Adaptive Integrated Driver-Vehicle Interfaces:

The AIDE Integrated Project

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Outline

- Adaptive Integrated Driver-vehicle Interfaces
  - The driver-vehicle interface
  - Adaptation
  - Integration
- Current state of the art
- The AIDE Project

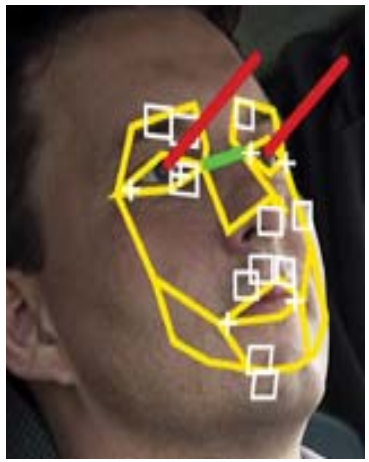
The driver-vehicle interface – a holistic approach

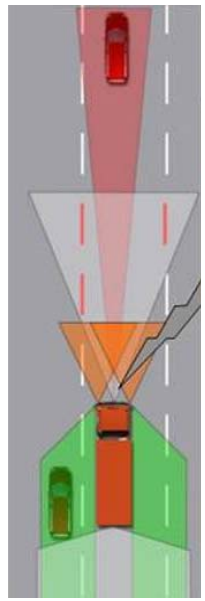
- ”Interface”=all aspects that govern the driver-vehicle-environment interaction (not just the displays and controls)
- The driver, the vehicle and the environment must function together

  -> holistic (”ecological”) approach needed

Adaptation

- We can monitor the Driver, the Vehicle and the Environment (DVE state) and adapt the driver-vehicle interface accordingly
- Examples:
  - Lock-out/postpone non-critical information on demanding situations
  - Adapt the timing/intensity of safety warnings (e.g. warn earlier when the driver is inattentive)





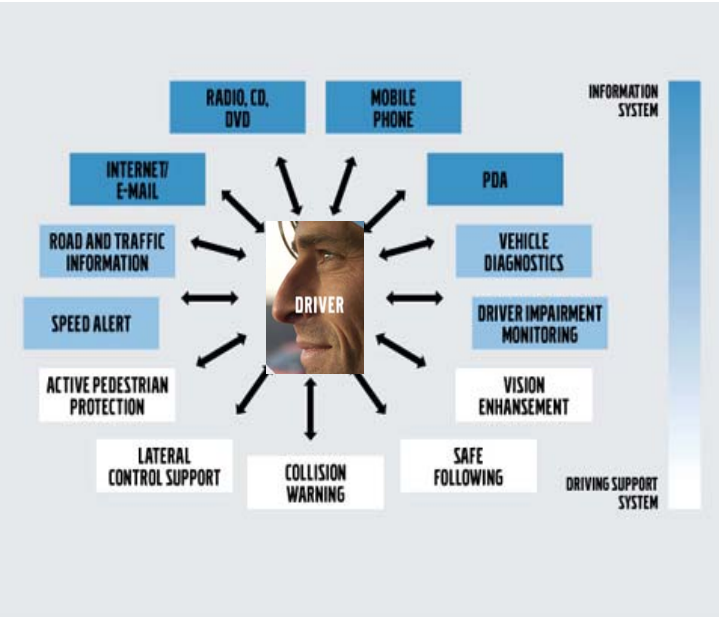
Benefits of interface adaptation

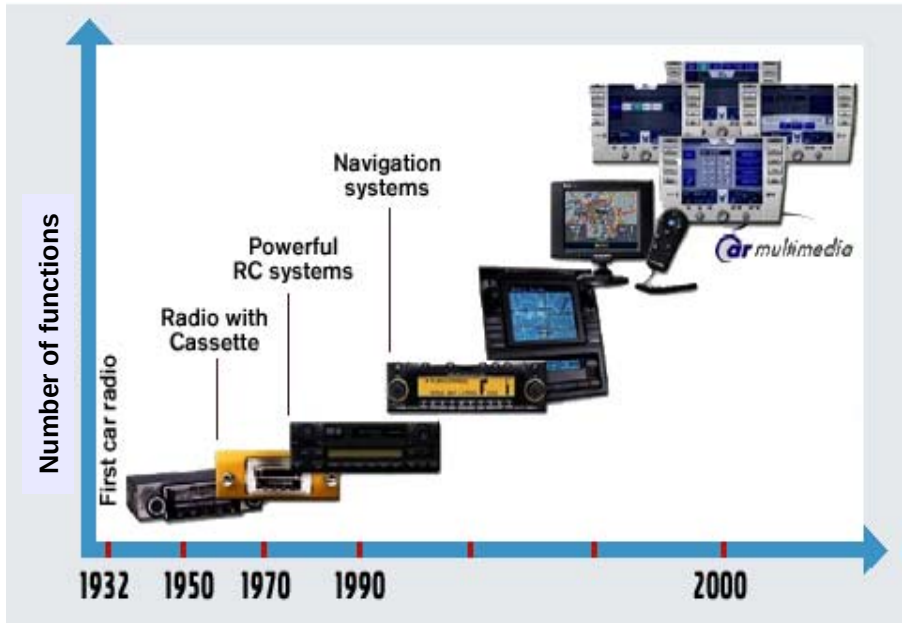
- Prevent driver information overload (inattention major cause of road accidents)
- Enhance efficiency and acceptance of active safety systems -> increase safety effects, accelerate deployment

Tricky issues

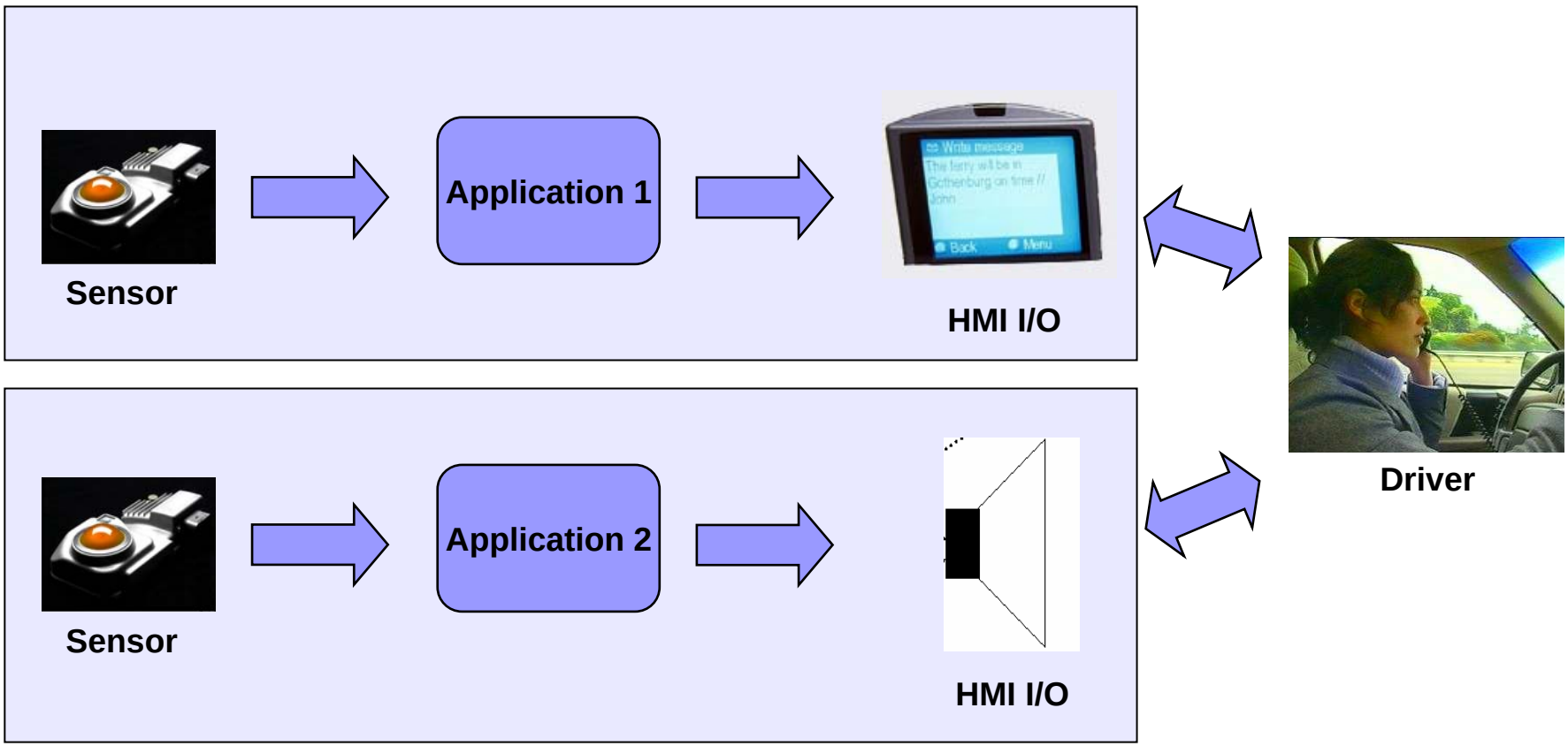
- Adaptive system more unpredictable -> more difficult for the driver to create mental model of the system
- The driver is a strongly skilled adaptive system. How will the driver adapt back in response to system adaptation -> infinite cycle of adaptations…?

Integration
Today: Rapid functional growth





Traditional approach: Non-Integrated systems



Integration

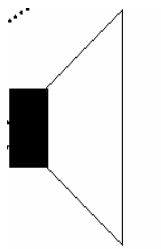
Nomad systems

Application 1

Application 2

Central interaction manager

Sensor



Shared HMI I/O

Driver

- Shared HMI input and output (as well as sensors)
- Centralised management for allocating resources and resolving HMI conflicts between applications
- Automatic integration of stand-alone systems (e.g. nomad devices)

Integration

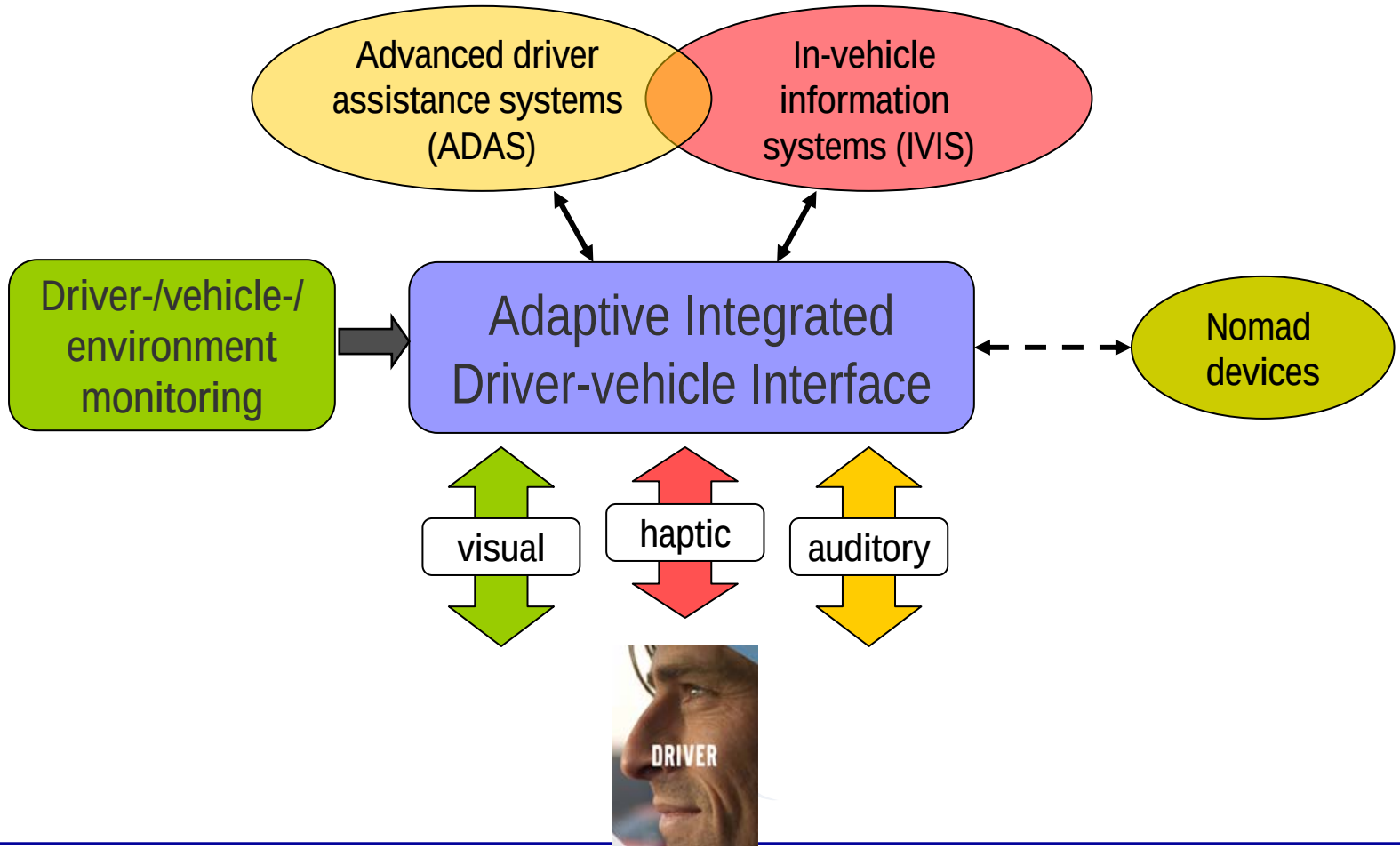
Benefits

- Prevents interference between applications (e.g. by prioritisation)
- Enhances efficiency of functions by exploiting synergies
- More efficient use of hardware (reduces cost)

Tricky issues

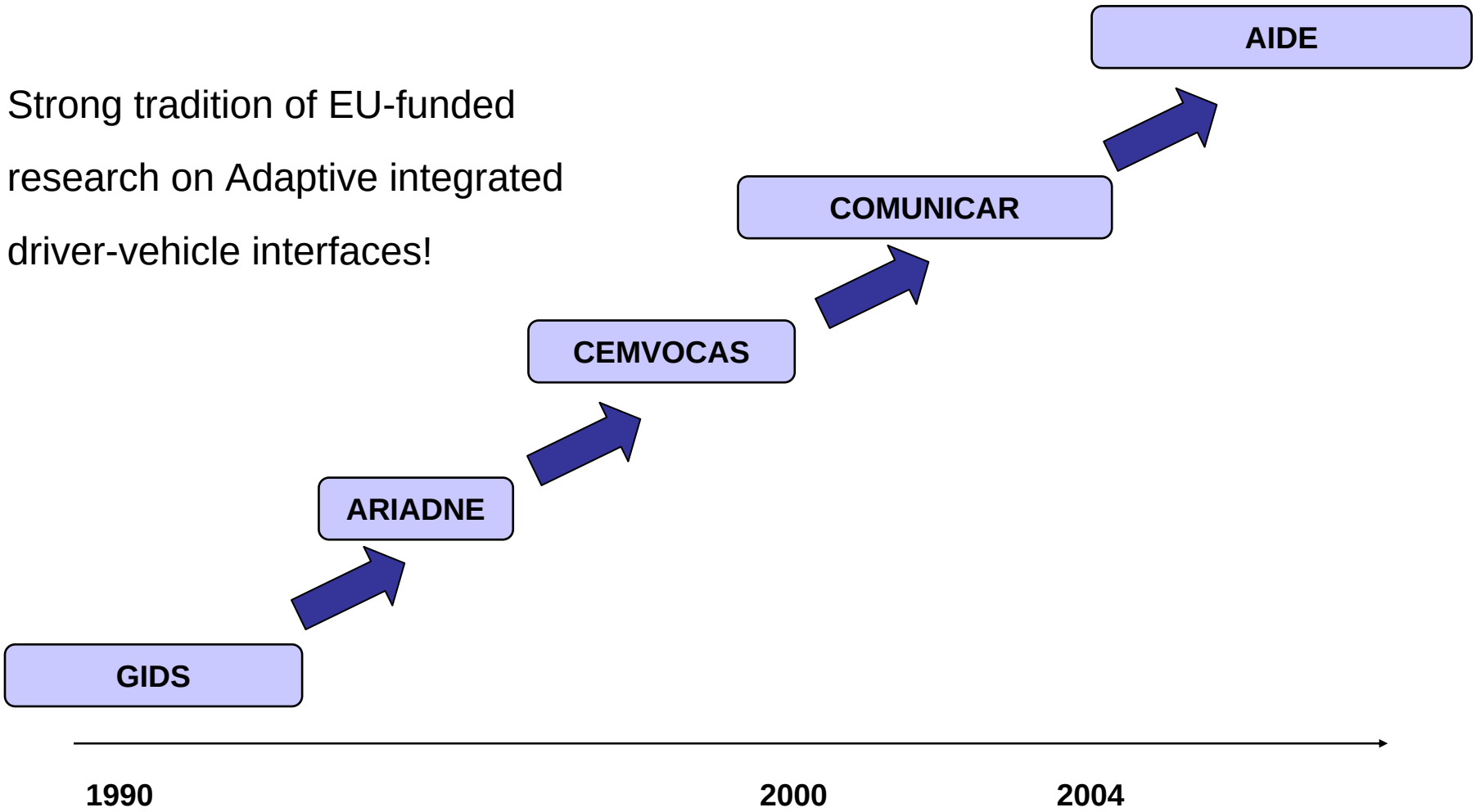
- More complex development process
- More complex system architecture (key enabler)
- Different behavioural effects of combined systems (?)
- How to evaluate integrated systems?

Adaptation + Integration= The Adaptive Integrated Driver-vehicle InterfacE (AIDE)



Current state of the art

Strong tradition of EU-funded research on Adaptive integrated driver-vehicle interfaces!



Current state of the art

US: SAVE-IT

- Ongoing major project on adaptive interface technologies
- Sponsored by NHTSA
- Led by Delphi

AMI-C (Automotive Multimedia Interface Collaboration)

- Standardisation for HMI integration

Systems in production:

- Saab Dialogue Manager
- Volvo Cars Intelligent Driver Information System (IDIS – standard in new S40 and V50)

Other in-house work

- **Most OEMs and suppliers are working on it…**

Future prospects: How to bring this to the market on a larger scale?

Key steps:

- Establish industrial consensus around the general idea of Adaptive Integrated Interfaces
- Develop an enabling system architecture – interact with existing initiatives (e.g. Autosar, EASIS, AMI-C)
- Standardisation (?)
- Focused research and development!
  - Driver behaviour when interacting with adaptive systems
  - Evaluation methods for adaptive integrated interfaces
  - Further development of HMI- and driver monitoring technologies

The AIDE Integrated Project: Basic facts

Integrated project on automotive human-machine interaction (HMI)

Addresses IST strategic objective (10) ”eSafety of road and air transport”

4 years duration

Started: March 04

Budget: 12.5 ME (Total), 7.3 ME (EU funding)

28 partners (~50/50 industry-academia division)

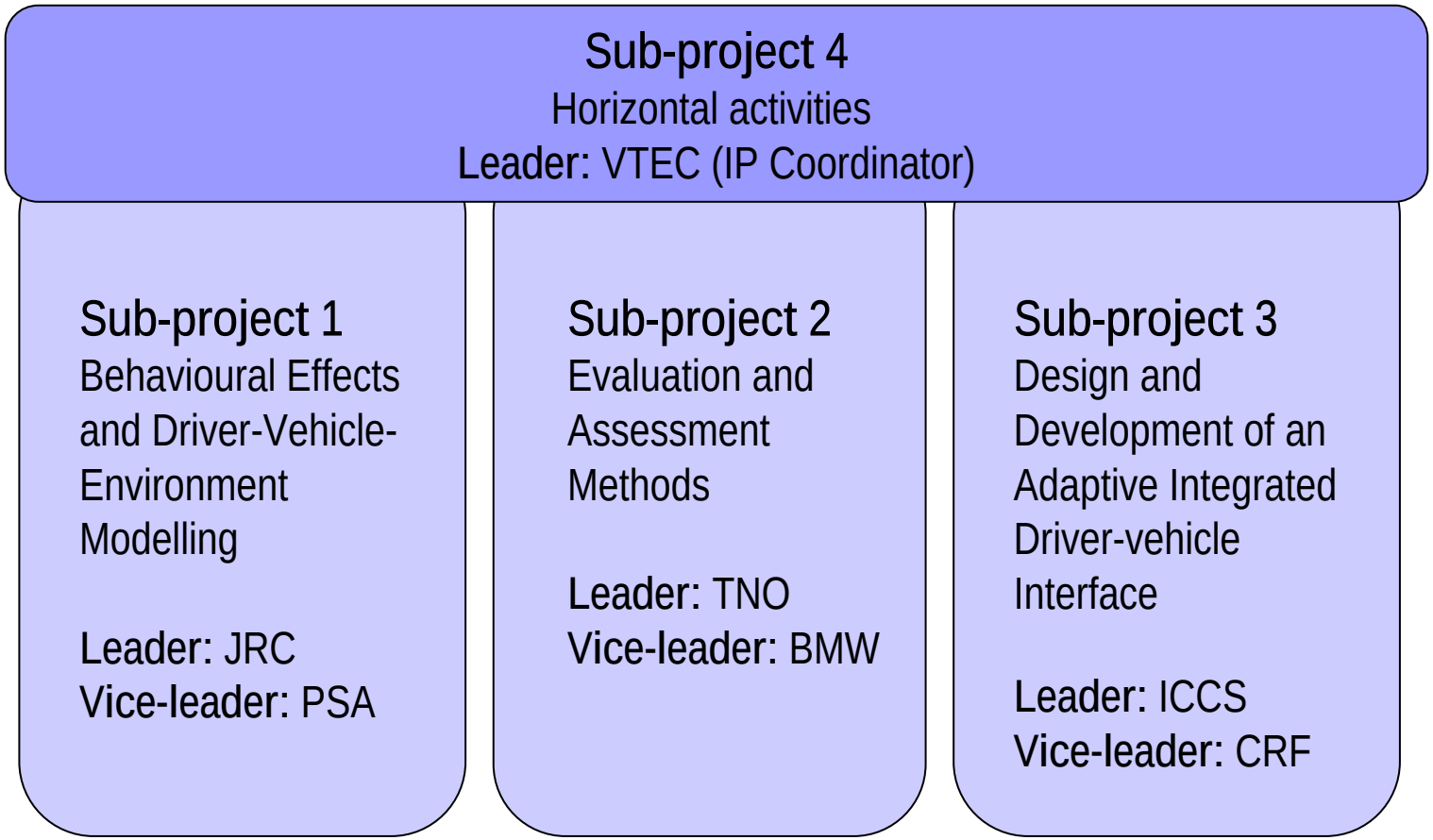
Part of the EUCAR Integrated Safety Program – close links to other related FP6 initiatives

AIDE core group: VTEC (coordinator), BMW, Bosch, CRF, ICCS, JRC, PSA and TNO

The AIDE Consortium

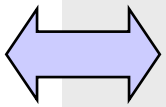
Industry	Research Institutes and others
Volvo Technology	European Commission Joint Research Centre (JRC)
BMW Group Forschung und Technik	INRETS
DaimlerChrysler	TNO
Ford-Werke	Institute of Communications and Computer Systems (ICCS)
Adam Opel	German Federal Highway Institute (BASt)
Peugeot Citroën Automobiles	CIDAUT
Renault Recherche Innvation	Swedish National Road and Transport Research Institute (VTI)
Centro Richerche de Fiat	VTT Technical Research Centre of Finland
Seat Centro Técnico	Centre for Research and Technology – Hellas
Robert Bosch	University of Stuttgart
Johnson Controls	University of Leeds
Siemens VDO	Linköping University
Motorola	University of Genova (DIBE)
KITE Solutions	ERTICO

AIDE: Overall project structure



Interactions with other initiatives: The Integrated Safety Program & HUMANIST

HUMANIST



EUCAR Program: Integrated Safety

	AIDE	EASIS	PReVENT	APROSYS	GST: On-line Safety Services
	Adaptive Integrated Driver-vehicle Interface - Driver Modelling - Evaluation - HMI Design	Electronic Architecture and System Engineering for Integrated Safety Systems	Integrated Preventive Safety Systems: - Lane Keeping - Collision Warning - Intersect. Control - ...	Advanced Protective Systems Enhanced restraint and protection systems. Crashworthiness	Traffic Info. Hazard Warning Rescue Service
OEMs:	BMW, CRF, DC, Ford, Opel, Seat, Renault, PSA, Volvo	DC, CRF, Ford, Opel, PSA, Renault, Volvo	BMW, CRF, DC, Ford, Opel, Renault, PSA, VW, Volvo	AUDI, CRF, DC, PSA, Renault, VW, TNO	BMW, DC, Opel, ...
Co-ordinator:	Volvo	DC	DC	TNO	Ertico

AIDE open forums for dissemination and interaction with key stakeholders

User forum (leader: ICCS)

- Facilititate interaction with target user groups and other key stakeholders (industry, academia, governments, standardisation organisations etc.)

System architecture forum (leader: Bosch)

- Facilitate open discussion on HMI architecture

Nomad forum (leader: ERTICO)

- Facilitate open discussion between automotive and telematics industry (and other interested parties) on methods and techniques for safe integration of nomad devices

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