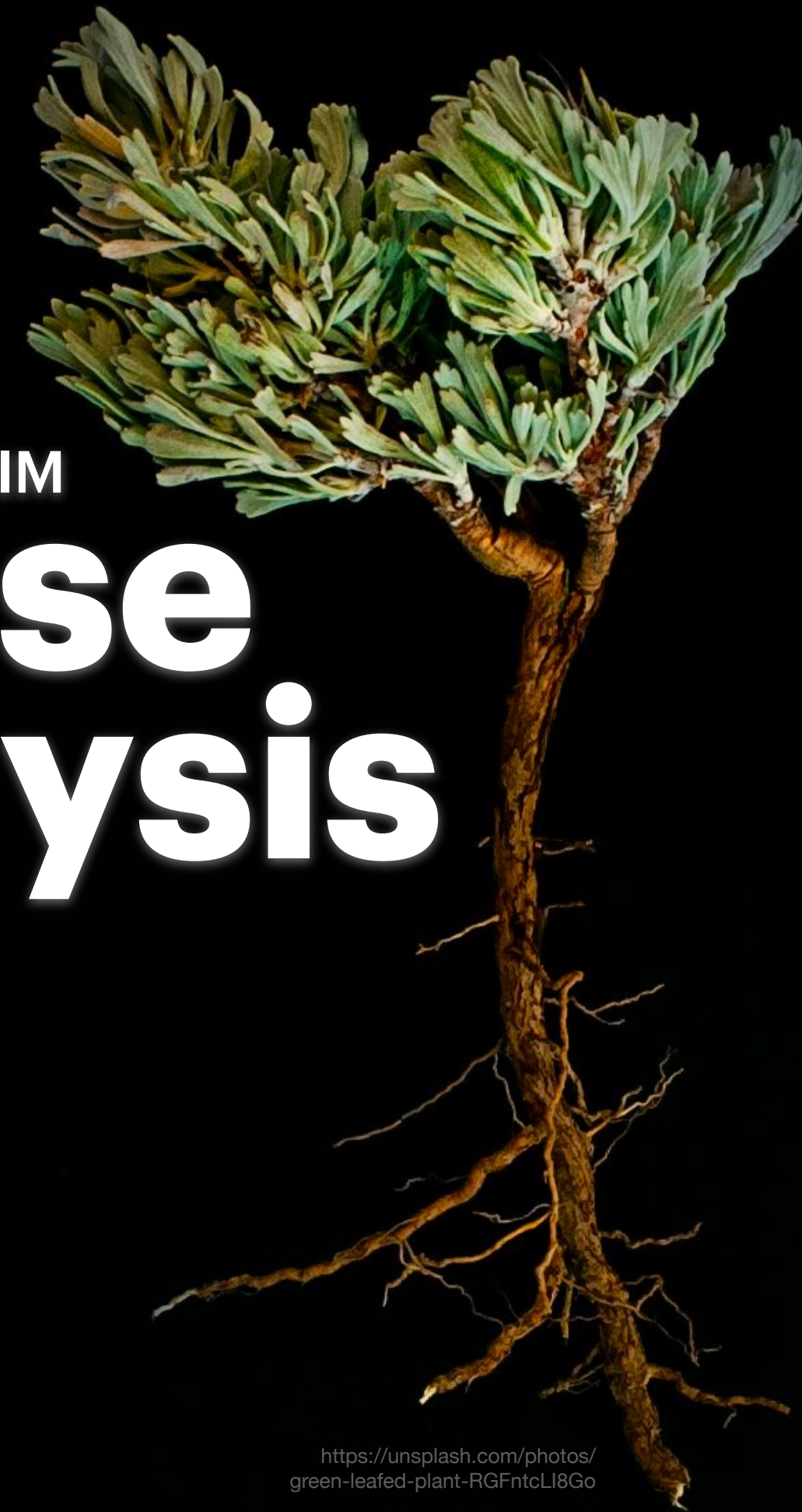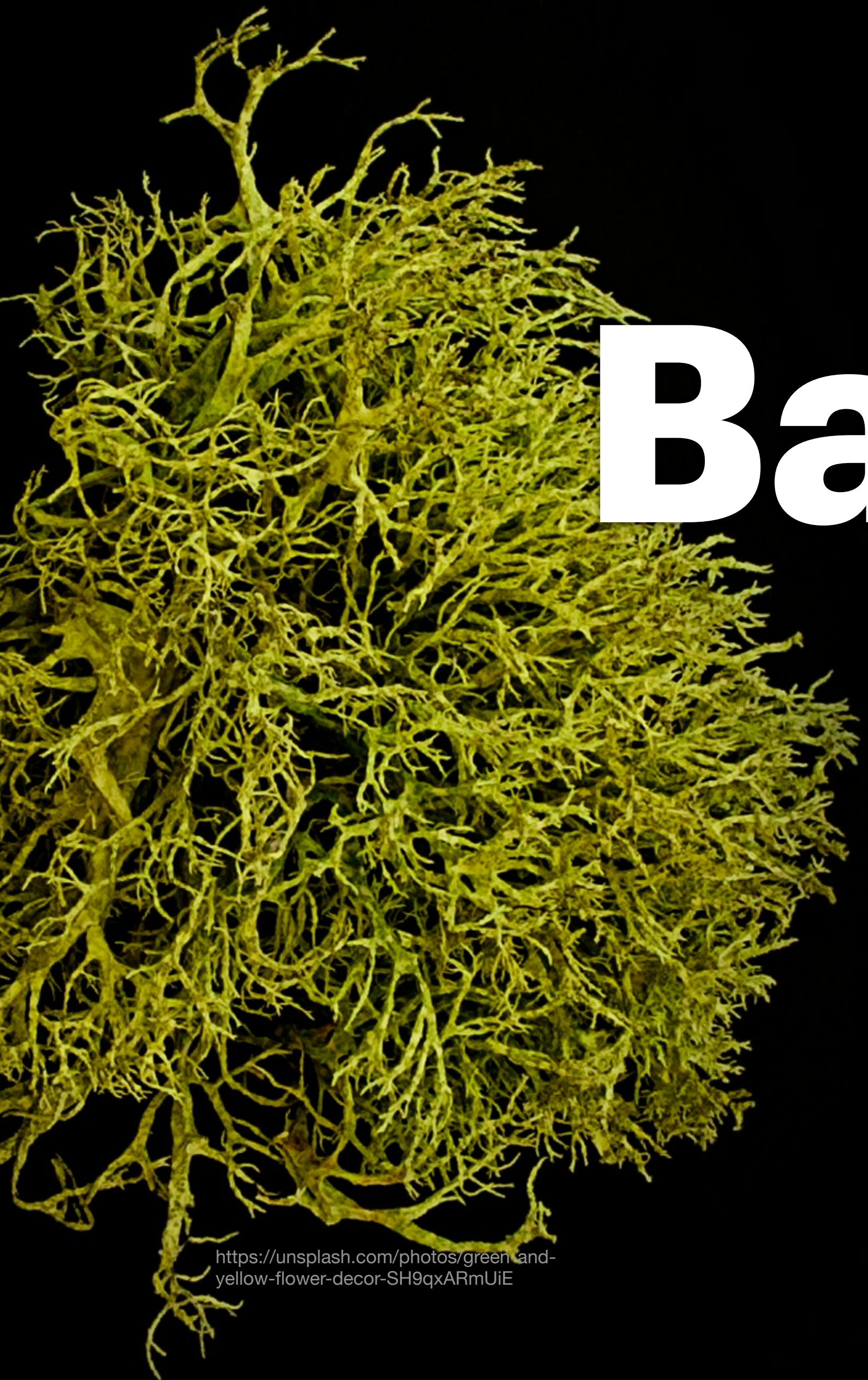KPE/MNKIM

Root Cause Analysis

Francová
Königová
Kuželová
Lukeš
Podolská

Basics

method   made automated
various fields
retrospective

Decision making process
Quality control

addresses issue by core

Identifying

Addressing **problems**

KPE/MNKIM

RCA conducted **after adverse events** preventing **reoccurrence**

- process monitoring
- fault diagnosis
- enhancing productivity, quality

https://unsplash.com/photos/green-leafed-plant-RGFntcLl8Go

KPE/MNKIM

RCA *is therefore important for business mostly because it provides:*

insights **into critical accidents**

enhanced **decision-making process**

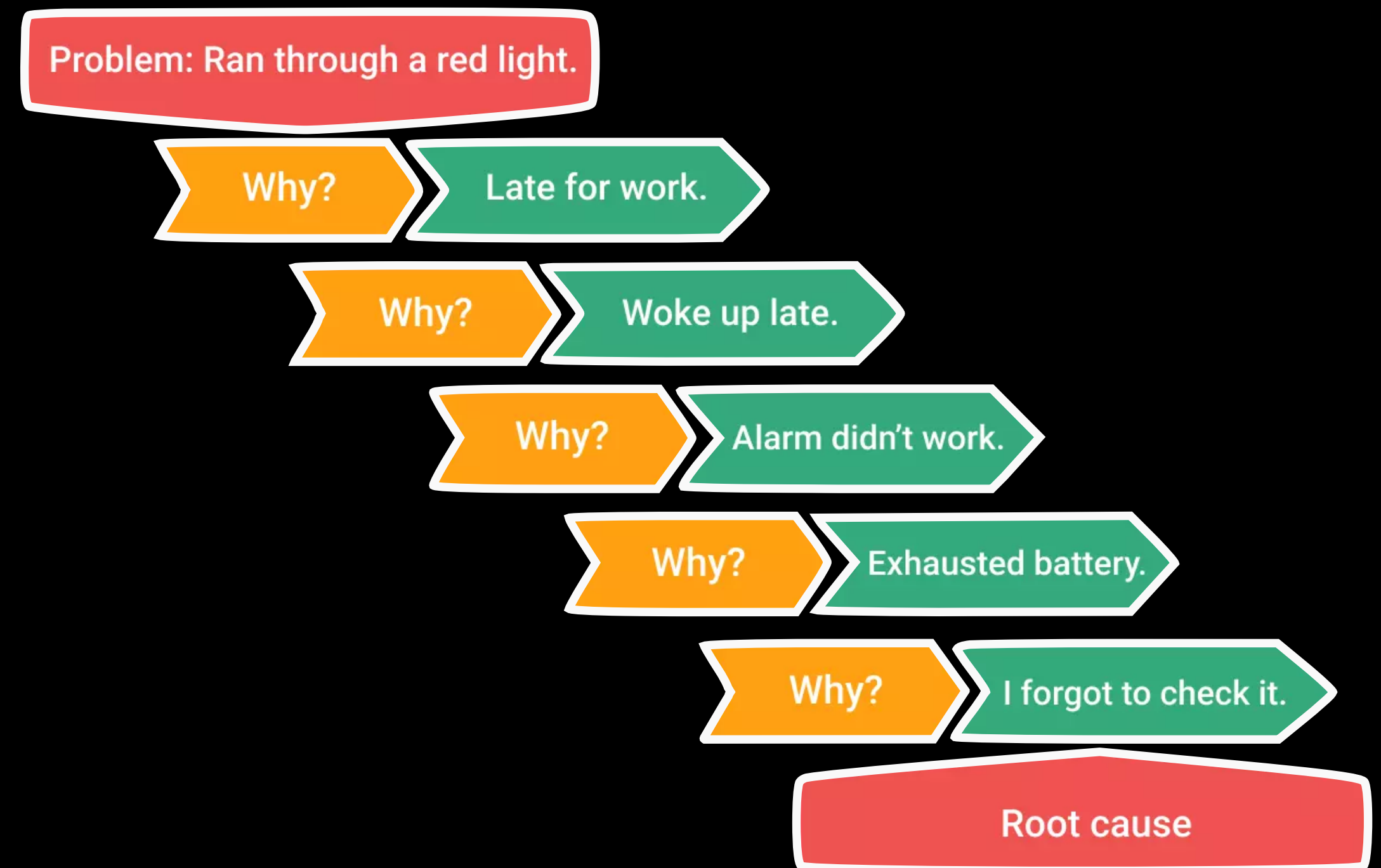**continuous improvement**

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5 WHY'S method

"Helps uncover the underlying causes of a problem rather than just addressing its symptoms."

one of the most effective **tools** for root cause analysis in Lean management

developed by ***Sakichi Toyoda***, part of ***Toyota*** production system

A ***problem-solving technique*** that focuses on:

- specific problem definition
- setting goals
- root cause analysis
- checks, standards, and follow-up activities

Problem: Ran through a red light.

Why? → Late for work.

Why? → Woke up late.

Why? → Alarm didn't work.

Why? → Exhausted battery.

Why? → I forgot to check it.

Root cause

Source: BUSINESSMAP.IO

—> ***The aim is to prevent the problem from recurring by eliminating its underlying causes.***

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FMEA

Failure Mode and Effects Analysis

Goal: identify potential defects in production / risks

5 steps:

1. *Define the scope and topic*

2. *Assemble a diverse team*

3. *Chart the process*

4. *Hazard analysis - > „RISK PRIORITY NUMBER MATRIX"*

5. *Action and measures*

Risk Acceptability

ACC	Acceptable
BOR	Borderline
NACC	Not Acceptable

SEVERITY

PROBABILITY OF OCCURRENCE

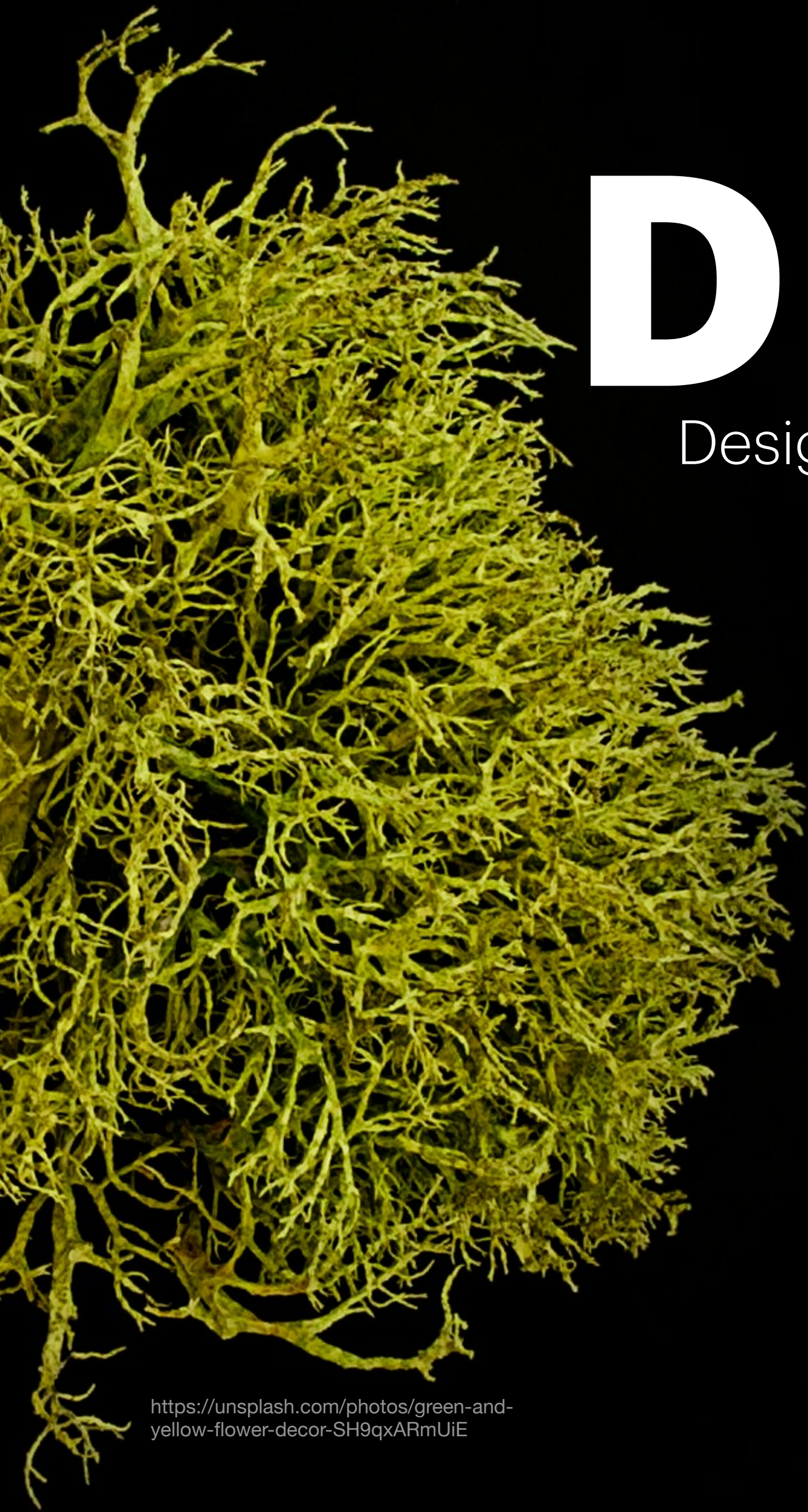|	Negligible	Minor	Serious	Major	Critical
Improbable	1	2	3	4	5
Remote	2	4	6	8	10
Occasional	3	6	9	12	15
Probable	4	8	12	16	20
Frequent	5	10	15	20	25

Success = following, reviewing and adjusting

FMEA

| Components / Processess	Potential Failure Modes	SEVERITY	OCCURRENCE	DETECTION	Risk Priority Number (RPN)
Welding	Incomplete welds	7	4	8	224
Painting	Paint bubbles	5	6	6	180
Assembly of engine parts	Misalignment of parts	8	3	5	120
Electrical system	Short circuits	9	7	7	441

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DFMEA

Design Failure Mode and Effects Analysis

- systematic approach used in engineering
- **Goal** - to identify and mitigate potential failures in the design of a product or process.
- a cross-functional team is involved
- The team **identifies potential failure modes**, their effects, and assesses their severity.
- **Likelihood** of each failure mode occurring and detectability are also **evaluated**.
- **DFMEA** helps focus efforts on addressing critical issues early in the design process.
- It leads to more robust and reliable products.

Difference between **FMEA** and **DEFMEA**

- **FMEA** (Failure Mode and Effects Analysis) identifies potential failures in products or processes regardless of their origin.
- **DFMEA** (Design Failure Mode and Effects Analysis) is a specific type of **FMEA** focused solely on design-related failures during the design phase.
- **FMEA** covers failures at all stages, while **DFMEA** specifically addresses design flaws early in development.
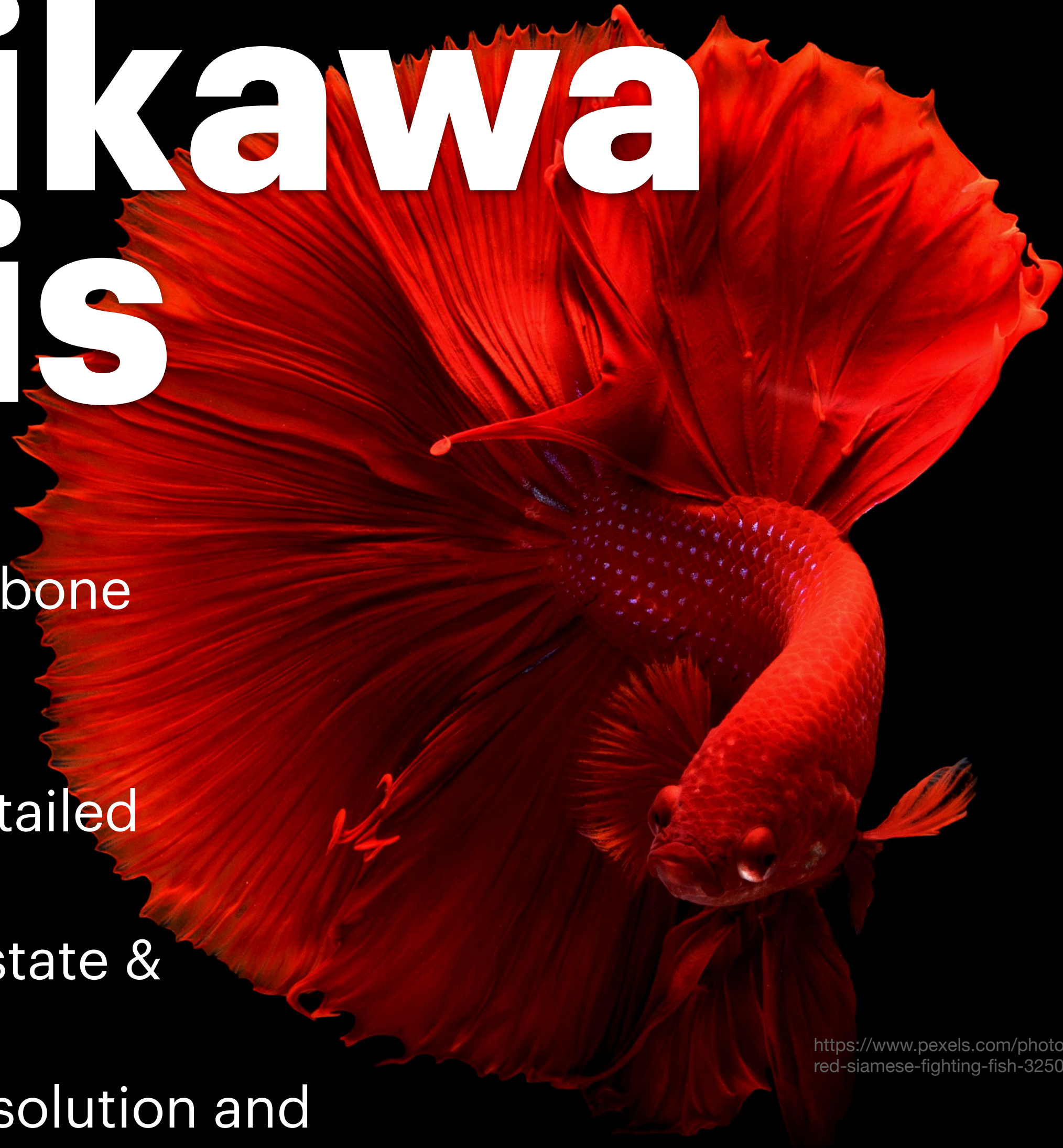
KPE/MNKIM
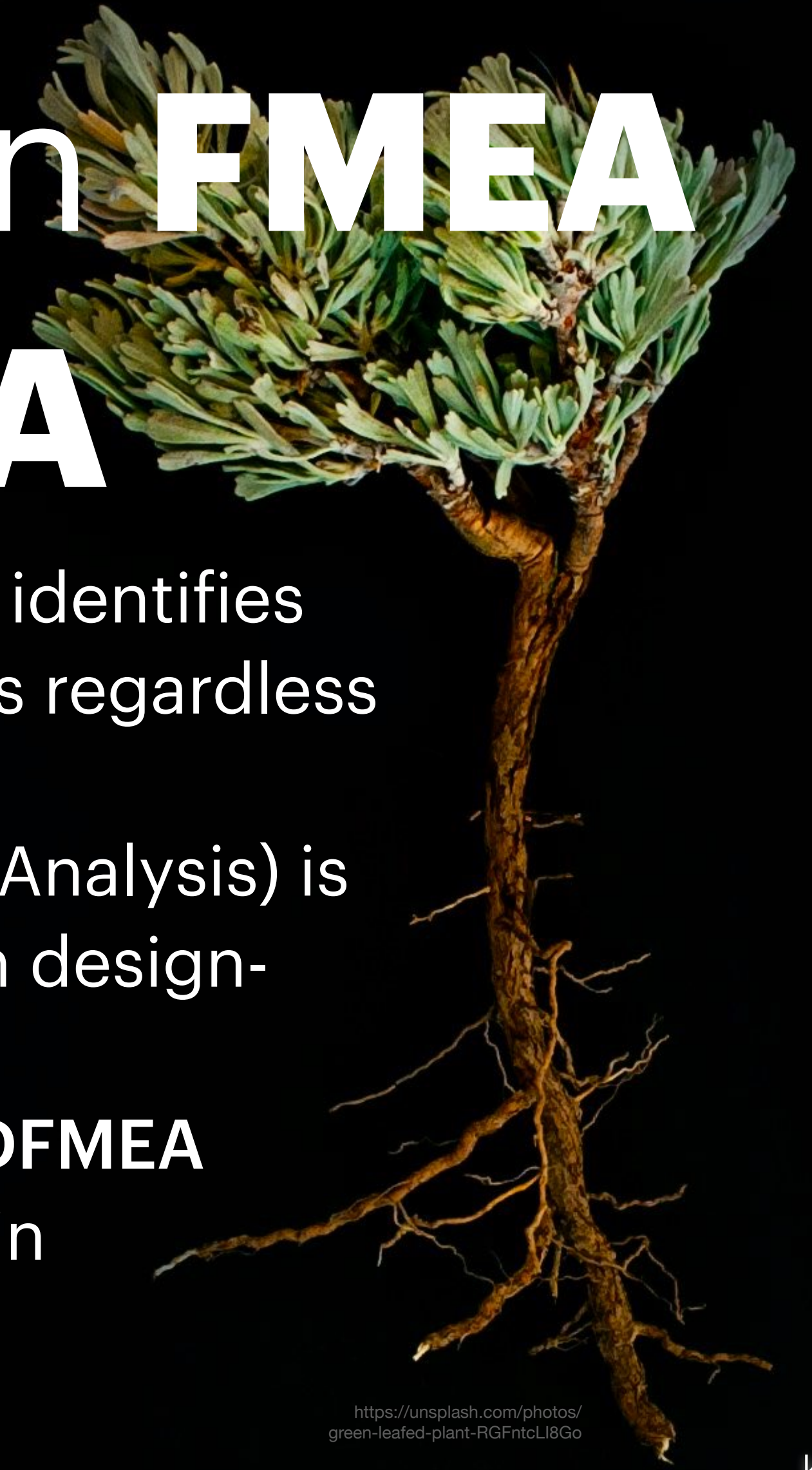
Ishikawa Analysis
Basics

- „Cause-and-effect diagram" or „Fishbone diagram"
- *1960 Kaoru Ishikawa (Japan)
- Identify problems in system with detailed approach
- Better understanding of processes state & possible defects
- Finding the root cause for effective solution and decision

When to Use

- **identifying** the root causes of a problem
- **brainstorming** solutions to a problem
- **developing** or **improving** a process
- **troubleshooting** an issue with a product or service
- **evaluating** the results of a marketing campaign
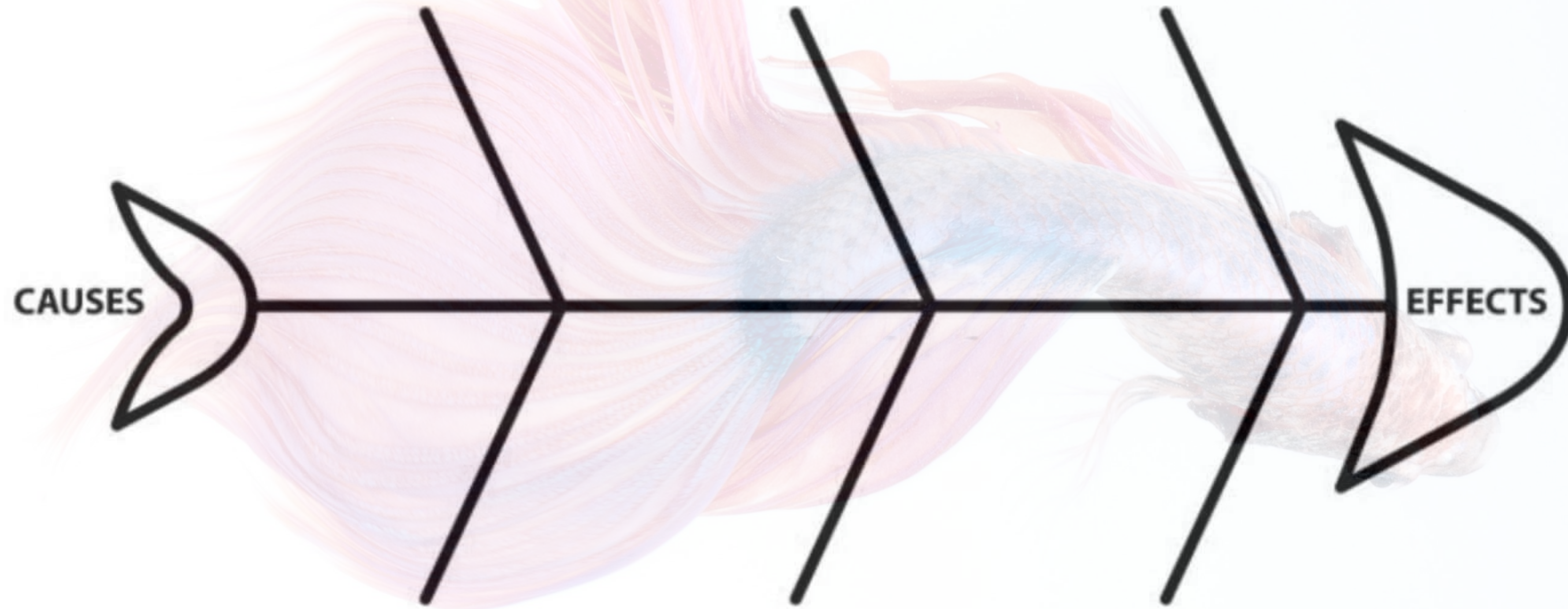- **planning** future projects or initiatives

KPE/MNKIM

6M

ENVIRONMENT   MACHINE   MAN

CAUSES   EFFECTS

MEASUREMENT   MATERIAL   METHOD

Benefits

- helps to identify the root causes of problems
- enables teams to visually organise complex information
- can be used to brainstorm solutions to problems
- allows teams to track progress and plan future actions

Disadvantages

- time-consuming to create
- challenging to interpret if not well-designed
- biased if team members do not actively participate in the analysis process
- risk of over confusing on individual factors instead of considering their common interaction
- challenging to apply in situations where multiple interrelated factors are involved
- not rigorous enough (vs newer FTA)

Benefits for XYZ Automotive Parts Manufacturing Company
(Škoda, TE Connectivity, Knorr Bremse)

Problem
The company has been experiencing an *increase in defects* in a specific component
used in their automobiles, leading to customer *complaints and increased warranty claims*.

Ishikawa Diagram

5 Why's

FMEA

KPE/MNKIM
Thank you for Attention

https://unsplash.com/photos/
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