Gas mains in multi utility ducts

Risk Management: a decision making tool

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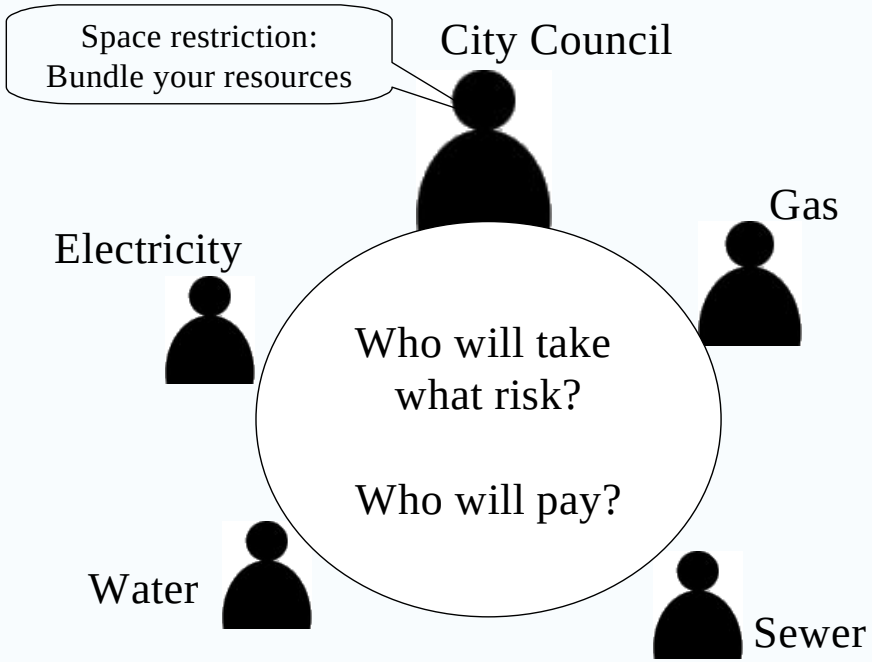
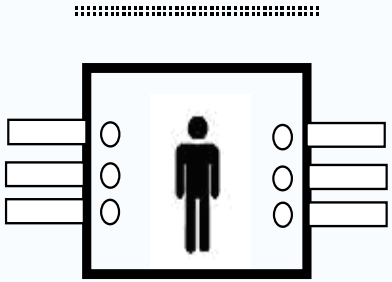
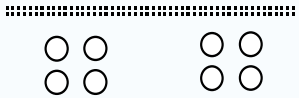
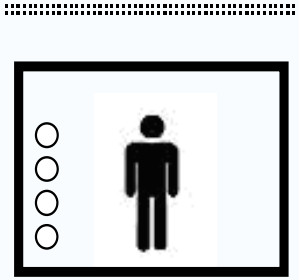
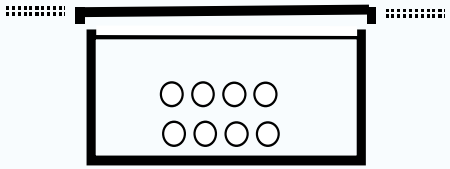
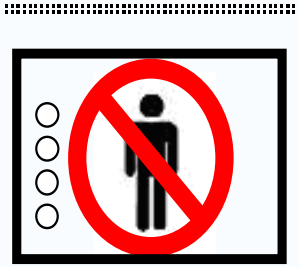
Scope

- Target: Create a decision support tool for deciding upon type and implementation of a multi utility duct.
- Broad acceptance due to participation: COB, TNO, KIWA, GASTEC, KEMA, NUON
- The Challenge:



Bundling types

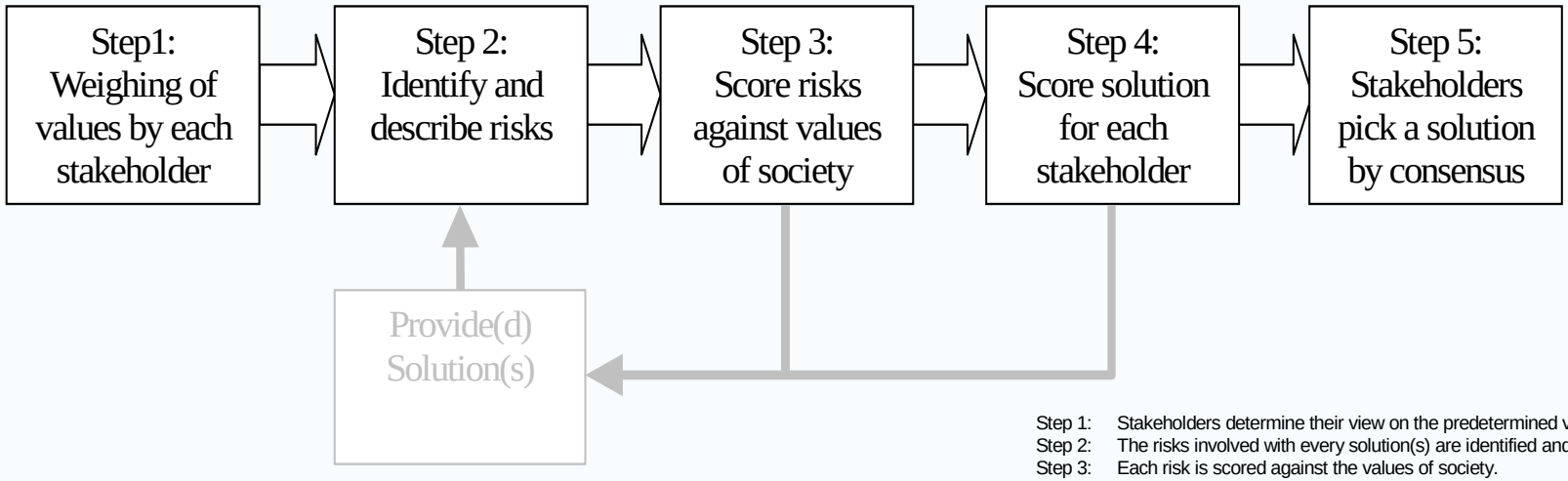
Cross section	Description	Cross section	Description
	Conventional underneath surfaces		Combination of small duct and accessible working area's
	Structured Conventional underneath surfaces, possible use of small ducts (1 duct contains 1 cable)		Accessible utility duct
	Cable and mains drain accessible from surface		Non accessible utility duct

Decision support tool

Important aspects:

- It's a negotiation
- Clarify stakeholder values to each other
- Risk quantification
- Decision(s) are made by the stakeholders

The simplified decision process



Step 1: Stakeholders determine their view on the predetermined values of society.
Step 2: The risks involved with every solution(s) are identified and described.
Step 3: Each risk is scored against the values of society.
Step 4: The risk profile of the solution(s) is provided for each stakeholder.
Step 5: Stakeholders determine which solution meet their combined whishes best

From risk to decision

Step 1: Weighing of values

- Each stakeholder distributes 100 points over the predefined values.

Table 2 Result of step 1: weighing of values by each

Stakeholde	Finance	Safety	Servic	…	Value n	Sum
Utility 1	20	10	50	…	12	100
Phone company	30	50	5	…	10	100
City council 1	20	50	10	…	9	100
…	…	…	…	…	…	100
Stakeholder	12	60	20	…	0	100

Step 2: Risk identification

- Each possible risk is identified
- Prefilled Baysian Network provides support

Step 3: Score impact of risks

- Score if applicable
- Risk = Impact x Probability

Event	Finance	Safety	Service	…	Value n
Blackout < 8 hours	20	0	50	…	1
Gas Explosion	50	1000	10	…	30
Flooding < 1 day	800	20	500	…	9
…	…	…	…	…	…
Event n	30	10	500	…	0

Step 4: Risk profile before/after solution

- Use weight from step 1 to score risk for each stakeholder

	Frequency	Finance	Safety	Service	…	Value n	Total
Event	**(per year)**	**w=20**	**w=10**	**w=50**	**w=…**	**w=12**	**Sum**
Blackout < 8 hours	0.05	20	0	125	…	0.6	146+
Gas Explosion	0.001	1	10	0.5	…	0.36	12+
Flooding < 1 day	0.005	80	1	125	…	0.54	207+
…	…	…	…	…	…	…	…
Event n	0.5	300	50	12500	…	0	12850+
Risk of solution		401+	61+	12750.5+		1.5+	**13214+**

- Compare $ investment with risk number. Acceptabel?

Step 5: Stakeholders decision upon solution

- Stakeholder know from each other how risks and solutions are perceived.
- They have been working together on a joint project for some time-> trust
- It is “their” working result. Joint responsibility -> commitment

Conclusion and further work

- This paper presents the basic idea behind the decision support tool, which will be used for deciding upon Multi utility ducts in the The Netherlands in the years to come.
- The strength of this particular model is that it makes risks transparent and clarifies why they are not perceived equally by the parties negotiating.

- The extensive version of the document, including a pre-programmed Baysian network for risk identification and quantification, will be available later this year.
- A seperate project is currently on its way on how to determine who will pay how much for the extra cost of a bundeling of cables/lines/pipes.