Initiation: Scoping the Problem

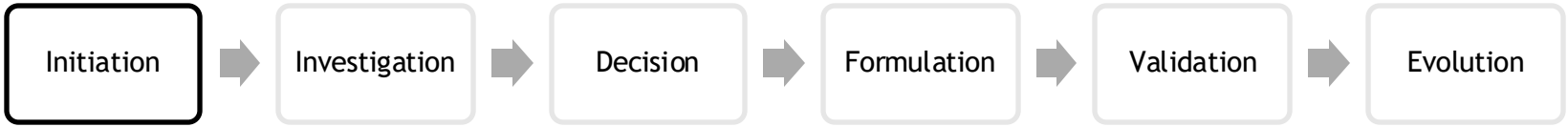
Emmanuel Letier

Outline

1. The initiation phase: overview
2. Setting the project scope
3. Identifying stakeholders
4. Defining the project goals
5. Identifying constraints and risks
6. Developing a project glossary
7. Summary

1. The Initiation Phase: Overview

The Initiation Phase ("project initiation")



Short burst of activity at the start of a project to define its vision and check the project is viable.

- Can take a few hours to several days.
- Important because sets direction for whole project.
- Best to find out early if project is not viable.

Deliverables

Project purpose	Short quantified statement of what the product is intended to do and what advantages it brings to its stakeholders.
Project scope	The part of the world that needs to be assisted or improved by the project.
Stakeholders	List of people interested in, or affected by the product.

Additional deliverables

Constraints	Implementation, budget and schedule constraints.
Risks	What could go wrong and how to mitigate it.
Glossary	Names and definitions for key concepts in the world.
Go/no go decision	Is the project viable and worthwhile?

2. Setting the Project Scope

The World and the Machine

The Machine is the product to be developed or improved.

Synonyms: the product, the software-to-be, the system-to-be, etc.

We create tangible machines that have physical effects on the world.

The World is the part of the real-world affected by the machine.

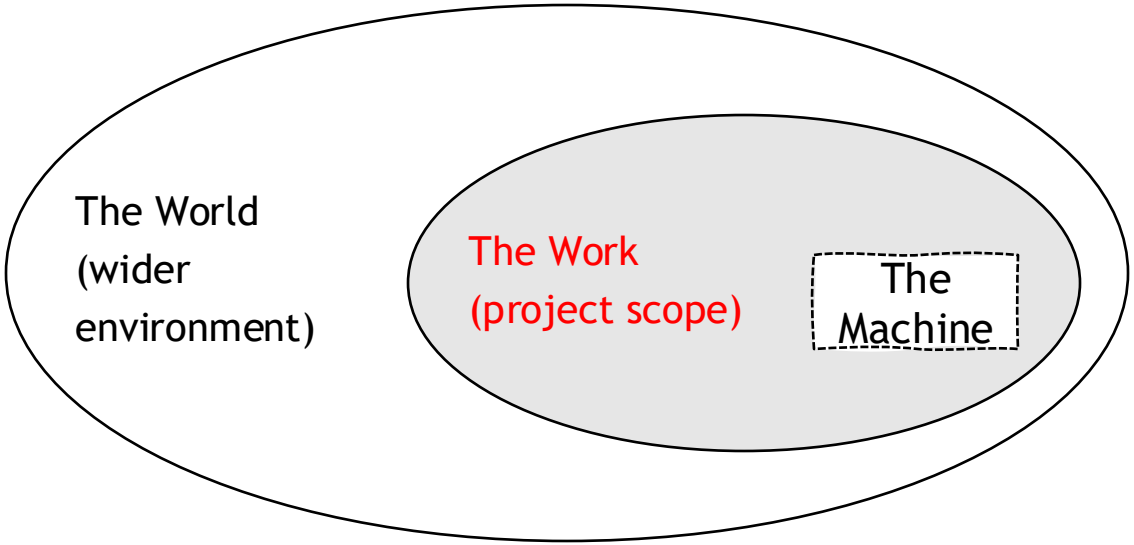
Synonyms: the application domain, the environment, the context.

The World is the scope of our requirements investigations.

The Work

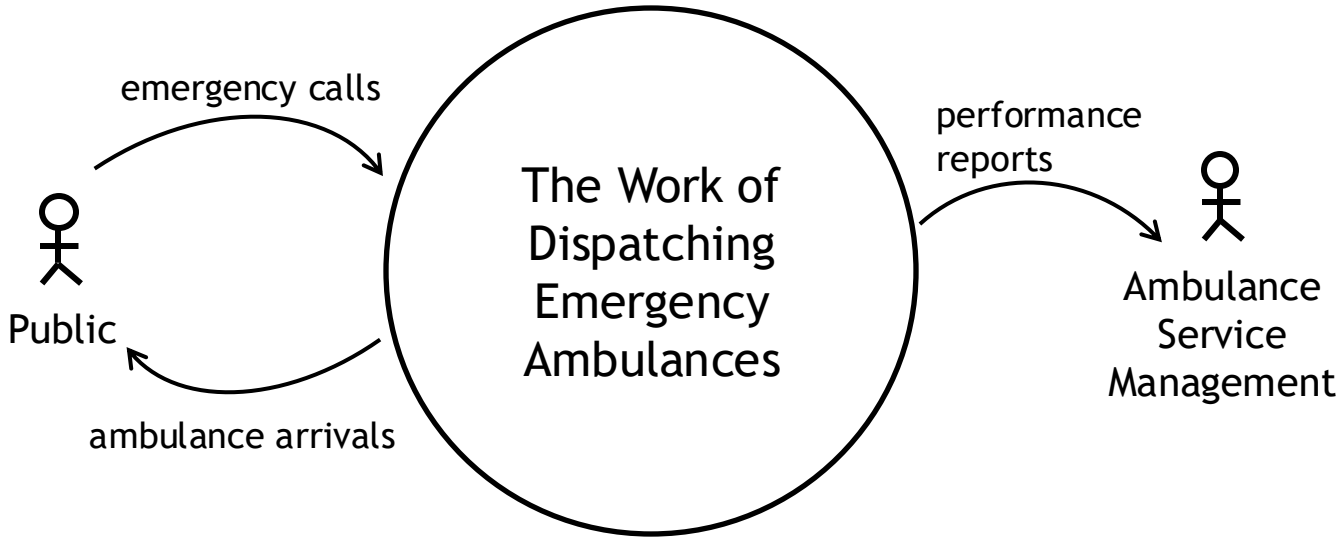
The Work is the part of the real-world to be supported and improved by the project or product development.

Synonyms: the project scope, the problem scope.



Work Context Diagram (aka. project-level context diagram)

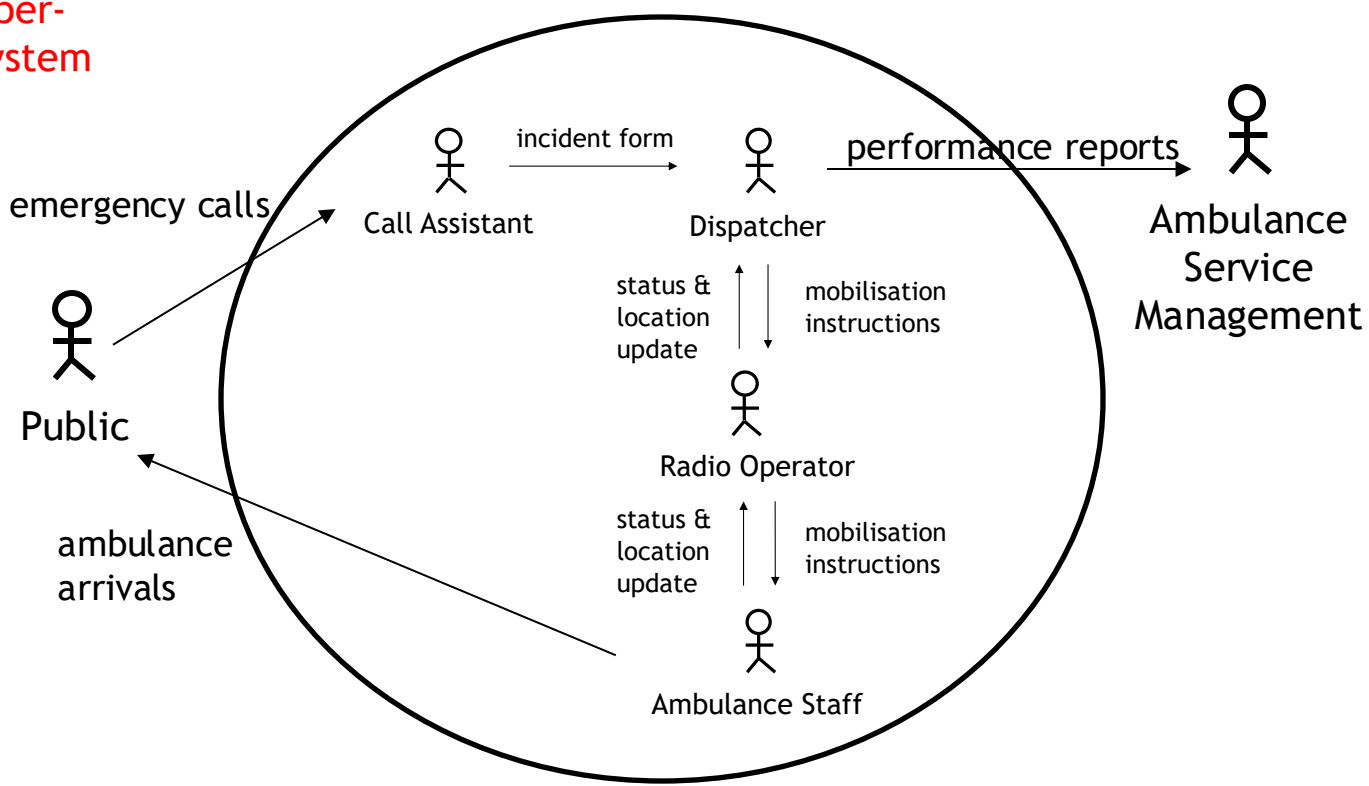
Think of the Work as a system that receives inputs and generate outputs from and to adjacent systems.



When setting the scope, we intentionally ignore what happens inside the Work area.
We ignore whether we are describing the World as-is or to-be.

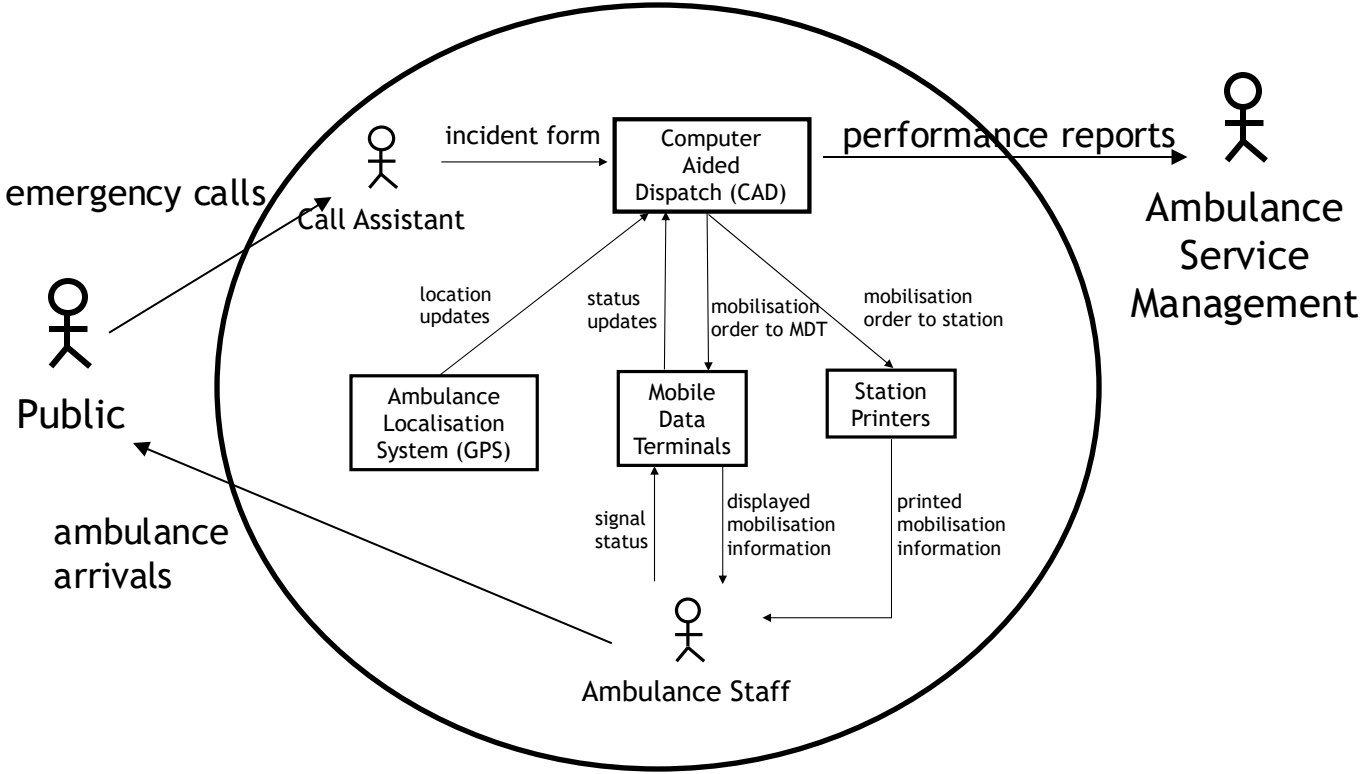
Inside the Project Scope: The World-as-is

1992 Paper-based system



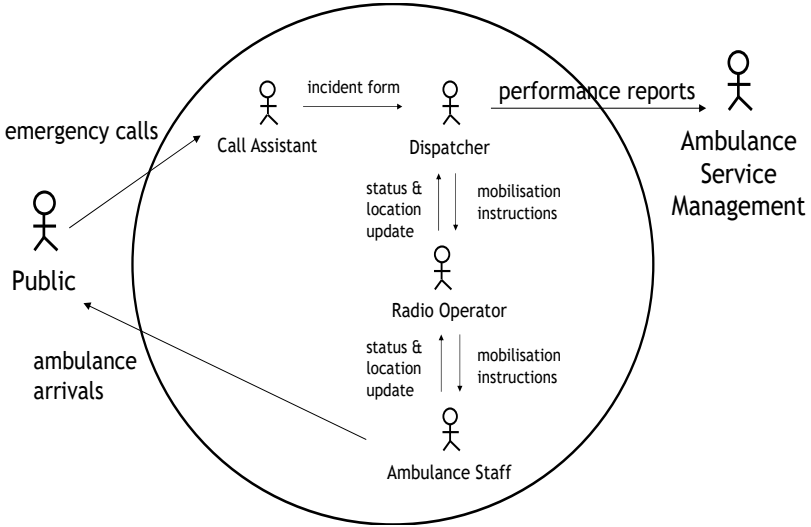
Inside the Project Scope: The World-to-be

1993 Automated System

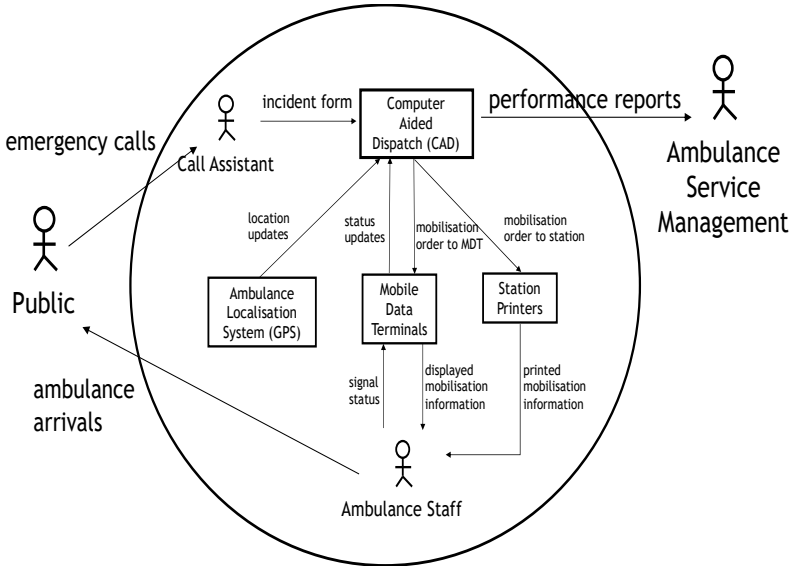


The Work context has not changed; only the inside has changed!

Before (paper-based system)



After (automated system)



How to set the project scope

1. Identify the real-world activities the machine must support or improve.
   - E.g. Dispatching ambulances.
2. Identify the inputs to those activities and their sources.
   - E.g. Emergency call from the public.
3. Identify the outputs to those activities and their recipients.
   - E.g. Ambulance arrivals at incident scene.

The Work inputs and outputs are the phenomena that matters for evaluating the project success or failure.

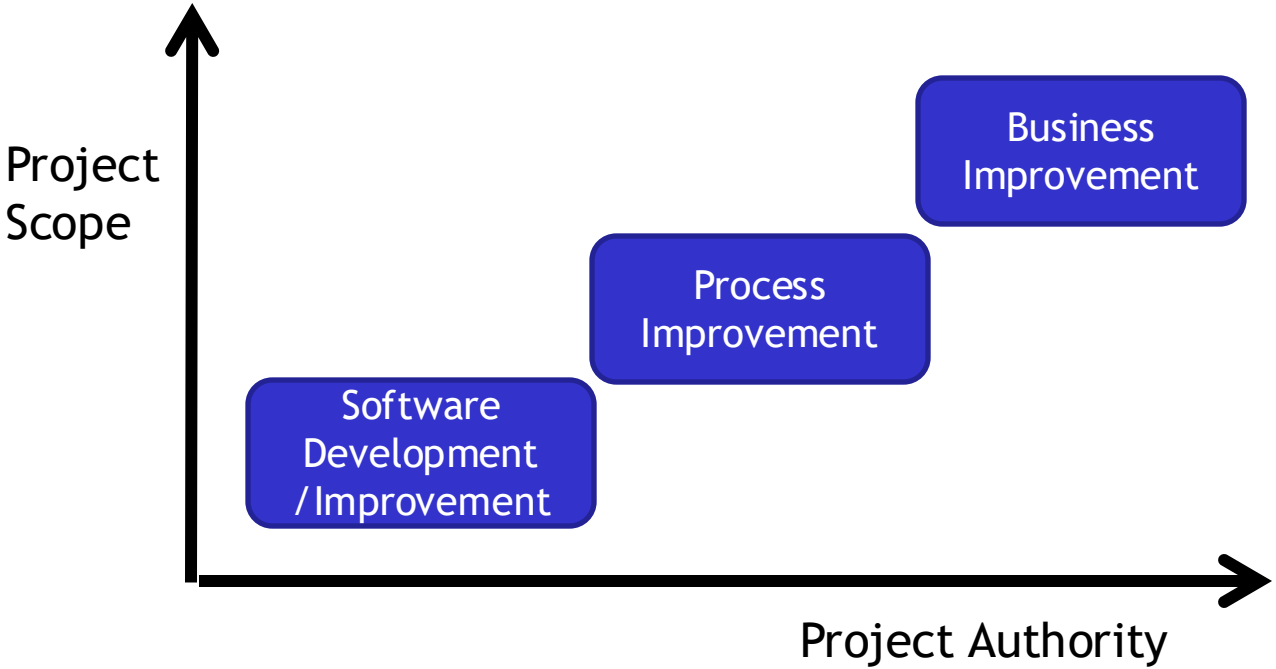
- Not relevant for project scope:
  - ambulance allocation to incident (inside the world)
  - city's total mortality rate (in wider environment, outside the project's responsibility).

Common scoping errors

1. Project scope too narrow
   - Product-centric scope; no other actors in the Work than the Machine (The Work = the Machine); .
   - This might be a sign that you do not understand what real-world activities the machine needs to support. You risk building the wrong product, and you limit your abilities to discover innovative solutions.

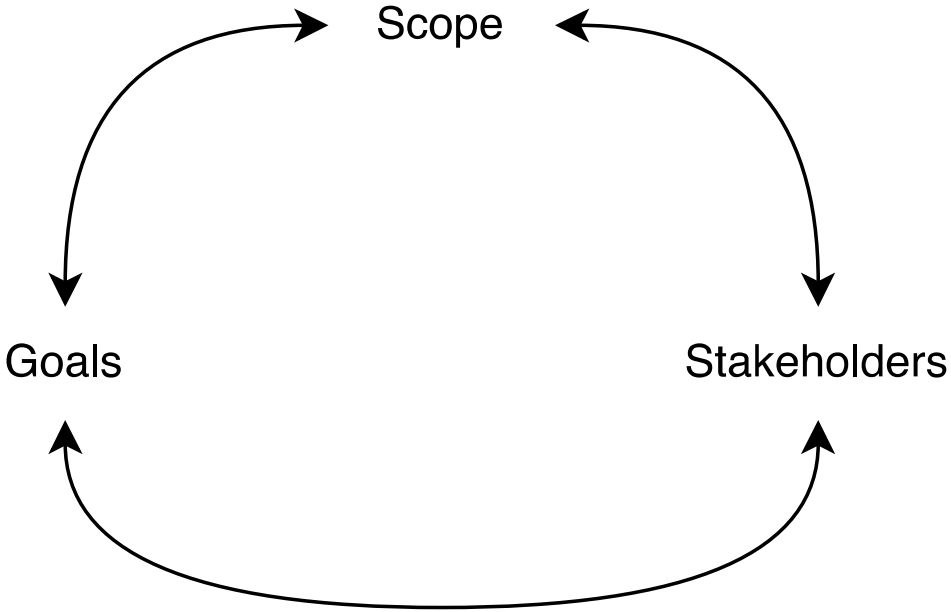
2. Project scope too wide
   - The project scope include parts of the real world over which the project team has no control.
   - Consequence: you will waste effort investigating problems and proposing solutions that are beyond the project authority.

Relation between Project Authority and Scope



Based on Debra Paul's Business Analysis Maturity Model

Scope, Stakeholders, Goals – An iterative discovery



3. Identifying stakeholders

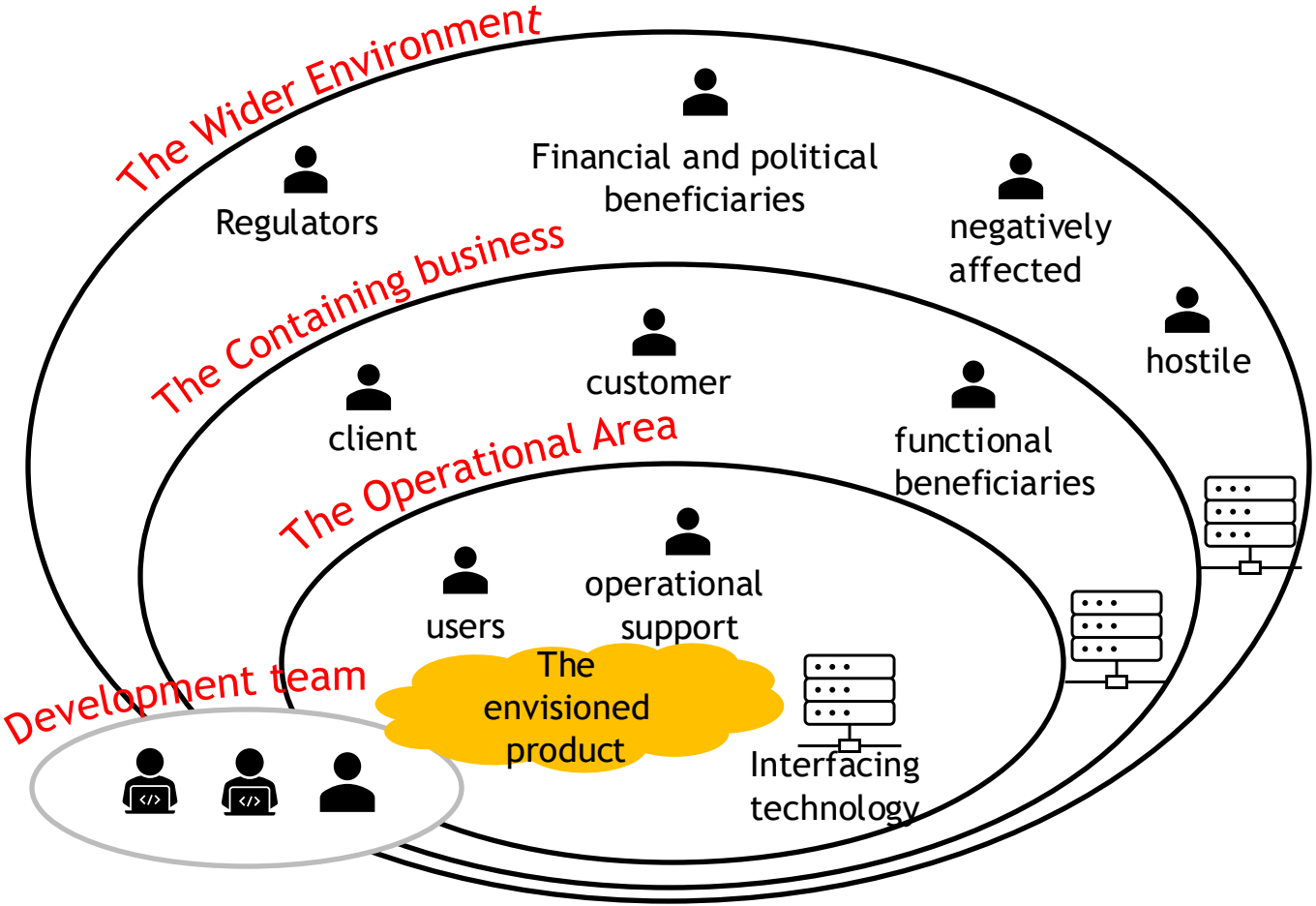
Stakeholders

A *stakeholder* is a person or group of persons who have an interest in, or are affected by the Machine.

Often many more stakeholder than the client and users!

Failing to consider some important stakeholders can have adverse effects on the people overlooked, lead to costly changes, or to partial or complete project failure.

The Stakeholder Onion Model



The operational area

All stakeholders who interact directly with the product.

- Users (“normal operator”) will operate the product
  - Consider different categories and profiles
  - Model users with personas (detailed descriptions of imaginary representative users)
- Operational support operate the product to help users (e.g. helpdesk)
- Interfacing technologies
  - all external systems that have interfaces with the product.
  - The stakeholders are the people who own or have knowledge of these systems.

The containing business

All stakeholders who benefit from the product in some way

- The client pays for the product development.
- The customer buys the product once developed.
- Functional beneficiaries are the people who benefit from the work done in the operational area.

The wider environment

Other stakeholders who have an influence on, or interest in product.

- Regulators and inspectors
  - legal requirements, safety inspectors, ...
- Financial and political beneficiaries
  - shareholders, politicians, ...
- Subject matter experts
  - domain expert, safety expert, usability expert, ...
- Negatively affected stakeholders
  - those who do not want product, are negatively affected by product, competitors.
- Hostile stakeholders
  - attackers, criminals, terrorists, ...

The development team

The people who will design, develop, test, operate, maintain and evolve the product.

- The organisations who develop and operate the software have their own goals.
- Involving developers and testers in early requirements phases generates better requirements. It also generates a shared understanding of the project goals and context.
- Involving IT support teams helps identifying requirements to support system operation, maintenance and evolution.

Discovering stakeholders

1. Use stakeholder onion model as a checklist.

2. For each stakeholder group, identify their main goals and concerns for the project.

3. Update the stakeholder list throughout the project.

Describing stakeholder goals and concerns

Stakeholder	Goals and concerns
London Ambulance Service (client)	• Meeting Govt. Performance Standards • Minimize operational costs • Wants system ready within 6 months
Call Handlers (users)	• Be able to handle emergency calls quickly, accurately, and with all required information
Public (functional beneficiary)	• Fast ambulance arrival • Efficient handling of emergency calls
Ambulance Crews (functional beneficiary)	• Want precise and timely mobilization instructions • Want to be able to reach incident location quickly after mobilization
National and local government politicians (political beneficiaries)	• Want system ready before next election.

4. Defining the Project Goals

Project goals

Project goals = short precise descriptions of the main expected impacts of the Machine in the World.

- They define the project success criteria. Ideally, observable and measurable.
- A subset of all stakeholder goals.

For an ambulance dispatching system:

Percentage of incidents for which the first ambulance arrives at the incident scene within 14' must be at least 95%. (1992 UK Gov. Standard)

For an airplane ground braking safety controller:

Reduce the number of accidents and incidents due to unsafe deployment when flying, and late or no deployment when landing.

Importance of clear and explicit project goals

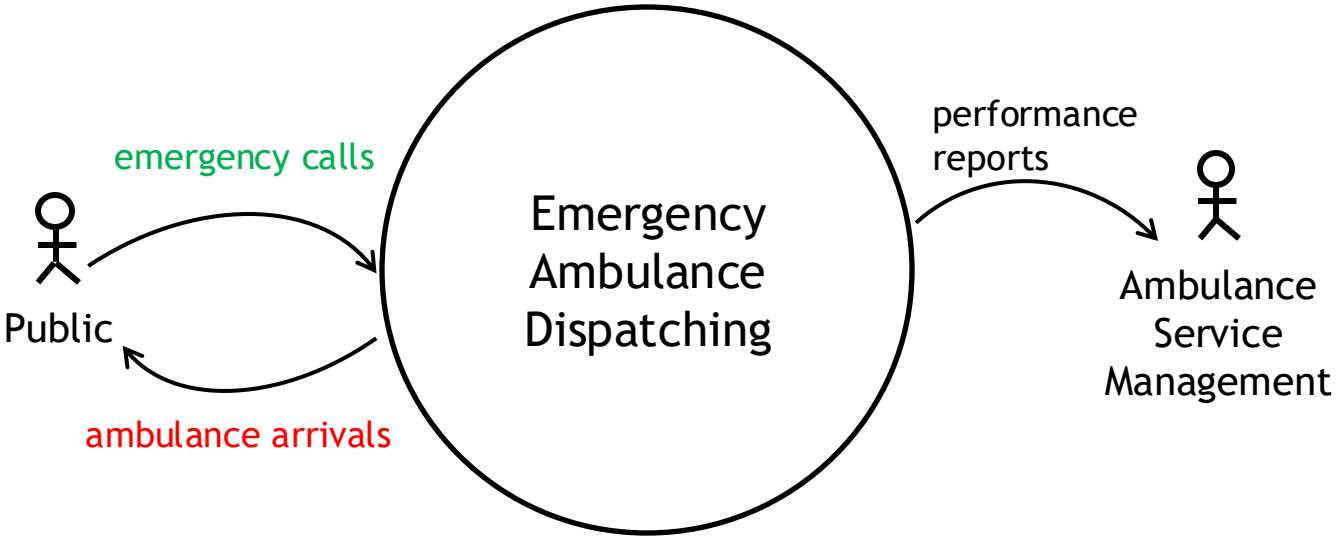
- Keep the project focused on achieving its goals
  - All requirements must contribute to the project goals.
  - Requirements that do not contribute to the project goals should be removed (or the project goals extended).

- Provides a shared vision for the development team
  - Vague goals lead to lack of focus and wasted effort.
  - Team collaboration improves when members share a clear common goal.

Mitkidis et al., Collective-Goal Ascription Increases Cooperation in Humans, PLOS One, 2013.

Project goals and project scopes are related

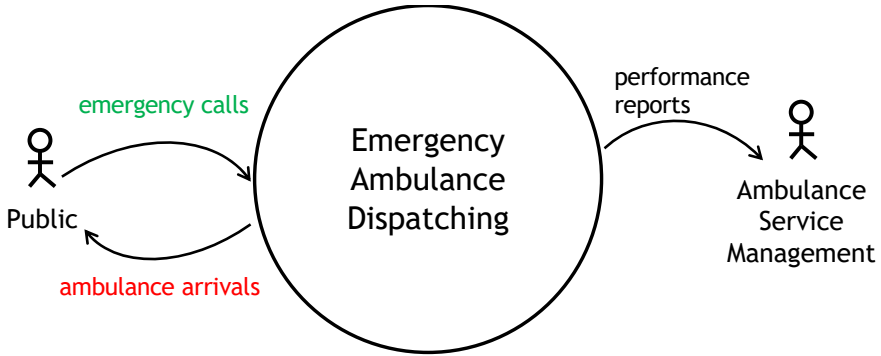
Goal: ambulance must arrive at incident scene within 14 minutes after first emergency call reporting the incident



Practical Tips

1. Identify project goals from the Work context diagram
   - For each world inputs and outputs, consider potential project goals related to these phenomena
2. Define the Work context from the project goals
   - For each project goals, identify the relevant World inputs and outputs

Goal: ambulance must arrive at incident scene within 14 minutes after first emergency call reporting the incident



Common Mistakes

1. Product-centric goal, no statement of impact.

   "The project's goal is to develop an automated ambulance dispatching system that will use GPS and MDTs."

2. Vague and unmeasurable impacts.

   "The project's goal is to improve the ambulance service efficiency."

3. Product-centric with vague impact.

   "The project's goal is to use machine learning on healthcare data to improve the nation's health."

Consequences: project lacks vision and direction, constant stream of changes, risk of building a system that has no real value.

Discovering project goals: from vague to measurable

Some techniques

1. Look for the organization's performance indicators.
2. Look for evaluation metrics in the scientific literature.
3. Ask why questions: purpose-advantage-measurement.
4. Ask questions about observable changes.

Look for organisation performance indicators

From London Ambulance Service Website in 2006

(New performance indicators have been introduced in 2017)

Category A response times

Response times, broken down by Primary Care Trust (PCT) area, will be updated here on a monthly basis.

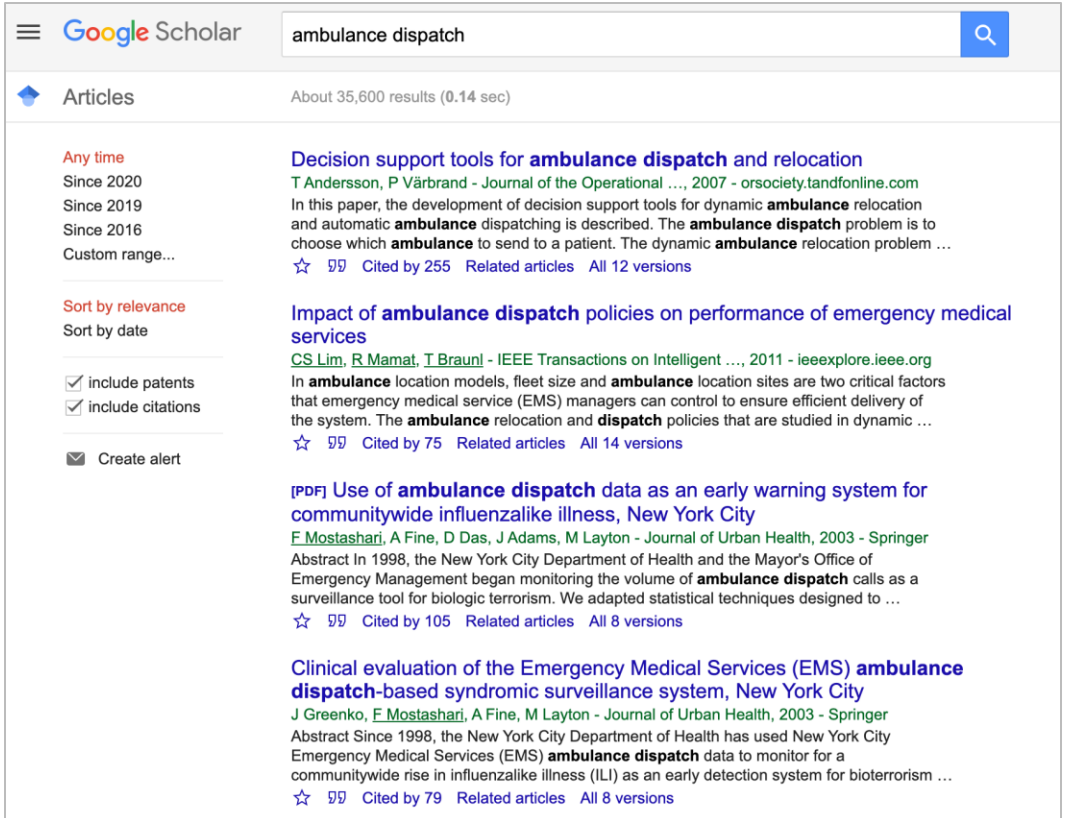
The figures relate to the first vehicle - whether it be a rapid response car, motorcycle or ambulance - to arrive at an incident. The national performance standard is to reach 75% of Category A (immediately life threatening) calls within eight minutes.

Proportion of Category A calls reached in 8 minutes: National standard = 75%

	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06
Brent	78%	80%	82%	79%	72%	72%
Ealing	71%	76%	80%	74%	71%	71%
Hammersmith & Fulham	82%	84%	85%	83%	81%	73%
Harrow	68%	76%	75%	73%	72%	72%
Hillingdon	73%	78%	74%	72%	73%	69%
Hounslow	66%	75%	73%	68%	69%	74%
Kensington & Chelsea	69%	69%	68%	71%	68%	69%
Westminster	71%	75%	77%	72%	68%	74%
NW London SHA	**72%**	**77%**	**77%**	**74%**	**72%**	**71%**
Barnet	69%	70%	75%	68%	67%	64%
Camden	75%	81%	78%	74%	68%	74%
Enfield	81%	84%	82%	82%	73%	76%

Look for goals in the scientific literature

Check whether relevant measurable goals already exist.



Ask “Why” questions

Practical tip: use PAM questions (Purpose – Advantage – Measurement).

Example: for a feature to detect duplicate calls

- What is the purpose of this feature?
  - *To automatically identify when an incoming call refers to an incident that has already been reported.*
- What are the advantages of identifying these duplicate calls?
  - *Not sending more ambulances than necessary to an incident.*
  - *Make it easier for call handlers to answer the call, deal with call backs, and update callers about progress.*
- How can these advantages be measured?
  - *By counting how often we have duplicate mobilisations.*
  - *By measuring times for handling duplicate calls and call backs.*

Look for observable changes

Ask about observable changes that stakeholders want to see in the world.

Example:

The new system should reduce stress for ambulance crews.

- What would be observable changes if ambulance crews were less stressed?
  - *Fewer errors with patients*
  - *Fewer navigation errors and road accidents*
  - *Fewer sick leaves*
  - *Higher job satisfaction in surveys*
- You could also ask PAM questions: what are the advantages of reducing stress? How can these advantages be measured?

Formulating Project Goals

Simple

use this to communicate project vision to stakeholders and development team

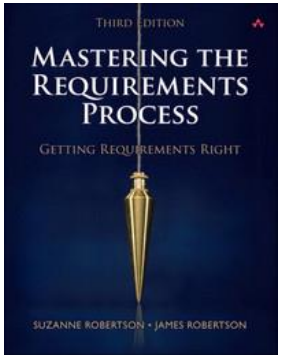
- a list of goals defined in natural language

Structured

- VOLERE Fit Criteria
- Quantitative Key Performance Indicators (KPI)

Formal

- KAOS behavior goals and objective functions
- Planguage, Qper, …



VOLERE Fit Criteria

Fit criterion: a measurement used to evaluate how well a goal is satisfied

Example Fit Criteria for Ambulance System:

14 Minute Response Rate: each month, the percentage of incident for which the first ambulance arrives within 14 minutes after the first call.

	Current	Must	Target	Ideal
14_min_response rate	82%	82%	95%	99%

KAOS behaviour goals and objective functions

Goal Achieve [Ambulance Intervention]

Desired Behaviour

GIVEN an incident has occurred
WHEN the ambulance service receives a call reporting the incident
THEN within 14 minutes
a first ambulance arrives at the incident scene

Quality Variable

response_time: Incident -> Time

Objective Function

Maximise 14_min_response_rate = *P*(response_time <= 14')

	Current	Must	Target	Ideal
14_min_response rate	82%	82%	95%	99%

5. Identifying Constraints and Risks

Constraints

- Project constraints
  - Time constraints
  - Financial constraints
- Solution constraints
  - Design and implementation constraints
  - Other systems with which your product must interact
  - Mandated (or forbidden) off-the-shelf and open source applications

Risks

Identify main risks and actions to control them

Practical tip: identify risks by negating project goals and constraints

Example for ambulance system

Goal 1: Improve 14 minute response rate

-> Risk 1: 14 minute response rate does not improve

Goal 2: No reported incident left unresponded

-> Risk 2: some reported incident left unresponded

6. Developing a Project Glossary

Domain concepts

- Start writing glossary of main domain concepts
- Clarifying terminology early on helps reducing misunderstandings!
- Can be represented with a conceptual models of domain entities, associations and attributes

7. Should the project go ahead?

Checklist: is the project worth doing?

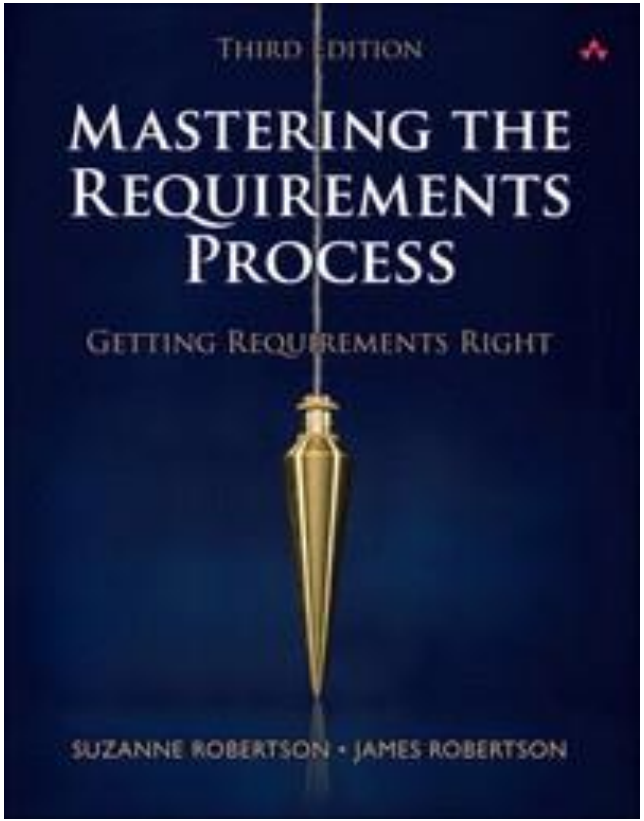
- Clear Vision
  - are the project goals clear and unambiguous?
  - are they measurable?
  - do they provide benefits to the organisation?
- Feasibility
  - is it possible to achieve the goals within allotted time and budget?
  - are stakeholders willing to be involved?
- Risk Management
  - have risks been identified?
  - are there plans to track and control the risks?

8. Summary

Summary

- A good start is critical to the project success
  - Stakeholders, Goals, Scope
  - Need measurable and relevant goals
  - Start building project glossary
  - Identify constraints and risks
  - Feasibility analysis – cost/benefit, schedule
  - If too vague or not viable, do not start the project
- Can take a few hours to several days or weeks

Reference and further reading



Chapter 3: Scoping the Business Problem

Describes the VOLERE requirements engineering process

Available online from the reading list.