How TomTom builds the freshest maps
March 2013

Yves Muysen – Director Product Management
Your host

Yves Muysen
Director Product Management - Maps: for TomTom, based in Belgium.

Yves is responsible for the Map Unit’s Global Product Strategy, Roadmap, and the Product Life Cycle – serving over 700 customers in the Automotive, Enterprise & Government and Consumer markets.
TomTom data used in many applications

- Consumer electronics
- Automotive
- Business Solutions
- Geo-spatial
Supplying the leading car manufacturers with maps

35% market share and growing
Leading Innovation in Mapping

- **1990-1995**: First digital European navigable map
- **2000**: North America & UK through ETAK acquisition
- **2002-2003**: Mobile Mapping Vans in North America and UK
- **2004**: North America updates through GDT acquisition
- **2005-2006**: First 3D Land Marks and cities
- **2006**: Expansion APAC, Africa & Latin America
- **2009-2010**: Power of community
- **2011-2012**: First NDS pilots, Open-LR Incremental updates
Maps as part of the TomTom offer

- HD Traffic
- Free daily map changes from the Map Share community
- IQ Routes
- The most up-to-date map
Maps Product Portfolio

Leading Global Coverage

TomTom has a leading global coverage, supporting 233 countries of which 111 are navigable.

Richest Content

Wide range of Enhanced content such as Address Points, Logistics, 2D city maps, 3D city models, 3D landmarks, ADAS content, Voice Maps,…

The freshest map

TomTom coverage is updated daily using multiple sources and delivered to customers on quarterly basis with increments available in between.
World wide coverage

111 navigable countries

163 000 000 addresses
36 917 000 km of roads
42 500 000 points of interest
30 000 000 Voice Transcriptions
TomTom’s Hybrid Map-Making Process delivering Coverage, Quality and Freshness

Detect Change
- Community Input
  - Active + Passive
- Traditional Sources
  - Partner community input

Validate Change
- Leading Fusion Engine
- Moderation & Guided Community

Accept Change
- Leading Content Store
- Real-time Quality Checks

Publish Change
- Map Edits
- OpenLR
  - Incremental Updates with MN-R/NDS/LBS

Reduction from 6 months to 48 hours or less
Combining a multitude of sources

- 250 000 reports/month by TT device users
- 10 000 reports/month by web users
- 7.5 trillion data points till date
- Covering 195 countries
- More than 10 million miles driven globally
- More than 50 000 sources globally

Offices in more than 40 countries
Updating where people drive

- Detect new geometry
- Add Traffic Flow
- Update Speed Information
Continuously improving Mobile Mapping Technology

- Ladybug 360° camera
- Laserscanner
- Differential GPS
- 3D gyroscope
- Laptop & TomTom device
- Odometer

1999
2002 - 2003
2003-2006
2006-2008
2008-2010
2011 - ...

TomTom
Intelligent processing of Mobile Mapping data

360° Panoramics view

Use cases:

• Manual verification and reference for road attributes
• Semi-automated Image recognition for Speed limits
• Detection of Traffic Signs
• Attribution of lane information
• Attribution of Signpost information
Building an archive of Lidar data

Every Mobile mapping van is equipped with high resolution Lidar equipment

TomTom is archiving and mining this data to further improve its core database and product
Building products based on driver behavior (Prototypes)

Driver Speed Behavior
Speeds along a segment
Red: Median
Blue: 5th percentile
Green: 95th percentile
Publishing change quickly

- Location Based Services: Map content **service** from Product Data Store via APIs
- Navigation Data Standard: modular **run time format**
- Standardized **data exchange formats** (GDF, Shape, MultiNet-R)
Fresh map - Daily updates sent back to the end user

- 15,557 individual changes
- 12,322 road closures
- 2,780 turn restrictions
- 356 changes in traffic flow
- 99 changed maneuvers

- August 5th was the busiest day with 1,046 patches
A certified Quality Management Framework

• Adopted Quality Management Standards: ISO/TS16949 and A-SPICE
  • Developed by the Automotive Industry to effectively control the quality of the output their suppliers

• ISO/TS16949
  • Focused on suppliers of parts
  • TomTom is certified since 2005 (EMEA), 2008 (APAC) and 2009 (NAM)

• Automotive-SPICE
  • Focused on suppliers of software
  • Assessment model of Process Maturity
  • TomTom recently reached level 2. External assessment planned for Q1 2013
Quality Monitoring and Checking

Map Quality Reporting

- Road geometry completeness and accuracy
- Direction of traffic and maneuvers
- Speed restrictions

Platform Testing and Regression Analysis:

Subject Quality Reporting: Completeness and correctness per subject per area

Real world application quality & benchmark

Overall  Address  POI  Address  POI  Route  Route
Availability Availability Accuracy Calculation Guidance

Geometry error detected

Standard Quality Check

Subject Quality Reporting
TT is a **leading innovator** in delivering the freshest map for the driver

- Proven capabilities fusing traditional sources with probe data
- Proven capabilities to publish daily updates to the end user
- Proven leadership in NDS development
- Fully integrated in existing Quality Management Systems

TT leverages its technology innovation to deliver a **globally competitive map** that brings the **best routing and guidance experience for the driver**
Thank You

For more information...

Yves.Muyssen@tomtom.com