FONDAZIONE links
PASSION FOR INNOVATION

Politecnico di Torino

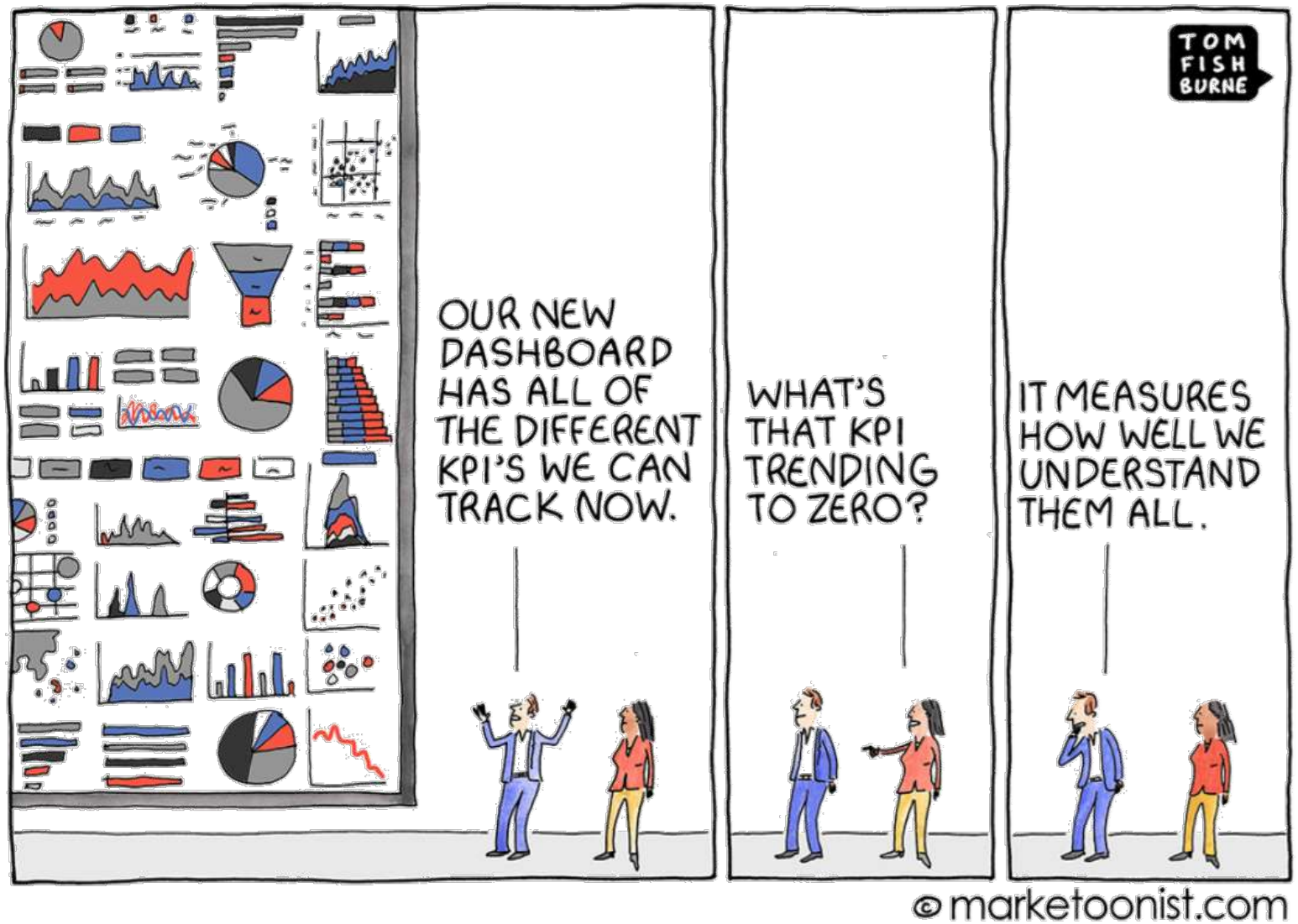
Applied Data Science Project

L21 – The stakeholders' mapping (hands-on)

A.A.2023/2024

Multi-perspective thinking

Expectations



Result

A good project replies to a demand, before supplying opportunities

We are not the user
The user is not the boss…
And not even a colleague, a friend, the desk mate…

We need to **access to the users' knowledge**
(both explicit and implicit knowledge).

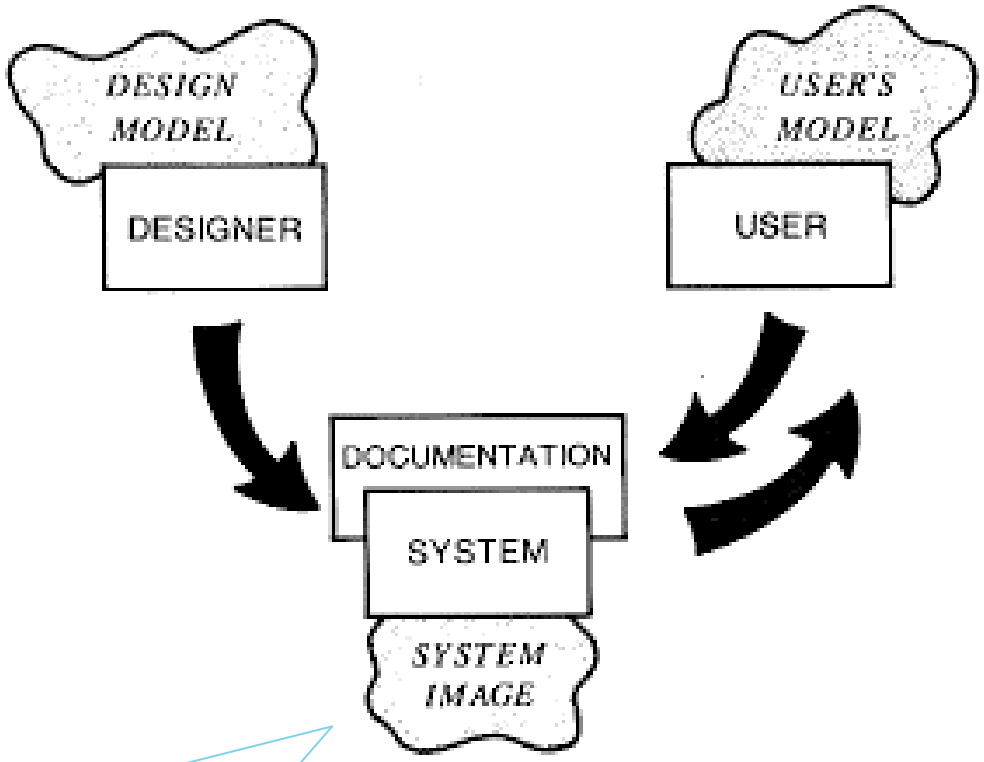
In many situations, observers, listeners, and researchers are not allowed, so we need for indirect knowledge.
Gathering information to know and map the mental models of users allows us to get out of **our perspectives** and biases and design solutions widely usable and accepted.

1 project, several mental models

We all create mental models that explain and organise our actions and interactions with the world.

The mental models we create derive from **what we can perceive of a system, its structure and visible behaviours.**

If the system image is incomplete, inadequate, or inconsistent, a weak usage experience will occur.



The system image is the mental model materialised by design activities, and that will be developed.
It is like a text open to interpretation

Source: Norman, D.A. The Design of Everyday Things, Basic Books, 1988; 2019

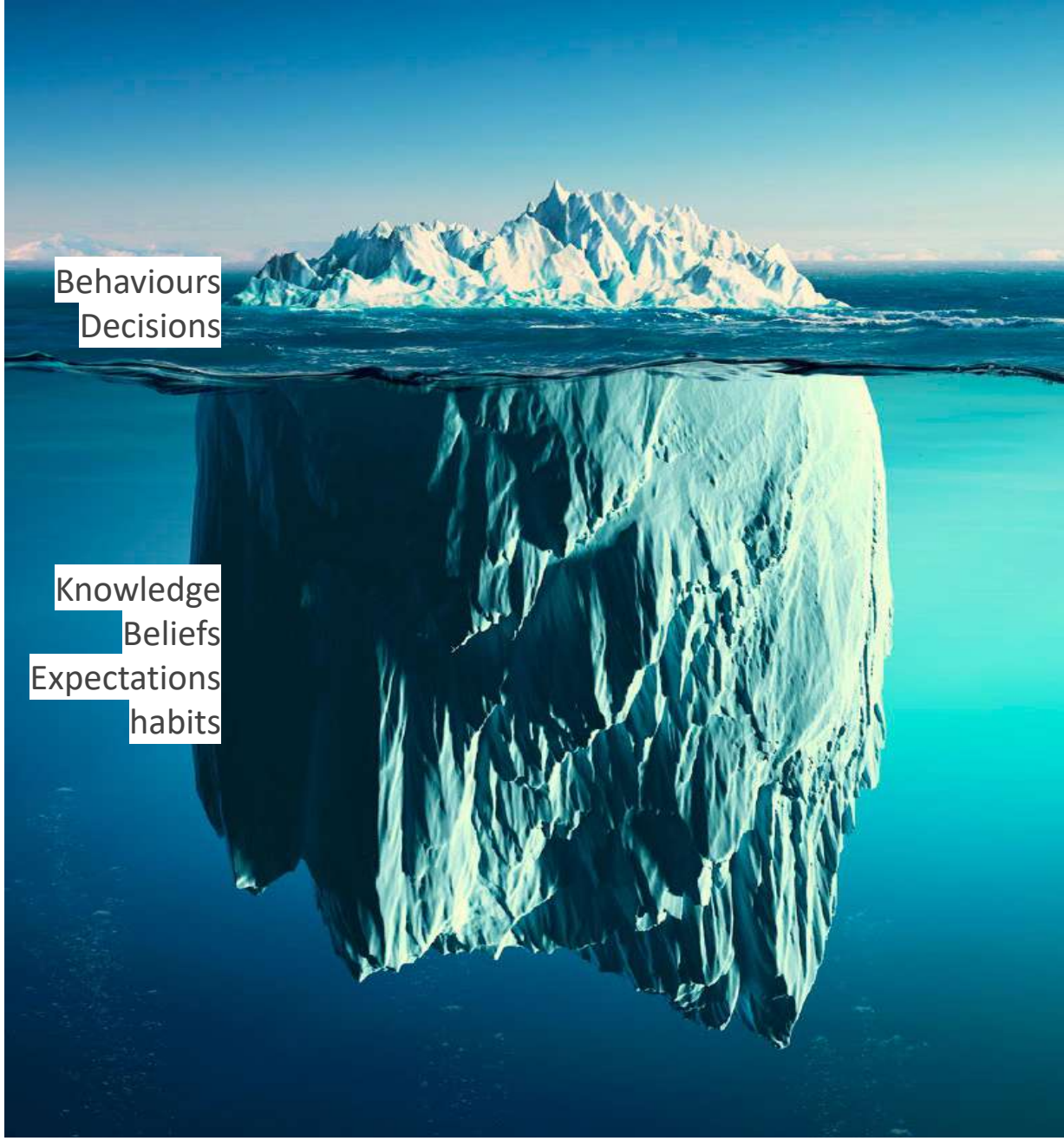
What are the mental models?

A mental model is a inner **representation of the real perceived world and relations between its various parts.**

A mental model contains **knowledge, beliefs, expectations and habits** deriving from our perceptions, **direct and indirect experiences**.

We develop mental models on any aspect of the experience, including the digital systems we use, through intuitive **perceptions of their actions and consequences**

Mental models drive our decision and behaviours (including the interaction with systems)



Source: A. Collins and D. Gentner, How people construct mental models. In Cultural Models in Language and Thought, Cambridge, U.K.:Cambridge Univ. Press, pp. 243-265, 1987.

Mental models

How to book a flight
We have our **habits** when searching for a flight and the information we will need along the way.

How to drive a car
We expect what are the **main commands** to interact with, what the car can do and **how to drive it appropriately** in **our country**.

How to use IM apps
We expect **messages** to come back in real-time and to send attachments like photos and GIFs.
We expect **to be notified** as soon as someone has responded.

How to interact with a virtual assistant
We usually ask for information and provide commands. We expect replies in a very short time and we expect event negative feedback.

Mental model and operational images

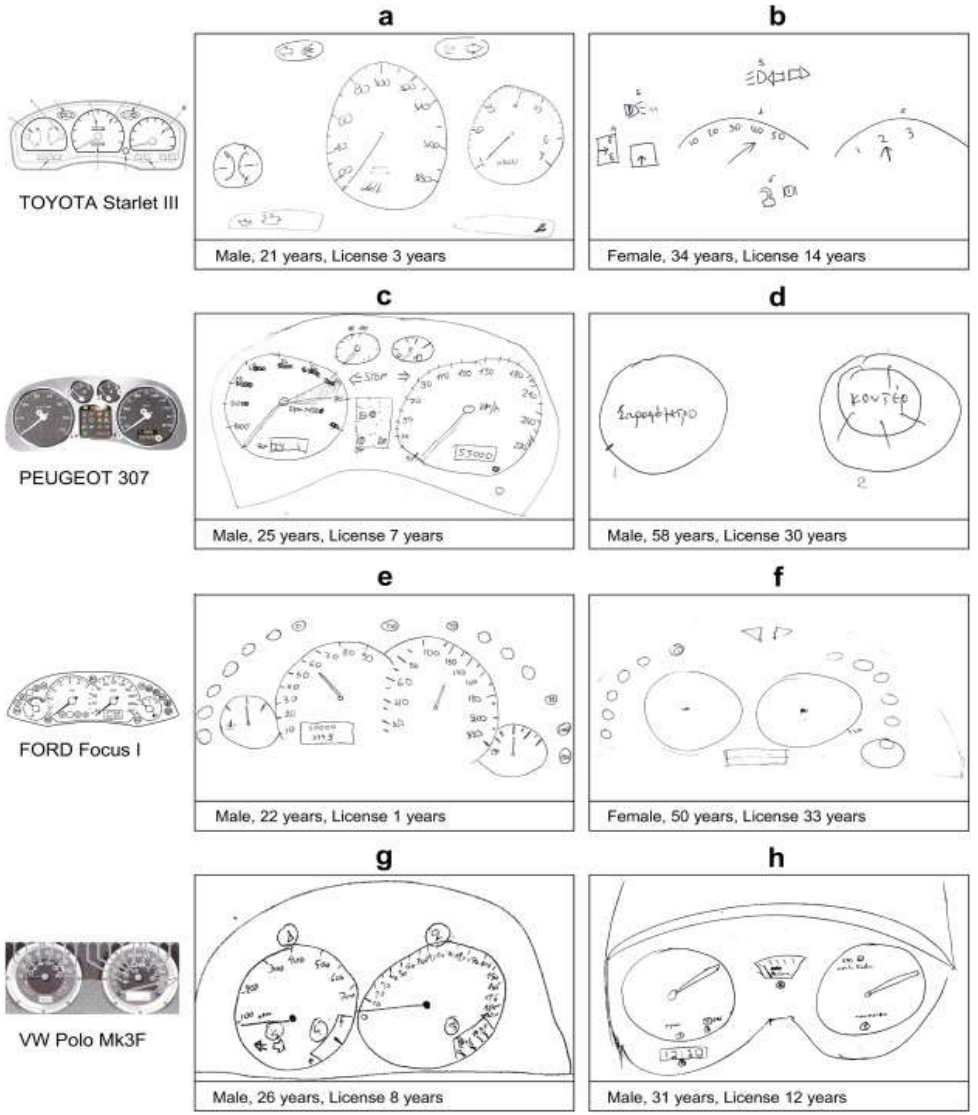
Mental models result in the interaction with the systems.
What we remember and how we represent them show that we use a task- oriented memory, excluding details not useful (interesting, emotional).

We store a big picture that is:

- **Incomplete** (or **essential**)
  as it better focuses on some aspects
  to the detriment of others

- **Unstable** (or **flexible**)
  as it changes over time, with experience and time,
  highlighting some details and forgetting others.

- **Thrifty** (or **efficient**)
  since it aims to reduce the mental workload



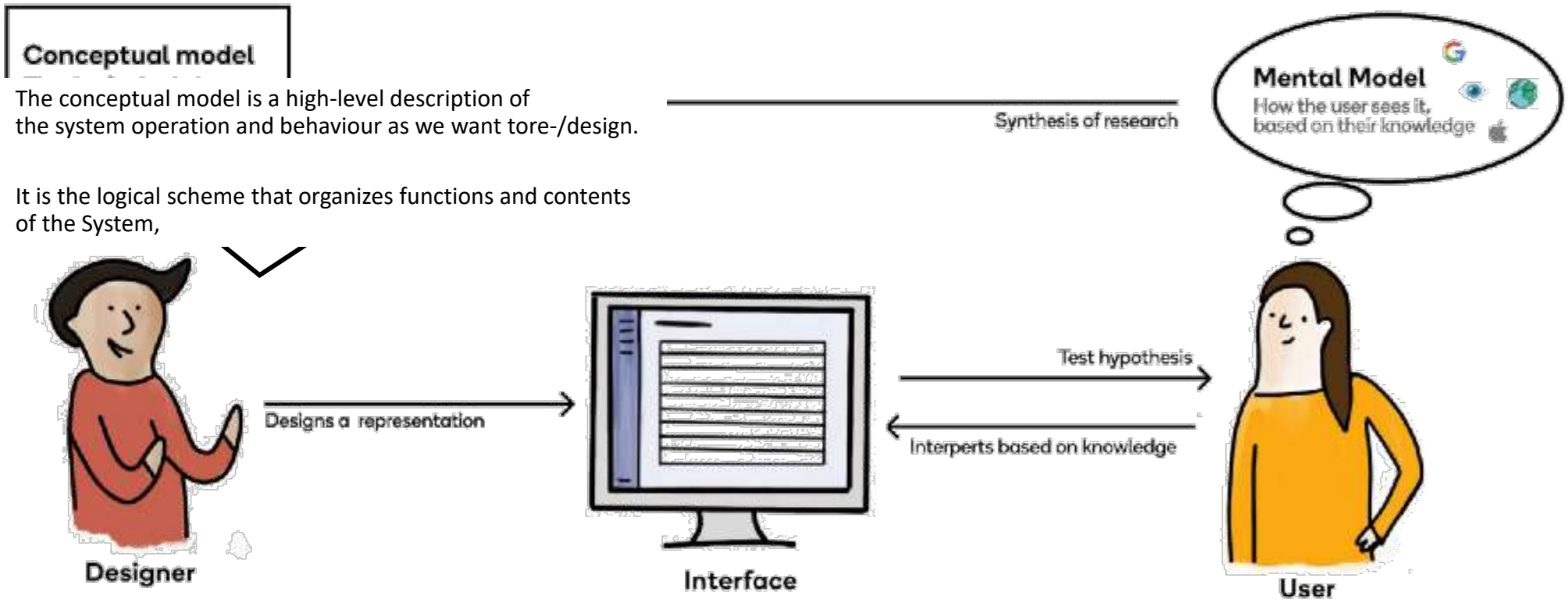
Proportions correspond to interest/priority

Teresa Colombi [Disegnami un sito: le immagini operative a servizio della UX](#).

From the mental model to the conceptual model and back

We as designers/developers often make too complex and detailed **conceptual models**, that do not respond the real needs and opportunities of the context and user

If the users get a mental model not corresponding to the system, they will likely do errors and get a bad experience(frustrating, difficult, boring, ...)



UX Collective. Understanding mental and conceptual models in product design.2019.

Why model humans?

The simplicity and convenience of advanced systems, such as human-AI interfaces, with the increase in machine decisions, requires a **deeper understanding of the human experience with algorithms.**

Model the humans to shape better systems that can:

- show **human-like behaviour**, e.g. in communications systems such as chatbots
- provide certain **autonomy**, e.g. humanoid robots in health support
- exhibit **contextual understanding**, as in advanced natural language translation systems based on NLP
- solve classification problem-solving, e.g. in the medical domain
- enable intelligent interaction, such as voice input or facial recognition
- …

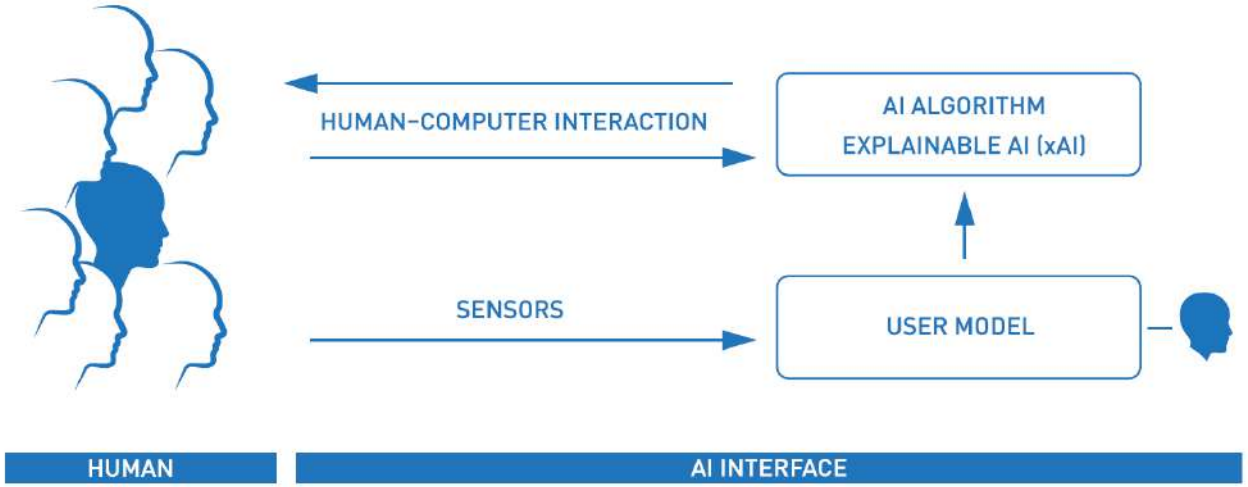
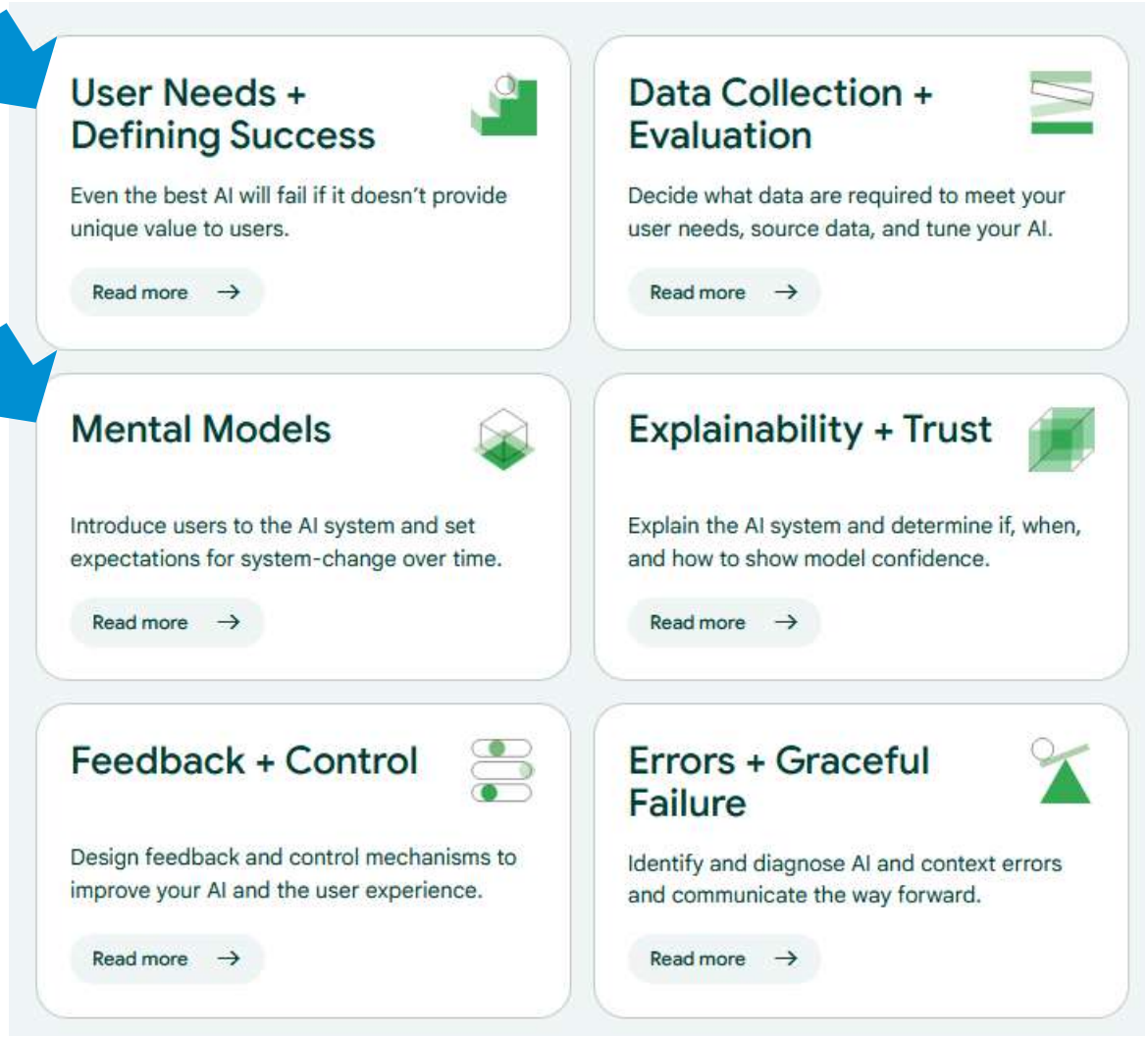


FIGURE 1. Human–AI interfaces differ in many ways from classical human–computer interfaces: they learn unobtrusively from our interaction behavior, store every interaction and can react adaptively and even make predictions about our next behaviour. They acquire some degree of human-like cognitive, self-executing, and self-adaptive capabilities and autonomy, and produce unexpected outputs that require non-deterministic interactions.

A. Holzinger, M. Kargl, B. Kipperer, P. Regitnig, M. Plass and H. Müller, "Personas for Artificial Intelligence (AI) an Open Source Toolbox," in *IEEE Access*, vol. 10, pp. 23732-23747, 2022

Google PAIR paradigm

People + AI Research



- Who are your different **user groups**?
- What **primary goal** will each user group have?

- What is the **step-by-step process** that **novice users** from each group currently use to accomplish the task that the AI system will accomplish? **How uniform or variable is this process**?

- What is the step-by-step process that **expert users** from each group currently use to accomplish the task that the AI system will accomplish? How uniform or variable is this process?

- What **mental models** might already be in place based on the step-by-step process and any **non-AI-driven tools** used by each group?

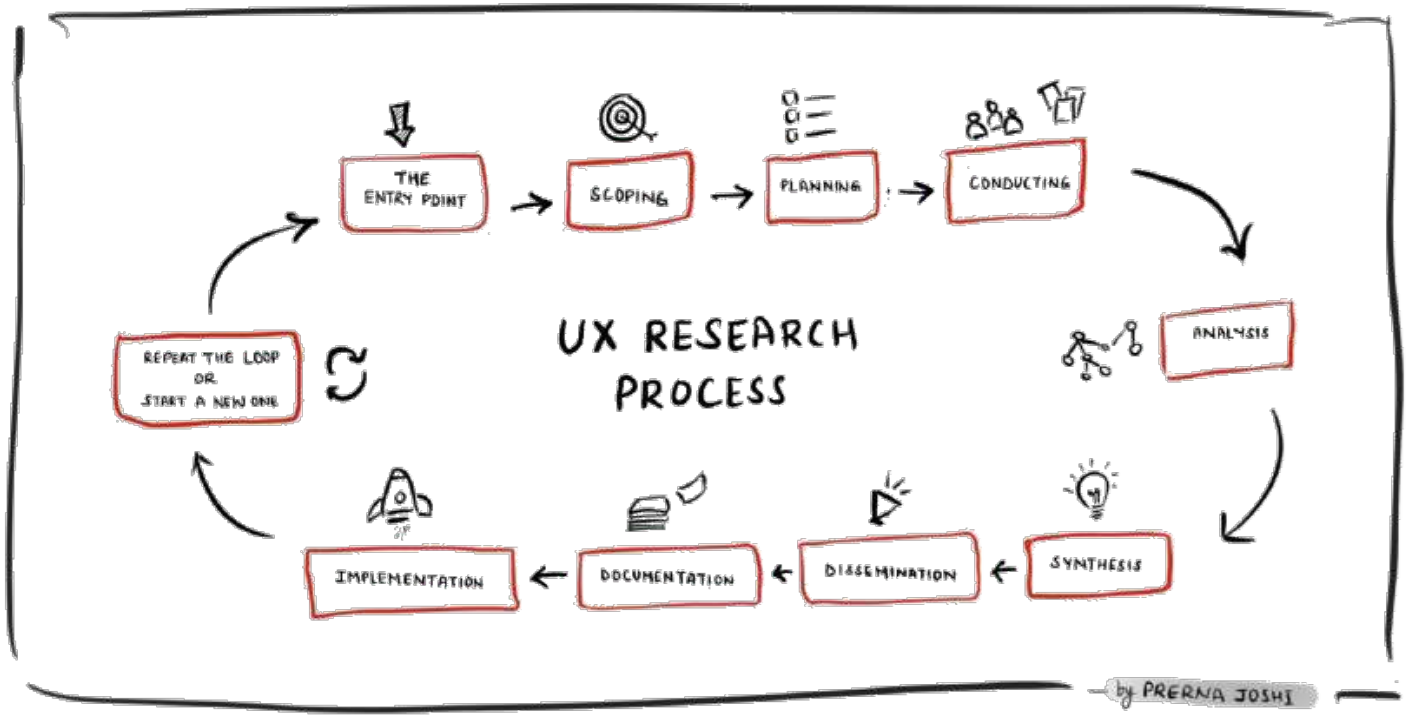
    - Which data they need and use?
    - Where and how they search them?
    - Which information shaper their decisions?
    - Which are the biases related to belief, habits, or context?

Google People + AI Guidebook

Why should we start by the User Research?

User Research activities begin before design and development to:

- Gather useful insights that **provide real benefits** to people
- Understand the **contexts, specific tasks, needs & wants**
- Detect and **mitigate biases** in data collection and processing
- Identify **cultural anchors**
- Set up the project correctly and continue to **explore and validate** throughout



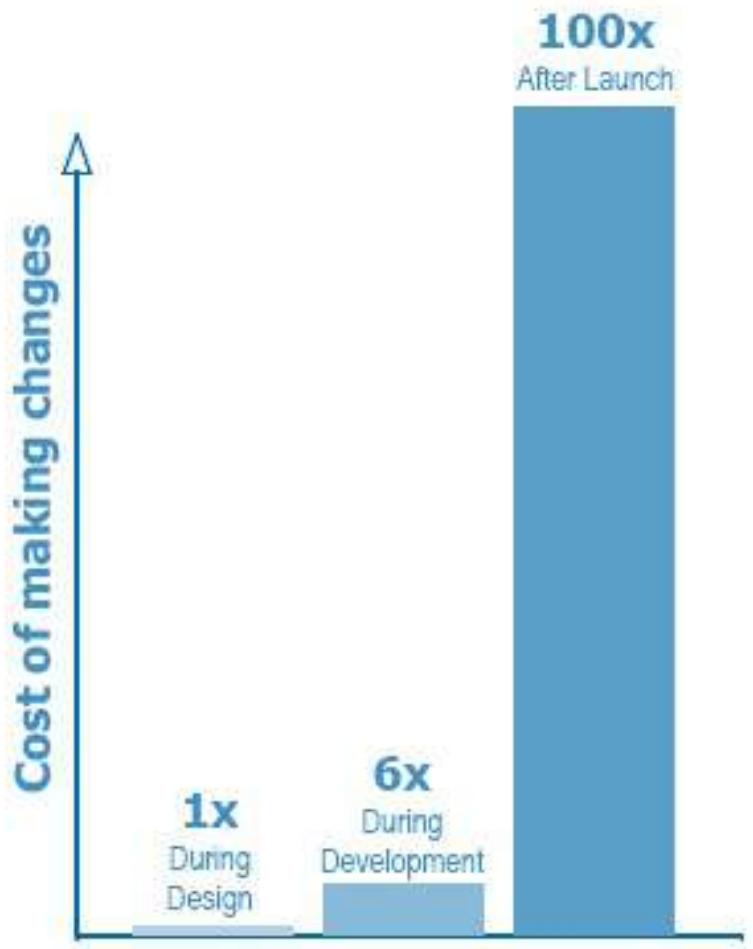
Bootcamp, What is your UX research process? 2021

Focus on real context| Common complaints

«**We already know our users/customers**»
Any one of us has **preconceptions and cognitive biases**. Investigating real users' perspectives allows us to identify solutions better replying to different target needs. We don't have enough experience and knowledge to deal with the variability of human factors.

«**We already have data**»
User research for design purposes is often confused with market research: they are both focused on knowing consumers and share many tools, such as interviews, focus groups and surveys, but have different goals. Data collected from market research is useful, but needs to be **complemented by information about users' objectives, needs, tools, habits and context**. Individual needs and expectations cannot be standardized: depending on the context and situation, each type of user has different needs, even for the same service.

«**It's too expensive and time-consuming**»
Basing the project on data and continuing to test it brings proven economic benefits, savings for the recovery of design errors, and gains related to valuable experiences.



Source: Bottà, D. User Experience Design, Hoepli, 2019

HCD collects user insights at every stage

The macro-process scales up the core process:
in every step, you will learn, ideate and test.

H

HEAR: Study, Visit, Listen, Observe, Ask
- Define the problem
- Map the context
- Know user characteristics and needs

C

CREATE, compare, draw
- Design big vision and details before starting to develop
- Design the service (concepts, systems, functions, UI)
- Test alternatives

D

DEVELOP, Test, Refine, test, Describe, Evolve
- Test the development
- Test with users
- Also design the support

Tools to:
Know, Design, Share, Refine

DATA COLLECTION	+	DATA DISPLAY
SURVEY INTERVIEWS CONTEXTUAL INQUIRY N/ETNOGRAPHY SERVICE SAFARI		STAKEHOLDERS MAP PERSONAS EMPATHY MAP
REQUIREMENTS CO-SKETCHING DIAGRAMMING		JOURNEY MAP INFO-ARCHITECTURE WIREFRAMES FAKE DOORS
HEURISTIC EVALUATION EXPERT ASSESSMENT COGNITIVE WALKTHROUGH USER TEST		UI DESIGN PoC WORKING PROTOTYPES USER GUIDE

Human Centered Design Toolkit, 2011. IDEO

Different types of data sources

There are various information sources we can use to build a knowledge base for the domain in which we operate.

- **Documents** (reports, scientific literature)
- **Open data**
- **Ad hoc surveys** (questionnaires, interviews, continuous surveys)
- **Crowdsourcing**: collaborative practice of data collection from user communities
- **Counter-data**: alternative or complementary data to those collected by governments and institutions, aimed at addressing situations where official data is not collected or is aggregated in reporting.

Blend both quali and quantitative data, big and small data.

"Data is not the goal to aim for, but a way to forward. ***Data are lenses*** *through which we can look at the world, count what surrounds us, give it a weight, a measure, interact with objects, activities, situations and events."*

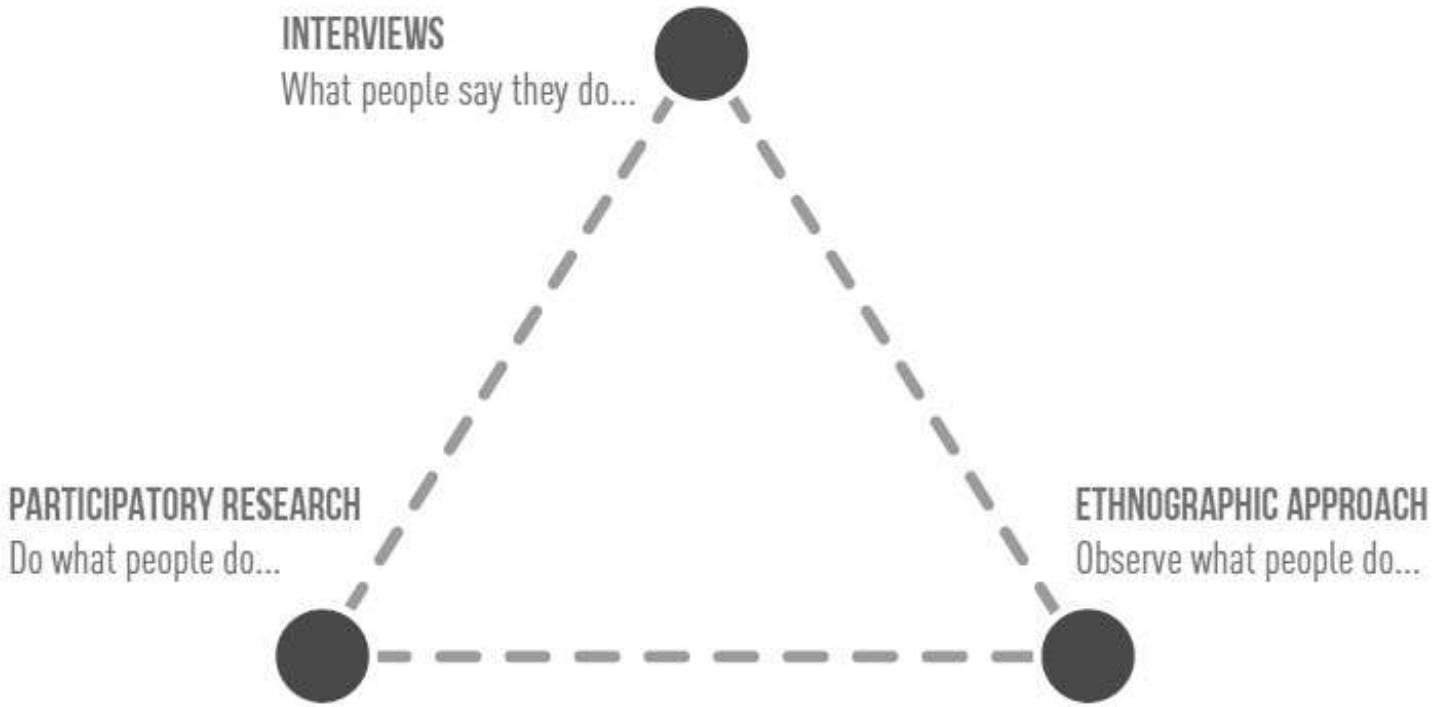
Dataninja

Data collection and triangulation

User research generates an in-depth understanding of the real needs of people and all the actors involved in the system.

To get a good enough understanding of the problem, ideally, **Big data (quantitative research) and Small data (qualitative research)** should be combined.

You can complete your vision, improve data and make more fair the output



Sources > Real-world data

- Administrative Data (insurance claims, work documents)
- Demographic Data (age, education, environmental factors, income, geographic location)
- Behavioral Data (diet, lifestyle, physical activity)
- Social Data (employment, family, family and social networks)
- Clinical Data (electronic medical records, labs, imaging, genomics, metabolomics, tissue, patient-reported outcomes)
- Attitudinal Data (patients' experiences and feelings)
- Financial Data (expenses, income, credit card purchases)

Official data sources

Istat
Eurostat
Istituto superiore di sanità
Banca mondiale
Pubbliche amministrazioni

Private data sources

Google Trends
Spotify
IDC
Gartner
Caritas
Save the Children
Legambiente
WWF
Fondazione Agnelli

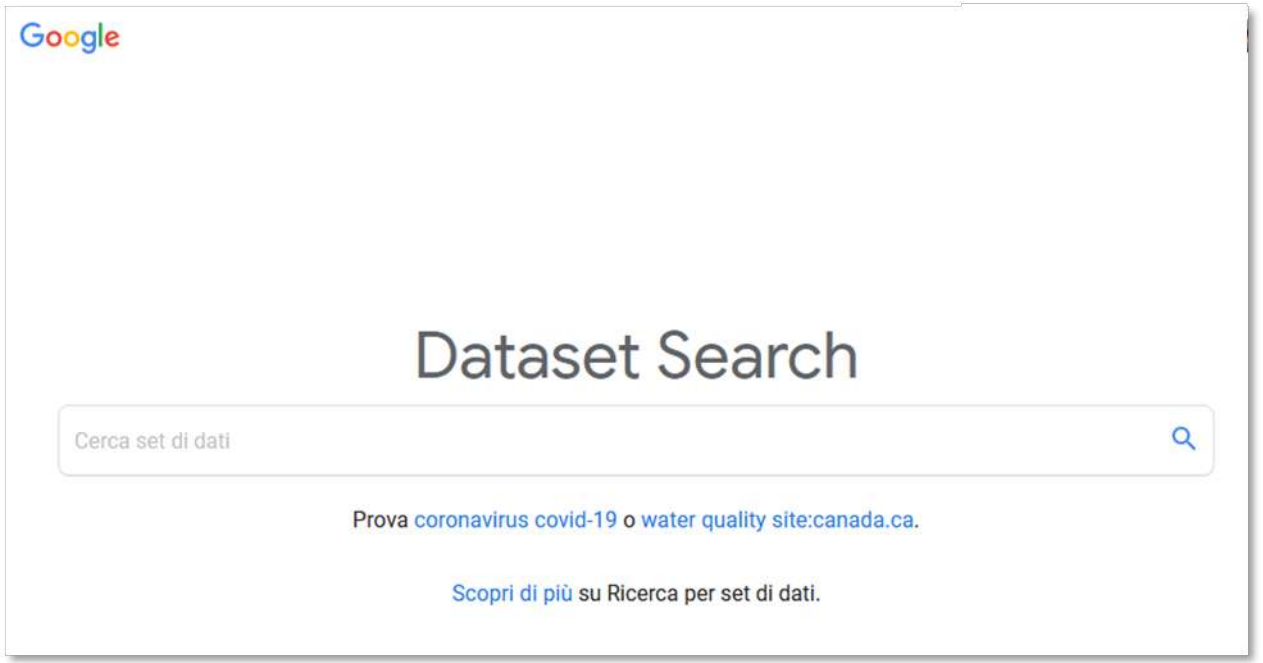
Aggregators

Statista
WikiData
OurWorldInData
Data.world
Google public data
https://datasetsearch.research.google.com

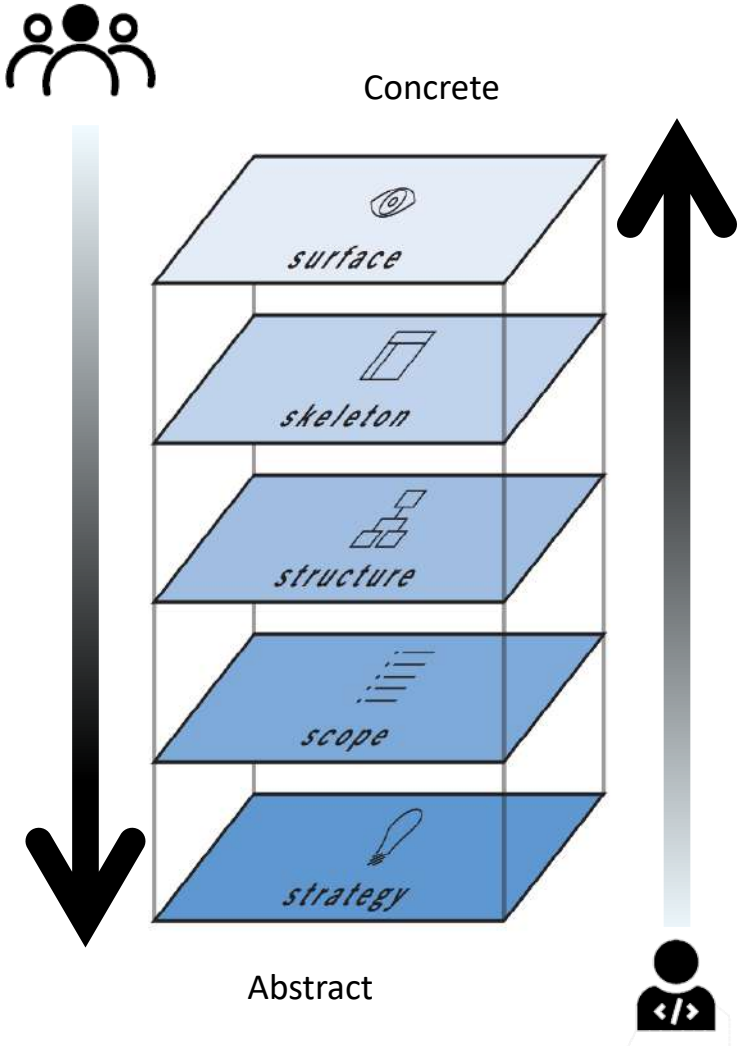
Sources > OPEN DATA

- bbc-data-unit
- Climate action report
- Dati.Gov.It
- Design for migration
- Disabled data
- European Data Portal
- European Journalism Network (sezione strumenti)
- Eurostat
- Google Public Data Explorer
- ISTAT
- Kaggle
- MIT - Massive Visualization Dataset
- OECD Data Portal
- OpenAfrica
- European Data Portal
- EU Open Data Portal
- Open Data Istruzione
- Open data Compagnia di San Paolo
- Our world in data
- UNdata
- World Bank Open Data Portal
- World Health Organization Data Repository

The role of data, in any field, and the way it is presented, is to ensure access to information, ease of use and reuse of data, and potentially even historical comparability or comparability with other countries.



https://datasetsearch.research.google.com



Based on the needs and characteristics of users, Designer collects details about the data needed:

- From what points of view can the phenomenon be described?
- What questions do different stakeholders ask?
- Will data support decisions?
- Who is left out of the current descriptions?

Driving questions:

- Who are the groups/people related to the data, and how many are (including decision-makers and indirect beneficiaries)?
- What are their informational needs? What questions must the data answer? What decisions need to be made?
- What data and information are necessary? What and how many subjects/phenomena do you aim to describe? Which categories to apply? How organize them
- Which output is expected

Abby Covert, How to Make Sense of Any Mess: Information Architecture for Everybody

About the categories

The categories are social inventions

The classification process is necessary to transform the overwhelming complexity of the world into something more manageable, something that individuals and institutions with limited storage and attention capacity can handle. Classification systems decide, in advance, what to remember and what to forget.

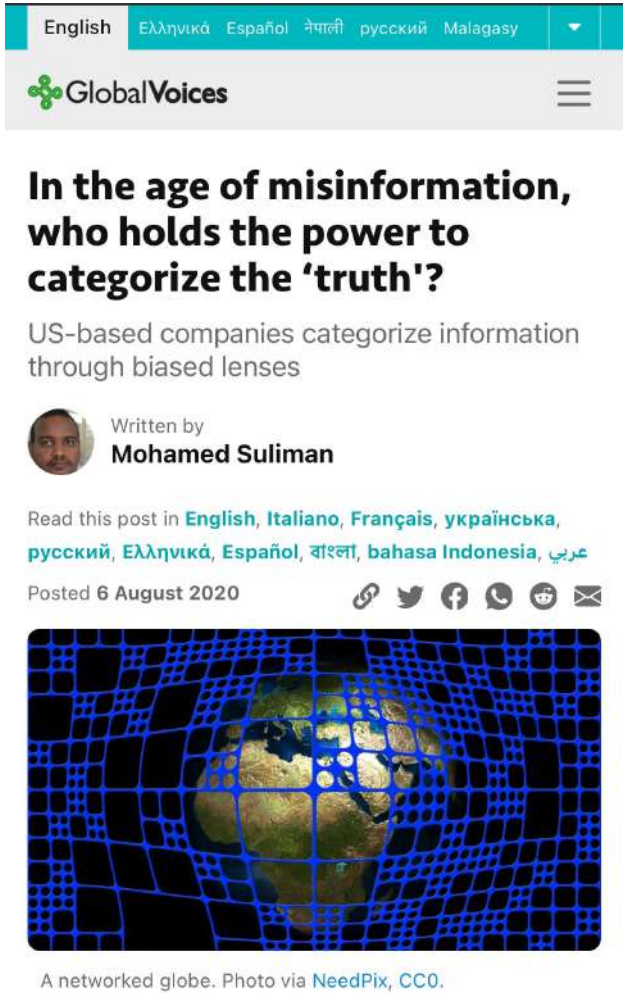
However, these categories are not neutral. All classification systems are the result of political and social processes and represent the interests of certain groups.

The problem arises when data users forget that categories are social constructs created for a specific purpose.

Families
Customers
Productivity
Abuse
Femicide

C. Thi Nguyen. The Limits of Data. Issues Vol. XI, 2, 2024

Categorization is not a technical issue



A networked globe. Photo via NeedPix, CC0.

Technology and social media platforms, which serve as the main gateways for news and opinion, often adopt disparate frameworks to classify information.

- Google uses a 5-point scale: **False, Mostly False, Half True, Mostly True and True**
- Facebook uses a different one: **False, Partially False or Altered, Missing Context, Satire, True**
- Twitter recently announced its framework that has three categories of **misleading information**, **disputed claims** and **unverified claims**

Fact-checking organisations differ radically in their categorizations.

- Politifact invented what is called Truth-O-Meter (true, mostly true, mostly false, false + not accurate and makes a ridiculous claim)
- Snopes uses a very different method with 14 categories.
- Full Fact, a UK-based fact-checking organisation, does not use any categorization, leaving the reader free to make his own judgement.

https://globalvoices.org/2020/08/06/in-the-age-of-misinformation-who-holds-the-power-to-categorize-the-truth

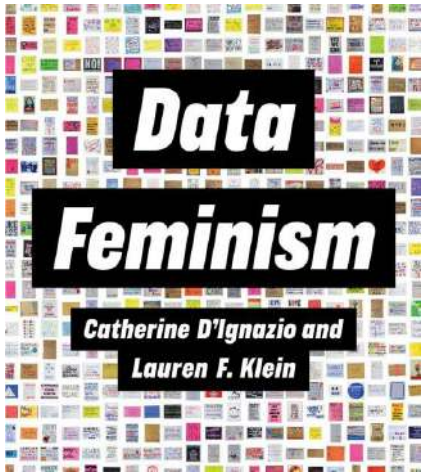
Define properly concepts, variables, quantitities, properties of data

The way we name things that we count and measure "counts"

*«The most challenging and **fascinating part of data** collection is **to decide what to include and what to exclude** in your analysis. Here **possible future discrimination** can arise.»*

Responsibility and power

Worth reading



To learn more about the power:
C. D'Ignazio and L. F. Klein. Data Feminism
Chapter 1 - **1. The Power Chapter**
https://data-feminism.mitpress.mit.edu/

Stakeholders’ mapping

Different people, in diffent contexts, produce and read data differently

Any person, group, or institution that, positively or negatively,
***affects or is affected** by a particular issue or outcome of your project is a stakeholder.*

According to the HCD, stakeholders (people, institutions, or social groups)
shall be **involved in the process**
from the early stages and during the design activities
(especially testing and validation)

Retegi, A. et al. *The Co-Create Handbook*. http://www.cocreate.training/

Sponsors are often those who initiate the project by mobilizing resources and managing activities. Sponsors own the requirement for the project, and if the requirement changes, they must direct the project accordingly.

Which role for clients?

- **Direct or Primary users (CORE players)**
- **Indirect or Secondary users (INVOLVED players)**
- **External stakeholders (INFORMED players)**

Which role for sponsors?

Which role for developers?

Dolfing, H. A Step by Step Stakeholder Mapping Guide. 2018.

Stakeholders' analysis

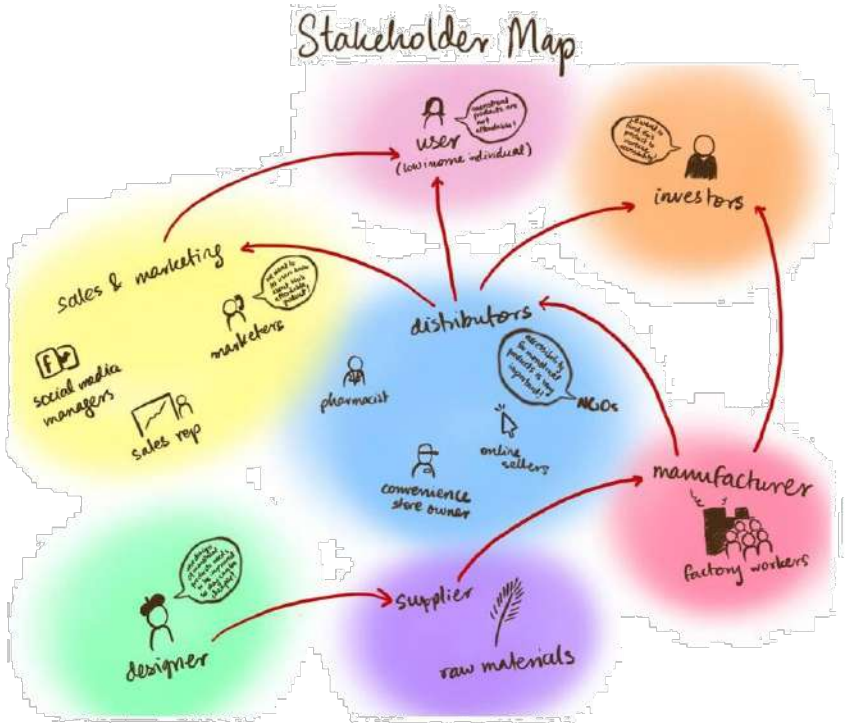
When starting a new project, it's important to **identify who else has a stake in the outcome**, whether that's **someone directly invested** in the project or **people you have to work with** to reach our goal.

Identifying them early will help steer you in the right direction and
give you a **network** to reach out to for support and help prevent unforeseen barriers.

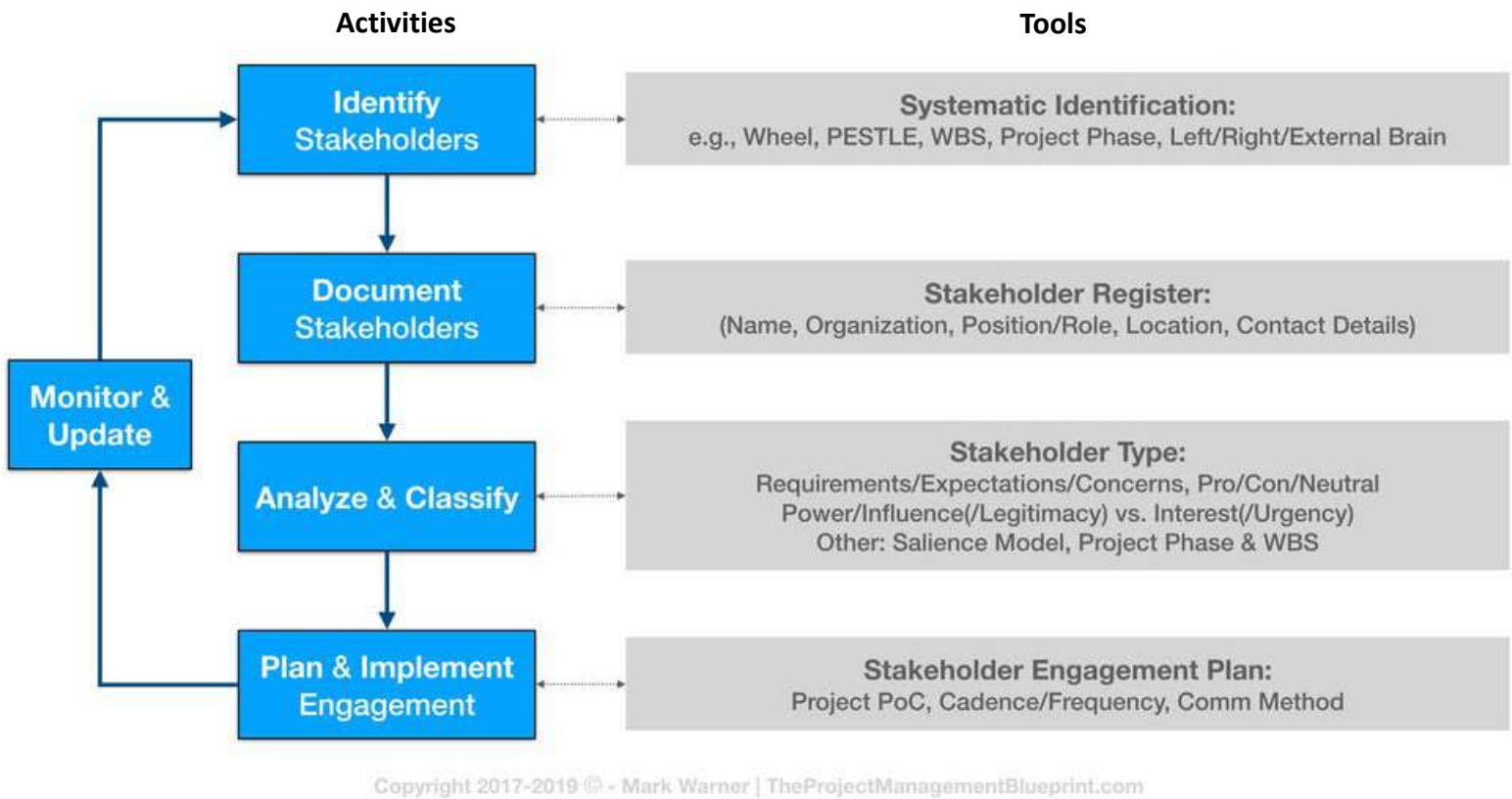
Stakeholder analysis and map are a **tried-and-true method** for driving out project specifics:

- **Who** is involved in a project
- **Who** is invested in the outcome
- **Who** has right of refusal
- **Who** will support the team
- **Who** are the key decision-makers
- **Who** the team should meet with to help get context

It gives an overview of all the actors and organizations involved and allows to develop a clearer picture of how different actors and interact with your project and each other.
This tool can be a great resource when used to share what you do with the community of stakeholders.



Stakeholders' management process



- Design & co-design
- Demonstration
- Testing and validation
- Field trial
- Exploitation
- Maintenance
- Continuous improving

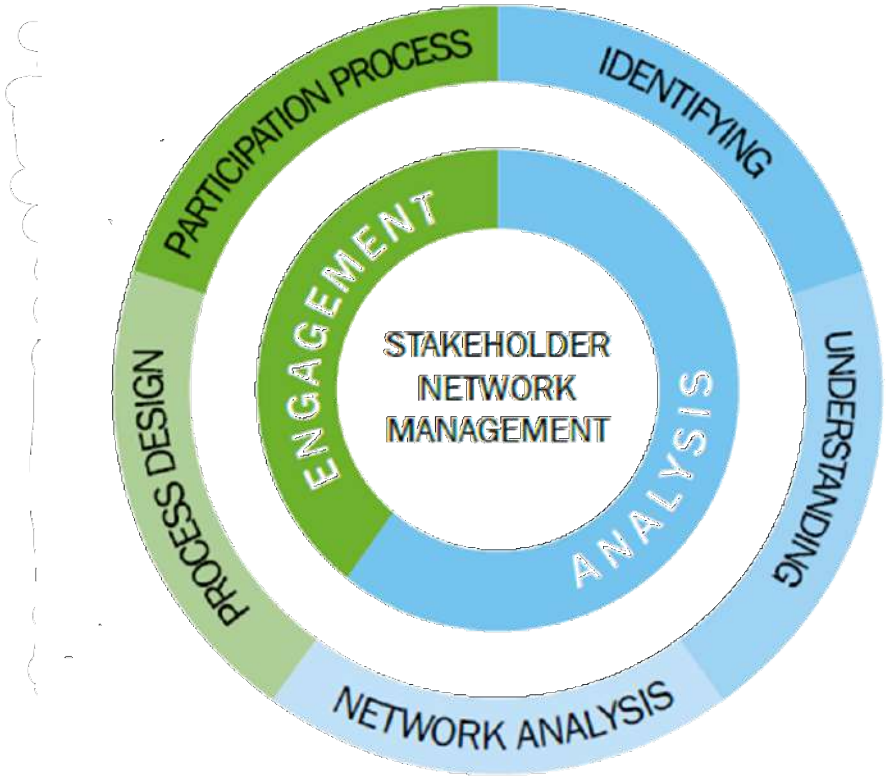
Stakeholders' maps: why and how to use them?

Maps are **dynamic supports** to be updated according to the real scenario (spatial/temporal).

They enable **different activities**: design, testing, trials, experimentation, distribution and marketing, communication, maintenance...)

They provide quick representation of complex information such as:

- **Target users real goals**
- Different **interests**
- **Success** metrics
- **Communication** hints
- Potential **risks**
- **Engagement** of users to be involved in testing activities
- Engagement of **key people** to be informed
- **Negative stakeholders** as well as their adverse effects on the project….



Matti, C. Visual toolbox for system innovation. Climate-KIC, 2016

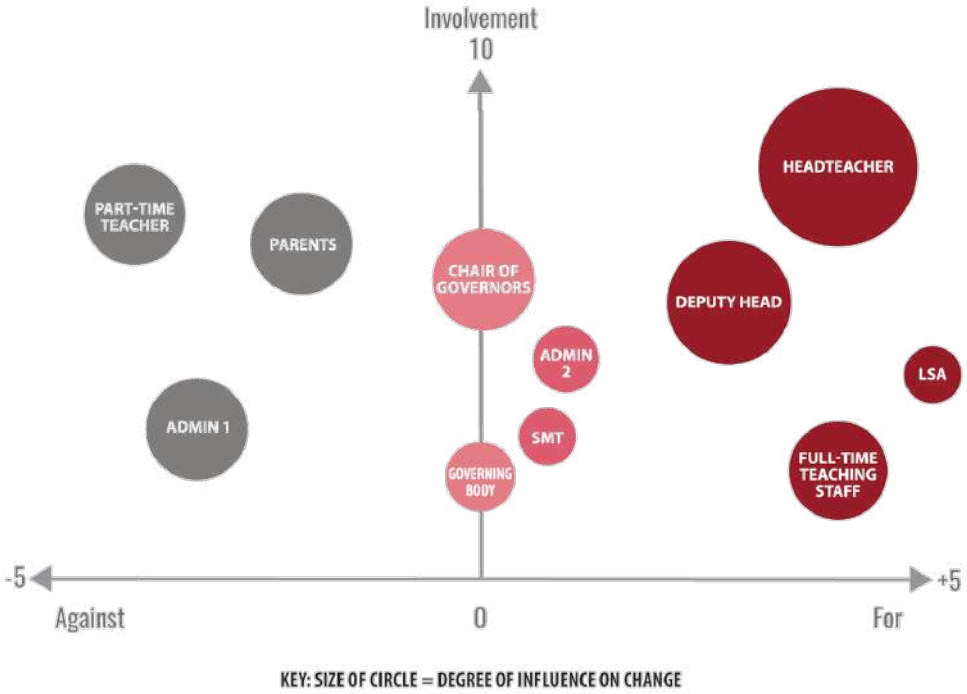
Stakeholders' map

The stakeholders mapping is a **visual representation** commonly used to set up design-related activities that incorporates data and information collected from primary and in-field research and activities.

A stakeholders' map includes the different types of players characterising the **domain of interest** and describes their relationship.

A stakeholders map usually identifies:

- **Direct or Primary users** (**CORE players**) are those subjects that because of role, power, authority, responsibilities, or claims over the resources, are central to the system. As end-users or enablers, they will directly affect the final results and their participation in activities is a requirement.
- **Indirect or Secondary users** (**INVOLVED players**) are subjects that may be not directly interested in the system use but can play the role of enablers or barriers.
- **External stakeholders** (**INFORMED players**) are subjects that can positively contribute to adopting the system, such as media and policy-makers.



Dolfing, H. A Step by Step Stakeholder Mapping Guide. 2018.

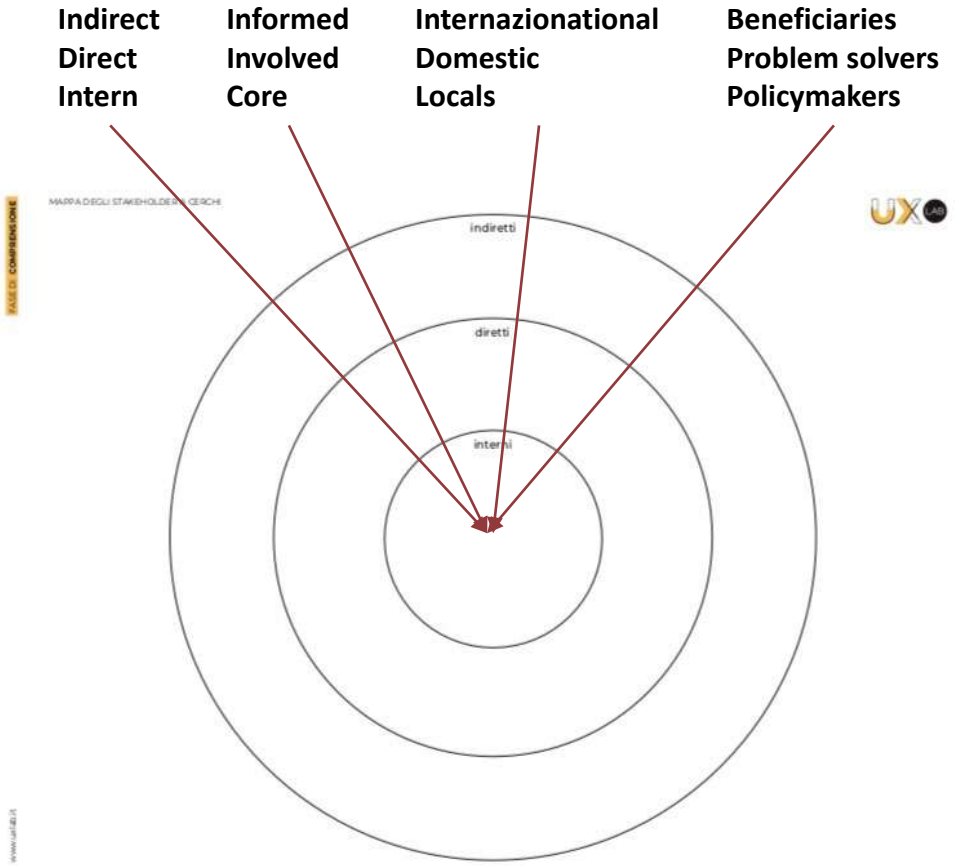
The Stakeholders' map is a **visual representation** of actors (people in their roles) who can influence the project and how they are connected (to each other and to the project).
It may include individual and collective subjects.

Different visual canvases allow you to display an overview of a complex ecosystem (and then share, process, communicate on and with) of who and how you are trying to reach.

Radar chart

Useful to organize groups on one variable dimensions:

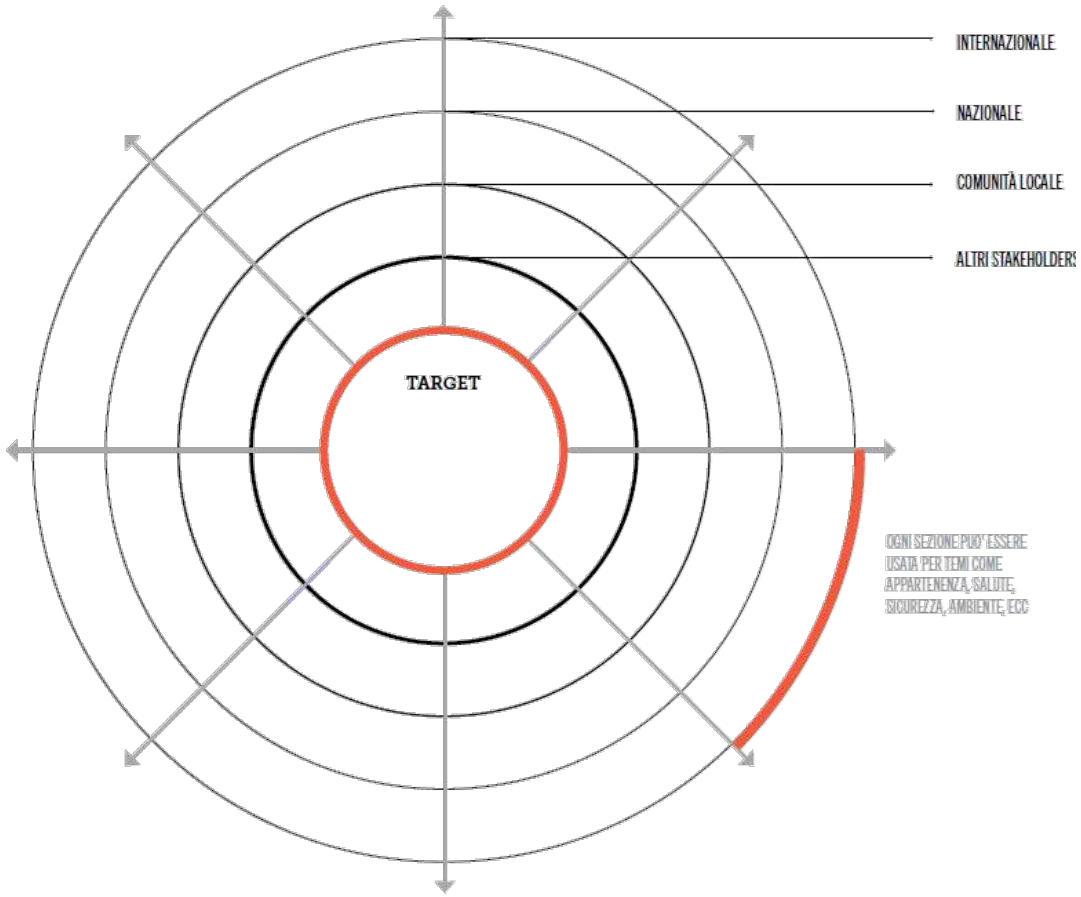
- responsibility
- influence
- proximity
- dependence, involvement
- …

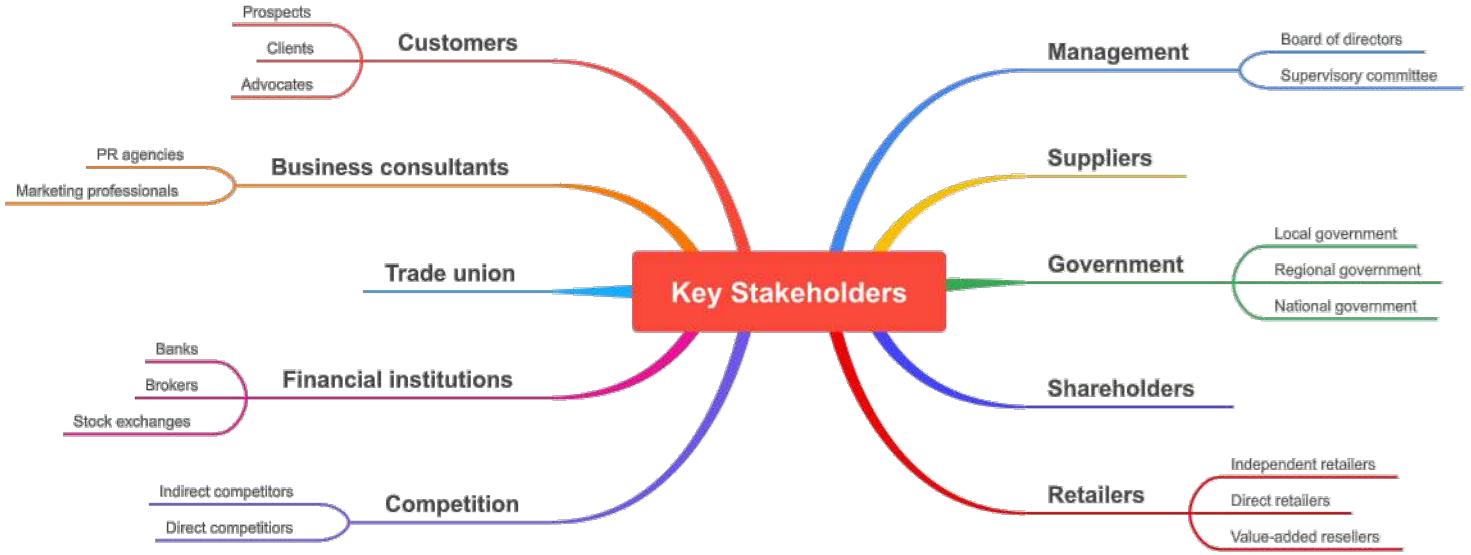


Bottà, D. UX Design design. Hoepli, 2019.
http://www.uxlab.it/strumenti.html

Radar chart

Original chart developed from the Helsinki Design Lab .





Hub & spoke

In the centre is the key group and around the other actors of the ecosystem.
It highlights the relationship between the various nodes with different visual encoding:

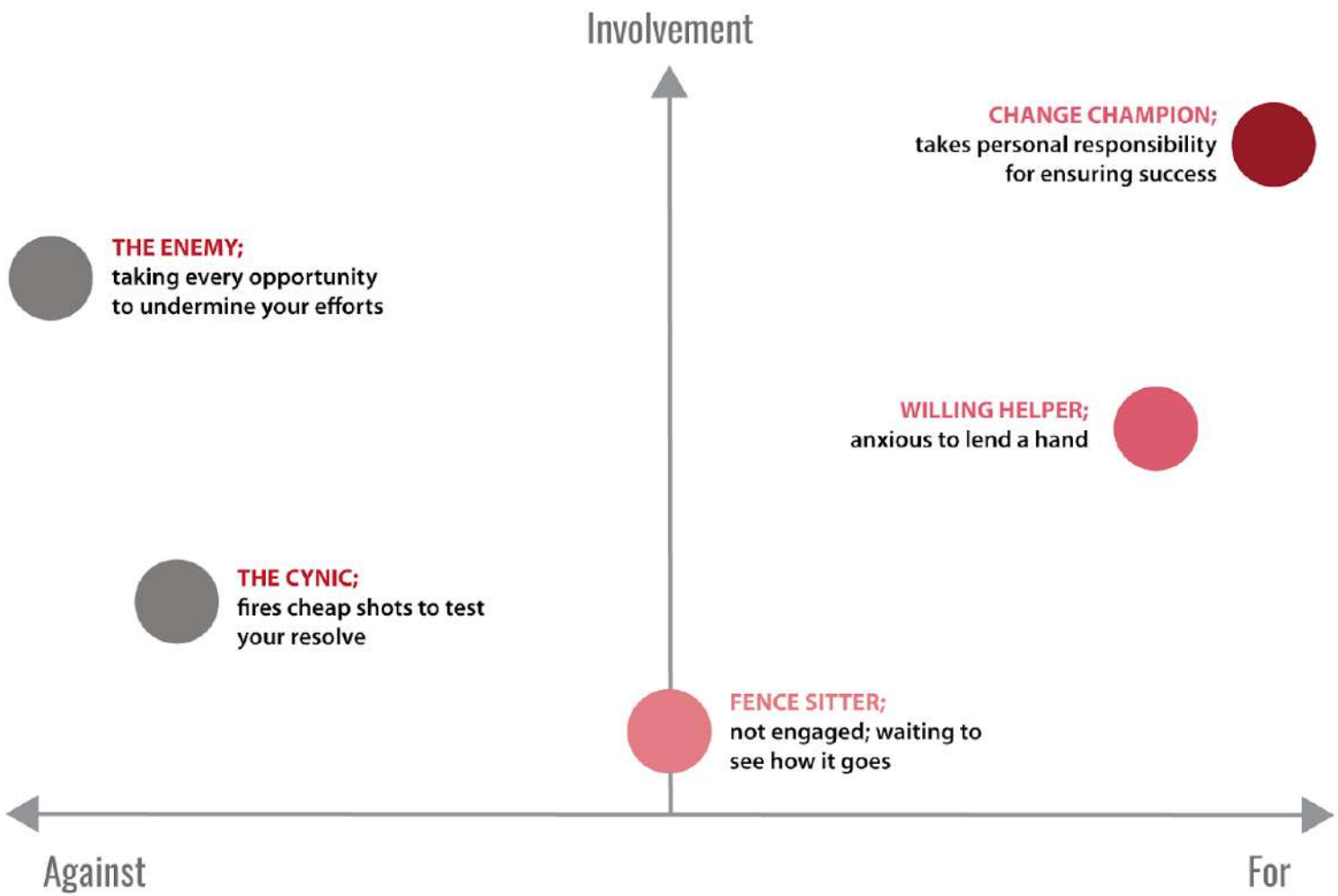
- **Lines**: continuous, dashed or more marked depending on the type of relationship
- **Colors**: type of target
- **Size**: type of target

It is useful for mapping the width of the ecosystem.
For each branch, quantitative data that complete the picture shall be added and kept updated.

Ecosystem canvas

Cicero et al. Platform Design Toolkit. 2016

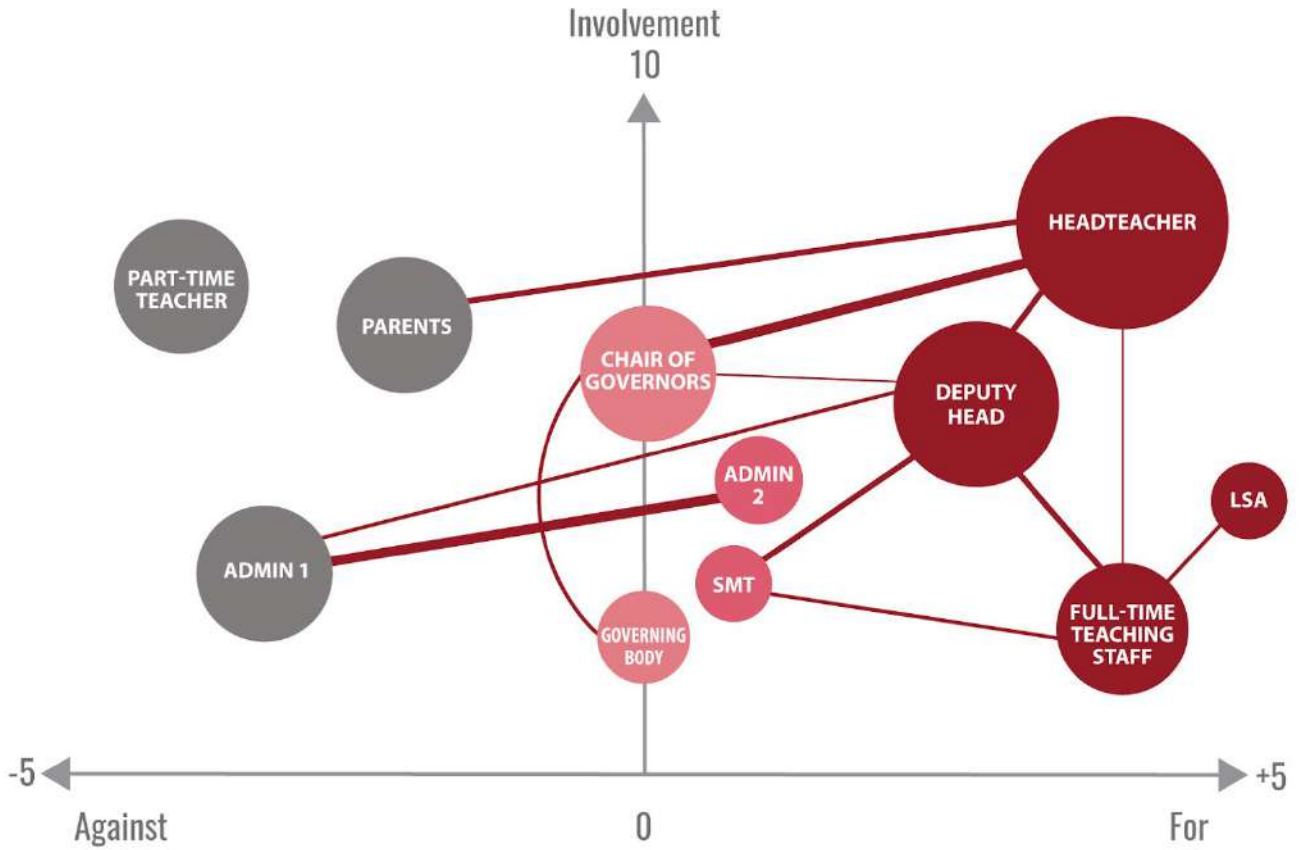
Diagram
Bubble chart



Dolfing, H. A Step by Step Stakeholder Mapping Guide. 2018.

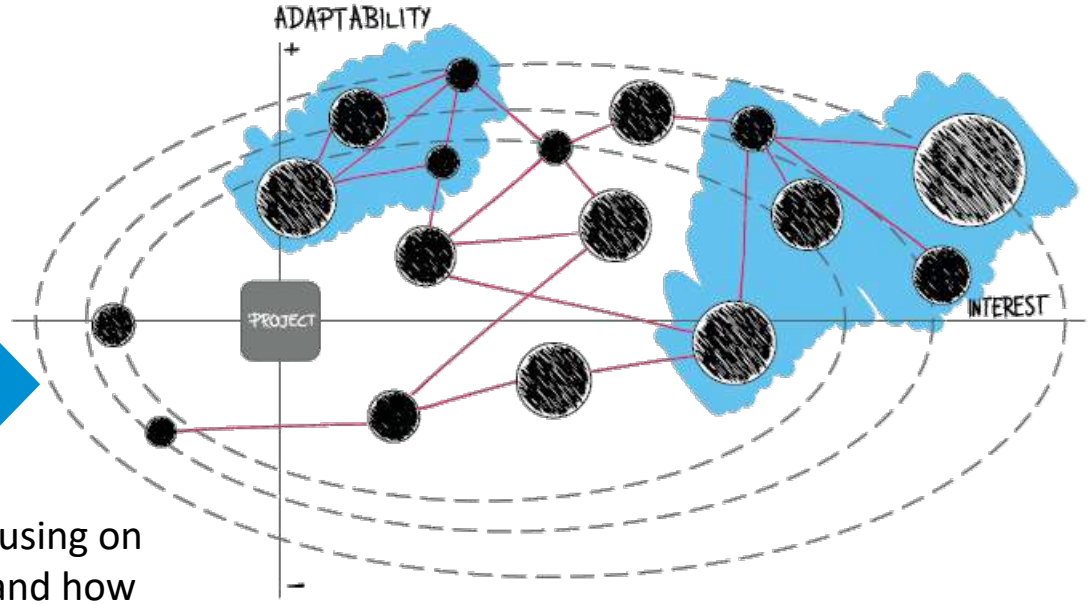
Diagram
Bubble chart

You can also visualize proportions and relations among groups and goals



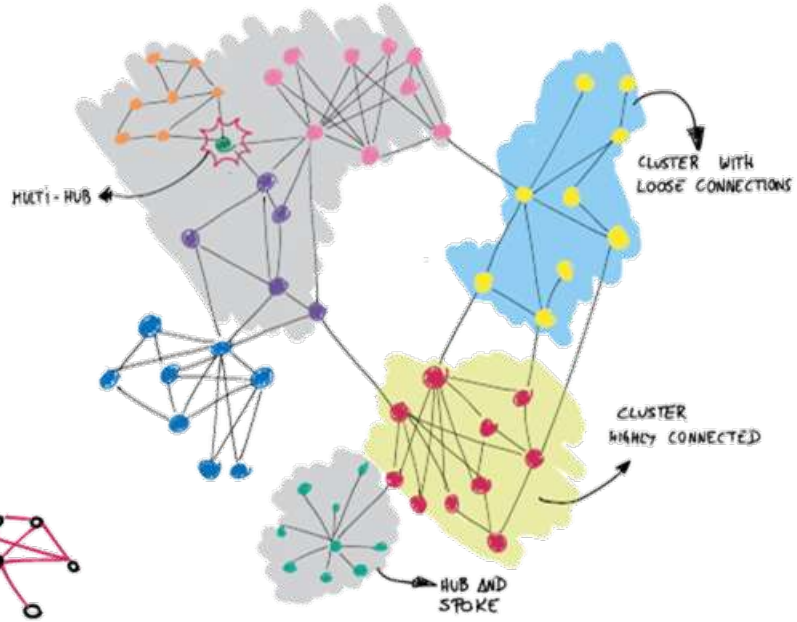
Dolfing, H. A Step by Step Stakeholder Mapping Guide. 2018.

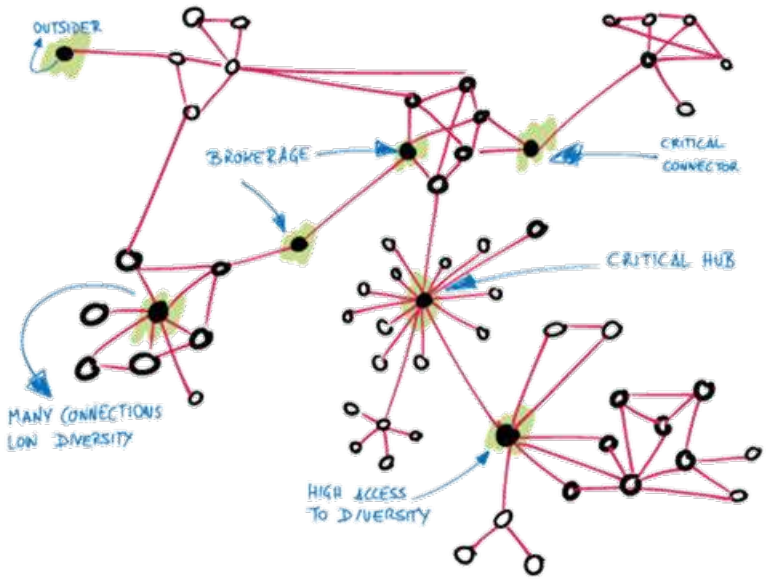
Stakeholders' universe



Visual network analysis tool focusing on the connections among actors and how these connections work and might evolve, affecting the system we are designing.

1) List the actors
2) Place them on the axis
3) Define connections
4) Define clusters



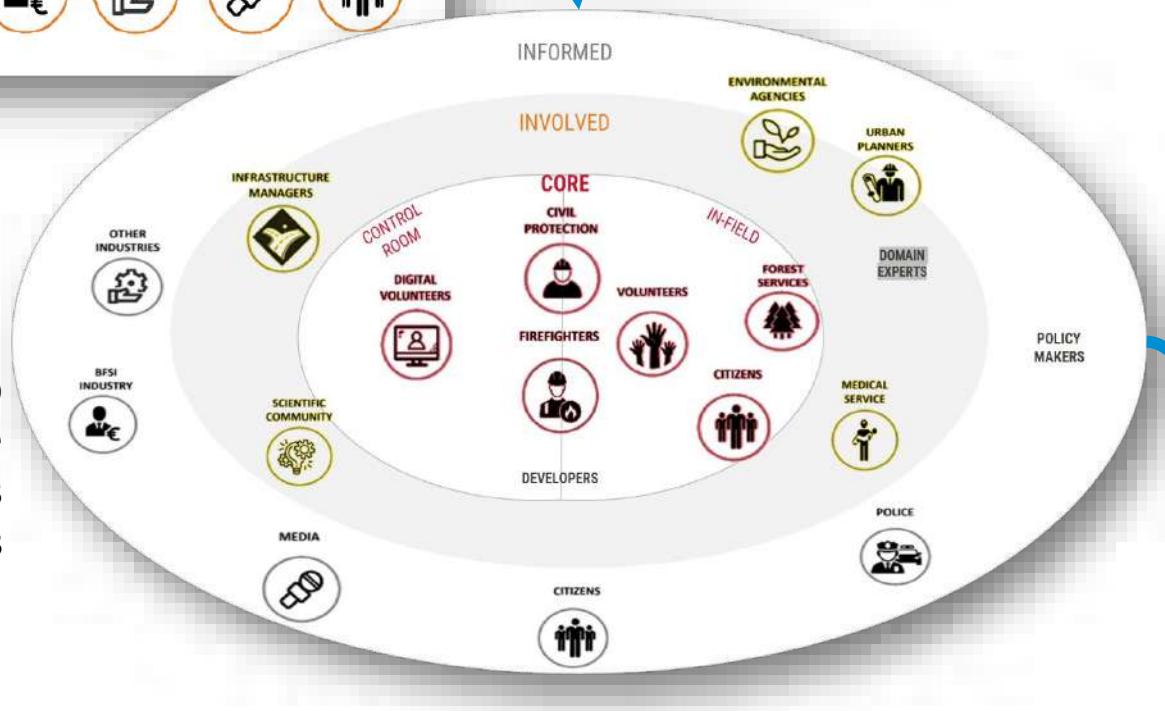


Matti, C. Visual toolbox for system innovation. Climate-KIC, 2016

Emergency management stakeholders'map

Stakeholders list

Stakeholders' map supporting the **User Requirements collection and specifications**

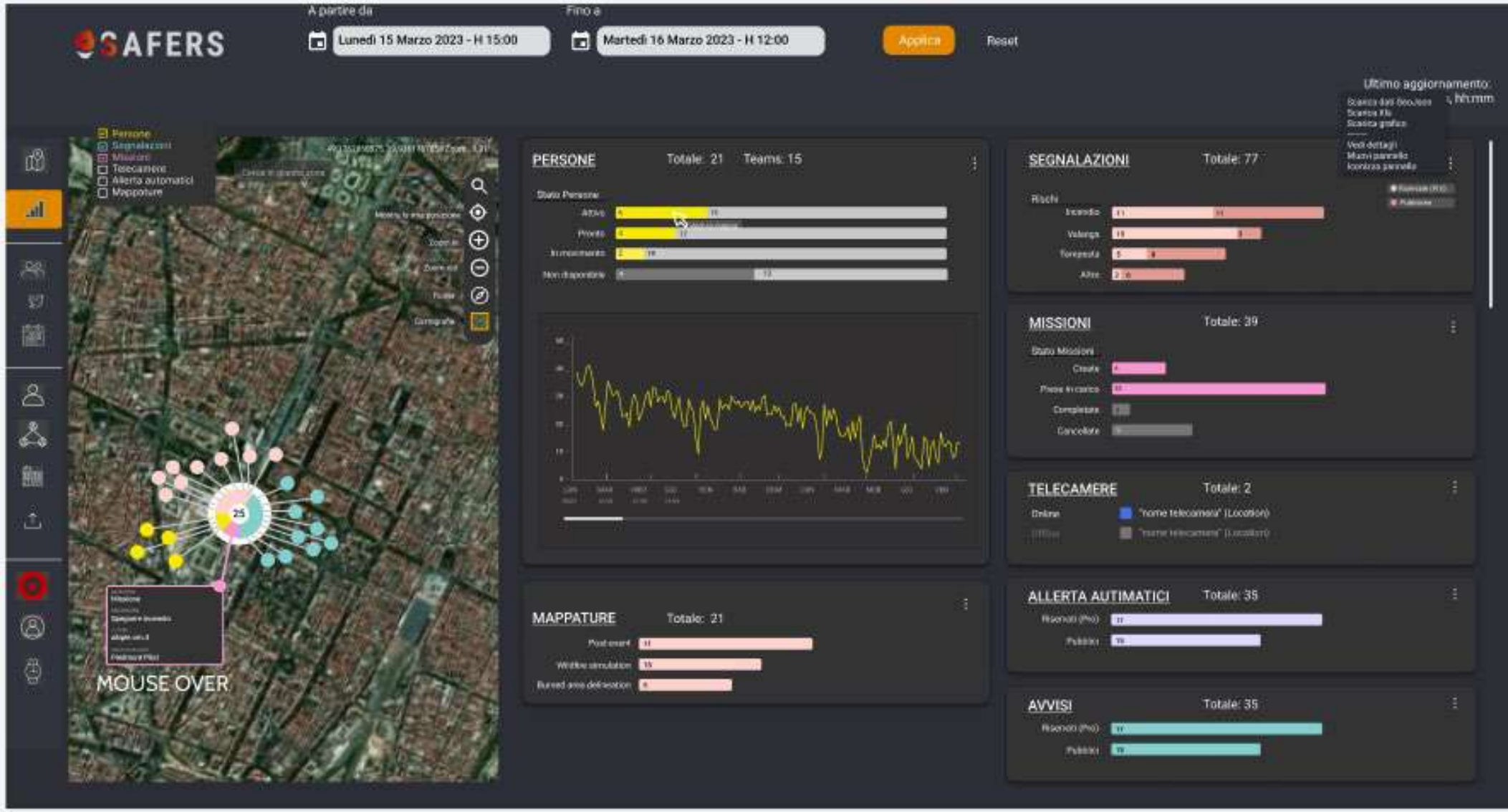


Stakeholders' map to support the **Pilot design and exploitation**

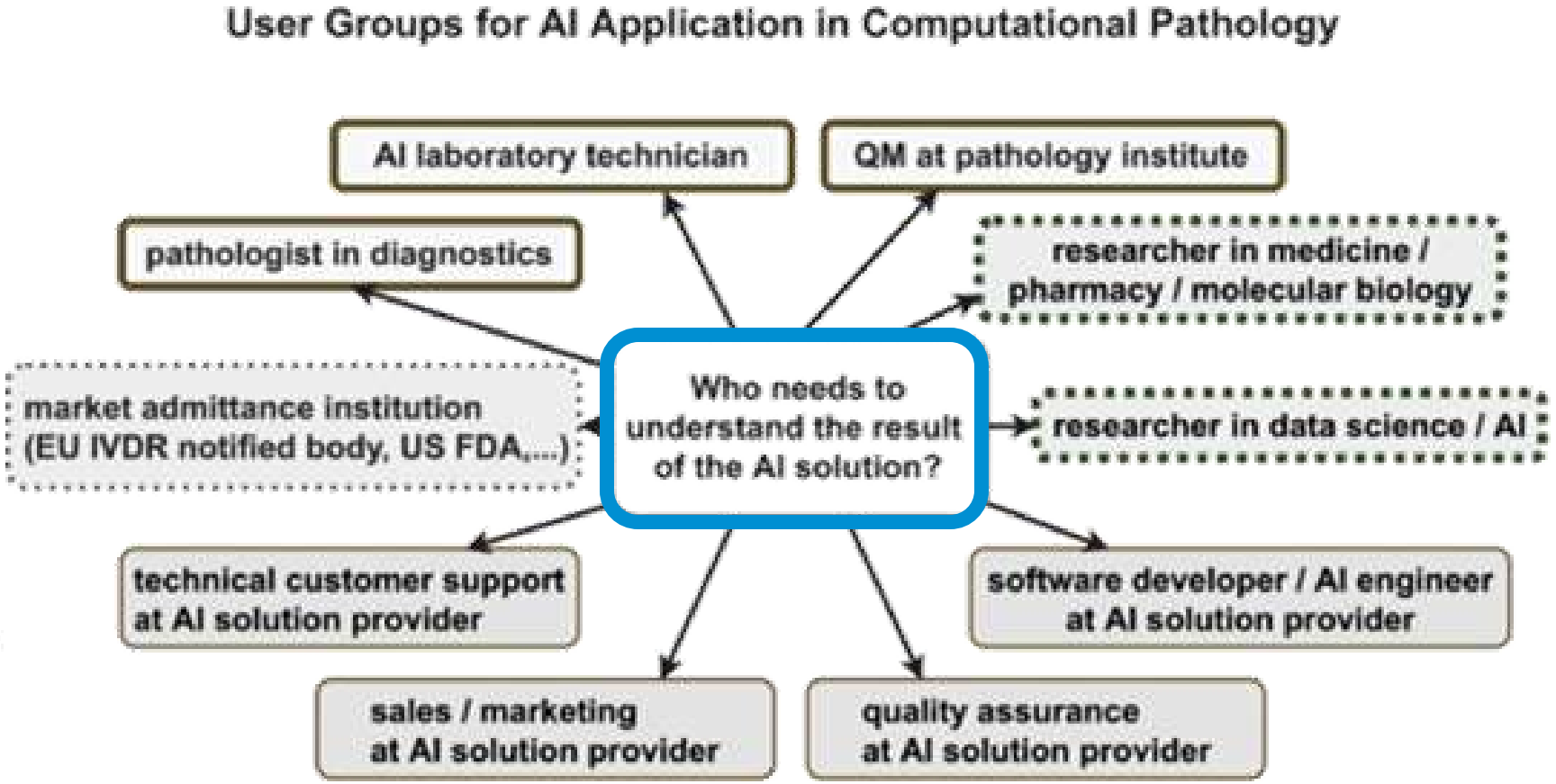
Stakeholder category	Role in SAFERS
Firefighters	**End-users** of SAFERS platform and smart services.
Civil protection	Their contribution revolves around the definition of end-user requirements, the co-design SAFERS solutions, the realization of pilots for testing and demonstrations for validation, and the provision of feedbacks. They will benefit from SAFERS during the emergency management phases: **prevention and preparedness** and **detection and response.**

Emergency management stakeholders'map

Web Dashboard for the consultation of satellite data, sensors and reports made by first responders and citizens (crowdsourcing)



Stakeholders map for AI-based services



A. Holzinger, M. Kargl, B. Kipperer, P. Regitnig, M. Plass and H. Müller, "Personas for Artificial Intelligence (AI) an Open Source Toolbox," in *IEEE Access*, vol. 10, pp. 23732-23747, 2022

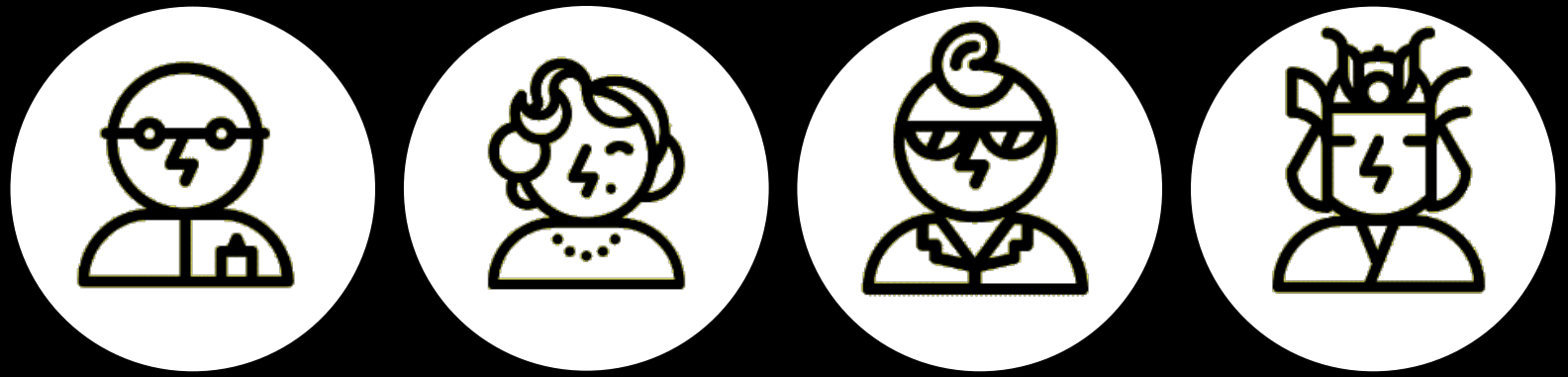
Different visual canvases allow you to display an **overview of a complex ecosystem** (and then share, process, communicate on and with) of who and how you are trying to reach.

There are no standard maps.
You can find many different canvases and labels (ecosystem canvas, players map, …), made available in wonderful existing toolkits.

You can also create yours for ad-hoc purposes and specific needs.

The golden rule is:
Keep it
. simple and clear
. stick to data (real world)
. updated

Hands-on
Stakeholders mapping



Let’s design our service

1

- Which is our challenge?
- Which needs and opportunities we see?
- Who will serve?
- Who will support-it?

Context analysis and STAKEHOLDERS MAP

2

- What do your customers want to reach?
- Which data and information will be provided?
- Where do they come from?

PERSONAS

3

- How do they search for it?
- Which channels Are Important?
- Understand your users’ preferences and decide how to engage with them effectively and efficiently.

CUSTOMER JOURNEY

4

- We can now define the SMART goals of the service

VALUE PROPOSITION
Smart goals
Service blueprint

ADaS Projects

P01. Visual-language pre-training

P01. **Education**: LLMs/SLMs for specification/design relational databases.

P03. **Formula 1 Racing Data Analysis**

P04. **Real-time Foosball Detection**

P05. Few-Shot Semantic Segmentation for Domain-Specific Data

P06. **Corn Yield Forecast** by integrating meteorological data to help farmers and agricultural stakeholders make more informed decisions regarding resource allocation, irrigation, and crop management

P07. **Hyperspectral oil spill detection:** rapid, accurate, and cost-effective monitoring of marine environments

P08. **Scientific papers classifier based on NLP**

P09. Retrieval Augmented Generation (RAG)

P10. **Classification and retrieval system for gas pipe repairs:** safety, efficiency and economic savings in gas pipe repairs by providing a decision-support tool to quickly and accurately assess patch applicability

P11. **Neural networks for SAR oil spill detection:** Provide rapid, accurate, and cost-effective monitoring of marine environments, compared to the human counterpart

P12. **Time-to-failure Prediction (TTF):** Identifying when an event is going to happen. In certain sectors, like predictive maintenance

P13. **Music composition platforms:** classifying music tracks

P14. **Lavazza A Modo Mio TINY:** consumers analysis

Stakeholder mapping process

Starting from the desk analysis (Demographic dataset, Reports, Research papers, Newspaper articles) **and the user research**

1. **MAKE A LIST OF ALL STAKEHOLDERS**
   Identify all the stakeholders who have any interest in your project's outcome.
   - Who is interested in the project
   - Who are the direct beneficiaries that will use the output?
   - Who are the indirect beneficiaries that will benefit from the outcome?
   - Who can refuse or obstacle the project/adoption?
     → **Identify** which population segments or user groups that (live, work, visit, act…) in the reference context

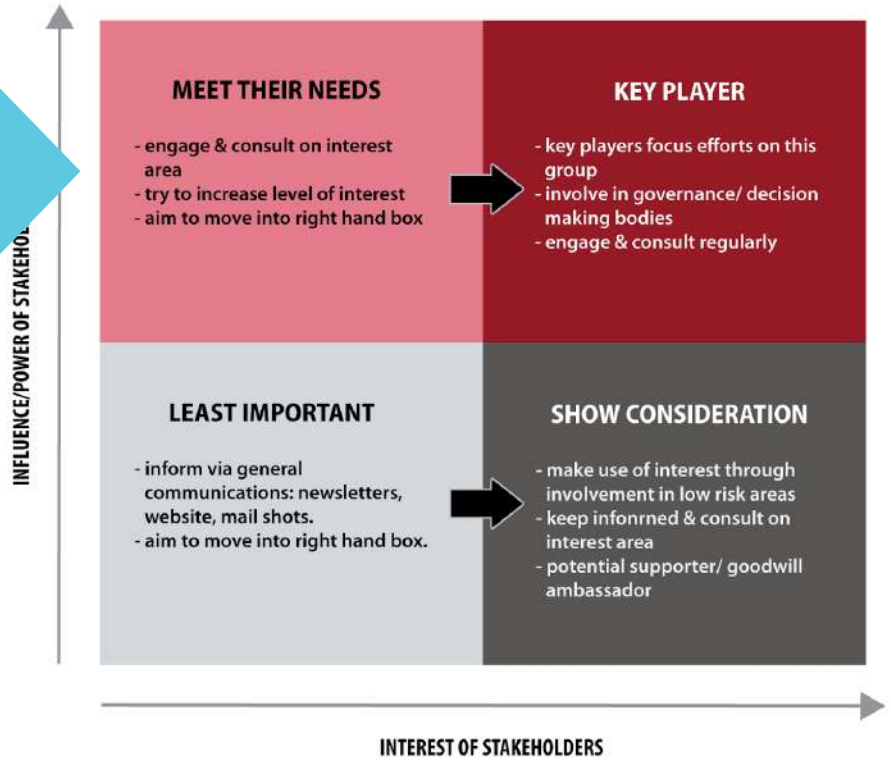
2. **Per each actor,** describe their GOAL (what they want to reach) data they need and/or can produce

3. **Systematize** stakeholders, **moving them to the map: place each stakeholder on the matrix, reflecting on the type of interest that each of them has about the project and the level of influence they can exert.**
4. **Add relevant questions, needs, wants they bring to the project**

5. **Prioritize** groups and relevant issues to be addressed by the systems/service, in a user-centred perspective

Power x interest matrix

Use this to understand which stakeholders are most important and how you should best interact with them.



Dolfing, H. A Step by Step Stakeholder Mapping Guide. 2018.

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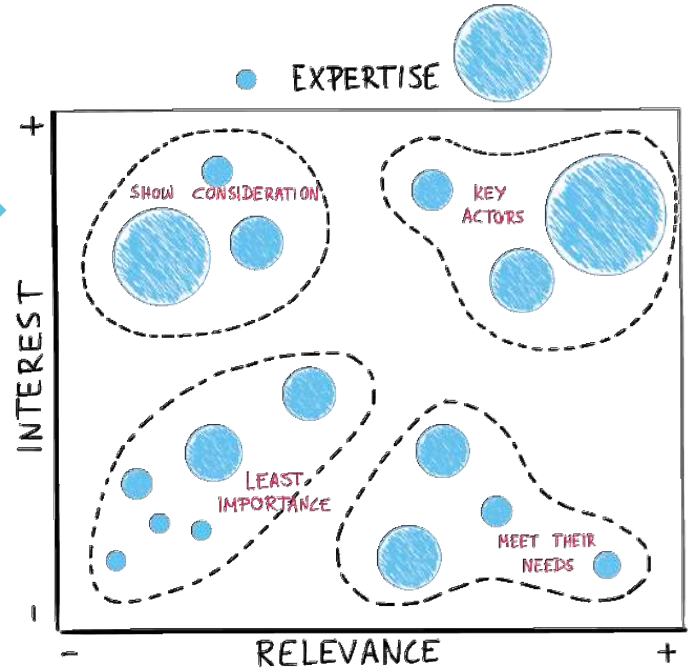
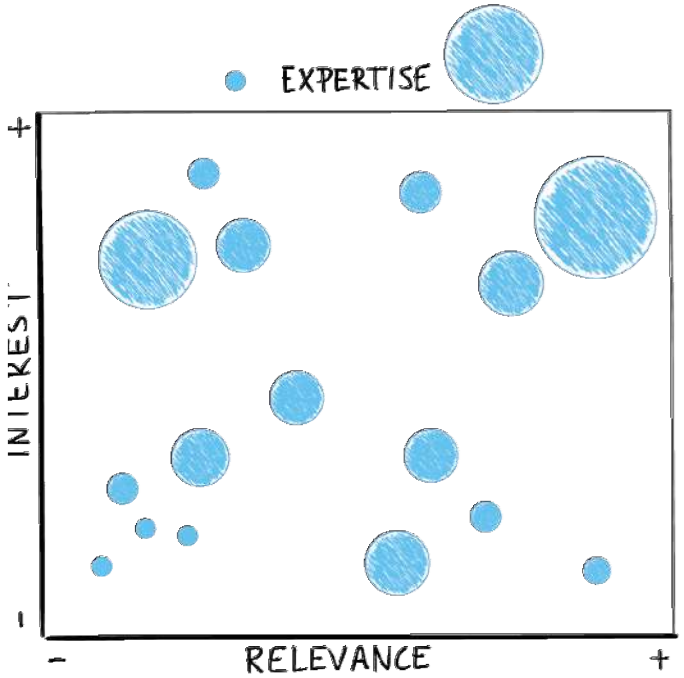
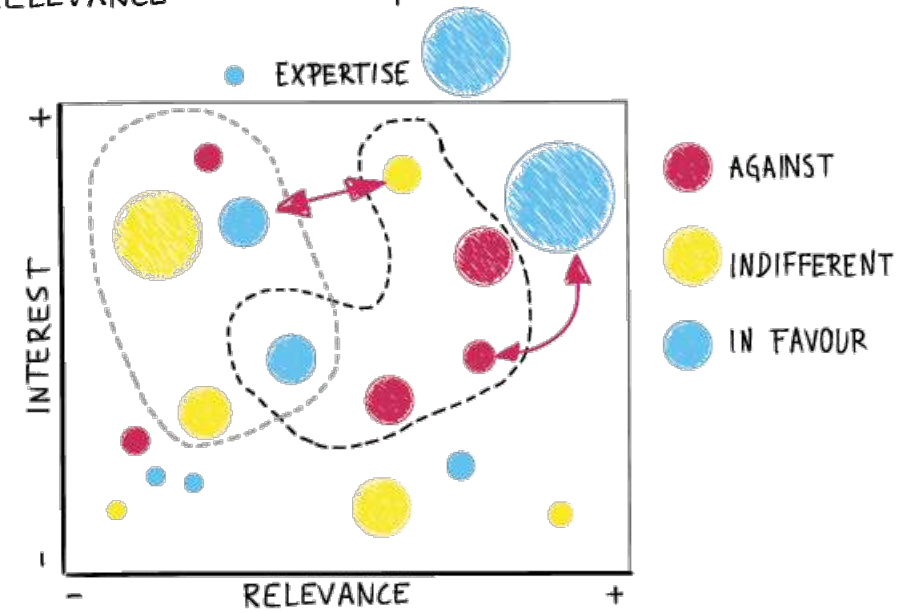
Power x interest matrix







Matti, C. Visual toolbox for system innovation. Climate-KIC, 2016

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