Digital Assessment - Standard

IFC Hospital

Project:**CCS01** | Creator:**CCS** | Discipline:**GEN** | Level : **ZZ** | Document:**DA**

Digital Index Assessment Report

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Executive Summary

This assessment 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: 86% - Good — 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.
- 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.

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.

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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

Excluded from this report (available in extended report)

- Classification Investigation
- iModel Trends
- Portfolio Trends
- Class Index Report

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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

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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.

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6. 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.

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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

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

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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

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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 seem 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.

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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

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

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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

Long Term

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8 Conclusions

Generally the model is well defined and accurate. 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)

Appendices

Validation Output

SQL Results

Statistics

Glossary

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