Project Roadmap

Unobstructed Constructed

A supporting tool for municipalities to stimulate the implementation of smart solutions in construction logistics in civil structure projects.

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Legend

Initiative phase

1 Initiative and Start note
2 Decision of principle

Starting point phase

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7 Purchasing strategy
7.1 Purchasing needs
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8 Customer Requirement Specifications
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11 Project agreement and Cooperation agreement
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Realisation phase

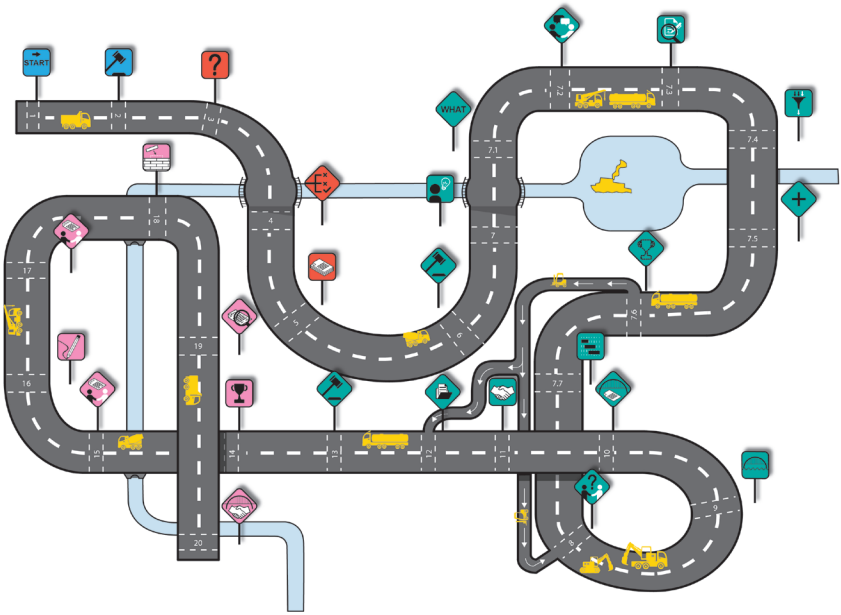
14 Tender is announced, Tender procedure and Officially awarding
15 Project management plan
16 Design
17 Issues the permit
18 Construction
19 Contract management
20 Completed and handed over

Text Actions to reduce nuisances
Text Responding to mentioned obstacles and incentives

No new actions are prescribed

Actions can be taken in order to reduce construction related nuisances

Content



Introduction

This small booklet called 'Project Roadmap' project responds to the specified Design Statement established in the thesis: 'Unobstructed Constructed' executed by Eke Hoekstra.

The Design Statement on which this booklet responds is as follows:

'Developing a tool that will give support to employees of municipalities working on the realisation of UAV-GC procured civil works, helping them to stimulate market stakeholders to implement smart solutions in construction logistics into projects.'

The 'Project Roadmap' focusses on the following topics:

- Projects in which municipalities act as the main **client** and also fulfil the role of a **licensor**, **coordinator,** and **owner of ground**.
- **civil construction projects** that are executed by municipalities.
- projects that are **UAV-GC** procured.
- municipalities that have to deal with **large building tasks** that are located in **urban confined areas**.
- the realisation of **civil structure projects** in the **GWW sector,** such as parking garages, aqueducts, viaduct, bridges and quay walls.
- the **operational level** of the execution of civil structure projects and will therefor be useful for **employees of municipalities** who operate on this level (such as a project manager, risk manager, environmental manager, technical manager and contract manager).

Necessary information

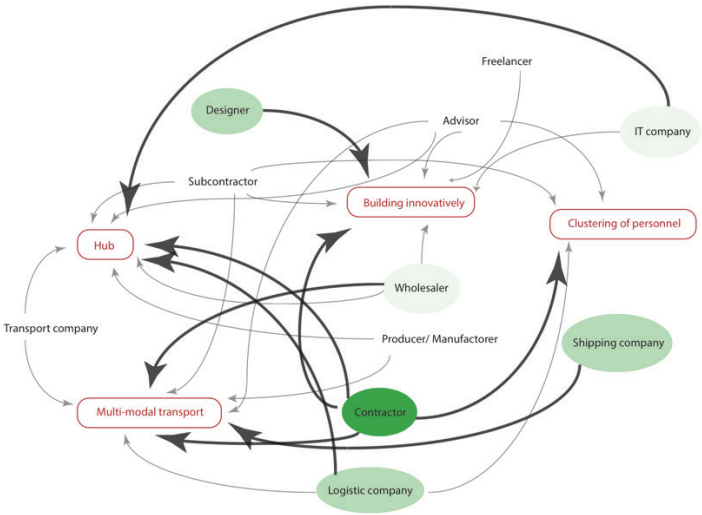
The most suitable smart solutions in construction logistics on which municipalities should focus when a reduction in construction related nuisances is required are:

Hub	A construction logistic hub can be used as an assembly point in which manufacturers, wholesalers/suppliers, transporters, and contractors deliver enormous quantities of products and materials. The products and materials will be bundled for each separate project and brought in smaller, fully loaded (electric) cars to the project site. This makes it possible to drive with fewer cars to the project site and to deliver goods 'just in time'.
Multi-modal transport	Multi-modal transport contains using various ways of transporting goods. In construction logistics, this usually means transport on roads and over water. This solution can reduce the amount of transportation on roads.
Building innovatively	Building innovatively requires design professionals to think about construction logistics in an early stage of the building process. By means of prefabbing or other future methods, like for example 3D-printing, a reduction in the amount of freight traffic can be achieved.
Clustering of personnel transport	Clustering of personnel can reduce the amount of traffic caused by the contractor its employees. The clustering can be executed in various ways, such as carpooling, where the employees collectively drive to the project location. Another option is parking at a Park & Ride at the border of a city, and from that point continuing the travel by taking the metro, tram, or bus to the project site.

The market stakeholders that have a high influence on the implementation of the most suitable solution are:

Hub	Contractor, Logistic company and IT company
Multi-modal transport	Contractor, Wholesaler and Shipping company
Building innovatively	Contractor and Designer
Clustering of personnel transport	Contractor

The level of influence that municipalities have on encouraging market stakeholders to implement smart solutions.



The municipality has an high influence on encouraging the market stakeholder to implement the smart solution in which the direction of the thick black arrow points.
The municipality has a general level of influence on encouraging the market stakeholder to implement the smart solution in which the direction of the thick black arrow points.
The municipality has little influence on encouraging the market stakeholder to implement the smart solution in which the direction the thick black arrow points.

The following instruments that municipalities can deploy in order to stimulate market stakeholders to implement smart solutions in construction logistics are used during the development of the Project Roadmap.

- Procurement
- Communication
- Material agency
- Contract management
- BLVC
- Coordination department

The Project Roadmap directly responds to the following obstacles that were stated by seven market stakeholders. Other mentioned obstacles and incentives are dealt with in the recommendations.

Obstacles	
1	Client is dominating in choice of sustainable goals.
2	Leakage of transparency in transport costs.
3	Contractor is not encouraged to order in big amounts.
4	Difficulty in fair profit distribution when implementing certain smart solutions in construction logistics.
5	Mind-set contractors.
6	Bad maintenance of award criteria.
7	A lack of interest by city districts.
8	Definition of construction logistics and nuisances is often not clear.
9	No quantitative data available concerning construction transportation (emissions and CO2).
10	A contract should not be a mean instead of a goal.

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Project Roadmap - Text

Initiative Phase

1. According to an established procedure, a new **Initiative** is devised by the municipal administrator and presented to the responsible alderman. During the procedure, the appointed project management team hands over a **Start note**. The start note consists of information about the following elements:

    - Problem description containing the motive, level of scale, urgency, and expected developments.
    - Relation to policy framework.
    - Related stakeholders.
    - Financial aspects.
    - Planning of administrative decision making.
    - Plan of action.

2. Subsequently, the responsible alderman (and sometimes the bench of mayor and aldermen) adopts the start note in the **Decision of principle**.

Starting point phase

3. After the decision of principle, the Project Management Team conducts a **Problem Analysis**. This analysis includes a study on the relevant stakeholders (municipal and market parties), a further research on the area, and a further exploration of the problem.

4. After obtaining this information, a number of individual solution paths are introduced. To test to what extent the solution paths

are achievable and technically feasible, the solution paths are further explored in a **Study of variants**. This study examines the general consequences each solution path has on, among other things, costs, benefits, risks, stakeholders interest, level of support, urban planning aspects, and the environmental impact. The outcomes are compared to each other by means of a cost-benefit analysis and qualitative analyses.

- Investigate the possible nuisances that relate to accessibility and liveability during the construction phase per solution path.
- Research the possible deployable smart solutions in construction logistics per solution path (focus on Hub, Multi-modal transport, Building innovatively, Clustering of personnel transport).

5. All examined information is collected and processed into a **Document of Basic Principles.**

Definition and Design phase

6. Hereafter, the decision making process is executed by the municipal council. The decision will be made to decide whether the process will continue, and if so, a preferred solution path is selected. This takes place in the **Preferred decision**. The choice of the municipal council is based on the study of variants.
    - Amongst others, take the observed nuisances related to accessibility and liveability during the construction phase into account when making the preferred decision.
    - Evaluate the project phase with all participants. Check whether it is worth to share the obtained findings with others internal and external.

7. By launching a **Purchasing strategy**, the start of the project is made. In this purchasing strategy, the following seven themes are discussed: Purchasing needs (7.1), Market situation (7.2), Type of contract (7.3), Award criteria (7.4), Clustering (7.5), and Planning (7.6)

7.1 **Purchasing needs** – Description of purchasing need, location, works/supplies/ services, value of contract, term of contract, conditions, risks, opportunities, and joint purchasing.

- Draw up the critical success factors including the ones that relate to the liveability and accessibility during the execution of the project. (reduction of obstacle 1: Client is dominating in choice of sustainable goals).

  For example:

  - 24/7 accessibility of neighbouring shops.
  - Level of liveability in construction site neighbouring areas.
  - Accessibility of neighbouring areas.
  - Maximum amount of noise pollution.
  - Maximum amount of transportation to and from building site.
  - Possibilities concerning the usage of Multi-modal transport.
  - Possibilities concerning Building innovatively.
  - Inclusion of the Bewuste Bouwers code of conduct.

7.2 **Market situation** – In which way will be collaborated with market parties? What information can be obtained from the market parties?

- Information related to the four most suitable smart solutions in construction logistics can be best found at the following market stakeholders:
  - HUB – Contractors and Logistic companies.
  - Multi-modal transport – Contractors and shipping companies.
  - Building innovatively – Contractor and Designer.
  - Clustering of personnel – Contractor.

7.3 **Type of contract** – Which type of contract is suitable? And why is this the best suitable contract?

7.4 **Type of tendering procedure** – Which type of tendering procedure is suitable? And why is this the most suitable tendering procedure?

7.5 **Clustering** – Can different projects be clustered?

- Search for combinations of projects (parts) that when executed together reduce the amount of nuisances related to liveability and accessibility. In this step, the coordinating department of the municipality can be made use of (if available).

7.6 **Award criteria** – Description of award criteria, exclusions, suitable requirements, and financial & economic standing.

- Use award criteria to stimulate innovative new ideas related to construction logistics.
- When setting up the award criteria, make sure that the contract manager that will be controlling the project (or often controls projects) during the execution gives input on the testability of the to be established award

criteria (reduction of obstacle 6: Bad maintenance of award criteria).

- Make sure that in the tender request is asked for explanations on how the contractor is going to fulfil the notification obligation (reduction of obstacle 6: Bad maintenance of award criteria).
- Avoid catch-all concept in award-criteria (reduction of obstacle 8: Definitions such as construction logistics and nuisances are often not clear).
- Avoid very specific formulated award-criteria if candidates cannot foresee the content yet.
- Do not use the BLVC-framework as a whole as award criteria.
- Liveability and accessibility in award criteria? Follow next steps to find out?

1. Is liveability and accessibility during the execution of the project of major importance? If yes, continue to number 2. If no, continue to process step 7.7.
2. Think about an award criterion (or criteria) relating to the liveability and accessibility during the execution of the project that meets the following requirements:

- Does the award criterion create added value?
- Does the award criterion provide solution space?
- Does the award criterion facilitate distinctive solutions?

3. If the award criterion meets all three requirements, the award the criterion can be used in the tender dossier (12). Keep in mind: The award criteria should be:

- Transparent
- Proportional
- Not discriminatory

4. If the award criterion does not meet all three requirements, it can be adapted to a requirement and placed into the customised BLVC-Framework (9).

Examples of award criteria related to liveability and accessibility are:

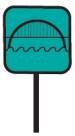
- Amount of transport to and from building site.
- Return of public space.

7.7 **Planning** – Explanation of used deadlines.

7.8 A start is made in obtaining **Customer Requirement Specifications.** The specifications consist of information about the problem, risks, stakeholders, interfaces, functions, context, and aspects.

- Make use of basis specifications of process & system if available (process = BLVC-framework).
- Obtain the requirements related to obligatory purchasing of materials.
- Require transparent transport costs in contract (reduction of obstacles 2/3/4/5 and 9: Leakage of transparency in transport costs, contractor is not encouraged to order in bigger amounts, difficulty in fair profit distribution, mind-set contractors and no quantitative data is available concerning construction logistics).
- Introduce evaluation moments in contract to give more suitable construction logistics solutions a chance during the execution phase (respond to obstacle 10, a contract should be a mean instead of a goal, flexibility is needed).
- Ensure all terms that are used in the to be constructed BLVC-framework are defined (nuisances, construction, logistics) (reduction of obstacle 8: Definitions such as construction logistics and nuisances are often not clear).

- Do not use BLVC to stimulate innovation. It is used to enforce requirements.
- Ensure that all requirements that are specified in BLVC-framework are possible to execute. An outline of the BLVC-plan can be constructed to check whether the requirements stated in the BLVC-framework are executable.
- Make the process requirements project specific in BLVC-framework. Important is to check to what extent the requirement satisfy the demand for each separate project. Examples are:
    - Mandatory usage of specified route.
    - Building site management guidelines.
    - Building site entrance guidelines.
    - Waste management guidelines.
    - Delivery windows.
    - Obligatory to work with HUB (preferably in finishing phase of execution).
    - Which trucks can enter the city.
    - Average/ minimum load factor of trucks entering the city.
    - Transport over water.
    - Mandatory usage of public transport/ shuttle bus to building site.



9. After obtaining a draft version of the Customer Requirement Specifications, a start is made in the development of a **Reference design.** This requires substantial research into technical aspects.

10. Subsequently, the outcome of both the customer requirements specifications and the reference design serve as input for the **System Requirements Specifications.** Steps 8, 9 & 10 will be

repeated a number of times to finally present the final Customer Requirement Specifications, reference design, and System Requirements Specifications.

- Test if what is outlined in the BLVC-framework is possible to execute in reference design.
- Check if the requirements related to obligatory purchasing of materials is included in system Requirements Specifications.

11. Stakeholders come to a **Project agreement** (input Customer Requirement Specifications) and **Cooperation agreement** (input System Requirements Specifications).

12. After coming to the agreements, the **Tender dossier** is drawn up. The dossier consists of three parts; the process documents, contract dossier, and the contract management plan.
    - The Process documents contain, amongst other things, the BLVC framework and the award criteria.
    - Define all used concepts in process documents, contract dossier, and contract management plan (reduction of obstacle 8: Definition such as construction logistics and nuisances are often not clear).

13. In order to announce the tender, first an **Implementation decision** is taken by the municipal council. Through taking this decision, the project credit is also determined.
    - Evaluate the previous project phase with all participants. Check whether it is worth to share the obtained findings with others within the municipality and/ or external (reduction of obstacle 7: leakage of interest by city districts).

Realisation phase

14. The **Tender is announced** on Tenderned. By doing this, the contracting party informs interested parties about the upcoming tender (not obliged). Subsequently, the **Tender procedure** has started. The contracting party announces their project on Tenderned. Market stakeholders that are interested respond to the tender procedure by uploading documents on Tenderned. The contracting party reviews all applications and preliminary awards the best scoring party. If the remaining parties do not appeal against the preliminary awarding, the tender is **Officially awarded**. If not, the case goes to court.

15. After signing the contract, the winning party hands in several documents to the client. One of the documents is the **Project Management Plan.** The Project Management Plan consists of among other things: the organisational structure of the winning party, which product the contractor is going to deliver, how this will be delivered, what their qualities are, how their risk and time management looks like, and how they are going to manage the notification obligation.
    - Make sure that the offer is clear and of high quality.
    - Make sure that the Project Management Plan is submitted and approved before the contractor is allowed to design and build.
    - Ensure that the timespan between the offer and execution of the project is not too short.

16. The winning contractor starts to execute the **Design** part of the contract.

17. Before starting the construction phase, the contractor submits a **BLVC-plan** to the client. In this way, the contractor reacts to the BLVC-framework (8) that is part of the signed contract. In the BLVC-plan, the contractor explains how he/she is going to react on the specified requirements stated in the BLVC-Framework.

18. When the plan satisfies the stated requirements, the municipality **Issues the permit** that enables the contractor to start working in the public space. The contractor starts to execute the **Construction** part of the contract.

19. It is now the responsibility of the municipality to execute proper **Contract Management**. It is of major importance to check whether the offers that are done by the contractor are fulfilled.
    - Check if award criteria are met.
    - Check if the execution takes place according the BLVC-plan.
    - Check if it is possible to deploy extra enforces (reduction of obstacle 6: Bad maintenance of award criteria).

20. Subsequently, the work is **Completed and handed over** to the administrator.
    - Evaluate the previous project phase with all participants. Check whether it is worth to share the obtained findings with others within the municipality and/ or external (Reducing obstacle 7: leakage of interest by city districts).

Other recommendations

- Investigations have revealed that a large share of the actions that can be taken by municipalities in order to stimulate market parties to implement smart solutions in construction logistics take place during the Definition and Design phase. The recommendation is therefore to focus especially on this phase when stimulation of contractors is required.

- Research has revealed that many Dutch municipalities do not yet make use or are unaware of the possibilities that a BLVC-framework can offer. It is therefore recommended to advertise more on BLVC possibilities.

- It is observed that the testability of award criteria and requirements are of major importance during the Definition and Design phase. This is because of the level of verifiability that takes place during the realisation phase. It is therefore recommended to give testability of award criteria and requirements considerable attention during the Definition and Design phase.

- Due to the increasing urbanisation and the added number of complex building projects, the actions that are offered in the Starting point phase will become more important overtime. The importance of taking the consequences that solution paths have on the level of liveability and accessibility during the execution of the projects should therefore increase in the future.

- Project managers working for municipalities are often driven by project goals of which costs and time are the dominant factors. These factors are also the factors of which the project manager is accounted for. In order to stimulate project managers to execute projects in a more sustainable way (of which focusing on a smart logistic execution of the project is part), incentives can be introduced. An example could be receiving extra money for executing a project in a sustainable way.

- Project managers must operate in-between the policy frameworks set by the municipality. By tightening the policy frameworks, project managers are directly confronted with the consequence of having less solution space in which to manoeuvre. In the case of reducing nuisances related to liveability and accessibility it can therefore be intelligent to tighten policy frameworks related to for example environmental zones, requiring usage of HUBs, or taxing transportation by car/truck.

- As a municipality, investigate if mandatory requesting of a 'Bewuste Bouwers' code of conduct can be determined.

- During conducting research, it is noted that most information that is about reducing nuisances and that relates to liveability and accessibility, can almost only be found by individual persons within municipalities. The recommendation is therefore to invest more in internal communication to ensure the knowledge is shared between all employees. Among other things, this could be done by introducing a database in which

all award criteria can be found and in which can be searched for specific themes.

- It is advised to provide a Dutch version of the tool as this will enable more people to make use of the Project Roadmap.

- It is recommended to develop a version of the Project Roadmap that suits online usage. This will ensure that more municipalities will discover the Project Roadmap.

- It is recommended to keep supplementing the Project Roadmap with the latest information concerning municipalities its deployable instruments and smart solution in construction logistics in urban confined areas.

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