Jörg Tischler | November 2019

Digital traffic infrastructure for automated mobility: Regulatory requirements for incremental value-added development

T · · Systems · Let's power higher performance

Süddeutsche Zeitung
SZ.de Zeitung Magazin

Tests für die Autos der Zukunft laufen an

Testfeld zwischen Deutschland, Frankreich und Lu
Ab 2019 wird autonomes Fahren grenzüberschr
getestet

Bis Ende 2019 soll ein digitales Testfeld fürs autonome Fahren zwischen Deutschland und Luxemburg entstehen. Es geht auch darum, künftig "verkehrstechnisch eine Sprache zu sprechen".

ntv RESSORTS SPORT TELEBÖRSE WETTER TV VIDEO

Dämpfer für die

Mobilität

E-Golfs fahren autonom im Hamburg

cken für Roboterautos

gente Straße des 17. Jun

natisierte Fahren soll in seiner ganzen K
verden. Dafür sammeln Cisco-Router am

TRANSPORTATION

The Way for Public Auton

gineering hop on a fully au
bility Congress in

Beijing sets about construction of 100 km² self-driving pilot zone

Tues

Peachtree Corners officially opens self-driving

Autonomes Fahren

Verkehrsminister auf Visite auf dem Testfeld

Rund ein Fünftel der CO2-Emissionen in Deutschland stammen aus dem Verkehrssektor. Das soll sich ändern, unter anderem mithilfe des automatisierten Fahrens. Wie weit das inzwischen entwickelt ist, hat sich Bundesverkehrsminister Andreas Scheuer heute in Hamburg zeigen lassen.

Von Axel Schröder

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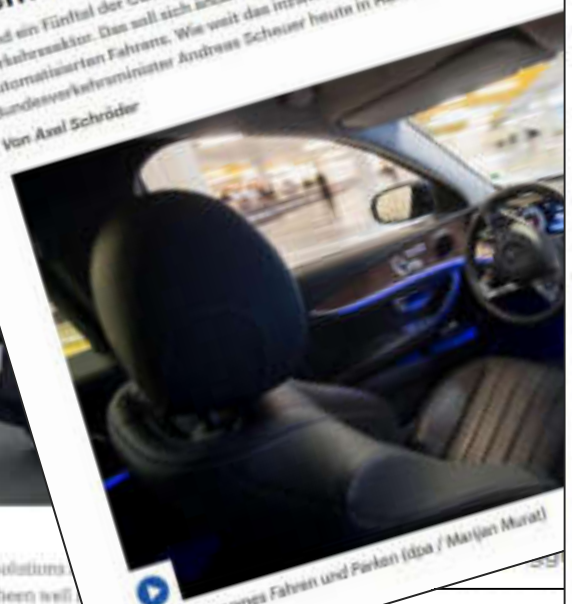


Autonomes Fahren und Parken (dpa / Marijan Murat)

New

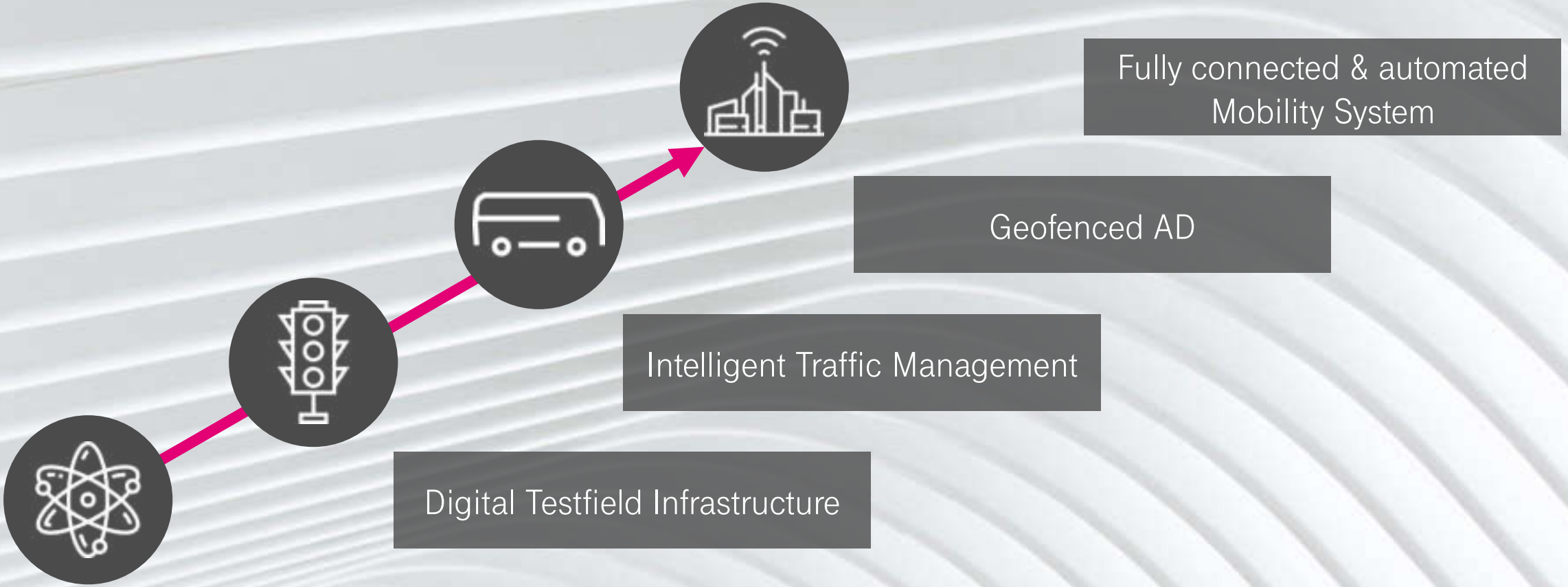
Atlanta Journal-Constitution

Photo: Amanda Clay/ajc.com

O2 plans 5G rollout for CAVs in London's Smart Mobility Living Lab

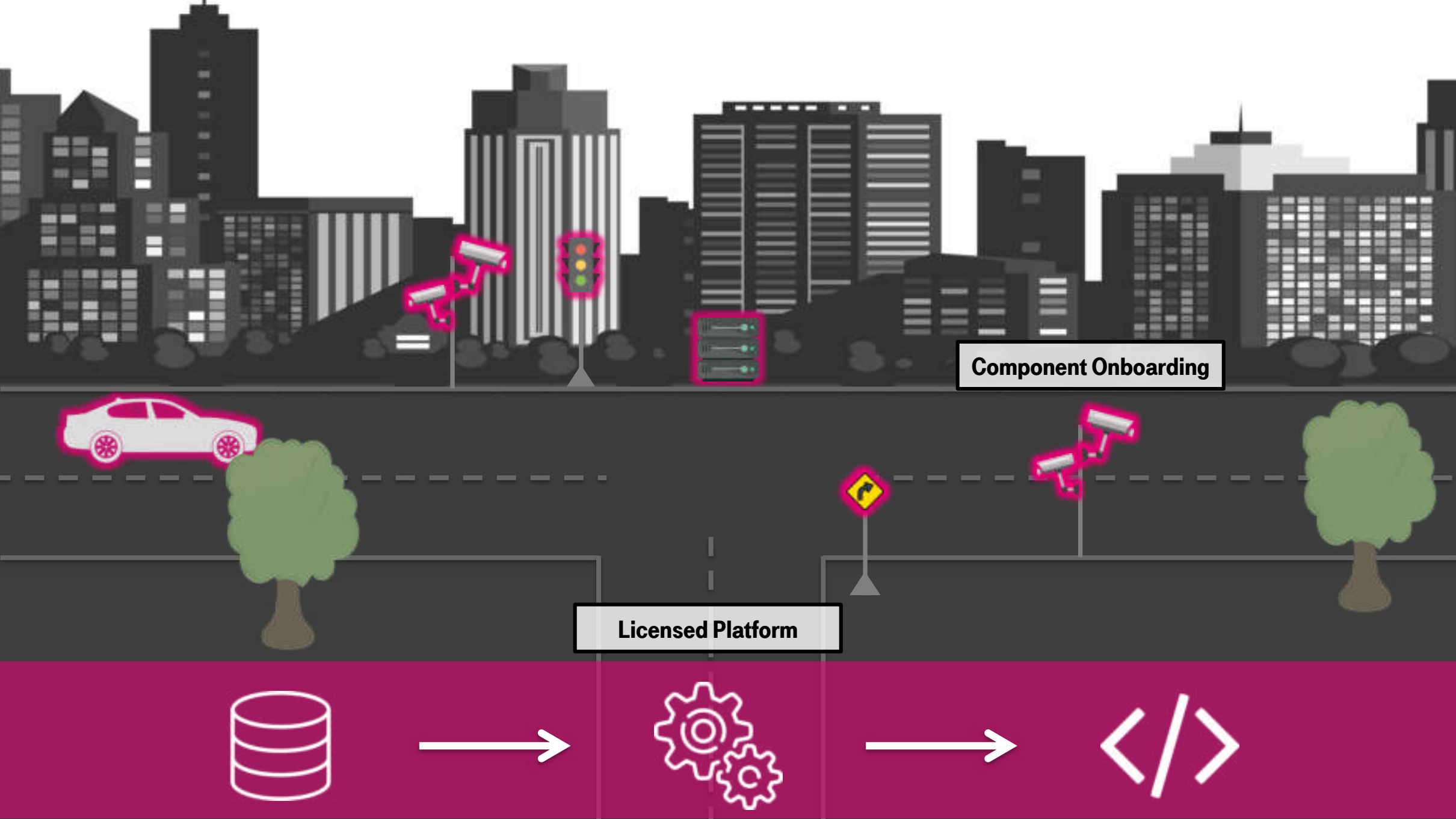
The high capacity of 5G will allow vehicles to transmit large amounts of data, including 4K video, to intelligent cloud-based transport systems, which are expected to improve road safety and help traffic authorities to monitor and manage traffic flow.

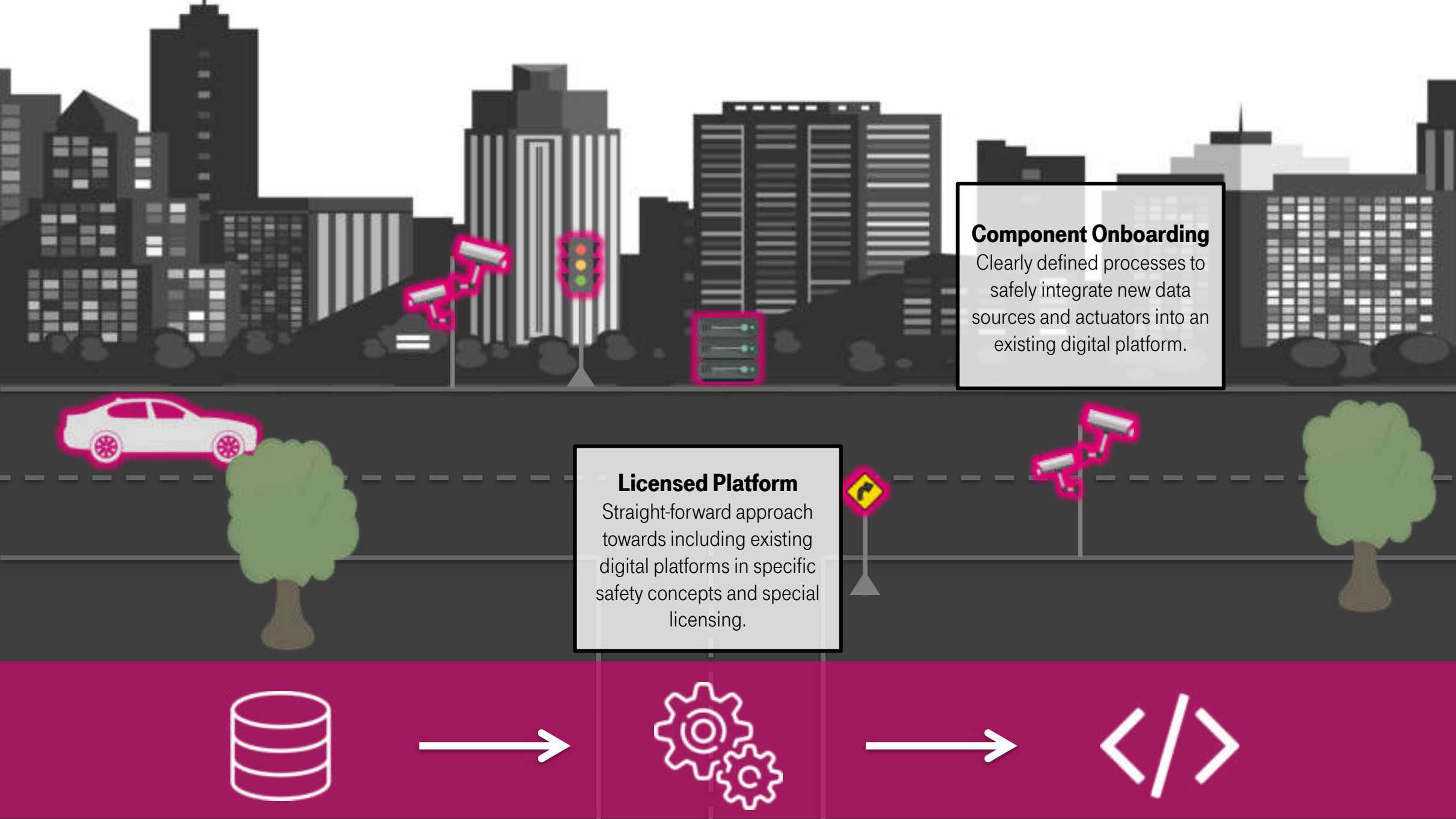
Focussing on economic added value suggests an incremental approach towards the development of automated mobility.



DIGITAL TESTFIELD INFRASTRUCTURE

Finding and productizing the common denominator of testbeds for connected and automated mobility in order to enable easy reuse.


Component Onboarding
Licensed Platform

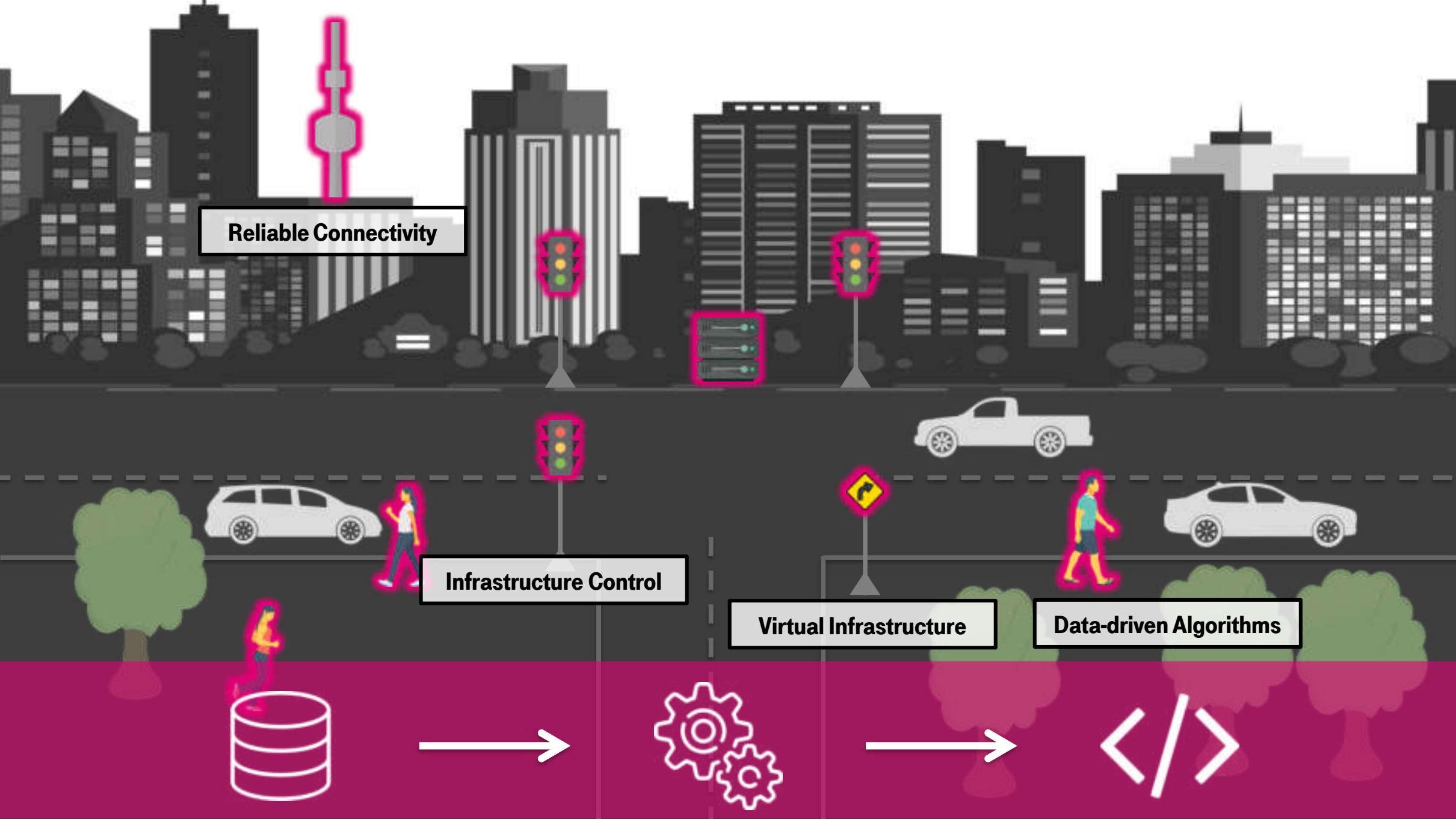

Component Onboarding
Clearly defined processes to safely integrate new data sources and actuators into an existing digital platform.
Licensed Platform
Straight-forward approach towards including existing digital platforms in specific safety concepts and special licensing.

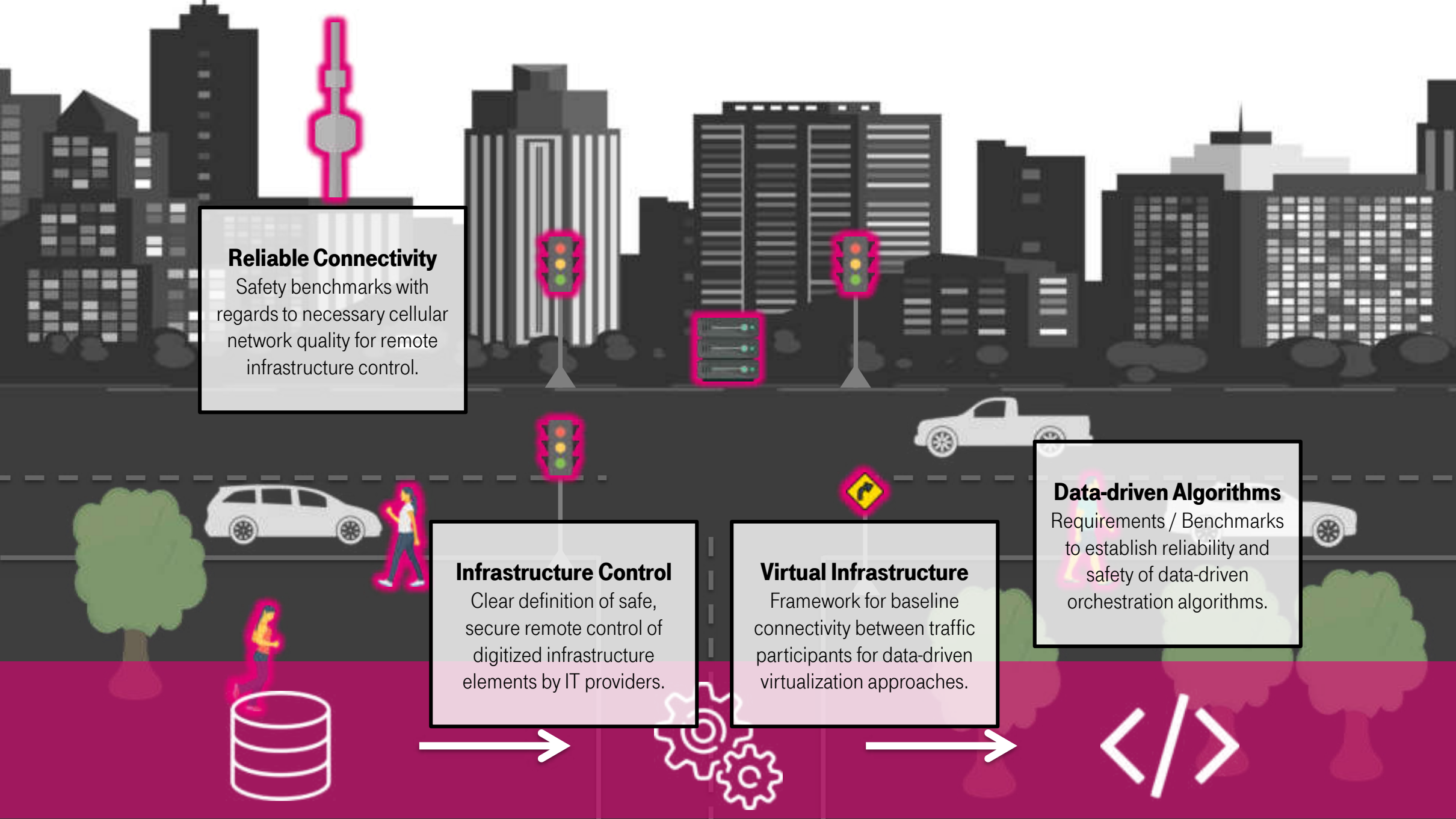
KEY CHALLENGE

Enabling digital testfields to create a mesh of cutting edge research and mature digital service platforms at the minimum of licensing and regulatory effort.

INTELLIGENT TRAFFIC MANAGEMENT

Orchestrating digital traffic infrastructure elements based on movement patterns and trajectories to enable optimized traffic flow.


Reliable Connectivity
Infrastructure Control
Virtual Infrastructure
Data-driven Algorithms

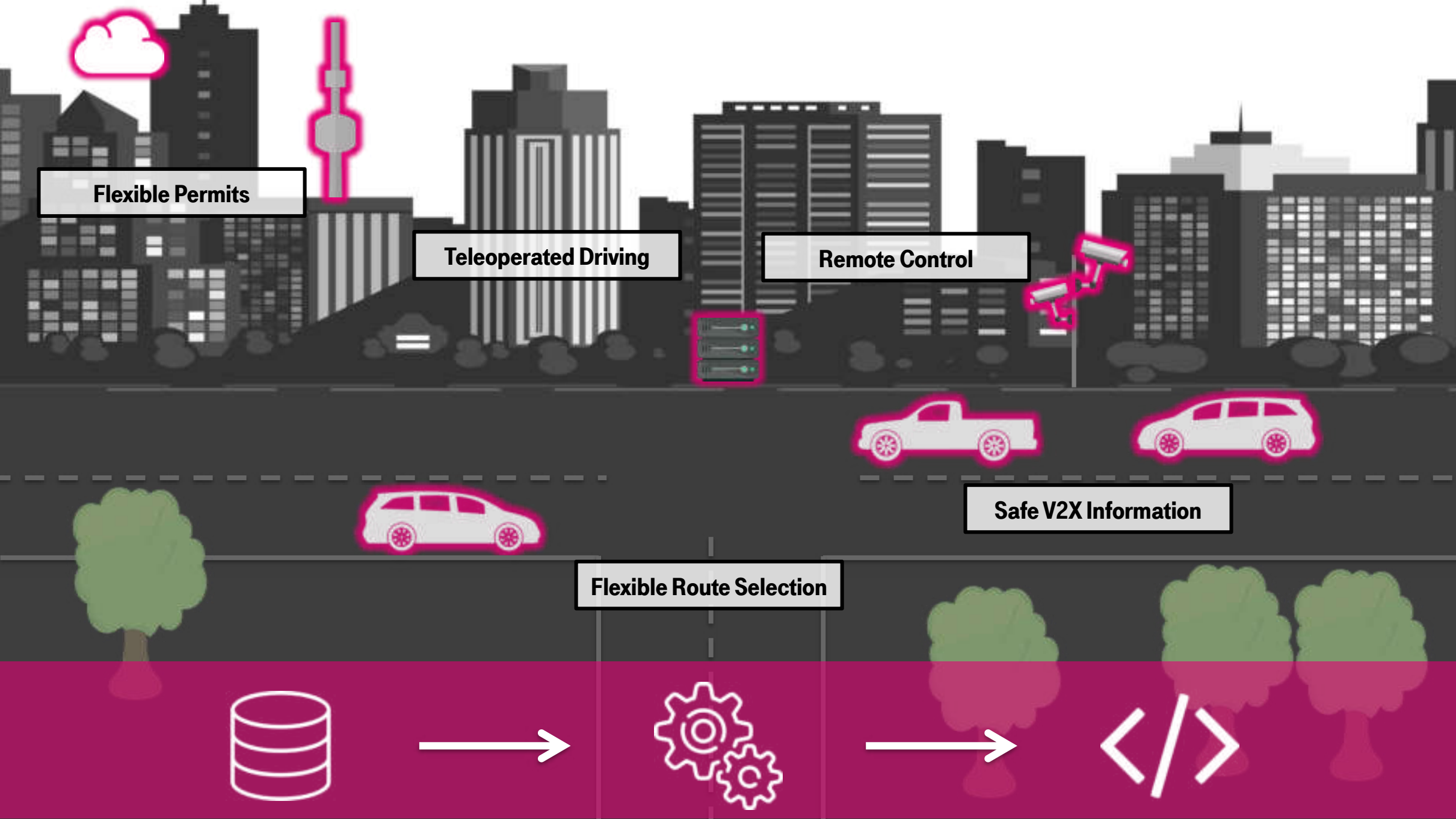

Reliable Connectivity
Safety benchmarks with regards to necessary cellular network quality for remote infrastructure control.
Infrastructure Control
Clear definition of safe, secure remote control of digitized infrastructure elements by IT providers.
Virtual Infrastructure
Framework for baseline connectivity between traffic participants for data-driven virtualization approaches.
Data-driven Algorithms
Requirements / Benchmarks to establish reliability and safety of data-driven orchestration algorithms.

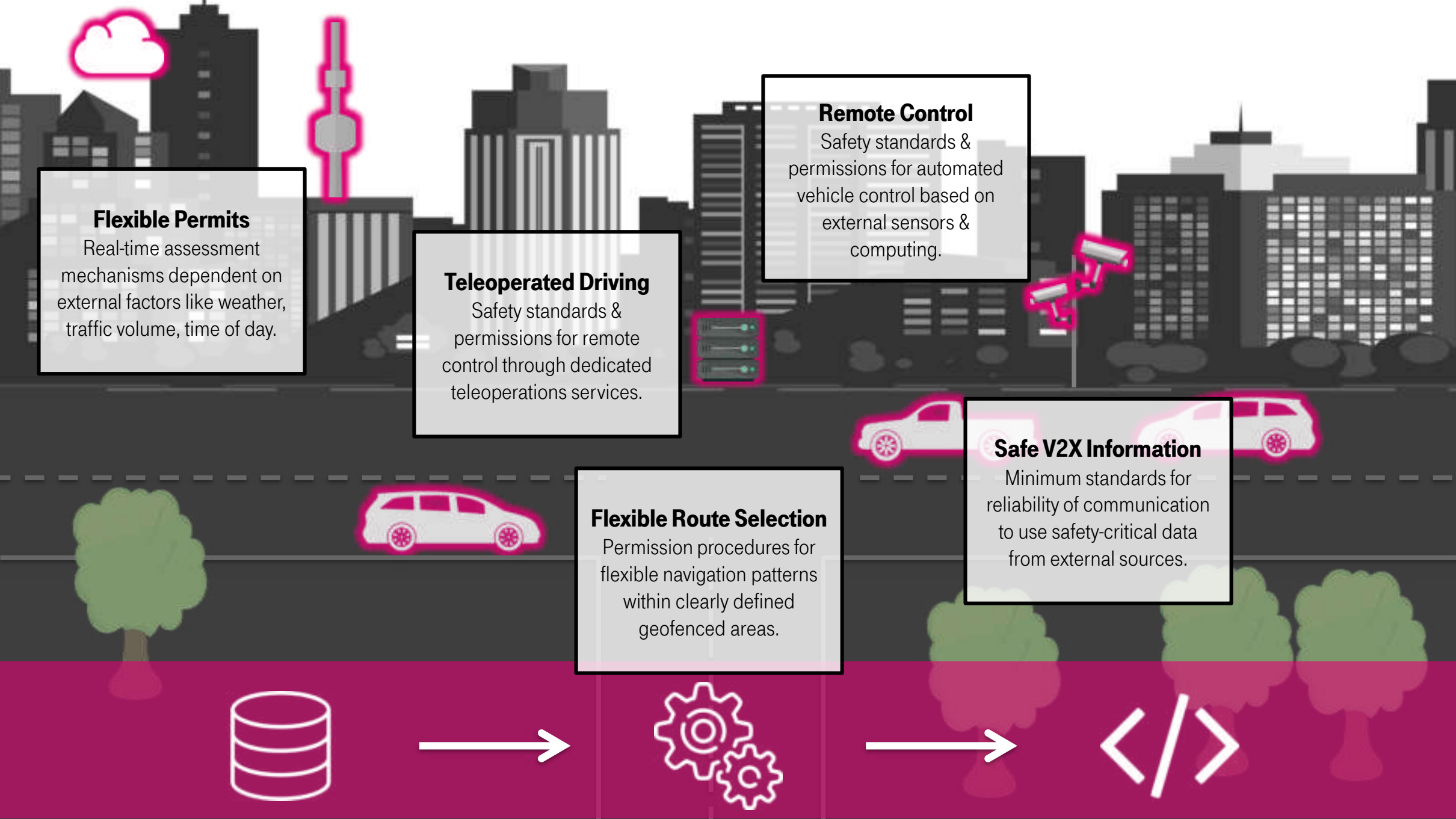
KEY CHALLENGE

Establishing a common standard for the necessary safety and reliability of digital traffic infrastructure elements.

GEOFENCED AUTOMATED DRIVING

Enabling Level 4 automated driving systems in a well-defined local area through connected support systems and fallback options.


Flexible Permits
Teleoperated Driving
Remote Control
Safe V2X Information
Flexible Route Selection

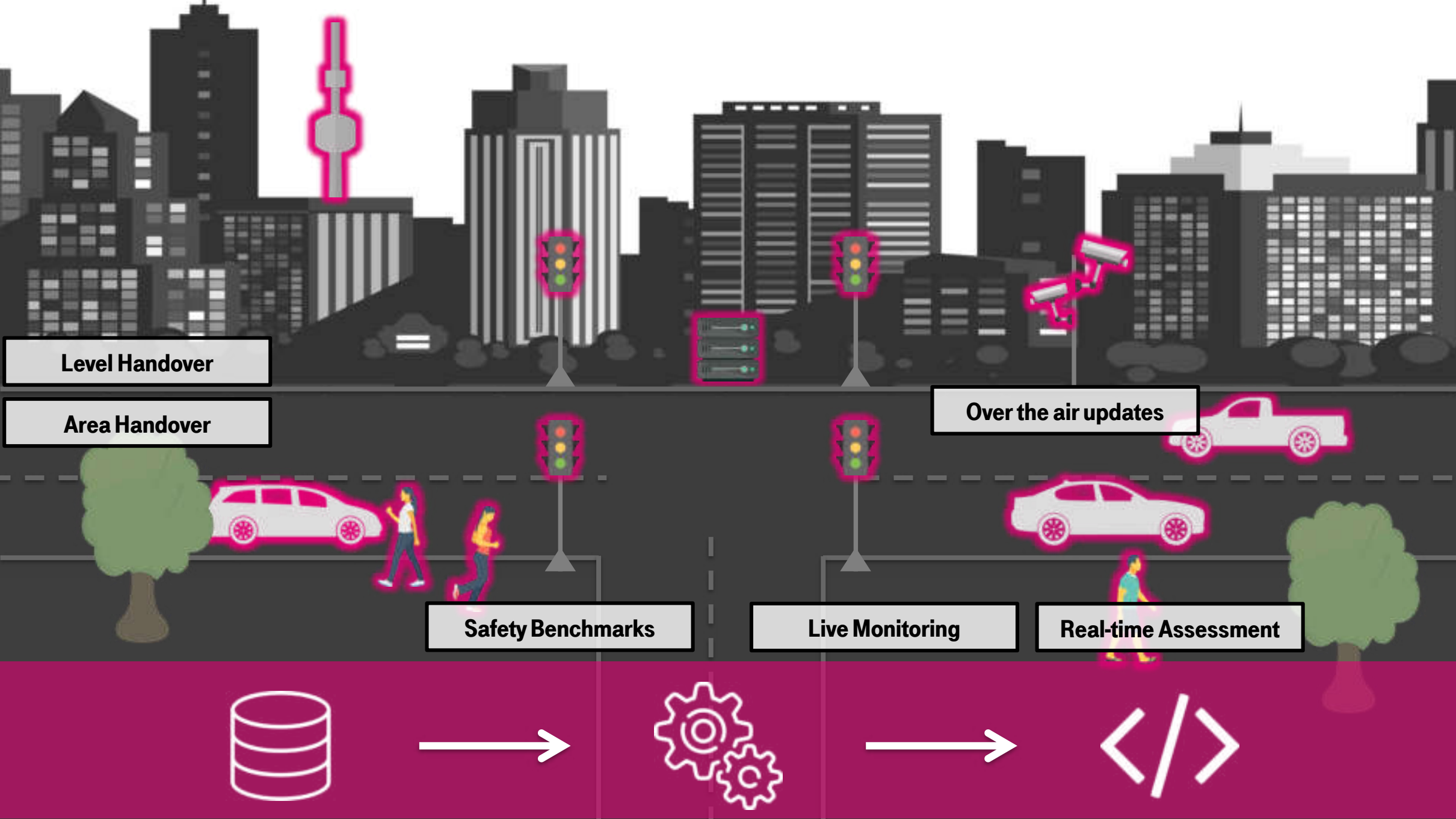

Flexible Permits
Real-time assessment mechanisms dependent on external factors like weather, traffic volume, time of day.
Teleoperated Driving
Safety standards & permissions for remote control through dedicated teleoperations services.
Remote Control
Safety standards & permissions for automated vehicle control based on external sensors & computing.
Flexible Route Selection
Permission procedures for flexible navigation patterns within clearly defined geofenced areas.
Safe V2X Information
Minimum standards for reliability of communication to use safety-critical data from external sources.

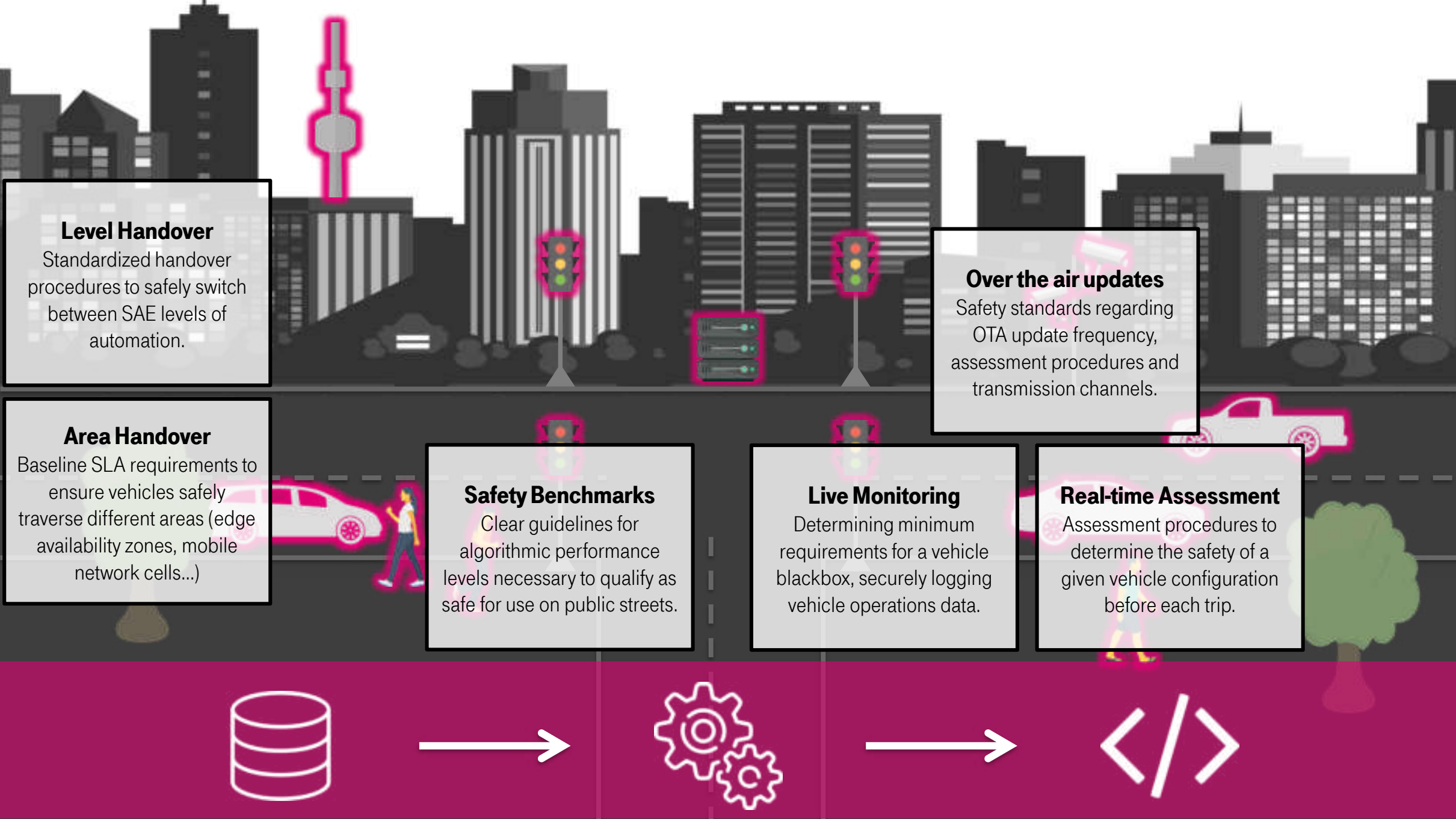
KEY CHALLENGE

Establishing a common standard for the necessary safety and reliability of flexible automated vehicle operations within a limited geographical area.

FULLY CONNECTED & AUTOMATED MOBILITY SYSTEM

Enabling long-term, high-volume automated vehicle operations in a wide geographic area comprised of a variety of Operational Design Domains.


Level Handover
Area Handover
Over the air updates
Safety Benchmarks
Live Monitoring
Real-time Assessment



Level Handover
Standardized handover procedures to safely switch between SAE levels of automation.

Area Handover
Baseline SLA requirements to ensure vehicles safely traverse different areas (edge availability zones, mobile network cells...)

Safety Benchmarks
Clear guidelines for algorithmic performance levels necessary to qualify as safe for use on public streets.

Live Monitoring
Determining minimum requirements for a vehicle blackbox, securely logging vehicle operations data.

Real-time Assessment
Assessment procedures to determine the safety of a given vehicle configuration before each trip.

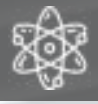
Over the air updates
Safety standards regarding OTA update frequency, assessment procedures and transmission channels.

KEY CHALLENGE

Creating an overarching framework to ensure compatibility, safe transitions and reliable operations in the connected automated mobility system.

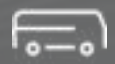
Isolated regulatory approaches will limit the impact of technological solutions, thus requiring internationally valid standards.

Enabling digital testfields to create a mesh of cutting edge research and mature digital service platforms at the minimum of licensing and regulatory effort.



Establishing a common standard for the necessary safety and reliability of digital traffic infrastructure elements.

Establishing a common standard for the necessary safety and reliability of flexible automated vehicle operations within a limited geographical area.



Creating an overarching framework to ensure compatibility, safe transitions and reliable operations in the connected automated mobility system.

Thank you!

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higher performance