

A Study on Utilization ‘ABIMO CHECKER’ for BIM and Indoor Spatial Information Built to Integrated Platform

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Abstract—This study is ‘BIM server’ utilizing ‘Open BIM’, through associated indoor spatial information texture, integrated platform system will de-sign. Latest global issue of spatial information, and utilization is high for room, based on spatial information and BIM to facility management effective implementation of studies have been conducted for service. Related research, available in conjunction from disparate sys-tem such as spatial information, ‘BIM server’, which can be visual-ized texture in indoor spatial information, integrated platform will de-sign. This study is design for platform, utilizing for our company developed BIM s/w ‘Abimo’ and IFC standards quality review ‘Abimo Checker’, simple experiment to try integrated design quality review for IFC conversion format, indoor spatial information texture and interoperation system of BIM are designed to offer, want to build platform.

Index Terms—abimo (BIM S/W), abimo checker, indoor spatial information, integrated platform, IFC

I. INTRODUCTION

Recently worldwide, spatial information and BIM based on facilities management and service for effective implementing studies are under-way. In this study, order to represent indoor spatial information texture from BIM, spatial information such as disparate system that can be linked with becoming ‘BIM server’ needs development. The reason for indoor spatial information texture connect to BIM, according to the U.S Environmental Protection Agency report, ‘Peoples are spend more time at indoors, 80% of the available 24 hours a day’, recent ICT convergence related to trends in the world market, because of they are closed to indoor spatial information.

Some essential requirements must be satisfied, in order to develop ‘BIM server’. ‘BIM server’ is store and manage at indoor spatial information texture, clients can query necessary information texture about information management, ‘Configuration Management (CM)’ and Transaction are unit works to be treated. Many in order to

indoor spatial information texture management and representing in BIM, should be equipped with proper quality performance. It requires a lot of development time and cost, in order to develop ‘BIM server’, this may be suitable alternative from take advantage of ‘Open BIM’.

‘BIM server’ is supports for multi user configuration management, open source based on collaboration BIM model server. By default, operating on the Berkeley DB file, compared to ‘Relational Database Management System (RDMS)’ register or fetch for BIM file, operation speed is fast and a variety of application can be linked web services are sup-ported. These allow web service, a variety of ways, BIM information queries including application tools can be developed. A variety of modeler and system with works, web services support about 470 (now in version 1.1), for map implementation. We have to take advantage of ‘Google’ and etc. cloud based on system.

Purpose of this study, disparate indoor spatial information client system in conjunction with open source based on ‘BIM server’, ‘Open BIM’ based will offer to integrated platform develop. In this study, recent began to take advantage of abroad, to analyze structure of open source based on ‘BIM server’, architecture is design in conjunction with indoor spatial information texture. ‘Open BIM’ based on indoor spatial information texture to visualize system is developed to verify applicability of architecture. This allows proposed method, for visualization of indoor spatial information texture, cost effective implementation of ‘BIM server’ looks can be utilized.

II. KOREA BIM SOLUTION

A. What is ‘ABIMO’ BIM S/W?

‘ABIMO’ was developed as a part of a government issued project to develop an open BIM Platform solution for an international construction IT ecosystem. It includes the development of a BIM modeler for the virtual 3D modeling of a designed artifact and MEP, a BIM Checker that checks various regulation requirement, and a BIM

server that manages the collaboration between project group members [1].

Code	Name	Title	
1	INT	INTerference	Object interference
2	ARE	AREa	Floor area
3	POL	POLygon count	Polygon
4	WID	WIDth	Object width
5	WIS	Width in Space	Indoor room object width
6	EXI	EXistence	Presence
7	INC	INClusion	Room zone attribute
8	AID	Area In Department	Room zone attribute + Area
9	FND	FND	Object search
10	WRA*	Windows RAtio	Window area ratio
11	SNN	Space Name&Number	Space Properties
12	ERL	Element Related Level	Level value
13	XSL	eXistence Same Level	Floor information of multiple space
14	SXL	Space eXistence Level	Specific floor information of space
15	DIS*	DIStance	Object distance
16	WIW	Window In Wall	Wall, window relationship
17	MAR	Minimum ARea	Minimum space area
18	ADS	ADJacent Space	Adjacent of space
19	SPC	SPace Count	Number of specific space
20	DOS	Distance Of Space	Space distance

Figure 1. Built-in Rule Set (Base Rule).

‘ABIMO’ was tested pilot projects to check if the software meets the qualifications of a valid BIM software. For the first year of development, ‘ABIMO’ was tested by constructing a five story multi-family housing, and the second year, an eight story hospital building. The five story multi-family housing was a reinforced concreted structure with a symmetrical plan layout. ‘ABIMO’ was used to model structural and architectural elements such as slabs, beams, columns, walls, ceilings, doors and windows. Doors and windows in particular were modeled in ABIMO’s Library Editor and placed back into the project. In addition to the types of elements modeled for the first year’s pilot test project (five story multi-family housing), the hospital building was modeled with the inclusion of elements such as curtain walls, stairs, ramps and elevators and site model. Also, each element was assigned different material properties and was visualized in the overall view of the model [1].

One of the most significant features of ‘ABIMO’ is that it provides a single platform in which all of the main functions listed above – BIM modeler, BIM checker BIM server are integrated. This provides the user with an Integrated Modelling Environment (IME) where the file does not need to be exported out and rather multiple

functions can be conducted on the project within a single solution.

‘ABIMO’ is also designed as an open platform where multiple file formats from different BIM solutions can be imported and exported freely to and from it. Especially, by fully supporting the international standard IFC file, ‘ABIMO’ is compatible with most of the BIM solutions in the industry.

Korea’s first IME (Integrated Modeling Environment) BIM software, Developed for the past 2 years under the Ministry of Trade, Industry & Energy (MOTIE)’s 3rd WBS (World’s Best Software) Project, ‘ABIMO’ (code name: K-BIM) is named after its ambition to influence the entire range-from "a"(alpha) to "o"(omega)-of a BIM process. The solution was official released in March, 2014 [1].

III. BIM CHECKER: BIM QUALITY REVIEW TOOL

B. BIM Model Validation And Quality Review

The support of the BIM model validation and quality review. Generated from ‘Abimo’ data and IFC import to data can be reviewed. Review available about Regulations, RFP and instructions to configure rule set [2].

Editable base rule of ICON form is various review support of BIM data, basic base rule can provide utilize edit by user. Gender and utilization gain about suitable for a characteristic rule, intuitive ICON and configuration CODE. (“Fig. 1”)

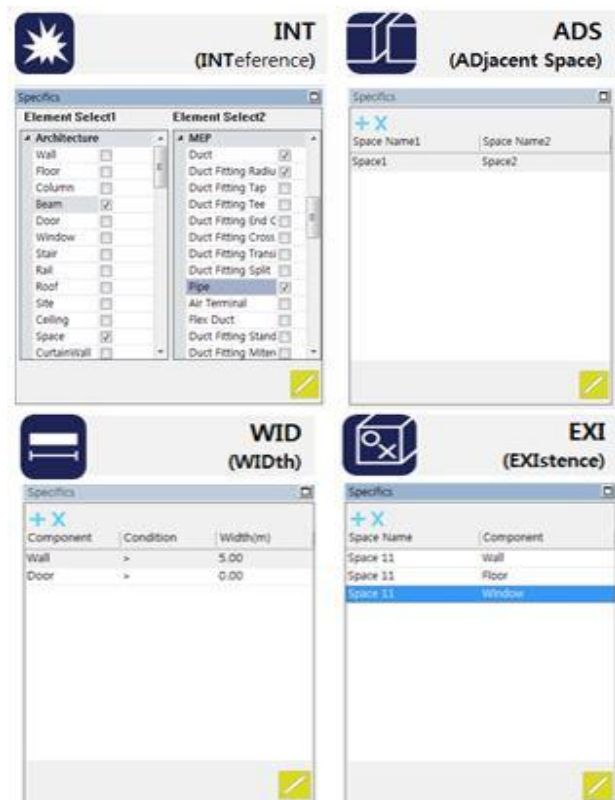


Figure 2. Examples utilizing of base rule.

UI of base rule based on individual parameter definition. Provide specifics window, available to enter

the properties and changes that fit the characteristics of the based rule. Interference between INT (INTerference) absence review: Between “Element A” and “Element B” is interference. That ADS (Adjacent Space) are two spaces adjacent review: “Space A” and “Space B” are adjacent to each other. Width review of WID (WIDth): The width of the “Element A” greater than “(X)”m. The width of the “Element A” less than “(X)”m. The width of the “Element A” it is over “(X)”m. The width of the “Element A” or less “(X)”m. The width of the “Element A” it is “(X)”m. Examine the existence of texture in EXI (EXIstence) space: Present in “Element” a “Space A”. (“Fig. 2”)

Checking function implementation through analysis of 3D geometry. Texture collision calculation, modeling Boolean operation, Extrude, considering scaling function implementation (“Fig. 3”).



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::InterferenceCheck()
::ElementDistanceCheckOnSameStory()
::CheckAdjacentBetweenSpaceAandB()
::WholeSpaceMustHaveEnoughWindowArea()
::CheckPolygons()
::DistanceBetweenSpaceAandB()

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Figure 3. Base rule for 3D analysis.

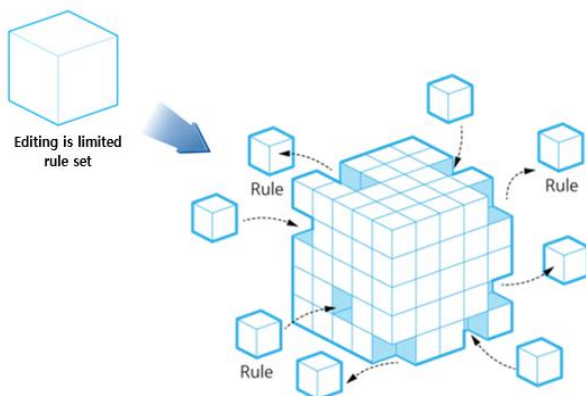


Figure 4. Necessary information freely editable rule editor.

Any combination of variety rule, specialized rule set manufacture. Using the built rule, user want to change the number or entries, specific re-view standards for user can be made to rule set (“Fig. 4”). That is built change parameter of rule set, configuring new rule set.

Can be saved configuring rule sets one by loading multiple rules. Checking low level functions through script, application quality review [2]. “Fig. 5” is checking to python script editing.

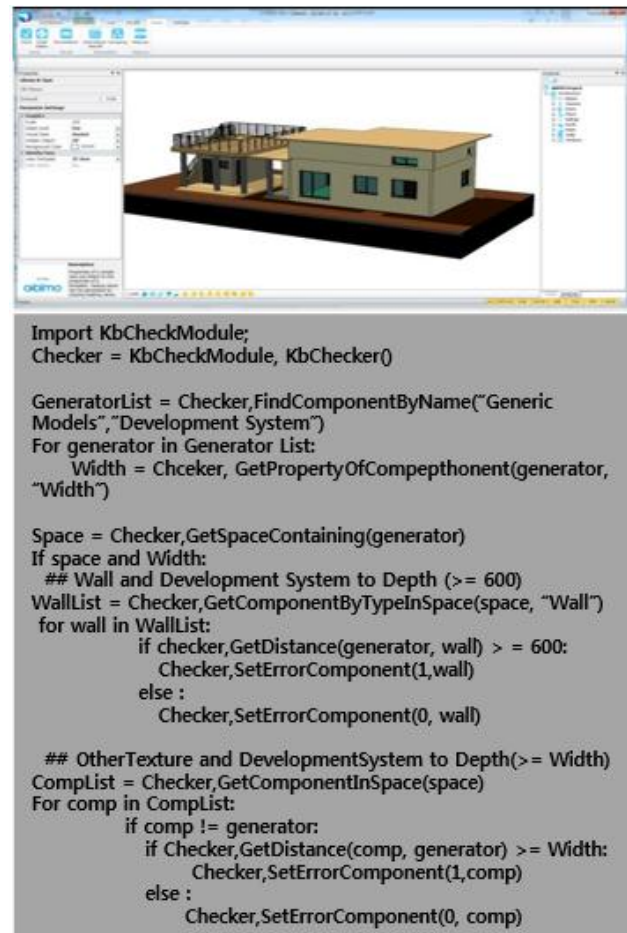


Figure 5. Python script editing examples.

Rule set support for BIM guidelines and RFP review. Korea BIM guide-lines and specific BIM RFP provide rule set, possible quality review and requirements validation of project. BIM guidelines analysis and quantify of Public Procurement Service, Ministry of Land, Korea Institute of Construction Technology, provided ‘Abimo’ rule set. High degree difficult of design, analyzing RFP of the hospital building, check function to analyze and organize included in the RFP, RFP rule set provides a complete core. Checking body effective visualization by automatically switches X-ray mode. The issues point generation of the review model that helps possible 10. “Fig. 6” is ‘ABIMO’ test report for visual approach of checking result.

Quality evaluation reports. Automatic generation reports of forms that can be checked at a glance that results of review model (xml and xls support to reports). Excel report: Easy processing results report of users. xml

report: Available to format about report that use to other s/w.

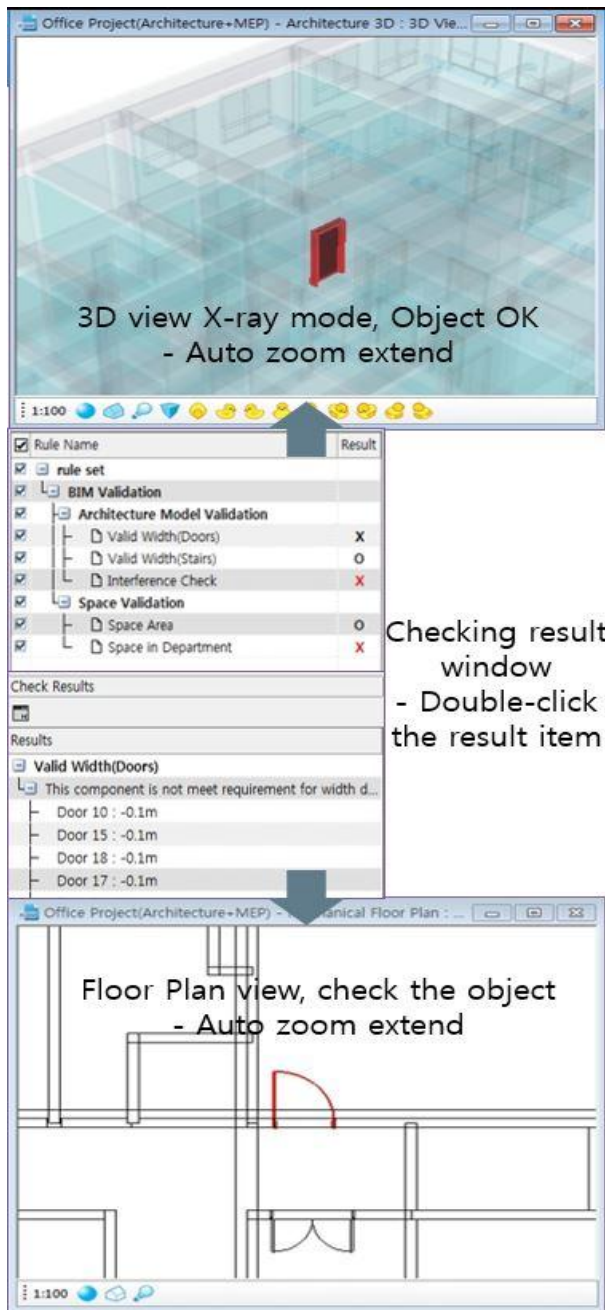


Figure 6. Report to visual approach of checking results.

Rule Name	Result
rule set	
BIM Validation	
Architecture Model Validation	
Valid Width(Doors)	X
Valid Width(Stairs)	O
Interference Check	X
Space Validation	
Space Area	O
Space in Department	X

Figure 7. Checking result export.

C. IFC Format Converter

Ensure interoperability through IFC import / export. To support import / export of IFC for international standard BIM, a variety of BIM s/w ex-change possible data to 'Open BIM' s/w ("Fig. 7"). Export to IFC generated from 'Abimo' data, resulting data about outside BIM s/w to save IFC, available import 'Abimo' [1].

D. Big Data

Recently, GPS-equipped smart phone due to the prevalence of SNS activation, social media, due to the growth of diverse and numerous amounts of text, video, location data is generated in real-time position information, as well as the behavior of people and ideas and through SNS comments are able to analyze and predict. Most of this data collection, storage, retrieval, analysis, visualization, and difficult to non/semi-structured data, if not used properly useless, that can be data [3]. Big Data and efficient processing of such data, analysis, and in order to take advantage of was the emergence, Big Data is usually data volume, variety, velocity as a combination of three factors is characterized by change [4]. Big Data and analysis techniques for processing such data, the text mining, opinion mining, social network analysis, cluster analysis has dual images similar to nested characteristics of the object together with the cluster analysis technique was used for outgoing [5].

IV. PLATFORM SYSTEM STRUCTURE(TEST)

Available to 'Abimo' + Indoor spatial information texture.

In this study, we want for design to develop an integrated platform of that BIM data and indoor spatial information texture, indoor spatial in-formation texture linked to BIM. We want need to geospatial data for-mat development, phase representation application of LOD (Level of Degree), adoption of cloud computing technologies that can handle large amounts, integrated platform development and stabilization operations ("Fig. 8").

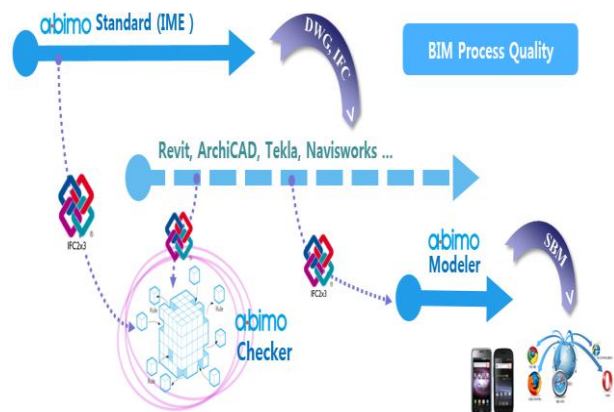


Figure 8. 'Abimo' + Indoor spatial information texture Platform Process.

This platform is topography and realistic building screen shown based on various form in the same

environment through 'DB structure', 'fast processing of big data' that can be implemented system is indoor spatial information texture on BIM.

DB structure is including storage, schema, properties, area based on 3D mode that rapid expression of results texture, space search of absolute coordinate, overlap of built based on data will be made ("Fig. 9").

In this study proposed platform, convert format service model of IFC and big scale indoor spatial information texture from BIM, for quickly visualization it requires a separate technology. To do this, will be able to solve problems through a weight generation algorithm for LOD.

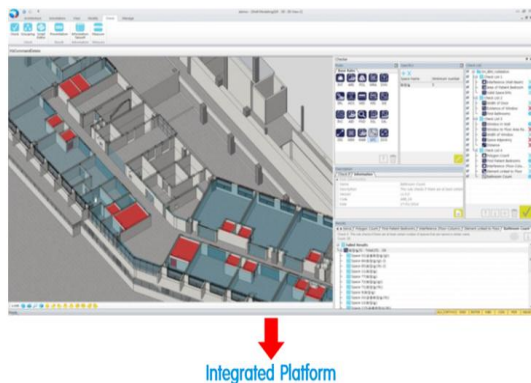


Figure 9. 'Abimo' Integrated Platform to design.

V. CONCLUSION

BIM instructions designed expressed in natural language, to define the computer is understood to be organize that research is not easy, but in this study, presented in order to design the platform was supposed to perform basic research, unlike other similar research using this, this difference being able to build platform through better quality data.

The more real design and perfect guidelines are more likely to be developed, as will be appreciated computer system [6]. This is combination of indoor spatial information texture and BIM, it is possible to build platform. When applied to production, main building life cycle productivity and efficiency as well as rising from BIM seeking. For spatial information, suggest that it is possible to develop wide range of service through application of the indoor texture ("Fig. 10").



Figure 10. A variety of Platform Applications.

For this study, to the build platform verification of several types, it is necessary to enlarge about BIM process improvement that through pre-review proven quality. True productivity and Efficiency for seeking BIM based on apply of indoor spatial information, will be able to pro-vide quickly 3D screen view and various develop applications of various big data that on BIM.

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