Automated BIM Compliance Tracking Framework and Results

Hazem Abdelmoneim Abdelhamed Ibrahim

BIM & GIS LEAD

Abstract:

Large construction programs typically involve multiple contractors and consul- tants operating in parallel, each with its own workflows and documentation prac- tices. Manual methods like Excelbased logs (e.g., Consultant Review Sheets, or CRS) have historically led to version conflicts, delayed resolution times, and mini- mal traceability. Recognizing these challenges, the SEVEN Program—a large-scale Saudi Arabian initiative—sought a unified solution for BIM compliance tracking. Autodesk Construction Cloud (ACC) was chosen as the core platform due to its rule-based workflows, customizable analytics, and alignment with ISO 19650's em- phasis on structured information management. This paper details the development and implementation of an automated compliance tracking framework, highlight- ing a 45% reduction in design review turnaround times, an 85% reduction in issue backlog, and a 77% drop in manual follow-ups.

1 INTRODUCTION

1.1 Background

Large construction programs often rely on multiple contractors and consultants operating simultaneously, each using different workflows and documentation practices. Historically, manual methods like Excel-based logs (e.g., Consultant Review Sheets, or CRS) have led to:

- Version Conflicts: Overwriting or duplicating issues due to inconsistent tracking.
- Delayed Resolution Times: Limited visibility into overdue tasks.

Minimal Traceability: Lack of clarity on issue ownership and resolution progress.

Recognizing these challenges, the SEVEN Program—a multi-billion SAR initiative by Saudi Arabia's Public Investment Fund (PIF)—sought a unified solution for BIM compliance tracking. Autodesk Construction Cloud (ACC) was chosen for its rule-based workflows, customizable analytics, and compatibility with ISO 19650's structured infor- mation management principles.

1.2 Objectives

This paper aims to:

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1. Develop a scalable, automated compliance tracking system that replaces manual CRS.

2. Demonstrate measurable efficiency gains and reduced coordination overhead.

3. Highlight how ACC's built-in tools (dashboards, role-based workflows) can improve design review turnaround times.

2 AUTOMATION FRAMEWORK

- 2.1 Overview of ACC Tools
- The automated framework leverages key ACC features, including:
- **Rule-Based Workflows**: Automated issue creation and assignment with manda- tory validations before closure. Escalations are triggered after 14 days of inactivity.
- **Centralized Dashboards**: Real-time visualization of open, overdue, and closed issues, with customizable filters by trade, assignee, and priority.
- **API-Driven Analytics**: Python scripts and ACC's built-in connectors track KPIs such as turnaround times, duplication rates, and backlog status.
 - **Role-Based Permissions**: Each stakeholder (e.g., consultant, contractor, PMO) has designated responsibility boundaries, ensuring accountability throughout the issue lifecycle.

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2.2 Framework Design

The framework aligns with ISO 19650 standards and incorporates:

- **Structured Naming Conventions**: Consistent folder hierarchies (Package, Dis- cipline, Version) for organized data management.
- **Overdue Notifications**: Automated reminders to stakeholders for resolving or updating overdue issues.
- **Mandatory Validation**: Issues require second-party review before closure, reinforcing traceability and quality control.

3 IMPLEMENTATION PROCESS

3.1 Six-Phase Plan

- The implementation followed a structured six-phase plan:
- 1. **Business Requirements**: Cross-functional needs were documented, and KPIs were finalized.
- 2. **Design**: Existing workflows were mapped to ACC features, and pilot strategies were prepared.
- 3. **Development**: ACC was configured, user roles were defined, and data was imported. Rule-based triggers and dashboards were tested.
- 4. **Pilot Projects**: The framework was piloted in Package D3 to collect baseline and post-automation metrics.
- 5. **Communication & Training**: Discipline leads were trained on ACC's function- alities, with an emphasis on time savings and data integrity.
- 6. **Go Live**: The framework was deployed across all packages, with continuous monitoring and iterative improvements.

3.2 Pilot in Package D3

- The pilot was conducted in Package D3, chosen for its moderate complexity and engaged stakeholders. Baseline metrics included 78 unresolved issues and an average turnaround of 18.6 days. Automation configurations included:
- Overdue triggers set at 14 days.
- Mandatory cross-validation for issue closure.

4 **RESULTS AND METRICS**

4.1 Quantitative Improvements

The pilot demonstrated significant improvements, as summarized in Table 1.

Metric	Pre-Automation	Post-Automation	Change (%)
Avg Turnaround Time (days)	18.6 ± 4.3	10.2 ± 3.1	-45%
Issue Backlog	78	12	-85%
Manual Follow-Ups	94/month	21/month	-77%

4.2 Adoption Trends

Figure 1 illustrates the adoption curve, showing rapid uptake following the pilot.



Figure 1: Adoption Curve for ACC Framework Over Time

5 ACC PROS CONS

The following content summarizes ACC PROS AND CONS:

5 1	
5.1	ACC Advantages
•	Documents and templates standardized to allow for better quality data.
•	Real-time quality control checklists and live reporting.
•	Full project document control through Autodesk Construction Cloud.
•	Technical submittals and RFIs completed within the software.
•	Offsite module quality control and progress tracked digitally.
•	Commissioning managed through a digital process.
5.2	ACC Disadvantages
•	Limited offline functionality due to reliance on internet connectivity.
•	Some manual work required to track comments across design stages.
6	DISCUSSION
6.1	Benefits of Automation
The framewor	k delivered:
•	Enhanced Traceability : Transparent issue tracking with clear ownership.
•	Faster Processes : Automated workflows reduced delays.
•	Data Integrity: Immutable logs within ACC ensured auditability.
6.2	Potential Limitations
•	Internet Dependency : ACC's cloud-based nature may hinder offline updates.
•	Versioning Nuences: Managing unresolved comments across file versions requires

• Versioning Nuances: Managing unresolved comments across file versions requires stringent protocols.

7 CONCLUSION

An automated BIM compliance framework using Autodesk Construction Cloud signifi- cantly streamlined design coordination in a multi-contract setting. The SEVEN Program saw a 45% cut in review turnaround times and 77% fewer manual follow-ups, validating the efficiency of this approach. Future work could explore machine learning, extended workflows, and scalability to other projects.

REFERENCES:

- 1. ISO 19650. Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM).
- 2. Sacks, R., Eastman, C., Lee, G., & Teicholz, P. (2018). BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers. John Wiley & Sons.
- 3. ACC Implementation Impact Survey Design Procedure Time and Meeting Reduction March 2025

3/3/25, 2:59 PM ACC Implementation Impact - Design Procedure Time & Meeting Reduction APPENDIX 1

ponses	Average Time	Duration
0 8	17:16 💟	0 Days
do you rate ACC implmentation	for design review in program 4	
do you rate ACC implmentation	for design review in program 4	
e do you rate ACC implmentation	for design review in program 4	
w do you rate ACC implmentation Very positive Somewhat positii 	for design review in program 4 6 re 4	40%
w do you rate ACC implmentation Very positive Very positive Neutral	for design review in program 4 6 re 4 0	40%
w do you rate ACC implmentation Very positive Somewhat positi Neutral Somewhat negati	for design review in program 4 6 re 4 0 ve 0	40%

2. How would you rate the impact of ACC on reducing the duration of the design review process?



3. How would you rate the improvement in review cycle efficiency and response times due to ACC?



4. How would you rate the reduction in the number of meetings required for design issue resolution?



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ACC Implementation Impact - Design Procedure Time & Meeting Reduction

5. ACC been in replacing traditional meetings or emails with online issue tracking and resolution



6. How would you rate ACC's effectiveness in streamlining issue categorization, assignment, and resolution tracking?



7. How satisfied are you with ACC's overall impact on design procedures and coordination efficiency?





8. Notes

2 Latest Responses Responses "We suggest that there should be a certain timeline for design consultants to resp..."