

ITS WORLD
CONGRESS

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Beyond mobility: building a safe, connected and human-centred system

Opening

Good morning. It is truly an honour to be here.

My name is Tjark Tjin, and I am the CEO of TNO, Our mission is to bring science to market, create leading deeptech companies, and strengthen economic competitiveness.

Why is mobility such an important topic today?

I'd say it's because several powerful forces are converging, creating both urgent problems and extraordinary opportunities.

How we respond will shape our societies, economies, as well as the climate for decades to come.

Urbanisation continues, bringing congestion and air pollution.

Populations are ageing, which poses specific challenges to the mobility system.

Transport accounts for roughly a quarter of energy-related greenhouse-gas emissions.

At the same time vehicles and infrastructure are often poorly utilised, wasting valuable resources.

And tragically every year, more than a million people die on the roads - almost twenty thousand in the European Union alone.

For Europe and economies around the world, mobility is also about competitiveness, and therefore ultimately about strategic autonomy.

These challenges are pressing and demand solutions.

Fortunately, technologies like artificial intelligence and advanced connectivity are creating remarkable opportunities.

Imagine mobility that is accessible, convenient, comfortable and safe, yet also completely clean and dramatically more efficient.

That is the future this ITS community is working towards.

But turning that vision into reality requires far more than technological breakthroughs.

It requires a fundamental systems transformation.

Let me explain why.

The future is not simply about better vehicles.

It is about integrating automated vehicles, public transport, logistics and even three-dimensional mobility into one seamless system that achieves the goals I just mentioned.

But at least seven major challenges remain.

Seven major challenges

1. Safety

First is safety.

AI-driven vehicles already perform impressively on defined routes.

But operating in the physical world is unpredictable.

An chatbot's mistake can produce a wrong sentence. A vehicle's mistake can cost lives.

Physical AI must correctly handle unpredictable traffic, bad weather, sensor failures and rare events, in real time. And correctly!

Proving acceptable safety across a range of real-world scenarios remains extraordinarily difficult.

Training AI to for routine situations is relatively straightforward. But the huge spectrum of unusual edge cases remains challenging.

That is why automated operations mostly remain confined to specific domains, and why further R&D is necessary.

2. Regulation

Second, regulation.

Our regulatory frameworks were designed for another era.

Standards differ across countries and regions, while liability becomes complex when vehicles, software providers, operators, and infrastructure interact.

This uncertainty discourages investment and deployment.

3. Economics

Third, economics.

Business models for automated taxis, shuttles, public transport and freight are still developing.

Operations remain expensive.

Economics improve when automation complements public transport, supports better urban planning, and addresses labour shortages.

That is why early deployment, for now, makes sense in controlled environments, like freight corridors, business parks, and fixed routes.

4. Infrastructure

Fourth is infrastructure.

Today's infrastructure was designed for yesterday's transport.

If we are to achieve our goals, it must be technologically upgraded, or replaced. Including secondary and rural roads, which account for half of EU road fatalities.

The reality is, however, that the required large investments are probably not feasible in the short term for many countries, including my own.

5. Data

Fifth, data.

Data remains fragmented and often sits in silos, standards are inconsistent, and interoperability remains limited.

Privacy and Intellectual Property concerns restrict sharing, while connectivity increases cybersecurity risks.

Traffic-incident data would be especially valuable for training AI on critical edge cases.

Unfortunately, this data is usually unavailable.

6. Integration

Sixth, is integration.

Coordinating public transport, autonomous vehicles, logistics, and aerial mobility requires unprecedented real-time interoperability. This remains a huge challenge.

We are not there yet, although digital advances are bringing it closer.

7. People

And seventh, people.

In the Netherlands, professional drivers represent roughly 2 percent of the workforce. Automation will affect many of them.

Meanwhile, Europe faces shortages of hundreds of thousands of truck drivers.

Automation can help, provided we invest in people and responsibly manage the social transition.

One interconnected systems transition

Taken together, these challenges reveal one fundamental truth.

These are not seven independent problems.

They form one interconnected systems transition, encompassing autonomous vehicles, infrastructure, legislation, urban planning, and data.

And systems transformations are difficult. They take time, investment and continued effort.

Fortunately, the convergence of advanced technologies makes this transformation increasingly feasible.

AI will be central., both in executing mobility functions and in orchestrating the wider ecosystem.

But AI alone is insufficient.

We also need advances in sensors, semiconductors, edge computing and high-performance networks, to name just a few.

Connectivity is fundamental

Connectivity is fundamental.

Autonomous vehicles rely on onboard sensors and intelligence.

Networks do not replace that intelligence. They extend it.

This distinction matters.

Better and more intelligent vehicles alone will not deliver our vision.

Beyond mobility means shifting our focus from individual vehicles to the interconnected ecosystem.

For example, vehicles and roadside infrastructure can exchange warnings about accidents, roadworks or slippery surfaces before onboard sensors detect them.

Cooperative perception allows nearby vehicles to exchange sensor data in real time, improving situational awareness and preventing accidents.

Roadside sensors can enhance this further, particularly in dense urban environments and dangerous crossings.

Cellular networks connect vehicles to traffic managers and control centres, enabling coordination and assistance in exceptional situations.

These applications require everything from reliable coverage, to robustness, to ultra-low latency.

That is why sovereign, secure and interoperable connectivity, through 5G today and 6G tomorrow, will become as fundamental to mobility as roads and railways.

Trust, safety and resilience

Ultimately, none of this will succeed without public trust.

Systems must demonstrably improve safety

and be understandable, verifiable, and governable.

AI must recognise its limitations and fail safely when conditions exceed their capabilities.

The other parts of the technology stack, including sensors, semiconductors, and networks, must be equally robust and resilient.

However, trust extends to privacy considerations and cybersecurity as well. And here there are challenges as well.

Connectivity can expose personal information.

And giving more control to automated systems that are connected through cellular networks creates cybersecurity risks with potentially lethal consequences.

As threats increasingly operate at machine speed, safety and resilience must be designed directly into the systems, in every layer of the stack.

People are the objective

But technology is not the ultimate objective.

People are.

Some see cars simply as transport from A to B.

If everyone did, nobody would buy a Ferrari.

For many, cars represents freedom, identity, status and passion.

Vehicle utilisation, or system efficiency, are not their priority.

Others dislike shared transport, however efficient or climate-neutral.

The pandemic showed how rapidly preferences can change. Public transport ridership in some major cities fell by 70 to 90 percent during and after the pandemic.

We cannot ignore these realities.

Real people have different needs, preferences and aspirations. Our systems must accommodate that diversity, not deny it.

So let us be ambitious about the opportunities technology creates, but also realistic about human preferences and behaviour.

We are building the system for humans, not the other way around.

That is what moving beyond mobility truly means.

Thank you.