

Inclusive civil engineering curricula

Jean Berlamont

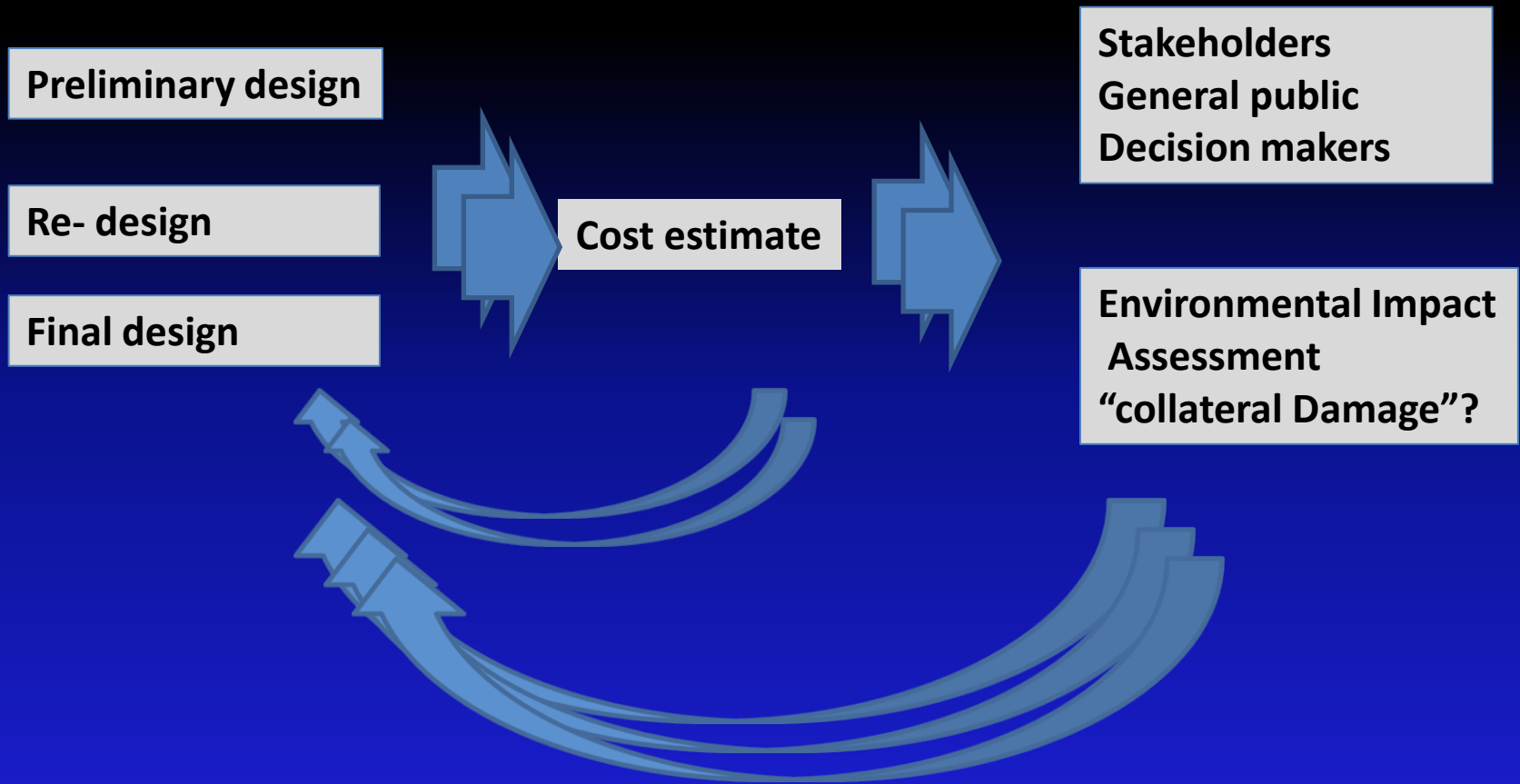
Society has changed

- Much more complex
- Everything is interconnected
- No preponderance of technology/ engineering
- general public is empowered: Participatory approach: (civil) engineering has a very high and visible impact on society
- Multi-dimensional

- Interest for the environment
- Maintain bio-diversity
- Effects of climate change
- Natural resources are limited
- Recycling/ life cycle analysis/ cradle to cradle design
- Energy consumption
- ...

(civil) Engineering has changed

- Multi – dimensional: from “calculator”, biased towards analysis, to designer
- (civil) engineering has a very high and visible impact on society: one cannot build anything, anywhere, anyhow
- Powerful tools have become available, reducing desk work, leaving space for other issues
 - Emergence of “EURO codes”
 - engineering software
 - Internet as information source and transmission tool



Engineering design is an interactive and iterative process

esthetics



welcome to

EUCEET, Pisa, 9.11.2012

Millenium wheel

Public acceptance



MECCANO tracé



Nature conservation

Groins to regulate the bed of the Danube

Austria y

Hungary n

Croatia ?

HLN, 03.07.2012



Natural habitat conservation



Belo Monte

Turbines

Reservoirs

Paquicamba
tribe's land

Adaptive (climate change) sea level rise



EUCEET, Pisa, 9-11-2012

Acqua Alta, Venice, 27.10.12



Ijburg, arch. Art Zaaijer



Autarkhome

Amphibious houses



Atos Origin and Advin



Olderhuske, Meuse, the Netherlands

“Collateral damage” at other places at other moments in time

Rhein river Tullal

Regulation of the Rhine river

"Along the Rhine, everything will change..." Colonel Tulla:

(1847):

"cutoffs" (- 14%)

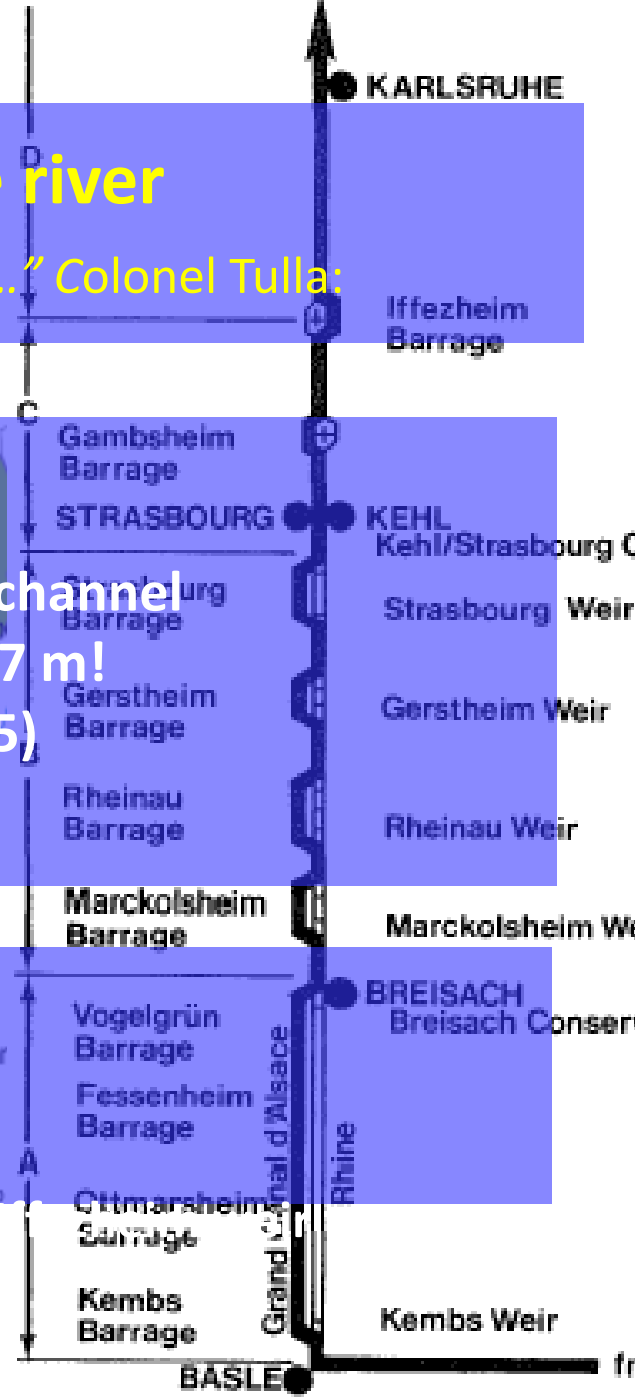
Endiking: single channel vs. multiple channel

Upstream: Lowering of groundwater 7 m!

Strasbourg no longer accessible (1865)

- "Grand Canal d'Alsace"
- Erosion downstream weir
- Further channelisation (1974, 1977, ...)

775 000 m³ / year gravel supply downstream

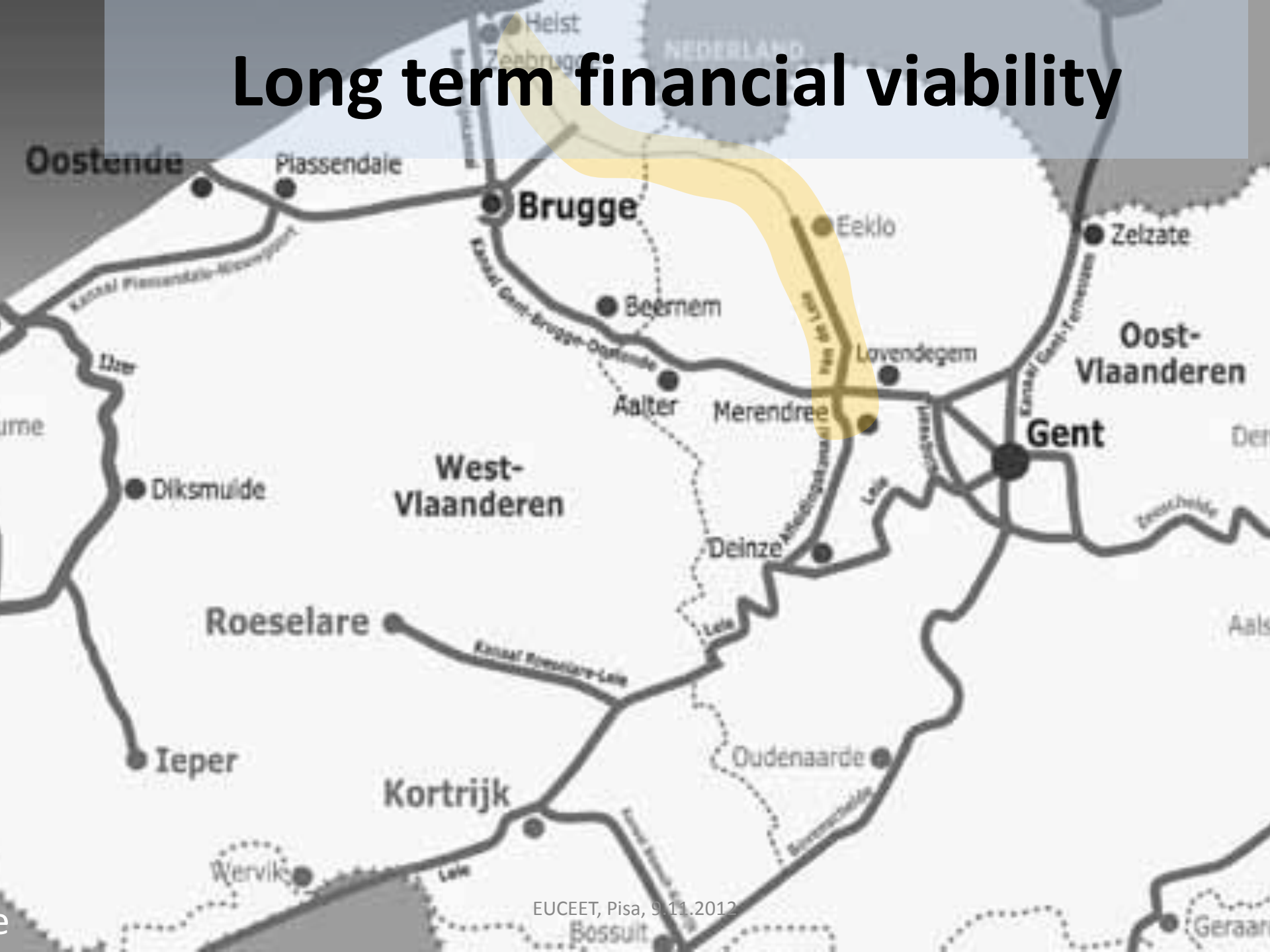


FRANCE

BADEN-WÜRTTEMBERG

Basel SWITZERLAND

Long term financial viability



(civil) Engineering curricula should
adapt to changing engineering world,
but, ...

***“Universities don’t change the curricula,
they just repackaging courses”***

Prof. Mayunga Nkunya
The East African, 20 – 26, 2012

(civil) Engineering curricula should adapt to changing engineering world,

We need Inclusive civil engineering curricula: ie. Civil engng. subjects should be treated taking into account information, constraints other than civil engng. ones:

engineering = designing with B.C. and under constraints

Of course:

- To include other fields, you need something to include it in**
- To be interdisciplinary you need to have a discipline**

- 
- Ba:
 - Basic sciences
 - Basic engrg. sciences
 - Basic civil engrg. courses, emphasis on **analysis**
 - Ma
 - Deepening engr. sciences
 - Deepening civil engrg. courses, emphasis on **synthesis**
 - Open up to other disciplines
 - **Contextualize design; frame project**
 - Ability to understand and co-operate with other disciplines

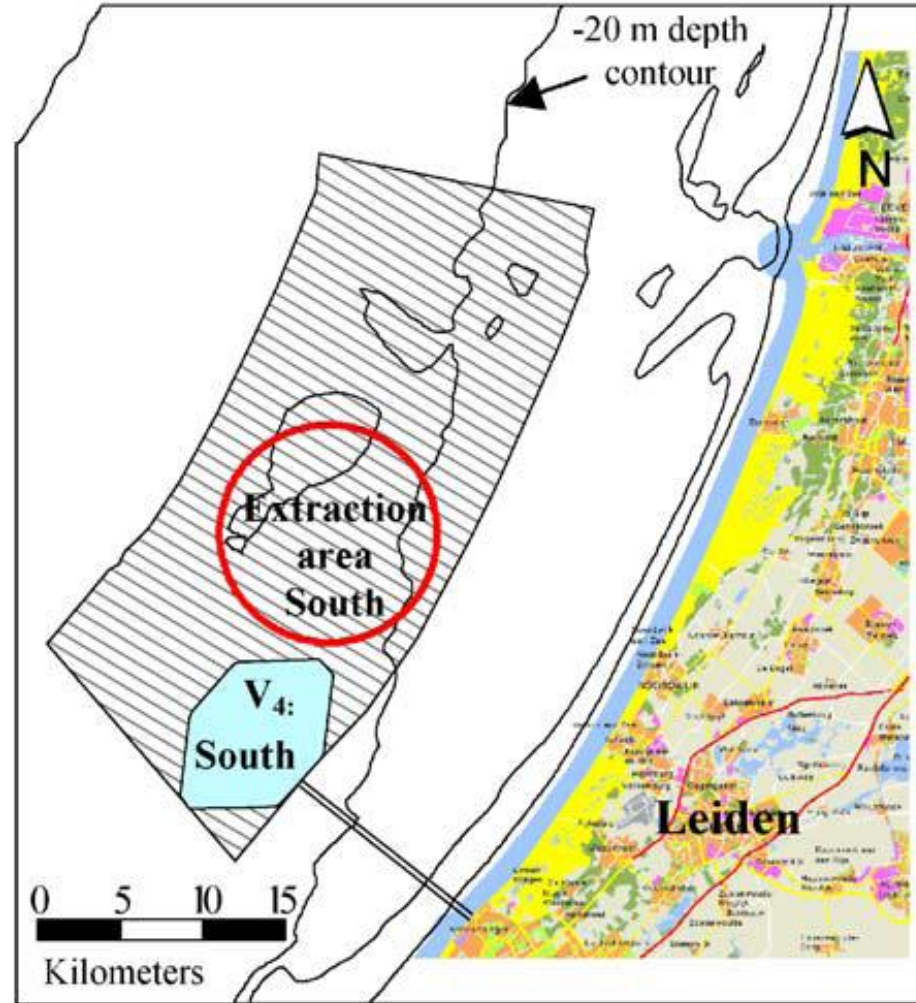
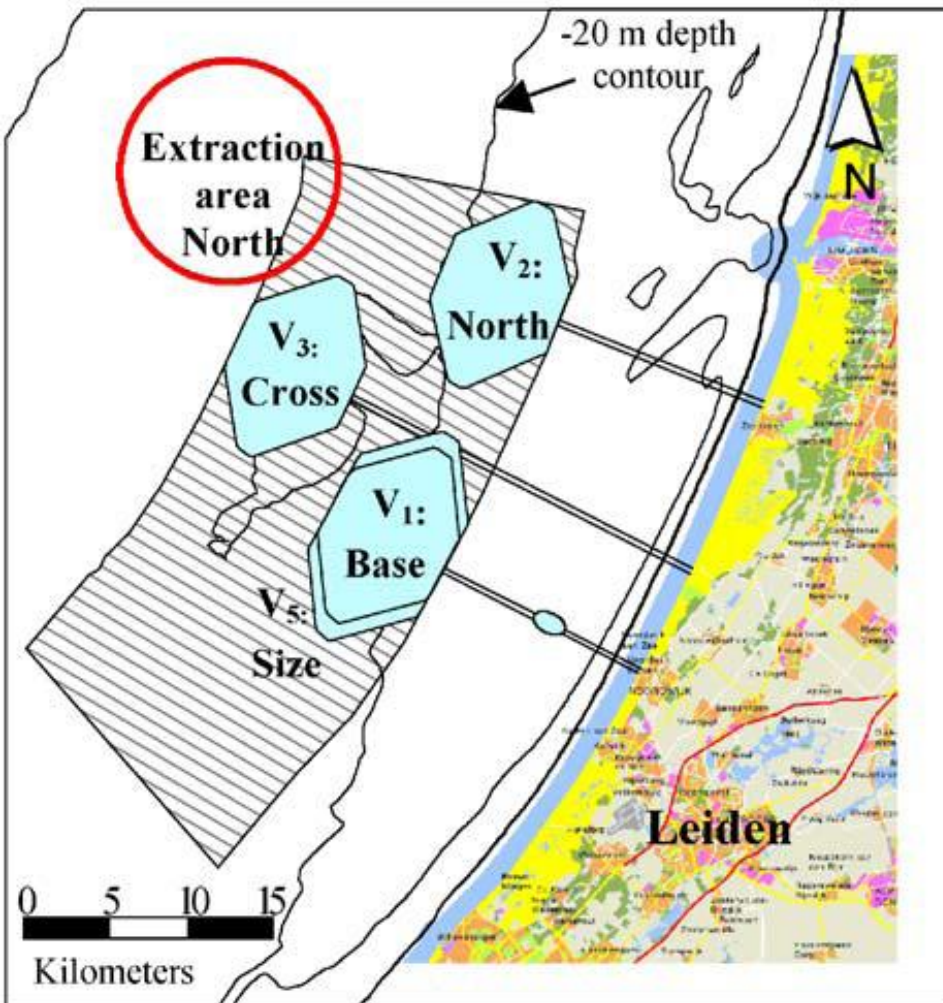
HOW?

- Safe time: less fact finding,
- Invite guest lecturers
- Build course notes with a team
- Pay attention to “side-issues”
- Project work attended by multi disciplinary team, mixed academicians and practice

Examples of side issues

- Foundation >> noise, vibrations
- Tunnel, impact ground water/ safety
- Dredging: suspended waste
- Building design: from energy consumption to energy production
- Energy/ prime materials from sewers
- Cradle to cradle design: not only build but re-use after economic life time: dismantle not destroy

FLY land



Examples of side issues

- Foundation >> noise, vibrations
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- Dredging: suspended waste **Implications for design and cost!!**
- Building design: from energy consumption to energy production
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4-dimensional design of footbridge in developing countries (2D)

MSc research, MOI University, University of Brussels

- Dimension time is *included* in the design
- Re-usable, dismantling
- Modular, movable, adaptable and transformable to cater for the dynamic nature of some rivers
- Minimum use of material, no waste of material
- Reminding the military Bailey bridge?
- Fast changing contemporary requirements
- Using EURO codes

4-dimensional design of steel towers, buildings (3D)

MSc research, MOI University, University of Brussels

ADAPT

Company Profile

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We compliment our software solutions with a wide range of professional development and project-specific design consulting services. Our commitment to excellence, passion for the design of concrete structures, and full-service partnership approach to our customers, has earned us a global and loyal customer base. Every day we work with our customers to help them improve their businesses and advance the state of the practice of concrete design.

International Association for life cycle civil engineering



From design to dismantling: cradle to cradle
Monitoring
Remaining life time
Re-use of building materials
Energy consumption

Conclusion

- Enrich the engineering curricula with lateral information: inclusive curricula
- The attitude to look behind the corner
- “horizontal knowledge”
- Civil engineers become leaders in companies, public service, capable of handle actual problems, taking into account their complexity
- Build the whole bridge, and not just part of it!