# THE FEASIBILITY OF THE SUPERBUS PROJECT

Investigating possible arrangements for successful implementation

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**Samenvatting**

*De haalbaarheid van het Superbus project. Het onderzoeken van mogelijke arrangementen voor een succesvolle implementatie.*

De Superbus lijkt een veelbelovend transport alternatief voor de Zuiderzeelijn. Door het innovatieve karakter en de dynamische omgeving, is er echter onzekerheid omtrent de haalbaarheid hiervan. Voor een succesvolle implementatie moet men onder andere de organisatie van het project, de taken en verantwoordelijkheden van actoren en de allocatie van risico's tussen partijen, goed beschouwen. Men moet de vier fases van projectimplementatie (initiatie, ontwerp, implementatie en exploitatie) en het 'systeem' dat men in beschouwing neemt (bepaald door middel van het TRAIL lagen schema) in acht nemen bij de selectie van een geschikt arrangement voor de organisatie van het Superbus project. Dit leidt tot drie mogelijke arrangementen: een DBFMO, een DBFM+O of een DB+F+M+O contract. Er is een bezwaar tegen een arrangement waarin alle activiteiten geintegreerd zijn (DBFMO), omdat er nog niet veel ervaring is met dit type PPS. In het DB+F+M+O arrangement is er een strictere scheiding tussen activiteiten. Dit is voornamelijk belangrijk voor innovatieve projecten als de Superbus waarin de tijd tussen het afronden van het eerste deel en de start van het tweede deel aanzienlijk kan zijn. Zowel de DBFM+O als de DB+F+M+O contract zijn geschikte arrangementen en ze zijn vergelijkbaar met betrekking tot de risico allocatie. Een lichte voorkeur wordt gegeven aan een DB+F+M+O contract, omdat het als een veiligere optie wordt beschouwd. Dit is belangrijk omdat de Superbus een nieuw risicovol project is.

**Summary**

*The feasibility of the Superbus project. Investigating possible arrangements for successful implementation.*

The Superbus project seems a promising transport alternative for the Zuiderzee Line. However, due to the innovative character and the dynamics, uncertainty regarding the feasibility emerges. In order for successful implementation one has to carefully consider the organisation of the project, the tasks and responsibilities of actors and the allocation of risks between parties. For the selection of an appropriate arrangement for the organisation of the Superbus project one has to consider the four phases of project implementation (initiation, design, implementation, exploitation) and one should consider the 'system' that is being under consideration (by means of the TRAIL layer scheme). This leads to three possible arrangements: a DBFMO, a DBFM+O or a DB+F+M+O contract. There are objections against an arrangement in which all the activities are integrated (DBFMO) because there is not yet a large extent of experience on this PPP structure. In arrangement DB+F+M+O there is a stricter separation between activities which is particularly important in innovative projects like the Superbus in which the time span between the completion of the first part and the start of the second part can be large. Both the DBFM+O and the DB+F+M+O contract are suitable arrangements and they are quite similar regarding the allocation of risks. A slight preference is given to a DB+F+M+O contract because it is considered a safer option, which is important because the Superbus is a new project including many risks already.

## 1. Introduction

The Superbus is an innovative electric vehicle travelling with speeds of 250 km/hour avoiding as many stops as possible by operating according to a demand-responsive transport concept Fast Transport on Request (FTR). The investigations on the Zuiderzee Line project, a high-speed public transport connection between the Randstad and the North of the Netherlands that aims to improve the accessibility and in this way the regional economy of the North, include the Superbus alternative.

Large technological project like the Superbus are often characterised by complexity, technical as well as social complexity. Complexity entails *risks and uncertainty of the project outcome* e.g. the feasibility of the project. As a result, large technology projects like the Superbus are often over time and over budget (Miller and Lessard (2000), Meredith and Mantel (2002) and Veeneman (2004)). Next to the problems related to the uncertainty, there are also a number of problems concerning the way in which the project should be designed in order to successfully implement the Superbus project. These problems are amongst others related to the *project appraisal method* CBA (cost-benefit analysis) and in particular how the distribution effects are handled, the *configuration* of the Superbus, the different *actors*, and the *organisation* of the project. By providing solutions to these concerns to the government, improvements in the feasibility of the Superbus can be obtained. This article focuses on the organisation of the project: the *responsibilities and tasks* between parties in the project and the *allocation of risks* between the parties. This can be organised by means of *institutional arrangements*, e.g. evasion, integration, contracting, covenants, management by self interest and public private partnership (PPP). Because there is a general trend for PPP (the EC is encouraging PPPs with projects) (Grimsey and Lewis 2002) and since it is already used as a starting point in the ZZL project this article mainly focuses on this latter type of arrangement. PPP can be used to obtain private *financing* and to specifically allocate *responsibilities* (Himmelweit et al., 2004). Such partnerships between the public and private sector are now an accepted alternative to the traditional state provision of public facilities and services. Arguably, the joint approach leads to results which neither party could achieve alone. The project organisation ZZL, the consortium FTR and the financing company Lazard B.V. have addressed their preference for a PPP structure in the form of a DBFMO or DBFM+O institutional arrangement for the organisation of the Superbus project. However there are also some problems with PPP. Akintoye et al. (2003) e.g. argue that the use of PPP is not straightforward because there are

complex issues that should be addressed by governments in order to use the method for infrastructure development successfully. Koppenjan and van Ham (2002) likewise point out that the use of PPP for financing is far more complex than was considered initially, which can be seen by the fact that the actual realization of these PPP projects is low. They consider the stagnation in decision making on concessions of both parties as the main cause.

The aim of this article is to investigate whether a PPP construction (DBFMO or DBFM+O) is actually the best possible way to organise the Superbus project or whether there are other constructions equally or even more suitable to deal with the risks that are caused by the uncertainty in order to successfully implement the Superbus project. The article provides an introduction to various institutional arrangements and presents the results for the way in which the Superbus should be organised for the Zuiderzee Line project. The research is based on a literature study of various types of arrangements whereby Public Private Partnerships is the main focus. The next section will give a short introduction of the Superbus. Section 3 examines the risks that are involved in the project. After that, in section 4 various types of arrangements are presented. Section 5 selects the institutional arrangement that is the most appropriate for the Superbus and will specify the arrangement by determining the responsibilities and by allocating the risks to the different parties. Finally, section 6 presents the main conclusions.

## 2. The Superbus

The Superbus is a new innovative transport mode that makes use of a new transport concept "Fast Transport on Request (FTR)". This concept aims to provide fast, flexible transport with high capacity at the main carriageways but with high local differentiation (Evers, 2005). The technical complexity can be seen here clearly: the difficulty is that the service combines two types of transport, local and interregional, with very distinguishing characteristics. The service functions as follows: passengers can request their specific transport trips by use of (mobile) telephone, the internet or at an office window at the stations. They can either make a reservation at the earliest departure time or at the latest acceptable moment of arrival. The actual time will differ from the requested moment, but within a certain predefined range. The concept is based on a system that provides the allotment of busses and seats to passengers in such a way that passengers will never be faced with more stops than a predefined maximum

(Evers et al., 2005). To make the logistics effective an extensive ICT application is required, preferably with an "intelligent" customer interface that makes it possible to obtain a more individualised public transport (for example passengers are informed when transport is delayed). For the Zuiderzee Line the Superbus with FTR assumes vehicles operating with high-speeds (180-250 km/hour) on separated tracks and with 'normal' (allowed) speeds on the existing tracks. The starting point however is that at first existing infrastructure (roads, bridges, tunnels etc) is used and in addition a number of newly constructed tracks of concrete for high-speed transport are used. In the future it is possible to implement whole new tracks.
The vehicle is driven by an electric engine so that it does not expel *damaging emissions*. The environmental impacts are according to its initiator Ockels far lower than a high-speed railway line because energy use is far lower and the implementation and maintenance of the track is less expensive and has a lower impact on the landscape (Verduyckt and Melkert, 2006). Two other advantages of the vehicle are the relatively inexpensive infrastructure and the flexibility; the vehicle can join 'normal' traffic for local transport, or at places where the implementation of separated tracks is expensive (for example at waterways, the Superbus can also make use of the existing bridges). The design of the concept will incorporate many new techniques: lightweight constructions for vehicles and bus track, advanced aerodynamics, electric propulsion and store, intelligent adhesion and navigation, dynamic logistics and planning (Melkert, 2006). It further has a pro-active shock absorber to increase the comfort of the bus at high speeds and a special radar that observes a few hundred meters in advance so that the bus can slow down on time, increasing safety considerably (Melkert, 2005).

## 3. Uncertainty and risks

The Superbus project is characterised by complexity due to the many new technologies. The technologies themselves are often already difficult and the stacking of all of these new technologies increases the complexity of the system even further, eventually leading to *uncertainty* in the outcome of the project. Complexity is the limited understanding of the system; either about the current state of the system, predictions of the behaviour of the system when intervening or about the best way to intervene. The complexity increases when the number of interactions (between the different subsystems and the technological innovations) increases or when the understanding of the interactions decreases.

Innovations hamper the *predictability* and *controllability* and due to hidden parts and interactions between different parts the *measurability* is reduced (Veeneman, 2004). Innovative parts of the project are hard to predict and bring uncertainty to the project, but innovation is often needed for the realization of the project. Reduced predictability, controllability and measurability indicate the increased *uncertainty*. "The size of the project challenges the measurability, the uniqueness of the system challenges its predictability and the dynamics challenges the controllability" according to Veeneman (2004).

These characteristics of large technological systems like the Superbus provide uncertainty in the outcomes of the project, the feasibility of the project. Uncertainty brings risks in the development and implementation of the project. In the most general terms, risk is the possibility that events, the resulting impact, the associated actions, and the dynamic interactions among the three may turn out differently than anticipated (Miller and Lessard, 2000). Risks are unforeseen circumstances or events that lead to a change in the costs or profits, delays or a lower quality of the project. Miller and Lessard (2000) have distinguished three main categories of risks: market-related risks, completion risks and institutional risks.

1. *Market-related risks:* Market related risks consist of three sub-categories. i) *Market risks:* market forecasts are based on assumptions about the structure of demand which is difficult to predict (and becomes more difficult when people have an alternative to the new project). ii) *Financial risks:* the potential difficulties that a project faces in attracting lenders and investors. iii) *Supply risks:* similar to market risks (both involve price and access uncertainties) but supply can be secured through contracts, open purchases or ownerships.
2. *Completion risks:* Completion risks consist of the following three sub-categories. i) *Technical risks* reflect the engineering difficulties and novelty, risks emerge because many aspects are locked in and cannot easily be reversed. ii) *Construction risks*: difficulties that sponsors and contractors face in the building of the project. iii) *Operational risks* refer to the possibility that equipment will not function adequately.
3. *Institutional risks:* Institutional risks consist of three sub-categories. i) *Regulatory risks*: e.g. delays and difficulties on obtaining approvals or permits ii) *Social-acceptability risks:* likelihood that sponsors will meet opposition. iii) *Sovereign risks:* probability that a government wants to renegotiate contracts or concessions.

All of these risks play a role in the Superbus project and one has to take these risks into account for successful implementation. In order to deal with risks many *tools* have been developed. Dziubiński et al. (2006) has made a general categorisation of methods used for risk analysis whereby a distinction between quantitative, semi-quantitative and qualitative methods for risk assessment was made. Foremost the relation between the *probability* of a risk occurring and the possible *consequences* of that risk for a specific project is considered important. Chapman (2006) likewise pointed out that this relation is important and elaborated upon the risk issue by addressing a so-called probability-impact matrix whereby risks with a low probability and a low impact are acceptable risks whereas risks with a high probability and high impact are *unacceptable* and need additional attention.

By means of surveys it was derived that financial, market, technical, operational and social-acceptability risks are the risks that are estimated as 'unacceptable'. The financial risks are indeed recognised as crucial and are addressed in institutional arrangements. With the technical and operational risks there have to be agreements as to who is bearing the risks. This can be incorporated in contracts (within the arrangement). Market-related risks are more difficult to incorporate, though it should be clear who is responsible when the actual demand is lower than expected. Overall, risks are taken into account but they are not all specifically addressed in contracts. Institutional arrangements are appropriate means to deal with these risks and the next section elaborates on this aspect.

## 4. Various institutional arrangements

The project organisation ZZL has investigated the possibilities for Public Private Partnership (PPP) and concluded that the Superbus project is suitable for a PPP construction which involves the implementation in cooperation with private parties (project organisation ZZL, 2006). The general reason of the government for PPP is the possibility to reduce debt and the benefits of sharing financial risks and rewards between public and private parties (Grimsey and Lewis, 2002). However, one should be careful with the financing issue because the use of PPP is not straightforward due to the complex issues involved (Akintoye et al., 2003). It is therefore necessary to investigate whether PPP is indeed the most appropriate coordination mechanism or whether there is another financing structure that fits better. Other institutional arrangements next to PPP that will be considered here are integration and contracting.

Institutional arrangements are arrangements between different institutions; this does not imply that it only incorporates arrangements of an institutional character rather it also incorporates the risk allocation between parties including all kind of risks, not only institutional risks but also completion risks and market-related risks.

*Integration:* different parties are brought under unified governance, merger or acquisition; there is an overarching authority that can establish monitoring by demanding information.
*Contracting:* written agreements between parties. Contracts are usually incomplete (do not specify everything in advance) and implicit (a set of shared expectations about the behaviour of other contracting parties which the parties consider binding). This traditional contracting type of coordination can be characterised by the principal-agent relationship between the national Government (principal) and the market (agent). This relationship is hierarchical in the sense that the Government specifies assignments which the market has to carry out. The agreements are captured in a contract. This relationship is actually one of the main differences with PPP in which the agents have a more equal position compared to the principal and have more influence in the execution of the project.
*PPP:* Public Private Partnership is a collaboration in which public organisations and private parties, retaining their own identity and responsibility, realise a project together based on clear task allocation and risk sharing (http://pps.min.nl). Contracts determine who is responsible for what action and which parties bear which types of risks and costs. There are various types of PPPs: traditional form, collaboration agreement, turnkey variant, joint venture, integrated contracts and the project development and exploitation type. For the Superbus project a joint venture and the integrated contract type were seen to be the most appropriate arrangements.

- *Joint ventures:* a form of collaboration between two or more companies which contribute certain means to start a new company whereby the legal body is risk bearing (http://www.onderhandelen.nl).
- *Integrated contracts:* may include some or all of the following features (Grimsey and Lewis, 2002): i) the public sector party *transfers facilities* controlled by it to the private sector party usually for the term of the arrangement; ii) the private sector party *builds*, extends or renovates a facility; iii) the public sector party specifies the *operating* features of the facility; iv) services are provided by the private sector party using the facility for a defined period of time; and v) the private party agrees to transfer the facility to the public

sector at the end of the term. Integrated contracts are contracts in which different stages of the investment are integrated. A common form is a DBFM-contract (Design, Build, Finance and Maintain): the contract integrates different elements like the design of the Superbus vehicle and the transport concept FTR, the construction of the track, financing and maintenance of the Superbus track and the installed equipment during a long time period (contract duration is based on the life cycle of the project) (http://www.vrom.nl). Transport infrastructure projects are typically developed under one of the five contractual frameworks (Lazard, 2006): Design and Build ("DB"), Design, Build, Finance and Transfer ("DBFT"), Design, Build, Finance and Maintain ("DBFM"), Design, Build, Finance, Maintain and Operate ("DBFMO"), and Design, Build, Operate and Transfer ("DBOT"). Risk transfer to the private sector theoretically increases from the DB framework towards the DBFMO framework.

Table 1 includes the various types of arrangements with their advantages and disadvantages.

**Table 1 Overview institutional arrangements: advantages and disadvantages**

| Institutional arrangement type | | Advantages | Disadvantages |
|---|---|---|---|
| Integration | | Reduces spill-over effects<br>Private information does not have to be transferred to other parties | Difficult to incorporate all of the different aspects of the Superbus project<br>Reduces flexibility and variety of experience |
| Contracting | | Long-term to deal with asset-specific investments | It is difficult for the principal to determine the level of effort of the agent<br>Opportunities for opportunism and hold-up problems<br>Expensive, limits innovation and the execution of activities |
| Joint ventures | | Risk and knowledge sharing<br>Task allocation | Steering is difficult<br>Quality is not maximised because parties do not have an incentive |
| Integrated contracts | DB | Penalties can distribute the risks | Cost overruns and delays are the responsibility of the public sector. Thus still a lot of responsibility and risk for the public sector |
| | DBFT | Fewer risks for the public sector; costs overruns and delays are the responsibility of the private sector | Little experience with this type of contract |
| | DBFM | Private sector can optimise the whole life cycle costing (reduce total costs of the project)<br>Greater transfer of risks to private parties | More difficult to prevent cost exceeding and synchronisation on the preservation of infrastructure |

| | | | |
|---|---|---|---|
| | DBFMO | It can include an element of revenue risk but it can also allocate some or all of the revenue risk to the public sector.<br>Design speeds and infrastructure can be optimised directly limiting the costs of infrastructure<br>The usage of material can be better synchronised on because this is all within one party. | Higher risk that less market development occurs |
| | DBOT | Private parties have freedom for the design and implementation but have to satisfy certain predefined requirements on the performance.<br>Efficiency gains can be obtained | The concessionaire has larger risks due to delays. |

In order to select an institutional arrangement that fits the characteristics of the Superbus project it is useful to consider the objectives the Ministry of Transport has in mind in relation with the implementation. The Ministry strives for the following objectives (Lazard, 2006):

- Create a legal framework which optimises risk transfer to the private sector
- Ensure that there is sufficient private sector interest and participation in the project
- Avoid situations where the public sector will retain a large degree of implicit risks (e.g. HSL-South)
- Select a technical option that optimises the socio-economic costs and benefits with a pre-agreed contribution by the national Government
- Develop an efficient and transparent selection process with a significant degree of competition among private bidders

Taking these objectives into account, integration is not considered appropriate because it cannot deal with the variety and complexity in the Superbus project and it does not transfer the risks to the private parties sufficiently. Contracting is also seen as less suitable because the hierarchical relation between the national Government and the market that is common in contracting does not match with the objective to have enough private sector interest and participation as well as risks transfer to the private sector. Foremost this latter goal can hardly be reached with contracting in which the flexibility and freedom of private parties is limited. Contracting is therefore not seen to be the preferred institutional arrangement, though it could be applied for a partial aspect in the project. Joint ventures and integrated contracts offer more possibilities for cooperation between public and private parties and are therefore particularly interesting. To summarise, contracting, joint ventures and integrated contracts are the main ingredients to establish an institutional arrangement that fits the Superbus project best.

## 5. Selecting and specifying an appropriate institutional arrangement

In order to establish an institutional arrangement it is useful to specify the 'system' that is considered. This is done by the use of the Trail layer scheme (Figure 1).

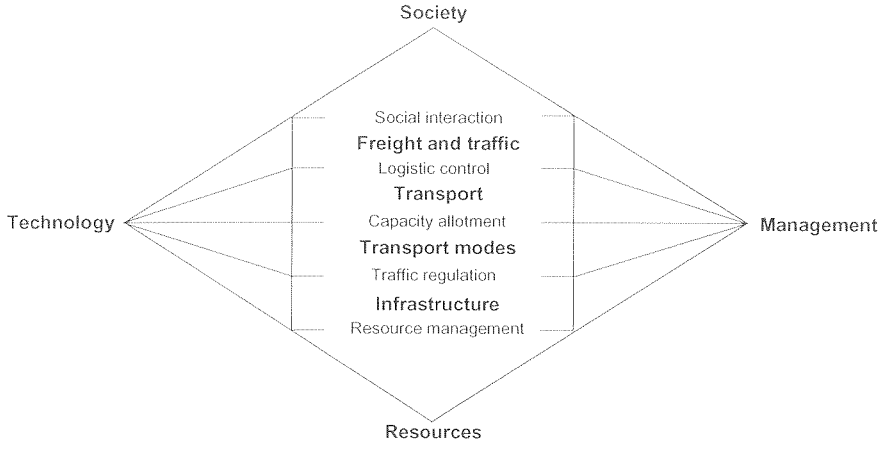


**Figure 1 Trail layer scheme (Bovy et al. (1994)**

The core of the TRAIL layer scheme represented in Figure 1 is that the transport system can be seen as composed of four connected layers each of which can be influenced by external effects. Every 'underlying' layer provides a service to the layer above; whereby each layer set requirements to the layer below. Between each layer there are interfaces (e.g. logistic control, capacity allotment etc) that indicate the interaction between two layers. Two layers are particularly important for the Superbus project namely the layers 'transport modes' and 'infrastructure'. These two layers form the 'system' that is considered here. For the organisation, the system can be considered overall, but it is also possible to separate the two layers and determine an institutional arrangement for the vehicles and for the infrastructure (this can be compared with the proposition by the consortium FTR which proposes two possibilities for financing, either a DBFMO contract or a DBFM+O contract). Next to a clear picture of the 'system' that is being considered it is useful to distinguish the different phases of the implementation of the project (Figure 2).

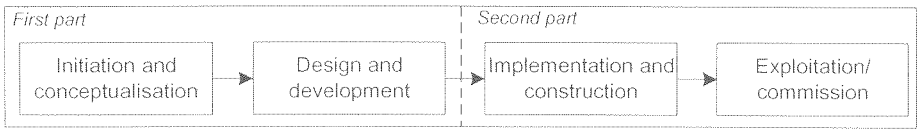


**Figure 2 Different phases of the project**

It is necessary to consider the phases and to recognise that each phase has actually a different character. The first two phases are foremost different from phases three and four and it is therefore recommended to specify two arrangements one for each of these two parts of the project process.

## 5.1 First part of the process: the initiation and design phase

The *initiation and design phase* can be arranged in either a joint venture, by means of contracting or by integrated contracts. It is argued that in this first stage of the project the risks are lower so that the transfer of risks is not the main issue; the risk allocation between public and private parties is important but less essential than in the second part of the project process. It can therefore be argued that the public parties do not necessarily have to transfer the risks in this first phase so that traditional contracting types become an option. *Contracting* seems a possibility in this first phase; it is a relatively straightforward method that is suitable because the complexity is limited and manageable in this first part. In the second part the number and complexity of the transactions increase so that contracting will become costly and difficult. However the limitation of the innovation and trust issue still seems a problem in the contracting type of arrangement in the first part of the process. It is essential in the design phase to consider all possible means to reach a 'best' outcome (design of the project) so that parties must have freedom to develop ideas. Contracting is therefore not preferred in the design phase and is only considered appropriate in the initiation phase in which different exploratory researches have to be carried out.

Another possibility for the first part of the project is to establish a *joint venture*. This has the advantage that parties can share the knowledge which can lead to an enrichment of the design (either by an improvement of the quality, the costs or the innovation). It can furthermore lead to efficiency gains as there is a close collaboration between parties. There are different possibilities for a joint venture, for example a joint venture of private parties whereby public parties steer from a distance or a joint venture in which private as well as public parties are collaborating. A joint venture between private parties has the disadvantage that the public parties interest are not represented sufficiently as the private parties strive to develop 'their' product rather than to strive to solve the problem. When public parties are represented in the joint venture as well, they can steer the project in such a way that the objectives are reached in

the right manner. However the disadvantage is that the public parties are also responsible for part of the risks. But because the risks in this first phase are little, the disadvantage of the risk sharing when public parties are involved does not weight against the advantages that can be gained from a joint venture construction, therefore a joint venture in which public as well as private parties cooperate is preferred.

A third possibility for the coordination of transactions in the first part of the project process is by means of an *integrated contract*. Again the risk allocation is not considered an issue here so that all of the identified integrated contract types are seen possible, that is a DB structure in which the public sector still bears the main part of the risks is also seen to be applicable for the first phase. However, when this type of institutional arrangement is chosen in the first part of the project process it limits the possibilities for the second part of the project process which also has to be an integrated contract. This is because integrated contracts always include the building part of the project, which is the third phase of the project.

## 5.2 Second part of the process: the implementation and exploitation phase

The second part of the project process consists of the actual implementation and the exploitation of the Superbus project. The infrastructure layer of the Trail layer scheme is particularly important for the implementation phases whereas the vehicles (and in this case also the transport concept FTR) are foremost important in the exploitation phase. Again there are several possibilities to finance the project. It should be noted that there are two ways to deal with this part of the project process: first of all by considering the transport mode and infrastructure as one system, or secondly by considering the two parts separately. Both ways lead to different types of contracts which will be seen in the following.

*1. Transport mode and infrastructure are approached as one system*

In this case the two phases, implementation and exploitation are intertwined and integrated contracts seem to fit the best. Contracting is not considered possible because of the complexity and the many transactions these two phases contain. Contracting will lead to unnecessary costs and task allocation and consequently risk allocation is not transparent.

Organising the implementation and exploitation by means of integrated contracts will avoid this. Joint ventures are also not favoured in this part of the project process because of the difficulties to steer the project and to control the quality. Because these two aspects are considered essential for the implementation and the exploitation of the Superbus project, joint ventures in this second part of the project process are not considered to be an accurate option. This leaves an integrated contract the most suitable means for the organisation. In a case where the system is considered integrated it is for efficiency reasons preferred to have an institutional arrangement which includes more aspects, e.g. the operating and maintenance. The integrated contract that is then the most suitable is the DBFMO contract. The other integrated contracts described either exclude the maintenance or the operating part of the project, so that a separated contract has to be established for this part of the project.

*2. Transport mode and infrastructure are dealt with separately*

When the transport mode and infrastructure are separately approached more possibilities for the organisation emerge. More specifically, contracting, joint ventures and integrated contracts belong to the possibilities. Contracting can be used for part of the implementation and operation phases, but it is too expensive to capture all the transaction into contracts. The maintenance for example can take place by agreements formulated in contracts. For this, specific requirements can be specified so that it is also possible to control whether the maintenance is carried out according to the requirements in the contract. A joint venture is promising for the transport mode in which the vehicle as well as the transport concept FTR has to be specified and implemented. In this case knowledge about the logistics of the system can directly be shared with the developers of the vehicle so that the project can take place efficiently. Regarding integrated contracts, a DB-contract is suitable for the infrastructure part of the project, whereby the maintenance of the infrastructure is separately captured by means of contracting. For the transport mode a DBFM-contract can be applied. The operating is then organised in a concession.

Considering the possibilities described above, Table 2 presents five possible arrangements that are possible for the Superbus project.

**Table 2 Establishing different institutional arrangements**

| Project phase | Arrangement 1 | Arrangement 2 | Arrangement 3 | Arrangement 4 | Arrangement 5 |
|---|---|---|---|---|---|
| Initiation and conceptualisation | Contracting | Contracting | Integrated contract: DB-contract with penalties<br>M via contracting | DBFMO integrated contract (infrastructure and transport mode are considered one system | Integrated contract DBFM: infrastructure<br>O: vehicle |
| Design and development | Joint venture between private and public parties | Joint venture between public and private parties (responsible for DBFO)<br>M via contracting | | | |
| Implementation and realisation | Integrated contract: DB for infrastructure<br>DBFM for vehicle<br>M via contracting | | F and O: via concession model | | |
| Exploitation/ commission | O via concession | | | | |

Considering this overview, the institutional arrangements 4 and 5 are the two arrangements proposed by the consortium FTR which were also preferred by the Lazard B.V. and the project organisation ZZL. The other three arrangements are newly defined and are considered equally good. However a decision between the arrangements has to be made. Keeping in mind the objectives of the national Government regarding the risk transfer to private parties all of the arrangements deal with this. Therefore other considerations have to be made. First of all, contracting in the initial phase is possible but not preferred because contracting has the disadvantage that it is difficult to specify in this early stage the requirements the outcome has to satisfy. It is therefore also difficult to make this explicit in contracts so that it might result in projects that do not meet the actual objectives. Therefore a relation between the private parties and public parties that is more flexible is considered better for this first stage. Arrangements 1 and 2 are therefore excluded from now on. This decision was also based on the fact that in the considerations of this analysis on financing PPP is preferred by the national Government. Thus among the five institutional arrangements that have been established, the ones including a PPP structure are preferred.

For the selection of an institutional arrangement the objection holds for an arrangement in which all the activities are integrated, this is arrangement 4. Because there is not yet much experience with PPP structures like these, care should be given to the integration of all of the activities in one contract. In addition it is assumed that the risks of an integrated contract like arrangement 4 will be higher than in case of a less 'integrated' contract. The DBFMO contract in which all activities are incorporated is assumed to be far more complex. Rather, in order to retain control of the project arrangements 3 and 5 are preferred.

In arrangement 3, there is a stricter separation between the first part of the project process (the initiation and design) and the second part of the project process (the implementation and exploitation). This is particularly important in innovative projects like the Superbus in which the time lasting between the completion of the first part and the start of the second part can be large. Arrangement 5 is an integrated contract but is split in two parts as it considers the vehicle and infrastructure separately. For the organisation of the Superbus project a DB+F+M+O or a DBFM+O contract is the most suitable arrangement. Considering the fact that the private financing is not always successful a DB+F+M+O contract is safer and this contract is therefore preferred. For the DB contract a consortium consisting of the consortium TU Delft Superbus and the consortium FTR could be arranged for example. This arrangement is considered less risky and this is an important advantage because the Superbus project is new, including many risks already.

## 5.3 Specification

Arrangement 3 and 5 are recommended for the organisation of the Superbus project because they are considered the most suitable (recognising the characteristics of the Superbus project), however, because the consortium FTR, Lazard B.V. and the project organisation ZZL indicate arrangement 4, a DBFMO integrated contract as a possibility, this arrangements is also included in the specification (this will then serve for comparison with the other arrangements). The tasks and responsibilities are divided as follows (part of this distribution is based on the proposition of the consortium FTR who has already established the tasks and responsibilities, for the third type of contract, the distribution of tasks and responsibilities is determined based on the distribution of the other two contracts).

*1. DBFMO for an integral concession (consortium FTR, 2006):*

- The concessionaire receives the rights to collective transport
- The concessionaire is responsible for constructing and financing new infrastructure
- The concessionaire is responsible for maintaining new infrastructure
- Adjusting (and maintaining) infrastructure: concessionaire adapts existing infrastructure in deliberation with owner and/or state transfers budget funds to owner to make adaptations
- Mobile equipment: the concessionaire will use mobile equipment complying with requirements set and/or the concessionaire will use a 'nominated supplier'

*2. DBFM and a separate concession contract (O) for operating (consortium FTR, 2006)*

- The Infra Provider (IP) is responsible for constructing and financing new infrastructure
- The Infra Provider is responsible for maintaining new infrastructure
- Adapt and if necessary maintain existing infrastructure: the IP adapts existing infrastructure in deliberation with owner and/or the state transfers budget funds to owner to make adaptations
- Concessionaire: has the rights to collective transport
- Mobile material: the concessionaire has mobile material that meets the requirements set, and/or the concessionaire uses a 'nominated supplier'

*3. Integrated contract for design and build activities and a separate form of contract for the maintenance (M), financing (F) and operating (O) for collective transport:*

- The concessionaire for operation receives the rights to collective transport
- The concessionaire for financing receives the rights to finance the project
- The contractor is responsible for maintaining new infrastructure
- The Infra Provider (IP) is responsible for constructing and financing new infrastructure
- Mobile material: the concessionaire has mobile material that meets the requirements set, and/or the concessionaire uses a 'nominated supplier'

Parties support the starting point of the project organisation that risks are borne in principle by the private parties unless the government can better control the risk. The allocation of risks should not only be considered from a financial perspective but incentives to parties can also play an important role (Ministry of Transport, 2006a). None of the parties sees the bearing of the total transport risk as a real option. The basis for the risk allocation that is applied here is the existing (international) experience with DBFM (O) contracts. The starting points of risk allocation herein are (Ministry of Transport, 2006):

- risks will be allocated to the party that can control the particular risk the best
- risk allocation is applied for subjects the private partner can partly influence (the State can in this way prolong the contract period in case of risk)
- risks before the contract has been signed are not for the costs of the private partner

The State thus still bears some of the risks. Table 3 indicates how the risks (identified in section 3 of this article) are allocated between parties.

**Table 3 Allocation of risks**

| Risk | Arrangement 3 | | | | | Arrangement 4 | | Arrangement 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *State* | *IP* | *Operator* | *C-M* | *C-F* | *State* | *C* | *State* | *IP* | *Operator* |
| *Market related risks* | | | | | | | | | | |
| Market risks | | | x | | x | | x | | | x |
| Financial risks | x | | | | x | x | | x | | |
| Supply risks | x | | x | | x | | x | | | x |
| *Completion risks* | | | | | | | | | | |
| Technical risks | | x | x | x | | | x | | x | x |
| Construction risks | | x | x | x | | | x | | x | x |
| Operational risks | | x | x | x | | | x | | x | x |
| *Institutional risks* | | | | | | | | | | |
| Regulatory risks | x | | | | | x | | x | | |
| Social-acceptability risks | | x | x | | | | x | | x | x |
| Sovereign risks | x | | | | | x | | x | | |

## 6. Conclusions and discussion

The Superbus project for the Zuiderzee Line is promising but in order to successfully implement the project one has to carefully consider the organisation of the project. The organisation consists of the tasks and responsibilities of actors and the allocation of risks between parties. PPP gains ever increasing popularity with governments to coordinate transactions in the project and to deal with the risks in projects. Also in the Superbus project a PPP construction in the form of a DBFMO and DBFM+O contract was proposed by some experts. This article confirms that these arrangements are indeed attractive for the organisation of the project and added hereto a third possibility: a DB+F+M+O integrated contract. These arrangements were formed by considering the 'system' and the project process. Of the three proposed arrangements, the DBFMO contract is thereby less preferred because the risks involved are considerably higher then with the other two types of contracts due to the fact that all the activities are within one party. Considering the other two institutional arrangements, there is not much difference; the risk allocation is for example quite similar for both types of arrangements. However, it could be argued that the DB+F+M+O contract is considerably more expensive and therefore less preferred. On the other hand, by tendering the different activities on a European scale it is expected that the costs can be minimised. A slight preference is given to a DB+F+M+O contract because the contract is considered less risky which is important for an innovative transport project like the Superbus. This should though be subject of subsequent research.

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