

Welcome

Noise Production Ceilings

How Dutch environmental legislation affects railway planning

Gerard Groenveld

July 17, 2014



<https://www.youtube.com/watch?v=vK57j7Kmp3l>

The Netherlands



Agenda

- About ProRail
- Noise legislation
 - Noise production ceilings
- Business implications
 - Railway planning
 - Asset management information
- GIS aspects

Our Mission

ProRail connects people, cities and businesses by a dense, intensively used rail network.

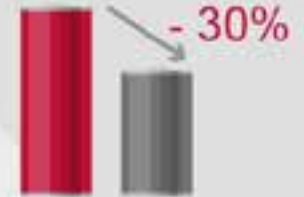
ProRail provides a secure, reliable, punctual and sustainable rail network and comfortable stations, in conjunction with operators and partners.

Our professionals work efficiently and cost-consciously on a rail network focused on pleasant passenger travel and unobstructed freight transport.

ProRail. Certainly on the track.



Our Ambition



Safe rail

Zero avoidable accidents

Reliable rail

Zero avoidable disruptions - 30%

Punctual rail

Further increase in punctuality

Sustainable rail

- Less energy consumption
- Highest rung on the CO₂ performance ladder

What we do



Construction

laying new track,
building new stations

Maintaining

existing rail network

Allocating

the space on the track

Controlling

all rail traffic

Managing

stations

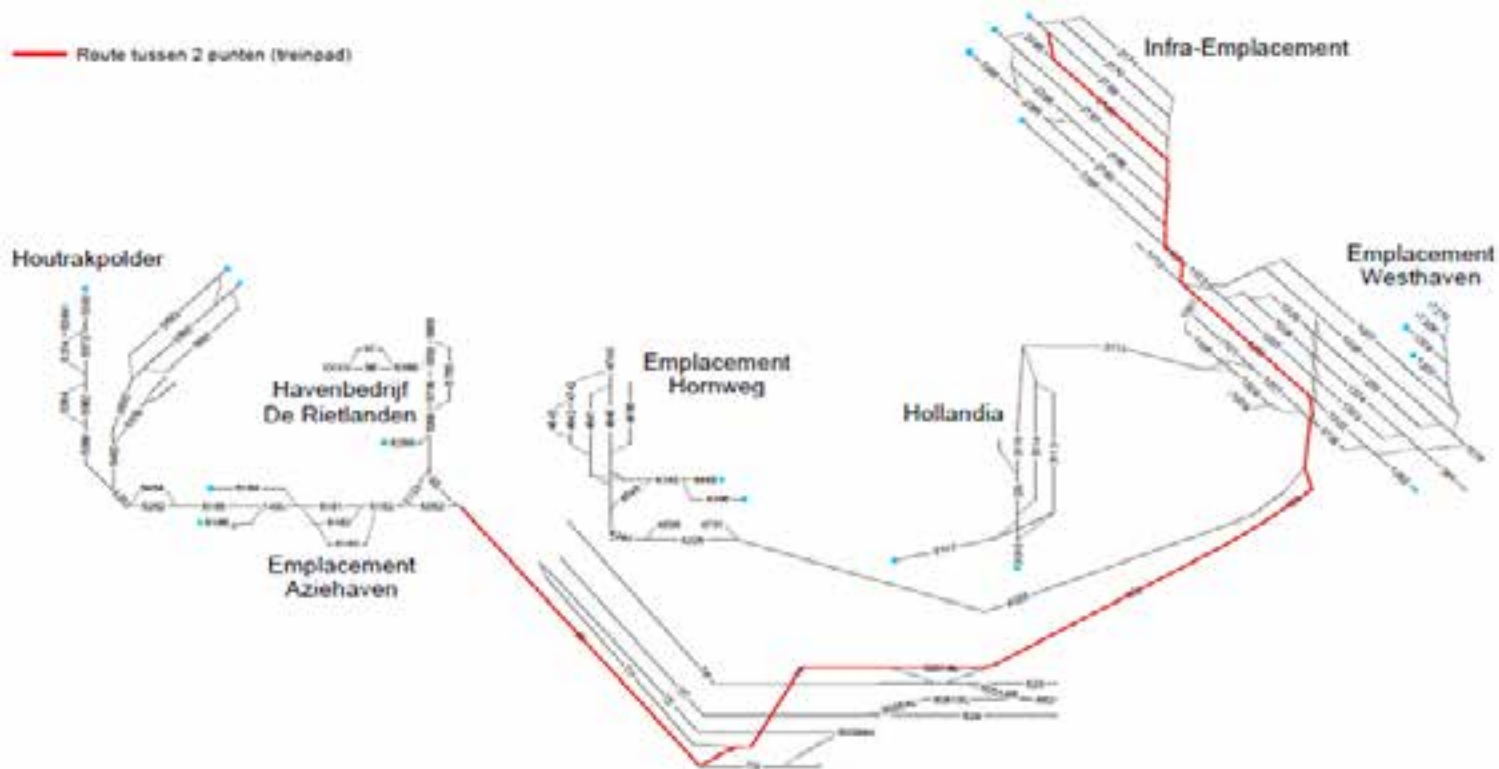
Informing

operators

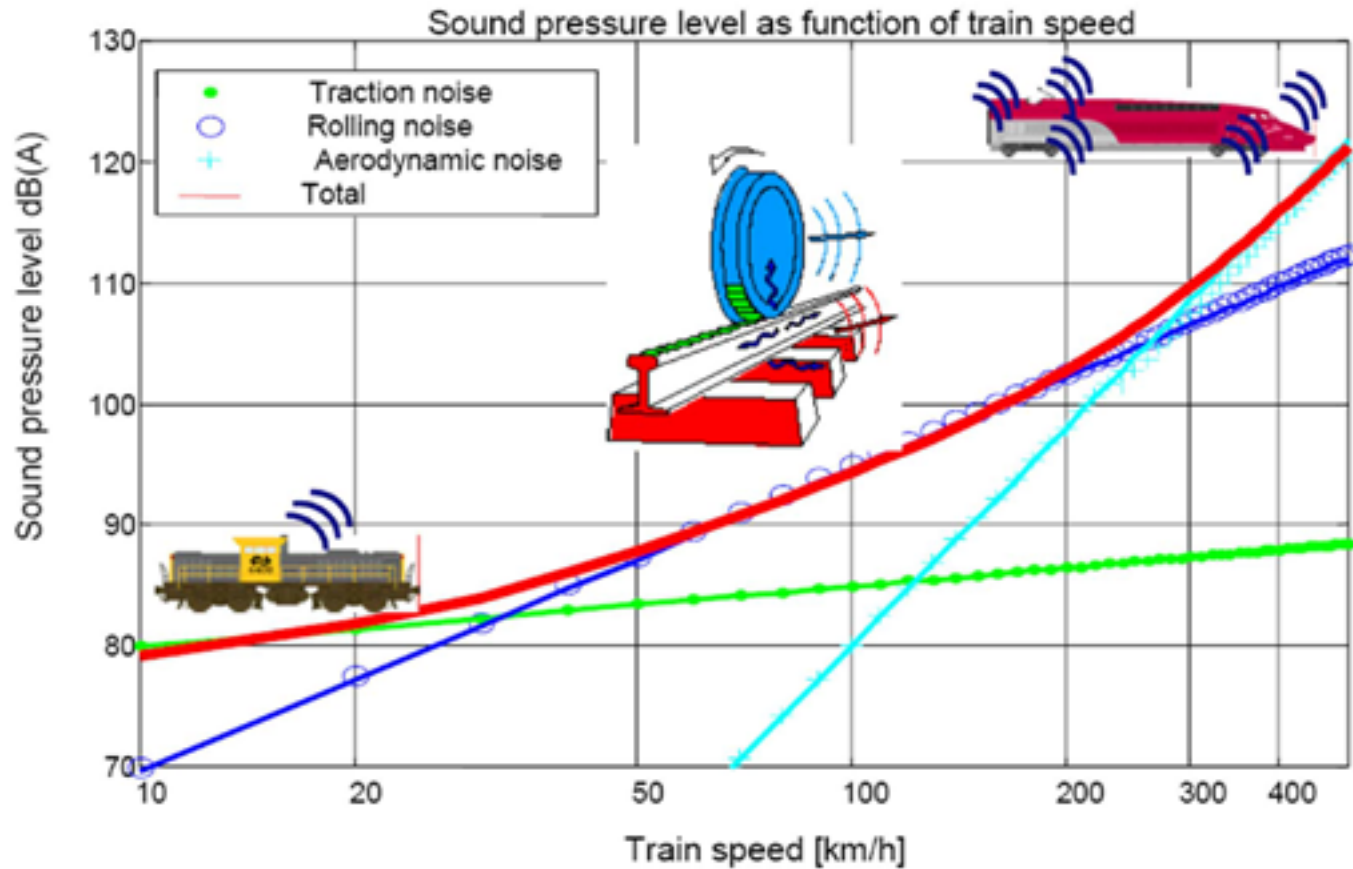


Our product: a 'train path'

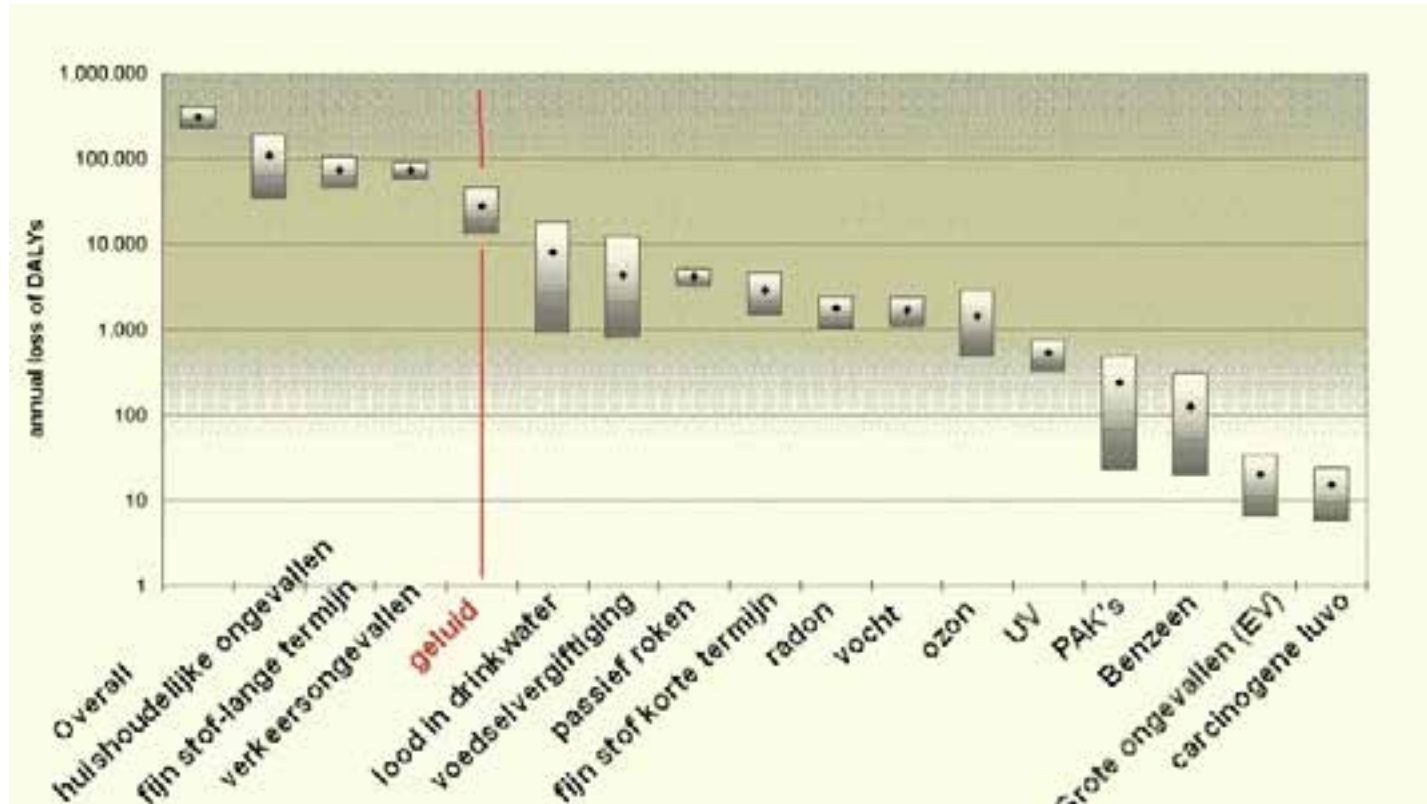
Westhaven (Amsterdam)



Noise



Noise effects



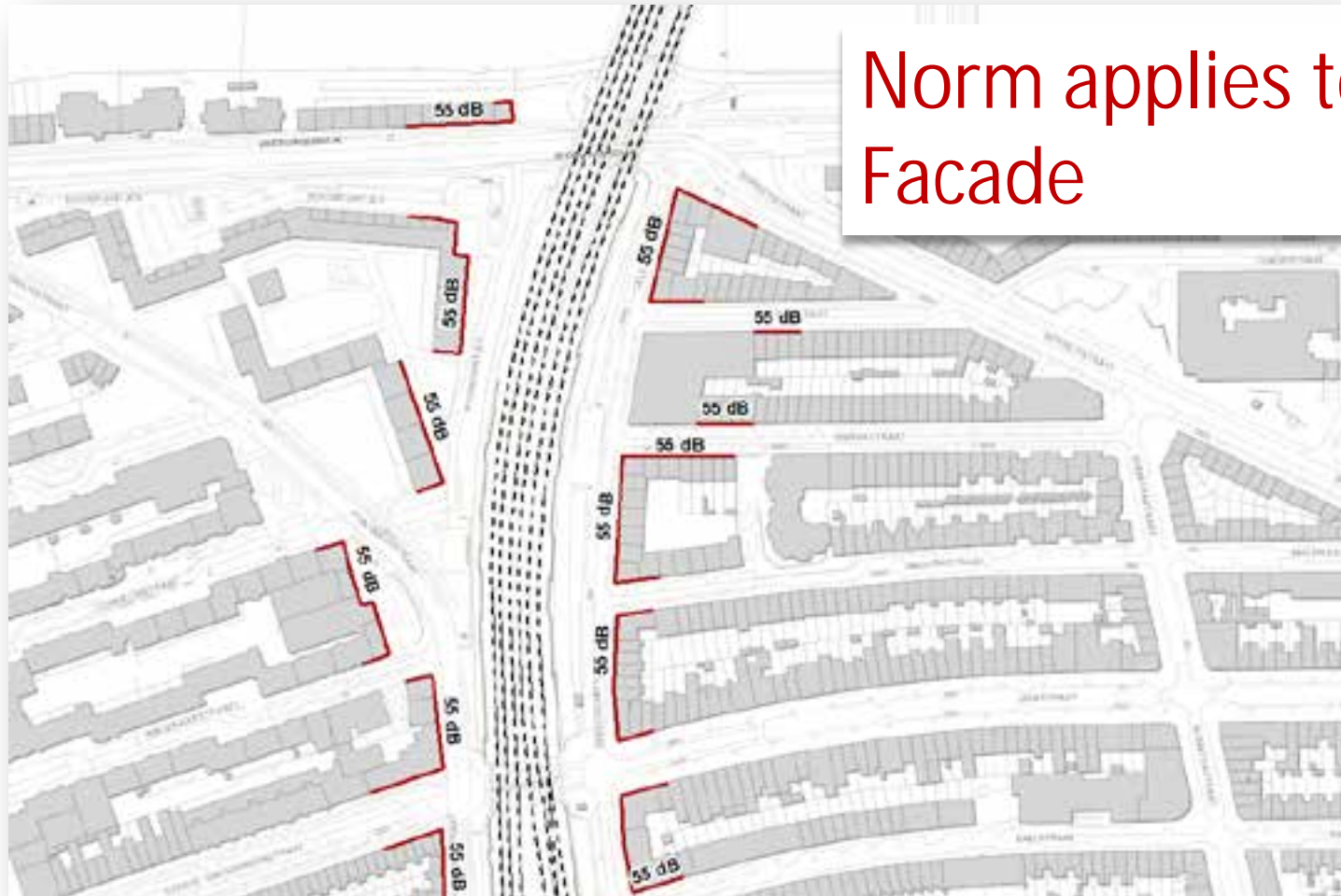
Source: [Milieubalans '97](#)

Legislation – (European) Noise policy

One objective

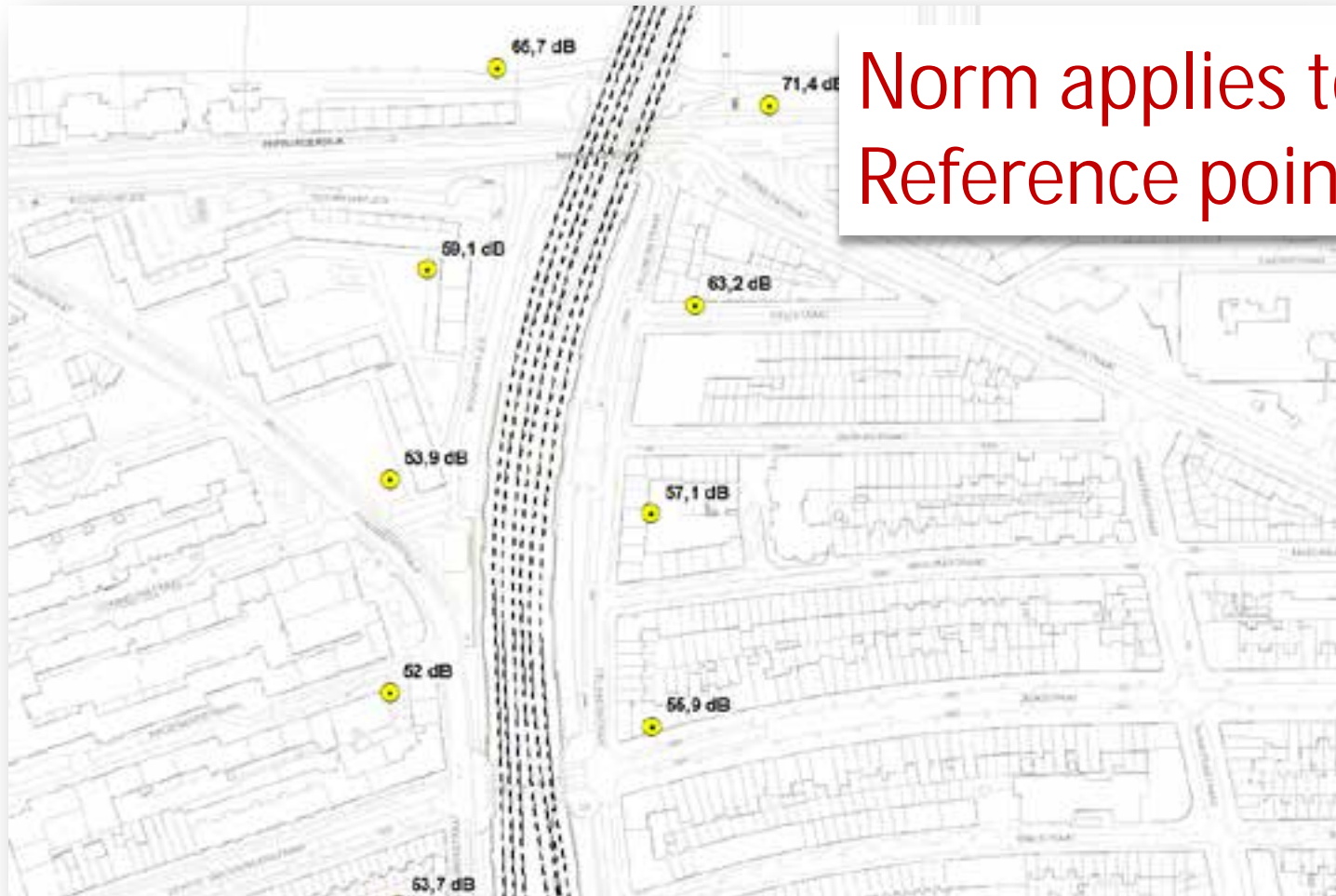
Nobody should be exposed to noise levels which endanger its health and quality of life

Legislation – *Noise Control Act*



Norm applies to
Facade

Legislation – *Noise Production Ceilings*



Norm applies to Reference point

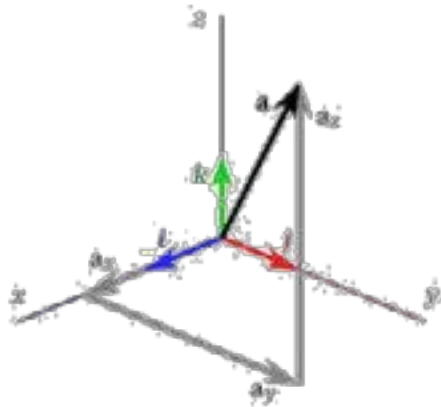
Legislation – *Noise Production Ceilings*

- Norm based on Noise Control Act and average levels of 2006, 2007 en 2008 plus 1,5 dB;
- Focus on 'Noise Production' instead of 'Reception'
- Monitored each year, nationwide;
- Clear responsibilities; ProRail is responsible for keeping Noise Production within limits;
- Noise limits taken into account in allocating railway capacity;
- ProRail is free to maintain, reconstruct and utilize rail system as long as Noise Production stays within limits;

Legislation – *Noise Production Ceilings*

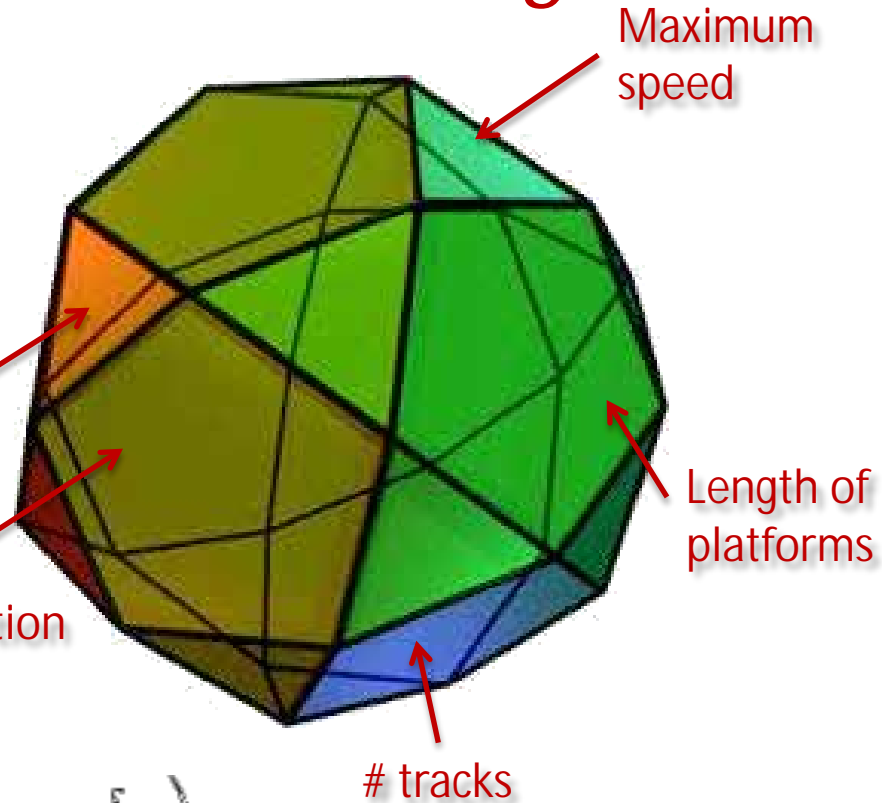
‘Noise production as one of the dimensions in a multidimensional capacity analysis’

Noise limiting track capacity

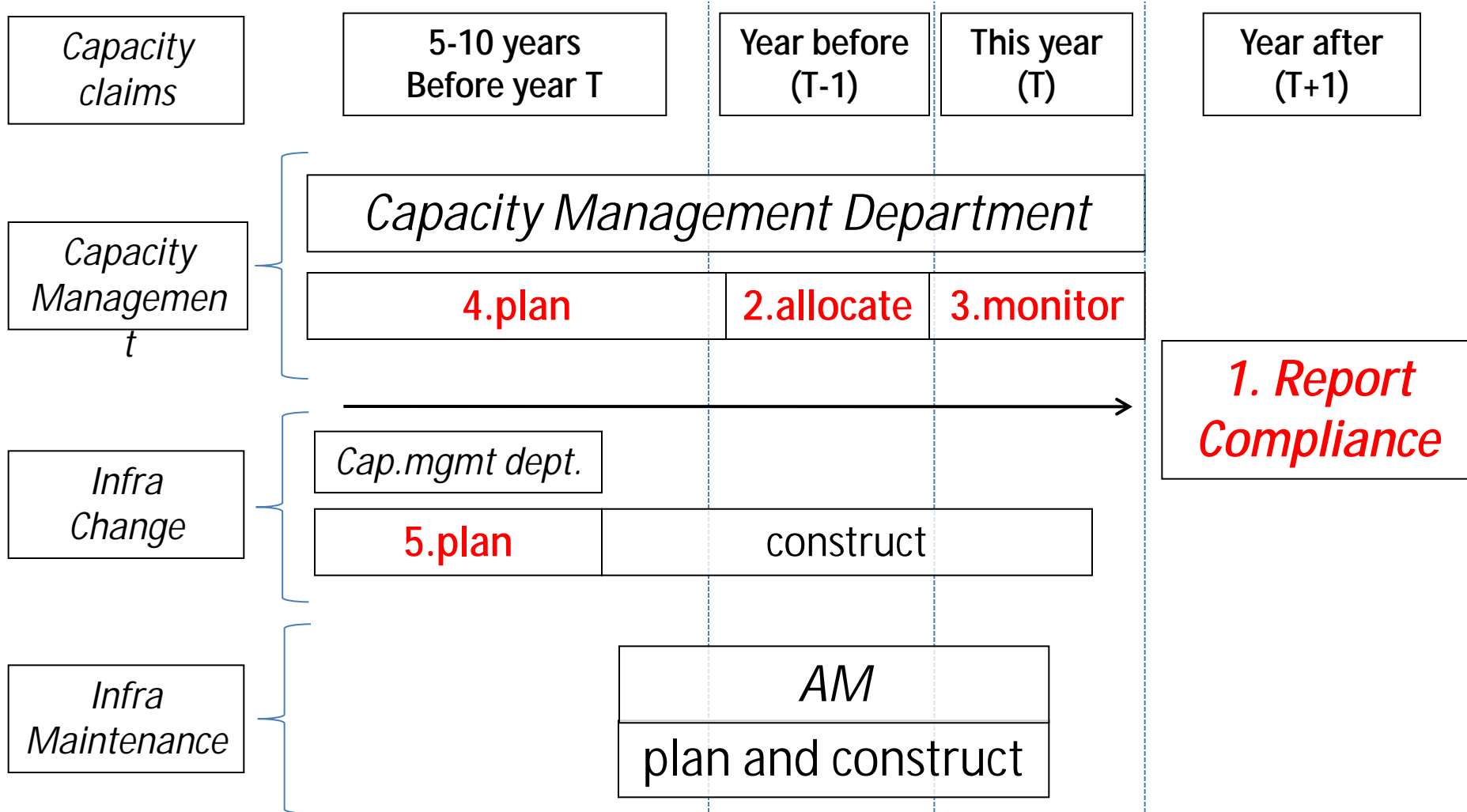


Train protection system

$$\Delta := \begin{pmatrix} \delta_{1,1} & \delta_{1,2} & \dots & \delta_{1,I} \\ \delta_{2,1} & \delta_{2,2} & \dots & \delta_{2,I} \\ \vdots & \vdots & \dots & \vdots \\ \delta_{I,1} & \delta_{I,2} & \dots & \delta_{I,I} \end{pmatrix} .$$



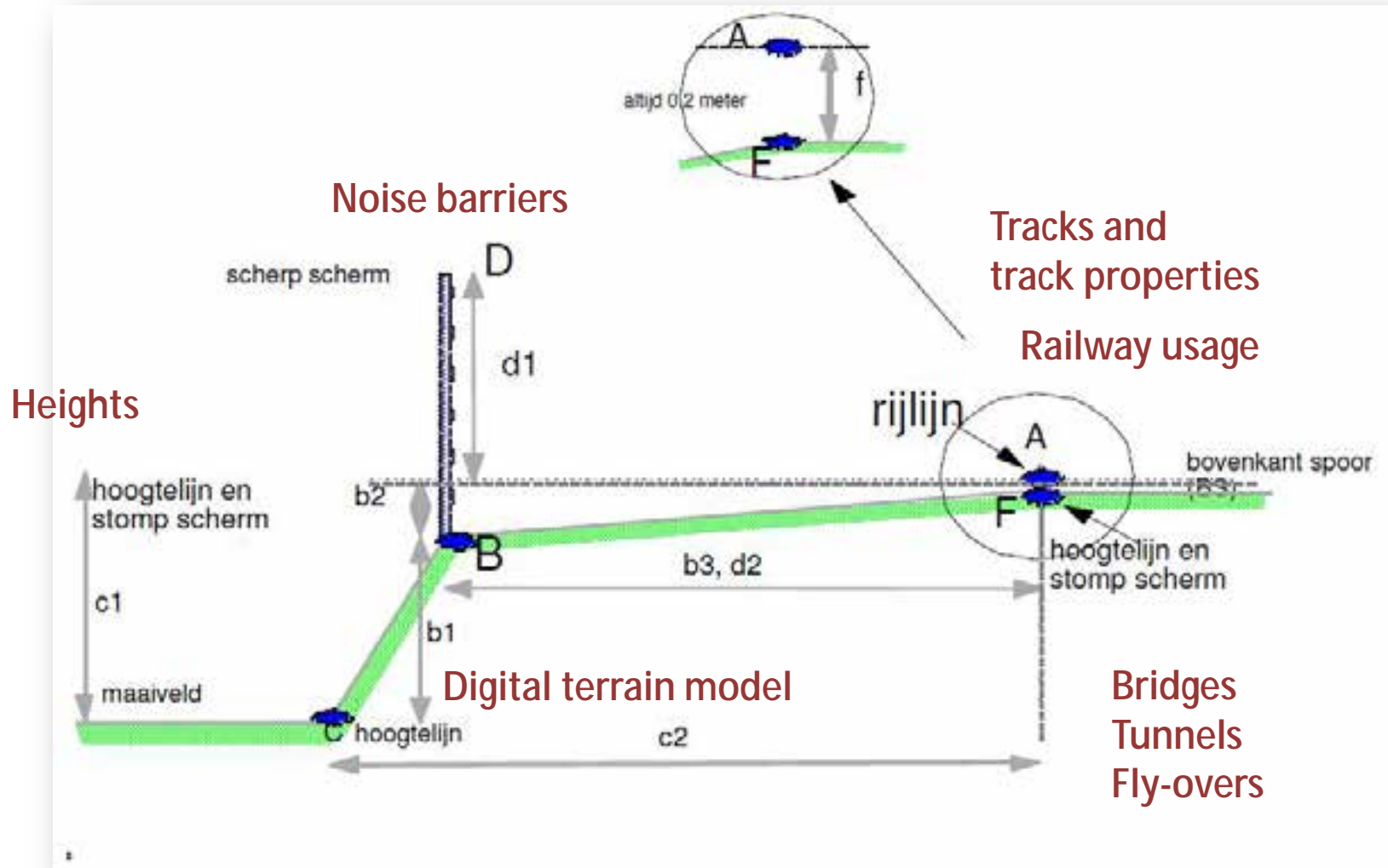
Impact on business



GIS challenges

- Data needed for noise modeling
- Combining all the data
- Updating models
- Organization

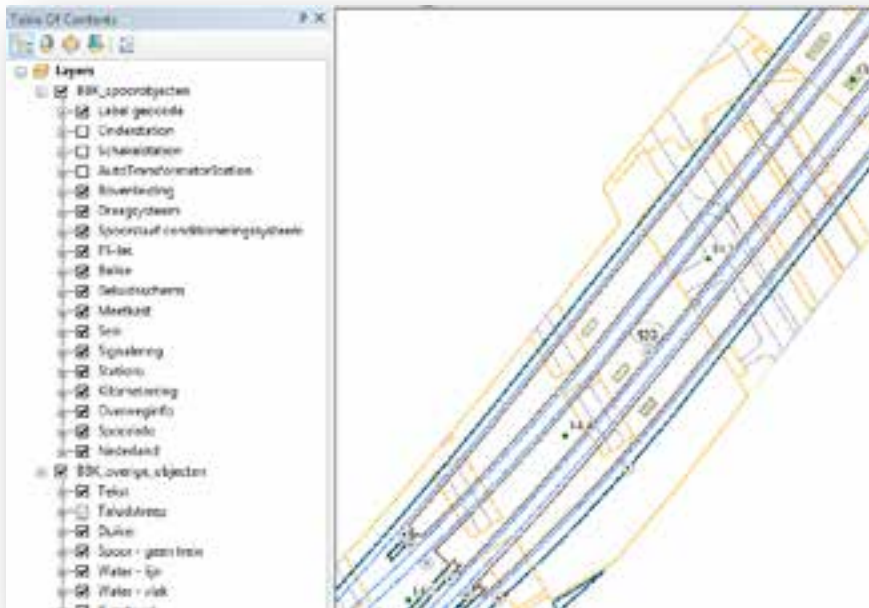
GIS challenges – Data needed



GIS data – Track Geometry

Source: Topographic basemap

Quality aspect: Timeliness: updated once a year by aerial imagery



<http://railmaps.prorail.nl/>

<http://mapservices.prorail.nl/ArcGIS/rest/>

Aerial Photographs 18

GIS data – Track Height

Source: SIGMA - High precision Track Geometry and height

Quality aspect: completeness, not all routes available



GIS data – Equipment properties (SAP)

Source: SAP EAM – Enterprise Asset Management

Quality aspect: *Free-of-error*, errors in required data

Track superstructure

- Rail Type
- Rail fastening
- Sleeper type
- Ballast
- Rail dampers

Linear assets registration

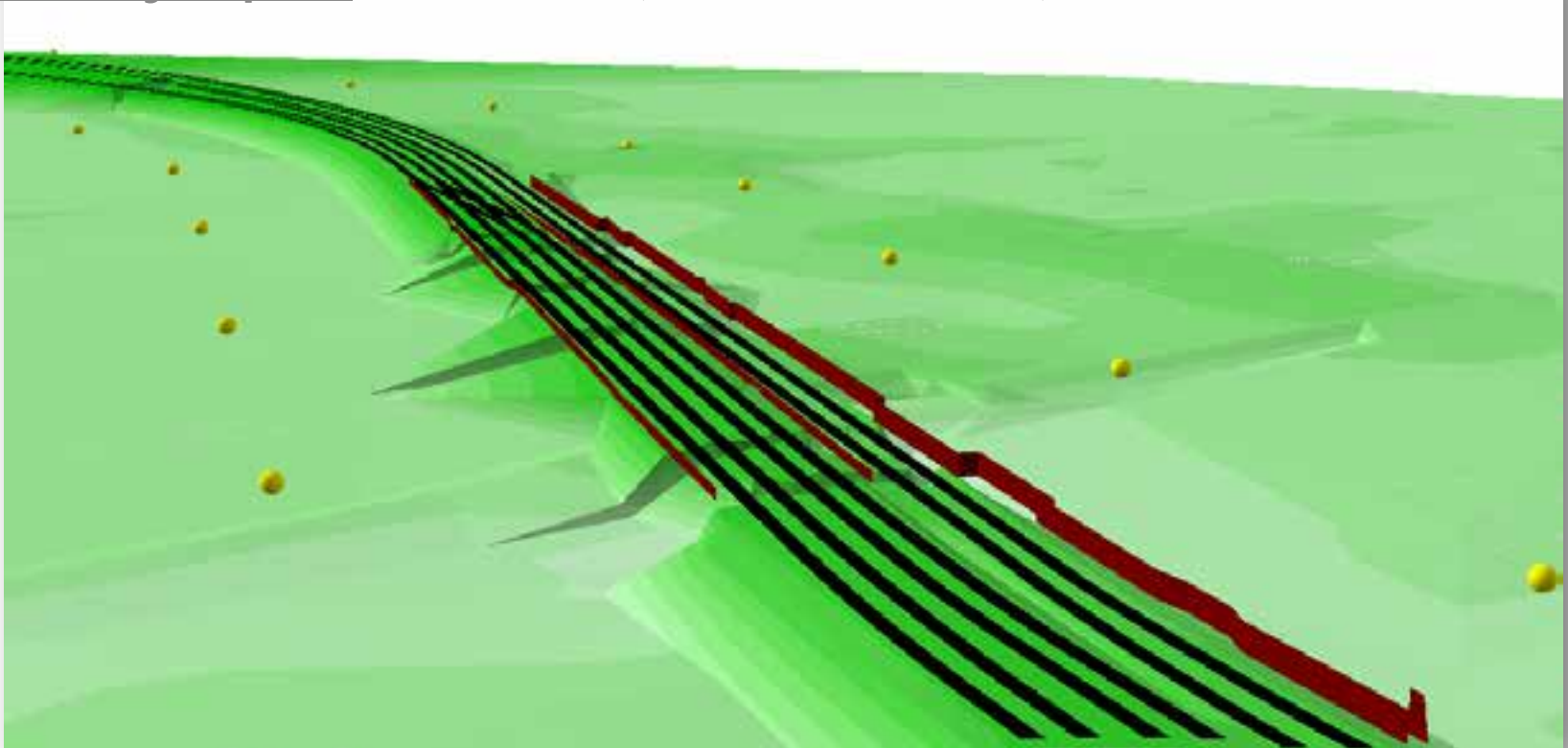
- line-id, mileage

Equipment ID	Description	Location
000001	1000000000	1000000000
000002	1000000000	1000000000
000003	1000000000	1000000000
000004	1000000000	1000000000
000005	1000000000	1000000000
000006	1000000000	1000000000
000007	1000000000	1000000000
000008	1000000000	1000000000
000009	1000000000	1000000000
000010	1000000000	1000000000
000011	1000000000	1000000000
000012	1000000000	1000000000
000013	1000000000	1000000000
000014	1000000000	1000000000
000015	1000000000	1000000000
000016	1000000000	1000000000
000017	1000000000	1000000000
000018	1000000000	1000000000
000019	1000000000	1000000000
000020	1000000000	1000000000
000021	1000000000	1000000000
000022	1000000000	1000000000
000023	1000000000	1000000000
000024	1000000000	1000000000
000025	1000000000	1000000000
000026	1000000000	1000000000
000027	1000000000	1000000000
000028	1000000000	1000000000
000029	1000000000	1000000000
000030	1000000000	1000000000
000031	1000000000	1000000000
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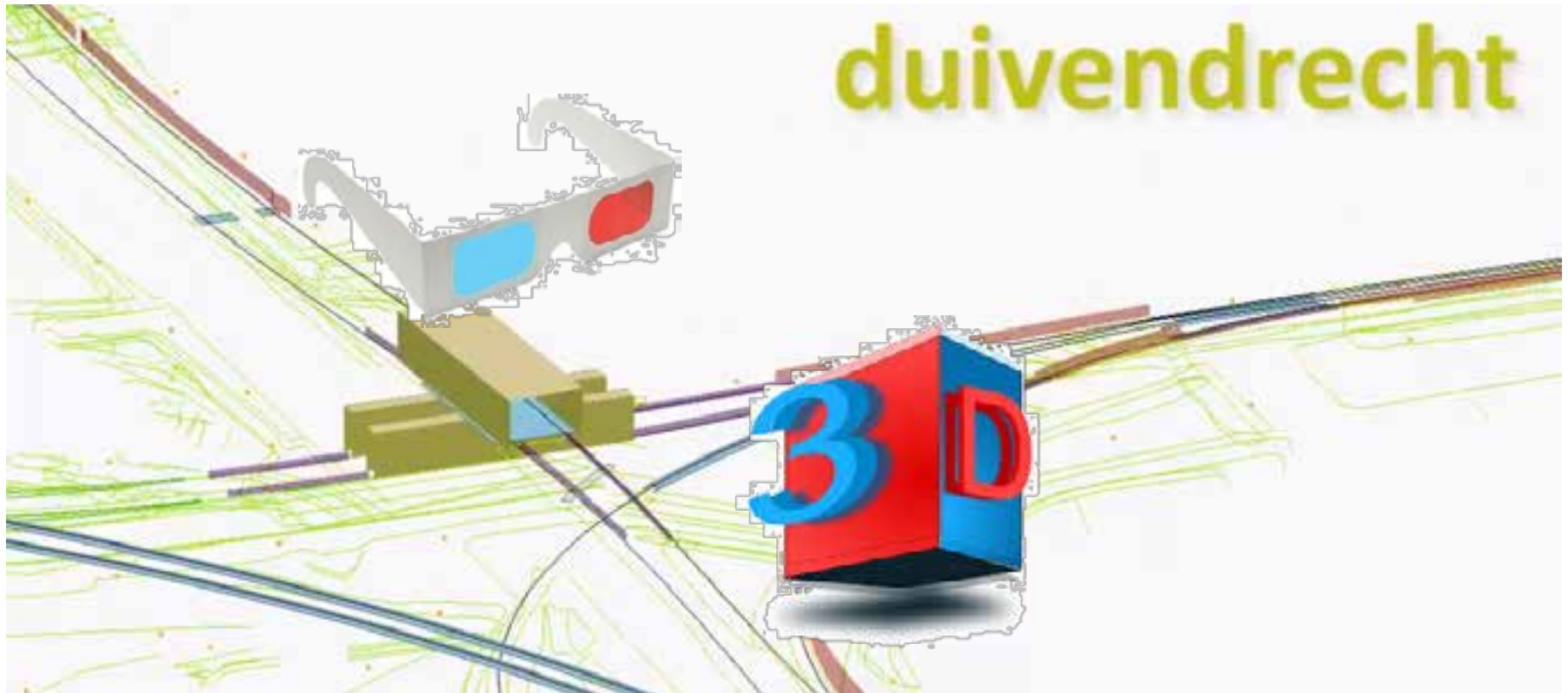
GIS data – Digital Terrain Model

Source: Third Party, based on stereo images

Quality aspect: Precision (~ 5 cm, σ 15 cm)

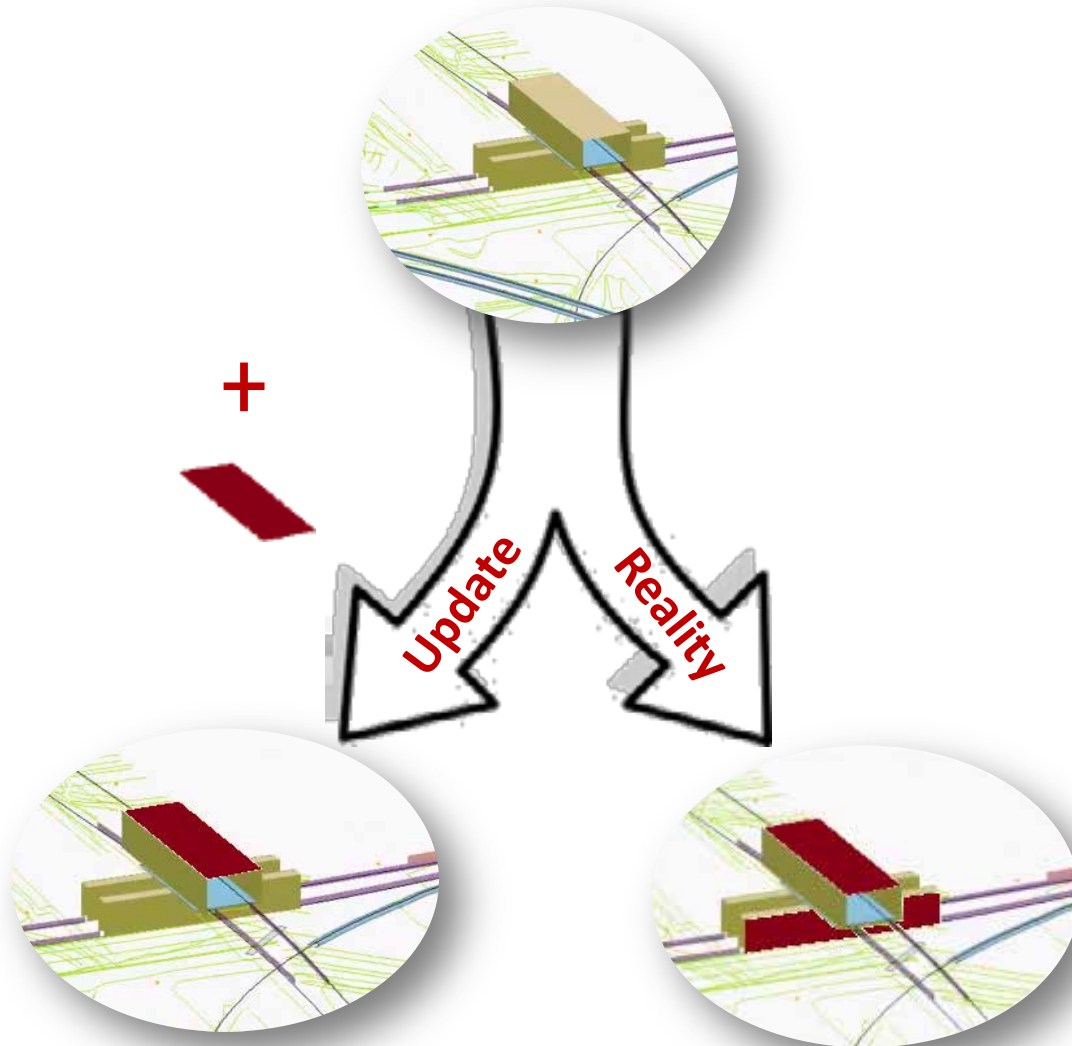


GIS challenge – Combining all the data



http://youtu.be/Imwvf6R3a_k

GIS challenge – Updating models



GIS challenge – Finetuning norms

Analyse non-compliance



Correct norm



Report compliance

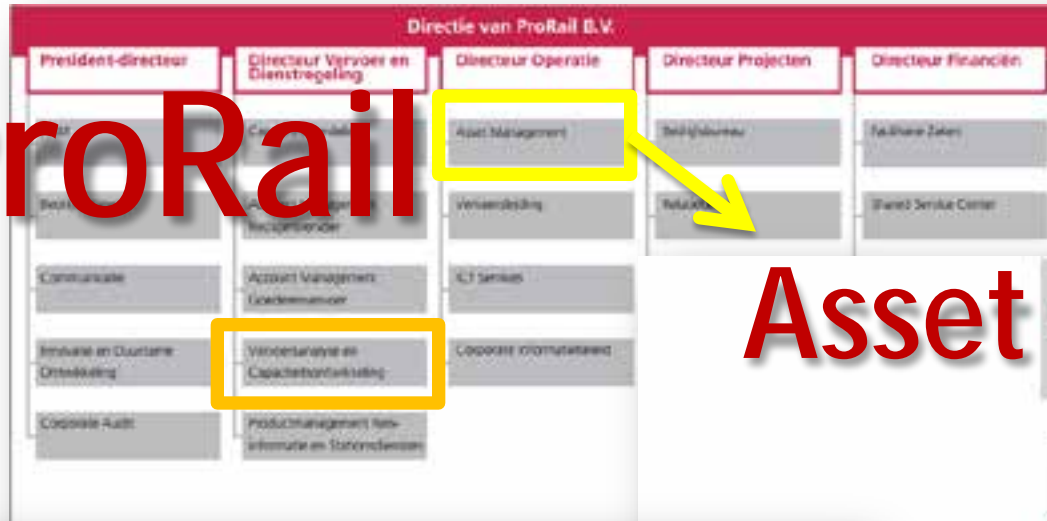


Analyse compliance



Challenge – Organization

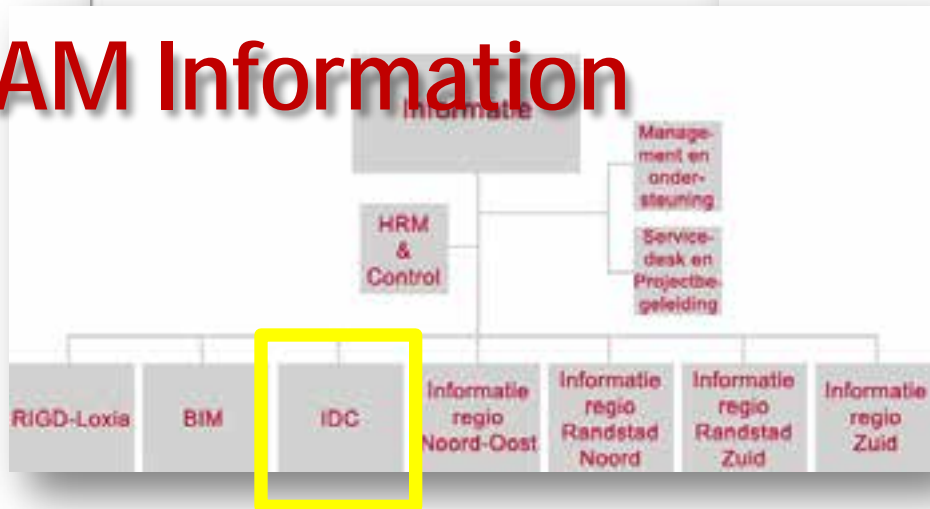
ProRail



Asset Management



AM Information



Recap

- Dutch Infra manager ProRail:
 - Maintains rail infra system;
 - Operates rail traffic;
 - Allocates space;
- Noise Production Ceilings
 - New responsibilities for ProRail.;
 - Focus on production instead of reception of noise;
- Noise Modeling / GIS
 - High data requirements;
 - Need for integration / combination;
 - Organizational challenges

Questions?



geluid goederen.mpg