



41st rai/ML[®] Conference

From more than 20 years of railML development - Lessons learnd by iRFP -





rallm NtzIntf RailML2.dll V2.2.12 X Cancel V Ok

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NtzIntf RailML1.dll V1.0.4

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- iRFP is an Institute emerged from Dresden University of Technology, Faculty of Traffic Sciences *Friedrich List*
- iRFP is a foundation member of railML.org from the first minute
- We develop and maintain *Fahrplanbearbeitungssystem FBS*, a Timetable Construction Software used by more than 100 customers world-wide



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(Extract from) Contribution of iRFP at railing





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The beginnings of *rail*ML more than 20 years ago:

- Starting point was a raising number of "proprietary" interfaces with the same claim:
 - VDV452 & Co. ("derivatives" derived from it)
 - FBS-XML (own development)
 - Exports based on Microsoft Excel and Text files
- This led to the idea of "one standard interface for all program combinations"
- The creation of a non-committed, neutral, open-source format leads to more acceptance than the selection of one proprietary format

		Exportieren nach RailML®1	
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	Herr Richard Duy, Fraunhofer IVI Dresden	D- hRa	
	Herr Dirk Bräuer, IRFP Leipzig	Lunnel star	
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VMI Sehemen	Herr Joachim Rubröder, SMA und Partner AG Zürich		
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	Herr Rolf Gooßmann, HaCon Hannover		
	Herr Hans Schlenker, Fraunhofer FIRST Berlin		
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*rail*ML is a data format purely designed for **data exchange** between two software programs – not for data storage

 \rightarrow No persistent primary keys etc.

- There need to be at least **two independent partners** to place a demand for requirements
 - \rightarrow Not one side alone can demand something
 - \rightarrow Data existing purely in one software are placed back
- Each requirement of two independent partners shall be represented somehow (a practical existing requirement cannot be refused)
- Avoidance of redundancies: What already can be expressed in one kind shall not be expressible in any other kind.

Where there are unavoidable redundancies, there shall be a preference of one solution at least by a semantical constraint. \rightarrow Ease of import from *rail*ML files







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FBS-RailML Interface in particular: Export

xport to RailML®2			×	
	➤ ⑧ Load and save settings		<u>∧</u> ●	<i>rail</i> ML-Versions 2.x
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	railML enforces that reference systems are specified for coordinates and h	heights (see also www.epsg-registry.org).		
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- UUUUNA		iBEP : Contract		The same name is used as in FBS if this field stays empty.

- Optional vehicle circulation, extendable for "folded" circulations
- Optional user defined fields

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OU>:vehicleOperator	<ou> = element <organizationalunits></organizationalunits></ou>			
) Export to individual field (out of railML standard):				
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iRFP : Contract	The same name is used as in ribb in this neid stays empty.			
The prefix shall be an abbreviation for the name space and needs to be set. It is recommended to use e.g. an abbreviation of you company, w/o spaces, not "XML", "railML", "FBS" or such. Prefix and name space are valid for all individual fields. Name space (URL Uniform Resource Identifier):				
um iRFP railml: 1.0				
Use a unique name for your use case. This should contain your company, the project title and version number. It should start with "um:" or "http://" and contain no spaces. Example: "um:MyRailwayrailML:Extension:1.0".				
Optional place of a schema file (XSD file):				
This place should only be given if there is really an XSD file accessible. Usually a network address beginning with "http://" is used (URL, Uniform Resource Locator).				

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FBS-RailML Interface in particular: Import

- *rail*ML-Versions 2.x
- Timetable data only

• Optional substitution of vehicles, formations, categories etc.

ral

• Integrated "route search" through the network

railML2-Import V1.2.6				
2. General file contents				
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Image: Second and the second and t				
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scheduled (100 % Coverage)	Verify/Adjust train categories and			
	products			
<u>Irans</u>				
690 operational trains in the railML file.	~~ ~			
653 commercial trains in the railML file.	Selection of the trains to be included			
Show sequence of steps X Cancel + Previous Next =	Perform import			

iRFP-own "support tools", e. g. railML viewer



		🞲 D:\FBS-Daten\Externe\Abellio\180713 railML\80-1760-18-2.railml <track id="tr17601"/>
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- a) Passenger information: Transfer of (planned) timetable data incl. circulation
 - into the trains
 - to the platforms
 - into (online) media







- b) Disposition / Control centre / RBL ("computer-aided operations management"): Transfer of (planned) timetable data incl. circulation Includes also, for instance, "SAT-ZB" of FH Wels
- c) Staff planning/rostering systems, with or without vehicle circulation data
- d) Booking / reservation systems: Transfer of (planned) timetable data incl. train formation and carriage booking no's.
- e) Prognosis systems for passenger demand / seat capacity utilisation: Transfer of (planned) timetable data Includes e. g. *PTV-VISION* software family
- f) Driver assisting systems: Transfer of infrastructure data incl. geographic coordinates and planned timetable data
- g) Special, rather individual solutions such as an automatic export of ad-hoc planned trains to an invoicing system

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- a) Collecting of next-years' timetable offers at Public Transport Authorities here also: FBS-to-FBS data exchange via *rail*ML for "neutralisation" only (a controverse use case, admittedly)
- b) Import of real-time train data from CTC (Centralised Train Control/ Signalling) centres for comparison with planned timetable data
- c) Import of geographic coordinates(so far, a special solution for internal purposes only)

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RFP Practical use cases 3/3: Discarded and deferred railm

- a) Data exchange of rolling stock data from Rolling Stock (data input) Internet form – too less demand, too "enclosed" data...
- b) Export of planned timetable data to synchronous simulations (such as OpenTrack) – very limited applications, only a few replies
- c) Export of (electronic) Driver's timetables, "EBuLa"
 PDF is easier...
- d) Import of infrastructure data

– "stand-alone" / "one-hit" solutions only, many different "realisations" in *rail*ML, much effort for a limited demand esp. in competition to *OpenStreetMap* data



Beispiel für einen elektronischen Buchfahrplan aus FBS; Stern & Hafferl, Gmunden



für Synchronsimulation, Quelle: Dr. Hürlimann, Zürich











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abellio







Mahidol University Wisdom of the Land







Zweckverband SPNV Rheinland-Pfalz Süd





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A special situation for iRFP is:

We do not "oversee" what happens with "our" data!

- The FBS-RailML-Interface is developed (and merchandised) as a *general* solution according to the original idea
- Each customer can export data to whichever purpose – with no need to consult iRFP
- iRFP only gets note of a *rail*ML "use case" if something does not work – which (presumably, fortunately) does not happen very often...
- → The task of "collecting" and "afterwards-systematising" of our use cases is an ongoing challenge.

Did we finally reduce the number of interfaces?

- → Just like Radio Yerevan: In principle, yes. But...
 - "Standards in the Standard" are a raising problem
 - Programming effort vs. Configuring effort

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Can *rail*ML be less "unwieldy"?

- Practical demand with nowadays typical time limits only would allow short-term extensions of *rail*ML.
- If once there is a solution with an extension, there will very often never be (time & money for) a "proper" solution...



Technische Hinweise für Entwickle

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We see a raising respect for *rail*ML as an accepted industrial standard, but also a raising demand back to proprietary solutions due to raising acceptance problems and/or access barriers (or fear for...)

- because of difficult inner data structures,
- because of easier development (less bureaucracy, no certification)

*rail*ML is – from our view – a good general starting basis for a data exchange interface, but there is a huge amount of additional effort necessary to bring it into a certain, working, well-documented use case.

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