

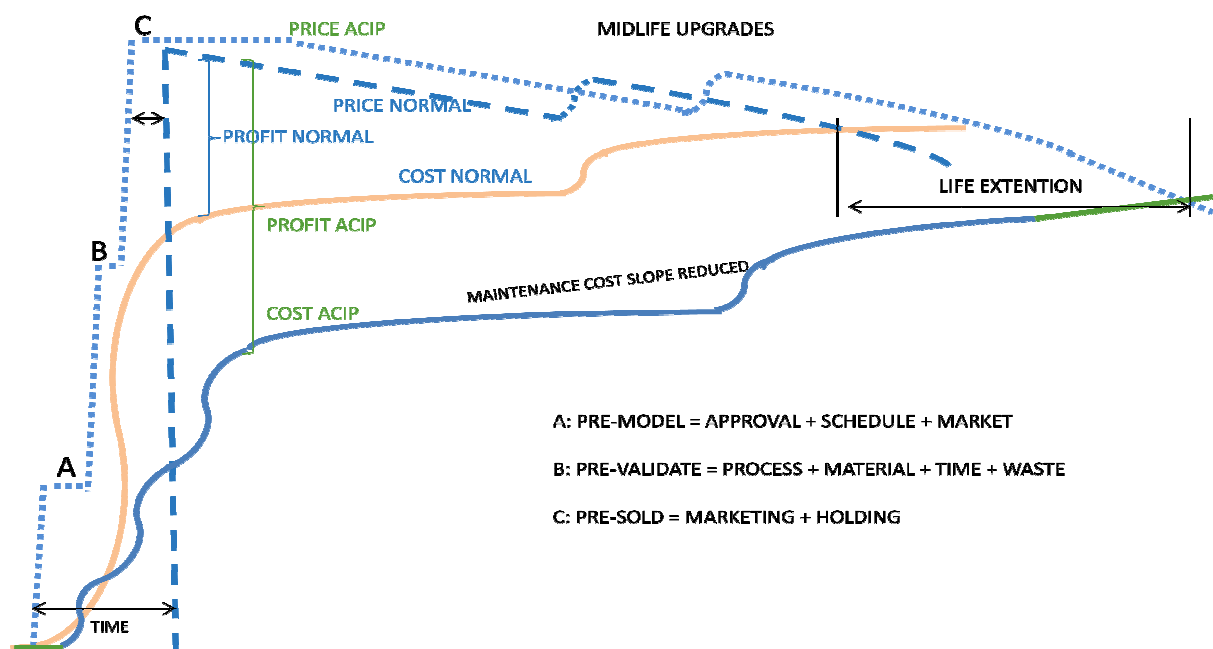
ACIP CONTRIBUTION TO CONSTRUCTION SAVINGS

Introduction

Industrialised Construction (IC) brings to the building industry what automated manufacturing brought to the automotive industry. The use of information technology in the Artificial Intelligence Construction Innovation Platform (ACIP), to analyse historic events, control current activities and predict future outcomes, results in a number of advantages for constructing and operating buildings.

ACIP Contribution to Cost and Schedule Reduction

ACIP uses the process of MODEL-MEASURE-MANAGE to control all activities during the full life cycle of a building. The models address the physical as well as the economic and social aspect of the building and the village in which it is functioning. The modelling also addresses the planning and design period before physical construction starts. It extends through the operation and maintenance periods to deconstruction and recycling of the building.



Before the building is physically constructed and sold, the process addresses the following three aspects:

- A: PRE-MODEL = APPROVAL + SCHEDULE + MARKET
- B: PRE-VALIDATE = PROCESS + MATERIAL + TIME + WASTE
- C: PRE-SOLD = MARKETING + HOLDING

Managing cost from an early stage, digitizing and automating approval processes and analysing market requirement for an exact fit, reduces the input cost and adds value to the project at an early stage. This value can be traded before investment and sale of the physical construction.

The validation of proposed processes and material from models and historic data, allows for the reduction in cost, time and waste. These savings can be validated beforehand. The risks are managed and reduced and the benefits traded.

The improvement in lifestyle and the 3D visualisation of the buildings in their environment allows stock to be sold before construction, early revenue generation and reduced holding times.

ACIP Contribution to Quality and Sustainability Improvement

Improved quality and sustainability increase the value of the buildings over the life cycle. The building achieves maximum value after construction and fitting. It reduces in discounted value as time progresses. During the life of the building one or more upgrade efforts may be performed. This should increase the value and extend the life of the building. When the cost and value curves intersect, the building has reached the end of its economic capital life and is reliant on utility value for sustained operation.

Bad process and material selection will reduce the life of the building and require early upgrades. Supervision of workmanship, correct execution and completion of works reduces cost and increases the value of the building. This reduces the slope at which the maintenance cost rises.

ACIP uses as-build models which it compares with as-design models to generate a singular Source of Truth (SST). These models are used before construction (planned and historic data), during construction and future planning of the operations of the building. These models are also used for the optimisation of use of resources like energy, water, waste. This brings along direct saving and also gives access to sustainability and green funding resources and subsidies.

The transparency and traceability that the models and processes bring allows the capability to perform risk management, whereby risk detection and identification are done already at early stages of the project and risk management and mitigation is conducted through the life cycle.

Conclusion

Construction of a building was in most cases treated as a project to construct a prototype artefact. Very little of the knowledge, other than that captured in the human experience and institutional experience, is captured and used on new projects. Limited knowledge is also transferred to the operator of the building when it is sold.

ACIP provides a platform, to not only expand the institutional memory of the organisation, but also transfer this information between life phases and across different actors of the full life cycle of the building. This reduces risks and cost for the owner and accelerates the processes in a controlled way.

The models are kept current and can be expanded to form a Digital Twin (DT) of the physical asset which is used for decision support in managing the building. The increases the overall value for the developer and subsequent owners of the building.