

Car.SW Org.

How Volkswagen profits from Navigation Data Standard Past, Present and Future

Dr. Markus Kerper
Frankfurt | September 24, 2020

How NDS started and the first success

History

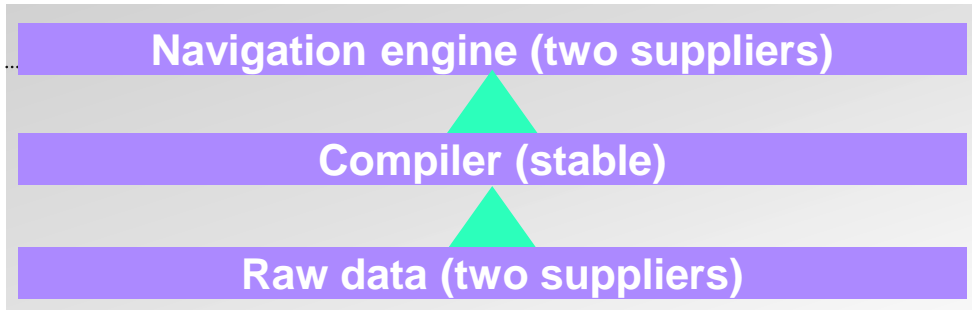
2004 – Foundation of an Industry Initiative

2009 – NDS becomes a Registered Association

2013 – First Volkswagen NDS System launched with Polo (MIB2 STD)

Success: First In-Car Navigation System from Two Different Suppliers

- NDS enabled the successful Volkswagen MIB2 system (Discover Media) to be the first Volkswagen in-car navigation system developed and produced by two different suppliers.
- From the beginning: Two different navigation engines (Applications)
- Over live time of the product: Two different raw data suppliers



Motivation

- Reduce costs and re-development efforts for compiler and testing
- Choose and switch between suppliers easily and not rely on proprietary DB formats

Result



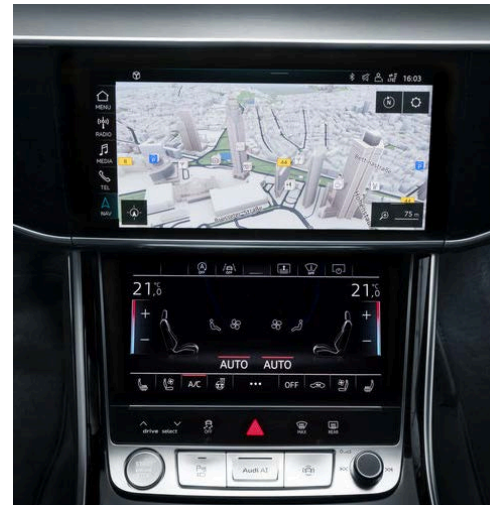
Lessons learned and setting up the next project (MIB3)

Lessons Learned

- NDS is a successful story
→ Role out NDS to Premium Brands. All navigation systems are using NDS in the Volkswagen Group.
- NDS Tooling and Validation Suite are the key for upcoming system generations. Research projects supported.
- Specification of „How to fill NDS“ is very important
→ Maintenance of the Filling Specification is one of the key tasks of the OEM
- Technical assessment / evaluation of suppliers can be done on one technical basis

The next (VW) project ...

- Goal: Adding more update-to-date features from NDS into the system; e.g. Incremental Map Updates on monthly basis, lane positioning and guidance
- Supporting Hybrid use-cases such as Routing, Dynamic POIs, Search, etc.
- Minimize the efforts on maintenance of the project after start of production
- Test and approval process shall be the same for all variants and markets (again for different suppliers)



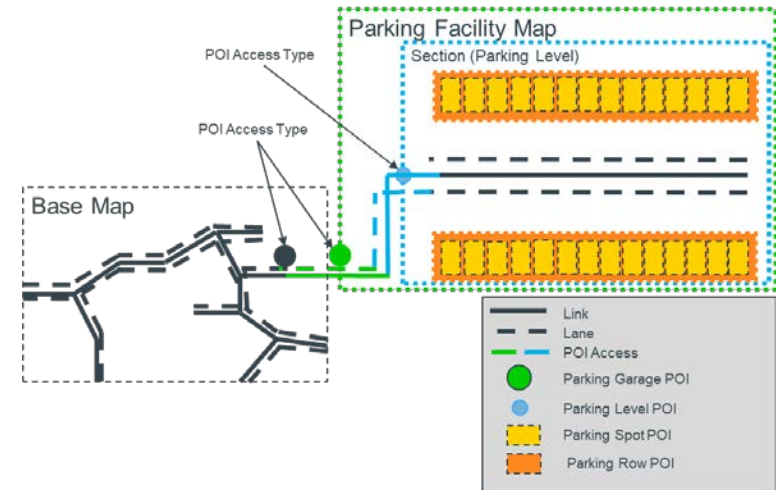
Research Activities and Automated Driving

Trend towards Automated Driving and NDS - Working Group 3

- Started research activity and implemented DAL for internal projects with the goal to realize research projects on a close-to-series environment
- Took a key role in discussions in WG3 regarding the NDS Lane Model and realized prototypes based in this format
- Requesting the development of Parking Garage Maps in NDS

Transfer the results and know-how to development

- Transferred three key functions to development to support the next project:
 - a) Standardized Lane Model in NDS 2.5.2
 - b) Algorithms for localization on a Lane Model
 - c) Prototype for Lane Guidance functionality and Tooling



Lessons Learned from MIB2 + NDS 2.5.2 including new features supported the MIB3 project from the beginning

Launching the MIB3 – The Success Story Continues

Lane Guidance based on NDS 2.5.2 in EU / NAR

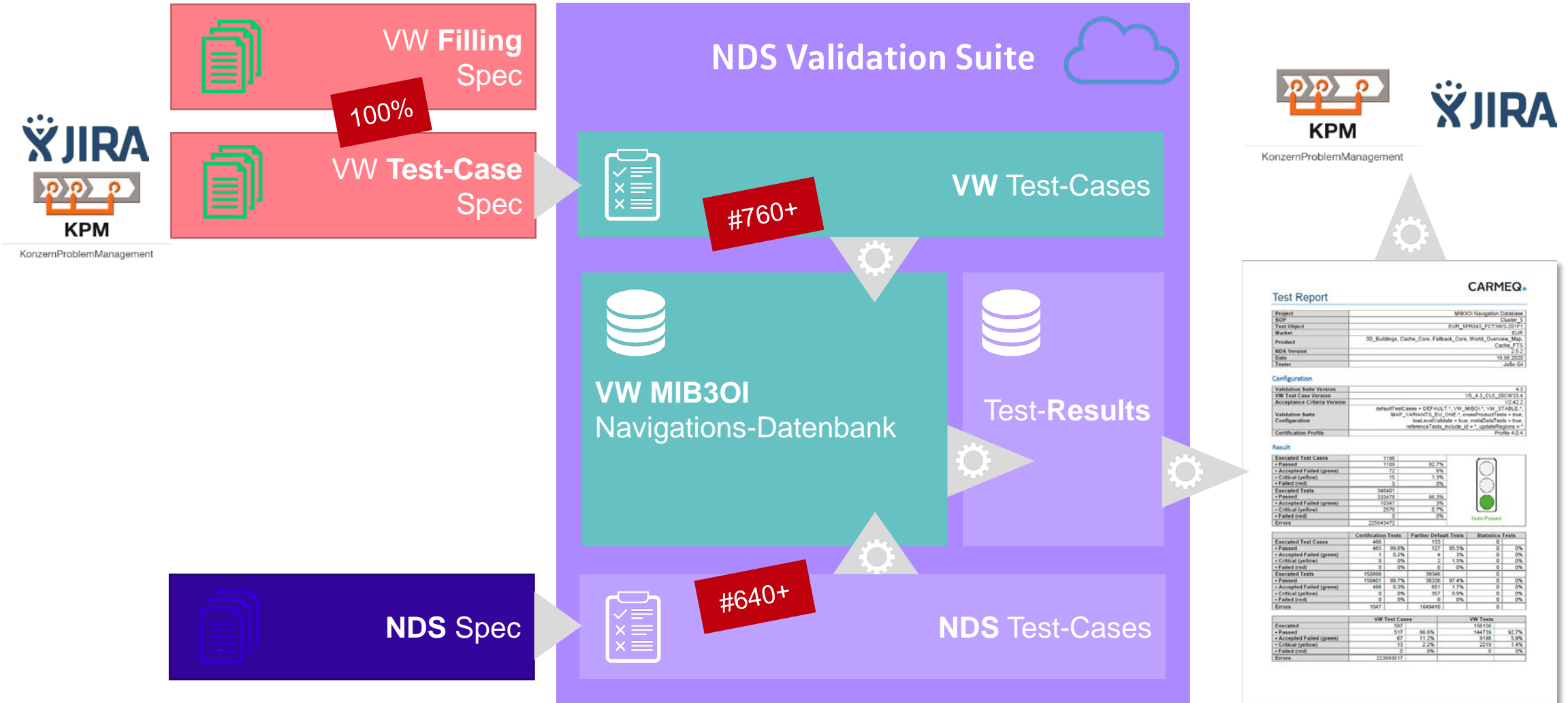
Überfahrt A4 aus Dresden nach A13
in Fahrtrichtung Berlin

zwei aufeinanderfolgende Manöver
mit Spurwechsel



How we are updating and testing the database

Updating and Testing on a monthly basis



Test Report

Project: MIB3OI Navigation Database
 Test Object: EUR_SFR043_FCT3W3-20171
 Market: EUR
 Product: 3D_Buildings_Cache_Core_FallBack_Core_World_Overview_Map_Cache_FTS
 NDS Version: 3.1.2
 Date: 18.08.2020
 Tester: Jode Gi

Configuration

Validation Suite Version: VS_4.3_CLL_200313.4
 VW Test Case Version: 2.42.2
 Acceptance Criteria Version: defaultTestCases = DEFAULT; VW_MBOI; VW_STABLE; Map; Validation_EU_One; KonzernProblemMgmt = true; levelOfValidation = true; metaDataTests = true; referenceTests_include_id = *; updateRegions = *

Certification Profile: Profile 4.0.4

Result

Category	Count	Percentage
Executed Test Cases	1198	
Passed	1109	92.7%
Accepted Failed (green)	72	6%
Critical (yellow)	15	1.3%
Failed (red)	0	0%
Executed Tests	345401	
Passed	333478	96.3%
Accepted Failed (green)	10347	3%
Critical (yellow)	2576	0.7%
Failed (red)	0	0%
Errors	225943472	

Less Passed

Category	Count	Percentage	Further Default Tests	Statistics Tests
Executed Test Cases	486		133	0
Passed	465	95.6%	127	95.5%
Accepted Failed (green)	1	0.2%	4	3%
Critical (yellow)	0	0%	2	1.5%
Failed (red)	0	0%	0	0%
Executed Tests	150899		39346	0
Passed	150461	99.7%	38538	97.4%
Accepted Failed (green)	498	0.3%	601	1.7%
Critical (yellow)	0	0%	387	0.9%
Failed (red)	0	0%	0	0%
Errors	1047		1648410	0

Category	Count	Percentage	VW Tests
Executed	597		156156
Passed	517	86.4%	144738
Accepted Failed (green)	67	11.2%	9188
Critical (yellow)	13	2.2%	2219
Failed (red)	0	0%	0
Errors	223993017		

Support new Features based on NDS

Augmented Reality in ID-Family



**More to
come...**

What is next?

Topic	Details
<p>01 Structural changes in the VW group</p>	<ul style="list-style-type: none"> Car.SW Org develops one unified software platform for the Group including standardized infotainment platform, highly automated driving functions, software functions for linking powertrains, chassis and charging technology, ecosystems for all mobility services and digital business models.
<p>02 Defining the product and its mission</p>	<ul style="list-style-type: none"> What are the customer needs now and in some years? How do we harmonize the requirements of all brands and markets in future? What are the technical challenges we need to address?
<p>03 Standardization efforts and research needed</p>	<p>The diagram illustrates the timeline of infotainment system development. It shows two parallel paths for MIB2 and MIB3, and a third path for an 'Upcoming Project'. Key milestones include 'Start', 'SOP' (Start of Production), and 'Update'. A dashed line labeled 'Reasearch & Standardization' spans from the start of MIB2 to the start of the upcoming project. A red dashed arrow labeled 'Today' points to the 'Update + Rollout to electric Vehicles' milestone on the MIB3 path.</p>

Car.SW Org. is committed to NDS and will plan future generations of the infotainment based on NDS

Thank You



Dr. Markus Kerper

