Life Cycle Costs and International Construction Measurement Standards (ICMS)

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Key words: ICMS, Life cycle cost, Financial management, Construction projects, Global consistency

1. SUMMARY

In this paper, the authors discuss the second edition of the International Construction Measurement Standard (ICMS) which incorporates life cycle costs and was published in September 2019. ICMS are landmark standards because, for the first time, the industry has provided a document that stipulates uniform global standards for costing construction projects and for comparing entire life cycle costs of projects. In doing this, it provides for uniformity in global costing. In an interconnected world, life cycle costs are crucial because they play a pivotal role in the financial management of construction projects; allowing critical decisions to be made regarding the relative importance of capital and longer-term costs, as well as impact asset performance, longevity, disaster resilience and sustainability. It is for this reason that the ICMS Coalition decided to revise and extend the scope of ICMS to incorporate this broader cost classifications. In outlining the tremendous benefits that the second edition of the ICMS brings to investors, financial institutions, and the construction industry as a whole, this paper makes a strong case for why the second edition of the ICMS has ushered the industry into a new era that will bring uniformity, transparency and cost savings in the global construction industry.

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2. INTRODUCTION

The construction industry is becoming more aware of fostering a holistic approach to design, building, and disposal of structures. With a substantial amount of construction budget being spent on repairs, maintenance, renewals and operations, there is a need to appraise and design for dependability, durability and sustainability. The way to do this is to examine how cost is allocated and spent during the lifetime of a building over a given period. This process is known as life cycle costing (LCC). LCC has the advantage of minimizing the cost of a project during its life time. It is used to form, and support decisions as they relate to life cycle cost. It is also used to deliberate on a selection of options while promoting the desirable parts of a project. Further, LCC is used to eliminate the undesirable elements in a construction project. Heralova (2019) defines LCC as "a method of economic analysis directed at all costs related to constructing, operating, and maintaining a construction project over a defined period". In other words, it is the process of compiling all costs that the owner or producer of an asset will incur over its lifespan. The benefit in it is that it is compiled and then reduced to its present value to determine the expected return on investment (ROI) and net cash flows. ICMS is a document put together by ICMS Coalition which provides "global consistency in classifying, defining, measuring, recording, analyzing, presenting and comparing entire LCC of construction projects at regional, state, national or international levels"(ICMS). The ICMS document was produced when it was realized that the global construction industry was not providing adequate global standards for construction costs (Muse, 2019). According to the World Economic Forum research, there has been improvement in design and construction procedures with the use of internationally recognized standards such as International Construction Measurement Standards (ICMS). Suffice to state that the ICMS has brought about data consistency and comparability to the construction industry.

3. LIFE CYCLE COSTS

As a part of the Whole Life Cost (WLC), LCC generally allows critical decisions to be made concerning the importance of capital and longer-term costs that involve asset performance, durability, flexibility and sustainability. LCC consist of an initial investment (usually construction costs) and follow-on costs (ordinary payments, i.e. energy, utilities, cleaning and maintenance, irregular costs for renewal or replacement), while some life cycle costing methods also include the costs of demolition. LCC is useful for estimating total costs in the early stage of a project. The diagram below in Fig 1. adapted from BS ISO 15686-5 illustrates LCC as a part of WLC. For the purpose of clarity, it is important to state that life cycle costs are those associated directly with

constructing and operating the building; while whole life costs include other costs such as land, income from the building and support costs associated with the activity within the building.

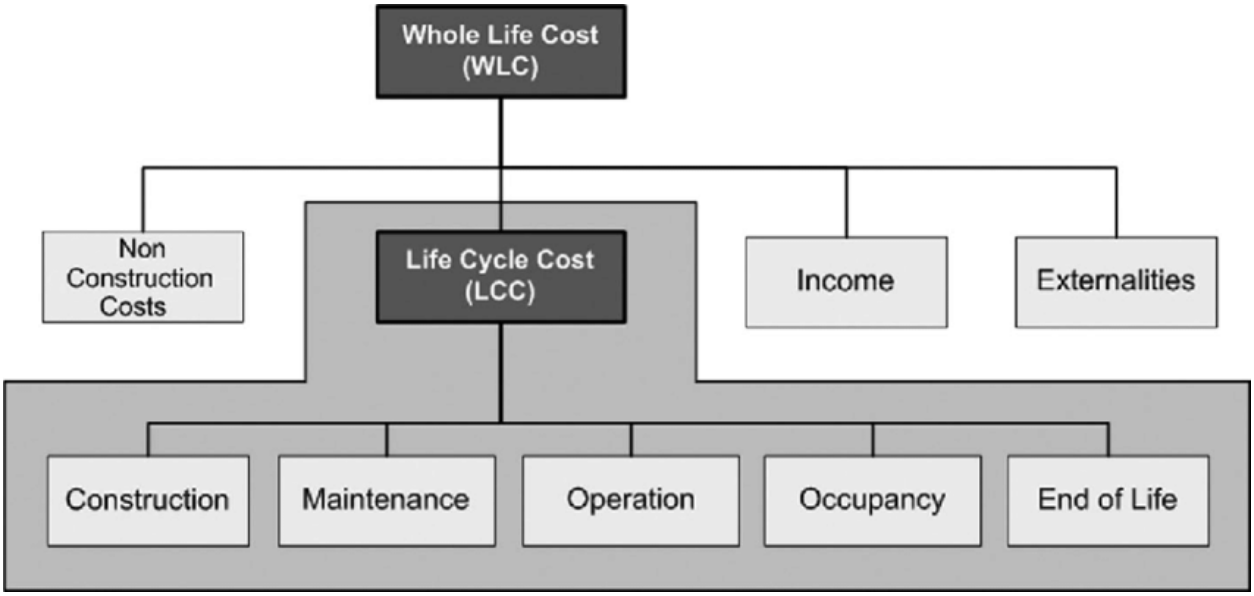

Fig 1. Courtesy BSISO 15686-5:2008 for LCC

3.1 BENEFITS OF LIFE CYCLE COSTING

The optimization of the **life cycle cost** of a project is critical for several decision-making processes:

3.3.1 Design Decisions

Design decisions made at this project phase can determine the whole life effectiveness of a building and life cycle costing, thereby putting economic optimization into the early design stages of a construction project. LCC is often recommended as the method for finding cost-optimal solutions for product design. For example, a high-quality building might also require higher costs in use to maintain its high aesthetic quality in use (Ashworth & Hogg 2000). Indeed, it is becoming the more frequently used tool in the design phase of buildings generally.

3.3.2 Technology Decisions

Decisions concerning the choice of the construction technology and construction materials are no longer based entirely on technical and economic attitudes, but are becoming increasingly influenced by LCC and environmental considerations. In fact, the capability to influence the outcomes of whole life ownership is enormous during the design phase. The types of material

specified and the contracting method have to be chosen directly upon operation and maintenance costs. For example, the quality of workmanship is directly related to the level of maintenance.

3.3.3 Investment Decisions

Returns on invested capital costs are essential in making decisions on investment scenarios (Boussabaine and Kirkham, 2008). Whole life cycle costs provide the required knowledge and information for which LLCs are a part of, therefore investors are increasingly required to abide by it. This is particularly the case when meeting the objectives of sustainable buildings and dealing with limited financial resources. Further, as it relates to investment decisions, data is a useful benchmark for boosting confidence in project financing, investment, programme and decision-making and related purposes.

4. INTERNATIONAL CONSTRUCTION MEASUREMENT STANDARDS (ICMS)

4.1 Objectives and Benefits Of ICMS

The first edition of ICMS focused on creating a standard for capital cost reporting. The second edition has built upon the first edition by creating LCC classification for acquisition, renewal, operations, maintenance and end of life costs - CROME (Fig 2). Both building and LCC cover classification, definition, measurement, recording, analysis, presentation and comparison of costs.

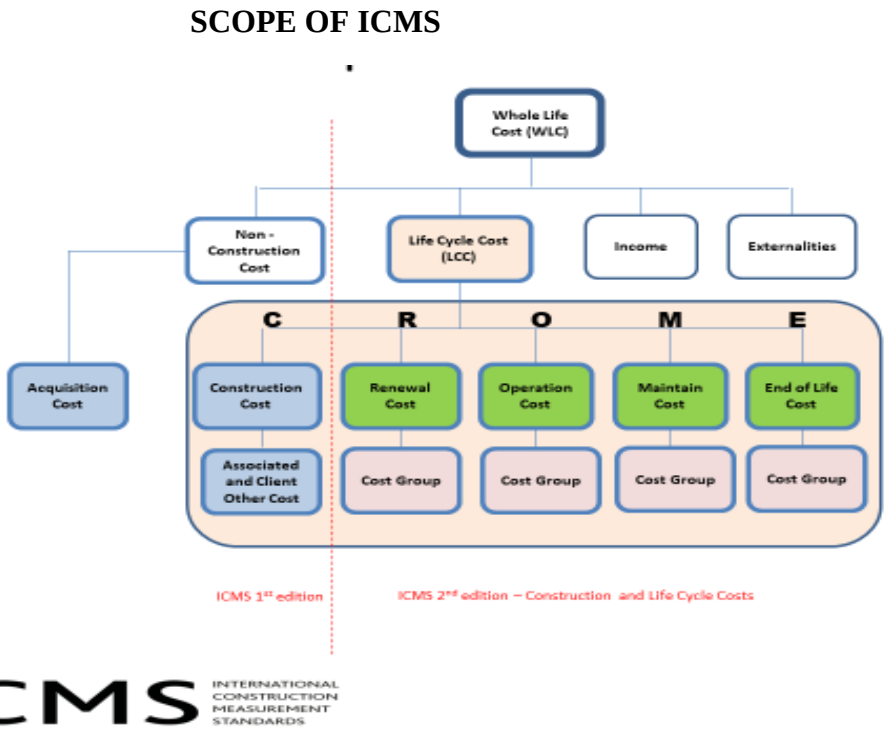

Fig 2. Courtesy ICMS (2019)

Different countries adopt different costing standards depending on various factors unique to them. This creates challenges in comparing project construction costs as well as constitute investments risks. Further, the adoption of ICMS standards promotes transparency and consistency across the globe with a focus on cross-boundary construction costs (Lian et al, 2017). Some of the advantages of adapting international ICMS standard include:

- it can be used as a benchmark
- variances in the costs can be easily detected.
- properly informed decisions on the design and location of construction projects can be made
- international investment decisions can be made
- global and accurate country and regional construction costs can be compared
- feasibility studies and appraisals can be carried out
- costs analysis, modeling, planning, control and procurement including tender analysis can be done
- disputes can be resolved
- reimbursement for insurances costs can be undertaken
- assets and liabilities can be estimated (Lian et al, 2017)

These objectives are all feasible through the evaluation of life cycle costs of different projects provided by International Construction Measurements Standards.

4.2 Beneficiaries of ICMS Life Cycle Costing

These include but are not limited to:

- Persons or organizations looking to invest in construction projects
- Stakeholders in the Construction Industry
- Construction Cost Management experts
- Financial Institutions who are looking for a basis to assess funding requirements
- Governments and the public who require prudent assessment of construction project costs

4.3 ICMS Framework and Classifications

ICMS has a very high-level structure framework which consists of four (4) levels of classification namely: 1. Project/Sub-projects, 2.Cost Categories, 3. Cost Groups and 4. Cost Sub-groups as shown in figs 3 -6.

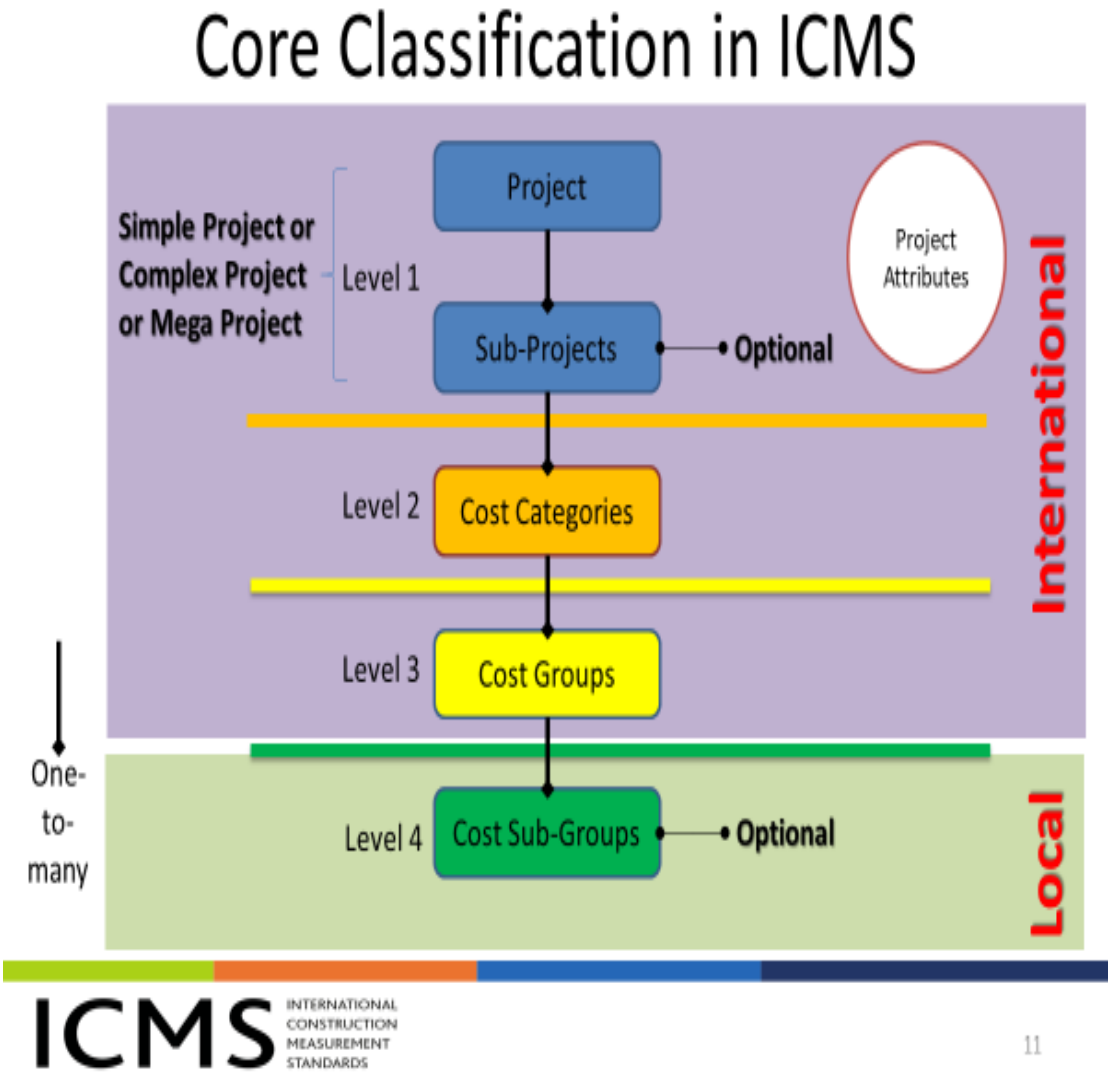

Fig 3.– Courtesy ICMS (2019)

The process chart below outlines the necessary stages required to undertake a LCC for a project portfolio.

Process Flow Chart

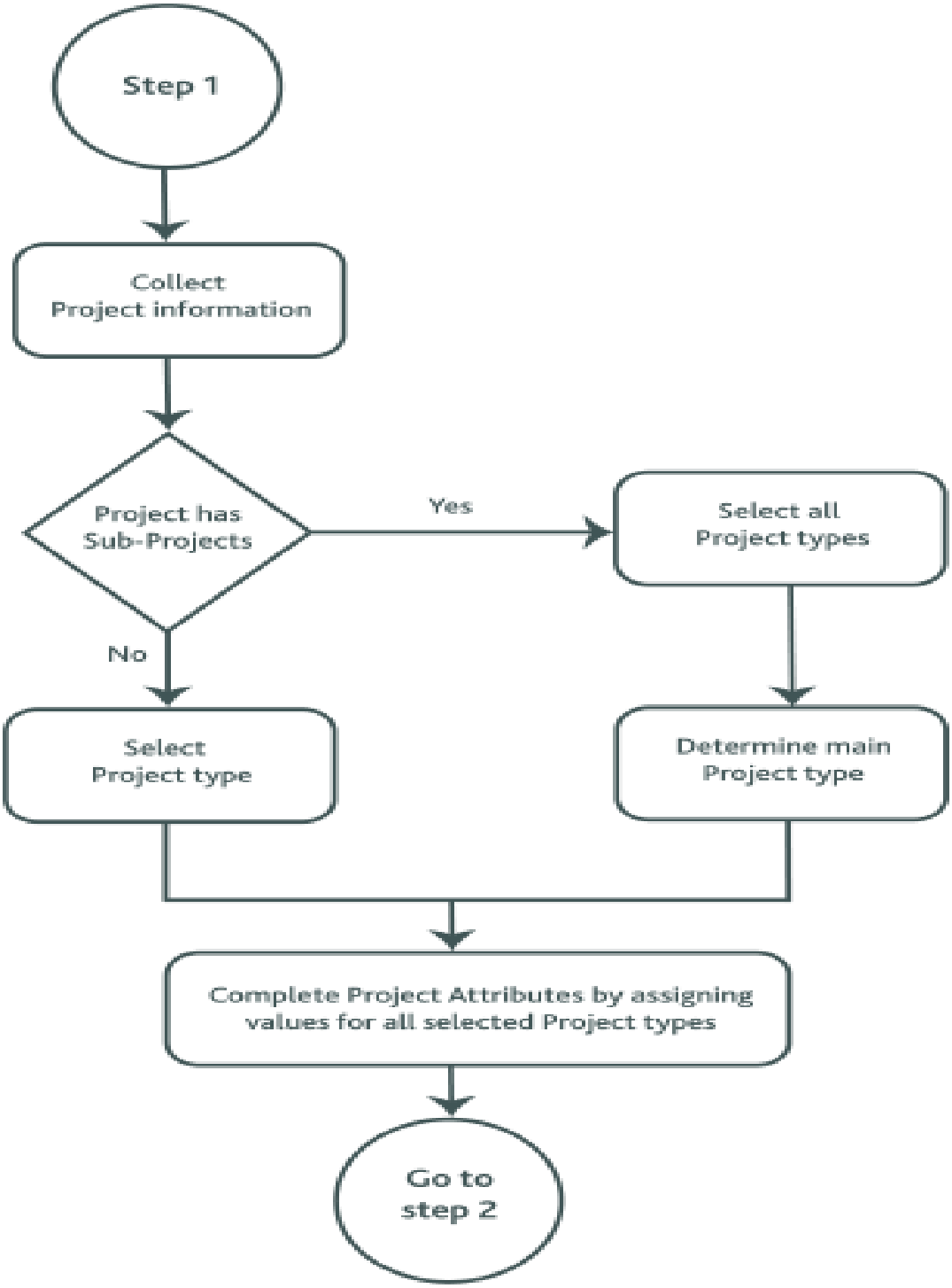

Fig 4– Courtesy ICMS (2019)

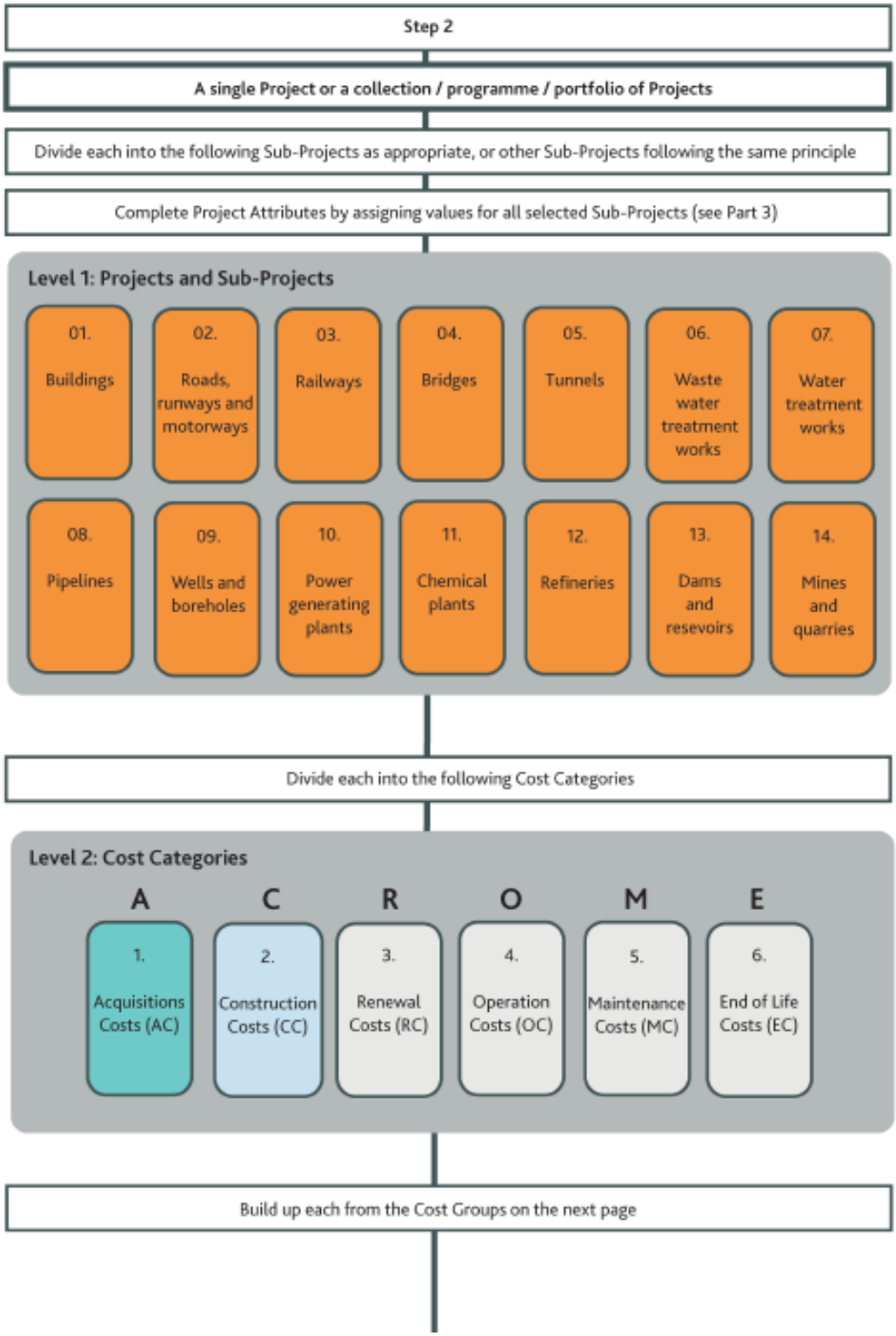
Step 2
A single Project or a collection / programme / portfolio of Projects
Divide each into the following Sub-Projects as appropriate, or other Sub-Projects following the same principle
Complete Project Attributes by assigning values for all selected Sub-Projects (see Part 3)
Level 1: Projects and Sub-Projects
01. Buildings
02. Roads, runways and motorways
03. Railways
04. Bridges
05. Tunnels
06. Waste water treatment works
07. Water treatment works
08. Pipelines
09. Wells and boreholes
10. Power generating plants
11. Chemical plants
12. Refineries
13. Dams and resevoirs
14. Mines and quarries
Divide each into the following Cost Categories
Level 2: Cost Categories
A
C
R
O
M
E
1. Acquisitions Costs (AC)
2. Construction Costs (CC)
3. Renewal Costs (RC)
4. Operation Costs (OC)
5. Maintenance Costs (MC)
6. End of Life Costs (EC)
Build up each from the Cost Groups on the next page

Fig 5– Courtesy ICMS (2019)

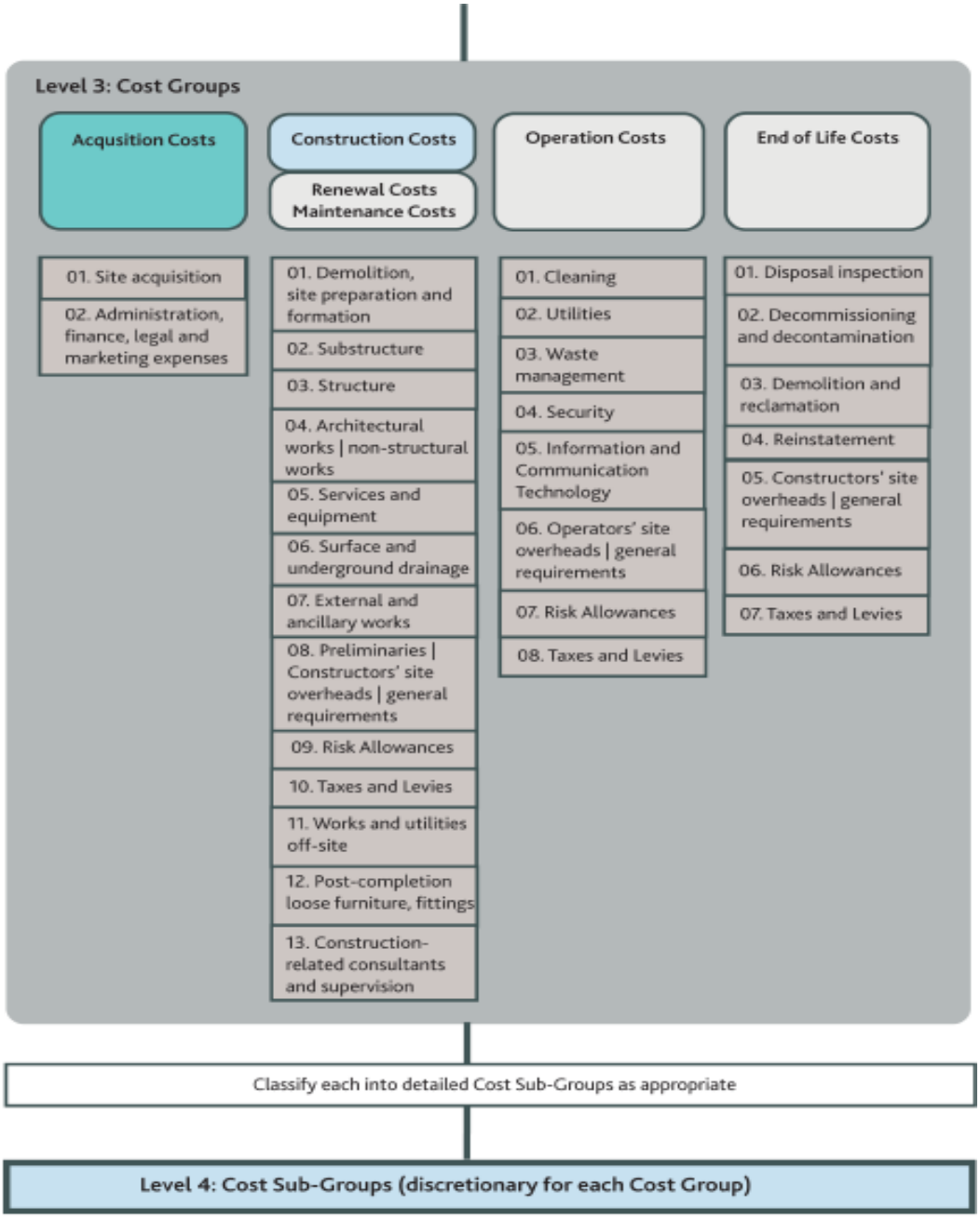

Fig 6 – Courtesy ICMS (2019)

Level 4 makes provision for cost-sub-groups that serves specific functions. Through this categorization, costs of the alternatives which have same function can be matched, appraised and designated.

4.4 Application of ICMS Life Cycle Costs

For a more in-depth information and guidelines on measurement standards for the different project categories, please see www.icms-coaltion.org

5. CONCLUSION

ICMS provides global consistency and transparency in construction cost management with LLC playing a significant role for critical decisions to be made on asset performance, robustness, and sustainability of capital projects. High profile international organizations such as World Bank Group, International Monetary Fund, United Nations, various regional development banks and non-governmental organizations, public sector project sponsors, global cost consultants and other construction sector stakeholders have leveraged the benefits of ICMS's global consistent practice in benchmarking international construction costs. They have also adopted it for use for comparative analysis of entire life cycle costs between countries. In addition to benchmarking construction costs, ICMS is also useful for cost reporting, data collection, feasibility studies, investment and risk analysis, procurement evaluation, design optimization, auditing and dispute resolution. Construction Industry stakeholders that are yet to adopt ICMS are encouraged to adopt these measurement standards for life cycle costing in order to make informed investment decisions and for other benefits that accompany its uses.

International is not somewhere else. ICMS can be used nationally across states and provinces and across sub-sectors. It has been mapped to national, more granular design and cost management standards around the world including NRM, Omniclass, Uniclass. By creating a standardized bi-directional flow of data from detailed, national level to international level ICMS allows improvements in the reporting, analysis and prediction of construction costs.

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BIOGRAPHICAL NOTES

Mercy Torkwase Iyortyer (IPP NIQS, FNIQS, RQS, MAPM, APMP, M.IoD, B.Sc Hons QS (ABU), M.Sc Arch (LON)) is the Vice Chair of FIG Commission 10. She is a Past President of the Nigerian Institute of the Quantity Surveyors. Mercy is a seasoned Cost Consultant, a Quantity Surveyor and Project Manager. She has over 40 years of work experience in cost management and development of infrastructure projects. Her expertise includes cost consultancy, project management, and financial management. Mercy is an entrepreneur and one of the founders of Zihabit Limited; a construction development company with over 27 years of work experience. She is also the co-founder of Sinoni Limited, a hospitality business as well as well the Chief Executive Officer for MTI Partnership, a Quantity Surveying firm. Mercy is a Fellow of the Nigerian Institute of Quantity Surveyors; a Registered Quantity Surveyor with the Quantity Surveyors Registration Board; a Member of the Institute of Directors. Mercy is a member of the Association of Project Management; and an Associate Member of the Women in Management, Business & Public Service .

Alan G. Muse BSc (Hons) MSc FRICS is both the Chair of FIG Commission 10 and of the ICMS standing setting committee.

Alan has over 40 years' experience in construction, specializing in the project and cost management of schemes up to £4 billion. Overseas experience includes spells in both the Middle East and East Asia. Since joining the RICS in May 2011, Alan has been involved in all aspects of the RICS response to the UK government construction strategy. Also, he leads international construction and BIM initiatives within the RICS including the development of skills, training and guidance for

RICS members. Finally, as a Global Director in Professional Groups he liaises with Chartered Surveyors on general matters of international standards development, international construction policy and global education and training.

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