

Welcome to the 1st NDS Public Conference!

13.06.2019, Munich

- Agenda & Basics
- Motivation Public NDS Conference
- Achievements 2018
- New Members
- Advantages and Benefits
- Outlook and goals

NDS Public Conference

Time		Subject	
09:00 – 09:20	1.	Welcome Notes / Introduction to 1 st NDS Conference	Martin Schleicher, Elektrobit
09:20 – 09:40	2.	The State of Autonomous Driving – What It Takes to Bring Self-Driving Cars to the Road	Felix Friedmann , Autonomous Intelligent Driving (AID)
09:40 – 10:05	3.	Building Cooperative Automated Public Transportation Systems and HD Maps	Seung-Mo Cho, SK Telecom
10:05 – 10:30	4.	Create a Replica of the World Based on HD Maps for Virtual Testing of Automated Driving Systems	Intakhab Khan, Automotive AI
10:30 – 10:55	5.	Vehicle Simulation with NDS ↔ OpenDRIVE Converter	Mario Aleksic, Daimler
10:55 – 11:25	Morning Break		
11:25 – 11:50	6.	How Safe is Safe Enough? PEGASUS Delivers the Standards for Highly-Automated Driving	Udo Steininger, TÜV SÜD
11:50 – 12:10	7.	NDS + ADASIS: Bringing Maps to Vehicle and Driving Functions	Roman Dolgov, Elektrobit
12:10 – 12:40	8.	NDS Achievements	Fabian Klebert, NDS Andre Heinrich, NDS
12:40 – 13:00	9.	NDS Future and Roadmap	Georg Horn, NDS
13:00 – 15:00	Business Lunch and Demonstrations		

NDS General Assembly

Time		Subject	
15:00 – 15:15	1.	Welcome by Chairman	Martin Schleicher, Elektrobit
15:15 – 16:15	2.	Proposed Resolutions	Markus Junker, NDS
16:15 – 16:30	3.	Closing Remarks	Martin Schleicher, Elektrobit

*NDS Internal Meetings
start at 15:00 today*

Joint Meeting of NDS Steering and Technical Committee

Time		Subject	
16:30 - 16:35	1.	Welcome by SC and TC Chairman	Martin Schleicher, Elektrobit
16:35 - 17:00	2.	Joint election of SC Chair/Vice Chairmen	Markus Junker, NDS
17:00 - 17:25	3.	Joint election of TC Chair/Vice Chairmen	Markus Junker, NDS
17:25 - 17:30	4.	Closing Remarks	Martin Schleicher, Elektrobit

Why do we organize the „First NDS public conference“?

- Communicate NDS strategy and benefits publicly
- More visibility and awareness for NDS
- Discussion and feedback with the industry

**NDS is THE worldwide
standard for map data
in automotive eco-systems**

NDS is THE worldwide

worldwide coverage and global adoption

standard for map data

one specification with enough flexibility
for a customized user experience

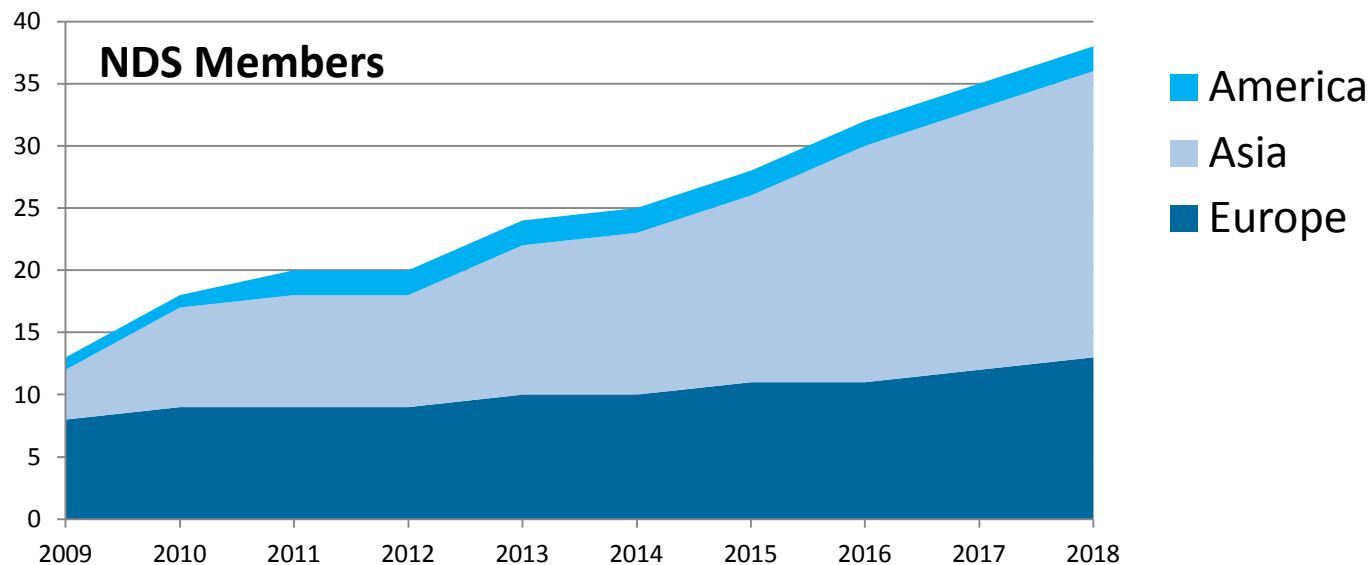
data model (structure & semantics),
storage format, interfaces, protocols

in automotive eco-systems

in-vehicle applications, companion applications, cloud applications, vehicle related services,
supporting navigation, driver assistance and autonomous driving

The NDS Association is Growing

- Number of members was constantly growing up to 38 today
- Majority of members from Asia and Europe
- Up to now 32 valuation contracts, more pending (e.g., with SIP-adus)



Visibility of NDS

- **Driving Simulator Conference (05.09.2018):**
Panel discussion „Standardization of Simulation Data Interfaces”
- **ITS World Congress Copenhagen (17.-21.09.2018):**
OADF Panel discussion and NDS booth
NDS will also attend ITS World Congress 2019 (21.-25.10.2019 in Singapore)
- **Autonomous Vehicle Symposium (20.05.2019)**
Presentation „OADF The cross-domain platform driving standardization in HAD”
- **OADF Meetings in**
 - Wuhan, China (12.07.2018)
 - Belmont, USA (05.02.2019)
 - Munich, Germany (12.06.2019) – huge success with 120 registrations
- Last but not least: **First public NDS Conference (13.06.2019) today**



Visibility of NDS

- New role 'Marketing Coordinator' in place:
 - Philip Hubertus, HERE
- Social media campaign to be launched to increase the visibility of NDS
 - Articles and whitepapers will be published regularly, e.g. "Maps for HAD"
 - Please inform Philip if you have any news to share



NDS Marketing Activities - Update of Progress: Campaign Content

What's news worthy?

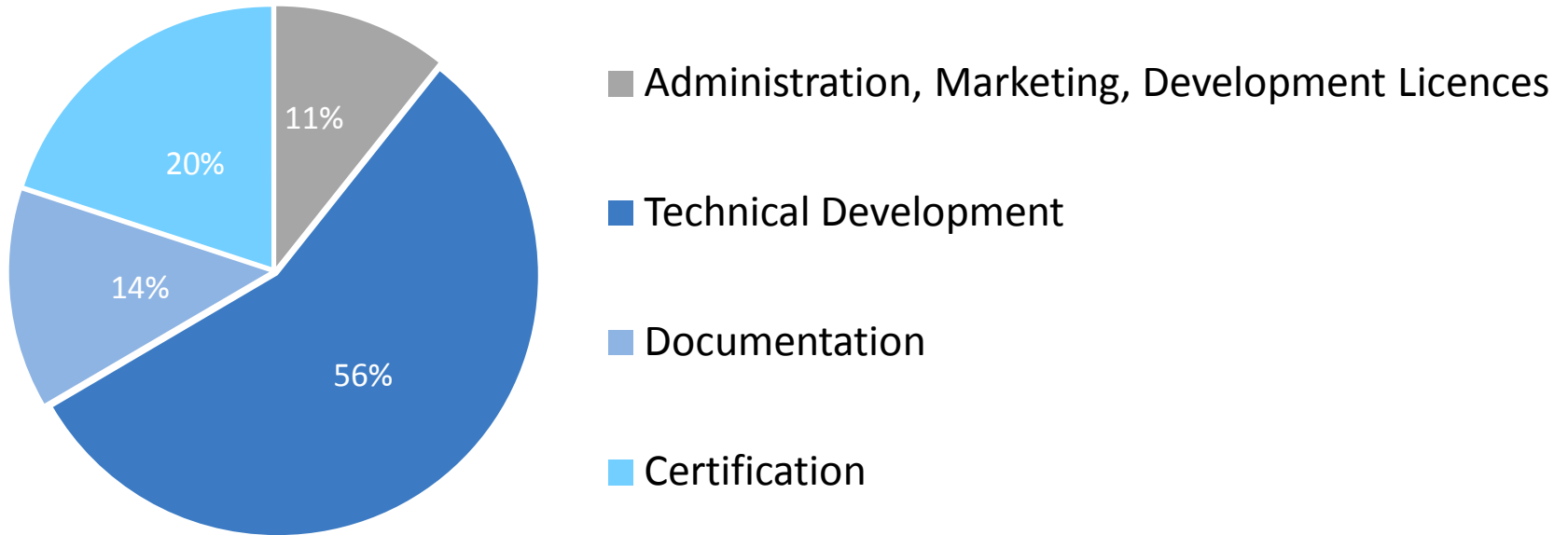
- Report out from NDS association activities at events, conferences etc.
- New NDS members with introduction
- New evaluation contracts with introduction and feedback
- Announcement of NDS spec and tool versions
- Reports from the WG meetings
- New SOPs by NDS members
- Success stories by NDS members

What makes you work on NDS?

 **Navigation Data Standard**

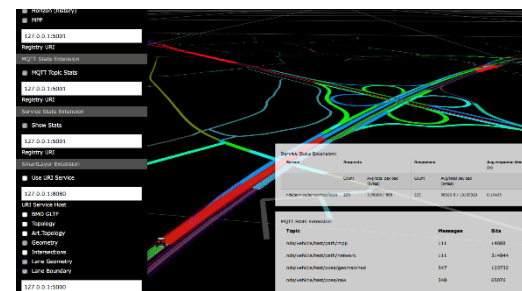
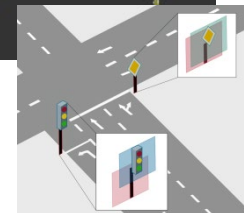
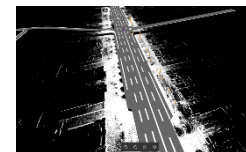
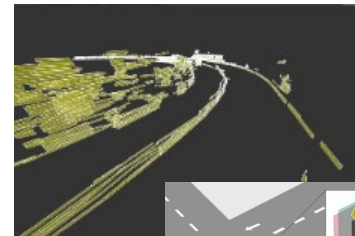
March 2019 | 5

The NDS Membership fees are well invested



Technical Development: NDS Releases and „Next Generation of NDS“

- **NDS specification 2.5.4** with new features:
 - Major improvements in all HD building blocks
 - Improved support for safety relevant systems
 - Believed to be used as base in first Automated Driving projects for 2020++
- Ongoing work on **“Next Generation of NDS”**
 - Overall architecture of distributed system
 - Focus on streaming map data (service interfaces) and online e-horizon
 - Highly modular approach
 - Proof-of-Concept to evaluate new approach
 - First alpha version released in May 2019



Technical Development: Advancements in NDS Tooling

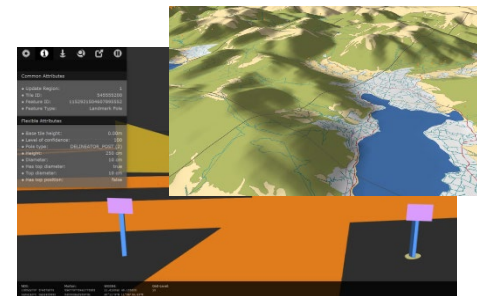
■ **zserio – the open source Serialization Framework**

- Published under Open Source License (BSD-3) in 2018
- Additional language support (Python) and services (GRPC)
- Ongoing work to support NDS.Live with advanced features



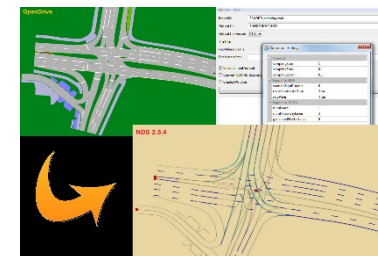
■ **Database Inspector & NDS Mapviewer**

- Advanced database search functionality
- Addition of 3D Objects, Digital Terrain, POIs, Labels, Localization Landmarks & Obstacles
- Powerful extension API to enable 3rd party development



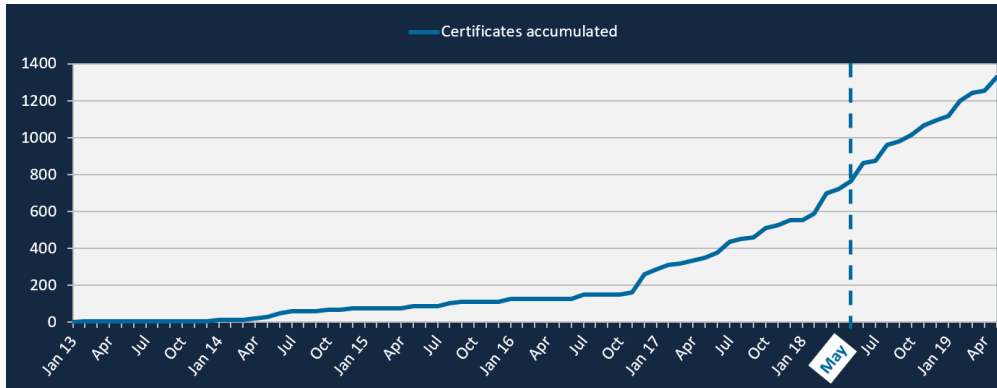
■ **OpenDrive Converter**

- **Roundtrip conversion** (NDS->XODR->NDS)
- Support for NDS 2.5.2 and 2.5.3



NDS Certification

- Certification Bench now supports NDS releases up to NDS 2.5.4
- Certification process and its documentation revised and improved
- Doubled number of NDS Certificates since May 2018 shows increasing acceptance of NDS in the market
- Successful ramp-up of new subcontractor for development of Certification Bench



NDS HD Maps for AD - Availability

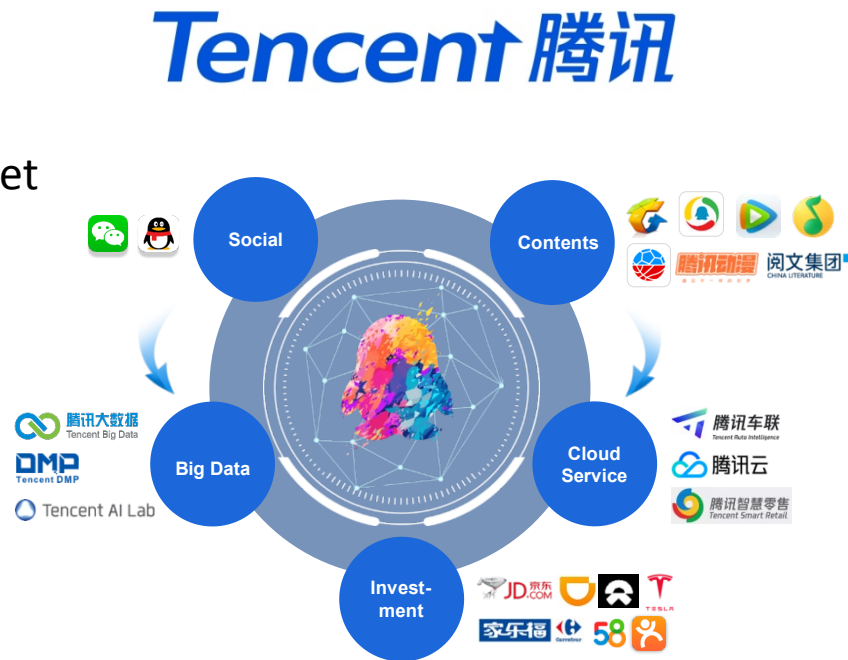
Who	Coverage	Comments	NDS Version
AutoNavi	China		2.5.4
HERE	North America and Western Europe	Ongoing global coverage roll-out	2.5.4
Kuandeng	China	<ul style="list-style-type: none">• Over 300 cities and 200,000 km highway and urban expressway covered in China so far.• Full coverage of highway and urban expressway expected within 2019 (About 330,000 km in total)• Also sample data in German and Korea. About several hundred kilometers including highway and urban roads.	2.5.1, 2.5.3, 2.5.4
NavInfo	China	<ul style="list-style-type: none">• 210,000 kilometers highway roads at the end of 2019 (of estimated total of 320,000 km)	2.5.3
Navis-AMS	South Korea	<ul style="list-style-type: none">• All highway and city expressways• All 4-lane roads	2.5.3

NDS HD Maps for AD - Availability

Who	Coverage	Comment	NDS Version
TomTom	Europe, North America, South Korea, China (via partner)	<p>The latest expansion brings TomTom's global HD Map and RoadDNA coverage to almost 380,000 km, including:</p> <ul style="list-style-type: none">• Interstates and highways in 48 U.S. states plus Washington DC* (185,000km);• Highways in Western Europe** (175,000 km)• Highways in Japan*** (18,000km) <p>* Mainland/Contiguous US: 48 states + Washington DC. Does not include Hawaii and Alaska. ** 19 Countries: France, Germany, UK, Spain, Italy, Ireland, Switzerland, Portugal, Austria, Czech Republic, Poland, Belgium, Netherlands, Luxembourg, Denmark, Norway, Sweden, Finland and San Marino. *** Japan main island</p>	2.4, 2.5 planned
Zenrin	Japan		

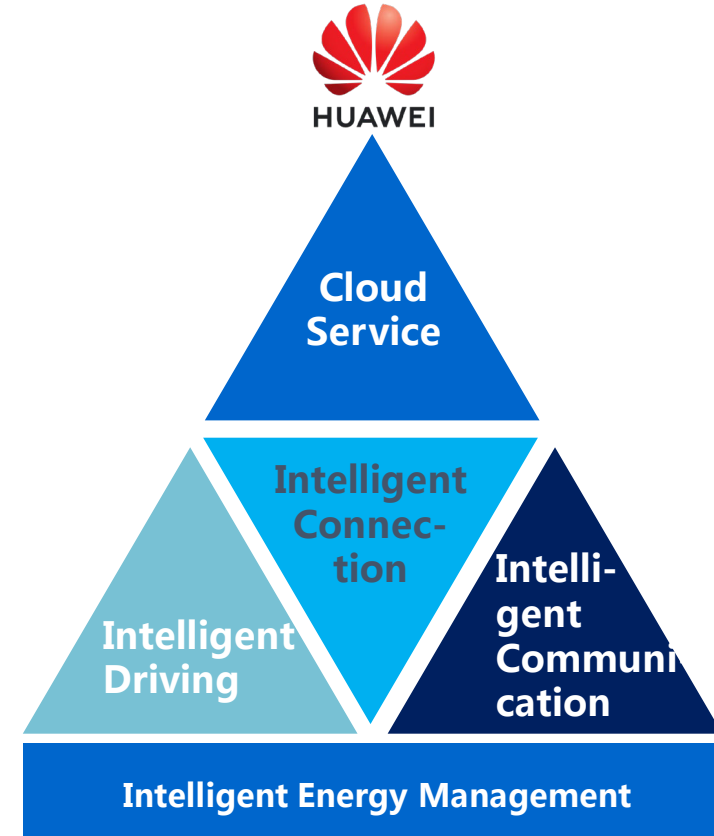
Tencent just joined NDS Association

- Leading Chinese internet service provider (> 1 billion users)
- Strategic decision for 'to-B' business: Automotive industry becomes potential market
- Already develops/provides telematics & autonomous driving products & services to Chinese market
- Joined NDS to get & share knowledge with the community
- Plans to provide NDS format map data & services in 1-2 years from now



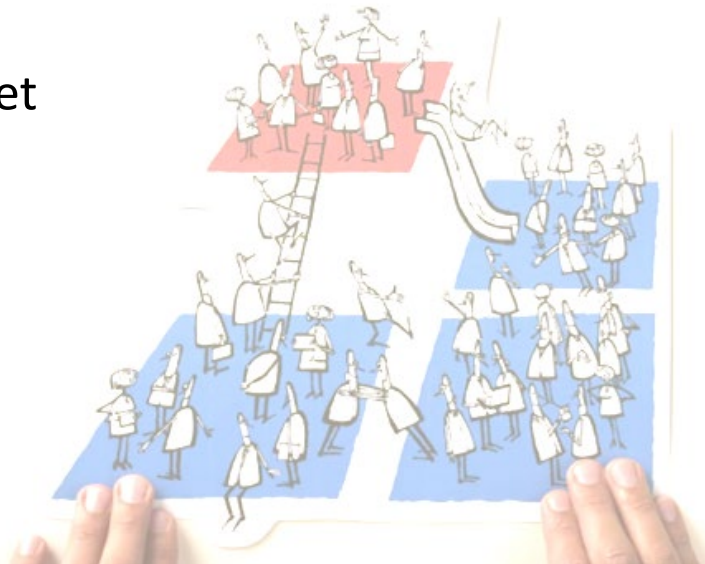
HUAWEI's accession to NDS is about to be completed

- Huawei is a leading global ICT solutions provider
- Huawei plans to become an incremental component supplier for making intelligent and connected car, based on ICT solutions, including:
 - MDC (Mobile data center) for intelligent driving
 - Hi-Car for intelligent communication in car
 - C-V2X module for intelligent connection
 - mPower for intelligent energy management
 - Octopus for cloud service for autonomous driving simulation and training
- Huawei plans to join NDS to contribute to HD map development which is critical to intelligent driving



Why to Become NDS Member?

- **Access to NDS specification and documentation**, to **NDS Support Team** and to a **lively NDS community**
- **Access to NDS tools** supporting the development of NDS compliant products
- **New business opportunities**, as there is a high demand for NDS compliance in the market
- **Avoid duplicate work** from the collaboration within NDS at development and testing
- **Cross-license** of other **NDS members' IPs** for own NDS products
- **Influence on the future development** of the NDS standard to the benefit of own business



Rights and Duties of NDS Members

■ Rights

- Access to NDS specification
- Participation and contribution to development of standard in all technical Working Groups (present Working Groups: 'Map Format', 'Autonomous Driving', 'Next Generation Architecture')
- Use of the other NDS members' IPs for own NDS compliant solutions
- Qualified for election in Steering Committee and Technical Committee

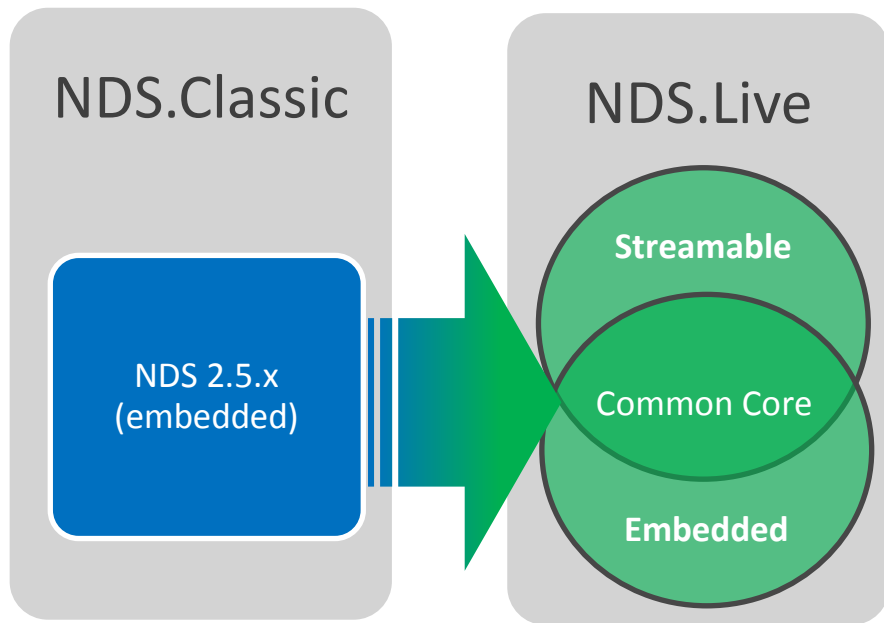
■ Duties

- Accession to NDS Cross License Agreement
- Entry fee of 60.000€ / Membership fee of 60.000 € per calendar year

Outlook: what's next for NDS

- Strategy and Evolution of the NDS standard
 - Product management and Product Definition Group to drive roadmap
 - Use cases driven specification work on future topics:
 - Navigation
 - Connected ADAS / electronic horizon
 - Automated Driving
 - Future Mobility
- Usage of NDS in projects
 - Software layer to simplify NDS database access from applications
 - Lower barrier for non-NDS members to use NDS for non-commercial use

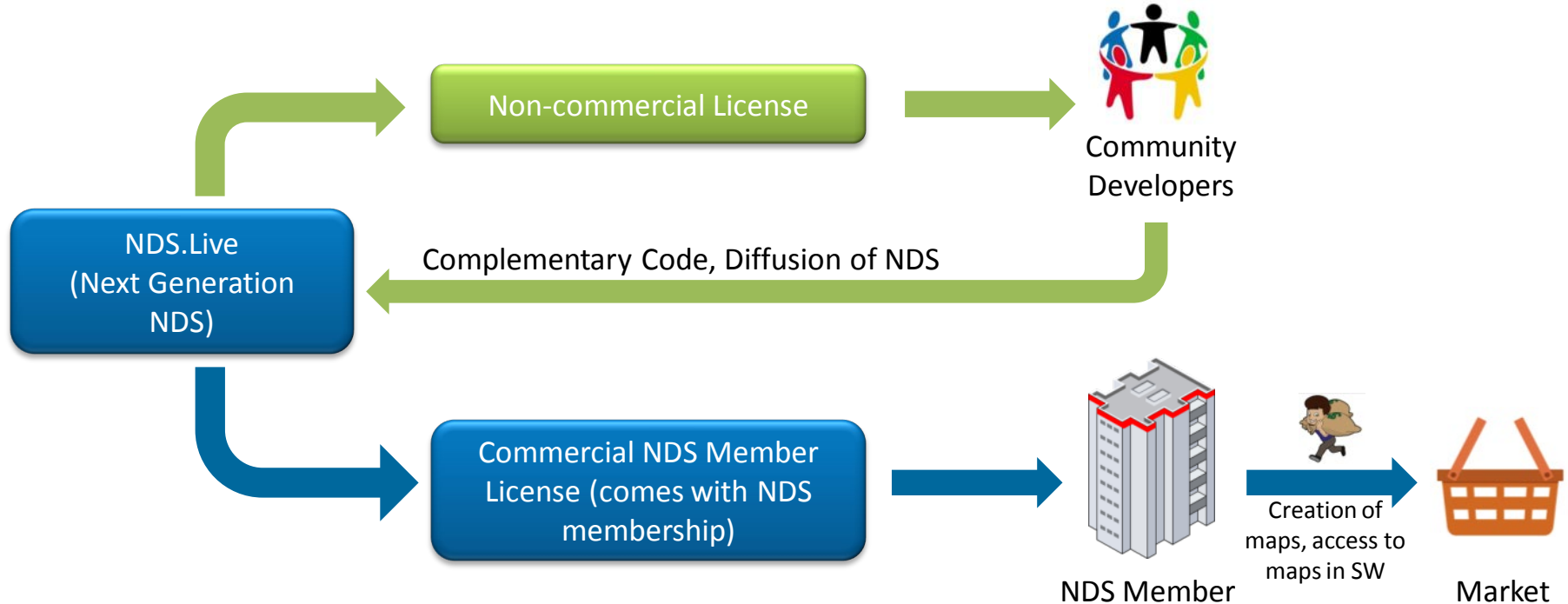
NDS Future and Roadmap: NDS.Live -> NDS as a Service



- Product Lines of NDS.Live:
streamable + embedded
to enable hybrid-scenarios and fallback solutions
- Clear separation between NDS.Classic and NDS.Live Generation for embedded
 - **re-factored embedded**
map data are part of NDS.Live
 - **Much stricter backward compatibility rules for NDS.Live**
 - **New concepts won't be back-ported to 2.5.x branch (NDS.Classic)**
 - NDS.Classic will be maintained in the future

NDS Diffusion as Open Source

New license models are under preparation for diffusion of NDS Standard



Call to action

- We are interested your feedback regarding:



Visibility of NDS and marketing activities



Product definition and roadmap



New product structure with NDS.Live and NDS.Classic



Software layer wrapping database



Simpler access to NDS for non-commercial use

- We are available: Georg Horn, Fabian Klebert, Markus Junker or myself.