



Camino Rail



Fieldlab Camino bijeenkomst 4 juni 2019
Paul van der Voort

Meer treinen op tijd

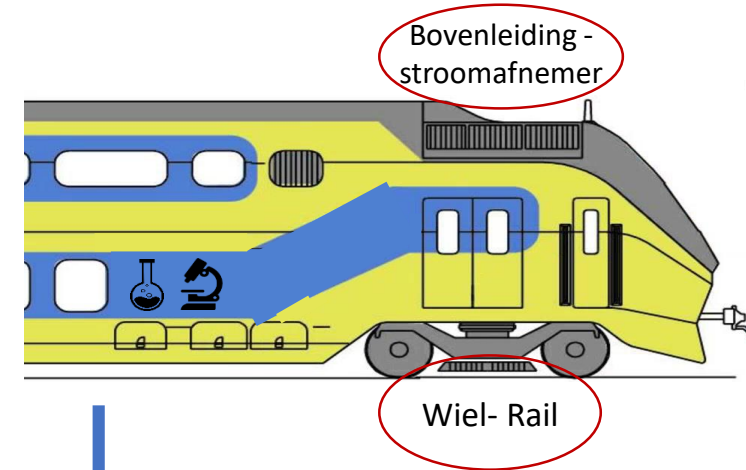
Treinvertraging



Oorzaken

Vertragingsoorzaken 2017		% gew. vertr. min.
Indirect		15%
Vervoerder (NS)	Commercie / Proces	27%
	Personeel	5%
	Materieel	2%
	Materieel defect	12%
Infra (ProRail)	CV/VL	10%
	Defecten Infra	14%
Derden		13%
Internationaal		1%
TOTAAL		100%

Trein-spoor interactie



o.a. defecten wielen, stroomafnemer

ProRail

o.a. defecten spoorstaaf, wisselpuntstuk, bovenleiding

Camino Rail - onderdelen



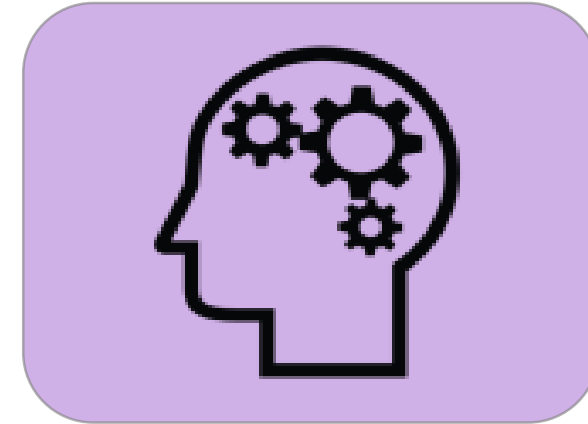
FieldLab

- Sensoren in het spoor
- Sensoren op 2 reizigerstreinen



Datalake / platform

- Tools en rekencapaciteit
- Datasets op platform



Analytics

- Gebruik bestaande algoritmes
- Ontwikkeling nieuwe algoritmes, modellen, analyses

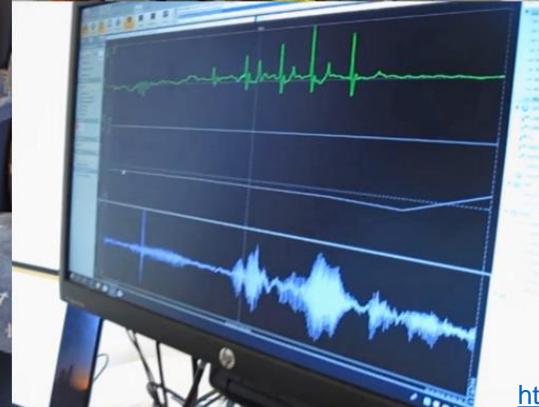
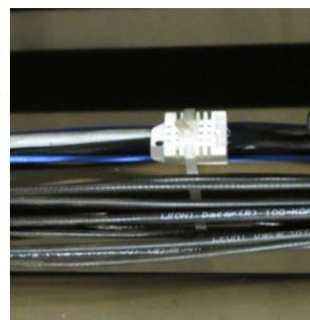
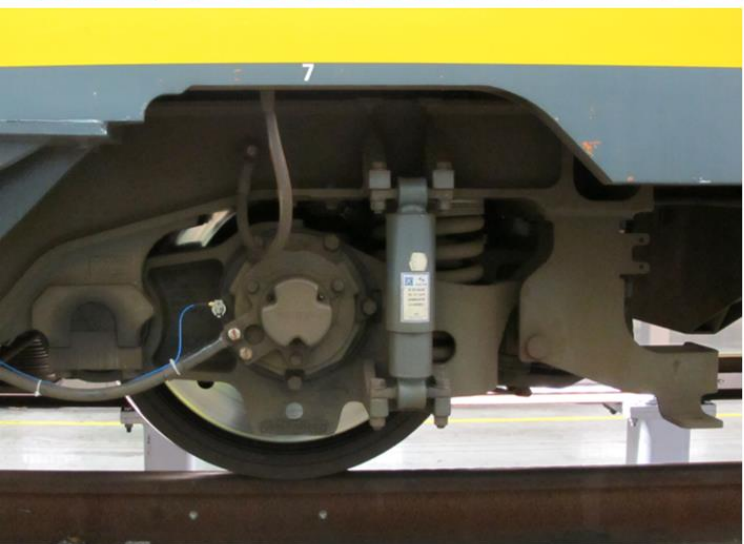


Open Camino

- Samenwerking wordt gezocht



FieldLab: montage sensoren op 2 treinen





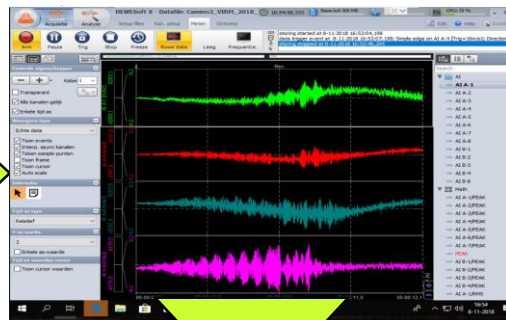
Analytics, case 1: Trigger van de week

ProRail

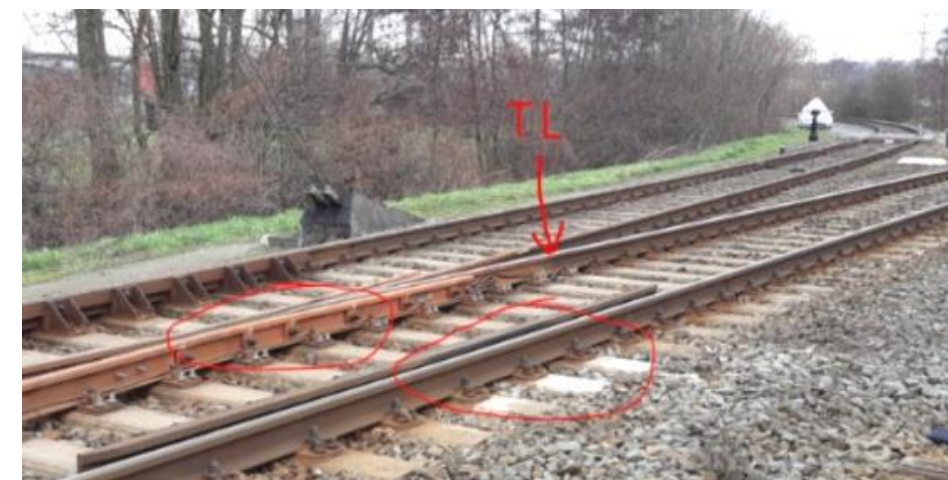
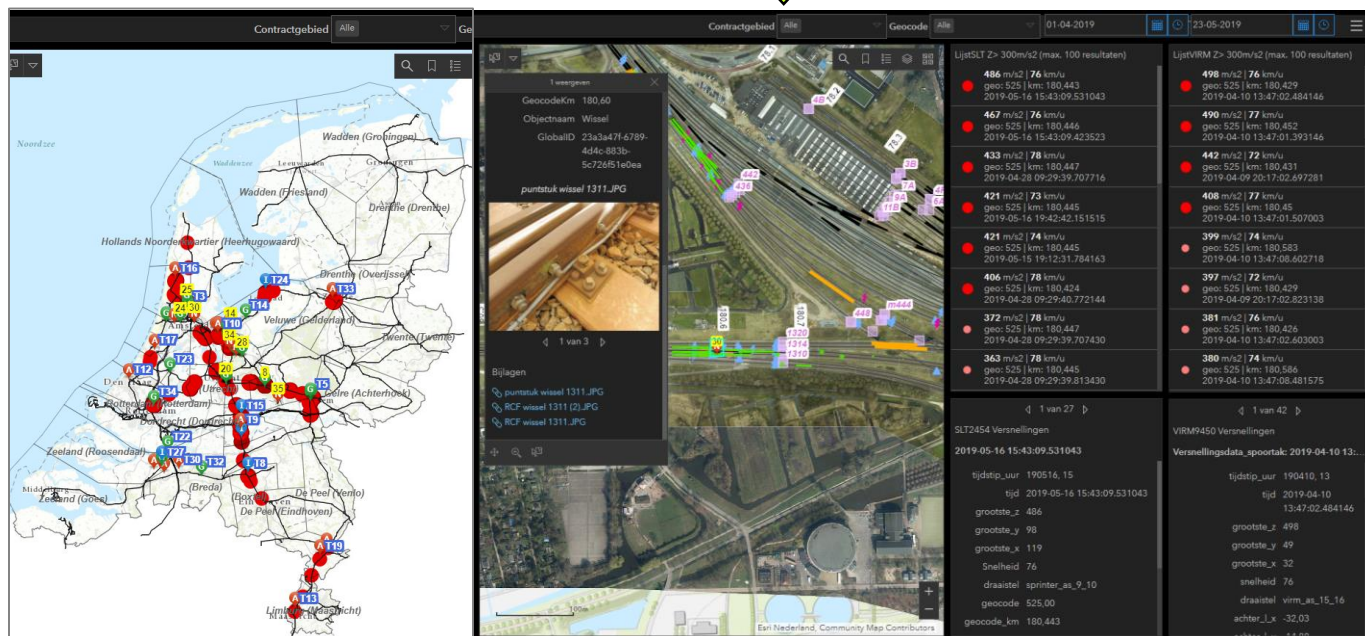


14 Sensoren op
2 reizigerstreinen

Continue meetdata



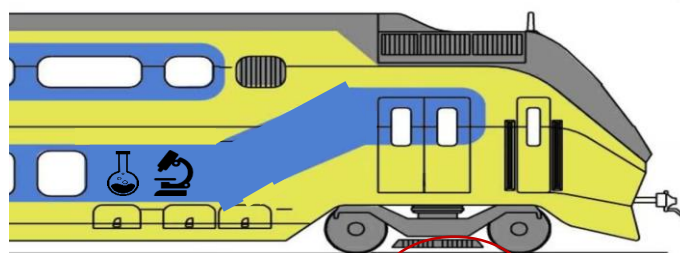
Defecten vinden en herstellen



- Ca 10 defecten opgespoord per maand
- >90% juist

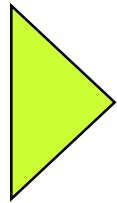


Analytics, case 2 & 3: Hoogteligging & geluid

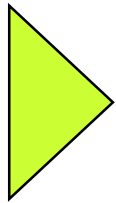
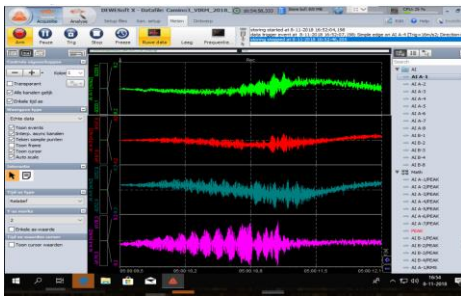


Wiel-
Rail

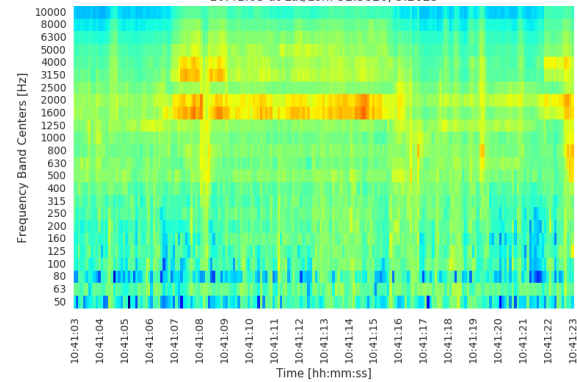
Microfoons



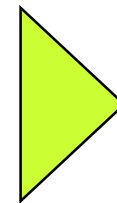
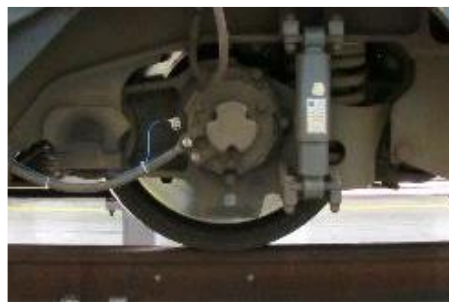
Continu realtime meetdata



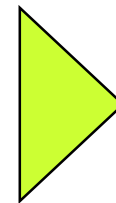
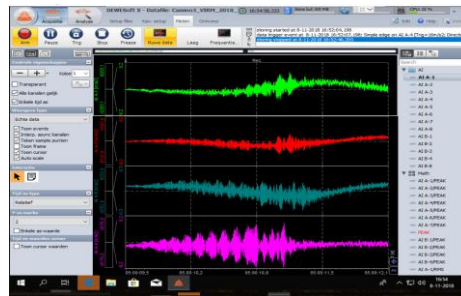
Booggeluid identificeren



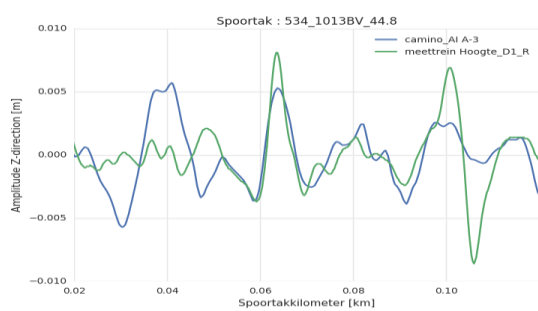
Versnellingsmeters



Continu realtime meetdata



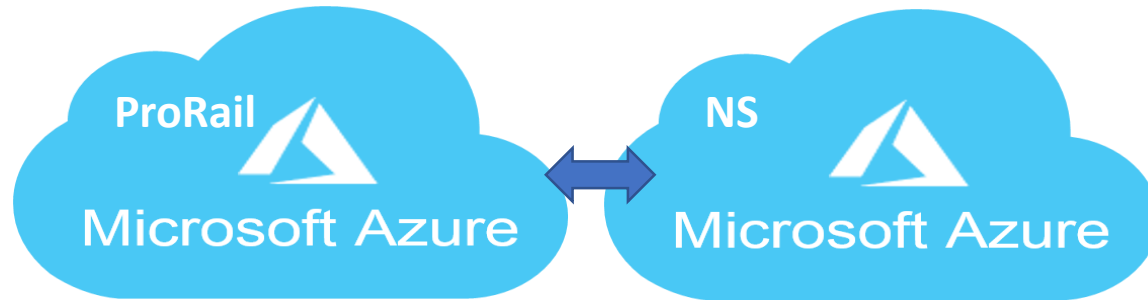
Relatieve hoogteligging afleiden



Werkwijze

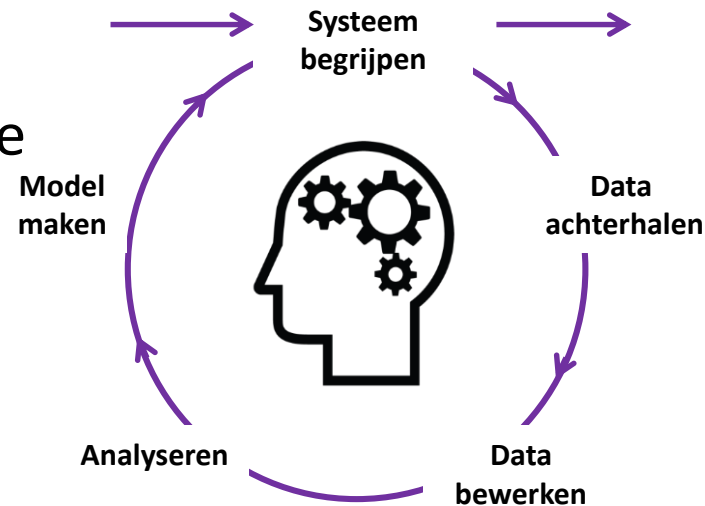
Middelen

- Big data analytics platform (Azure)
- Ontwikkelen in Python



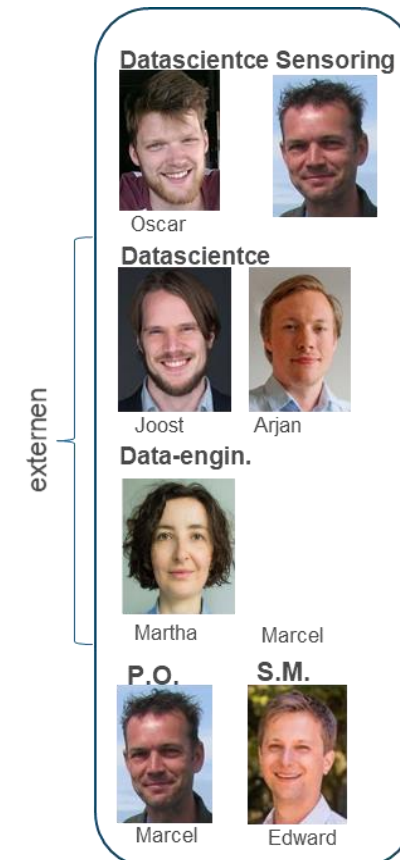
Methoden

- Scrum
- Datascience cycle



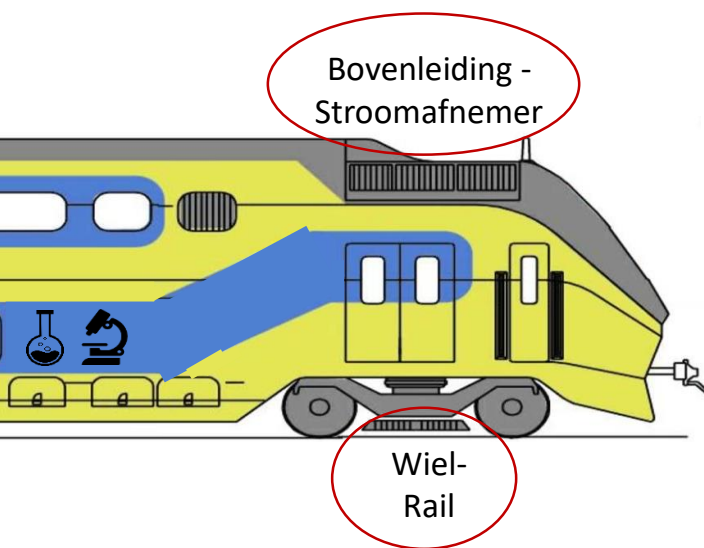
Mensen

- Team ProRail – NS - extern
- Datacientists



What next ?

Welke onderwerpen willen we verder oppakken via Camino Rail?



Nieuw

Bovenleiding



Pantograaf



Huidig

Spoorligging en -defecten

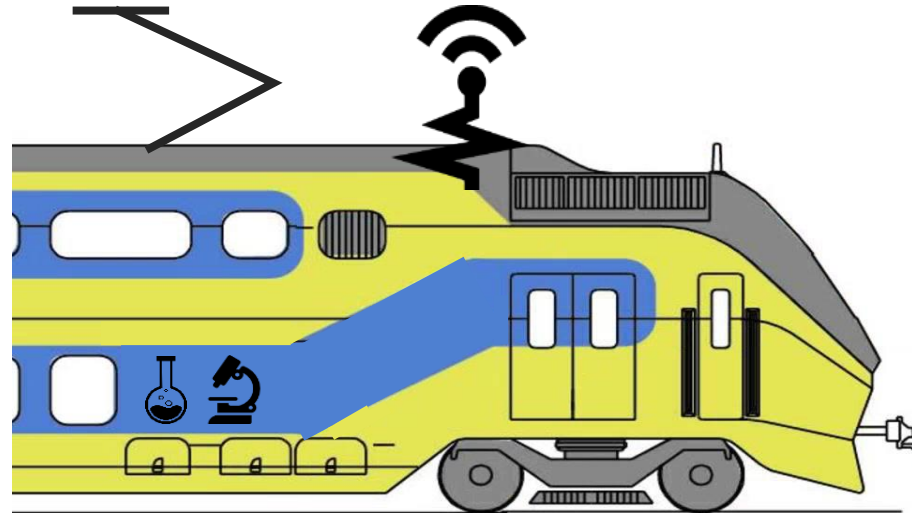


Geluid



Pantograaf-bovenleiding interactie

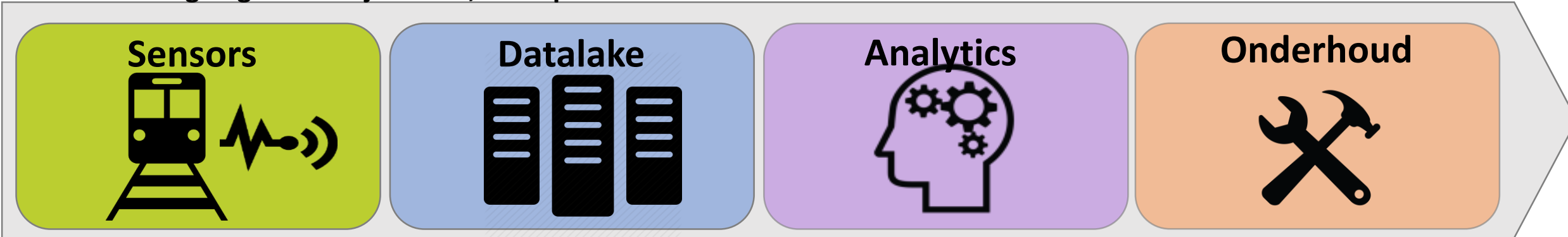
1. Pantograaf
monitoring
(camera's en
beeldherkenning)



2. Bovenleiding
monitoring
(sensoren aan
bovenzijde trein)

3. Analytics
Pantograaf - bovenleiding

Partners brengen gezamenlijk iets in, in de predictive maintenance keten:



Kansen voor verbreding Camino Rail samenwerking:

- Sitec (infrabeheerder chemiepark Camelot, 60km spoor):
 - ProRail deelt algoritmes 'trigger van de week' met Sitec
 - Sitec maakt algoritmes geschikt voor goederentreinen <40 km/u
 - Sitec deelt aangepaste algoritmes met ProRail
- Analytics bedrijf
 - Analytics bedrijf levert beeldherkenningsalgoritme voor spoordefecten aan ProRail
 - ProRail stelt algoritme open voor de spoorbranche

Wie heeft ervaring met delen van algoritmes ?