A NEW DIMENSION IN E/E-ARCHITECTURE

# eFuture
# Safe and Efficient Electrical Vehicle

Green Car Initiative

Brussels, 11 June 2010

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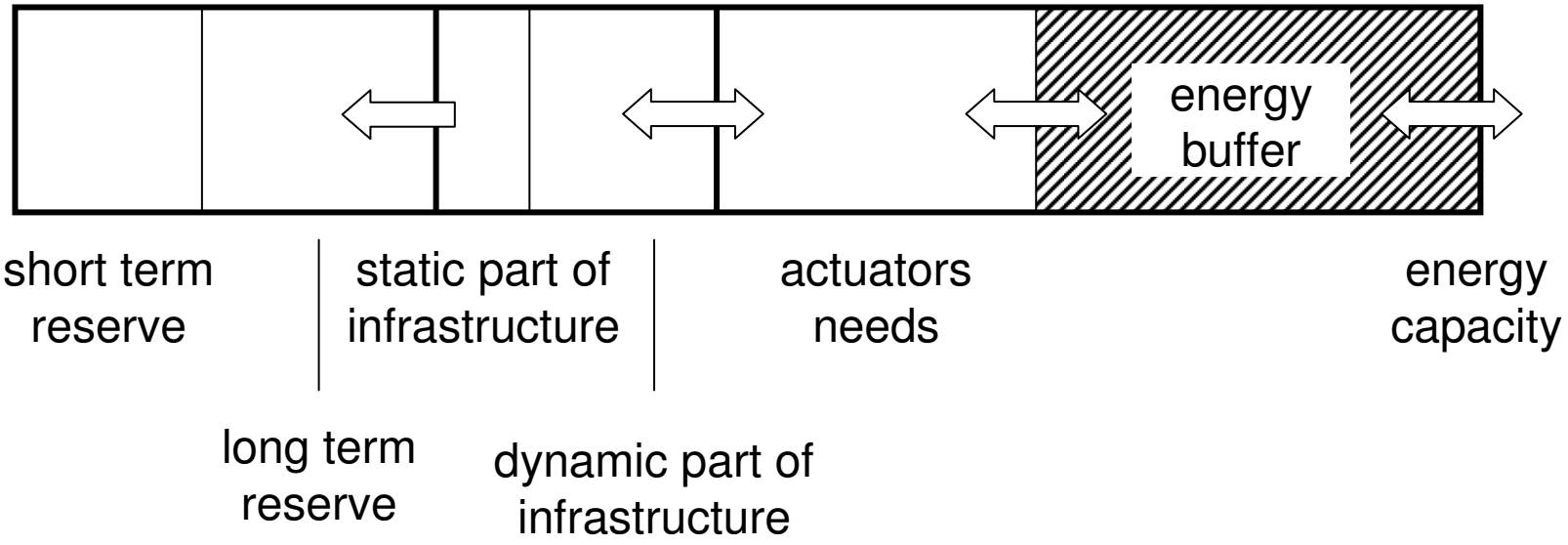
# Concept and project objectives

- Lots of factors influence the energy fluctuation within a vehicle
- A vision at vehicle level is mandatory to get a new lean vehicle architecture
  - Energy optimised and safe vehicle infrastructure
  - Drivetrain performance: new actuators, influence by friction, centre of gravity
  - ADAS performance: complexity of independent systems, time to decision
  - Choices of dynamics based on: drivetrain current state & energies levels, ADAS & driver commands, time horizon

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# Presentation of the consortium

01-INT Intedis
PIC: 985 994234
Consulting services
Architecture, decision units
http://intedis.com

02-TMETC Tata Motors
PIC: 985 803920
Vehicle manufacturer
Integration, drivetrain control
http://uk.tata.com

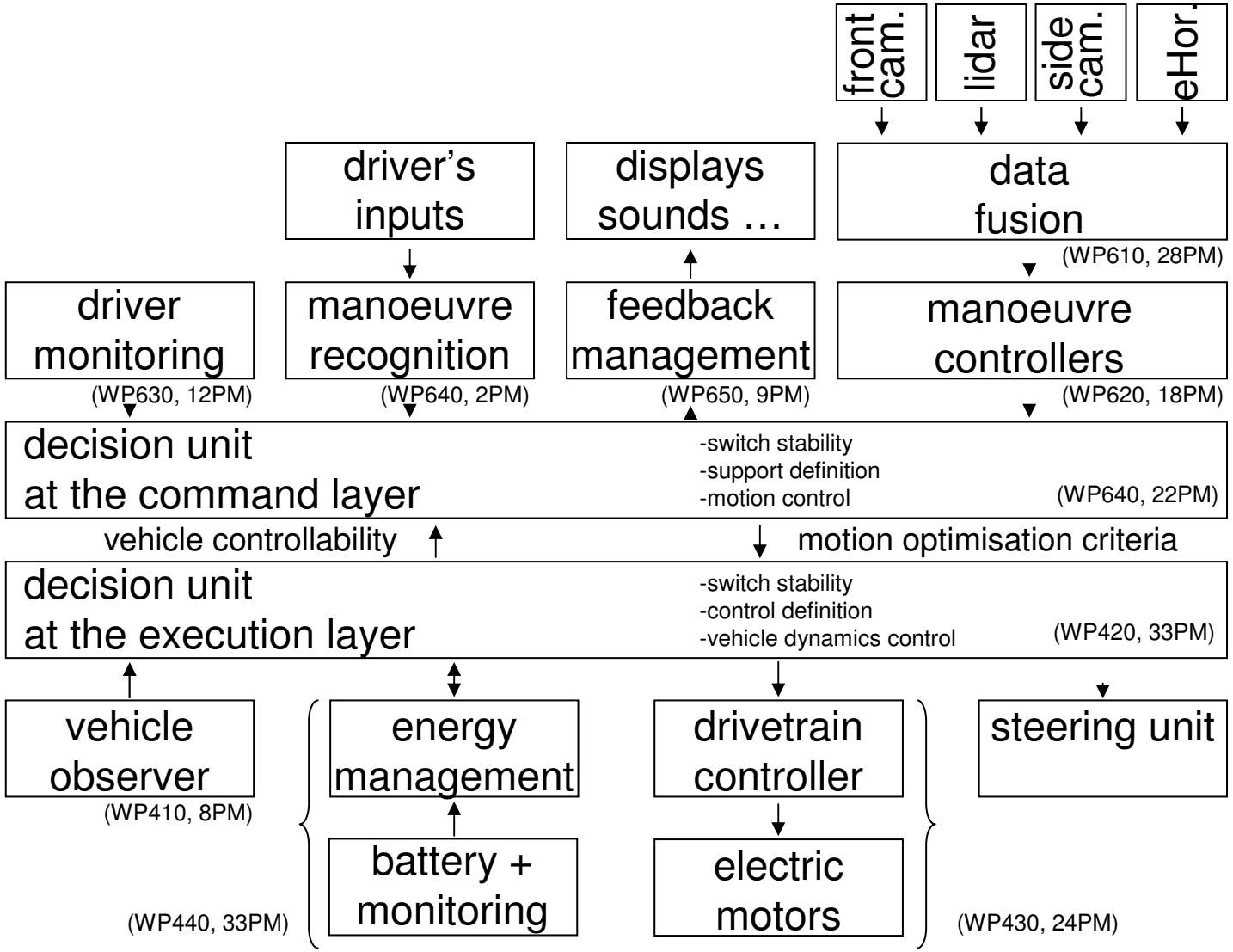
03-MIL Miljøbil Grenland
PIC: 985 882296
Vehicle manufacturer / Tier 1
Batteries, Energy Management
http://www.miljobil.no

04-HELLA Hella
PIC: 992 440078
Tier 1
Sensors, ECUs
http://www.hella.com

05-INRETS INRETS-Livic
PIC: 999 612064
Research center
Dynamics controller
http://www.inrets.fr/ur/livic

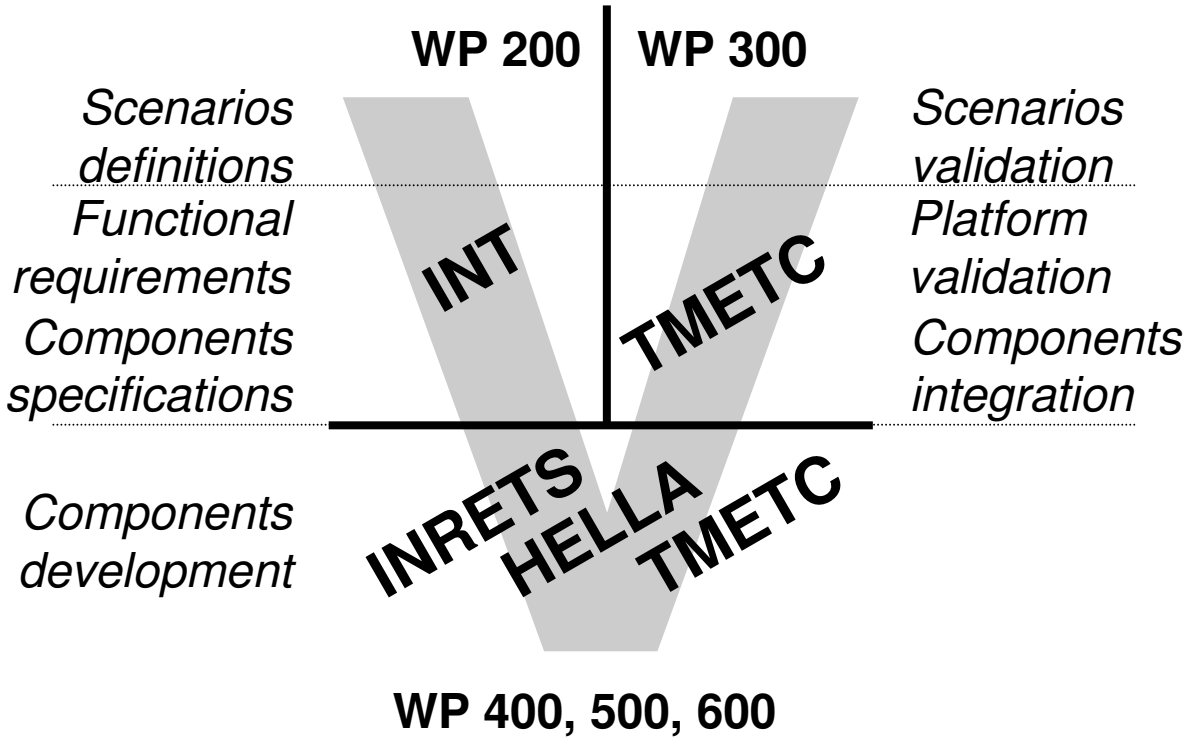
06-WIVW WIVW
PIC: 999 668324
Consulting services
Ergonomics, simulators
http://wivw.com

# Data flow and presentation of the work packages



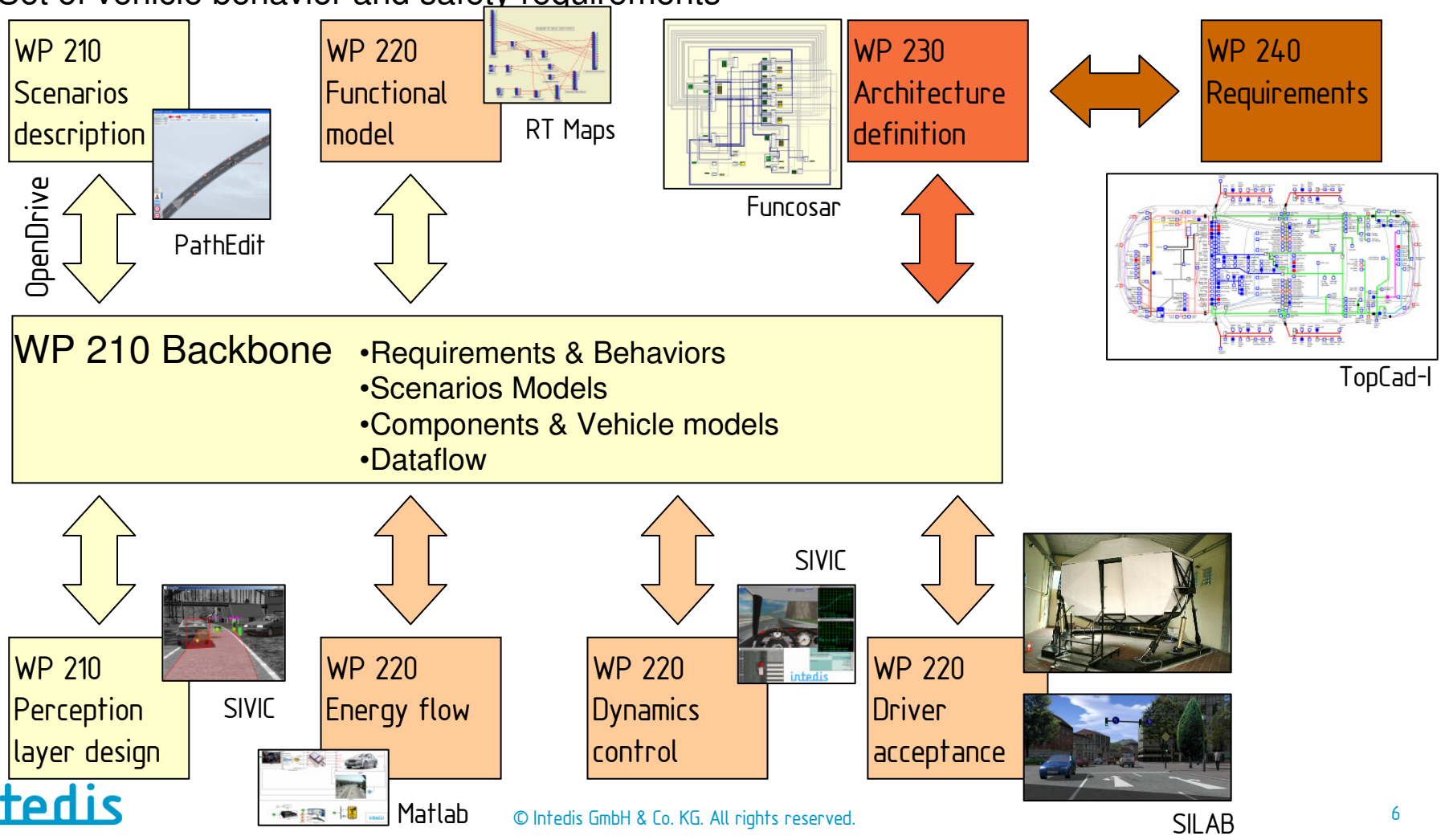
# S/T methodology and description of the work packages

- Four pillars for the project
  - WP 100 – Project management (MGT)
  - WP 200 – Vehicle specification (RTD)
  - WP 300 – Vehicle integration & validation (DEM)
  - WP 400/500/600 – Development of the layers (RTD)



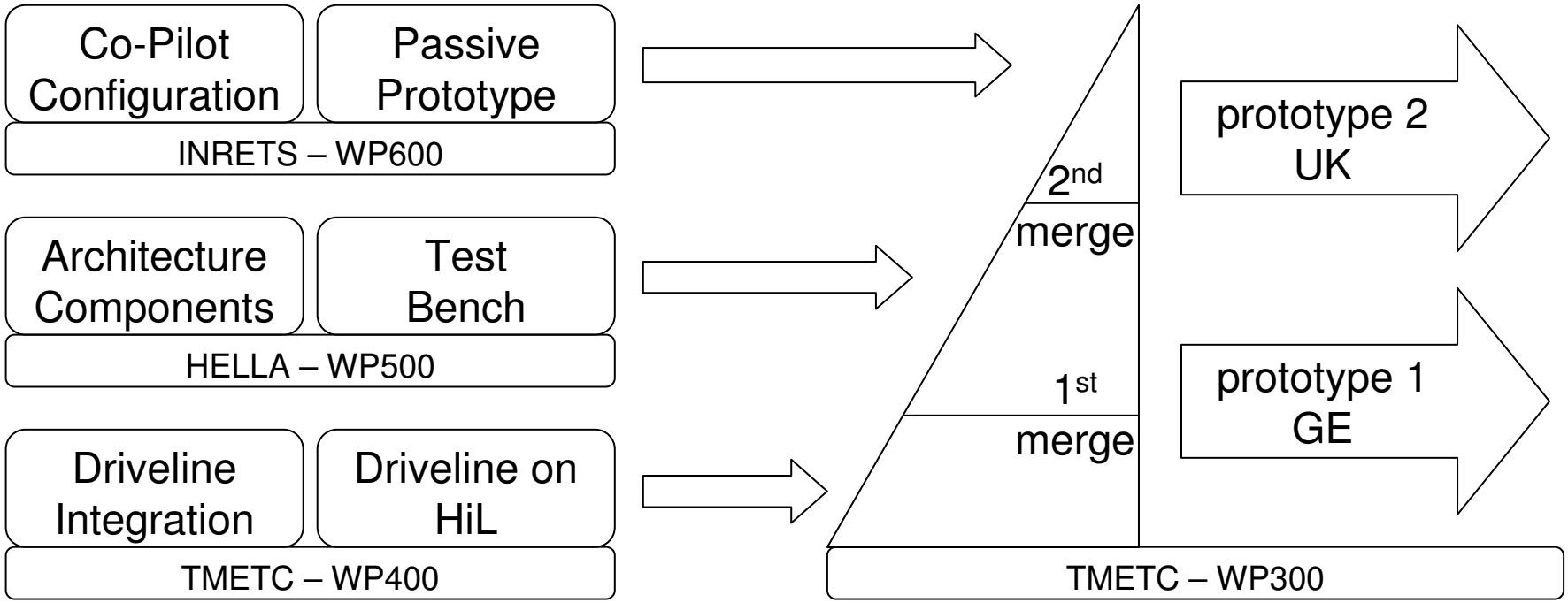
# Vehicle specification

- Creation of a virtual prototype to set the prototypes targets
- Simulation platforms as backbone for the concept development
- Set of vehicle behavior and safety requirements



# Development and integration

- Three development groups in parallel with linear integration
  - WP 400 – Execution layer: electric motors, traction battery, Dynamics Control
  - WP 500 – Electronic platform: ECUs and network nodes
  - WP 600 – Command layer: Sensors, Co-Pilot, Decision Units

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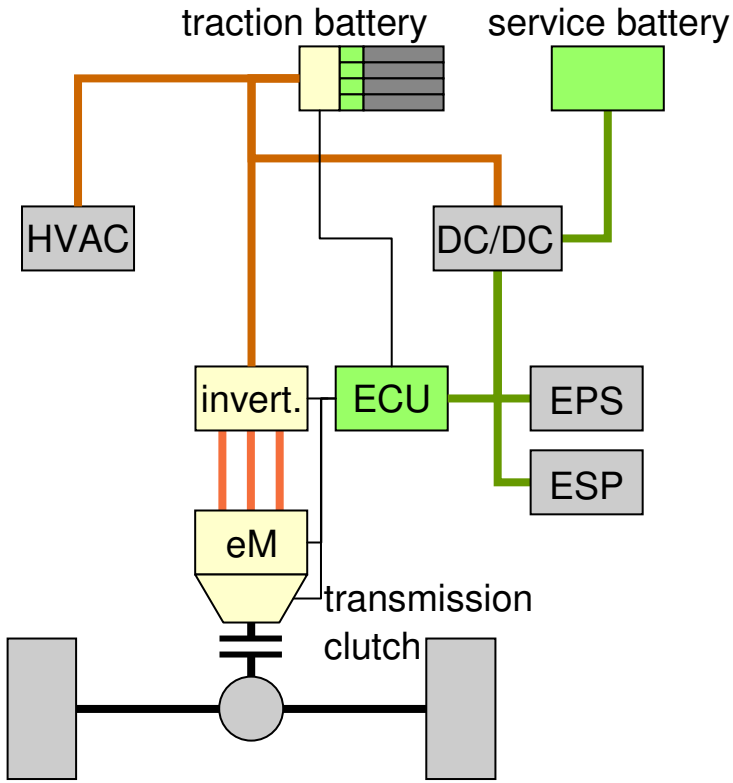
# Execution Layer

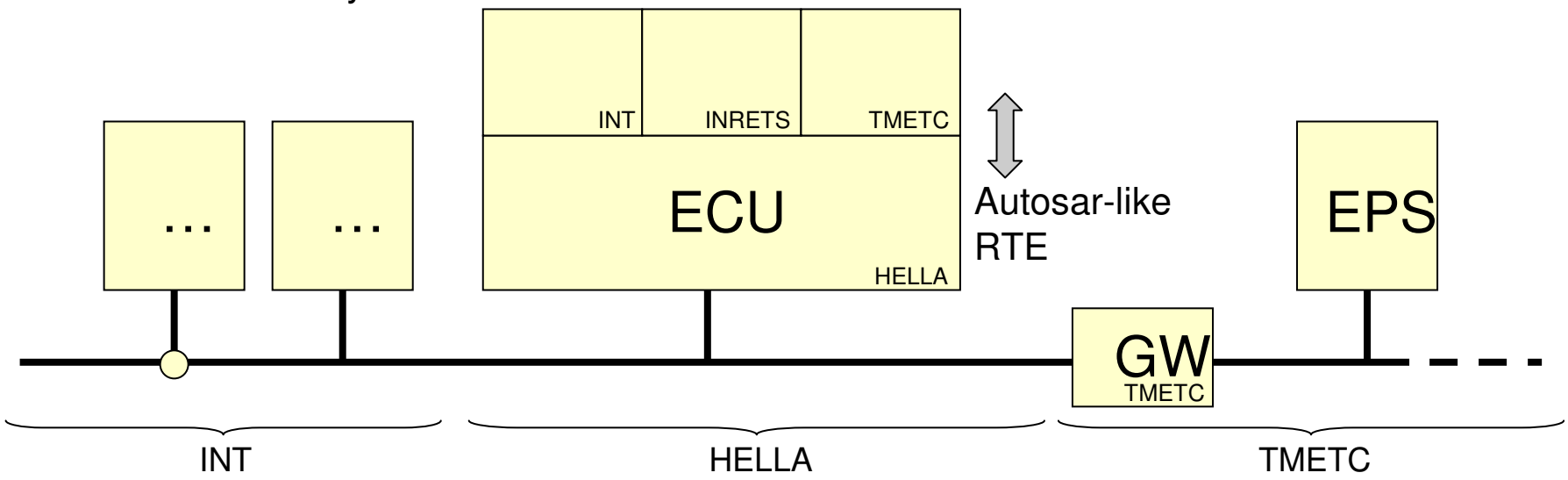
- Preliminary driveline in three domains (to be worked-out during the requirements phase)
  - High voltage domain: traction battery, HVAC, inverter & electric motor
  - Low voltage domain: service battery, DC/DC converter, power steering, brakes
  - Mechanical domain: integrated transmission, safety clutch, differential




- Traction battery
  - Cells & pack: MIL
  - Sensors & EMS: HELLA
- HVAC: TMETC (out of scope)
- Inverter & electric motor: TMETC (or new partner)
- Clutch & differential: TMETC (not budgeted)
- Service battery: INT
- EPS, ESP: unchanged (gateway from TMETC)
- ECU
  - HW: HELLA
  - SW: INT & TMETC

# Electronic Platform

- Hella: ECU
  - Design and development of the test environment
  - HW/SW integration and verification in lab
  - ECU target currently only A-SiL A/B with Autosar → A-SiL D possible 2015
- INT: Communication platform
  - Communication matrix, power modes, vehicle diagnostics
  - Physical layer (Flexray topology, nodes, wake-up)
  - Conformance tests and failures recognitions
- TMETC: Gateways



# Command Layer

- Exterioceptive sensors & data fusion
  - Image processing platform, Lidar, side cameras, eHorizon
- Data fusion - perception layer
- Virtual co-pilot
- Situation assessment
- Maneuvers controllers:
  - Longitudinal control down to vehicle standing
  - Lateral control with lane keeping and lane changing
  - Integrated longitudinal and lateral control
  - Predictive speed adaptation
- Driver monitoring: driver's mental model and driver's acceptance
- Decision unit
  - Stability assessment
  - Maneuver recognition
  - Transition between actors/maneuvers
  - Arbitration unit
- Driver Interface
  - Specification of components needed for HMI
  - Components definition & development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