in groups or individually.

Only one response permitted.

Only one winner.

Individuals who arrive late do not join an already established group.
(to bad, so sad!)

Requirements engineering

The slides provide the outline of the course but will not allow you to revise it on their own.

... sorry, you need to listen!

REQUIREMENTS ENGINEERING – WHAT IS IT?

REQUIREMENTS ENGINEERING IS A SYSTEMATIC DISCIPLINE DESIGNED TO IDENTIFY, ANALYZE, DOCUMENT, VALIDATE, AND MANAGE THE NEEDS AND EXPECTATIONS OF STAKEHOLDERS. ITS PURPOSE IS TO CLEARLY DELINEATE THE FUNCTIONALITIES A SYSTEM MUST PROVIDE, THE CONSTRAINTS IT MUST OPERATE UNDER, AND THE QUALITY STANDARDS IT MUST MEET THROUGHOUT ITS LIFE CYCLE.

IT REPRESENTS A SOCIO-TECHNICAL PROCESS OF DECISION-MAKING AND NEGOTIATION, PRIMARILY AIMED AT MINIMIZING UNCERTAINTY, PREVENTING MISUNDERSTANDINGS, AND ESTABLISHING ENDURING ALIGNMENT AMONG BUSINESS OBJECTIVES, USERS, AND THE IMPLEMENTED SOLUTIONS.

REQUIREMENTS ENGINEERING IS EMPLOYED TO PREVENT THE DELIVERY OF A SOLUTION THAT, WHILE TIMELY AND WITHIN BUDGET, IS ULTIMATELY UNNECESSARY.

REQUIREMENTS ENGINEERING – THE PLAN 1/2

- FUNDAMENTAL CONCEPTS AND CONTEXT
- THE STATISTICS
- THE EXPENSES AND HAZARDS
- FUNDAMENTAL PRINCIPLES
- THE VARIOUS CATEGORIES OF REQUIREMENTS
- RE IN ORGANIZATIONS
- CHALLENGING ESTABLISHED NORMS
- THE WARNING SIGNS

THE REQUIREMENTS ENGINEERING PROCESS.

- ELICITATION AND ACQUISITION
- MODELISATION
- SPECIFICATION
- PRIORITIZATION
- TRACEABILITY AND DEPENDENCIES
- IMPACT EVALUATION
- NEGOTIATION
- QUALITY ASSURANCE

THEORETICAL FRAMEWORKS

- QUALITY IN REAL ESTATE
- CONTINUITY
- THE PROCESS OF DECISION-MAKING
- THE METAPHOR OF THE SWEATER AND THE SHEEP

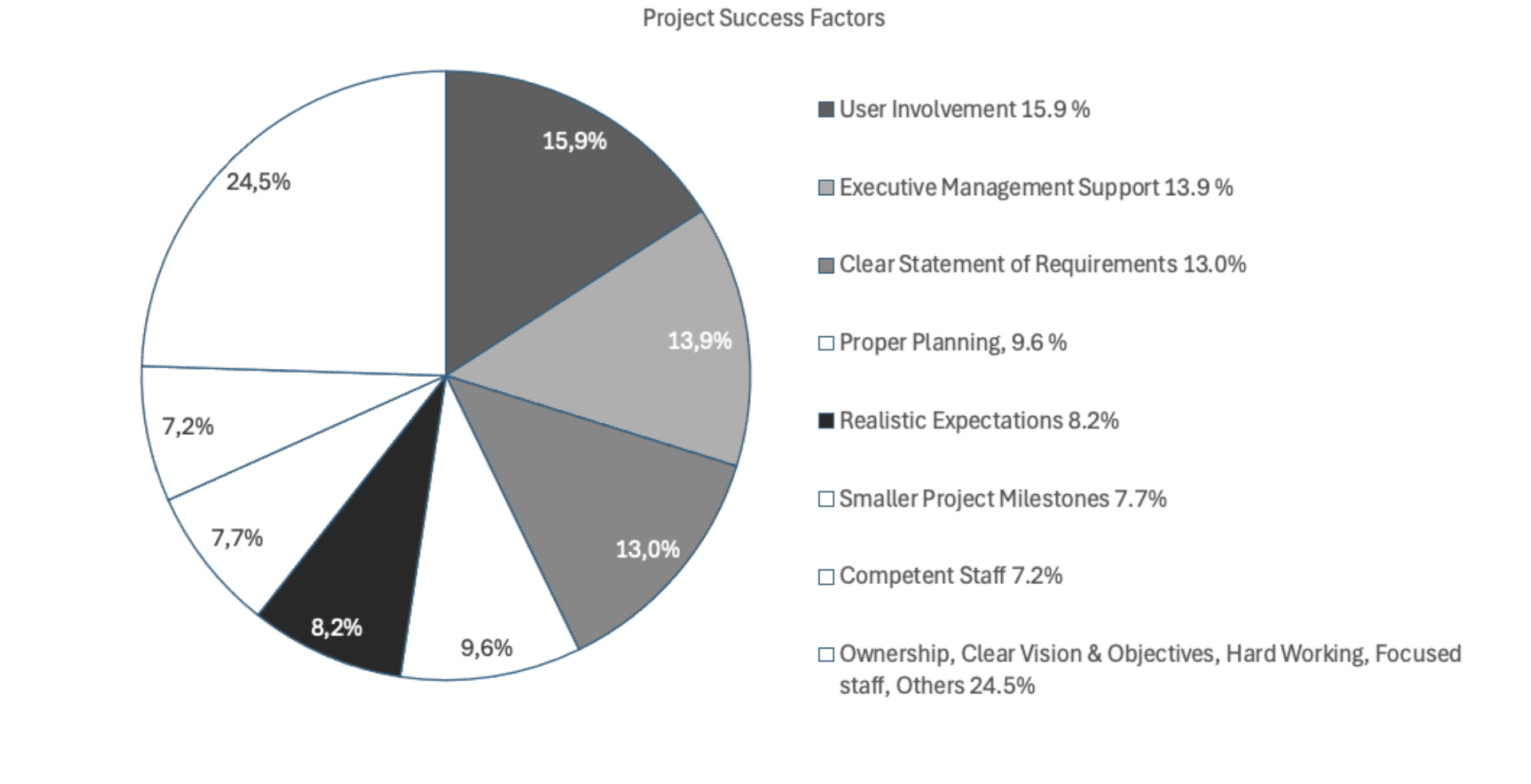
REQUIREMENTS ENGINEERING – THE STRATEGY 2/2

APPROACHES

- SMART OBJECTIVES
- OBJECTIVE TREES
- GOAL TREE – ELEKTRA
- GOAL TREE AND KPI
- SYNTACTIC AND GRAMMATICAL ANALYSIS
- EKD
- EKD CMM
- CREW L'ECRITOIRE
- 5W2H
- INTERVIEWS
- 6 HATS
- ELM
- PROTOTYPING AND WIREFRAME
- BROWN COW MODEL
- DELPHI
- MOSCOW
- DESIGN THINKING
- REQUIREMENT ENGINEERING AND DATA GOVERNANCE
- REQUIREMENT ENGINEERING AND DATA STRATEGY

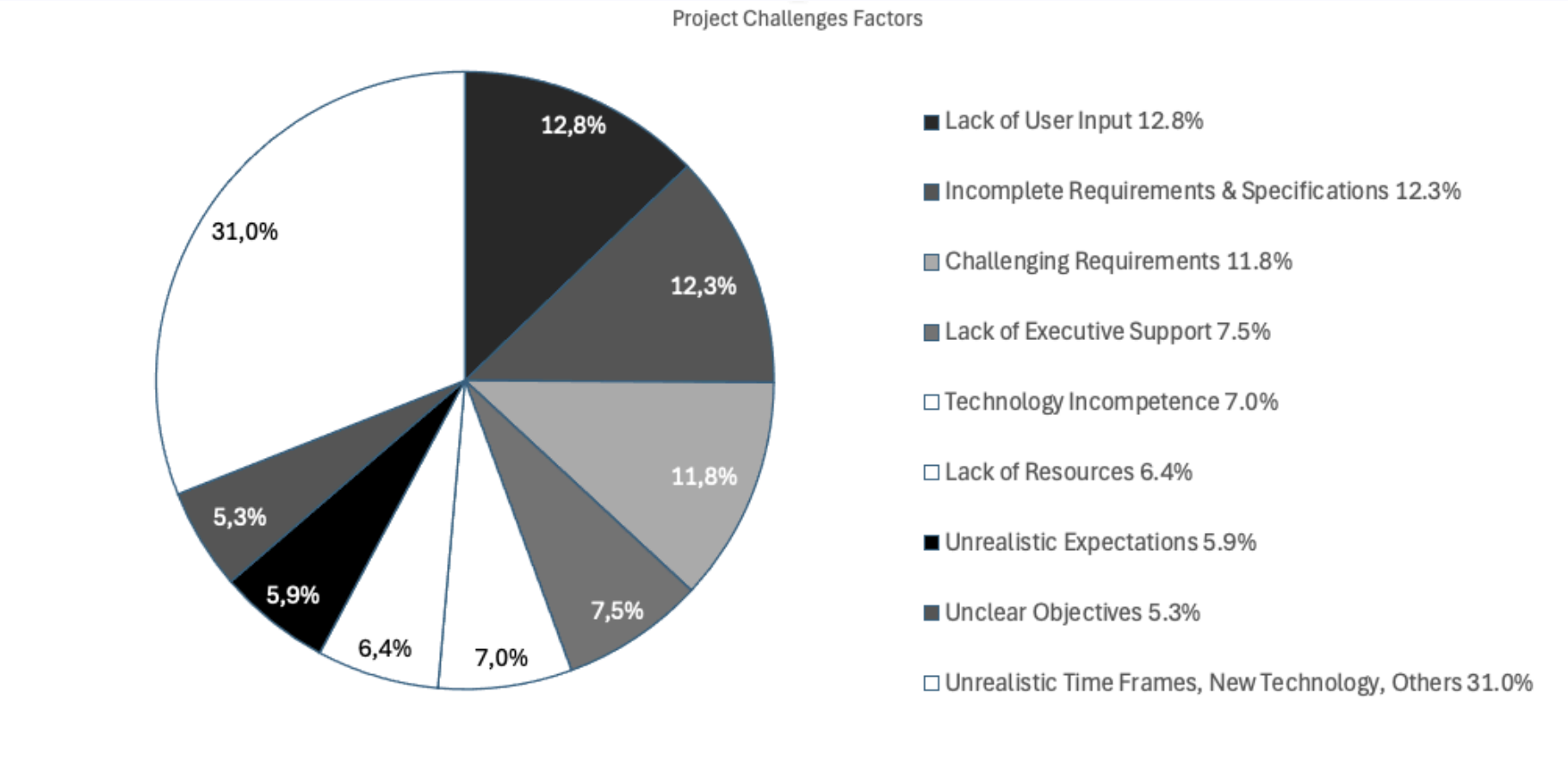
STATISTICS

PROJECT SUCCESS FACTORS AS IDENTIFIED IN THE SMART STUDY OF 2014



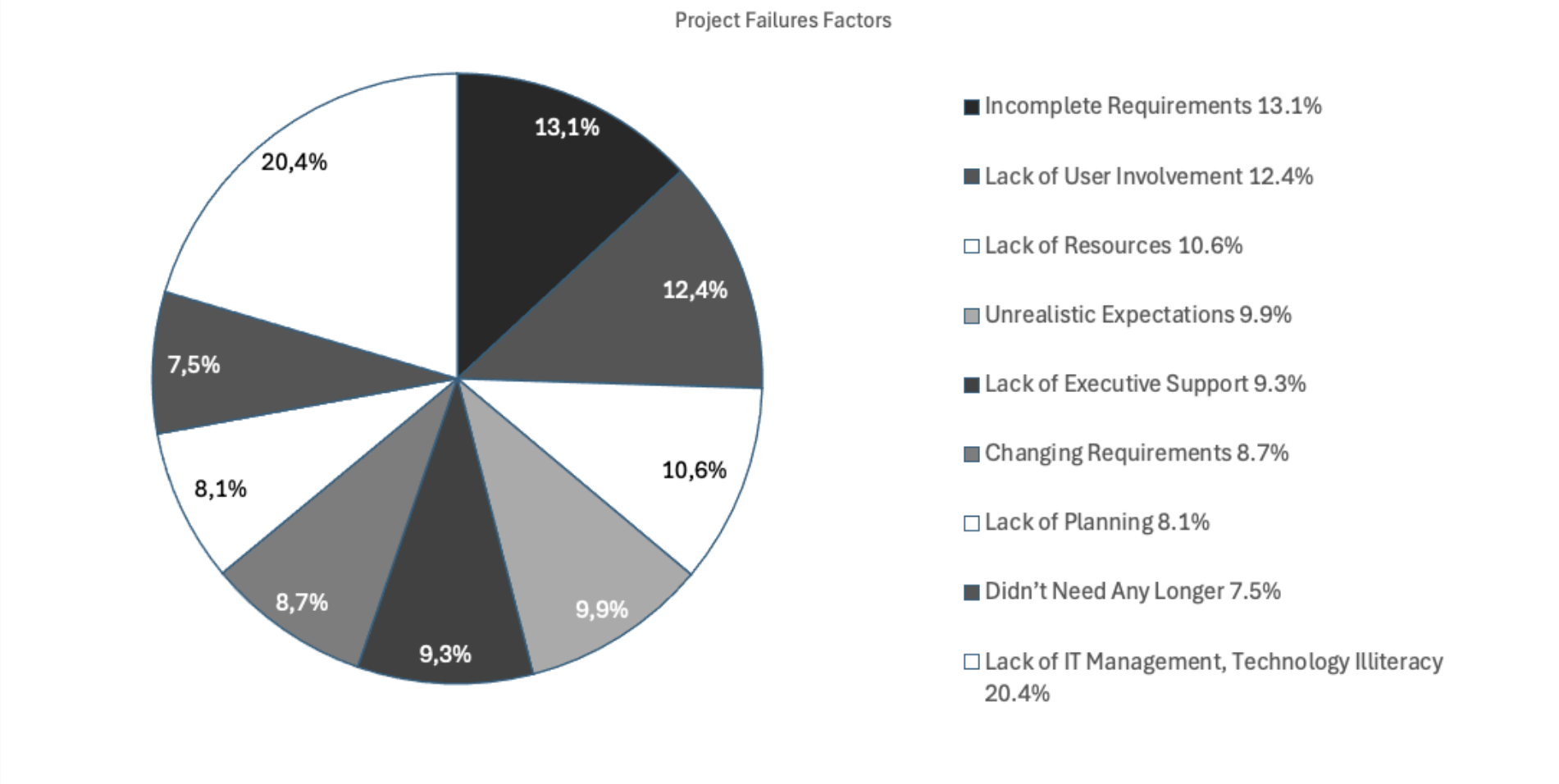
STATISTICS

PROJECT CHALLENGES FACTORS ACCORDING TO THE SMART STUDY 2014

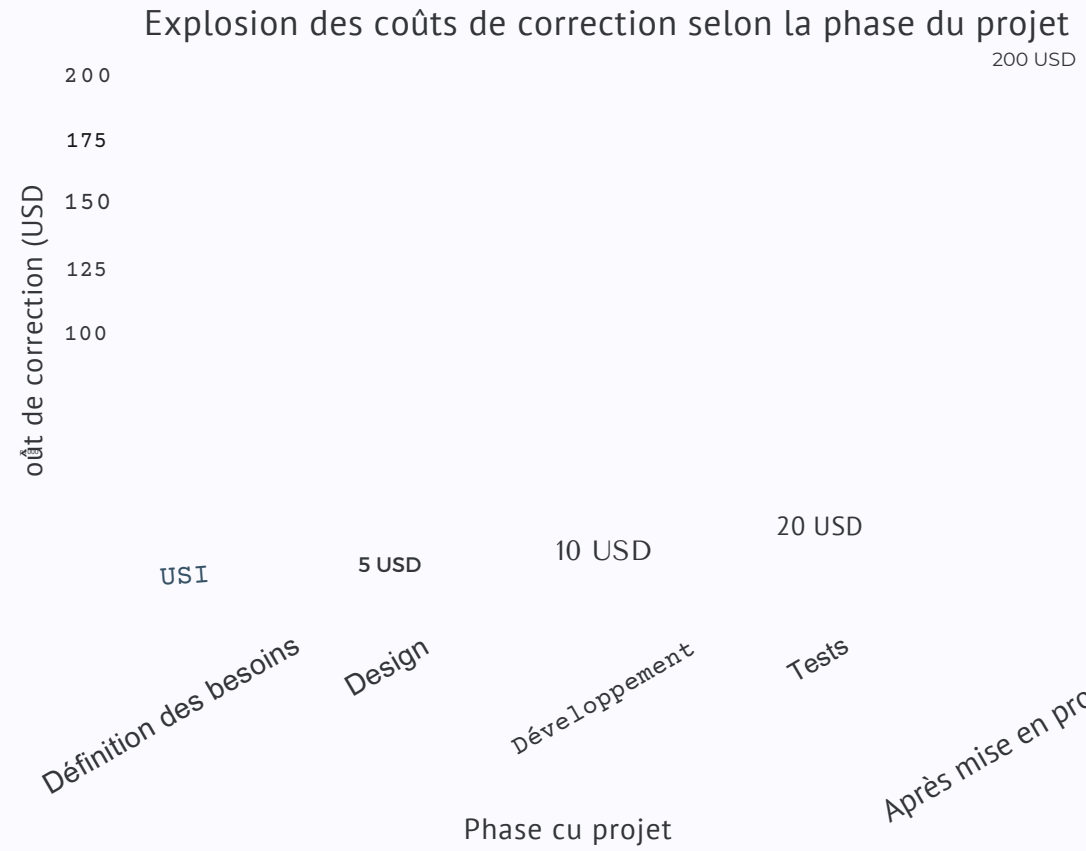


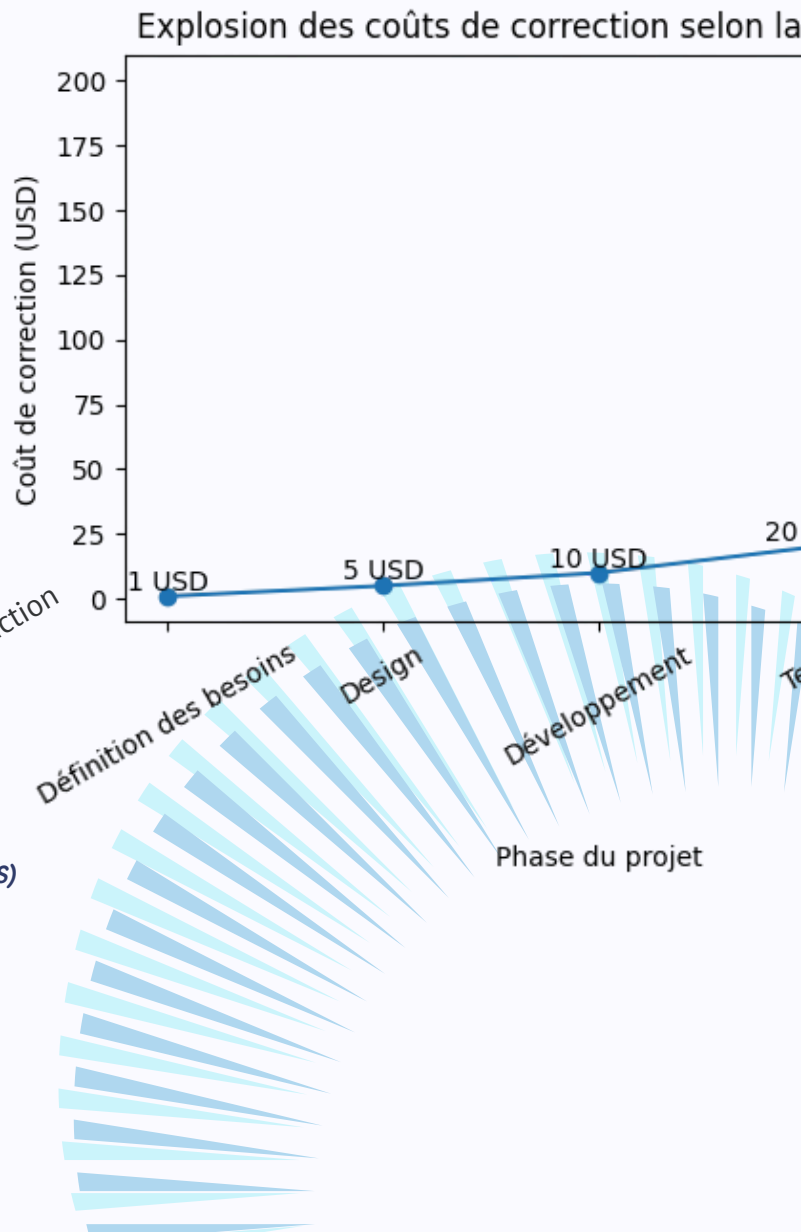
STATISTICS

PROJECT FAILURE FACTORS ACCORDING TO THE SMART STUDY, 2014



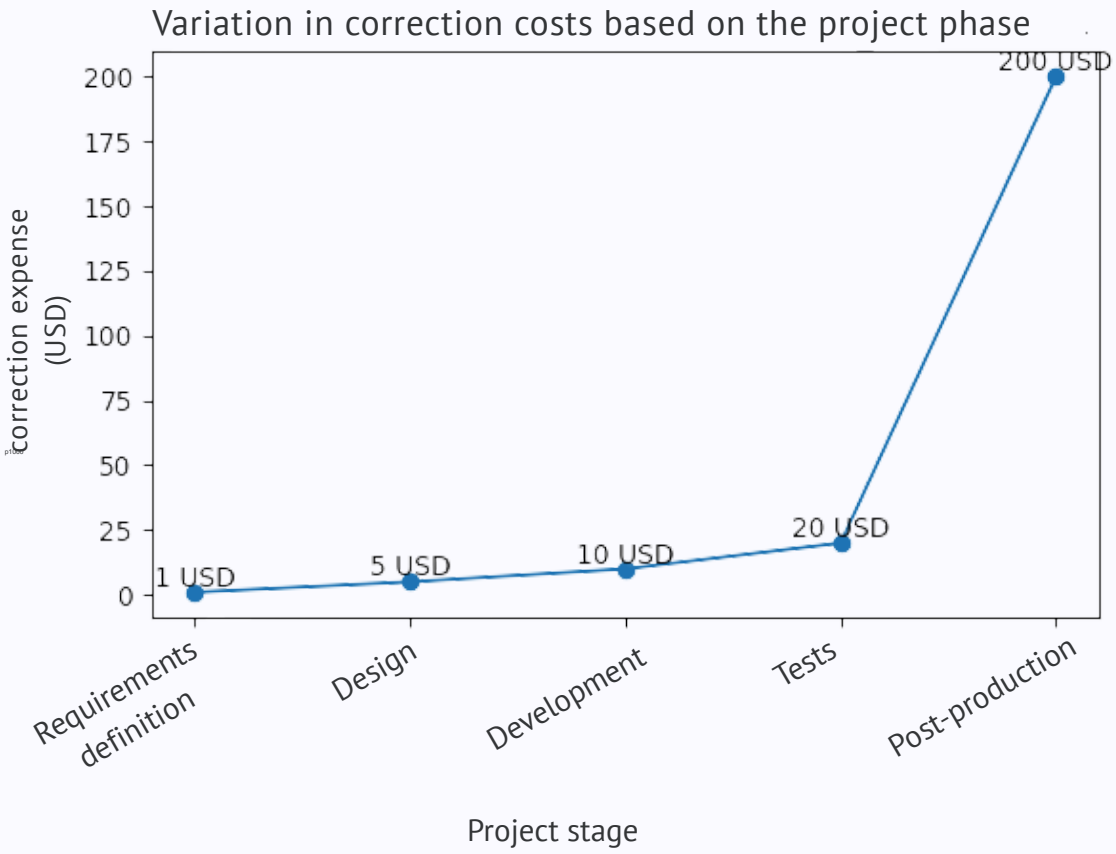
EXPENSES AND HAZARDS





BOEHM AND PAPACCIO (UNDERSTANDING AND CONTROLLING SOFTWARE COSTS: ADDRESSING ERROR COSTS)

EXPENSES AND RISKS



BOEHM AND PAPACCIO (UNDERSTANDING AND MANAGING SOFTWARE COSTS: ADDRESSING ERROR EXPENSES)

COSTS AND RISKS ASSOCIATED WITH THE PROJECT

THE SURGE OF DELAYS

DEMOTIVATION AND SELF-ASSURANCE

THE EXPENSES AND RISKS ASSOCIATED WITH THE SOLUTION

REFLECTION AND CORRECTION INITIATIVES

UNUSABLE FUNCTIONS

EXCLUDED FEATURES

CHALLENGING-TO-MAINTAIN SOLUTION (TECHNICAL DEBT)

COSTS AND RISKS – FOR STAKEHOLDERS

IMPACTS ON BUSINESS OPERATIONS

IMPACTS ON DECISION-MAKING

FUNDAMENTAL PRINCIPLES

REQUIREMENT

A REQUIREMENT IS A CONDITION OR CAPABILITY ESSENTIAL FOR A USER, ORGANIZATION, OR SYSTEM TO ADDRESS A PROBLEM OR ATTAIN A GOAL.

KEY POINT: A REQUIREMENT DELINEATES WHAT IS ANTICIPATED, RATHER THAN THE METHOD OF IMPLEMENTATION FOR THE SOLUTION.

REQUIREMENT

A NEED SIGNIFIES AN UNDERLYING, FREQUENTLY IMPLICIT, NECESSITY THAT DRIVES A REQUEST OR REQUIREMENT.

THE NEED PRECEDES THE REQUIREMENT; MULTIPLE REQUIREMENTS CAN FULFILL THE SAME NEED.

STAKEHOLDER

A STAKEHOLDER IS ANY INDIVIDUAL, GROUP, OR ORGANIZATION THAT:

- AFFECTS THE REQUIREMENTS,
- IS INFLUENCED BY THE SYSTEM,
- OR HAS A VESTED INTEREST IN ITS OUTCOME.

STAKEHOLDERS MAY POSSESS DIVERGENT OR EVEN CONFLICTING OBJECTIVES.

OBJECTIVE (AIM)

AN OBJECTIVE IS A DESIRED OUTCOME TO BE ATTAINED, ARTICULATED AT A STRATEGIC OR BUSINESS LEVEL.

REQUIREMENTS MUST BE TRACEABLE TO EXPLICIT OBJECTIVES.

SYSTEM

A SYSTEM IS A COHESIVE COLLECTION OF INTERRELATED COMPONENTS, STRUCTURED TO DELIVER VALUE WITHIN A SPECIFIC CONTEXT.

THE SYSTEM MAY CONSIST OF SOFTWARE, ORGANIZATIONAL ELEMENTS, HUMAN COMPONENTS, OR A HYBRID OF THESE.

CONTEXT

THE CONTEXT DELINEATES THE OPERATIONAL, ORGANIZATIONAL, REGULATORY, AND HUMAN ENVIRONMENTS IN WHICH THE SYSTEM WILL BE UTILIZED.

A REQUIREMENT IS MEANINGFUL ONLY WITHIN A SPECIFIC CONTEXT.

THE VARIOUS CATEGORIES OF REQUIREMENTS

BUSINESS NEED

BUSINESS NEED ARTICULATE THE ORGANIZATION'S OBJECTIVES, NEEDS, OR EXPECTATIONS AT A STRATEGIC LEVEL, INDEPENDENT OF ANY TECHNICAL SOLUTIONS.

THE VARIOUS CATEGORIES OF REQUIREMENTS

USER NEED

USER NEED ARTICULATE THE NEEDS AND EXPECTATIONS OF USERS REGARDING THE SYSTEM, CONVEYED IN LANGUAGE THAT IS COMPREHENSIBLE TO THOSE USERS.

THEY OUTLINE THE CAPABILITIES USERS SHOULD POSSESS WHEN INTERACTING WITH THE SYSTEM, WITHOUT DELVING INTO TECHNICAL SPECIFICS.

THE VARIOUS CATEGORIES OF REQUIREMENTS

FUNCTIONAL REQUIREMENT

FUNCTIONAL REQUIREMENT DELINEATES THE FUNCTIONS THAT THE SYSTEM MUST DELIVER, ENCOMPASSING THE BEHAVIORS, SERVICES, OR RESPONSES OF THE SYSTEM IN SPECIFIC SCENARIOS.

THEY DELINEATE THE EXPECTED FUNCTIONS OF THE SYSTEM.

THE VARIOUS CATEGORIES OF REQUIREMENTS

NON-FUNCTIONAL REQUIREMENT

NON-FUNCTIONAL REQUIREMENT DELINEATES QUALITY CONSTRAINTS AND SYSTEM CHARACTERISTICS, INCLUDING PERFORMANCE, SAFETY, USABILITY, RELIABILITY, AND MAINTAINABILITY.

THEY DELINEATE THE EXPECTED BEHAVIOR OF THE SYSTEM AND THE CONDITIONS UNDER WHICH IT SHOULD EXECUTE ITS FUNCTIONS.

THE VARIOUS CATEGORIES OF REQUIREMENTS

CONSTRAINT

A CONSTRAINT IS A LIMITATION PLACED ON THE SOLUTION, WHICH RESTRICTS THE AVAILABLE OPTIONS FOR DESIGNING OR IMPLEMENTING THE SYSTEM.

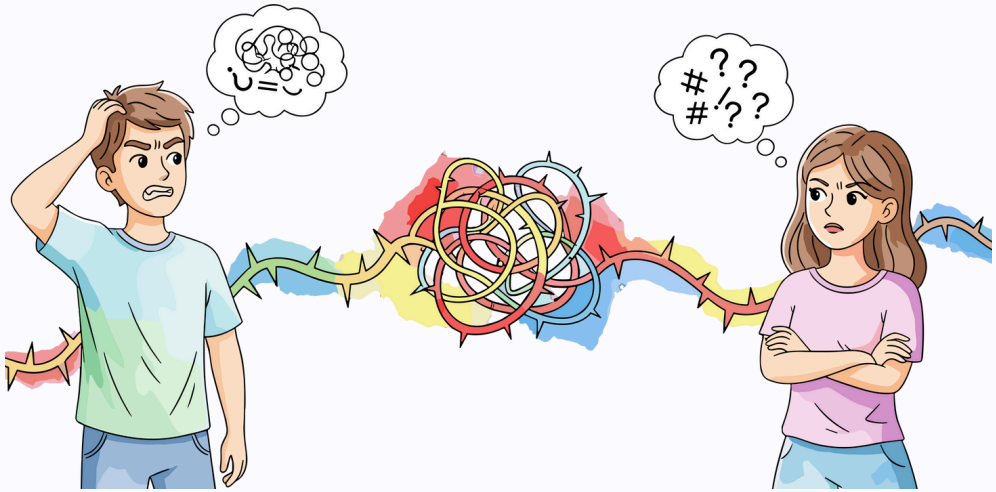
THE CONSTRAINTS MAY INCLUDE:
TECHNICAL, ORGANIZATIONAL, LEGAL, REGULATORY, CONTRACTUAL.

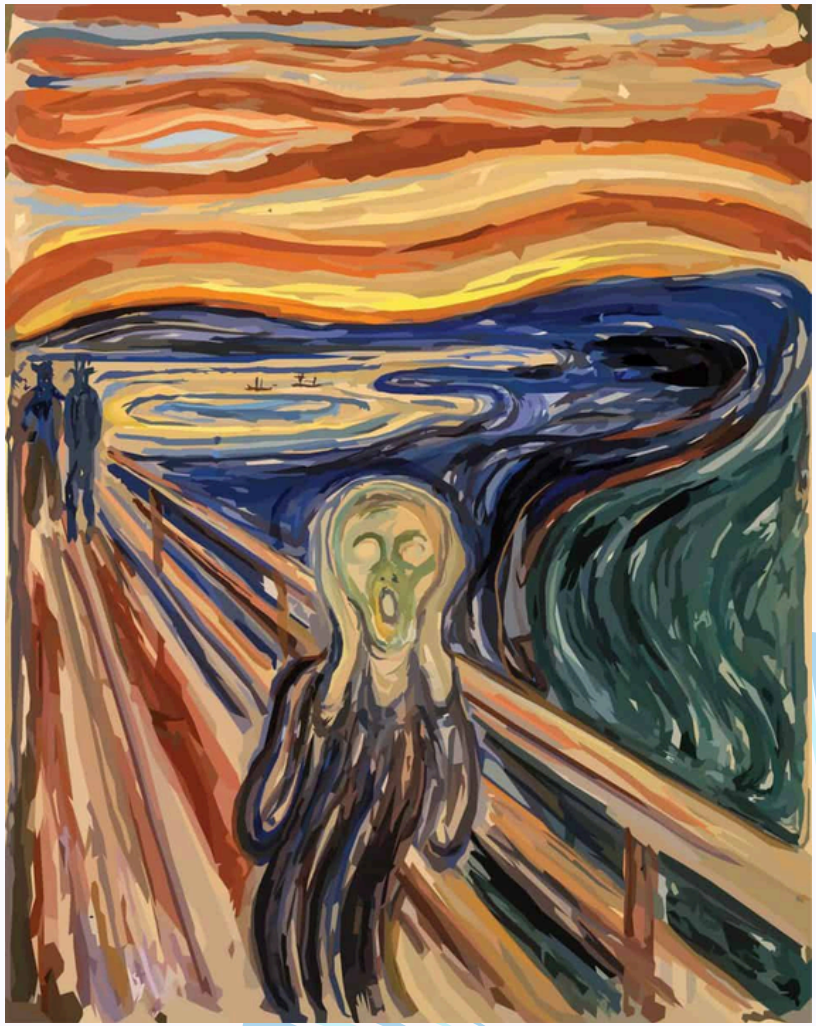
THE VARIOUS CATEGORIES OF REQUIREMENTS

	strategy	tactical	operational
organisational need	Strategic organization. Competitiveness. Technology. Marketing. Enhanced value of products	product expected benefits	Balancing technological advancements with market adaptations.
Solution need	Product architecture. Organization of product deliverables across project phases.	Resource management. Implementation of a particular version.	Change management. Volatility of demand.
project need	Project planning. Feasibility analysis. Personnel acquisition.	Project administration. Quality assurance.	needs fitting in the next release validation

KAHOOT!

REQUIREMENTS ENGINEERING IN ORGANIZATIONS





REQUIREMENTS ENGINEERING IN ORGANIZATIONS

REQUIREMENT

STAKEHOLDER REQUIREMENT

FONCTIONAL REQUIREMENT

FUNCTIONAL NEED

DOCUMENTATION

FUNCTIONAL REQUIREMENT

FUNCTIONAL SPECIFICATION

ANALYSIS

STAKEHOLDER NEED

SPECIFICATION

NEED

TECHNICAL NEED

REQUIREMENTS ENGINEERING IN ORGANIZATIONS

CENTRALIZED, DISTRIBUTED, OR HYBRID

BUSINESS ANALYST / PRODUCT OWNER / ARCHITECT

REQUIREMENTS ENGINEERING IN ORGANIZATIONS

COGNITIVE ASSESSMENT OF STAKEHOLDERS

- BIAS
- POLITICAL MANEUVERING
- INFORMATION IMBALANCES

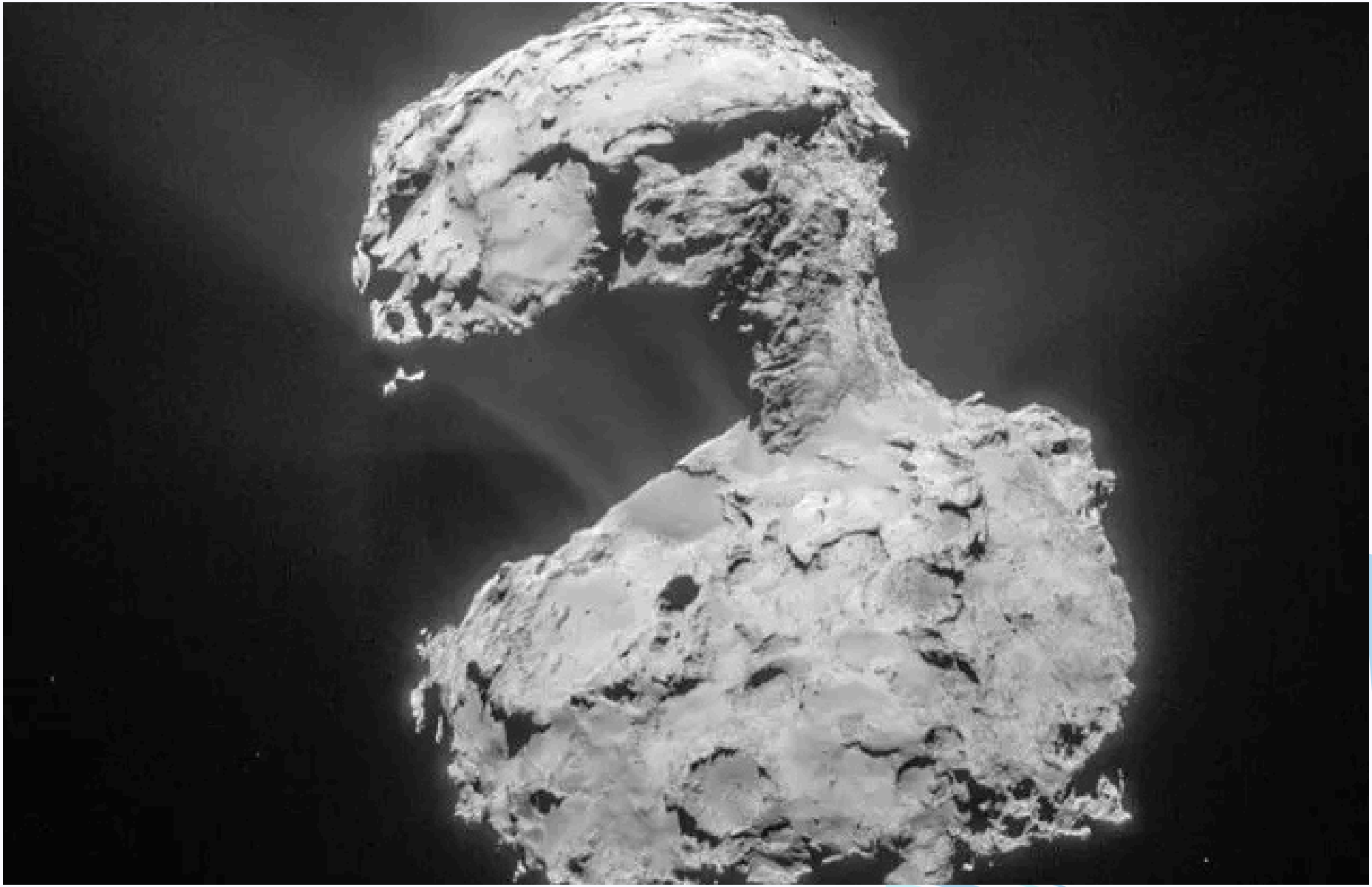
CHALLENGING THE EXISTING PARADIGM

"USERS OFTEN RECONSIDER THEIR DECISIONS."

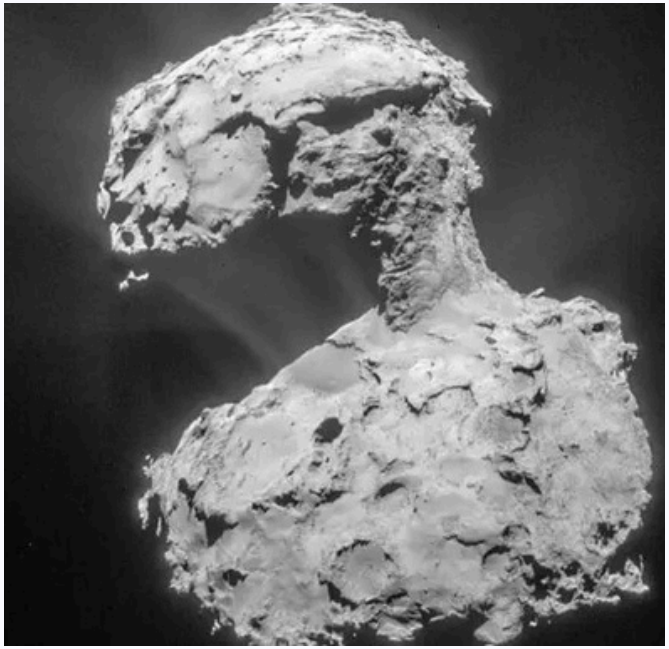
CHALLENGING THE EXISTING PARADIGM

"FAILURE TO DELIVER ON TIME: THAT IS COMMONPLACE."

CHALLENGING THE EXISTING PARADIGM



CHALLENGING THE EXISTING PARADIGM



67P/Tchourioumov-Guérassimenko

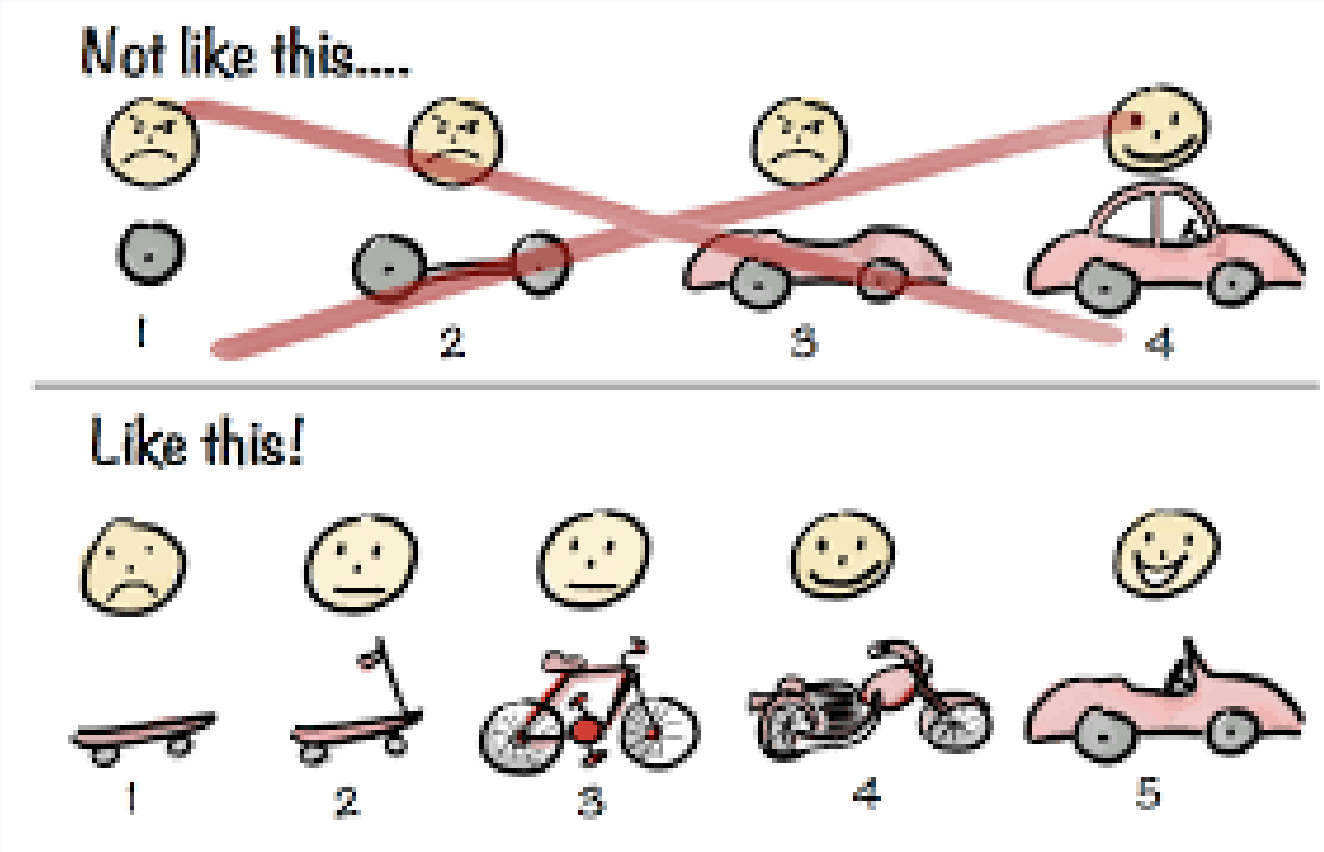
- 135 000 km/sec
- a dimension of 3.5 by 4 km
- rotating on its axis 2.4 times each hour
- “passing close” to Earth at 650 million kilometers
- 500 engineers from 50 companies across 14 countries.
- They invent technologies on the way

THEY MADE IT

CHALLENGING THE EXISTING PARADIGM

"THERE IS NO NECESSITY TO DEFINE A REQUIREMENT WHEN ENGAGING IN AGILE METHODOLOGIES."

CHALLENGING THE EXISTING PARADIGM



CHALLENGING THE EXISTING PARADIGM

"ALL REQUIREMENTS MUST BE FORMALIZED."

CHALLENGING THE EXISTING PARADIGM

“PUT THE ALMOND POWDER IN THE LARGE BOWL AND MIX.”

CHALLENGING THE EXISTING PARADIGM

"USERS AND THEIR REPRESENTATIVES DELINEATE THE FUNCTIONALITIES OF THE SOLUTION."

CHALLENGING THE EXISTING PARADIGM

https://youtube.com/shorts/vuYdHsRvmyg?si=vOctJD4PqLPngQFz

CHALLENGING THE EXISTING PARADIGM

"THERE IS ONLY ONE WAY TO ADDRESS THE NEED."

APPROACHES

SYSTEMATIC IMPACT ASSESSMENT
DEPENDENCY ANALYSIS
SCENARIO ANALYSIS
STAKEHOLDER ASSESSMENT
ANALYTICAL DOCUMENTARY
VALUE, COST, AND RISK TRADE-OFF
WORKSHOPS
STRUCTURED NEGOTIATION SEMINARS
BPMN
ORGANIZED BRAINSTORMING
BROWN COW MODEL
APPLICATIONS
TEST CASES GENERATED FROM SPECIFICATIONS
REQUIREMENTS CATALOG
FORMAL CHANGE REQUEST
QUALITY ASSESSMENT CHECKLISTS
CLASSIFICATION OF REQUIREMENTS
PAIRWISE COMPARISON
WRITING DESK TEAM
ACCEPTANCE CRITERIA
DESIGN THINKING
EKD/CMM
ELM
FACILITATED GUIDANCE
REQUIREMENTS TEMPLATES
OBJECTIVE TREES
GOAL-ORIENTED REQUIREMENTS ENGINEERING (GORE)
DEPENDENCY GRAPHS
HIGH / MEDIUM / LOW

CONFLICT IDENTIFICATION
PERSONAL INTERVIEWS
ROLE-PLAYING GAMES, STRUCTURED NATURAL LANGUAGE
LINKS: PREREQUISITES ↔ GOALS ↔ ASSESSMENTS
MAPS FUNCTIONAL MODELS
TRACEABILITY MATRIX
PRELIMINARY EXPLORATORY ASSESSMENTS
STRUCTURED MEDIATION
DELPHI TECHNIQUE
OBJECTIVE-DRIVEN FRAMEWORKS
USER STORIES (VALIDATED IN RE@AGILE)
VALUE VERSUS RISK MATRIX DEMONSTRATIONS
FIELD OBSERVATION
PEOPLE
MULTI-CRITERIA PRIORITIZATION,
PROTOTYPING,
SURVEYS,
REQUIREMENTS EVALUATIONS
APPLICATION CONTEXTS
SIX THINKING HATS
STORYTELLING
UML
WIREFRAMES
MOSCOW
DATA MODELS

RED FLAGS OF REQUIREMENTS ENGINEERING

MISTAKING NEED WITH SOLUTION

ASSUMING THAT FUNCTIONAL MEANS IMPORTANT

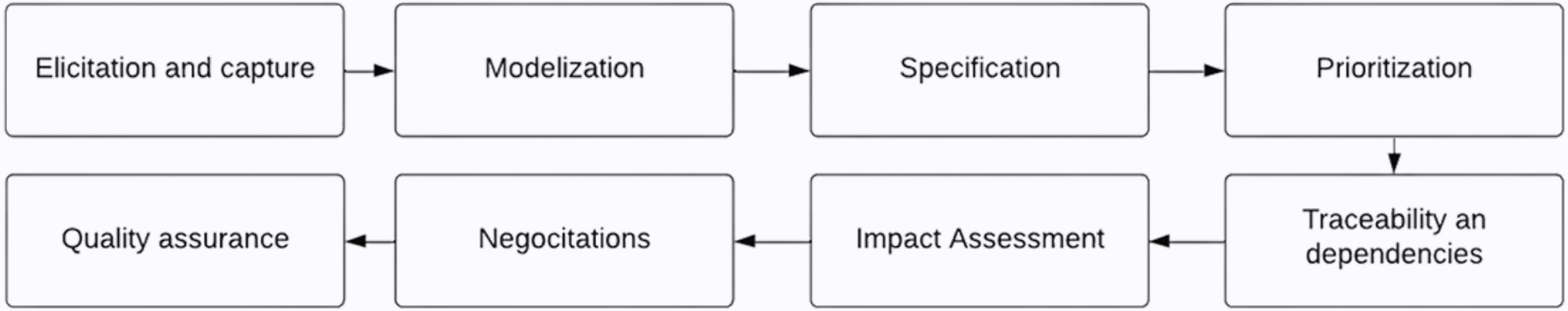
CONFUSING BETWEEN VALIDATION AND VERIFICATION

DOCUMENTING TO PROTECT ONESELF, NOT TO MAKE DECISIONS.

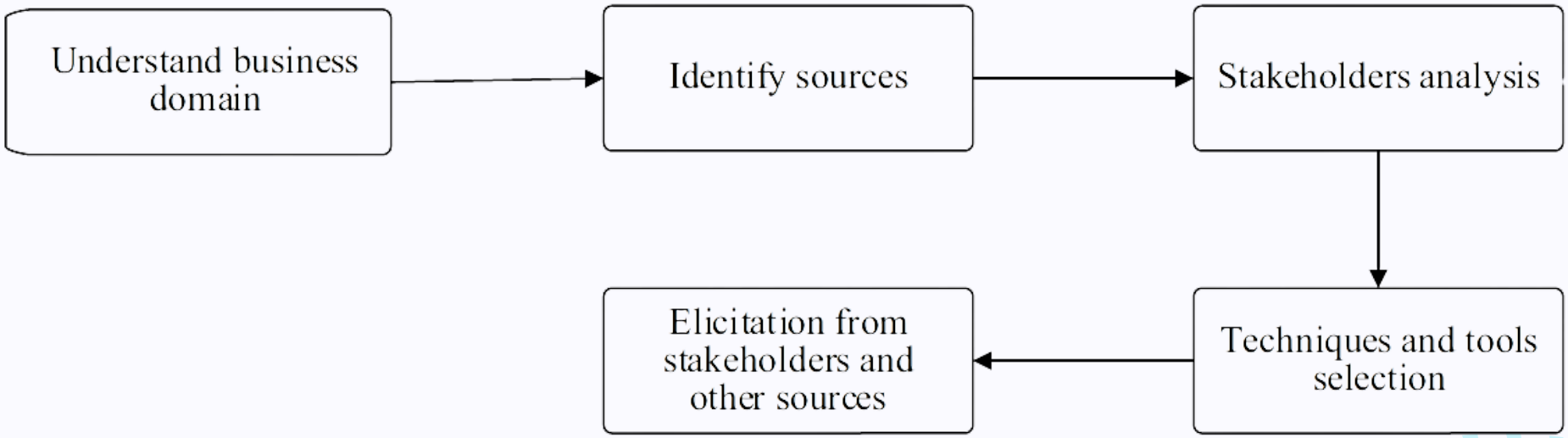
RELEGATE NON-FUNCTIONAL REQUIREMENTS TO THE CONCLUSION.

REFERRING TO SOMETHING THAT IS ALREADY TECHNICAL DESIGN AS A “BUSINESS REQUIREMENT”

REQUIREMENTS ENGINEERING PROCESS



REQUIREMENTS ENGINEERING PROCESS: ELICITATION AND DOCUMENTATION



REQUIREMENTS ENGINEERING PROCESS MODELING

MODELING WILL ENABLE US TO FORMALIZE THE NEED AT A CONCEPTUAL LEVEL. THIS CAN BE ACHIEVED THROUGH THE USE OF ONE OR MORE MODELS. THE MODEL(S) WILL SUBSEQUENTLY FACILITATE THE ARTICULATION OF VARIOUS NEEDS IN A VISUALIZATION THAT ALLOWS US TO CONCEPTUALIZE THE SYSTEM OR SYSTEMS TO BE DEVELOPED OR MODIFIED.

REQUIREMENTS ENGINEERING PROCESS DOCUMENTATION

REQUIREMENTS SPECIFICATION INVOLVES THE METICULOUS DOCUMENTATION OF REQUIREMENTS IN A PRECISE, UNAMBIGUOUS, AND STRUCTURED MANNER, UTILIZING SUITABLE NOTATIONS (EITHER TEXTUAL OR GRAPHICAL) TO FACILITATE THEIR VERIFICATION, VALIDATION, AND MANAGEMENT.

THE SPECIFICATION SEEKS TO:

MINIMIZE AMBIGUITY AND DIVERSE INTERPRETATIONS;

ENSURE THAT THE REQUIREMENTS ARE BOTH VERIFIABLE AND TESTABLE.

TO FUNCTION AS A SHARED FOUNDATION FOR COMMUNICATION;

TO FACILITATE TRACEABILITY AND CHANGE MANAGEMENT.

PRIORITIZATION OF THE REQUIREMENTS ENGINEERING PROCESS

PRIORITIZING REQUIREMENTS ENTAILS ASSESSING AND CONTRASTING REQUIREMENTS BASED ON ESTABLISHED CRITERIA TO ASCERTAIN THEIR RELATIVE SIGNIFICANCE IN FULFILLING PROJECT OBJECTIVES, WHILE CONSIDERING CONSTRAINTS RELATED TO RESOURCES, RISKS, AND CONTEXT.

REQUIREMENTS ENGINEERING PROCESS PRIORITIZATION CRITERIA

- THE SIGNIFICANCE OF THIS WILL VARY BASED ON THE STAKEHOLDER'S PERSPECTIVE. IT MAY HOLD IMPORTANCE FOR THE BUSINESS, FOR END CUSTOMERS, OR FOR ENHANCING EFFICIENCY WITHIN TEAMS.

PENALTIES: THE REGULATIONS, EVEN IF INITIALLY PERCEIVED AS OBLIGATORY, OFTEN LEAD US TO THINK, "IT IS THE LAW, SO COMPLIANCE IS NECESSARY." TYPICALLY, REGULATORS DESIGN THESE FRAMEWORKS TO ENSURE THAT PENALTIES SERVE AS A DETERRENT, RENDERING THE ISSUE MOOT.

THE COST ENCOMPASSES NOT ONLY THE EXPENSES ASSOCIATED WITH DEVELOPING THE FUNCTIONALITY (SUCH AS INFRASTRUCTURE AND SERVERS) BUT ALSO THE POTENTIAL LOSSES INCURRED BY THE BUSINESS IN THE ABSENCE OF THIS FUNCTIONALITY.

REQUIREMENTS ENGINEERING PROCESS PRIORITIZATION CRITERIA

- TIME: ASSOCIATED WITH THE EXPENSES RELATED TO VARIOUS FACETS OF DEVELOPMENT. IN THIS SECTION, WE WILL ASSESS THE DEGREE OF PARALLELISM AMONG TASKS, STAKEHOLDER TRAINING, AND THE SUPPORT MATERIALS TO BE GENERATED...

- THE RISK: VARIOUS TYPES OF RISKS EXIST, INCLUDING INTERNAL, EXTERNAL, DIMINISHED PERFORMANCE, EROSION OF BRAND IMAGE, AS WELL AS ISSUES RELATED TO PLANNING AND DEADLINES.

- VOLATILITY: IF THE PROJECT MUST BE DELIVERED IN A RAPIDLY EVOLVING ENVIRONMENT, THE REQUIREMENTS MAY BECOME IRRELEVANT BY THE TIME OF DELIVERY.

- DEPENDENCIES: CERTAIN REQUIREMENTS CANNOT BE PRIORITIZED UNTIL OTHERS HAVE BEEN FULFILLED.

REQUIREMENTS ENGINEERING PROCESS: TRACEABILITY AND INTERDEPENDENCIES

- TRACEABILITY REFERS TO THE CAPACITY TO CREATE AND UPHOLD CLEAR CONNECTIONS BETWEEN REQUIREMENTS AND:
- THEIR ORIGINS (GOALS, REQUIREMENTS, STAKEHOLDERS),
- THEIR RELATIONSHIPS WITH ONE ANOTHER,
- AND THE SOLUTION COMPONENTS (DESIGN, IMPLEMENTATION, TESTING).
- DEPENDENCIES DELINEATE THE LOGICAL, FUNCTIONAL, OR DECISIONAL RELATIONSHIPS AMONG REQUIREMENTS, INCLUDING ASPECTS SUCH AS PRIORITY, CAUSALITY, COMPATIBILITY, OR EXCLUSION.

REQUIREMENTS ENGINEERING PROCESS: TRACEABILITY AND INTERDEPENDENCIES

TYPES OF TRACEABILITY (IREB)

- VERTICAL TRACEABILITY ESTABLISHES A CONNECTION AMONG: OBJECTIVES → BUSINESS/USER REQUIREMENTS → SYSTEM REQUIREMENTS → TESTS.
- IT ENSURES STRATEGIC ALIGNMENT AND COMPREHENSIVE FUNCTIONAL COVERAGE.

REQUIREMENTS ENGINEERING PROCESS: TRACEABILITY AND INTERDEPENDENCIES

HORIZONTAL TRACEABILITY: CONNECTION AMONG REQUIREMENTS AT THE SAME LEVEL,

FOR INSTANCE:

- DEPENDENT PREREQUISITES,
- ALTERNATIVES,
- COMPETITORS.
- IT FACILITATES THE MANAGEMENT OF CONSISTENCY AND COMPROMISES.

REQUIREMENTS ENGINEERING PROCESS IMPACT EVALUATION

- IMPACT ON REQUIREMENTS: INTRODUCTION OF DEPENDENT OR CONFLICTING REQUIREMENTS, AS WELL AS REDUNDANCIES OR INCONSISTENCIES.
- IMPACT ON OBJECTIVES: CONTRIBUTION TO BUSINESS VALUE, STRATEGIC ALIGNMENT OR MISALIGNMENT.
- IMPACT ON THE SOLUTION: ARCHITECTURE, DATA, INTERFACES, AND RESULTING TECHNICAL COMPLEXITY.
- ORGANIZATIONAL IMPACT: BUSINESS PROCESSES, USER WORKLOAD, TRAINING, AND IMPLEMENTATION.
- PROJECT IMPACT: EXPENSES, DURATION, ASSETS.

REQUIREMENTS ENGINEERING PROCESS DISCUSSION

NEGOTIATING REQUIREMENTS ENTAILS RECONCILING DISCREPANCIES AMONG STAKEHOLDERS BY PURSUING CONSENSUS ON:

- THE SUBSTANCE OF THE REQUIREMENTS,
- THEIR PRIORITY,
- THEIR SCOPE,
- OR THEIR EXECUTION,
- WHILE ADHERING TO THE PROJECT CONSTRAINTS AND OVERARCHING GOALS.

QUALITY ASSURANCE REQUIREMENTS ENGINEERING METHODOLOGY

REQUIREMENTS QUALITY ASSURANCE INCLUDES ALL ACTIVITIES DESIGNED TO VERIFY AND VALIDATE THE QUALITY OF REQUIREMENTS, ENSURING THAT THEY ARE:

- CORRECT,
- COMPLETE,
- CONSISTENT,
- UNDERSTANDABLE,
- AND ACCESSIBLE TO STAKEHOLDERS.

IT INTEGRATES VERIFICATION (THE QUALITY OF THE FORMULATION) AND VALIDATION (ITS RELEVANCE TO THE NEEDS).

CHECK VERSUS VALIDATE

VERIFICATION CRITERIA:

- CLARITY,
- THE CLARITY OF EXPRESSION,
- CONSISTENCY WITH ADDITIONAL REQUIREMENTS,
- COMPLETENESS WITHIN ITS PARAMETERS,
- TESTABILITY,
- COMPLIANCE WITH WRITING CONVENTIONS.

A REQUIREMENT MAY BE THOROUGHLY VERIFIED YET STILL PROVE TO BE SUPERFLUOUS.

CHECK VERSUS VALIDATE

THE CRITERIA FOR VALIDATION ARE:

- COMMERCIAL SIGNIFICANCE,
- THE ALIGNMENT WITH STAKEHOLDER NEEDS,
- ALIGNMENT WITH GOALS,
- THE ADDED VALUE,
- THE TRUE UTILITY OF THE SYSTEM.

A VALIDATED REQUIREMENT IS CONSIDERED DESIRABLE AND PERTINENT, RATHER THAN MERELY WELL-ARTICULATED.

CHECK VERSUS VALIDATE

THE VERIFICATION INSTILLS CONFIDENCE IN

THE TEAMS.

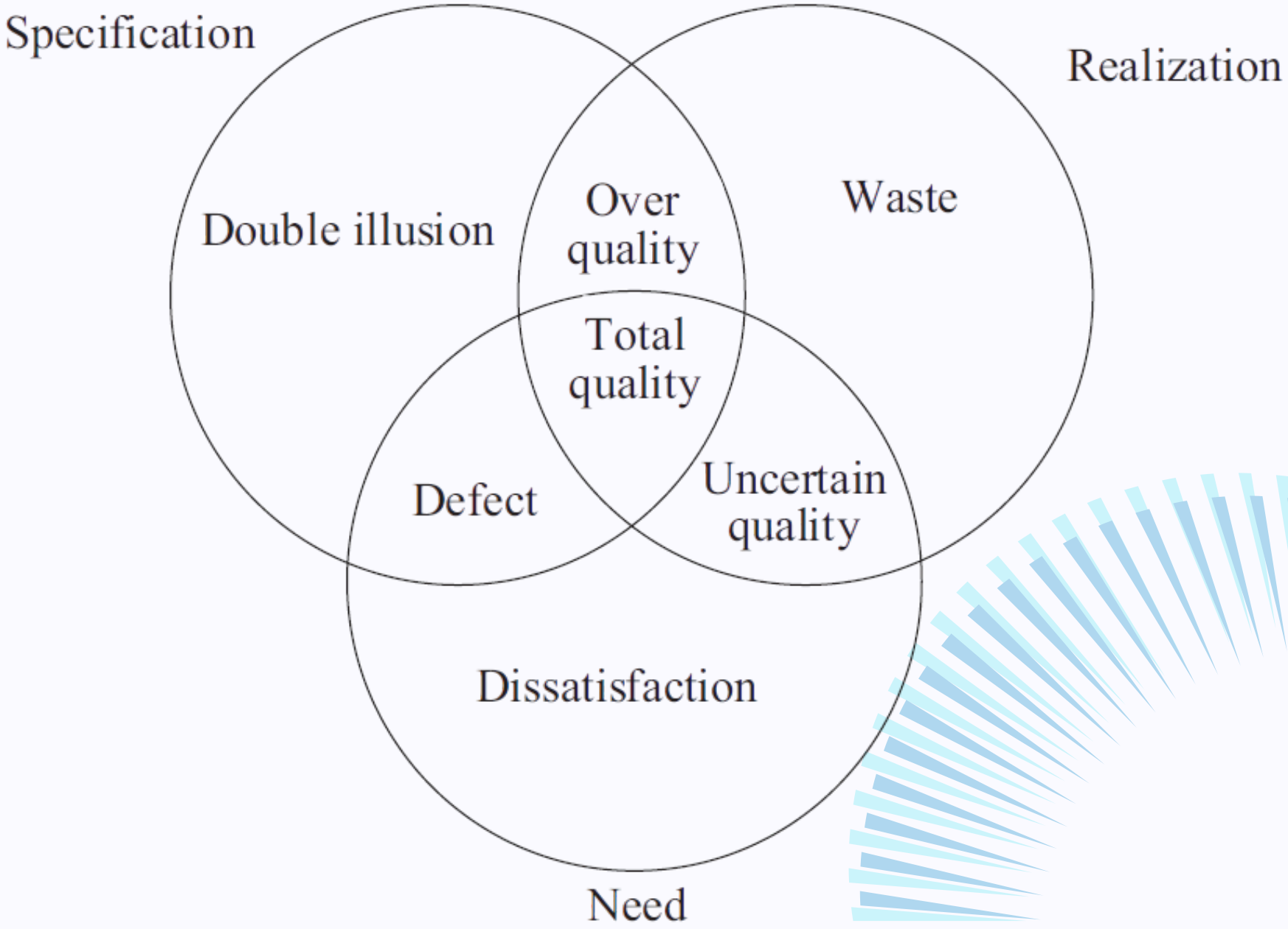
VALIDATION SAFEGUARDS THE ORGANIZATION.

SPECIFICATION → VERIFICATION

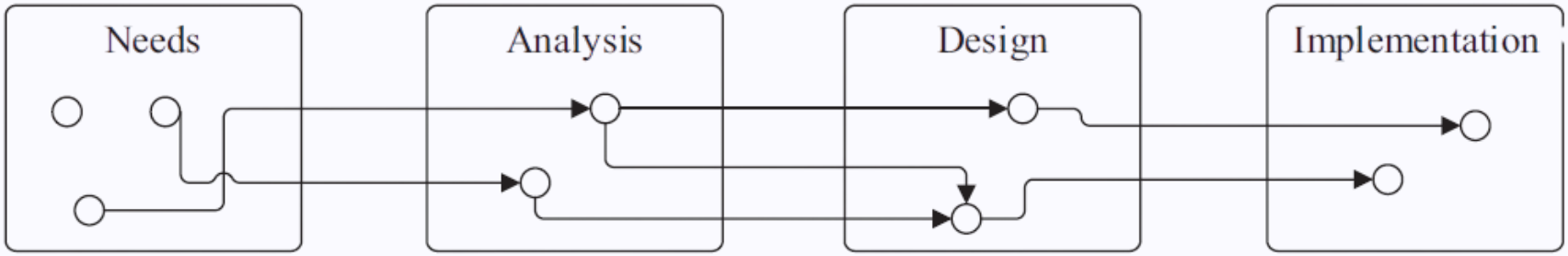
QUALITY ASSURANCE → VERIFICATION + VALIDATION

NEGOTIATION & DECISION → VALIDATION

TOTAL QUALITY IN REQUIREMENTS ENGINEERING



CONTINUITY MANAGEMENT



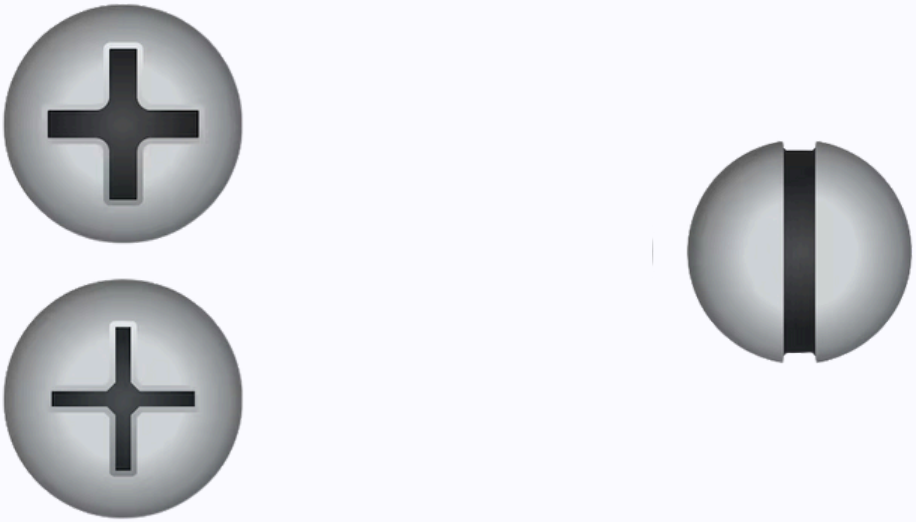
NEEDS
THESE REPRESENT THE OBJECTIVES OF THE ORGANIZATION FOR WHICH YOU ARE EMPLOYED.

ANALYSTS
ITS FORMALIZATION AND INTERPRETATION INTO FUNCTIONAL REQUIREMENTS. CERTAIN ASPECTS OF THE BUSINESS NEED WILL BE EXCLUDED FROM THE SCOPE.

DESIGN.
THE IMPLEMENTATION MODEL WILL MEET THE FUNCTIONAL REQUIREMENTS. THIS MODEL WILL DELINEATE THE FEATURES THAT THE SOLUTION WILL ENCOMPASS.

IMPLEMENTATION
THE PHYSICAL IMPLEMENTATION (THE CODE) PRODUCED TO MEET THE FUNCTIONAL REQUIREMENTS.

WHEN CONTINUITY IS DISRUPTED



WHEN CONTINUITY IS DISRUPTED

CAM OUT (ALSO CAM-OUT OR CAMMING OUT) IS A PROCESS BY WHICH A SCREWDRIVER SLIPS OUT OF THE HEAD OF A SCREW BEING DRIVEN ONCE THE TORQUE REQUIRED TO TURN THE SCREW EXCEEDS A CERTAIN AMOUNT.[1] REPEATEDLY CAMMING OUT DAMAGES THE SCREW, AND POSSIBLY ALSO THE SCREWDRIVER, AND SHOULD NORMALLY BE AVOIDED.

THE NARRATIVE SURROUNDING THE NUMBER

* CONTEXT

The numbers convey meaning, albeit not in straightforward terms. Your task is to decipher the narrative behind a singular key performance indicator (KPI). Each number encapsulates a human experience—be it success, struggle, or silence. By delving into the nuances, you will reveal varying degrees of necessity.

* EXERCISE

Select a key performance indicator (KPI) and develop hypotheses to discern the various levels of underlying needs. Subsequently, based on these hypotheses, recommend the subsequent phases for delineating requirements.

- Team morale temperature: 42°C
- Data Ocean turbidity: 76%
- Customer Echo Index: 1.4x
- Heart Rate: 58 BPM

* REFLECTION

What insights have you gained regarding the fundamental needs of the data? In what ways can storytelling uncover concealed risks or expectations? How will this influence your approach to gathering requirements? Condense your primary observation into a single sentence.

THE ANALOGY OF THE SWEATER AND THE SHEEP.

THE ANALOGY OF THE SWEATER AND THE SHEEP.

THE ANALOGY OF THE SWEATER AND THE SHEEP.

THE ANALOGY OF THE SWEATER AND THE SHEEP.

Problem/Need

Solution

THE COMPARISON OF THE SWEATER AND THE SHEEP.

Problem/Need

Solution

Subject / Domain

Usage

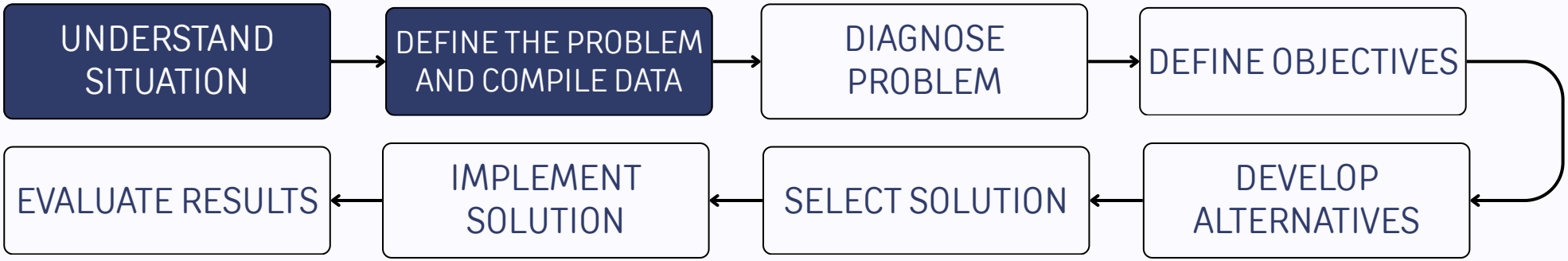
System

THE ANALOGY OF THE SWEATER AND THE SHEEP.

IN SCOPE → FONCTIONNAL DEFINITION/USAGE → TECHNICAL DEFINITION

OUT OF SCOPE → FRUSTRATION, V2, WORKAROUND, TECHNICAL DEBT

THE DECISION-MAKING PROCESS



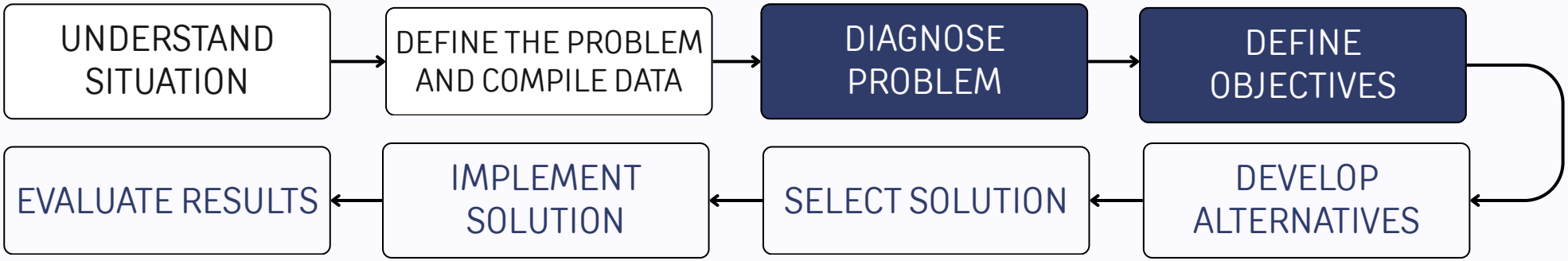
UNDERSTAND SITUATION

UNDERSTAND SITUATION MARKS THE COMMENCEMENT OF THE PROCESS. WE POSSESS A RELATIVELY CLEAR UNDERSTANDING THAT A PROBLEM REQUIRES RESOLUTION (OR WE SEEK TO ASCERTAIN ITS EXISTENCE).

DEFINE THE PROBLEM AND COMPILE DATA

WE NOW AIM TO VERIFY THE CONTEXT, VALIDATE THE INFORMATION GATHERED, AND CONFIRM ITS RELEVANCE TO THE ISSUE AT HAND. IT IS FREQUENTLY DURING THIS PHASE THAT USERS WILL EMPLOY DECISION-MAKING SYSTEMS. THE REPORT AND ANALYSIS WILL OFFER THEM INSIGHT INTO THE PROBLEM ORIGINALLY CONCEIVED.

THE DECISION-MAKING PROCESS



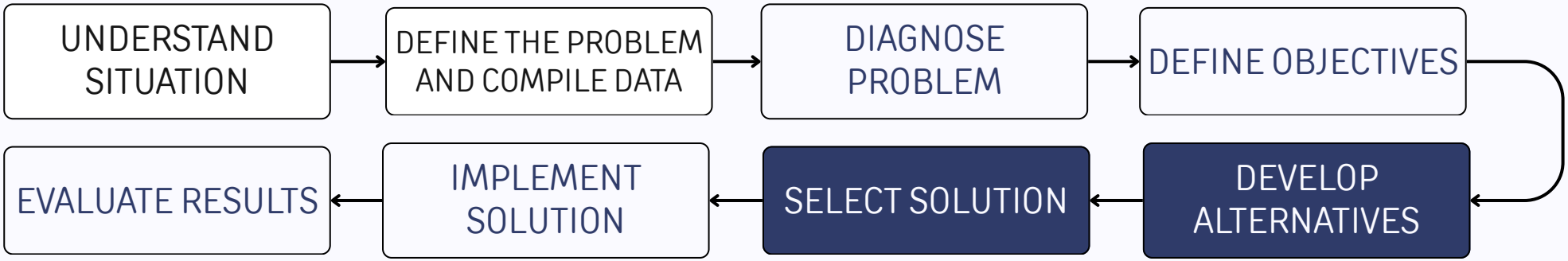
DIAGNOSE PROBLEM

SUBSEQUENTLY, ALL INFORMATION—WHETHER DERIVED FROM THE DECISION-MAKING SYSTEM OR OTHERWISE—ALONG WITH ITS CONTEXT AND CREDIBILITY, MUST BE SYSTEMATICALLY ORGANIZED TO CLEARLY DEFINE THE PROBLEM THAT REQUIRES RESOLUTION.

DEFINE OBJECTIVES

ONCE THE PROBLEM IS IDENTIFIED, A SOLUTION WILL BE FORMULATED. WHAT DOES IT SIGNIFY TO BE FREE OF THE PROBLEM?

THE DECISION-MAKING PROCESS



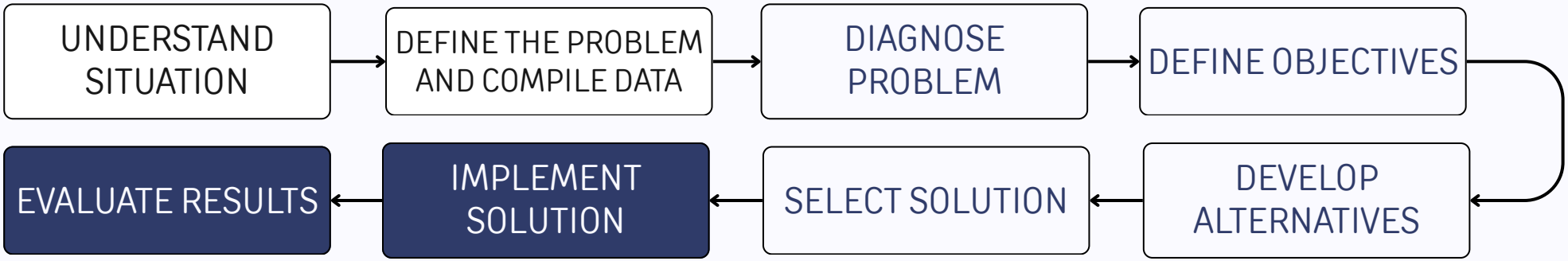
DEVELOP ALTERNATIVES

WE WILL EVALUATE VARIOUS STRATEGIES AND ALTERNATIVES FOR ADDRESSING THE ISSUE. WE WILL OUTLINE THEIR BENEFITS AND DRAWBACKS.

SELECT SOLUTION

WE MUST NOW SELECT FROM THE HYPOTHETICAL OPTIONS CONSIDERING THE OBJECTS, ADVANTAGES, DISADVANTAGES, AND CONSEQUENCES.

THE DECISION-MAKING PROCESS



IMPLEMENT SOLUTION

WE WILL IMPLEMENT THIS OPTION OR THESE OPTIONS IN AN EFFORT TO ADDRESS THE INITIAL PROBLEM.

EVALUATE THE RESULTS

THE RESULTS OBTAINED WILL BE ASSESSED IN RELATION TO THE PREVIOUSLY ESTABLISHED OBJECTIVES. IF THEY ARE NOT ALIGNED, A NEW CYCLE WILL BE INITIATED.

PARADOXICAL CHOICE GAME
DECISION-MAKING PROCEDURE

CONTEXT

You have been engaged as a business analyst to address a decision-making crisis at BlueStream Logistics. Three key performance indicators (KPIs) present three distinct perspectives. Management is divided, deadlines are imminent, and the project is losing focus. Thoroughly analyze the data and assist the team in arriving at a decision that integrates logic and sound judgment.

EXERCISE

Key Performance Indicator (KPI) A — Operational Effectiveness

- On-time delivery rate: 74% (Target: 90%)
- Average delivery cost per order: €17.40 (down from €19.80)
- Warehouse utilization rate: 97% (significant congestion)

KPI SET B — Client Experience

- Customer complaints: +18% this quarter.
- Customer satisfaction score (CSAT): 3.4/5 (decreased from 4.1)
- Net recommendation score: -12

Stakeholder viewpoint

Operations Department: Guarantee business continuity. You equate quality with efficiency. You are cautious of subjective metrics such as satisfaction.
Finance Department: Your focus is exclusively on the cost implications. You perceive the BI project as excessively costly and assert that it must swiftly illustrate its return on investment.
Customer service: Our customers hold significant value. Do you believe that management overlooks user complaints and overestimates internal performance metrics?
IT/BI Department: Maintain a neutral yet assertive stance concerning the data. You guarantee consistency and accuracy while others engage in discussions about its interpretation.

Output

Following your group discussion, please provide a brief response:

- Which key performance indicator (KPI) have you prioritized, and what is the rationale behind your choice?
- What bias or emotional factor impacted your decision?
- Did your team achieve consensus with ease? What were the reasons for this?
- What factors would you require to make a more objective decision?

REFLECTION

Which key performance indicator (KPI) did you prioritize, and what was the rationale behind your choice? What biases or emotional factors impacted your decision-making process? Did your team achieve consensus with ease? If so, why? What resources or information would you require to facilitate a more objective decision?

KAHOOT!

THE TECHNIQUES

SYSTEMATIC IMPACT ASSESSMENT
DEPENDENCY ANALYSIS
SCENARIO ANALYSIS
STAKEHOLDER ASSESSMENT
ANALYTICAL DOCUMENTARY
VALUE, COST, AND RISK TRADE-OFF
WORKSHOPS
STRUCTURED NEGOTIATION SEMINARS
BPMN
ORGANIZED BRAINSTORMING
BROWN COW MODEL
APPLICATIONS
TEST CASES GENERATED FROM SPECIFICATIONS
REQUIREMENTS CATALOG
FORMAL CHANGE REQUEST
QUALITY ASSESSMENT CHECKLISTS
CLASSIFICATION OF REQUIREMENTS (BUSINESS, USER, FUNCTIONAL, NON-FUNCTIONAL)
PAIRWISE COMPARISON
WRITING DESK TEAM
ACCEPTANCE CRITERIA
DESIGN THINKING
EKD/CMM
ELM
FACILITATED GUIDANCE
REQUIREMENTS TEMPLATES
OBJECTIVE TREES
GOAL-ORIENTED REQUIREMENTS ENGINEERING (GORE)
DEPENDENCY GRAPHS
HIGH / MEDIUM / LOW

CONFLICT IDENTIFICATION
PERSONAL INTERVIEWS
ROLE-PLAYING GAMES
STRUCTURED NATURAL LANGUAGE
LINKS: PREREQUISITES ↔ GOALS ↔ ASSESSMENTS
MAPS
FUNCTIONAL MODELS
TRACEABILITY MATRIX
STRUCTURED MEDIATION
DELPHI TECHNIQUE
DATA MODELS
OBJECTIVE-DRIVEN FRAMEWORKS
MOSCOW
FIELD OBSERVATION
PEOPLE
MULTI-CRITERIA PRIORITIZATION
PROTOTYPING
VALIDATION PROTOTYPING QUESTIONNAIRES REPRIORITIZATION
REQUIREMENTS EVALUATIONS
APPLICATION CONTEXTS
SIX THINKING HATS
STORYTELLING
PRELIMINARY EXPLORATORY ASSESSMENTS
UML (CLASS DIAGRAMS, SEQUENCE DIAGRAMS, ACTIVITY DIAGRAMS)
USER STORIES (VALIDATED IN RE@AGILE) VALUE VERSUS RISK MATRIX
DEMONSTRATIONS
WIREFRAMES

SMART OBJECTIVES

SPECIFIC,

MEASURABLE,

ATTAINABLE (OR ACCEPTABLE),

REALISTIC (OR RELEVANT),

TIME-BOUND.

EVALUATED/EVALUABLE

REVISABLE (REVISE/REVISION)

SMART REQUIREMENTS CHALLENGE

* CONTEXT

Budget reductions. Data vulnerabilities. Compressed timelines.
BlueStream Logistics must complete its decision-making dashboard prior to the upcoming management review. The budget has been reduced by 25%, and concerns regarding data reliability have arisen. Your objective is to establish a SMART requirement that will ensure the company remains on course despite these limitations. This requirement should be Specific, Measurable, Achievable, Relevant, and Time-bound.

* EXERCISE

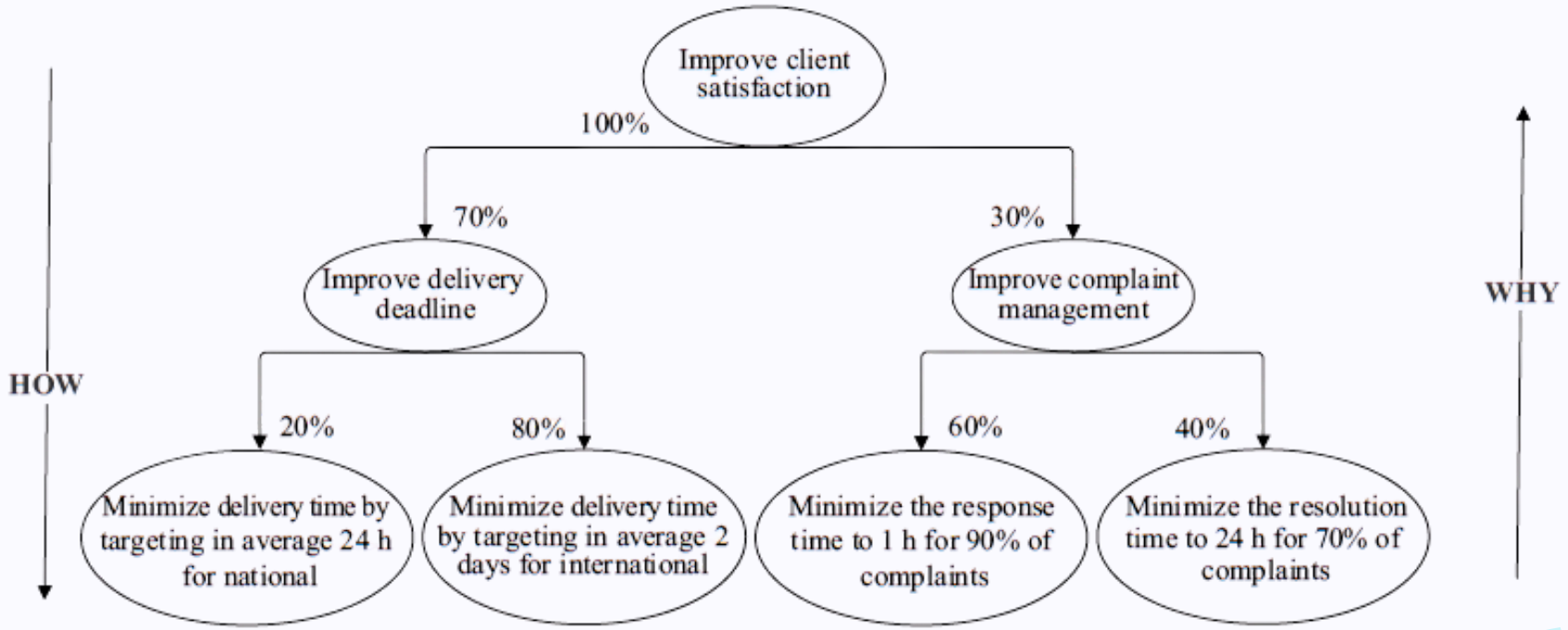
Within your team, formulate a SMART requirement that:

1. Responds to a stakeholder requirement.
2. Adhere to the revised budget.
3. Mitigates risk or uncertainty.
4. Is quantifiable and can be verified.

* REFLECTION

Which constraint proved to be the most challenging to adhere to?
The expense, the hazard, or the duration?
What rendered your requirement SMART?
How did your team navigate risk in high-pressure situations?
What actions would you take differently in the future?

OBJECTIVE TREES



OBJECTIVE TREES

"REFINE".
THERE EXISTS A DISTINCTION IN ABSTRACTION BETWEEN THE TWO OBJECTIVES. ONE FACILITATES THE CONTRIBUTION TO THE REALIZATION OF THE OTHER.

"AND".
BOTH OBJECTIVES, CONNECTED BY AN "AND" RELATIONSHIP, MUST BE ACCOMPLISHED FOR THE PRIMARY GOAL TO BE REALIZED. EACH PLAYS A ROLE IN THE ATTAINMENT OF THE OVERARCHING GOAL.

"OR".
ONE OF THE TWO OBJECTIVES CONNECTED BY AN "OR" RELATIONSHIP MUST BE ACCOMPLISHED FOR THE PRIMARY GOAL TO BE ATTAINED.

“CONFLICT”.
THE TWO OBJECTIVES CANNOT BE ATTAINED CONCURRENTLY, AS THEY ARE INHERENTLY CONTRADICTORY.

GOAL TREES – ELEKTRA

DEMONSTRATES STRONG ADAPTABILITY IN DECISION-MAKING.

EACH OBJECTIVE MUST COMMENCE WITH A VERB FROM THE FOLLOWING LIST:

- SUSTAIN
- STOP
- IMPROVE
- ADD
- INTRODUCE
- EXTEND
- ADOPT
- REPLACE

GOAL TREE - EXERCISE

CONTEXT

Your organization has established the following strategic objective: "Enhance the customer satisfaction score by 5% by the conclusion of the second quarter."

Management anticipates that this objective will manifest as tangible actions throughout all levels of the organization. Your task is to convert this overarching intention into a cohesive and actionable framework of objectives.

EXERCISE

Articulate the strategic objective prominently at the top of your page or mockup.

Identify two to four managerial-level objectives that directly support this strategy.

For each management objective, delineate one to three operational objectives.

Ensure that:

Each objective possesses a distinct meaning. Each objective is articulated clearly and without ambiguity.

The degree of granularity is adjusted according to its position within the hierarchy.

You may construct the objective tree at your discretion, ensuring that the relationships are clearly defined.

What is the effect of hierarchy on this process?

What is the effect of dependencies among requirements on the process?

What should you do if you genuinely prefer that a requirement not be prioritized? How do you respond?

REFLECTION

Which objectives proved to be the most challenging to articulate clearly?

Where did you identify any potential conflicts or ambiguities?

What would occur if one operational objective were optimized to the detriment of others?

GOAL TREES AND KEY PERFORMANCE INDICATORS

THE GOAL 👉 ARTICULATES A STRATEGIC INTENTION.
IT ARTICULATES OUR OBJECTIVES, THE RATIONALE BEHIND THEM, AND THE INTENDED DIRECTION.

- IT IS QUALITATIVE OR SEMI-QUANTITATIVE IN NATURE.
- IT IMPARTS SIGNIFICANCE.
- IT IS FORWARD-LOOKING.
- IT IS FREQUENTLY ARTICULATED AT THE STRATEGIC OR TACTICAL LEVEL.

👉 ASSESSES ADVANCEMENT TOWARD AN OBJECTIVE.
HE ADDRESSES THE INQUIRY: "HOW CAN WE ASCERTAIN WHETHER WE ARE MAKING PROGRESS?"

IT IS QUANTITATIVE IN NATURE.
IT IS QUANTIFIABLE.
IT IS GROUNDED IN OBSERVABLE DATA.
IT IS UTILIZED FOR NAVIGATION AND DECISION-MAKING.

GOAL TREE AND KPI – EXERCISE

✳ CONTEXT

BlueStream's management team asserts that success will stem from "a 25% increase in customer engagement." The goal is to assess whether the key performance indicator is clear, measurable, and attainable.
In groups of three, introduce yourselves to the key performance indicators (KPI) tribunal.

✳ EXERCISE

Key performance objective: "Enhance customer engagement by 25% this quarter."
Background:

- Engagement has remained consistent over the past two quarters.
- The term "commitment" is applied inconsistently across different teams.
- No reference or monitoring mechanism had been established in advance.
- Management anticipates prompt outcomes to meet investor expectations.
- The marketing team gathers the data on a weekly basis, while the IT team updates it on a monthly schedule.

The prosecution contends that the key performance indicator is unrealistic, ambiguous, or politically driven. It underscores the absence of data, the vagueness, and the presence of concealed motives.

The defenders contend that the key performance indicator is either valid or subject to enhancement.
Propose enhancements to render it measurable or attainable.

The judge evaluates the arguments impartially and assigns a credibility score to the key performance indicators (ranging from 0 to 5). He facilitates the final deliberations and documents the decision. (A)

Criterion	Score (0-5)	Notes

✳ REFLECTION

- What was the most compelling argument presented during the debate?
- Did you reconsider your position during the discussion? If so, what prompted that change?
- What renders a key performance indicator (KPI) genuinely objective and quantifiable?
- How can discussions of this nature enhance BI governance? (Consider the TRIAL process.)

SYNTACTIC AND GRAMMATICAL ANALYSIS

SYNTACTIC AND GRAMMATICAL ANALYSIS

Not sexy enough?

SYNTACTIC AND GRAMMATICAL ANALYSIS

That is requirement engineering under steroid!
Here are strategies to enhance your LLM proficiency.

SYNTACTIC AND GRAMMATICAL ANALYSIS

The ambiguities may stem from:

- Glossary: Each concept must be defined by a singular taxonomy. Two terms may refer to the same entity; a single word may possess dual meanings.

- Anaphora, pronouns, and generic nouns

  Paul collaborates with Pierre; he has encountered his sister.

- Scope: Occasionally, the terminology employed is deliberately broad. This is especially true in the legal domain; legal articles must be applicable to all enterprises and sectors of activity.

SYNTACTIC AND GRAMMATICAL ANALYSIS

What are our activities?

“Context, context, context” (*) indeed, but there is more to consider...

(*) source experts chat GPT – November 2022

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

<Verb>$_{verb}$ <Parameters>$_{function}$ (*)

the parameters may define

- an “Object”
- a “Result”
- a “Reference”
- a “Source”
- a “Direction”
- a “Manner”
- a “Mean”
- “Quality”
- a “Beneficiary”
- a “Place”
- a “Time”.

(*)Pratt 1997

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The "Object" refers to one or more entities influenced by the goal. It/They exist prior to the attainment of the goal.

(Elevate) $_{verb}$ *(the mean basket)* $_{object}$.

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The “Result” comprises one or more entities influenced by the goal, which do not exist prior to the attainment of the goal.

(Create) $_{verb}$ *(sales report)* $_{result}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The reference: it delineates the entity concerning which the objective is established.

(Create) $_{verb}$*(the new clients)*$_{reference}$ *(sales report)*$_{result}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The source constitutes the information that underpins the objective.

(Create) $_{verb}$*(the new clients)*$_{reference}$ *(sales report)*$_{result}$

(from the CRM database and ad hoc files)$_{source}$

SYNTAX AND GRAMMAR ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

Direction represents the data destination.

(Create) $_{\text{verb}}$(the new clients)$_{\text{reference}}$ (sales report)$_{\text{result}}$

(from the CRM database and ad hoc files)$_{\text{source}}$, (stored in the shared folder) $_{\text{direction}}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The manner outlines the way by which the objective can or should be accomplished.

(Create) $_{verb}$*(the new clients)*$_{reference}$ *(sales report)*$_{result}$ *(from the CRM database and ad hoc files)*$_{source}$, *(stored in the shared folder)* $_{direction}$, *(automatically)*$_{manner}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The means refers to the instrument utilized in attaining the objective.

(Create) $_{verb}$*(the new clients)*$_{reference}$ *(sales report)*$_{result}$ *(from the CRM database and ad hoc files)*$_{source}$, *(stored in the shared folder)* $_{direction}$, *(automatically)*$_{manner}$ *(using SSRS)* $_{means}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

Quality refers to the standard to be attained or preserved.

(Create) $_{\text{verb}}$(the new clients)$_{\text{reference}}$ (sales report)$_{\text{result}}$ (from the CRM database and ad hoc files)$_{\text{source}}$, (stored in the shared folder) $_{\text{direction}}$, (automatically)$_{\text{manner}}$ (using SSRS) $_{\text{means}}$ (with 98 percent data accuracy)$_{\text{quality}}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

The beneficiary: the individual or group that will gain from the realization of this objective.

(Create) $_{verb}$(the new clients)$_{reference}$ (sales report)$_{result}$ (from the CRM database and ad hoc files)$_{source}$, (stored in the shared folder) $_{direction}$, (automatically)$_{manner}$ (using SSRS) $_{means}$ (with 98 percent data accuracy)$_{quality}$, (accessible by the commercial manager)$_{beneficiary}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

Location: Position the objective within a spatial context; this may encompass a virtual environment.

(Create) $_{\text{verb}}$(the new clients)$_{\text{reference}}$ (sales report)$_{\text{result}}$ (from the CRM database and ad hoc files)$_{\text{source}}$, (stored in the shared folder) $_{\text{direction}}$, (automatically)$_{\text{manner}}$ (using SSRS) $_{\text{means}}$ (with 98 percent data accuracy)$_{\text{quality}}$, (accessible by the commercial manager)$_{\text{beneficiary}}$ (on his tablet)$_{\text{location}}$

SYNTACTIC AND GRAMMATICAL ANALYSIS: AN ILLUSTRATION OF OBJECTIVES

Time: places the objective within a temporal context.

(Create) $_{verb}$(the new clients)$_{reference}$ (sales report)$_{result}$ (from the CRM database and ad hoc files)$_{source}$, (stored in the shared folder) $_{direction}$, (automatically)$_{manner}$ (using SSRS) $_{means}$ (with 98 percent data accuracy)$_{quality}$, (accessible by the commercial manager)$_{beneficiary}$ (on his tablet)$_{location}$(every Monday before 9:00 a.m. GTZ time)$_{time}$

SYNTACTIC AND GRAMMATICAL ANALYSIS EXERCISE

Conduct a syntactic analysis of your goal tree.

EKD

EKD IS A METHODOLOGY FOR ENTERPRISE KNOWLEDGE MANAGEMENT (ENTERPRISE KNOWLEDGE MANAGEMENT).

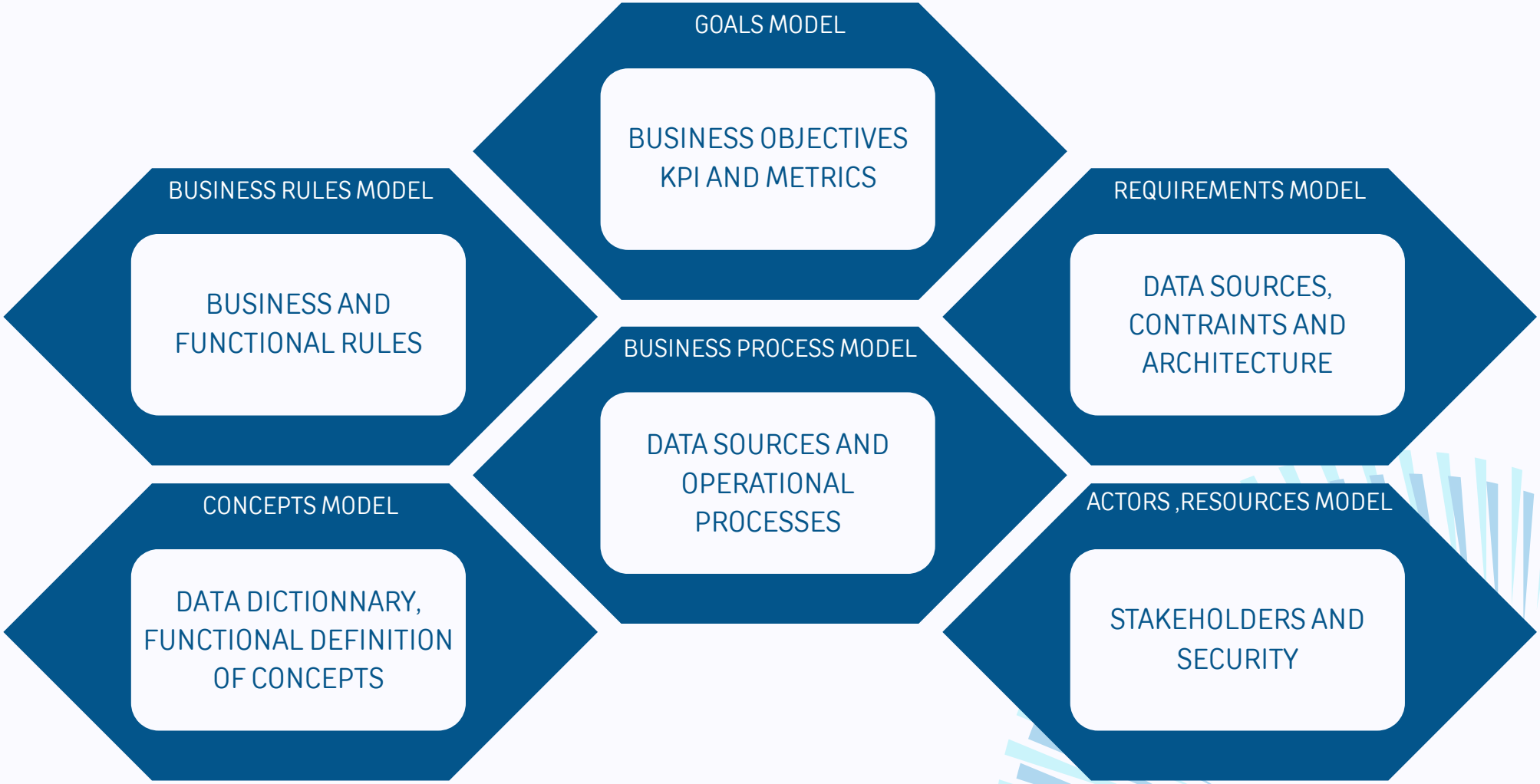
1980 TO 2000 IN SWEDEN

THIS METHOD INTRODUCES, FOR THE FIRST TIME, THE NOTION OF "BUSINESS GOALS" (FUNCTIONAL OBJECTIVES). THIS INNOVATION ENABLES, FOR THE FIRST TIME, THE MODELING OF STAKEHOLDER AND ORGANIZATIONAL INTENTIONS. CONSEQUENTLY, IT WILL ALSO BE POSSIBLE TO EVALUATE WHETHER THE IMPLEMENTED PROCESSES ALIGN WITH THE ORGANIZATION'S NEEDS.

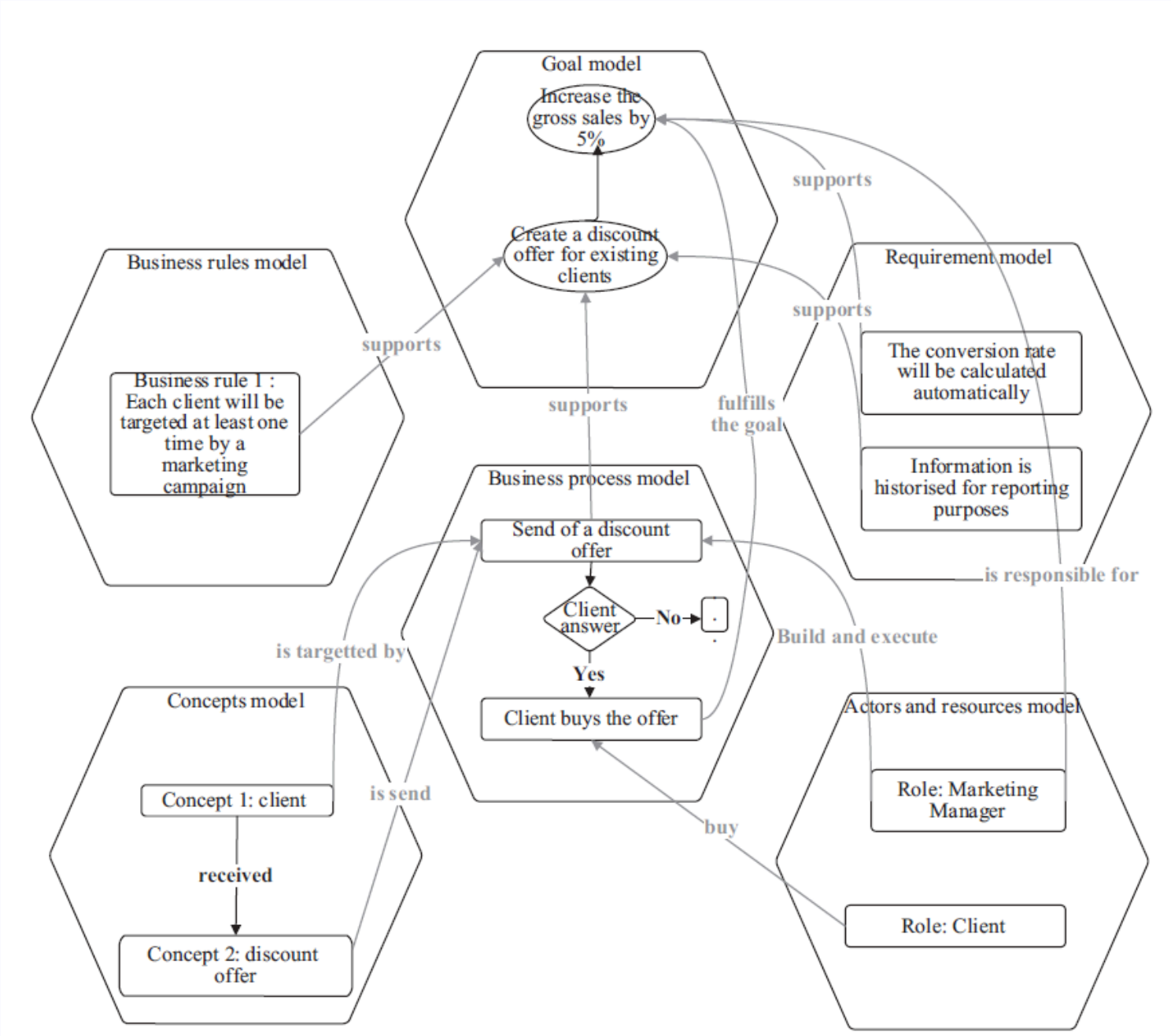
THE FRAMEWORK DEVELOPED UNTIL THE EARLY 2000S, AFTER WHICH IT STABILIZED. IT COMPRISES TWO COMPONENTS: A LANGUAGE AND A MODELING PROCESS.

EKD – THE MODELS

THE EKD LANGUAGE COMPRISES SIX SUB-MODELS THAT COLLECTIVELY CONSTITUTE A GLOBAL MODEL:



EKD – ILLUSTRATION



EKD-CMM

CMM IS A METHODOLOGY THAT OFFERS A SYSTEMATIC FRAMEWORK FOR COMPREHENDING, ANTICIPATING, AND MANAGING THE IMPACTS OF CHANGE, GROUNDED IN EXISTING EKD MODELS. IT EXTENDS BEYOND TECHNICAL CHANGE, EXPLICITLY ADDRESSING HUMAN AND ORGANIZATIONAL TRANSFORMATION.

EKD-CMM

ANALYSIS OF THE EXISTING CIRCUMSTANCES (AS-IS)

- ESTABLISHED ORGANIZATION.
- PROCESSES, RESPONSIBILITIES, AND ESTABLISHED REGULATIONS.
- EXISTING LIMITATIONS.

DEFINITION OF THE DESIRED OUTCOME (TO-BE)

- OBJECTIVES.
- INNOVATIVE PROCEDURES.
- REVISED RESPONSIBILITIES.

EKD-CMM

RECOGNIZING MODIFICATIONS

- ORGANIZATIONAL MODIFICATIONS.
- PROCESS MODIFICATIONS.
- ROLE MODIFICATIONS.
- TRANSFORMATIONS IN INFORMATION SYSTEMS.

IMPACT ANALYSIS

- IMPACT ON STAKEHOLDERS.
- IMPACT ON COMPETENCIES.
- IMPACT ON METHODOLOGIES.
- INFLUENCE ON GOVERNANCE.

TRANSITION STRATEGY

- IMPLEMENTATION PROCEDURES.
- SUPPORT INITIATIVES.
- RESISTANCE MANAGEMENT.

CREW L'ECRITOIRE

THE CREW L'ECRITOIRE METHOD OF WRITING IS A COLLABORATIVE APPROACH TO PROOFREADING AND ENHANCING REQUIREMENTS, DRAWING INSPIRATION FROM COLLECTIVE WRITING PRACTICES, WHEREIN A SMALL GROUP COLLABORATES TO ELEVATE THE QUALITY OF A TEXT WHILE PRESERVING ITS ORIGINAL INTENT.

ROLES

- THE AUTHOR ARTICULATES THE REQUIREMENT AND HIS INTENTION WITHOUT OFFERING A DEFENSE.
- CREW: REVIEWS, INTERROGATES, REPHRASES, SUGGESTS ENHANCEMENTS.
- FACILITATOR (OPTIONAL) GUARANTEES ADHERENCE TO THE REGULATIONS.

CREW L’ECRITOIRE

FUNDAMENTAL PRINCIPLES

WE CRITIQUE THE TEXT, NOT THE AUTHOR.

THE DISCUSSION CENTERS NOT ON THE SOLUTION ITSELF, BUT RATHER ON THE PHRASING.

THE AUTHOR ATTENTIVELY LISTENS, RECORDS NOTES, AND DETERMINES THE NECESSARY MODIFICATIONS.

THE PROPOSALS ARE SPECIFIC AND RESTRUCTURED, RATHER THAN ABSTRACT.

STREAMLINED PROCEDURE

REVIEWING THE REQUIREMENTS.

COMPREHENSION INQUIRIES.

IDENTIFICATION OF AMBIGUITIES AND DEFICIENCIES.

RECOMMENDATIONS FOR REPHRASING.

ENHANCED ITERATION OF THE REQUIREMENT.

CREW L'ECRITOIRE – THE FRAMEWORK

C — CONTEXT

WHO IS IMPACTED?

IN WHAT CIRCUMSTANCES?

AT WHAT STAGE IN THE PROCESS?

R — RATIONALE

WHAT IS THE RATIONALE BEHIND THIS REQUIREMENT?

WHAT GENUINE ISSUE ARE WE ENDEAVORING TO ADDRESS?

E — PREREQUISITE

THE REQUIREMENT ITSELF, ARTICULATED WITH CLARITY IN THE ABSENCE OF AN IMPLICIT TECHNICAL SOLUTION UNAMBIGUOUSLY

W — VERIFICATION

(WITNESS / WHAT SUBSTANTIATES IT)

HOW WILL WE ASCERTAIN THAT THE REQUIREMENT HAS BEEN FULFILLED?

WHAT OBSERVABLE CRITERION SUBSTANTIATES THIS?

CREW L'ECRITOIRE – EXERCISE

✳ CONTEXT

In numerous projects, requirements often fail not due to the inadequacy of the solution, but rather because the requirements were inadequately articulated. Ambiguous language, implicit assumptions, and insufficient justification lead to misunderstandings, rework, and concealed risks. To mitigate these issues, analysts must employ a stringent writing framework that compels them to clarify: for whom the requirement is intended, the rationale for its existence, the specific needs, and the criteria for verifying success. The CREW (Context, Justification, Requirement, Evidence) method offers such a framework. It functions as a writing "office" that fosters clear thinking prior to the commencement of technical design.

✳ EXERCISE

"We require a more efficient management dashboard."

Reformulate this statement into a comprehensive and clear requirement utilizing the CREW structure.

- Step 1 – Context: Elucidate the circumstances under which the requirement is applicable: Who is impacted? In which activity or process does it occur? At what time?
- Step 2 – Justification: Elucidate the rationale behind this requirement: What issue does it address? What challenges or constraints are presently encountered?
- Step 3 – Requirement: Articulate the requirement itself: Employ clear and precise language. Refrain from suggesting technical solutions unless explicitly necessary. Ensure that the meaning is unambiguous.
- Step 4 – Verification: Specify the method for verifying the requirement: What observable outcome demonstrates its fulfillment? Under what circumstances can it be confirmed?

Your final output must be a single, coherent CREW requirement that is clear and comprehensible without additional clarification.

✳ REFLECTION

Which aspect of the CREW structure proved to be the most challenging to finalize? What were the reasons?
Did this structure uncover any assumptions that you initially accepted as given?
How has the distinction between justification and requirement altered your formulation?
How does this approach mitigate ambiguity and the risks associated with the project?

5W 2H

CUISINE
SALLE DE BAL
VÉRANDA
SALLE DE BILLARD
SALLE À MANGER
BIBLIOTHÈQUE
SALON
HALL
BUREAU

5W 2H

Where?

Who?

When?

What?

Why?

How?

How much?

5W 2H - EXERCISE

Select a business process characterized by various levels of granularity and employ the 5Ws and 2Hs framework. (This may pertain to a model developed during the "Business Process Engineering and Management" course.)

INTERVIEWS

It may be free, semi-structured, or structured.

Always be prepared for the interview!

Each stakeholder will have the opportunity to articulate their views independently.

The interview facilitates the consideration of each perspective independently, free from external influence.

Interviews are instrumental in shaping a high-level project. They facilitate an understanding of the concerns of various stakeholders and the topics that need to be addressed, along with the operational specifics.

To be conducted effectively, an interview must remain impartial. Another significant limitation is that the workload correlates directly with the number of stakeholders involved. This method does not facilitate the utilization of collective intelligence.

INTERVIEWS

Techniques derived from law enforcement interrogations:

- Free storytelling: the objective is to allow the individual to express themselves without interruption.

- Open-ended questions: this phase enables the interviewer to pose inquiries that steer the discussion and concentrate on the aspects that appear to be priorities.

- Specific inquiries: the domain is now precisely defined; it is a matter of elucidating specific details.

INTERVIEWS

CONTEXT

Welcome to the BI interview marathon. BlueStream Logistics requires details regarding the specifications of its new BI system. As a member of the functional analyst team, your objective is to interview key stakeholders, each offering a unique perspective on the project. Your challenge is to pose the appropriate questions, recognize biases, and extract pertinent information.

EXERCISE

Objective: to perform two brief interviews and uncover contradictions, implicit assumptions, and gaps in information.

In groups of three, cut out the cards from the second page and arrange them in a stack, face down.
Each of you will conduct a brief interview with two stakeholders without reviewing their profile sheets.
The analyst seeks to uncover the objectives and requirements of the individuals interviewed.

Round	Question asked	Stakeholder answer	Observation/Assumption

REFLECTION

Which question provided the most pertinent information? Which misconception caught you off guard? What bias did you identify—whether your own or that of the stakeholder? How might you enhance your listening and note-taking abilities?

6 HATS THINKING

WHITE
FACTS
Information & Data

RED
FEELINGS
Intuition & Gut Instinct

BLUE
PROCESS
Planning & Action

YELLOW
BENEFITS
Potential & Uses

GREEN
CREATIVITY
Possibility & Alternatives

BLACK
CAUTIOUS
Difficulties & Dangers

6 HATS THINKING – EXERCISE

CONTEXT

Business intelligence decisions are inherently multifaceted, encompassing human, ethical, organizational, and political dimensions, which frequently result in tension and misunderstandings. In numerous instances, conflicts arise not from divergent opinions but from the interplay of various modes of thought: facts, emotions, risks, creativity, and management.

EXERCISE

In groups of six, you will examine two intentionally polarizing proposals utilizing the six hats method.
Each student dons colored glasses that correspond to a particular mode of thinking. Switch glasses between statements.

- "Employee data will be utilized to predict burnout."
- "Customers' emotions will be automatically deduced from the data."
- "A robust KPI is more dependable than subjective impressions."
- "An indicator that has not been utilized for three months will be automatically removed."
- "Data quality holds greater significance than the speed of delivery."
- "A poorly shared KPI is preferable to a well-regarded KPI that is overlooked."

In groups, create a summary sheet that includes:
1 to 2 key concepts per heading
A conclusive recommendation (adopt, reject, adapt, experiment)

REFLECTION

Which thinking hat did you find most challenging to utilize? Why? What aspects would have been overlooked without this approach? In what ways did the differentiation of thinking hats enhance the quality of the discussion? How can this technique be beneficial in a steering committee or project meeting?

ELM

ELM REFERS TO THE ENSEMBLE LOGICAL MODEL. EMP CONSTITUTES A THREE-STEP PROCESS. IT SERVES AS THE MODELING PHASE PRECEDING A DATA VAULT-TYPE IMPLEMENTATION.

1. ARTICULATE THE FUNDAMENTAL BUSINESS CONCEPTS (NOUNS, VERBS)
2. CLASSIFY: EVENT, INDIVIDUAL, LOCATION, OBJECTS, ADDITIONAL CONCEPTS
3. ELIMINATE REDUNDANCIES OF SYNONYMS AND AMBIGUITY.
4. FOR EACH EVENT, CONNECT EACH OCCURRENCE.

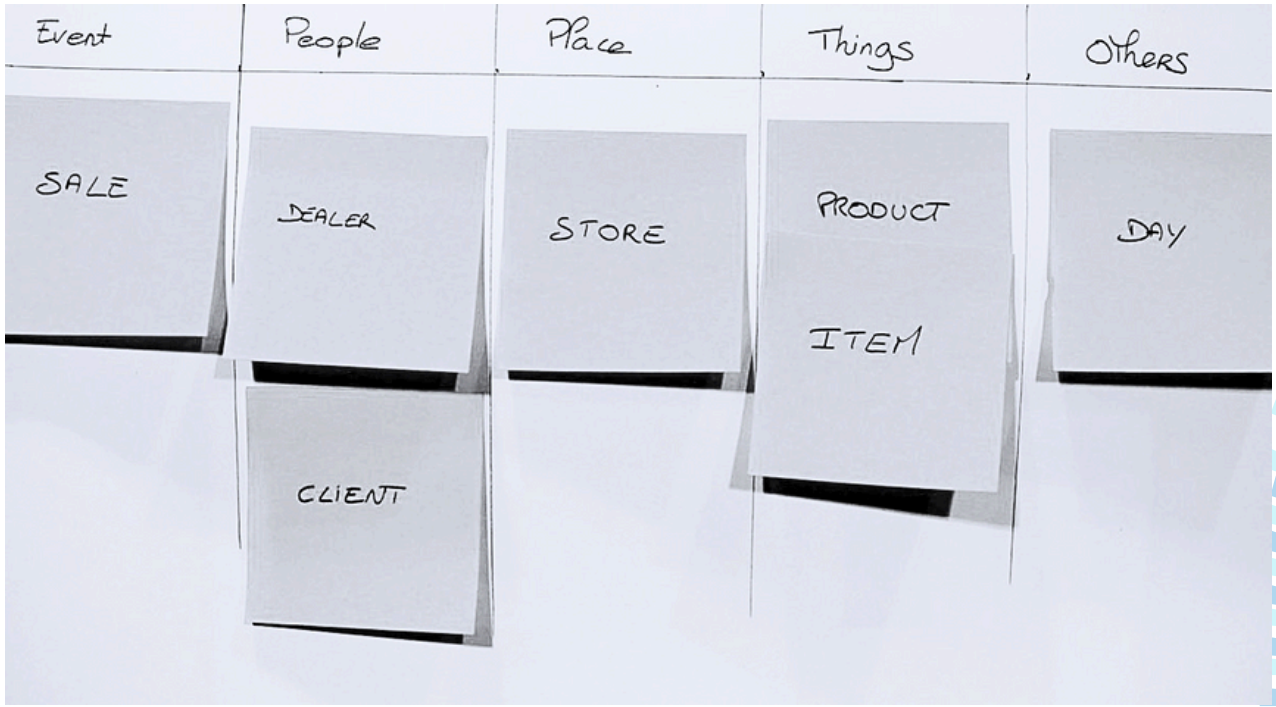
WITH ITS COMMERCIAL CONCEPTS

ELM

THE INITIAL STEP IN IDENTIFYING THE FUNDAMENTAL CONCEPTS INVOLVES LISTING EACH CONCEPT ON STICKY NOTES; THIS ACTIVITY IS REFERRED TO AS "FACILITATION." WHILE IT IS NOT A MODEL IN ITSELF, IT SERVES AS AN ELICITATION AND BRAINSTORMING PHASE.

ELM

THE COMPILATION OF FUNDAMENTAL CONCEPTS AND THE CATEGORIZATION LIST: THESE CONCEPTS WILL SUBSEQUENTLY BE ORGANIZED INTO FIVE GROUPS: EVENTS, PEOPLE, PLACES, THINGS, AND OTHER CONCEPTS. THIS WILL ENABLE US TO IDENTIFY, IN PARTICULAR, WHETHER CATEGORIES LACK ASSOCIATED CONCEPTS OR IF TWO CONCEPTS WITHIN THE SAME CATEGORY ARE, IN FACT, SYNONYMS.



ELM

WE WILL SUBSEQUENTLY OUTLINE THE RELATIONSHIPS THAT CONNECT EVENTS TO VARIOUS CONCEPTS. THIS WILL FORM THE INITIAL DRAFT OF THE "BACKBONE" OF THE DATAVAULT MODEL.

ELM

WE WILL DELINEATE ALL THE ATTRIBUTES AND THE CONTEXT OF EACH CONCEPT.

ELM EXERCISE

CONTEXT

Before data can be stored, reported, or analyzed, it must first be understood.
Many modeling problems arise because teams focus too early on tables, fields, and technical structures, without clarifying what the business is actually talking about.
The ELM (Entity–Lifecycle–Model) helps avoid this trap. It represents how a business entity comes into existence, changes state, and eventually disappears, based on meaningful business events. This exercise helps you practice thinking in lifecycles, not schemas.

EXERCISE

You are given the following business situation:
"A dairy farm tracks cattle from birth until they leave the farm. Animals may be vaccinated, become sick, produce milk, and eventually be sold or transferred."
Your task is to model this situation using the ELM approach.
Step 1 – Identify the EntityDetermine. the main business entity: What is the central object of interest? What exists over time and changes state? Write down one primary entity.
Step 2 – Identify States. List the main states this entity can be in. Examples of guiding questions: When does the entity start to exist? Which stable situations can it be in? When does it stop being relevant?
Step 3 – Identify Events. Identify the events that cause transitions between states: What business actions or occurrences trigger a change? Which events are meaningful from a business perspective? Use verbs, not system actions.
Step 4 – Build the ELM Diagram. Draw an ELM diagram showing: The entity, Its states, The events linking the states, Keep it simple and readable.
Deliverable

- One ELM diagram representing the entity lifecycle
- A short explanation of: chosen states, key events

REFLEXION

- Which stats were the hardest to define? Why?
- Did you identify events that were initially implicit?
- How does ELM modeling differ from traditional data modeling?
- How can this model support BI, governance, or traceability?

PROTOTYPING AND WIREFRAME

	Profond	Large	Pourquoi
Low-fi	+	+++	Tester une organisation, une structure
Medium-fi	++	++	Tester une interface avec des utilisateurs
High-fi	+++	+	Tester une difficulté technique

PROTOTYPING AND WIREFRAMING – EXERCISE

CONTEXT

In many projects, solutions are discussed in abstract terms: documents, specifications, or verbal explanations. This often hides misunderstandings and delays feedback until it is too late.

Prototyping offers a different approach. By making ideas visible early, even in a rough form, teams can test assumptions, uncover missing requirements, and align understanding before investing heavily in development.

This exercise uses low-fidelity prototyping to support thinking and discussion, not aesthetic design.

EXERCISE

You are asked to create a simple prototype for the following situation: “Users say they need a better way to understand and act on performance data.” Your goal is not to build the final solution, but to explore what ‘better’ might mean.

Step 1 – Clarify Assumptions

Before drawing anything, discuss: Who is the user? In which situation will the prototype be used? What decision or action should it support? Write down your assumptions.

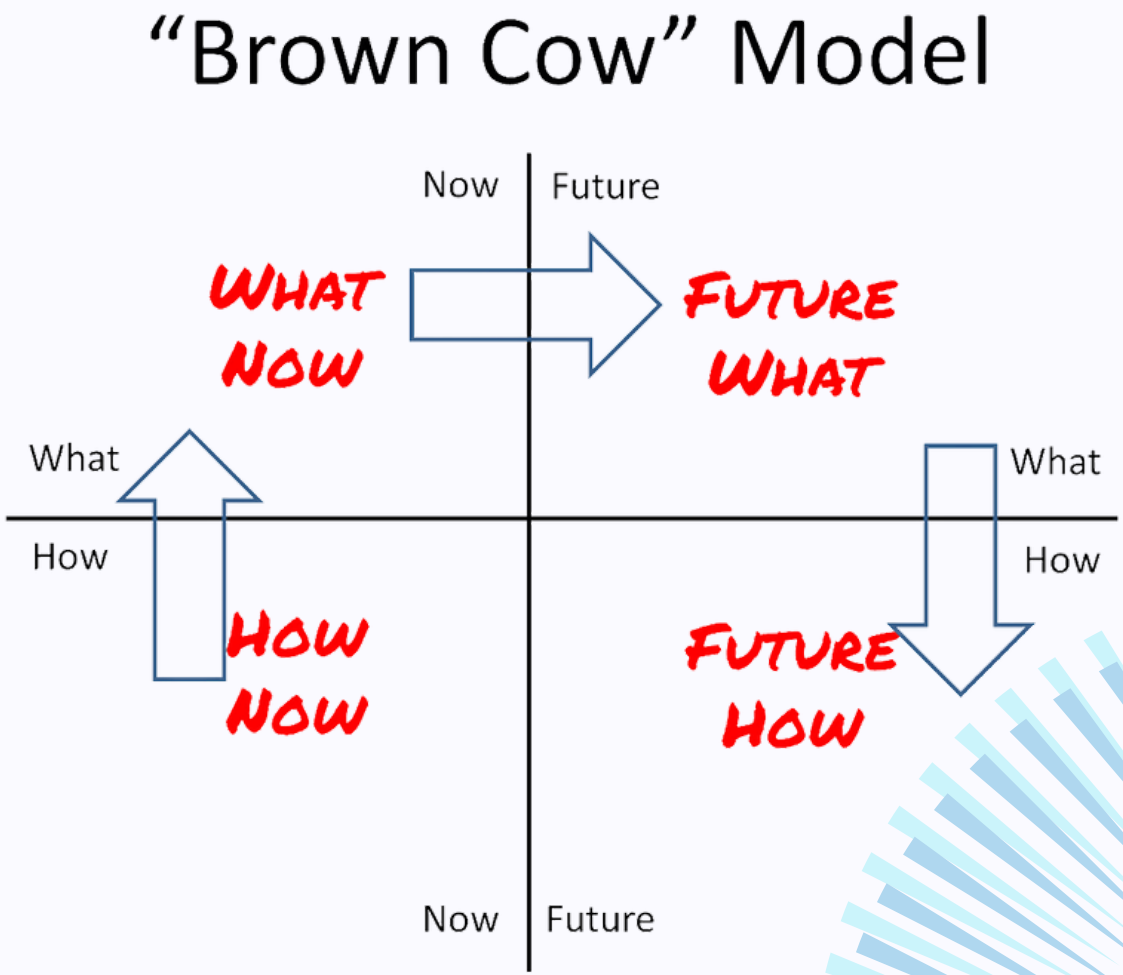
Step 2 – Build a Low-Fidelity Prototype. Create a rough prototype: Use paper, sticky notes, or basic shapes Focus on structure, information, and interactions Avoid details such as colors, fonts, or aesthetics The prototype should be easy to change or discard.

Step 3 – Test and Refine Present your prototype to another group or to the class: Explain what the prototype is supposed to support, Collect feedback and questions, Adjust the prototype based on what you learned Deliverable One low-fidelity prototype, A short list of assumptions tested, insights gained, questions that remain open

REFLEXION

- What assumptions did the prototype make visible?
- Which misunderstandings appeared once the prototype was shown?
- How did feedback change your understanding of the problem?
- How can prototyping reduce risk in requirements engineering?

BROWN COW MODEL

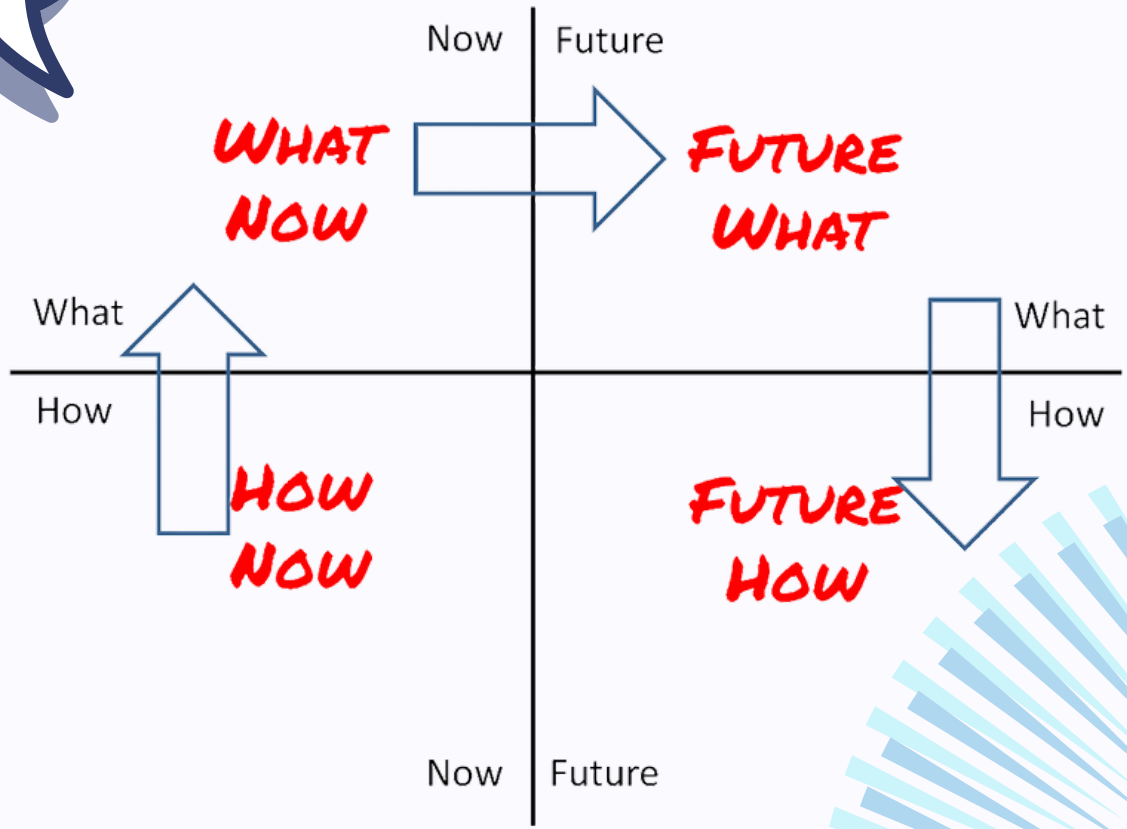


From: Robertson & Robertson (2013)

BROWN COW MODEL

WHY DOES THIS MATTER TO YOU?

"Brown Cow" Model



From: Robertson & Robertson (2013)

BROWN COW – EXERCISE

CONTEXT

You are working with a cattle farmer who relies on a dashboard to monitor herd health, productivity, and operational risks.

The data is available and technically correct, but the way it is presented influences how the farmer understands the situation and acts upon it. In this exercise, you will analyze a dashboard prototype to understand how visual design, KPI selection, and layout affect decision-making.

EXERCISE

Your objective is not to change the data, but to critically analyze how the information is displayed and how this influences user behavior.

Work individually first, then in a small group.

1. Observe the dashboard HOW-NOW
2. Interpret the design and needs behind WHAT -NOW
3. Identify risks and blind spots to propose a futur WHAT- FUTUR
4. Propose improvements for the futur HOW-FUTUR

REFLEXION

- Which quadrant was the hardest to complete? Why?
- At which step did your understanding of the problem change?
- How would your solution differ if you skipped one quadrant?

THE DELPHI METHOD

THE DELPHI METHOD AIMS TO SEPARATE IDEAS FROM THEIR ORIGINATORS, ENSURING EACH CONCEPT IS EVALUATED ON ITS MERITS, FREE FROM BIAS OR PRECONCEIVED JUDGMENTS ABOUT THE PERSON PROPOSING IT.

- DEFINE THE SUBJECT
- SELECT STAKEHOLDERS
- CREATE THE QUESTIONNAIRE
- DISTRIBUTE THE QUESTIONNAIRE
- ANALYZE AND SYNTHESIZE RESPONSES : DISAMBIGUATION,ANONYMIZATION, SUMMARIZATION
- PRIORITIZATION

THE DELPHI METHOD – EXERCISE

✳ CONTEXT

You are part of BlueStream's future strategy panel. Your mission: forecast which BI priorities will have the greatest impact over the next 5 years. But there's a twist — you must form consensus without open discussion. Through three silent rounds, your team will learn how structured iteration builds agreement and clarity.

✳ EXERCISE

Individually, rank the BI priorities below from 1 (most impactful) to 5 (least). (O)
Do not discuss your answers. This round is purely independent judgment.

Data Democratization	Data Quality Automation
Predictive Analytics	Single Source of Truth Initiative
AI Ethics & Transparency	Privacy-by-Design Architecture
Data Literacy Training	Self-Service BI Enablement
Real-Time Dashboards	Employee Behavioral Analytics

what is the impact of hierarchy in the process?
What is the impact of requirement dependencies in the process?
What if you really do not want a requirement to be prioritize, how do you behave?

✳ REFLEXION

Did your opinion change across rounds? Why? How did the feedback affect your confidence? What did you learn about consensus and independence? How could the Delphi method support BI governance decisions?

MOSCOW

MUST

Essential features that are critical for the application to operate effectively and fulfill its primary purpose.

User registration and authentication | Customized training programs | Instructional videos

SHOULD

Features that offer considerable added value yet are not critical for the launch.

Push notifications. Integration with mobile devices.

COULD

Desirable features that can enhance the user experience, though not essential for initial success.

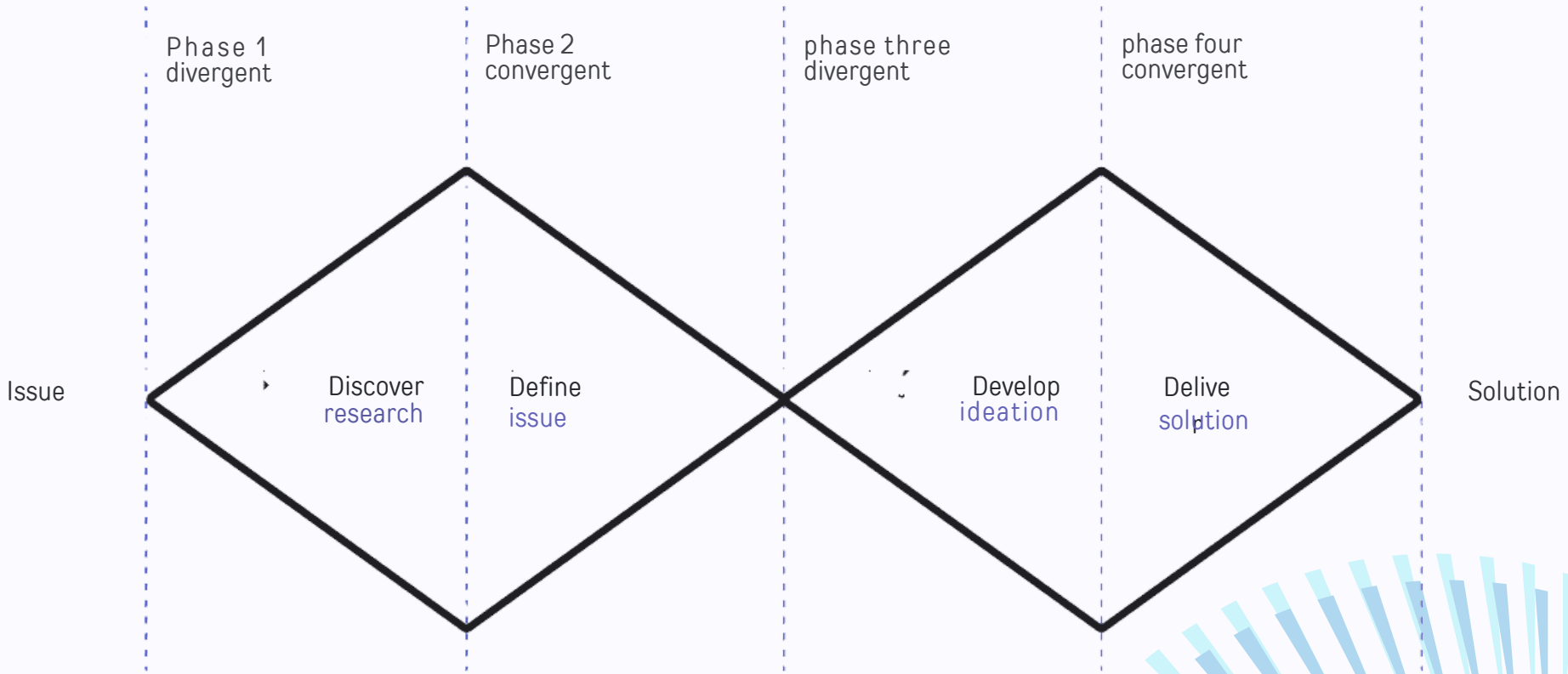
Gamification and features for social media sharing

WON'T

Features that do not align with immediate objectives or that can be incorporated at a later stage.

Backlog monitoring

DESIGN THINKING



DESIGN THINKING – EXERCISE

✳ CONTEXT

In many projects, teams rush toward solutions as soon as a problem is mentioned.
Dashboards are redesigned, tools are replaced, indicators are added — often without questioning whether the real problem has been correctly understood. Design Thinking offers a different approach. It starts with the user's experience, explores needs and frustrations, and reframes the problem before any solution is discussed. This exercise helps you experience that shift in mindset.

✳ EXERCISE

You will work in a small group on the following situation:
"Users say the BI dashboard is not useful and rarely consulted."
Your task is to explore this situation using a Design Thinking approach.

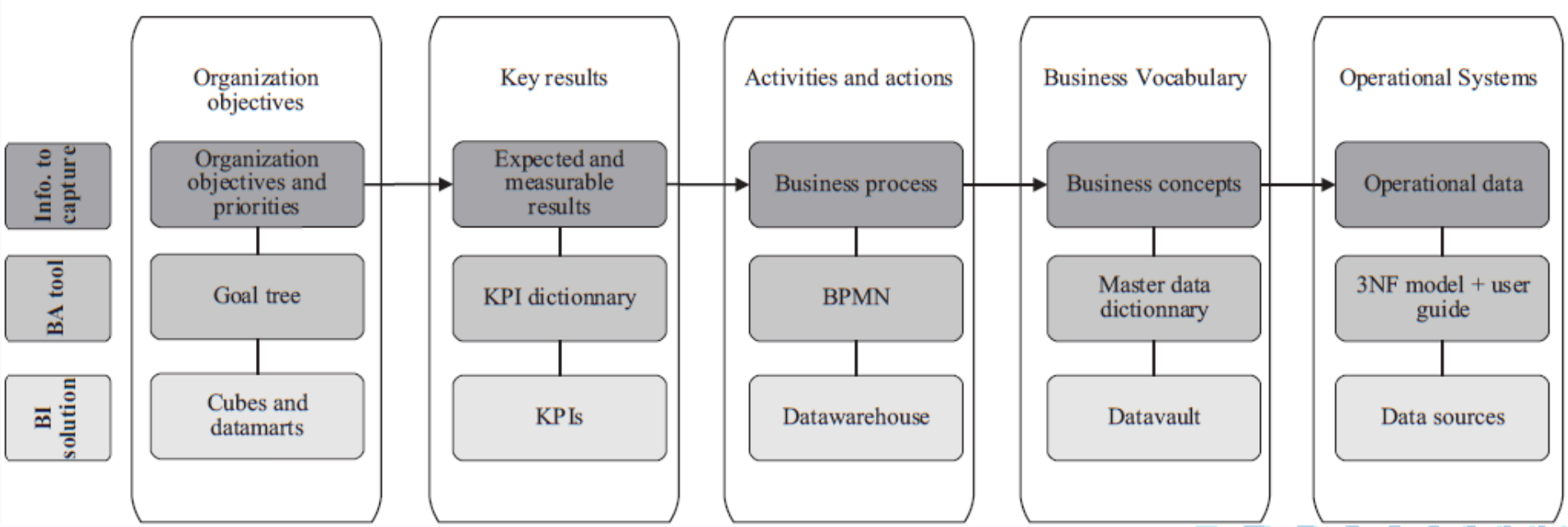
Deliverable

- A short user description
- One reframed problem statement
- A list of alternative perspectives or ideas

✳ REFLEXION

- At which step did your understanding of the problem change?
- Which assumptions were hardest to let go of?
- How did focusing on the user alter your thinking?
- How could this approach improve requirement definition and BI design?

REQUIREMENTS ENGINEERING AND DATA GOVERNANCE



REQUIREMENTS ENGINEERING AND DATA GOVERNANCE

CONTEXT

Without governance, BI becomes a factory of conflicting numbers: different definitions, hidden assumptions, and decisions based on politics rather than evidence. Governance is what makes BI consistent, trusted, and sustainable.

EXERCISE

Using the same case as the strategy exercise, build BI governance step-by-step:

Step 1 — Scope & principles

Define what is governed (KPIs, definitions, data access, quality, changes) and 3 guiding principles.

Step 2 — Roles & ownership

Assign who owns what (KPI owner, data owner, steward, IT custodian, sponsor).

Step 3 — Decision rights

Define who can create/approve/retire KPIs and who approves definition changes.

Step 4 — Data quality controls

Choose 3 quality rules (e.g., completeness, timeliness, accuracy) and set simple thresholds + monitoring responsibility.

Step 5 — Change & escalation

Define how a KPI change request is submitted, reviewed, approved, communicated, and escalated when conflict arises.

Deliverable

A one-page governance summary with: roles, decision rights, quality rules, and change/escalation flow.

REFLEXION

- Which ownership decisions were most political? Why?
- Where could governance become too heavy—and how did you avoid it?
- What happens if KPI definitions change silently?
- Which single governance rule would you enforce first to create trust?

REQUIREMENTS ENGINEERING AND DATA STRATEGY

- SECURING AN EXECUTIVE SPONSOR
- DEFINING BUSINESS OBJECTIVES
- IDENTIFYING KEY STAKEHOLDERS
- CHOSSING A PLATFORM
- ASSESSING EXISTING ASSETS
- BENCHMARKING AND VALIDATION
- DEFINING BI AND TECHNICAL ROADMAPS (BI & TECHNICAL)
- ORGANIZING BI TEAM
- PREPARING DATA ARCHITECTURE

REQUIREMENTS ENGINEERING AND DATA STRATEGY

CONTEXT

Many BI initiatives fail because they start with tools and reports instead of strategy. Organizations invest in dashboards without clarifying what decisions they want to improve, which outcomes matter, and how to prioritize efforts. A BI strategy provides structure. It connects mission and priorities to decision needs, measurable results, data feasibility, and a delivery roadmap. This exercise guides you through that process step by step.

EXERCISE

You are advising "Aurora Food Aid", an NGO that distributes food packages across multiple regions. Demand is rising, funding is unstable, and operations must remain transparent to donors. Your mission: build a BI strategy that improves decision-making and reporting while staying realistic with limited resources. Follow the steps from the previous slides or this 5 simplified steps.

Step 1 — Clarify Mission and Stakeholders. Identify: The mission in 1 sentence, 3–5 key stakeholders (donors, operations, field teams, leadership, finance) Output: stakeholder list + mission statement.

Step 2 — Identify Decision Needs. For each stakeholder, define key decisions BI should support, such as: Where to allocate resources next month? Which regions show the highest unmet demand? Which suppliers are unreliable? Output: 5–8 decision questions.

Step 3 — Define BI Objectives and KPIs. Convert decision needs into strategic objectives and measurable KPIs.
Example: Objective: improve delivery reliability KPI: on-time delivery rate, shortage incidents, supplier lead time variance Output: 3–5 BI objectives + 2 KPIs per objective.

Step 4 — Data and Capability Check. List potential data sources and gaps: Existing spreadsheets? ERP? partner data? manual logs?Data quality risks? ownership? missing definitions? Output: data inventory + top 3 risks.

Step 5 — Roadmap and Priorities. Create a simple roadmap: Quick wins (0–3 months), Build foundations (3–6 months), Scale and govern (6–12 months) Output: 3-phase roadmap with priorities and rationale.
Deliverable: A one-page BI Strategy Summary containing: Mission + stakeholders, Decision needs, BI objectives + KPIs, Data sources + gaps, Roadmap

REFLEXION

Which stakeholder's needs were hardest to translate into KPIs? Why? Which objectives felt strategically important but data-wise unrealistic? Where did you see potential conflicts (transparency vs speed, cost vs quality, donors vs operations)? How does this exercise change your view of BI as a strategic capability?