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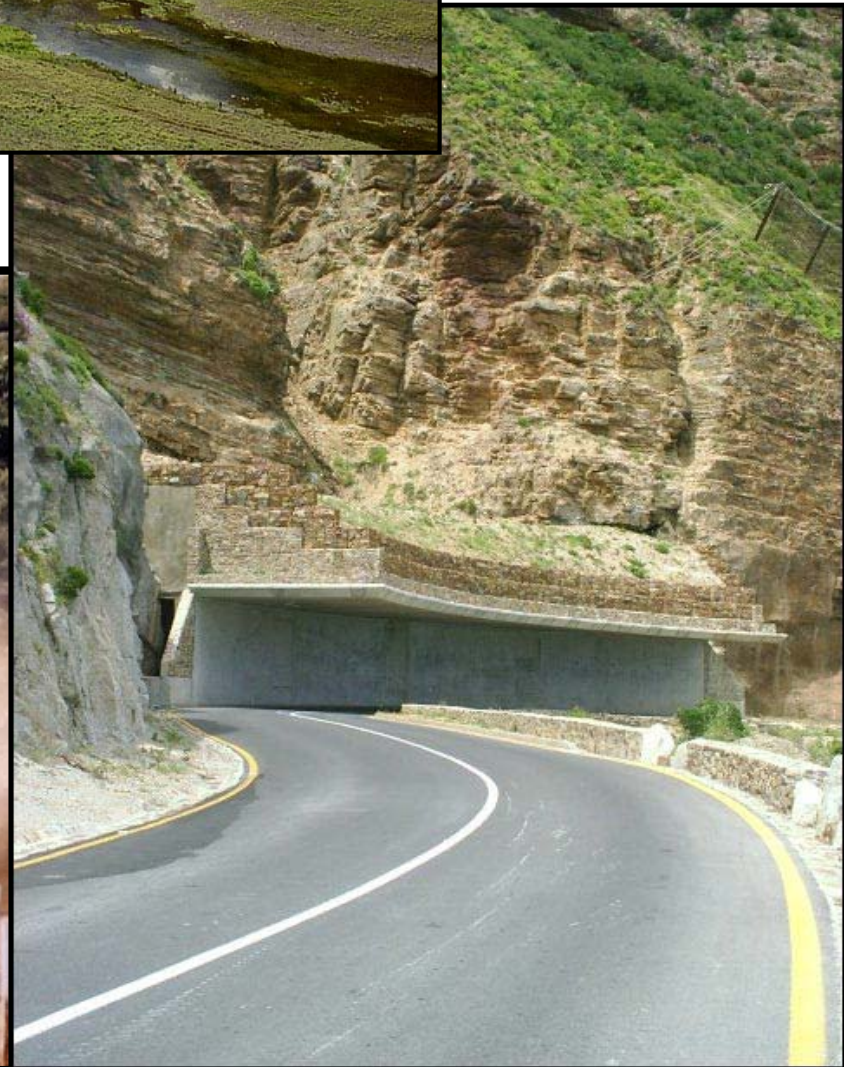
ENGINEERING:

It is…more than a profession…

It is about…building bridges…

- *Between people and societies*
- *To connect societies with prosperity*
- *Providing physical infrastructure, to build a nation*
- *To bring people together in search of development*

Engineering

The environment of infrastructure development

Structures

Transport

Water

Geotech

Contracts

Risk

Procurement

Collaboration

Community

Finances/ Economy

Quality

Human resources

Schedule

Comms.

Environment

ECSA requirement
Solving complex engineering problems:

a) require in-depth <u>fundamental and specialized</u> engineering knowledge

Solutions are:

1) are <u>not obvious</u>, require originality or analysis based on fundamentals;

2) are outside the scope of <u>standards and codes</u>;

3) require information from <u>variety of sources</u> that is complex, abstract or incomplete;

4) involve wide-ranging or conflicting issues: <u>technical</u>, engineering and interested or <u>affected parties</u>.

"*Engineering is not science. A scientist, concerned only with how things work, can always reduce the problem a little further until it becomes understandable. An engineer is forced to create new artifacts using inadequate knowledge. As with any art, the art of engineering feeds on science but is not limited by it. …..*"

Bill Harvey, UK

Participants in infrastructure projects
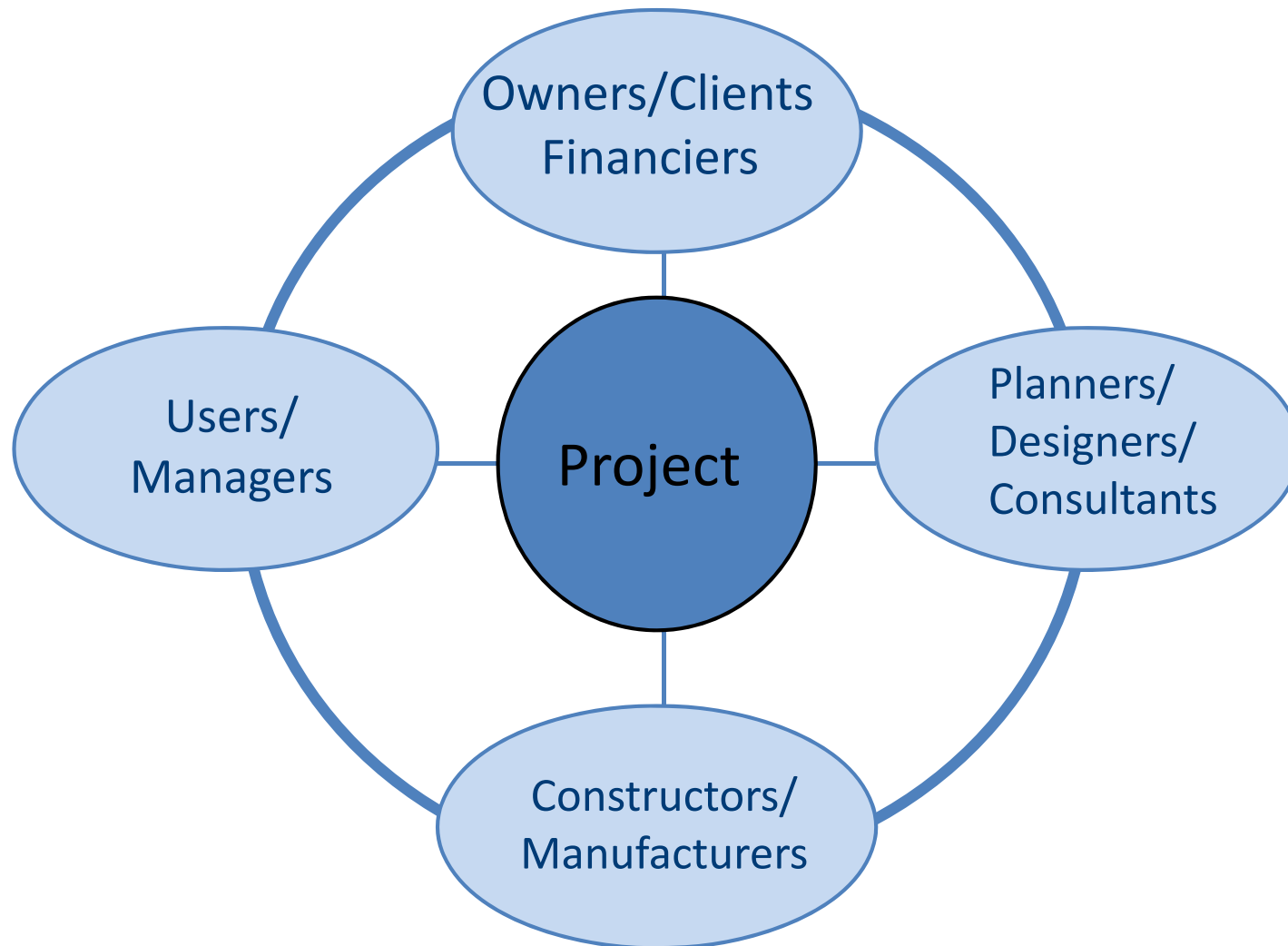
Impacts and influence over time

With thanks to Hannes Marais
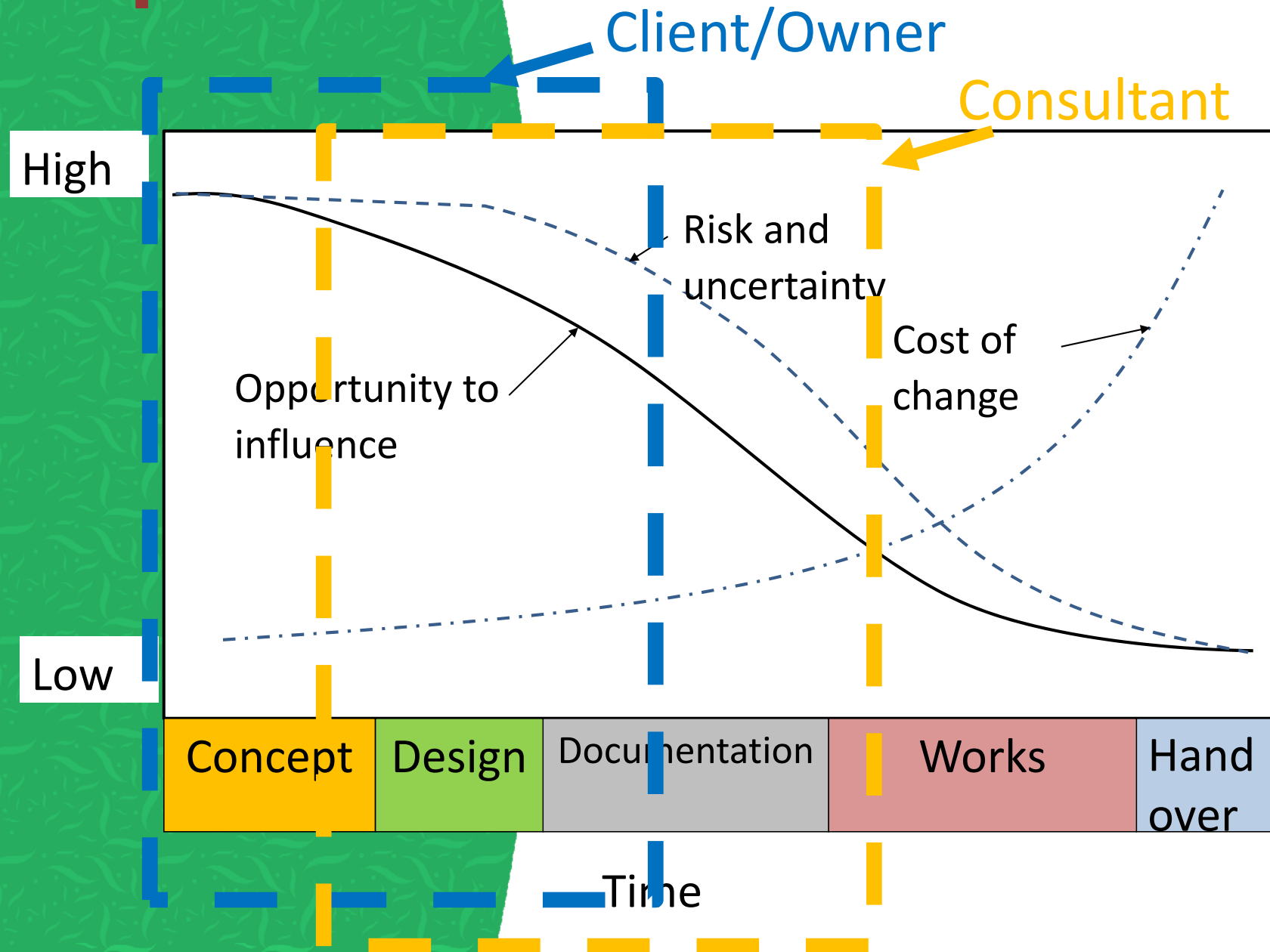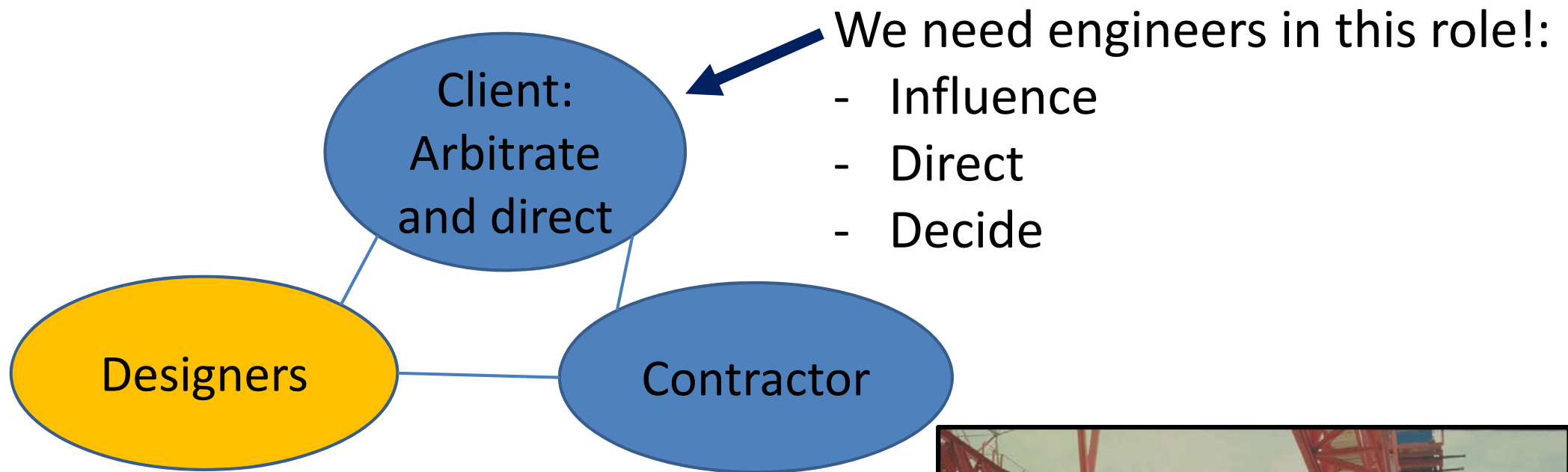
The role of the client/owner

- Can (and must!) play an important role in the
   conceptual phase
- Needs to be technically and otherwise capable and
   informed in order to:
    - Evaluate
    - Arbitrate
    - Direct

Management role of client

Client:
Arbitrate
and direct

Designers

Contractor

We need engineers in this role!:
- Influence
- Direct
- Decide

Current industry challenges and the way forward

- Identified challenges
- Method for identification
- Proposed way forward

Overview:

- 4 weeks residence programme

- Middle management programme

- Engineering related practitioners

- Strategic management, as well as operational and infrastructure development

- Tests and develops management and leadership qualities
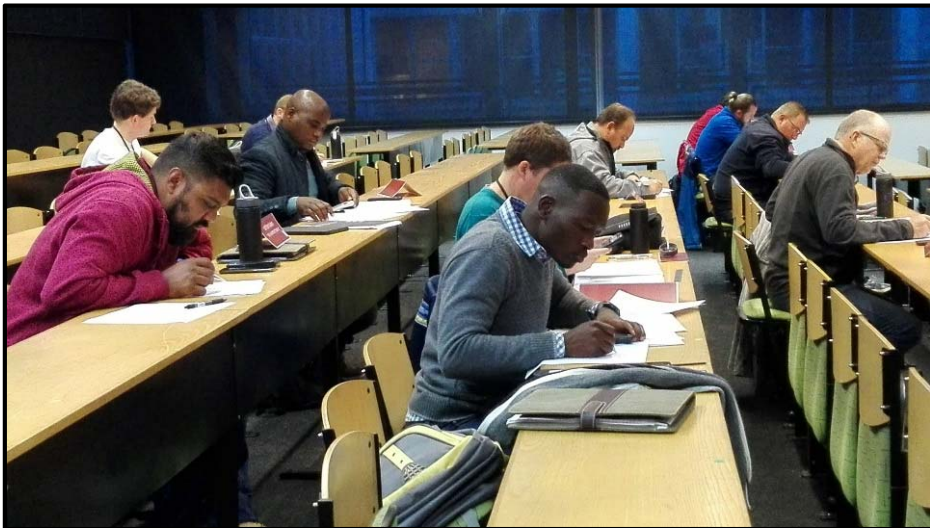
CMP history:
- Initiated 1976
- Joint Venture of Tertiary Institutions
    — Cape Town; Pretoria; Stellenbosch & Wits
- Every second year, annually since 2007
- + 1000 alumni

CMP Delegates

	Construction firms	Client / implementation agencies	Consultants	Academic
2013	28	11	2	0
2014	25	12	3	1
2015	20	16	4	0
2017	22	12	4	1
2018	15	11	3	0

2018 annual CMP theme

Saving the construction industry for the future of South Africa

Benefit of addressing the problem through CMP:
- 30 professionals with 10 – 20 years experience
- Exposed to industry leaders and academics for 4 weeks
- Collaboration and mutual understanding

Survey results: Ranking of industry problems

Item	Rank all	Contractors rank	Clients rank	Consult rank
Corruption	2	2	4	1
Procurement Constraints	3	1	3	4
Resources	7	7	6	8
Uncertainty from Government	4	3	2	4
Digital Revolution	8	8	9	7
Lack of leadership	1	4	1	1
Construction Disruption	6	6	7	4
Poor government expenditure planning	5	5	5	1
Unemployment	9	9	8	9

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Summarized CMP 2018 outcome:

- Lack of industry <u>leadership</u>
- Corruption
- <u>Procurement</u> constraints
-    Uncertainty from
      <u>government</u>
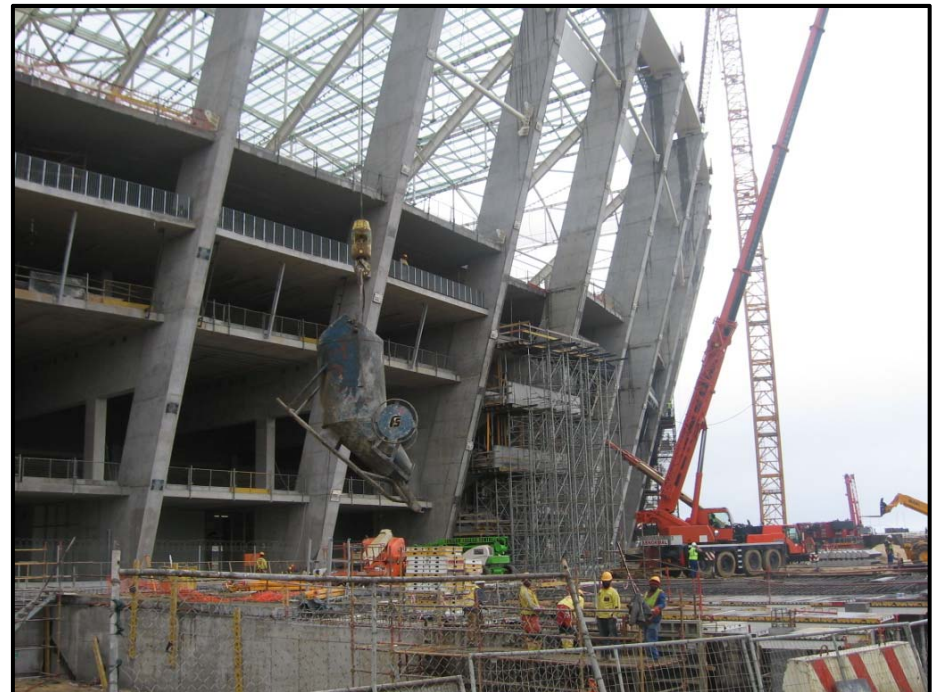
How can these outcomes be achieved:

- Need a uniform voice from industry
- Need participation between all parties (clients/consultants/contractors at "grass roots level" (discussion platforms)
- Need strong client organisations

The engineer of the future

- How should universities prepare engineers for the future?

Recent collaborative think scrum at the University

Participants:

- Departmental staff (7 – 8): Young and experienced
- National consultant (7 – 8): Young and experienced
- Facilitator

Purpose:

- What would be required of the engineer of the future?

Outcome of workshop

The future engineer needs:
- <u>Technical capabilities</u> and be able to <u>use technology</u> efficiently and responsibly
- To understand and function within <u>diversity</u>
- To find <u>holistic solutions</u>
- Have "<u>soft skills</u>":
    - Communication
    - People management
    - Collaborate across a wide spectrum
    - Multi disciplinary capabilities and understanding
    - Be emotionally mature

Increase diversity in the construction industry:

- First and foremost: Improve quality of basic schooling
- Increase awareness of the profession and the contribution it makes to society
- Provide mentorship and support for first generation students
- Increase the diversity of academic staff at institutions of higher education (need role models):
  - Sponsored post graduate studies
  - Closer collaboration between industry and academic institutions
- Mentorship for young engineers

- There is a need for engineers in public organisations (!)
- Engineers need holistic problem solving skills (not only technical)
- Engineers need to become involved in:
    - Discussion platforms
    - Industry organisations

- The construction industry need to speak from one voice:

  - An Office of the Engineer General can play such a role:
    - Mouthpiece towards government
    - Quality management organ? – ECSA plays and should play this role

- All organisations should where they are encourage improved schooling for learners

- Increase collaboration between industry and academic institutions

Thank you

I hope you enjoyed this presentation

Jan Wium
Professor