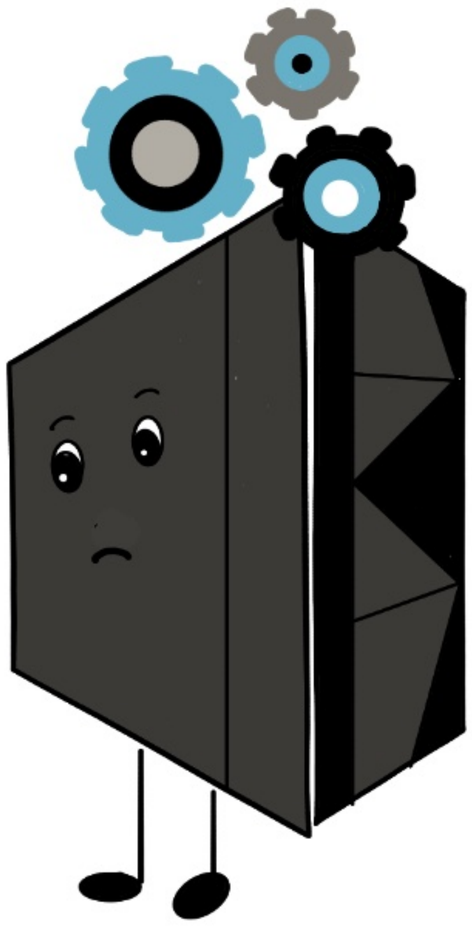
MAINFRAMES OF THE PAST

MODERN CONVENIENCES, HOWEVER, ARE NOT AVAILABLE ON THE MAINFRAMES THAT RUN 40 OR 50 YEAR OLD CODE.

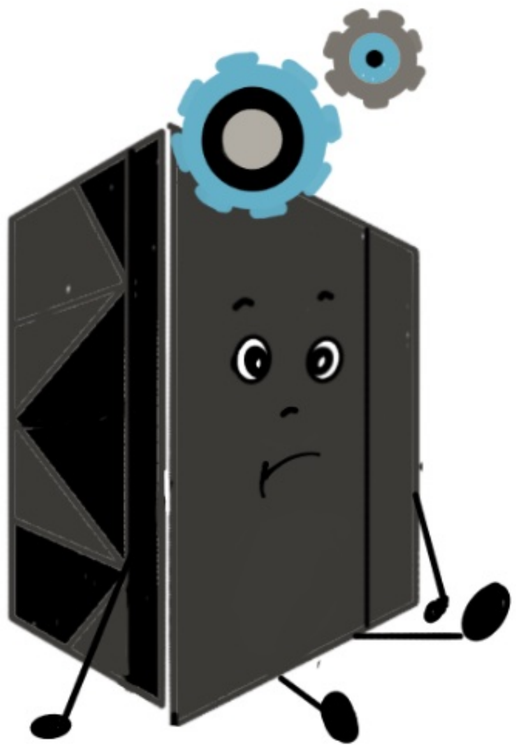
MAINFRAME CODE IS IN DECADES OLD LANGUAGES..

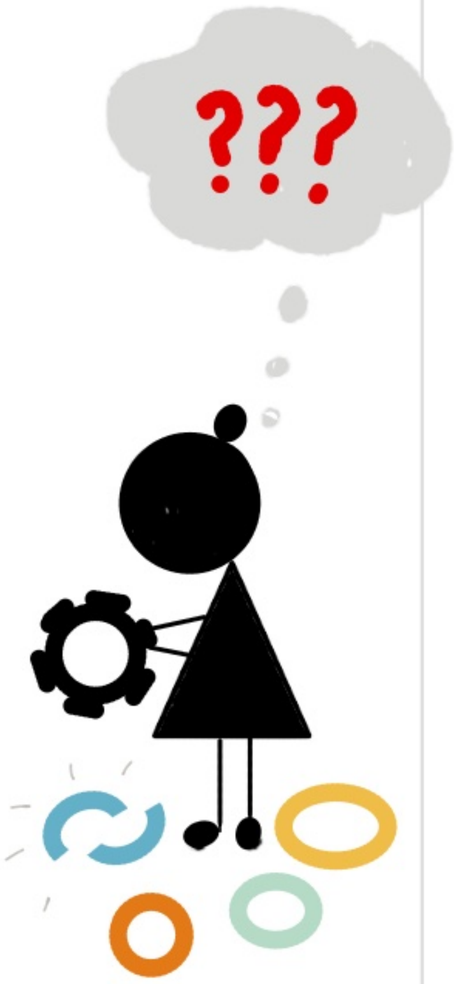


..NOT FAMILIAR TO TODAY'S PROGRAMMERS—MAKING IT...



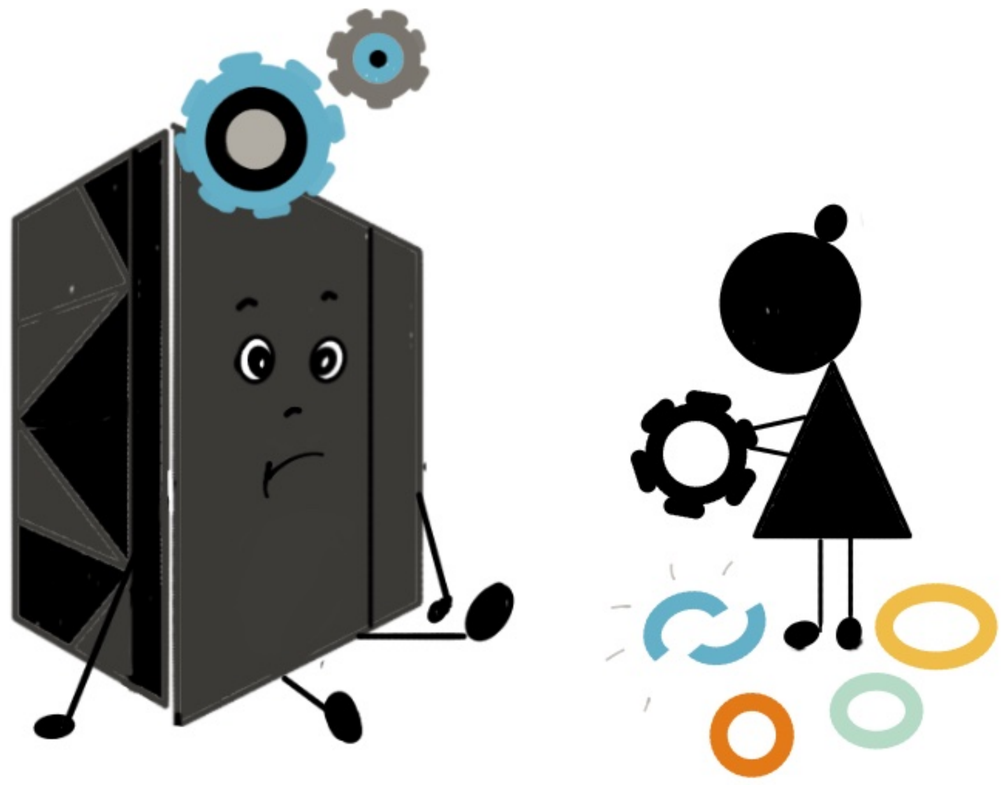
..HARD TO UNDERSTAND THE INTENT OF LEGACY CODE





...AND EVEN HARDER TO MAKE CHANGES TO FEATURES

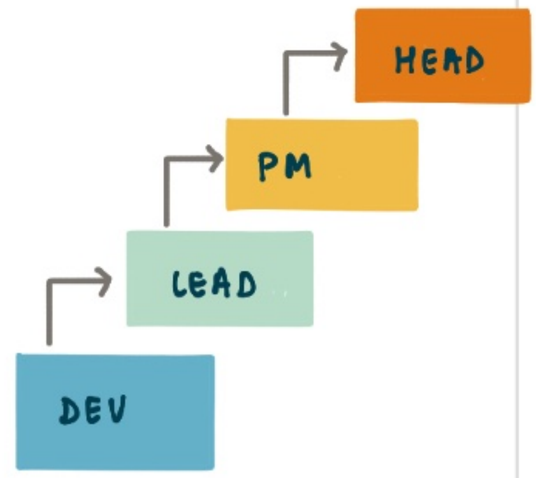
CHANGE IS DIFFICULT



FIXING EVEN SMALL ISSUES CAN TAKE TIME

DEPLOYING THE FIXES ALSO ADDS WEEKS.

MAKING CHANGES TO FULFILL COMPLIANCE/LEGAL REQUIREMENTS TAKES MONTHS AND MUCH OVERSIGHT



CHANGES MIGHT END UP BEING LESS OPTIMAL LEADING TO BUILDING UP TECHNICAL DEBT

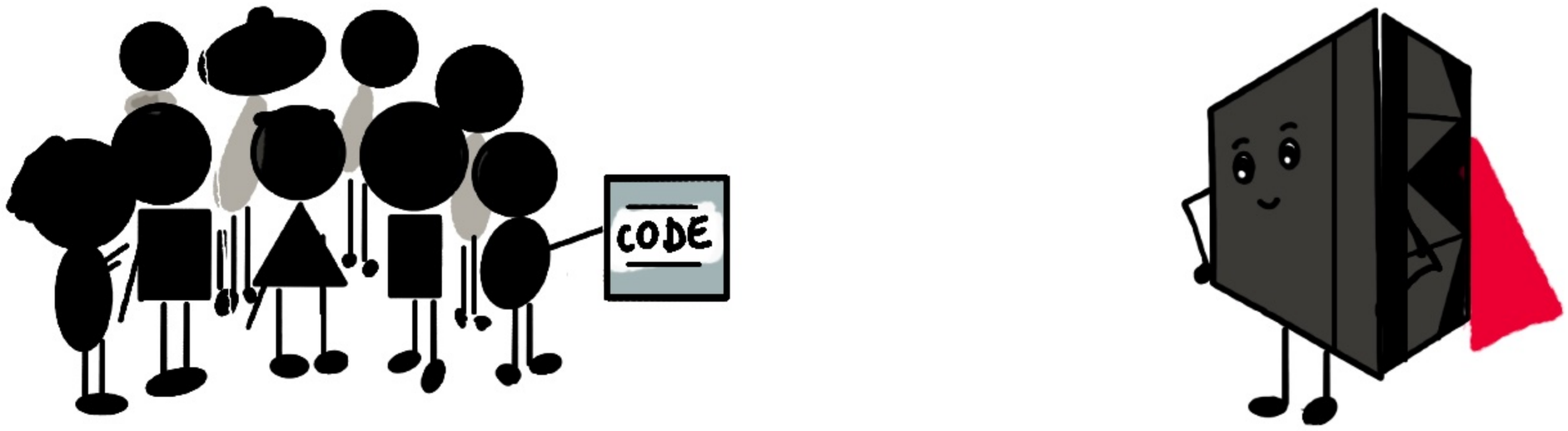
THIS MAKES IT SLOWER AND HARDER TO BE RESPONSIVE TO CHANGES IN DEMAND

SOME CONTEXT

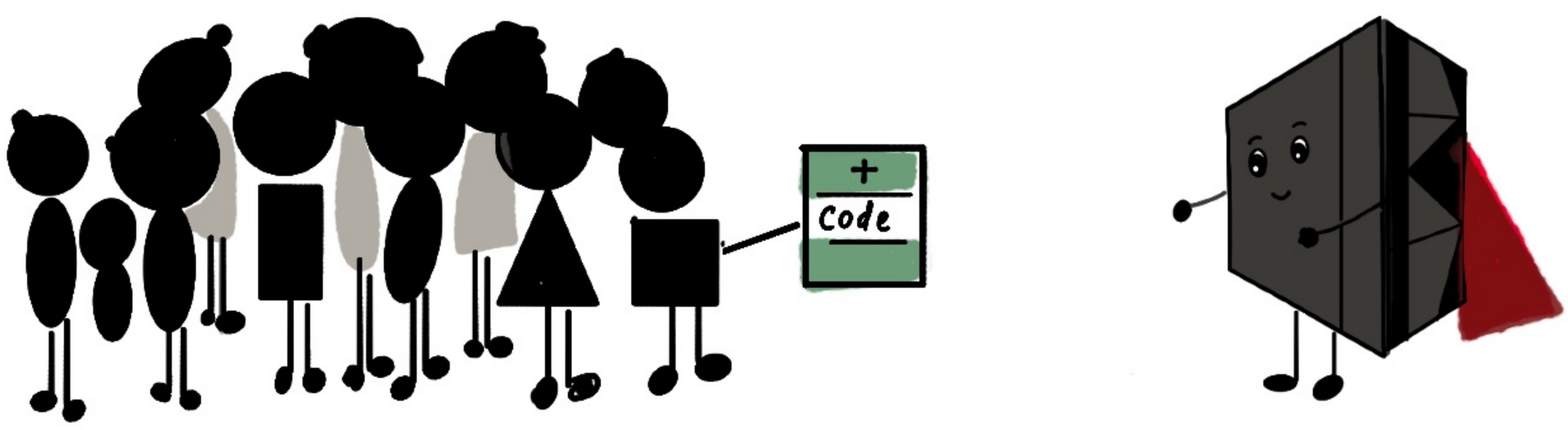
ABOUT WHY CHANGE

BECAME A PAINPOINT

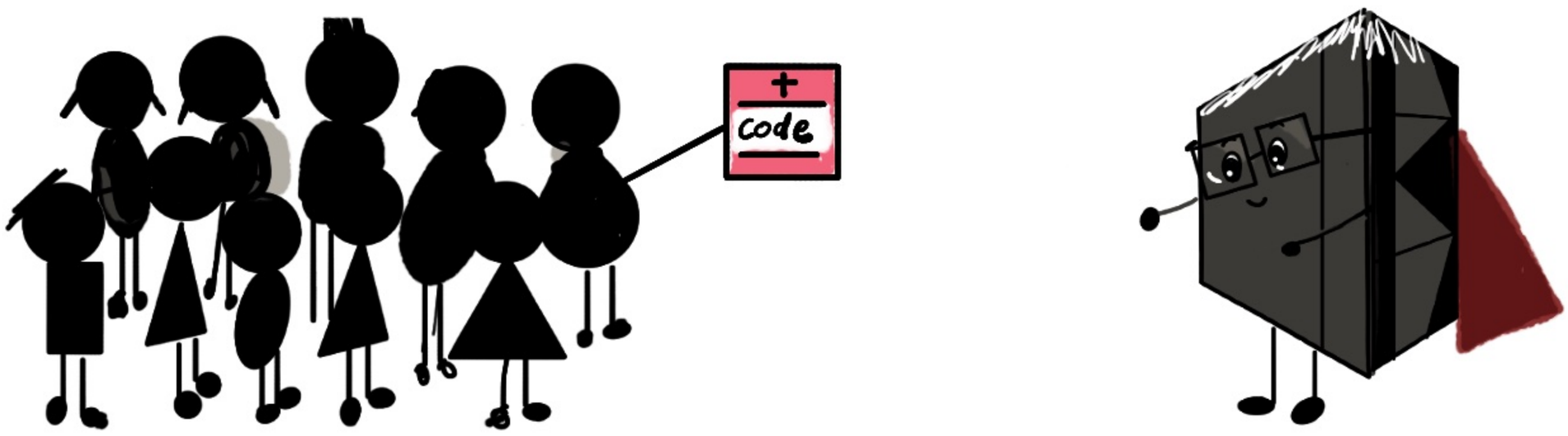
THE CODEBASES



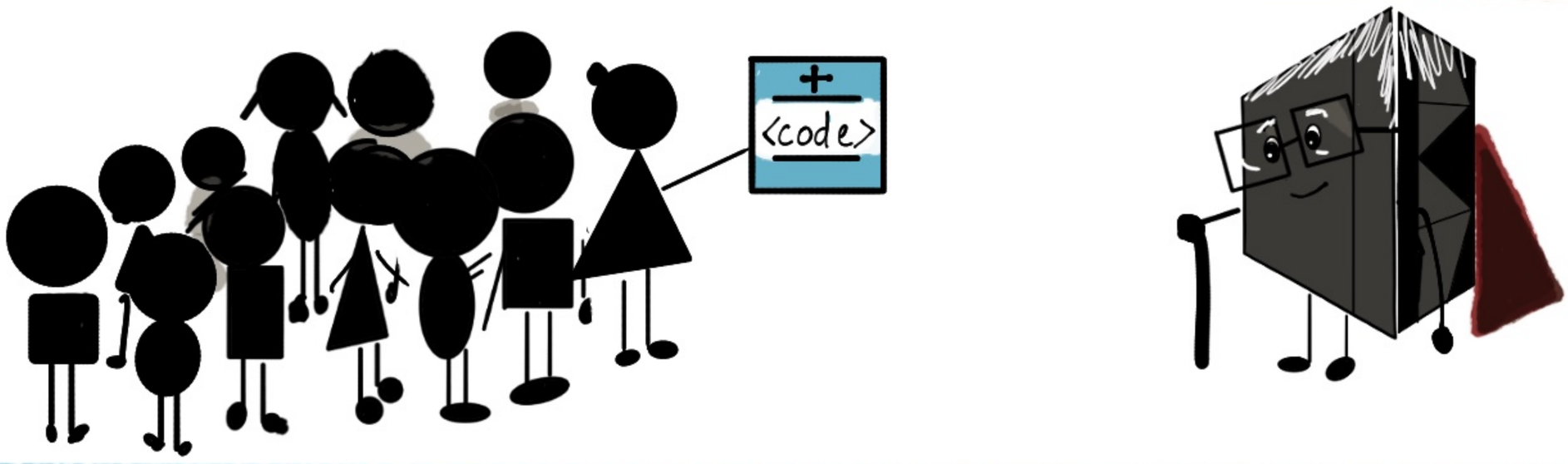
OVER THE DECADES, MAINFRAME APPLICATIONS HAVE HAD CODE ADDED ON BY SEVERAL TEAMS



IN LANGUAGES THAT WERE AROUND AT THAT TIME — THAT STILL RUN TODAY BECAUSE OF BACKWARD COMPATIBILITY —



EACH WITH A RANGE OF APPROACHES TO TECHNOLOGY

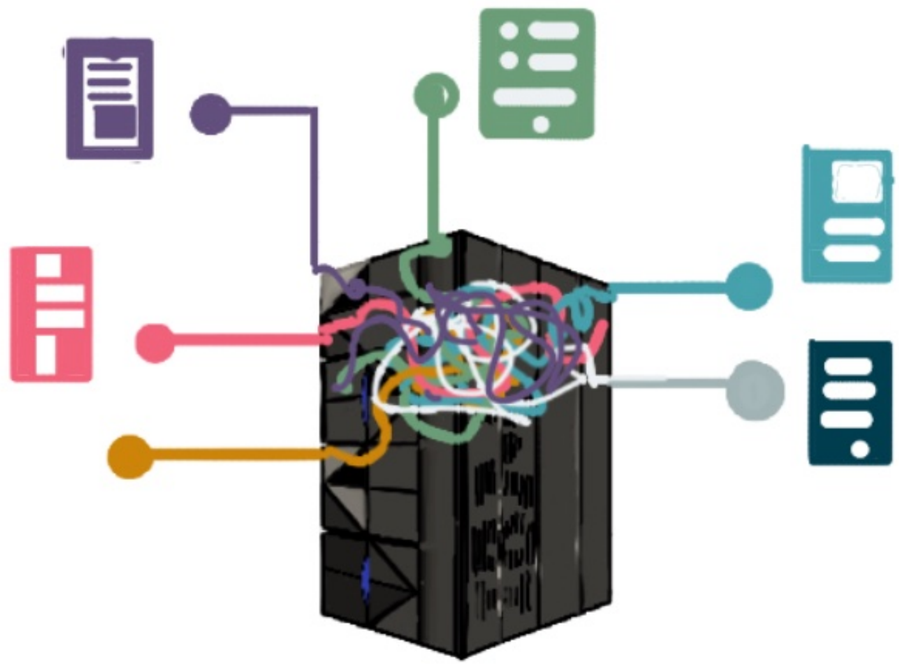


RESULTING IN COMPLEX CODEBASES OF MILLIONS OF LINES OF CODE

THE TECHNOLOGY

MAINFRAME APPS USED TO BE HARDWARE SPECIFIC

WITH COMPLEX DEPENDENCIES & INTERRATIONS.



CODE WAS OFTEN EDITED

DIRECTLY ON THE MAINFRAME

VERSION CONTROL :

ABSENT IN MANY CASES

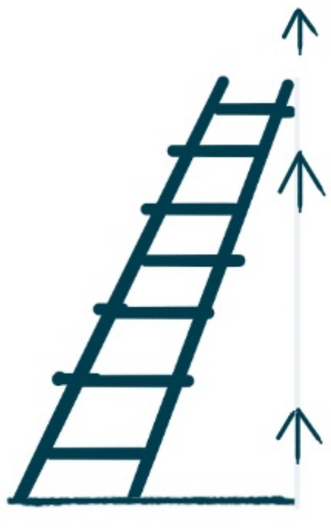
JOBS RUN AS A BATCH

AT SCHEDULED TIMES

SCALING : ACHIEVED BY ADDING

CPUs, MEMORY OR I/O

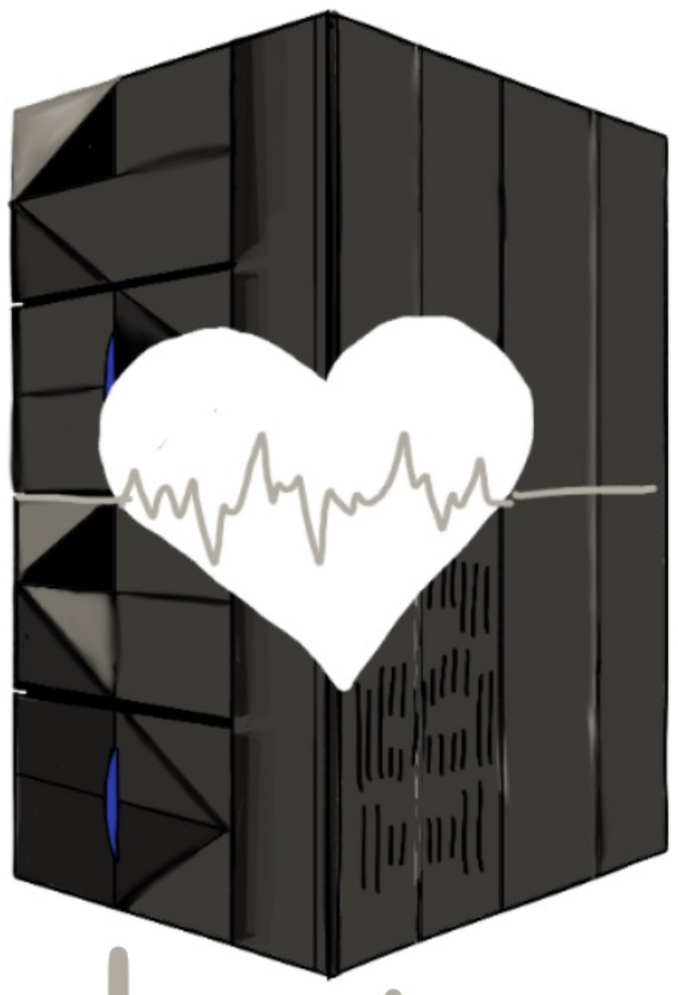
THE EXISTING MACHINE



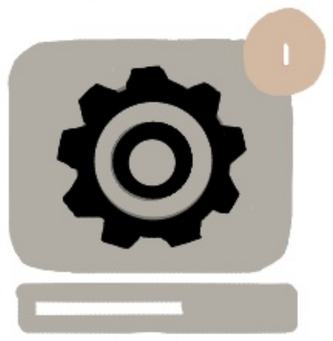
CODE + INFRA + DATA

THE OLD APPLICATION CODE IS MACHINE-OPTIMISED

TOOLS WERE PURPOSE BUILT FOR THE HARDWARE



DATABASES WERE TIGHTLY COUPLED TO MEMORY AND FILE ACCESS

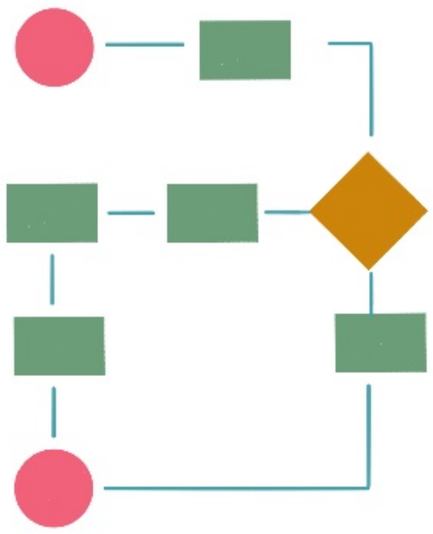


SOMETIMES, RUNNING THE SCHEDULED JOBS INVOLVE SWITCHING OFF SOME ONCLINE SERVICES

THE KNOWLEDGE

THE FUNCTIONALITY OF THESE APPLICATIONS IS OFTEN

NOT VERY WELL DOCUMENTED



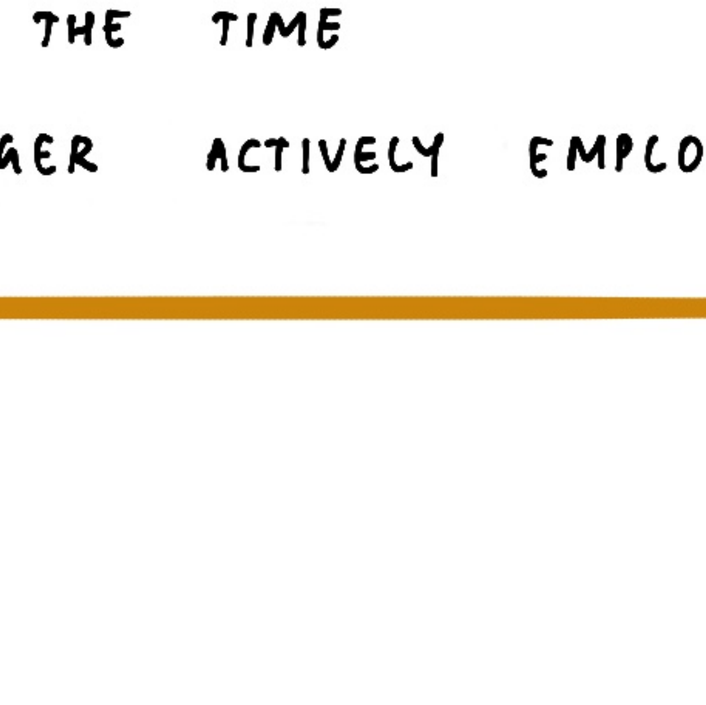
EITHER FOR PROCESS REASONS

OR THE SHEER TIME SCALE

MOST DOMAIN EXPERTS AND CODERS OF THE TIME ARE NO LONGER ACTIVELY EMPLOYED

OTHER TOOLS/ LANGUAGES

MAINFRAME LANGUAGES



THE INDUSTRY HAS FAR FEWER PROFESSIONALS TRAINED IN MAINFRAME TECHNOLOGIES

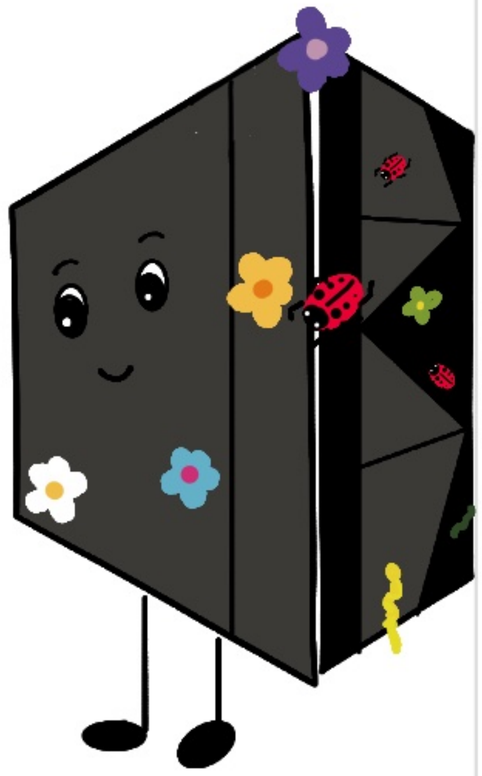
THE TESTS

IT CAN BE CHALLENGING TO SET UP

DEVELOPMENT ENVIRONMENTS OR TEST ENVIRONMENTS

TO PROBE THE FEATURES OR ISSUES

IN A MAINFRAME APPLICATION.



IN MANY CASES,

AUTOMATED TESTS AND CONTINUOUS INTEGRATION/

- UNIT
- INTEGRATION
- END-TO-END

DEPLOYMENT

PIPELINES

DON'T EXIST WITH MAINFRAME CODE

THE SECURITY

MAINFRAMES WERE SECURED EITHER BY LIMITING

- PHYSICAL ACCESS
- NETWORK ACCESS

A HARD OUTER LAYER OF DEFENSE + A WIDE OPEN NETWORK ONCE THE ATTACKER HAS MADE IT PAST PERIMETER DEFENSES IS CALLED AN EGGSHELL MODEL

OUTDATED SOFTWARE/ INFREQUENT PATCHES

PERMISSIVE DEFAULT SETTINGS

NEWER FORMS OF CYBERCRIMES

WEAKNESSES HAVE BEEN EXPOSED BY

INTEGRATION WITH CLOUD AND APIs

OLDER PROTOCOLS FOR SECURITY

THE OPERATIONAL COSTS

MAINFRAMES ARE VERY EXPENSIVE TO ACQUIRE AND RUN

$ EXPERTS $

$ FACILITIES $

$ MAINTENANCE $

$ SERVICE LEVELS

$ SOFTWARE LICENSES

$ ENTERPRISE-LEVEL HARDWARE $ MILLIONS

TIED TO HARDWARE CAPACITY REGARDLESS OF USAGE

MIPS-BASED LICENSING

HIGH CAPITAL EXPENDITURE

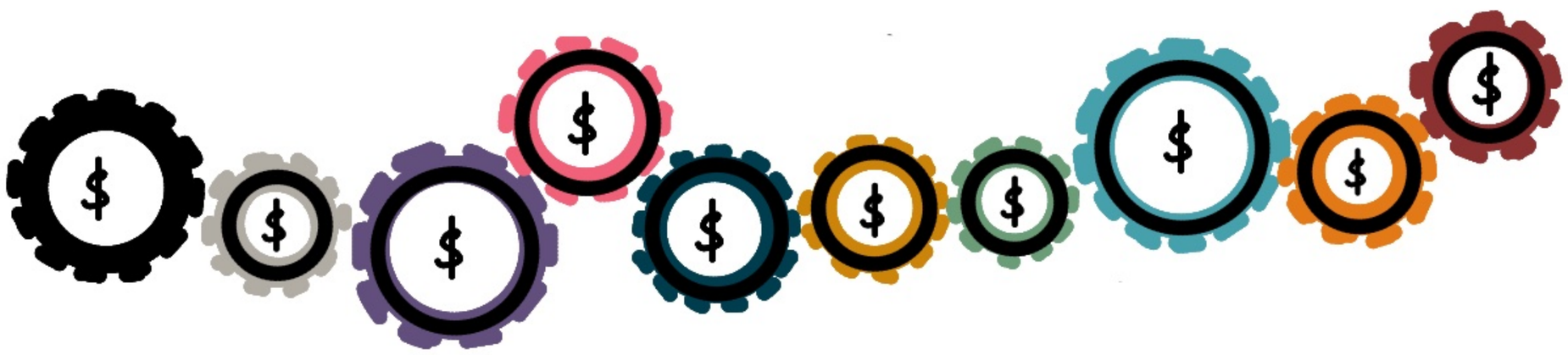
THE IMPLICATIONS

ALL THESE FACTORS CONTRIBUTE TO THE RISK TO ORGANISATIONS

RISK CAN BE CATEGORISED INTO THE FOLLOWING CATEGORIES

SLOW INNOVATION / BUSINESS AGILITY

HIGH OPERATIONAL COSTS



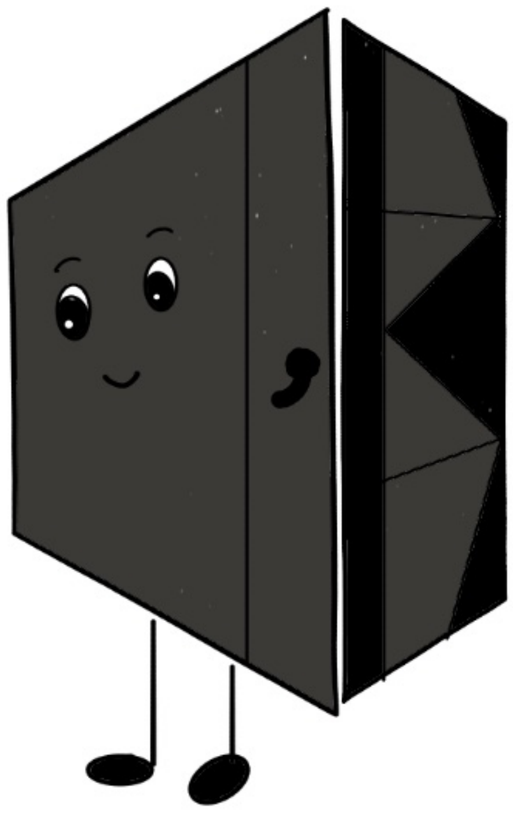
HIGH COMPLIANCE / SECURITY / LEGAL COSTS

ON MODERNIZING MAINFRAMES

WHAT IS MODERNIZATION ?

MAINFRAME MODERNIZATION

a



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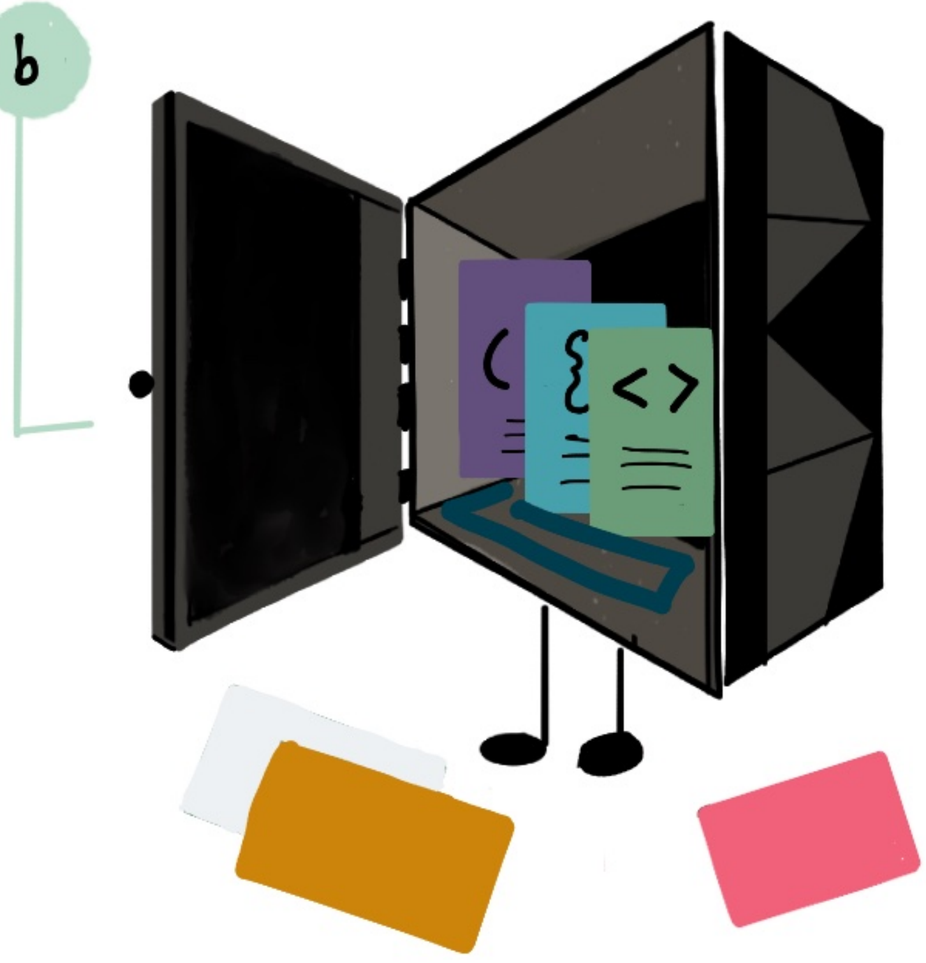


IS IT ABOUT MODERNISING OR UPGRADING THE HARDWARE?

IS IT ABOUT UPDATING THE APPLICATION SOFTWARE?

THAT WOULD BE

HARDWARE MODERNIZATION

AND

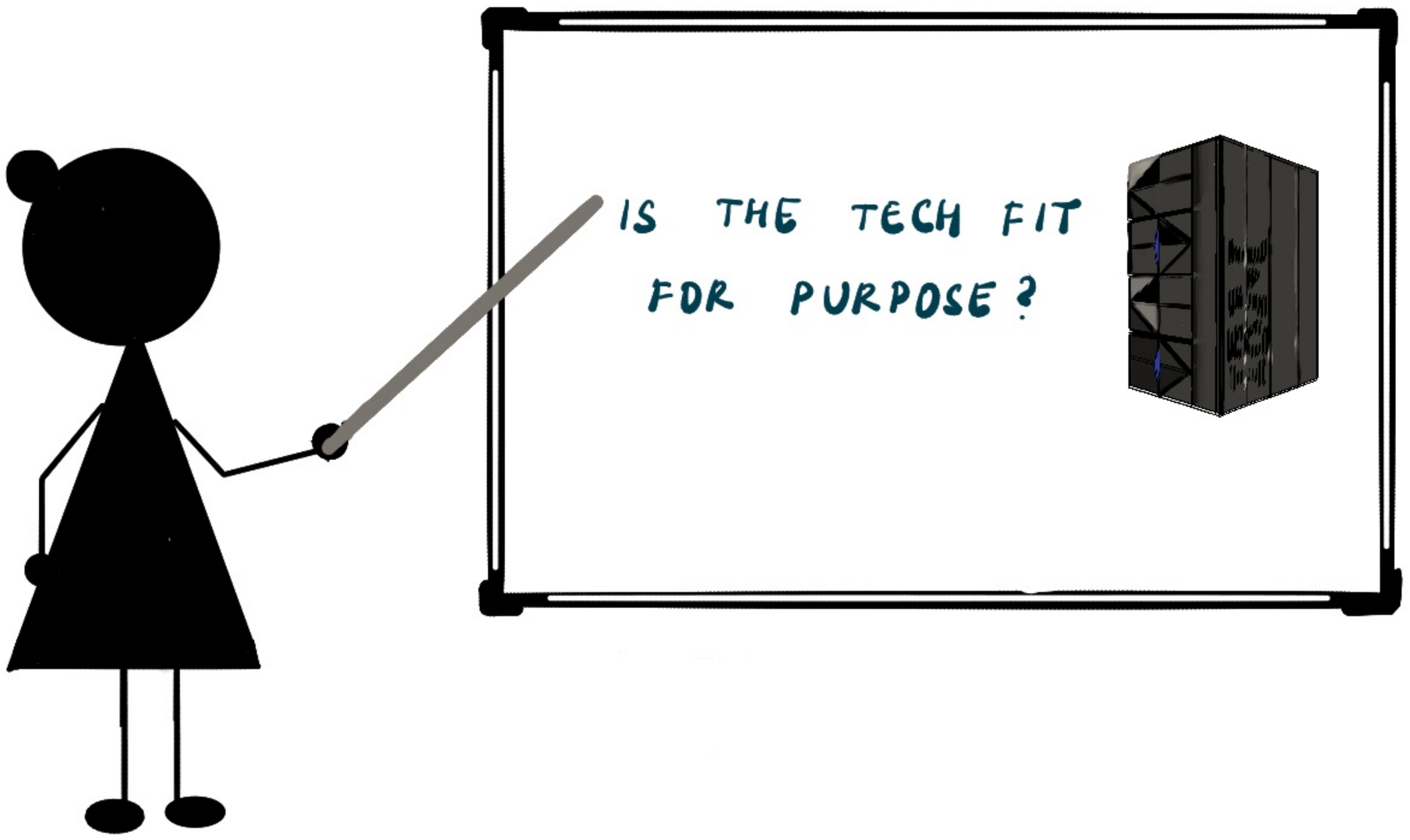
OUT OF SCOPE FOR THIS BOOK

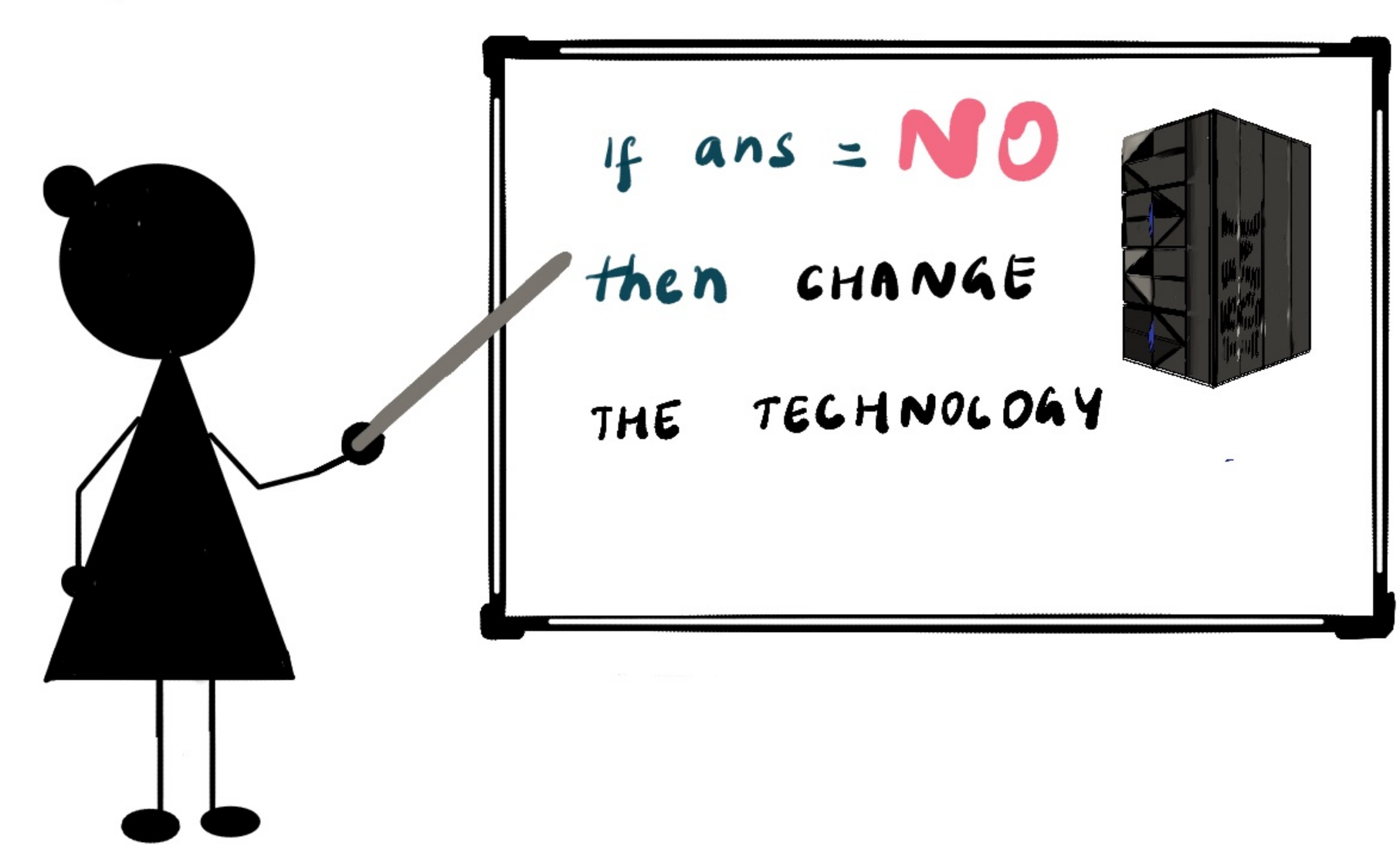
YES! WHEN WE SAY LEGACY OR MAINFRAME } MODERNIZATION

WE USUALLY MEAN APPLICATION MODERNIZATION

WHAT IS MODERNIZATION ?

MODERN IS NOT ABOUT THE AGE OF THE CODE OR LANGUAGE





THIS CHANGE IS CALLED MODERNIZATION*

*FOR THE PURPOSES OF THIS BOOK, 'MODERNIZATION' REFERS TO LEGACY MODERNIZATION

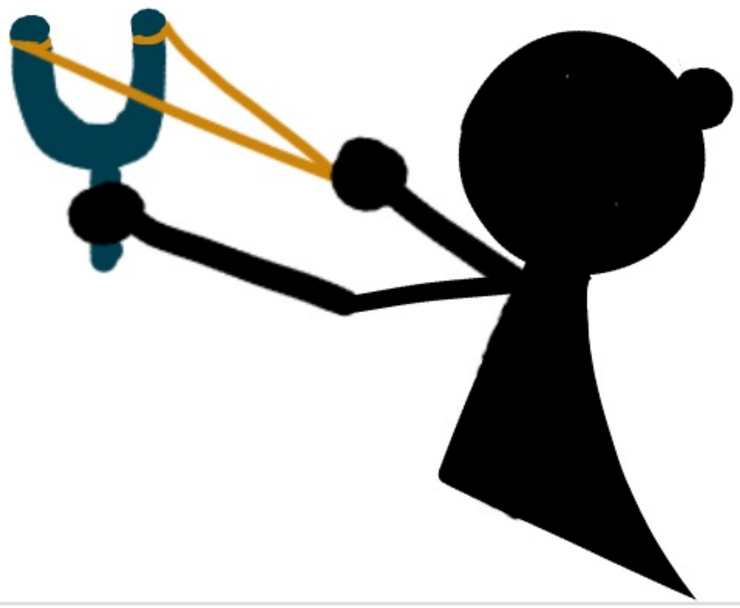
WHY MODERNIZE?

THE NEED TO MODERNIZE

MODERNIZATION IS NOT JUST ABOUT OLD AND NEW

IS THE TECH EASY TO USE AND ARE MY CUSTOMERS DELIGHTED?

HOW SOON CAN I RESPOND TO CHANGE AND LAUNCH NEW FEATURES?



ARE WE USING TECH THAT IS SOON TO BE OBSOLETE?

CAN I MINIMISE THE TOTAL COST OF OWNERSHIP?

PURCHASE PRICE OF ASSET

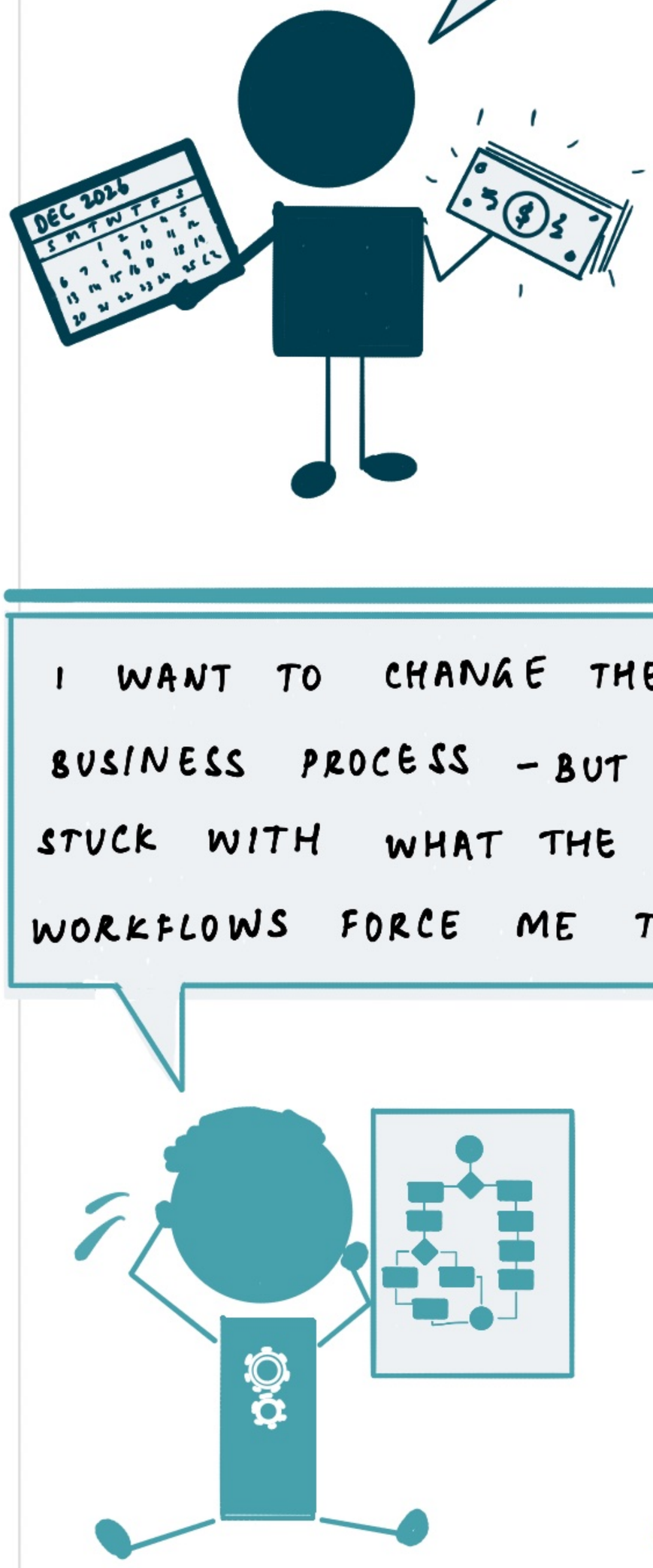
+

COSTS OF OPERATION OVER ASSET LIFE SPAN

CAN I ATTRACT/RETAIN THE SKILLS OF PEOPLE THE ORG NEEDS?

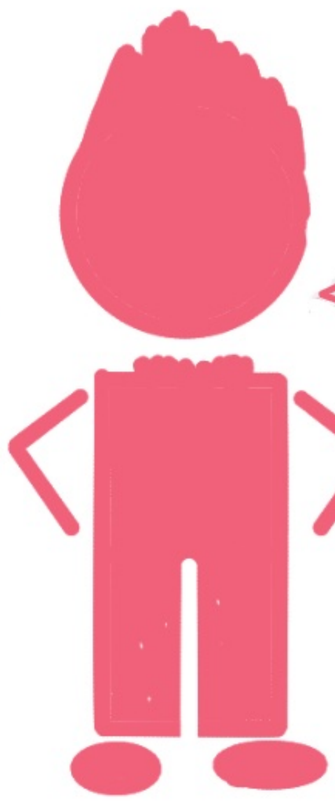
WHAT ARE YOUR REASONS?

I DON'T WANT TO PAY FOR END-OF-LIFE HARDWARE & SOFTWARE



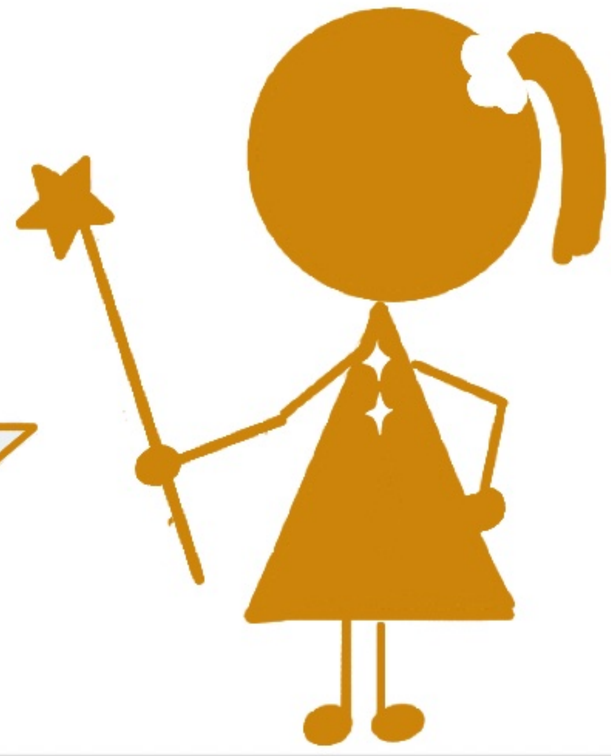
I WANT TO REDUCE THE COST OF CHANGE AND GET BETTER ROI

I WANT TO CHANGE THE BUSINESS PROCESS - BUT AM STUCK WITH WHAT THE SYSTEM WORKFLOWS FORCE ME TO DO!



I HAVE A COMPETITOR!

I HAVE TO BE COMPLIANT WITH A NEW REGULATION



I WANT SHINY NEW TECH

THE ASPIRATION

LOOSELY COUPLED ARCHITECTURES

WELL ABSTRACTED HORIZONTAL LAYERS

STANDARD LIBRARIES AND FRAMEWORKS - NEWER ONES

RICH IDES & LOCAL DEV ENVIRONMENTS

DEBUGGING TOOLS

DISTRIBUTED VERSION CONTROL WITH COLLABORATION

TEST DRIVEN DEVELOPMENT

CI/CD PIPELINES AND REGULAR DEPLOYMENTS

RELATIONAL OR DOCUMENT BASED DATA STORES

ENCRYPTION AT REST AND IN TRANSIT

SMALL GRANULARITY TRANSACTIONS

EVENT-BASED RATHER THAN TIME-BASED SCHEDULING

HORIZONTAL SCALING - ADDING MORE NODES
INSTEAD OF UPGRADING THE ONE MACHINE

AUTO SCALING BASED ON DEMAND

PAY PER USE MODEL

HEALTH CHECKS

APP-LEVEL RESILIENCE

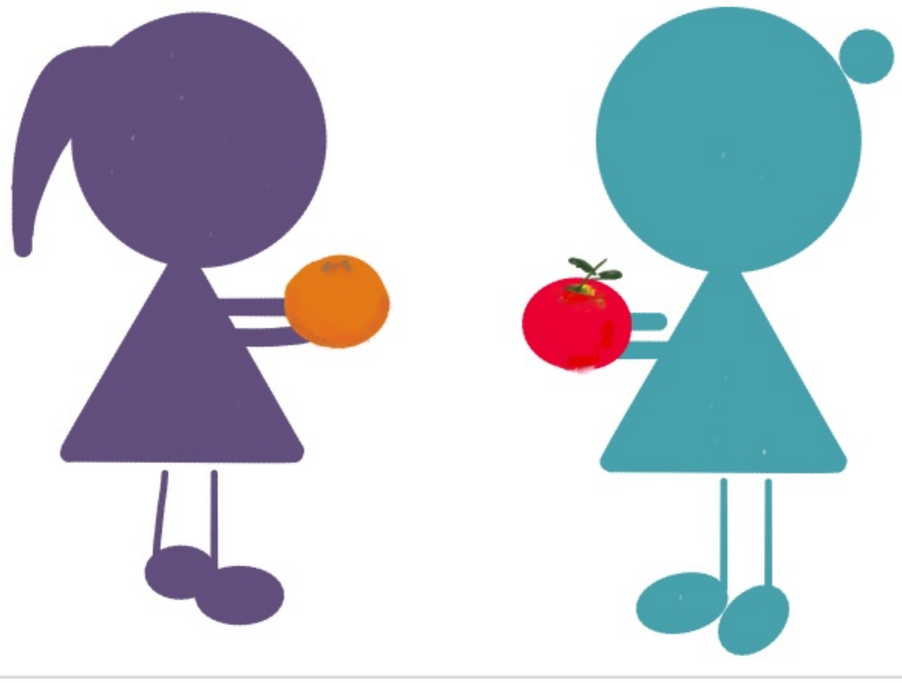
. . . AND MORE !

DECIDING VALUE & FIT

WHAT IS USEFUL, VALUABLE OR FIT FOR PURPOSE IS A COMPLEX DECISION.

IT IS BASED ON WHAT THE ORGANISATION NEEDS. SUCH AS...

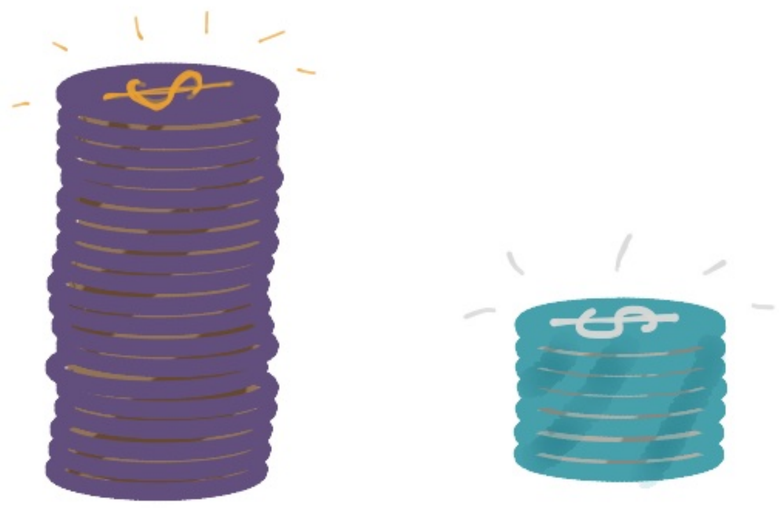
...MATCHING COMPETITION



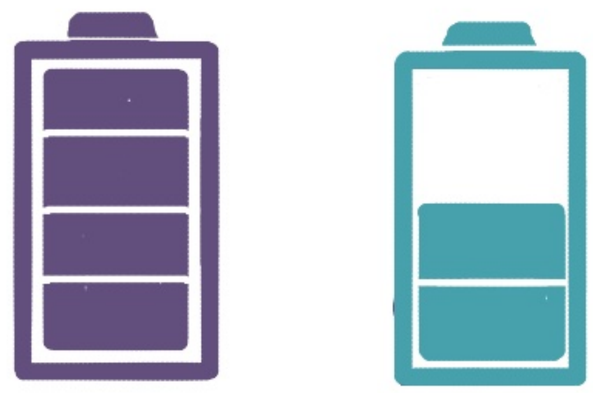
...COMPETITIVE ADVANTAGE

...FASTER PACE OF CHANGE

...CHANGE TO BE CHEAPER



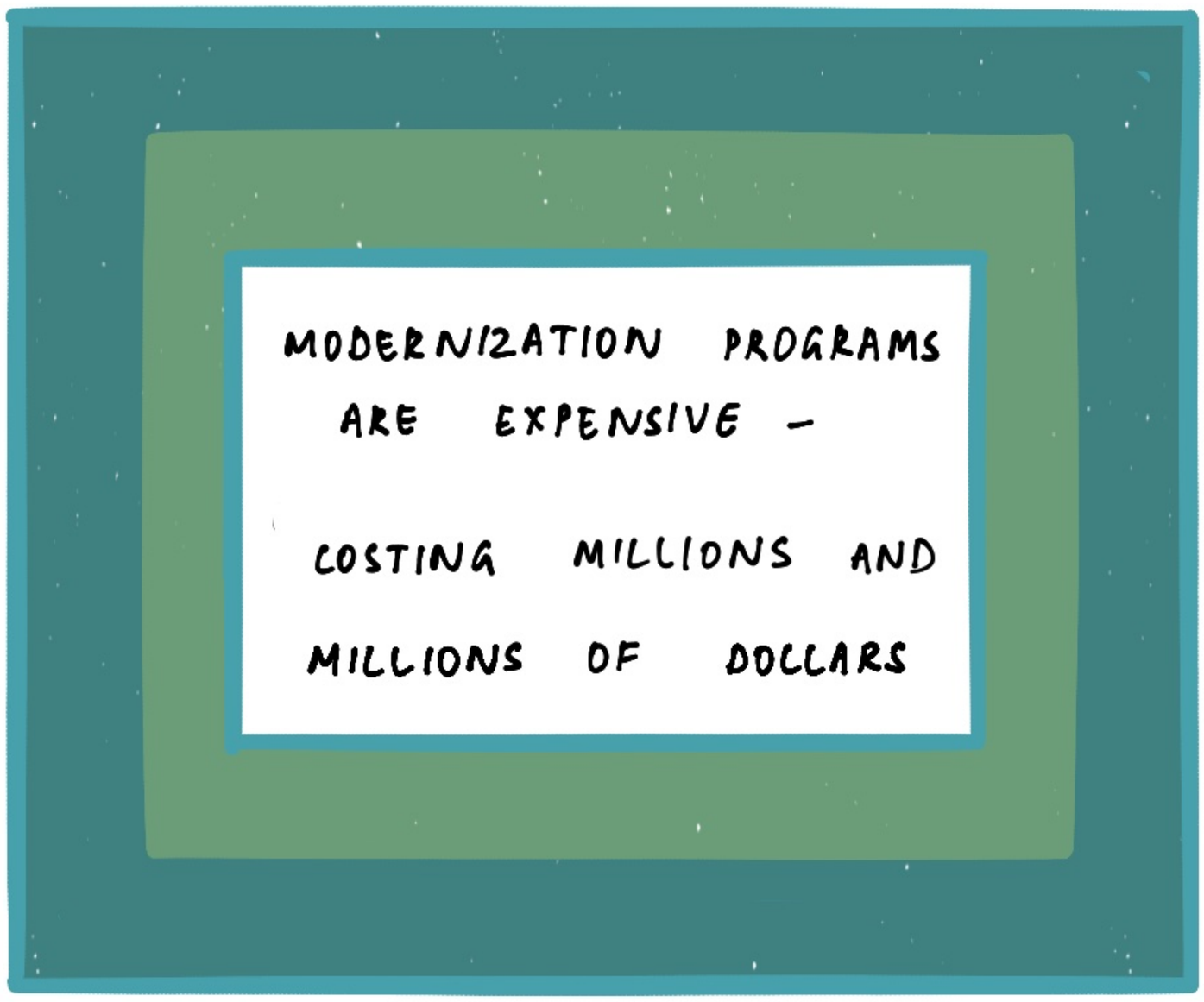
...A LOWER RUN COST



MODERNIZATION

IS A HARD PROBLEM

EXPENSIVE


MODERNIZATION PROGRAMS ARE EXPENSIVE -
COSTING MILLIONS AND MILLIONS OF DOLLARS

TAKES YEARS

MODERNIZATION PROGRAMS

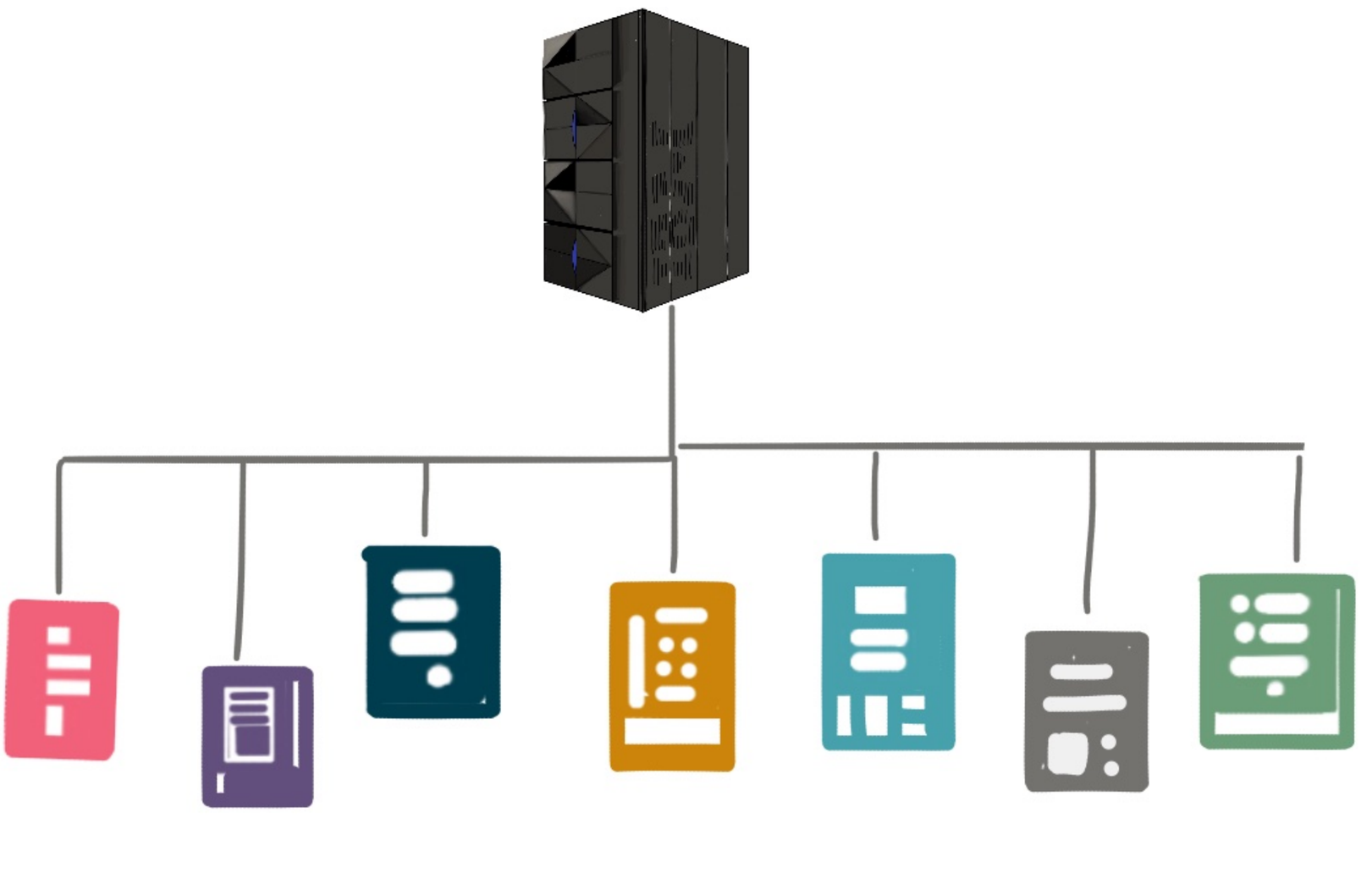
TAKE

SEVERAL YEARS

TO COMPLETE

MANY APPLICATIONS

AN ORGANIZATION MAY HAVE ONE MAINFRAME RUNNING A HANDFUL OF APPS

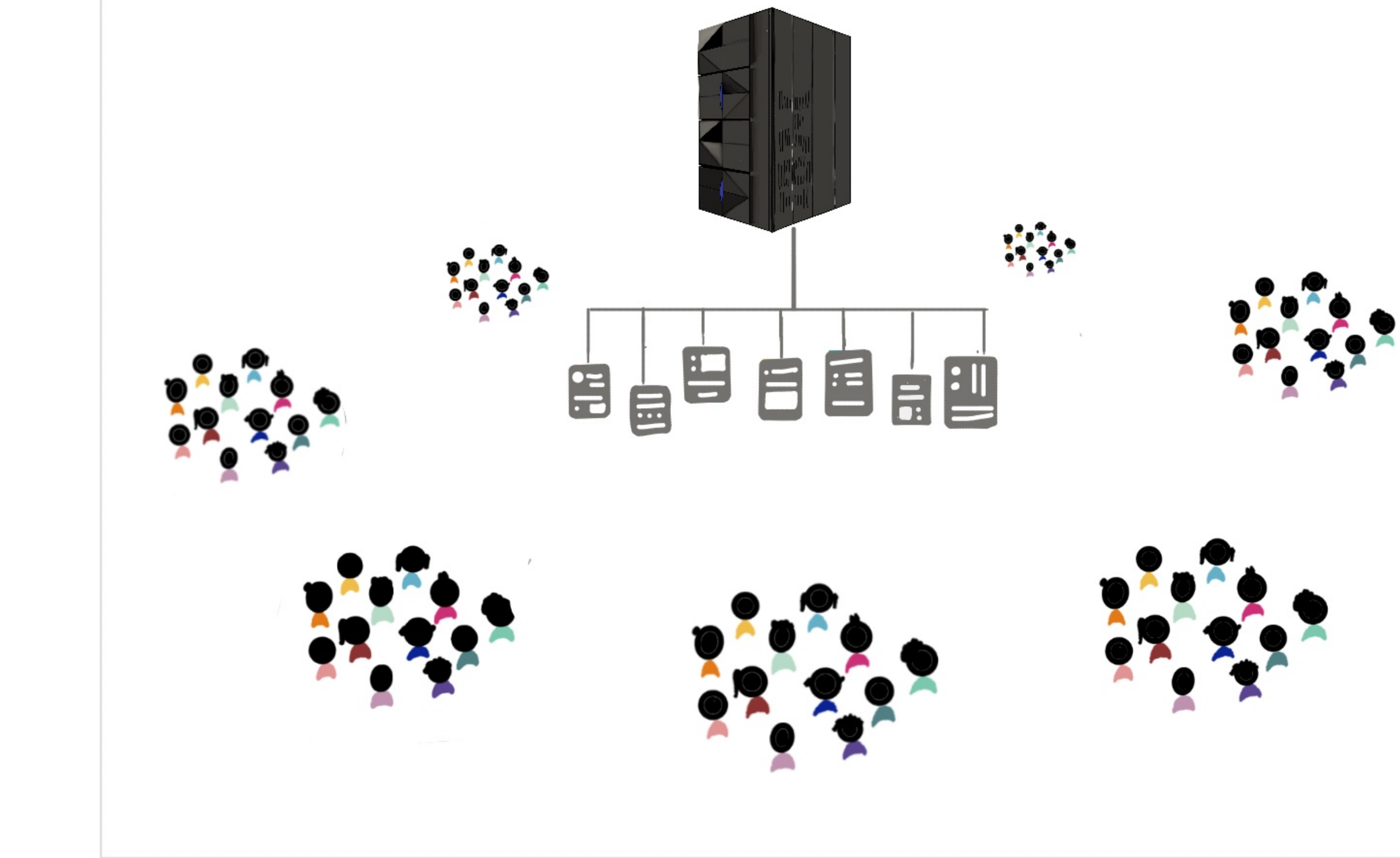


MANY MAINFRAMES

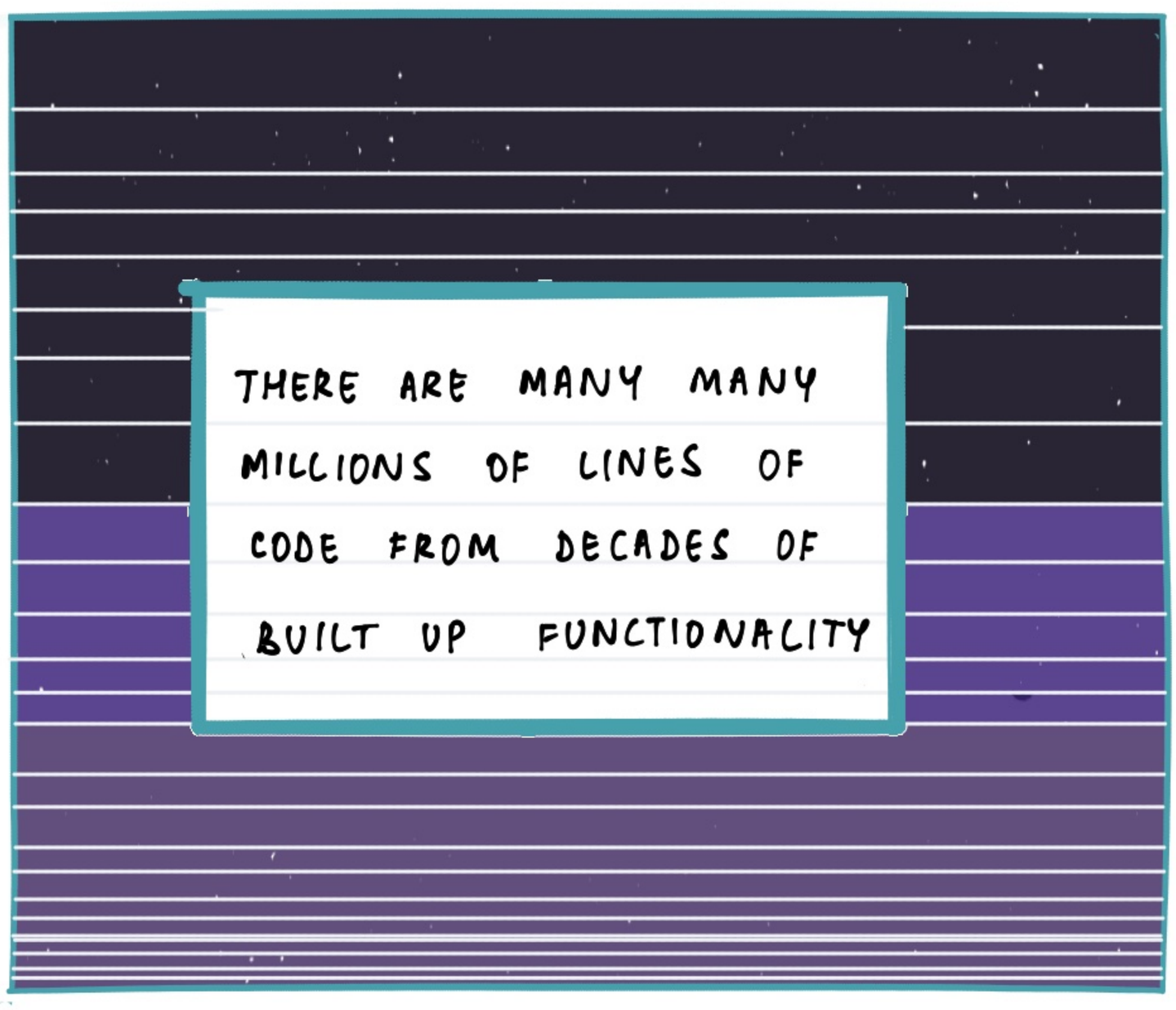
OR MULTIPLE MAINFRAMES
RUNNING
SEVERAL APPS

MANY MAINTENANCE TEAMS

THESE MAINFRAMES ARE MAINTAINED BY MULTIPLE TEAMS - OFTEN DIFFERENT ORGANISATIONS



LARGE SCOPE


THERE ARE MANY MANY
MILLIONS OF LINES OF
CODE FROM DECADES OF
BUILT UP FUNCTIONALITY

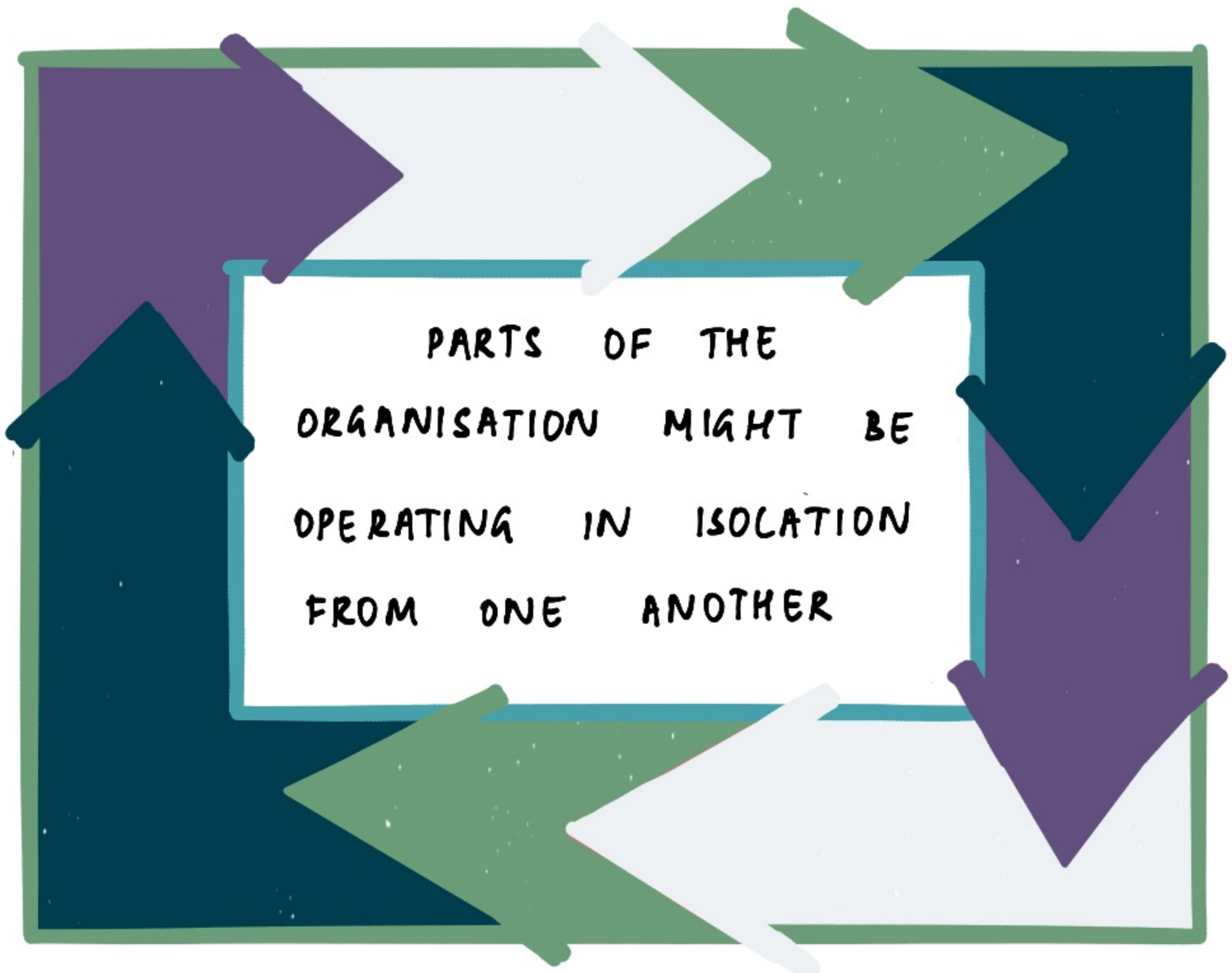
CATCHING UP

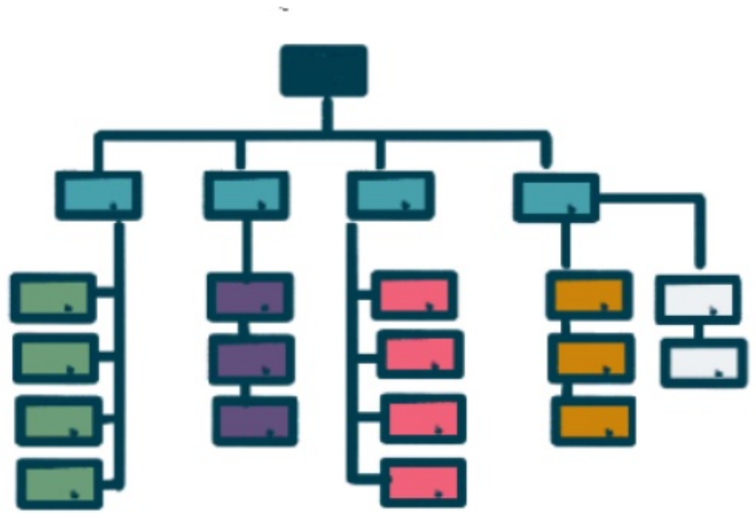
ORGANISATIONS STRUGGLE TO MAKE PROGRESS WITH OUTDATED TECHNOLOGY

OLD [TECH
PROCESS

TECH INNOVATIONS

WORKING IN SILOS





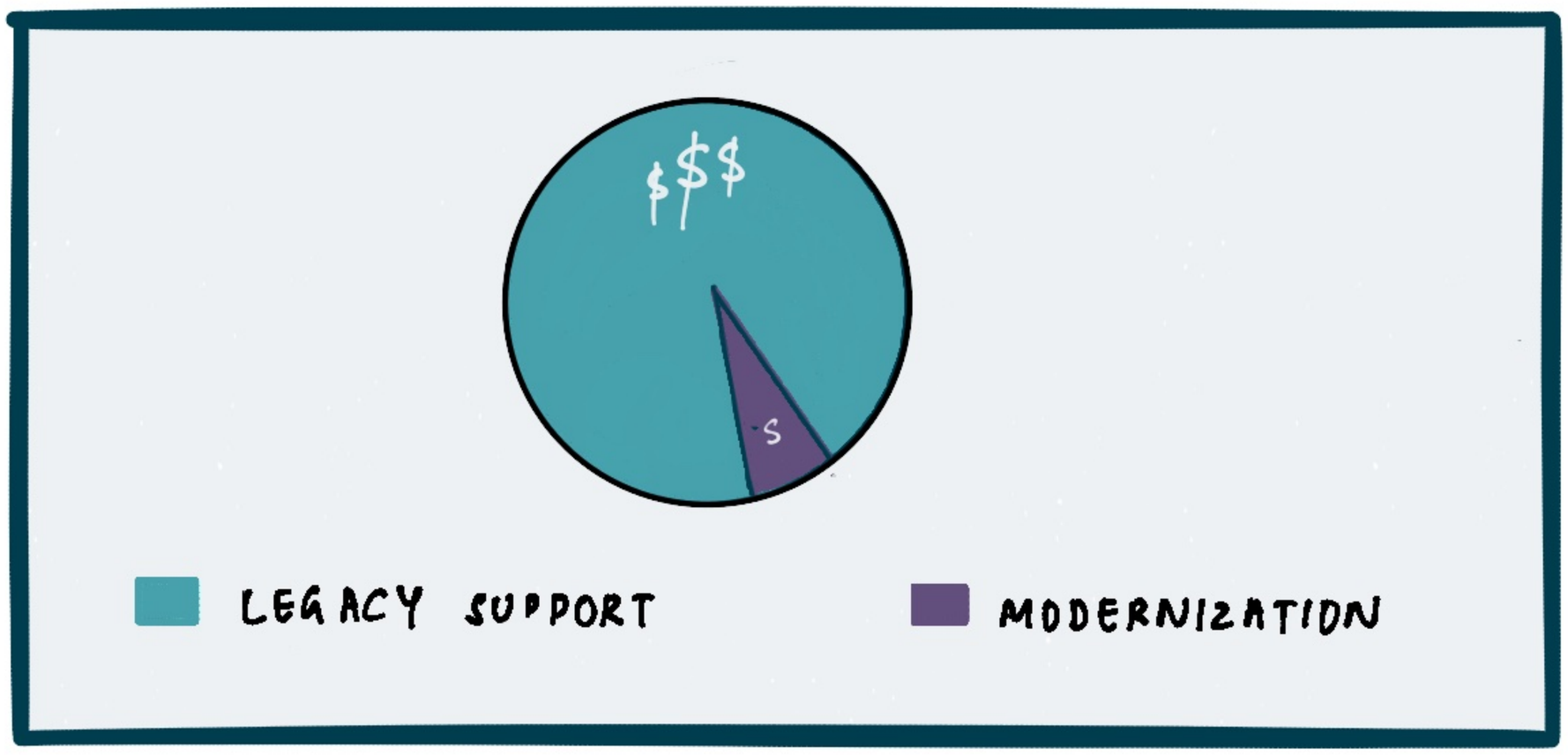
HIGH FAILURE RATE

DECISIONS MAY BE DELAYED

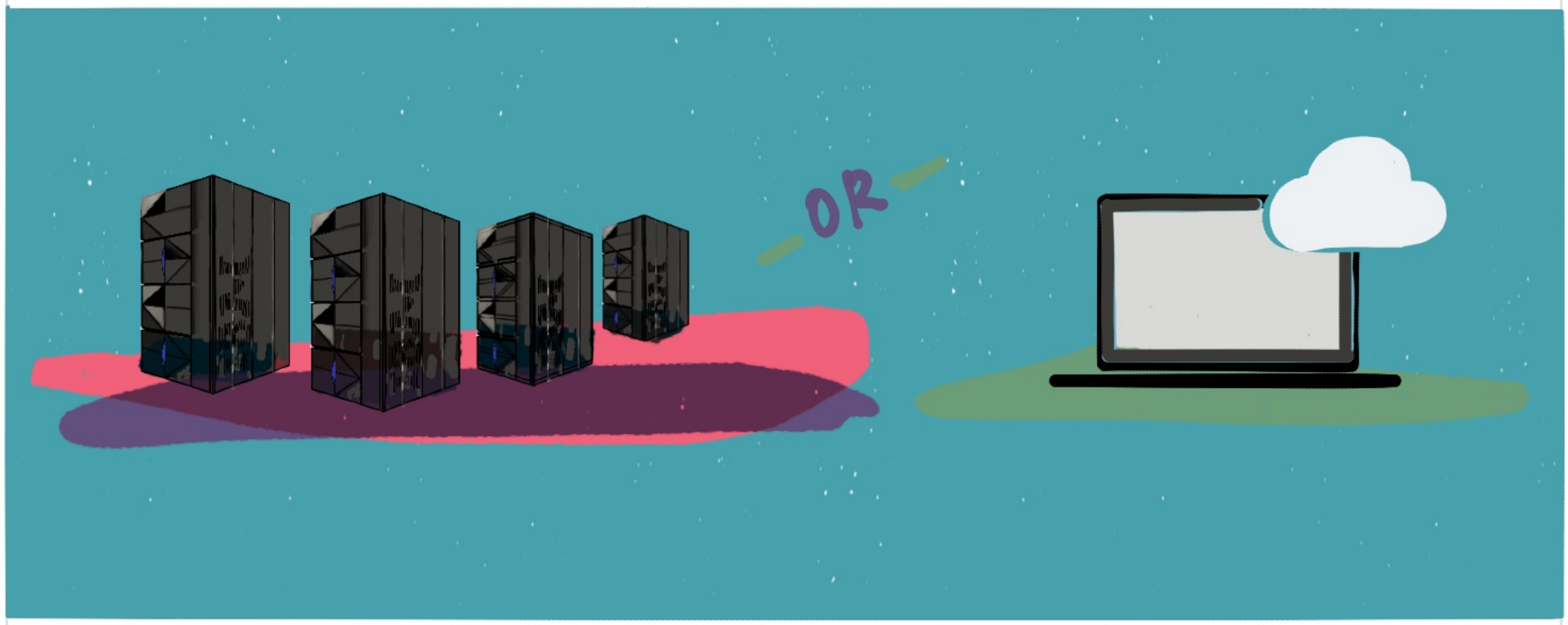
DELAYS : BAU/ BUDGET

THERE MAY BE BUSINESS AS USUAL -BAU- PRESSURES

AND NOT ENOUGH BUDGET



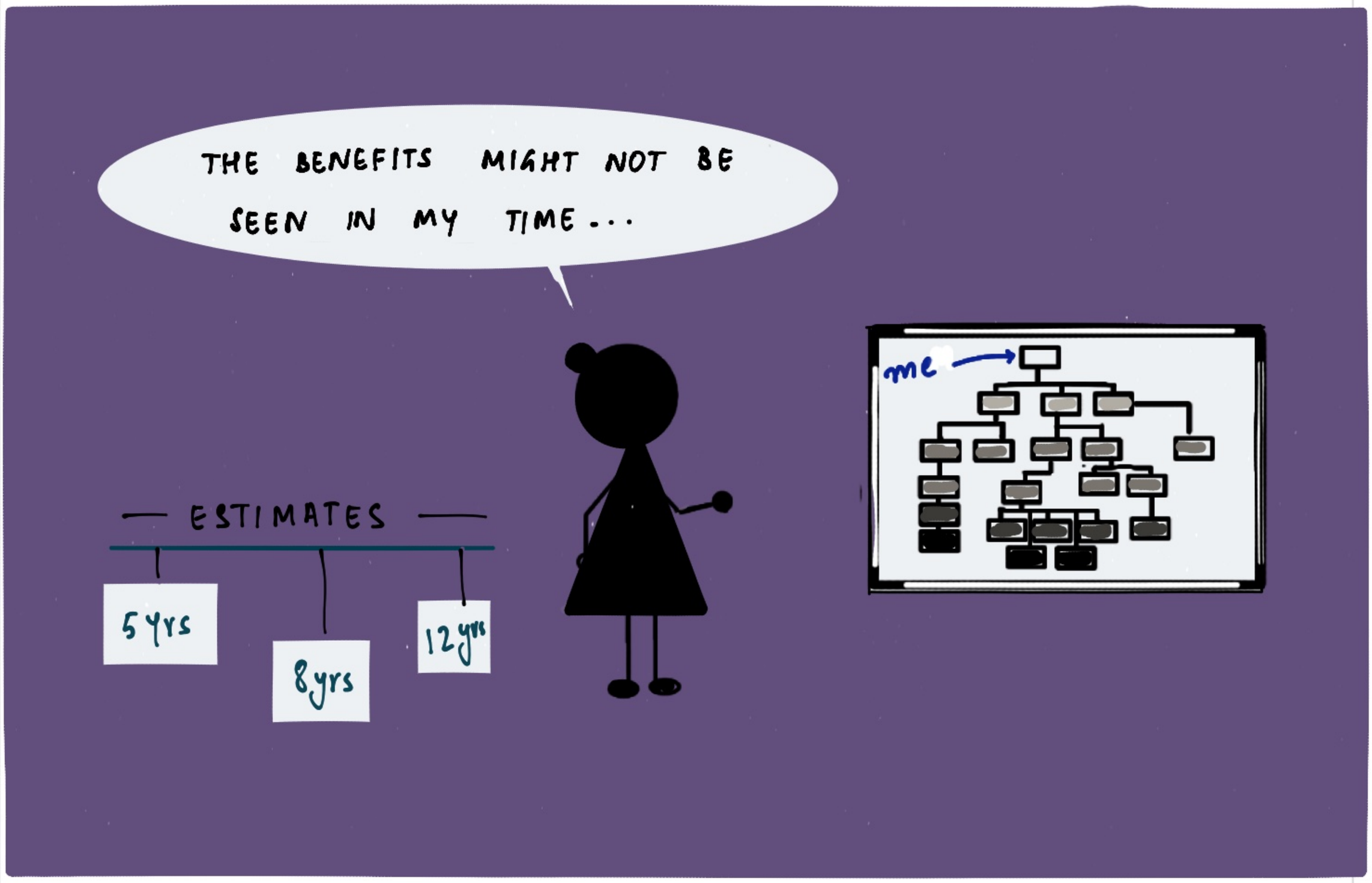
DELAYS : SUNK COSTS



THE COST OF MAINFRAMES IS A SUNK COST

BUT IT AFFECTS THE DECISION ON FUTURE SPENDING

DELAYS: GAINS TAKE TIME



IT TAKES YEARS TO SEE GAINS FROM MODERNIZATION.

AND CEOs ARE OFTEN RELUCTANT TO INVEST IN IT.

DELAYS: RISKY & COMPLEX

PERCEIVED TECHNOLOGY RISKS

+ FEAR OF FAILURE

COST OF DECOMMISSIONING

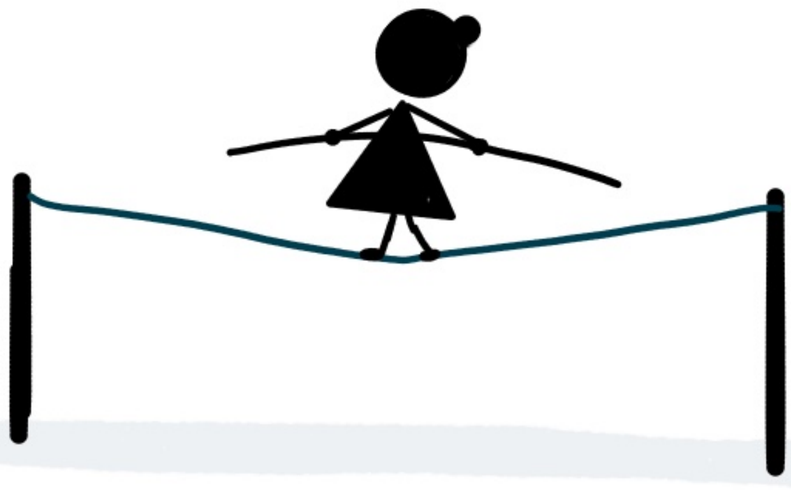
+ COMPLEXITY OF THE LEGACY SYSTEMS

THERE ARE QUESTIONS TO ADDRESS

WHAT'S IN MY MAINFRAME?

WILL I NEED EVERYTHING IN THE FUTURE?

WHAT SHOULD THE ARCHITECTURE LOOK LIKE?



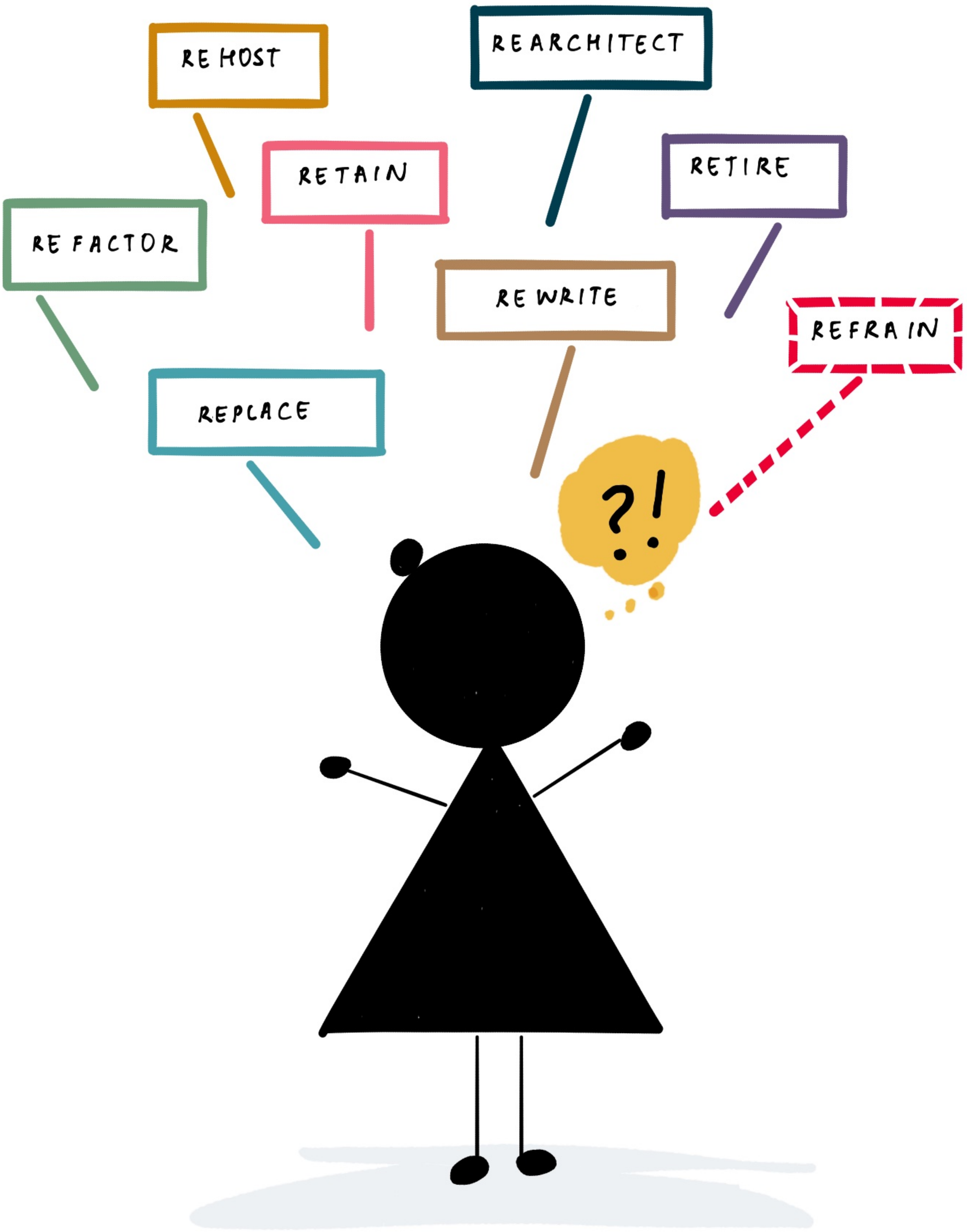
HOW NOT TO DISRUPT CURRENT BUSINESS PRIORITIES

WHAT HAPPENS TO ORGANISATIONAL CAPABILITIES?

WHEN DO I BEGIN TO SEE RETURNS ON INVESTMENT?

HOW TO APPROACH MODERNIZATION

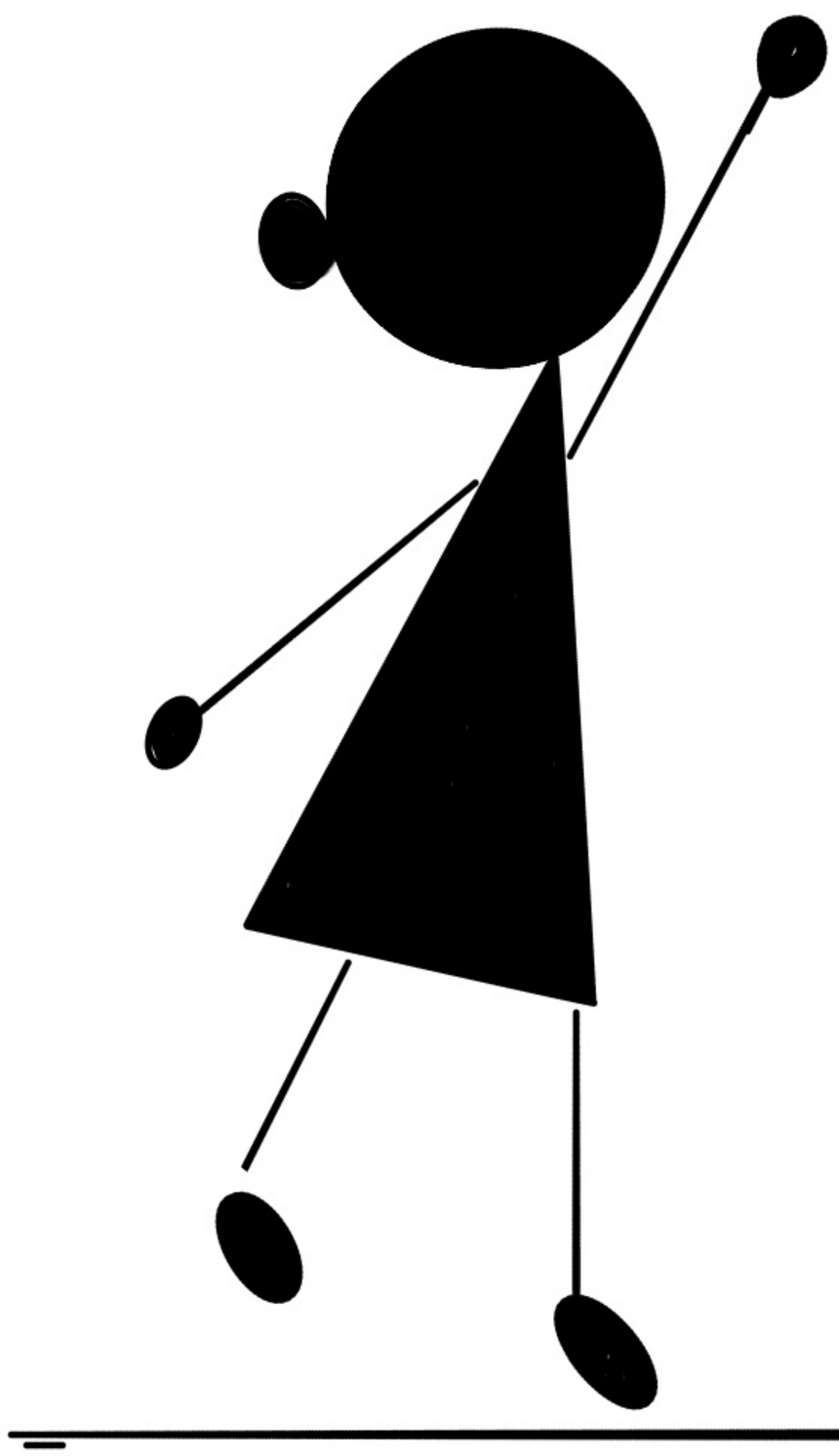
STRATEGIES FOR MODERNIZATION



TOO MANY OPTIONS - WHAT ARE THE PROS AND CONS?

LET'S SAY...

...THERE ARE 3 OPTIONS



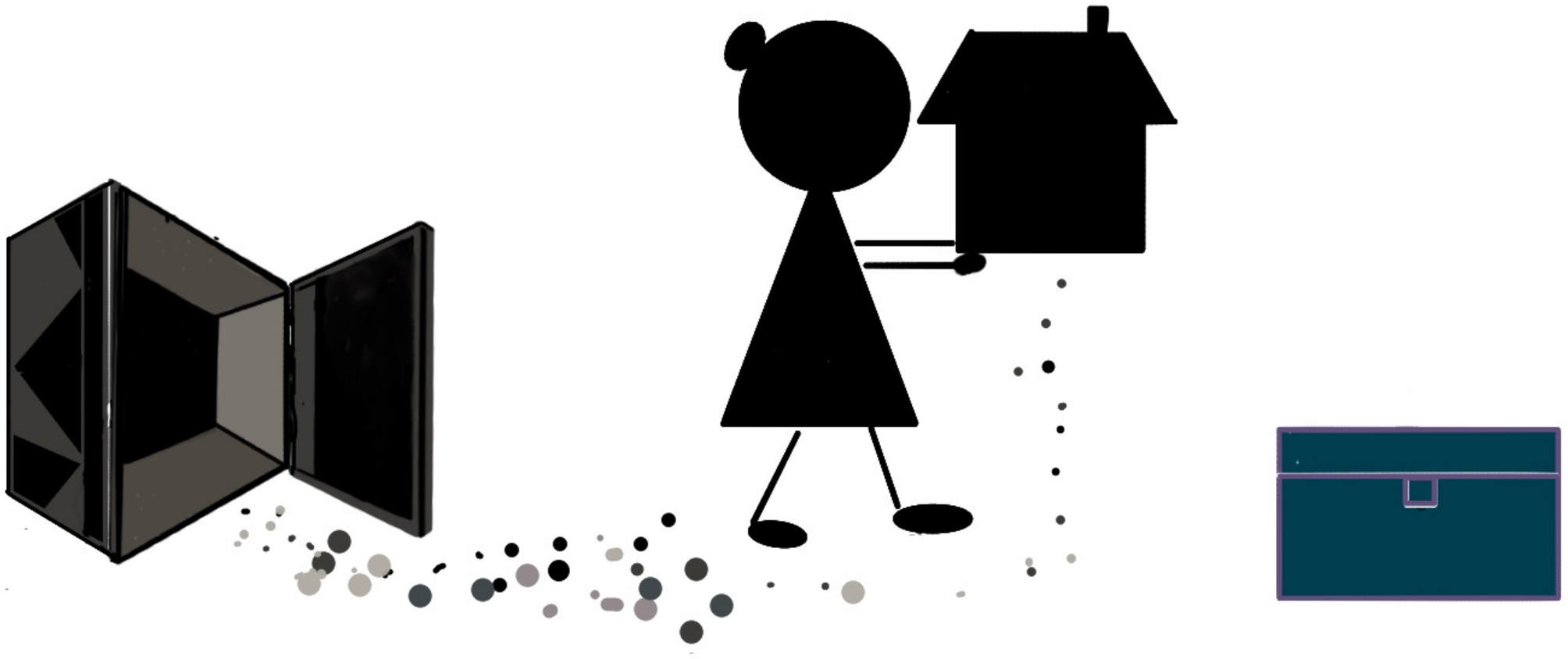
3 FEELS TOO RADICAL

2 SOMEWHERE IN BETWEEN

1 FEELS TOO FAMILIAR

FEELS TOO FAMILIAR

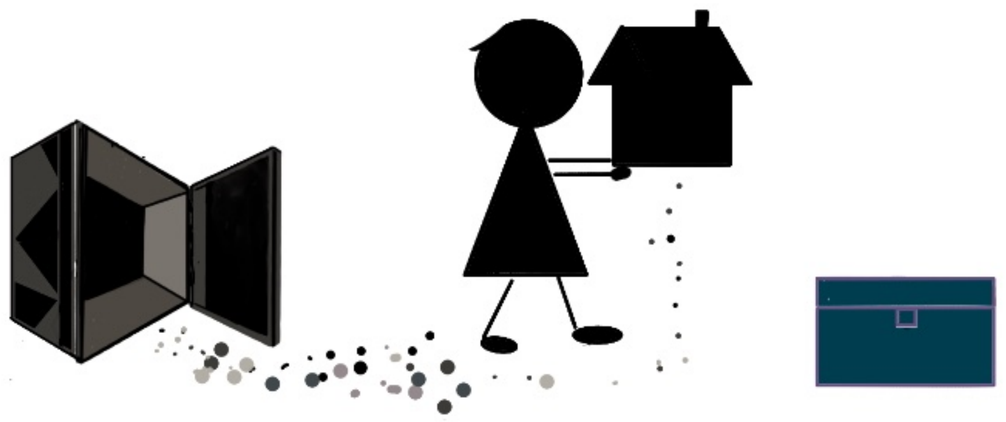
1



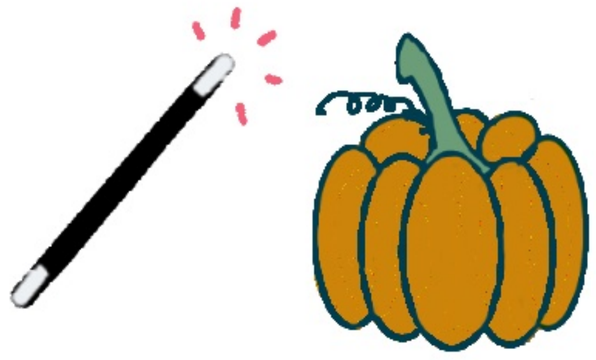
MOVE THE WHOLE APP WITH

MINIMUM CODE CHANGE AND MAXIMUM FEATURE PARITY

FEELS TOO FAMILIAR

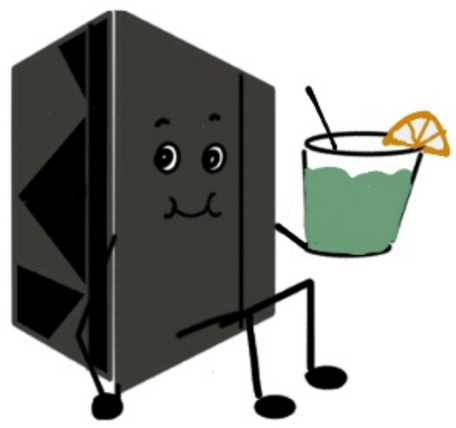


THIS TAKES TIME AND
IS DEEMED LOWER RISK



IT IS STILL HARD TO TRANSFORM THE BUSINESS WITH THE
LIKE-FOR-LIKE UPDATE

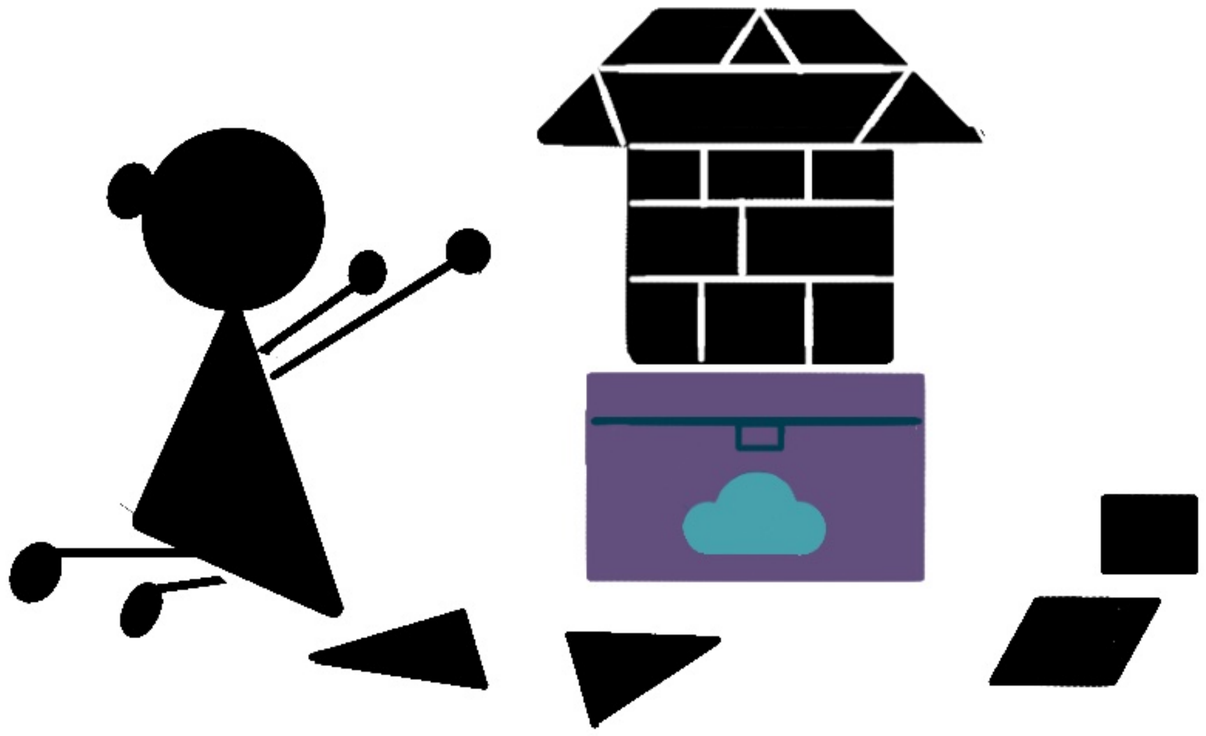
A LIKE-FOR-LIKE UPDATE
STILL SUPPORTS
YESTERDAY'S BUSINESS



THE LEGACY STILL EXISTS
& USES RESOURCES

FEELS TOO RADICAL

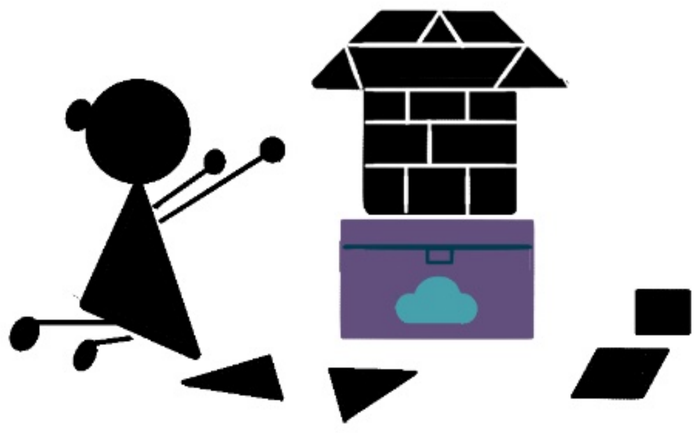
3



CUSTOM BUILD AN APP FOR YOUR BUSINESS

ON A NEW TECH STACK

FEELS TOO RADICAL



THIS TAKES TIME AND IS DEEMED HIGHER RISK

THE LEGACY IS RETIRED

CUSTOMER VALUE IS IMPROVED

COST OF CHANGE IS REDUCED

BUSINESS IS EASIER TO TRANSFORM

DELIVERY IN LARGE INCREMENTS WON'T ALLOW THE BUSINESS TO SEE RETURN ON INVESTMENT. MOMENTUM IS HARD TO MAINTAIN. IT MAY END IN ABANDONING THE INITIATIVES.

SOMEWHERE IN BETWEEN

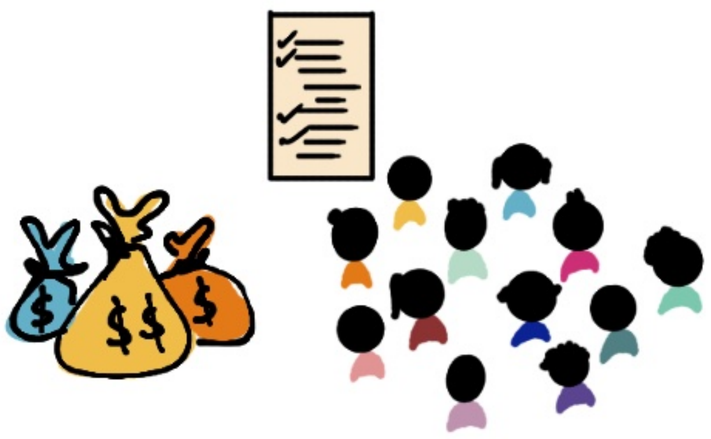
2

SECURE BUY-IN

FROM LEADERSHIP TEAMS

GET CONTINUED SUPPORT

FINANCIAL & GOVERNANCE



DEFINE SUCCESS MEASURES

WHAT THE CHANGE MEANS

BUSINESS AGILITY ?

HOW MUCH MODERNIZED ?

FINANCIAL SAVINGS ?

DEMONSTRATE PROGRESS

MODERNIZE CAPABILITIES

NOT APPLICATIONS

FOUR PARAMETERS

VALUE

→

TIME

↑

ORGANISATIONS THAT WEIGH IN

THESE FOUR PARAMETERS

WHEN PICKING STRATEGIES

FOR MODERNIZATION

FIND MORE FLEXIBILITY TO OPTIMISE

↑

RISK

→

COST

THE

SOMEWHERE-IN-BETWEEN

OPTION

MAP YOUR CAPABILITIES

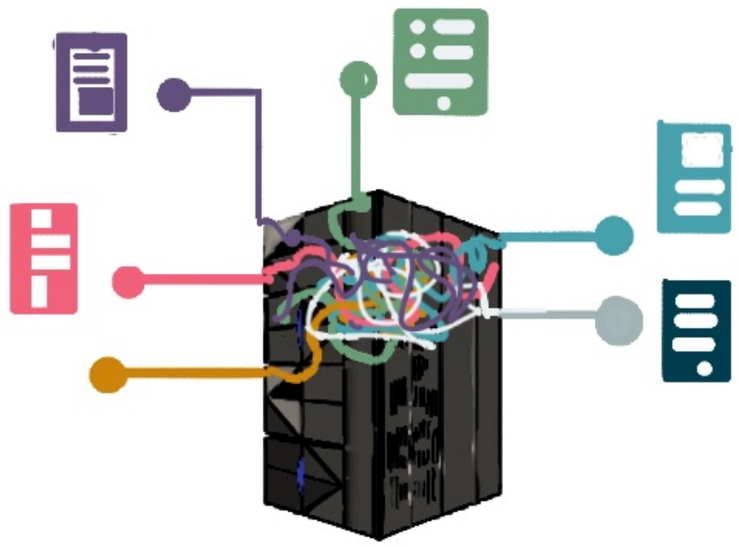
MODERNIZATION

IS A **BIG** PROBLEM

THE PROBLEM NEEDS TO BE BROKEN INTO SMALLER PARTS

ONE WAY TO START IS TO

- LIST
- ALL
- THE
- FUNCTIONS
- SERVICES
- YOUR
- BUSINESS
- OFFERS...



... AND THE APPS THAT FULFILL THEM

AND MAP THE TWO.

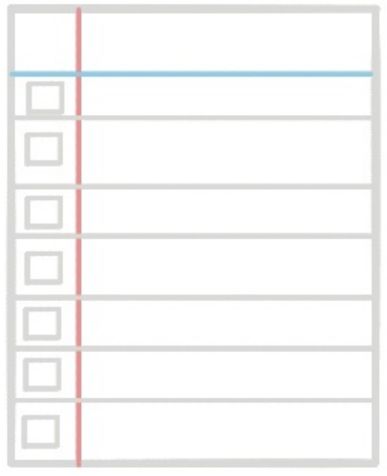
THE OUTPUT IS CALLED A CAPABILITY MAP

MAP YOUR CAPABILITIES

ORGANISATIONS HAVE

CAPABILITIES

APPLICATIONS

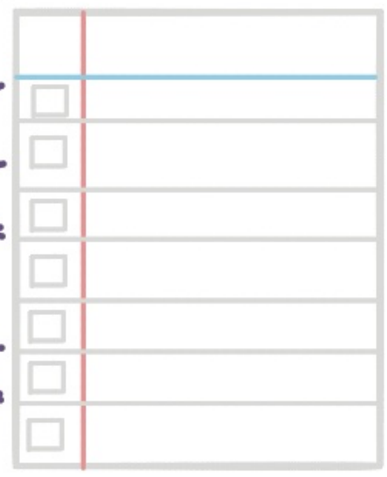


INCLUDING SPREADSHEETS

MAPPING THEM

CAPABILITIES

APPLICATIONS



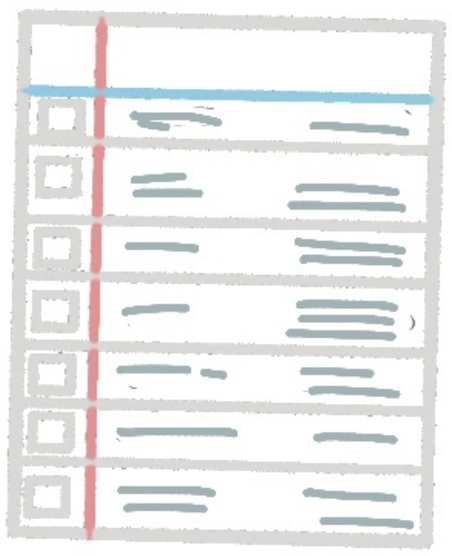
THIS WILL INVOLVE THE TECHNOLOGY EXPERTS AS WELL AS THOSE WITH BUSINESS KNOWLEDGE.

ALLOWS US TO SEE THEM AS INDEPENDENT PIECES OF 'VALUE'

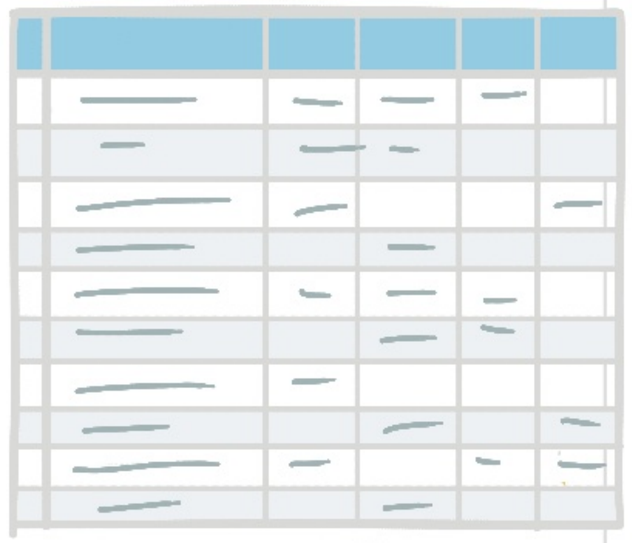
A CAPABILITY MAP

A CAPABILITY MAP MIGHT BE

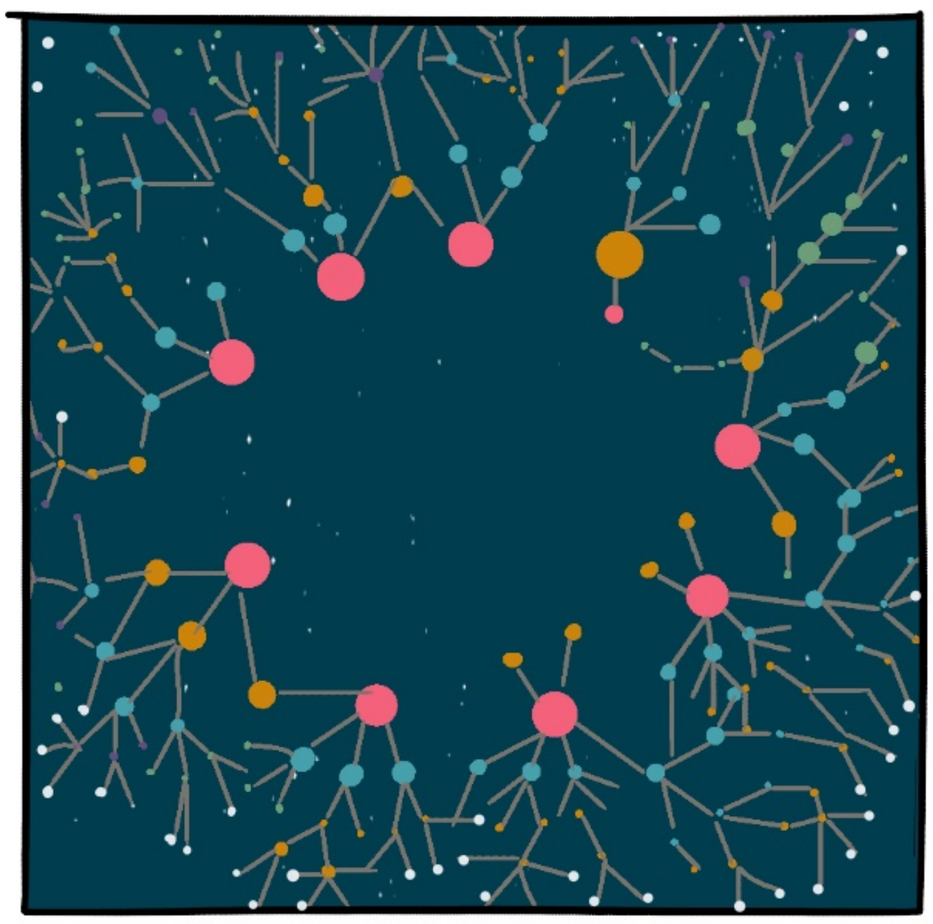
A LIST



A SPREADSHEET



A DIAGRAM



AT THE DESIRED LEVEL OF GRANULARITY

MAPPING CAPABILITIES

HAS BENEFITS

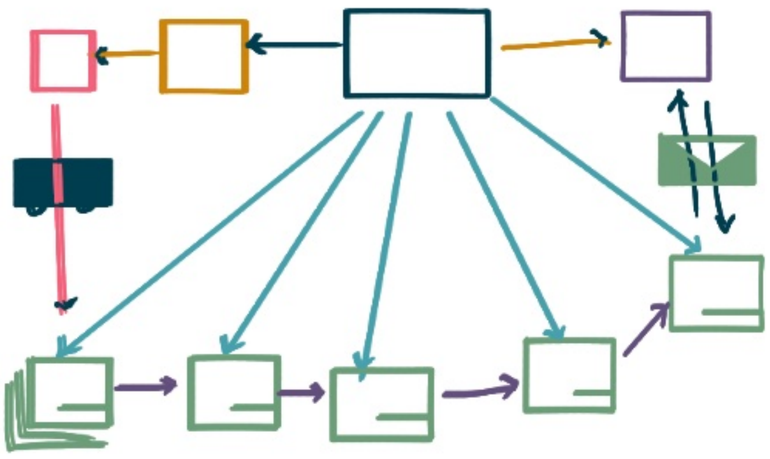
THE EXERCISES

HELPS TEAMS...

UNDERSTAND HOW ARCHITECTURE

SUPPORTS VALUE GENERATION

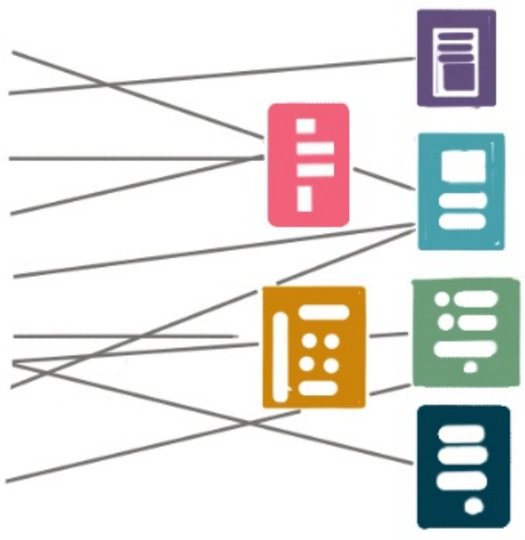
SEE HOW USERS



ACCOMPLISH WORK

DESCRIBE BUSINESS PROCESSES

IDENTIFY COMMONLY NEEDED



SERVICES FOR BUSINESS APPLICATIONS

PROMPTS A RETHINK

OF BUSINESS OPERATIONS

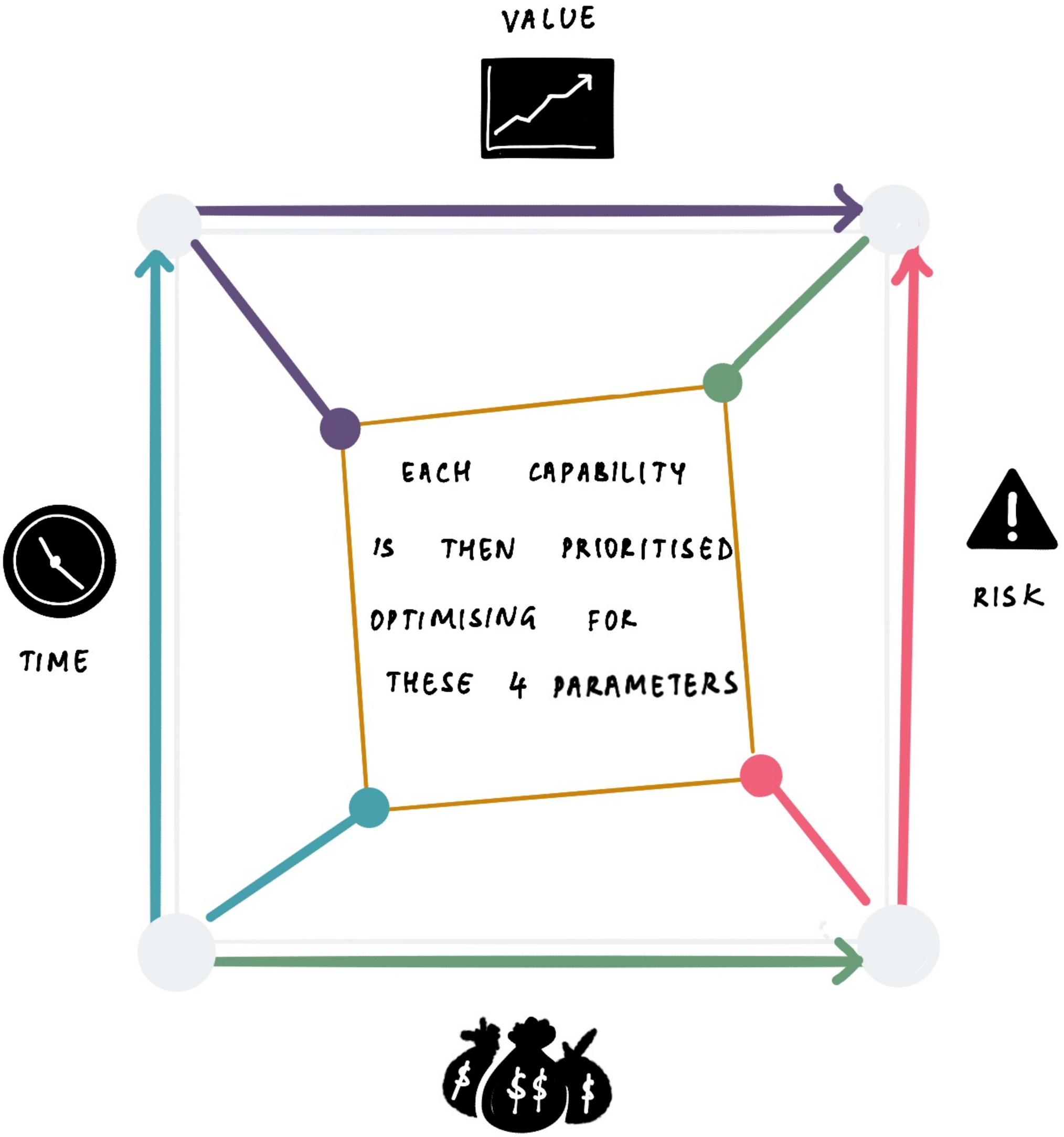
MAPPING TOOLS

SOME OF THE WELL-KNOWN TOOLS / TECHNIQUES / EXERCISES* USED ARE:

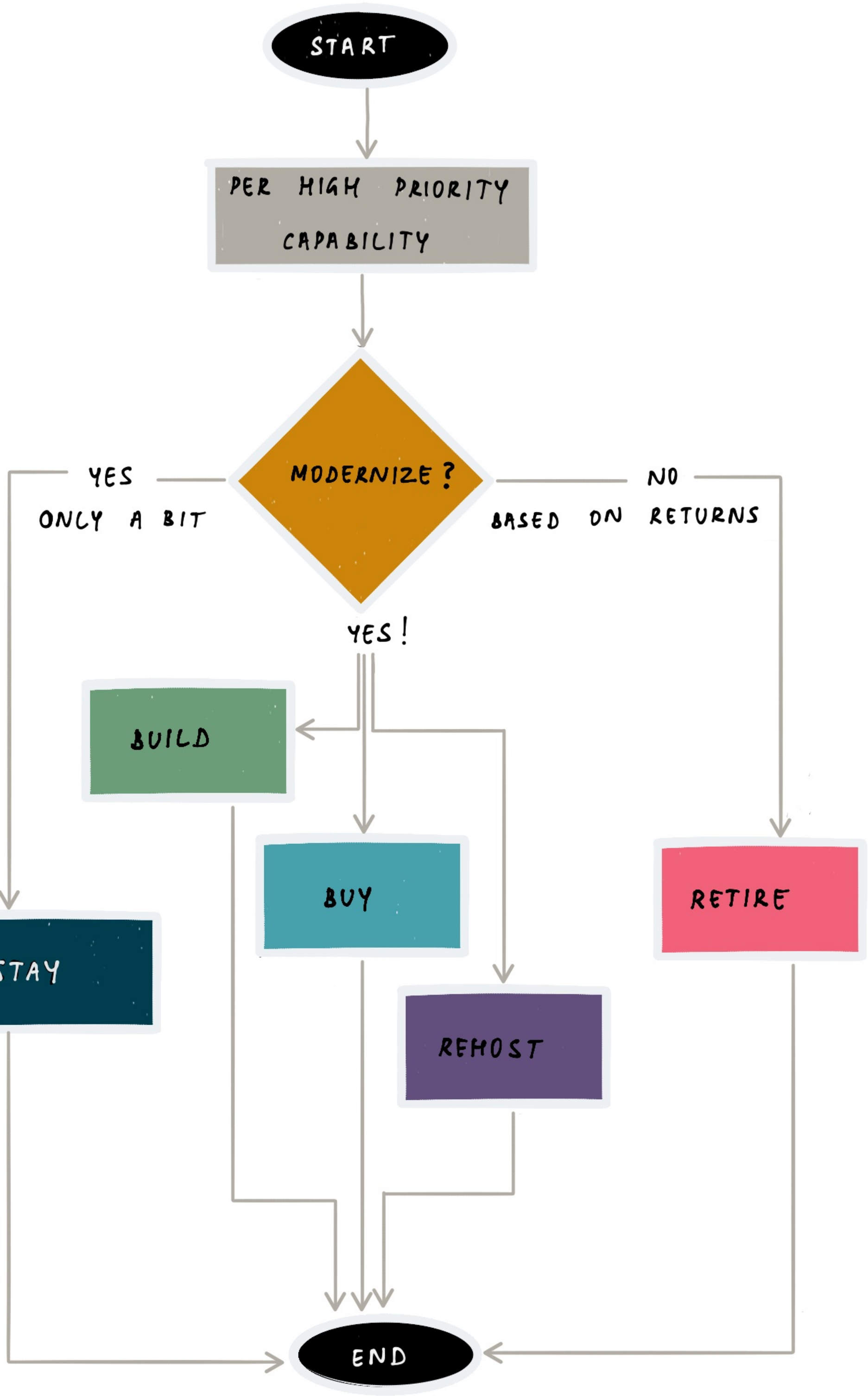
- EVENT STORMING
- WARDLEY MAPPING
- BUSINESS CAPABILITY MAPPING
- DOMAIN MAPPING
- VALUE STREAM MAPPING
- CUSTOMER JOURNEY MAPPING
- and more!

* IT IS BEYOND THE SCOPE OF THIS BOOK TO EXPLAIN THESE TOOLS.

PRIORITISING CAPABILITIES



SIMPLIFIED DECISION PATH



BUILD

WHAT IS BUILD?

WRITE CUSTOM SOFTWARE IN A NEW STACK

WHY BUILD?

THIS IS A DIFFERENTIATING CAPABILITY AND IS HIGH VALUE

BUY

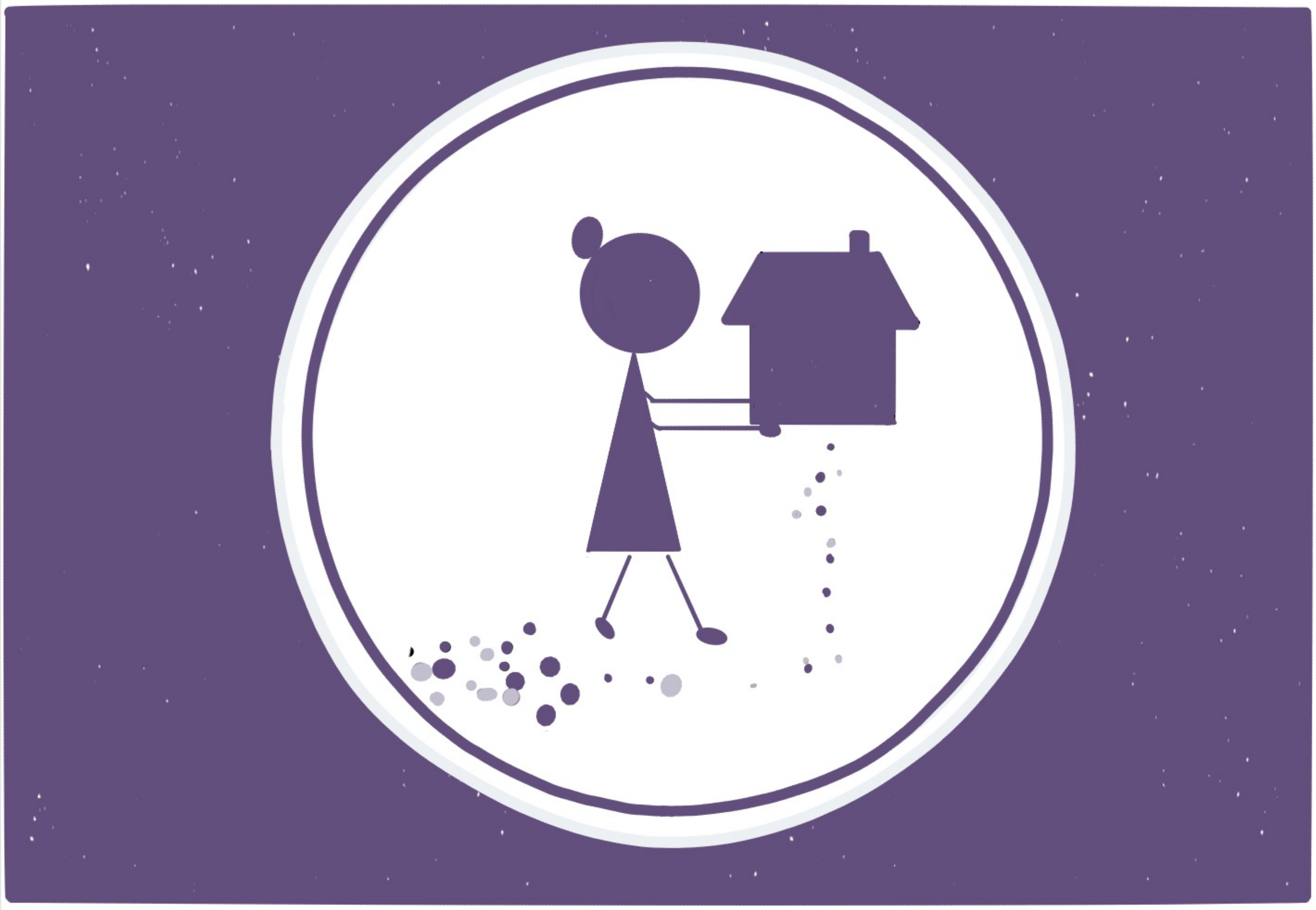
WHAT IS BUY?

CHOOSE A COMMERCIALLY AVAILABLE SOLUTION

WHY BUY?

PROVEN PRODUCT EXISTS AND NEEDS LITTLE CUSTOMISATION

REHOST



WHAT IS REHOST?

'LIFT AND SHIFT'

WHY REHOST?

KEEP THE CURRENT BEHAVIOUR LOWER OPERATIONAL COSTS

RETIRE

WHAT IS RETIRE?

STOP USING AN APP. SUNSET. DECOMMISSION.

WHY RETIRE?

BUSINESS FUNCTION AND/OR APPLICATION NOT IN USE

CAPABILITY MAY BE ONLY PROVIDING DIMINISHING RETURNS

CAPABILITY MAY HAVE BEEN MODERNIZED.

STAY

WHAT IS THE STAY OPTION?

MODERNIZE IN PLACE BY ADDING VERSION CONTROL AND CONTINUOUS DELIVERY PIPELINES.

WHY STAY?

FUNCTIONALITY IS LARGELY STABLE / ONLY MINOR UPDATES

INTEGRATES TO OTHER SYSTEMS

CHOOSING TO MODERNIZE

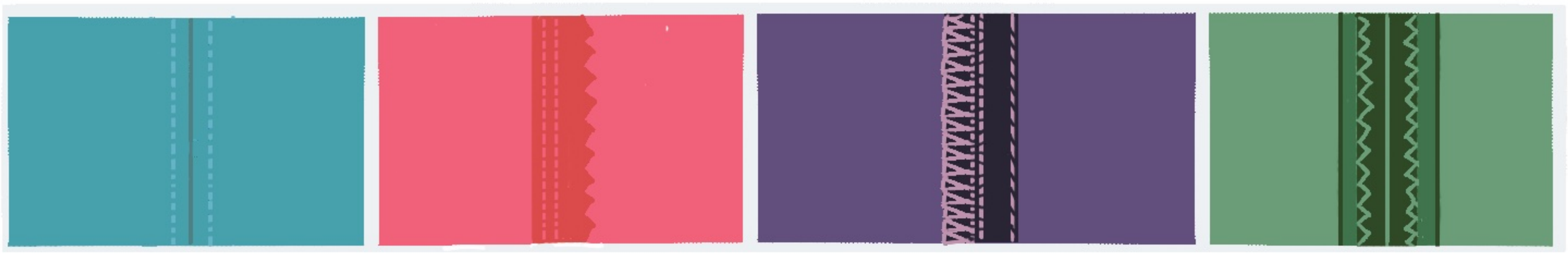
BREAKING UP THE PROBLEM

ANY OF THESE DECISIONS

STILL REQUIRE THE PROBLEM TO BE 'SMALLER'.

DURING THE CAPABILITY MAPPING,

THE TEAM WOULD HAVE



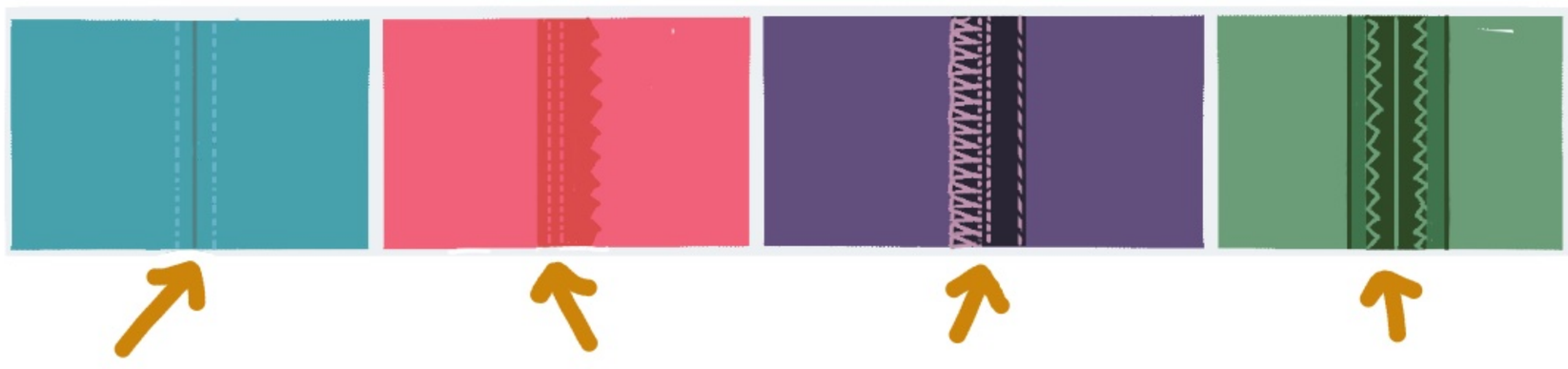
IDENTIFIED 'SEAMS'

IN THE CURRENT BUSINESS TECH LANDSCAPE.

"A SEAM IS A PLACE WHERE YOU CAN ALTER BEHAVIOUR IN YOUR PROGRAM WITHOUT EDITING IN THAT PLACE"

— MICHAEL FEATHERS

FINDING SEAMS



THE IDENTIFIED SEAMS HELP TO TEASE APART HOW TO BREAK UP THE MAINFRAME APPS AND PLAN A WAY FORWARD TO BUILD A PLATFORM WITH THE SERVICES COMMONLY NEEDED.

SEAM - FINDING METHODS

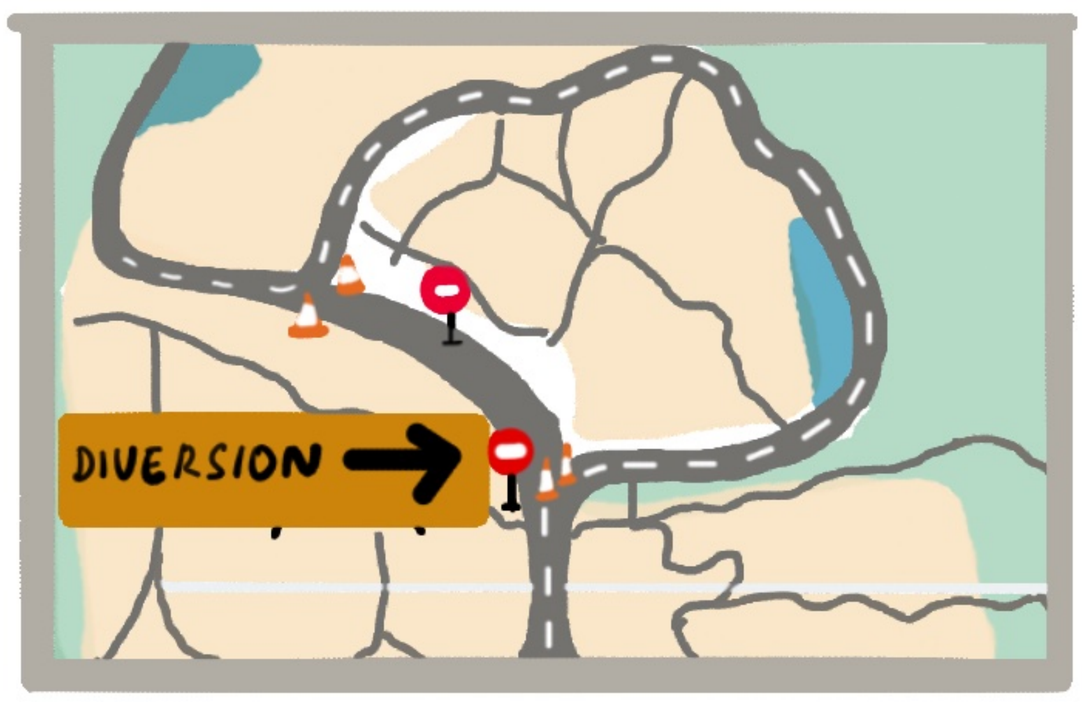
- BATCH INPUT
- API ACCESS
- PIPELINE HANDOFF
- DATA CHARACTERISTIC
- REQUIRED SIDE EFFECT

FINDING THE FIRST SEAM IS THE FIRST BIGGEST CHALLENGE. THE FIRST SEAM WHEN MODERNIZED AND IN USE, SETS UP THE RHYTHM FOR THE REST OF THE SEAMS

MANAGING RISKS/UNCERTAINTY

THERE ARE WAYS IN WHICH SOFTWARE ENGINEERING PATTERNS ARE USED IN MODERNIZATION TO MANAGE RISKS AND 'KEEP THE LIGHTS ON'

PATTERNS ARE GENERAL REUSABLE AND WELL TESTED SOLUTIONS TO COMMON PROBLEMS IN SOFTWARE ENGINEERING.



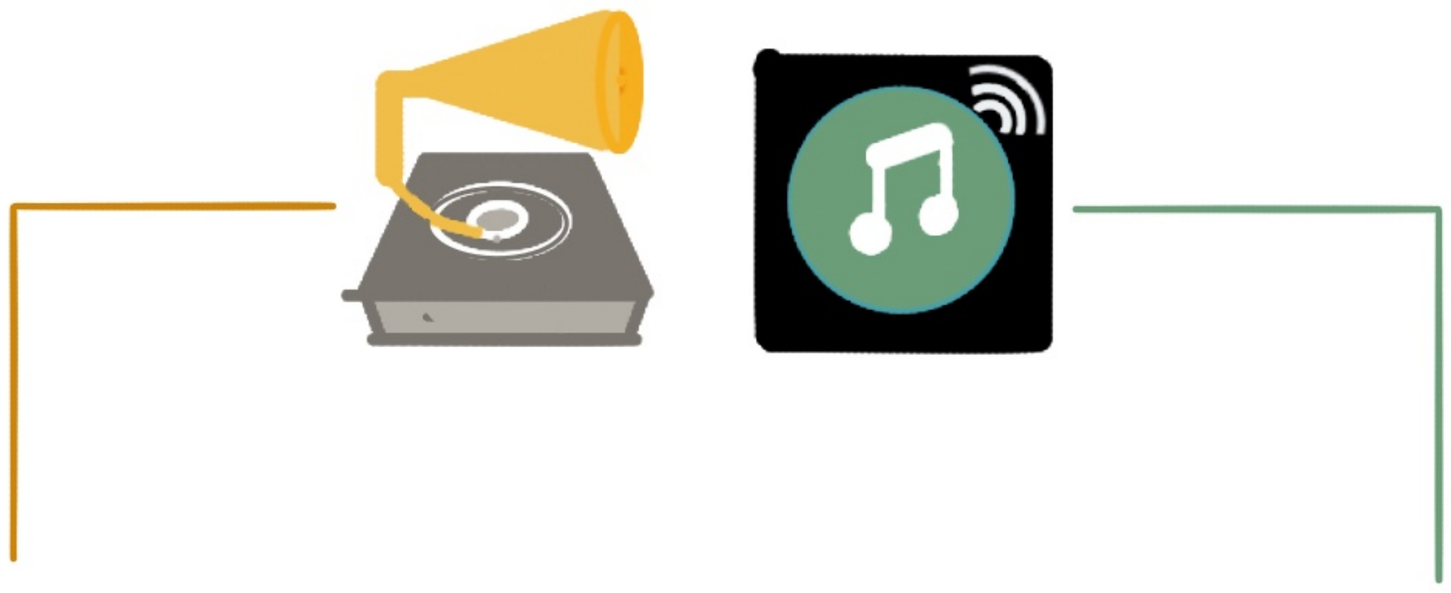
WITH THESE PATTERNS, TEAMS CAN

DATA AND FUNCTIONS

MANAGING RISKS/UNCERTAINTY

IN A LEGACY MODERNIZATION PROGRAM

PATTERNS ALLOW



NEW FUNCTIONS TO BE TESTED AGAINST THE OLD

THE OLD AND NEW CO-EXIST TO MAINTAIN CONTINUITY

BY MANAGING THE RISK/UNCERTAINTY

PATTERNS ALLOW FUNCTIONALITY TO GRADUALLY MIGRATE FROM OLD SYSTEM TO NEW

NAMES OF PATTERNS* YOU MAY HEAR

CRITICAL AGGREGATOR

DIVERT THE FLOW

EVENT INTERCEPTION

EXTRACT PRODUCT LINES

FEATURE PARITY

LEGACY MIMIC

REVERT TO SOURCE

TRANSITIONAL ARCHITECTURE

STRANGLER-FIG

DOMAIN DRIVEN DESIGN

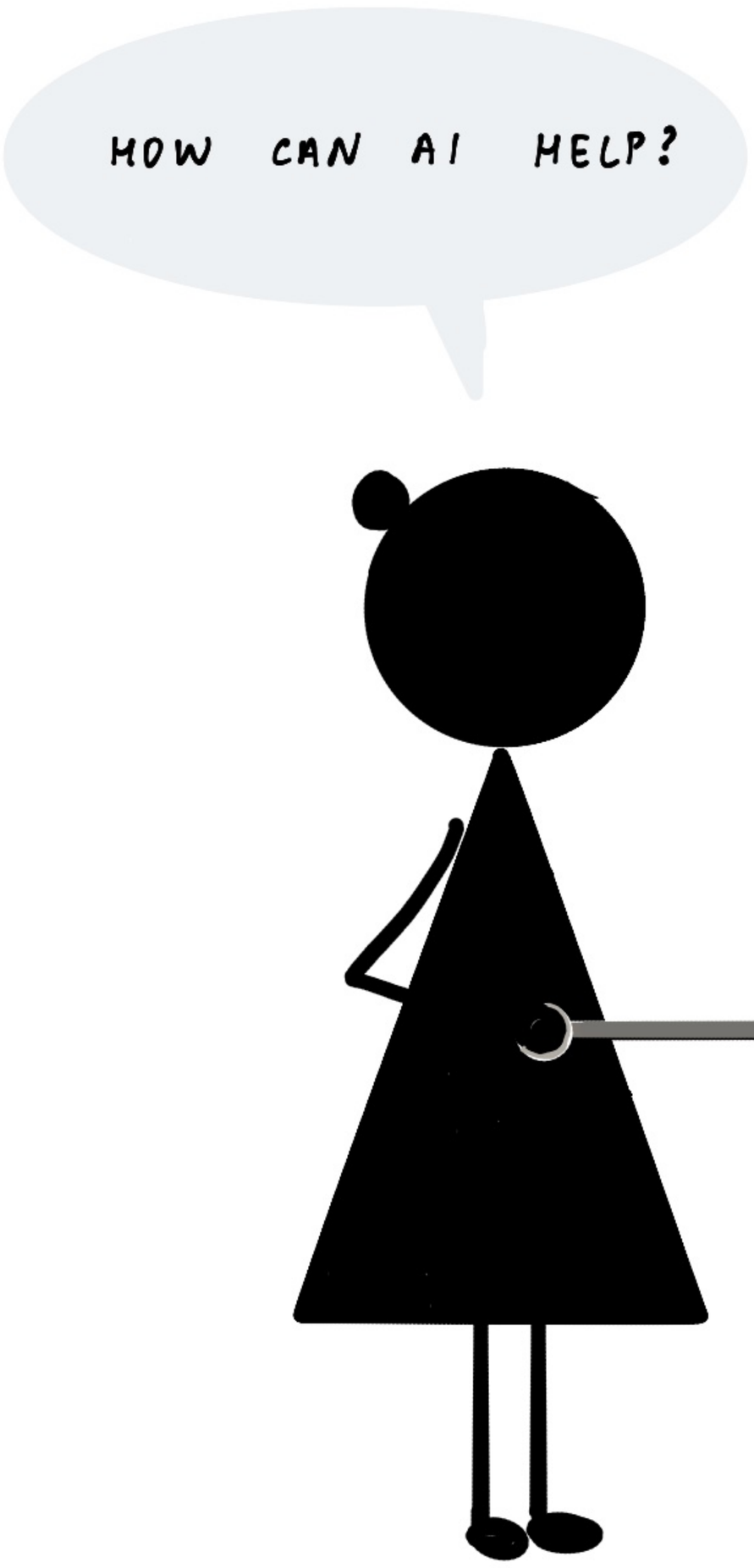
API-LAYERING

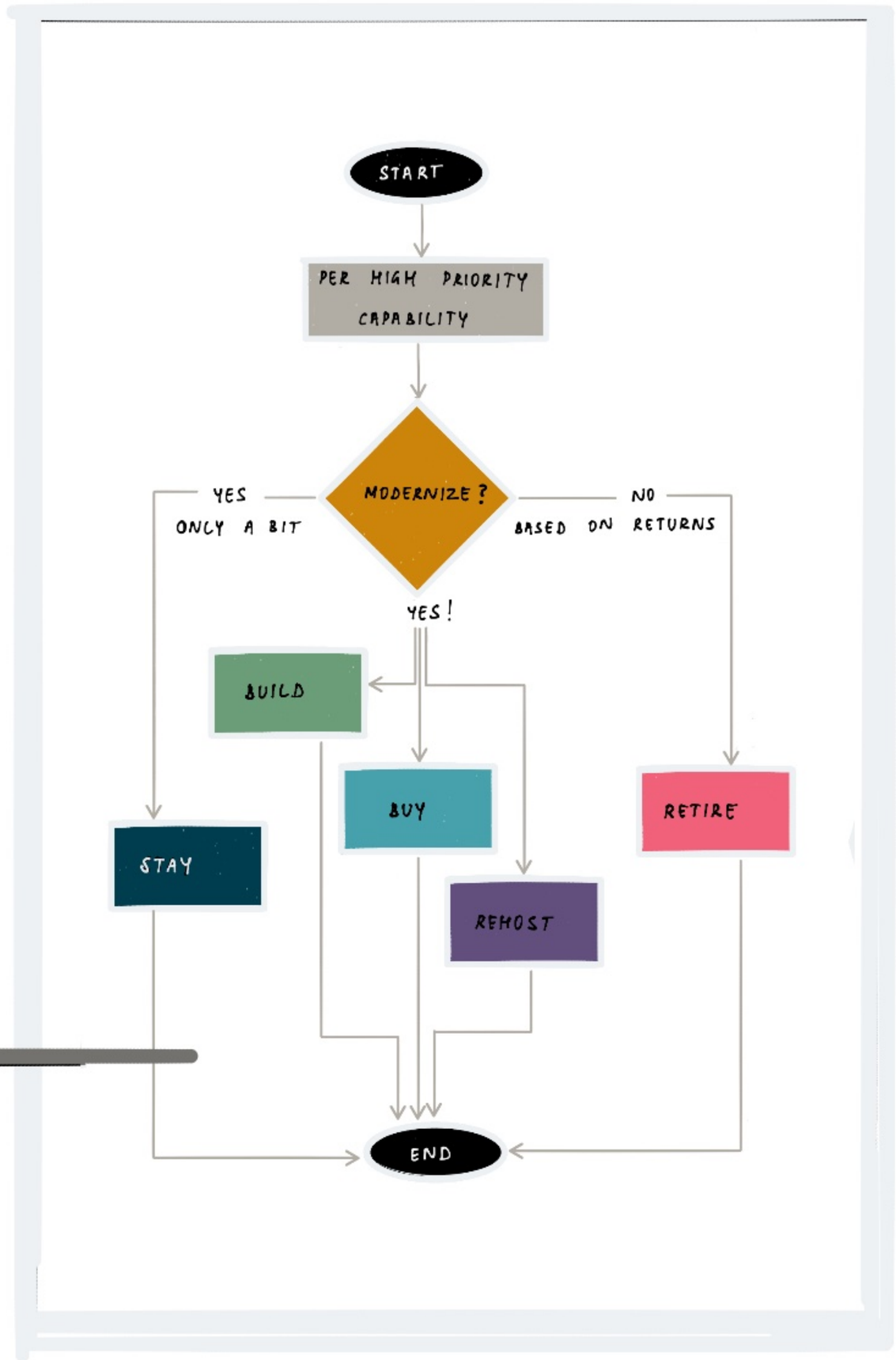
EVOLUTIONARY ARCHITECTURE

CLOUD NATIVITY

* IT IS BEYOND THE SCOPE OF THIS BOOK TO EXPLAIN THESE PATTERNS

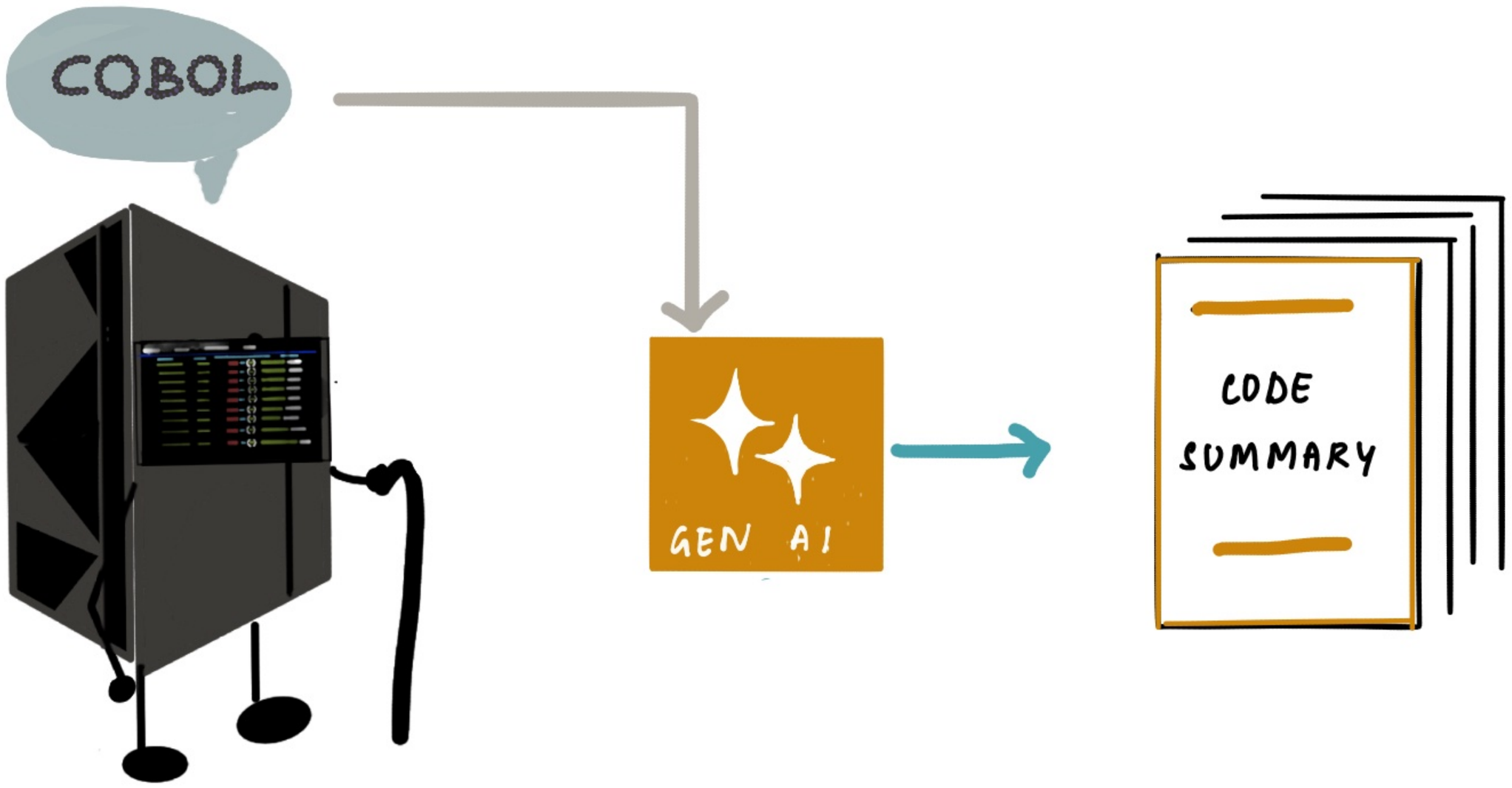
USING AI





THERE ARE AI TOOLS THAT CAN SPEED UP UNDERSTANDING LEGACY CODE AND EVEN AUTOMATING SOME OF IT

GAINING DOMAIN KNOWLEDGE

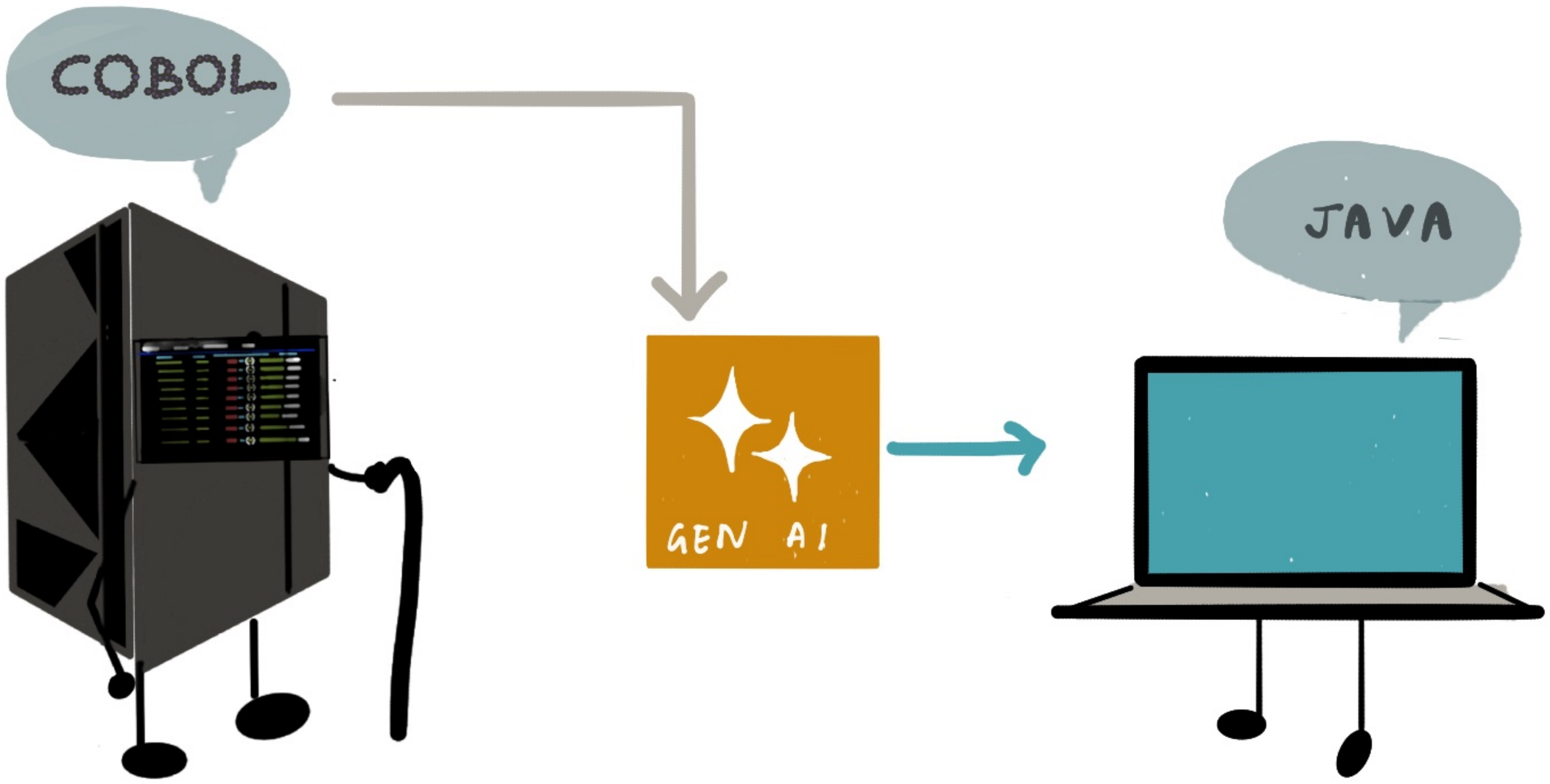


GEN AI TOOLS CAN HELP IN ANALYSING CODEBASES AND COMING UP WITH DETAILED DOCUMENTATION AND CODE SUMMARIES

TIME SAVED

- ON UNDERSTANDING CODE BEHAVIOUR / DOMAIN - INCLUDING UNUSED OR DUPLICATE CODE.
- FOR DEVS WHO CAN DO OTHER HIGHER VALUE TASKS
- IN CREATING KNOWLEDGE BASES
- FOR SUBJECT MATTER EXPERTS IN VALIDATING FUNCTIONALITY AND UNCOVERING MISMATCHES BETWEEN CODE AND EXPECTATION.

CODE GENERATION

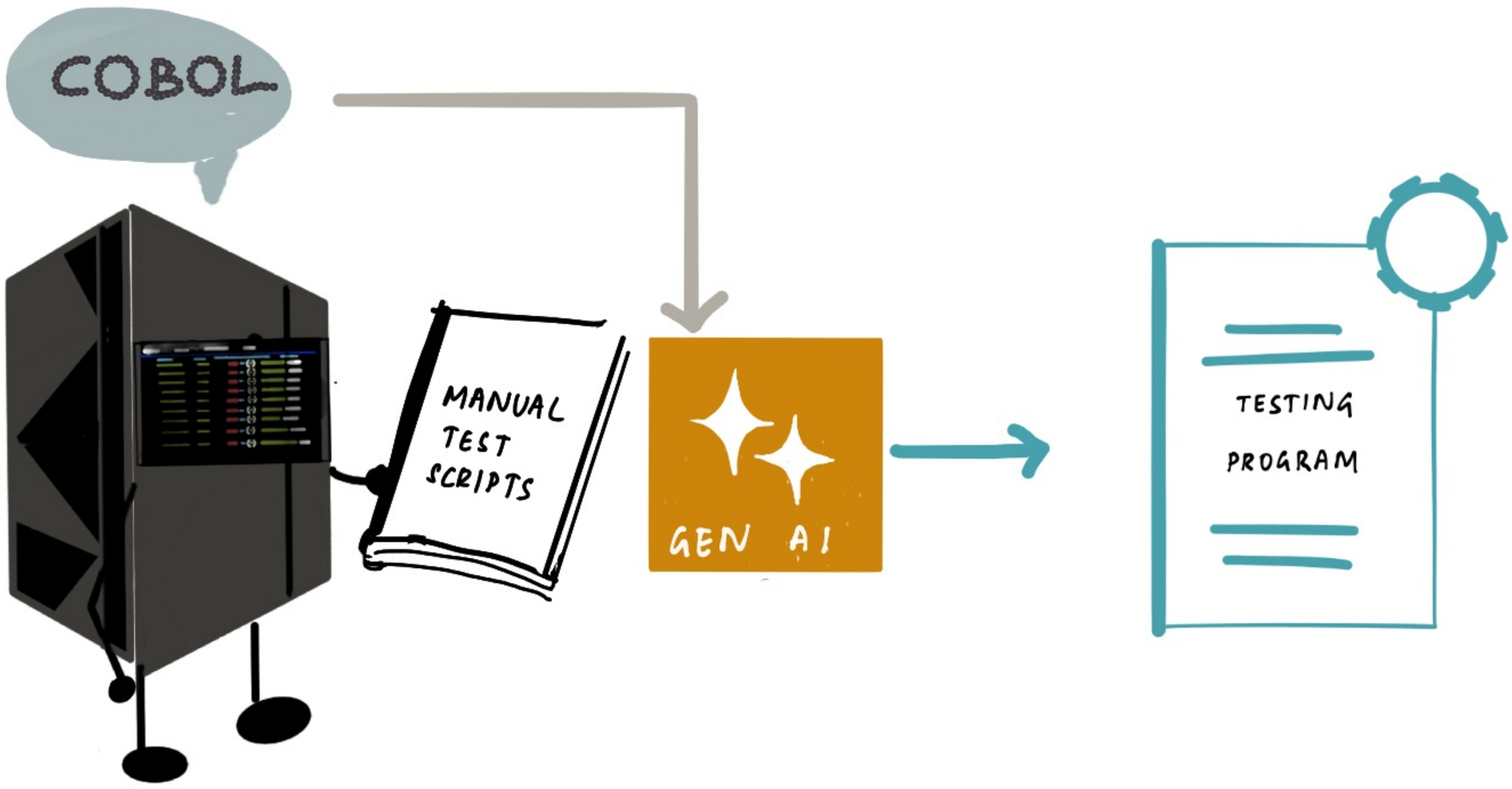


GEN AI TOOLS CAN AID IN GENERATING ENTERPRISE JAVA /C# OR PYTHON FROM LEGACY CODE. IT STILL REQUIRES VALIDATION BY TECHNICAL EXPERTS.

BENEFITS

- SPEEDS UP THE MODERNIZATION
  - ALBEIT WITH POTENTIAL CODE QUALITY ISSUES.

SAFETY NETS FOR IN-PLACE IMPROVEMENTS



GEN AI TOOLS CAN CREATE TESTING PROGRAMS, GENERATE TEST CASES - AS WELL AS FROM MANUAL TEST SCRIPTS. THEY ALSO HELP BUILD MONITORING TESTS.

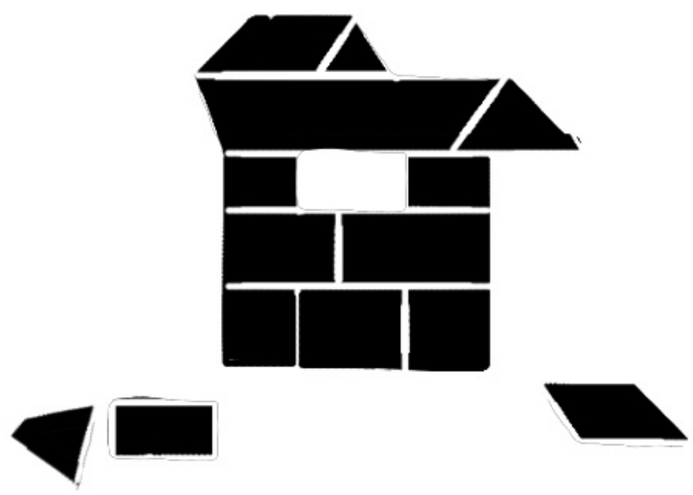
BENEFITS

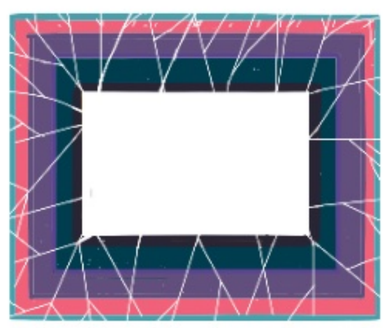
- ENABLES IN-PLACE MODERNIZATION
- BUILDS RESILIENCE
- PROVIDES MONITORING AND INSIGHTS

A BIG BANG
MODERNIZATION
IS NOT NEEDED

INCREMENTAL MODERNIZATION

THE VALUE / BENEFITS OF
LEGACY MODERNIZATION CAN BE
REALIZED IN INCREMENTAL STEPS
WITHOUT WAITING FOR YEARS

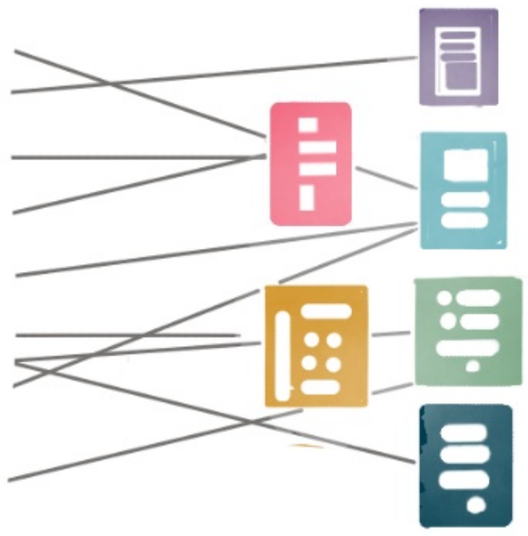




IN FACT, A LOT OF MODERNIZATION
FAILURES ARE THE RESULT
OF A 'BIG BANG' RELEASE

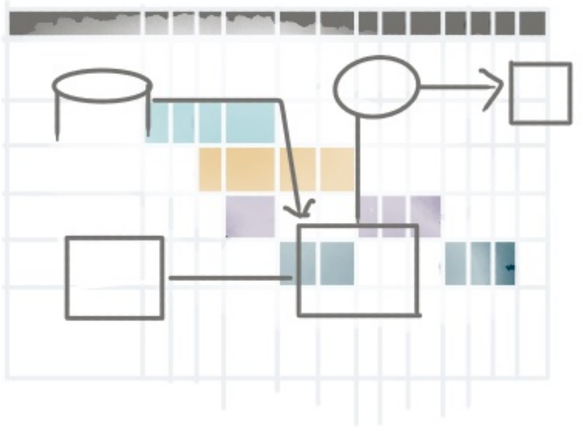
INCREMENTAL MODERNIZATION

THE CAPABILITY MAPPING HELPS THE TEAM SPOT THE FUNCTIONS AND SERVICES COMMONLY NEEDED FOR DIFFERENT BUSINESS APPLICATIONS.



THIS GIVES RISE TO THE IDEA OF A BUSINESS PLATFORM WITH DECOUPLED SERVICES & DATA

THE TEAM MAKES ARCHITECTURE AND IMPLEMENTATION PLANS FOR EACH CAPABILITY AND SUB-CAPABILITY



EACH (SUB) CAPABILITY WHEN DELIVERED IS A 'THIN SLICE' OF VALUE

PROGRESS IS MEASURED BY THE CAPABILITIES MODERNIZED

MODERNIZATION AND LEGACY

THINKING IN TERMS OF CAPABILITIES HELPS ORGANISATIONS GET TO THE TRUE HEART OF MODERNIZATION

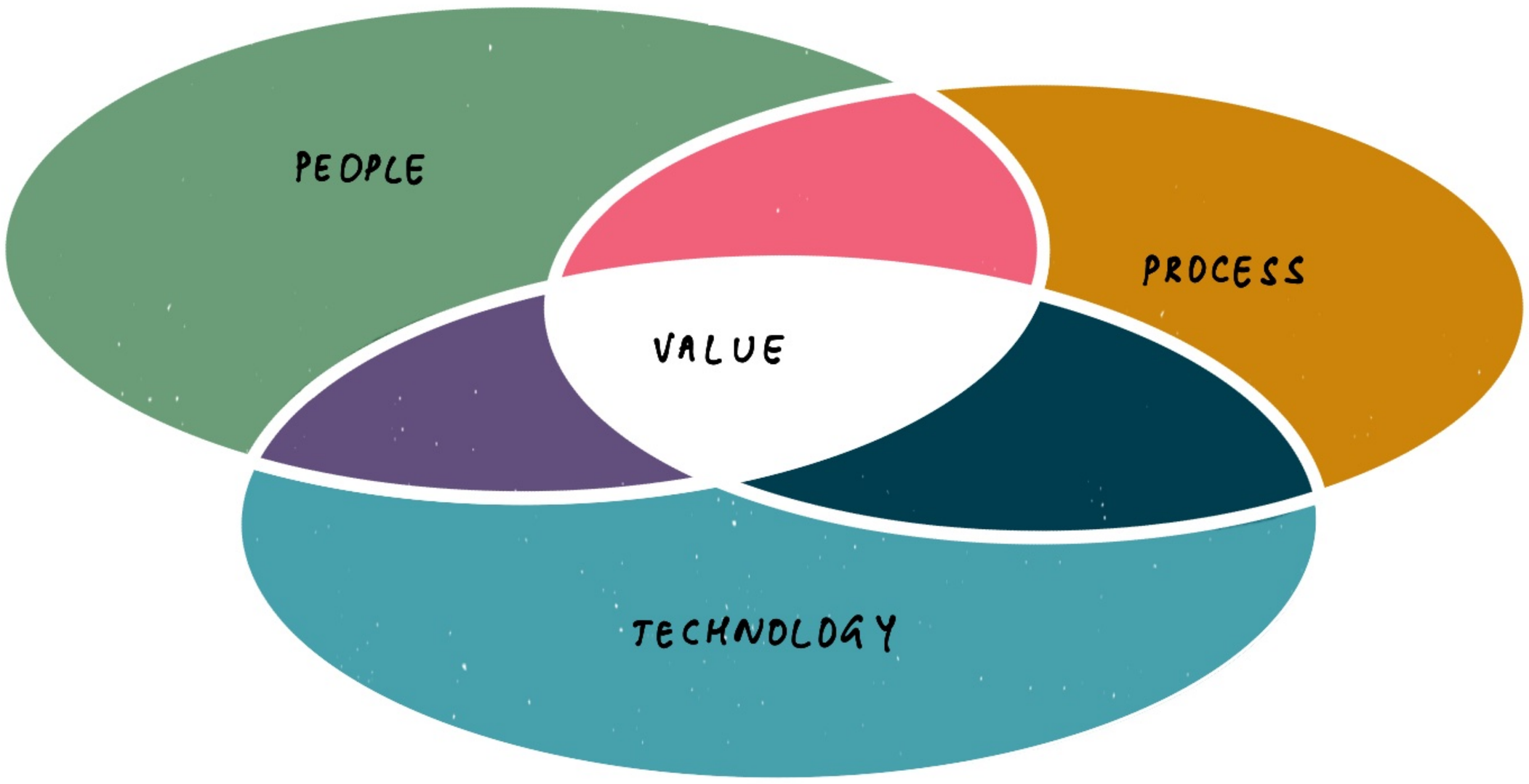
'LEGACY' IS NOT ONLY TECHNOLOGY. IT INCLUDES THE OUTDATED OPERATING MODEL, WHICH IS LIKELY NOT RELEVANT TODAY. THE OPERATING MODEL HAS TO EVOLVE WITH MODERNIZATION.

MODERNIZATION IS HARD

ORGANISATIONS CREATE VALUE WHEN

PEOPLE, PROCESS AND TECHNOLOGY

COME TOGETHER



LEGACY MODERNIZATION THEN, IS NOT A TECHNOLOGY PROBLEM

OUT OF SCOPE

THIS GUIDE CONTAINS A LOT OF INFORMATION ABOUT LEGACY MODERNIZATION. THERE IS ALSO MUCH THAT IT WON'T COVER SIMPLY BECAUSE OF THE EXPANSE OF THE TOPIC.

WHILE IT EXPLAINS WHAT TECHNOLOGY TEAMS MAY BE THINKING ABOUT, THE BOOK DOES NOT GO INTO IMPLEMENTATION DETAILS THAT A DEVELOPER|ARCHITECT WOULD GO INTO.

FINANCIAL CONSIDERATIONS ARE A LARGE PART OF THE DECISION MAKING PROCESS AND HAS BEEN DELIBERATELY DMITTED AS IT DIFFERS WITH EACH ORGANISATION.

PROGRAM PLANNING IS SPECIFIC TO THE PROBLEM AND IS NOT DISCUSSED HERE.

THIS BOOK ALSO DOES NOT COVER WHAT TO DO IN CASE OF A BUY STRATEGY FOR MODERNIZATION

DECOMMISSIONING IS ALSO A MAJOR ACTIVITY AND DEPENDS ON THE SUCCESS MEASURES DEFINED

MY REFERENCES

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ARSTECHNICA.COM - THE IBM MAINFRAME - HOW IT RUNS AND WHY IT SURVIVES