New Solutions - Underground Logistics Syste

Use of Underground Space
Content.

Underground freight
Why important?

- Underground freight can help to **reduce congestion and distribution bottle necks** on the surface.
- It can help be part of a **sustainable transportation and infrastructure** development system.
- It **can help cities move their cargo**, shipments and deliveries without congesting our city streets with trucks, thereby avoiding polluting emissions.
- It can help **save costs for industries and companies** using an efficient and dedicated distribution system.

www.fhwa.dot.gov depiction of SUBTRANS, the proposed underground freight transport system.

Infrastructure projects
Experiences.

One of the main aspects why infrastructure projects fail is the missing integration of relevant stakeholders in the planning phase.

The integration of relevant stakeholders is key to a successful planning phase.

In 9 of 10 infrastructure projects costs are underestimated.

Our Planning Approach increases security and accuracy significantly.

In Germany 68 % of the population are sympathetic towards protests against big infrastructure projects after having passed the approval procedures.

New ways of Participation and new ways of Communication are needed – Important Aspects of Our Solution Finding.

Worldwide Cargo Transportation is estimated to increase by 56% until 2030 - compared to the figures from 2002

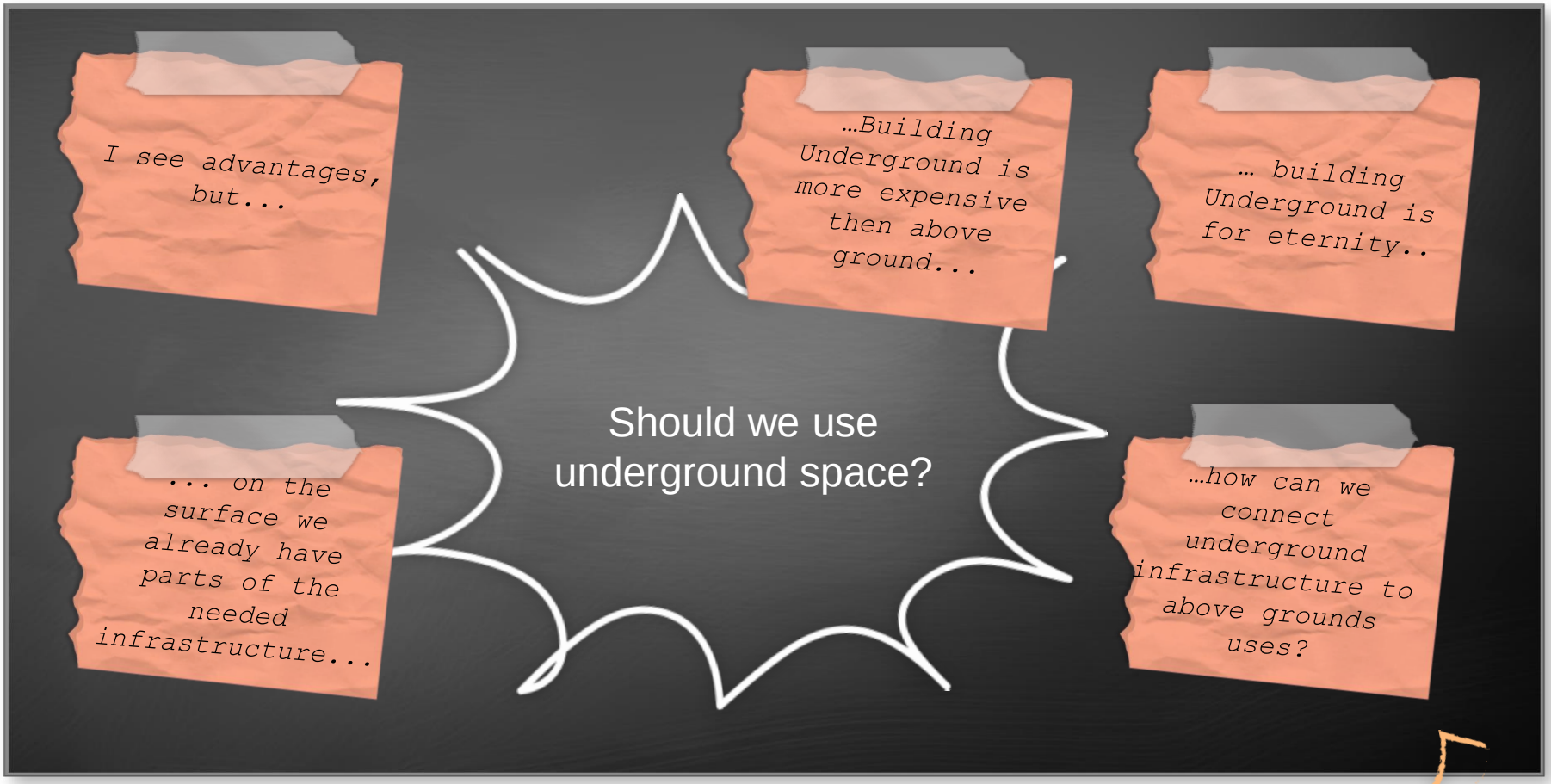
Just adding more roadway lanes does not help anymore – sustainable solutions are needed.

Failure of many infrastructure projects is due to insufficient system design.

Infrastructure projects must be scaled to profitable operations and must be planned based on market needs.

Infrastructure projects naturally have a huge complexity but it can get even more complex with underground projects.
Why is this the case and how can we manage the complexity?

Procedure
Common prejudices.



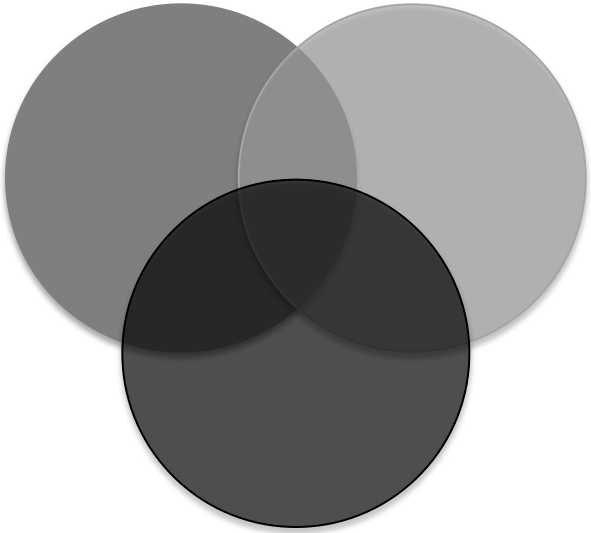
The question is how to get over these hurdles and how to manage the complexity?

Complexity in underground projects
Characteristics.

The complexity of infrastructure projects is mainly driven by two elements:

- The project itself
- The stakeholder environment (Investor – Public – Supply Chain)

Investors



Public / Goverrnment

Logistics/
Supply Chain

Stakeholder

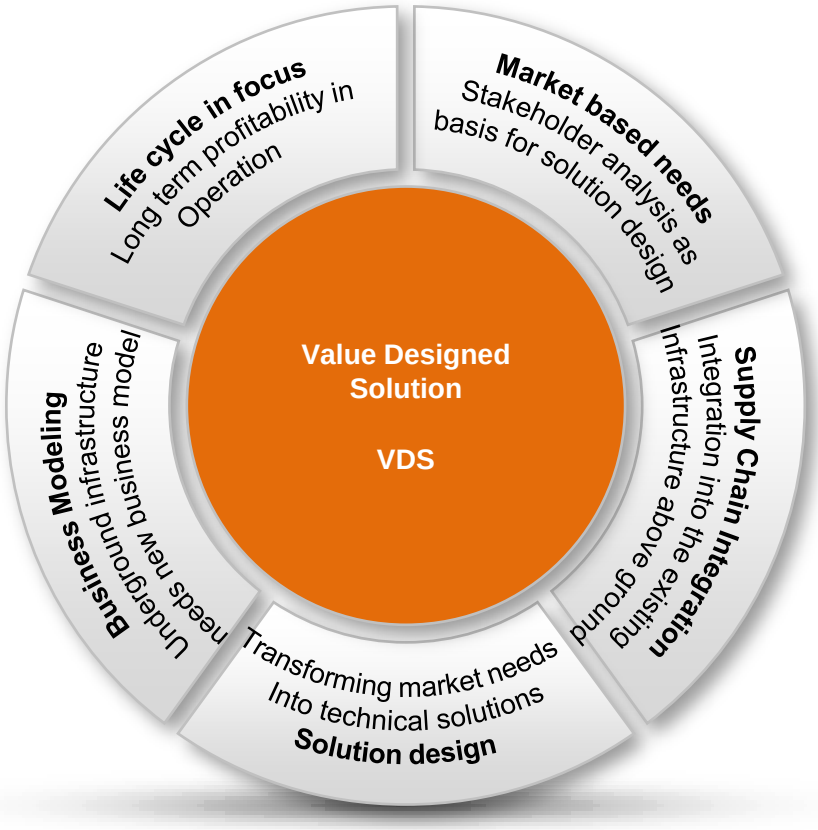
Existing Infrastructure

✓ With underground projects there is a third driver: the integration into the existing infrastructure network above ground.

Use of Underground Space
Content.

Value Designed Solution
How to manage the complexity.

Underground solutions need a **dedicated process to integrate the new infrastructure into the existing** infrastructure. Because of common reservations (for example: underground is more expensive than above ground) the infrastructure design PROCESS is a key element:



Benefits of Value Designed Solution (VDS):

- The system design **bases on market needs** and secures a seamless connection of the supply chain into existing infrastructure
- **The interdisciplinary approach results in maximum acceptance** within the involved people and profitability.
- The **business modeling element is key to overcome the higher initial invest** of the underground solution

Value Designed Solution
Market based analysis.

Challenges of underground solutions	Main Risks
▪ Aboveground there is already **existing infrastructure** and **it is easier to increase its efficiency** ▪ All **infrastructure is part of a network** and therefore the **main challenges are the connections**	▪ The economic operator always compares the opportunity costs of the underground infrastructure ▪ All underground infrastructure needs to be designed along the supply chain and network

What we provide

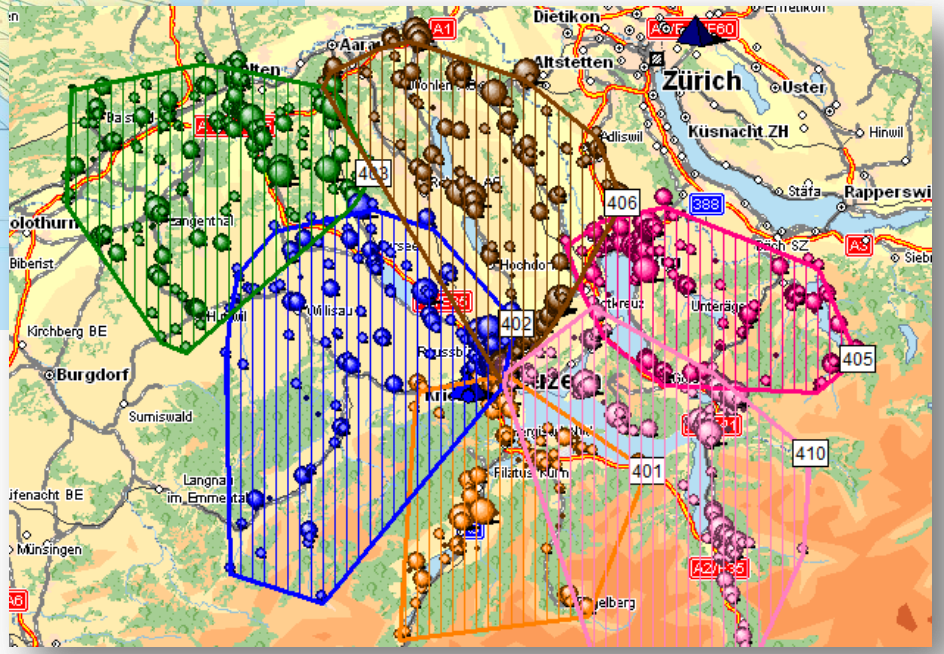
- Setting a proper base for the infrastructure design by **analyzing the the goods transportation flow**
- We rely on **real market data** (transport volumes for different industries) as much as possible
- We have **collected industry transportation data from all over the world**. Combined with real data **we are able to project the movements and the supply chains**
- The **relevant stakeholders** of the project can be identified and the information on their **requirements can be captured**

Benefits for the project

- The **analysis pictures** the relevant **stakeholders and geographical dimensions** of the **relevant flows**
- Out of the market map we are able **to identify area points with highest volumes**
- This makes us aware **of interactions in-between spots and areas**
- The **existing infrastructure is laid out** and we no the important connections need to be
- The relevant stakeholder groups are identified and can start analyzing the supply chain more in detail

Value Designed Solution
Market based analysis.

Different layers of the market analysis will deliver a clear understanding of the threats and opportunities of today's solution.



Value Designed Solution
Supply Chain integration.

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We manage complexity

Challenges of underground solutions	Main Risks
▪ **Underground infrastructure** is often **not connected to the infrastructure above ground** ▪ **Underground infrastructure** is very often **considered for the first tim**e and there are **no standard solutions** for connecting the above ground network	▪ **Underground infrastructures not fully integrated** are never profitable and it will remain “unique experiments” ▪ **No out of the shell solutions for connection concepts** are a high risk

What we provide

- **All performance aspects** (availability, operation times, buffering) will be part of the service and operations level requirements
- All relevant stakeholder groups and their **requirements will be integrated for further design solutions** , steps and interactions

Benefits for the project

- **Clear understanding of performance criteria** within the supply chain and the environment **compared to above infrastructure**
- **Identification of additional transport volume to make infrastructure more efficient** and therefore more attractive (because of the higher underground costs)
- **First ideas for further business potential** and therefore relevant aspects in solution design

Supply Chain Analysis
Transparency by Layering.

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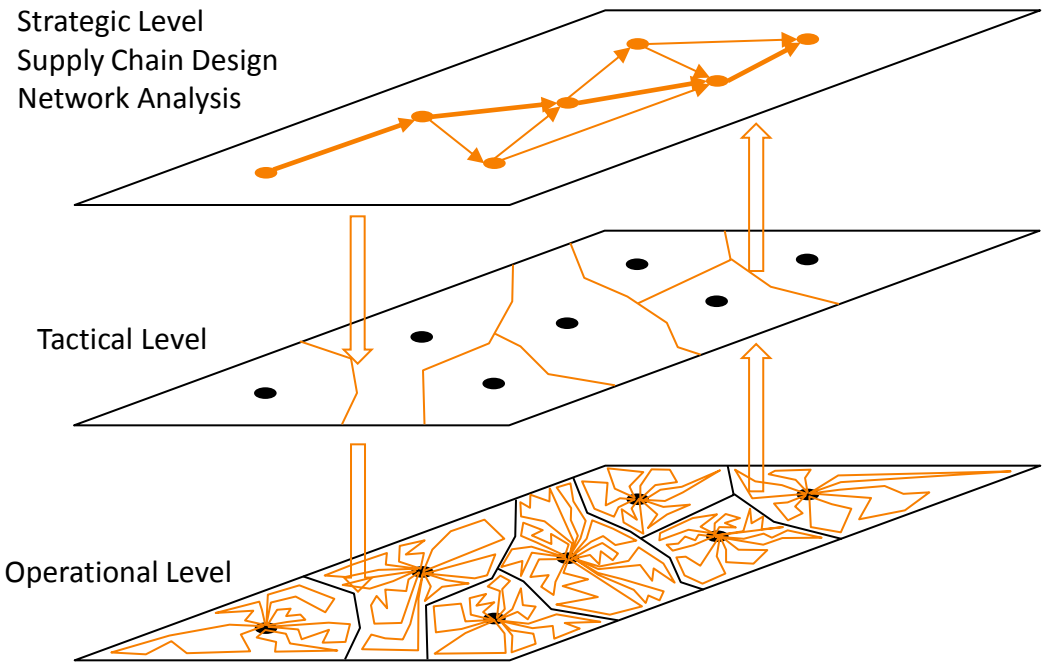
Visualization and Simulation

Trends and Technologies



Strategy

Processes

- Structured Check, Visualization and Simulation of the Supply Chain(s)
- Analysis of influencing Trends, Technologies and Scenarios
- Identification of Technologies and Automisation Improvement Potential
- Elaboration and Realisation of innovative Business Solutions

Working in Scenarios

Value Designed Solution
Solution design.

Challenges of underground solutions	Main Risks
▪ Underground space **has not become attractive enough due to lack of integration** in existing infrastructure networks ▪ **Project setup needs to be different** from traditional ones and this is key from the beginning (idea creation)	▪ Individual underground projects can be realized but not nationwide ▪ **Underground will not be fully accepted** and not be seen as equal to above ground infrastructure solutions

What we provide

- Derived from the results of phase 1 and 2 the **solution requirements will be translated into technical solutions**
- The **system will be configured along the construction kit** as far as possible. Wherever new solutions are required the **interdisciplinary approach leaves flexibility** for new innovative designs
- The overall solution design will be optimized for **profitability and acceptance** (implementation) within the existing environment

Benefits for the project

- A project design **which is strictly oriented on profitability and sustainability** and involves all relevant players at the right stage
- Innovative Design with **connection to existing infrastructure and networks**

Value Designed Solution
Solution design.

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We manage complexity

- ✓ Tailor-made technical solutions, fully integrated into existing infrastructure

Value Designed Solution
Business modeling.

Challenges of underground solutions	Main Risks
▪ **Underground solutions are often more expensive** than above ground ▪ Customer links underground solutions with inflexibility and eternity	▪ Underground projects are not considered attractive enough ▪ **Not enough projects are realized** that underground space is considered the norm?

What we provide

- Based on all analysis **business opportunities will be identified** in a structured way
- Along the future supply chain , **business opportunities are transformed into technical requirements** for the system design
- Business opportunities and the **detailed specifications will be evaluated on expense-income ratios**

Benefits for the project

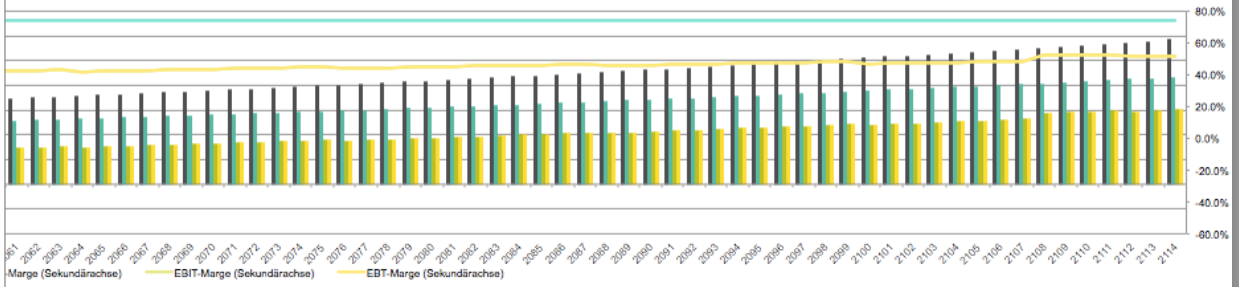
- Through the process new business can be identified – **Underground infrastructure needs different business models** because of **higher initial costs** in comparison with above ground solutions
- The result will be a **profitable and sustainable business case**
- **Investment concepts** for the dedicated case for further fundraising

Value Designed Solution
Business modeling.

The possibility to simulate different business ideas in one case allows you to find new business models. With this approach you will be able to find the most attractive case with sustainable profitability and operation.

Sachkosten	(49'253)	(50'163)	(51'090)	(52'035)	(52'999)	(53'981)	(54'981)	(56'001)	(57'041)	(58'101)
Personalkosten	(4'154)	(4'196)	(4'238)	(4'550)	(4'595)	(4'641)	(4'687)	(4'832)	(4'880)	(4'929)
EBITDA	**108'224**	**110'835**	**152'953**	**155'871**	**159'121**	**162'438**	**165'822**	**169'178**	**172'702**	**176'297**
Abschreibungen	(92'598)	(92'944)	(93'297)	(93'657)	(94'020)	(94'394)	(94'777)	(95'164)	(95'559)	(95'967)
EBIT	**15'626**	**17'890**	**59'655**	**62'214**	**65'100**	**68'044**	**71'045**	**74'014**	**77'143**	**80'330**
Finanzaufwand	(84'812)	(85'313)	(84'489)	(82'160)	(79'417)	(76'440)	(73'216)	(70'331)	(67'206)	(64'698)
Nicht operatives Ergebnis	-	-	-	-	-	-	-	-	-	-
EBT	**(69'186)**	**(67'423)**	**(24'834)**	**(19'946)**	**(14'317)**	**(8'396)**	**(2'171)**	**3'683**	**9'937**	**15'633**
Ertragssteuern	-	-	-	-	-	-	-	-	-	-
Reingewinn	**(69'186)**	**(67'423)**	**(24'834)**	**(19'946)**	**(14'317)**	**(8'396)**	**(2'171)**	**3'683**	**9'937**	**15'633**

Abbildung 2: Entwicklung Umsatz und Profitabilität



Normalisierte Erfolgsrechnung in % Nettoumsatz

Bruttoumsatz aus Kerngeschäft	102.9%	102.9%	103.0%	103.0%	103.0%	103.0%	103.0%	103.0%	103.0%	103.1%
Bruttoumsatz aus weiteren Geschäftsfeldern	0.7%	0.7%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Erlösminderungen	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%	-3.5%
Nettoumsatz	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Sachkosten	-30.5%	-30.4%	-24.5%	-24.5%	-24.5%	-24.4%	-24.4%	-24.3%	-24.3%	-24.3%
Personalkosten	-2.6%	-2.5%	-2.0%	-2.1%	-2.1%	-2.1%	-2.1%	-2.1%	-2.1%	-2.1%
EBITDA	**67.0%**	**67.1%**	**73.4%**	**73.4%**	**73.4%**	**73.5%**	**73.5%**	**73.6%**	**73.6%**	**73.7%**
Abschreibungen	-57.3%	-56.3%	-44.8%	-44.1%	-43.4%	-42.7%	-42.0%	-41.4%	-40.7%	-40.1%
EBIT	**9.7%**	**10.8%**	**28.6%**	**29.3%**	**30.0%**	**30.8%**	**31.5%**	**32.2%**	**32.9%**	**33.6%**
Finanzaufwand	-52.5%	-51.6%	-40.6%	-38.7%	-36.6%	-34.6%	-32.5%	-30.6%	-28.6%	-27.0%
Nicht operatives Ergebnis	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
EBT	**-42.8%**	**-40.8%**	**-11.9%**	**-9.4%**	**-6.6%**	**-3.8%**	**-1.0%**	**1.6%**	**4.2%**	**6.5%**
Ertragssteuern	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Reingewinn	**-42.8%**	**-40.8%**	**-11.9%**	**-9.4%**	**-6.6%**	**-3.8%**	**-1.0%**	**1.6%**	**4.2%**	**6.5%**

Value Designed Solution
Life cycle cost - sustainability.

Challenges of underground solutions	Main Risks
▪ Growing regions are often **focusing on the transportation of people but not of goods**– therefore important synergies are not being considered ▪ For underground projects very often only the investment is in focus – can be a shop-stopper	▪ In case no life cycle observation is done, projects will most likely not be economical ▪ Underground projects normally have a negative ecological balance because of negative impacts during the construction phase

What we provide

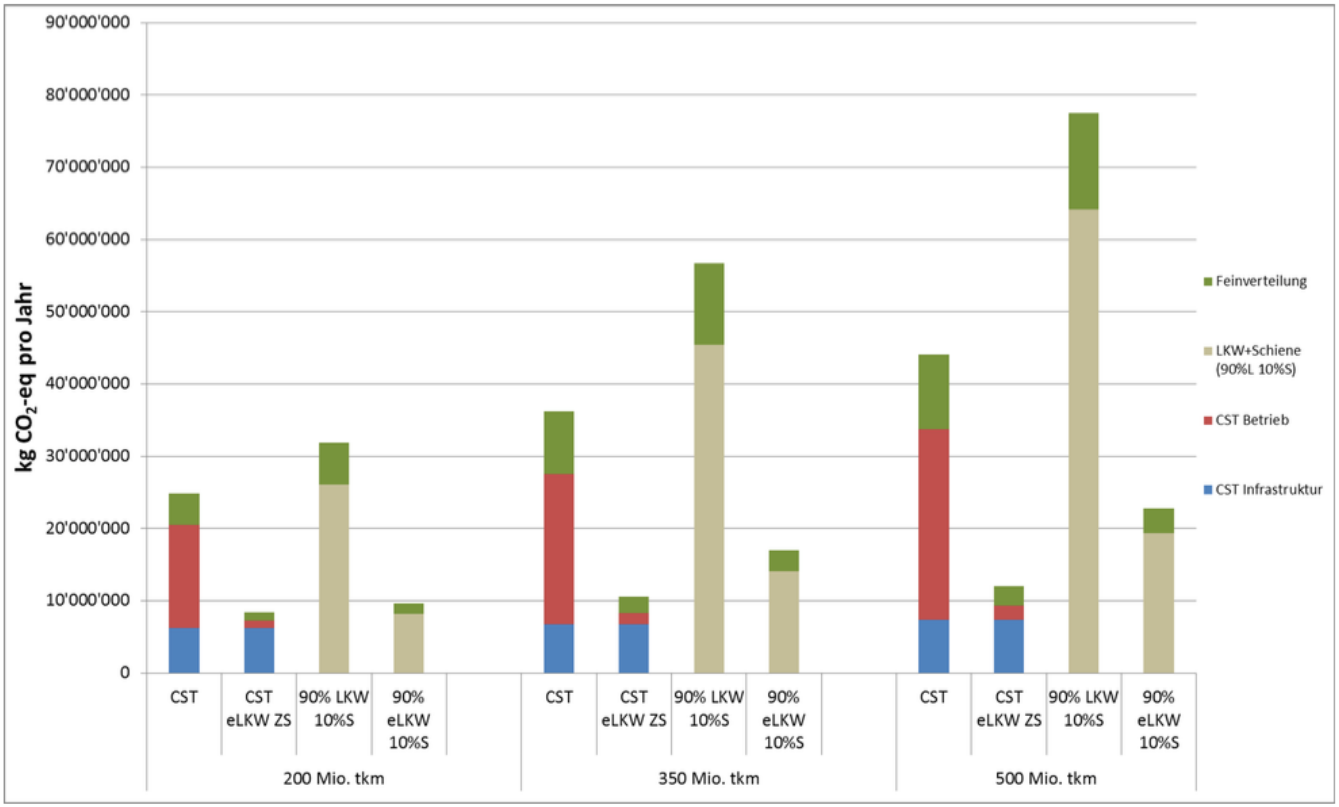
- Based on the previous phases a **proper outline of the ecological balance** is possible – all trigger points can identified
- The **system design will be** consequently **optimized on life cycle aspects**
- Through to the supply chain analysis also ecological aspects can be optimized for example through smart city solutions

Benefits for the project

- Clear understanding of **ecological drivers** and triggers for further business models
- **Optimized solution also from operational standpoints**, which increases attractiveness for all different kind of investors

Value Designed Solution
Life cycle cost - sustainability.

Sensitivity analysis will help you to find the most sustainable solution without compromising on profitability.



Value Designed Solution
Benefits at a glance.

Value Design Approach

- Clear understanding of the **market situation and processes (Supply Chain)**
- Knowledge of all **relevant drivers and relevant interfaces** in between underground and above ground infrastructure
- **Business levers are identified** and enable a **profitable business modeling process**
- The approach is an enabler for **integrated and sustainable** underground projects

Traditional Approaches

- Lack of clear understanding of processes
- **Isolated project view – no integration** into the infrastructure network or relevant processes
- Underground projects are often more expensive and **therefor not attractive enough** – No clear business model
- **No real breakthrough** nationwide for underground space

Use of Underground Space
Content.

Smart use of Underground Space
Cargo sous terrain – Switzerland.

Hubs:

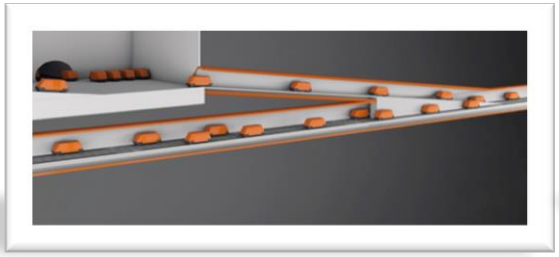
- **Underground Connection** of **logistics and shopping centers** in Switzerland.
- No additional consumption of land: **existing infrastructure will be used**.

Terminals:

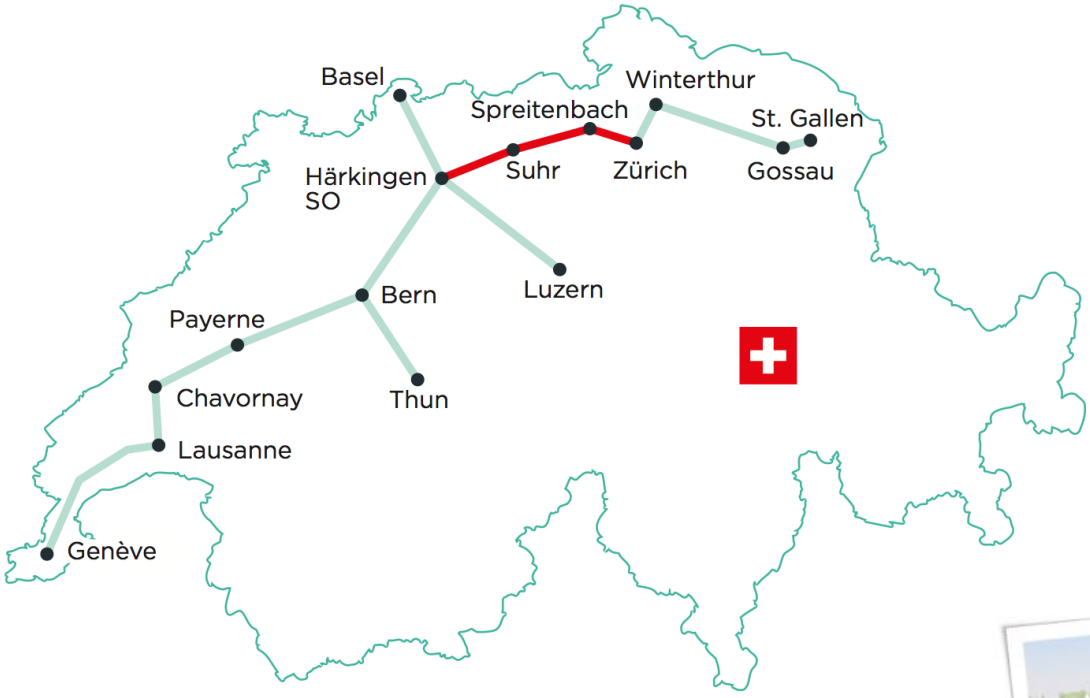
- Inside the tunneling **system fully automated, autonomous transport vehicles are operating on three lanes**.

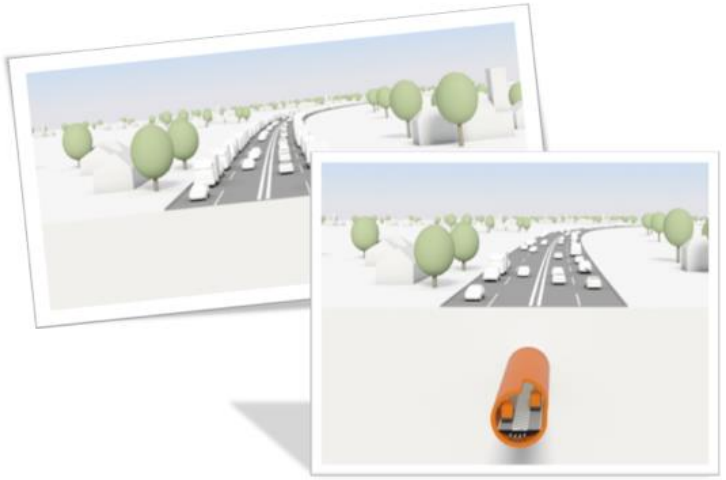
Vehicles:

- Goods are mainly transported in **fixed units: pallets or skeleton containers are transported with continuous speed around 30km/h.**



Smart use of Underground Space
Cargo sous terrain – Switzerland.





Smart use of Underground Space

Cargo sous terrain – Switzerland & Singapore.

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