Modular INNOVATION Toolkit (MiT)
Center of Automotive Management
Prof. Dr. Stefan Bratzel

January 2019
Content

Overview – CAM Modular INNOVATION Toolkit (MiT)

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The Modular INNOVATIONS Toolkit (MiT) is developed by CAM as an unique strategy and planning tool designed to evaluate current and future trends of the automotive industry and the mobility system.

MiT is based on ...

- an **Automotive INNOVATIONS data base** surveying more than 90 car manufacturers in key technology areas like powertrain, connected car, safety and autonomous driving, interior. Customer centric novelties are continually updated and analysed using about 50 defining attributes like innovations type, originality, maturity etc.

- a **Mobility Services data base** consists of more 400 platform services like ride hailing, car sharing, intermodality that are offered by automotive manufacturers as well as mobility providers or digital players and start-ups. Mobility Services are periodically updated and analysed.

- CAM Research reports providing market data, analytic insights and forecasts on key technology fields like E-Mobility, Connectivity and Autonomous Driving.
CAM research is fundamentally based on two databases which are continuously updated, enlarged and improved since more than ten years.

**CAM Automotive INNOVATIONS database:**
- 36 global car groups with 90 automotive brands
  - VOLKSWAGEN AG
  - TOYOTA
  - DAIMLER
  - BMW Group
  - Other global groups
  - GROUPE RENAULT
  - HONDA
  - HYUNDAI Motor Group
  - Other global groups
  - CHRYSLER
  - PSA
  - Other global groups
  - FCA
  - PSA
  - Other global groups
  - CHRYSLER
  - PSA
  - Other global groups
  - BMW Group
  - Other global groups
  - CHRYSLER
  - PSA

**CAM Mobility SERVICES database:**
- Automotive global car groups + Non-automotive players
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler
  - Service Brands of Automotive OEM
  - Volkswagen
  - Toyota
  - Daimler

**Non-Automotive Mobility Service Provider**
- Non-Automotive Mobility Service Provider

**Non-Automotive Mobility Players**
- Non-Automotive Mobility Players

**Chinese and smaller groups**
- BYTON
- BYD
- NEXTEV
- Great Wall
- McLaren
- BYTON
- BYD
- NEXTEV
- Great Wall
- McLaren
- Chinese and smaller groups
- SAIC
- CHANGAN
- GEELY
- BAIC
- BRILLIANCE
- Mahindra
- Chinese and smaller groups
- SAIC
- CHANGAN
- GEELY
- BAIC
- BRILLIANCE
- Mahindra
- Chinese and smaller groups
The CAM AutomotiveINNOVATIONS databases is filled on a regular basis. Every quarter a new update is released. The databases contains more than 10,000 single innovations at present. Each innovation is tracked and analysed using more than 50 attributes.

Features and attributes of the AutomotiveINNOVATIONS database

**Basic information**
- name
- description
- picture
- year presented

**Survey object**
- company
- brand
- production series
- model
- segment

**Market Launch**
- planned year(s)
- planned market(s)

**Technology classification**
- technology field
- subfield
- main type
- innovation type

**CAM assessment**
- Originality
- Maturity level
- Customer Benefits:
  - Driving dynamics
  - Convenience
  - Safety
  - Versatility
  - Efficiency
  - Environment
- Innovation level
- Innovation strength

**Source**
- original text (copy)
- date of original text
- sources (URLs etc.)
- sources of pictures
- link to picture (if avail.)
- link to video (if avail.)

**Quantified data**
- fuel/power consumption
- CO2 emissions
- electric range
- battery size

**Supplier information**

... and much more

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**Number of total and world-first innovations (accumulated)**

![Graph showing the accumulated total and world-first innovations from 2005 to 2022.](image)

**Source:** CAM. *2018 - 2022 and n total estimated.

Limited comparability of data from 2016 on with previous years due to slightly adjusted method, e.g. stricter standards of innovation definition, upgrading of world-first innovations.

\[ n = 16500^* \]
MiT can support you:

1. **Compare technical novelties** and the resulting innovation strengths in all automotive technology fields and car segments of your company with those of your competitors (Competitive Intelligence and Analysis).

2. **Identify** necessary **technologies and innovations** for strategic model planning in different segments and define your unique selling proposition (Innovation Planning).

3. Gain **visibility** on **mobility services** offered by OEM and new competitors and the current and future market demand (Comparing Mobility Ecosystems)

4. **View** the innovations and **technologies presented on motor shows** and technology fairs (Technology Scouting)

5. **Discover relevant innovations and mobility services** with high customer adoption rates (Future Innovations and Services)

6. **Identify** necessary **competencies** to be successful in future technology fields (Competence Analysis)

7. **Assess single innovations** with the help of **experts** or **collective intelligence**. Real or potential buyers can contribute online with their opinions (Consumer and Expert Innovation Assessment)

8. We conduct **customer-tailored innovation** and **market research projects** for our clients using MiT that leads to action-oriented recommendations
**USE CASE 1: Competitive Intelligence, Benchmarking and Analysis**

**Compare** technical novelties and the resulting innovation strengths in all automotive technology fields and car segments of your company with those of your competitors.

**BENCHMARKING/TODAY**
(Examples, Data: 2017)

**KEY QUESTION:** Which features are essential for a future product in a certain segment?

**FUTURING/FORECAST:**
- Coverage of concepts/ pre-series innovations
- Analysis of OEM announcements
- Tracking of suppliers innovations

**Examples:** BEV Innovations (Data: 2018)
**USE CASE 1: Innovation Analysis & Forecast - Sources and Methods**

**Forecast:** We analyze product strategies, competencies and forecast innovation activities of automotive groups or brands in core future technology fields like electric drivetrain or self driving cars.

**We use multiple sources and methods to assess strategies, competences and innovation strengths of OEMs/brands:**

- **Announcements:** Research of future product planning of OEM and brands, e.g. in certain technology field like electric drivetrain. 
  *Sources:* Announcements of OEM, specialized literature, automotive magazines, automotive web portals

- **Technical Data:** Research or assessment of important technical details, e.g. range of electric vehicles, functions of ADAS, capability of autonomous driving features (e.g. autonomy level one to five) etc. This is important for profound assessment of innovation strength

- **Assessment of Innovation Strength:** Assignment of innovation strength to each future product regarding technology field, corresponding to past assessment of similar innovations, based on technical data like mentioned above. Method: CAM MOBIL approach.

- **Aggregation:** The innovation strength of single innovations of each OEM or brand is aggregated to a sum total. So the assessment of an OEM or brand is comparable to another in a technology field.
USE CASE 2: Innovation Planning

**Identify** necessary **technologies and innovations** for strategic model planning in different segments and define your unique selling proposition (Innovation Planning).

*Example: Electric Mobility Roadmap (Data: 2018) & Safety Innovation Planning Luxury Segment (Data: 2018)*
## Mobility Services Scheme

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Daimler</th>
<th>VW Gr.</th>
<th>BMW</th>
<th>Ford</th>
<th>Hyundai</th>
<th>Tata</th>
<th>Renault</th>
<th>Tesla</th>
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### Selected Relevant Mobility Provider

<table>
<thead>
<tr>
<th>Provider</th>
<th>Services</th>
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<tr>
<td>Didi Chuxing</td>
<td>CarFinder, RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
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<tr>
<td>Uber</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
<tr>
<td>Renault</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
<tr>
<td>Hyundai</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
<tr>
<td>Tata Motors</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
<tr>
<td>Tesla</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
<tr>
<td>Ford</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
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<tr>
<td>Daimler</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
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<tr>
<td>Volkswagen</td>
<td>RideHailing, Maps, Navigation, Payment, Parking, Carsharing</td>
</tr>
</tbody>
</table>

### Mobility Services of Automotive OEM (as of 2018-08, excerpt)

**Visibility on Mobility Services**

**Gain visibility** on mobility services offered by OEM and new competitors and the current and future market demand (Comparing Mobility Ecosystems)
USE CASE 4: Technology Scouting

**View the innovations** and technologies presented on motor shows and technology fairs (Technology scouting)

*Example: CAM Procedure of Technology Scouting (Example Trade Fair in China 2014)*
**USE CASE 5: Future Innovations with High Customer Adoption Rates**

**Discover** and adjust relevant innovations and mobility services offerings with high customer adoption rates

**CAM Concept: Factors of High Customer Adoption**

- **Rational Customer Benefit**
  - „functionality“
    - Preis-/Leistung
    - Leistungsumfang
    - Sicherheit
    - Zuverlässigkeit
    - Umweltfreundlichkeit

- **Leistungs-Quadrant**
  - Rationale Kundenakzeptanz / langsame Adoptionsdynamik / moderate Zahlungsbereitschaft meist mit hoher Nachhaltigkeit

- **Bratzel-Quadrant**
  - Hohe Kundenakzeptanz / starke Adoptionsdynamik / hohe Zahlungsbereitschaft

- **Nischen-Quadrant**
  - Geringe Kundenakzeptanz und Adoption / nur Nischenanwendung

- **Emotions-only Quadrant**
  - Begehrlichkeit mit geringen rationalen Nutzen / schnelle Adoptionsdynamik / jedoch häufig ohne Nachhaltigkeit

**Emotional Customer Benefit**

- „attraction“
  - Persönlichkeit / Status
  - Sozialer Nutzen
  - Beziehungsnutzen
  - Simplicity
  - Spieltrieb/Coolness
USE CASE 6: Competence Analysis

**Identify** necessary **competencies** to be successful in future technology fields like electrified drivetrain, autonomous driving, connected cars and mobility services.

*Key Questions on Competence Analysis*

- What are the **core competencies** that are needed for certain products/services?
- Which relevant **players/competitors** have these competencies available already? What is still missing?
- How can I **gain** these **competencies**: Own setup, acquisition, partnerships?
- Which **partners** within and beyond automotive industry are suitable for cooperation?

*Example: Autonomous Driving*

**Core Competencies to build and offer autonomous driving cars:**

- Hardware sensor technology (radar, lidar, camera ...)
- Software (implementation, artificial intelligence, ...)
- Data of surroundings (high density maps)
- Mobility services platform (access to customers)
- ...
USE CASE 7: Consumer and Expert Innovation Assessment

The CAM AutomotiveINNOVATIONS database can be used to assess single innovations, with the help of experts or collective intelligence. Real or potential buyers can contribute online with their opinion.

Example: Customer survey

Three ways to learn about the appreciation or assessment of innovations:

- **Customer survey**: web portal for consumers to assess innovations (real or potential use)
- **Expert assessment**: comparison of innovations with defined criteria by expert jury
- **Blog reviews**: (partly) automated review of blogs that deal with innovative automotive or mobility topics

Analysis are possible for technical innovations or mobility services.
USE CASE 8: Customer-tailored innovation and market research projects

We conduct **customer-tailored innovation and market research projects** for our clients using MiT that leads to action-oriented recommendations.

**Project Examples (Selection)**

- **Study „Das vernetzte Reisemobil“** Wertschöpfungsfaktor Connectivity

- **Innovationskraft der deutschen Automobilhersteller und Zulieferer**
  International vergleichende Analyse von Innovationen und Innovationsbeziehungen unter Berücksichtigung zentraler Technologiefelder zwischen 2005 und 2014
  
  **Center of Automotive Management (CAM)**
  Prof. Dr. Stefan Bratzel
  Bergisch Gladbach, im Februar 2016
  
  www.auto-institut.de // www.AutomotiveINNOVATIONS.de

- **Study: FINANCING AND INSURANCE OF NEW MOBILITY CONCEPTS**

- **Center of Automotive Management (CAM)**
  Prof. Dr. Stefan Bratzel
  Dipl.-Ing. Ralf Teilmann, Dr. Oliver Ehret
  www.auto-institut.de
CAM uses MiT to evaluate and compare the overall innovation strengths of OEMs*. As a result we conduct studies ranking the OEMs according to their innovation strength.

- The rankings are broadly used in media coverages to compare the Innovation Performance of OEMs or the industry as a whole.
- Based on the MiT we award prizes in certain innovation categories yearly together with our partner PriceWaterhouse-Coopers (PwC): The winners are honoured by a ceremony in Frankfurt and receive the AutomotiveINNOVATIONS Award.

*All innovations are systematically assessed and get a certain predefined „score“ using four criteria (CAM MOBIL approach): Maturity, Originality, Benefit and Innovation Level. For more information see: http://www.auto-institut.de/index_htm_files/Methodik_One-Pager.pdf. This, in our view, is a much more meaningful indicator for assessing the innovation performance of an OEM or brand than simply counting patents or R&D expenses.
Director of the Center of Automotive Management is Professor Stefan Bratzel, who founded the institute in 2004.

At the same time, Prof. Bratzel is the technical director of the business administration specialization automotive industry at the private university of applied sciences (FHDW) in Bergisch Gladbach.

Stefan Bratzel (born 1967) has worked for several years in the product marketing of the Daimler subsidiary smart and as sales manager for an automotive supplier.
### CAM - Modular INNOVATIONS Toolkit (MiT)

<table>
<thead>
<tr>
<th>Innovations Database</th>
<th>Mobility Services Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Data: INNOVATIONS/SERVICES TOMORROW</td>
<td>Current/Past Data: INNOVATIONS/SERVICES TODAY</td>
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<tr>
<td><strong>OEMs</strong></td>
<td><strong>Suppliers</strong></td>
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<tr>
<td><strong>OEMs</strong></td>
<td><strong>Mobility / Digital Players</strong></td>
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</tbody>
</table>

#### CAM Automotive INNOVATIONS database:
36 global car groups with 90 automotive brands

- **Volkswagen AG**
  - Volkswagen
  - Audi
  - Seat
  - Škoda
  - ...  

- **Toyota**
  - Toyota
  - Lexus
  - Daihatsu

- **Daimler**
  - Mercedes-Benz
  - Smart

- **BMW Group**
  - BMW
  - MINI
  - Rolls-Royce

- **Other global groups**
  - Groupe Renault
  - Honda
  - Hyundai Motor Group
  - Tata
  - Ford
  - Suzuki

- **Chinese and smaller groups**
  - BYTON
  - BYD
  - NextEV
  - Great Wall
  - McLaren

#### CAM MobilitySERVICES database:
Automotive global car groups + Non-automotive players

- **Service Brands of Automotive OEM**
  - CAR2GO
  - ON Call
  - moovel
  - Audi connect
  - CRUISE
  - OnStar
  - JAGUAR ESECURITY
  - ParkNow
  - mytaxi
  - A Link

- **Non-Automotive Mobility Service Provider**
  - Uber
  - trive.me
  - DB
  - Grab
  - AVIS
  - OLASHUTTLE
  - DiDi
  - Parkopedia
  - GETGEBER

- **Non-Automotive Mobility Players**
  - Alphabet
  - Waymo
  - Apple
  - Microsoft
  - IBM
  - Amazon
  - Baidu
  - Alibaba.com
**Electric Drive (BEV)**

Top Automotive Groups by Innovation Strength (Cumulative, Series only)*

<table>
<thead>
<tr>
<th>Groups</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
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<td>1. Tesla</td>
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<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>6. Dongfeng</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>7. Tata</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>12. VW Group</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

*Innovation strength consists of innovation in series only. Only BEVs (battery electric vehicles). A-4L: Y-coupé, all brands, e.g. VW, Audi, Porsche (since 2012) etc. Limited comparability of data from 2016 on with previous years due to slightly adjusted method, e.g. stricter standards of innovation definition, upgrading of world-first innovations. Cumulative values: The values of each year are added to the sum of the previous year’s values, 2013 & 2014: **, 2015 & 2016: *, 2017 & 2018: ✔️.*

Example: Electric Mobility Roadmap (2018)

**Mobility Services Scheme**

<table>
<thead>
<tr>
<th>10 Haupttypen</th>
<th>ca. 70 Servicetypen</th>
<th>ca. 160 Akteure</th>
<th>ca. 800 Einzelne Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daten dienste</td>
<td>Officel Messaging, App Entertainment, App lokale Informationen, …</td>
<td>20 chinesische oder multinationale OMQ: BYD, Chery, Mahindra, Aston Martin, …</td>
<td>Google</td>
</tr>
<tr>
<td>Infotainment</td>
<td>Infotainment, Ride Sharing, …</td>
<td>10 Big Data Player: Google, Apple, Baidu, Samsung, Alibaba, Amazon, Facebook, Microsoft, Huawei, Tencent</td>
<td>NAVIGON</td>
</tr>
<tr>
<td>Fahrzeuvvermittlung</td>
<td>Logistik Marktplatz, Temporär Schlüssel, …</td>
<td>49 Mobilität Player: Uber, Deutsche Bank, Didi Chuxing, Didi, Avina, Budget, Enterprise, Get, Moovit, …</td>
<td>DIDI</td>
</tr>
<tr>
<td>Intermodale dienste</td>
<td>Parkplatz-Bestelleinst., Parkplatz-Finder-Pulled</td>
<td>Alle 50 Datenpunkte pro Service, z.B.:</td>
<td>Mera</td>
</tr>
<tr>
<td>Logistik services</td>
<td></td>
<td></td>
<td>MoMo</td>
</tr>
<tr>
<td>Parkplatzdienste</td>
<td></td>
<td></td>
<td>MoMo</td>
</tr>
<tr>
<td>Remote-Dienste</td>
<td></td>
<td></td>
<td>MoMo</td>
</tr>
<tr>
<td>Sonstiges</td>
<td></td>
<td></td>
<td>MoMo</td>
</tr>
</tbody>
</table>

Quelle: CAM

Example: Charging Services

<table>
<thead>
<tr>
<th>Charging-Services</th>
<th>Beschreibung des Servicetypen</th>
<th>Beispiel</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Ladesäulen</td>
<td>Betreiber bietet ein Netz von Ladesäulen zur Benutzung an.</td>
<td>Tesla Supercharger</td>
</tr>
<tr>
<td>E-Ladesäulen induktiv</td>
<td>Anbieter bietet ein Netz von Ladesäulen mit induktiver Lademöglichkeit (ohne Kabel) an.</td>
<td>Audi wireless charging</td>
</tr>
<tr>
<td>E-Ladesäulen Home</td>
<td>Verkauf, Vermietung oder Betrieb von privaten Ladesäulen.</td>
<td>BMW i Home Charging</td>
</tr>
</tbody>
</table>

Quelle: CAM