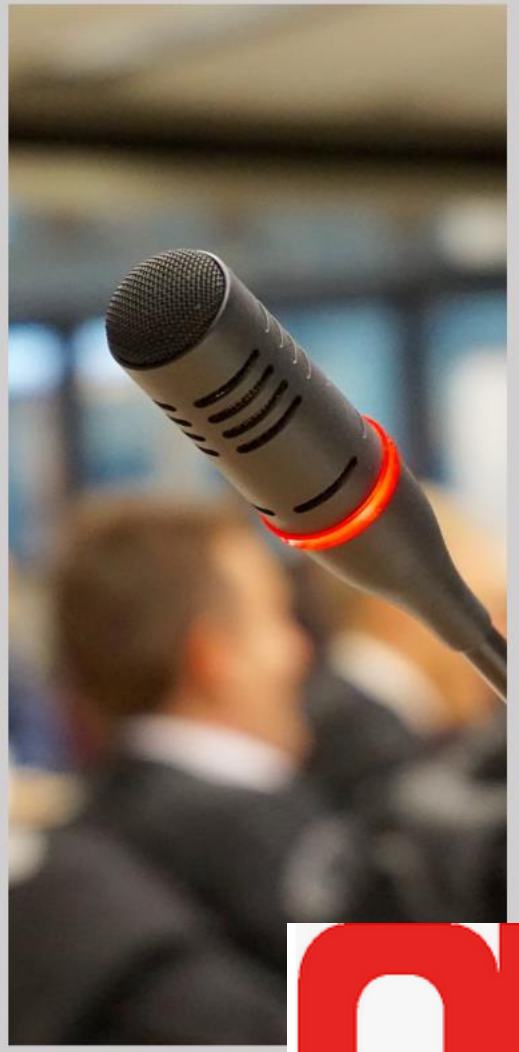

Herimanosi A Madzokere

Building Information Modelling (BIM) and Internet of Things (IoT), a great impact in the facilities management fraternity

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OK ZIMBABWE LIMITED

OVERVIEW

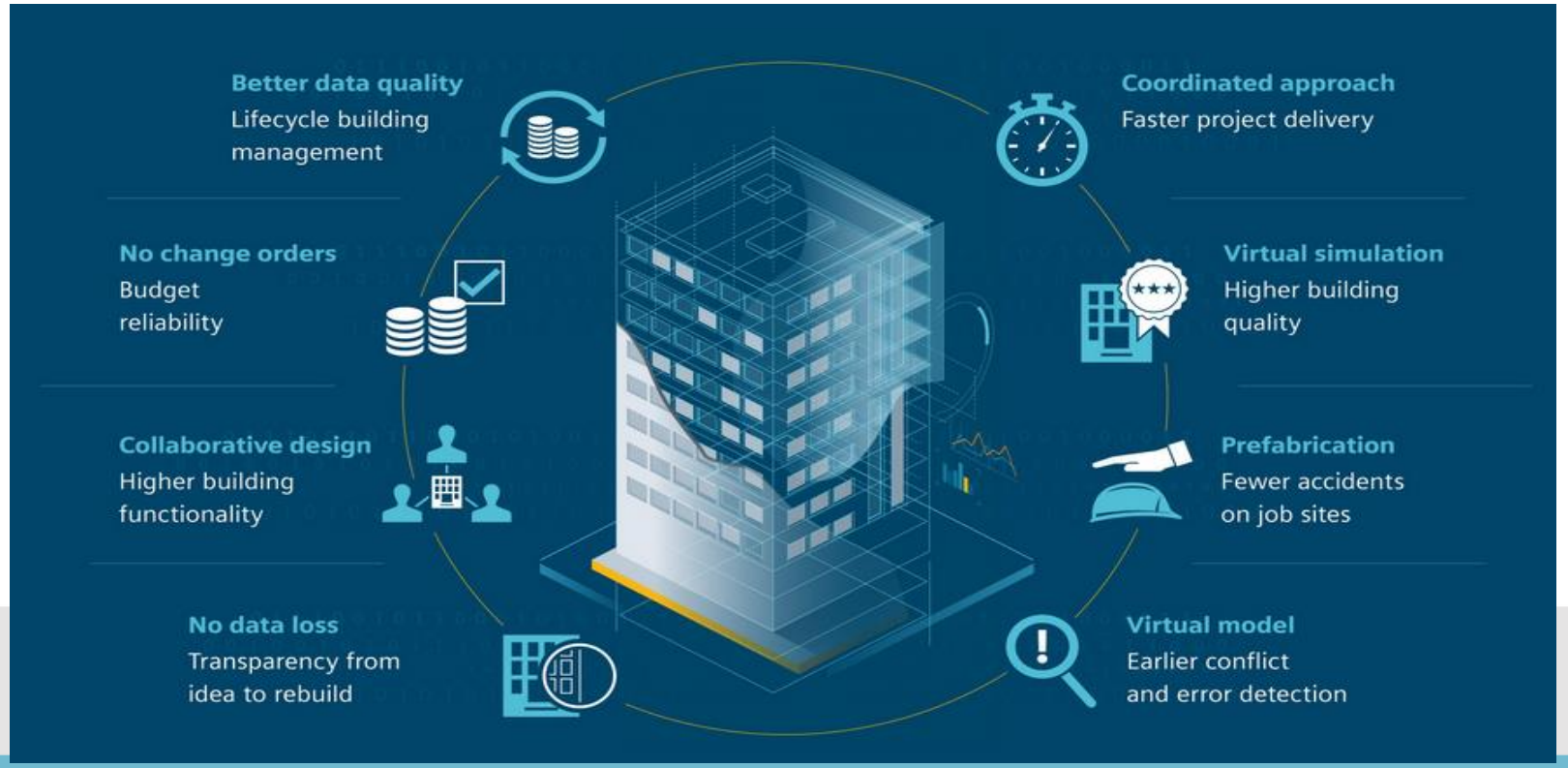
- What is BIM? and What is IoT?
- The outlook of African Construction and Facilities Industry without BIM
- Practical applications and benefits of this digital world evolution
- Benchmarking and steps to adopt BIM

BUILDING INFORMATION MODELLING

BIM is a “digital representation” of a building’s physical and functional properties and characteristics.

It is a 3D model – based process that provides AECF professionals information and tools to efficiently plan, design, construct and manage buildings and structures (throughout their lifecycle)

BUILDING INFORMATION MODELLING



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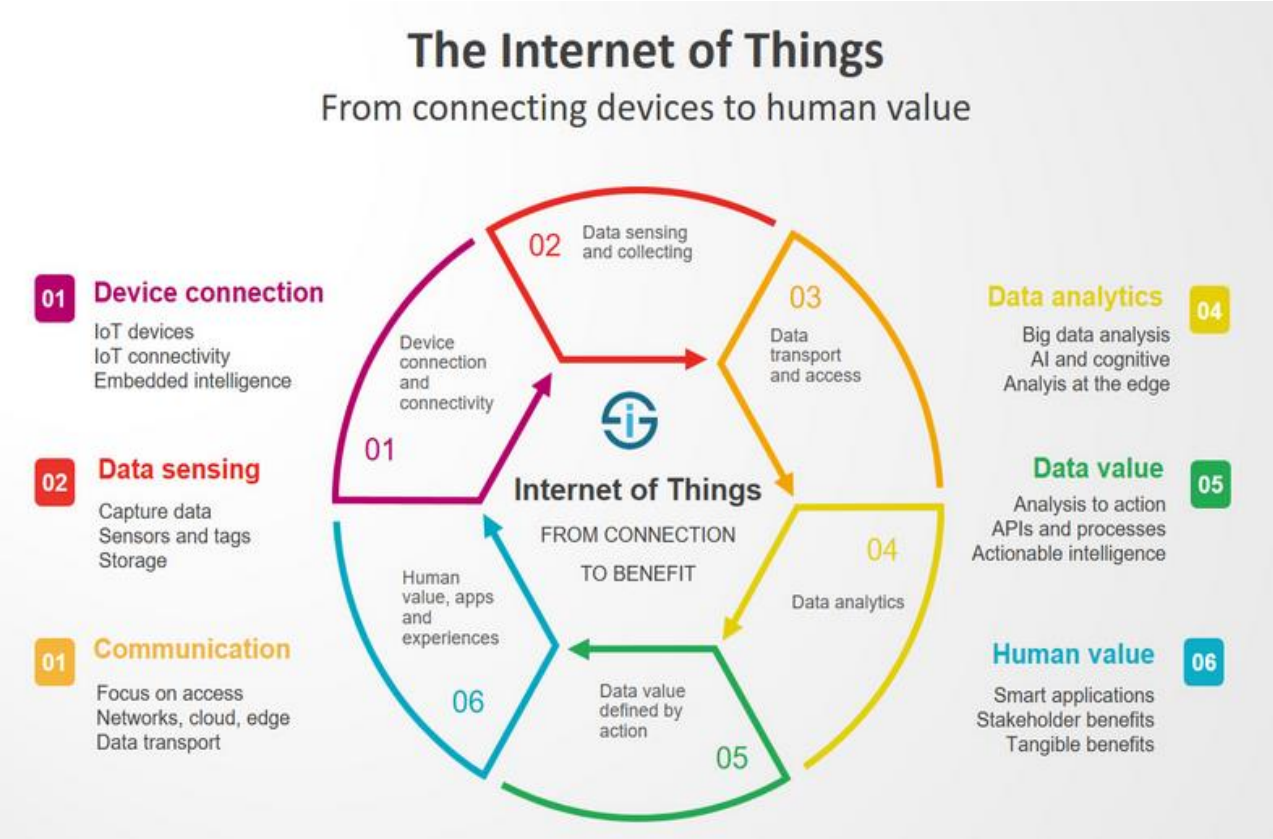
WHAT IS INTERNET of THINGS (IoT)?

The interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data.

The global network of physical objects embedded with electronics, software and sensors, and the ability to transfer data over a network without requiring human to human or human to computer interaction.

HOW IoT WORKS



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OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

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OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- In 2018, infrastructure development of projects tracked by Deloitte were valued at US$471 billion.
- This includes a total of 482 projects valued at US$50m or above.
- Governments were the main owners of the projects with 364 projects which translates to 75.5%.
- Private domestic firms had 9.3% with the remaining left for FDIs

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- Statistics from the World Bank have also shown huge infrastructure investments done by the African Countries.
- This is in terms of the Gross Fixed Capital Formation (GFCF) as a percentage of Gross Domestic Product (GDP).
- GFCF includes improvements and the construction of infrastructure by both the private and public sector.
- On average, African countries have a percentage between 10% and 20%.

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- Example, according to the World Bank 2018, GFCF as a percentage of GDP for South Africa is about 19% which translates to USD66 billion investment in infrastructure, considering GDP is USD349.5 billion.
- However, a rule of thumb is that economies that are investing approximately 30% of GDP into GFCF are better performers and able to create an environment conducive to growth.
- Only Ethiopia has consistently spent over the required 30% of GDP on GFCF, spending the equivalent of 39% of GDP in 2017.
- There is room for improvement if resources are utilized effectively!

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- Worryingly, studies have shown that 9 out of 10 global major projects ventures off track, and this is mainly budget and time overruns. It is suggested that this could be as high as 183% for cost overruns and 70% for time overruns.
- Averagely, 30% of construction cost is rework, attributed to design error, contractor error and scope changes from client.
- The overruns and reworks translates to significant financial losses that can be minimized or prevented by use of the Building Information Modelling process.

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- South Africa's role as host of the 2010 FIFA soccer world cup resulted in the construction or upgrading of 10 soccer stadiums as well as other transport infrastructure upgrades.
- Although all 10 stadiums were completed in time, there was a total budget overrun of us$267 million.
- This is said to be due to lack of communication and late issue of instructions among other things.

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- Without BIM projects implementation face challenges due to incomplete design documentation.
- Other causes leading to poor projects delivery are:

1. Decisions are based on the lowest price rather than the best value
2. Significant problems in project leadership continuity
3. Poorly defined contracting strategies and structuring of the project management team

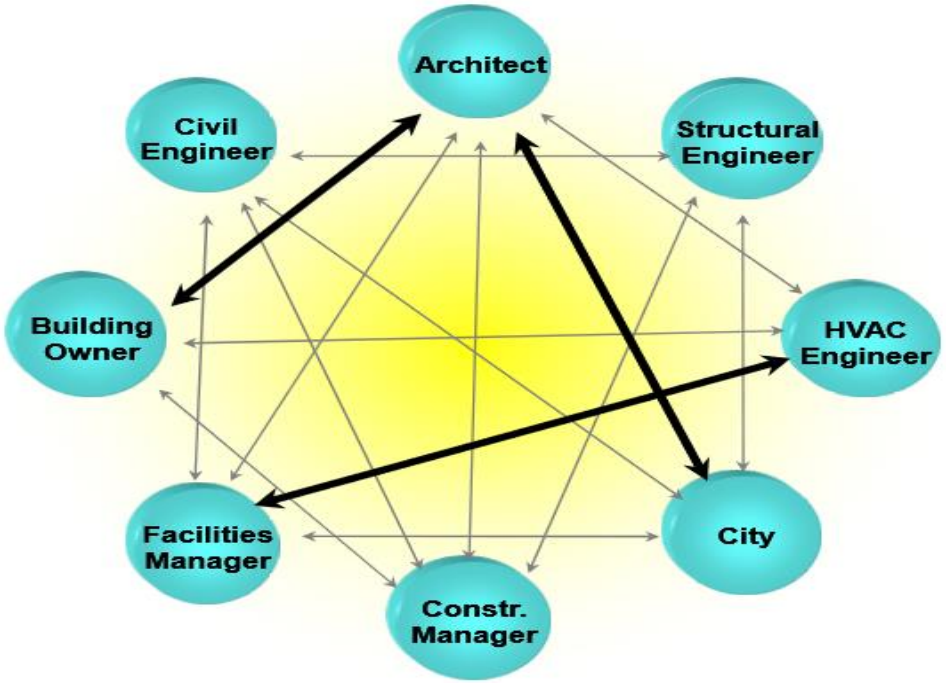
- The implementation of BIM process is a valuable prescription to these troubles!!!

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA

- The handover of projects to Owners/Facilities Managers has always been a rough terrain

- Construction project managers handover huge piles of 2D drawings, blueprints and manuals to Owners/Facilities Managers

OUTLOOK OF THE CONSTRUCTION AND FACILITIES INDUSTRY IN AFRICA



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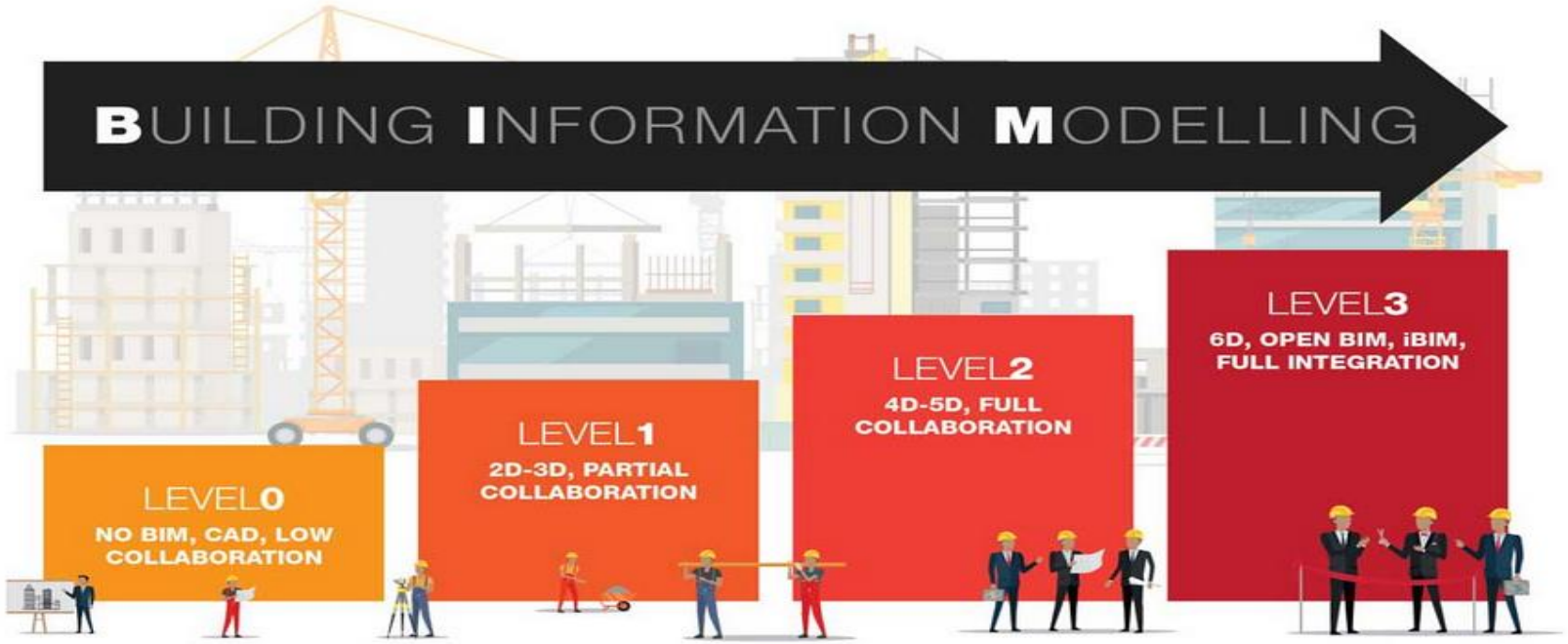
LEVEL OF BIM MATURITY IN AFRICA

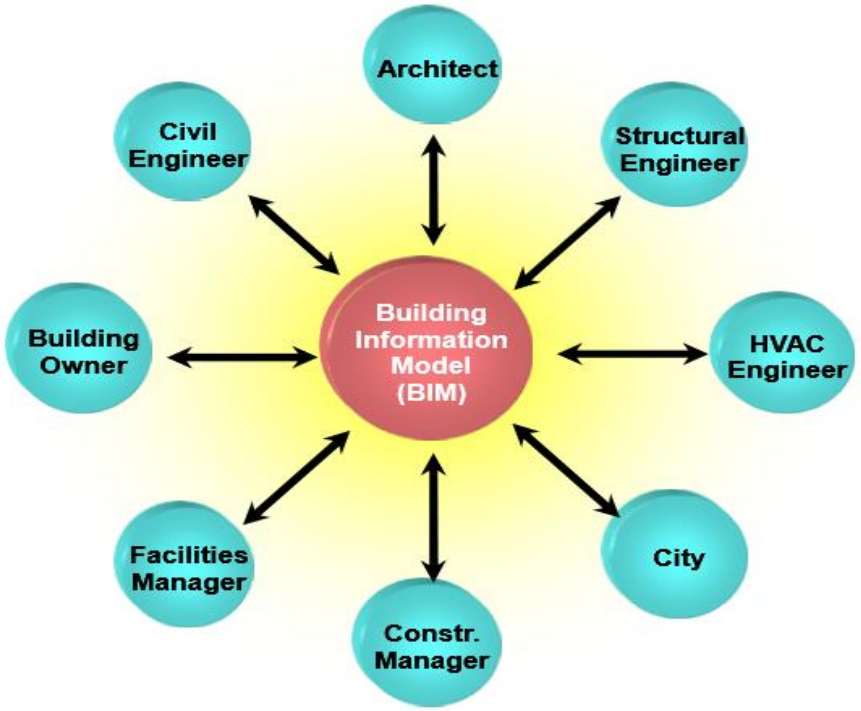


LEVEL OF BIM MATURITY IN AFRICA

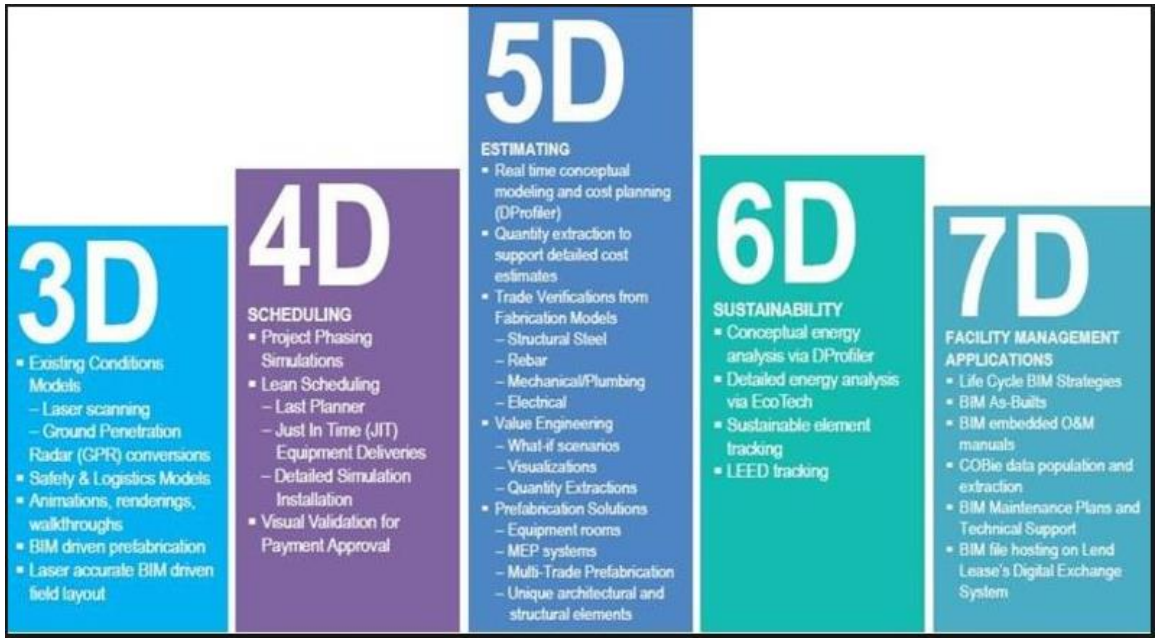
- Ethiopia is the only country in the process of adopting BIM through its Government Ministries
- This effort to embrace the BIM technology by Ethiopia translates to its above par investment in infrastructure development. This is shown by its GFCF which is more than 30% of its GDP.
- Research has shown that other African Governments are still miles away and not moving closer to mandating BIM
- The governments are at Level 0, only 2D CAD drawings are utilised
- The private sector has mainly moved to Level 1, where 2D and 3D drawings are used, though without collaboration with data.

PRACTICAL APPLICATION AND BENEFITS OF BIM

- Integrated project delivery
- Foundation for effectively reducing Facilities Life Cycle Costs
- Design for Maintainability

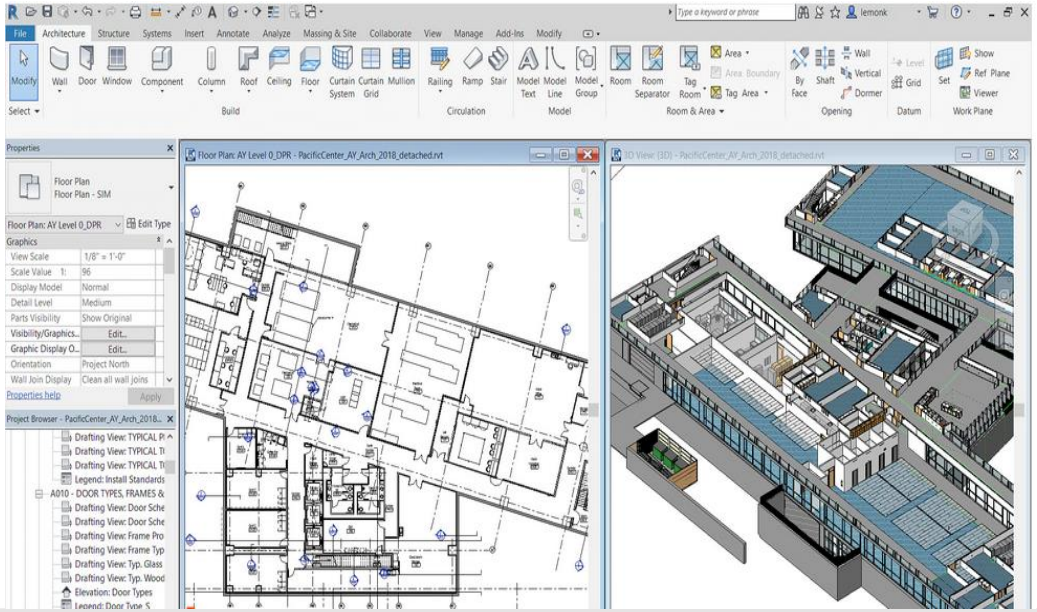


PRACTICAL APPLICATION AND BENEFITS OF BIM



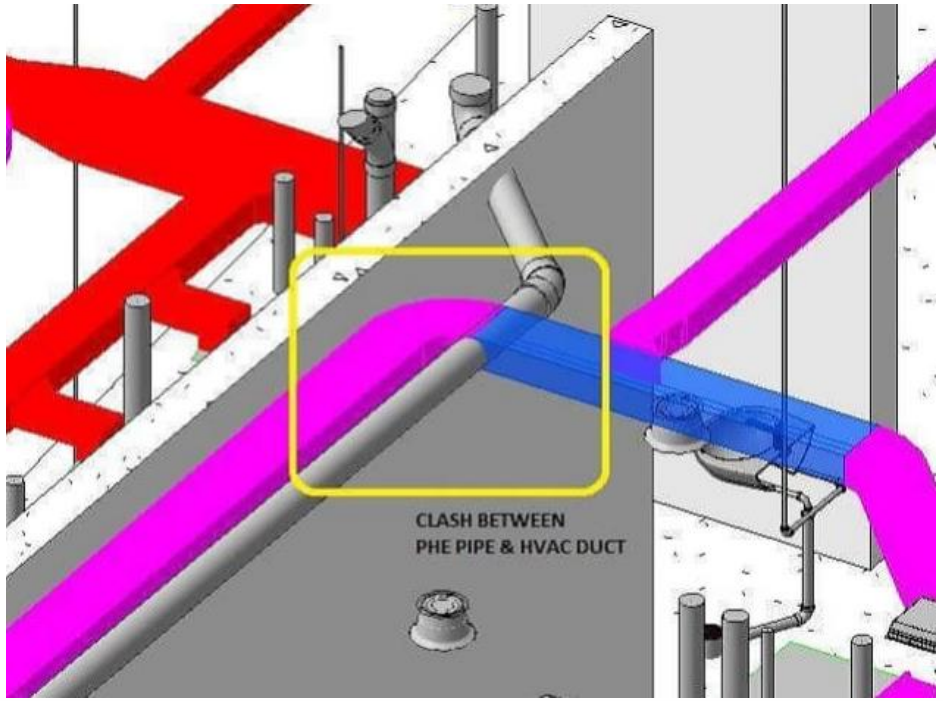
PRACTICAL APPLICATION AND BENEFITS OF BIM

- 3D Visualisation and walk throughs



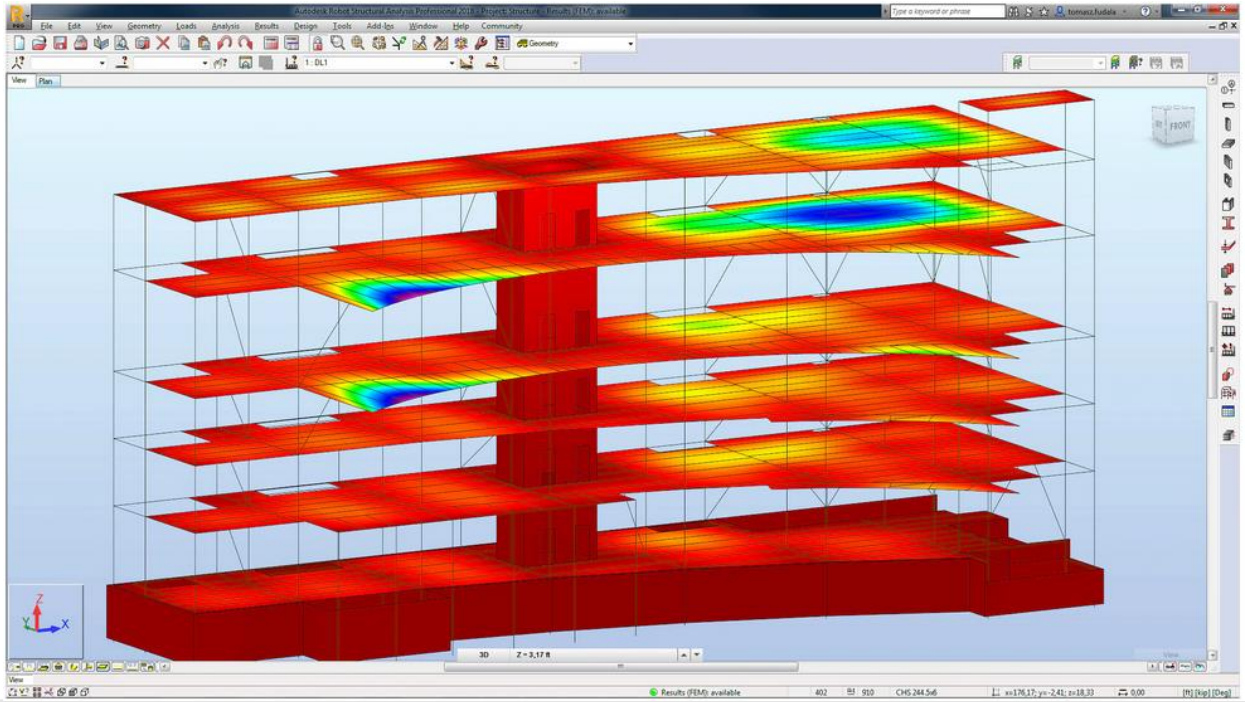
PRACTICAL APPLICATION AND BENEFITS OF BIM

- Project schedule management, through clash detection and elimination of reworks.
- Project real time cost/budget management



PRACTICAL APPLICATION AND BENEFITS OF BIM

- Simulations for building sustainability- Energy, Material Strength, HVAC, Lighting lux level



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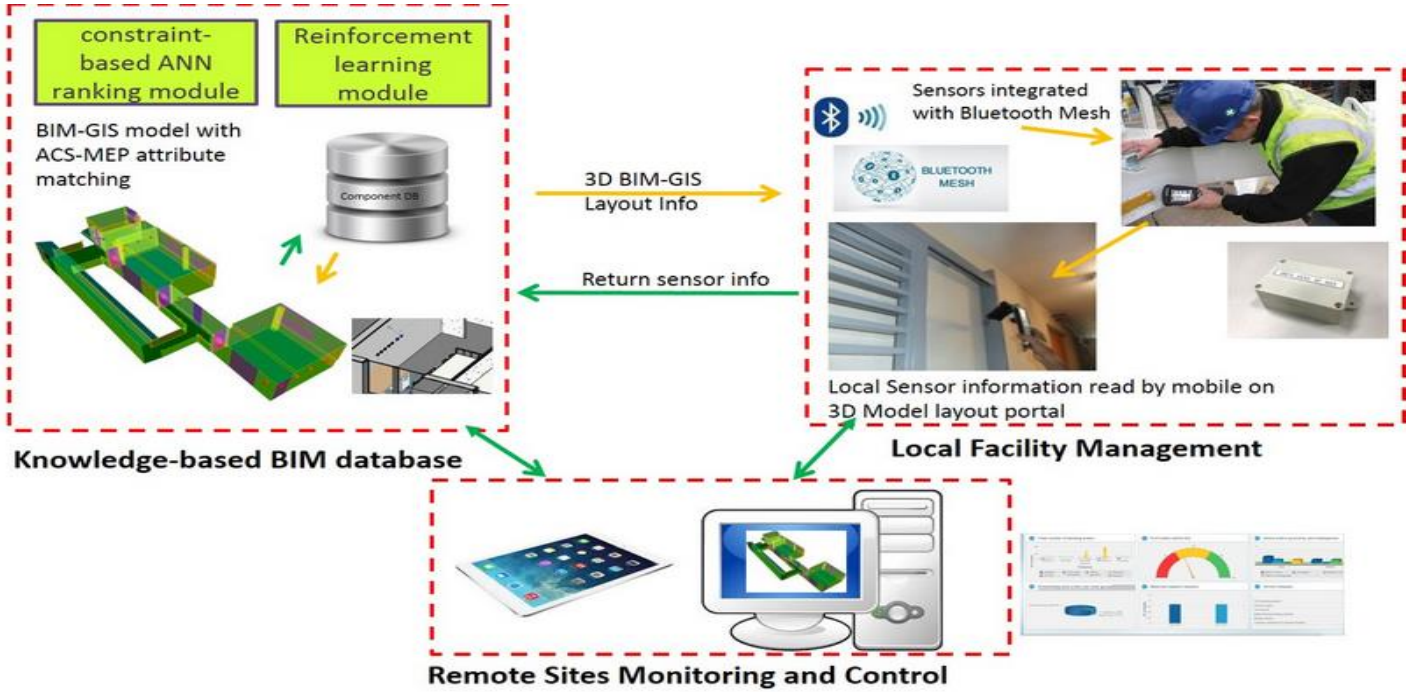
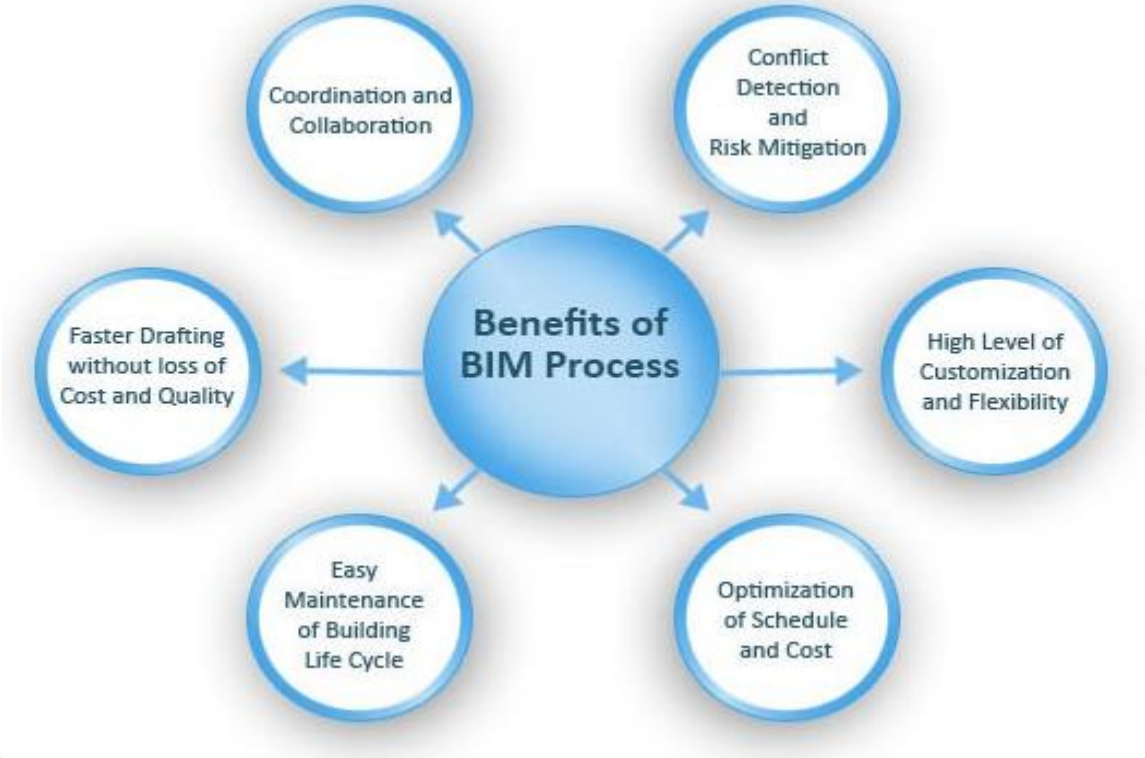
PRACTICAL APPLICATION AND BENEFITS OF BIM

- Facilities Management,

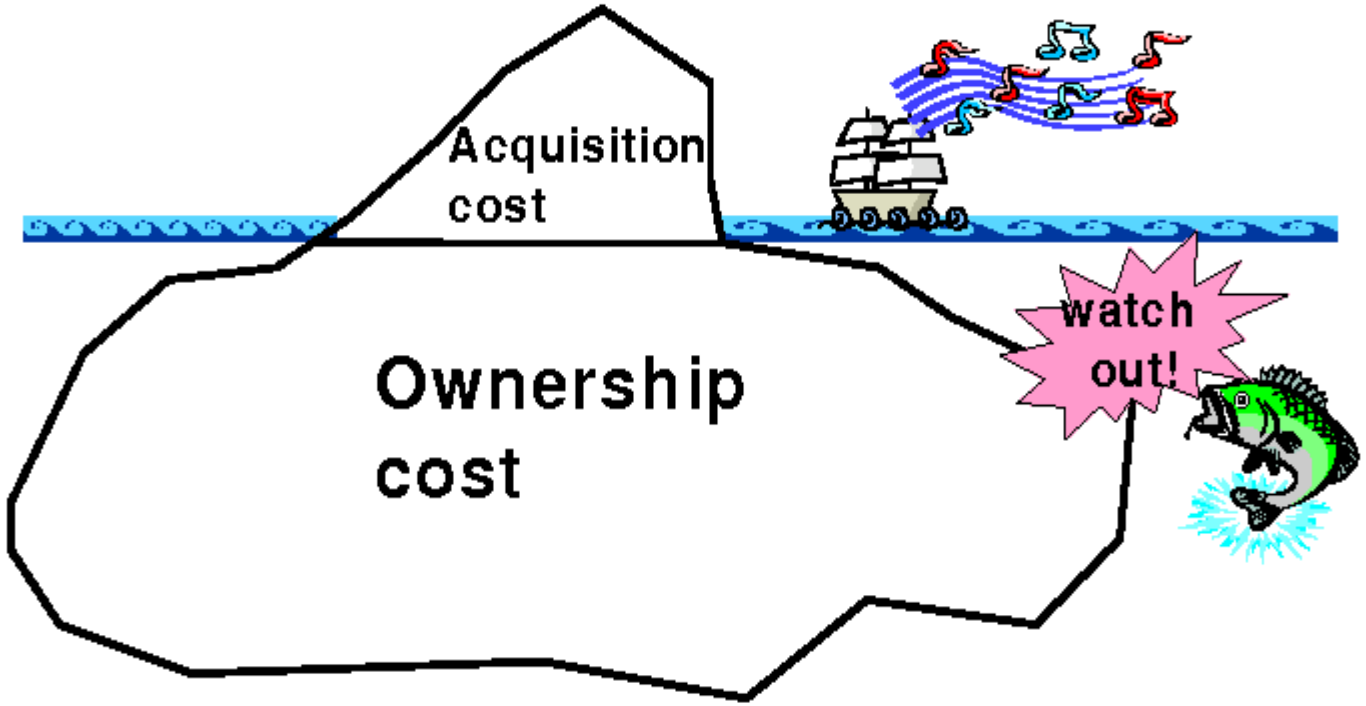
  BIM integrated with IoT



PRACTICAL APPLICATION AND BENEFITS OF BIM



BIM EMPOWERS FACILITIES MANAGERS/OWNERS



BIM EMPOWERS FACILITIES MANAGERS/OWNERS

- Transparency in budget and initial capital outlay
- Improve building quality
- Significantly reduce lifecycle cost through participating in design
- Better understand design projects from beginning to end
- Optimize operational efficiencies
- BIM can be integrated with IoT to enhance Facilities Management

WHAT STEPS CAN BE TAKEN TO ADOPT BIM?

- Firstly, we need not to re-invent the wheel, as Africa we need to benchmark with those who have since embarked on the amazing journey of BIM implementation.
- Secondly, we need to understand that BIM is not a software, it's a PROCESS.

BENCHMARKING (Case Study: The United Kingdom)

- Around the year 2008 to 2009, construction industry was ‘terrible’ in the United Kingdom
- Building was too expensive, never completed in time and upsetting clients
- In 2009, Construction Excellence submitted a report to the UK Government confirming the non-performance of the construction industry.
- The government decided to address the issue

BENCHMARKING (Case Study: The United Kingdom)

- Two years later, in 2011, the UK's BIM Strategy was issued as part of the Government's Construction Strategy.
- The strategy set a mandate for the use of collaborative BIM (Level 2) on all centrally built assets across all government departments by 2016, which is a 5 year period.
- The Government took the lead to make clear the vision and benefits of adopting BIM
- Government fully sponsored this initiative 5 million British Pounds was granted to for the UK BIM Task Group.
- The Task Group worked with the industry to define new ways of working and standards.

BENCHMARKING (Case Study: The United Kingdom)

- The UK decided to adopt BIM for strategic and economic reasons:

1. 33% cost reduction in the initial costs of construction and whole life cost (LCC) of built assets
2. 50% reduction in the overall time from inception to completion for new build and refurbished assets
3. 50% reduction in greenhouse emissions in the built environment
4. 50% reduction in the trade gap for construction products and materials

BENCHMARKING (Case Study: The United Kingdom)

- The UK Government's BIM mandate required the supply chain to progressively develop their BIM capability.
- A term of 5 years was deemed sufficient for the industry to adapt its processes and increase training and skills
- The UK BIM Task Group also made freely available the British Standards and other relevant information
- BIM was mandated successfully in April 2016!

ADOPTING BIM AS A PROCESS

- The ‘Baron of BIM’, Vaughan Harris- through the BIM Institute, and BIM Africa are doing a fantastic work in advocating for the adoption of BIM
- It is now left for the industry and governments not to be change blockers.

STEPS TO ADOPTING BIM

- Collectively challenge the status quo
- Honestly review current construction/facilities operations
- Identify gaps
- Find the need to adopt BIM and be convinced (consider its applications and benefits)
- Call for training for all stakeholders
- Consider BIM tools and software favourable to your needs. Remember, software is just 10% of the BIM process

STEPS TO ADOPTING BIM

- On your first project to implement BIM, simultaneously run the process with your traditional method
- Evaluate both processes and give feedback on areas to improve
- Get more training
- Do more implementation and training iterations until the BIM process results are achieved. Do not despair! It’s a tried and tested process
- Integrate with Internet of Things to reap more!

ADOPTING BIM AND IoT TECHNOLOGY

Lastly, who can adopt?

- Owners
- Facility Managers
- Architects
- MEP and Structural Engineers
- Quantity surveyors
- Construction Managers
- The list is endless

NO ROLE IS MADE REDUNTAND, LET US ALL EMBRACE!!!

WHATS NEXT? LEST GO FOR IT!

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END OF PRESENTATION

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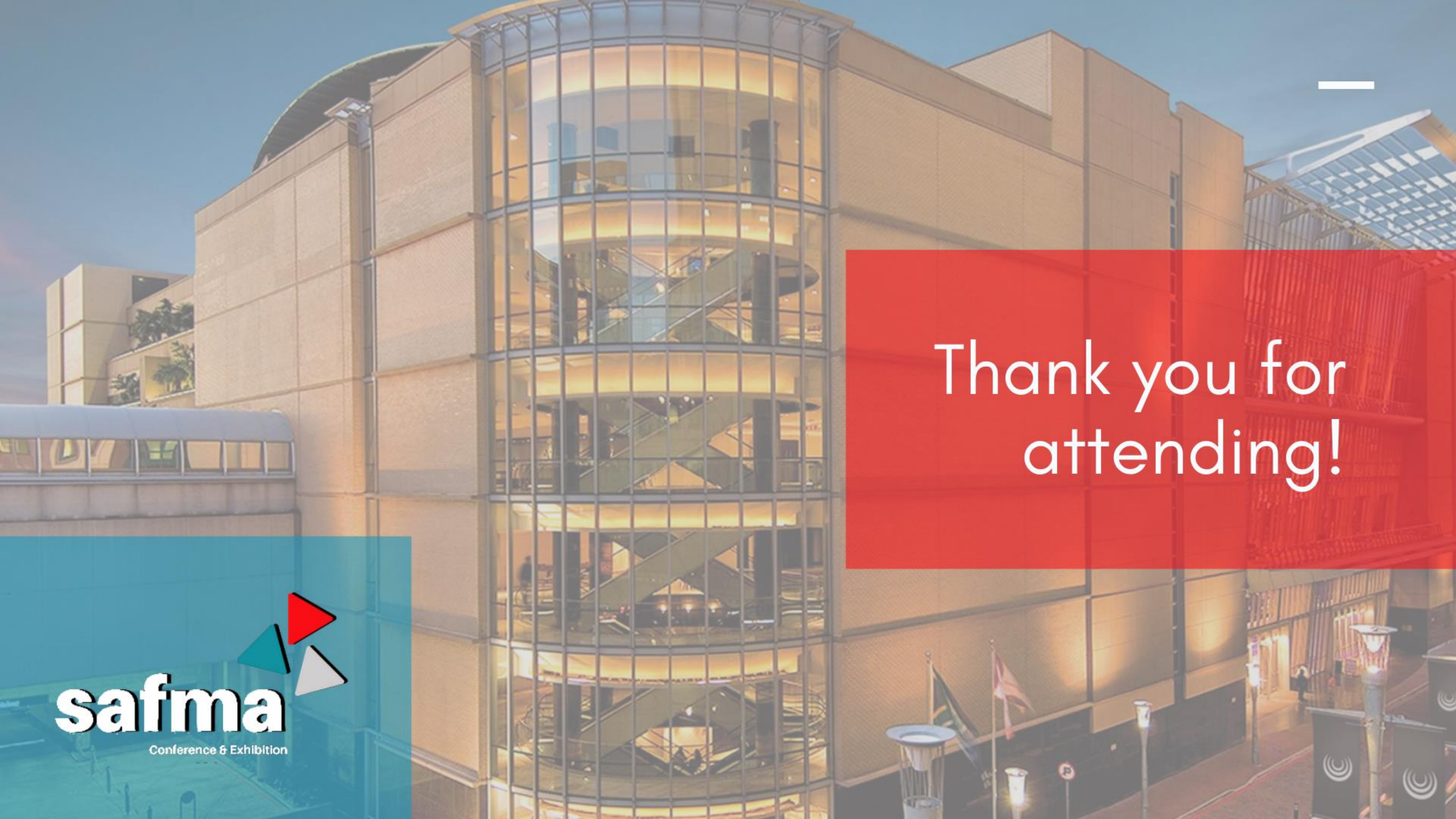
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