LIVING-IN.EU

Education & Capacity Building sub-group

WORKSHOP

Digital innovation in Living Lab environments

9 October 2023

14:00 – 16:00 CET

Online

Funded by the European Union

Go Li.EU is funded by the European Union Digital Europe Work Programme 2021-2022 under Grant Agreement No. 101083615

Aim of today's webinar

To explore how Living Lab methodologies can be applied to Digital Twins, Data Spaces, and AI innovation, ensuring that they meet the needs and expectations of the communities they serve.

Agenda

14:00 - 14:10: Welcome and introduction - Kaisa Spilling, Forum Virium Helsinki & Giacomo Lozzi, ENoLL

14:10 - 14:25: Madrid Living Lab Digital Twin (www.leadproject.eu) - Sergio Fernández Balaguer, EMT - Transport Company Madrid.

14:25 - 14:45: Co-creation, experimentation methods, and tools - Dimitri Schuurman, imec

14:45 - 14:55: Questions & answers

14:55 - 15:05: Break

15:05 - 15:50: Interactive exercise

- Participants engage in a practical exercise related to Digital Twin and Living Lab collaboration.

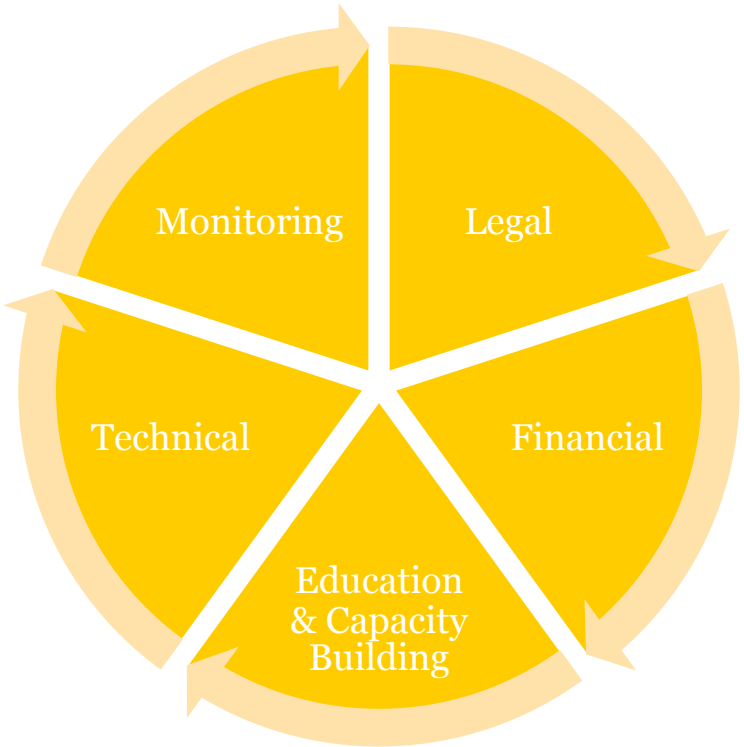
15:50 - 16:00: Wrap-up and next steps

LIVING-IN.EU

- Movement born in 2019
- Mission: to collectively drive the **digital transformation** across all corners of Europe – from countries, regions and municipalities.
- Amplify the advantages of digital solutions
- Approach **driven by cities** and **centered around citizens**
- **Cities as open innovation ecosystems**

Living Lab approach align with and can enable these principles

Living-in.EU: 5 sub-groups



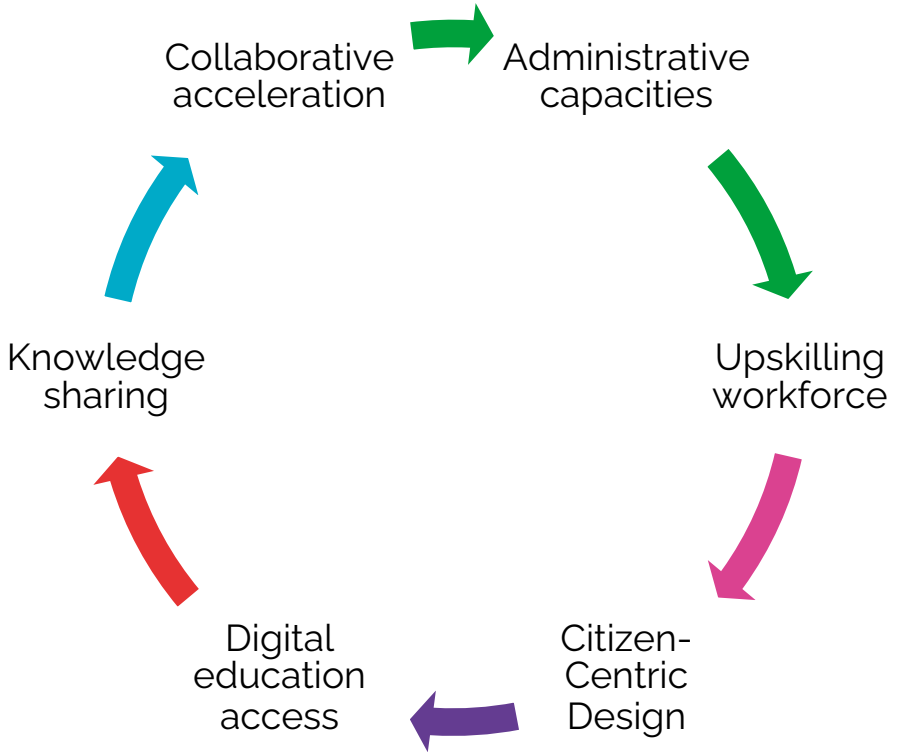
LIVING-IN.EU

Education & Capacity Building Working Group

Led by the European Network of Living Labs (ENoLL)

Leverages skills and methods for effective digitalisation

Culture of co-creative, participative and cross-sector approaches to designing new solutions



LIVING-IN.EU

Interactive exercise

Participants engage in a practical exercise related to Digital Twin and Living Lab collaboration.

Upcoming event

6 November 2023, 14:00-15:30

Workshop on collecting tools for the Living-in.EU Catalogue of Tools

Follow us and become member on https://living-in.eu/groups/commitments/education-capacity-building

LEAD Madrid Living Lab Digital Twin

Digital innovation in Living Lab environments

Online, October 9th, 2023

Sergio Fernández, Sergio.fernandez@emtmadrid.es

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

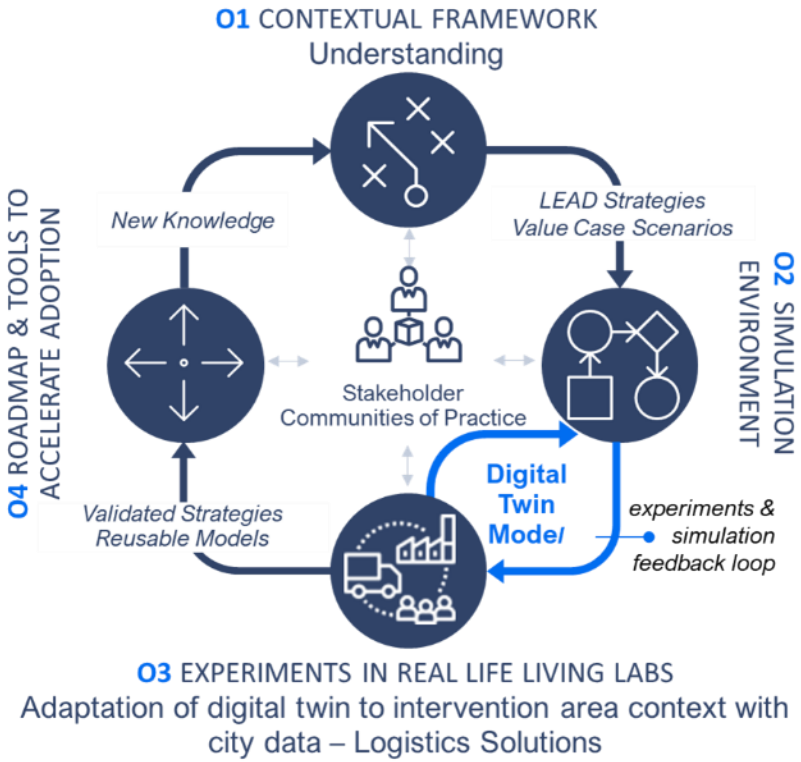
What is LEAD project?

- LEAD: “Low-Emission Adaptive last mile logistics supporting on demand economy through Digital Twins”
- 3.941.625 € (start 1/06/2020, 36 months, just finished!!)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 861598

Objectives

- Value cases co-design
- Digital Twinning Tools
- Validation in Living labs
- Scaling-up



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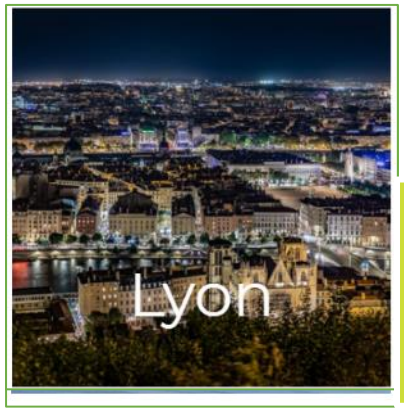
Transforming a Parking Lot to an Urban Consolidation Centre

Integrated last-mile logistics with demand-supply matching platforms

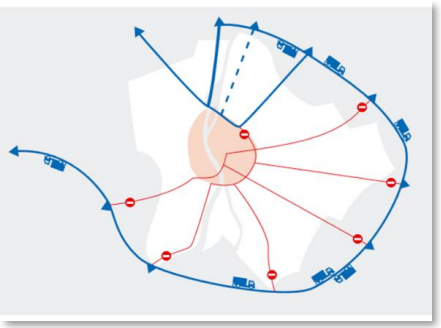
Turning retail stores to electric mobility nodes



Validation of last mile distribution models

Spatial Planning of Inner-City Loading Areas

Green Crowdshipping through the mass transit network



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LEAD

LEAD Strategies

1

Innovative business models

with a view to optimising the performance of last mile logistics (based on volatility of demand, delivery life cycles and costs) in response to the challenges posed by the on demand economy

2

Agile freight storage and distribution

Agile schemes for urban freight storage and last mile distribution, including crowdsourced shipping, capacity sharing, multi-echelon and Physical Internet inspired approaches

3

Low emission delivery vehicles

including Electric Delivery Vehicles (EDVs), hybrid and automated vehicles for freight delivery like cargo-bikes, delivery robots and droids -walkers will also be considered

4

Smart data-driven logistics solutions

for shared, connected and low-emission logistics operations, empowered by an adaptive modelling approach and Digital Twin models, applied in real-life environments

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598

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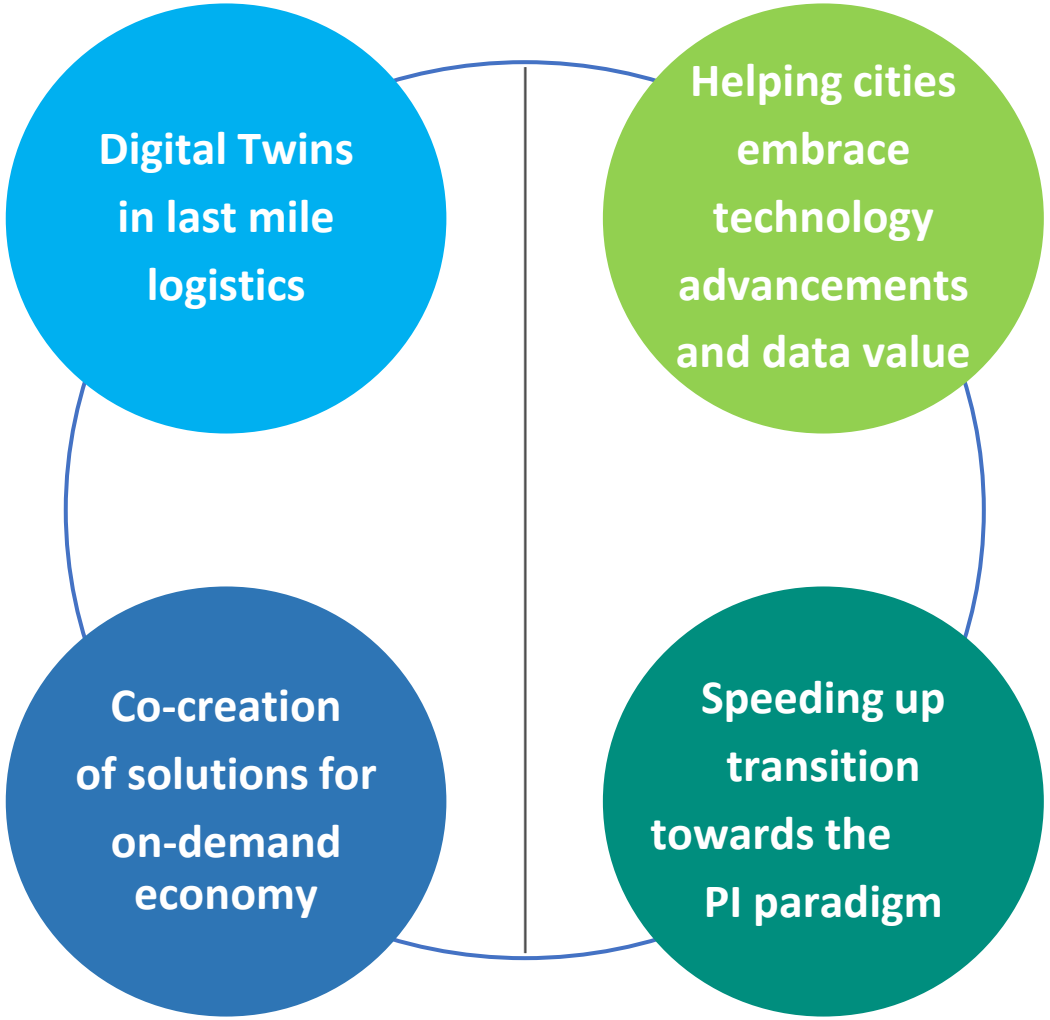
LEAD Innovations

The Living Lab (LL) is a stakeholder-centred ecosystem, operating in an urban node context, for the systematic evaluation of innovative ideas and technological solutions in real use cases



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Mid to long term expected impacts

Impact 1	Impact 2	Impact 3
• Clear understanding of cost-effective strategies, measures and tools to achieve essentially zero emission city logistics in major European urban centres by 2030.	• New tested, demonstrated practices and solutions for better cooperation between suppliers, shippers and urban/ regions policy makers (planners)	• Clearly provide inputs for the preparation and implementation of SULPs, SUMPs and other planning tools (big data and real-time traffic management)

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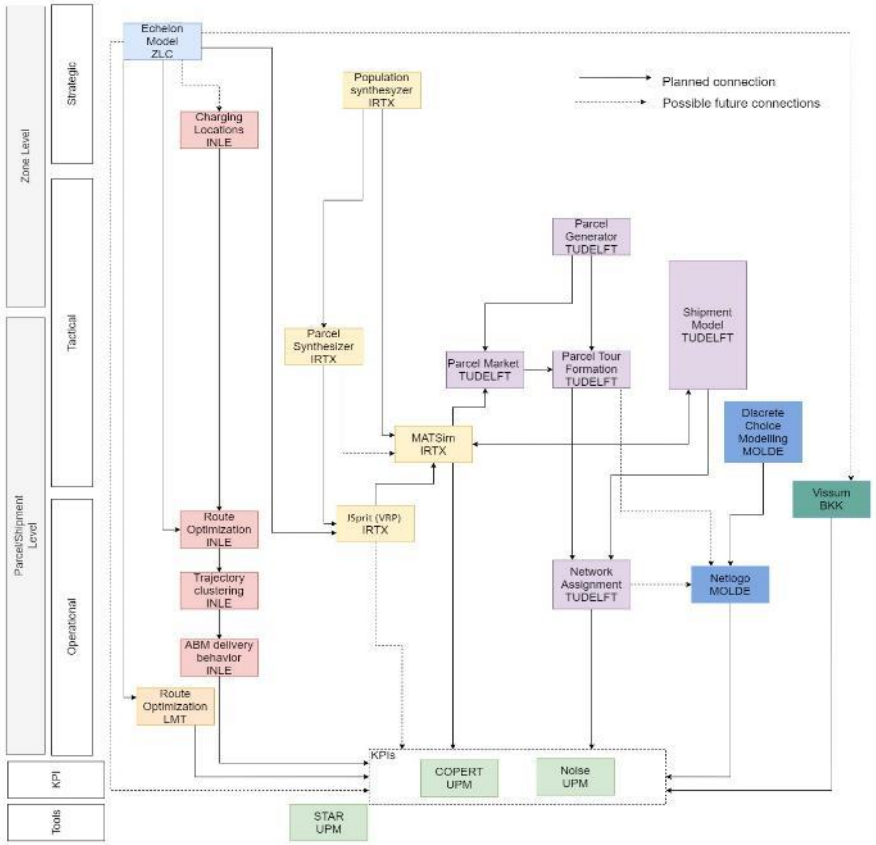
DT model library overview

Number	Model name	Model owner
1	Route optimization	LMT
2	Synthetic population	IRTX
3	Parcel synthesizer	IRTX
4	MATSim	IRTX
5	JSprit	IRTX
6	Echelon	ZLC
7	Parcel Market	TUD
8	Parcel generation	TUD
9	Parcel tour formation	TUD
10	Shipment model	TUD
11	Network Assignment	TUD
12	STAR	UPM
13	COPERT	UPM
14	NOISE	UPM
15	VISSUM	BKK/SZE
16	Charging station	INLE
17	Route optimization	INLE
18	Trajectory clustering	INLE
19	ABM delivery behaviour	INLE
20	NetLogo	Molde
21	Discrete Choice Modelling	Molde



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Living Lab

Transforming a Parking Lot to an Urban Consolidation Centre

Status Quo

- Madrid is an important logistics hub (between the Atlantic and the Mediterranean TEN-T corridors),
- Occasional air quality and congestion challenges,
- Madrid LEZ and current regulations (Madrid360),
- Rise of e-commerce and home delivery (even more due to COVID19 and post-COVID19 challenges).

Ambition

- Demonstrate the **better efficiencies** in using a UCC connected to the TEN-T to deliver to the city center;
- Assess flows and congestion. **Route optimization engine** in many-to-many and many-to-one scenarios, combining vehicles of different fleets. Improving of environmental indicators;
- Explore **alternative (and sustainable) business models;**
- **Public-private cooperation mechanisms**, identifying new ideas for cooperation and evaluating the costs and benefits of implementation;
- The economic **efficiency and reliability** for courier companies, and henceforth for clients, of using the LEAD strategies compared to conventional freight delivery approaches;
- Explore potential **incentives**. **Data management.**

Partners:

ZLC

EMT MADRID

LastMile TEAM

CITYlog

SMART | ECOLOGICAL | FRIENDLY

POLITÉCNICA

UNIVERSIDAD POLITÉCNICA DE MADRID

Panasonic

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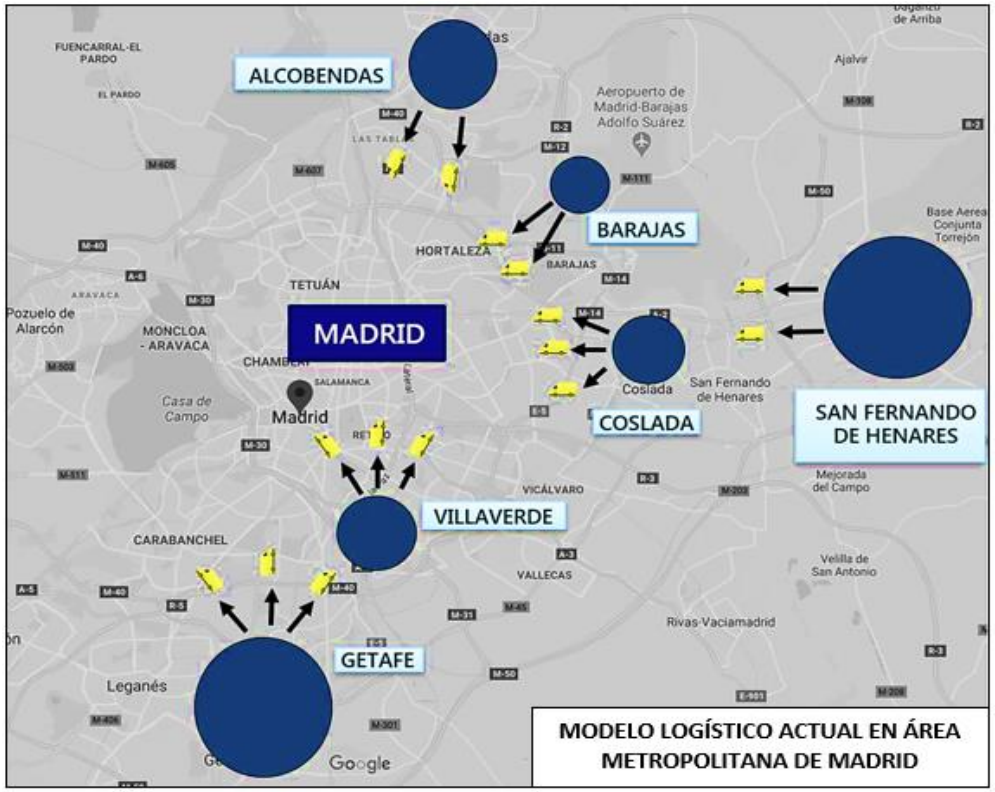
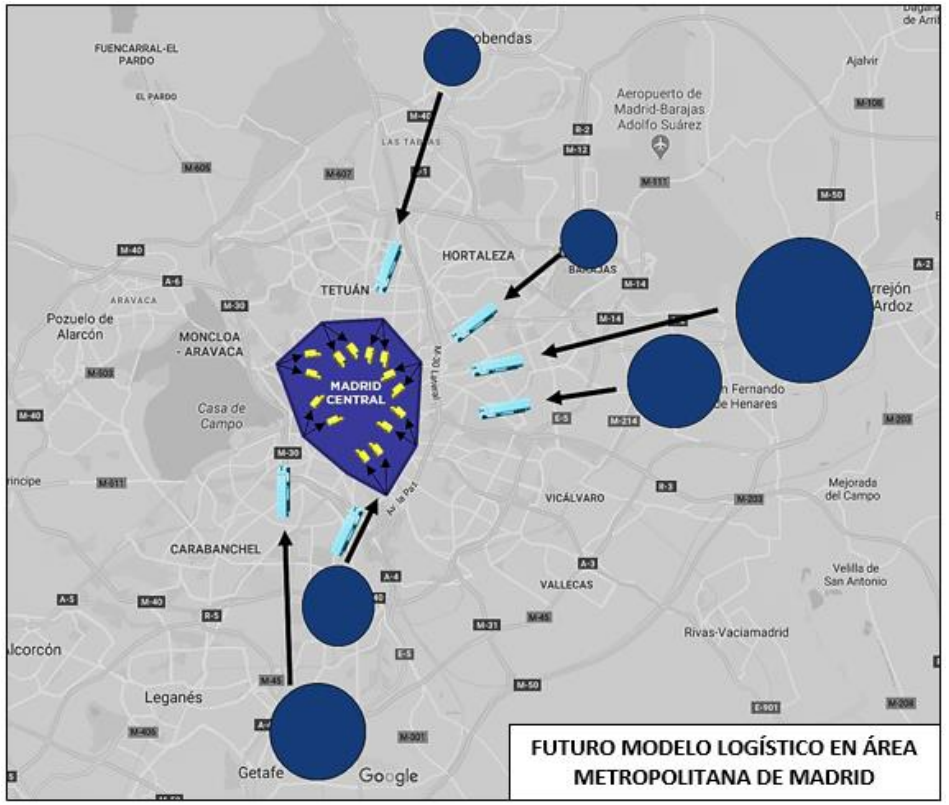
Living Lab Madrid

Business as usual (BaU)



Desired status (TO BE, UCC)



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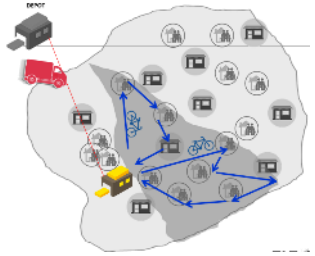
Value case scenarios

- 4 different ones based on location, mostly:
  - #1: Microplatform at San Fernando de Henares (“Hotspot for the e-commerce in Spain”
  - #2: Microplatform at city centre (with vehicle restrictions)
  - #3: Microplatform at Ring Road “M30”
  - #4: Microplatform at city centre (without vehicle restrictions)



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Pilot setting

- Location decided (Plaza Mayor underground parking)
- Paperwork required (contract EMT-CityLogin) – starting on 4/12/2020

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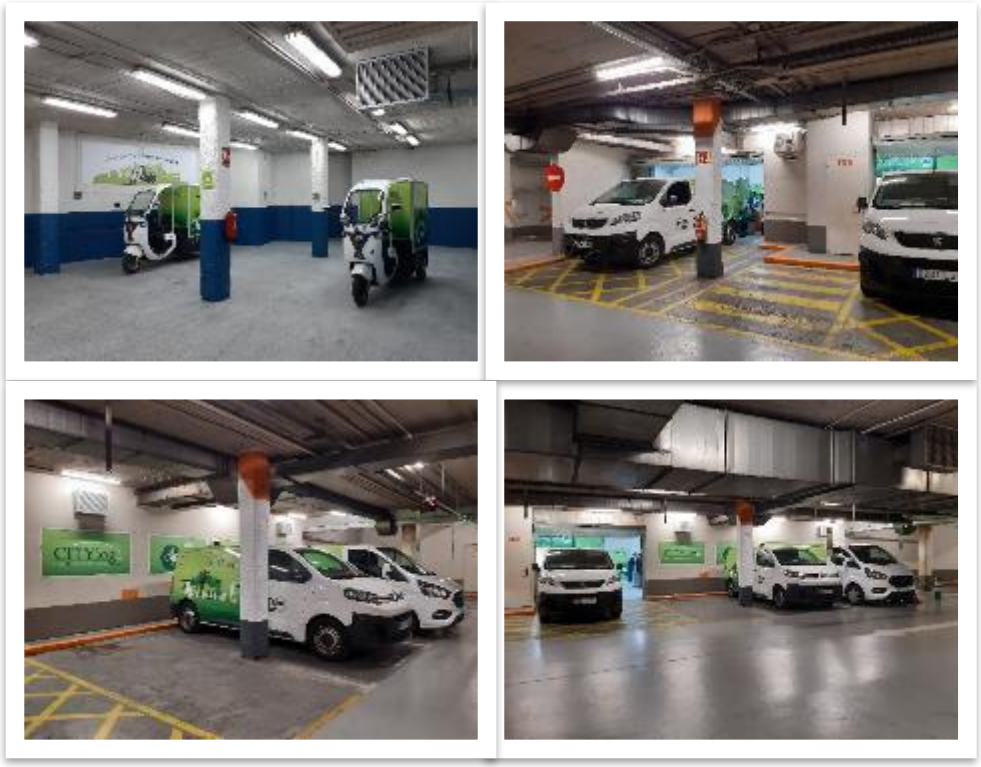
Pilot Results

Demonstrate the **better efficiencies** in using a UCC connected to the TEN-T, to deliver to the city centre

LAUNCH: OCTOBER 6TH, 2021

ENDING OPERATION: 1st June 2023



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How has it worked?

Steps	Timetable	Where	Vehicles
Reception and classification	02:00 am 10:00 am	San Fernando Hub	6m3 van (due to heigh limitation at the parking)
Distribution (Delivery)	11:00 am 21:00 pm	Plaza Mayor Microhub	Electric three wheeler
Reverse logistics	21:00 pm 22:00 pm	Plaza Mayor + San Fernando	6m3 van

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“What if” (value cases) scenarios

Scenario	Vehicles	Parcel capacity	EV Energy consumption (kWh/100km)
BaU	Diesel van	161	
	E-van	161	
UCC	Hybrid van + E-scooter	161	
		34	8.7
	E-van + E-scooter	161	22.7
		34	8.7
	Big E-van + E-scooter	284	25.0
		34	8.7

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Digital Twin workflow

Data Sources

Distrito Centro geospatial LEZ

Vehicles characteristics

Traffic speed history

Available personnel

All 5 use cases route optimization

Daily services

BaU Scenario
Service from
S. Fernando

1 - Diesel van

2 - E-van

UCC Scenario
Service from
Plaza Mayor

3 - Hybrid van + E-scooter

4 - E-van + E-scooter

5 - Big E-van + E-scooter

Analysis

- ICE vehicles emissions
- E vehicles emissions
- Input to noise model
- Routes executional plan

Outputs

User dashboard

Open Data repository

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Business-as-Usual (BaU) scenario

- One-echelon routing
- Direct delivery from a periurban DC located at 25 km from city center

Engine type	Payload	Max nº parcels
Euro6CI	878 kg	161

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Urban Consolidation Center (UCC) scenario

- Two-echelon routing
- Consolidated delivery to the UCC from the periurban DC located at 25 km from city center
  - With two different van sizes
- Final delivery with E-scooters

Engine type	Payload	Max nº parcels
Electric	250 kg	34

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Urban Consolidation Centre vs. Business-as-Usual

Scenario	Vehicles	Total Journey (hours)	Driving time (hours)	Serve time (hours)	Km driven	Nº of Vehicles	Energy per delivery (kWh)	CO_2 per delivery (grams)	$PM_{2.5}$ per delivery (grams)	NO_2 per delivery (grams)
BaU	Diesel van	1.151	293	792	10.980	148	1,39	372,86	0,04	0,46
	E-van	-	-	-	-	-	-96%	-100%	-100%	-100%
UCC	Hybrid van + E-scooter	-23%	-8 %	-28%	-22%	14%	-81%	-84%	-75%	-100%
	E-van + E-scooter	-23%	-8%	-28%	-22%	14%	-95%	-100%	-100%	-100%
	Big E-van + E-scooter	-25%	-14%	-28%	-33%	1%	-95%	-100%	-100%	-100%

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598

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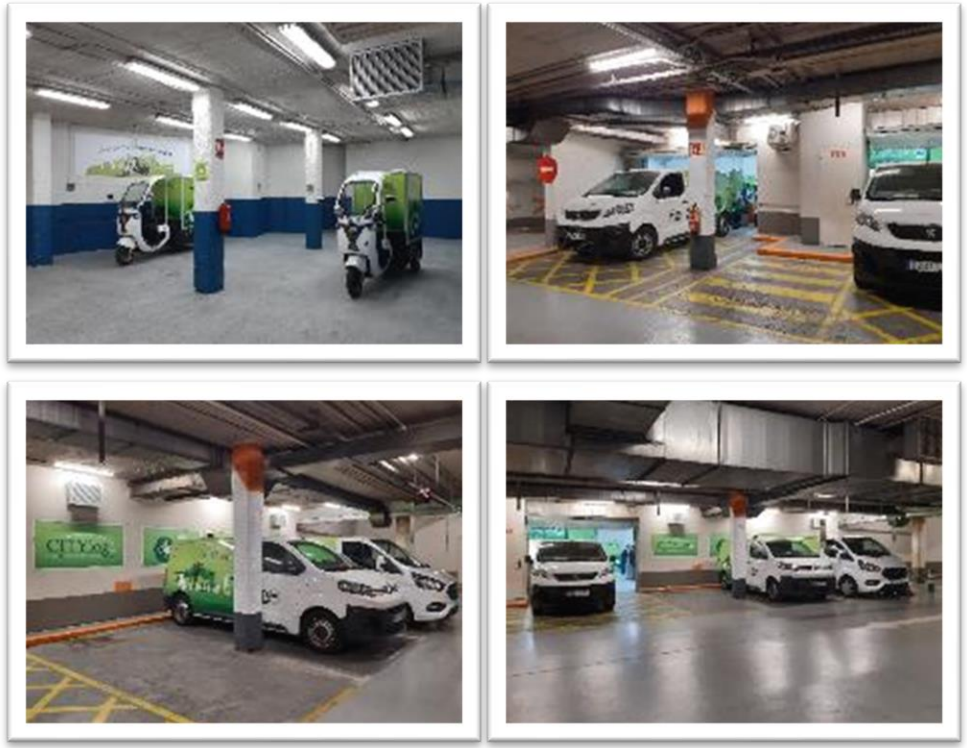
Acknowledge

Madrid's Living Lab was selected as a **European Best Practice in Sustainable Urban Logistics by EIT Urban Mobility in 2022**



This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861598

Learnings & findings/ Steps forwards

- Real Pilot: advisable to **start as soon as possible**
- Matching the needs of the local administration with the requirements of the logistics operator: **sustainability** (at all levels)
- **Taking advantage** of the policies established in the city (regulatory framework, strategies, etc.) to promote this type of activities
- Establishment of objectives and KPIs must be **useful** for the operator
- Collaborative scenarios **do not impact** the transport efficiency and emissions while the service quality is improved
- **Synchronous** planning: manufacturers may benefit from real-time digital twins to enable collaborative distribution schemes with local businesses
- **Effective collaboration between public and private** entities has been identified as a key strength of Madrid LL

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Exchanging and sinergies

Senator

ULaDS
URBAN LOGISTICS AS AN ON-DEMAND SERVICE

DUET

alice | Alliance for Logistics Innovation through Collaboration in Europe

MOVE 21

HARMONY

- Synergies with ST4W, IW-NET,
- Living.in-EU Initiative (DG CONNECT/ENoLL)

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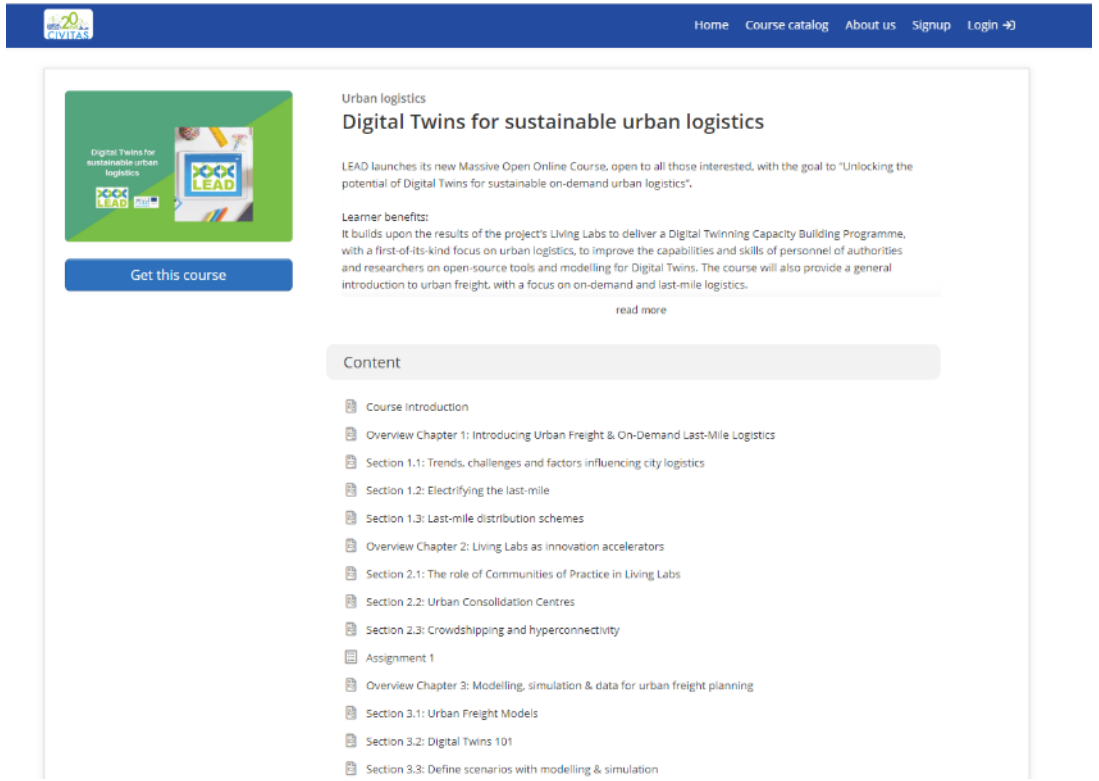
Exchange of knowledge



“Massive Online Open Course” (MOOC) available at the CIVITAS e-learning centre

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 861598

Just finished!

SAVE THE DATE

Urban Logistics Innovation Day

26 September 2023, Brussels (BE)

Info on registration soon

This in-person event is organised as the final conference of the **EU-funded LEAD project**, in cooperation with **ALICE-ETP and POLIS**, bringing together other urban logistics innovative projects, to showcase innovative solutions.

This will also include live demonstrations on the digital innovative solutions for Digital Twins and Urban Logistics planning developed by LEAD. .

LEAD

CIVITAS

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POLIS

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LEAD

Thank you!

- Website: https://www.leadproject.eu/
- LinkedIn: lead-h2020

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Innovation Management for scoping DT use cases

Dimitri Schuurman (PhD)
Innovation Expert AI & Data department
@dimischuurman
Dimitri.Schuurman@imec.be

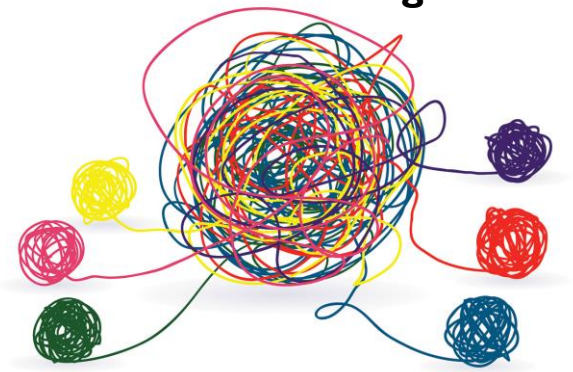
Solving WICKED PROBLEMS via technological enablers

Wicked Problems

- Complex, multi-stakeholder ecosystems
- Complex decision-making
- There is no 'ultimate test' for a solution
- Wicked problems are understood by formulating solutions

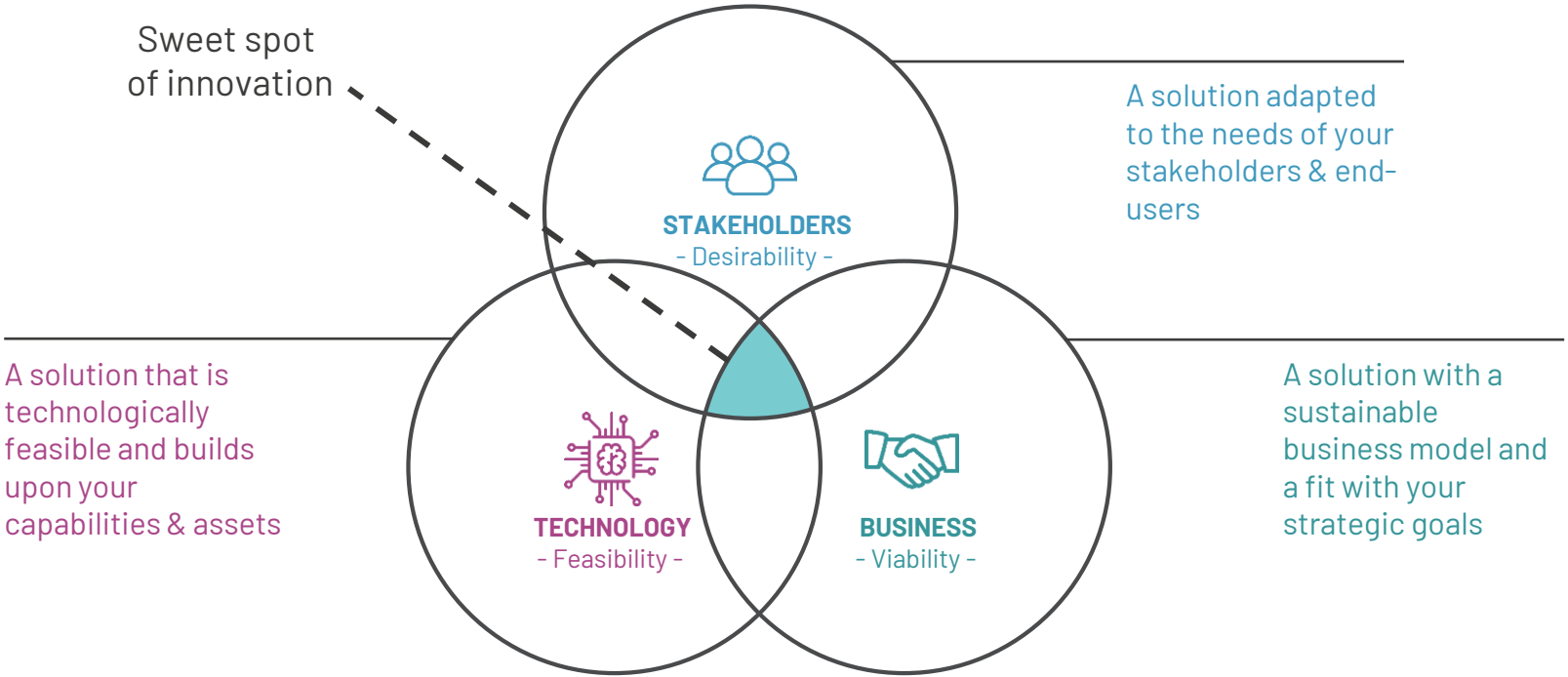
Our Innovation Management principles

- **Multi-stakeholder** approach – Quadruple helix
- Active stakeholder involvement (**co-creation**)
- **Real-life** experimentation
- **Agile** & multi-method innovation process



imec

Three elements of (data) solutions



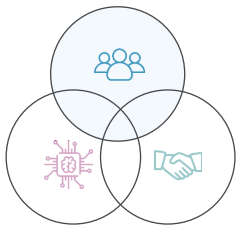
Imec's innovation management process

WHAT IS YOUR PROBLEM?
EXPLORING

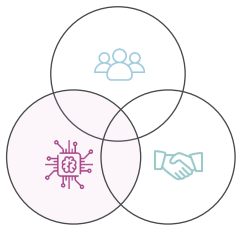
CAN YOU SOLVE IT?
CO-CREATING

CAN YOU MAKE IT?
DEFINING

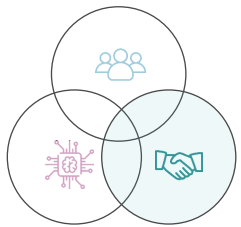
DOES IT DELIVER?
PROTOTESTING



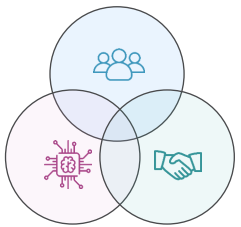
Define main problems, problem owners & future DT users



Involve primary user(s) to co-create & test DT mock-ups



Define relevant tests & test-users based on the DT scope



Iteratively test & validate new developed DT functionalities

IDENTIFYING & TESTING ASSUMPTIONS

INNOVATRIX

Stakeholder (incl. SDP role)				
Needs / Opportunities				
Current Practices				
Currents Datasets / Models				
Jobs-to-be-done				
Value Creation				
Key Resources				
Trustworthiness Requirements				
Barriers				

SMART DATA USE CASE CANVAS

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EXAMPLE 1: DT BRUGES

Digital twin van de stad Brugge, demovideo | imec Vlaanderen on Vimeo

▲ Maandag was er nog protest tegen het circulatieplan op de Burg in Brugge © Benny Proot

Dan toch geen eenrichtingsverkeer in Vijversdreefwijk na protest van buurtbewoners

DE TIJD

Nieuws Markten Netto


Chatbot van OpenAI jaagt Elon Musk angst aan

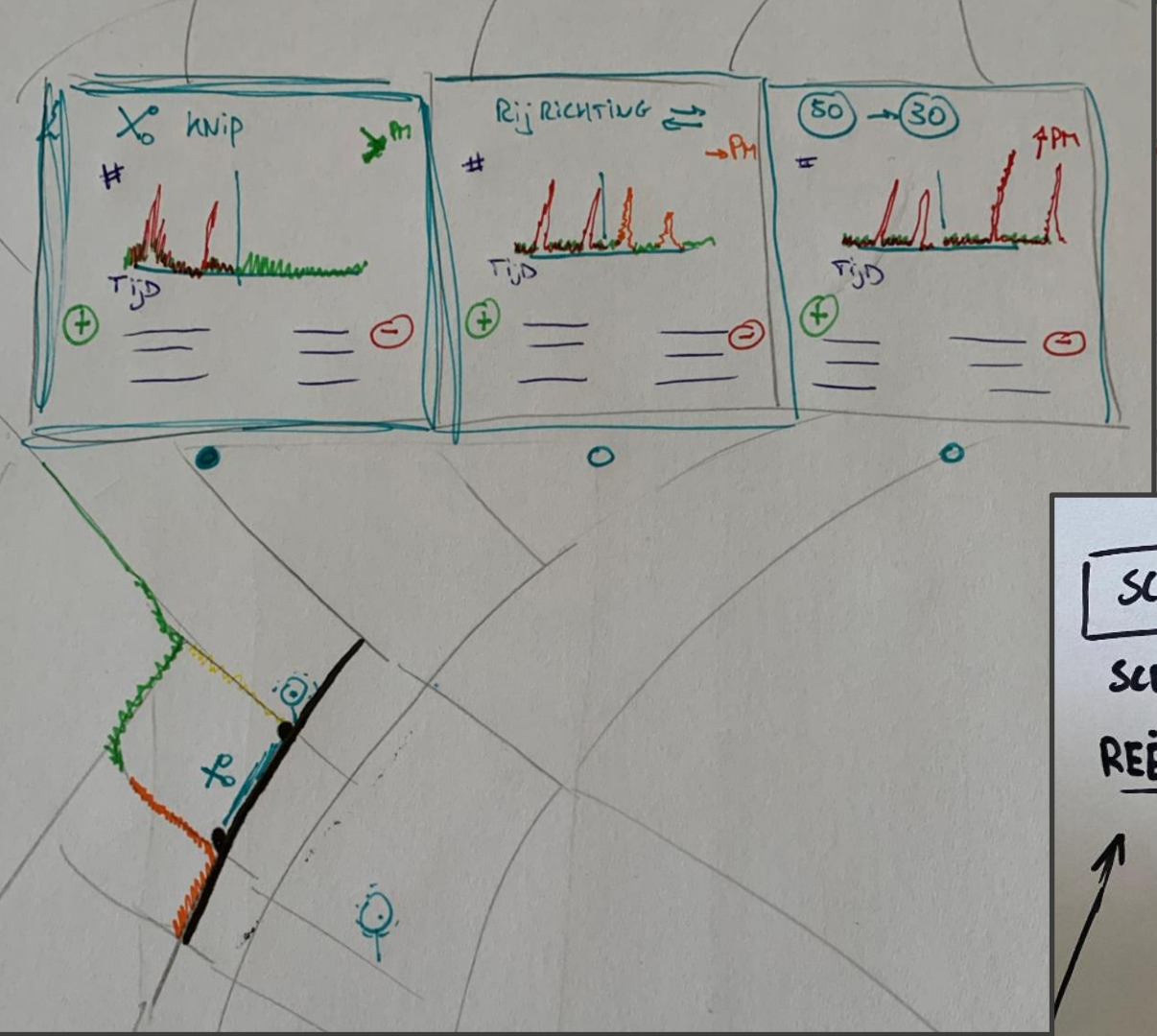

Markt tweedehandsauto's komt weer op gang

Computer says yes: Brugge bouwt digitale tweeling

STEPHANIE DE SMEDT | 07 februari 2021 08:00

Brugge bouwt tegen eind dit jaar samen met het onderzoeksinstituut Imec zijn digitale even-beeld, om het verkeer beter te sturen en de luchtkwaliteit te vrijwaren. Een belangrijk piloot-project voor het enorme potentieel van digitale tweelingen, een technologie die oprukt.

imec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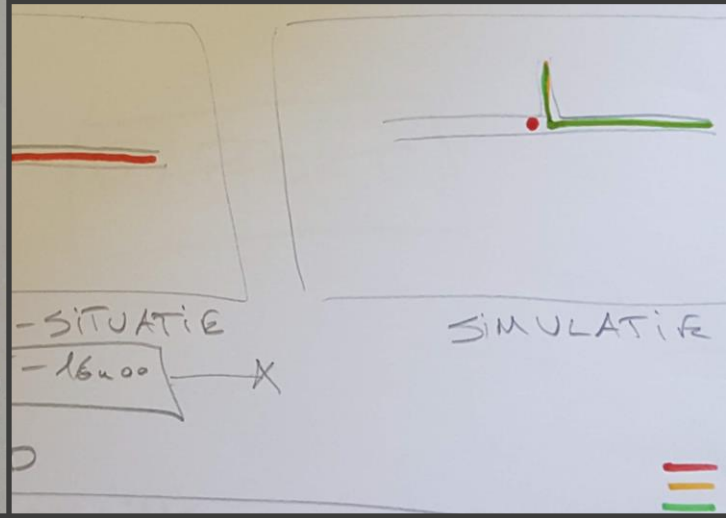
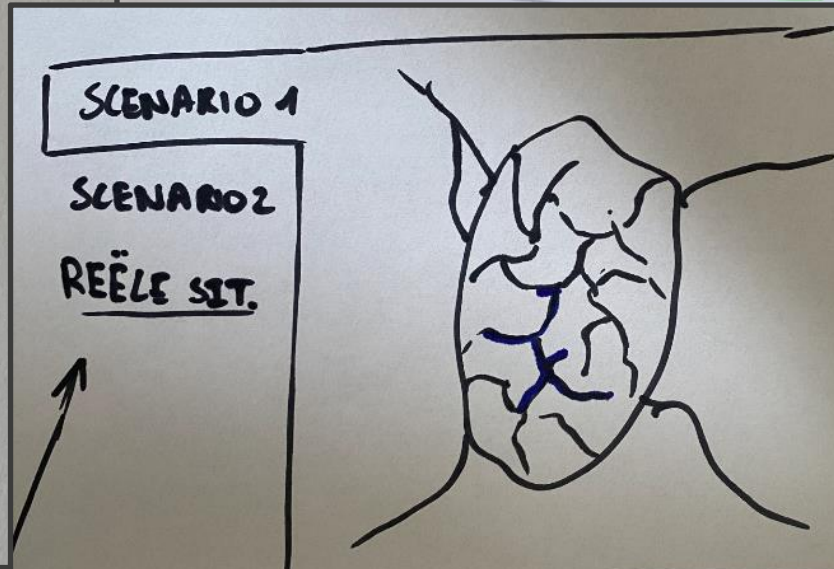
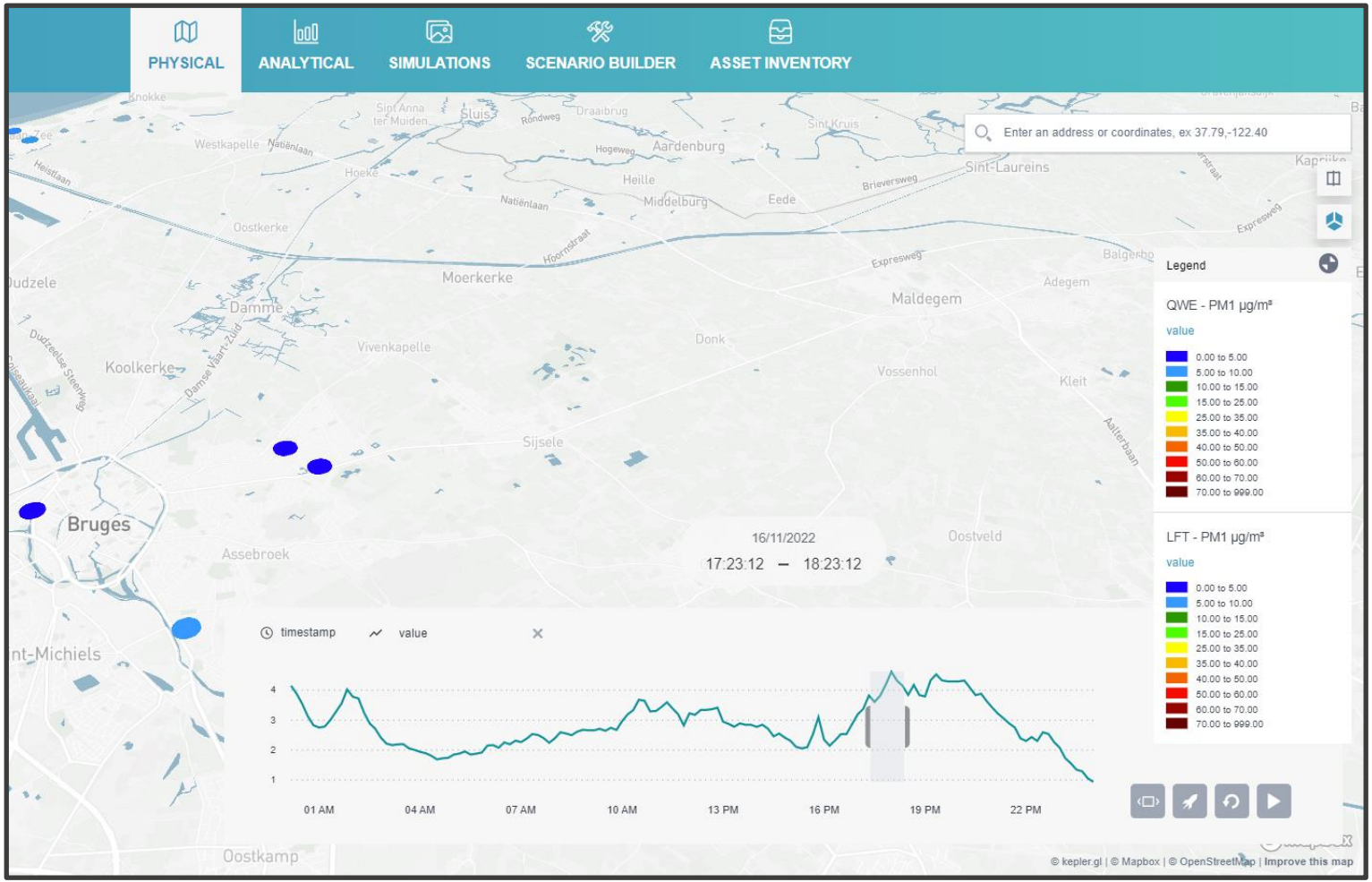

-SITUATIE
SIMULATIE


SCENARIO 1
SCENARIO 2
REËLE SIT.


PHYSICAL
ANALYTICAL
SIMULATIONS
SCENARIO BUILDER
ASSET INVENTORY
Enter an address or coordinates, ex 37.79,-122.40
Legend
QWE - PM1 µg/m³
value
0.00 to 5.00
5.00 to 10.00
10.00 to 15.00
15.00 to 25.00
25.00 to 35.00
35.00 to 40.00
40.00 to 50.00
50.00 to 60.00
60.00 to 70.00
70.00 to 999.00
LFT - PM1 µg/m³
value
0.00 to 5.00
5.00 to 10.00
10.00 to 15.00
15.00 to 25.00
25.00 to 35.00
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50.00 to 60.00
60.00 to 70.00
70.00 to 999.00
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07 AM
10 AM
13 PM
16 PM
19 PM
22 PM
Bruges
Assebroek
Oostkamp
Moerkerke
Damme
Koolkerke
Vivenkapelle
Sijsele
Maldegem
Vossenhol
Oostveld
Sint-Laureins
Aardenburg
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Oostkerke
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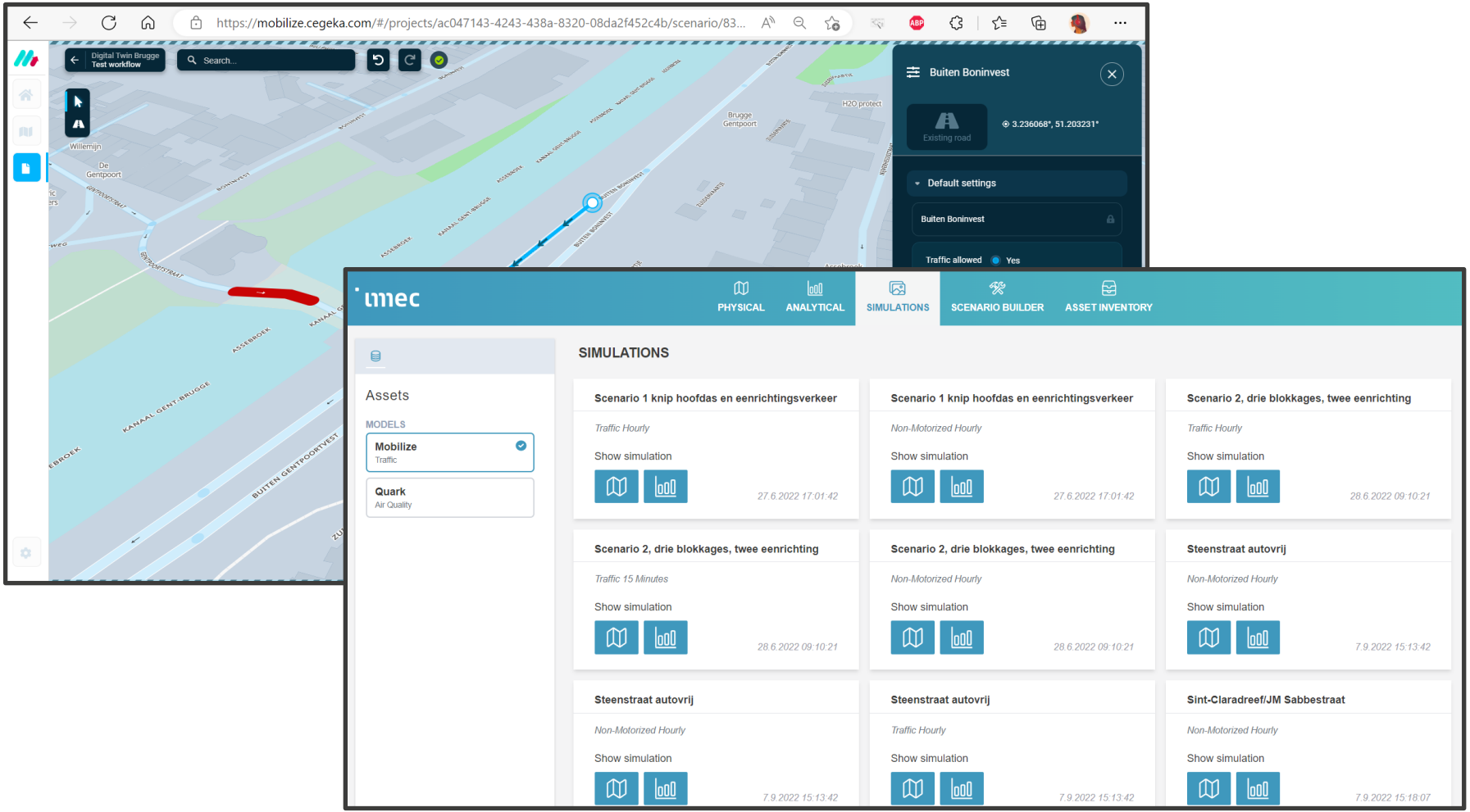
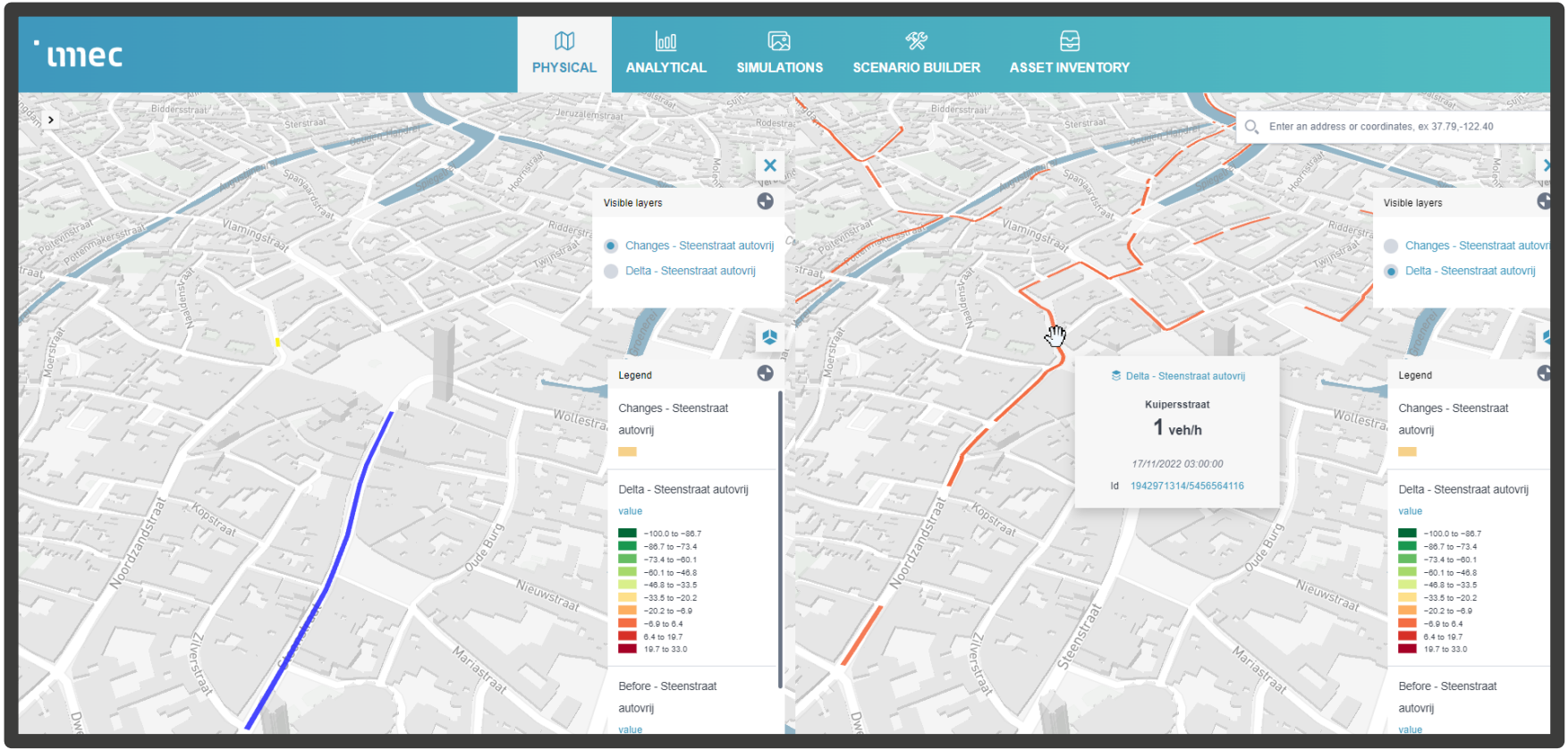
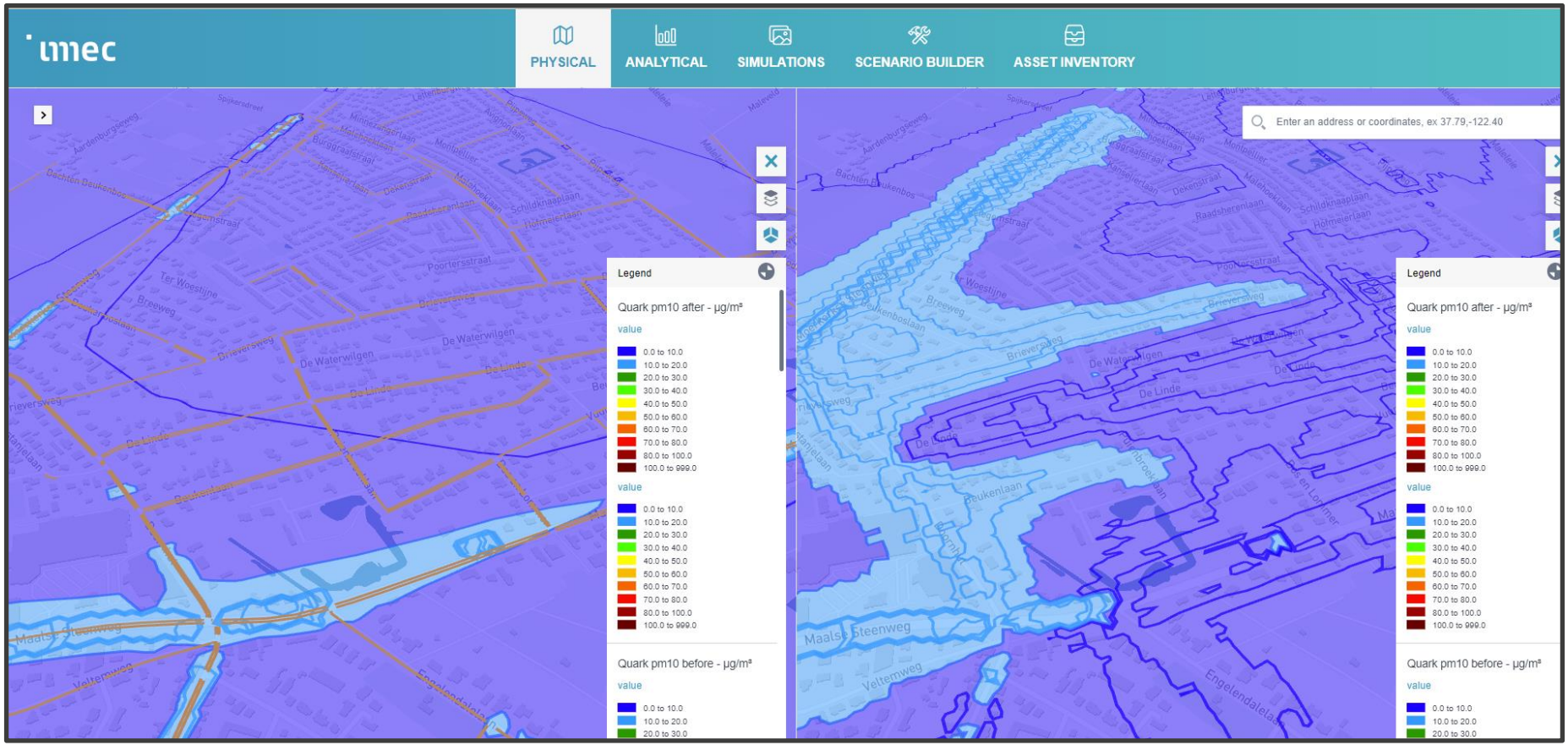
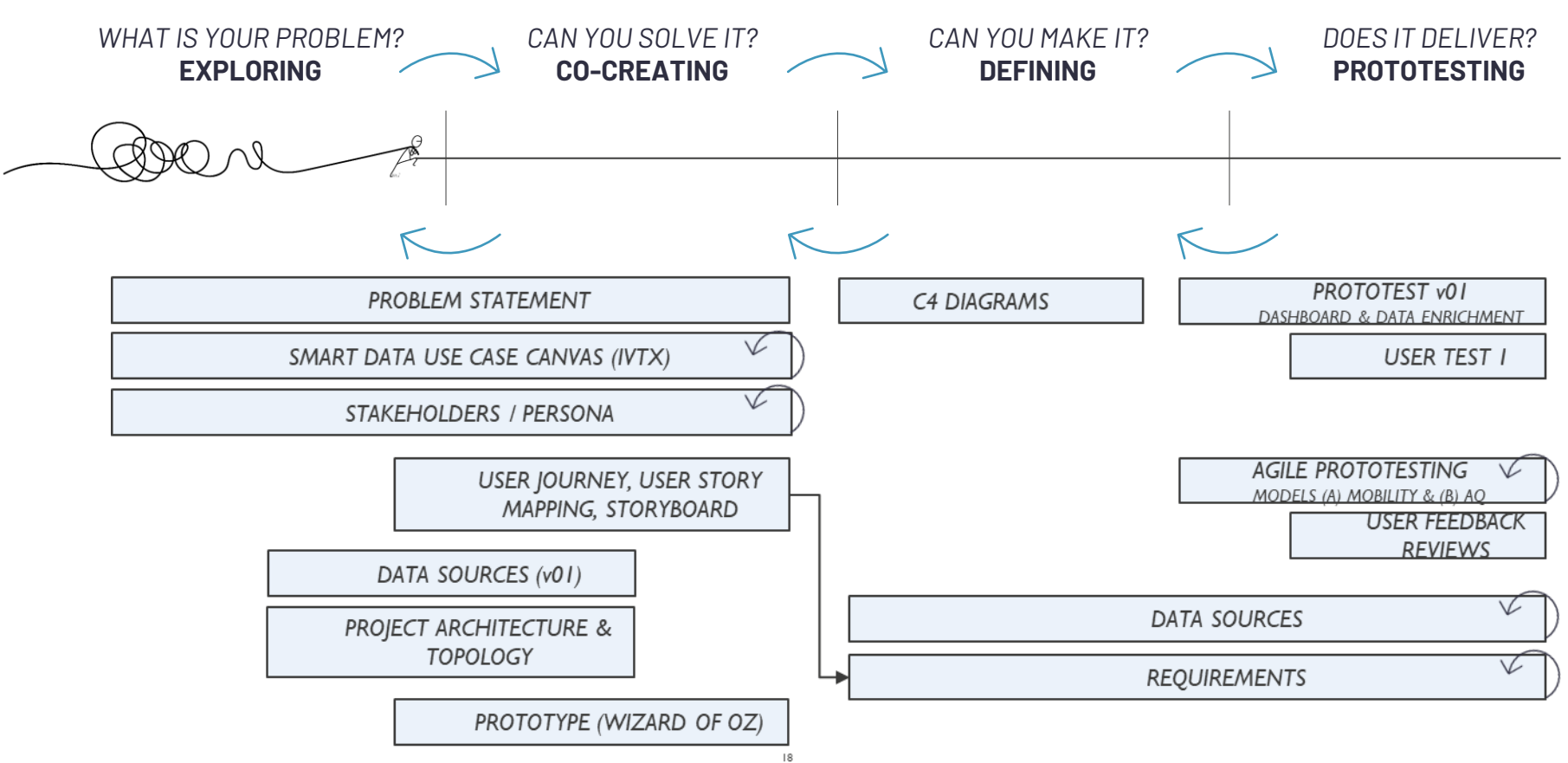

https://mobilize.cegeka.com/#/projects/ac047143-4243-438a-8320-08da2f452c4b/scenario/83...
Digital Twin Brugge
Test workflow
Search...
Buiten Boninvest
Existing road
3.236068°, 51.203231°
Default settings
Buiten Boninvest
Traffic allowed
Yes
imec
PHYSICAL
ANALYTICAL
SIMULATIONS
SCENARIO BUILDER
ASSET INVENTORY
Assets
MODELS
Mobilize
Traffic
Quark
Air Quality
SIMULATIONS
Scenario 1 knip hoofdas en eenrichtingsverkeer
Traffic Hourly
Show simulation
27.6.2022 17:01:42
Scenario 1 knip hoofdas en eenrichtingsverkeer
Non-Motorized Hourly
Show simulation
27.6.2022 17:01:42
Scenario 2, drie blokkages, twee eenrichting
Traffic Hourly
Show simulation
28.6.2022 09:10:21
Scenario 2, drie blokkages, twee eenrichting
Traffic 15 Minutes
Show simulation
28.6.2022 09:10:21
Scenario 2, drie blokkages, twee eenrichting
Non-Motorized Hourly
Show simulation
28.6.2022 09:10:21
Steenstraat autovrij
Non-Motorized Hourly
Show simulation
7.9.2022 15:13:42
Steenstraat autovrij
Non-Motorized Hourly
Show simulation
7.9.2022 15:13:42
Steenstraat autovrij
Traffic Hourly
Show simulation
7.9.2022 15:13:42
Sint-Claradreef/JM Sabbestraat
Non-Motorized Hourly
Show simulation
7.9.2022 15:18:07







Lesson learned: try to avoid too long project timelines

EXAMPLE 2: PRECINCT – EU PROJECT

Preparedness and Resilience Enforcement for Critical INfrastructure Cascading Cyberphysical Threats and effects with focus on district or regional protection

4
Living Labs

3
Transferability

1
PRECINCT

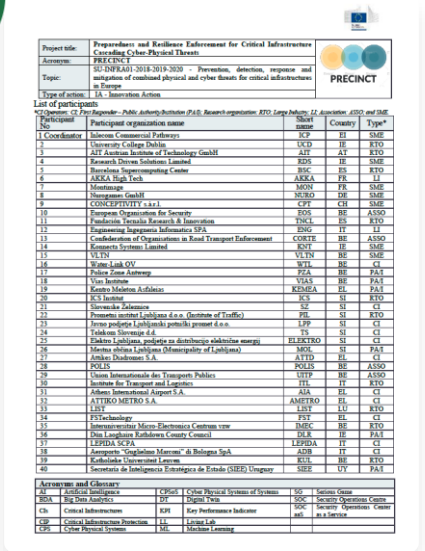
40
Partner

Precinct TTT session 1 - general introduction & use case definition
Recording and transcription have started. By attending this meeting, you consent to being included. Privacy policy
ALJOŠA KANDŽIĆ
Shirley Delannoy
John Limaxis
Dimitri Schuurman (imec)
Brancaccio Giuseppe
denis.caleta
Mute (Ctrl+Shift+M)
Leave
End session
16:00
Microsoft

Exploring

PRECINCT

As a regional authority, I would like to have a predicting model of the future rainfall and flooding to proactively take preventive measures on traffic, water, energy and industrial CI's potentially impacted by a flooding event	Rainfall radar images, rate/intensity and accumulated rainfall (1h, 24h) .hdf - 5 min intervals, VMM, KNMI
	Rainfull gauge measures (intensities) .csv - 1 min intervals, VMM
	River measures (water level) .csv - 1 min intervals, HIC
As emergency services, we would like to visualize critical infrastructure impacted by potential flooding, including traffic, water and energy CIs, to estimate the potential risk of floods in order to take preventive measures	Google maps and tbd through interactions with CIs and emergency stakeholders



Project title:	Preparedness and Resilience Enforcement for Critical Infrastructure Cascading Cyber-Physical Threats
Acronym:	PRECINCT
Topic:	SU-INFRA01-2018-2019-2020 - Prevention, detection, response and mitigation of combined physical and cyber threats for critical infrastructures in Europe
Type of action:	IA - Innovation Action

PRECINCT

List of participants

*CO=Operator; CE=First Responder – Public Authority/Institution (PAI); Research organization: RTO; Large Industry: LI; Association: ASSO; and SME.

Participant No.	Participant organization name	Short name	Country	Type*
1 Coordinator	Inlecom Commercial Pathways	ICP	EI	SME
2	University College Dublin	UCD	IE	RTO
3	AIT Austrian Institute of Technology GmbH	AIT	AT	RTO
4	Research Driven Solutions Limited	RDS	IE	SME
5	Barcelona Supercomputing Center	BSC	ES	RTO
6	AKKA High Tech	AKKA	FR	LI
7	Montimage	MON	FR	SME
8	Nurogames GmbH	NURO	DE	SME
9	CONCEPTIVITY sàrl	CPT	CH	SME
10	European Organization for Security	EOS	BE	ASSO
11	Fundación Tecnalia Research & Innovation	TNCL	ES	RTO
12	Engineering Ingegneria Informatica SPA	ENG	IT	LI
13	Confederation of Organizations in Road Transport Enforcement	CORTE	BE	ASSO
14	Konsortiq Systems Limited	KNT	IE	SME
15	VLTN	VLTN	BE	SME
16	Water-Link OV	WTL	BE	CI
17	Police Zone Antwerp	PZA	BE	PAS
18	Vias Institute	VIAS	BE	PAS
19	Kentro Meletes Asfaleias	KEMEA	EL	PAS
20	ICS Institut	ICS	SI	RTO
21	Slovenske Zeleznice	SZ	SI	CI
22	Prometni institut Ljubljana d.o.o. (Institute of Traffic)	PIL	SI	RTO
23	Javno podjetje Ljubljanski potniški promet d.o.o.	LPP	SI	CI
24	Telekom Slovenije d.d.	TS	SI	CI
25	Elektro Ljubljana, podjetje za distribucijo električne energij	ELEKTRO	SI	CI
26	Mestna občina Ljubljana (Municipality of Ljubljana)	MOL	SI	PAS
27	Attiko Diadromes S.A.	ATTD	EL	CI
28	POLIS	POLIS	BE	ASSO
29	Union Internationale des Transports Publics	UITP	BE	ASSO
30	Institute for Transport and Logistics	ITL	IT	RTO
31	Athens International Airport S.A.	AIA	EL	CI
32	ATTIKO METRO S.A.	AMETRO	EL	CI
33	LIST	LIST	LU	RTO
34	FSTechnology	FST	EL	CI
35	Interuniversitair Micro-Electronica Centrum vzw	IMEC	BE	RTO
36	Dún Laoghaire Rathdown County Council	DLR	IE	PAS
37	LEPIDA SCPA	LEPIDA	IT	CI
38	Aeroporto "Guglielmo Marconi" di Bologna SpA	ADB	IT	CI
39	Katholieke Universiteit Leuven	KUL	BE	RTO
40	Secretaría de Inteligencia Estratégica de Estado (SIEE) Uruguay	SIEE	UY	PAS

Acronyms and Glossary

AI	Artificial Intelligence	CPSoS	Cyber Physical Systems of Systems	SG	Seismic Genie
BDA	Big Data Analytics	DT	Digital Twin	SOC	Security Operations Centre
CIs	Critical Infrastructures	KPI	Key Performance Indicator	SOC aaS	Security Operations Center as a Service
CIP	Critical Infrastructure Protection	LL	Living Lab		
CPS	Cyber Physical Systems	ML	Machine Learning		

Exploring

Problem statement

PRECINCT

Preparatory response to a flooding event in the city of Antwerp happens based on (not very accurate) provincial warnings issued by the KMI. Even though a CP-Ops is issued, the emergency services have to wait until the first emergency situation takes place to take measures in the field. This complicates preventive planning which could reduce the harm done.

By combining various (real-time and historic) data sources, we could issue a warning in advance, which in turn could improve the response and resilience to flooding events and reduce the cascading effects on the critical infrastructure.

Living lab scoping sprint based on **f.a.c.t.s**.

FOCUS

What problem do we **focus** on?

What concrete **use case** do we scope?

Who are the main **stakeholders** and **users**?

ANALYZE

How is this **problem** solved today?

What **technology**, **data** sources and **tools** are currently used?

What **design constraints** are there?

CO-CREATE

What **current solutions** exist?

Which **examples** can inspire?

What should the **solution** look like?

PROTOTYPE & TEST

How can we **simulate / prototype** the solution?

Test with real users and where possible in a real environment

STUDY & LEARN

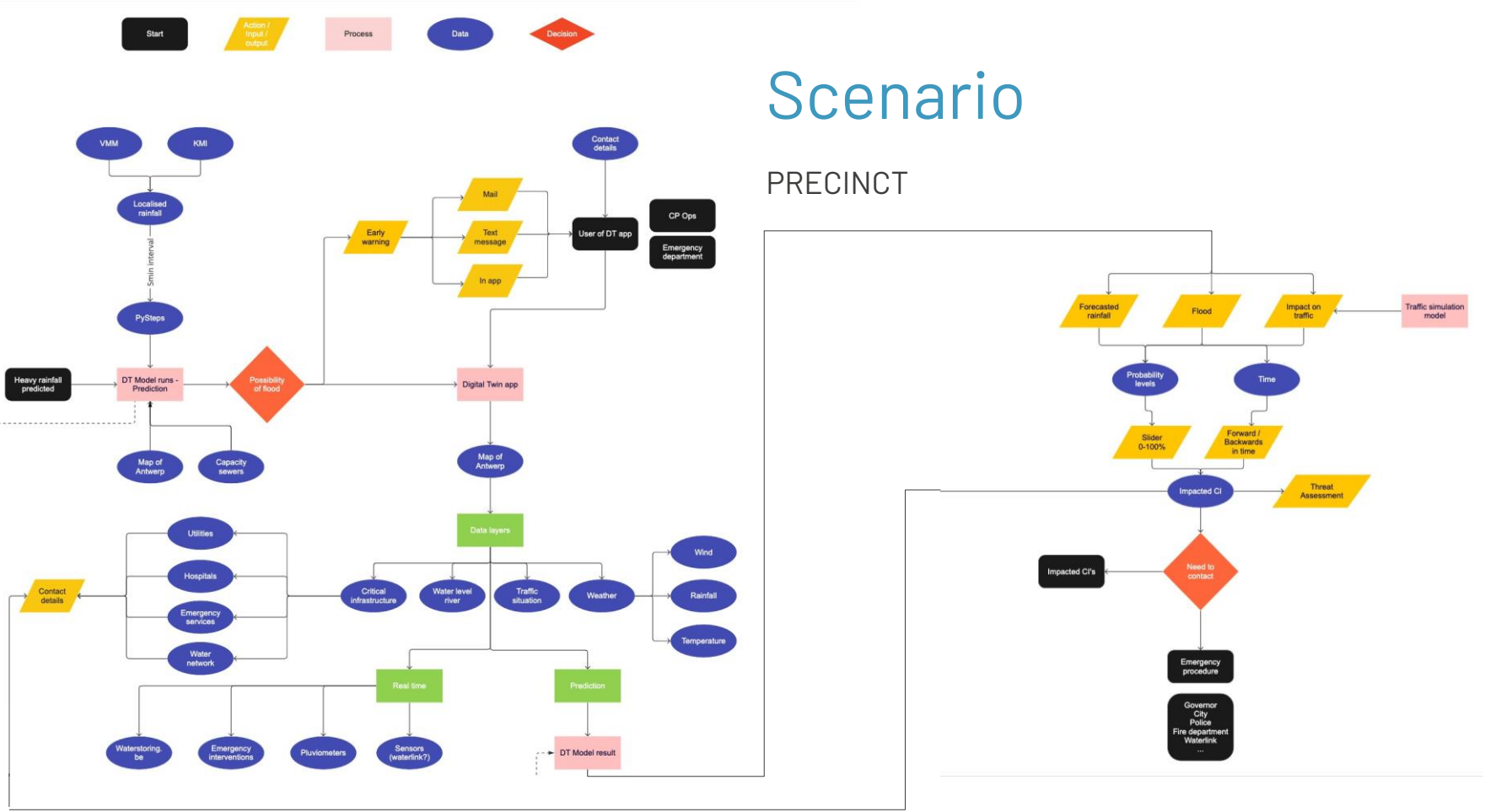
What have we **learned**?

What are the **next steps**?

[Co-creating phase]

Scenario

PRECINCT



CP-Ops Decision Makers

In case of an event, these will be responsible for taking actions and measures. They will use the DT solution to simulate different scenarios

- Is created when a disaster is likely to occur
- Responsible 5 disciplines + coordinator
- Expert advisors
- Have a degree in 'rampenmanagement'

CI Contacts

Operational staff of the CI's that will be informed in case of a threat

- Waterlink (sewer system)
- Emergency services (fire department, hospitals, local police)
- Electricity network
- Public Transport / Traffic Infrastructure
- Port of Antwerp
- AWV: agentschap wegen en verkeer

CP-Ops in real-time

- People in the field

Needs

- More accurate insights in current or future threats
- More actionable insights
- Detailed info per CI
- Faster response time

Needs

- Earlier warnings if a disaster might occur
- Faster resource allocation
- Taking preventive measures
- More detailed information regarding the threat(s)

Needs

- Faster information
- More detailed information
- There is a diversity of tools (per discipline)
- Delays & misunderstandings via the use of mutiple tools/software
- People in the field feel the need for a unified system

Current Practices

- Different tools (unknown)
  Climate-Fit.city map of CI

Current Practices

- Call via emergency number to control room
- Control room that is staffed 24/7

Current Practices

- Every discipline has its own software (e.g. police uses Focus)
- There is a shared logbook where actions are logged (information purposes) - updated per 30mins

See PRECINCT public board – 1. Focus

CP-Ops Decision Makers

In case of an event, these will be responsible for taking actions and measures. They will use the DT solution to simulate different scenarios

- Is created when a disaster is likely to occur
- Responsible 5 disciplines + coordinator
- Expert advisors
- Have a degree in 'rampenmanagement'
- Fire department is in the lead

Department of Emergency Planning

- Policy makers for emergency procedures
- Important when there is no flooding
- Permanent department
- Monitoring and follow up
- Different disciplines present

CI Contacts

Operational staff of the CI's that will be informed in case of a threat

- Waterlink (sewer system)
- Emergency services (fire department, hospitals, local police)
- Electricity network
- Public Transport / Traffic Infrastructure
- AWV: agentschap wegen en verkeer
- Port of Antwerp

Needs

- More accurate insights in current threats
- More actionable insights
- Detailed info per CI
- Faster response time
- Quick overview of CIs

Needs

- More accurate insights in future threats
- Better understanding of (cascading) effects

Needs

- Earlier warnings if a disaster might occur
- Faster resource allocation
- Taking preventive measures
- More detailed information regarding the threat(s)

Current Practices

- Different tools (unknown)
- Assemble a CP-Ops based on the threat level (small > big)

Current Practices

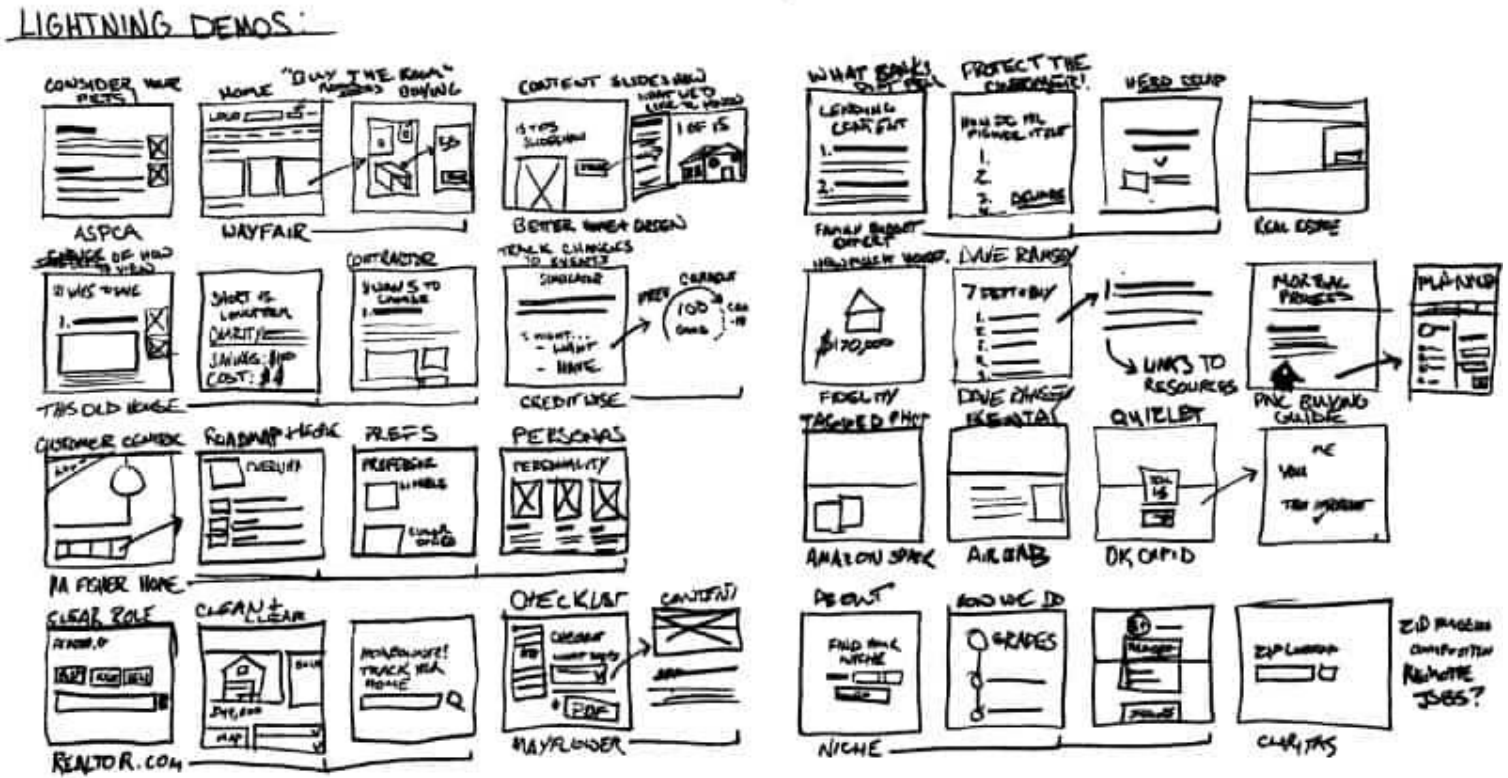
- Climate-Fit.city map of CI
- Policy makers for emergency planning

Current Practices

- Call via emergency number to control room
- Control room that is staffed 24/7

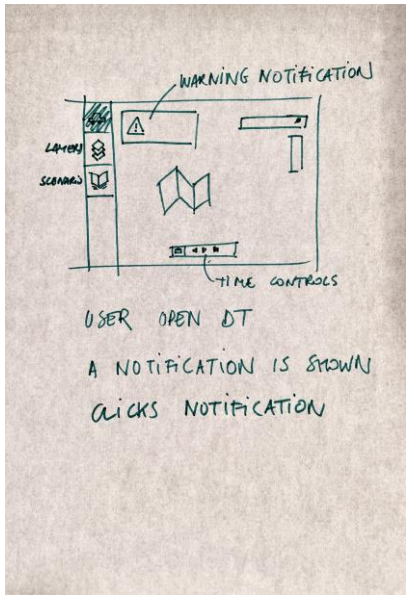
See PRECINCT public board – 2. Analyze

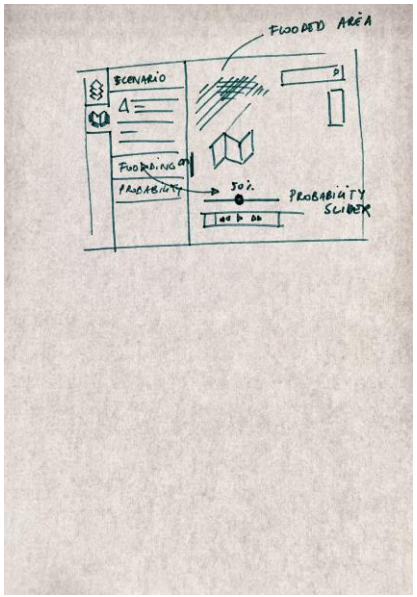
Inspiration: Lightning demos

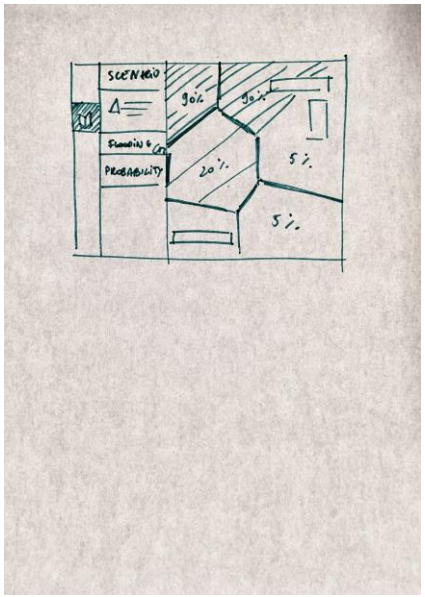


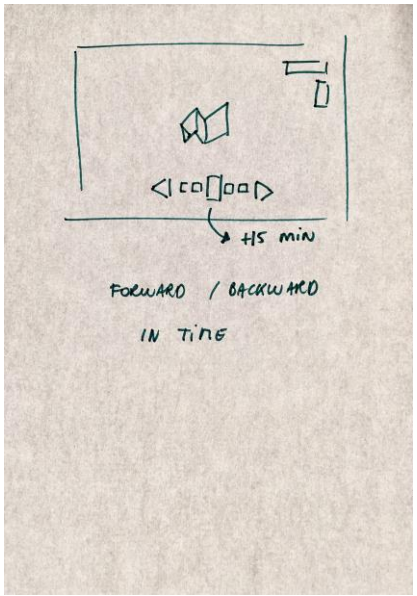
Story boards

A visual representation of the sequence of steps the user will take.



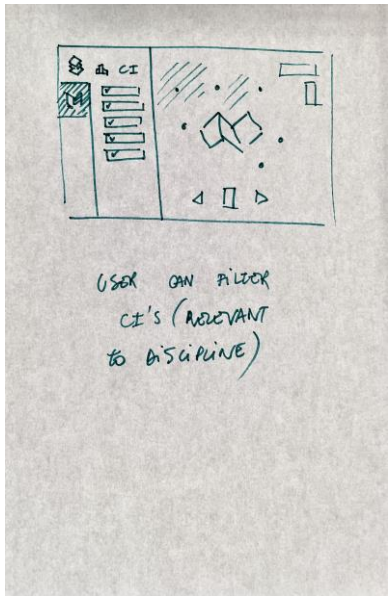


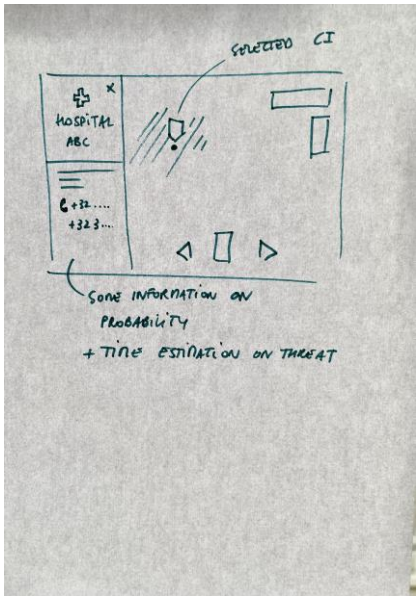


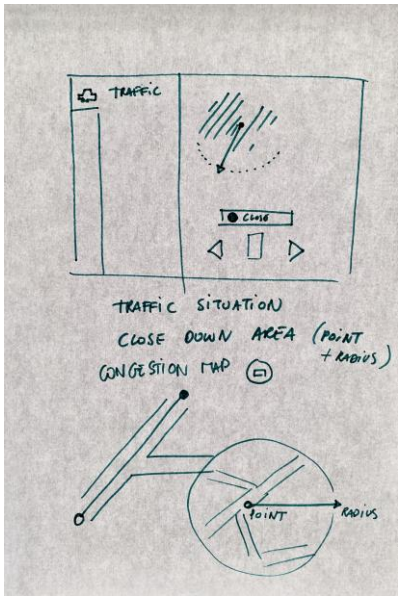


Story boards

A visual representation of the sequence of steps the user will take.



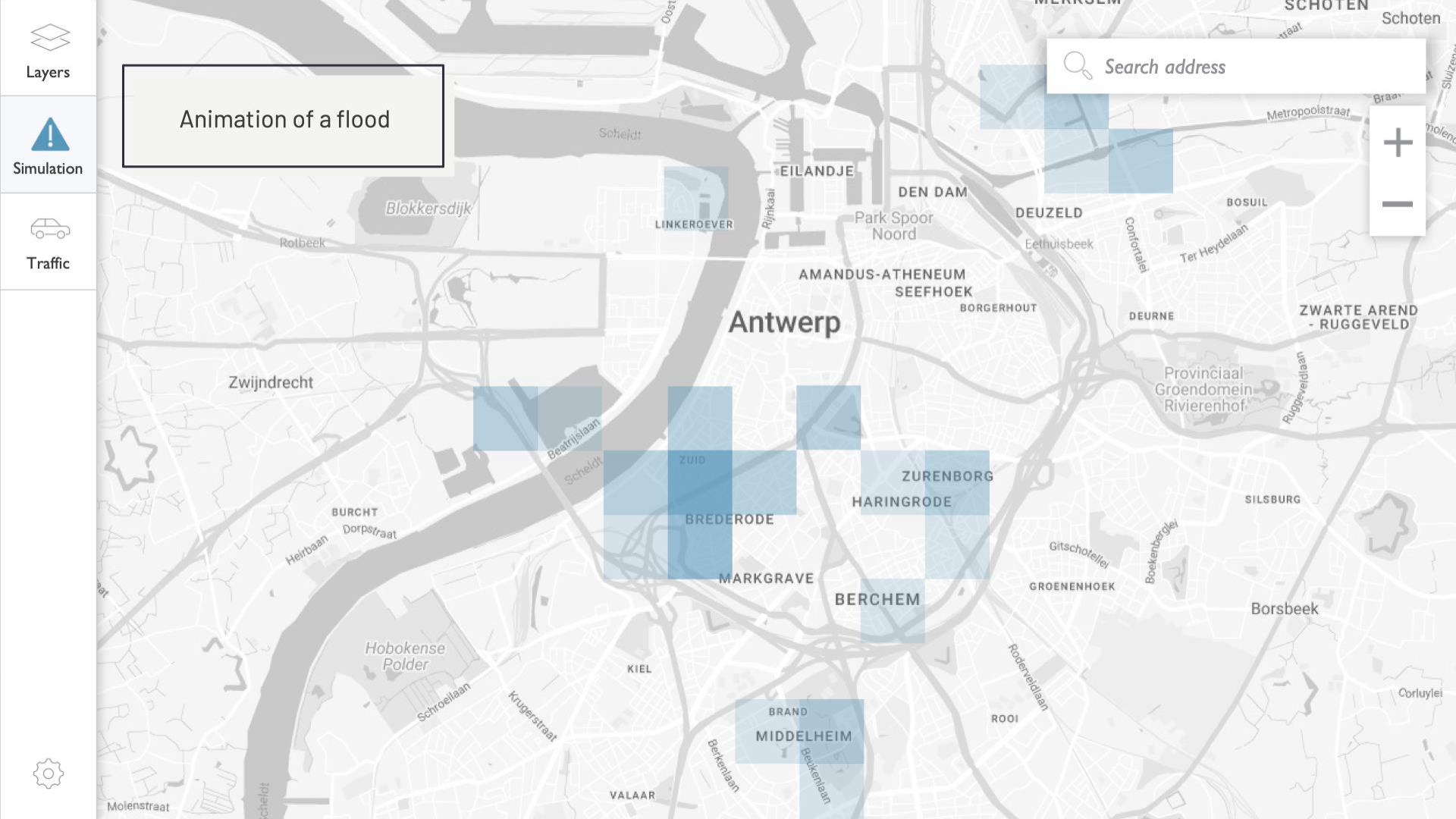


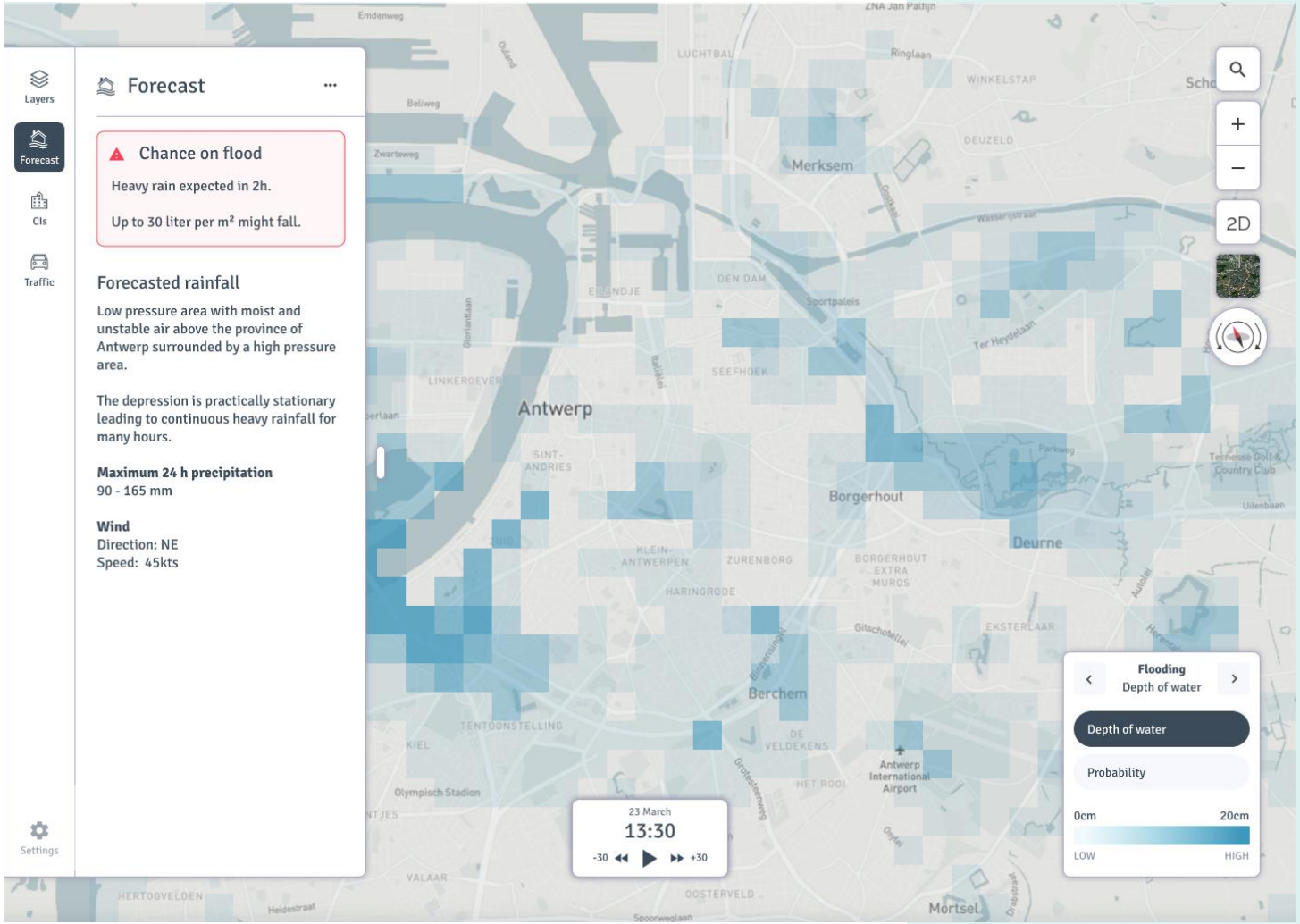



Screenshot of a map
Schoten
Borgeindstraat
Braamstraat
Metropoolstraat
Hoogmolen
Scheldt
EILANDJE
DEN DAM
Blokkersdijk
LINKEROEVER
Rijnkaai
Park Spoor Noord
DEUZELD
BOSUIL
Rotbeek
Eethuisbeek
Confortalei
Ter Heydelaan
AMANDUS-ATHENEUM
SEEFHOEK
BORGERHOUT
DEURNE
ZWARTE AREND - RUGGEVELD
Antwerp
Zwijndrecht
Provinciaal Groendomein Rivierenhof
Ruggeveldlaan
Pauwstraat
Beatrijslaan
Scheldt
ZUID
ZURENBORG
HARINGRODE
SILSBURG
BURCHT
Dorpstraat
Heirbaan
BREDERODE
Gitschotellei
Boekenbergei
Brestraat
MARKGRAVE
BERCHEM
GROENENHOEK
Borsbeek
Hobokense Polder
KIEL
Schroellaan
Krugerstraat
Roderveldlaan
Corluylei
BRAND
ROOI
MIDDELHEIM
Berkenlaan
Beukenlaan
VALAAR
Molenstraat

Add controls to our map

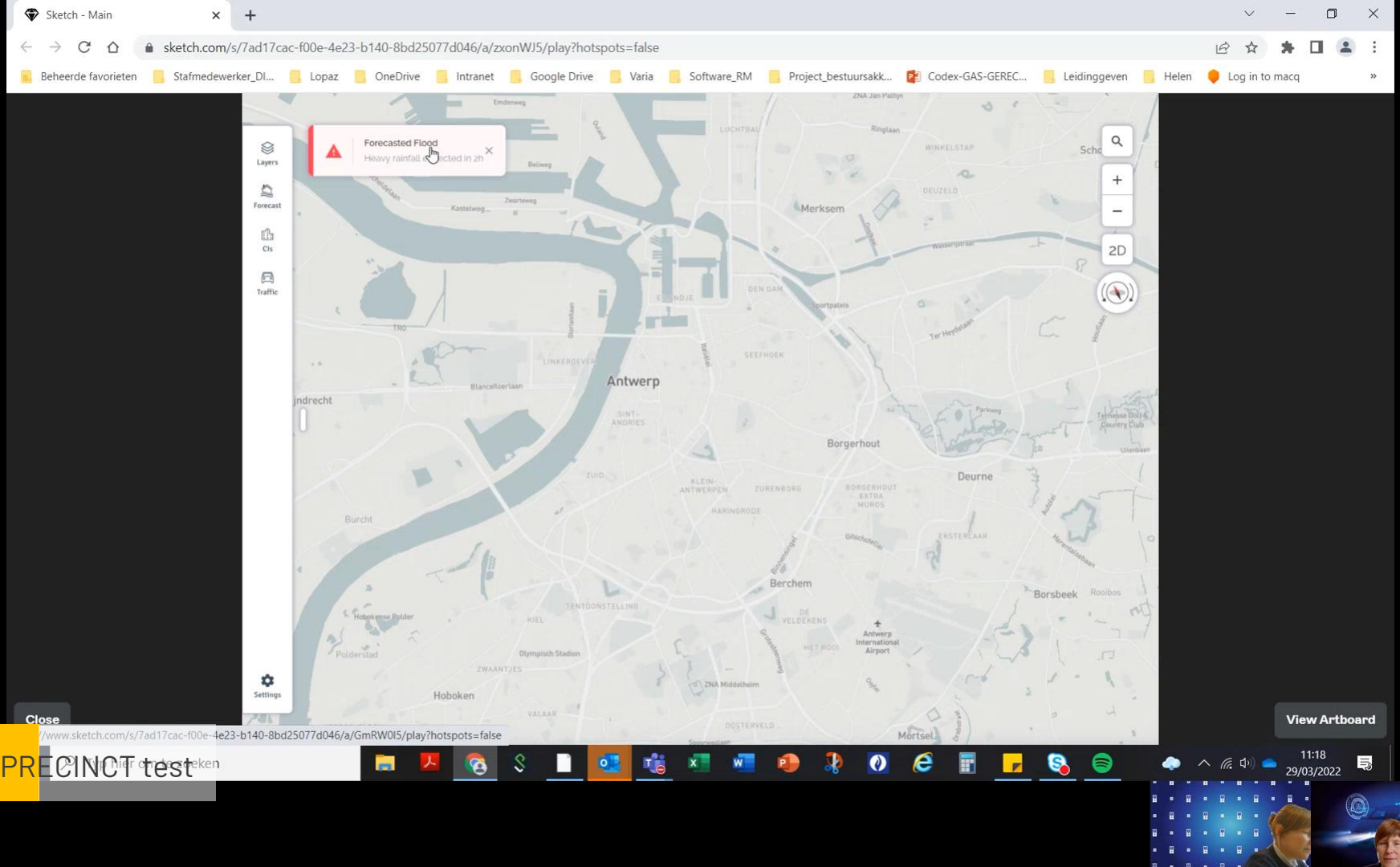

Layers
Simulate
Traffic
Navigation elements
Search address
Antwerp
Zwijndrecht
LINKEROEVER
EILANDJE
DEN DAM
DEUZELD
Park Spoor Noord
AMANDUS-ATHENEUM
SEEFHOEK
BORGERHOUT
DEURNE
ZWARTE AREND - RUGGEVELD
Provinciaal Groendomein Rivierenhof
ZUID
ZURENBORG
HARINGRODE
BREDERODE
SILSBURG
BURCHT
MARKGRAVE
BERCHEM
GROENENHOEK
Borsbeek
KIEL
BRAND
MIDDELHEIM
ROOI
VALAAR
Hobokense Polder
Blokkersdijk
Rotbeek
Scheldt
Eethuisbeek
Metropoolstraat
Schoten
Molenstraat


Layers
Simulation
Traffic
Animation of a flood
Search address
Antwerp
Zwijndrecht
Scheldt
Blokkersdijk
Rotbeek
LINKEROEVER
EILANDJE
Rijnkaai
DEN DAM
Park Spoor Noord
DEUZELD
BOSUIL
Eethuisbeek
Confortalei
Ter Heydelaan
Metropoolstraat
AMANDUS-ATHENEUM
SEEFHOEK
BORGERHOUT
DEURNE
ZWARTE AREND - RUGGEVELD
Provinciaal Groendomein Rivierenhof
Ruggeveldlaan
Schoten
Beatrijslaan
ZUID
ZURENBORG
HARINGRODE
BREDERODE
SILSBURG
BURCHT
Dorpsstraat
Heirbaan
Gitschotellei
Boekenbergei
MARKGRAVE
BERCHEM
GROENENHOEK
Borsbeek
Hobokense Polder
KIEL
Schroellaan
Krugerstraat
Roderveldlaan
Corluylei
BRAND
MIDDELHEIM
ROOI
Berkenlaan
Beukenlaan
VALAAR
Molenstraat



[Try it out](#) yourself.

imec


Sketch - Main
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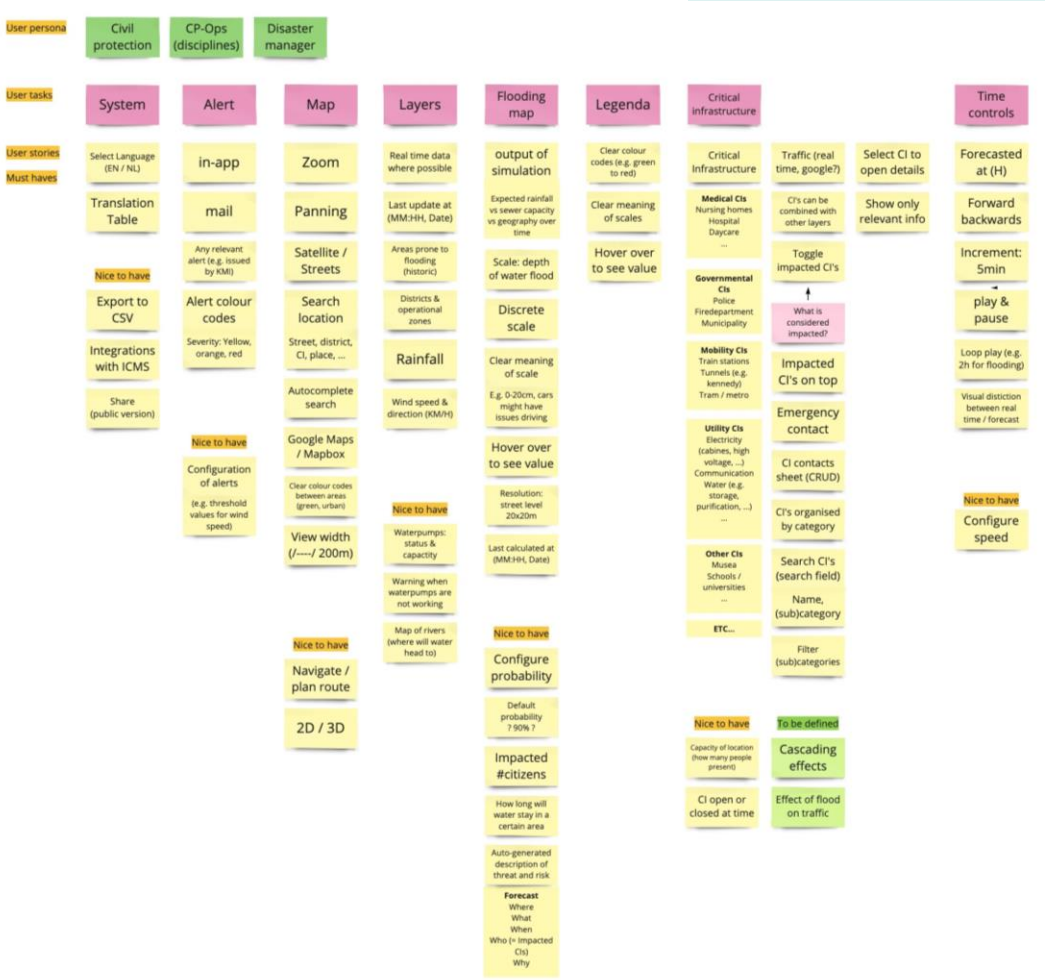
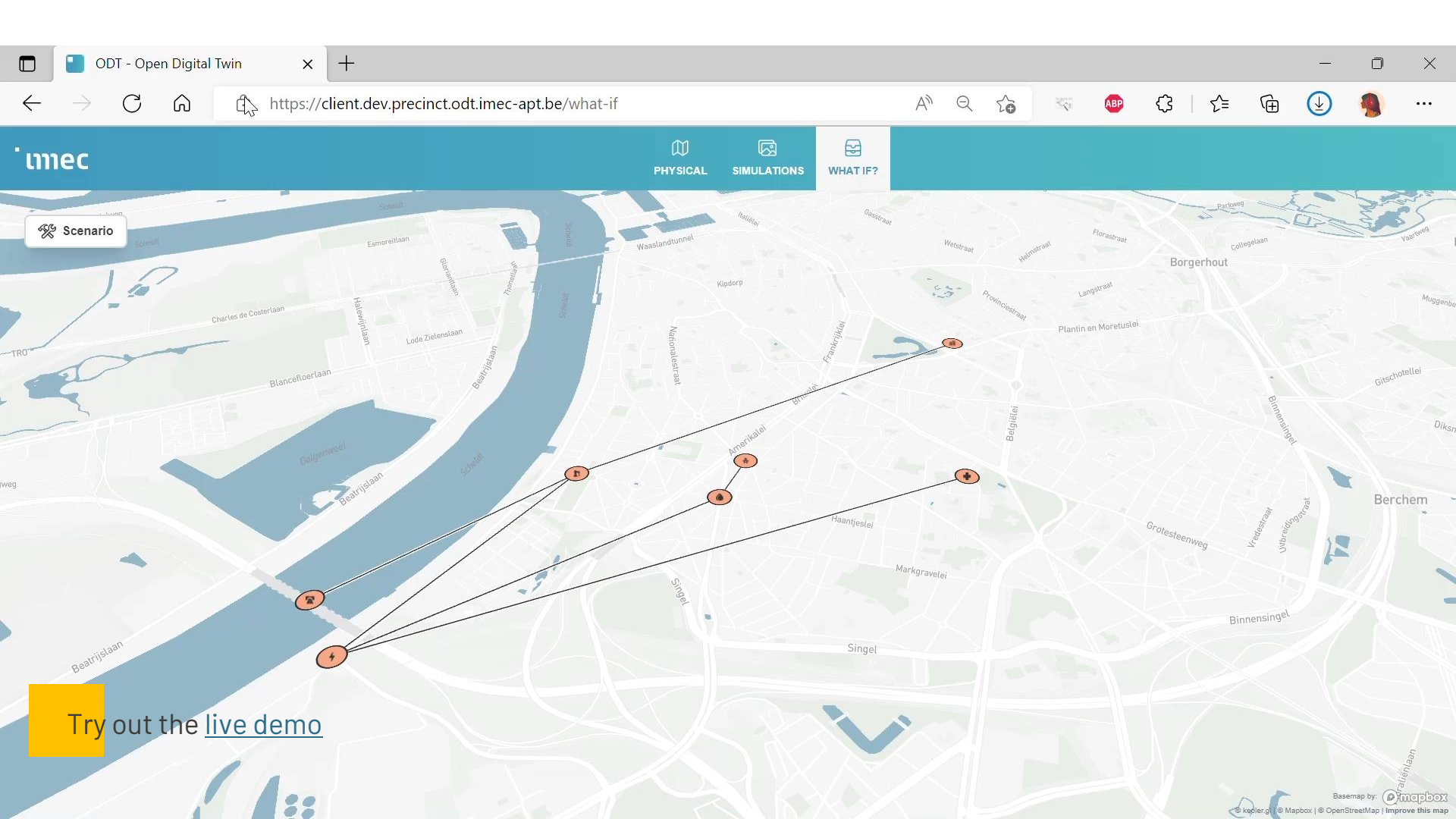
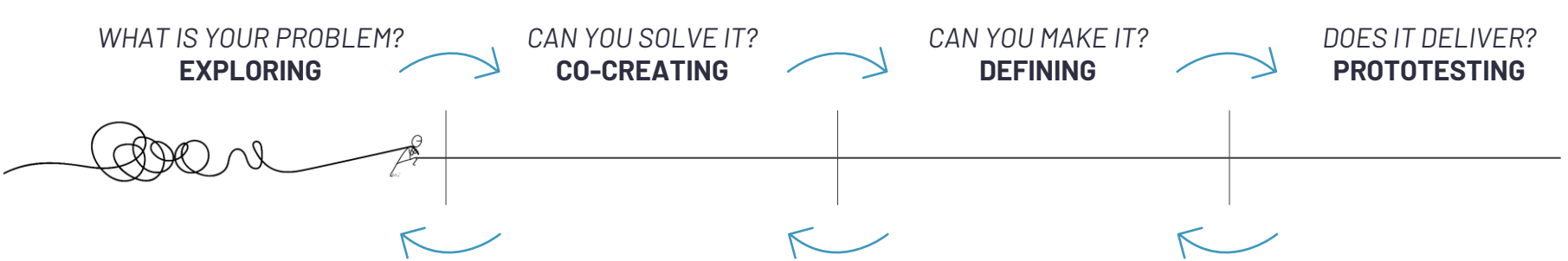
Beheerde favorieten
Stafmedewerker_DI...
Lopaz
OneDrive
Intranet
Google Drive
Varia
Software_RM
Project_bestuursakk...
Codex-GAS-GEREC...
Leidinggeven
Helen
Log in to macq
Forecasted Flood
Heavy rainfall
Layers
Forecast
CIs
Traffic
Settings
2D
Antwerp
Merksem
Borgerhout
Deurne
Berchem
Borsbeek
Hoboken
Burcht
Mortsel
Close
View Artboard
PRECINCT test
11:18
29/03/2022

PRECINCT user story map




ODT - Open Digital Twin
https://client.dev.precinct.odt.imec-apt.be/what-if
imec
PHYSICAL
SIMULATIONS
WHAT IF?
Scenario
Try out the live demo

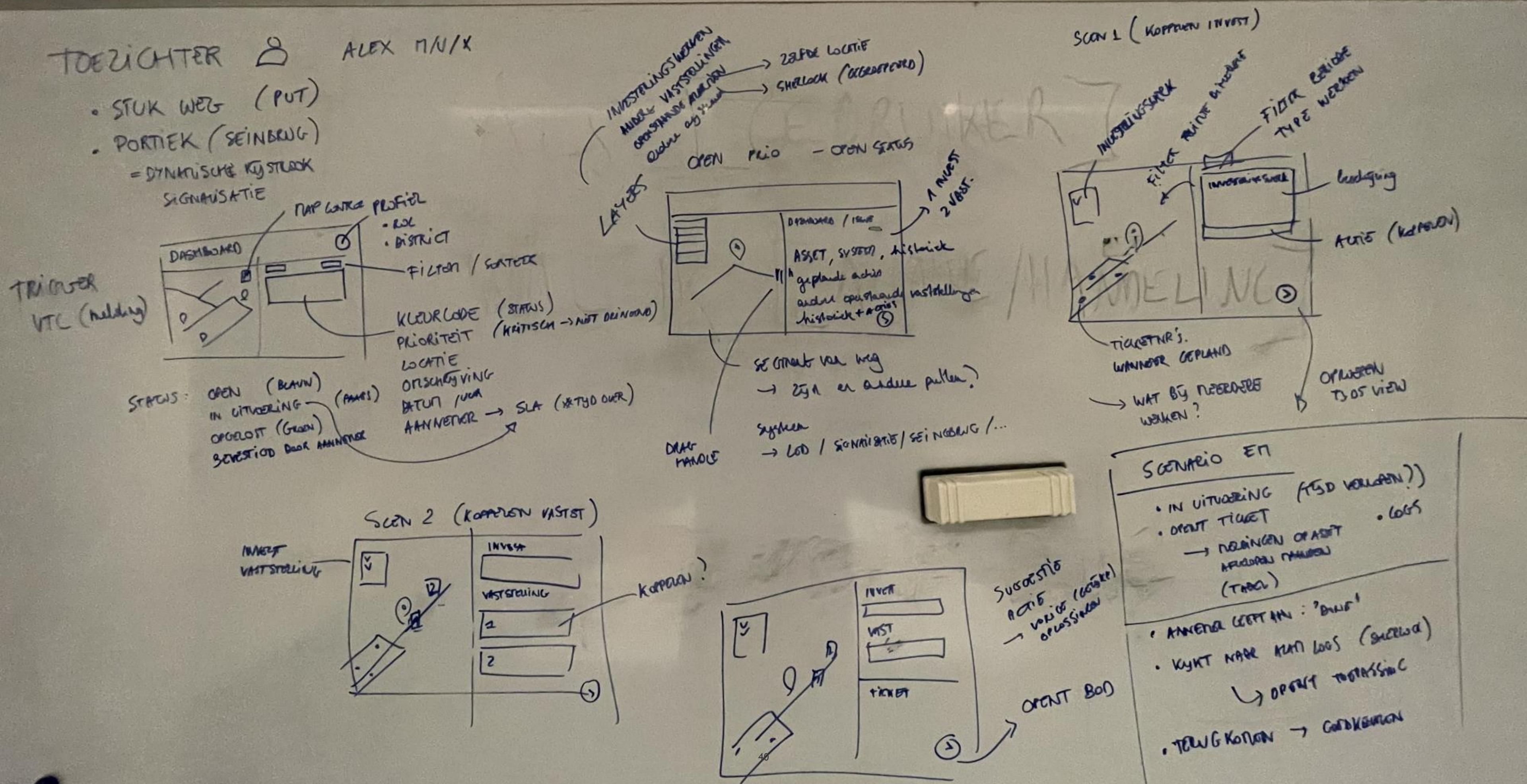


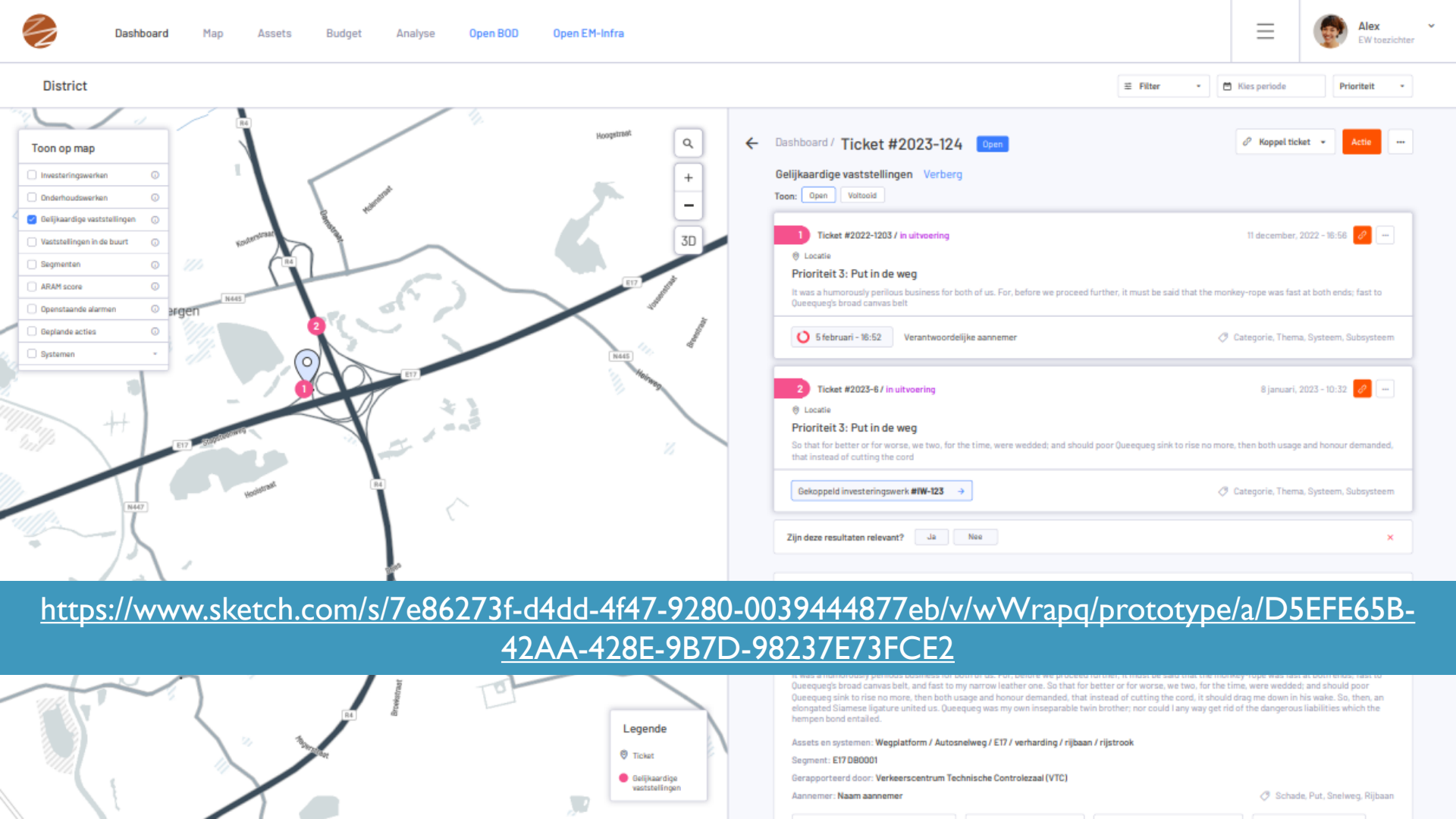
Lesson learned: by deeply involving your eventual end-users, the outcomes might differ from what was initially planned

EXAMPLE 3: PREDICTIVE MAINTENANCE OF ROAD ASSETS (FLEMISH DEPARTMENT OF MOBILITY)

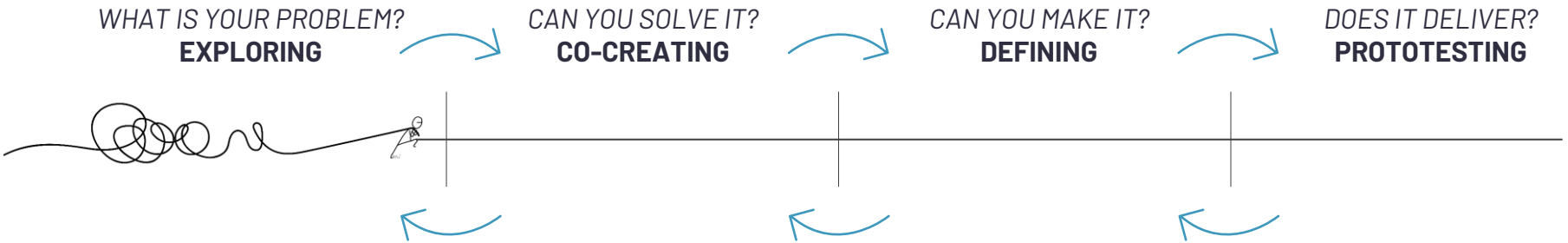

TOEZICHTERS
EM-TOEZICHTERS
EW-TOEZICHTERS
75% BUDGET SCHADEGEVAL
PAS TEGEN ZOMER "TUUR" ONDERHOUD UITVOEREN
VEEL DATA VEEL APPLICATIES ⇒ PERSOONSGE-BONDEN KENNIS
INNOVATIE-MOEHEID
BELANG ZICHT-LIJN
PERSOONSGEBONDEN BESLISSINGEN!
≠ NODEN PER PERSOON
OMGEVINGSPARA-METERS (QUASI) NIET MEEGENOMEN
GROEN ONDERHOUD VIA VASTE AANNEMER
KENNIS PATRIMONIUM ⇒ GEEN SYSTEEM-DENKEN!
TAAKGEBONDEN INFO / NUT
OVERBEVRAAGD - ADMIN LAST
CHANGE MANAGEMENT!
KWALITEIT DATA ≠ INVENTARIS WISSELEND
INNOVATIE MOEHEID
TE WEINIG CONTROLE BIJ INSTALLATIE
SAMENWERKEN MET OVERHEDEN ONDERMANDS
HISTORIEK SLECHTE ERVARINGEN
TE WEINIG TERUGKOPPELING BIJ MELDINGEN
VERSNIPPERING DATA ≠ KENNIS
"LIEFDESPOLITIEK"
DATA ZIT MAAR 'VAST' IN APPLICATIES
TE VEEL ADMINISTRATIE ⇒ MANUELE FOUTEN
25% BUDGET MINDER DRINGENDE MELDINGEN ⇒ BACKLOG!!!
BUDGET!!!
DISTRICTSCHEF
VERKEERSCENTRUM
TE WEINIG SYSTEEMDENKEN
COMBINATIE AANTAL BEWONERS x MENSEN IN HET WEEKEND/FEESTJE, ...)
WEINIG AFSPRAKEN MET POLITIE
TE WEINIG LIFE CYCLE APPROACH
DATA UITWISSELING TOEZICHTERS LAAT VEEL
BEPERKTE INFO STERK AFHANKELIJK VAN TECHNIEKEN
CRITERIA VOOR PRIORITERING - VAK SUBJECTIEF
OPERATOR MAKKELIJK EERST OF PAPIER - VEEL MANUEEL WERK
SHERLOCK-TOOL ⇒ ALARMEN REACTIE GEBREKEN
HEEL VEEL TOOLS ≠ DATABANKEN
TE VEEL = TE ONDUIDELIJKE ALARMEN AFSTAND-BEWAKING
LEVENSDUUR NIEUWE INFRA NIET GEKEND
KLIMATOLOGISCHE MET PRIORITAIR
VEEL VEEL OMPAPIEREN!
MANAGEMENT
PARAMETERS: 1) VEILIGHEID 2) IMAGOSCHADE
TE VEEL BUDGET INVESTERING, TE WEINIG ONDERHOUD
WEG: CYCLISCH EM: PRIORITAIR
GEEN MARGE MEER
OBJECTIEF CYCLO-MATERIAAL HELPT!
NODEN OVERAL HOOG → MOTIVATIE
OBJECTIVERING STAAT ASSETS NODIG
ONDERHOUDSBUDGET STIJGT NIET, PATH-NAVAM WEL
VEROORDEN VAN ONDERHOUD


2.04
Vergaderzaal
Quinten Matsijs


TOEZICHTER ALEX M/V/X
• STUK WEG (PUT)
• PORTIEK (SEINBRUG)
= DYNAMISCHE KYSTROOK SIGNALISATIE
MAP CONTROL PROFIEL
• ROL
• DISTRICT
DASHBOARD
FILTER / SORTEER
TRIGGER
VTC (melding)
KLEURCODE (STATUS)
PRIORITEIT (KRITISCH → NIET DRINGEND)
LOCATIE
OMSCHRYVING
DATUM / UUR
AANNEMER → SLA (ALTYD OVER)
STATUS: OPEN (BLAUW)
IN UITVOERING (PAARS)
OPGELOST (GROEN)
BEVESTIGD DOOR AANNEMER
INVESTERINGSWERKEN
ANDERE VASTSTELLINGEN
OPENSTAANDE MAATREGELEN
→ ZELFDE LOCATIE
→ SHERLOCK (GEGROEPEERD)
LAYERS
OPEN PRIO - OPEN STATUS
DASHBOARD / ISSUE
ASSET, SYSTEEM, historiek
geplande acties
andere openstaande vaststellingen
historiek + acties
1 INVEST
2 VAST.
SEGMENT van weg
→ zijn er andere putten?
DRAG HANDLE
systeem
→ LOD / SIGNALISATIE / SEINBRUG / ...
SCEN 1 (KOPPELEN INVEST)
INVESTERINGSWERK
FILTER PRIORITEIT
FILTER PERIODE TYPE WERKEN
INVESTERINGSWERK
beschrijving
ACTIE (KOPPELEN)
TICKETNR'S
WANNEER GEPLAND
→ WAT BIJ MEERDERE WERKEN?
OPNEMEN IN TJ05 VIEW
SCEN 2 (KOPPELEN VASTST)
INVEST VASTSTELLING
INVEST
VASTSTELLING
KOPPELEN?
INVEST
VAST
TICKET
SUGGESTIE ACTIE
→ VORIGE (GOEDE) OPLOSSINGEN
OPENT BOD
SCENARIO EM
• IN UITVOERING (TIJD VERLOPEN))
• OPENT TICKET
→ METINGEN OP ASSET AFLOPEN MAKEN (TABEL)
• LOGS
• AANNEMER GEEFT AAN: 'BLUE'
• KYKT NAAR ALLE LOGS (SHERLOCK)
→ OPENT TOPTASSIC
• TERUGKOPPELEN → GOEDKEUREN
40



https://www.sketch.com/s/7e86273f-d4dd-4f47-9280-0039444877eb/v/wWrapq/prototype/a/D5EFE65B-42AA-428E-9B7D-98237E73FCE2



Lesson learned: take into account data availability & quality – decision makers are not always enough in sync with the operational reality

EXAMPLE 4: LOCAL PORT CASE

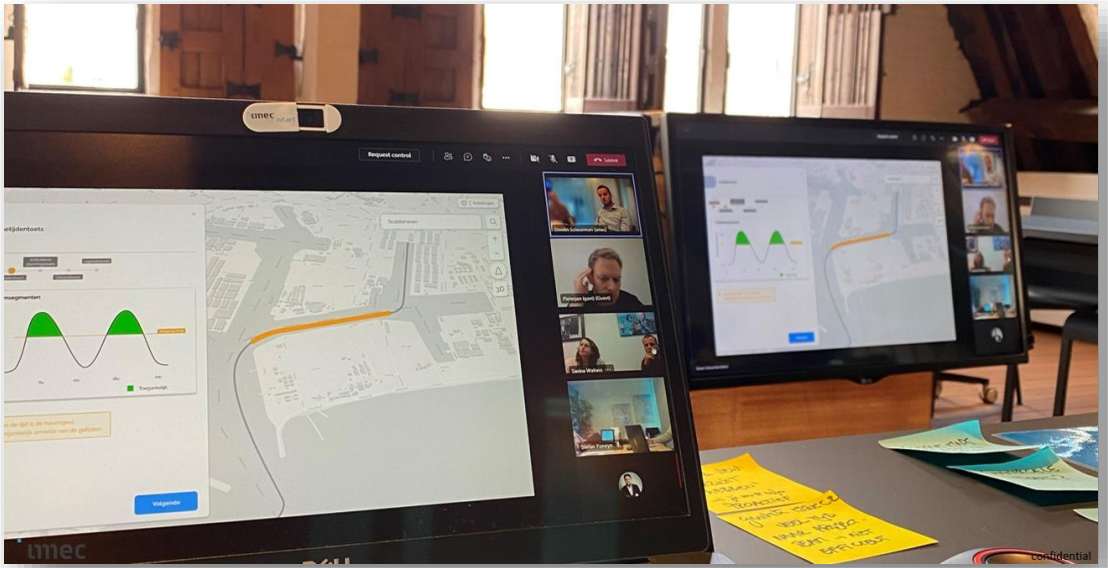
Real-life co-creation

Multi stakeholder interaction test for Port Digital Twin application

imec

Multi-stakeholder interaction test

- Dynamics of the interaction were crucial in the process
- Group feedback vs. individual feedback
- Use of fact sheets to get the participants into a realistic scenario



Further reading...

- Innovatrix: https://timreview.ca/article/1225
- Living Labs for scoping Digital Twins: https://openlivinglabdays.com/wp-content/uploads/2022/12/OLLD-2022-Proceedings.pdf
- Testing: https://timreview.ca/article/1204
- Living Lab methodology: https://timreview.ca/article/956
- PhD on Living Labs: https://biblio.ugent.be/publication/5931264/file/5931265.pdf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Smart Data Canvas

Smart Data Canvas

As one of the first steps in the Co-Creation phase, an innovatrix workshop should be organised.

> First, decide on the three most important stakeholders to be mapped. More than three makes the canvas difficult to read and is an indication of not having enough focus.

Obviously, most smart data use cases will have more than three stakeholders that are affected or involved, but carefully consider which three are most relevant for the use case.

At least one of these stakeholders should be the eventual '*end-user*' of your resulting smart data use case and at least one stakeholder should be paying and/or providing the resources to realise the smart data use case. If you cannot agree on the (maximum) three stakeholders to be included, organise a voting exercise among your innovation team.

- Create your own board: https://imec.innovatrix.be
- A miro template can be found here: Innovatrix Template

Stakeholder			
Needs / Opportunities			
Current Practices			
Currents Datasets / Models			
Jobs-to-be-done			
Value Creation			
Key Resources			
Trustworthiness Requirements			
Barriers			

Criteria

If you agree for the stakeholders to be involved, fill out all elements per stakeholder and go ‘top down’ for all elements.

Stakeholders

List the main characteristics of this stakeholder. Is it an organisation or a user group? What are the defining elements? How are they different from other stakeholder groups? Be as specific as possible.

Needs / Opportunities

What are the main needs or problems of this stakeholder group? Do not formulate this in terms of a solution, but in terms of a problem or opportunity. Do not include all needs or opportunities, but the ones that are relevant or important for the given stakeholder and for the use case.

- How was this need identified?
- How frequent does this problem / opportunity arise?
- What’s the impact of this problem?

Impact and frequency could be important signifiers to identify whether the proposed solution is rather nice to have or life threatening.

Current practices

What is the current behaviour of this customer segment regarding the needs or opportunities? What tools, applications or alternatives do they currently use to cope with the need or take advantage of the opportunity?

- What is their current way of working?
- What competition or alternatives exist? What are the benefits or downsides?
- How effective are these current practices in solving the problem?

Current datasets / models

What data or models does the stakeholder currently use? Add any information regarding these data and models that seems relevant for the problem / opportunity: quality, availability, ownership,...

- What datasets or models are currently available? Is it readily available?
- Who is the owner or can grant us access?
- How does the data look like? Frequency,

This is the final element that looks into the **current way of working**.

Jobs-to-be-done

What needs to be done in order to answer the need or reap the opportunity? This describes the main functions, characteristics or components of the solution in development.

- What result is this stakeholder expecting?
- What are the key components of the job-to-be-done?
- How do these jobs-to-be-done differ for the different stakeholders?

Note that in the earlier stages of the project, this input can be quite high level or even unknown.

Value creation

What impact or value is created for this particular stakeholder segment when the ‘job-to-be-done’ is effectively accomplished?

- What value (monetary and non-monetary) does the resulting smart data solution bring to this stakeholder?
- What is the added value in comparison with the current practices?

In earlier stages (smart data concept is little mature) this input can be high-level and largely assumption-based. In later stages, when the scope matures, this should become more clear.

Key Resources

What resources are needed to deliver or facilitate the jobs-to-be-done of the smart data use case for this stakeholder?

Key resources can refer to:

- (new) datasets or models
- technology development
- partnerships or expertise
- new processes
- …

Add all information that seems relevant to achieve the jobs-to-be-done.

Trustworthiness Requirements

What does this stakeholder need in order to trust the (smart data) solution and the other parties involved?

- What aspects, such as data quality and availability or agreements are critical to build trust?

Barriers

What are the main barriers for this solution to work out? These barriers can relate to any of the previous elements.

- What could make the innovation fail?
- Where lie the biggest risk?

This is a devil's advocate exercise for this particular stakeholder. Where could it go wrong? Elements such as trust, competition, adoption,... can all play a role here. Note down those that you believe are the most likely 'deal breakers'.

Iterate these steps for the two other stakeholder segments.

Make sure you look back at the previous input, as putting new information on the canvas might have an impact on information that is already there.

Remember to list the most important elements (from your perspective), it is by no means the intention to be exhaustive. Map what you regard as **crucial information** for your innovation project. Using it this way, the canvas is a way to help us understand our main stakeholders and users, structure our ideas and value proposition while maintaining the overall picture. It is a crucial tool in our philosophy: **an assumption-based approach to innovation.**