Aids to Navigation (Inland AtoNs)
Status quo, Pilot application at the river Elbe
Content

- AtoN concept (VTT and Inland ECDIS)
  - "Real AtoNs", "Virtual AtoNs"
  - Maritime <> Inland
- AtoN pilot project at the River Elbe (RIS COMEX)
  - Elbe-Weser Corridor
  - AIS infrastructure in Germany
  - Technical realization in the frame of RIS COMEX
  - Tests and applications
Two groups of AtoNs have to be distinguished, "Real AtoNs" and "Virtual AtoNs":

„Real AtoNs“:

- Buoys and beacons:
  - Existing as real objects along the waterway,
  - Equipped with transponders that regularly send the condition and position via AIS.
- Purpose: marking durable situations and/or dangerous spots
- Inland ECDIS charts: have to be encoded (e.g. via incremental updates)
- Visualization in Inland ECDIS:
  - Case „on position“: point object with current position and status
  - Case “off position”:
    - "missing" – symbol at required position and
    - "off position“ – symbol at actual position
Real AIS AtoN message

- AIS AtoN message for an „Real AtoN“ transmitted by an AIS transponder at the buoy
„Virtual AtoNs“:

• Buoys, beacons, lines and areas, transmitted via AIS landinfrastructure:
  • Only digital objects, not existing as real objects along the waterway
  • Purpose: marking temporary situations (restrictions) and/or dangerous spots
• Inland ECDIS charts: no chart update intended with this objects
• Visualization in Inland ECDIS:
  • AIS point object at position
  • Should be oriented, when there is an direction of impact
  • Lines and areas at position
Virtual AIS AtoN message

- AIS AtoN message for an „Virtual AtoN“ transmitted by an AIS base station
Virtual AIS AtoN dedicated point messages
Virtual AIS AtoN line message
Virtual AIS AtoN area message
Maritime- and Inland code tables

### Maritime AtoNs (IALA)

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition Maritime</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Default, Type of AtoN not specified</td>
</tr>
<tr>
<td>1</td>
<td>Reference point</td>
</tr>
<tr>
<td>2</td>
<td>RACON</td>
</tr>
<tr>
<td>3</td>
<td>(NOTE 1 – This code should identify an obstruction that is fitted with an AtoN AIS station)</td>
</tr>
<tr>
<td>4</td>
<td>Emergency Wreck Marking Buoy</td>
</tr>
<tr>
<td>8</td>
<td>Leading Light Rear</td>
</tr>
<tr>
<td>9</td>
<td>Beacon, Cardinal N</td>
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</tbody>
</table>

### Inland AtoNs (CEVNI)

<table>
<thead>
<tr>
<th>Code</th>
<th>CEVNI code</th>
<th>on pos-o</th>
<th>miss-m</th>
<th>off pos-f</th>
<th>virt-v</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Default, Type not specified</td>
</tr>
<tr>
<td>1</td>
<td>4.A + 4.B</td>
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<td></td>
<td></td>
<td>Channel near the right bank</td>
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<tr>
<td>2</td>
<td>5.A + 5.B</td>
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<td></td>
<td></td>
<td></td>
<td>Channel near the left bank</td>
</tr>
<tr>
<td>3</td>
<td>4.C + 4.D</td>
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<td></td>
<td></td>
<td></td>
<td>Cross-over right bank</td>
</tr>
<tr>
<td>4</td>
<td>5.C + 5D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cross-over left bank</td>
</tr>
<tr>
<td>5</td>
<td>8.C - 8.C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bridge pillar</td>
</tr>
<tr>
<td>6</td>
<td>8.C3 + 8.C4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overhead cable</td>
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<td>-----------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>7</td>
<td>1.A - 1.D</td>
<td><img src="image1.png" alt="image" /></td>
<td><img src="image2.png" alt="image" /></td>
<td><img src="image3.png" alt="image" /></td>
<td><img src="image4.png" alt="image" /></td>
<td>Buoy right-hand side</td>
</tr>
<tr>
<td>8</td>
<td>2.A - 2.D</td>
<td><img src="image5.png" alt="image" /></td>
<td><img src="image6.png" alt="image" /></td>
<td><img src="image7.png" alt="image" /></td>
<td><img src="image8.png" alt="image" /></td>
<td>Buoy left-hand side</td>
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<tr>
<td>9</td>
<td>3.A - 3.D</td>
<td><img src="image9.png" alt="image" /></td>
<td><img src="image10.png" alt="image" /></td>
<td><img src="image11.png" alt="image" /></td>
<td><img src="image12.png" alt="image" /></td>
<td>Bifurcation</td>
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<tr>
<td>10</td>
<td>3.E1 + 3.F1</td>
<td><img src="image13.png" alt="image" /></td>
<td><img src="image14.png" alt="image" /></td>
<td><img src="image15.png" alt="image" /></td>
<td><img src="image16.png" alt="image" /></td>
<td>Bifurcation, pass right-hand side</td>
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<tr>
<td>11</td>
<td>3.E + 3.F</td>
<td><img src="image17.png" alt="image" /></td>
<td><img src="image18.png" alt="image" /></td>
<td><img src="image19.png" alt="image" /></td>
<td><img src="image20.png" alt="image" /></td>
<td>Bifurcation, pass left-hand side</td>
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<tr>
<td>12</td>
<td>1.F + 1.F1</td>
<td><img src="image21.png" alt="image" /></td>
<td><img src="image22.png" alt="image" /></td>
<td><img src="image23.png" alt="image" /></td>
<td><img src="image24.png" alt="image" /></td>
<td>Danger point or obstacle right-hand side</td>
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<tr>
<td>13</td>
<td>2.F + 2.F1</td>
<td><img src="image25.png" alt="image" /></td>
<td><img src="image26.png" alt="image" /></td>
<td><img src="image27.png" alt="image" /></td>
<td><img src="image28.png" alt="image" /></td>
<td>Danger point or obstacle left-hand side</td>
</tr>
<tr>
<td>14</td>
<td>-</td>
<td><img src="image29.png" alt="image" /></td>
<td><img src="image30.png" alt="image" /></td>
<td><img src="image31.png" alt="image" /></td>
<td><img src="image32.png" alt="image" /></td>
<td>Berth right-hand side</td>
</tr>
<tr>
<td>15</td>
<td>-</td>
<td><img src="image33.png" alt="image" /></td>
<td><img src="image34.png" alt="image" /></td>
<td><img src="image35.png" alt="image" /></td>
<td><img src="image36.png" alt="image" /></td>
<td>Berth left-hand side</td>
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<td>--------</td>
<td>-----------</td>
<td>--------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>16</td>
<td>A.1</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>No entry upstream</td>
</tr>
<tr>
<td>17</td>
<td>A.1</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>No entry downstream</td>
</tr>
<tr>
<td>18</td>
<td>A.9</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>Do not create wash upstream</td>
</tr>
<tr>
<td>19</td>
<td>A.9</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>Do not create wash downstream</td>
</tr>
</tbody>
</table>
Inland AtoNs, special cases

Point objects with direction of impact

- Need orientation (special AIS message?)
Inland AtoNs, special cases

Signal float
Is only the basis for other signs and signals
• How to provide this information?
Work Breakdown Structure

**RIS COMEX**

- **Activity 1: Project Management**
  - Project Start
  - Project Coordination
  - Common Procurements
  - Project Dissemination
  - Project Closure

- **Activity 2: Corridor RIS Preparation**
  - CoRISMa Assessment
  - Level 1 Case Definition
  - Level 2 Case Definition
  - Level 3 Case Definition
  - Corridor RIS Concept

- **Activity 3: Corridor RIS Implementation**
  - Coordination of Spec. & Impl.
  - Level 1 Services
  - Level 2 Services
  - Level 3 Services
  - Evaluation

- **Activity 4: Corridor RIS Sustainability**
  - Corridor RIS Master Plan
  - Legal Arrangements
  - Org. & Financial Arrangements
  - Service Level Agreements
  - Advanced Capabilities

- **Activity 5: Horizontal Activities**
  - IWT Safety Aspects
  - RIS Stakeholder Consultation
  - Reference Data and Statistics
  - Intermodal Interfaces
  - Evolution of RIS Standards
RIS COMEX
Corridor "Elbe-Weser"
Existing AIS land infrastructure

Covered stretches 2,400 km
- 95 base stations
- 10 repeaters
- 4 regional AIS Servers
Future

AIS landinfrastructure

extended to
Covered stretches 2,800 Km
- 130 base stations
- 10 repeaters
- 5 regional AIS Servers
- 1 central server (Koblenz)
- 1 testserver (Elbe)
Technical realization in the frame of COMEX

Extension of the AIS software system in Germany:

- Implementation of AIS data exchange with the Waterway Authority of the Czech Republic and the Port Authority of Hamburg, in accordance with the rules for the protection of personal data
- Extension of the internal AIS functionality for monitoring
- Implementation of an Interface to provide AtoN related AIS data for an public AtoN Web Map Service
Preparation of the Pilot application at the river Elbe

- Extensions of the national software which provides the necessary user environment for the responsible staff, with the functionality to administer and publish AtoNs
- The AIS infrastructure has to be extended along the Elbe river
- The AIS data exchange has to be realized
- The ECDIS producers have to be included for realizing the AtoN visualisation at the Inland ECDIS systems on board
- Shipping companies will also take part in the pilot phase
- For recreational navigation, which are not obliged to have an ECDIS system on board, a public Web Map Service (WMS) is planned in combination with a public IENC WMS

The AIS Infrastructure and the software environment should be ready until April 2018. Afterwards the pilot application phase can start. End of project is end of 2020.
Questions to be answered during the pilot phase:

- Can AtoNs improve the safety of navigation?
  - What does this mean for the services and systems?
  - How can all user groups be reached?
  - What is the benefit for the users? Are efforts and costs acceptable by them?
  - Are there also some benefits for the administrations?
- Can the demands regarding availability and reliability of the provided services be fulfilled in an economic sense?
- How fits the Inland AtoN concept into existing regulations?
- Are other standards affected, e.g. the radar standard?
- …

At the end of the project we should have a solid base for the further decisions regarding prospects of the use of AtoNs (real and virtual) in future. Simultaneously should the standardization of the feasible be prepared.
Vielen Dank für Ihre Aufmerksamkeit!

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