



Digital Assessment - Standard

IFC Hospital

Project:**CCS02** | Creator:**CCS** | Discipline:**GEN** | Level : **ZZ** | Document:**DA**

Digital Index Assessment Report

Document	CCS01-CCS-GEN-ZZ-DA-0002
Title	IFC Hospital Digital Assessment for C&C Solutions (Extended)
Version	P01
Project Id	CCS01
Project	IFC Hospital
Client	C&C Solutions
Author	Glen Worrall

Executive Summary

This is an extended assessment which reviewed the IFC Hospital iModel set to determine the overall readiness of the digital assets for construction and commissioning, the conformity to naming and classification standards, and the quality of spatial and element data for downstream use.

- Overall digital index: 69% - Moderate — the project contains many high-quality spatial and room definitions, but data-quality issues (elements on the Default layer, high counts of BuildingElementProxy and IFC Distribution ports) reduce confidence for automated downstream consumption. The investigation of Class Index and in particular Asset Index highlight that the overall quality is much lower in the majority of the engineering content.
- Key strengths: Floors and room naming are broadly consistent and machine-parseable; room-level identification and floor story tagging are suitable for spatial validation and quantity take-off.
- Key issues:
 - Large numbers of elements on the Default layer indicate export or family configuration problems
 - Classification diversity is reduced by many generic proxies and distribution ports
 - some naming does not follow an ISO 19650 style which will hinder automated matching across disciplines.
 - Asset naming and relationships are sparse or inaccurate

Recommendations:

- Immediate: Run a component/export review to eliminate geometry on the Default layer and correct the BuildingElementProxy exports. This will restore reliable quantities and visual filtering.
- Short term: Adopt a consistent ISO 19650-aligned naming convention for model filenames and key element labels (project–originator–discipline–number). Update export mappings so discipline codes and layer names follow a predictable pattern (e.g. A-770-M_FFE_SA → standardized code).
- Medium term: Re-classify or map generic elements (BuildingElementProxy / Distribution ports) to their correct IFC types where possible; update property sets for electrical and glazing components to support performance reporting.

Next steps: Prioritise the Default-layer remediation and a proof-of-concept re-export of one discipline model. Re-run the validation scripts and compare the digital index delta before rolling changes to the full model set.

1 Introduction

Following instruction from yourselves to carry out a Digital Assessment of the IFC Hospital, C&C Solutions have reviewed the project [Testing iModels](#) with a focus on the following

- Determine the an overall digital index score
 - Determine if ISO standard naming conventions have been followed and a path to restructuring around ISO 19650
 - Determine the classification of the project
 - Determine the overall quality of the digital content ready for construction and commissioning
 - iModel Trends
 - Portfolio Trends
 - Class Index Report
 - Asset Index Report
-

2 Project Overview

The IFC Hospital is a sample iModel that has been relocated to Darlington for presentation purposes The engineering models were originally created in Revit and exported to IFC as a sample by Autodesk. Generally the model is visually appealing and has some nice environmentally friendly content as well as generally well structured room names and components

3 Assessment Methodology

This section describes the framework, the testing process, scoring approach and standards used to assess the IFC Hospital models.

Digital Index Framework

The Digital Index is a composite metric that quantifies the readiness and quality of digital assets. It is composed of the following weighted sub-indices:

- Data completeness & properties: 30% — presence and completeness of required property sets and attributes for key elements.
- Classification & naming: 25% — use of consistent discipline, layer and naming conventions (ISO 19650-aligned where applicable).
- Spatial accuracy & story/room tagging: 15% — floor and room identification completeness and consistency.
- Geometry & topology quality: 15% — duplicate geometry, large unbroken solids, and export artifacts (elements on Default layer).
- Usability & classification diversity: 15% — proportion of generic proxies vs. correctly-classified IFC types and the ability to map components to discipline-specific reporting.

Each sub-index returns a 0–100 score; the Digital Index is the weighted average of the sub-indices and reported as a percentage.

Assessment Process

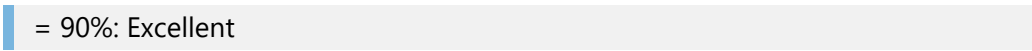
1. Source capture: collect the exported IFC files and the most recent iModel package, record file names and export tool/versions where available.
2. Normalisation: apply a pre-processing step to normalise encodings, resolve relative image paths for the report, and extract element lists into a working database or CSV.
3. Rule application: run a set of deterministic checks and regex rules to validate names, layers and attribute patterns. Examples used in this report:

```
Layer rule: ^[AEMLS]-\d{3}-M_\w*  
Floor rule: ^Level\s\d{1}$  
Room rule: ^\d{1,3}\s.*$
```

4. Classification analysis: identify generic **BuildingElementProxy** elements and IFC Distribution ports, sample representative elements and evaluate whether reclassification or exporter changes are required.
5. Geometry checks: detect elements on **Default** layer, duplicates and very large solids that may indicate modelling or export issues.
6. Class Index - Run the standard Class Index for the iModel

7. Asset Index - Configure and Run the Asset Index for Location / Location / System Breakdown Structures
8. Scoring & reporting: compute sub-index scores, aggregate into the Digital Index, and produce a findings table, risk register and recommended actions.

Scoring method

- Rule checks are binary (pass/fail) and mapped to a per-rule score; where relevant a tolerance or partial score is permitted (for example, percentage of elements matching a naming rule).
- Numeric metrics (element counts, % on Default layer, % BuildingElementProxy) are normalised to a 0–100 scale and combined with rule results using the weights defined above.
- Thresholds used in this engagement (example):
 -  = 90%: Excellent
 - 75–89%: Good
 - 50–74%: Moderate
 - < 50%: Poor

Include the raw metric values and the computed scores in the Appendices for traceability.

Tools, inputs and outputs

- Inputs: iModel - Specifically the IFC Hospital.
- Tools: C&C Solutions Toolbox is used for our standard Digital Assessment
- Outputs: Digital Assessment Report

Standards and conventions

- ISO 19650: naming and information management principles are recommended for model and file naming.
 - IFC: where available, targets IFC classification and property set usage consistent with the discipline requirements.
 - Naming examples used for remediation guidance:
 - Model filename: **HOS001-ADK-00-00-MD-AR-0001**
 - Layer pattern: **A-770-M_FFE_SA** → should map to a documented discipline-layer schema.
-

4 Trend / Portfolio Summary

4.1 Trend Analysis

Excluded from this Report: The trend analysis are excluded from this report and we have only utilised the latest changeset for this Digital Assessment Trend Analysis will cover

- Track Digital Assessment for the Digital Index Framework Sub-Indexes
- Track Duplicate Models
- Track changing IFC GUIDs
- Heatmap areas of change
- Provide Visibility into improving or deteriorating digital quality

TREND ANALYSIS WAS EXCLUDED AS THERE WERE INSUFFICIENT CHANGESSETS TO RUN HISTORIC DIGITAL ASSESSMENTS.

4.2 Portfolio Summary

Excluded from this report:

Portfolio Statistics are excluded from this report, we can maintain and report on a trend analysis, should this be requested.

- Portfolio statistics
- Overall trends
- Highest scores
- Lowest scores
- Contractor comparison
- Package comparison

PORTFOLIO ANALYSIS WAS EXCLUDED AS THERE WERE INSUFFICIENT SIMILAR IMODELS TO RUN PORTFOLIO DIGITAL ASSESSMENTS.

5 Findings

Model Names

There are 7 models within the iModel

All of the models have a regular pattern of WRSH_

While this is consistent they do not follow an ISO 19650 convention of

Project – Originator – Functional Breakdown – Spatial Breakdown – Form – Discipline – Number.

This could still be represented such that

WRSH_Architectural would become

HOS001-ADK-00-00-MD-AR-0001

The nature of Revit is to create discipline models for the overall site, but as we move to smaller as-built models from the construction and commissioning teams, the ability to match and determine changes will be easier with a well defined naming convention.

Layer Names

For the purpose of this report we use the name layers to mean categories / levels and layers There are 42 layers inside the various models The overall quality score is 40% when we use the following rule [AEMLS]-\d{3}-[M]_\w*

<DisciplineCode>-<3 digit identifier>-M_<Description>

Layer	Elements	%age	Description
Default	90127	57%	No elements should be on the default layer. This should be a misconfigured IFC Export. Contractor to fix. Issues are across all models with Mechanical and Sprinkler being the largest contributors
IFC_Footprints	2695	2%	Architectural and Structural disciplines to review
IFC_Openings	669	< 1%	Architectural and Structural disciplines to review
A-770- ME_FFE_SA	333	< 1%	Architectural misconfiguration

Floor Names

There are 20 Floors all identified in the architectural model

The overall quality score is 95%.

Floors are correctly identified in the model as ifcbuildingstory.

There is a mismatch of Floor Names, generally we allow `^Level \d{1}$`

With only Level 7A failing the rule and not understood to be acceptable 218 elements < 1%

However, there is a mismatch of Level n Ceiling and Level n TOS, which should be reviewed, they are accepted

Room Names

There are 27 rooms all identified in the Architectural model

The overall quality score is 100% with the following rule : `^\d{1,3}\s.*$`

However, there is inconsistency in the naming convention around MENS / WOMENS ROOMS / TOILETS / TOILET, we would expect to see much more descriptive and standardised naming conventions.

Classification Diversity

The model is generally well classified

There are 3806 BuildingElementProxy elements which represent about 2% of the elements.

The elements are across multiple types, such as grab rails / stall doors etc suggesting an incorrect export configuration.

The quality index reports a quality score of 73% due to a heavy weighting for IFC Distribution ports, which represent more than 50% of the overall model.

This suggests the remainder of the model is not well modelled or the sprinkler / plumbing are modelled to a higher level of detail than other disciplines.

Geometry

There are no reported duplicates

There are no reported large geometrical elements.

Extended Digital Assessment

Class Index

Class Index Unused Class Definitions Of the 74 classes defined for models schemas there are only 29 unused class definitions, while 40% may seem high, 29 is considered to be well within a well defined class structure.

There are 230 Aspect Classes which is typical of a Revit export, making data management more complex. Eg There are 14

IFCDynamic:ifcAspect_08_Storefront_w_2h_mull_1vert_mull__x003A__1500w_x_3500h__x003A__all with 11 properties, suggesting that the Revit export has not been configured correctly. See Recommendation RST-003

For the Class Digital Index we have purposefully included 203 classes, indicating the sparse context of the export from Revit and the proliferation of IFC Property Sets.

For the Class Digital Index the score is 0.422 (42%), generally reflected across all models.

Types We have included Class / Aspect Types in this calculation, but could be excluded if required.

Asset Index

Asset Index For the Asset Index, the score is considered to be critically low and is given a score of 10%

- Location Index

LBS Asset Hierarchy Tree

LEVEL DEPTH: 0: Facility 1: Storey 2: Space 3: Asset

ACTIVE HARVESTED INDEX PUBLISHED – Visualizing LBS structure with 53700 assets indexed at 6:36:15 AM (2446 issues registered).

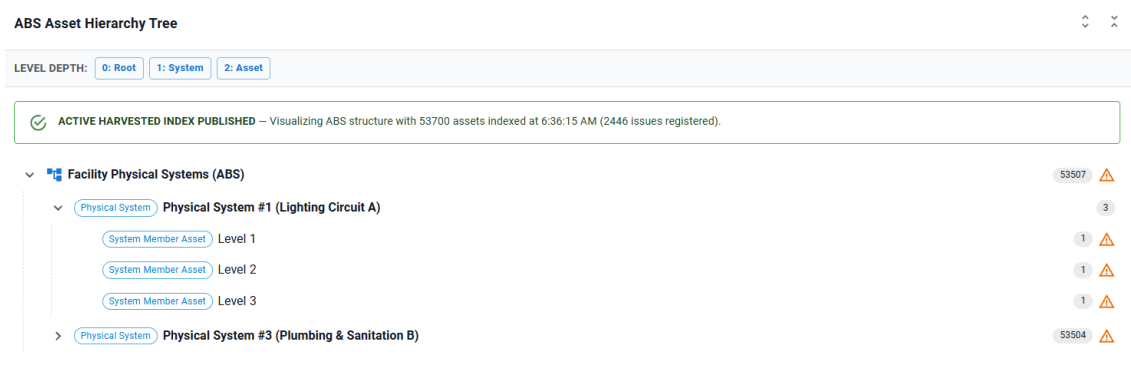
IFC Hospital Asset Index Configuration

- > Storey / Level Level 1
 - Storey / Level Level 1 Ceiling
- > Storey / Level Level 2
 - Storey / Level Level 2 Ceiling
 - Storey / Level Level 2 TOS
 - Storey / Level Level 3
 - Storey / Level Level 3 Ceiling
 - Storey / Level Level 3 TOS
 - Storey / Level Level 4
 - Storey / Level Level 4 TOS
 - Storey / Level Level 5
 - Storey / Level Level 5 Ceiling
 - Storey / Level Level 5 TOS

422 1 Dupl Merged

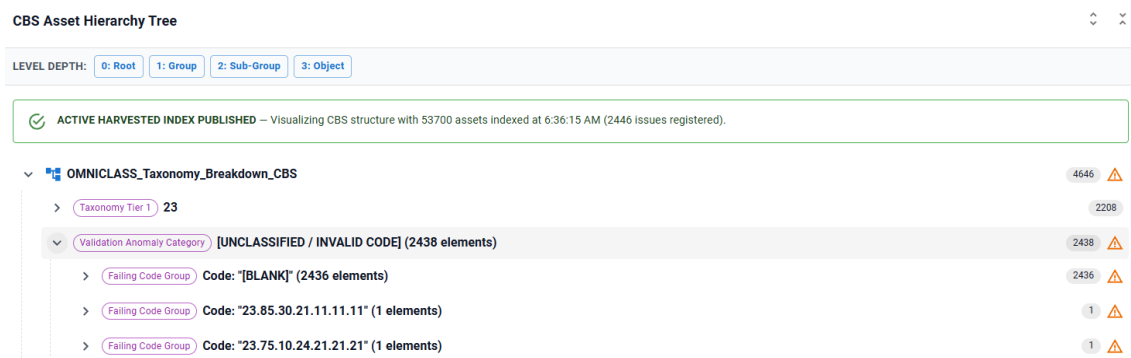
- While there are storeys and rooms in the model, the model does not seem complete
- Only Levels 1,2 & 6 have rooms assigned
- Room names are ambiguous and not descriptive such as 109 SPEC, 110 SPEC, rest rooms are also not consistent.
- Generally the Location Index is considered incomplete

- System Breakdown



- Only 2 systems are defined in the model
- Lighting Circuit A with 3 elements
- Plumbing & Sanitation with 53504 elements is not well structured

- Classification Breakdown



- The engineering models have been tagged with the OmniClass breakdown structure
- Of the 4645 Omniclass Records only 2208 seem to be tagged correctly, providing a Classification Index of 47%

- Work Breakdown

- The Work breakdown is not defined in this iModel.

Overall the model seems to have pockets of well defined data, but it should not be considered to be complete for utilisation for downstream activities.

6 Risks

Critical

27 Rooms in a hospital does not seem aligned with other large asset models. Consider a review of room modelling

- Recommendation RIM-001 The Systems, Locations and Classification systems are not well defined and should be considered unsatisfactory.

Major

Elements on Default suggest that components have been used that are not well defined or following corporate standards.

- Recommendation #RST-001

Minor

BuildingElementProxy elements should be correctly identified before issuing Construction / Commissioning Work Packages

- Recommendation #RST-002

Observations

7 Recommendations

Immediate

Recommendation	Action	Impact
RIM-001	Carry out a room review to ensure all rooms are modelled	Validation of space requirements to ensure sufficient patient / surgical / admin space requires that all spaces are modelled and named accurately. Currently even a simple review of rest room space and location to waiting areas has a low level of trust.

Short Term

Recommendation	Action	Impact
RST-001	Review all components that are creating geometry on the Default layer. Update component or export configuration to move geometry to the correct layer	Quantities and reporting quality will increase and downstream users can visually locate and identify elements associated with search criteria
RST-002	Ensure data quality issues do not migrate down the supply chain. Locate and Correct the invalid BuildingElementProxy elements to improve data quality being issued to supply chain consumers	Data Quality of digital assets tends to decrease as the model is updated by construction and commissioning supply chain project members. Ensure all data is validated before being sent and the same quality is maintained through to the handover of the physical and digital asset
RST-003	Ensure all Revit classes are mapped to grouped IFC Classes rather than creating property sets for instances of classes	

Long Term

8 Conclusions

Generally the model is well defined and accurate in spots. The model is correctly geo-located, but there are no infrastructure models, so access roads and storage have been excluded from this review. The model should be only considered for spatial consideration and basic quantity extraction. Structural Elements have material identified, but no qualities (eg Glazing is defined as Glass with no thermal qualities or thickness) There are limited electrical / technical properties for assets. (eg Solar Panels have dimensions, but no power output, some electric elements are well defined) There are limited breakdowns for other disciplines, therefore the model should only be considered as a sample engineering content and not utilised for any trusted quantity take offs or construction workflows.

Appendices

Validation Output

SQL Results

Statistics

Glossary
