The Requirements Process: An Overview

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Outline

1. The Big Picture
2. The Requirements Process in 6 Phases
3. The Role of Modelling

The Big Picture: Transforming the World

"The goal of software development is **not** to develop software; … it is to change the world!"

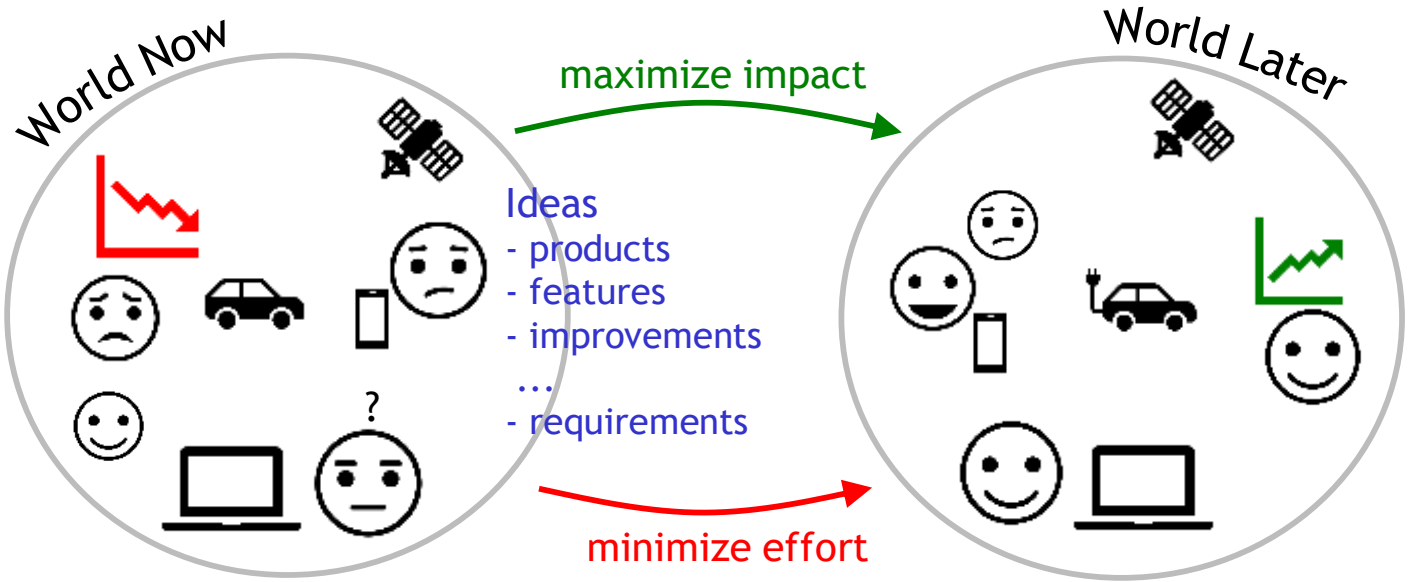
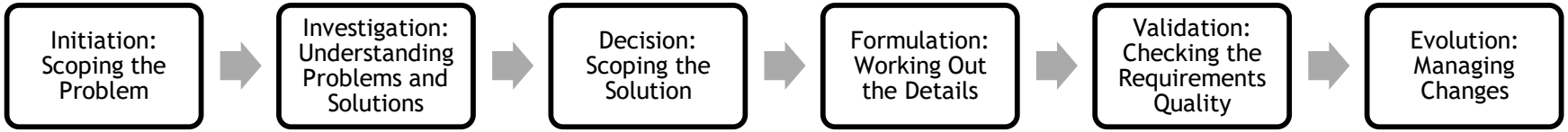


Figure and quote adapted from Jeff Patton, User Story Mapping, 2014.

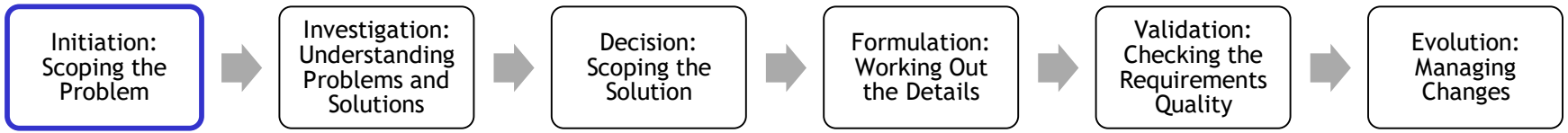
Requirements Engineering in 6 Phases



A linear order: earlier phases must happen before later phases.

Not a linear process: we never “finish” a phase, we move through the phases in waves.

Phase 1: Initiation



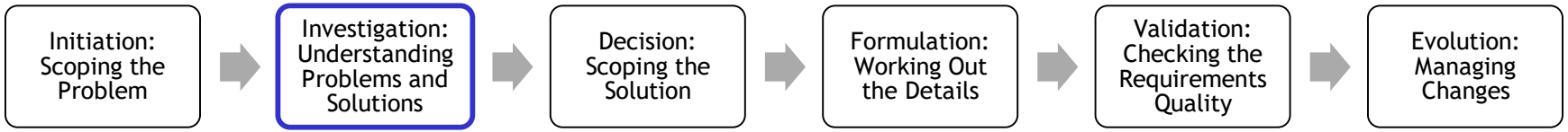
Objectives:

- define project goals and scope
- identify the main stakeholders
- decide whether the project is viable and worth pursuing

Techniques

- Specifying measurable goals
- Stakeholder onion diagram
- Context diagrams

Phase 2: Investigation (a.k.a. requirements elicitation)



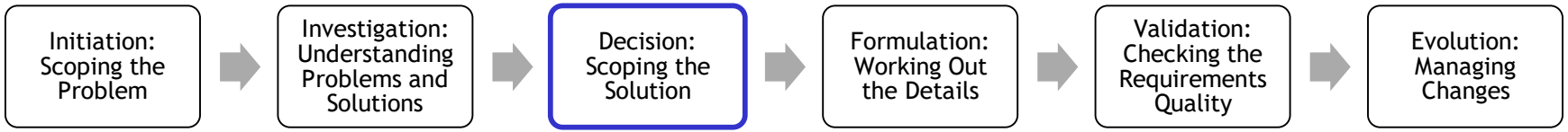
Objectives:

- understand the current situation (the World as-is)
- identify ideas and aspirations for the future situation (the World to-be)

Techniques:

- Background reading and data collection
- Interviews, workshops, surveys, observations
- Modelling the World as-is and to-be: domain scenarios, context diagram, process models, conceptual model

Phase 3: Decision (aka “requirements evaluation, negotiation, prioritization”)



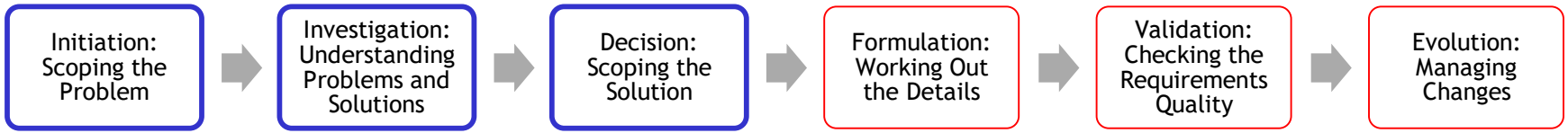
Objectives:

- Identify candidate features and qualities
- Estimate impacts of features and qualities on stakeholder goals
- Decide what features and qualities to build

Techniques:

- Impact mapping, user story mapping, strategic release planning
- Goal modelling
- Prototyping to test and compare ideas

Early phases vs. late phases requirements engineering



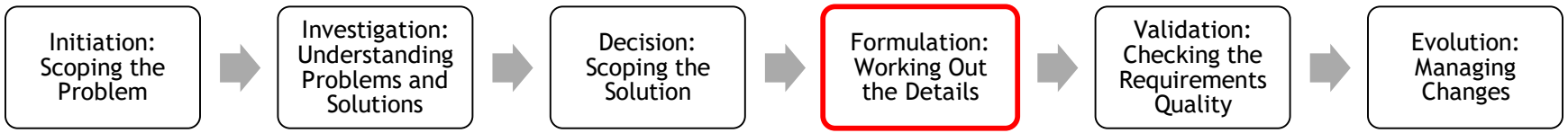
Early phases

- Main output = list of features and qualities.
  - request for proposals in client projects
  - product roadmap in product development
- Often led by systems engineers, business analysts, enterprise and software architects, or product owner.

Late phases

- Main output = detailed, testable requirements.
- Software development team tend to play a bigger and more active role.

Phase 4: Formulation ("requirements specification")



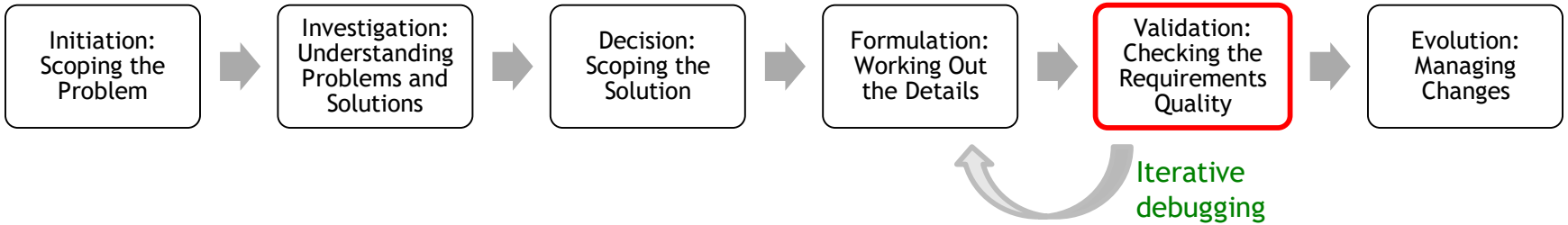
Objective:

- Define detailed, testable requirements for the machine's features and qualities

Techniques:

- Specification by example (Behaviour-Driven Development)
- Requirements templates
- Goal-oriented requirements specification
- Formal specification

Phase 5: Validation ("requirements quality assurance")



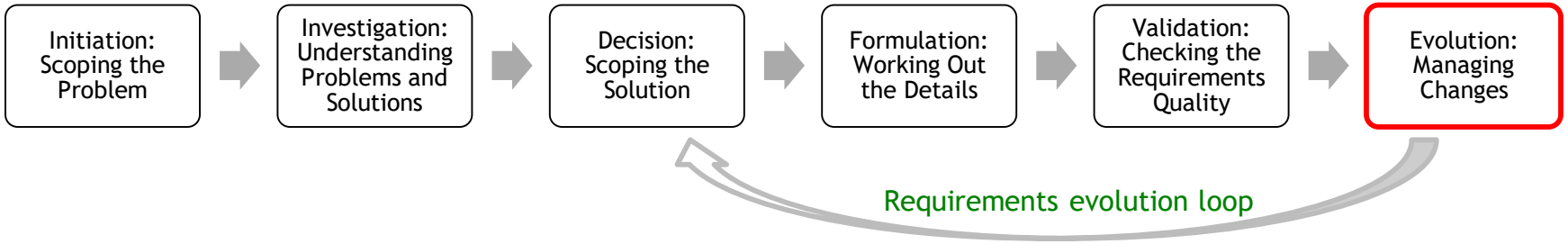
Objective:

- check the detailed requirements and remove errors

Techniques:

- Requirements reviews
- Goal-oriented requirements analysis
- Automated model simulation and verification

Phase 6: Evolution



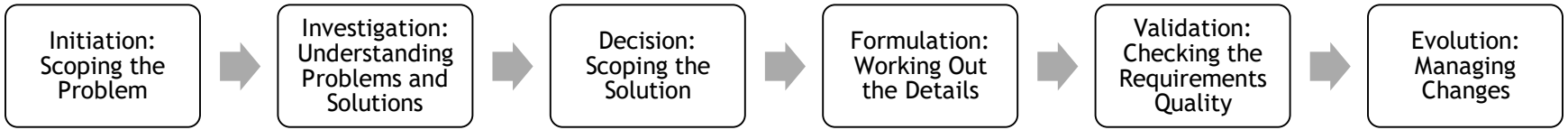
Objectives:

- evaluate the impacts on stakeholder goals after the software is deployed
- evolve the software to improve goal satisfaction and to respond to changes

Techniques:

- Run-time monitoring of goals, requirements and assumptions
- Collecting and analysing stakeholder feedback
- Traceability to support change impact analysis and change propagation

Two supporting activities



Requirements Modelling

Requirements Management and Traceability

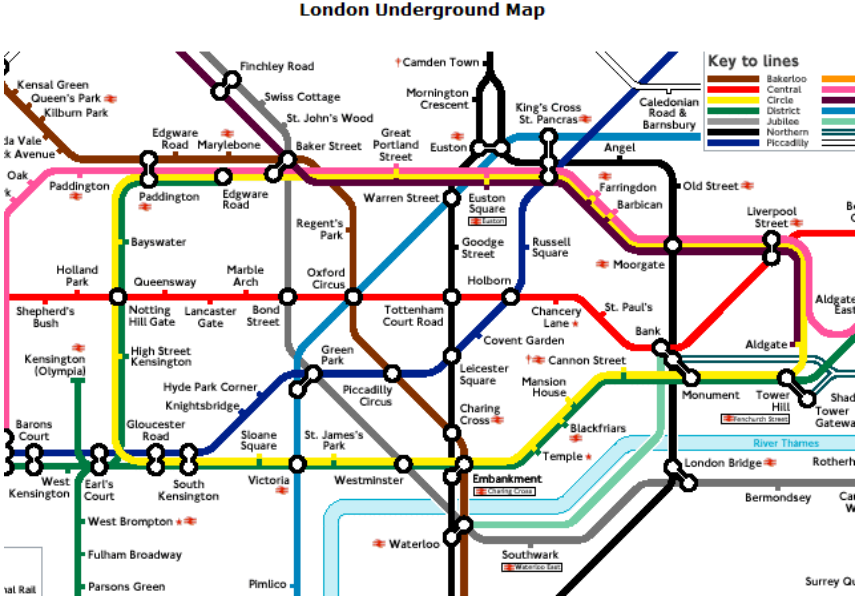
Modelling in the Requirements Process

Initiation	Context diagram, stakeholder onion diagram, goal model
Investigation	Domain scenario, context diagrams, process models, conceptual models, goal model
Decision	Goal model, impact map, story map
Formulation	Goal model, specification by example, state machines, formal requirements
Validation	Goal model, obstacle model, domain scenarios, state machines, formal requirements
Evolution	Goal model, obstacle model, scenarios, state machines, formal requirements

What is a model?

A model is a simplified description of a system or process

to assist understanding, communication and reasoning

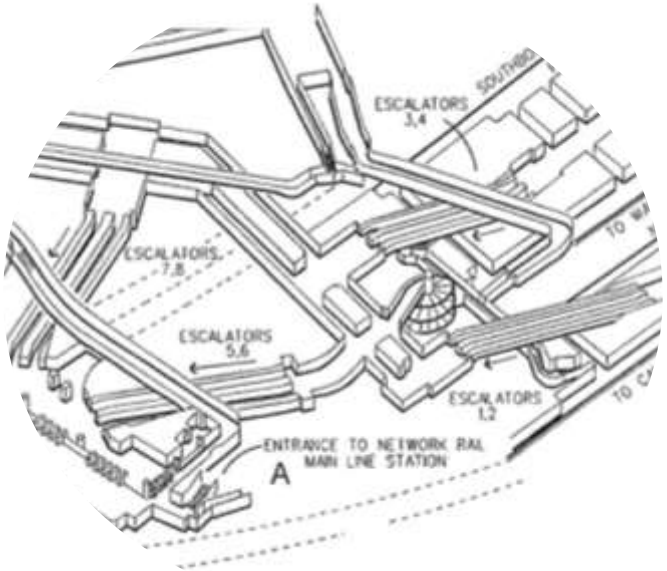


"All models are wrong, but some are useful"

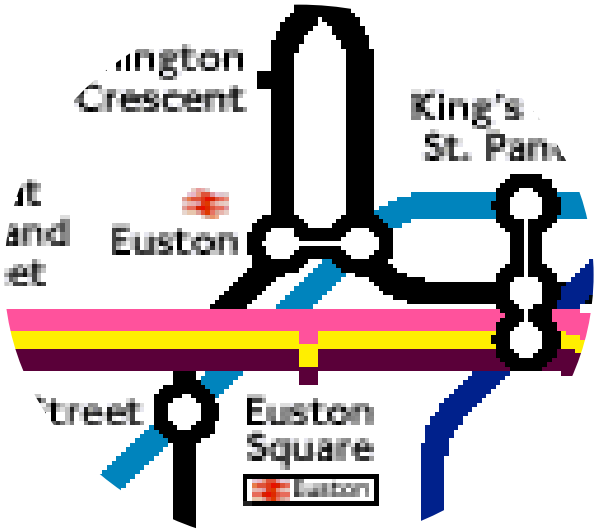
Modelling with Multiple Views

Complex systems are best described using multiple views

Euston Station Layout



Euston Station Lines



Main requirements models in this course

Goal Model

describes stakeholder goals and their refinements into subgoals, machine requirements and domain assumptions

Conceptual Model

defines entities, relationships, attributes and events of the World

Scenarios

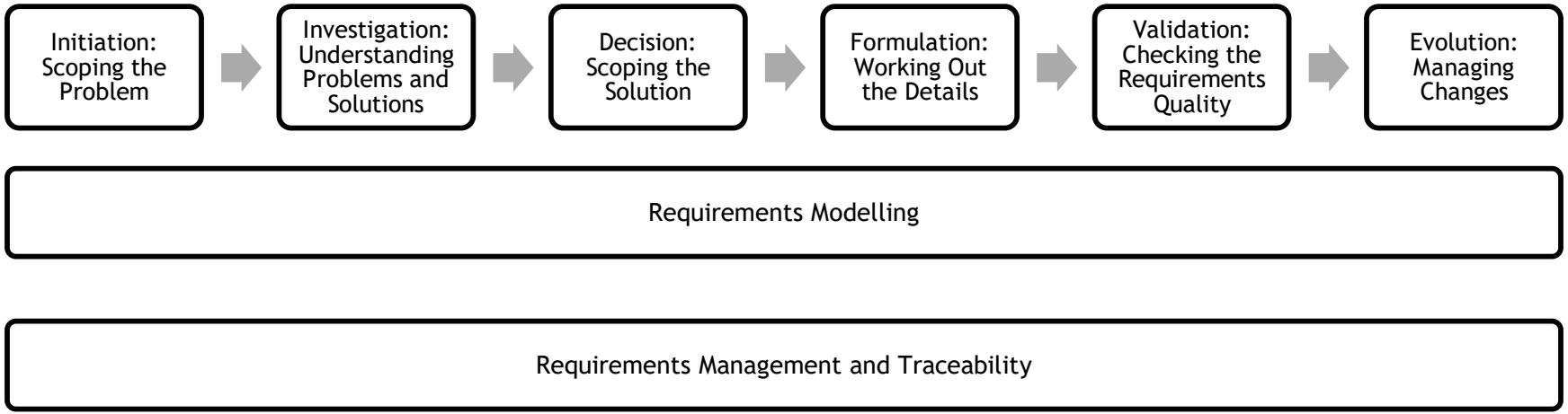
describe sequences of World events and sequences of interactions between world actors and the Machine

Context Diagram

describes the world actors and their interfaces with each other and with the Machine

Summary

Requirements engineering can be seen as consisting of 6 phases



Revision

Put the phases in order and match each phase with the text that best describes it.

1. Initiate
2. Validate
3. Speculate
4. Investigate
5. Formulate
6. Evaluate and Evolve

A. Check requirements correctness
B. Define the project goals and scope
C. Understand current situation and identify ideas for the future system
D. Decide what features to build
E. Define detailed requirements
F. Evaluate how well the deployed system satisfy the stakeholders' needs