

# DESIGNING PEOPLE-CENTRED MOBILITY SOLUTIONS: FROM VISION TO ACTION

COLLOQUIUM REPORT  
OCTOBER 2023





Anthropolis Colloquium | 14 September 2023

# DESIGNING PEOPLE-CENTRED URBAN MOBILITY SOLUTIONS FOR TOMORROW: FROM VISION TO ACTION

Final Report | October 2023

The [Anthropolis Chair](#) presented in its closing colloquium a series of integrated approaches, ranging from scenario-based decision and design support to active mobility in MaaS and agent-based simulations, complemented by two keynotes that elaborated on tomorrow's urban mobility challenges.

The different sessions showcased various lenses and methods developed in the past four years to tackle these stakes, enriched by insights from collaborations with Sweden, China, Egypt, and Morocco.

Various opportunities to exchange around posters and project demonstrations completed the hybrid event that was attended by about 70 participants.

The colloquium has been organised by the Anthropolis Chair of [IRT SystemX](#) and [CentraleSupélec](#) and was supported by the Chair's partners EDF, Engie, Groupe Renault, Communauté d'Agglomération Paris-Saclay, and Nokia Bell Labs, working together towards people-centred urban mobility. It took place on the EDF campus, generously provided by one of the Chair's partners.

Partners of the Chair



# COLLOQUIUM 2023

Programme 14 September 2023

Three sessions with a total of five presentations and one discussions made up this year's colloquium. Click on the sessions below to access the summaries.

The end of the document portrays the Chair's Vision and the Biographies of the Speakers. On our [YouTube Channel](#), all available recordings are accessible.

10:00	<b>OPENING WORDS</b> Didier Roustan (EDF R&D) Abdelkrim Doufene (IRT SystemX) Bernard Yannou (CentraleSupélec)
10:10	<b>INTRODUCTION</b> Flore Vallet
10:30	<b>SIMULATION OF FUTURE SCENARIOS</b> Tarek Chouaki, Tjark Gall
11:00	<b>INCENTIVISING WALKING IN PARIS</b> Mariana Reyes, Tarek Chouaki
11:30	<b>KEYNOTE 1: TRANSITION OF URBAN ECONOMY</b> Isabelle Baraud-Serfaty (Ibicity)
12:30	Lunch Break
14:00	<b>KEYNOTE 2: UNDERSTANDING MULTIMODALITY</b> Catherine Morency (Polytechnique Montréal)
15:00	<b>COFFEE BREAK + DEMONSTRATIONS</b>
15:45	<b>ROUNDTABLE</b> Chair partners Moderators: Flore Vallet, Yann Briand
16:30	<b>PERSPECTIVES + CLOSING</b> Flore Vallet Yann Briand Paul Labrogère (IRT SystemX)
16:50	

## OPENING WORDS

10:00-10:10 | **Didier Roustan, Abdelkrim Doufene, Bernard Yannou**

This year's Anthropolis Colloquium was opened by Didier Roustan (EDF R&D), representing the hosting organisation, as well as Abdelkrim Doufene of IRT SystemX and Bernard Yannou of CentraleSupélec.

## INTRODUCTION

10:10-10:30 | **Flore Vallet** | [Link to recording](#)

In the first session, Flore Vallet introduced the overall vision and task structure of the Anthropolis Chair, complemented by its main contributions, its network, and the agenda and concept behind the colloquium. More details on the Anthropolis Chair and all speakers can be found at the end.

## AGENT-BASED SIMULATION OF FUTURE SCENARIOS

10:30-11:00 | **Tarek Chouaki, Tjark Gall** | [Link to recording](#)

Sustainable and people-centred mobility solutions designed today must be prepared for decades to come. Evaluating social and environmental impacts through simulation is crucial but challenging due to various social and technological uncertainties. We developed a transdisciplinary approach linking scenarios, personas, and synthetic populations to simulate 2030 scenarios of Paris and Cairo. The method is applied to intermodal AV services and its results highlight anticipated impacts on emissions, energy demand, and individual costs across scenarios and user groups.

## MODELLING AND SIMULATING THE POTENTIAL OF ECONOMIC INCENTIVES FOR WALKING

11:00-11:30 | **Mariana Reyes, Tarek Chouaki** | [Link to recording](#)

Our study centres on the potential of sustainable urban mobility in the Paris Region, particularly walking, as an eco-friendly and health-enhancing mode of transportation. Despite the acknowledged physical and mental well-being advantages of walking, there remains a necessity to substantiate its benefits to public authorities. Our research employs quantitative modelling, specifically agent-based modelling, to examine the effects of economic incentives on walking behaviours. By simulating 36 distinct incentive scenarios and integrating them into a mode choice model, we comprehensively evaluate their impacts on various trip components such as duration and cost. We extend this analysis to the Île-de-France area, employing a representative simulation and mode choice model to assess the feasibility and potential outcomes of incentive policies for walking. Our work contributes valuable insights for informed urban transportation policymaking towards a sustainable and healthier future.

## URBAN ECONOMY TRANSITIONS: HOW TO ALLOCATE SCARCE RESOURCES IN AN UNCERTAIN WORLD?

11:30-12:30 | Isabelle Baraud-Serfaty | Ibicity, Lecturer at Sciences Po

[Link to recording](#)

How can local authorities and city operators: respond to the multiplication of uncertainties and interdependencies? Implement the sobriety policies essential to the ecological transition? Finance affordable housing and associated urban amenities? Governing the new street level operators? Adapt their strat-

egy to the platformization of the provision of services to city residents? Urbanize urban logistics? These are some of the questions that cities will have to answer in the years to come, and which will be approached through the prism of urban economics, concepts of scarcity and value.

## TOWARDS AN INTEGRATED AND MULTIMODAL UNDERSTANDING OF MOBILITY

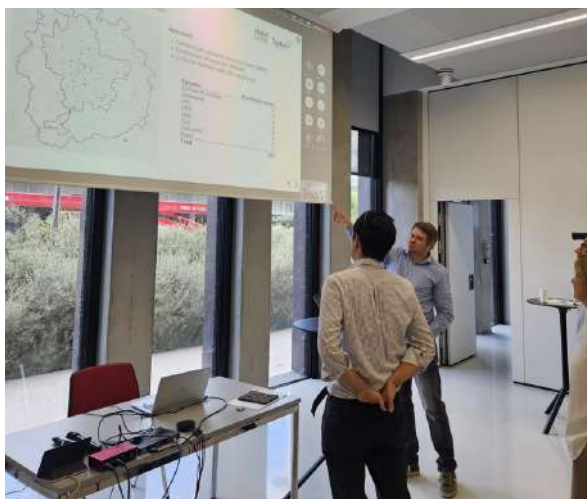
14:00-15:00 | Catherine Morency | Professor at Polytechnique Montréal

[Link to recording](#)

The keynote focused on a deep investigation of multimodal practices of people in Montreal, Canada. This research works are centered on systematic approaches: identification of multimodal patterns, creation of efficient multimodality measures and indicators, com-

plementarity or competition between modes. The challenge outlined concerned the strong interactions between modes as well as the necessary aggregation of multiple data sources and thorough analysis to reflect multimodal practices.

## POSTERS, GAME & PLATFORM DEMONSTRATIONS



15:00-15:45

Works conducted in collaboration with the Anthropolis Chair have been portrayed. The following people presented their work during the session:

**Ouidad Benhlime** | CentraleSupélec

[Download poster](#)

**Sebastian Hörl** | IRT SystemX

[Access presentation](#)

**Julien Baltazar** | CentraleSupélec

[Download poster](#)

**Julia Godoy** | Student, CentraleSupélec



# ROUNDTABLE: BUILDING AN INDUSTRIAL RESEARCH APPROACH: FROM VISION TO ACTION

**15:45-16:30 | Bernard Yannou, Jakob Puchinger, Vincent Bihan-Bocquet, Patrice Aknin, Pierre Moench, Maxime Top, Mariana Reyes**

**Moderated by Flore Vallet and Yann Briand**

The final roundtable welcomed seven participants: Patrice Aknin (IRT SystemX), Vincent Bihan-Bocquet (Communauté d'Agglomération Paris-Saclay), Pierre Moench (ENGIE), Jakob Puchinger (EM Normandie), Mariana Reyes (IRT SystemX and CentraleSupélec), Maxime Top (EDF), Bernard Yannou (CentraleSupélec). Five rounds of questions were asked to stimulate a discussion on how to conduct an industrial research

approach applied to the mobility field. The topics addressed were related to transportation and wider societal issues: current and future mobility challenges around the world, articulating past and present in future studies, leverage of R&D results for local authorities and economic stakeholders, potential transfer of developed methods and tools to industrial partners, challenges to ensure mobility equity.

# TOWARDS A THIRD SEASON OF ANTHROPOLIS: A NEW PARADIGM, TOMORROW'S CHALLENGES

**16:30-17:00 | Flore Vallet, Yann Briand, Paul Labrogère**

In the last session, the Chair holder Flore Vallet and project manager Yann Briand provided an outlook towards the next Chair and the future. The key topics for the next Chair have been presented, including the interrelations between energy, mobility, and infrastructures.

The session and last Anthropolis Colloquium was closed by the CEO of IRT SystemX, Paul Labrogère, who thanked the partners for their contributions and active exchange, the participants for the interesting dialogues, and the Chair's team for their contributions during the past four years.



# THE ANTHROPOLIS CHAIR VISION

## Introduction

As shown on the figure below, the research plan of the chair is organised according to three interconnected themes (Urban Mobility Futures; Mobility as a Service and Infrastructures). An additional transversal topic is addressing Sustainability Challenges for urban mobility. Based on this scheme, the chair presented its research contributions during the colloquium.

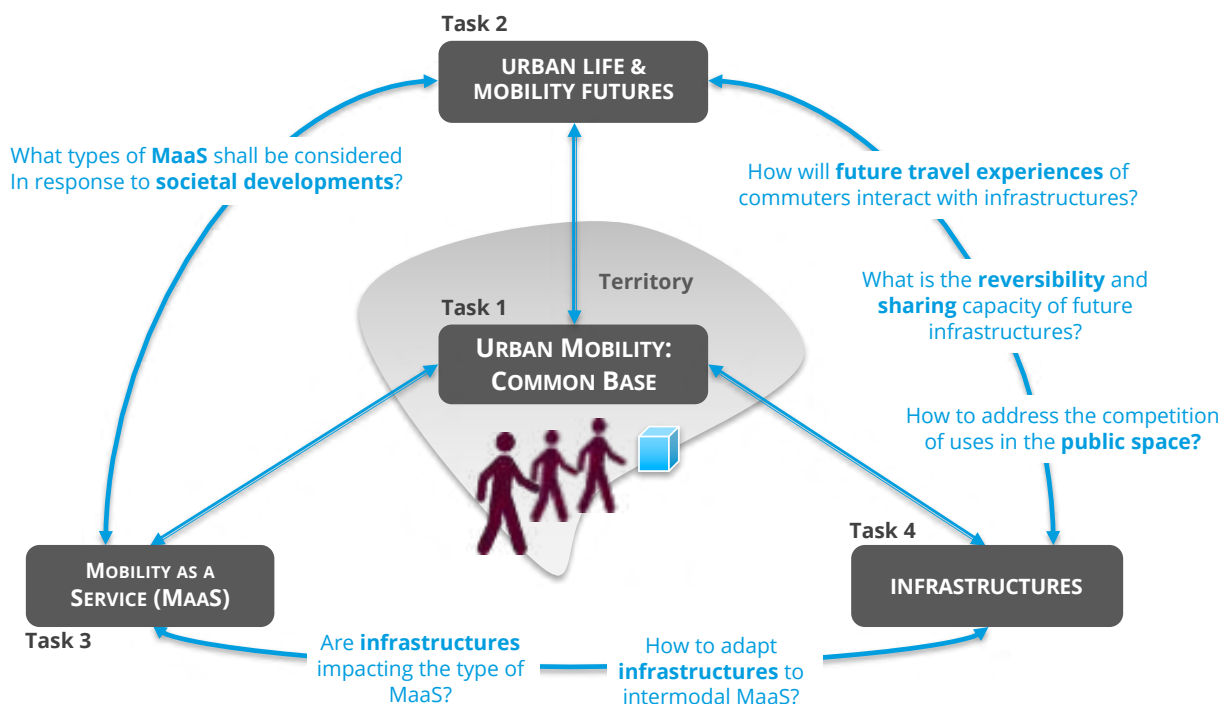
## Sustainability Challenges

This part of the contribution is placed under the umbrella of Sustainable Development Goal 11 – Sustainable Cities and Communities. Our goal was set by the Paris Agreement with the Zero Carbon Emission target in 2050. A part of the long-term strategy to reduce Greenhouse Gases emissions is the Paris ban on combustion and diesel-fuelled engines by 2030.

In our work, we intended to balance and examine sustainable value creation as well as negative (environmental and social) impacts generated by mobility solutions. We also considered resources in a broad sense, meaning material and energy, as well as data flows.

A special interest was on social impacts when building future scenarios for mobility and urban life, and more specifically the expected equity of scenarios for different social groups.

Regarding value creation, the sustainability of MaaS business models was taken into account, as well as the privacy when using mobility data. Another emerging topic concerns the quantification of environmental impacts associated with mobility data along their life cycle, i.e., data production, storage, and analysis.



For the infrastructure theme, we focussed on the joined environmental impacts of infrastructures and vehicles, for instance in the case of electric mobility. Our intent was to consider more impacts than Greenhouse Gas emissions or energy consumption to better embrace the diversity of impacts generated. We combined eco-design and transport approaches with a spatialised vision, considering mobility practices in the model. Finally, we discussed the sustainability challenges jointly raised by the usage of high-tech solutions for mobility (for managing data for instance) or low-tech solutions mostly based on usage shifts.

### Urban Mobility Futures

The second task of the Anthropolis Chair expanded on the future methods' research and personarrative approach of the first cycle of the Chair; responding to the question of how the futures of urban mobility may look like and how we can prepare, plan, or impact its materialisation. The goal was to find new pathways to contribute to a sustainable transition towards more human-centred mobility in the urban areas of tomorrow.

The specific objectives were to create a state-of-the-art overview on foresight and forecast methodologies; to compile and to analyse impacting societal, behavioural, and technological trends; observe individuals' needs, behaviours, and preferences through theoretical and participatory research; and finally, develop a systematic and creative method for alternative future scenarios of urban mobility. These methods and tools were applied in the Communauté d'agglomération Paris-Saclay and led to multiple, people-centred, and place-

based urban mobility scenarios which can guide and support product, service, and policy design.

### Mobility as a Service

The vision of the Anthropolis Chair on Mobility as a Service (MaaS) started by emphasising the place that MaaS could take in the futures of urban mobility as a human-centred mobility solution.

We built our MaaS research on economic, social, and technological axes, as well as the transversal axis eco-innovation. In the economic axis, we proposed to analyse value creation, capture and redistribution models as well as the overall value chain restructure in the ecosystem for sustainable MaaS' solutions. We created a typology of business models that permits us to further examine more scaled and territorialised MaaS deployments and its outcomes and to create more specific indicators for the evaluation of these criteria. In the social axis we identified the aftermaths of governance dynamics in reconfiguration and MaaS' societal effects regarding equity of access to mobility through MaaS, issues of spatial justice in the public space, sustainability, and health impacts. In the technological axis we approached the issues of creation, ownership, and management of data by all the services integrated in MaaS solutions. We further assessed the role of parallel technological innovations in the evolution of MaaS, for example how infrastructure will be integrated as well as new mobility services like automated shuttles or charging networks for electric vehicles.

Exploring MaaS from this ecosystemic approach, we followed a set of research goals:

- To identify the status of MaaS definition and monitor and map its evolution.
- To clarify the effects of governance configurations on the value chain in the ecosystem.
- To identify the sustainable outcomes of MaaS business models to assess them and provide recommendations to stakeholders.

We mapped and analysed the policies and regulations that might enable a more successful merge between innovation and sustainability in MaaS, in other words, assure that MaaS solutions will be developed under an eco-innovative approach.

Lastly, we approached different options of MaaS models and analysed them via agent-based simulations.

Further, we were working on the appraisal of active modes in MaaS towards more sustainable MaaS business models that promote walking and cycling and provide an added value to customers and to MaaS operators. Some of the steps in our research included identifying methods and tools that permit us to assess MaaS under a series of sustainability criteria as well as under technological and organisational perspectives. Regarding this, we mapped MaaS actors and created a topology of the new economic dynamics and governance configurations between them.



## Infrastructures

The theme of the infrastructures of the future first raised the question of user interactions between people and these infrastructures (for example, pick-up and drop-off facilities for carpooling), as well as the notion of competition between uses. Within a shared public urban space, it is becoming more and more imperative to question the place given to people on the move and to infrastructures, as evidenced for example by the tensions brought about by unlimited individual means of transport. (electric scooter and free-floating bike, electric scooters).

Associated with the question of the sharing of public space, we must look systemically at parking (public and residential), the methods and locations of charging/smart charging stations for the various electrical equipment, the spaces reserved for car-sharing and autonomous shuttles, or delivery areas. Further, there is the challenge of developing active modes in urban areas, in their connection with other modes of travel.

The operation of the infrastructures of the future will be based on emerging technologies which we must consider here. In a non-exhaustive way, these technologies make use of sensors, connectivity and information devices, connected (intelligent) road structures for all modes, or wireless charging methods.

Infrastructures can also be seen from the angle of their function of inducing or controlling the mobility of people and goods and the continuity of travel without interruption. These same infrastructures can also have the function of giving a more human image to the city. In medium and long-term temporal projections, the infrastructures must be designed with a view to reversibility, as for example in the case of urban parking spaces.

# ANTHROPOLIS CHAIR TEAM

## Presenters



### Flore Vallet

Anthropolis Chair Holder at IRT SystemX and CentraleSupélec

Researcher on Human Centered Design at IRT SystemX and Assistant Professor at CentraleSupélec, she joined the Anthropolis chair in 2016 and is the chair holder since September 2022. Before, she was assistant professor at the Mechanical Systems Engineering Department of the Université de Technologie de Compiègne (UTC). She graduated in mechanical engineering design at the ENS Cachan (1993), and obtained a Master's degree in industrial design from UTC in 1999. In 2012, she completed a PhD on the dimensions of eco-design practices towards education of engineering designers. She is a member of the French EcoSD (Eco-Conception de Systèmes Durables) network and of the Design Society. Her fields of interest are practices of eco-design and eco-innovation in industry and for education, human centered approaches in design and eco-design.



### Jakob Puchinger

Scientific Advisor, Anthropolis Chair

Jakob Puchinger is professor in Supply Chain Management and Logistics. He joined EM Normandie in 2022. He is also affiliate professor at the Laboratoire Génie Industriel at CentraleSupélec, Université Paris-Saclay and co-director of the Future Cities Lab with Centrale Pékin. Jakob Puchinger holds a doctoral degree from TU Wien obtained in 2006. His thesis investigated the combination of metaheuristics and integer programming for solving cutting and packing problems. His main research interests are in logistics and urban mobility, disruptive technologies and the optimisation of the underlying transport systems. Before joining EM Normandie, Jakob Puchinger was Anthropolis Chair Holder at IRT SystemX and Centrale-Supélec. Jakob Puchinger co-authored more than 80 scientific publications.



### Yann Briand

R&D Manager, Mobility & Logistics Leader at IRT SystemX

Yann Briand is responsible for the mobility and logistics domain at IRT SystemX. Fostering applied digital engineering, Yann takes part in the setting up and coordination of collaborative projects, at national and European level. Yann is involved in mobility challenges for more than 15 years, supporting industrials and academics in their innovation programs. Yann Briand graduated from Ecole des Mines and Sciences Po.



**Mariana Reyes**  
PhD Candidate,  
Anthropolis Chair

Researcher and PhD candidate on “Mobility as a Service: Concepts, governance and business models.” Mariana has a degree in Architecture and a diploma in Urban Planning and Management of Metropolitan Mobility in Mexico. She joined the Chair in November 2020, after completing a MSc in Urban Planning, Transportation and Mobility at the Ecole d’Urbanisme de Paris (UGE-ENPC) with the research topic of “Governance of Mobility as a Service and its effects on public transport systems”.



**Ouidad Benlima**  
PhD Candidate,  
CentraleSupélec

Ouidad Benhlima is a PhD candidate at the LGI and has been an R&D Engineer at Centrale Casablanca since November 2020. Her educational qualifications include an engineering degree from the Mohamedia School of Engineers (EMI) and an MSc in Circular Economy from IMT Nord Europe. Ouidad’s research interests include the analysis of urban mobility and spatial accessibility in an emerging city such as Casablanca in central-western Morocco.



**Julien Baltazar**  
PhD Candidate,  
LGI, CentraleSupélec

Julien Baltazar’s thesis deals with the development of territorial environmental assessment for passenger mobility. He aims to create a diagnosis and simulation tool that would be useful to local authorities for the design of their mobility plans and projects. During a collaborative project within the EcoSD Network, he has worked on electric vehicle performances considering long-distance trips. Julien Baltazar also teaches engineering design, circular economy, and industrial ecology at CentraleSupélec.



**Tarek Chouaki**  
PhD Researcher,  
Anthropolis Chair

Tarek Chouaki obtained a Master’s degree in Artificial Intelligence from Sorbonne Université in 2019. His major fields of interest are Artificial Intelligence and Multi-Agent Systems. His work for the CHair, in the scope of his PhD, focuses on the design and operation of Mobility-on-Demand systems using agent-based simulation framework MATSim and reinforcement learning techniques, with an emphasis on the area of Paris-Saclay and the prospective assessment of the impacts of future public transportation systems.



**Tjark Gall**  
PhD Candidate,  
Anthropolis Chair

Tjark pursues a PhD on developing people-centred scenarios of urban mobility futures to include uncertainties into solution design processes, applied to the areas of Paris-Saclay and New Cairo. He is an urbanist with experience in urban development, climate change, and the effective use and visualisation of urban data to strengthen evidence-based decision- and policy-making. He obtained a MSc Urban Management and Development Studies course at IHS, Erasmus University Rotterdam (NL), and MSc Architecture at the Technical University of Brunswick (GER).

## KEYNOTE SPEAKERS



**Isabelle Baraud-Serfaty**  
 Founder, Ibicity  
 Lecturer, Sciences Po

Isabelle Baraud-Serfaty is head of ibicity, a consulting firm that she founded in 2010 after working for 15 years in various public and private structures (Caisse des Dépôts et Consignations and ING Real Estate). ibicity is specialised in urban economics and articulates a resolutely operational approach. It acts in support of local authorities or developers for the implementation of complex urban projects. Ibicity's research focuses on cities' new economic models and on the coproduction of the urban factory. The consultancy firm is a member of Greater Lyon's Foresight Network since November 2017. In parallel, Isabelle Baraud-Serfaty has taught at the Urban School of Sciences Po Paris since 2004. She graduated from the École Normale Supérieure de Commerce in Paris and the Urban Planning cycle of Sciences Po. Isabelle Baraud-Serfaty is a member of the steering committee of La Fabrique de la Cité.



**Catherine Morency**  
 Professor, Polytechnique  
 Montréal

Catherine Morency is a civil engineer and full professor in the Department of Civil, Geological and Mining Engineering at Polytechnique Montréal. Her area of expertise focuses on transportation engineering. She holds the Mobility Chair (Chaire Mobilité), which deals with the implementation of sustainability in transport, and the Canada Research Chair in Human Mobility (Chaire de recherche du Canada sur la mobilité des personnes), which looks at the interactions between different modes of transport. Moreover, she is co-director of the Centre interdisciplinaire de recherche en opérationnalisation du développement durable (CIRODD) and a member of the Board of Directors of the Société de transport de Montréal (STM). Finally, Catherine Morency is a member of the Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport (CIRREELT), the Institut de valorisation des données (IVADO) and the Laboratoire en intelligence des données.

The Anthropolis Chair, operated by IRT SystemX and CentraleSupélec, brings together the partners EDF, Engie, Groupe Renault, Communauté d'Agglomération Paris-Saclay, and Nokia Bell-Labs to work towards human-centred mobility. To get to know more about ongoing activities, visit the Chair's website.

Website [www.chaire-anthropolis.fr](http://www.chaire-anthropolis.fr)

