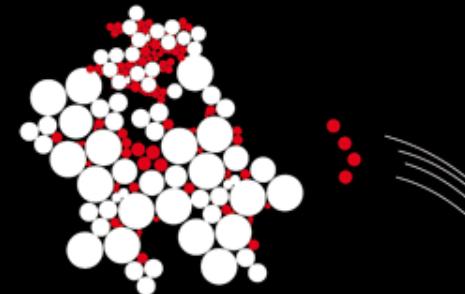


UNIVERSITY OF TWENTE.

WELCOME !!!



*Intelligence in Subsurface Infrastructure*  
workshop

27 nov 2018

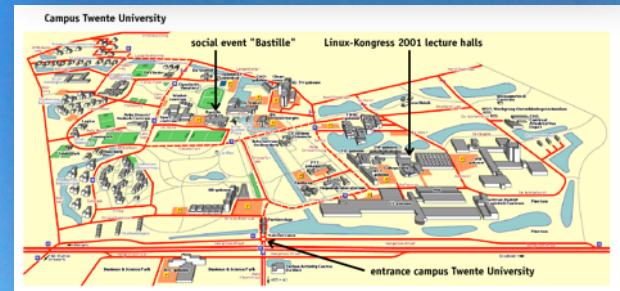


André Dorée

a.g.doree@utwente.nl



# OUR ALMER MATER



## STUDENT ENROLMENT

Total number of enrolled students in 2013 (by domicile):

9,545



Bachelor's

The Netherlands

4,410



Germany

1,101



THE NETHERLANDS

27970

ASIA

3363

EUROPE  
EXCL. THE NETHERLANDS

3023

alumni

NORTHERN AMERICA

SOUTHERN AMERICA

OCEANIA

AFRICA

842

989

284

2145

## DOCTORAL DEGREES AWARDED IN 2013

220

## RESEARCH FUNDING (IN M€)



2013

DIRECT FUNDING	102
(national) COMPETITIVE FUNDING	57
CONTRACT RESEARCH	35
Total	194

Master's (incl. Pre-Master's)

The Netherlands

2,980



Germany

314



Other countries worldwide

554



Total MSc

3,848



Degrees Awarded 2012/2013

Undergraduate

1,221



Graduate

1,150



## SCIENTIFIC OUTPUT 2013

PUBLICATIONS TOTAL

3,463

REFEREED PUBLICATIONS

2,914

ECONOMIC AND SOCIAL IMPACT

900

TOTAL NUMBER OF SPIN-OFF COMPANIES:

## STAFF COMPLEMENT (IN FTE) 2013

TOTAL  
2,689

ACADEMIC\*

1,573 .....

SUPPORT

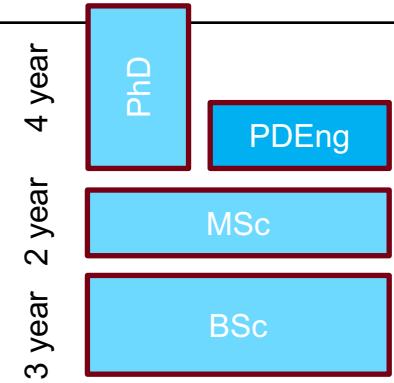
1,116 .....

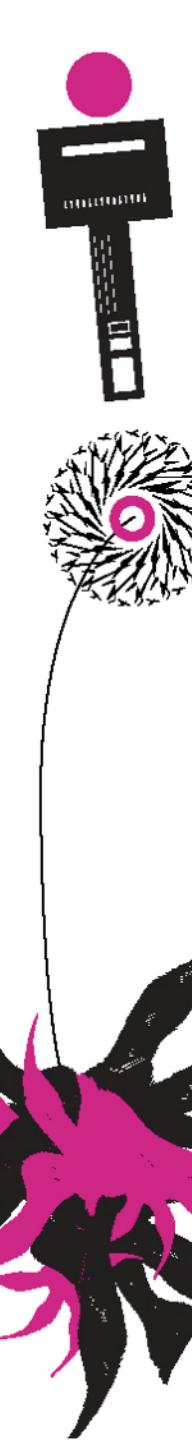
\* Academic, incl. PhD

# ZOOMING IN TO .....

..... DEPT. OF CONSTRUCTION MANAGEMENT & ENGINEERING

- Faculty of Engineering Sciences
- Civil Engineering Cluster
- Civil Engineering programs:
  - BSc Civil Engineering (3yrs; 100 enroll → 65 graduate/yr)
  - MSc Civil Engineering & Management (2yrs; 40 → 35/yr)
  - 3TU MSc Construction Management & Engin. (2yrs; 30 → 25/yr)
  - PDEng Civil Engineering (2yrs; 12 → 10/yr)
  - PhD (4yrs; 8 → 7/yr)
- academic year runs Sept-Juli: 1640 hrs in 4 quartiles





# ZOOMING IN TO .....

..... DEPT. OF CONSTRUCTION MANAGEMENT & ENGINEERING

---

## ■ Department CM&E

- next to dept *transport* & dept *water management*
  
- staff: 16 fte + 12 PhD + 10 PDEng
- PhD/PDEng employed elsewhere (8)
- CM&E research focus on:
  - *fragmented construction proces/industry*
  - *life cycle approach, integration, innovation*
  - *contracts; organisation; technologies; people*
  - *specific domains*

# AUG 2017



staff

# Dept CM&E



PhDs & PDEngs



## CME raison d'etre

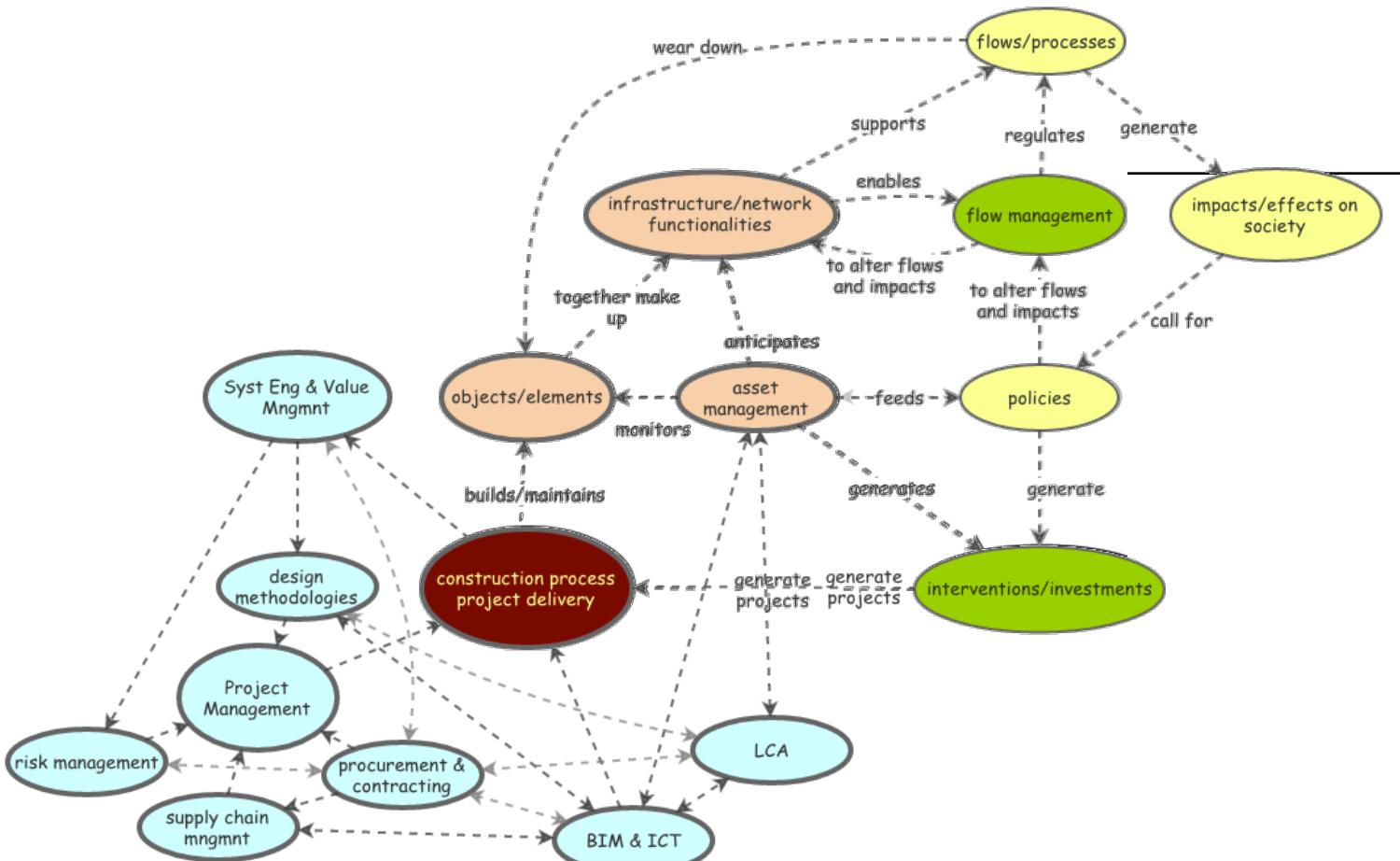
---

***CM&E aims to reduce fragmentation in the infrastructure life cycle and project delivery. To do so we study, develop and teach new process approaches, methods and technologies to enhance integration and innovation for the infrastructure asset management and integrated project delivery.***



Our core areas of expertise are:

- **Engineering design methodologies** (as systems engineering, value management, design science),
- **ICT technologies** (as BIM & data management)
- **Life Cycle Approaches for Infrastructure & Asset Management,**
- **Inter organizational boundary spanning** (procurement, contracting, supply chain management).
- **Risk & Project management** (risk management, project management, process management)



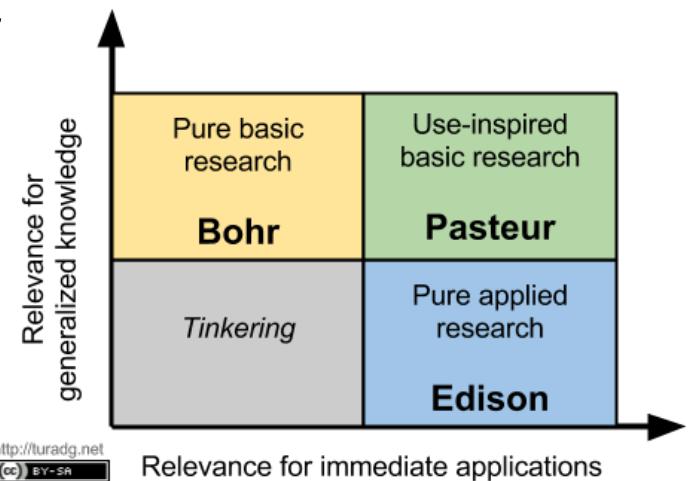


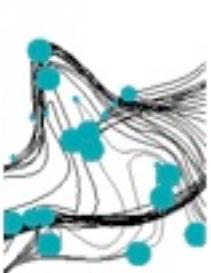
# THE RESEARCH APPROACH WITHIN OUR GROUP

---



- engineering character/style
- aimed at problem solving, impact, design, intervention
- design science; knowledge for the specific; pragmatic
- close to practice, real world problems,
- engaged scholarship, cases, experiments
- constructivism: relativism rather than absolutism;
- operating in '*Pasteur's quadrant*'





# strategies/choices ....

---

- 
- select domains based on societal/industrial changes/challenges
  - be different: avoid themes crowded by science competitions
  - proximity (pragmatic)
  - integrate education, research, industry including clients
  - connect to *inspired* rather than *troubled practices* (continuity)
  - be patient and persistent: avoid academic hypes (reframe)
- 
- 
- Pasteur's Quadrant as inspiration
  - *engineering paradigm* rather than *social science paradigm*
    - *this is particularly an issue for CM-domein*
    - *technology is cumulative; social science is disputable*



# strategies/choices ....

---

- 
- engaged scholarship approach
  - connecting education, research domains & industry networks
  - integrate state of the art practice/technologies into courses
  - external thesis projects BSc (100%) and MSc (95%)
  - MSc thesis = report for the client & scientific paper for acad evaluation
  - publish in wide range of journals (different angles per domain)
    - Technological (ADVEI; Automation in Construction; road building)
    - Construction Management (ECAM, CM&E, JCE&M)
    - Project Management (IJPM, EPOJ)
    - Procurement
    - innovation:
- 

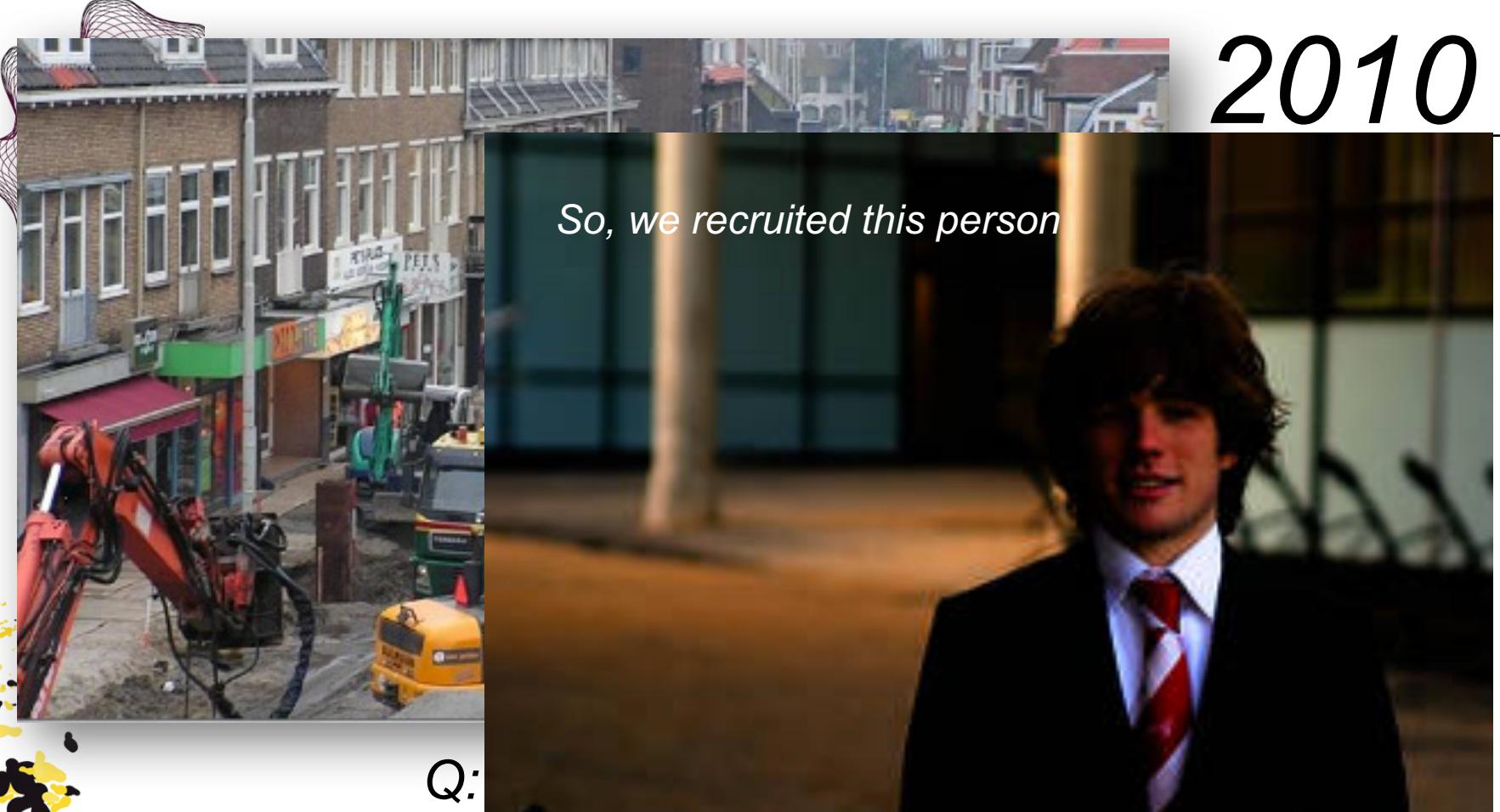
# Overlooked in Civil Engineering

2010



*Q: Can we create a Virtual Construction Site  
to coordinate this chaos ?*

# Overlooked in Civil Engineering



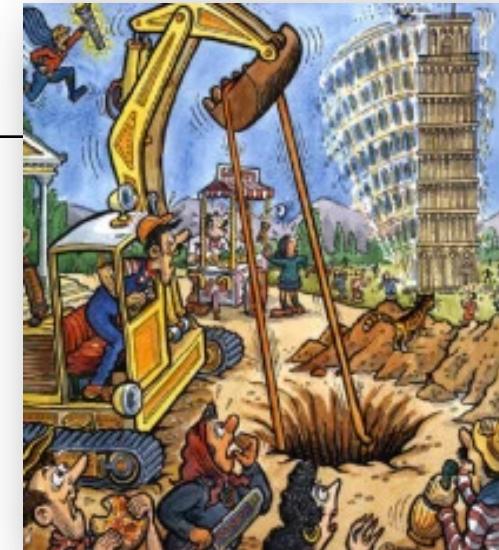


- annually connected 400.000 houses to the ftth.
- wanted to promote innovation and co-makerships
- aimed to reduce the number of damages and cable hits
- Created the ZoARG / REDUCE Fund for PDEng's



Leon's works showed

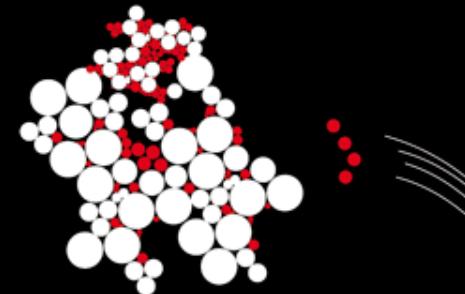
- Virtual Construction Site works, however ..
- once on site the careful planned process derails because of unexpected location and state of utilities



We concluded: **To really coordinate this inner-city projects chaos we need to map the underworld and get to grips with the unknowns and uncertainties.**

UNIVERSITY OF TWENTE.

WELCOME !!!



*Intelligence in Subsurface Infrastructure*  
workshop

27 nov 2018



André Dorée

a.g.doree@utwente.nl

