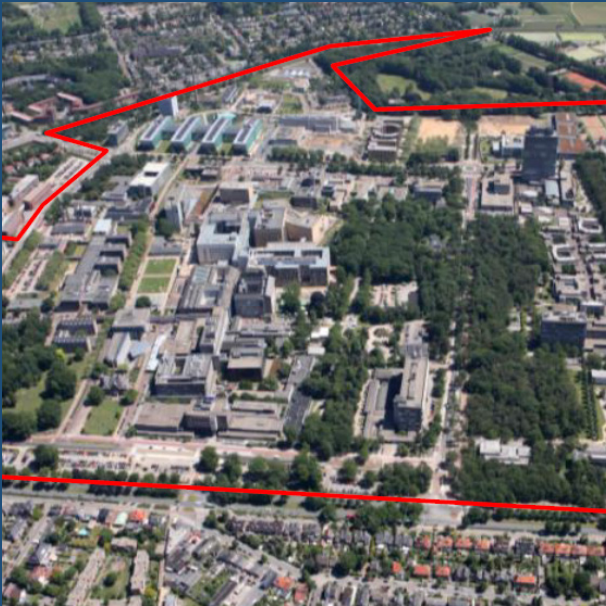


Smart Reconstructing RADBOUD NIJMEGEN



Smart construction
logistics
the case of a large Dutch
inner city hospital and
university

Dr. E.A.I. Bogers, HAN / KennisDC
Logistics Gelderland

R. Postulart, Topsector Logistics /
Connekt

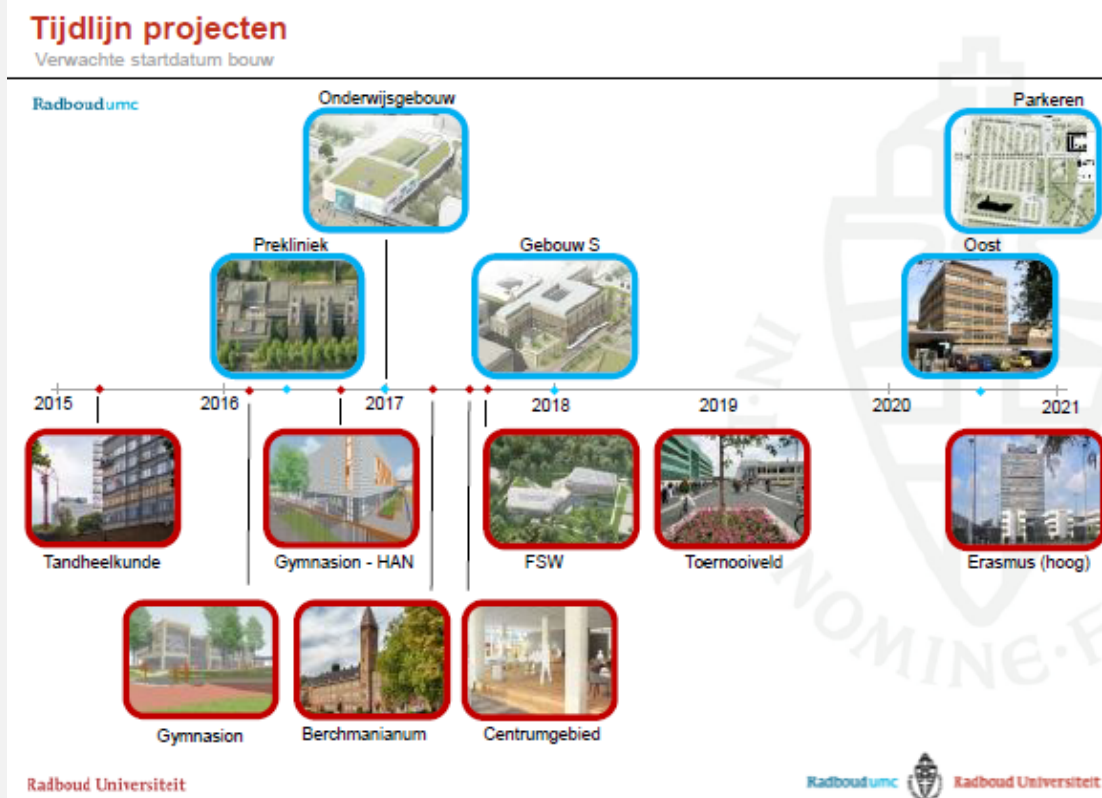
Prof. W. Ploos van Amstel, HvA /
KennisDC Logistics Amsterdam

Prof. S.J.C.M. Weijers HAN / KennisDC
Logistics Gelderland

Radboud: green location in a city centre



Timeline of construction plans



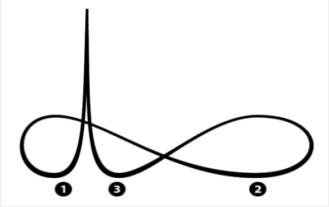
Onderwijsgebouw



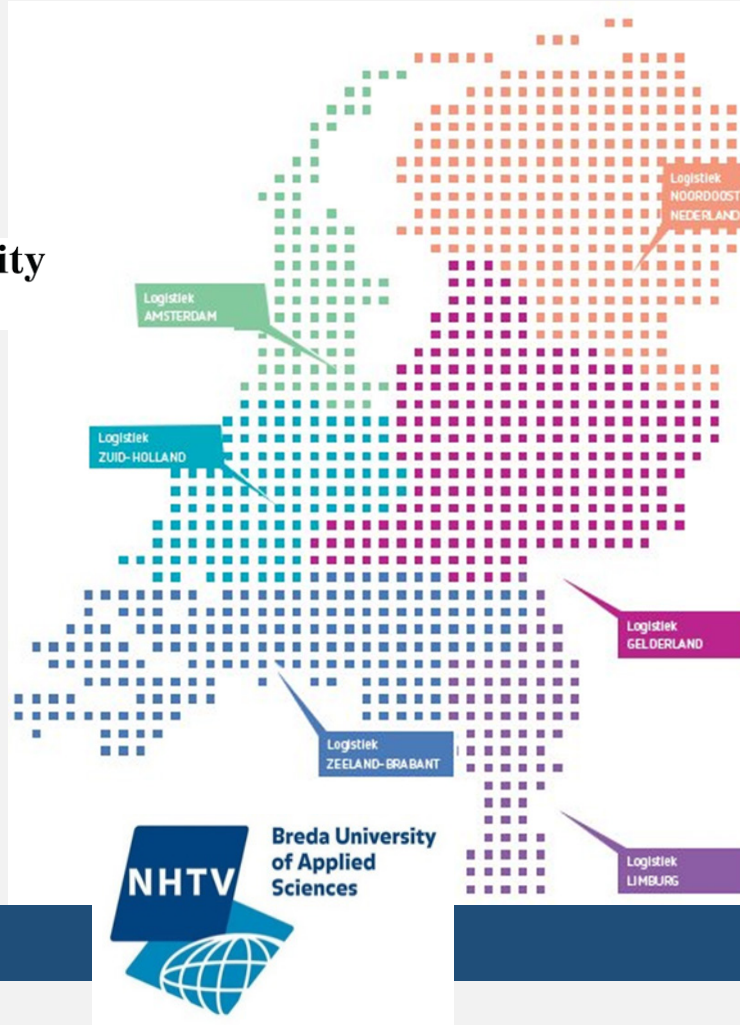
Roles of partners in this research project

- Research contractor: *Connekt* – PPP – intends to stimulate smart construction logistics, as part of its Zero Emission policy programme, together with the *Dutch National Topsector Logistics*.
- Researchers: *Kennis DC Logistics Gelderland* (institution) and *Kennis DC Logistics Amsterdam* - they develop and disseminate knowledge on smart construction logistics, and assist Radboud with an applied advice:
- Research Question: **In logistic terms, how best to organise the complex (re-) building of 13 sites of Radboud in Nijmegen?**
 - Which logistics concepts do apply?

National coverage - 6 nodes; 9 partners; many supporters from Governments, Knowledge institutions and Business



Dutch National
Topsector Logistics



Regional priorities and specialisations

■ Knowledge DC Limburg

- Customs / Trade, Synchro-modality, E-commerce, VAL/VAS, Agro Logistics

■ Knowledge DC Gelderland

- FMCG, Health Care logistics, Human Capital

■ Knowledge DC Zeeland / Brabant

- Physical distribution & warehousing, Event logistics, Service & Maintenance

■ Knowledge DC Zuid-Holland

- Port logistics, City Logistics, Service logistics

■ Knowledge DC North East

- 'Supply Chain Finance' and 'Logistic nodes / inter-regional networks'

■ Knowledge DC Amsterdam

- Mainport logistics and City logistics

Research outline

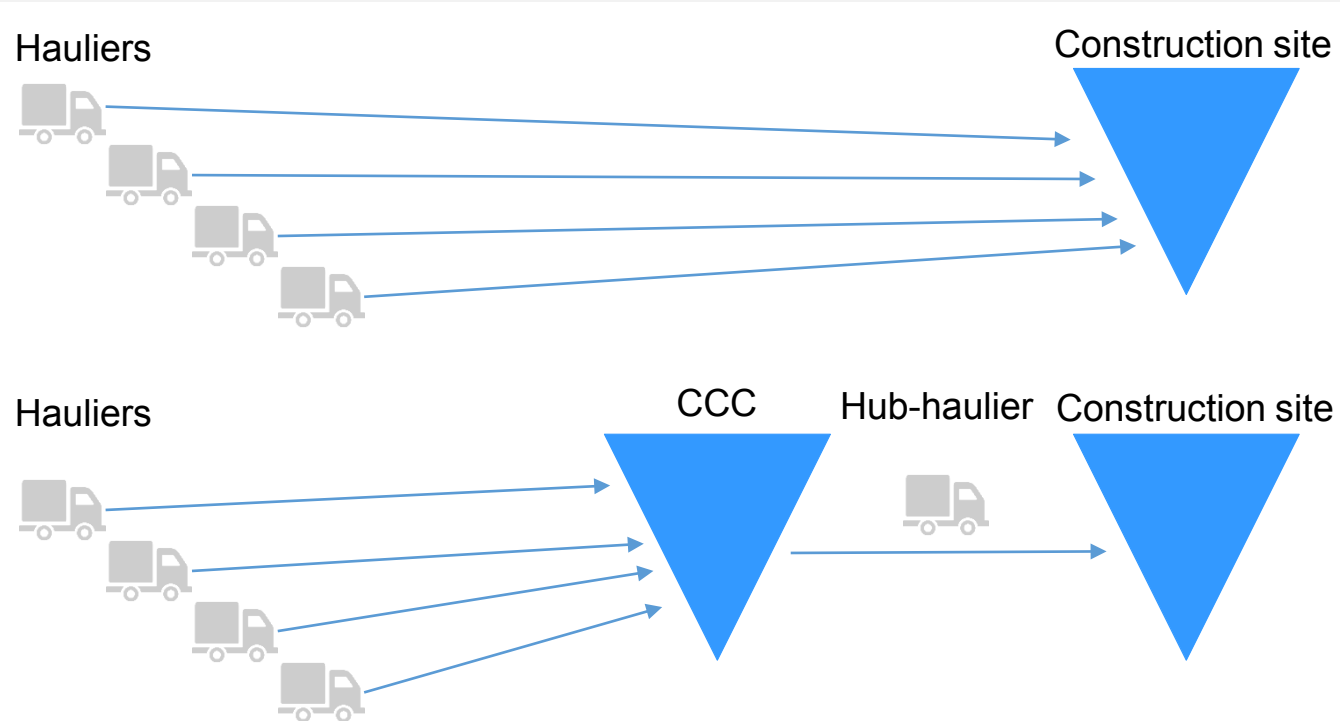
In logistic terms, how best to organise the complex (re-) building of 13 sites of Radboud in Nijmegen? Which logistics concepts do apply?

- Inventarisation of smart construction logistics concepts
- Obtained results of applied smart construction logistics concepts
- Characteristics of Radboud
- Synthesis: which concepts have most potential for Radboud?

A selection of relevant construction logistics concepts

- A construction consolidation centre (buffer in time and place, facilitates other concepts)
 - On the level of the logistics chain
- Prefabrication (saves space and time),
 - On the level of production
- Construction logistics tickets (regulates traffic to, from and on the construction site)
 - On the level of logistics tactics
- Shuttle service for employees (regulates traffic and saves parking space)
 - On the level of logistics tactics
- Construction logistics coordinator (realize mentioned above through a smart planning).
 - On the level of logistics management
- Monitoring through KPI's (continuous improvement)
 - On the level of logistics management
- *EMAT criteria (economic most profitable procurement conditions)*
 - On the level of procurement

The construction logistics concept: Construction consolidation centre



- the CCC (or hub) is a buffer in time and place
- it facilitates other concepts

A selection of relevant construction logistics concepts

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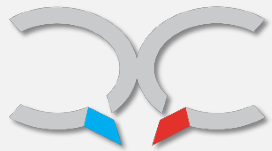
Results of smart construction logistics

Construction Consolidation Centre London

- + 95% Delivery reliability
- + 25% Safety
- + 47% productivity
- - 68% Transport movements to the site
- - 15% Decrease of waste
- - 75% CO2 reduction

Construction Consolidation Centre Amsterdam Amstelkwartier & de Trip

- + 45% Productivity
- + 50% Loading capacity
- - 18% Kilometres travelled
- - 54% Construction Freight in city centre
- - 23% CO2 emissions
- - 0,8% Budget
- - 40% Delivery time



Features Radboud

Feature	Implications for construction logistics
In city centre	Little space on the construction site, busy traffic: smart construction logistics necessary
Many visitors	Must remain (relatively) accessible and safe; separation of traffic flows (pedestrians/cyclists/cars): smart construction logistics necessary
Ambulance traffic	Must remain fully accessible: smart construction logistics necessary
Will take several years	Investment in good construction logistics possible Monitoring by means of KPIs will allow for interim improvements
Major financial investment	Investment in good construction logistics possible
Technology develops rapidly	Construction plans to remain flexible
Two project managers (university and hospital)	Coordination required
Available sites nearby	Construction logistics hub possible
Willingness to make use of smart construction logistics concepts	Investment in good construction logistics possible Support required in design of logistics and stakeholder management; follow-up research necessary

Recommendation

- Establish the hub in combination with:
 - prefabrication (to save time and space)
 - a ticketing system (to regulate traffic to, from and on the construction site)
 - a shuttle service for employees (to regulate traffic and save parking space)
 - a construction logistics coordinator (to ensure that the above benefits are realised by means of smart planning)
 - monitoring of the construction process by means of KPIs (to learn from and improve on previous experiences).
- Support in development and stakeholder management

Conditions for success

Stakeholders do have to be prepared to change roles – in order to create win-wins!

It really will help when:

- the **client (Radboud)** obliges the contractors to integrate a hub in its tender proposals, and evaluates all contractors' proposals on the existence of a hub plan, on the basis of EMAT criteria (in addition to other criteria);
- the **main contractors** establish a logistical concept that not only is optimal for themselves, but also incorporates all main subcontractors and suppliers, while sharing costs and benefits equally between each others;
- the **subcontractors, suppliers** and **hauliers** all actively choose to cooperate within the new common way of working;
- the **municipality** provides a site for the hub, stimulates preferred routes between the hub and the construction site, lays down requirements for vehicles in the building permits, lays down conditions in the environmental local permits, and so on.

Conclusions

- A lot of opportunities do exist for smart organising the complex (re-) building of 13 sites of Radboud in Nijmegen
- Enormous wins can be gained – especially when combining different construction logistics concepts
- The big challenge remains: how to develop construction logistics in such a extremely fragmented branche of industry, into a coördinated construction demand chain?



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volg ons op

