



railML.org

Timetable Scheme
railML[®] 3.2

41th railML[®] Conference – April 26th 2022

Agenda

railML timetable 3.2 Development

- Use Cases
- Approach
- Goals
- Modelling
- Outlook

Timetable 3.2 Development – Use Cases

- Use Case ITMS
 - Driven mainly by requirements of Thales
 - Detailed timetable
 - Links to Mesoscopic/Microscopic infrastructure
 - Links to rolling stock
 - Links to interlocking
 - Planning scope
 - Yearly (full data transfer)
 - Daily (full data transfer)
 - Adhoc (partial data transfer)
 - Connections
 - For passengers and crew



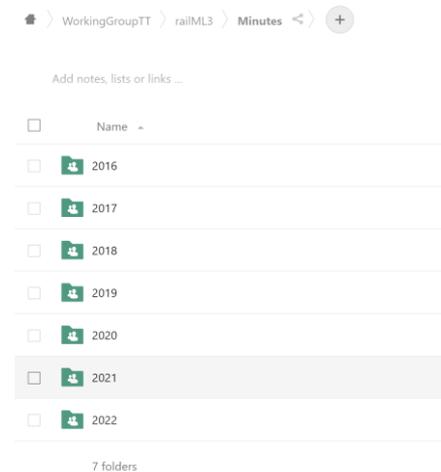
Timetable 3.2 Development – Use Cases

- Use Case PISY
 - Similar requirements as railML 2.5
 - Support of Announcements
 - Support of Special Texts
 - Support of Symbols
 - Support for Placeholder Mediafragments
 - Support for Cancellations



Timetable 3.2 Development – Approach

- Community driven
- Main work done in 2020 - 2022
- Development in bi-weekly developer meetings
 - Due to Covid-19 mostly virtual ones
- Transparency
 - Publishing of progress in forum
 - Discussions of modelling details in forum
 - Cloud
- Development using EA 15.2 (same like IS and IL)



Forum: railML:timetable --- Posted on Tue, 19 April 2022 11:12 --- By: Milan Wölke
[railML3:Valores and booleans](#)
Hi all, in unserer letzten railML3 Telko haben wir uns auf ein neues, gegenüber railML 2.x vereinfachtes, Konzept zur Abbildung von Feiertagsregelungen geeinigt. Dieses möchte ich Ihnen hier gern vorstellen. Es ist zwar nicht mehr viel Zeit bis zum Rele...

Forum: railML:timetable --- Posted on Mon, 04 April 2022 14:22 --- By: Milan Wölke
[railML3:Basic information on formations / Basic information on formations](#)
Hi all, in general, information about formations is encoded in rolling stock, while timetable is referencing a formation. In one of our last timetable developer calls we discussed if timetable should/nt also include some basic information about formatio...

Forum: railML:timetable --- Posted on Mon, 28 March 2022 11:04 --- By: Milan Wölke
[railML3:Crew exchange / Personalbeschäft](#)
Hi all, for the near railML3 TT model we have the requirement to model operational connectors in order to describe where a crew exchange takes place. The model the timetable developer group proposes is very much like the modelling of an operational tra...

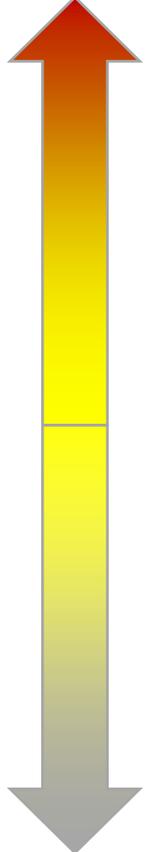
Forum: railML:timetable --- Posted on Mon, 28 March 2022 10:29 --- By: Milan Wölke
[railML3:Angabe der Präzision von Zeitangaben / Specification of precision for time values](#)
Hi all, in our last developer meeting we reviewed the specification of times for stops. The intended modelling for railML 3 currently includes an attribute for each time value that allows specifying the precision of said time value. During the discussio...

Forum: railML:timetable --- Posted on Wed, 16 March 2022 13:32 --- By: Milan Wölke
[railML3.2: Proposal for removal of xs:any elements](#)
Hi Community, bei unserer letzten Konferenz in Göteborg, Schweden hatte unser Common-Koordinator das Thema aufgebracht, in railML3 die Art und Weise zu ändern, mit der Erweiterungen für railML erstellt werden können. Thomas hat in dort eine neue Vorgeh...

Forum: railML:timetable --- Posted on Mon, 28 February 2022 14:32 --- By: Milan Wölke
[railML3:Type of train \(goods/passenger\)](#)
Hi all, the timetable developer group recently discussed how to encode the train type, i.e. how to say that it is a passenger train or a goods train. In order to do that we decided to provide an enumeration to the OperationalTrainSection. This enum woul...

Timetable 3.2 Development – Goals

Very Important



Not Important

Semantical Uniqueness

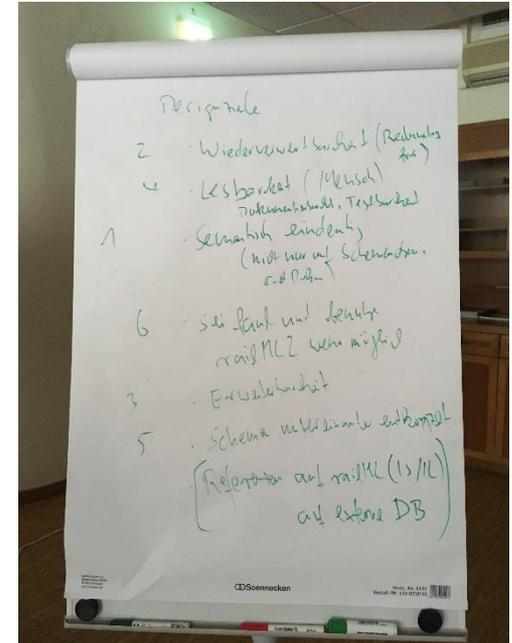
Reduced Redundancy

Extendability

Human Readability

Decoupling of railML schemas

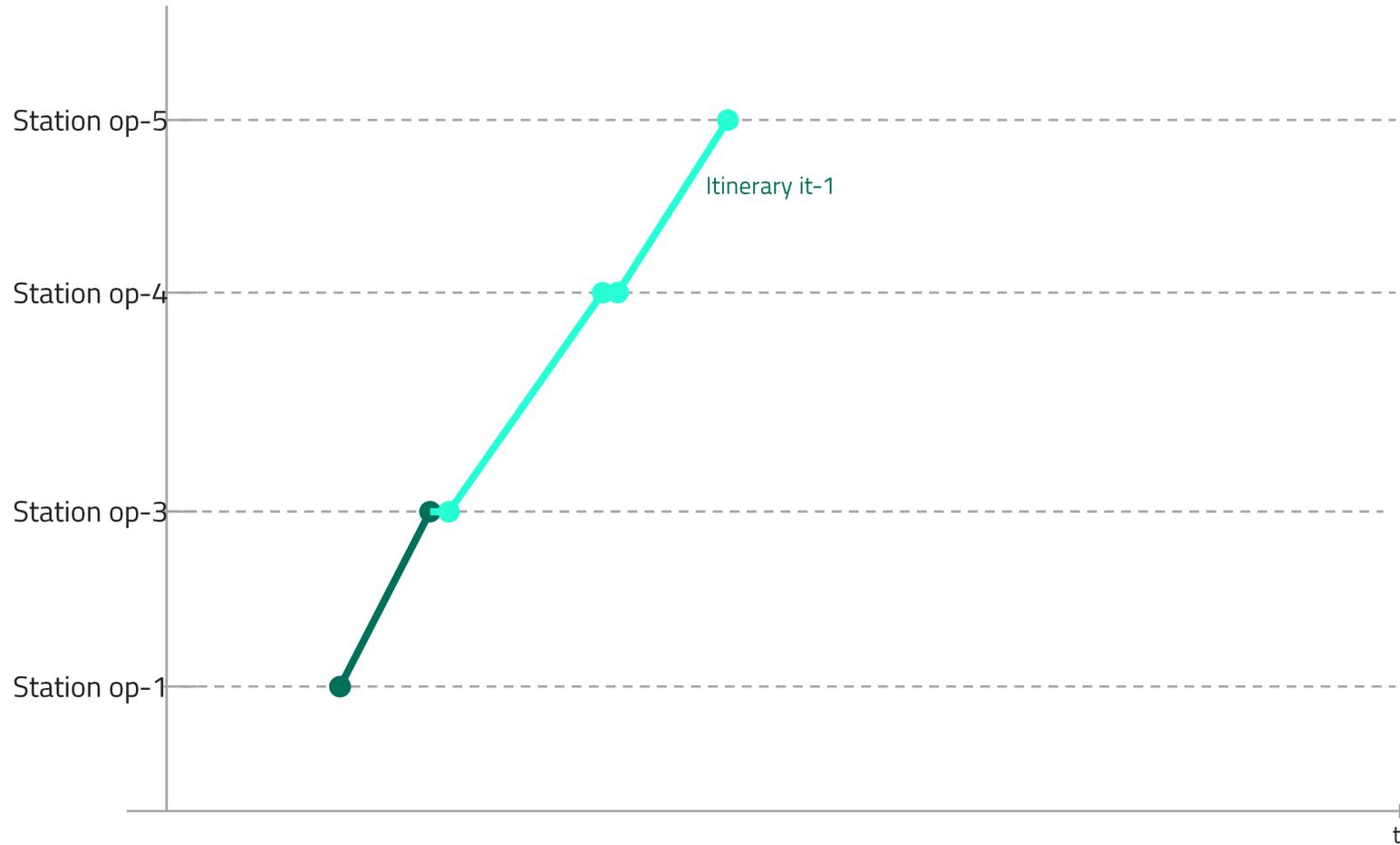
Use railML 2 as much as possible



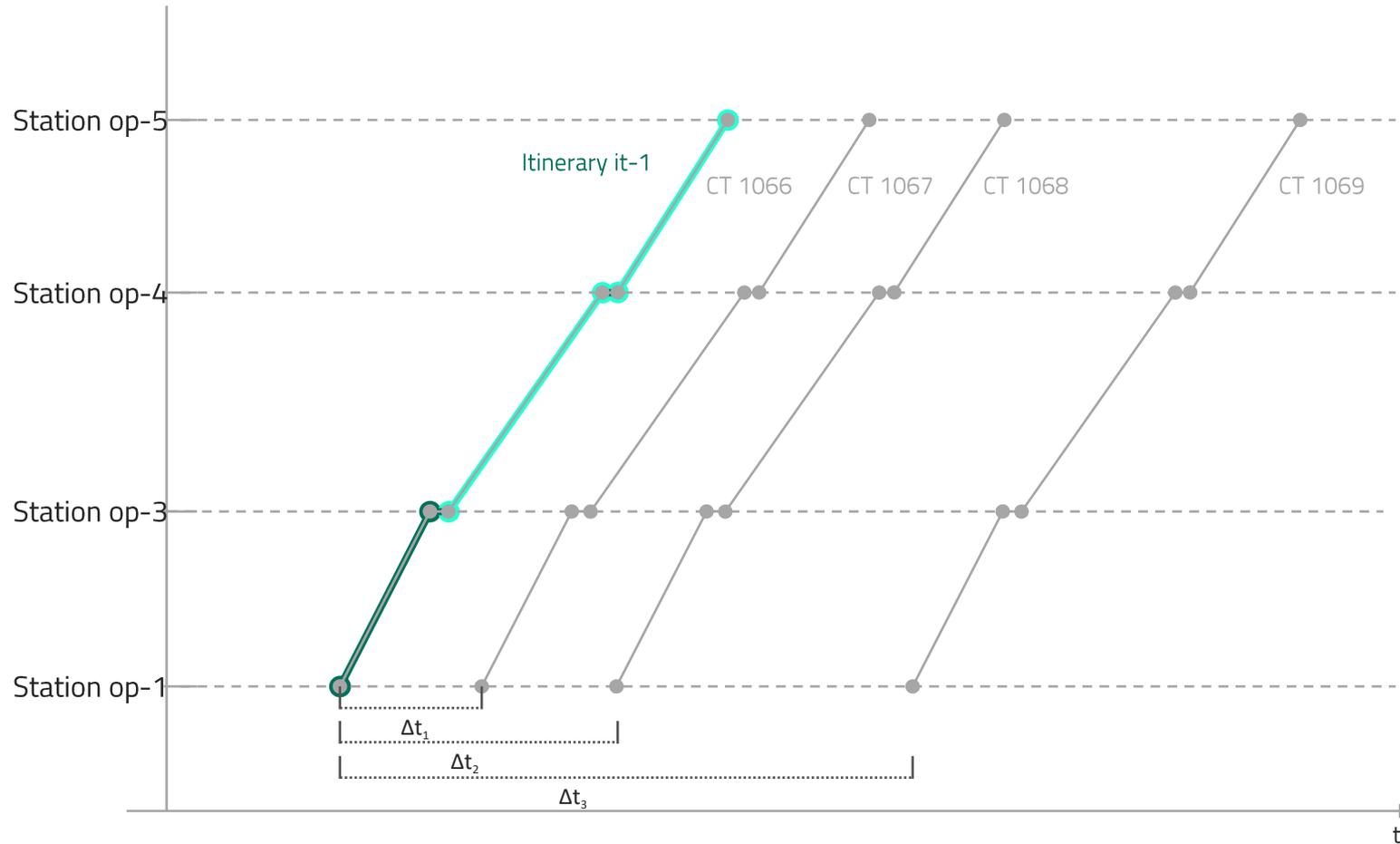
Timetable 3.2 Development – Current Modelling

- General approach:
 - Definition of itineraries
 - Reference of these by operational as well as commercial trains
 - Definition of mapping between operational and commercial trains
- Benefits:
 - Less redundant
 - Easy to specify regular train runs (e.g. one train every hour)

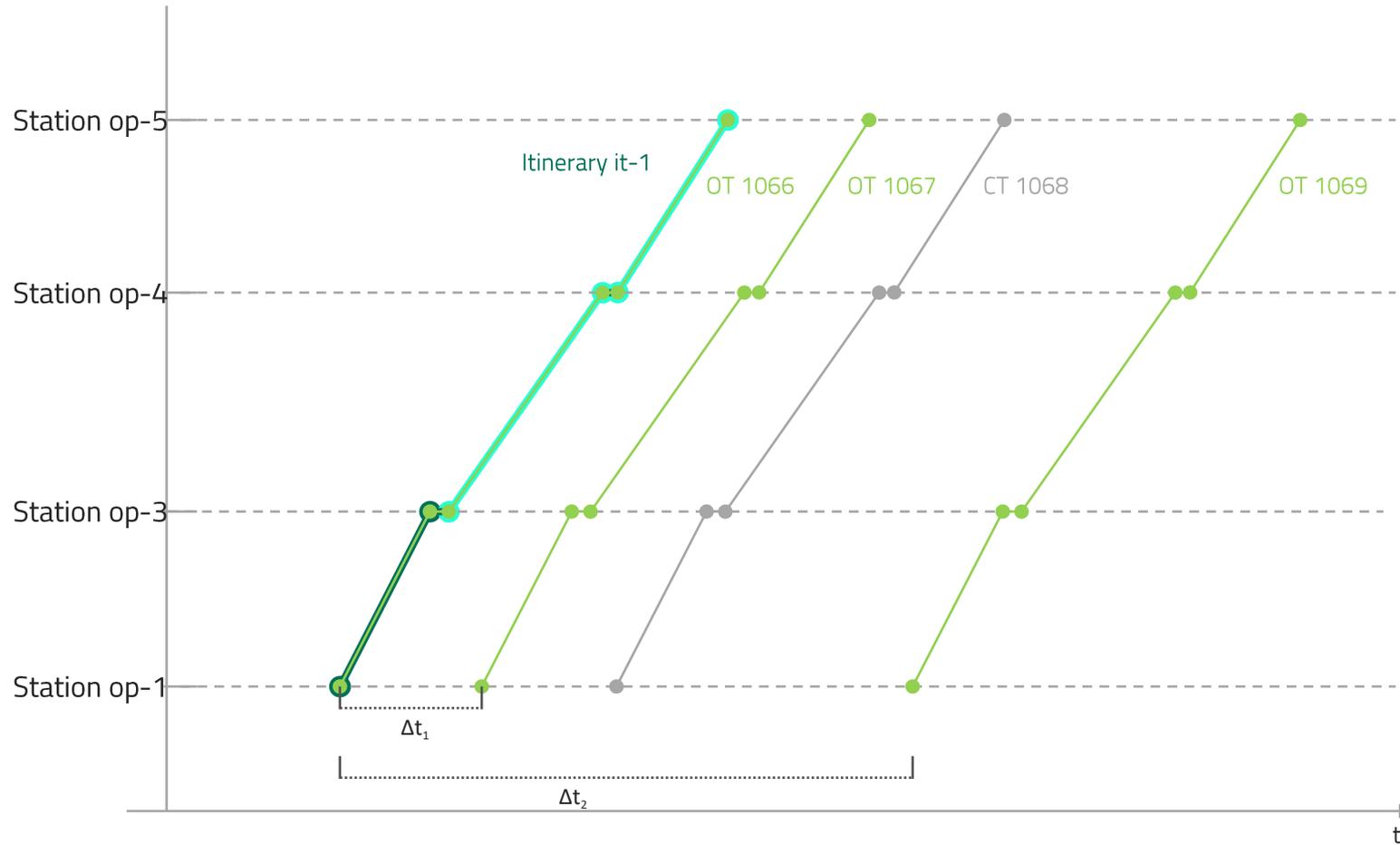
Timetable 3.2 Development – Current Modelling



Timetable 3.2 Development – Current Modelling



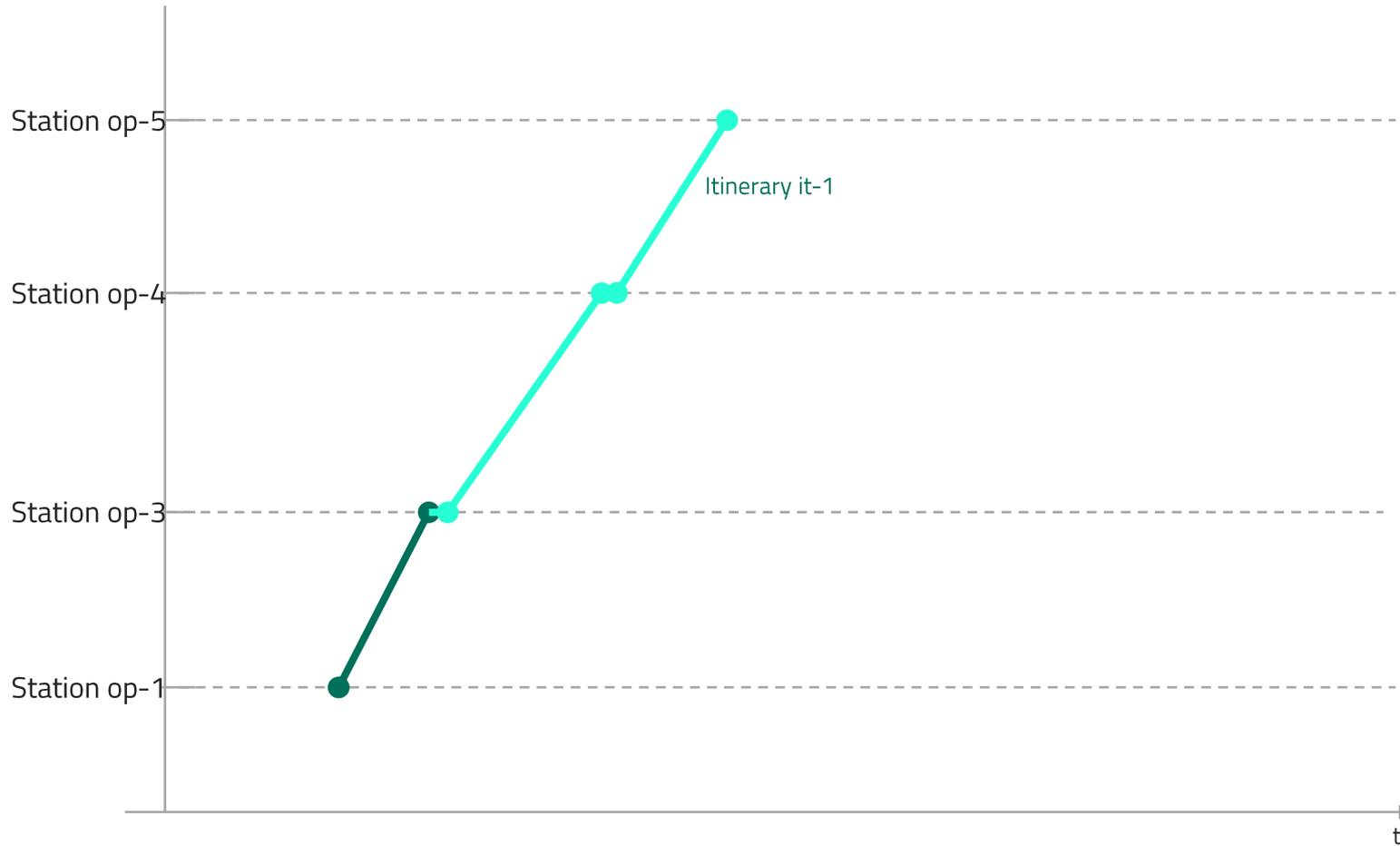
Timetable 3.2 Development – Current Modelling



Timetable 3.2 Development – Current Modelling

- General approach:
 - Definition of itineraries
 - Reference of these by operational as well as commercial trains
 - Definition of mapping between operational and commercial trains
- Benefits:
 - Less redundant
 - Easy to specify regular train runs (e.g. one train every hour)

Timetable 3.2 Development – Current Modelling



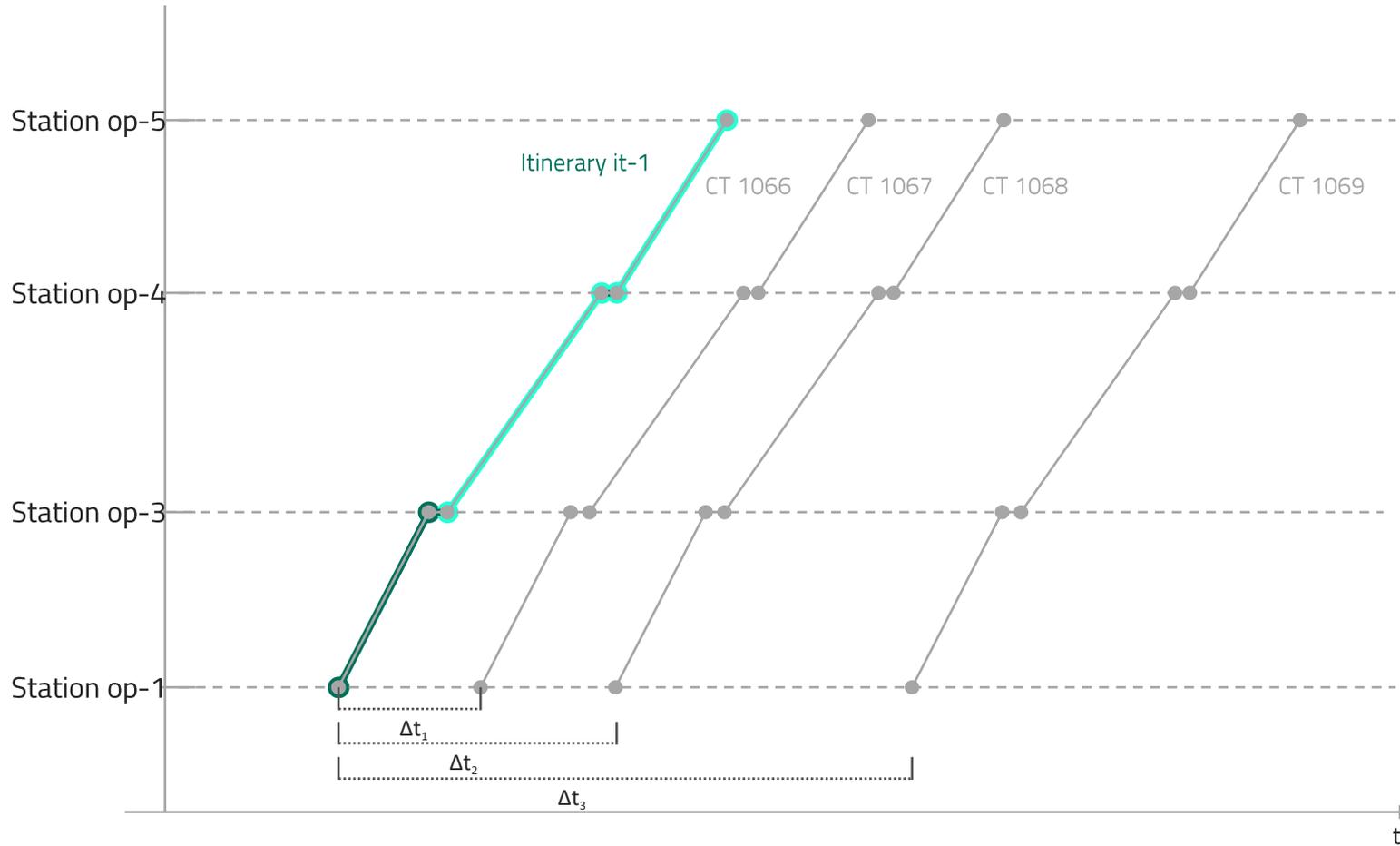
Timetable 3.2 Development – Current Modelling

```
<baseItinerary id="bi-1">
  <baseItineraryPoint id="bp-1" locationRef="op-1">
    <times scope="commercial">...</times>
    <times scope="operational">...</times>
    <followupSections>...</followupSections>
    <trackRef ref="tk-2"/>
    <stop>...</stop>
  </baseItineraryPoint>
  <baseItineraryPoint id="bp-2" locationRef="op-3">
    <times scope="commercial">...</times>
    <times scope="operational">...</times>
    <trackRef ref="tk-5"/>
    <stop>...</stop>
  </baseItineraryPoint>
</baseItinerary>
```

```
<baseItinerary id="bi-3">
  <baseItineraryPoint id="bp-5" locationRef="op-3">
    <times scope="commercial">...</times>
    <times scope="operational">...</times>
    <followupSections>...</followupSections>
    <trackRef ref="tk-5"/>
    <stop>...</stop>
  </baseItineraryPoint>
  <baseItineraryPoint id="bp-6" locationRef="op-4">
    <times scope="commercial">...</times>
    <times scope="operational">...</times>
    <followupSections>...</followupSections>
    <stop>...</stop>
  </baseItineraryPoint>
  <baseItineraryPoint id="bp-7" locationRef="op-5">
    <times scope="commercial">...</times>
    <times scope="operational">...</times>
    <stop>...</stop>
  </baseItineraryPoint>
</baseItinerary>
```

```
<itinerary id="it-1">
  <range baseItineraryRef="bi-1" start="bp-1" end="bp-2" offset="-PT10M"/>
  <range baseItineraryRef="bi-3" start="bp-5" end="bp-7" offset="-PT10M"/>
</itinerary>
```

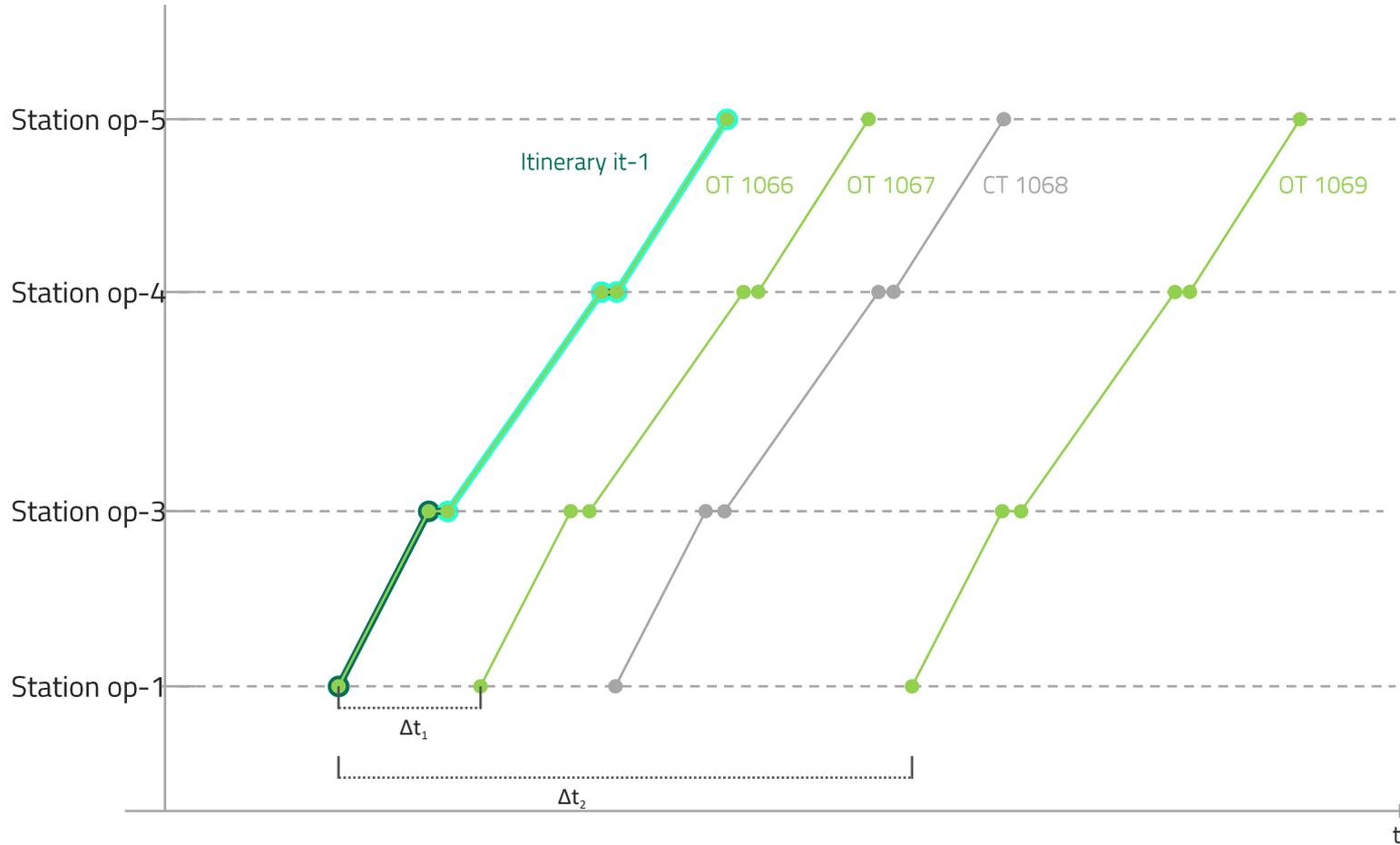
Timetable 3.2 Development – Current Modelling



Timetable 3.2 Development – Current Modelling

```
<commercialTrain id="ct-1">
  <commercialTrainVariant id="cv-1" itineraryRef="it-1" validityRef="va-2">
    <identifiers>
      <identifier number="CT1066" type="CommercialTrainNumber"/>
    </identifiers>
    <commercialTrainSection id="cs-1">
      <range start="bp-1" end="bp-7"/>
      <transportServiceRef ref="ts-3"/>
    </commercialTrainSection>
  </commercialTrainVariant>
</commercialTrain>
<commercialTrain id="ct-2">
  <commercialTrainVariant id="cv-2" itineraryRef="it-1" offset="PT1H" validityRef="va-2">
    <identifiers>
      <identifier number="CT1067" type="CommercialTrainNumber"/>
    </identifiers>
    <commercialTrainSection id="cs-2">
      <range start="bp-1" end="bp-7"/>
      <transportServiceRef ref="ts-3"/>
    </commercialTrainSection>
  </commercialTrainVariant>
</commercialTrain>
<commercialTrain id="ct-3">
  <commercialTrainVariant id="cv-3" itineraryRef="it-1" offset="PT2H" validityRef="va-2">
    <identifiers>
      <identifier number="CT1068" type="CommercialTrainNumber"/>
    </identifiers>
    <commercialTrainSection id="cs-3">
      <range start="bp-1" end="bp-7"/>
      <transportServiceRef ref="ts-3"/>
    </commercialTrainSection>
  </commercialTrainVariant>
</commercialTrain>
```

Timetable 3.2 Development – Current Modelling



Timetable 3.2 Development – Current Modelling

```
<operationalTrain id="ot-1">
  <operationalTrainVariant id="ov-1" itineraryRef="it-1" validityRef="va-2">
    <identifiers>
      <identifier number="OT1066" type="OperationalTrainNumber"/>
    </identifiers>
    <operationalTrainSection>
      <operationalTrainSectionPart id="os-1">
        <formationInformation formationRef="fm-1"/>
      </operationalTrainSectionPart>
    </operationalTrainSection>
  </operationalTrainVariant>
</operationalTrain>
<operationalTrain id="ot-2">
  <operationalTrainVariant id="ov-2" itineraryRef="it-1" offset="PT1H" validityRef="va-2">
    <identifiers>
      <identifier number="OT1067" type="OperationalTrainNumber"/>
    </identifiers>
    <operationalTrainSection>
      <operationalTrainSectionPart id="os-2">
        <formationInformation formationRef="fm-1"/>
      </operationalTrainSectionPart>
    </operationalTrainSection>
  </operationalTrainVariant>
</operationalTrain>

<commercialScheduling id="csc-01" sectionRef="cs-1">
  <operationalRange sectionPartRef="os-1"/>
</commercialScheduling>
<commercialScheduling id="csc-02" sectionRef="cs-2">
  <operationalRange sectionPartRef="os-2"/>
</commercialScheduling>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces

```
<baseItineraryPoint id="bp-6" locationRef="op-4">
  <times scope="commercial">
    <arrival time="12:05:00"/>
    <departure time="12:05:00"/>
  </times>
  <times scope="operational">
    <arrival time="12:04:30"/>
    <departure time="12:05:30"/>
  </times>
  <followupSections>...</followupSections>
  <trackRef ref="tk-5"/>
  <stop minDwellTime="PT1M30S">
    <platformEdgeRefs>
      <platformEdgeRef ref="pe-8" onOff="on"/>
      <platformEdgeRef ref="pe-9" onOff="off"/>
    </platformEdgeRefs>
    <stoppingPlaceRef ref="sp-6"/>
    <isCommercial onRequest="true" onOff="both"/>
  </stop>
</baseItineraryPoint>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs

```
<baseItineraryPoint id="bp-17" locationRef="op-9">
  <times scope="operational">
    <arrival time="11:47:30"/>
    <departure time="11:47:30"/>
  </times>
  <followupSections>...</followupSections>
  <pass isGuaranteed="true">
    <referencePoint ref="sp-11"/>
  </pass>
</baseItineraryPoint>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section

```
<followupSections>
  <followupSection priority="0">
    <minimalTime runTime="PT4M"/>
    <trackRefs>
      <trackRef ref="tk-91"/>
      <trackRef ref="tk-92"/>
    </trackRefs>
    <lineRef ref="ln-01"/>
    <routeRefs>
      <routeRef ref="rt-01"/>
    </routeRefs>
    <reserves>
      <reserve reserve="PT1M" type="qualityByRailwayUndertaking">
        <rule>
          <timeBasedRule supplementInPercent="25"/>
        </rule>
      </reserve>
    </reserves>
  </followupSection>
  <followupSection priority="1">...</followupSection>
</followupSections>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section
 - Info about activities at a stop and the required times

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section
 - Info about activities at a stop and the required times

```
<activities>
  <activityLoad id="atd01" onOff="both" minDuration="PT1M"/>
  <activityTripDependency id="atd03" minDuration="PT30S" operationalTrainVariantRef="ov-7-1"
    bipRef="bp-3" trainActivityClassification="occupationBlock">
    <previousActivities>
      <activityRef ref="atd01"/>
    </previousActivities>
  </activityTripDependency>
</activities>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section
 - Info about activities at a stop and the required times
 - Info about passenger information

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section
 - Info about activities at a stop and the required times
 - Info about passenger information

```
<stop>
  <passengerTextInfos>
    <passengerTextInfoRef ref="pt-01"/>
  </passengerTextInfos>
  <announcements>
    <announcementRef ref="an-01"/>
  </announcements>
  <isCommercial/>
</stop>
```

Timetable 3.2 Development – Current Modelling

```
<passengerTextInfos>
  <passengerTextInfo id="pt-01" type="text">
    <name name="Arrivalmessage" language="de"/>
    <mediaCategories>
      <mediaCategory id="mc-01">
        <name name="Basic texts" language="de"/>
      </mediaCategory>
    </mediaCategories>
    <text language="de" verboseness="normal">Zugankunft</text>
    <text language="en" verboseness="normal">Train has arrived</text>
  </passengerTextInfo>
  <passengerTextInfo id="pt-02" type="image" URI="https://pis.resources.system/logo.gif">
    <name language="de" name="Unternehmenslogo"/>
    <mediaCategories>
      <mediaCategory id="mc-02">
        <name language="de" name="Images"/>
      </mediaCategory>
    </mediaCategories>
  </passengerTextInfo>
</passengerTextInfos>

<announcements>
  <announcement id="an-01" URI="ann://123.532">
    <variant language="de" URI="https://audio.resources/123.532.de.wav"/>
    <variant language="en" URI="https://audio.resources/123.532.en.wav"/>
  </announcement>
</announcements>
```

Timetable 3.2 Development – Current Modelling

- Within this basic structure
 - Info about station tracks, platformEdges and stoppingPlaces
 - Info about pass-throughs
 - Info about followup track section
 - Info about activities at a stop and the required times
 - Info about passenger information

```
<stop>
  <passengerTextInfos>
    <passengerTextInfoRef ref="pt-01"/>
  </passengerTextInfos>
  <announcements>
    <announcementRef ref="an-01"/>
  </announcements>
  <isCommercial/>
</stop>
```

Timetable 3.2 Development – Current Modelling

- Validities based on railML 2 idea
- Extendable

Bitmask

```
<!-- weekdays, except wednesday-->
<validity id="va-99">
  <bitmaskValidity timePeriodRef="ttp01"
    fromDate="2022-02-07"
    bitmask="110110011011001101100">
    <weekPatterns>
      <weekPattern pattern="1101100"
        publicHolidayMode="runsOnIndicatedHolidays"/>
    </weekPatterns>
  </bitmaskValidity>
</validity>
```

Conceptual (only weekday-pattern)

```
<!-- daily, except holidays -->
<validity id="va-1">
  <operatingDayValidity
    timetableScenarioRef="ts01"
    publicHolidayMode="neverRunsOnHolidays"
    pattern="1111111"/>
</validity>
```

Timetable 3.2 Development – Current Modelling

- New modelling for connections
- Clearer roles
- Support for connections to external trains

```
<commercialConnection minimalTransferTime="PT1M" maximalWaitingTime="PT5M" responsibleOrganizationalUnitRef="ou-1">
  <feeder>
    <commercialTrainReference trainVariantRef="cv-1" bipRef="bp-2"/>
  </feeder>
  <connector>
    <commercialTrainReference trainVariantRef="cv-5-1" bipRef="bp-11"/>
  </connector>
</commercialConnection>
<commercialConnection minimalTransferTime="PT1M" maximalWaitingTime="PT2M" responsibleOrganizationalUnitRef="ou-1">
  <feeder>
    <commercialTrainReference trainVariantRef="cv-1" bipRef="bp-2"/>
  </feeder>
  <connector>
    <externalTrainReference>
      <stop>
        <locationRef ref="lo-99"/>
      </stop>
      <train>
        <tafTapTsiId objectType="TR" companyCode="4711" core="1234" variant="00" timetableYear="2022"/>
      </train>
    </externalTrainReference>
  </connector>
</commercialConnection>
```

Timetable 3.2 Development – Current Modelling

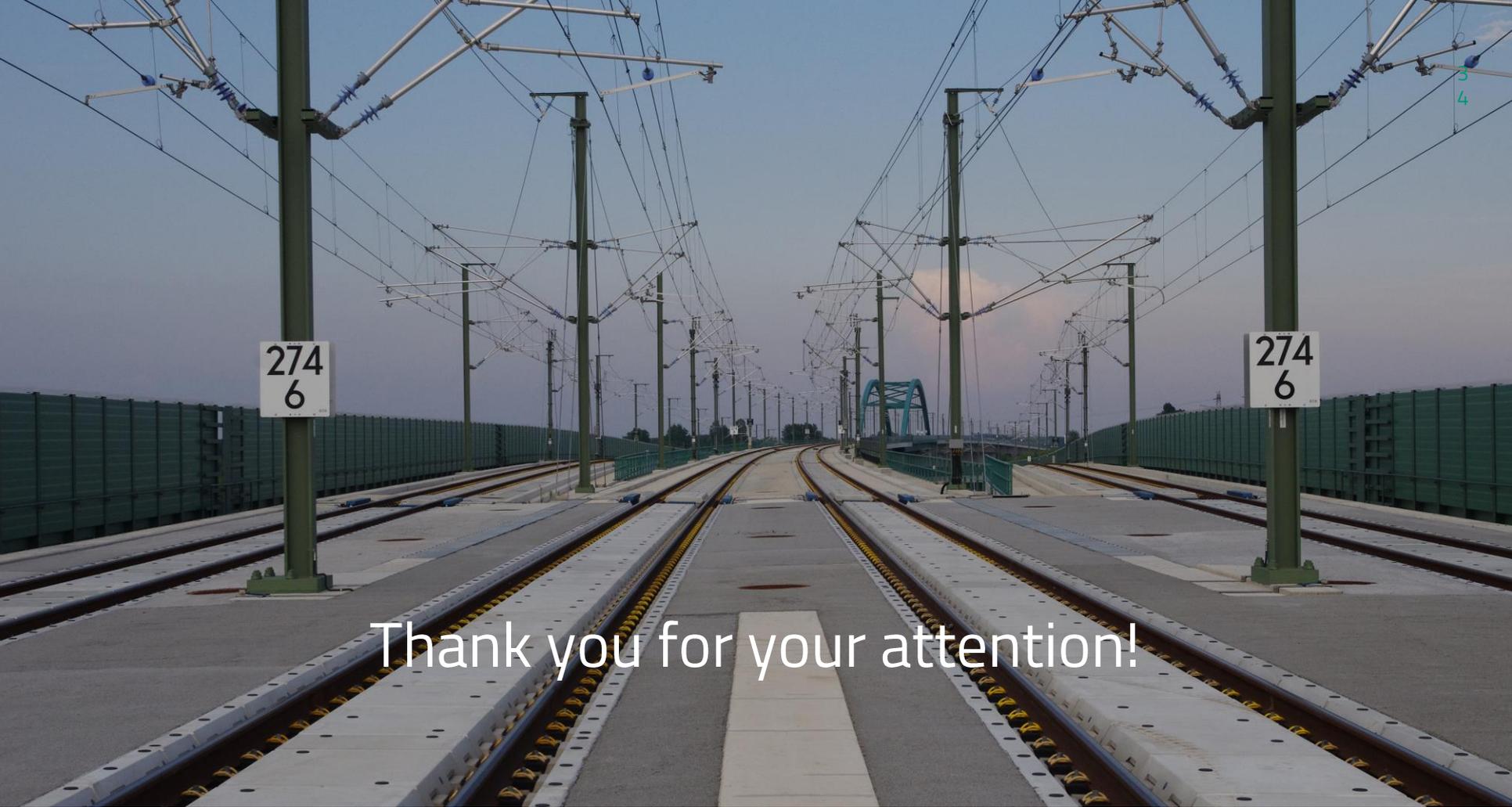
- New modelling: master data `<connectionTransferTime>`
- Following discussion in forum
- Minimizing redundancy
- Can be overridden by individual connection
- Designed to specify only the necessary

```
<connectionTransferTimes>
  <connectionTransferTime startOPRef="op-3"
    defaultTransferTime="PT2M" samePlatformDefaultTransferTime="PT1M">
    <transferRelation>
      <transferPoint duration="PT10M" transferOPRef="op-4"/>
    </transferRelation>
    <transferRelation>
      <startPoint platformRef="pf-3"/>
      <transferPoint duration="PT2M30S" platformRef="pe-4"/>
    </transferRelation>
  </connectionTransferTime>
</connectionTransferTimes>
```

Timetable 3.2 Development – Outlook

- Documentation of 3.2
 - Tutorial
 - Best practice examples
 - Critics welcome
- Future Development
 - Based on Use Case description – please contribute
 - Specific modelling for individual trains
 - Better support for online interfaces





Thank you for your attention!

railML.org

www.railml.org

Milan Wölke – railML.org

Timetable Schema Coordinator



coord@timetable.railML.org



+49 172 384 1613