railML® – In OpenTrack And In Other Tools

IT15.rail, OpenTrack Userworkshop

June 12th, 2015

Dr. Bernhard Seybold, trafIT solutions

TRAF IT SOLUTIONS

trafIT solutions gmbh
Heinrichstrasse 48
8005 Zürich

Tel. +41 44 271 16 05
Fax +41 44 271 16 08
info@trafit.ch

Outline

- Introduction to railML
- railML in OpenTrack
- Other railML tools

Some slides courtesy of Vasco Kolmorgen, railML.org

About trafIT solutions

Founded 2009, Zurich

We write software

- OnTime, the timetable quality tool
- Tools for OpenTrack (OTH, OTD, IA2OT)
- railOscope: railML-validation und –visualization, other railML tools
- TreMOla: Optimization of maintenance schedules in the GBT
- LayoutLib: Automatic generation of schematic graphs
- Custom-tailored tools for railway companies

We analyze data

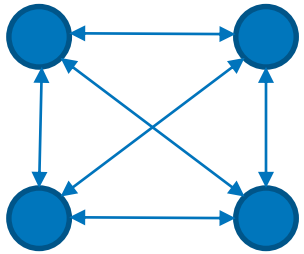
- Timetables/operation: Quality, Stability, Punctuality
- Service concepts: key figures, accounting
- Railway data in several formats (railML, HAFAS, VDV, Info+, ...)

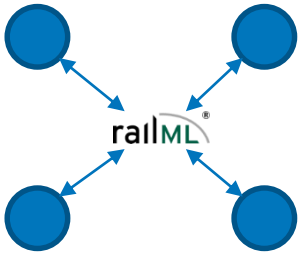
We do research & development

- RTSE (closed-loop railway disposition, founded by Swiss government)
- Prototype for automatic generation of periodic timetables

railML Motivation

- Railway models are large, programs need to exchange data
- First: point to point integration. Some tools define import or export interface. Other tools produce those formats.
- -> Interface explosion (quadratic)
- Need one model for all: birth of railML





TRAF IT SOLUTIONS

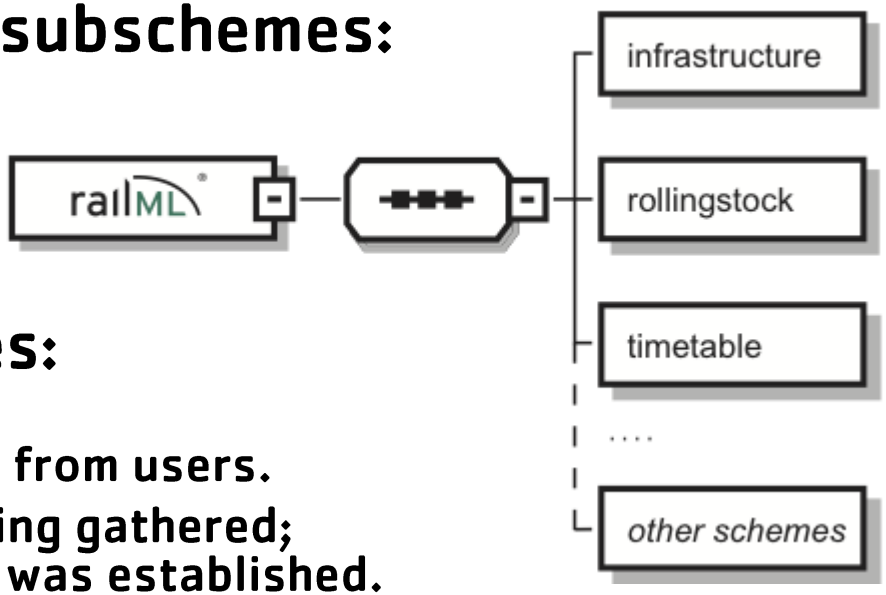
railML Overview

- Exchange format for railway data based on xml
- Open-Source, current version is 2.2
- 10 years of development
- Supported by UIC, ERA/RINF

- Supports timetable, infrastructure, rolling stock, interlocking
- Active community with bi-annual meetings
- Only registration at railml.org needed

Subschemes

- railML organized into subschemes:



- Additional subschemes:
  - *station facilities*: On hold,
    currently no requirements from users.
  - *crew rostering*: Data is being gathered;
    railML.org-working group was established.
  - *interlocking*: railML.org-working group active with regular meetings,
    Compilation of elements, allowing connection to existing sub-schemes achieved. First use case: Interlocking data for ETCS.
  - ...

TRAF IT SOLUTIONS

railML Content

railML timetable common
rollingstock
infrastructure

- **Timetable scheme:**
  - trains, train groups, rosterings
  - operating periods, timetable periods
- **Infrastructure scheme:**
  - lines, tracks, operation points
  - track elements (signals, switches, tunnels, bridges, kilometration, balises, maxSpeed, electrification, radius, ...)
  - coordinates (geo and sheet coordinates)
- **Rolling Stock scheme:**
  - vehicles (engines, wagons), formations
- **Interlocking scheme:**
  - routes, blocks, switches, signal aspects

Example File

railML-version

Train

Departure time

Itinerary

Stop

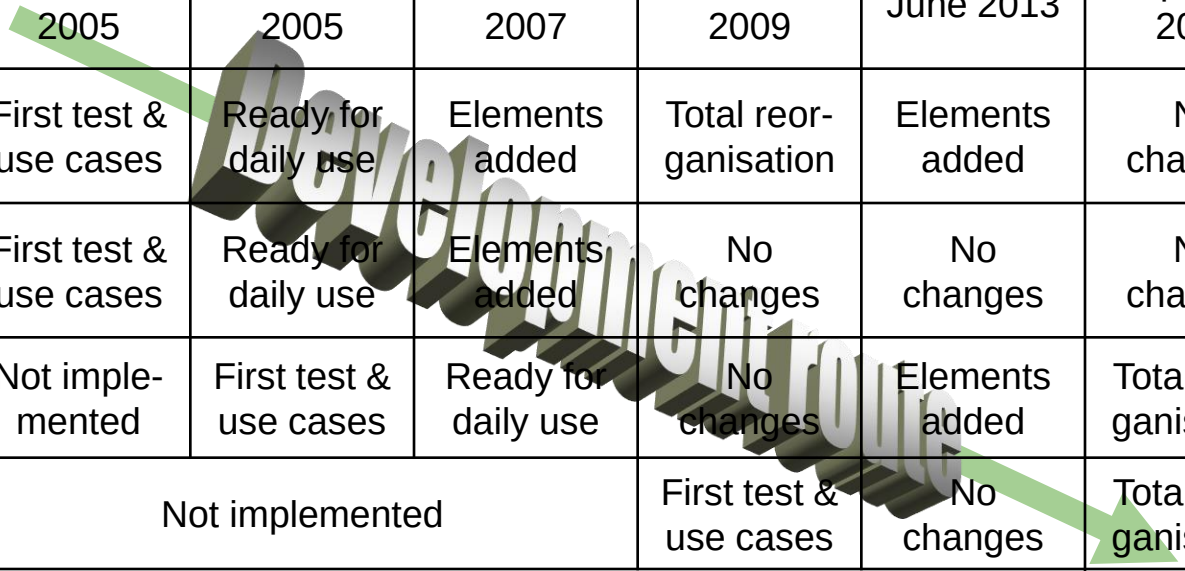
Itinerary Entry

```
<?xml version="1.0" encoding="UTF-8"?>
<railml xmlns:xsi=http://www.w3.org/2000/10/XMLSchema-instance
xsi:noNamespaceSchemaLocation="timetable.xsd">
    <timetable version="1.1">
        <train trainID="RX 100.2" type="planned"  source="opentrack">
            <timetableentries>
                <entry posID="ZU" departure="06:08:00" type="begin"/>
                <entry posID="ZWI" departure="06:10:30" type="pass"/>
                <entry posID="ZOER" arrival="06:16:00" departure="06:17:00"
                        minStopTime="9" type="stop"/>
                <entry posID="WS" departure="06:21:00" type="pass"/>
                <entry posID="DUE" departure="06:23:00" type="pass"/>
                <entry posID="SCW" departure="06:27:00" type="pass"/>
                <entry posID="NAE" departure="06:29:00" type="pass"/>
                <entry posID="UST" arrival="06:34:30" type="stop"/>
            </timetableentries>
        </train>
    </timetable>
</railml>
```

TRAF IT SOLUTIONS

Roadmap

Version and subscheme	railML V 0.x	railML V 1.0	railML V 1.1	railML V 2.0	railML V2.2	railML V 3.x
Year	2002 - 2005	December 2005	November 2007	November 2009	June 2013	expected 2016
Timetable	First test & use cases	Ready for daily use	Elements added	Total reor-ganisation	Elements added	No changes
Rolling stock	First test & use cases	Ready for daily use	Elements added	No changes	No changes	No changes
Infrastructure *macroscopic*	Not imple-mented	First test & use cases	Ready for daily use	No changes	Elements added	Total reor-ganisation
Infrastructure *microscopic*	Not implemented			First test & use cases	No changes	Total reor-ganisation
Infrastructure *interlocking*	Not implemented					Ready for daily use



TRAF IT SOLUTIONS

Organization

- Semi-annual conferences to exchange experience and discuss basics
- Project coordinators for the individual subschema moderate and establish *releases*
- Documentation with a railML-Wiki and HTML explanation files
- Discussions in German and English; Documentation is entirely in English
- Coordination in Dresden & Zurich

TRAFIT SOLUTIONS

Information Sources

- Webpage
  - http://www.railml.org/
- Download xsd schemas and examples
  - http://www.railml.org/index.php/download_en.html
- Online documentation with browsable element hierarchy
  - http://www.railml.org/index.php/documentation.html
- Wiki
  - http://wiki.railml.org
- Forum
  - http://forum.railml.org/

Data Sources

- **Examples for all schemas are part of the railML distributions**
  http://www.railml.org/index.php/download_en.html

- **Model of the entire Norwegian network, provided by Jernbaneverket**
  http://www.jernbaneverket.no/en/startpage1/Market1/Model-of-the-national-rail-network/

Current Developments

- Preparation of railML 3.0
- Support for UIC Topo-Model
  http://www.railml.org/index.php/railml3-development.html
- New subscheme for Interlocking
- Reorganize organization and structure
- Certification process

railML in OpenTrack

- Daniel Hürlimann is founding member of railML consortium
- OpenTrack was one of the first tools to support railML (since v0.95)
- OpenTrack uses all schemas for import and export
- Automatic imports gets more and more important

railML in OpenTrack

- **New in OpenTrack 1.8: support for railML 2.2**

- Functions -> Exchange Rolling Stock Data -> Export Rolling Stock (railML-Format) - Version 2.2
  Functions -> Exchange Rolling Stock Data -> Import Rolling Stock (railML-Format) - Version 2.2
- Functions -> Exchange Timetable Data -> Export Timetable (railML-Format) - Version 2.2
  Functions -> Exchange Timetable Data -> Import Timetable (railML-Format) - Version 2.2
- Functions -> Exchange Infrastr. Data -> Export Infrastructure (railML-Format) - Version 2.2
  Functions -> Exchange Infrastr. Data -> Import Infrastructure (railML-Format) - Version 2.2
- Functions -> Exchange Station Data -> Export Stations (railML-Format) - Version 2.2
  Functions -> Exchange Station Data -> Import Stations (railML-Format) - Version 2.2

- **Mapping for timetable and rolling stock straight forward**
- **Infrastructure modeling different in OpenTrack (double vertex graph) and railML (line / track oriented)**

TRAF IT SOLUTIONS

Other railML tools

Some tools supporting railML:

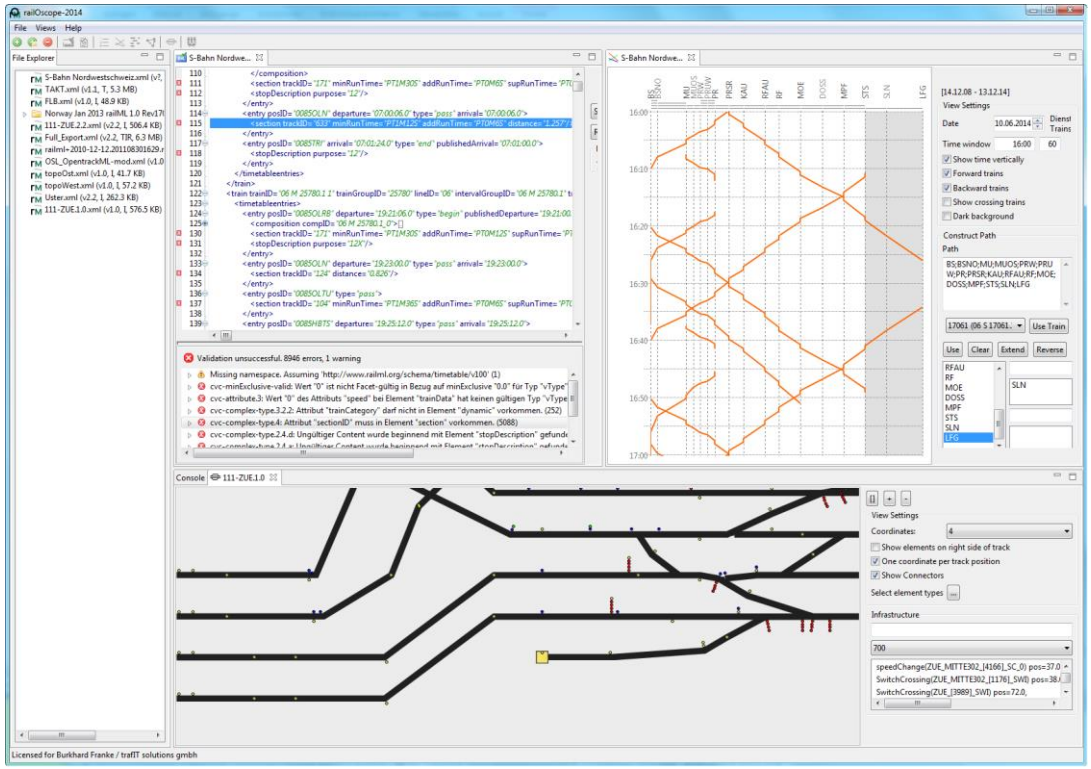
- FBS, iRFP
- IVU.suite, IVU
- LUKS, VIA-Con
- OnTime, trafIT solutions / VIA-Con
- OpenPowerNet, IfB
- OpenTimeTable, distributed by VIA-Con
- Treno, Liftlab
- TPS, HaCon
- Viriato, SMA and Partner
- VISUM, PTV
- ...

- new: Open-Source tool railVIVID funded by UIC

http://www.railml.org//index.php/programme.html

railOscope by trafIT solutions

validate, visualize and analyze rail-data (railML®)



- Master rail data
  - Validate railML files
  - Edit, correct, complete (rule based)
  - Revise, convert, publish
- Access files and understand data
  - Fault-tolerant handling of non-standard files
  - Visualize: standard views
- A reliable product
  - Support, Updates, Upgrades
  - Customization

TRAF IT SOLUTIONS

Summary

- railML is a mature exchange format
- railML is now supported by UIC
- OpenTrack supports v1.x and 2.2 (new)
- Many other tools for railML available

- Join the railML initiative!

- Next meeting (28th conference): 05 Nov 2015, UIC, Paris
- http://www.railml.org/