INTERNATIONAL UNION
OF RAILWAYS

railML®

railML Feasibility

railML and ÖBB asset-database applications
UIC, Paris 2013-09-18

IQSOFT

Contact

Andreas Pinzenöhler

IQSOFT Gesellschaft für Informationstechnologie mbH
Schönbrunner Str. 218, Stiege B
A-1120 Wien
Austria

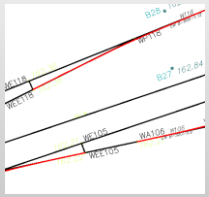
web: www.iqsoft.at

E-Mail: a.pinzenoehler@iqsoft.at

IQSOFT …

- Established 1999
- Staff: 35
- Independent IT Service Provider
- 150 person years project experience in railway solutions
- Areas of railway expertise
  - Asset databases
    - permanent way, track geometry, platforms, avalanche barriers, noise barriers, culverts, drainage lines …
    - Telecom (cables, equipment, locations …)
  - Data acquisition processes with measurement and survey equipment
  - Data analysis (Laserscan, object recognition, ……)
  - Railway geocoding
  - Reference systems
  - Line description (IM → RU)

Context – business processes with railML potential



Track layout

XML

TXT

TXT

Switch Inspection

Acceptance of tamping work

XML

TXT

ÖBB ASSET-DB

eg. permanent way track geometry

XML

Track/Switch Measurement

Reference data tamping machine

TXT

TXT

XML

Cable Documentation

TXT

Track Measurement

IQ SOFT

Context – R & D Project

Track/Switch Measurement

R & D Project (finished 2012)

Process-development

System-evaluation

procurement

…..

System-integration

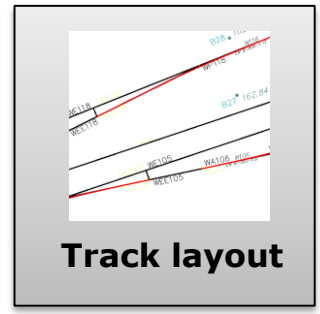
…..

railML®

IQSOFT

Work-packages systemintegration

- Support system verification and testing
- Dataexchange interface LandXML
  - → operational today
- Evaluation of railML
  - → potential interfaces to „Track layout Software"



Evaluation of railML

- Analysis of prior work
  - railML Schema Version 2.1
  - „Verifizierung von railML-Daten mithilfe von Schematron“ (Susanne Wunsch 2010)
  - railML-Wiki
- Definition of research topics
- Implementation of a functional prototype with real world data targeting railML-Version 2.1 (2012/09)

IQ SOFT

railML specific topics

- Can we produce a valid railML document from real world geometry data?

- Required extensions of the existing railML standard to exchange real world trackgeometry layout information?

- Which extensions have to be applied to the structure of the existing asset database?

- Necessary adaptions of processes related to the existing asset database?

IQSOFT

railML related questions and answers

Q: does railML provide a potential base for exchange of infrastructure data?
A: basically yes

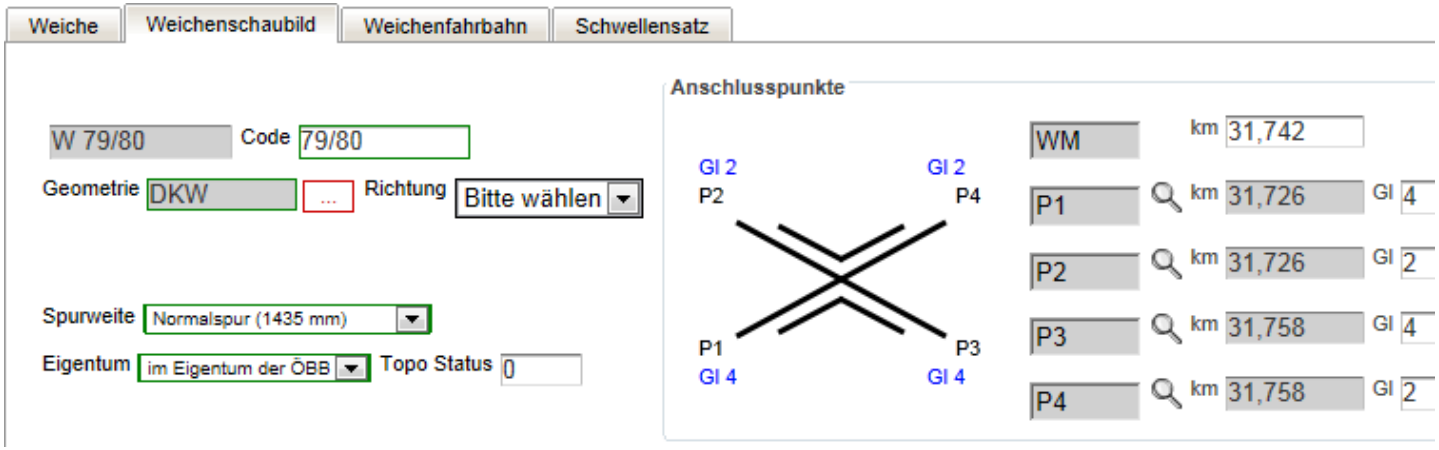
Q: has railML to be extended for the exchange of trackgeometry data
A: yes

Q: may railML schema extensions be applied using xs:any?
A: no

Q: should ÖBB-specific railML schema extensions be applied
A: at first some fundamental issues have to be addressed

Issues

Some combinations of tracks and switches cannot be modelled



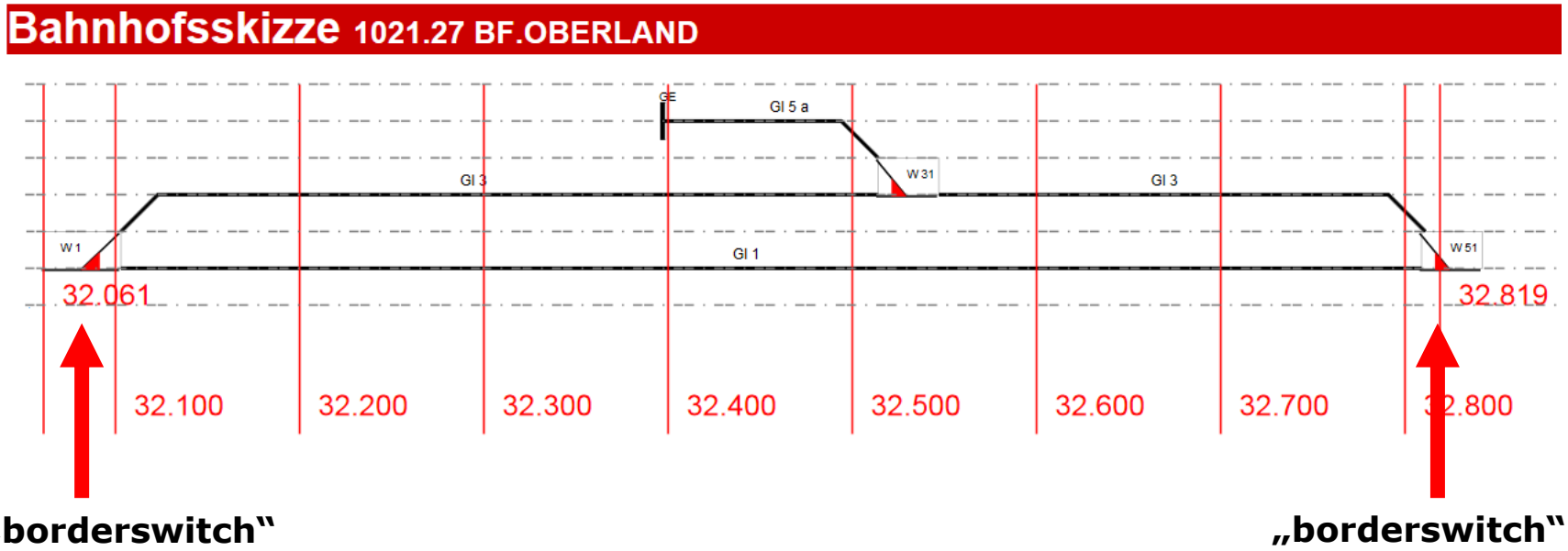
see also:
http://www.railml.org/forum/ro/?group=1&offset=0&thread=56&id=296

discussion of workarounds using „fictive" elements

Assumptions versus real world

railML assumption: the processed dataset is complete and consistent

real world: datasets are portions of the full dataset



Infrastructure processes DO NOT operate on the complete network

Assumptions versus real world

railML assumption: positioning is straightforward

real world: positioning is full of hidden pitfalls and misunderstandings

- 44 different registered line designations
- 4 different registered track designations
- Mile post has 3 different accuracy levels
- Mile post may have 2 different stations within one accuracy level (station change)
- Coordinates:
  - at least six different application areas
  - accuracy ranging from meter to millimeter

IQSOFT

Assumptions versus real world

railML assumption: tracks and switches come as twins

real world: there is no such thing in rail infrastructure ☺

Tamping machines:
switches are an obstacle

Reference data tamping machine

Cable Documentation

Telecom cables:
they do not take notice of a switch

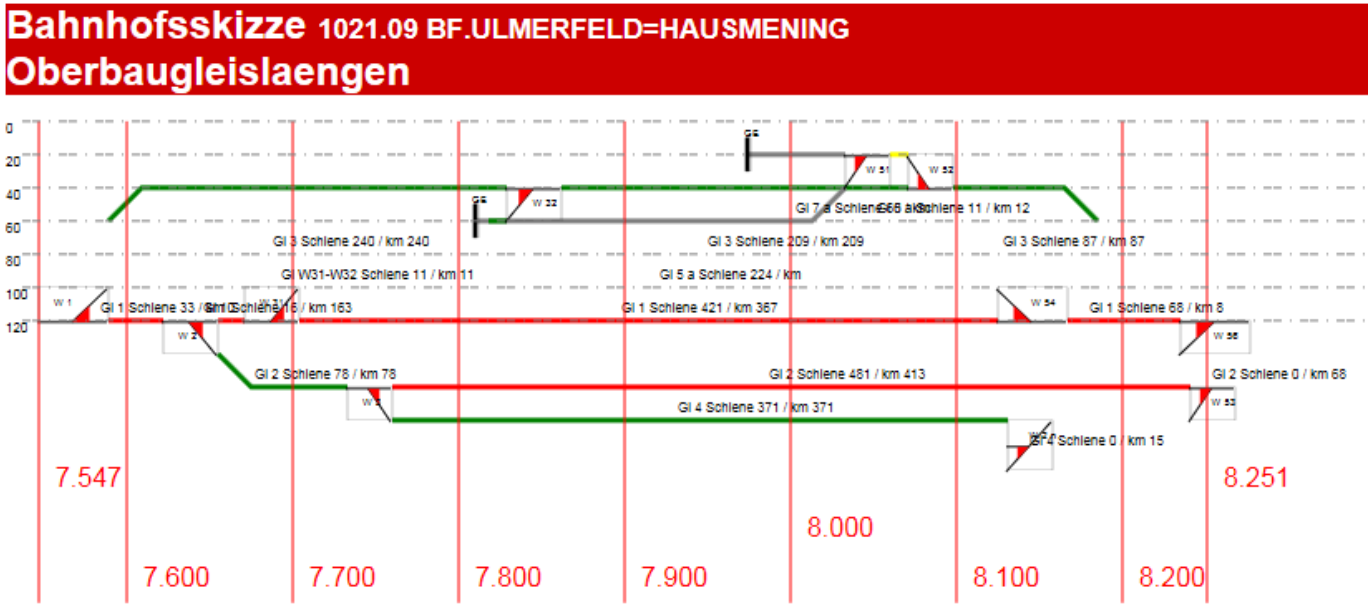
Switch inspection:
is already done in the factory before delivery

Switch Inspection

Assumptions versus real world

railML assumption: data basis is complete and without errors

real world: there are missing parts and there are wrong parts



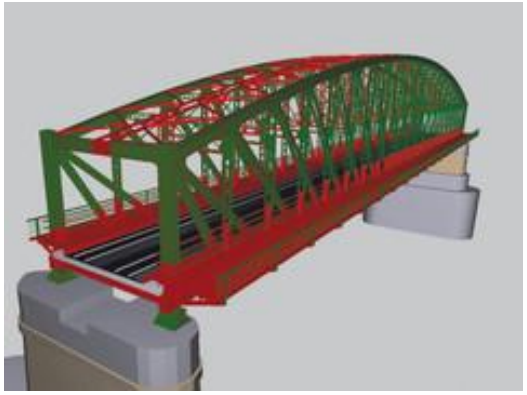
Assumptions versus real world

railML assumption: structural dependence between asset and track

real world: many assets exist without any track information

- Lifecycle considerations
  - Asset basically possesses a relation to a track, but not in all phases of the lifecycle
- No structural dependence at all
- Structural dependence to a line
  - asset relates to ONE line but to one or MORE tracks

Assets without relation to tracks - examples



Brigde is in the early planning stage

Track data will be available in 2 months

Track was abandoned 20 years ago

Brigde still has to be maintained

Assets without relation to tracks - examples

Switch is measured in the factory

Measurement results are documented in asset database without related tracks

iWeichenrevision ÖBB INFRA

Hauptmenü | Messen/Prüfen | Weichenuntersuchungsblätter | Weichenreport | Werksmessung

Werksweichen

Geometriedaten

Geometriecode *	EW 54E2-500-1:14 Fsch	Schmalspur?	N
Geometriebezeichnung		Radius	500
Schienenform	54E2	Leistungslänge	82
Rollenvorrichtung	O	Bauart	

Speichern | Verwerfen

Untersuchung	Spurweitenprüfung										Leitweitenprüfung		Rillenweitenprüfung				Zungenprüfung	
	a	b	c1	c2	d1	d2	e1	e2	f1	f2	h1	h2	l1	l2	m1	m2	ZuPr	
	1435	1437	1435	1435	1435	1435	1435	1435	1435	1435	1394	1394	62	62	45	45	gut	Sollwert
	14	14	14	14	14	14	12	12	12	12	3	3			6	6		Gr. SES
	10	10	10	10	10	10	8	8	8	8								Gr. ES
	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2			-2	-2				Kl. ES
	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-2	-2	-4	-4	-4	-4		Kl. SES
Rausch Johannes 22.04.2011	0	1	1	0	1	-1	1	0	3	0	2	2	10	11	1	0	gut	Messwert
																	OK	SAM-Status

IQ SOFT

Assets with relation to two or more tracks - examples

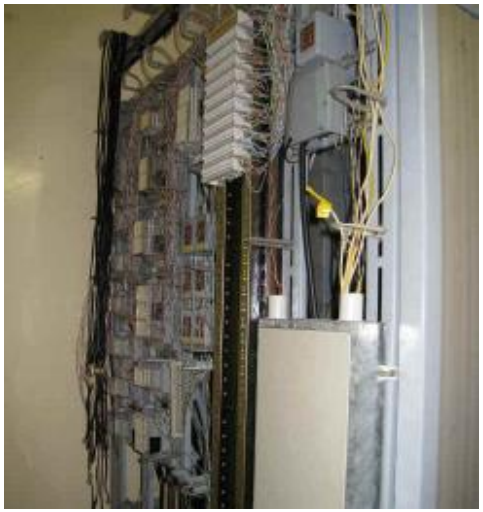
Railway crossing intersecting one street and two tracks

Brigde with three tracks

Assets without any structural dependence to tracks

Noise barriers

Avalanche barriers



Telecommunication equipment

Conclusions 2013

- railML is still not ready for our usecases
- Further development of railML is definitely worth watching
- Minor changes (version 2.3 ?) may allow railML based interface definitions for track geometry
- Majority of considered usecases require a major, even radical redesign (version 3.0 ??)

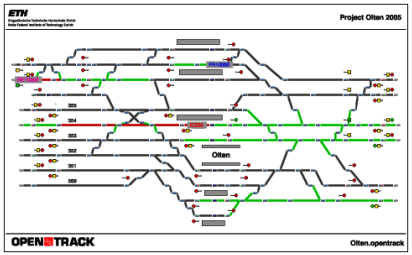
Development of railML 3.0 – some deliberations

planning → building → maintaining → providing

topology ↑

What is covered?

↓ topology



railML®

Define the context!

IQSOFT