

Develop 5D in Design & Construction of Outstanding Buildings in Nigeria



Markus Rambach

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Nigeria

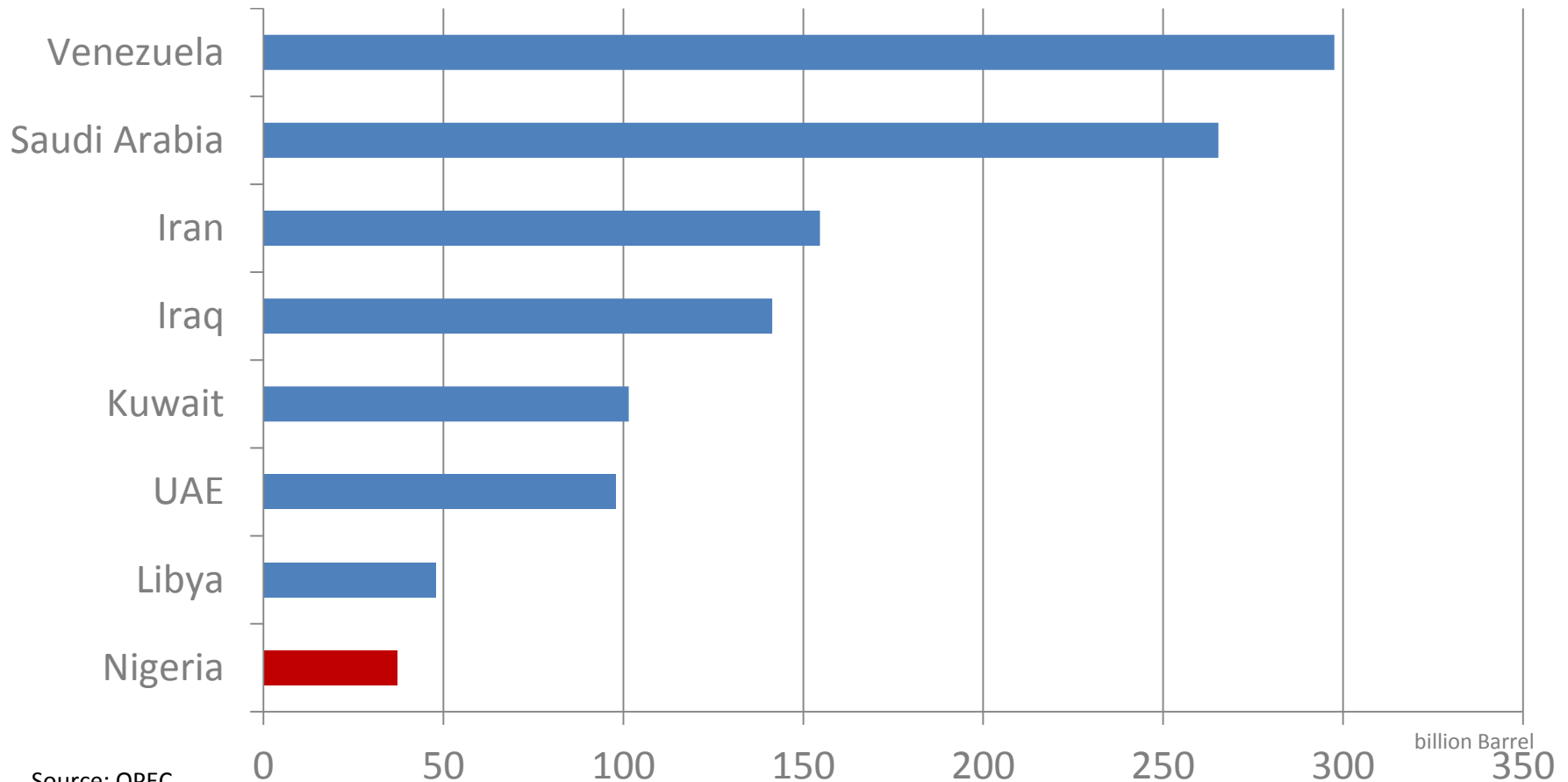
- Area: 925,000 km²
(2.5 x size of Germany)



Population:

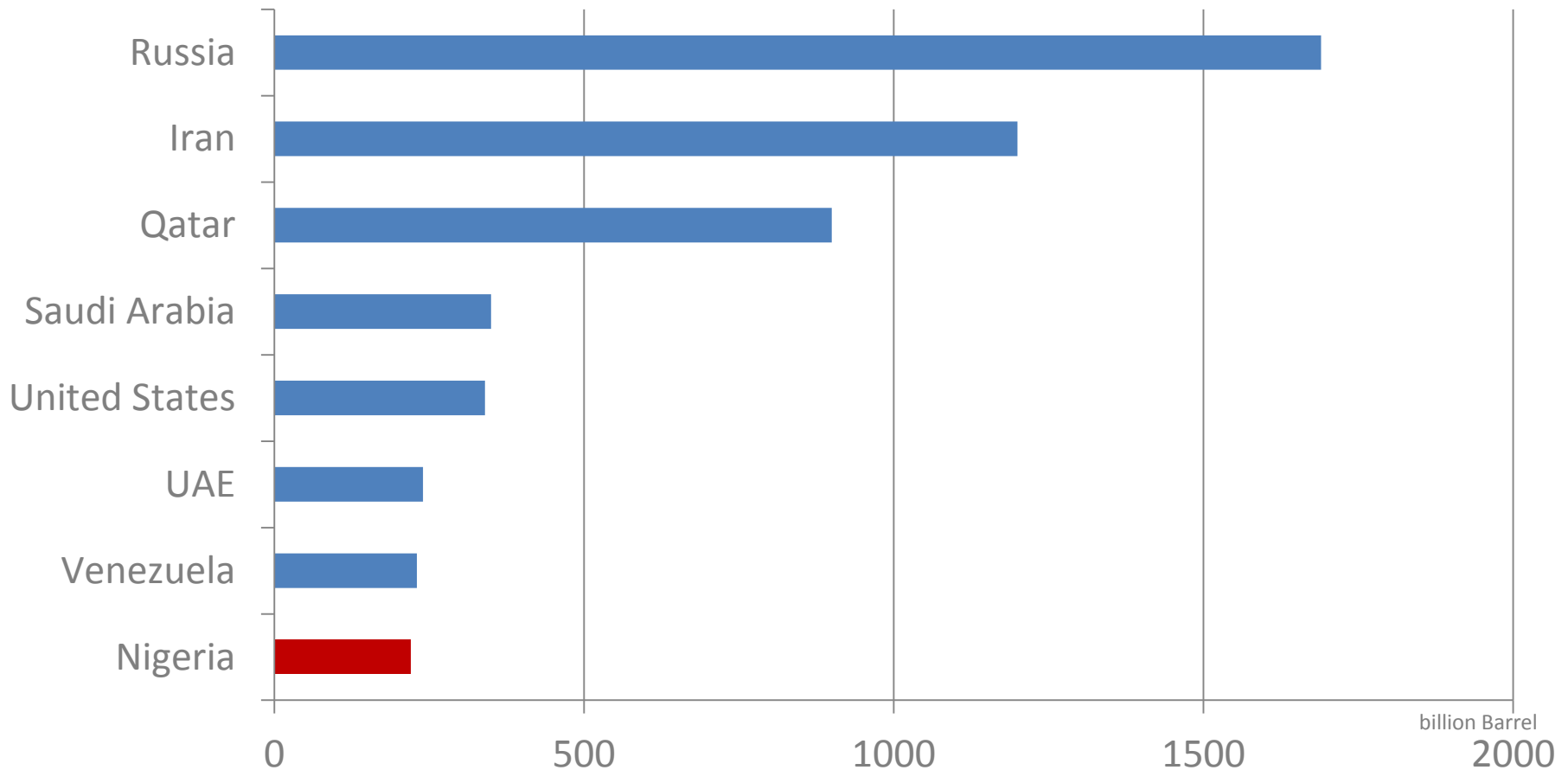
- Largest in Africa (160 million)
- Every sixth African is Nigerian
- Very fast growing

Abundance of Resources Oil Resources



Source: OPEC

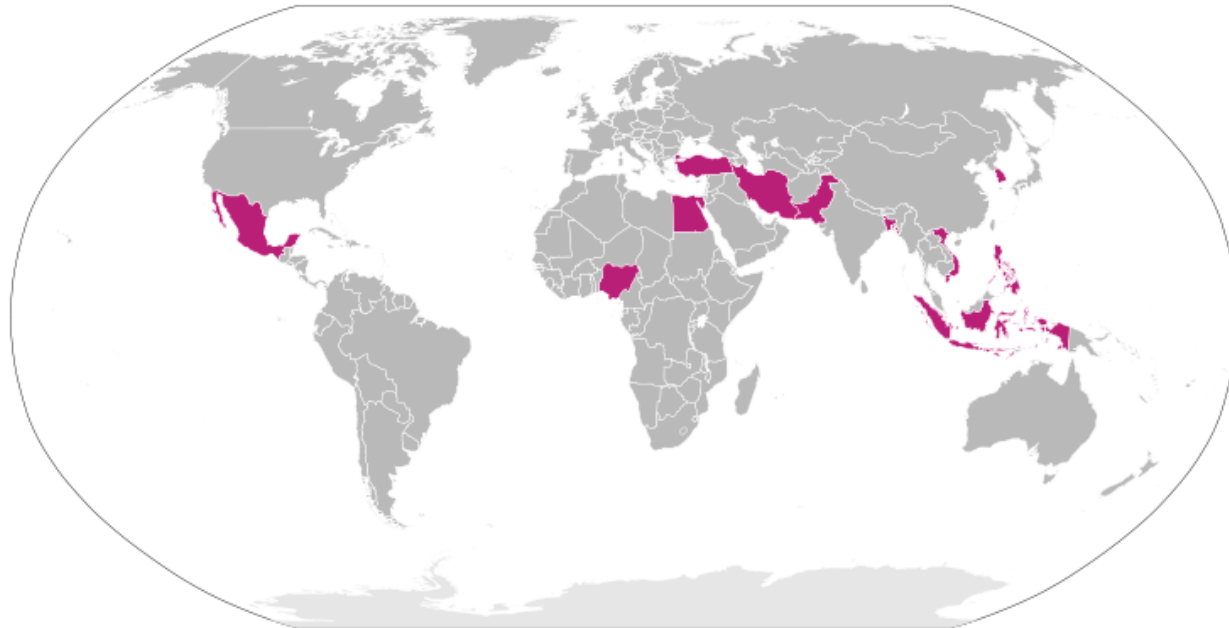
Abundance of Resources Gas Resources



Source: eia Oil & Gas Journal

„One of the Next-11 Emerging Markets“

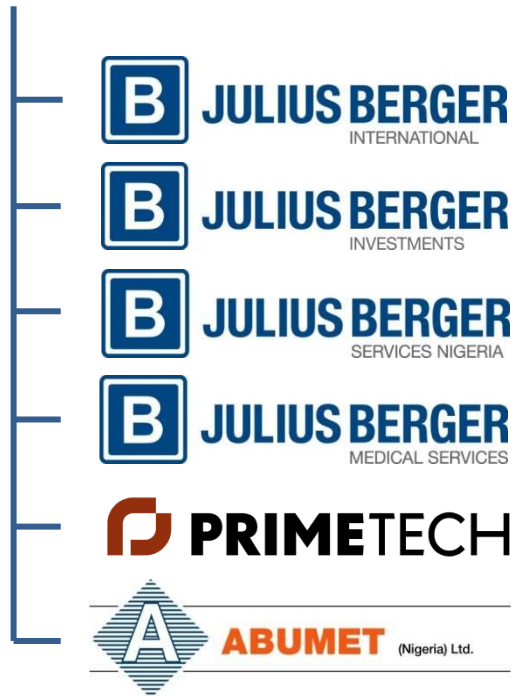
- Economical growth: 7% annually (for 6 years)
- Public revenue: 85% from oil and gas industry



Source: http://en.wikipedia.org/wiki/File:Next_Eleven.svg

Julius Berger: „More than a construction company“

B JULIUS BERGER



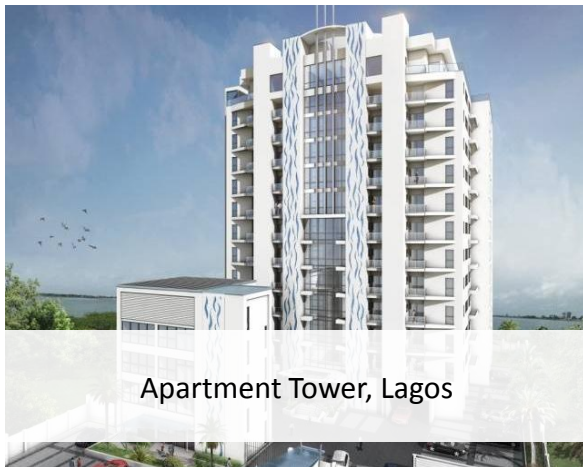
Julius Berger Nigeria Plc.

Quick Facts

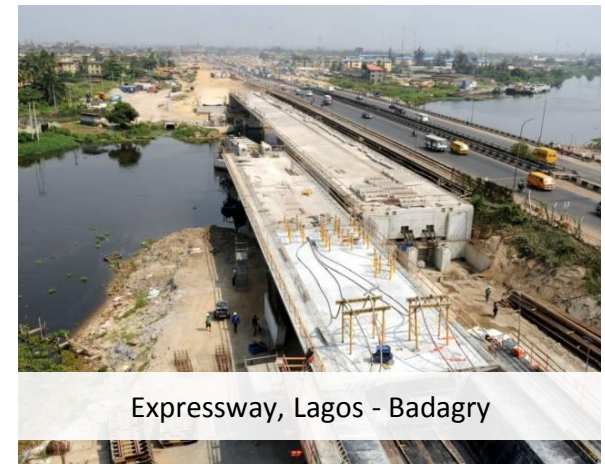
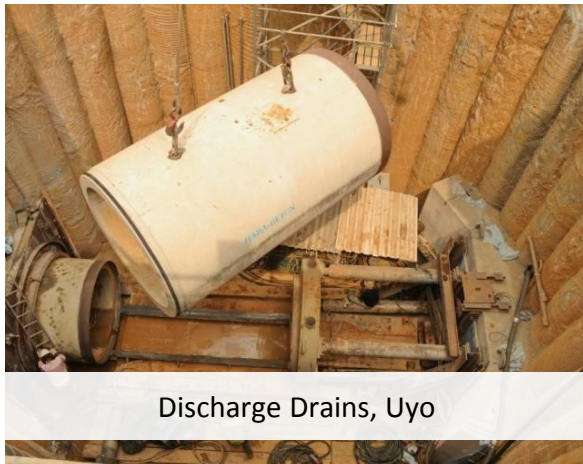
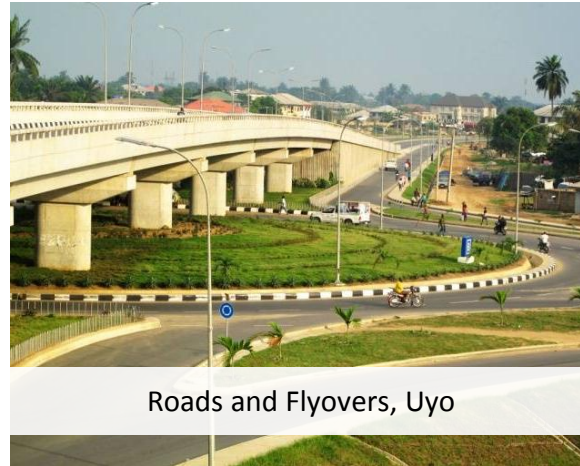
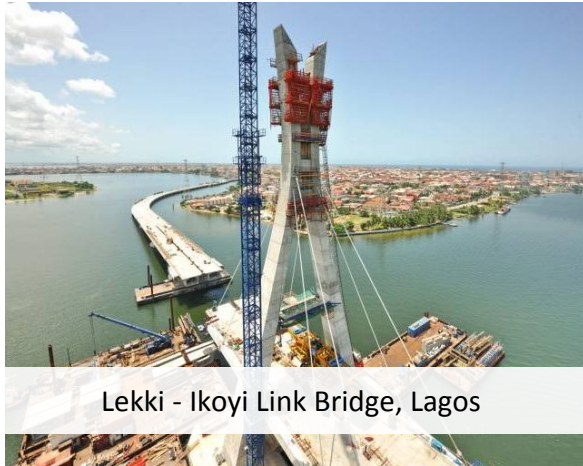
- Started business in 1965
- Listed on the Nigerian Stock Exchange since 1991
- Shareholders:
60% Nigerian investors; 40% Bilfinger SE, Germany
- Largest construction company in Nigeria
- Annual turnover: € 900 million
- ISO 9001:2008 certified



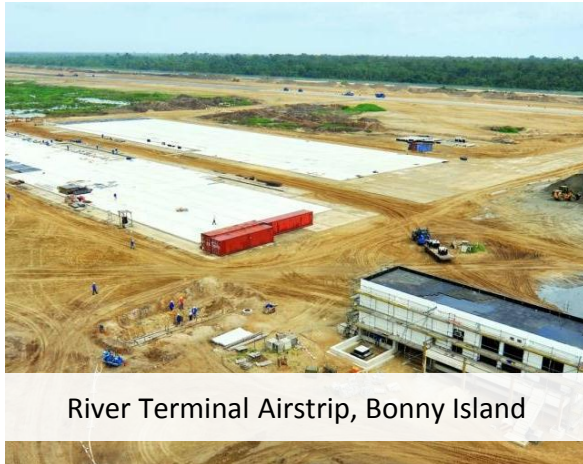
Highlights | Buildings



Highlights | Infrastructure



Highlights | Industries



River Terminal Airstrip, Bonny Island



Cement Plant, Edo State



Gas-to-Liquids Facility, Escravos



Sugar Refinery, Port Harcourt



Babycare Production Plant, Lagos



LNG Plant, Bonny Island

Service Facilities



Port of Warri



Central Store for Spare Parts etc.



Tire Reconditioning Workshop



Equipment Repair Shops



Asphalt & Concrete Mixing Plants



Quarries

Service Facilities



Equipment

Total new value of 500 million €

- 2 aeroplanes
- 8 asphalt mixing plants
- 9 crushing & screening plants
- 12 asphalt finishers
- 17 concrete mixing plants
- 47 dumpers
- 53 graders
- 81 dozers
- 147 wheel loaders
- 171 forklifts
- 183 excavators
- 1181 trucks
- 1820 cars



Equipment

Total new value of 500 million €

- 1 dredger
- 2 jack-up platforms
- 5 pile-driving rigs
- 13 crawler cranes
- 20 tug boats
- 24 crew, speed & work boats
- 33 barges
- 60 tower
- 101 mobile cranes
- 185 rollers
- 425 generators



Julius Berger International GmbH

Quick Facts

Engineering & services provider for JBN:

- Design & engineering
- Project management
- Procurement
- Logistics
- HR recruitment & secondment



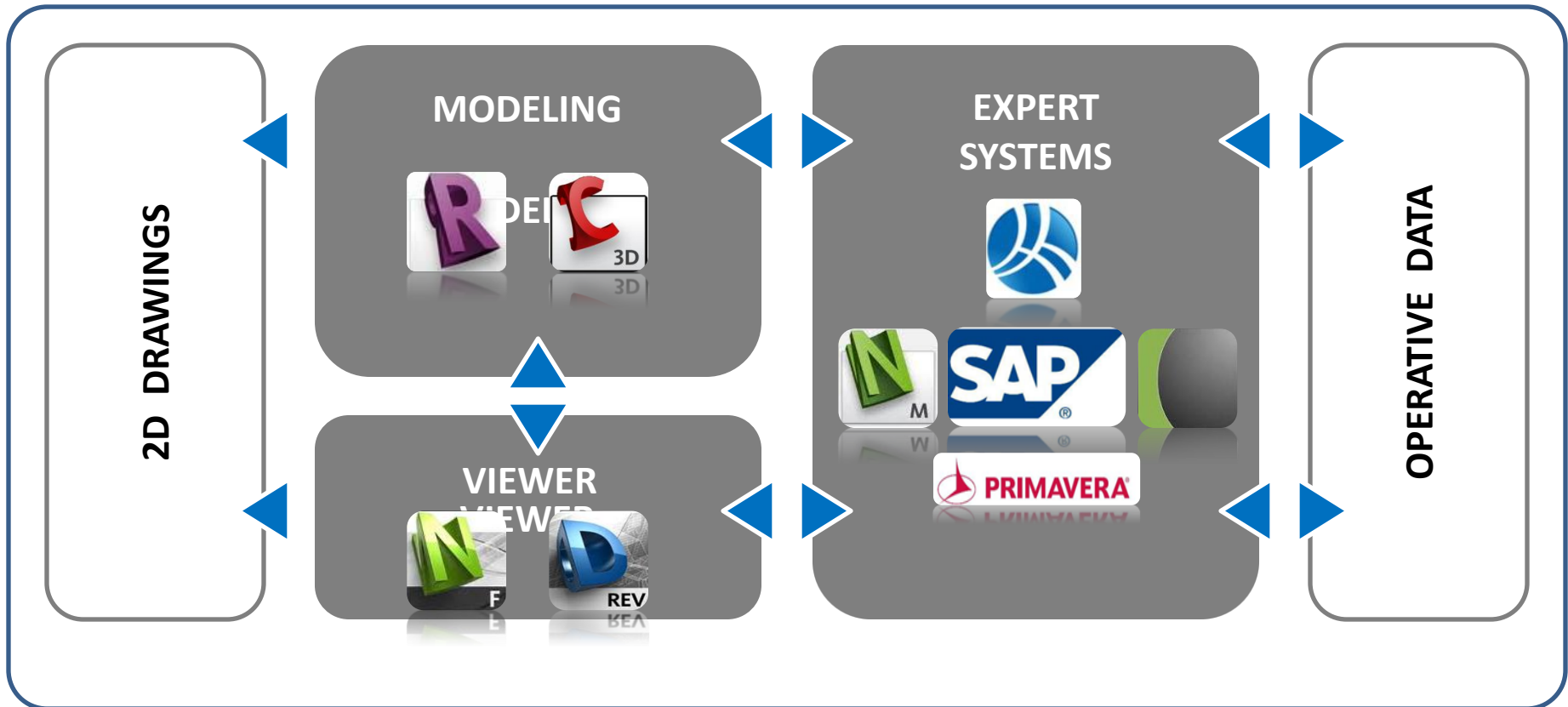
Julius Berger International GmbH

Quick Facts

- Formed out of Bilfinger Berger Nigeria GmbH (2012)
- Engineering expertise for Nigeria since 1965
- 400 employees in Wiesbaden, Germany
- 200 employees in design & engineering
- Construction experts for:
buildings, infrastructure, transportation, oil & gas
- Annual turnover: € 300 million

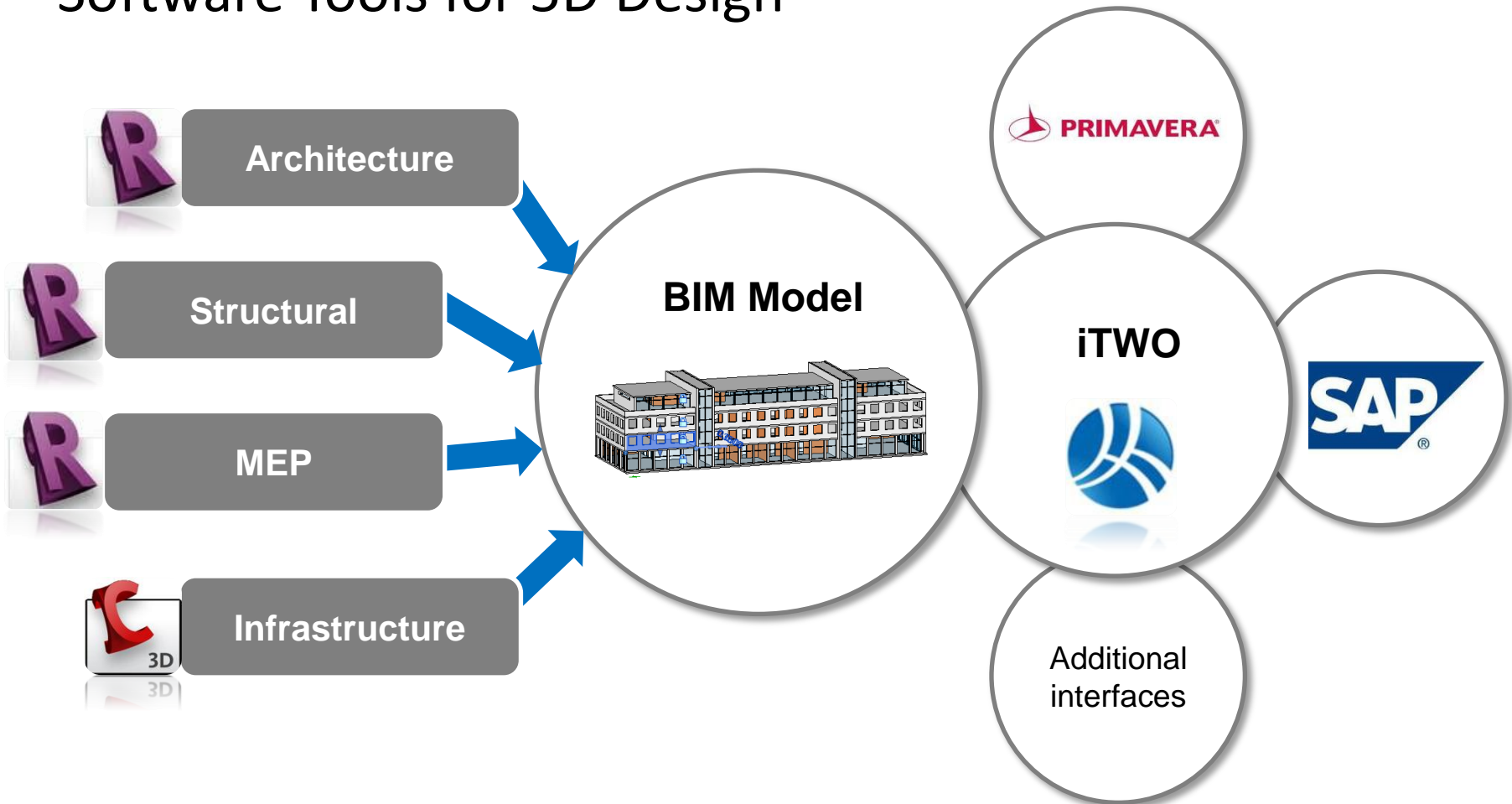


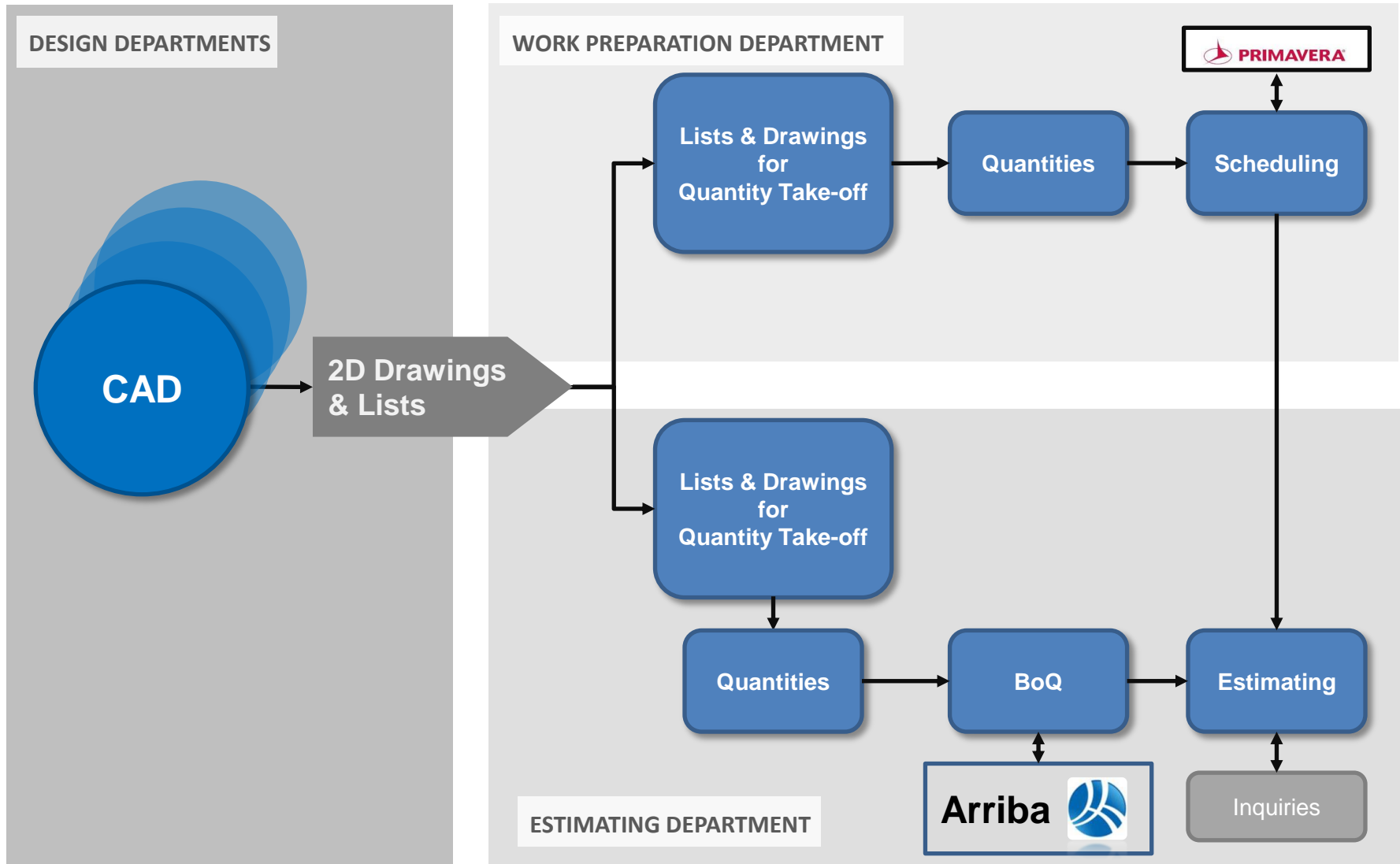
5D Process Management

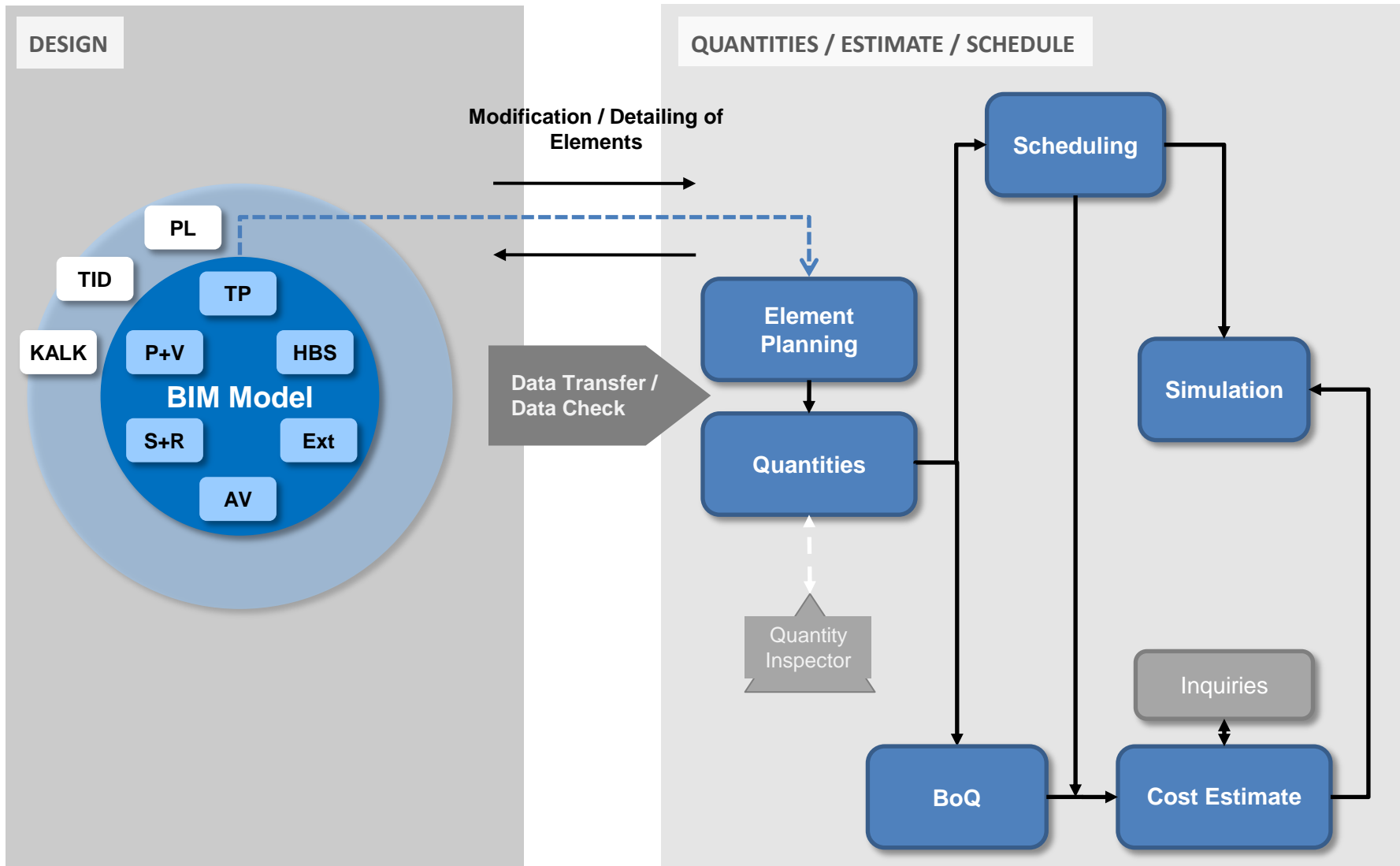


Source: <http://www.5d-initiative.eu/mission.php>

Software Tools for 5D Design







Apartment Tower, Lagos



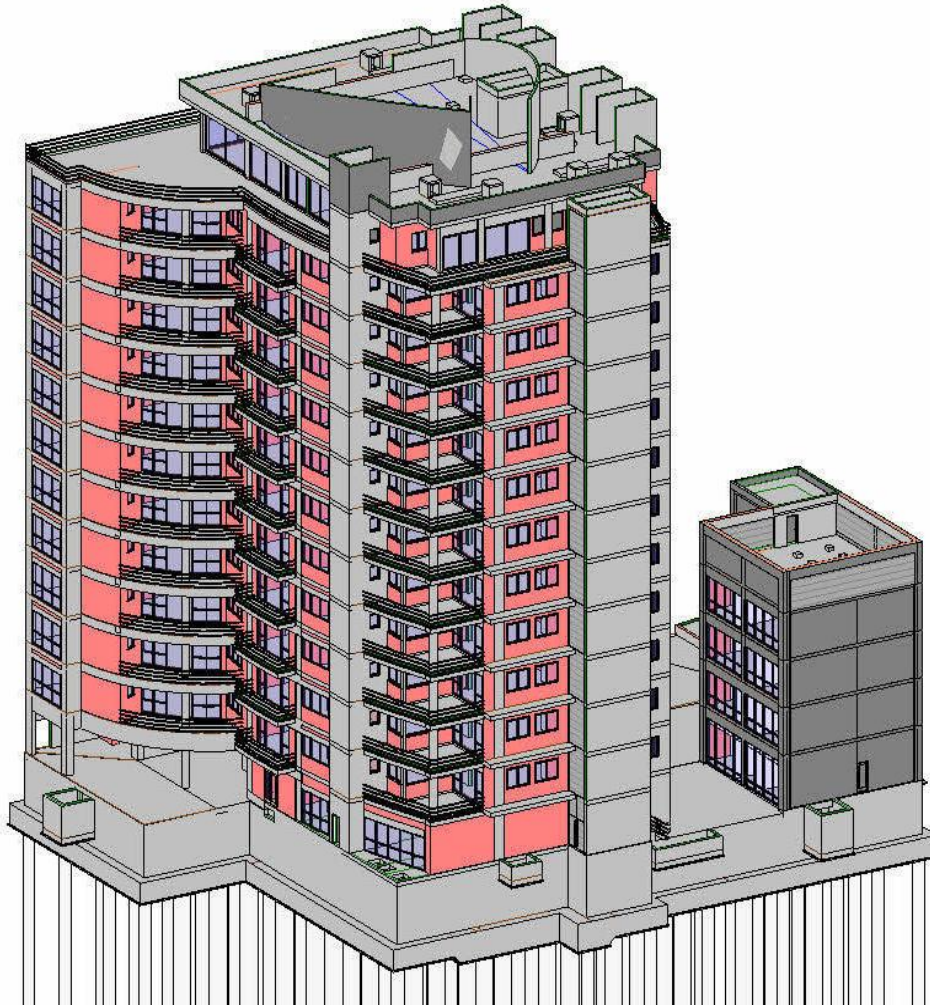
Construction period

2011- 2014

- 14-storey apartment tower
- 36 apartments
- Spa & gym area
- Basement parking
- 4-storey office building



Apartment Tower, Lagos



Pilot Project

- Model-based structural design tests (Revit 2010)
- Basic development of content
- Quantity take-offs at multiple design changes
- Simulations to optimize time schedule
- Updates on site for further tests
- Tests of cost control with iTWO 2013
- Visualization of performed quantities

Akwa Ibom Stadium, Uyo



Construction period

2012 - 2015

- Multifunctional stadium (31,200 m² | 30,000 seats)
- VIP area
- Sports park facilities
- Parking lot (2,500 cars & buses)



Akwa Ibom Stadium, Uyo



Tender Phase

- Structural design with Revit
- Quantity take-offs with iTWO

Execution Phase

- Detailed structural design with Revit
- Cost controlling with iTWO (“3D”)
- Connection of 4th and 5th dimension
- Invoicing to client

Victoria Island Tower, Lagos

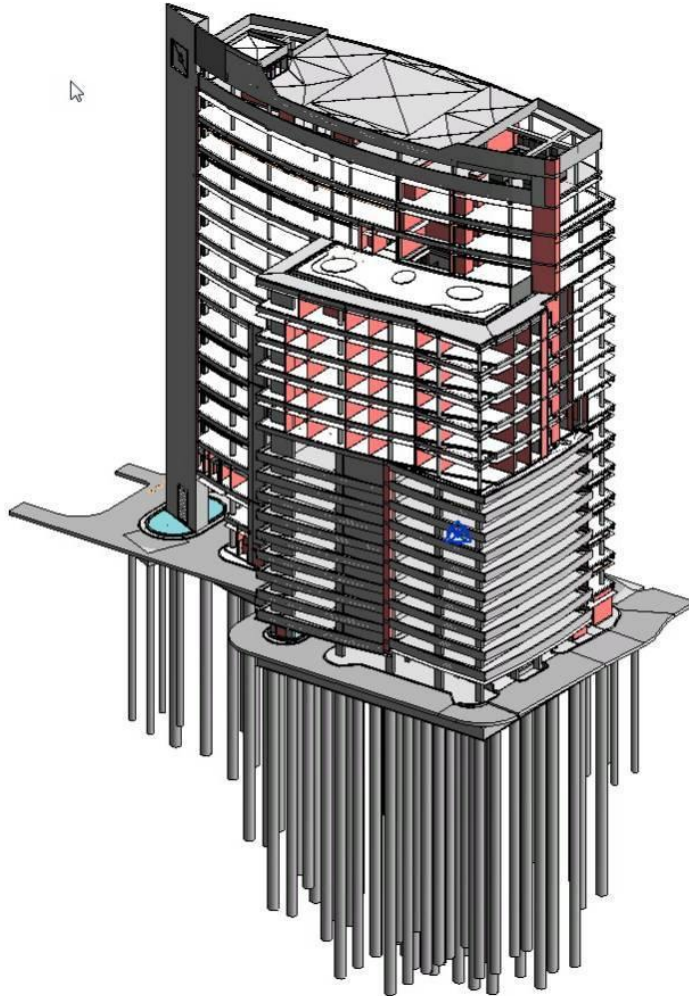


Construction period

2012 - 2015

- 15-storey building
- Offices and apartments
- Total GFA: 32,000 m²
- LEED silver certification

Victoria Island Tower, Lagos



Tender Phase

- Architectural and structural design with Revit
- Quantities and estimate with iTWO

Execution Phase

- Structural, architectural and MEP design with Revit
- Testing of procurement with iTWO
- Controlling with iTWO ("2D")
- Viewer for site management: ceapoint desite MD

The Jasper ***** Hotel, Abuja



The Jasper ***** Hotel, Abuja



Approval Design Phase

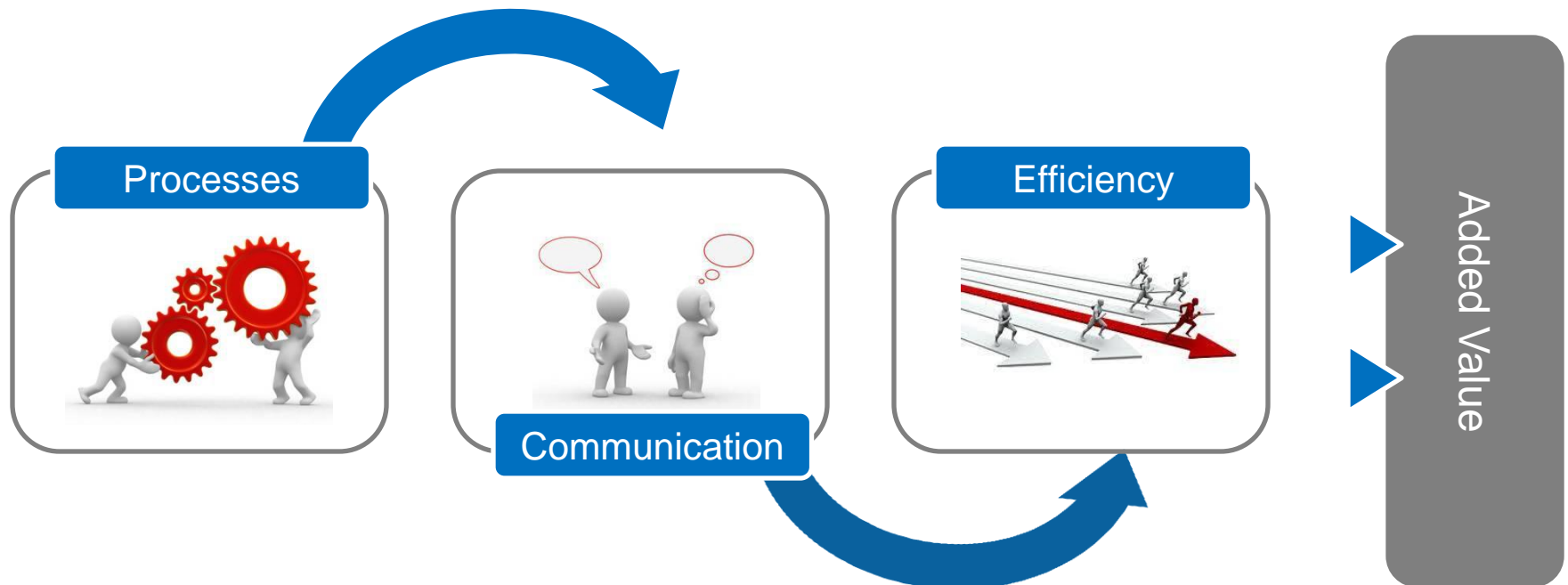
Structural, architectural and MEP design with customized content and Revit 2013

Tender Phase

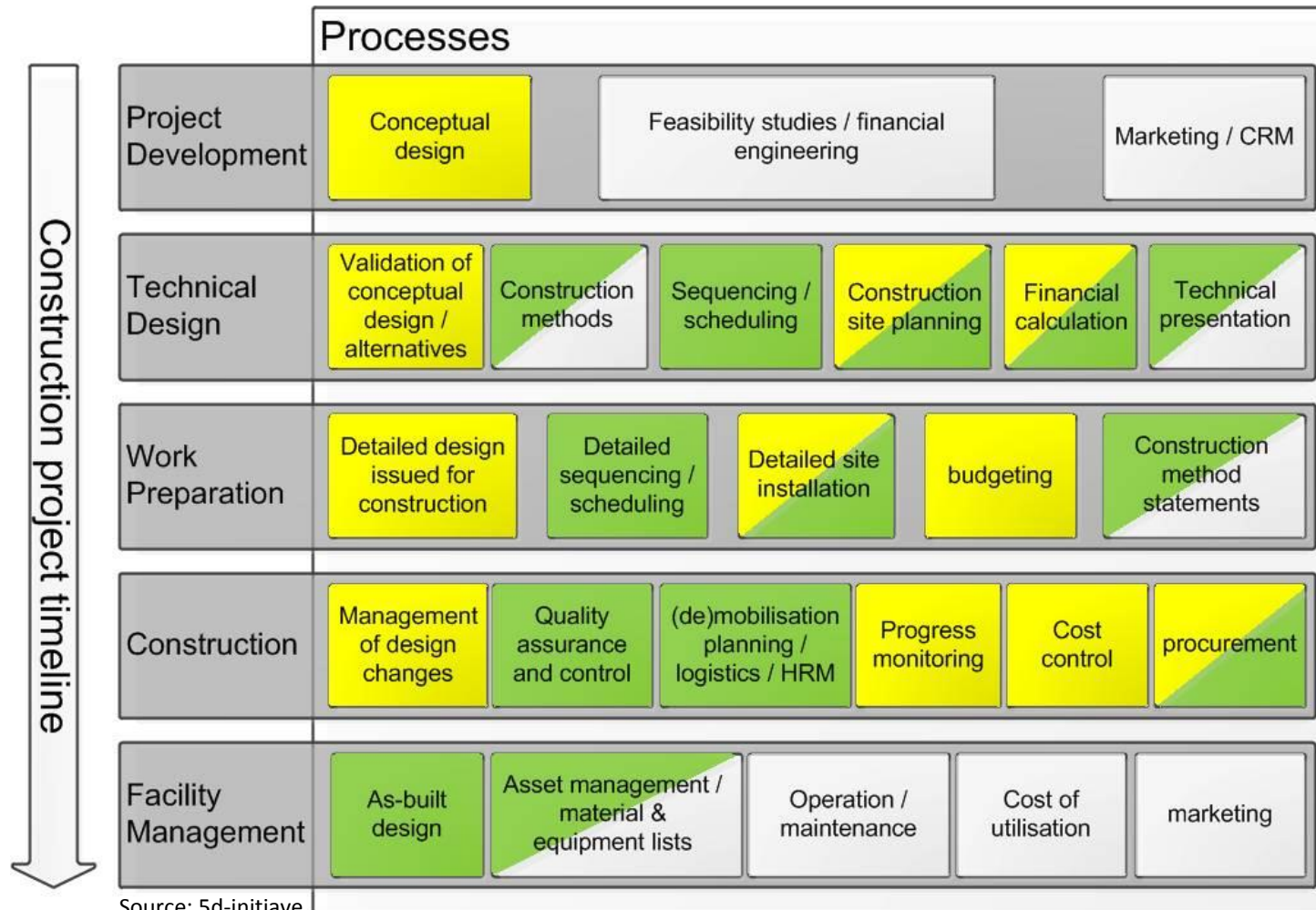
Quantity take-offs and estimate with iTWO 2013

Implementation of 5D Method

Paradigm Change



Construction Project Processes



What are our next steps?

- Integrate more disciplines:
- MEP (analysis, design, collision checks)
- Infrastructural design
- 4th dimension with equipment and site installation
- Controlling of execution of construction

Where are our limits?

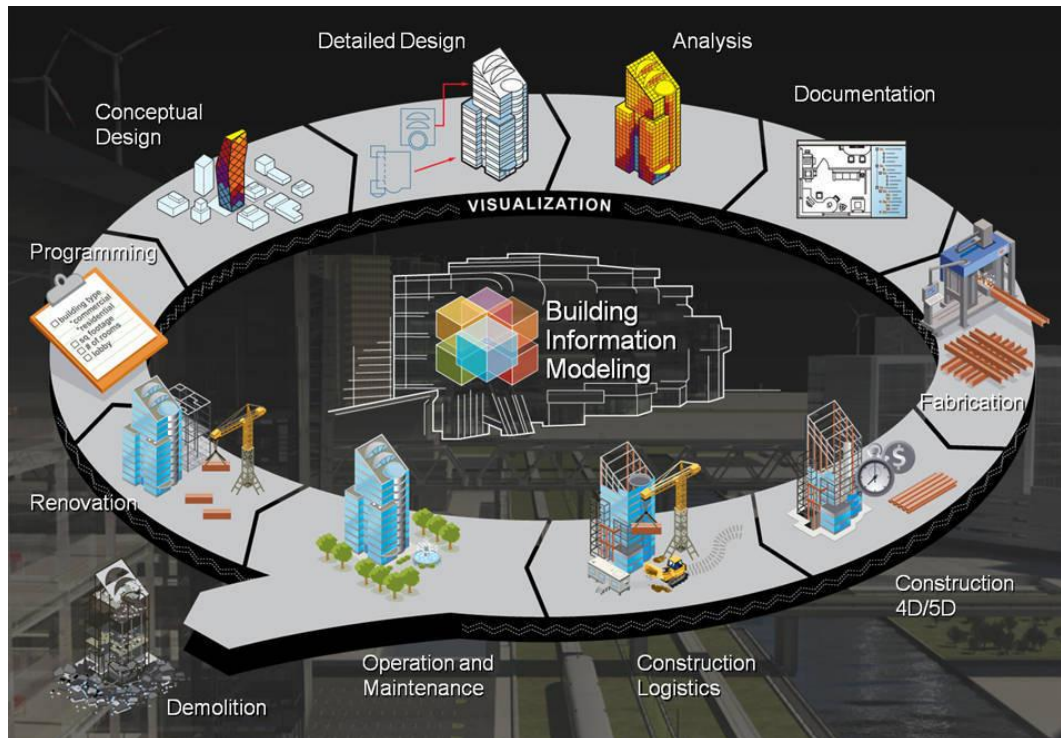
- Databases are very big for infrastructural design
- International BIM standards for cooperation with stakeholders
- Company policies have to be established
- Own content has to be developed and tested
- Team has to be trained and needs more time in learning curve

Where are our benefits so far?

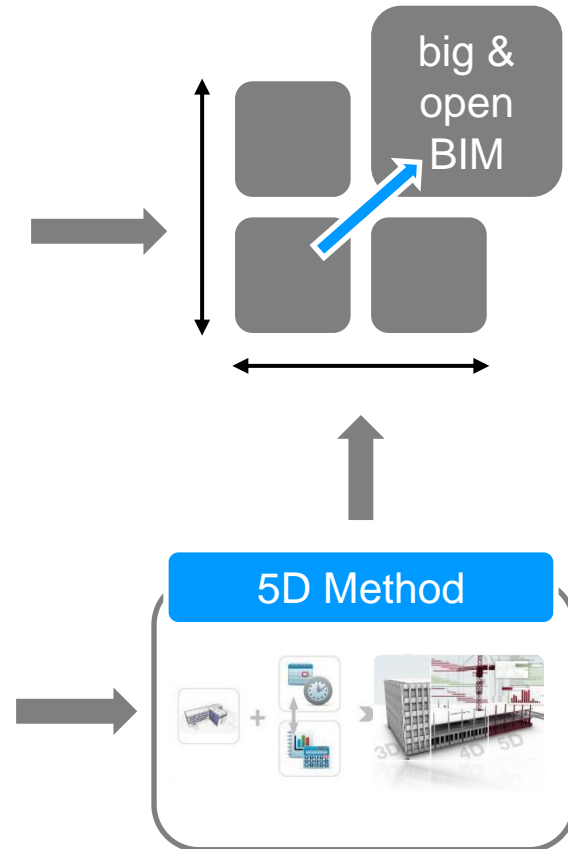
- More stakeholders adapt the 5D method
- Quantities
- Change management
- Simulation
- Easier comprehension of visualized structures
- Collision checks
- Big share of entire project life cycle in „one“ hand

Way Forward with 5D

at Julius Berger



Source: Autodesk



Thank You.
Markus Rambach

