

Making transport about people

Smart Mobility



RAMBOLL

Bright ideas.
Sustainable change.

What does smart mobility mean to you?

While smart mobility means different things to different people, it's clear that people and goods need to move more safely, more efficiently, more sustainably, - smarter. The focus is changing from transport and vehicles to mobility and people. New technologies, services, and modes can simplify choices. Public spaces can successfully be redesigned to enrich both liveability and mobility.

SMART (/sma:t/):

adjective 1 People's needs are the priority. 2 Holistic planning approach. 3 Choices are simplified by technology and new services.

Communities around the world are increasingly experimenting with an ever-growing list of new information-based services that have no precedents in local laws. Transport services typically operated by the public sector are being challenged by new, privately-owned providers of mobility services. Public and private operators are working closer together, and integrating their operations more than ever before.

The pace at which new mobility concepts are coming to market is faster than the speed governments are designed to operate. Moreover, technology is impacting the way we - and our freight - get around faster than the life expectancy of infrastructure assets, resulting in significantly higher risks to public investment decision-making. Transparency is also increasing. The importance of data is better understood. Facts and figures are essential to open, public discourse. Taxpayers are demanding higher quality services at lower costs.

At Ramboll, we welcome these challenges as part of a more inclusive society, and embrace every new opportunity to engage communities as collaborators. We strive to inspire, challenge, and support our clients to achieve their mobility visions and goals. Our foundation is holistic planning, including the fundamental modes of walking, cycling, public transport, and cars, as well as new services and modes such as Mobility-as-a-Service (MaaS), e-mobility, autonomous vehicles, strategic parking, and digital solutions.

MOBILITY (/məʊ'bi:ləti/)

noun 1 Sustainable movement of people and goods. 2 Seamless transfer between convenient modes. 3 Strong sense of safety and security.

Our approach is inclusive, progressive, and dialogue-based, working side-by-side with stakeholders in communities around the world for a better future. We customize global expertise to the specific, local needs of our partners at all levels of government, public agencies, private development, design teams, established technology firms, and start-up outfits.

What we do

- Holistic Mobility Planning
- Pedestrian Prioritization
- Cycling Policy & Planning
- Public Transport
- Modelling & Simulations
- Transport Economics
- Sustainable Urban Mobility Planning (SUMP)
- Traffic Safety Audits and Planning
- Transport Strategies and Policies
- Digital Solutions
- Intelligent Transportation Systems (ITS)
- E-mobility
- Mobility-as-a-Service (MaaS)
- Autonomous Vehicles

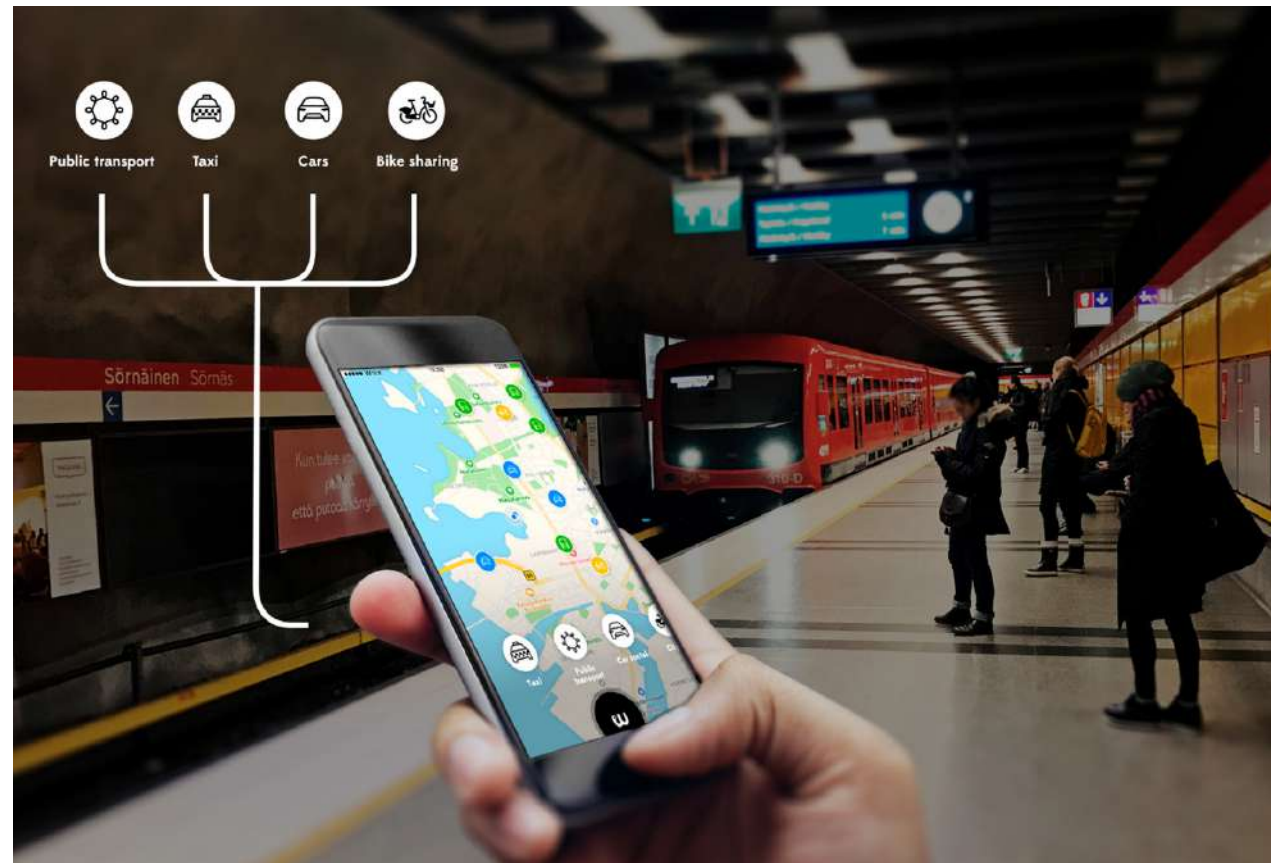
Opposite: Copenhagen's "bicycle snake" elevated pathway prioritizes bicycle traffic through the busy city centre.



We make mobility about people

Your trusted advisor

Ramboll is your trusted advisor for realizing Smart Mobility in your communities and projects; we have deeper, more compelling experience from the most acclaimed cities than any other company in the industry.



Mobility as-a-service (MAAS)

Enter your destination and your phone returns a multi-modal mix of route options ranked by criteria such as speed, comfort, price, carbon footprint, special needs, etc. Whatever you choose, all fares are handled at once. That's the essence of MaaS.

MaaS is young, but its impacts are a major concern for our clients. A recent study by the International Transport Forum warns that unmanaged growth in new mobility services could more than double congestion levels. These forecasts are supported by recent empirical findings in California and New York City. How can we maintain the priority of walking and bicycling in a future of many new modal options? Will for-hire vehicles improve or

exacerbate congestion? Is combined mobility a threat or an opportunity for public transport? We have the tools and expertise to evaluate and deliver objective answers to these and many other concerns Ramboll has been part of the development of MaaS from its very origins in Helsinki, Finland, where we provided strategic industry input to the original business plan. We perform feasibility assessments on MaaS readiness and advise private operators, cities, and transport agencies about implementation strategies for the major changes coming to cities due to the widespread uptake of MaaS services. We can model traffic as well as the economic impacts of new MaaS services, and harness big data to produce the critical assessments needed by decision makers.

“Ramboll has been a contributor of expert knowledge from the get-go and continues to be a valuable partner in the MaaS ecosystem”

Sampo Hietanen
CEO and Founder, MaaS Global



Autonomous vehicles

Self-driving capabilities are building momentum in the automotive world; real-world testing is becoming commonplace in many countries. Manufacturers are promising that elimination of the most unpredictable part of driving - human error - can lead to orders of magnitude reductions in roadway fatalities. Officials understandably want to embrace such innovative technologies, but are justified in their concerns about so many unknowns

and the fast pace of adoption. In terms of physical planning, the impacts of self-driving vehicles dramatically changes the way we think about curbside and sidewalk configurations, building entrances, and perhaps most important, parking facilities. Ramboll is not only advising national governments on the fundamental policy guidelines for anticipating and adapting to the use of autonomous vehicles on roadways, we're also working in specific locales to support

pilot testing and implementations to better understand the roles, risks, and benefits of autonomous vehicles in the future of mobility. One example is the municipality of Aalborg, Denmark, where we are assessing the impacts of an automated bus on a shared-use pathway. In Finland, we supported the pilot demonstration of a 10-passenger autonomous vehicle to provide shuttle service between a temporary fairgrounds and nearby public transport.

Intelligent transportation systems (ITS)

An entire generation of ITS infrastructure is reaching its life expectancy; updates require integration with new technology without risking the reliability of important roadway and track information. From centralized national public announcement systems to extreme-weather tested park-and-ride information and wayfinding networks, Ramboll has extensive experience planning and designing the systems and guidelines for complex ITS infrastructure. As this infrastructure evolves to support new technologies, we continue to innovate and work with communities to assess potentials and risks, such as our in-motion charging trolley bus impact assessment in Lyon, France.



Holistic mobility planning

The smartest cities in the world are those that respect the synergies and conflicts across all functional layers of a discrete urban area. From our legacy of planning in the Nordic capitals, we understand that holistic planning is always rooted in local context, every individual project is part of a bigger picture, and that any plan must always consider the community's larger vision as well as the long-term needs of society. This explains our holistic community development consultancy approach. When we joined the dynamic team tasked with planning a new satellite city for Mongolia's overcrowded capital of Ulaanbaatar, we not only intro-

duced a multi-layered transport plan that was flexible and forward-thinking, we also introduced "nodes" with other disciplines to strengthen the holistic characteristics of the plan. Our participation extended beyond the silo of mobility to the integration of energy, water, food, and economic development solutions so that the overarching masterplan was a carefully interwoven and indeed, holistic strategy.



Pedestrian prioritization

In rural communities and urban city centres, the importance of protecting people in mixed-traffic environments is paramount. Safety and comfort of pedestrian infrastructure are key factors in nurturing the growth of walkable communities that are most attractive to existing and potential residents. Cities are increasingly acting on the knowledge that trips made on foot not only reduce infrastructure investment burdens to taxpayers, they also promote healthier communities. Moreover, streets that cater to pedestrians enjoy significantly higher volumes of customers at local shops and, consequently, quantifiable contributions to economic development. This deep knowledge finds its place

in all our projects at every scale, from streetscape designs to multi-modal transport models such as the work we recently prepared in Zagreb, Croatia.

Our traffic safety expertise is arguably the best in the world, with roots in the original Vision Zero policies in Sweden and its development over decades in neighbouring countries. We've produced innovative digital tools to improve pedestrian safety, such as the ViaSmart roadway safety assessment platform used by over 150 municipalities in Finland. Our planners work every day with multi-modal streetscapes and understand the importance of strong pedestrian networks throughout communities.



Public transport

We have been planning and designing world-class public transport networks for decades. Our traditional expertise runs the gamut of systems, including long distance heavy rail, intercity rail, light rail, tram, metro, bus, ferry, and their respective depots. We also develop wayfinding, accessibility, intermodal, and strategy plans for these systems.

In recent years, our expertise has expanded to evaluations and assessments of the many new paratransit concepts coming to market. An excellent example of our wide-ranging knowledge includes our work with an expert team on the implementation strategy for Bus Rapid Transit (BRT) in Manila, Philippines.



E-mobility

Electric cars, buses, trucks, bicycles, scooters; streets and sidewalks are becoming host to new fleets of vehicles that come with many benefits to noise, air quality, accessibility, equity, etc. How can communities leverage these benefits while minimizing the negative aspects of electrification? Moreover, what are the appropriate steps needed to be prepared for increased electricity charge point and supply demands?

Come visit our offices in Oslo, Norway - where over half of new car

sales are electric or hybrid - and you might think you're on a road trip into a future where many of the uptake challenges have already been overcome. Our charging station planning knowledge in that city and elsewhere are second-to-none. We're also behind the most advanced studies about the relationships between electric bicycles and placement of public transport nodes as well as the larger impacts to land use; the findings might surprise you.

We're not just talking the talk about electric vehicles, we're working every

day on the systems needed to allow communities to benefit from their advantages. From mapping long-term charging station needs for a metropolitan region to modeling the impacts of electric bicycles on a city's accessibility, to designing the routes, parking spaces, and infrastructure required for charging electric buses at terminals and en-route, Ramboll is involved in the development of e-mobility networks at all levels in countries around the world.

Transport economics

Evaluations of costs and benefits across a range of criteria are increasingly pivotal inputs to the decision-making process for infrastructure investments. Organizations at all levels are expected to do more with less, and employ leaner methodologies towards ultimate goals. Tight budgets translate to a need for quick but reliable assessments, clear communications of findings, and very clever phasing strategies.

Ramboll has provided a wide range of transport economics analyses in countries around the world. We handle assessments at the national, regional, and municipal level, as well as critical input to private development. Our work always includes awareness of the sensitive balance between implementation costs and return-on-investment, even with the world's most game-changing concepts.

Take Hyperloop for example. Ramboll was asked to provide decision makers at multiple levels of government with a technical assessment of

the necessary facility components and impacts to consider for implementation of Hyperloop in Finland. Our Proof of Feasibility Technical Report considers potential corridors, alignments, and impacts of this completely new, high-speed vacuum tube transport system implementation across Finland from Helsinki to Turku and continuing on to Stockholm, Sweden.

In another study, where we assessed the regulatory barriers to automated shipping, our team provided clear and stepwise advice for legislative actions across multiple governments. Our expertise allows for assessments of the world's most demanding subjects.



Modelling & simulations

Smart mobility is linked with innovation, but new ideas mean high risks. Fortunately, many excellent tools exist to help predict as well as visualize the anticipated outcomes of innovative solutions. Whether you want to know how best to organize customers' travel paths in a shopping center, traffic lanes at a busy intersection, loading operations at a logistics facility, or the signaling of an entire railway network, we have the tools and the experience to produce reliable forecasts.

Our experts use microsimulation tools to study and help visualize movements at individual intersections, pedestrian flows for optimized shopping centres or evacuation routes for large event facilities such as arenas. For better

understanding of larger network phenomena - such as the impacts of electric bicycles to land use patterns in Norway or the assessment of requisite improvements to full national maritime, rail, and roadway logistics networks in Finland - we have expertise using a broad range of tools to guide good policy and boost investment confidence.

For example, in Hyderabad, India, we developed a roadway network and public transport model in Cube to forecast metro ridership for multiple horizon years and performed a sensitivity analysis with respect to fares and headways.

Bicycle infrastructure

Where does bicycling fit in to the future of our cities? Should buildings expand bicycle parking and storage for residents and employees, or is it better to focus energy on shared-use schemes, and should bike-share be fixed station or free-floating? How can we design streets to safely balance bicycling and walking demands?

The incredible bicycle - and its electric-assisted cousin - can do so much to reduce congestion, improve well-being, and strengthen local economies in our cities, and we have first-hand experience to make the strongest case. Indeed, our hometown of Copenhagen, Denmark - where on-street parking has been systematically converted to higher and better uses over the course of several decades - is considered by many to be the world's premiere example of successful bicycle planning and infrastructure implementation.

Ramboll has been working alongside the City for decades to achieve these resounding successes, and we're ready to help you enjoy similar outcomes.



Strategic parking

It's no coincidence that the most sustainable cities in the world are also those that share the best parking management practices. Parking is indeed a powerful tool for realizing sustainable communities, and it is an aspect of development where cities and constructors can easily agree. Strategically reducing parking demand improves quality of life as well as the economics of projects. Ramboll's parking experts are an excellent choice when tackling the challenging tasks of establishing and implementing sustainable, fair parking policy. Our advisory and planning capabilities have led to excellent parking efficiencies in developments on many continents, such as the Al J City masterplan in Jeddah, Saudi Arabia, where capitalizing on the unique earthwork contours allowed the team to hide parking volumes and minimize the amount of valuable land dedicat-

ed to this expensive infrastructure. Pushing for improved connectivity to maximize the benefits of adjacent public transport, and leveraging shared parking potential based on the proposed mix of land uses are other methods used to strike the perfect balance for current and future parking needs.

Our team also has world-class experience with the full design process and implementation of state-of-the-art, dynamic parking wayfinding solutions. We're leading the charge on the development of what we call "Generation 2 Parking", by integrating parking information with open data and nascent MaaS networks.

Global Mobility

Internationally recognised,
world-leading consultancy.

200+ specialists working
with Smart Mobility.

Key Projects

01
Helsinki, Finland
Mobility-as-a-Service (MaaS)
Business Plan Advisory

02
Aalborg, Denmark
Autonomous Vehicle Use on
Pathway Assessment

03
Lyon, France
In-motion Trolley Bus Charging
Assessment

04
Ulaanbaatar, Mongolia
Holistic Mobility Masterplan

05
Oslo, Norway
E-bus Charging Operations
Assessment

06
Zagreb, Croatia
Transport Masterplan

07
Salo, Finland
Hyperloop Pre-Feasibility
Assessment

08
Jeddah, Saudi Arabia
Parking Masterplanning

09
Hyderabad, India
Metro Ridership Forecast Analysis

10
Manila, Philippines
Bus Rapid Transit (BRT)
Implementation Strategy

11
Copenhagen, Denmark
Best-in-Class Bicycle Facilities
Planning

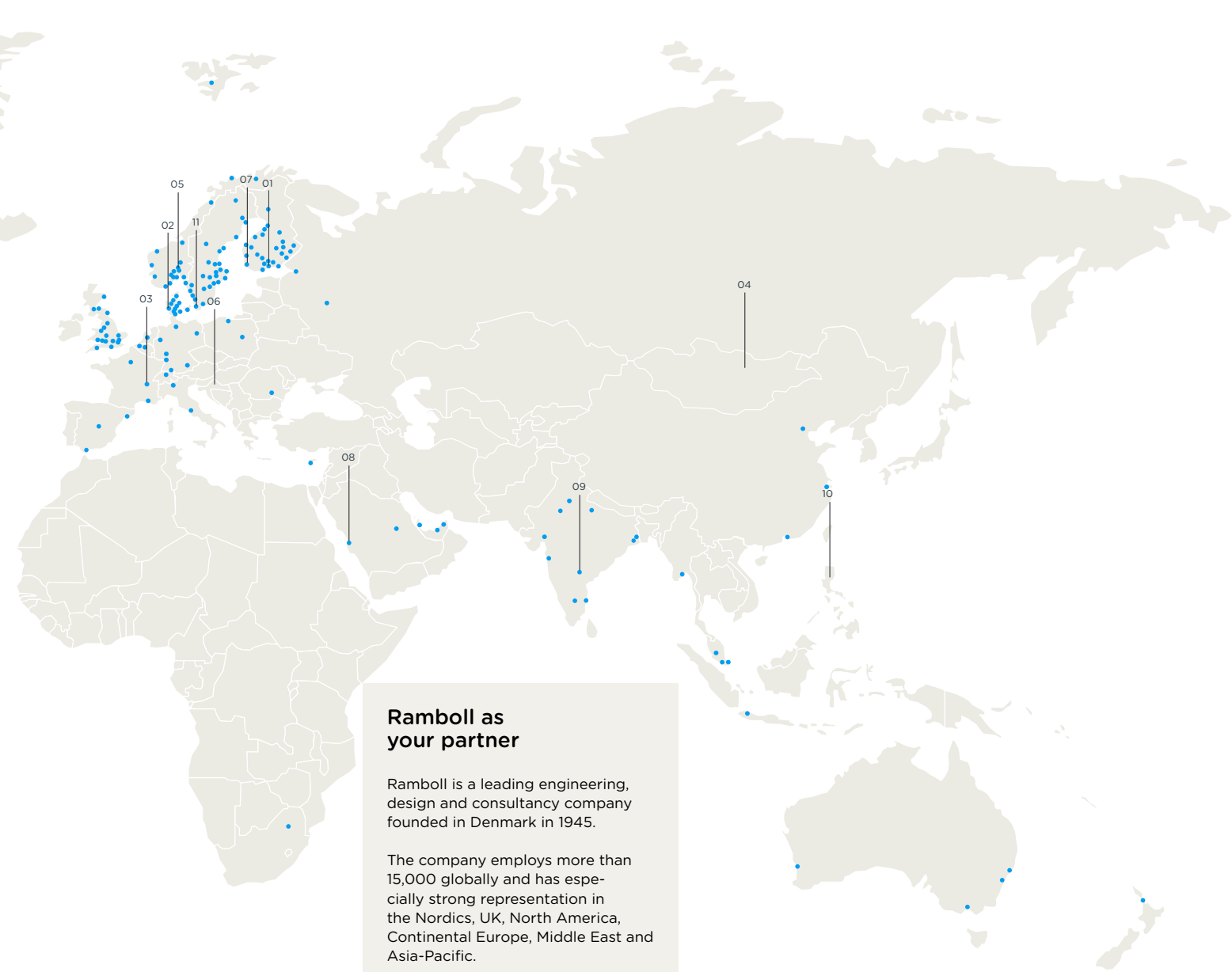
Ramboll as your partner

Ramboll is a leading engineering,
design and consultancy company
founded in Denmark in 1945.

The company employs more than
15,000 globally and has espe-
cially strong representation in
the Nordics, UK, North America,
Continental Europe, Middle East and
Asia-Pacific.

With more than 300 offices in 35
countries, Ramboll combines local
experience with a global knowl-
edgebase constantly striving to
achieve inspiring and exacting solu-
tions that make a genuine difference
to our clients, the end-users, and so-
ciety at large. Ramboll works across
the markets: Buildings, Transport,
Planning & Urban Design, Water,
Environment & Health, Energy and
Management Consulting.

www.ramboll.com



Contact

Jukka-Pekka Pitkänen

Global Division Director
jukkis@ramboll.com
+358 40 738 4190

Markku Kivari

Regional Director, Finland
markku.kivari@ramboll.fi
+358 40 527 1277

Erik Hedman

Global Division Unit Manager,
Sweden
erik.hedman@ramboll.se
+46 10 615 54 83

Thomas Dyhr Martinus

Global Division Unit Manager,
Denmark
tdma@ramboll.dk
+45 5161 2689

Sindre Levinsen

Global Division Unit Manager,
Norway
sindre.levinsen@ramboll.no
+47 950 84596

Nick Fellows

Director, Transport, South-East
Asia
nick.fellows@ramboll.com
+65 9680 4107

Srinivas Chekuri

Global Division Unit Manager,
India
srch@ramboll.com
+91 80081 45111

Ray Krishna

Global Division Unit Manager,
Singapore
ray.k@ramboll.com
+65 9856 0851

Alan Pauling

Senior Market Director, Transport,
UK
alan.pauling@ramboll.com
+44 794 648 6001

Hinrich Brümmer

Business Development Manager,
Germany
hinrich.bruemmer@ramboll.com
+49 1525 3218 360

Paavo Moilanen

Global Manager, Digital Mobility
Lab
paavo.moilanen@ramboll.fi
+358 40 527 3277

www.ramboll.com/smart-mobility