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**Automated Driving Applications and
Technologies for Intelligent Vehicles**

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*Towards a common methodology
for automation FOTs and pilots*

Technical Workshop

Athens, Greece
21–22 APRIL 2016

//Content

- Field Operational Tests (FOTs) of automated driving
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//Field Operational Tests (FOTs) of automated driving

- Large-scale user tests
- Demonstrate and disseminate the benefits
- Assess
  - Technical performance, system robustness
  - User aspects: driving & travel behaviour, HMI, acceptance
  - Impacts on safety, mobility, environment, efficiency
    - Society
- Study deployment potential
- Future recommendations

//Why a common methodology for testing?

- Scientifical rigour is needed to attain proof and valuable results
  - Public funding is for user tests, assessing impacts on transport system
  - Not enough that „my friend tried it and he thinks it's fine"
- Systematic approach
  - Tests produce comparable results
  - Tests complement each other
- Guidelines support test preparations and analyses, enable faster work
  - Large-scale testing includes dozens of steps, difficult at first
  - Legal checklists
  - Recommendations for data collection and management
- Common vocabulary
- Methodology can encapsulate lessons learned

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//FESTA Handbook

- FESTA Handbook covers the time-line and administration of FOTs
  - http://wiki.fot-net.eu/index.php/FESTA_Handbook
- Originally published in 2008 by FESTA support action, updated by FOT-Net (http://www.fot-net.eu/) support actions
  - FOT-Net is a networking platform open to FOT stakeholders and community, with more than 30 participating organisations
- FESTA has been used in all major European FOTs and many internationally
  - General-purpose, but includes specific advice e.g. for ADAS testing
  - Applicable for various types of user trials of new vehicle ICT
  - EU's input for trilateral work between US–Japan–EU on evaluation framework for automated driving
- Current update round: Data Sharing Framework, first version available
- Collecting requirements to update FESTA regarding automated driving

//FESTA V

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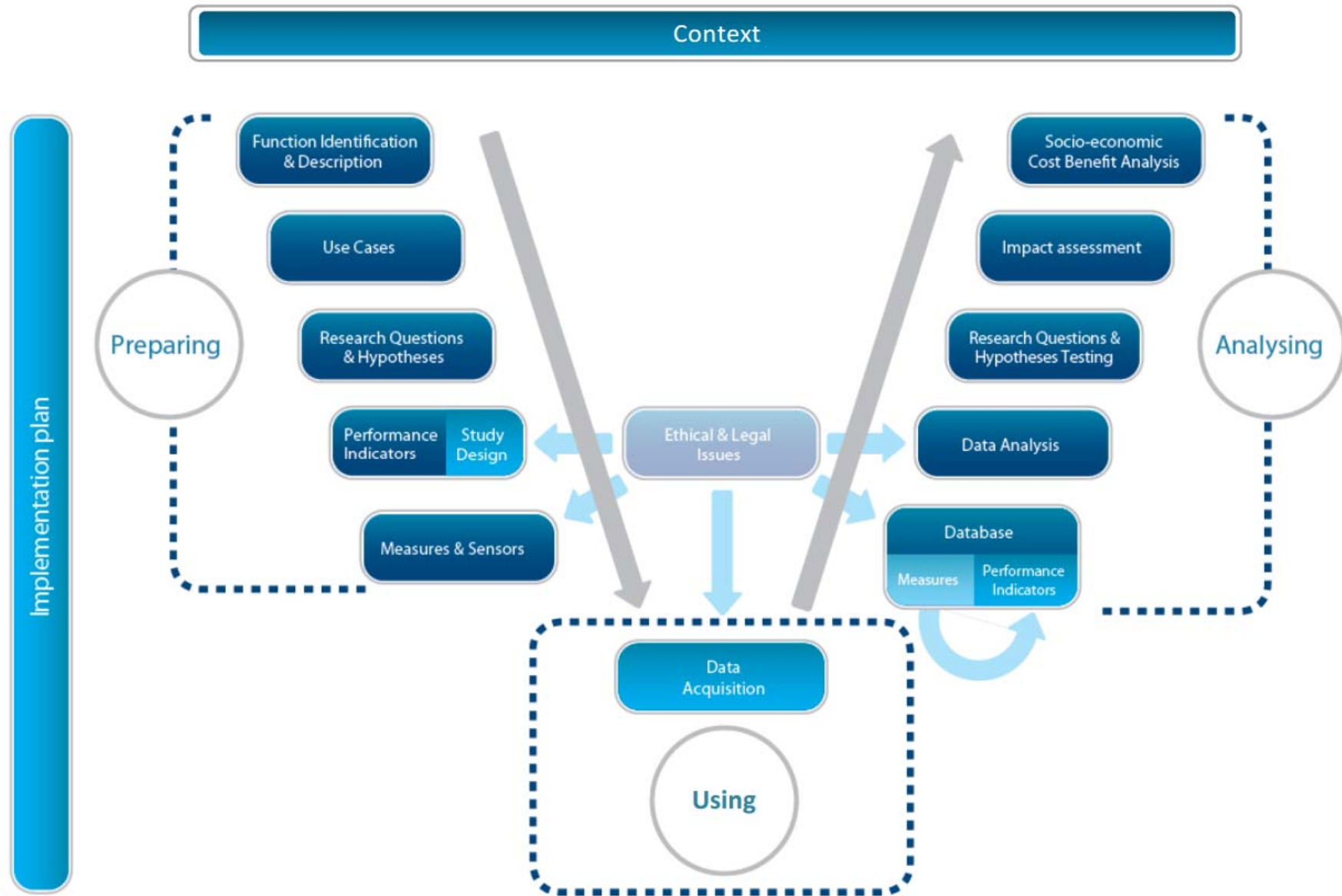
//FOT implementation steps*

Defining and preparing the study

- Function identification and description: initial review and specifications
- Define general objectives, research questions and test methodology
- Technical assessment goals and simulation plans
- Define and design data logging
    - Define additional data sources, e.g. weather, time tables
- **Data management plans (new)**
- Guidelines
    - Recruitment
    - Ethical and legal issues, legal agreement checklists
- Plan survey tools and questionnaires

* Adaptation of FESTA implementation plan for presentation purposes

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//FOT implementation steps

Test site set-up and pre-tests

- Set-up
  - Convene test site team
  - Finalize experimental procedures
  - Plan recruitment and driver incentives, driver training & briefing
  - Final legal agreements
  - Plan communication with stakeholders
  - Obtain or lease equipment
  - Instrument vehicles: sensors, data logging and new functions
  - Set up test site specific data collection and storage
- **Pre-tests** ("piloting"), as was extended in DRIVE C2X
  - Part 1 – Technical validation
  - Part 2 – First user tests
  - Part 3 – Piloting of analyses
    - ➢ Green light for testing?
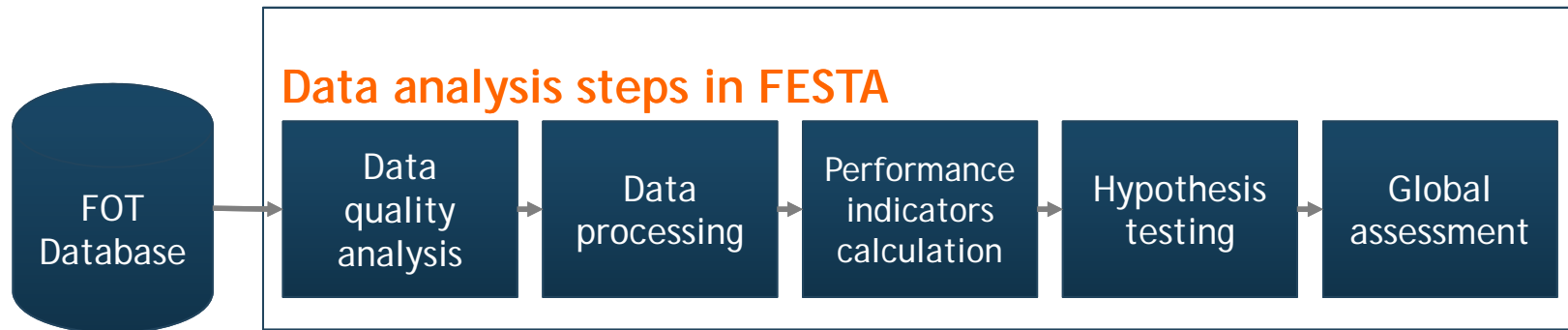
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//FOT implementation steps

Test execution and wrap-up

- Execution
  - Recruitment of subjects
  - Driver briefings and interviews
  - User support
  - Data collection including **periodical validation of collected data**
  - Additional technical tests
- Wrap-up
  - Users return systems or take up offers to continue use
  - Decommission systems or continue into operational phase
  - Video annotation by test site
  - Compile final datasets and finalise documentation & metadata*
  - Provision of data for analysis, anonymisation*
  - Data curation and sharing*

  * new topics addressed by FOT-Net's Data Sharing Framework

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//FOT implementation steps

Analysis

Data analysis steps in FESTA

FOT Database → Data quality analysis → Data processing → Performance indicators calculation → Hypothesis testing → Global assessment

- Data enrichment and post-processing to generate defined indicators and summaries
- Technical evaluation
- User acceptance
- Impact assessment, e.g. as in DRIVE C2X
  - Impacts on driving and travel behaviour
  - Impacts on safety, mobility, efficiency and environment
- Societal assessment and scaling up of results

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//Conclusions (1/2)

Automated driving tests from FESTA point-of-view

- FESTA implementation steps remain valid, the process seems the same
- Wider range of impact assessment research questions
  - Automated transport is bigger than wide-spread take-up of a function
    - Eventually brings up topics more commonly related to public transport, e.g. demography, land use, accessibility
    - Value of being able to work or watch a movie while travelling
  - Opinions, reactions and behaviour of other road users
    - Afraid? No eye contact, do we need new warning lights?
- Technology development status sets limitations to naturalistic testing: areas and users
  - FESTA methdology also applies to small-scale & controlled tests
  - For proving the value and reliability of the new technology, there's a need to go as naturalistic as possible

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//Conclusions (2/2)

Automated driving tests from FESTA point-of-view

- Data collection
  - Vehicles have capabilities to "annotate" the environment automatically, e.g. classify traffic situations
    - Reduces the likely extreme needs on manual video annotation
  - Not only monitoring of drivers' eyes, but their pose and activities
  - Detailed driving data needed for comparison against human drivers, e.g. lane keeping behaviour and safety margins, intersection driving
- Recent emphasis on data sharing
  - Anonymisation of GPS and video data
  - FOT-Net's Data Sharing Framework (FESTA extension)
- Collaboration allows for high-level coordination of test projects and their evaluation activities
  - Collect proof on technical reliability, impacts on driving
  - Harmonisation e.g. between EU-US-Japan

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Thank you.

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