RFID in Rail paves the way for condition-based maintenance

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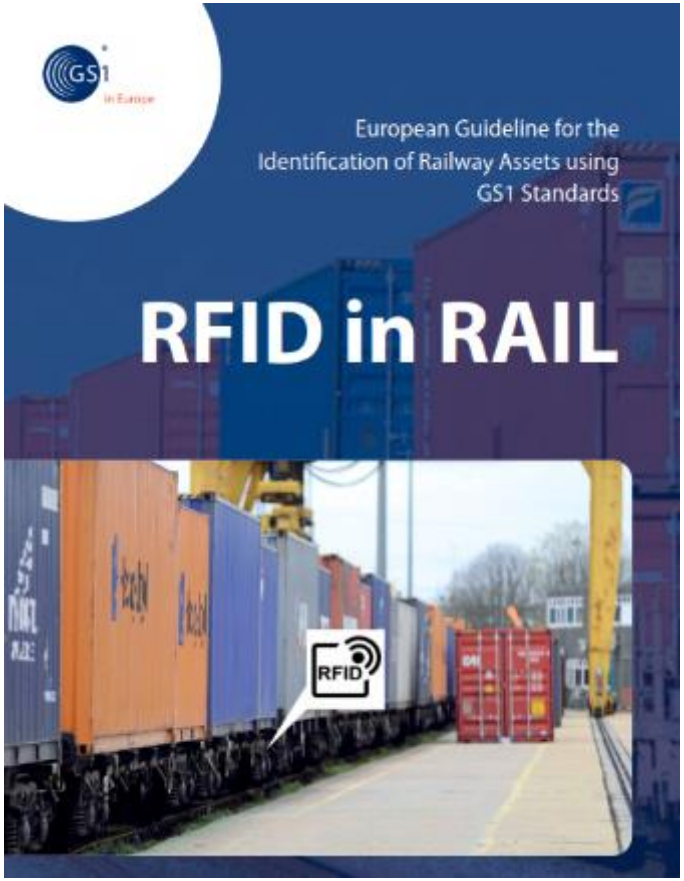
Creating standards



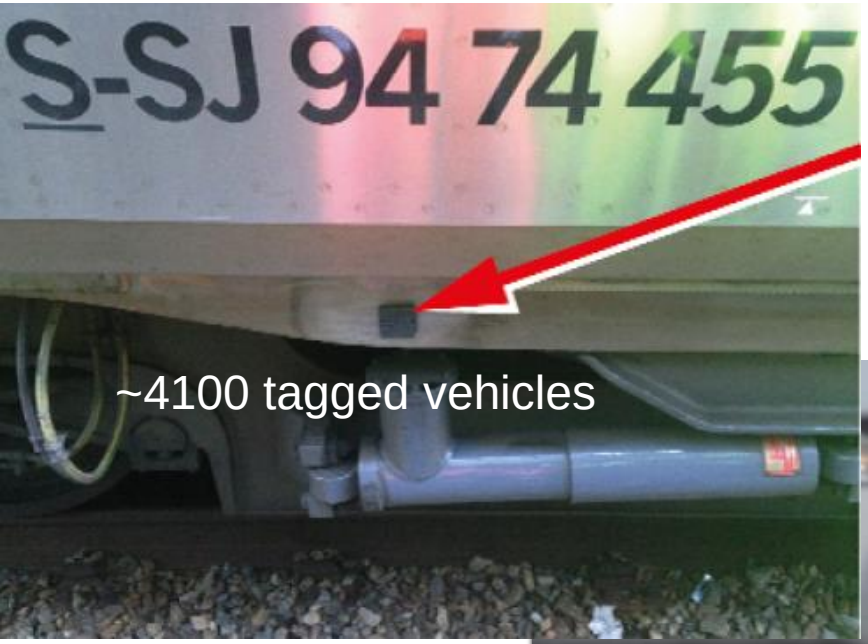
CEN/TC 225/WG 4 **N 38**

CEN/TC 225/WG 4
Automatic ID applications
E-mail of Secretary: ulrike.poehlmann@din.de
Secretariat: DIN

Draft - RFID in Rail (00225082) (2016-05-14)

Date of document	2016-05-17
Expected action	Next Meeting
Due Date	2016-06-08
Source	Project editor

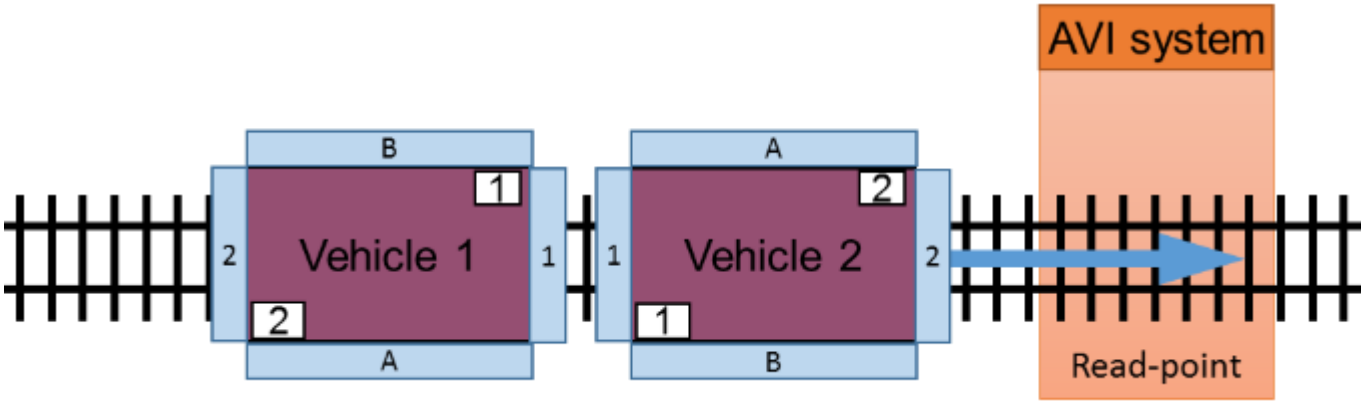
Digitizing vehicle-number



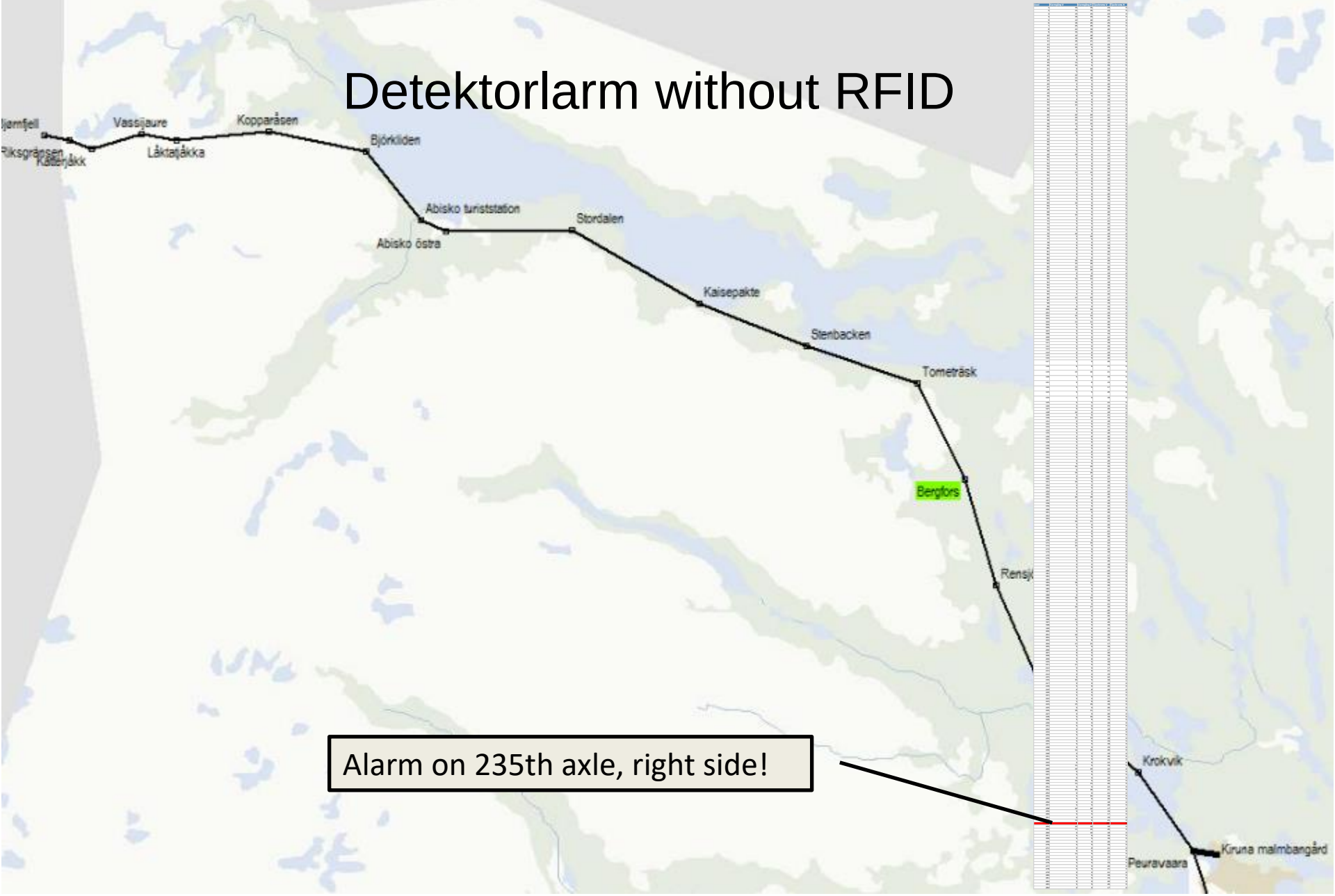
~4100 tagged vehicles

~250 installations

RFID give us correct train composition



Detektorlarm without RFID



Alarm on 235th axle, right side!


LKAB

RFID + WTMS

Grundinformation | Tåginformation | Väderinformation | Larr

Hjulskada | Vikt

Axel	Fordonsnummer	Axel i fordon	Fordonsnummer RFID
228	5009	4	877468720090
229	5115	1	877468721155
230	5115	2	877468721155
231	5115	3	877468721155
232	5115	4	877468721155
233	5116	1	877468721155
234	5116	2	877468721155
235	5116	3	877468721155
236	5116	4	877468721155

Historiska mätvärden

Fordonsnummer RFID: 877468721155

Axel i fordon RFID: 7

☑ Hjulskada

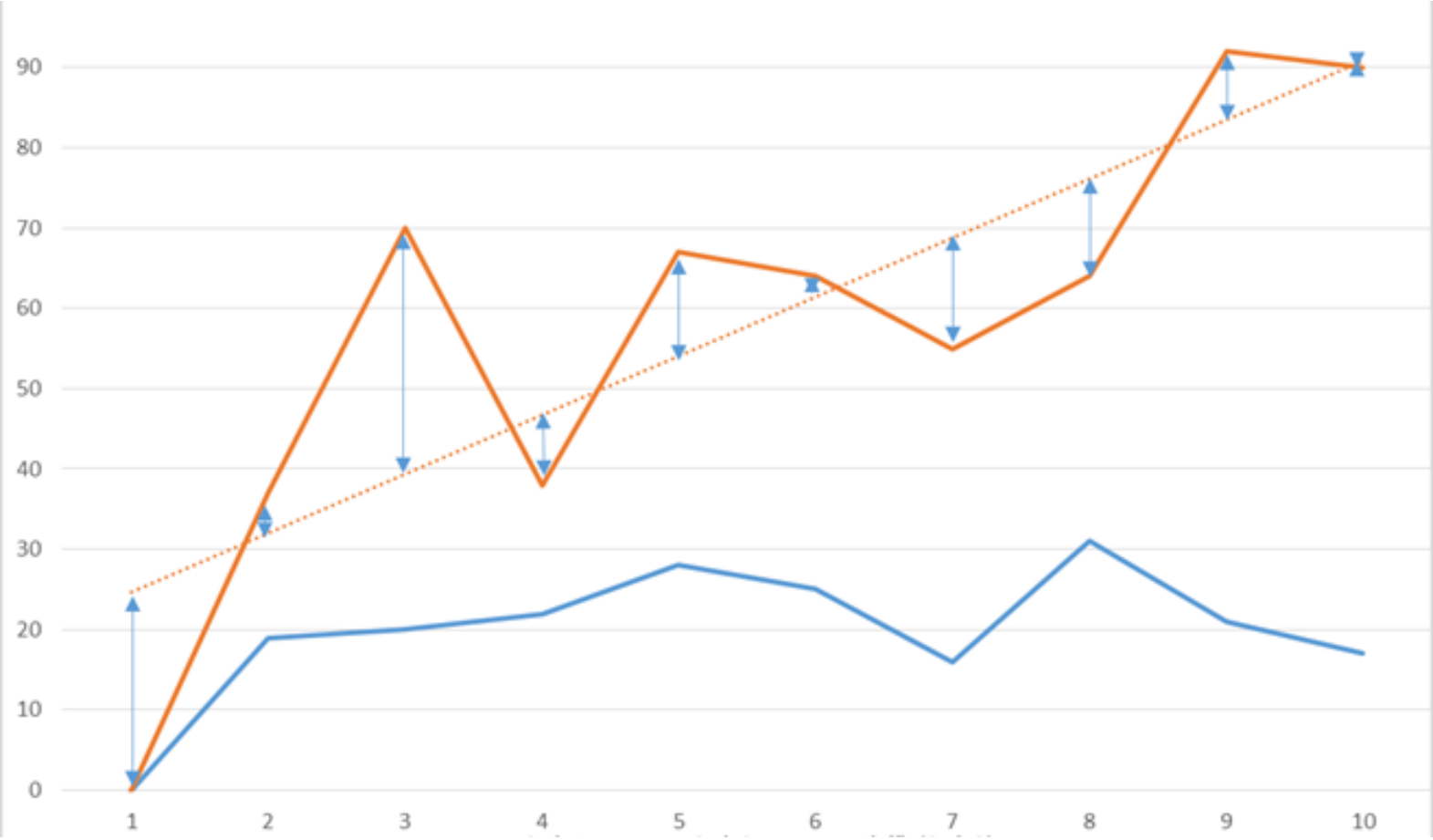
☐ Varmgång/Tjuvbroms

Tidpunkt	Plats	Tågriktning	Hastighet	Mean Vänster	Peak Vänster	Mean Höger	Peak Höger
2016-11-05 06:38:16	Harrträsk Hj	Jämn	69	27	38	23	57
2016-11-05 03:29:45	Sunderbyns Sjukhus Hj	Jämn	71	24	30	24	64
2016-11-05 00:45:43	Sunderbyns Sjukhus Hj	Udda	56	153	163	152	220
2016-11-04 21:35:34	Harrträsk Hj	Udda	47	150	186	149	268
2016-11-04 17:55:02	Harrträsk Hj	Jämn	73	25	37	24	77
2016-11-04 15:16:42	Sunderbyns Sjukhus Hj	Jämn	71	25	31	23	53
2016-11-04 12:55:54	Sunderbyns Sjukhus Hj	Udda	59	145	153	157	253
2016-11-04 09:38:31	Harrträsk Hj	Udda	50	148	177	155	312
2016-11-03 22:38:59	Harrträsk Hj	Jämn	63	24	34	23	66
2016-11-03 19:15:49	Sunderbyns Sjukhus Hj	Jämn	71	26	35	25	69
2016-11-03 16:43:47	Sunderbyns Sjukhus Hj	Udda	50	149	165	149	224
2016-11-03 13:27:34	Harrträsk Hj	Udda	55	151	171	148	265
2016-11-02 22:22:51	Harrträsk Hj	Jämn	73	26	38	24	77
2016-11-02 19:10:48	Sunderbyns Sjukhus Hj	Jämn	71	26	32	23	54
2016-11-02 16:34:40	Sunderbyns Sjukhus Hj	Udda	63	145	150	156	212
2016-11-02 13:24:53	Harrträsk Hj	Udda	58	142	155	150	223
2016-11-01 20:14:06	Harrträsk Hj	Jämn	71	24	35	24	76
2016-11-01 16:04:08	Sunderbyns Sjukhus Hj	Jämn	71	25	33	26	80
2016-11-01 13:30:02	Sunderbyns Sjukhus Hj	Udda	61	146	159	149	211
2016-11-01 10:13:06	Harrträsk Hj	Udda	54	140	164	143	249
2016-10-31 22:05:54	Harrträsk Hj	Jämn	70	26	35	22	75
2016-10-31 19:03:10	Sunderbyns Sjukhus Hj	Jämn	71	26	32	23	41
2016-10-31 16:40:31	Sunderbyns Sjukhus Hj	Udda	53	150	160	158	207
2016-10-31 13:29:44	Harrträsk Hj	Udda	42	145	188	156	240

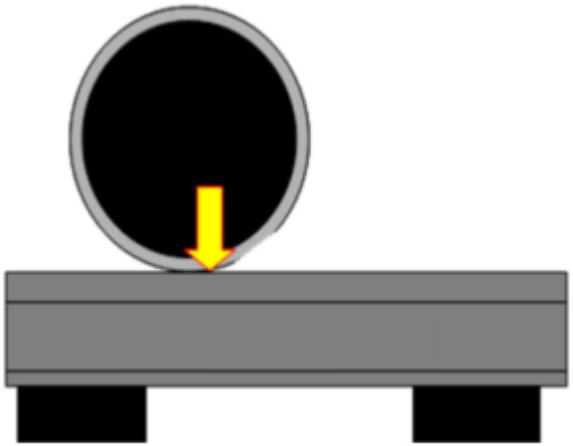
Advantages

- Actions at low level alarms ➔ 73% decrease of high level alarms (potentially ~500 delay-hours applied in Sweden)
- Correct train composition
- Correct length of train

Trend analysis



Flat wheel detectors



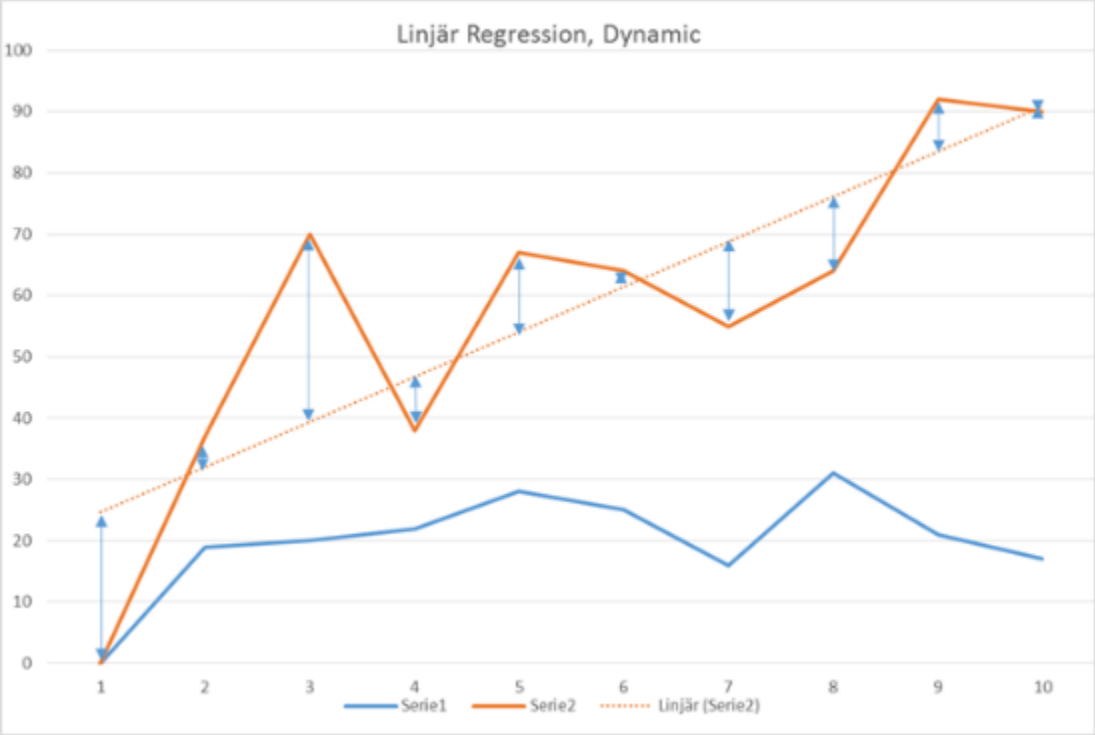
Regression model

Linear regression

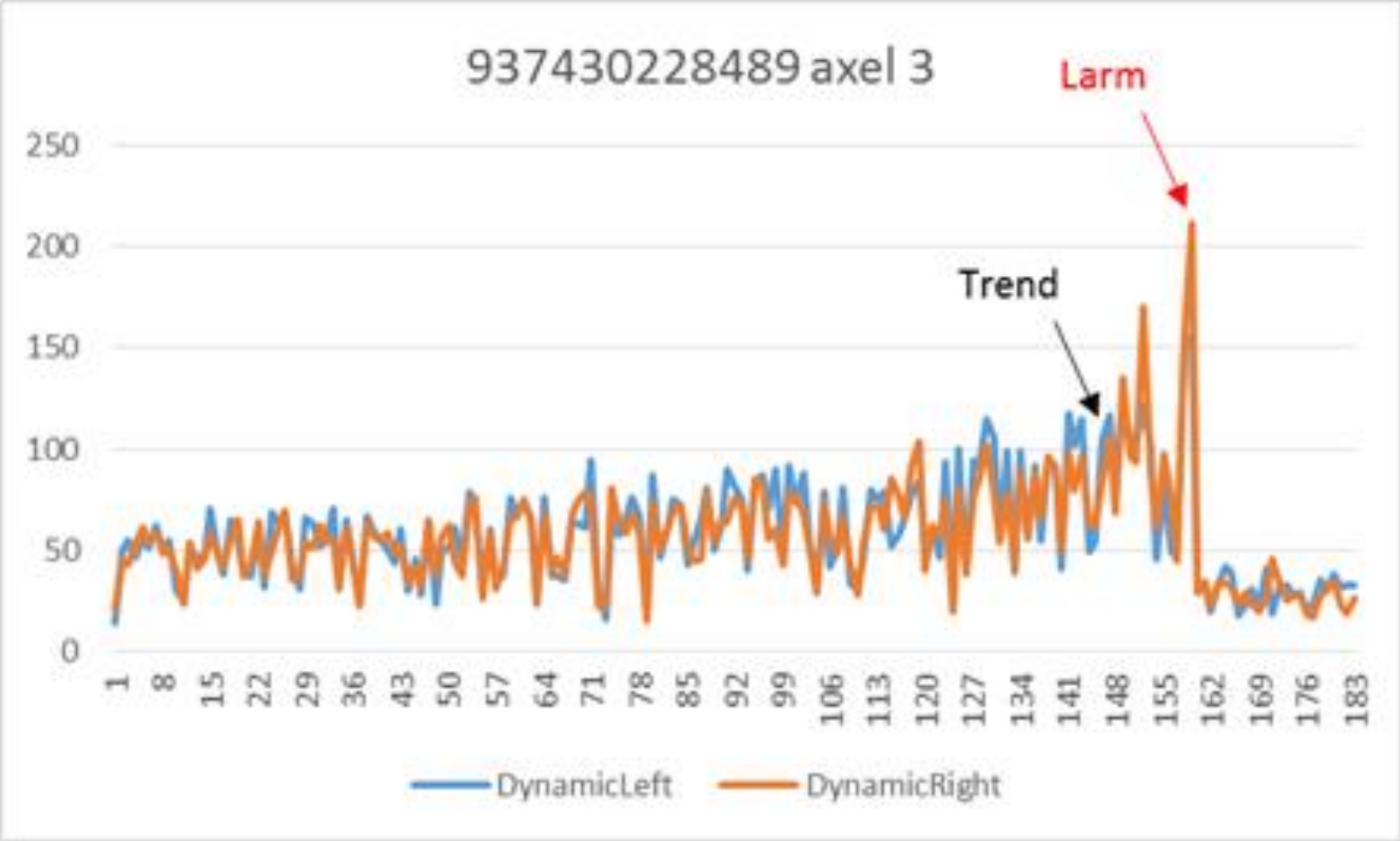
- y=kx+m, n=10 and 50.

Parameters of regression

- Gradient (k)
- Coefficient of determination (R^2)
- Estimated y-value ($\hat{y}$)

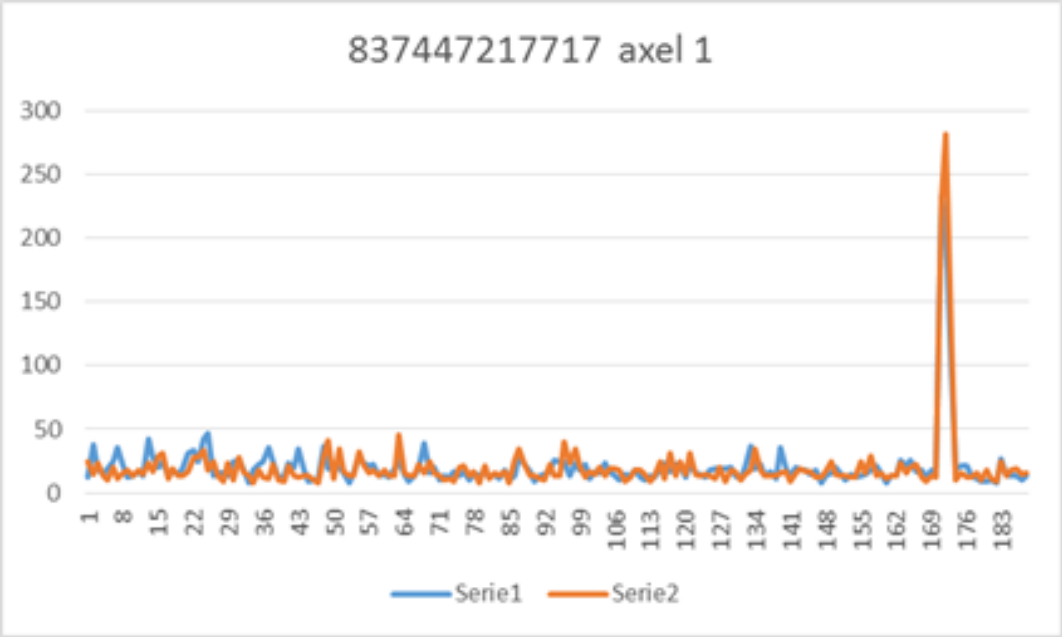


Trend alerts



Cons

- Some alerts not predictable
- ~50% risk of ”false” alerts (with this method)

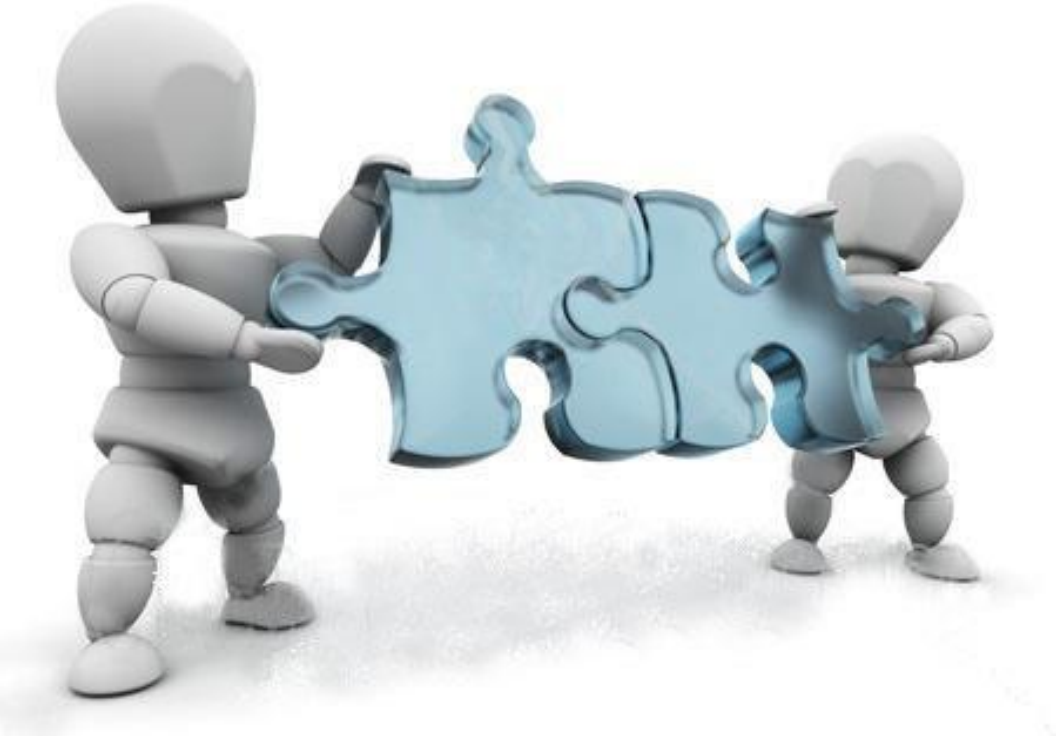


- Implementation without business impact, create opportunities!

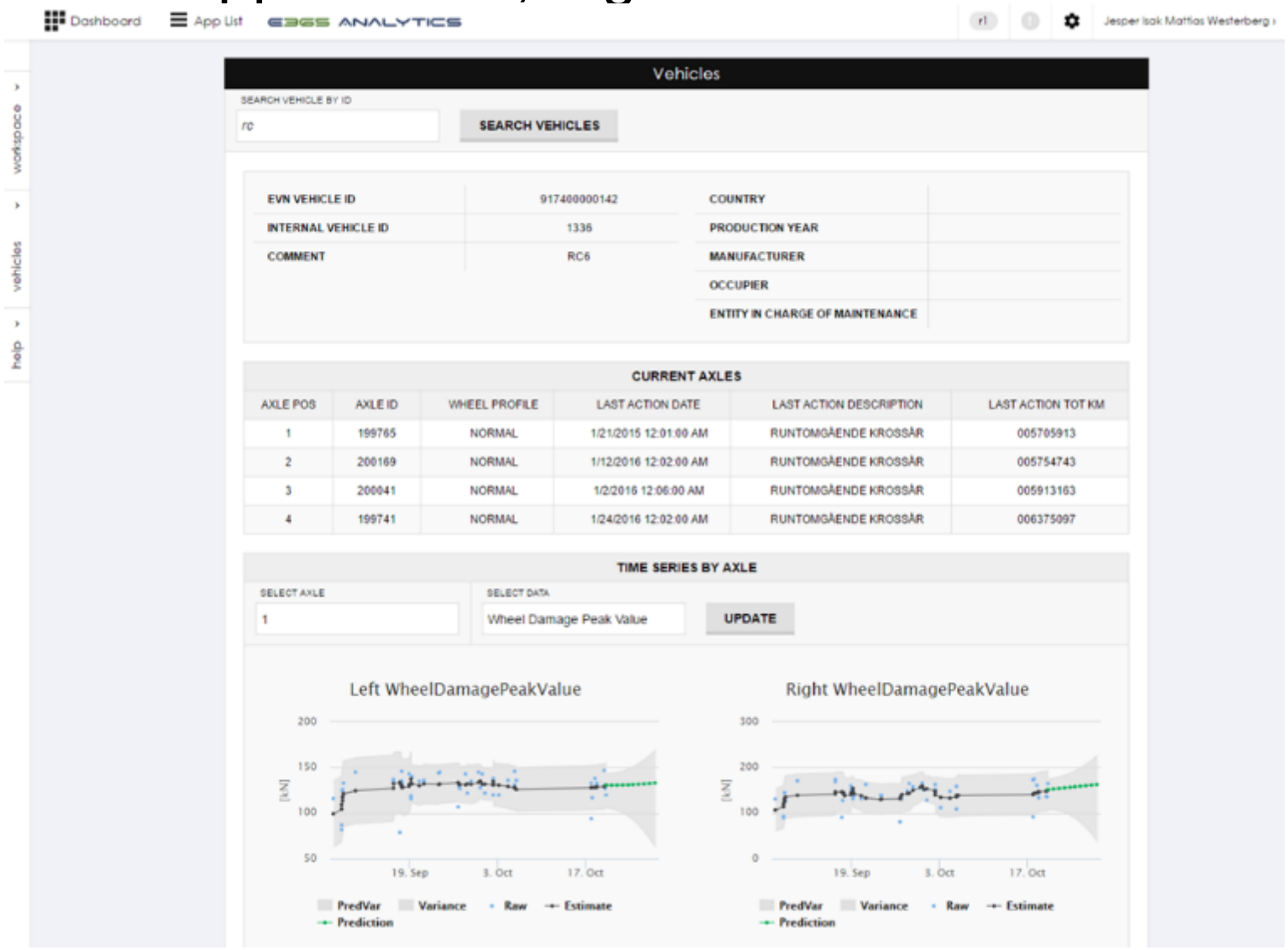
Standardized XML-protocols

HRMS – Detector measurements

EPCIS – Vehicle identification



External applications, e.g. eMaintenance365



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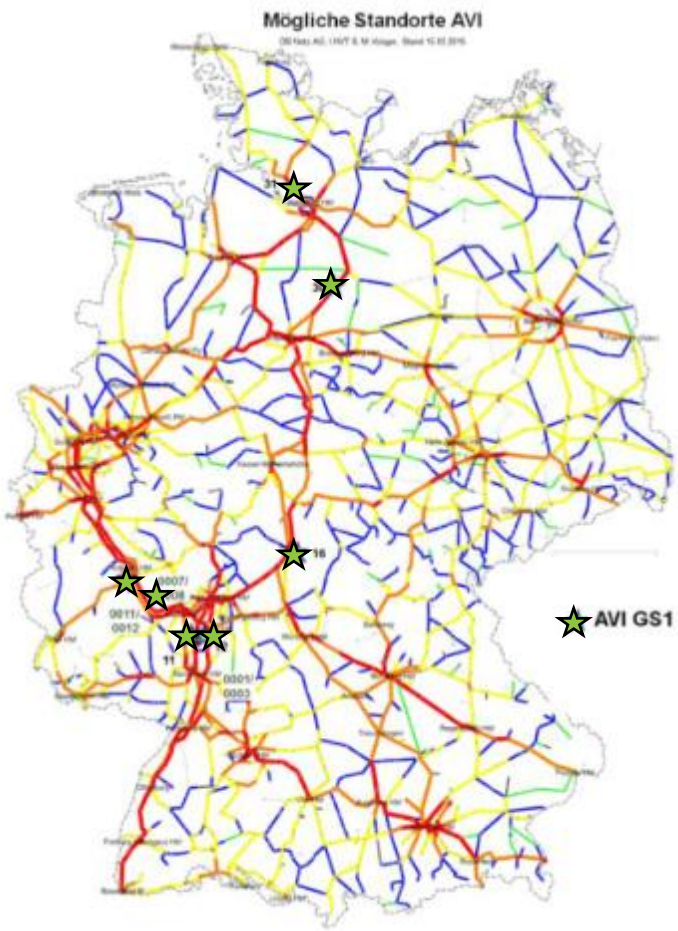
Possibilities for international services

Germany (incl. plans)



Denmark

Sweden

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Questions? karl.akerlund@trafikverket.se