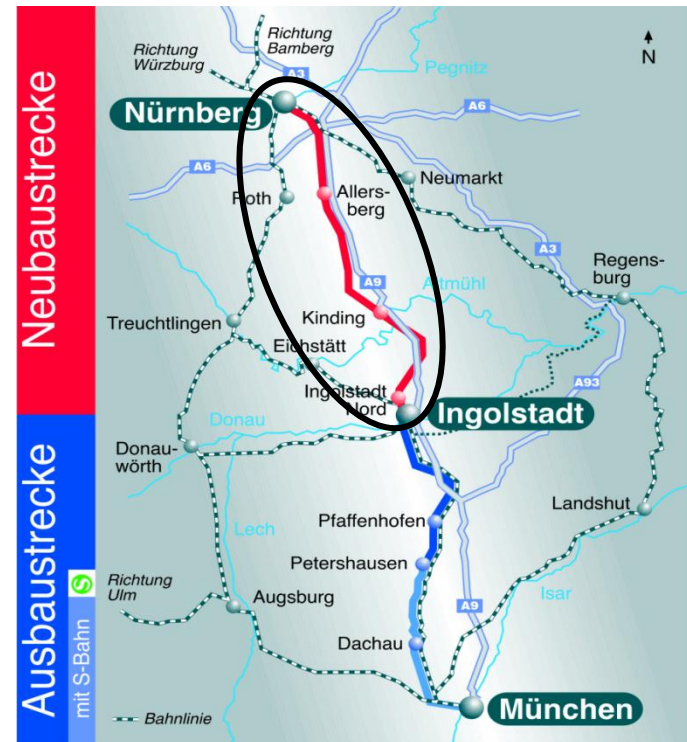
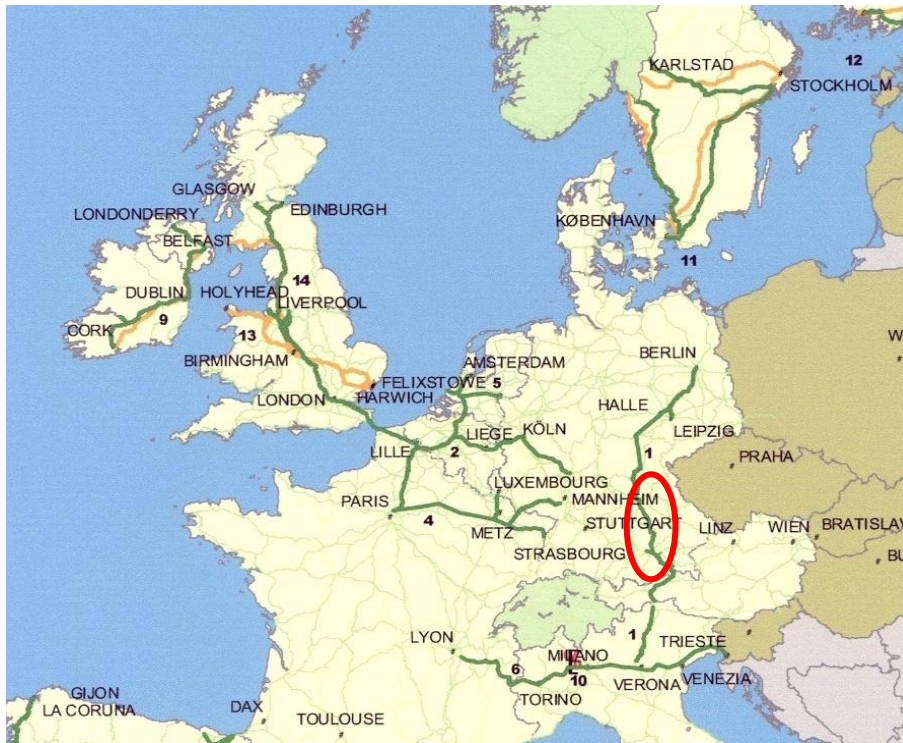


MEGAPROJECT Case Study

Case compiled by: Prof. Dr.-Ing. Konrad Spang and M. Kümmerle
 Contact details: spang@uni-kassel.de , kuemmerle@uni-kassel.de

New stretch of track: High Speed Railway Nuremberg - Ingolstadt



MEGAPROJECT Case Study

Case compiled by: Prof. Dr.-Ing. Konrad Spang and M. Kümmerle

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Basic Project Information

Project Title	High Speed Railway (NBS) Nuremberg-Ingolstadt in Southern Germany (Part of NBS/ABS Nuremberg – Ingolstadt - Munich)
Location	Germany (Bavaria) between Nuremberg and Ingolstadt
Purpose ^{1,3} (NBS/ABS)	<ul style="list-style-type: none"> • Increase of capacity (4 instead of 2 main running lines at the ABS and 4 running lines at the NBS) • Decrease of travel time about 40min from Nuremberg via Ingolstadt to Munich • Decrease of effective length (36 km = 14%) NBS
Scope ^{1,4} NBS	<ul style="list-style-type: none"> • Double-track (large parts run parallel to the highway A9) • Passenger trains (up to 300kph) • Light good trains (up to 160kph)
Total Project Value ^{1,8}	Total costs: 3'573 Mio. € for NBS and ABS (Amount NBS, about 2'300 Mio. €)
Project Status ¹ (i.e.. initiation, planning, construction, operation, dismantling)	The High Speed Railway Nuremberg – Ingolstadt is operating since 28 may 2006 (NBS)

MEGAPROJECT Case Study

Case compiled by: Prof. Dr.-Ing. Konrad Spang and M. Kümmerle

Contact details: spang@uni-kassel.de , kuemmerle@uni-kassel.de

Basic Project Information

<p>Contractual Framework ^{1,4} (e.g. fixed price, cost-plus etc.) (NBS)</p>	<ul style="list-style-type: none"> • 6 sections (North, Middle, South, Fischbach-Feucht, node Ingolstadt and Technical Equipment) • Each section was assumed by one general contractor • All tasks in each section were coordinated by the general contractor
<p>Relevant Physical Dimensions ^{1,8,10} (e.g. height, width, volume, length) (NBS)</p>	<ul style="list-style-type: none"> • Total length: 171 km (77km NBS, 94km ABS) • Total costs: 3'573 Mio. € (NBS and ABS) • 9 Tunnels; 82 Bridges (5 major bridges and 77 smaller bridges) ; 3 Stations (NBS and ABS) • Maximum Speed: NBS (300km/h) ; ABS (200km/h)

Note about NBS and ABS:

The overall project consists of the 2 parts NBS (Neubaustrecke = completely new track) and ABS (Ausbaustrecke = extension track). For more clarity, only the NBS will be considered, since the NBS is more a typical Mega Project as the ABS.

The overview of the project on pages 2,3 and 29 is recommended. This is important due to the fact that the decisions of the whole project about costs, time and effects was relevant to the NBS

The total cost can be roughly broken down in 1/3 for the ABS and 2/3 for the NBS, thus the cost of the NBS are estimated at 2,300 Mio.€

MEGAPROJECT Internal Stakeholder Identification

(Stakeholders with a direct legally sanctioned relationship with the project)

		Stakeholder Category	Case-Study	Comments (e.g. maturity, previous experiences of stakeholders, skills, influence on project)	
Internal	Supply-Side	Client ¹	Deutsche Bahn AG (DB AG)	Contains DB Netz AG, DB Energie GmbH and DB Station&Service AG	
		Financiers ^{1,6}	1. FRG (2'049 Mio. €) 2. DB AG (1'154 Mio.€) 3. EU (190 Mio.€) 4. Free State of Bavaria (180 Mio.€) <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> } 3'573mio. € </div>	Funding from the FRG and co-financed by the other financing Bodies	
		Sponsors	no private sponsors		
		Client's Customers	DB AG (is the client and the customer)	Gives the project to the DB ProjektBau	
		Client's Owners ²¹	The FRG owns the DB AG to 100%		
		Other internal supply-side categories (please specify)	Category	Case-Study	
			Client's Agent ^{1,2,8}	DB ProjektBau GmbH is the constructor of the Project (Project Company)	

MEGAPROJECT Internal Stakeholder Identification

(Stakeholders with a direct legally sanctioned relationship with the project)

		Stakeholder Category	Case-Study	Comments (e.g. maturity, previous experiences of stakeholders, skills, influence on project)
Internal	Demand Side)	Principal Contractor Construction ⁴	Joint Venture of <i>Bilfinger and Berger (München)</i> and <i>Max Bögl (Neumarkt, Oberpfalz)</i> : North Section (September 1998)	These general contractors coordinate the whole construction sequence up to the rail operations in each section (Principal Contractor = General Contractor)
			<i>Hochtief (München)</i> : Middle Section (September 1998)	
			Mid-Sized Joint Venture under the leadership of <i>Berger Bau (Passau)</i> and <i>August Reiners Bau (München)</i> : South Section (September 1998)	
			Joint Venture under the leadership of the <i>Leonhard Weiss (Crailsheim)</i> : section 'Fischbach-Feucht' (1997)	
			Joint Venture with <i>Walter Bau (Augsburg)</i> under the leadership of <i>Dywidag</i> : Section 'Audi-Tunnel'	
			<i>Adtranz</i> : technical equipment of the NBS with overhead wire, electronics and signalling equipment (December 1998)	
		Principal Contractor Design ⁴	General planner for each construction section. And some external companies for project controlling.	

MEGAPROJECT Internal Stakeholder Identification

(Stakeholders with a direct legally sanctioned relationship with the project)

		Stakeholder Category	Case-Study	Comments (e.g. maturity, previous experiences of stakeholders, skills, influence on project)
Internal	Demand Side ⁴	First Tier: Contractors	Many contractors which were coordinated by the six general contractors. (See page 5) Typical contract works are listed at page 7	
		Second Tier: Consultants	General consulting operations, for example: environmental management consulting engineers and project management	
		Professional Services Providers	Specific operations, for example geotechnical engineering for tunnel construction, town and country planner, landscape architect and ground investigation	

MEGAPROJECT Internal Stakeholder Identification

(Stakeholders with a direct legally sanctioned relationship with the project)

Typical contractor work at the NBS Nuremberg-Ingolstadt

Track superstructure and underground

Groundwork and track maintenance work

Communication facilities

Construction of the Ballast less track

Tunnel and track Construction

Electrification

Railway switch technology

MEGAPROJECT External Stakeholder Identification

(Stakeholders with a direct interest in the project but with no legal contract)

		Stakeholder Category	Case-Study	Comments :	
External	Public	Regulatory Agencies	Category	Tasks	
			Federal Ministry of Transport, Building and Urban Affairs (BMVBS)	<ul style="list-style-type: none"> • Highest direction and overall responsibility of all public transport routes in the FRG • Definition of new building operation in the BVWP 	
			Federal Railway Authority (EBA) 'Eisenbahn Bundesamt'	<ul style="list-style-type: none"> • According to the §18 Allgemeines Eisenbahngesetz (AEG) the EBA has the planning and financing permission to devise new railway lines. • Inspects periodically the adequate use of the earmarked funds • Planning approval and building control for operating equipment of trains from the FRG(planning approval authority) • Train supervision • Issuance and revocation for a operating licence 	The EBA is an authority subordinated to the BMVBS. The tasks of the EBA were former realized from the DB AG until the privatisation. (For more precise classification, see the organisation chart at page 39)
			The Region of Augsburg and Schwaben	<ul style="list-style-type: none"> • Impairment of there location quality (The former railway route from Nuremberg to Munich goes through Augsburg 	
			Department of the Environment (BMU) 'Bundesministerium für Umwelt'	<ul style="list-style-type: none"> • To observe a line of conduct or rather to prove the rights of the 'Bundesnaturschutzgesetz' (§8 Abs.2 BNatSchG) 	
			European Union	<ul style="list-style-type: none"> • The EBC checking procedure for high-speed rail systems 	

MEGAPROJECT External Stakeholder Identification

(Stakeholders with a direct interest in the project but with no legal contract)

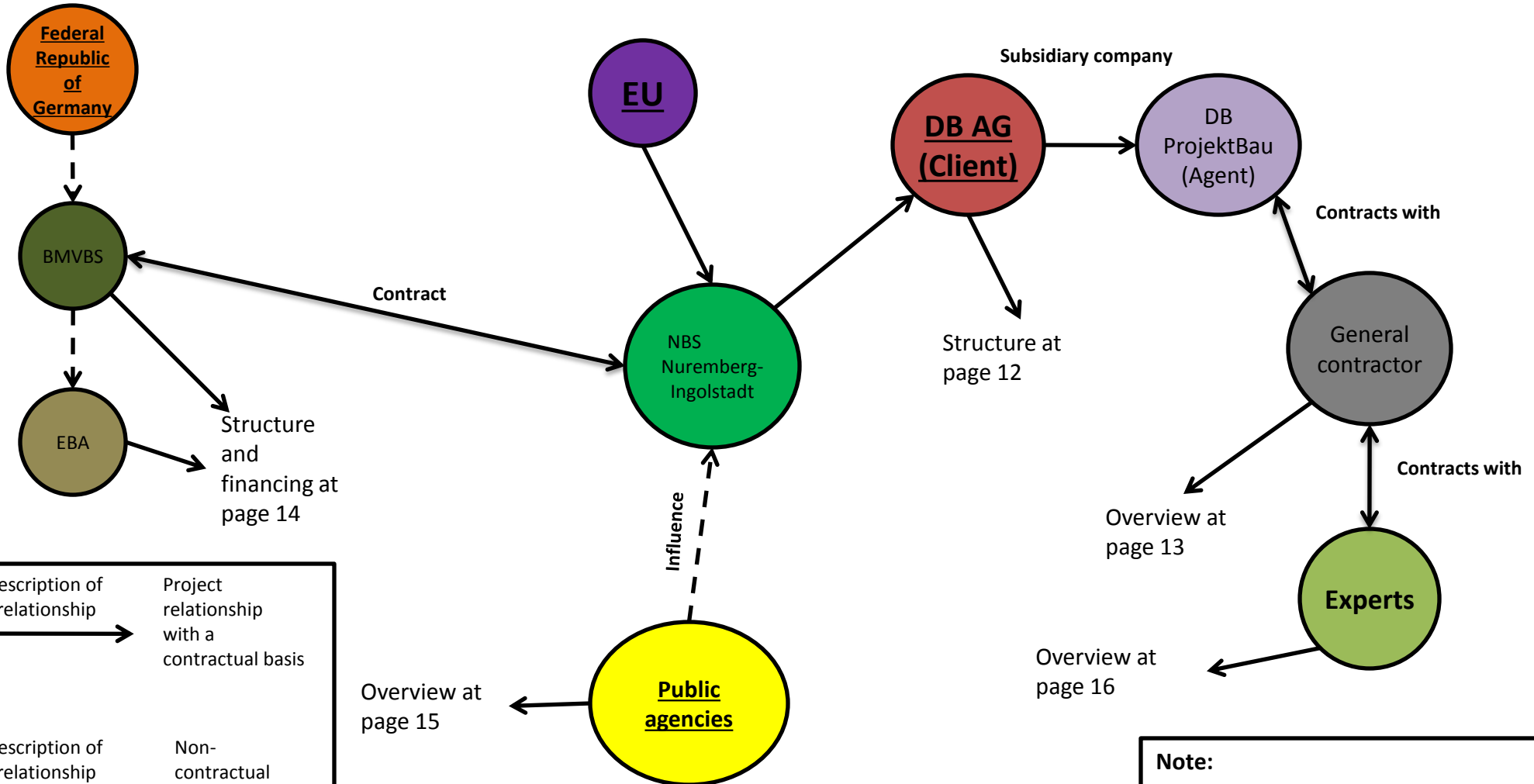
	Stakeholder Category	Case-Study	Comments (e.g. maturity, previous experiences of stakeholders, skills, influence on project)
	Other internal supply-side categories (please specify)	Category	Case-study
	Local Government	<ul style="list-style-type: none"> The Free State of Bavaria and the regional council of Upper Bavaria (hearing authority) and other bottom authorities. (There is a schemata at page 38 to see the important departments in the planning of the NBS/ABS Nuremberg-Ingolstadt (-Munich) of the regional council of Upper Bavaria) The Affected Communes participated in the environmental impact analysis (UVU) which was carried out together with the regional plan procedure (Only 300 Objections were counted) Adjoining communes and residents in the proximity of the new railway track (nearby the freeway) rural districts and independent cities 	
	National Government	Federal Republic of Germany with the BMVBS as as the highest direction and overall responsibility of all public transport routes in the FRG.	
Private	Local residents	<ul style="list-style-type: none"> local land owners with land and buildings next to the NBS / ABS. Directly not affected with there own possession but affected by noiseor/and pollution. private persons, and citizens 	
	Local Landowners	Private persons, citizens (communes, the Free State of Bavaria, Federal Republic of Germany) Directly affected with there own possession., because the track passes there property.	
	Local Companies	<ul style="list-style-type: none"> PLE Pipeline Engineering GmbH Fränkisches Überlandwerk AG (<i>local electric company</i>) and other private companies 	
	Conservationists	<ul style="list-style-type: none"> 'Bund Naturschutz in Bayern e.V.' (tried to prevent the project by way of action at the Bavarian administrative court) Schutzgemeinde Deutscher Wald (<i>German Association for the Protection of Forests and Woodlands</i>) Verein zum Schutz der Bergwelt (<i>Association for the Protection of the mountains</i>) 	

MEGAPROJECT External Stakeholder Identification

(Stakeholders with a direct interest in the project but with no legal contract)

Other External Private stakeholders (please specify)	Category	Case-study	
	Interest Groups	Naturpark Altmühlthal (Nature Park) Landesjagdverband (regional hunting associations) Landesfischereiverband (regional fishing associations)	
	Stakeholder Category	Case-Study	
Public agency	Associations ^{1,17}	<ul style="list-style-type: none"> • 'Bund Naturschutz in Bayern e.V.' • Schutzgemeinde Deutscher Wald (<i>German Association for the Protection of Forests and Woodlands</i>) 	
	Archaeology	<ul style="list-style-type: none"> • 'Bayerisches Landesamt für Denkmalpflege' (State Office of monument protection) • Archaeological accompaniment of train paths as profits for land- and landscape history (No rescheduling to protect the ground landmark) • Under the leadership of the state office for monument protection in Bavaria, the financial support of the DB AG and the technical help from the construction companies, they could realize rescue excavation for sudden discoveries. 	
	Authorities ¹⁷	<ul style="list-style-type: none"> • State office for water supply in Bavaria • State office for road construction Ingolstadt • State office for environment protection in Bavaria • Motorway directorate Upper Bavaria • Geological state office Bavaria • Commune Denkendorf (f.e.) • Planning association Ingolstadt 	

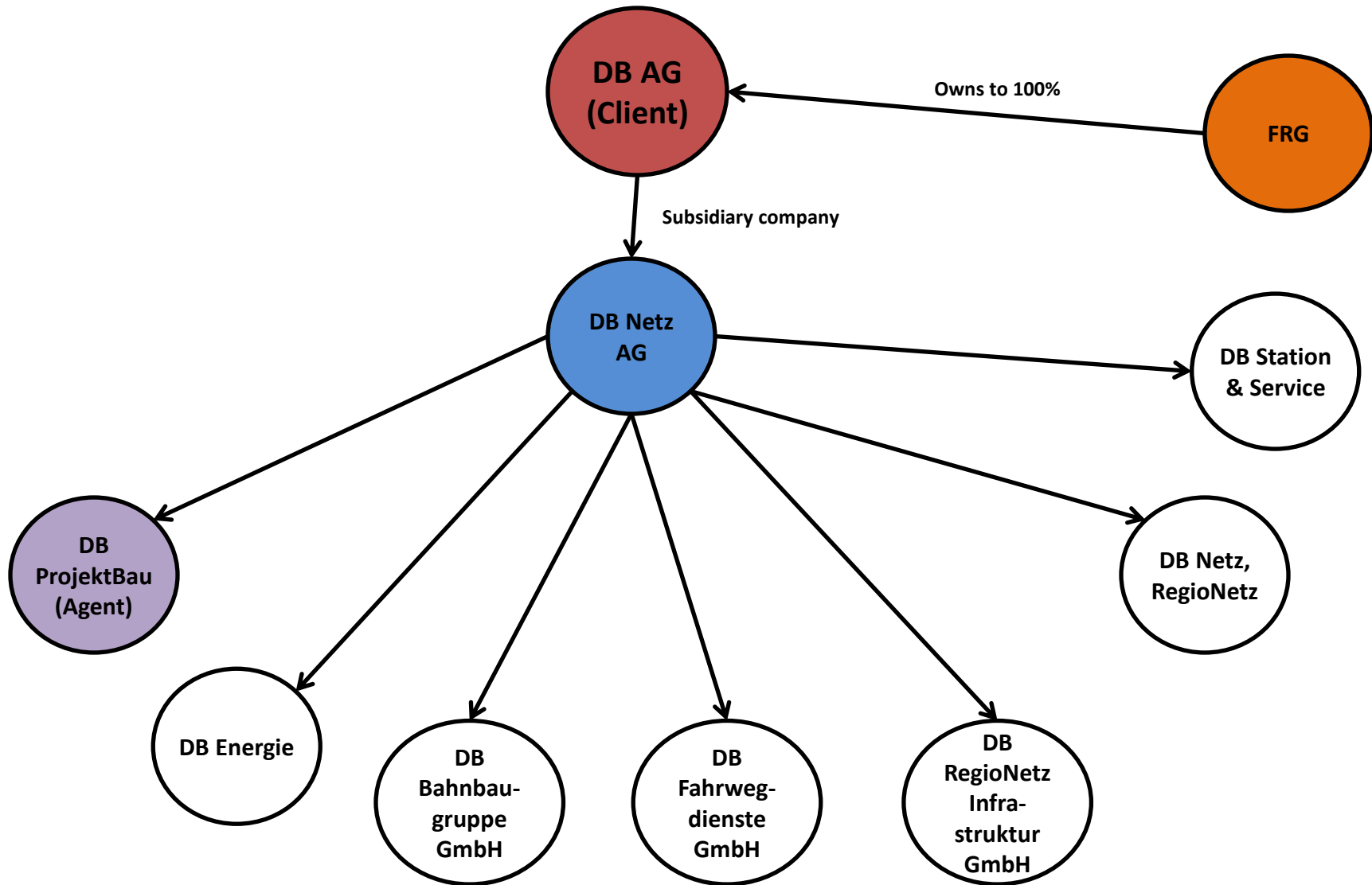
Stakeholder Relationship Maps: Short overview across the whole project



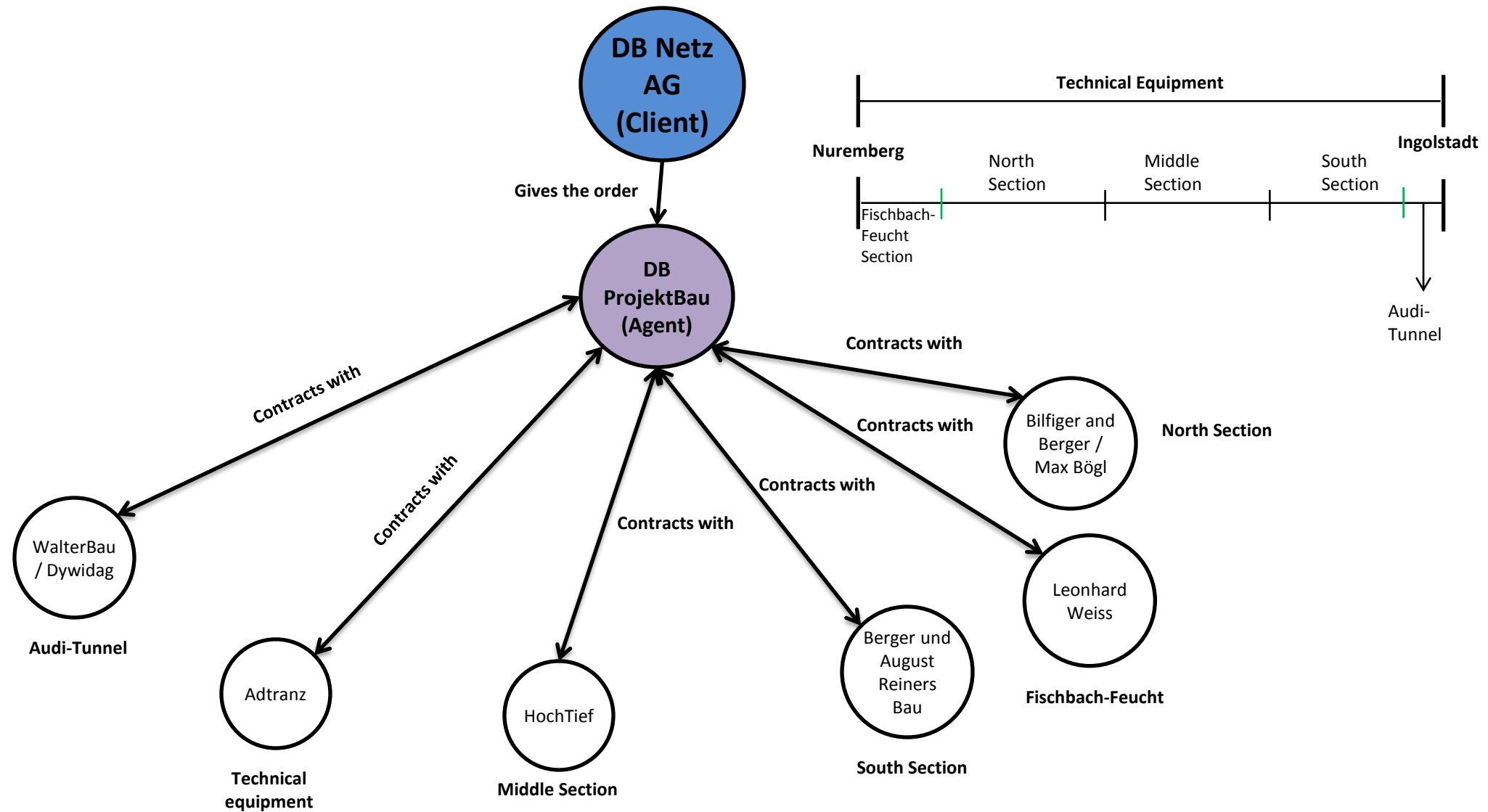
Description of relationship	Project relationship with a contractual basis
→	
Description of relationship	Non-contractual project relationship
- - - - -	

Note:
All explanations on the following sides (9-14) can be found in the glossary

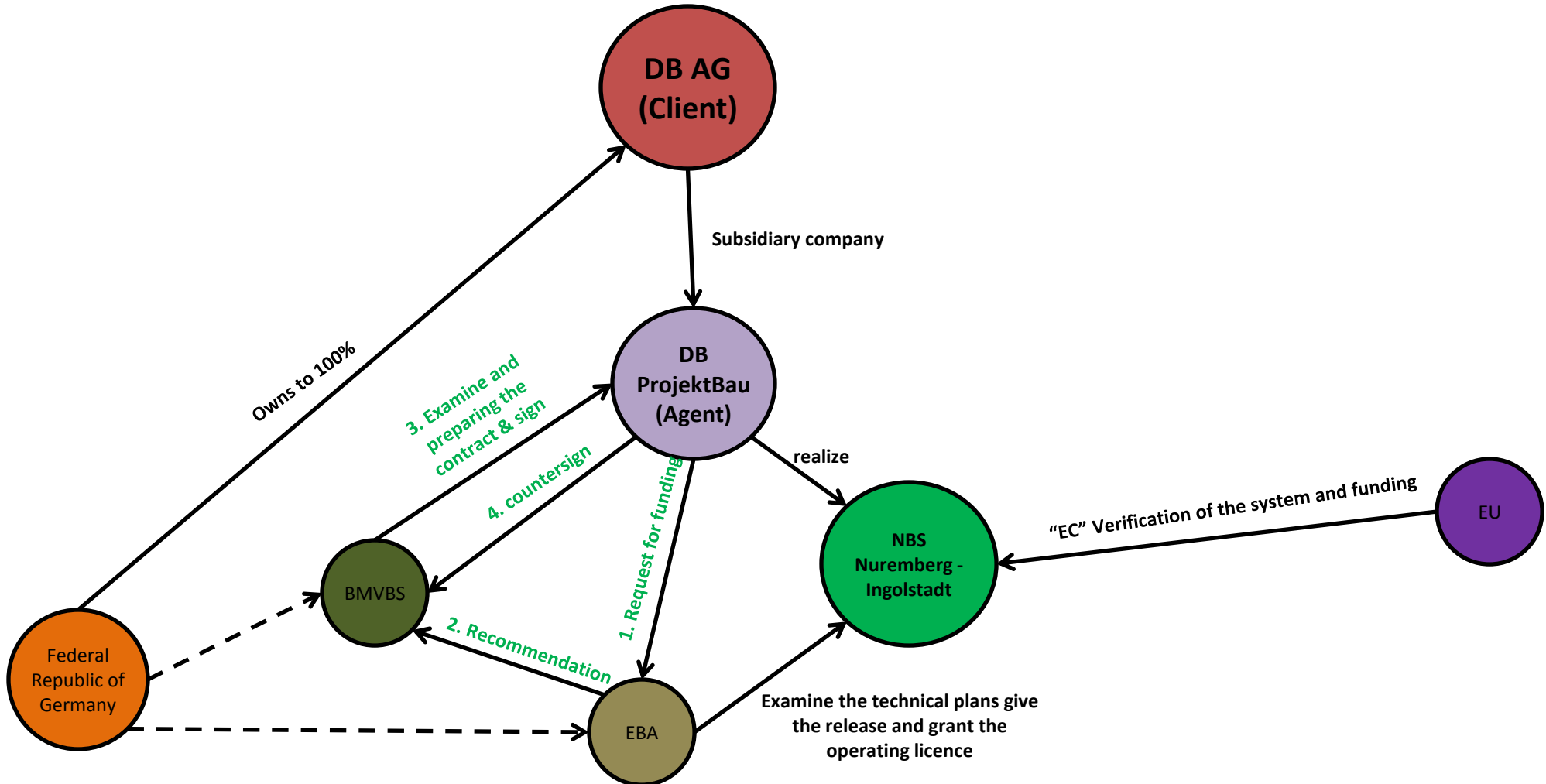
Stakeholder Relationship Maps: Structure of the DB AG and DB Netz AG



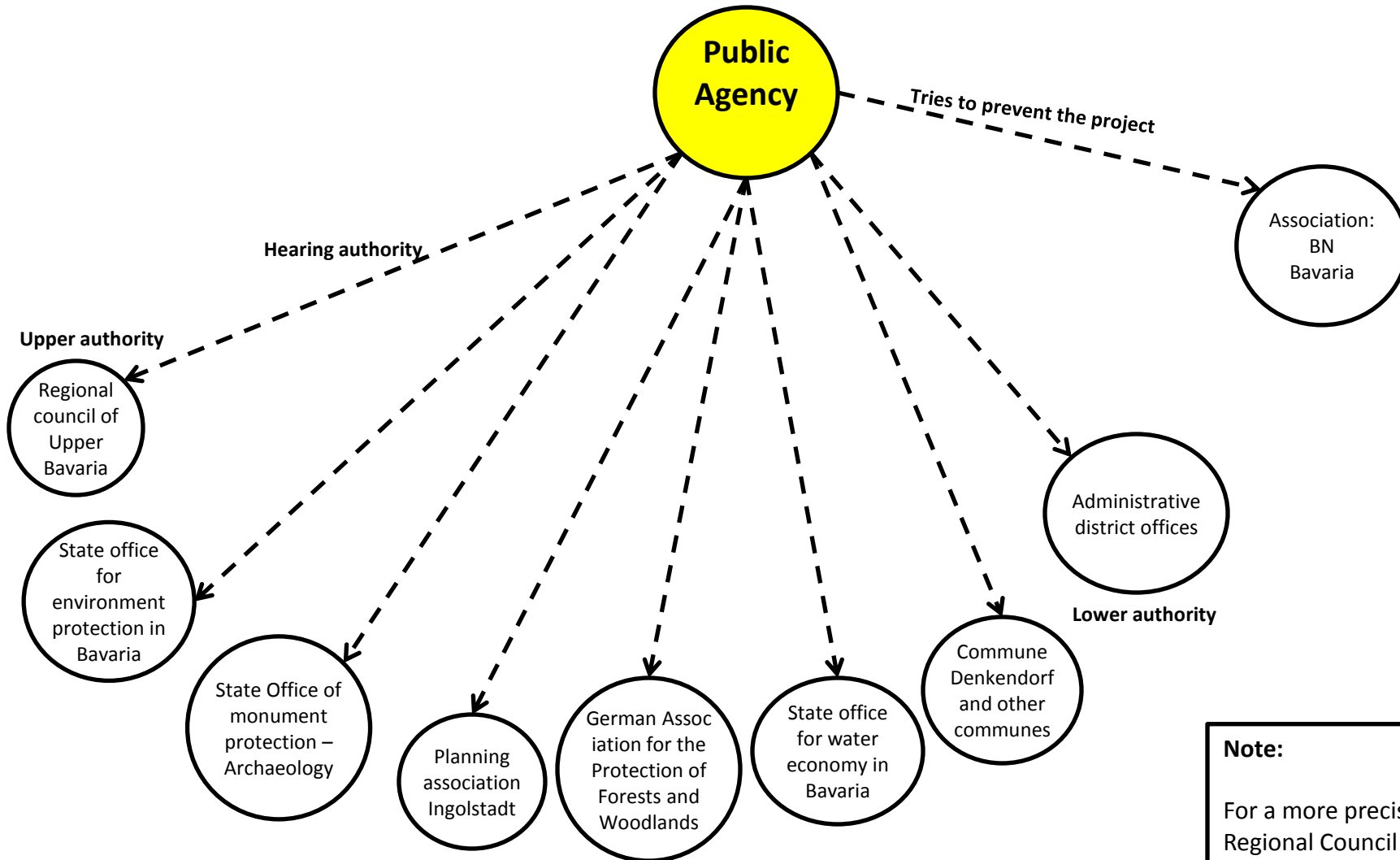
Stakeholder Relationship Maps: Structure of the general contractors (internal Stakeholder) 4



Stakeholder Relationship Maps: Structure and financing of the project ¹

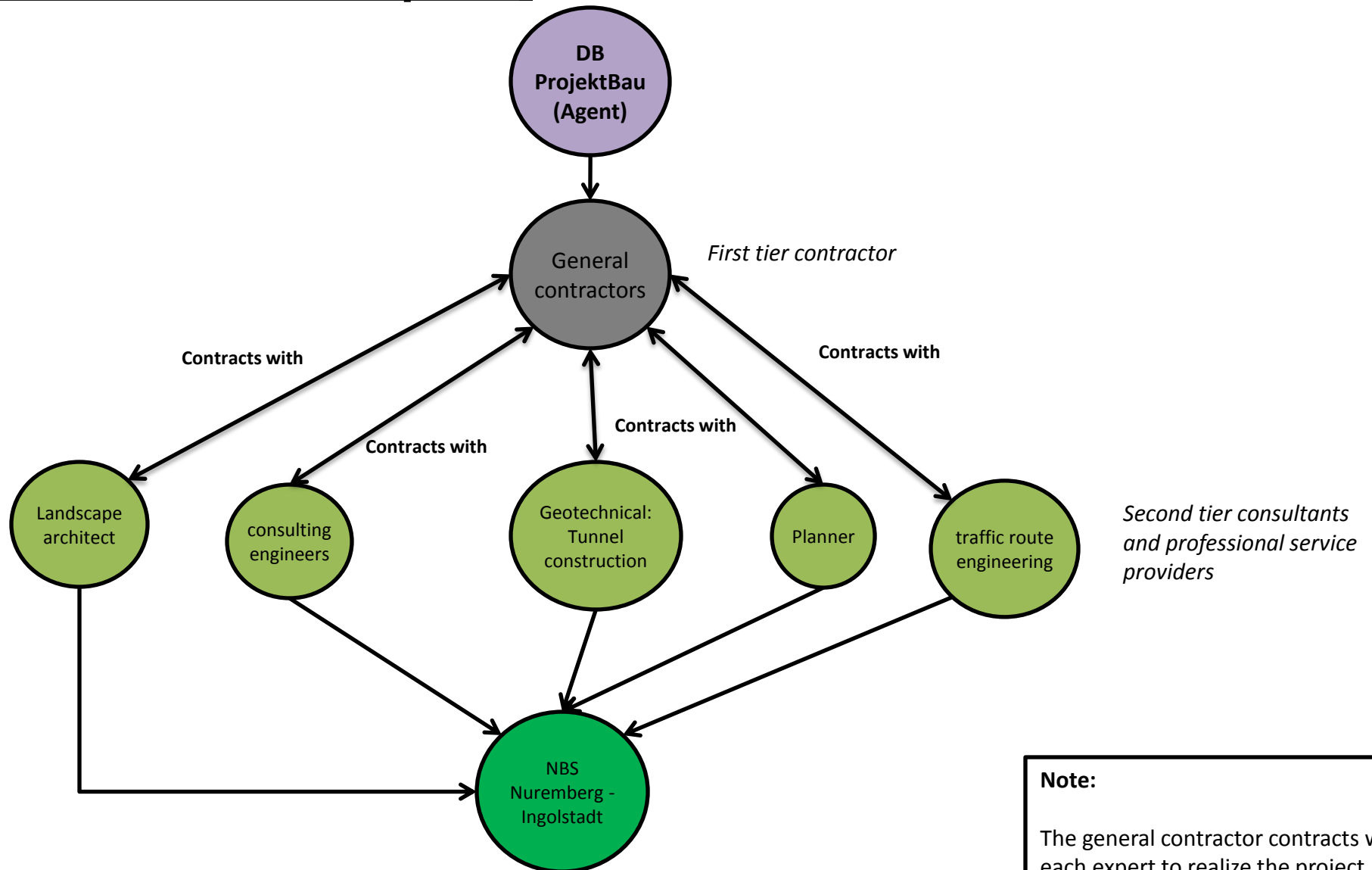


Stakeholder Relationship Maps: Structure of Public Agencies 17, 1, 5

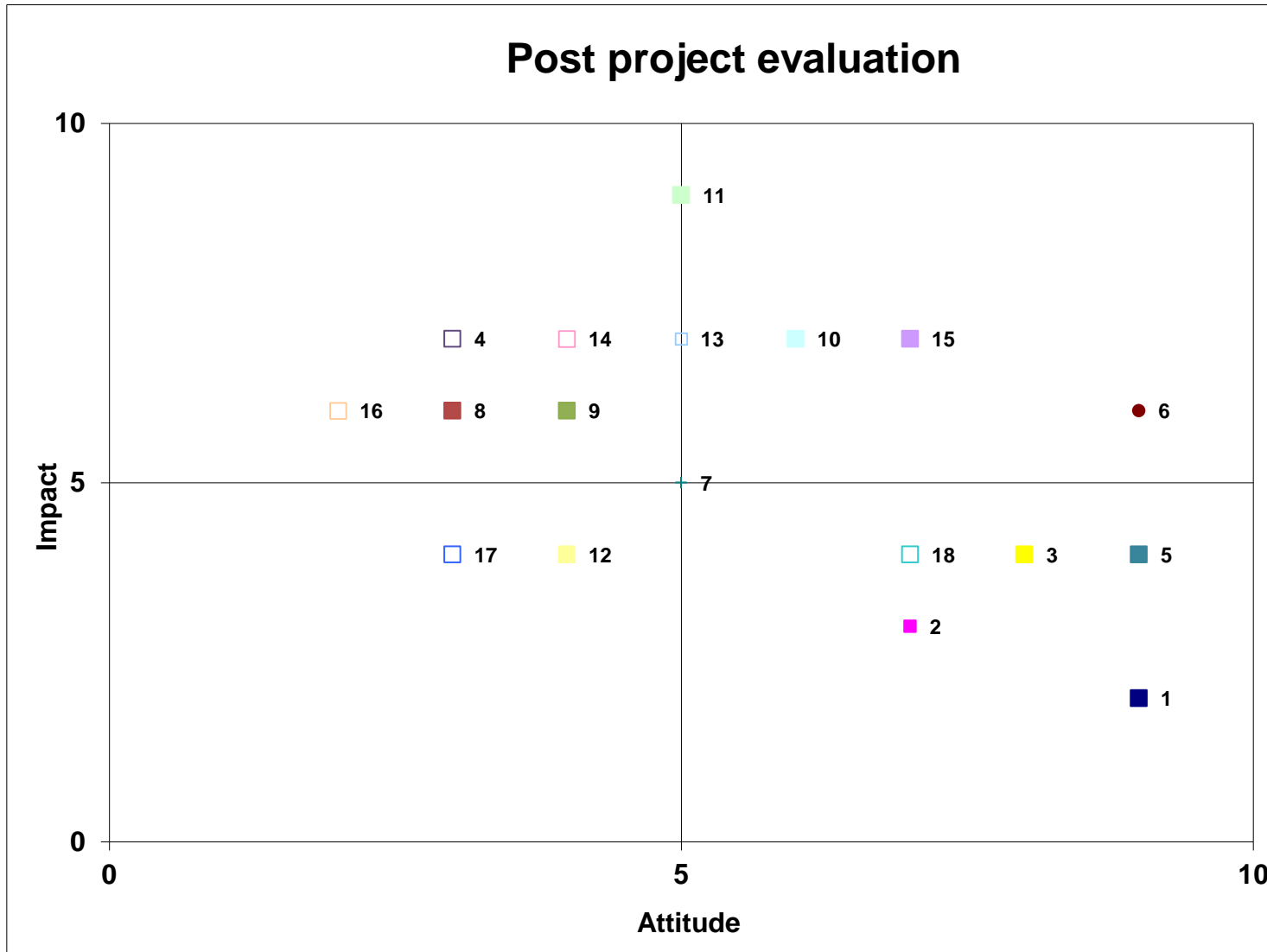


Note:
For a more precise schedule of the Regional Council of Upper Bavaria, see Page 33

Stakeholder Relationship Maps: Structure of the experts



Stakeholder Portfolio (Example, s. charts 18-25)



1. European Union
2. Federal Republic of Germany
3. The Free State of Bavaria
4. IHK of Augsburg and Swabia and the City of Augsburg
5. Federal Ministry of Transport, Building and Urban Affairs (BMVBS)
6. Federal Railway Authority (EBA)
7. State office for water economy in Bavaria
8. State office for monument protection – Archaeology
9. State office for environment protection Bavaria
10. 'Bund Naturschutz in Bayern e.V.'
11. Commune Denkendorf
12. Planning association Ingolstadt
13. Local residents (landowners)
14. Local residents (neighbors)
15. Local residents (company owners)
16. German association for the protection of forest and woodlands
17. Nature Park 'Altmühltal e.V.'
18. Local electric company ('Fränkische Überlandwerke AG')

MEGAPROJECT External Stakeholder Attitude Analysis

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high; 0 neutral; - low; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high; 0 neutral; - low; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
1	European Union ¹²	Transborder traffic for citizens and economy in the European union without technical barriers for all trains Attitude: +	EG-Validation from the EBC to confirm the interoperability standard (EIV / TSI) Influence: +	The NBS / ABS is now a part of the TEN and guaranty fast and save transportation. Impact: +	Initiation and operation
2	Federal Republic of Germany ¹⁰	Build a fast Extension between Berlin an Nuremberg for the transportation project 'Deutsche Einheit Nr. 8' and also the same attitude as the Free State of Upper Bavaria Attitude: ++	Influence over the ministry (BMVBS) The FRG finances all transport routes in Germany, so the FRG financed all railway tracks Influence: ++	The FRG had to handle the exploding costs in the project. From the project start, these costs were not calculated correctly. (Changes in operating costs and external factors were not considered) Impact: --	Initiation, planning and operation
3	The Free State of Bavaria	Build a short track between Nuremberg and Munich. With Nuremberg as a connection point to north Bavaria and Ingolstadt as the geographical center of the track ⁴ Attitude: ++	Supports the project to be registered it in the BVWP and wanted a fast realization ³ Influence: +	A faster regional and long-distance connection and more regional traffic between the Bavarian cities of Nuremberg, Ingolstadt and Munich. Impact: ++	Planning, construction and operation

Note:

To give an short overview above the Attitude, Influence and Impact, we decided to use a valuation system: **(The valuation is an example!)**

++ Very positive / highest ; + positive / high; 0 neutral; - negative / low; -- very negative / very low

MEGAPROJECT External Stakeholder Attitude Analysis

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high; 0 neutral; - low; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
4	IHK of Augsburg and Swabia and the City of Augsburg	Impairment of location quality ³ Attitude: --	Political lobby work to establish the option Nuremberg-Munich via Augsburg Influence: +	No expansion of current track between Munich and Nuremberg via Augsburg, instead of that, the DB realized a track from Nuremberg via Ingolstadt to Munich Impact: --	planning and operation
5	Federal Ministry of Transport, Building and Urban Affairs (BMVBS) ¹	The BMVBS wanted a fast connection between east and south Germany. The track between Nuremberg and Ingolstadt is a part of a big project which was listed in the BVWP Attitude: ++	<ul style="list-style-type: none"> • Highest direction and overall responsibility of all public transport routes in the FRG • Definition of new building operation in the BVWP Influence: ++		Initiation, planning, construction and operation
6	Federal Railway Authority (EBA) 'Eisenbahn Bundesamt'	There is a positive attitude if the DB PB and the DB AG works within the framework of the legal rules from the EBA and other laws (page 24) Attitude: +	<ul style="list-style-type: none"> • Standardized in the §3 BEVVG the EBA is responsible for the building inspection (EBA & EIV) ¹² • Planning approval and building control for factory equipment of trains from the FRG • Train supervision • Issuance and revocation for a operating licence • Grants federal funds • An authority subordinated to the BMVBS Influence: ++		Initiation, planning, construction and operation

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
7	State office for water economy in Bavaria	Interventions in the water balance and possible impairment of the use of ground water. Existing geological conditions are not properly recorded. Attitude: -	The ability to stop the project if there is negative interference with the water balance. Influence: +	No effect, because the records do not provide information on the hazards of drinking water. Impact: 0	Construction, operation and dismantling
8	'Bayerisches Landesamt für Denkmalpflege' (State Office of monument protection – Archaeology)	They want to protect and sustain the ground monuments in the interests of the science and public ¹³ Attitude: -	•Ability to Lobby Government •Conversation on a high political level lead to a financial participation of the DB AG ¹³ Influence: +	The State office of monument protection got the financial participation from the DB AG. They protect various ground monuments under the track Impact: +	Planning, construction
9	State office for environment protection in Bavaria	The noise protection turns out to be low. There is no protection from shocks and vibrations Conservation and landscaping must be maintained. Attitude: -	Can ensure that the project is built according to the limits of the BImSchV Influence: +	The measures for nature conservation have to be carried out and the limits to concerning noise protection have to be respected Impact: +	Planning, construction, operation and dismantling

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
10	'Bund Naturschutz in Bayern e.V.'	They have the following point of view: "The NBS is one of highest nature destructive, most expensive and questionable transport political project in Germany" ⁹ The 'Bund' rejects the project! Attitude: --	•Ability to Lobby Government and the ability to institute proceedings against the project to stop the realization •Legal action against the project to stop the realisation Influence: ++	The legal action against the project wasn't successful and the DB AG built the NBS / ABS Impact: --	Planning, construction, operation and dismantling
11	Commune Denkendorf	<ul style="list-style-type: none"> • It should have all the plans for the route • Landfills in the immediate neighborhood will be rejected • No construction traffic through the industrial area • No damage to the supply and disposal lines in the industrial area •The areas of the community, which are commercial areas are not for sold • Application of active noise control Attitude: --	If the limits for noise control are not respected, or the plans are incomplete, this can lead to a delay, or even to a stop of the project. Influence: ++	<ul style="list-style-type: none"> • The landfill is necessary and is therefore used • The immediate use of the industrial area of the site traffic is essential • The project company is required to pay for damage to water supply and waste lines • The noise level standards are respected Impact: -	Planning, construction and operation

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
12	Planning association Ingolstadt	<ul style="list-style-type: none"> • Pollution and deterioration of nature and people has to be reduced to a minimum • Groundwater contamination must be avoided • Impairment of the commercial area in Denkendorf should be avoided • Limits of noise protections must be respected Attitude: 0	If the requirements are not respected, it is possible to stop the project. Influence: ++	The demands are respected. The DB AG tries to keep the damage to humans and nature as small as possible. Impact: +	Initiation, planning
13	Local residents (landowners)	<ul style="list-style-type: none"> • They don't want to lose their land for general public interest • The property near to the tracks is more or less worthless Attitude: --	In such cases the individual interest is lower than the general public interest. The result yields the plan approval procedure Influence: 0	Some landowners lost their land and got a financial compensation Impact: --	Planning, construction and operation

MEGAPROJECT External Stakeholder Attitude Analysis ¹⁷

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
14	Local residents (neighbours) ¹	<ul style="list-style-type: none"> • The negative attitude to the NBS is related to the noise exposure based on the high-speed railway •The noise exposure is unacceptable • Stability of the buildings are not guaranteed •Attitude: -- 	<ul style="list-style-type: none"> •Ability to institute proceedings against the noise exposure. (related to the 16. BImSchV and the BImSchG) •Additional cost for noise exposure ¹⁴ Influence: + 	The plan approval procedure committed the DB AG to build noise protection near the track. The stability is ensured Impact: 0	Planning, construction and operation
15	Local residents (company owner)	<ul style="list-style-type: none"> • There is an intervention in the property, and in the business operation • Structural expansion is impossible • Business operations can not be maintained Attitude: -- 	<ul style="list-style-type: none"> •Ability to file a suit against the noise exposure. Relating to the 16. BImSchV and the BImSchG •Delay of official planning approvals with additional cost for noise protection Influence: + 	<ul style="list-style-type: none"> • The owners will receive an indemnification for the incoming damage •To continue the business operation , the approach is guaranteed Impact: 0 	Planning, construction and operation

	External Stakeholder	External Stakeholder's Attitude to this Project <i>++ Very positive ; + positive ; 0 neutral ; - negative ; -- very negative</i>	External Stakeholder's Influence on project <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Impact of Project on External Stakeholder <i>++ highest ; + high ; 0 neutral; - low ; -- very low</i>	Phase of Project of Greatest Interest (initiation, planning, construction, operation, dismantling)
16	German Association for the Protection of Forests and Woodlands	<ul style="list-style-type: none"> • There is no master plan for the project • The project includes unavoidable impacts on nature • The NBS / ABS is not necessary for public transport Attitude: --	In theory, they could prevent the construction of various sections. According to the planning approval process, the intervention in the environment may be as low as possible. Influence: 0	The project has an impact on nature. Deforestation and other interventions in the natural forest area connected to such a large infrastructure project. Impact: --	Construction, operation and dismantling
17	Nature Park Altmühltal e.V.	<ul style="list-style-type: none"> • There is no adequate buffer between the park and landfill site • Nature should be preserved even after completion. • Disposal sites should be sustainably restored Attitude: -	<ul style="list-style-type: none"> • The landfill will be replanted and restored after completion • There are safety devices installed to protect the nature reserve Influence: +	The impacts on the environment are kept to a minimum. In addition, structurally-used areas are restored. Impact: +	Construction, operation and dismantling
18	Fränkisches Überlandwerk AG (local electric company)	Neutral attitude to the project because all objections are considered by the project planners. Attitude: 0	The project developer must ensure that electricity pylons are shifted, and the underground cables are buried Influence: +		construction

MEGAPROJECT Ext. Stakeholder Attitude Analysis (s. Charts 17-24)

Number	Attitude to project	Influence on project	Impact on project
1	+	+	+
2	++	++	--
3	++	+	++
4	--	+	--
5	++	++	
6	+	++	
7	-	+	0
8	-	+	+
9	-	+	+
10	--	++	--
11	--	++	-
12	0	++	+
13	--	0	--
14	--	+	0
15	--	+	0
16	--	0	--
17	-	+	+
18	0	+	

MEGAPROJECT Project Management

Project Organisation

Client Project Team Size & Structure ¹	<ul style="list-style-type: none"> • Lean project organisation at the beginning. Basic idea was an adequate project controlling with few relevance of monitoring to the contractors. (Contractors had to assure the compliance of dates, costs and qualities with their own site supervision) • In the beginning of 2001 the project organisation was changed. (Result of a diversity in the interpretation of the contracts; from one project manager for the whole project, to six different project managers and two co-ordinators for each construction lot) • One General Project Manager for the whole project and six project managers for each construction lot. • Interfaces between principal and constructor <p>An overview over the project organisation is on page 40 and 41</p>
Contractor Project Team Size and Structure ¹	
Sub-Contractor Project Team Involvement ¹	

Project Tools and Techniques

Please ✓ if present, x if absent, leave blank if unknown

Life-Cycle Costing Approaches ✓¹⁹

Project Management Software ✓¹¹

Lessons Learnt Transfers ✓¹⁹

Stakeholder Involvement ✓

Relationship Management Tools

Team Building Tools

Building Information Modelling (BIM)

Project Knowledge Management Tools ✓

Competency framework ✓¹

Computer supported technical risk management (TRiM) developed by the DB PB (*See Risk Management Processes*)

Lesson Learnt Transfer:

Iterative implementation of changes in technical specifications during the construction process. The DB PB implemented changes in the project relating to experiences from other projects. As an example the DB PB had to improve the safety standards in a tunnel during the construction work.

Project Processes

Risk Management Processes ¹	<p>Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/></p> <p>From the start of the project risk management was not a part of the management processes. In the year 2002 the systematic and anticipative risk management strategy was implemented. That is one fact about the bad cost performance in this project. An implemented risk management at the beginning of the planning could prevent more costs in the construction work, or shows a realistic cost plan for the future.</p> <p><u>Risk management within the DB ProjektBau:</u> To cope the risks of costs, dates and changing technologies, DB PB developed a computer supported technical risk management (TRiM). This system does not only serve to document and manage risks during a project, but also helps to evaluate the risk potential of a project ex ante by carrying out a risk potential assessment.</p> <ul style="list-style-type: none"> • Finding single risks in every Group (planning, legal procedures, financing / costs, tendering) • Evaluate the Risk potential of the project by carrying out a risk potential assessment • Quantification of single risks • Document and manage risks during the project • Determined opportunities and threats were rated monetarily in terms of best / worst / realistic case scenarios and the probability of occurrence was calculated • No 'tunnel vision' of experts through the interdisciplinary teams • The origin of project costs became transparent and a global discussion about project costs can now be avoided with detailed discussion about single issues
HR Management Processes	No Information <input checked="" type="checkbox"/>
Procurement Management Processes	<p>Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/></p> <ul style="list-style-type: none"> • public tendering • The DB PB didn't tender individual contracts with single companies • 6 Main contracts for each section (north, middle, south)
Integration Management Processes	<p>Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/></p> <p>- Main coordination from the DB PB in all cases</p>
Scope Management Processes	<p>Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/></p> <ul style="list-style-type: none"> •The basis for further planning is the concept of the Federal Transport Infrastructure Plan (BVWP) •Periodic meetings with project owner (DB AG) and legal authorities (EBA) discussing project changes and their handling

Time Management Processes ¹⁹	Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/> - Frame schedule with defined milestones
Cost Management Processes ⁴	Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/> • See Statement of Risk Management Processes
Quality management Processes	No Information <input checked="" type="checkbox"/>
Communications Management Processes	Present <input checked="" type="checkbox"/> Not Present <input type="checkbox"/> No Information <input type="checkbox"/> Communication Process with a project software which was programmed for the project NBS / ABS Nuremberg-Ingolstadt (EPLASS) ¹¹

MEGAPROJECT Project Performance

Aspects of Performance Concerned with Doing the Project Right

	Original Targets and changes to targets	Actual Achievements Against Targets
Performance relating to time ^{1, 19}	After the financing agreement between the Federal ministry of transport and DB AG the scheduled commissioning date was in the year 2003	The entry into service of the NBS Nuremberg-Ingolstadt was set for 28 May 2006, to coincide with the start of the 2006 FIFA World Cup in Germany: <ul style="list-style-type: none"> •Commissioning of the NBS on the 28. May 2006 • Commissioning of the ABS on the 10. December 2006
Performance relating to cost (NBS and ABS) <i>Note: A statement about the bad cost performance can be found at page 42& 43</i>	Cost estimation: ¹⁰ <ul style="list-style-type: none"> • 1985: 2.400 Mio. DM • 1989: 3.100 Mio. DM • 2002: 3.600 Mio. € • Cost for each kilometre of track (1996): 8 Mio € 	Total costs: 3.573 Mio. € Financiers: <ul style="list-style-type: none"> • FRG: 2.049 Mio. € (BSchwAG) • Communes: 180 Mio. € (GVFG / EKrG) • EU: 190 Mio. € (TEN) • DB AG: 1.154 Mio € (equity capital) • Cost for each kilometre of track: 13,8 Mio € <p>(The total cost can be roughly broken down in 1/3 for the ABS and 2/3 for the NBS, thus the cost of the NBS are estimated at 2,300 Mio. €.)</p>
Performance related to achieving specification ^{1 & 8} (NBS/ABS)	<ul style="list-style-type: none"> •Total length: 171 km •9 Tunnels; 82 Bridges; 3 Stations •Double Track •Maximum Speed: NBS: 300kph, ABS: 160-200kph 	<ul style="list-style-type: none"> • Total length: 171 km •9 Tunnels; 82 Bridges; 3 Stations •Double Track •Maximum Speed: NBS: 300kph ABS: 160-200kph

Aspects of Performance Concerned with Doing the Right Project

Stakeholder or Stakeholder Grouping	Original Aims of Project Involvement and Changes to these Aims	Achievement of these Aims
Local residents (neighbours)	They want a track without any noise exposure	The DB AG had to build noise protection Relating to the 16 BImSchV and the BImSchG
'Bund Naturschutz in Bayern e.V.'	The 'Bund Naturschutz in Bayern e.V.' want to prevent the NBS / ABS Nuremberg-Ingolstadt, because they thought that the track is one of highest nature destructive, most expensive and questionable transport political project in Germany" ⁹	They take legal action but this legal action was rejected by the court and the NBS / ABS was built
IHK of Augsburg and Swabia and the City of Augsburg	The region of Augsburg and Swabia want to prevent the route from Nuremberg to Ingolstadt because they considered a decrease in the economic strength of the region. So they wanted a route over Augsburg instead Ingolstadt	They didn't prevent the NBS / ABS between Nuremberg and Ingolstadt and the region didn't gain the variant Nuremberg-Munich over Augsburg
Nature Park Altmühltal e.V.	Restoration of landfill space and protection of the natural park	Protective measures may be established and the landfill areas are restored easily
German Association for the Protection of Forests and Woodlands	Protection of nature should in particular to prevent forest areas of the NBS / ABS.	The track will be built as planned and the planned measures for the laying of the tracks are completed
European Union	A fast, cross-border intra-European rail networks linking.	With the construction of the NBS / ABS the Federal Republic take a part of a fast European railway network

MEGAPROJECT Project Environment

Legal and Regulatory Environment

<p>Legal and Regulatory Project Environment (regionally, nationally and Europe wide) 16</p>	<p>Laws:</p> <ul style="list-style-type: none"> - Law concerning the Federal Railways - Waste Act - Water Management Act - Federal Control of Pollution Act - Federal Nature Conservation Act - Act on the Federal Administration of Railway Traffic - Federal Railway Infrastructure Upgrading Act - Act about level crossings (railway – road) <p>EBC: EG-Validation from the EBC to confirm the interoperability standard (EIV / TSI)</p> <p>General Railway Act: The law gives the guarantee of a save operating railway and an attractive traffic offer on the rail. Furthermore the law cares about an undistorted competition on the track especially at the train transport service and the operation of the railroad infrastructure. In addition to the laws in Germany, the General Railway Act serves the realization of legal acts in the European Community considering to the railway law.</p>
<p>Specific Legal and Regulatory events impacting on the project</p>	<p>Plan approval procedure: (See schemata below; Page 44)</p> <p>Regional planning procedure: To validate the concrete plan with the Aims and principles of the regional planning. Which is horizontal oriented and integrates with economic, ecologic, social and cultural aspect. It's the purpose that the main investor has a high planning security</p> <p>Environmental impact assessment: Systematic examination procedure in advance to proof the immediate und indirect effects from projects to the environment. To give a particular feedback for the legitimacy of the Purpose. The environmental impact assessment has no material legal effect . That means, a negative environmental impact assessment can not prevent the project</p>

MEGAPROJECT Project Environment

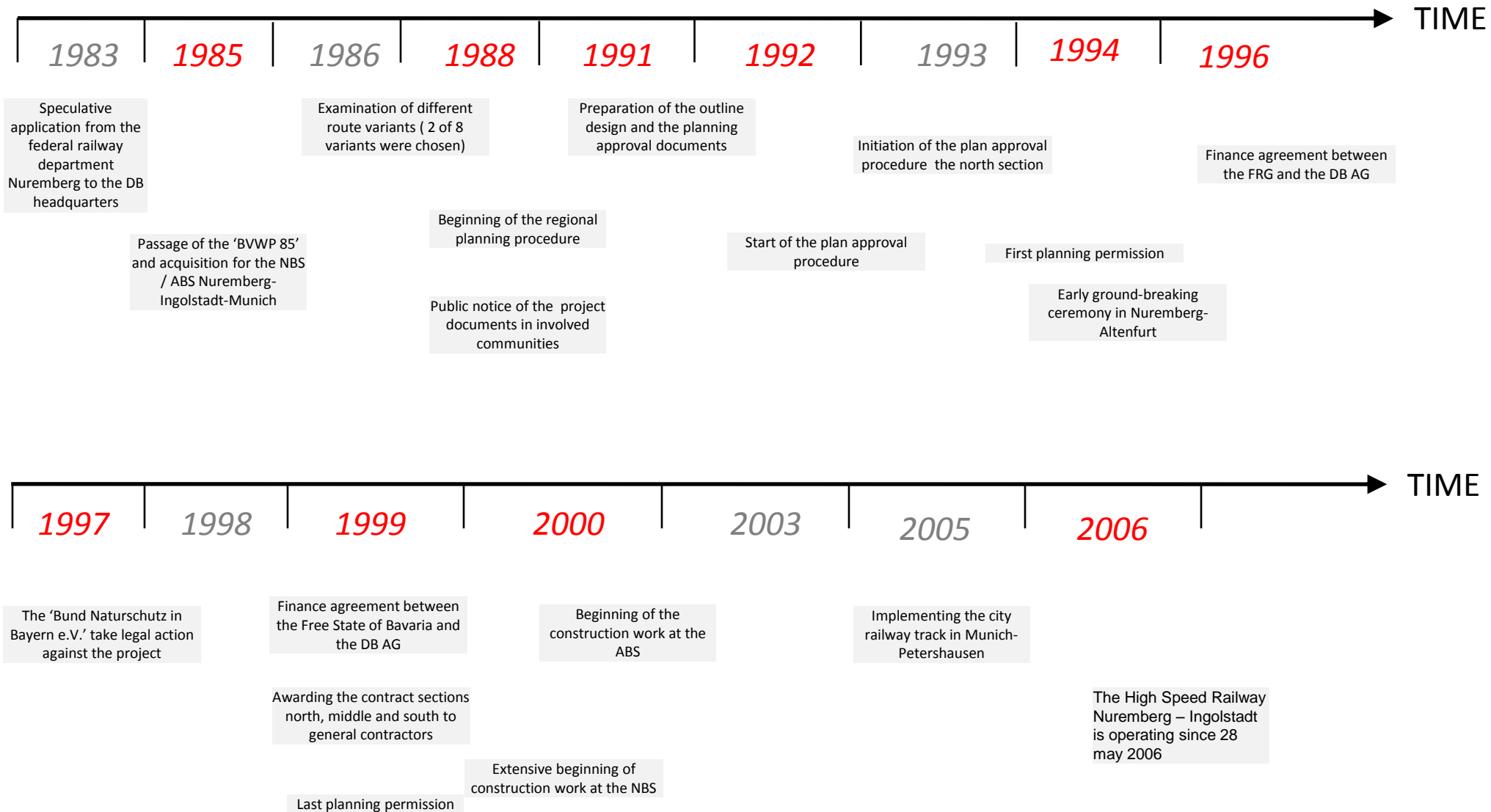
Political Environment

Political Project Environment ¹⁰	<p>The Federal Republic of Germany had the aim to construct a fast connection between Nuremberg and Munich. In addition to it the train path is one part of the North-South Connection in the FRG. The train path is particularly an extension of the transportation project “Deutsche Einheit Nr.8” from Berlin across Halle/Leipzig and Erfurt to Nuremberg.</p> <p>On the European side the train path is a part of the first axis from Berlin across Verona to Palermo. This axis is a part of the Trans-European Network (TEN)</p> <p>Regional project environment: Regional council of Upper Bavaria with the sections 2,3 and 5 (See schemata; Page 38)</p>
Specific Political Events impacting on the project	<ul style="list-style-type: none"> - FIFA Football World Cup 2006 as a target - The reunification of Germany in 1990

Economic Environment

Economic Project Environment ²	<p>Competition of street, air and rail traffic: DB AG tried to get the rail network more attractive than the other means of traffic. They wanted to connect built-up areas with a distance from 100km up to 500km.</p>
Specific Economic Events impacting on the project	<ul style="list-style-type: none"> - The reunification of Germany in 1990

MEGAPROJECT Project Key Events and Activities Timeline



Sources

- **1-** *Spang, Schalcher, Wadenpohl*: Case Study Report Nuremberg - Ingolstadt : NETLIPSE Knowledge Team Alps.
- **2-** *Weigelt, Horst; Honerkamp, Bernd*: Schnellbahnachse Nürnberg-Ingolstadt-München: neue Infrastruktur mit Spitzentechnologie; in Zusammenarbeit mit DB projektBau GmbH; Eurailpress; Hamburg 2006.
- **3-** *Weigelt, Horst* : Projektgeschichte der Schnellbahnachse Nürnberg-Ingolstadt-München in Zeitraffer; in: Weigelt, H.;Honerkamp, B. (2006); pp.14-26.
- **4-** *Nussberger, Peter; Menius, Reinhard; Königs, Heinz-Dietrich*: Planung NBS/ABS Nürnber-Ingolstadt-München zwischen Raumordnung und Baubeginn; in: Weigelt, H.; Honerkamp, B. (2006);pp. 28-41.
- **5-** *Wagmann, Klaus*: Erfahrungen bei der Planfeststellung der NBS und ABS Nürnberg-Ingolstadt-München; in: Weigelt, H.; Honerkamp, B. (2006); pp. 50-55.
- **6-** *Schäfer, Peter; Sonntag, Martin*: Die besondere Finanzierung für ein besonderes Vorhaben; in: Weigelt, H.; Honerkamp, B. (2006); pp. 56-60.
- **7-** *Feldwisch, Wolfgang; Ritzert, Jörg*: Am Ziel: Mit hochgeschwindigkeit von Nürnberg nach München; in: Weigelt, H.; Honerkamp, B. (2006); pp. 208-215.
- **8-** *Spang*: NETLIPSE: Handout / Presentation
- **9-** Press release BUND: (<http://www.bund-naturschutz.de/presse/pressemitteilungen/detail/artikel/314/pm/e8d37a59ea.html>)
- **10-** http://de.wikipedia.org/wiki/Schnellfahrstrecke_N%C3%BCrnberg%E2%80%93Ingolstadt%E2%80%93M%C3%BCnchen
- **11-** <http://www.seib-itc.de/fileadmin/dam/Referenzen/Refer-4s-de-11-11-Mail.pdf> **and** <http://www.seib-itc.de/produkte.html>
- **12-** *Köprülü, Rüksam*: Bauaufsicht und Inbetriebnahmegenehmigung der NBS Nürnberg-Ingolstadt durch das EBA; in: Weigelt, H.; Honerkamp, B. (2006) pp. 196-201
- **13-** *Nadler*: Archäologische Begleitung von Trassen – Gewinne für Landes- und Landschaftsgeschichte; in: Weigelt, H.: Honerkamp B. (2006); pp. 174-181
- **14-** *Müller*: Die Planung der Ausbaustrecke Ingolstadt München; in Weigelt, H.:Honerkamp B. (2006); (pp. 42-49)
- **15-** *Koch*: Umweltschutz, Integraler Bestandteil bei Planung, Errichtung und Instandhaltung von Bahnanlagen; in: Edition ETR; ETR-Eisenbahntechnische Rundschau, B.(1993)
- **16-** http://www.gesetze-im-internet.de/aeg_1994/
- **17** Planning permission for the High Speed Railway Nuremberg-Ingolstadt (tunnel Denkendorf)

Sources

- 18- *Seiler*: Fertigstellung und Inbetriebnahme der Neubaustrecke Nürnberg-Ingolstadt; in: Weigelt, H.; Honerkamp, B. (2006); pp. 202-207
- 19- Interview with Heinz-Dietrich Könnings; Projectmanager of the project Nuremberg-Ingolstadt from 1996-2001
- 20- Interview with Wolfgang Löns; Project director of the NBS Nuremberg-Ingolstadt; Berlin, 26.11.2012
- 21- http://de.wikipedia.org/wiki/Bahnreform_%28Deutschland%29
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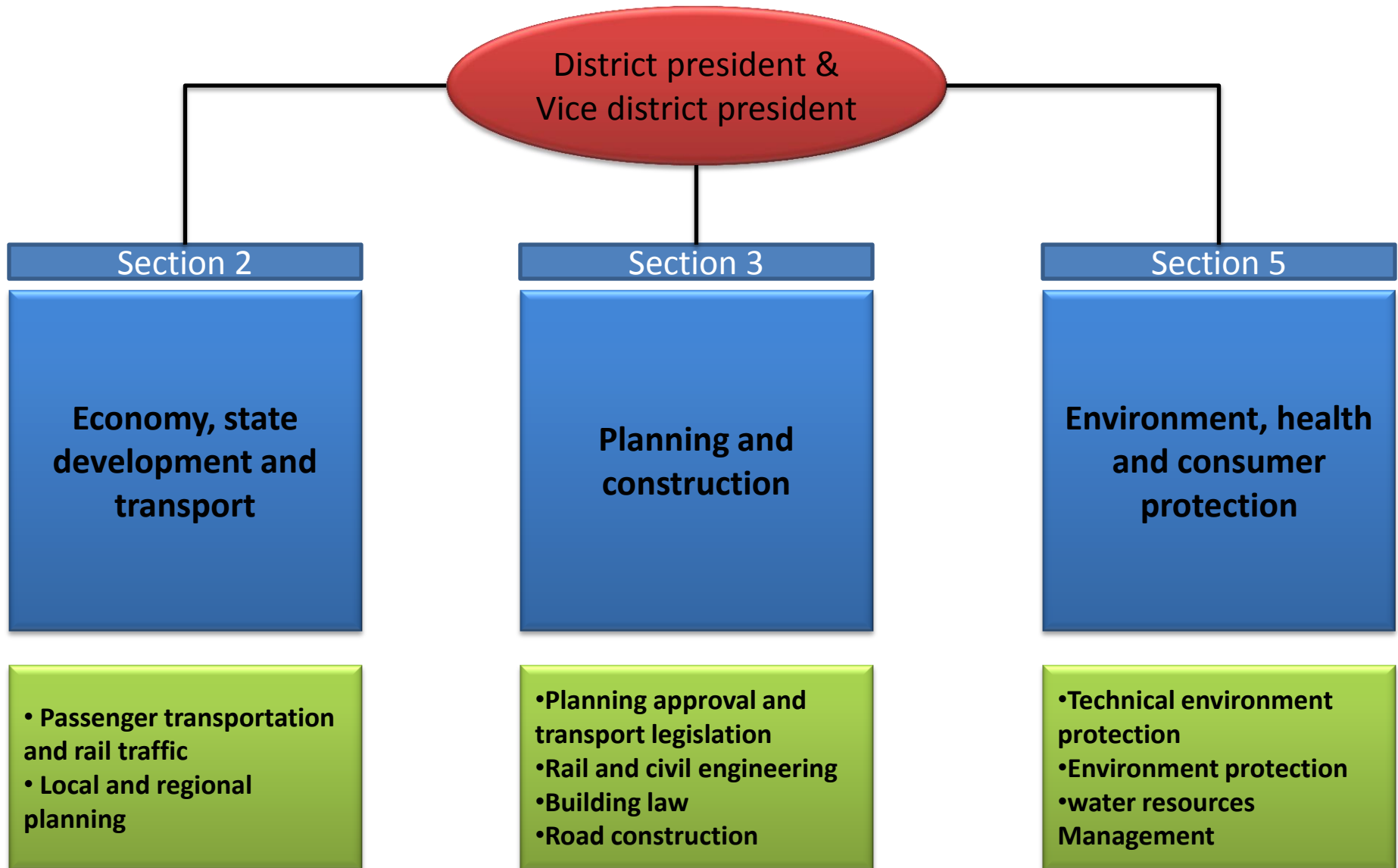
Glossary

ABS	Expansion Track / Ausbaustrecke * Explanation: Built up an old track, for example to get higher speed or better connection.
AbfG	Waste Act / Abfallgesetz
AEG	General Railway Act / Allgemeines Eisenbahngesetz
BbG	Law concerning the Federal Railways / Bundesbahngesetz
BEVVG	Act on the Federal Administration of Railway Traffic / Bundeseisenbahnverkehrsverwaltungsgesetz
BImSchG	Federal Control of Pollution Act / Bundesimmissionsschutzgesetz
BImSchV	German Federal Immission Protection Ordinance / Bundesimmissionsschutzverordnung
BLfD	State Office of monument protection / Bayerische Landesamt für Denkmalpflege
BMF	Federal Ministry of Finance / Bundesministerium der Finanzen
BMU	Federal Ministry of the Environment / Bundesministerium für Umwelt
BMVBS	Federal Ministry of Transport, Building and Urban Affairs / Bundesministerium für Verkehr, Bau und Stadtentwicklung
BN	Registered association for the preservation of nature in Bavaria / Bund Naturschutz in Bayern e.V.
BNatSchG	Federal Nature Conservation Act / Bundesnaturschutzgesetz
BSchwAG	Federal Railway Infrastructure Upgrading Act / Bundesschienenwegeausbaugesetz
BVWP	Federal Transport Infrastructure Plan / Bundesverkehrswegeplan
DB /DB AG	German Railways Ltd / Deutsche Bahn AG (from 1994) *Also see page 2 and page 11
DB PB	DB Project Development Co. Ltd / DB Projektbau GmbH * Explanation: project management organisation, planning and building inspection
DB Netze	Explanation: bundling of infrastructure expertise, professional and integrated infrastructure management
DB Energie	Explanation: energy supply for the DB AG
DB Station & Service	Explanation: Operation and maintenance for the rail stations and stops of the DB AG
DB Netz, RegioNetz	Explanation: regional traffic network management

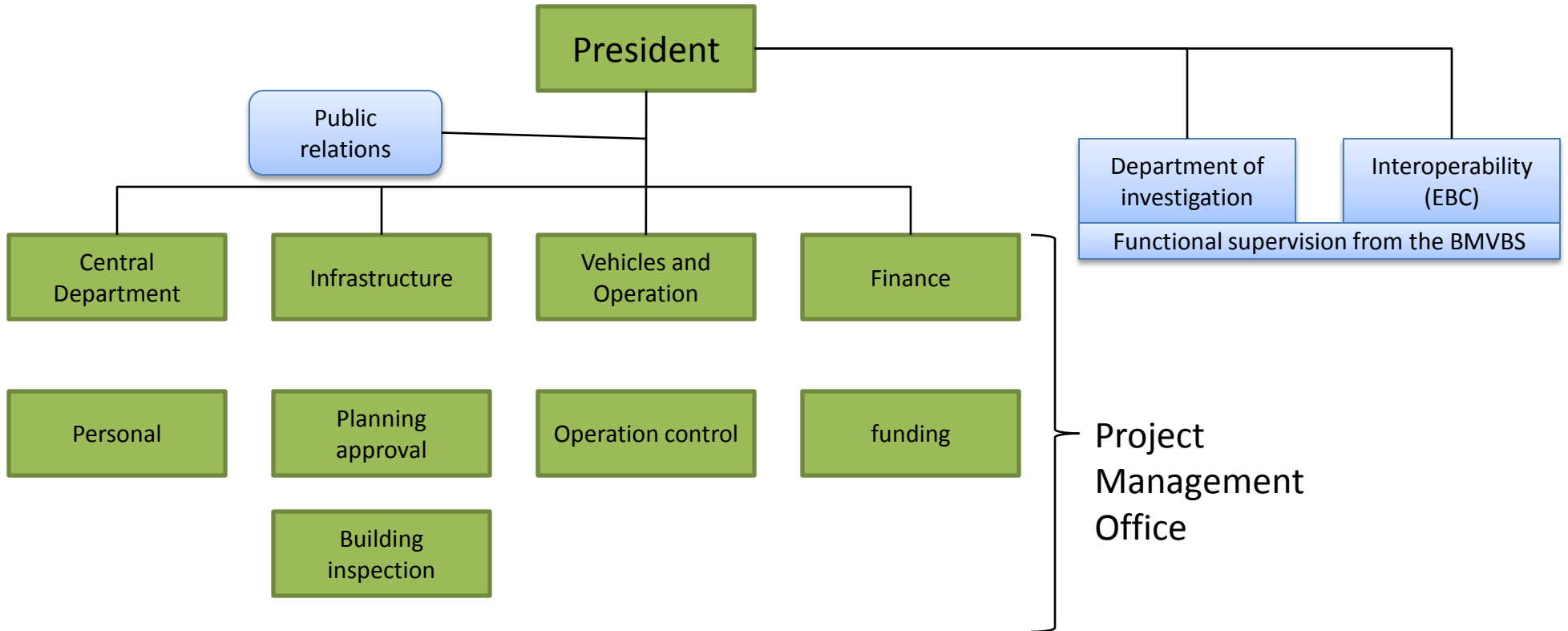
Glossary

Deutsche Einnheit Nr.8	This is a transportation project to connect the former GDR and the FRG
EBC	Certification of Rail Systems and Constitutions in Europe / Eisenabhn-CERT
EIV	Eisenbahn-Interoperabilitätsverordnung (EIV) /
EU	European Union / Europäische Union
e.V.	Incorporated society (association without financial interest) / Eingetragener Verein
EBA	Federal Railway Authority / Eisenbahnbundesamt
EKrg	Act about level crossings (railway – road) / Eisenbahnkreuzungsgesetz
FRG	Federal Republic of Germany / Bundesrepublik Deutschland (BRD)
GmbH	Limited corporation / Gesellschaft mit beschränkter Haftung
GVFG	Act about financing local traffic / Gemeindeverkehrsfinanzierungskonzept
IHK	Chamber of Industry and Commerce / Industrie- und Handelskammer
Kph	Kilometers per hour / Kilometer pro Stunde (km/h)
LIP	Large infrastructure project / Großes Infrastrukturprojekt
NABU	Nature and Biodiversity Conservation Union / Naturschutzbund Deutschland e.V.
NBS	Newly built rail link / Neubaustrecke *(New track)
PBDE	Planing association railway construction / Planungsgesellschaft Bahnbau Deutsche Einheit
TEN	Trans-European Networks
TÖB's	Public agency / Träger öffentlicher Belange *Stakeholder without defined tasks
TSI	Technical Specifications for Interoperability
UVP	Environmental impact assessment / Umweltverträglichkeitsprüfung
UVU	Environmental impact assessment / Umweltverträglichkeitsuntersuchung
WHG	Water Management Act / Wasserhaushaltsgesetz

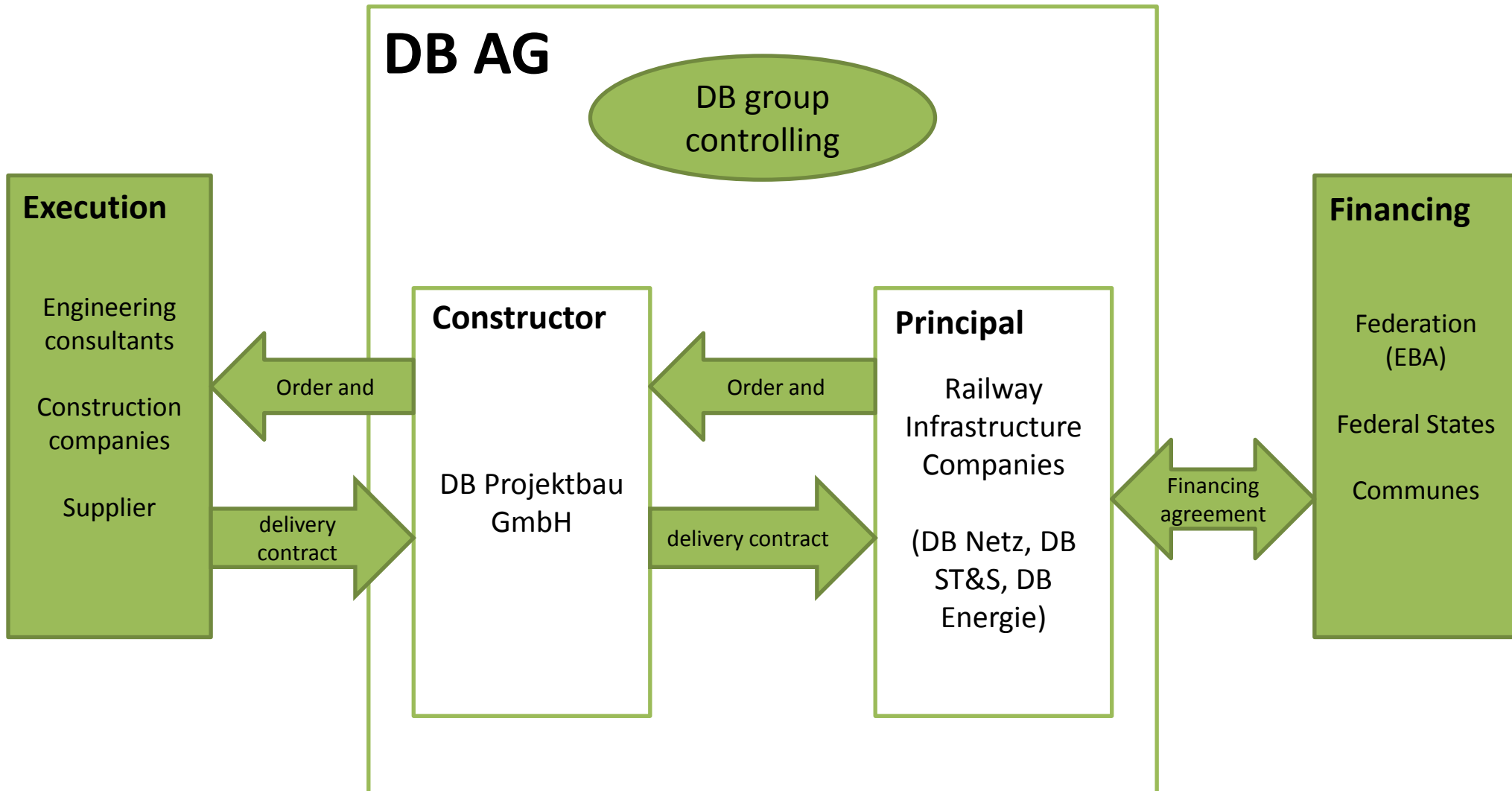
Structure of the regional council of Upper Bavaria



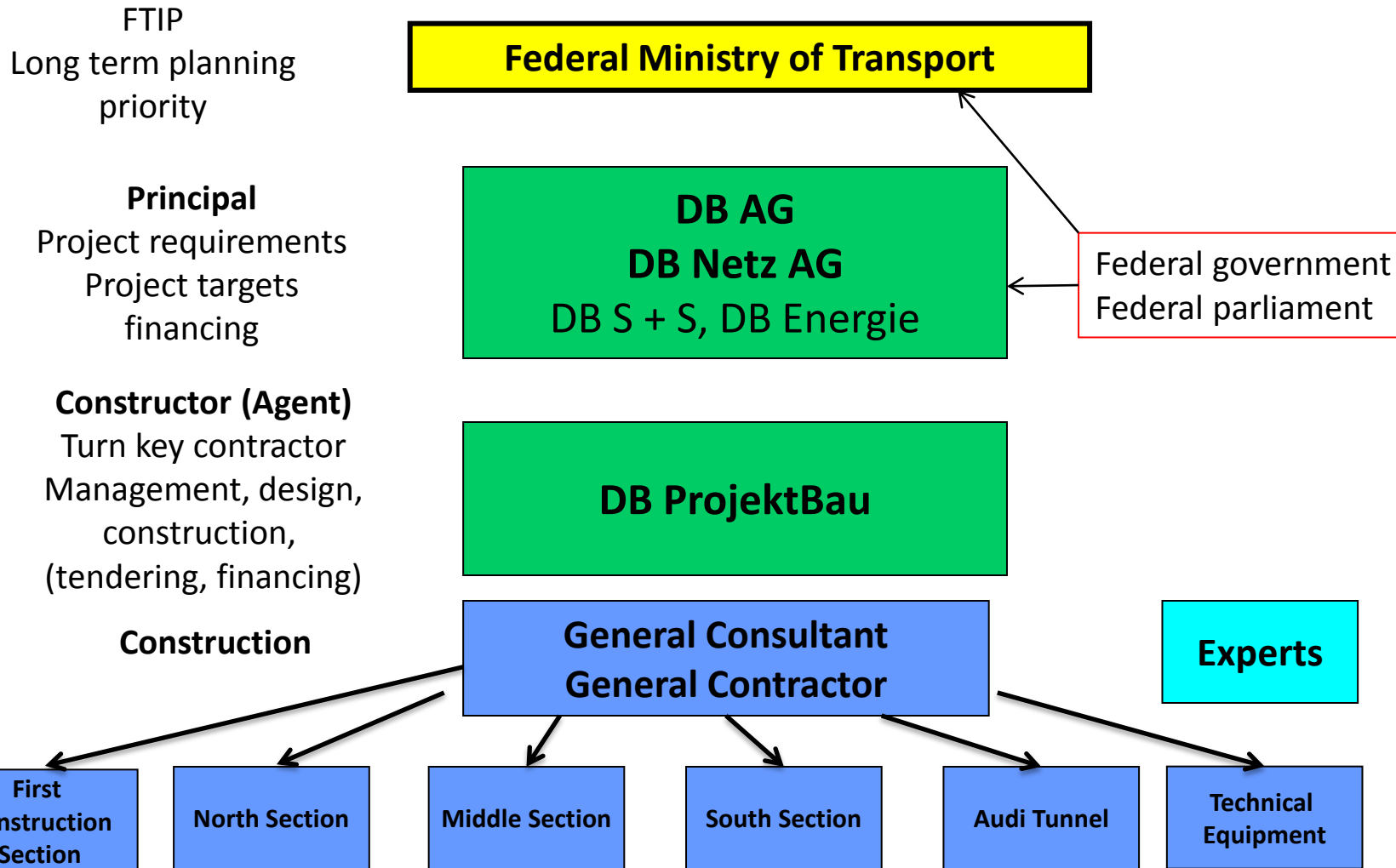
Organigram of the EBA



Contractual relationship of the project members ¹



Particularities: Organisation



Stakeholder
(Policy, authorities, citizens, NGO)

Companies are listed on page 5

Bad Cost Performance at the NBS/ABS

The exploding costs at the NBS / ABS Nuremberg-Ingolstadt-Munich are a result of some different aspects.

- The variety number of ecological interventions In the environment (e.g. Creating of new retention rooms)
- Geological risk (e.g. some different aspects during the tunnel construction, especially carst)
- Building ground problems
- Archaeological diggings to prevent the land history
- Noise protection measures to prevent the neighbors of the track from intolerable noises
- Increase of security regulations, especially in the tunnels
- Price increase from 1985 to 2002
- Political price?

At the point of the single finance agreement the building and planning cost are estimated with 2 billion euro. The cost increase about to 3,6 billion euro resulted in the following processes.

- Change from ballast to slab track **[0,06 Mio. €]**
- Unfavorable geology **[0,43 Mio. €]**
- Security restrictions **[0,06 Mio. €]**
- LST **[0,10 Mio. €]**
- Miscellaneous (planning costs, properties, etc.) **[0,38 Mio. €]**
- Extension of the building time (delay in construction), supplements, general price increase **[0,57 Mio. €]**

Bad Cost Performance at the NBS/ABS

Lessons learnt:

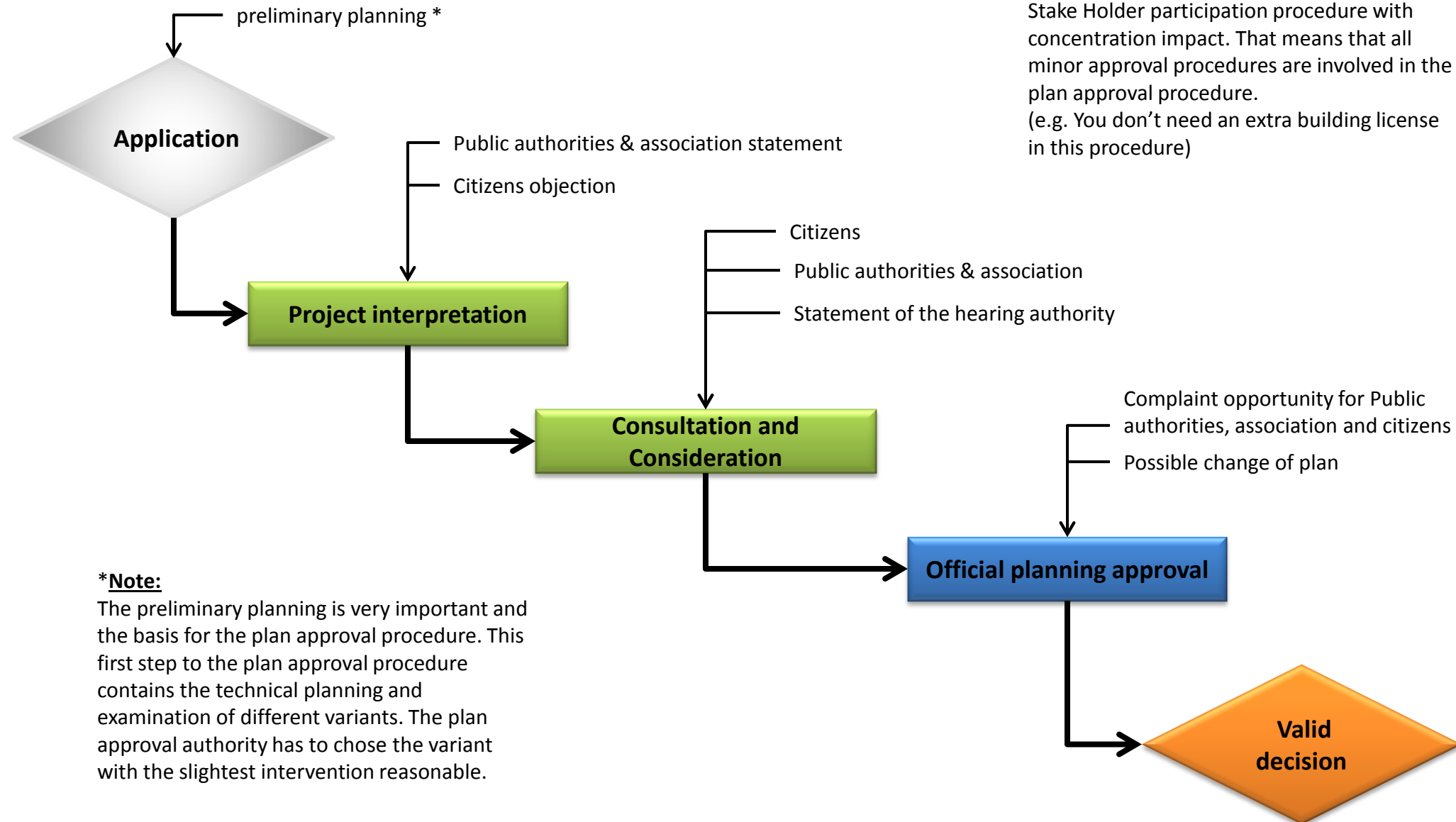
- Risk of geology cannot be shifted to the contractor and therefore the building ground has to be explored more in detail before the tendering
 - In tunnel engineering it is impossible to know the entire geology ex ante
- With the financial ceiling the DB AG did not covered additional costs caused by changes in rules and regulations
 - The DB AG was convinced that the costs could be kept within the calculated budget by making use of general contractors
 - Financing with a ceiling would need reserves to cover risks which cannot be shifted to the contractor
- The DB PB strongly demands a standardization of the reporting procedure to harmonize the reporting towards the different financing bodies
 - The financing bodies have to agree extra costs
- Current status of the planning should be mature before the approval procedures
- Reporting procedures between the different financing sources have to be harmonized
- Exact risk potential assessment has to be standardized in other large infrastructure projects
- Fixed prices clash with not well known circumstances
- The EBA strongly recommends an active process management on the constructor's side with the regard to planning approval procedures

Plan approval procedure

Note:

The Plan approval procedure is an extensive Stake Holder participation procedure with concentration impact. That means that all minor approval procedures are involved in the plan approval procedure.

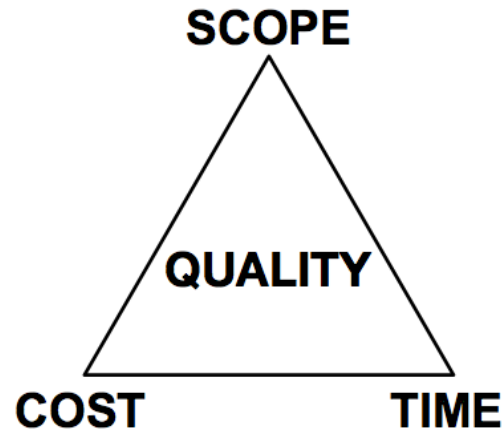
(e.g. You don't need an extra building license in this procedure)



*Note:

The preliminary planning is very important and the basis for the plan approval procedure. This first step to the plan approval procedure contains the technical planning and examination of different variants. The plan approval authority has to choose the variant with the slightest intervention reasonable.

Proposal: Indicator for a good project performance



The project success could not only be measured by physical numbers. Generally a project has a good performance when it is realized in scope, budget and time. At this point, we may ask “Was the project NBS/ABS Nuremberg-Ingolstadt-Munich a successful project?” Related to the budget, the DB AG as the client and the DB PB as an Agent could not fulfill the scheduled cost plan. The increasing of the cost from 1.200 Mio. € (1985) to 3.600 Mio. € (2002) is not a sign for a good project performance and a result of the processes from page 42.

A delay in construction because of geological problems and the change from ballast to slab track is another part to gain a bad performance during and at the end of the project. There are more different examples which extend the project length but these stated problems were the main factor to extend the time and didn't reach the targeted project aim previous as originally planned.

To summarize the project performance we could say that the required performances in terms of route length and speed has been provided. The line was completed in addition to the target date of 2006. However, the budget was blown up considerably.

So it's a matter of interpretation, how you see the project success in this case. The adherence of the planned costs and a theoretical earlier completion date would made the project even more successful and efficient.