EXPERIMENTS & TRANSITION

URBANISM NEXT EUROPE 2021

Disruptive innovations – Social XR

Disruptive new mobility innovations and fundamental human needs

Speaker: Sri Ganesan, Mobility Consultant | Portfolio lead - Disruptive Mobility Concepts TNO

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SRI GANESAN
MOBILITY CONSULTANT

CAREER AT TNO | Joined TNO in 2018; Mobility consultant and portfolio lead of Disruptive Mobility Concepts. I help the ministries and companies to assess the *impacts and potential future scenarios* for better policies and efficient infrastructure investments.

PAST EXPERIENCES| Business Developer at Virgin Hyperloop for the Netherlands market
Transportation and bid engineer Larsen&Tubro, India.

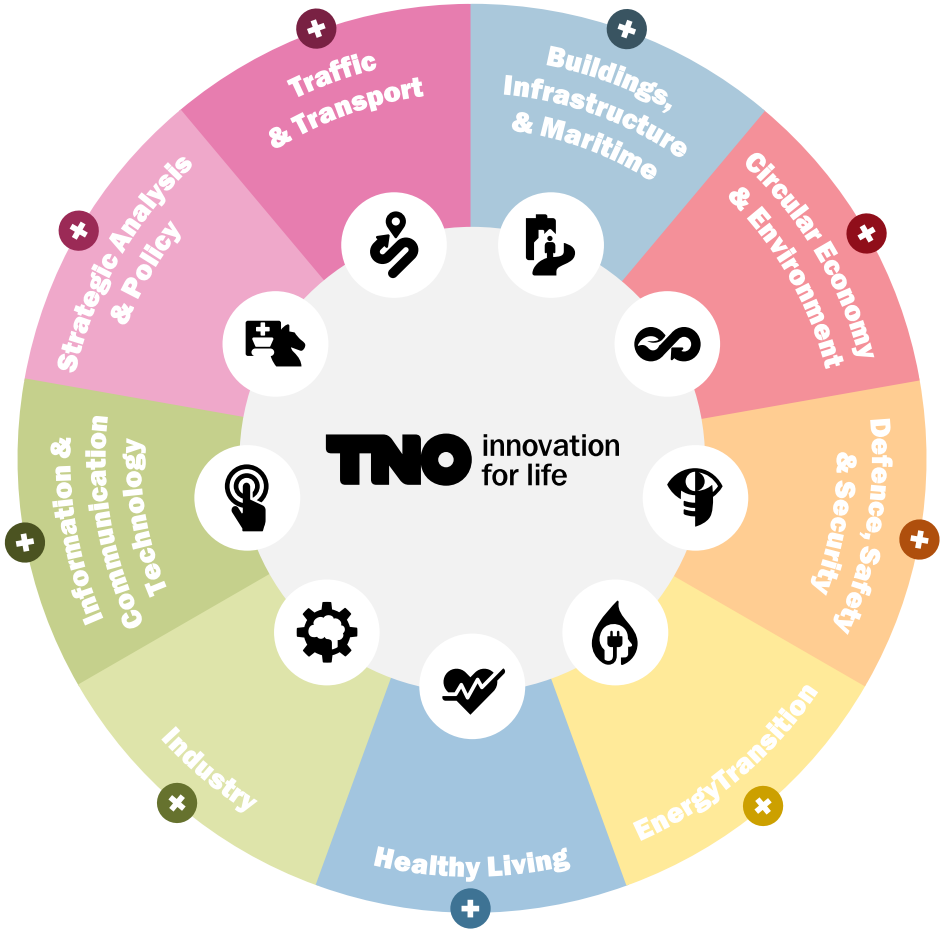
EDUCATION | Transport, Infrastructure and Logistics (MSc) at TU Delft, with specialization in policy.

ASK ME ABOUT:

- Disruptive mobility concepts
- Hyperloop, Avatars, XR
- Impacts, vision and strategy

TNO innovation for life

ABOUT TNO

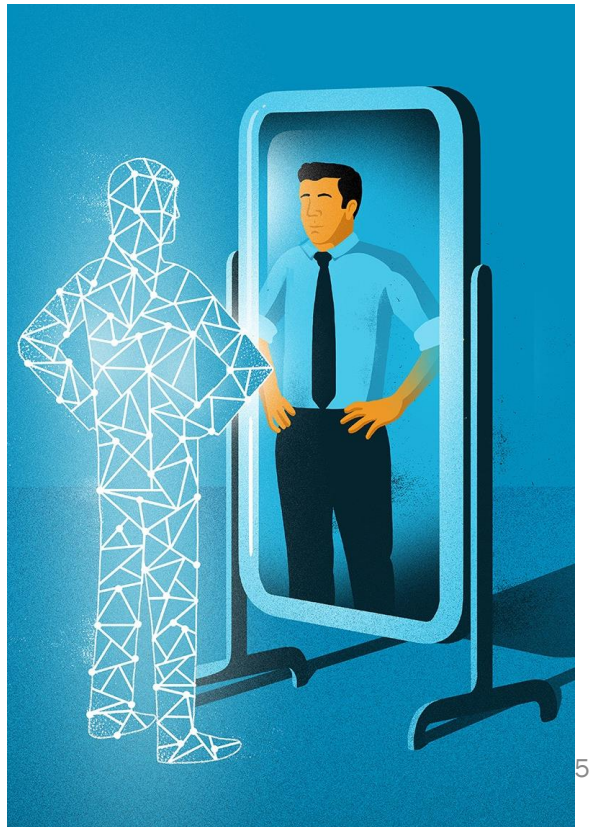


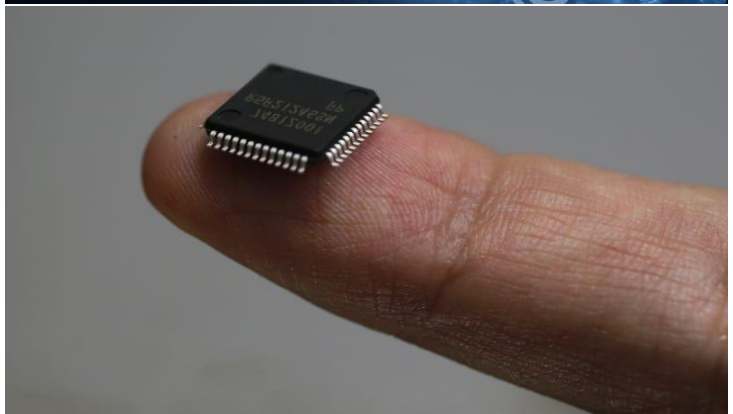
TNO innovation for life

INNOVATIONS IN THE LAST DECADE…

- High pace of technological developments and high uncertainty of their potential disruptive impact on economy and on society
  - So many innovations that are and can be disruptive in field of mobility in the last decade…

RYANAIR JUMP Lime Uber Ford FORD SMART MOBILITY WAYMO





Source: Ryanair, JUMP, Uber, Ford Smart Mobility, Lime, Waymo, Hardt hyperloop

LEVELS OF INNOVATION

Modes & services (1st degree)

- Car pooling / ride sharing
- Hyperloop
- E-step scooters
- Self-driving cars
- Boom supersonic

Cross-disciplinary innovation (2nd degree)

- Business models
- Services
- 5G
- Starlink
- AI

Indirect technologies innovations (3rd degree)

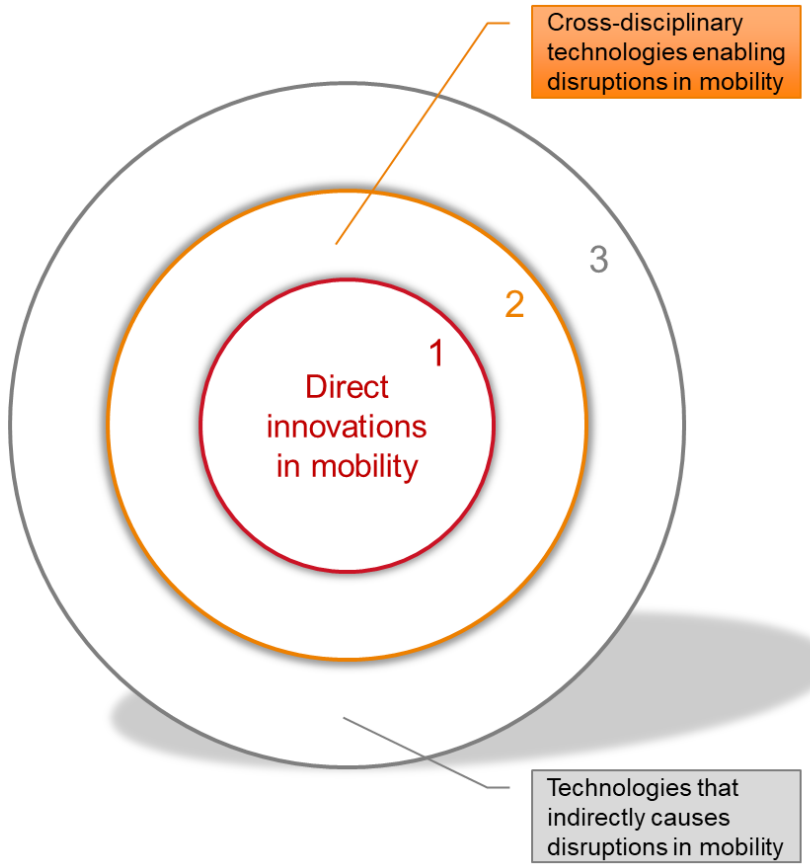
- Robots
- eXtended Reality
- Social Presence
- Graphene
- Edge computing

Mobility constraints

- Availability of time, preferred travel time of 45 minutes
- Congestion
- Waiting time

External constraints

- Economy - cost
- Weather
- Environment



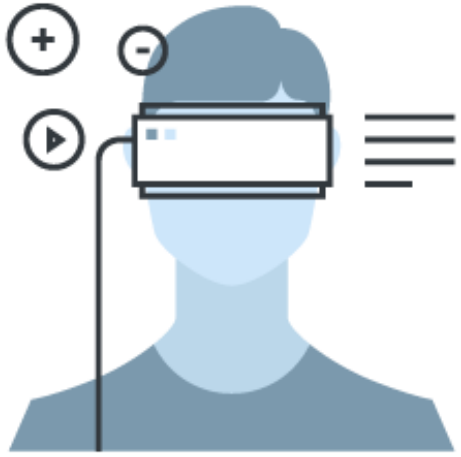
DISRUPTIVE INNOVATIONS

- New concepts worldwide at a rapid pace of development
- Government organisations (national and EU) and (incumbent) industries want to check if an innovation is a hype or can really offer a change? And if it is worth supporting and investing in this innovation?
- The value of independent research organisation like TNO is very high in this regard. This fits TNO's scope and capabilities to answer the request from the government.

XR: EXTENDED REALITY

EXTENDED REALITIES

VIRTUAL REALITY (VR)
Full immersion

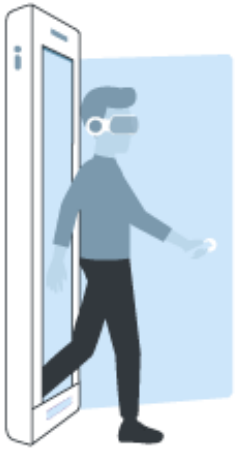


Complete virtual immersion into a simulation.

AUGMENTED REALITY (AR)
Real world with virtual elements

Digital information presented over real world view.

MIXED REALITY (MR)
Real world and virtual collide

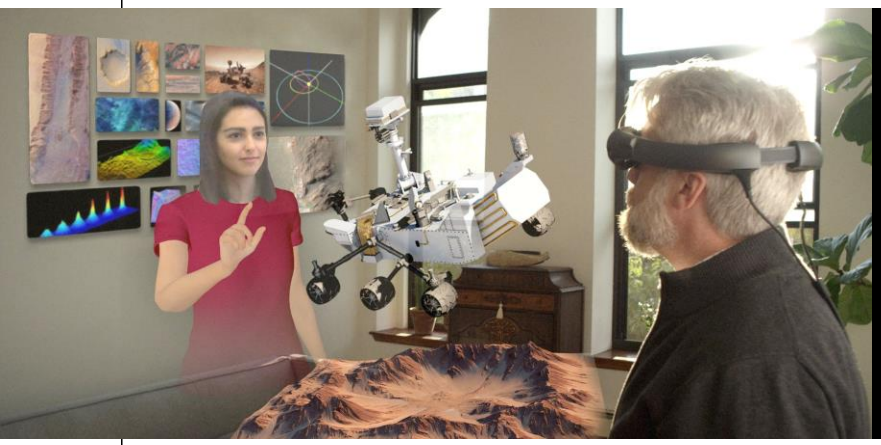


Virtual world is imposed on real world view with user able to interact with both.

SOCIAL XR / XR COLLABORATION

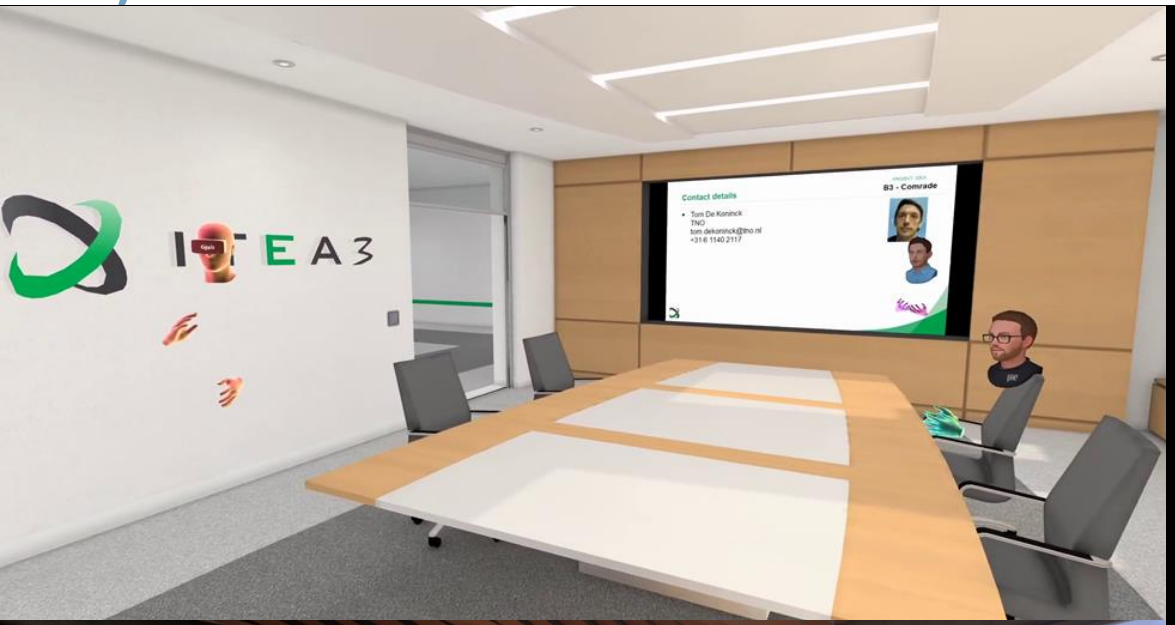
- Social XR is social interaction paradigm, mediated by XR technologies, where individuals experience social presence and may engage in real-time interpersonal conversation and shared activities.

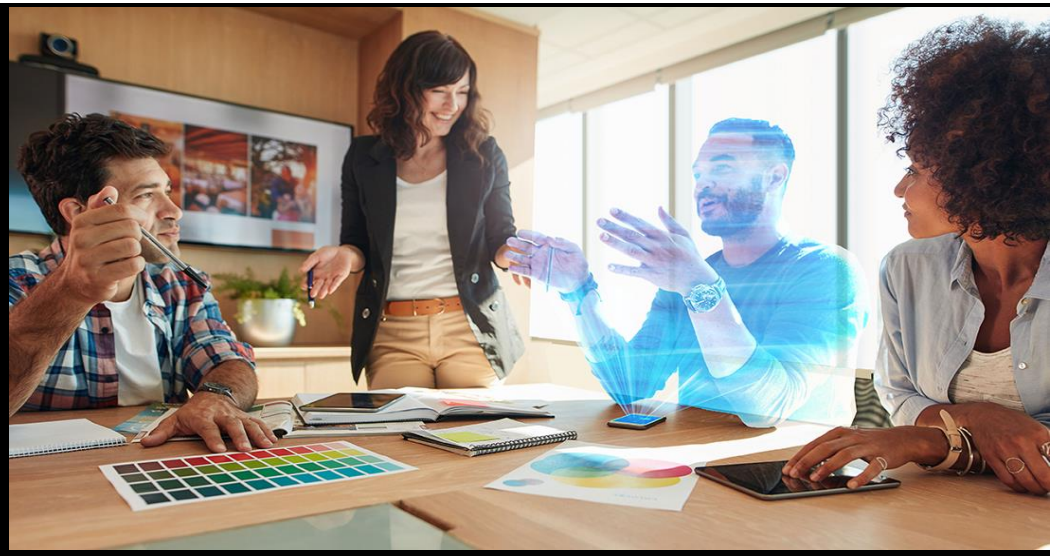
- XR collaboration refers to the use of XR technologies to bring groups of people together for remote activities, such as meetings, conferences, design reviews, classroom sessions, and more.



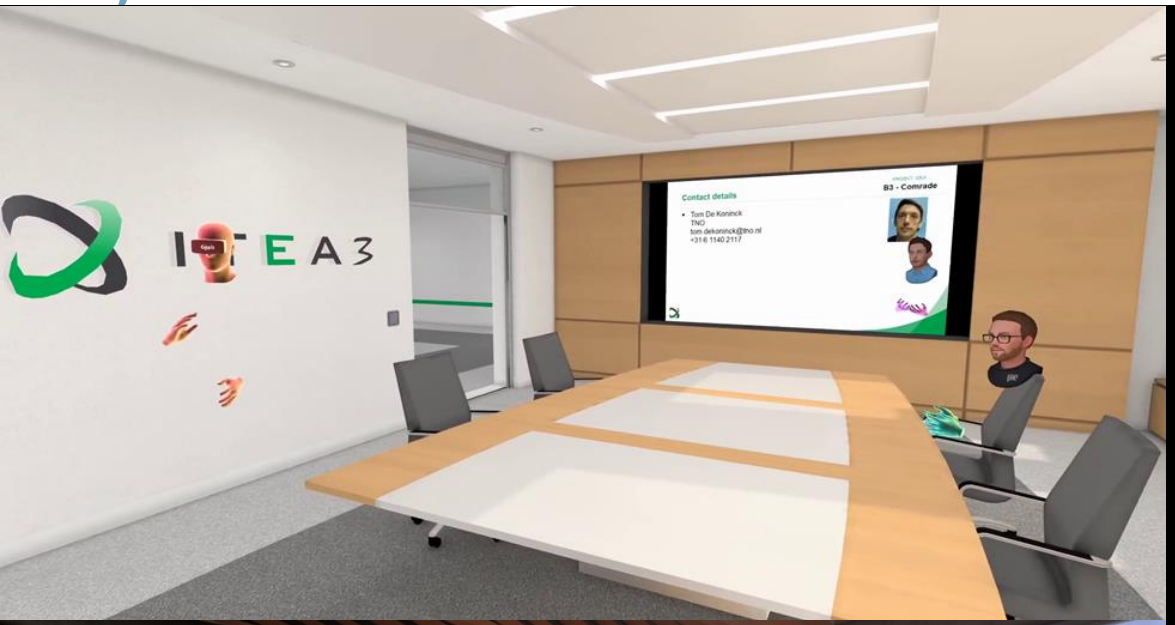
Sources: https://spatial.io/ and TNO

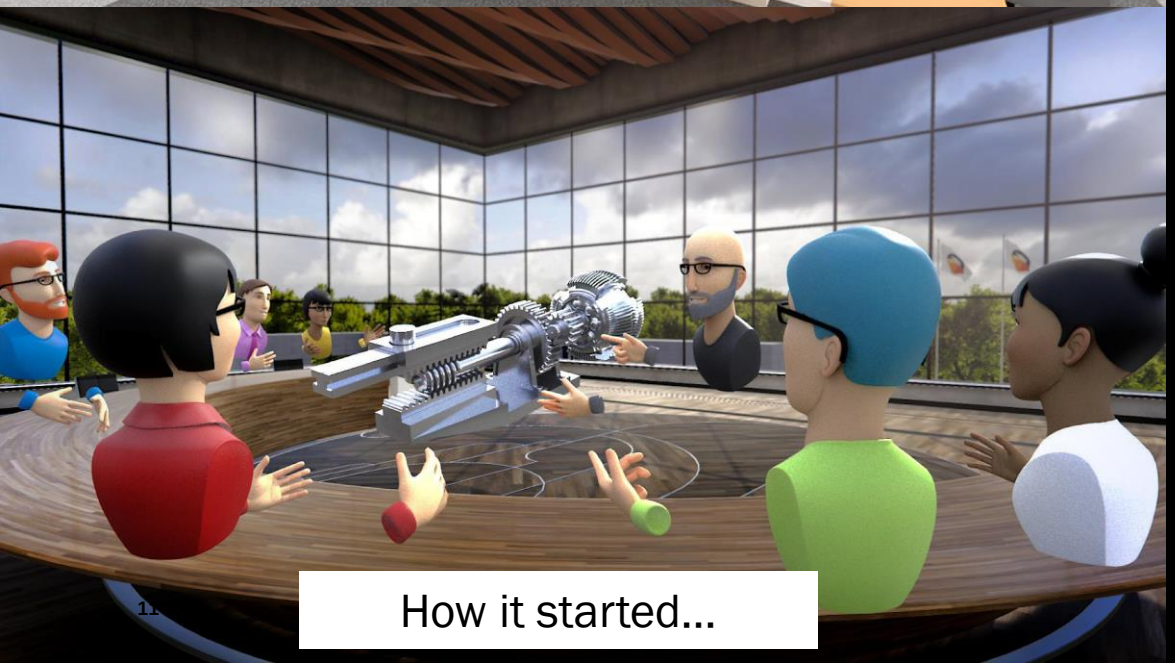
VISION





REALITY





How it started…

How it’s going…

SOCIAL XR / XR COLLABORATION
EXAMPLE USE CASES

XR MEETINGS

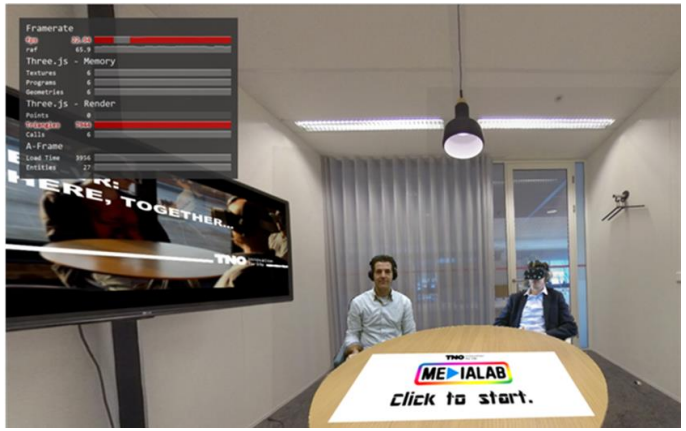
- How can we effectively meet remote?

XR VISITS

- Can we enable remote visits to nursing homes with today's hardware?

REMOTE EXPERTISE

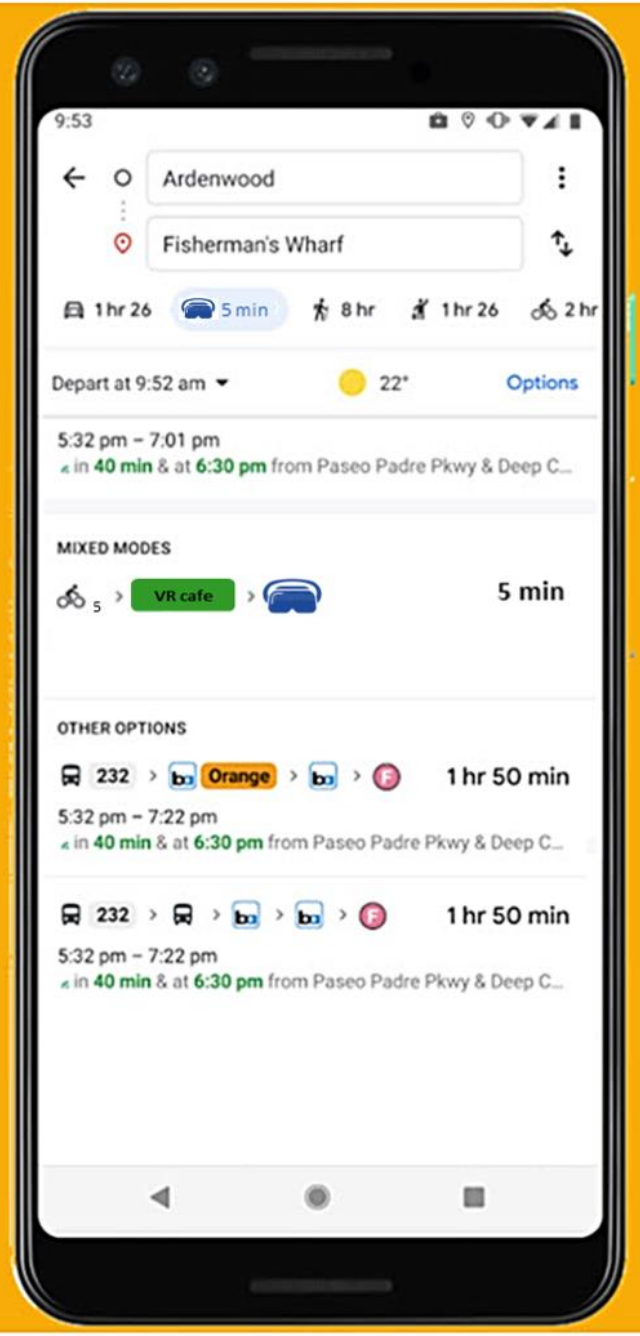
- How do we merge remote environments into social XR?



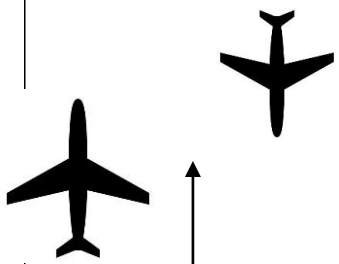
SOCIETAL IMPACT THROUGH SXR

- Digital Modal Shift
- Replacing (long distance) travel with local trips

- Need to understand → Human factors and needs
- First potential → Business travel



CONCEPT: DIGITAL MODAL SHIFT

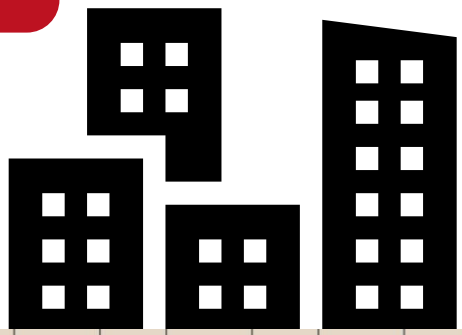


Time, money, CO_2

Zero emissions
Zero loss
Zero casualities

Digital modal shift

XR cafe



SOCIAL XR IN TRANSPORT EQUATION

UNKNOWN POTENTIALLY DISRUPTIVE BEHAVIOUR

Example: Amsterdam – Paris			
	Train (Thalys)	Hyperloop	Social XR
Journey time (not end2end)	3h20m	0h30m	<5 minutes
Travel cost (reimbursable for business)	From 65Eur	Probably from 90eur	Probably 10-20eur/hour of the service
Comfort of journey (end2end)	OK (transfers from Paris Nord)	Unknown	Dependent on the quality of experience – unknown
Externalities	Gov. subsidy	Gov. subsidy	-
Flexibility	Low	Relatively high	High
Disutility	Transfers, delays, first & last mile	Transfers, delays, first & last mile	In case XR meetings go on for too long
Utility function	Known	Unknown, but methodology exists	Unknown, no methodology exists yet

- How do you steer such innovations to achieve maximum societal impact and achieve societal goals?
  - Necessity to understand:
    - Impact of the tech on choice behaviour, acceptance – human needs
    - Scenarios on environment and economy
    - Governance models to steer them towards positive societal impact

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Thank you!

Do you have any question?

Ask Sri Ganesan, sri.ganesan@tno.nl

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