

FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

Presented by the FIG Working Week 2019,
April 22-26, 2019 in Hanoi, Vietnam

"Geospatial Information for a Smarter Life
and Environmental Resilience"



ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



5-DIMENSIONAL BIM AND THE CHALLENGES OF ADOPTING MEASUREMENT STANDARDS

FIG WORKING WEEK 2019 CONFERENCE 22-26 APRIL, 2019, HANOI, VIETNAM

By: Amuda-Yusuf Ganiyu (PhD, FNQS,RQS)

Department of Quantity Surveying, Faculty of Environmental Sciences University of Ilorin, Ilorin, Nigeria

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



PRESENTATION OUTLINE

- Traditional Quantity Surveying
- BIM – Based Approach
- Classification Systems
- BESMM4 and the Challenges of Automation
- Conclusion

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



TRADITIONAL QUANTITY SURVEYING PRACTICE

1

Quantity Take-off (QTO) is generally performed manually or the use of software packages for QTO from 2D or 3D CAD drawings.

2

Using software applications QS still have to manually extract useful information from printed drawing set or CAD drawings.

3

Transferring dimensions to sheets or spread sheets AND carrying out cost estimates or interim payment assessment

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



ISSUES WITH TRADITIONAL PRACTICES

- Focus on drawing production
- Projects information in multiple files and format
- Difficult to manage changes late in the design
- Design intent and cost data are often separated and isolated in different digital environments
- Risk of data loss during multidiscipline coordination
- The practice is time consuming, inefficient & susceptible to human errors.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



BIM EVOLUTION AND MEASUREMENT STANDARDS

- ❑ BIM holds great promise for addressing these challenges by using automated BIM QTO tools.
- ❑ BIM-based QTO provides **simpler** and yet more **detailed** and **accurate** cost estimates of the project.
- ❑ Information is usually exchanged between the BIM and cost estimation software in one of two ways:
 - ❑ Both systems use the **same** proprietary format for product data definition and the exchange is done smoothly without loss of data.
 - ❑ The systems use **different** proprietary formats and the exchange is done by converting the data to a third, common format, usually the Industry Foundation Classes (IFC).
- ❑ **HOWEVER**, the rules of measurement would be required to provide the basis for codified framework for cost planning (Matipa, Cunningham, & Naik, 2010).

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



- ❑ IFC is an industry-wide open and **neutral data exchange format** that will interact with the majority of **measurement** software.
- ❑ **Project information and specifications** need to be organized in a structured format to ensure **interoperability** and processes such as cost planning to take place.
- ❑ **Designers** do not always design in a way that easily aligns to **measurement standards**.
- ❑ Popular BIM tools cannot manipulate data in line with the rules of **measurement standards**.
- ❑ Hence, the need for a system to **classify construction information**

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CONSTRUCTION INFORMATION CLASSIFICATION SYSTEMS (CICS)

- ❑ CICS IS defined as A standard representation of construction project information Carlos and Soiberman (2003).
- ❑ The classification structure in CICS provides a common framework for improving organisation and coordination of information in construction projects.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CONSTRUCTION INFORMATION CLASSIFICATION SYSTEMS

S/No.	CLASSIFICATION SYSTEMS	COUNTRY
1	MASTERFORMAT and UNIFORMAT (NOW IN OMNICLASS CONSTRUCTION CLASSIFICATION SYSTEMS- OMCCS)	US & CANADA
2	COMMON ARRANGMENT OF WORK SECTIONS (CAWS) UNIFIED CLASSIFICATION FOR THE CONSTRUCTION INDUSTRY (UNICLASS, 2, 15)	UK
3	NATSPEC CLASSIFICATION SYSTEMS	AUSTRALIA
4	CODE OF PRACTICE FOR CLASSIFICATION OF CONSTRUCTION COST INFORMATION & CODE OF PRACTICE FOR CLASSIFICATION OF CONSTRUCTION RESOURCES INFORMATION	SINGAPORE

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CLASSIFICATION SYSTEMS & MEASUREMENT STANDARDS

Singapore

Singapore's Core IT Practice for Classification of Construction Cost Information (SS CP80 : 1999)

Comprises of:

- an elemental classification
- a work-section classification
- a mapping dictionary for elements and work sections
- a set of guidance notes

Aligned with Construction Electronic Measurement Standard adaptable for model quantity extraction in BIM

CP CP 97 –
CEMS

United
Kingdom

Common Arrangement of Work Sections (CASWS) and Unified Information Classification Systems (Uniclass).

- CAWS – work section classification format
- Uniclass – Section J contain CAWS and Section G. Building Elements

SMM7

SMM7 is aligned with CAWS

United
Kingdom

BCIS: Elemental Standard Form of Cost Analysis (SFCA)
The RICS New Rules of Measurement (NRM) is aligned with the SFCA

RICS NRM

Australia

ASMM5

National Specification Systems of Australia (NATSPEC). Australian Standard Method of Measurement of Building Works (ASMM5)

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CLASSIFICATION SYSTEMS

In the US: Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC) developed:

- Masterformat for work results &
- Uniformat for Elements. Construction Specifications Institute (CSI)
- OmniClass was developed by the International Construction Information Society (ICIS) & incorporates both Masterformat & Uniformat: -**ISO 2006-2**

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



In the UK:

- ❑ The development of **CAWS** was based on the outcome of the work of Co – ordinating Committee for Project Information (CCPI) (Seeley, 1989) Now **CPIC** Construction Project Information Committee
- ❑ The **CPIC** was sponsored by the:
 - ❑ Royal Institute of British Architects (RIBA);
 - ❑ the Royal Institution of Chartered Surveyors (RICS),
 - ❑ the Construction Confederation (CC),
 - ❑ the Institution of Civil Engineers (ICE),
 - ❑ the Chartered Institution of Building Services Engineers (CIBSE) and
 - ❑ The Chartered Institute of Architectural Technologists (CIAT) (Gelder, 2010)

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



In **Singapore**: Construction Industry IT Standards Technical Committee (CITC) & the Construction and Real Estate Network (CORENET) Developed the following Standards:

- Code of practice for classification of Construction Cost Information - SS CP 80:1999
- Code of Practice for Construction Computer – Aided
- Code of practice for Classification Construction of Construction Resource Information – SS CP 93:2002.
- Code of Practice for Construction Electronic Measurement Standards (CEMS)
- Code of practice for Information Exchange and Documentation.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CLASSIFICATION SYSTEMS

In Australia:

- Australian NATSPEC was developed and published by the Construction Information Systems Australia (CISA) in 1975 last update was 2007;
- Arranged around work sections
- NASPEC also covers tendering procedures, preliminaries, quality assurance and contract issues.
- Basis for AUS-Spec &
- Basis for the 5th Edition of their SMM (ASMM5)

ORGANISED BY



PLATINUM SPONSORS

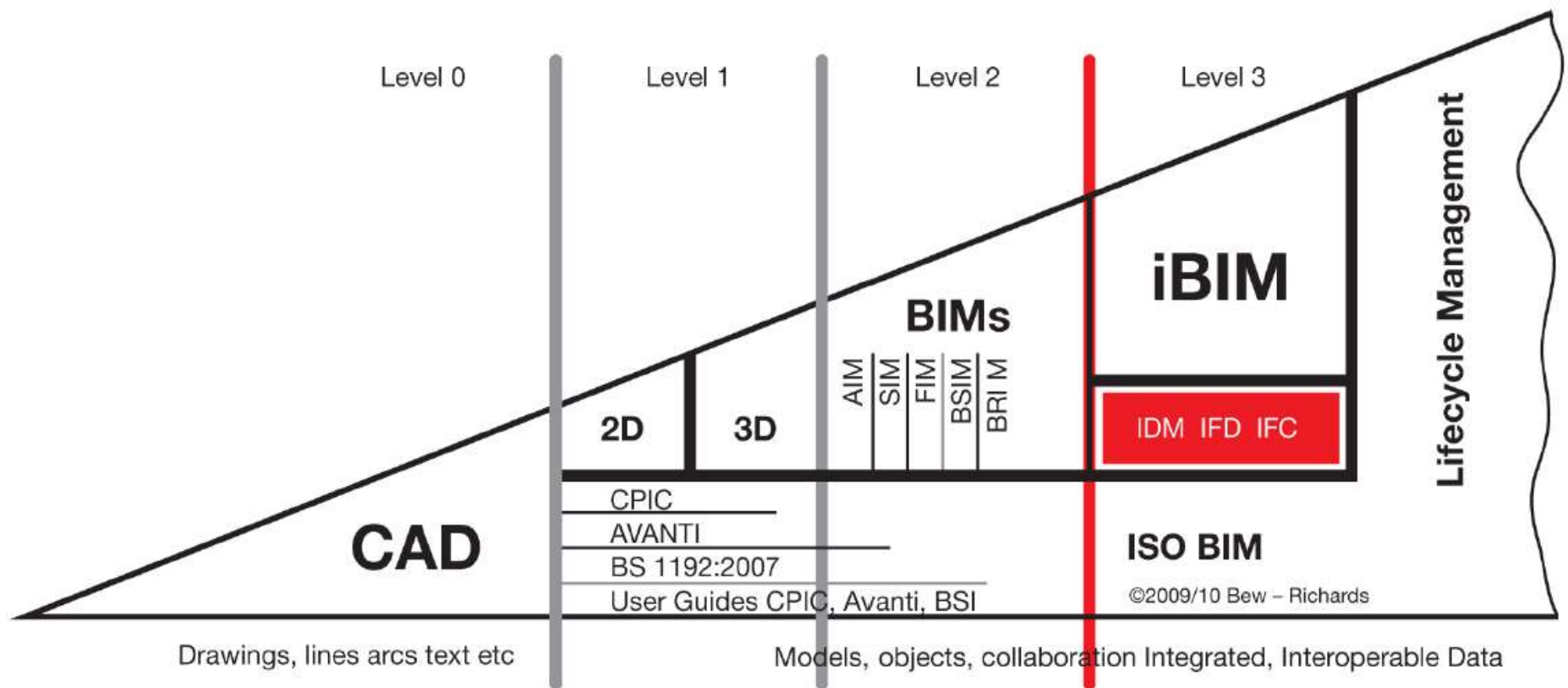




FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



BESMM4 & THE CHALLENGES OF AUTOMATION



- ❑ IFC export shows only **Object based Quantities**
- ❑ Extracting quantities according to the **Standard Method of Measurement** of Building Works requires Information Delivery Manual
- ❑ Maintaining **Object based quantities** with standard based quantities in BIM requires software vendors.
- ❑ There is no holistic solution from **software vendors**
- ❑ **Standard** is required to define QS traditional practices

BESMM4

Building and Engineering
Standard Method of
Measurement
4th Edition

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



BESMM⁴

Building and Engineering
Standard Method of
Measurement
4th Edition

- A review of BESMM3 (UK SMM7 & CESMM3)
- Structure & term of set-out based on UK NRM2, SMM7 and CESMM4;
- prepared by NIQS without consultation with other professionals;
- Only document that mimicked UK classification system; but
- Not aligned with any local classification system;
- Therefore cannot support model-based quantity take- off on collaborative basis;

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



INTERVIEWS CONDUCTED

Organisation Type	Interviews Conducted	Percentage
Contracting	8	30%
Client	7	26%
Consulting	12	44%
Total	27	100

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



Findings from the study shows that:

- ❑ 79% of the participants believed there is no classification systems in the construction industry;
- ❑ 20% have no knowledge of the use of classifications systems;
- ❑ 45% pointed out that there is no relationship in the measurement standard used and industry classification systems; and
- ❑ 10% of the participants stated that they have organisation-based classification system used for BIM projects.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CLASSIFICATION SYSTEMS/CODES IN NIGERIA RESULTS: CHALLENGES OF USING BESMM4 IN 5D BIM

- No specification standards jointly referenced by design professionals in the country;
- Designer firms largely extract specifications from manufacturer's catalogue for integration into their design-lack of specification standards;
- Individual design firms made reference to specification documents built-up over years of practice.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



CONCLUSION

- ❑ THE study discussed traditional QS practice and BIM evolution.
- ❑ The nature of the **construction industry classification systems** used in some selected countries were identified and the relationships between their measurement standards highlighted.
- ❑ The study found that there is lack of common classification system used by industry practitioners that could serve as basis for aligning measurement standards
- ❑ The study also found that QS could champion the course of developing classification systems by way of collaboration with other industry stakeholders. Such standards could in turn be aligned with measurement standard used by Quantity Surveyors.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



IMPLICATION OF THE STUDY

- Extracting quantities IN 5D BIM requires standards to define QS traditional practices and the standard must align with **CICS**.
- Such Standard must align with the requirements of BIM authoring software for efficient quantity extraction.
- In the interim, measurement and quantification may need to continue using 2 D and 3D drawings at industry level.



BESMM 4

Building and Engineering
Standard Method of
Measurement
4th Edition

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



THE WAY FORWARD

RECOMENDATION

- ❑ Collective championing effort among industry players is required to develop construction information classification systems and specification standards for the benefit of the entire industry stakeholders.

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



THANK YOU

FOR

YOUR KIND

ATTENTION

ORGANISED BY



PLATINUM SPONSORS





FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam



"Geospatial Information for a Smarter Life and Environmental Resilience"



ORGANISED BY



PLATINUM SPONSORS

