HADRIAN

Holistic Approach for Driver Role Integration and Automation Allocation for European Mobility Needs

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www.hadrianproject.eu/

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PROJECT SHORT INFO

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- **Call** H2020-DT-ART-2018-2019-2020
  - Human Centred Design for the New Driver Role in Highly Automated Vehicles
  - **Coordinator**: Virtual Vehicle
  - **Duration**: 42 Months
  - **Start**: Dec 2019
  - **Funding**: 8 Mio EUR

virtual vehicle
AVL
FORD OTOSAN
nervtech™
VDI|VDE|IT
ASFINAG
bast
tecnalia Inspiring Business
UNIVERSITÄT SALZBURG
UNIVERSIDAD DE GRANADA
IESTA
TU Delft
National Technical University of Athens
ika | RWTH AACHEN UNIVERSITY
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FROM RESEARCH TO INDUSTRY cea tech

PRINCIPLE ASSUMPTIONS FOR THE HADRIAN PROJECT

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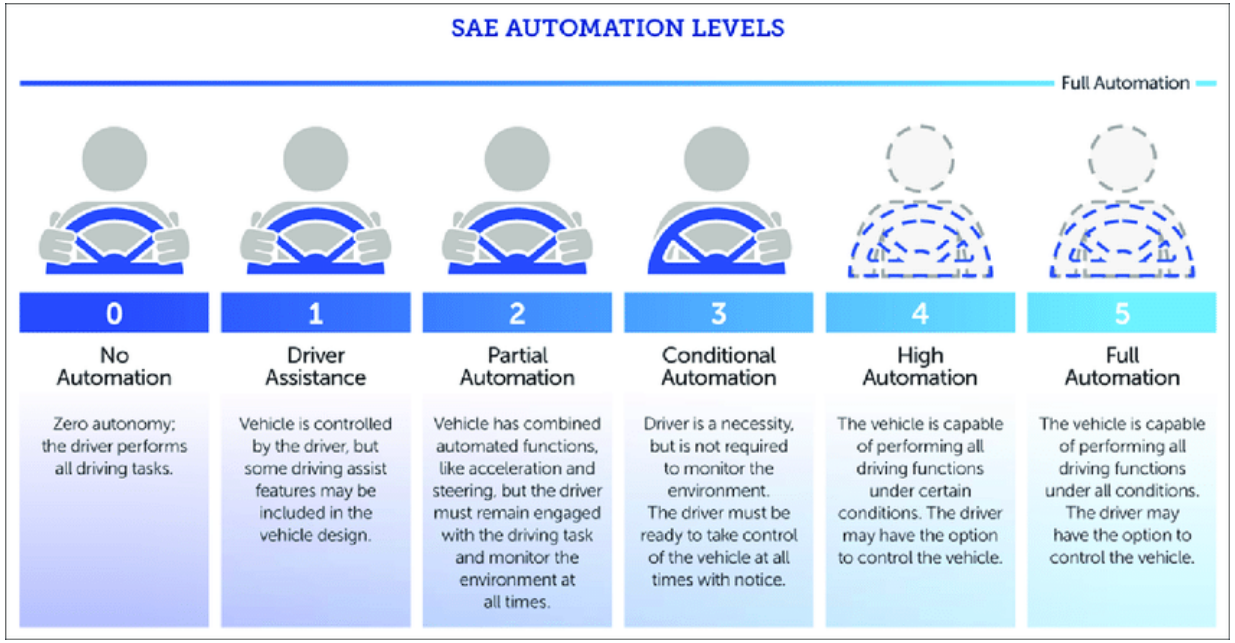
- Humans will remain part of automated driving in the foreseeable future to address critical transitions
  - Take back control of the vehicle when needed
  - Maintain mode awareness of automation
  - Calibrate trust for automated driving system
  - Handle changes in automated driving level
- There is significant research world-wide that investigates the human role in automated driving
  - Especially in Europe



SAE J3016

iDREAMS
https://idreamsproject.eu/wp/

Mediator
https://mediatorproject.eu/

interACT
Designing cooperative interaction of automated vehicles with other road users in mixed traffic environments
https://www.interact-roadautomation.eu/

BRAVE
http://www.brave-project.eu/

TRUSTONOMY
https://h2020-trustonomy.eu/

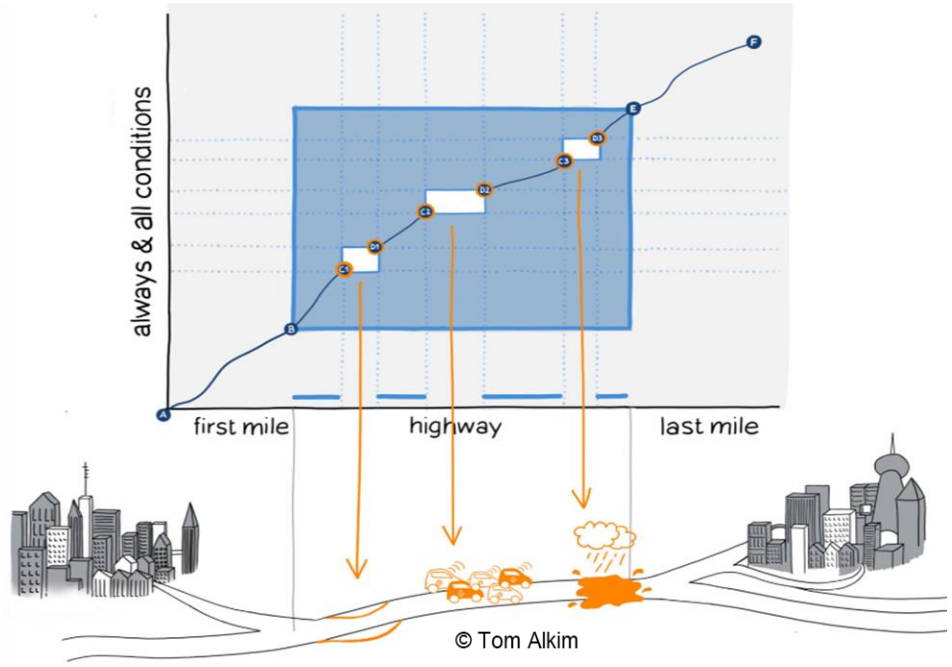
SUaaVE
http://www.suaave.eu/

TRUSTVEHICLE
https://www.trustvehicle.eu/

ADAS&ME
https://www.adasandme.com/

AUTOMATION AND LIMITATIONS

- Automated Driving at Level 3: Fallback-ready user can engage in some non-driving related tasks
- OEMs are starting to bring this functionality on the market
  - ADL 3 is available in certain Operational Design Domains (ODD)
    - limited to fully access-controlled highways
    - up to a specific maximum speed
    - Machine-detectable lane markings
    - The absence of tunnels, toll booths and traffic control devices
    - Within geo-fenced boundaries
    - Within specific transient conditions
      - inclement weather, such as heavy rain, snowstorms or heavy fog, or
      - adverse traffic conditions, such as a temporary construction site.
- The human driver is left to manage the complexities that arise out of the interaction between vehicle and real-world conditions



HADRIAN HOLISTIC APPROACH

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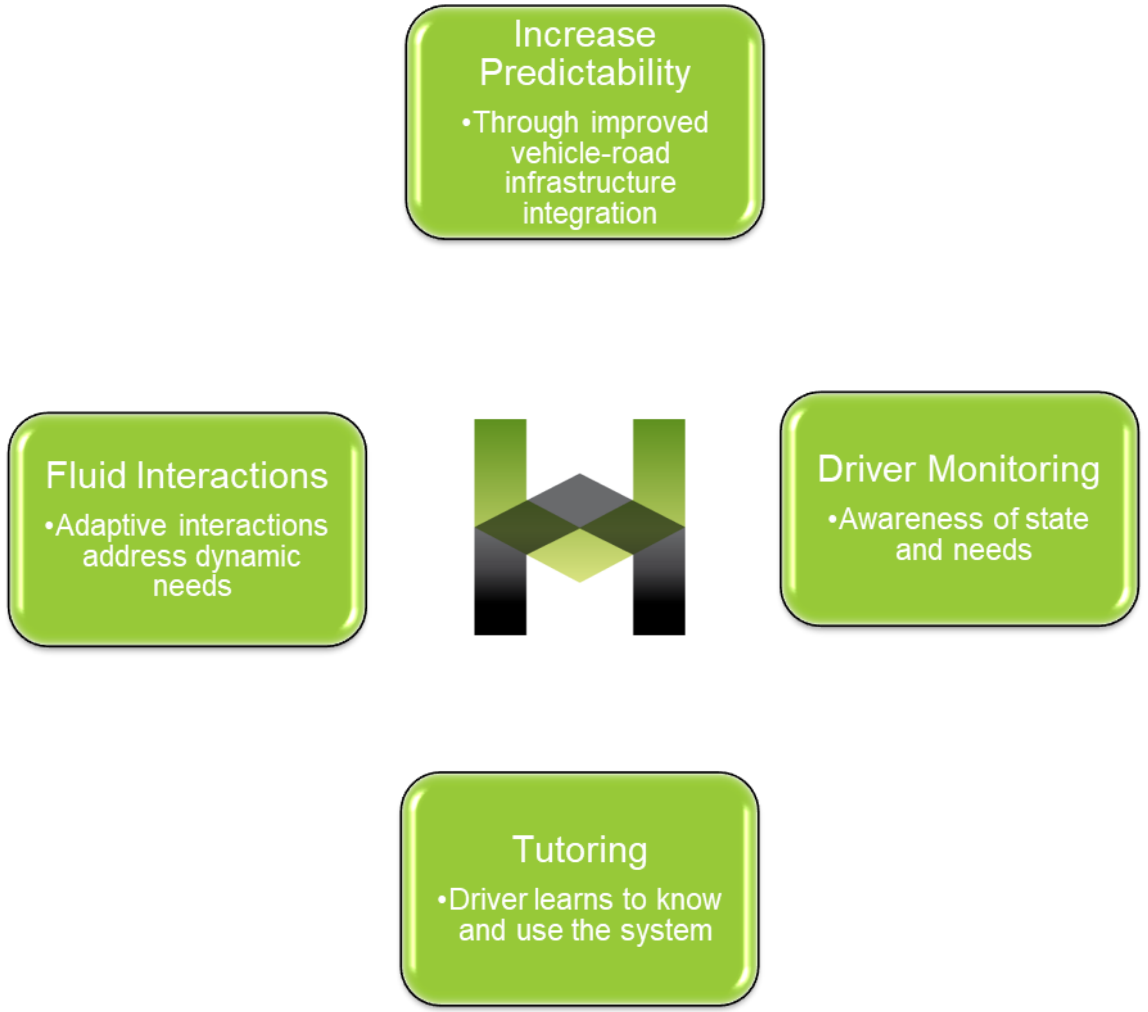
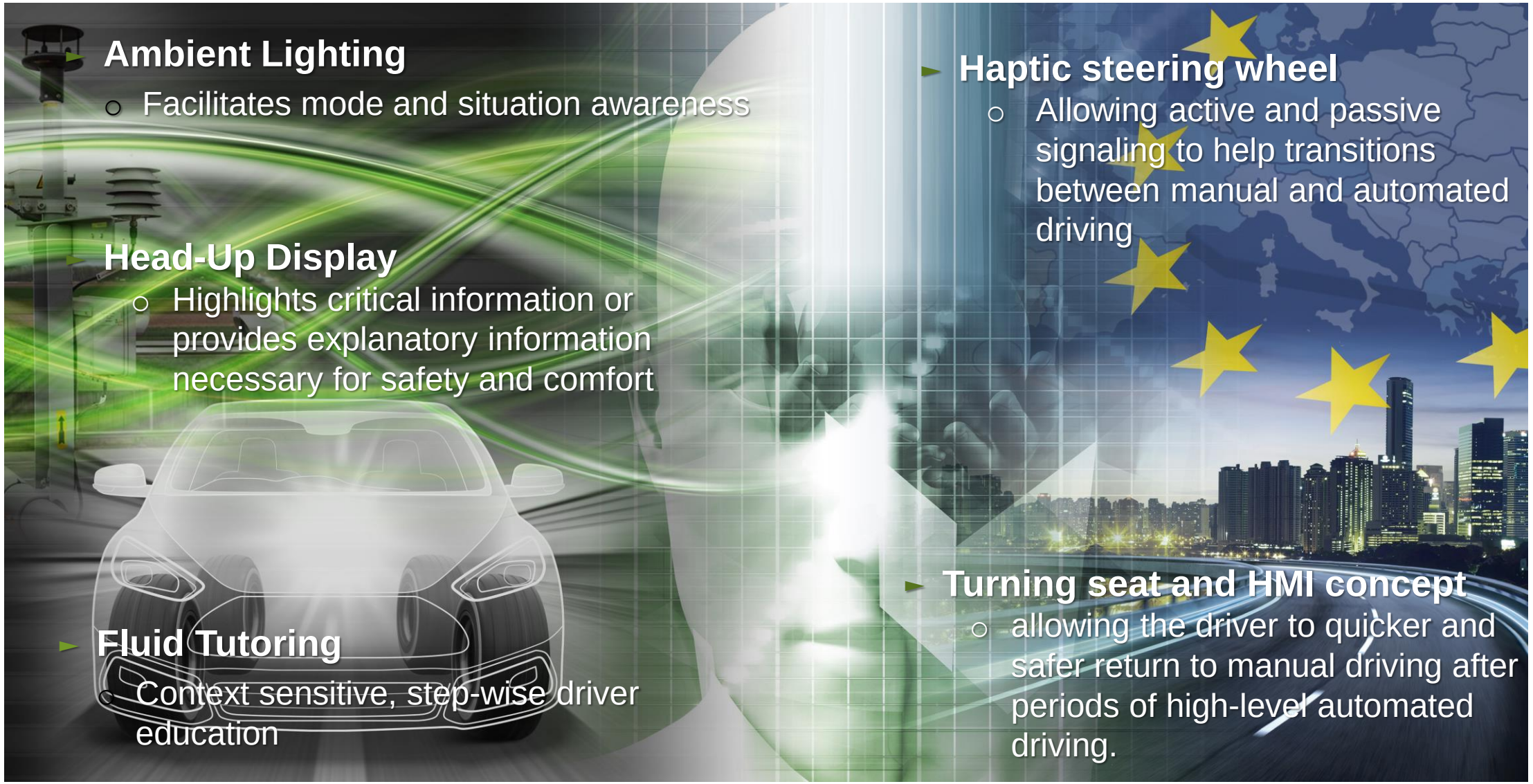
- HADRIAN uses a three-pronged approach to achieve acceptable & safe driver roles
  1. The **predictability** of automated driving states & transitions can be improved through **integration** of onboard vehicle sensors with **road infrastructure** sensors and communication
     - "Innovate" automated driving levels: 2, 3, and 3+
     - Guarantee ADL transition durations
     - Guarantee ADL durations
  2. Advanced driver monitoring capabilities facilitate in-cabin **fluid interactions** that offer the "just needed" information and interventions based on information from detailed **driver monitoring** systems
     - During automated driving
     - Before and during the transition to manual driving
     - During manual driving
  3. **Active tutoring** can improve the skills and knowledge of drivers to safely and comfortably use the automated vehicle
     - Before the drive
     - During the drive
     - After the drive



FLUID INTERACTION COMPONENTS



MOBILITY PERSONAS AND MODES OF AUTOMATION

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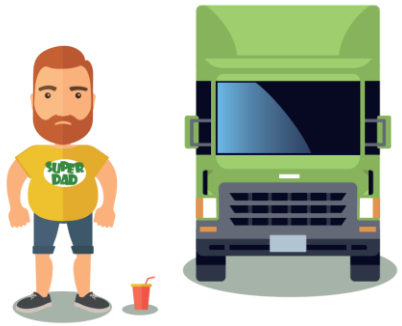
Harold
is an elderly driver wanting to stay mobile



Sven
is a truck driver within the challenges of increasing competitiveness

Florence
is a business women wanting to keep up productivity during transportation

Manual Driving Aid for Elderlies

Innovation to ADL 2 Driving

Innovation to ADL 3 Driving

Innovation to ADL 3 Driving for Extended Disengagmt.

Guarding Angel

INVESTIGATED INNOVATIONS

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- Benefit of an environmental awareness assistant to simplify driving task for elderly drivers

- Reduced human monitoring need during ADL 2

- Benefit of minimum guaranteed time for human driver to transition from ADL 2, 3 & 3+ to manual driving

- Benefit of guaranteed minimum ADL 3/+ duration

- Active driver monitoring & fluid guidance during the transition back to manual driving

- Adaptive tutoring to improve driver skills, knowledge, and competences for AD usage

- Guarding angel as safety protector during manual driving

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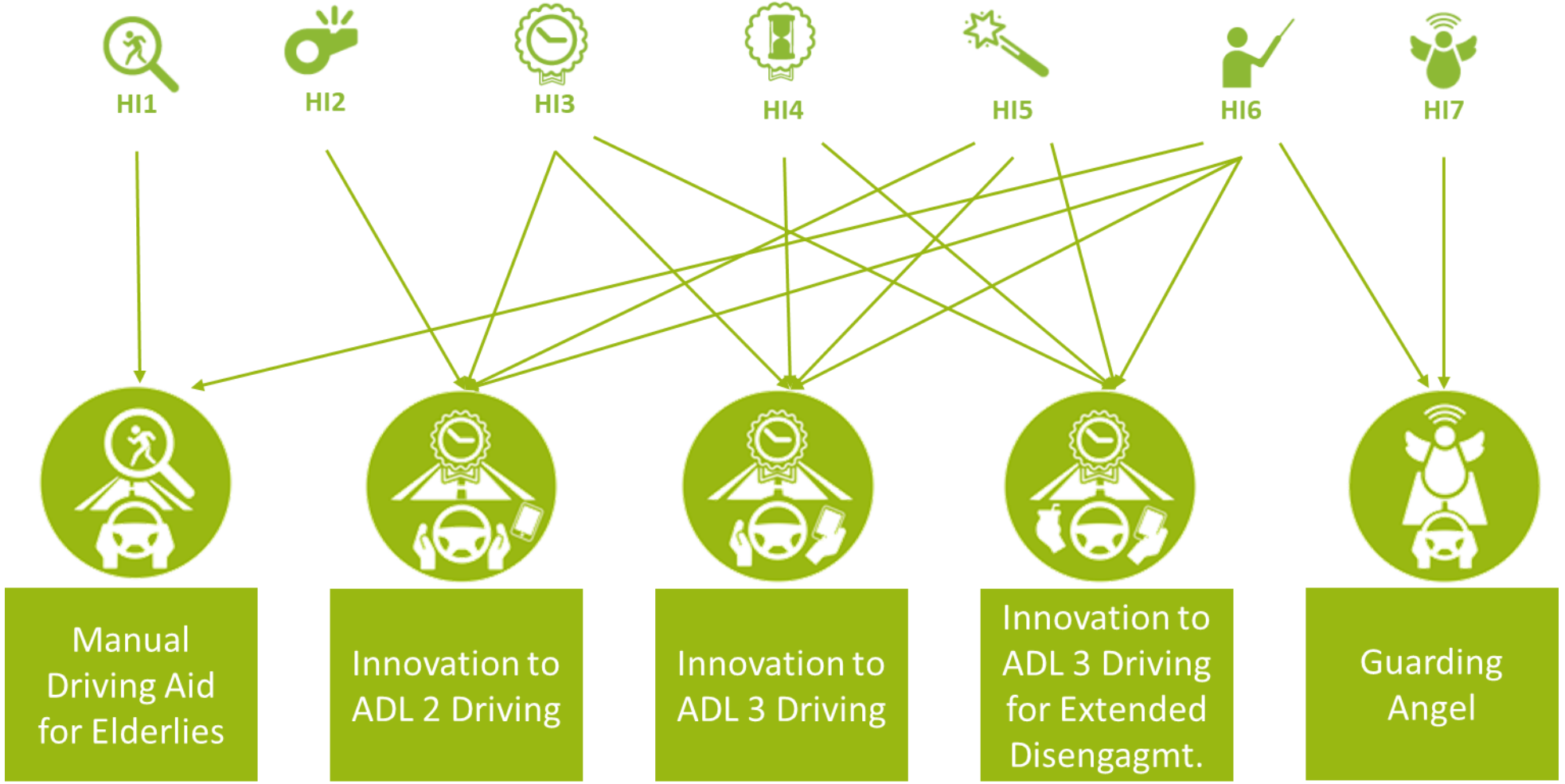
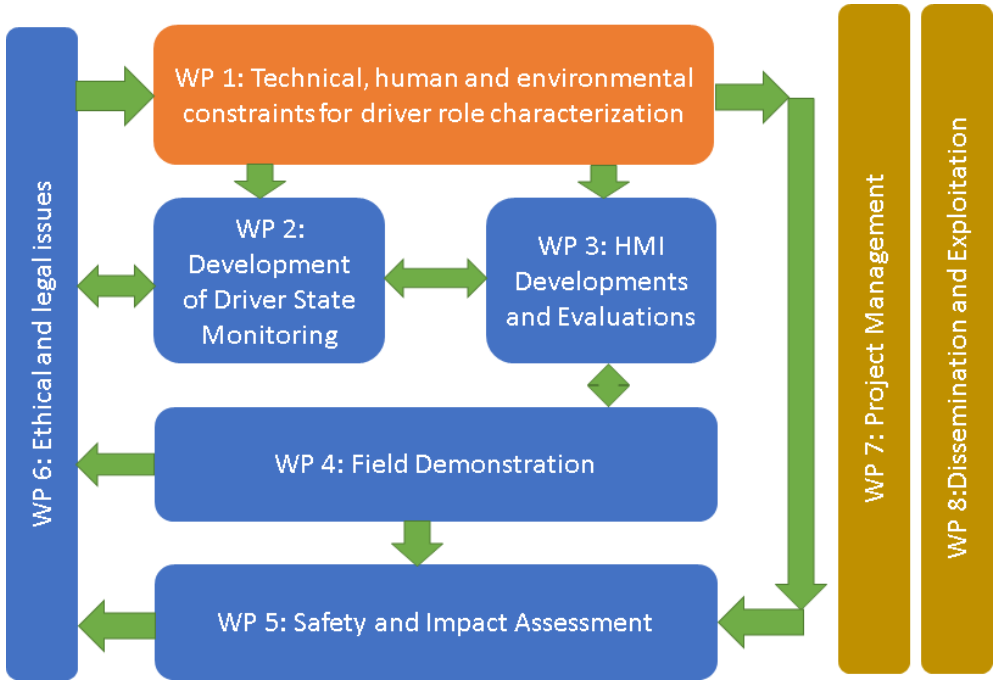
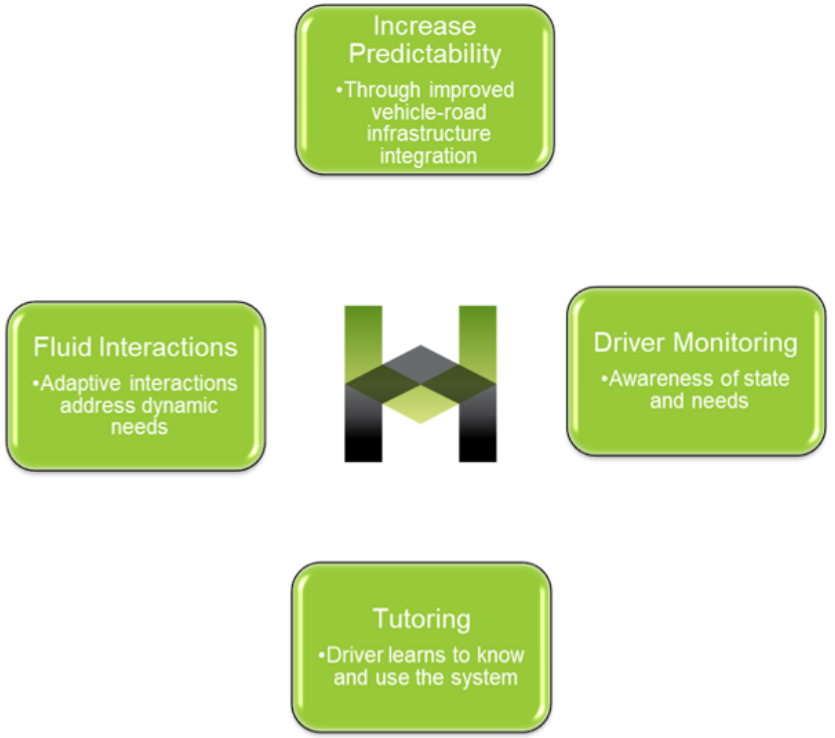


WP STRUCTURE





DRIVING SIMULATIONS

- Ensure consistent and coordinated research among partners
  - Need a common frame of reference
- Scenario based development of operational concepts
  - Definition of common user, environmental, vehicle, and infrastructure characteristics
  - Standardized set of simulation scenarios
  - Developed early on in PM 1 - 12
    - Nervtech: SCANer
- Mobile driving simulator
  - Travels to different research partners to ensure comparable instrumentation
  - Sharing of scenarios across partners for consistent development

PLANNED DEMONSTRATIONS

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No.	Demonstrator	Field Demonstration	Demo Vehicle	Partner
1	Visual Aiding Fluid Interface HUD System	X		NVT
2	Real-time driving state estimator			UGR
3	Haptic feedback f-HMI		1, 2, 3	TEC
4	Truck driver monitoring system	X	3	FORD
5	Ambient display and indicator f-HMI	X	3	PLUS
6	Multi-modal f-HMI	X	1, 2	VIF
7	Basic Fit2Drive App	X	1, 2, 3	CEA
8	Adaptive Fit2Drive App			CEA
9	Haptic f-HMI			IKA
10	Fluid Interaction Tutoring System	X	1	VIF
11	Collaborative AD demonstrator		3	NVT
12	FLUID Platooning HMI	X		FORD
13	Lab-implementation of holistic integrated in-vehicle f-HMI		1, 2	PLUS

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