



OPTIMISED ENERGY EFFICIENT DESIGN
PLATFORM FOR REFURBISHMENT
AT DISTRICT LEVEL

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Abbreviations and Acronyms

Acronym	Description
BES	Building Energy Systems
BESM	Building Energy Systems Manager
BIM	Building Information Model
DDM	District Data Model
DMM	District Management Module
DPI	District Performance Indicator
ECM	Energy Conservation Measure
ETL	Extract-Transform-Load
GIS	Geographic Information System
ESB	Enterprise Service Bus
GUI	Graphical User Interfaces
IFC	Industry Foundation Classes
IPD	Integrated Project Delivery
NEST	Neighbourhood Evaluation for Sustainable Territories
JMS	Java Message Service
JSON	JavaScript Object Notation
OptEEmAL	Optimised Energy Efficient Design Platform for Refurbishment at District Level.
OWL	Ontology Web Language
RDB	Relational DataBase
RDF	Resource Description Framework
RDFS	Resource Description Framework Scheme
REST API	REpresentational State Transfer Application Programming Interface
SQL	Structured Query Language
STP	STandard for the Exchange of Product
XML	eXtensible Mark-up Language

Executive Summary

This report is an account of the work done in Task 2.4 “Data repository prototype deployment and validation” concerning the data repositories and Data Management Module (DMM) deployment documented in Deliverables D2.4 “District Data Model repository” [01] and D2.5 “Report on standardised information exchange protocols”. Validation tests that have been carried out to ensure the functionalities and robustness of the five data repositories included in the OptEEemAL platform: BIM repository, City repository, Context repository, ECM repository and Project repository. These repositories are used by the platform modules to facilitate the interoperability between various input data sources (BIM and GIS models, climate, social, economic, etc.) and a set of tools (EnergyPlus, Nest, CitySim and other tools that may be needed in the future) used to determine the optimal measures to be applied in the refurbishment of buildings. A performance test has been carried out in each repository to check their performance considering accessibility, response time, concurrent requests, response completeness and failure response in various scenarios involving data insertion and data retrieval. A requirements test has been designed to verify that each repository works as expected in conjunction with other platform components. This test will be carried out in Task 6.1. “Technology validation in relevant environment” after all modules and components have been integrated in the platform.

This document also includes the results of the validation of the DMM, created to ensure the interoperability between input data sources and the Simulation Module which calculates the District Performance Indicators (DPIs) using a set of calculation tools. Tests have been carried out to evaluate the performance as well as the validity of the data generated by the DMM. To carry out these tests, a tool has been developed with Java to compare the results of the data transformation and integration processes provided by the DMM with the data requirements of the Simulation Module. The RDF file generated as a result of these processes has been compared to an XML file of the SimModel model generated by alternative means (e.g., SimModel files exported from Simergy). The Java tool allows the user to select different options to carry out the verification (e.g., comparing only instances of classes or also their properties). This way, it is possible to identify possible inconsistencies, making it easy for users to fix them. With this Java tool it is possible to avoid the manual checking of the amount of generated and expected instances, while reducing the mapping process and maintenance time. The tool generates reports that include more detailed information than the one displayed in the user interface. The validation of the DMM has been carried out using two building models: a model on an un-built project (Demo4 case) and a model of an existing building from the “4 de Marzo” pilot case (Torre Turina).

1. Introduction

1.1. Purpose and target group

This document summarizes the work undertaken in the Subtask 2.4.3 “Data repository and exchange protocols validation”, which is included in Task 2.4 “Data repository prototype deployment and validation”. The purpose of the work carried out in this subtask was to conduct a set of validation tests to ensure the functionality and robustness of the data repositories. The validation has been conducted in two steps. Firstly, tests to evaluate the performance of the repositories according to a list of features have been created. Secondly, end-to-end tests have been performed to guarantee that all the mechanisms and protocols involved in the communication between platform components and repositories work as expected.

Only the results in the implementation of the performance tests are reported in this report. Since end-to-end tests require the finalisation of some platform modules, which have not been completed yet at the time of writing this report, they will be carried out in the Task 6.1 “Technology validation in relevant environment” and reported in deliverable D6.1 “Report on the technology validation in relevant environment”. Moreover, the tests corresponding to the ECM repository are reported in the Deliverable D3.4 “Requirements and specification for the District Data Model” [02].

Finally, the document includes the results of the tests carried out in the Data Management Module (DMM) following the latest update of the DataMapper which includes the queries necessary to complete the data transformations.

1.2. Contributions of partners

Table 1 sums up the main contributions of partners (TUC, CAR, TEC, and FUNITEC) to the contents of this document.

Table 1: Contribution of partners

Participant short name	Contributions
FUNITEC	Task coordination. Collaboration in the description of the test methodology (Section 2) and in its verification. Validation of the data integration tools (Section 4). Report of final conclusions (Section 5).
TEC	Main contributor for the description of the test for BIM and City repositories (Sections 3.1)
CAR	Main contributor for the description of the test methodology (Section 2) and main contributor for the description of the test for the Context and Project repositories (Sections 3.2 and 3.3)
ES	Contributions in documenting the results of the test for the Context and Project repositories (Section 3.2 and 3.3)

1.3. Relation to other activities in the project

Table 2 shows the relationships between the work documented in this report and other activities (or deliverables) developed within the OptEEmAL Project.

Table 2: Relation to other activities in the project

Deliverable Number	Relationship
D2.1	Requirements, specification and interoperability with the District Data Model and information about data repositories.
D2.3	Introduction about the data repositories.
D2.4	Deployment of the data repositories.
D2.5	Communication between repositories and the modules.
D3.4	Tests for ECM repository are provided in this deliverable.
D6.1	The result of the end-to-end tests are reported on this deliverable.

1.4. Glossary

These are the terms and definitions of some of the key concepts used in this document:

- **Data model.** A standardized model that represents the input data sources of the platform, such as BIM and GIS models in IFC and CityGML standards respectively, and models to represent the contextual data (e.g., climatic, energy, social, economic).
- **Data Management Module (DMM).** A module to manage the data required to feed the District Data Model and the generation of links between the different data models.
- **Data repository.** A database to store the data from the multiple domains processed by the platform. There are five data repositories: BIM, City, Context, ECM and Project.
- **District Data Model (DDM).** A comprehensive semantic framework to facilitate the intertwining of standard data models with domain specific ontologies by using semantic web technologies (as previously defined in deliverables D2.1 and D2.3).
- **District performance indicator (DPI).** A data type (measured or calculated) used in the assessment of the performance of buildings and districts in a specific domain: energy, environment, comfort, social, economic and urban.
- **Energy conservation measures catalogue (ECM repository).** A database containing the related information for each Energy Conservation Measure that can be implemented at building and/or district level, and modelled according to the District Data Model.
- **Enterprise Service Bus (ESB).** A software architecture model intended to facilitate the management of communications between web services.
- **Repository connector.** A logical communication layer component designed to provide the exchange of data between data repositories and components implemented in the platform modules.
- **Simulation model.** It refers to a set of data that fulfils the input data requirements of a specific simulation tool.

1.5. Structure of the document

This document is organized into five sections including this introduction (Section 1).

Section 2 contains a description of the two tests used to check the performance and requirements of the repositories included in the OptEEmAL platform.

Section 3 is dedicated to the implementation of the tests to validate the processes to store and retrieve information from the repositories. The tests have been performed in four of the five repositories (BIM repository, City repository, Context repository, and Project repository). The outputs of the test concerning the ECM repository can be found in D3.4 “Testing of the ECMs catalogue” [02].

Section 4 reports the validation and results obtained in the Data Management Module (DMM) components after implementing the updates of the last period in the development of the OptEEmAL project.

The conclusions and learned lessons about the work carried out in this task are presented in **Section 5**.

To complement the information presented in the main body of this report, **annex 1** provides a brief of the instances contained in the IFC file of the Demo4 case; **annex 2** includes a summary of the instances contained in the IFC file of the Torre Turina building, and, finally, the report generated by the Java comparing tool for the Demo4 case can be found in **annex 3**.

2. Methodology to validate the repositories

This section introduces the methodology to validate the repositories of the OptEEmAL platform, which includes the validation tests to be performed. Two types of test have been considered (Figure 1). The first type (Performance tests) focuses on the evaluation of the performance of each repository. In this case, the repositories are tested in terms of accessibility, response time, the number of requests that can be accepted at a specific time, completeness of requested information and failure response, etc. These tests can be carried out for each of the repositories separately, independently from other components of the OptEEmAL platform. The second type (Requirements tests) are end-to-end tests, whose purpose is to verify that each repository works as expected in conjunction with the different components of the platform. In this case, the expected behaviour of each repository is verified once it has been integrated into the rest of the platform. An end-to-end test is performed for each type of access that is made to each repository. Since some of these tests require the finalisation of some platform modules, which have not been completed yet at the time of writing, they will be carried out in Task 6.1. “Technology validation in relevant environment” after they have been integrated in the platform.

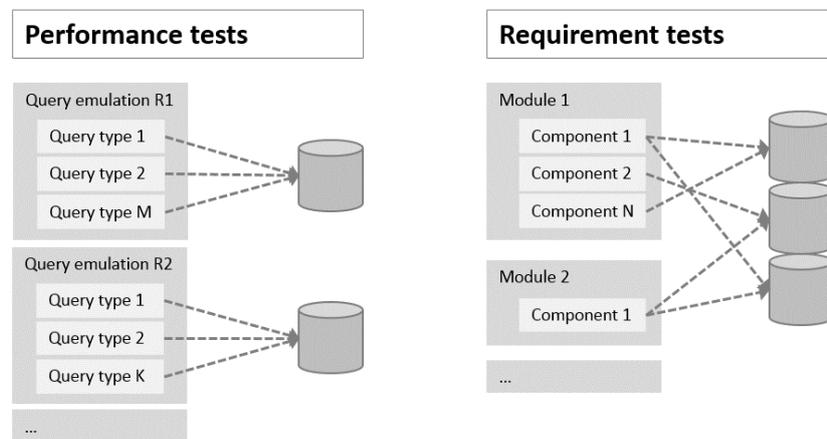


Figure 1: Two types of test to check the performance and requirements of repositories

2.1. Performance tests

The purpose of these tests is to check the performance of the repository itself, regardless of the connections with other components of the OptEEmAL platform. The tests that have been performed are summarized in Table 3.

The actions included in a test are the following:

- Setting up the repository.
- Implementing the appropriate code or query.
- Executing the actions
- Analysing the results (e.g., accessibility, response time, number of requests that can be accepted at a specific time, completeness of requested information, and failure response among others).
- Summarizing the results and, in case of failure, explaining the reasons.

The performance indicators considered are as follows:

1. **Connectivity.** To verify if a repository is accessible to the various platform components, providing a non-error response. The result of this test is “pass” / “not pass”.

2. **Response time.** A set of representative queries to check the response time of a repository. A valid range of response time values is needed to perform the check. The result of this test is “pass” / “not pass”.
3. **Load test (data retrieval).** To verify if a repository facilitates the required information in a fixed time response, particularly in those queries that involve large amounts of data from the repository. The data retrieval starts with a simple query and then the amount of information requested steadily increases. A performance curve is obtained as a result of this test, showing the point at which the repository's performance worsens (inflection point).
4. **Load test (data insertion).** This test is similar to the previous one. Queries are performed to insert the data into the repositories in a valid period of time. The data insertion starts with a simple query, and then the amount of information inserted in the repository is progressively increased. A performance curve is obtained as a result of this test, showing the point at which the repository's performance worsens (inflection point).
5. **Concurrency.** Assessing the responsiveness of the repository to a number of queries carried out simultaneously to identify its limits. The result is a curve indicating the inflexion point from which the repository fails to meet the acceptable response time requirements.
6. **Completeness.** To verify that the database or data structure that corresponds to each repository is correctly designed. All types of queries that a repository should be able to answer are executed. The result of this test is “pass” / “not pass” for each query.
7. **Failure response.** To verify that the repository is able to provide error messages to enable the modules interacting with it to take the appropriate actions. For this purpose, it is necessary to: (1) identify the list of possible situations that may arise, (2) verify that in each case the repository provides the appropriate error messages.

To carry out these tests, the repositories have been populated with actual data from case studies. There are different options to implement the tests. For example, if the emulation of different numbers of queries in parallel is required, the tools provided by the data management system of the repository (e.g., the database management system) can be used. Furthermore, additional applications can be developed to carry out the test (e.g., Java applications). Finally, existing tools to carry out performance tests (e.g., Advanced Rest Client¹) can be used.

¹ <https://advancedrestclient.com/>

Table 3: Performance battery tests for the OptEEmAL repositories.

#	Test Id	Goal	Pre-requisite	Passing condition	Result	Comment
1	Connectivity	Check if the repository is accessible/reachable making a query to it	The repository is up and running	The repository provides a non-error response	✓, ✗	
2	Response time	Check if the response time of the repository is appropriate according to the user needs for a common query	The repository is up and running The repository contains data	The response time is fixed between the limits or thresholds indicated by the user	✓, ✗	
3	Load test (data retrieval)	Check if the repository is able to provide information in a bounded time response even when asking for the complete information of the repository	The repository is up and running The repository contains data	The response time is fixed between the limits or thresholds indicated by the user, even when all the information of the repository is required	Curve	
4	Load test (data insertion)	Check if it is possible to insert information into the repository in a bounded time response even when trying to insert a big amount of data	The repository is up and running	The response time for data insertion is fixed between the limits or thresholds indicated by the user, even when the insertion of a big amount of data is required	Curve	
5	Concurrency	Check if multiple connections to the repository are feasible without errors at the same time	The repository is up and running The repository contains data	The repository admits N connections at the same time	Curve	To launch this test it is necessary to consider the usual number of connections (N) that a repository could have while interacting with the platform components
6	Completeness	Check if the repository provides the appropriate information according to specific queries	The repository is up and running The repository contains data	The repository responds with the expected information according to the query	✓, ✗	Select a set of usual queries to be made to the repository

7	Failure response	Check if the repository provides the appropriate information when an error occurs	The repository is up and running The repository contains data	The repository provides error messages facilitating the identification of the problem occurring	✓, X	
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2.2. Requirement tests

The purpose of the requirement tests is to verify that the queries to be made by each of the components of the OptEEmAL platform to the different repositories are performed properly (Table 4).

Table 4: Outline of a requirement test

#	Module	Component	Repository	Technologies and protocols	Type of query	Result
1	Name of the module (e.g., Data Management Module,...)	Name of the component of the module (e.g., Instance Creator,...)	Name of the repository to be accessed (e.g., Project repository,...)	Technologies and protocols implemented in the connection (e.g., ESB, Rest API,...)	Check that the repository is accessible/reachable making a query to it	✓, ✗

The results of the tests must show whether all repositories involved are able to respond to the particular requests of the components of each module while fulfilling the performance indicators previously outlined. This validation will be performed for each connectivity operation between components of the different platform modules and the Data repositories as is indicated in Table 5

Table 5: Connection between components of modules and repositories

#	Module	Component	Repositories	Technologies and protocols	Type of query	Result
1	Data insertion module	Data Checker	City/GML repository	Web Services	Performs all the checks and updates the status of each file	✓, ✗
2			BIM repository	ESB and Web Services	Performs the checks, enhances the BIM files and updates the status of each file	✓, ✗
3		Input Data Connector	City/GML repository	Form	Uploads the files to the repository	✓, ✗
4			BIM repository	Form	Uploads the files to the repository	✓, ✗
5			Context repository	REST API	Adds documents and redirects SPARQL query to the Triple store database	✓, ✗
6			ECM repository	Web Services	Uploads ECM base xml files to the document database and queries the catalogue by ID	✓, ✗

7			Project repository	SQL commands ESB	Manages all the connection between the GUI , database and other modules	✓, X
8		Geo Connector	External resources	REST API	Retrieves weather and socio economics data from some external repositories	✓, X
9		Strategies checker	Project repository	SQL commands ESB	Manages all the actions connected with the scenarios and applicable strategies	✓, X
10	Data Management Module	DataMapper (ETL 1)	BIM repository	Web Services	Retrieve IFC models of buildings	✓, X
11			Project repository	REST API	Store instances of IFC models in RDF	✓, X
12			Project repository	Web Services	Retrieve district neighbour shading data	✓, X
13			Project repository	REST API	Store district neighbour shading data in RDF	✓, X
14		DataMapper (ETL 2)	Context repository	REST API	Retrieve weather data in RDF	✓, X
15			BIM repository	REST API	Retrieve IFC models in RDF	✓, X
16			Project repository	REST API	Store instances of SimModel baseline models	✓, X
17			Project repository	REST API	Store instances of ECO models	✓, X
18		DataMapper (BESM)	Project repository	REST API	Retrieve instances of SimModel baseline models	✓, X
19			BES repository ²	REST API	Retrieve Snippets	✓, X
20	Project		REST API	Store instances of SimModel baseline	✓, X	

² BES (Building Energy Systems) repository introduced in Deliverable D2.4 “District Data Model repository”

			repository		models	
21		Instance Creator	Project repository	REST API	Retrieve instances of SimModel baseline models	✓, X
22			ECM repository	REST API	Retrieve Snippets	✓, X
23			Project repository	REST API	Store instances of SimModel candidate retrofitting scenario models	✓, X
24	Simulation module	Input Data Files Generation	Project repository	Technology: ESB Protocol: JMS	Retrieves Simulation Data Models (District Energy, Economic, Environmental)	✓, X
25		DPIs calculation	Project repository	Technology: ESB Protocol: JMS	Stores DPIs in the project repository	✓, X
26	Optimisation module		Project repository	REST API	Retrieve Applicable matrix, targets & boundaries, weights, diagnosis DPIs	✓, X
28	Exportation module	Export Data Configuration	BIM repository	Form	Retrieve BIM models in IFC standard to be enhanced	✓, X
29			ECM repository	REST API	Retrieve optimal solution obtained by the platform that must be applied to obtain the enhanced BIM models	✓, X
30			Project repository	SQL commands ESB	Retrieve the information necessary to manage the BIM enhancement process	✓, X

3. Validation of the data repositories

The outcomes of the Performance Tests carried out in four repositories (BIM repository, City repository, Context repository, and Project repository) are presented in this section. The results of the tests for the ECM repository are documented in the D3.4 “Testing of the ECMs catalogue”.

3.1. BIM and City repositories

Two repositories (BIM and City) have been implemented using GIT, a control system for tracking changes in computer files and systems. Both repositories contain the files representing the buildings and the district of the retrofitting projects performed with the OptEEmAL platform. The retrofitting projects are created in the same repositories and structured in different folders. Details on the implementation of these repositories are included in D2.4 “District Data Model repository” [01].

3.1.1. Initial configuration

The BIM and City Repositories are hosted in a server with the following configuration:

- HW: Intel® Xeon® CPU E5-2680 v3 @ 2.50GHz (2 processors). 8GB RAM.
- Operating System: Windows Server 2008 R2 Standard. 64-bit Operating System.
- Web Server: Apache Tomcat 8.5.
- GIT repository manager: Gitblit WAR 1.8.0.

It has to be noted that this is not a dedicated server for OPTHEMAL tools and services. This means that other projects and services are supported by this server, which may cause delays or longer processing times than in a dedicated server.

3.1.2. Tests

Several tests have been carried out in order to ensure that the BIM and City repositories work as expected and to estimate an average response time of each of the deployed services. In order to perform the tests, it has been necessary to develop some Java tools. As BIM and City repositories are based on the same implementation, all the tests have been carried out in the City repository and the results are applicable to the BIM repository.

The tests have been conducted according to the methodology described in Section 2.1, as follows:

3.1.2.1. Connectivity

In order to test that the City repository is accessible/reachable, a GIT clone process has been implemented. This process ensures that the repository is running.

3.1.2.2. Response time

To ensure that the response time of the repositories meets the requirements of a common query, a filename given to a project is searched in the City repository. The same process is performed 100 times to obtain an average time for the query.

The execution timeout set up for to validate if the response time is adequate is 1 second.

The same process has been performed 3 times, with the following results:

1. 100 times. Average response time, in milliseconds: 397
2. 100 times. Average response time, in milliseconds: 454
3. 100 times. Average response time, in milliseconds: 445

3.1.2.3. Load test (Data Insertion)

In order to test if it is possible to insert data into the repositories within a given time response, 10 CityGML files with different sizes have been uploaded to the City repository. This process has been performed 3 times in order to have an average loading time. The 10 files have been uploaded to different projects because if a file has not been modified it cannot be reloaded to the repository.

The response time of the loading process will depend on the file size, so it will be no possible to define a time limit in this case. The average load time for 10 files with different sizes, after the three attempts, is presented in Figure 5.

Table 6: Performance time of the loading data insertion test

Filename	Size (Kb)	Time Run1 (milliseconds)	Time Run2 (milliseconds)	Time Run3 (milliseconds)	Average (milliseconds)
01.xml	40	1.130	1.001	1.048	1.060
02.xml	409	1.280	874	1.277	1.144
03.xml	3.820	1.659	808	1.340	1.269
04.xml	11.350	1.927	1.040	1.769	1.579
05.xml	20.322	2.583	1.876	2.253	2.237
06.xml	36.347	3.168	2.635	2.928	2.910
07.xml	72.692	4.825	3.371	4.842	4.346
08.xml	145.382	8.907	6.868	8.467	8.081
09.xml	236.861	17.701	16.347	15.696	16.581
10.xml	411.757	25.634	22.381	23.127	23.714

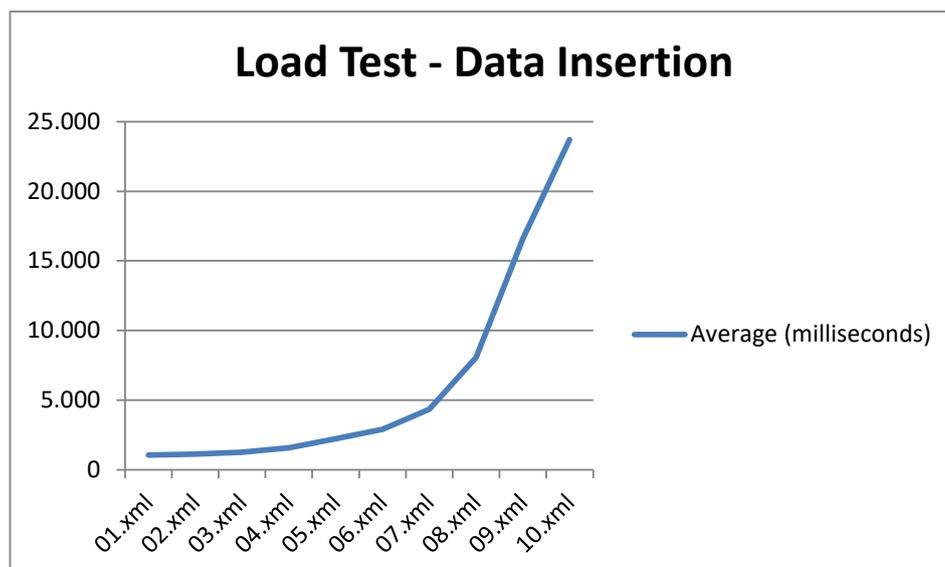


Figure 2: Chart line of loading data insertion test.

Figure 2 shows the results of the data insertion test. As can be seen, a near-exponential curve is obtained. This leads to the conclusion that the larger the file, the longer it takes to load it. Response times for small or medium size files are very small; only huge files require a considerable time. It is

also clear that the loading time will vary depending on the bandwidth and the speed of the connections.

Tests files can be found in the following link, changing the filename:

➔ <http://3dcity-test.tecnalia.com/Resources/Opteemal/OpteemalTestUploadv2/01.xml>

id	model_type	uri
integer	character varying	character varying
73	1050 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!01.xml
74	1051 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!02.xml
75	1052 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!03.xml
76	1053 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!04.xml
77	1054 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!05.xml
78	1055 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!06.xml
79	1056 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!07.xml
80	1057 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!08.xml
81	1058 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!09.xml
82	1059 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/5!temp!10.xml
83	1090 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!01.xml
84	1091 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!02.xml
85	1092 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!03.xml
86	1093 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!04.xml
87	1094 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!05.xml
88	1095 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!06.xml
89	1096 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!07.xml
90	1097 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!08.xml
91	1098 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!09.xml
92	1099 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/7!temp!10.xml
93	1100 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!01.xml
94	1101 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!02.xml
95	1102 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!03.xml
96	1103 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!04.xml
97	1104 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!05.xml
98	1105 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!06.xml
99	1106 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!07.xml
100	1107 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!08.xml
101	1108 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!09.xml
102	1109 CITYGML	http://3dcity-test.tecnalia.com/gitblit-1.8.0/raw/OpteemalCity.git/master/8!temp!10.xml

Figure 3: Result of loading data insertion in the link database

3.1.2.4. Load test (Data Retrieval)

To test if the City repository is able to provide information in a bounded time response, the same 10 files that have been uploaded in the previous test have also been downloaded from the GIT repository. This process has been performed 3 times in order to obtain an average running time.

As in the previous test, the response time of the downloading process will depend on the file size, so it will be no possible to define a time limit in this case. The list of average time to download 10 files with different sizes, after three attempts, is presented in Figure 6.

Table 7: Performance time of the retrieval data test

Filename	Size (Kb)	Time Run1 (milliseconds)	Time Run2 (milliseconds)	Time Run3 (milliseconds)	Average (milliseconds)
01.xml	40	1.053	1.080	1.182	1.105
02.xml	409	586	638	587	604
03.xml	3.820	790	720	834	781
04.xml	11.350	1.171	1.461	1.142	1.258
05.xml	20.322	1.616	2.117	1.571	1.768
06.xml	36.347	2.641	3.209	2.483	2.778
07.xml	72.692	6.086	6.039	4.297	5.474
08.xml	145.382	7.869	11.798	7.987	9.218
09.xml	236.861	12.441	17.849	12.006	14.099

10.xml	411.757	21.626	32.080	21.512	25.073
--------	---------	--------	--------	--------	--------

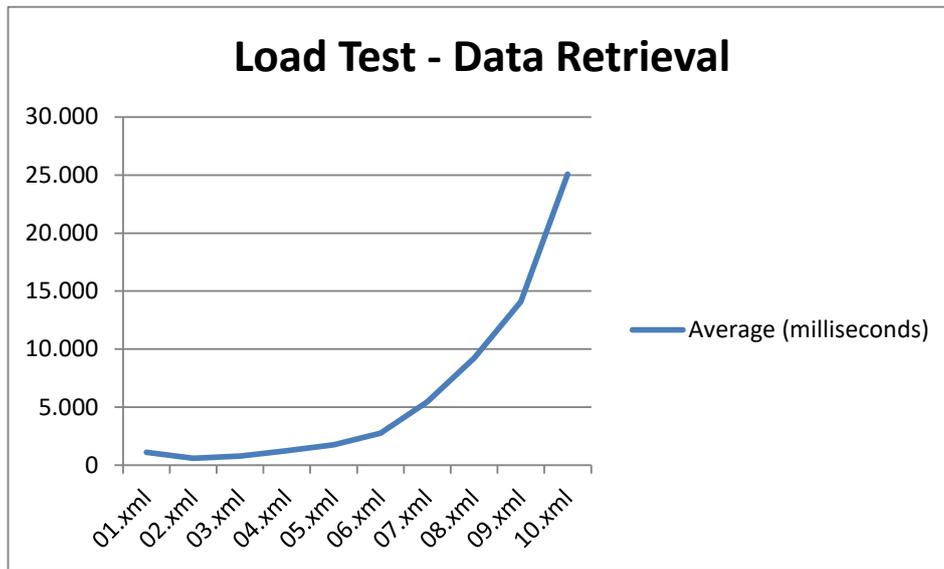


Figure 4: Chart line of data retrieval test

Results for data retrieval are pretty similar to the results of the tests for data insertion. As can be seen in Figure 4: Chart line of data retrieval test, an almost exponential curve is obtained. In conclusion, the larger the file, the longer it takes to download. Response times for small or medium size files are very small, and only huge files require a considerable time. It is also clear that the loading time will vary depending on the bandwidth and the speed of the connections.

3.1.2.5. Concurrency

This test checks if multiple connections to the repository can be performed at the same time by multiple users without causing errors. To make the test, one of the files in the repository has been accessed and downloaded 10 times simulating the actions of 10 users working at the same time. In this case, file access and download have been carried out using Java threads. This process has been performed 3 times in order to ensure the concurrency. The results are summarized in Table 8: Concurrency test results.

Table 8: Concurrency test results

	Time Run1 (milliseconds)	Time Run2 (milliseconds)	Time Run3 (milliseconds)
	ElapsedTime 5: 6610	ElapsedTime 2: 8875	ElapsedTime 7: 8835
	ElapsedTime 6: 7201	ElapsedTime 4: 10476	ElapsedTime 8: 9498
	ElapsedTime 8: 8012	ElapsedTime 3: 10708	ElapsedTime 3: 9709
	ElapsedTime 3: 8899	ElapsedTime 6: 11948	ElapsedTime 1: 10378
	ElapsedTime 7: 9033	ElapsedTime 5: 14178	ElapsedTime 6: 10394
	ElapsedTime 4: 9103	ElapsedTime 7: 14305	ElapsedTime 2: 10669
	ElapsedTime 2: 9327	ElapsedTime 8: 14942	ElapsedTime 4: 10733
	ElapsedTime 1: 9496	ElapsedTime 1: 15353	ElapsedTime 5: 10742
	ElapsedTime 9: 4050	ElapsedTime 9: 6887	ElapsedTime 9: 4285
	ElapsedTime 10: 3555	ElapsedTime 10: 6217	ElapsedTime 10: 3929
Total Elapsed Time	10760	16697	13431

Table 9: Performance times of the concurrency test

User	Time Run1 (milliseconds)	Time Run2 (milliseconds)	Time Run3 (milliseconds)	Average (milliseconds)
1	9.496	15.353	10.378	11.742
2	9.327	8.875	10.669	9.624
3	8.899	10.708	9.709	9.772
4	9.103	10.476	10.733	10.104
5	6.610	14.178	10.742	10.510
6	7.201	11.948	10.394	9.848
7	9.033	14.305	8.835	10.724
8	8.012	14.942	9.498	10.817
9	4.050	6.887	4.285	5.074
10	3.555	6.217	3.929	4.567

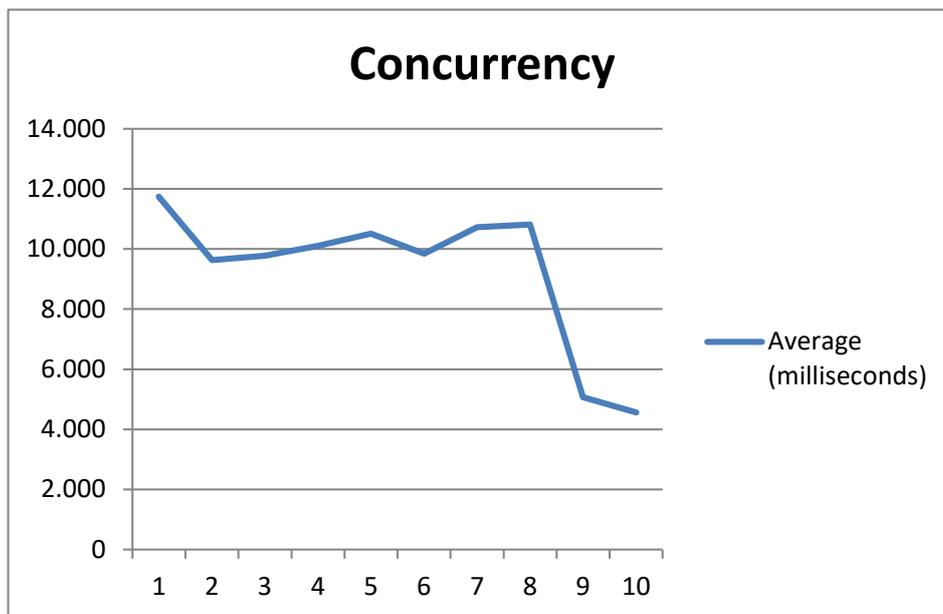


Figure 5: Chart line of the concurrency test

The results of the concurrency test show that it is possible to have multiple connections with the repository simultaneously. It also shows that on average almost all the users need the same time to download the file (except the last two, because these are the last ones to access it), all the processing time is much faster because there are not more users downloading at the same time. Even if the time needed is higher than when only one user is using the platform, the repositories still work correctly and the response time is acceptable.

3.1.2.6. Completeness

This test does not apply to the BIM and City repositories due because they are file-based systems. The completeness tests are only applicable to structured data.

3.1.2.7. Failure response

The objective of this test is to check if the repository provides the appropriate information when an error occurs. Three different error types have been selected to check this type of test: error in the connectivity to the repositories; error to access the Link Database containing information of the files in the repositories, and incorrect URI of the file. The error messages for each case are presented below.

- Connectivity

If the GIT repository or the server is not working, the following message is obtained:

```
Caused by: org.eclipse.jgit.errors.NoRemoteRepositoryException:  
http://tecnalia@3dcity-test.tecnalia.com/gitblit-1.8.0/r/OpteemalBIM1.git:  
http://tecnalia@3dcity-test.tecnalia.com/gitblit-1.8.0/r/OpteemalBIM1.git/info/refs?service=git-upload-pack not found
```

- Link database

If a project, project version, domain or model is not found when the Link Database is queried, the following errors are shown:

```
ERROR: Project not found!  
ERROR: Project Version not found!  
ERROR: Domain not found!  
ERROR: Model not found!
```

- URI of the file is not correct

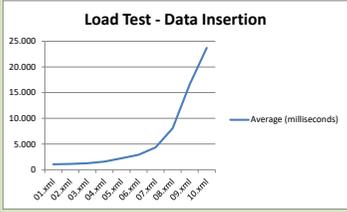
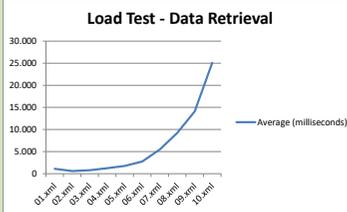
If the URI of the file is not correct, the following error message is shown:

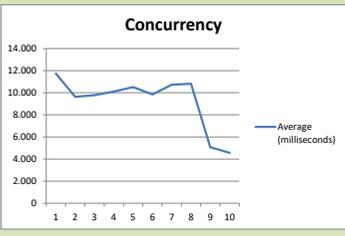
```
java.io.FileNotFoundException:  
http://3dcity-test.tecnalia.com/Resources/Opteemal/OpteemalTestUpload/01111.xml
```

3.1.3. Results

The results of the test performed in the BIM and City Repositories are summarized in the following Table 10:

Table 10: Results of the test performed for BIM and City repositories

#	Test Id	Goal	Result	Details
1	Connectivity	Check if the repository is accessible/reachable making a query to it	✓	
2	Response time	Check if the response time of the repository is appropriate according to user needs for a common query	✓	A time limit of 1 second has been set up to validate if the response time is adequate.
3	Load test (data insertion)	Check if it is possible to insert information into the repository in a bounded time response even when trying to insert a big amount of data		As a result of the data insertion test a curve near to exponential is obtained. In conclusion, the larger the file, the longer it takes to load it. Response times for small or medium size files are very small, only huge files requires a considerable time. It is also clear that the loading time will vary depending on the bandwidth and the speed of the connections.
4	Load test (data retrieval)	Check if the repository is able to provide information in a fixed time response even when asking for the complete information of the repository		Results for data retrieval are pretty similar to the results of the tests for data insertion. As a result of the data retrieval test a curve near to exponential is obtained. As a conclusion, the larger the file, the longer it takes to download it. Response times for small or medium size files are very low, only huge files require a considerable time. It is also clear that the loading time will vary depending on the bandwidth and the speed of the connections.

5	Concurrency	Check if multiple connections to the repository are feasible without errors at the same time		The results of the concurrency test show that it is possible to have multiple simultaneous connections with the repository. It also shows that on average almost all the users need the same time to download the file, except the last two. Even if the time needed is higher than when only one user works in the platform, the repositories still perform correctly and the response time is acceptable.
6	Completeness	Check if the repository provides the appropriate information according to specific queries		Not applicable.
7	Failure response	Check if the repository provides the appropriate information when an error occurs	✓	

3.2. Context repository

The Context repository stores all the input information on refurbishment projects that is not included in the BIM and CityGML models in the OptEEmAL platform, among them the structured data obtained from the geo-cluster service (climate conditions, economic and other data related to a specific location).

3.2.1. Initial configuration

A Fuseki server has been used to store the information of the Context repository. It provides RDF data over the HTTP protocol using a SPARQL server.

To test that technology, the Apache-Jena-Juseki-2.6.0 packet has been used to load 4 geo-data RDF files from different locations that have been loaded. Once the server is available, the data from the Context repository is retrieved through the corresponding API managed by the Context repository connector. The information related to the six case studies and three demonstration cases foreseen in the OptEEmAL project is already stored in this repository, along with the information about several locations in Europe, in order to test the performance and functionality of this repository. More specifically, the repository has been loaded with 45 RDF files extracted by the geo-connector module (Table 11) containing weather data from 45 different locations in Europe.

Table 11: RDF files extracted by the geo-connector module

Antwerp, BEL.rdf	Coimbra, POR.rdf	Lisboa, POR.rdf	Nantes, FRA.rdf	San Sebastian, Spain.rdf
Bari, ITA.rdf	Caceres, ESP.rdf	Liverpool, UK.rdf	Nottingham, UK.rdf	Santiago de Compostela, Spain.rdf
Berlin, GER.rdf	Cordoba, ESP.rdf	London, UK.rdf	Nuremberg, GER.rdf	Soma, Turkey.rdf
Bristol, UK.rdf	Eibar, Spain.rdf	Lund, Sweden.rdf	Oporto, POR.rdf	Stuttgart, GER.rdf
Brno, CZE.rdf	Genoa, ITA.rdf	Lyon, FRA.rdf	Orleans, FRA.rdf	Toulouse, FRA.rdf
Bruges, BEL.rdf	Ghent, BEL.rdf	Madrid, ESP.rdf	Ostrava, CZE.rdf	Trento Italia.rdf
Brussels, BEL.rdf	Guarda, PT.rdf	Milan, ITA.rdf	Paris, FRA.rdf	Valladolid, Spain.rdf
Cambridge, UK.rdf	Hannover, GER.rdf	Munich, GER.rdf	Prague, CZE.rdf	Venice, ITA.rdf
Cardiff, UK.rdf	Kassel, GER.rdf	Murcia, ESP.rdf	Roma, ITA.rdf	Zaragoza, ESP.rdf
Antwerp, BEL.rdf	Coimbra, POR.rdf	Lisboa, POR.rdf	Nantes, FRA.rdf	San Sebastian, Spain.rdf
Bari, ITA.rdf	Caceres, ESP.rdf	Liverpool, UK.rdf	Nottingham, UK.rdf	Santiago de Compostela, Spain.rdf

3.2.2. Tests

The results of executing the performance tests for the Context repository are included in the next subsections. The tests have been performed according to the plan described in Section 2.1. The results of the tests and the corresponding conclusions are also provided.

3.2.2.1. Connectivity

The aim of this test is to verify if the Context repository is accessible with the corresponding queries, providing a non-error response. To this aim, a simple test application has been implemented to enable the verification of this accessibility. The result of this test is “pass” or “not pass”. The test invokes an API with a simple SPARQL query as parameter:

http://94.177.191.106/opteemal_DataInsertionModule/rest/idc_services/context_connector/getContextualData

If the server is up-and-running, the result of the search is returned. If the Jena Fuseki server is down an empty string is returned. The result of this test was: “pass”.

3.2.2.2. Response Time

A set of representative queries was performed to check the response time provided by the Context repository meets the requirements of the OptEEmAL platform components. The performance depends on the type of data requested (data from a data base, documents from a document based repository, and so on). This test requires setting up a valid range of response time values. The result of this test is “pass” or “not pass”. The test invokes an API for 13 SPARQL queries:

http://94.177.191.106/opteemal_DataInsertionModule/rest/idc_services/context_connector/getContextualData

If the respond exceeds the ResponseTime limit (2 secs), the test fails.

ResponseTime test:

sparql_simBuilding_Building-apr.rq running time is:	0.1350000 milliseconds
sparql_simBuilding_Building-aug.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-dec.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-feb.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-jan.rq running time is:	0.0790000 milliseconds
sparql_simBuilding_Building-jul.rq running time is:	0.0770000 milliseconds
sparql_simBuilding_Building-jun.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-mar.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-may.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-nov.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-oct.rq running time is:	0.0780000 milliseconds
sparql_simBuilding_Building-sep.rq running time is:	0.0830000 milliseconds
sparql_simBuilding_Building.rq running time is:	0.0580000 milliseconds

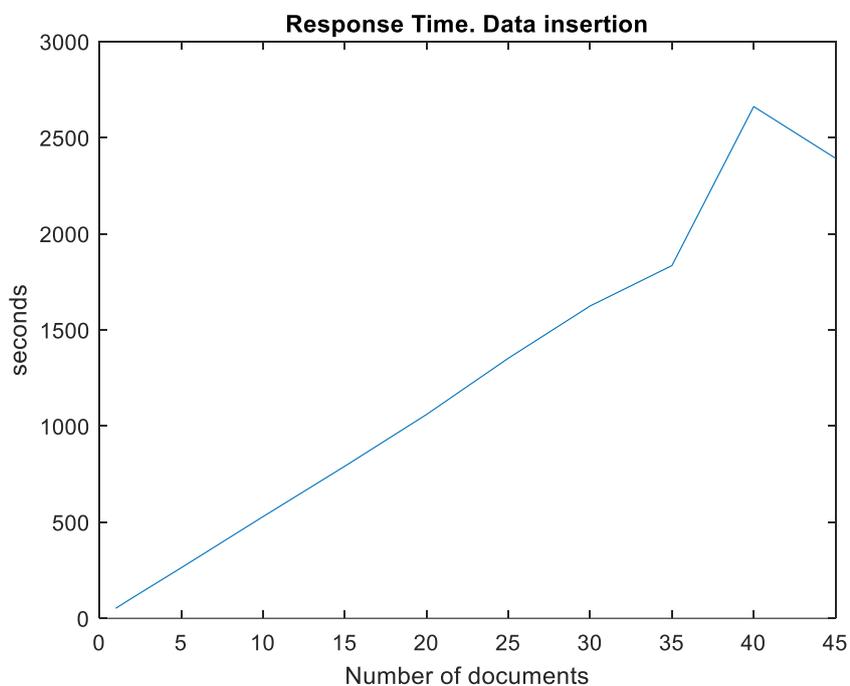
Since the result of all requests is under the *ResponseTime*, the result of this test was: “pass”.

3.2.2.3. Load test (Data Insertion)

The purpose of this test is to verify the progressive upload time with packages of 1, 2, 5, 10, 15, 20, 25, 30, 35, 40 and 45 RDF files uploaded to the repository. A performance curve shows the point at which the performance worsens (inflection point). RDF files with a size of 14Mb have been used to carry out this test.

ResponseTime test:

ResponseTime for Uploading 1 files is:	52.0403828 seconds
ResponseTime for Uploading 2 files is:	1 minute and 45.7706014 seconds
ResponseTime for Uploading 5 files is:	4 minutes and 22.8849010 seconds
ResponseTime for Uploading 10 files is:	8 minutes and 48.8137352 seconds
ResponseTime for Uploading 15 files is:	13 minutes and 11.0041127 seconds
ResponseTime for Uploading 20 files is:	17 minutes and 40.2873228 seconds
ResponseTime for Uploading 25 files is:	22 minutes and 32.8501338 seconds
ResponseTime for Uploading 30 files is:	27 minutes and 04.7071826 seconds
ResponseTime for Uploading 35 files is:	30 minutes and 34.6583848 seconds
ResponseTime for Uploading 40 files is:	44 minutes and 21.7585068 seconds
ResponseTime for Uploading 45 files is:	39 minutes and 52.9598425 seconds



The result of this test was: “pass” because after uploading all these group of files, the server was still working. It is important to note that there is an almost direct relation between the level of performance obtained and the number of the documents to be uploaded. Also, the bandwidth influences the performance. It is important to mention that is very unlikely to have more than one document uploaded at the same time in an usual operation of the OptEEmAL platform.

3.2.2.4. Load test (Data Retrieval)

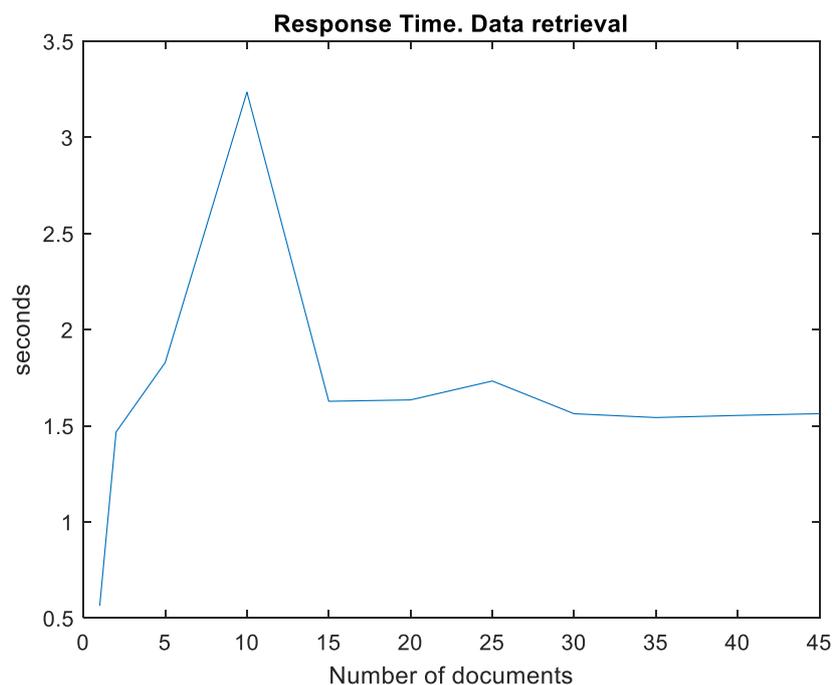
This test is carried out to verify if the Context repository provides the required information in a time-limited response. In order to execute this test, the Context repository is queried to provide information, starting with a simple query and then progressively increasing the amount of information required. A performance curve shows the outcomes of the test, with the inflection point at which the performance worsens. This test has been done using an API to execute 13 SPARQL queries with a progressive increase in the number of files to be retrieved:

http://94.177.191.106/opteemal_DataInsertionModule/rest/idc_services/context_connector/getContextualData

The results indicate that the performance level is guaranteed after inserting 1, 2, 5, 10, 15, 20, 25, 30, 35, 40, and 45 RDF files previously loaded with a size of 14Mb.

ResponseTime test:

ResponseTime for 13 query with a corpus of 1 documents is:	0.5636300 seconds
ResponseTime for 13 query with a corpus of 2 documents is:	1.4673566 seconds
ResponseTime for 13 query with a corpus of 5 documents is:	1.8284830 seconds
ResponseTime for 13 query with a corpus of 10 documents is:	3.2352613 seconds
ResponseTime for 13 query with a corpus of 15 documents is:	1.6272172 seconds
ResponseTime for 13 query with a corpus of 20 documents is:	1.6343652 seconds
ResponseTime for 13 query with a corpus of 25 documents is:	1.7327023 seconds
ResponseTime for 13 query with a corpus of 30 documents is:	1.5625236 seconds
ResponseTime for 13 query with a corpus of 35 documents is:	1.5426808 seconds
ResponseTime for 13 query with a corpus of 40 documents is:	1.5536763 seconds
ResponseTime for 13 query with a corpus of 45 documents is:	1.5628237 seconds



As reflected in the results, the response time is not related to the number of files simultaneously inserted, but with other issues such as the server load at the time of carrying out the query or the bandwidth. After running the test, the result was passed.

3.2.2.5. Concurrency

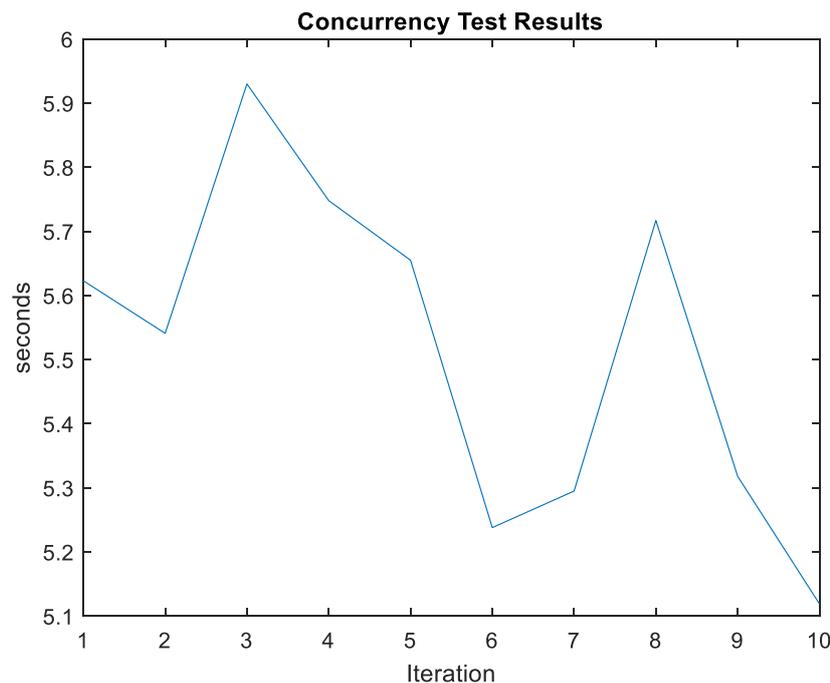
The responsiveness of the Context Repository to a number of queries carried out simultaneously has been assessed to identify its limitations to provide the data requested. The result is a curve indicating the inflection point from which the repository fails to meet the acceptable response time requirements. This test was performed with an API for 13 SPARQL queries running in parallel:

http://94.177.191.106/opteemal_DataInsertionModule/rest/idc_services/context_connector/getContextualData

The test was carried out on 10 parallel processes, each one with 13 requests. The load generated in the test shows that the running performance of each query is less than one second. The running time for each query in parallel is shown as follows:

ResponseTime test:

Running time is: 5.6230000 seconds
 Running time is: 5.5410000 seconds
 Running time is: 5.9300000 seconds
 Running time is: 5.7480000 seconds
 Running time is: 5.6550000 seconds
 Running time is: 5.2380000 seconds
 Running time is: 5.2950000 seconds
 Running time is: 5.7170000 seconds
 Running time is: 5.3180000 seconds
 Running time is: 5.1190000 seconds



As can be seen in the results, there was no problem in the case of the concurrency of parallel queries in the repository. So the result was: "pass".

3.2.2.6. Completeness

The purpose of this test is to verify that the database or data structure that corresponds to each repository is properly designed. To this aim, it is necessary to list all the types of queries that the repository should be able to answer. The result of this test is "pass" / "not pass" for each query. The test has been done using an API which invokes SPARQL queries that request monthly weather data. The test checks if the response to the query contains the data expected.


```
# filename: site_GndTemp_BldgSurface_NovGndTemp.rq
PREFIX ifcowl: <http://ifcowl.openbimstandards.org/IFC4_ADD1#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX list: <https://w3id.org/list#>
PREFIX express: <https://w3id.org/express#>
PREFIX afn: <http://jena.apache.org/ARQ/function#>
PREFIX math: <http://www.w3.org/2005/xpath-functions/math#>
PREFIX simbldg: <http://www.lbl.gov/namespaces/Sim/BuildingModel#>
PREFIX simcore: <http://www.lbl.gov/namespaces/Sim/SimModelCore#>
PREFIX simres: <http://www.lbl.gov/namespaces/Sim/ResourcesGeneral#>
PREFIX simgeom: <http://www.lbl.gov/namespaces/Sim/ResourcesGeometry#>
PREFIX apf: <java:org.apache.jena.query.pfunction.library.>
PREFIX wo: <https://www.auto.tuwien.ac.at/downloads/thinkhome/ontology/WeatherOntology.owl#>
PREFIX time: <http://www.w3.org/2006/time#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX siminstances: <http://www.lbl.gov/namespaces/Sim/siminstances#>

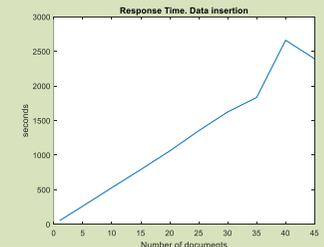
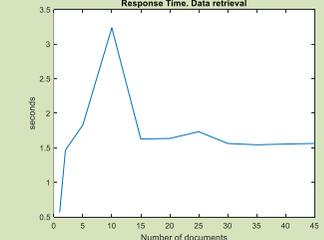
select (xsd:decimal(?v) as ?val) WHERE {
  ?ws1 rdf:type wo:WeatherState ;
  wo:hasObservationTime [time:inDateTime [time:month "14"]];
  wo:hasExteriorTemperature [wo:hasValue ?v].
}
```

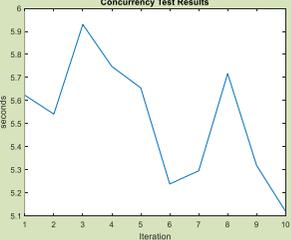
This example shows that the server continues to function even if incorrect queries are performed. In this case, the result is an empty string. The next test is performed with the same query but with the Fuseki server down. The expected result is an empty string and no exceptions are thrown. Therefore, the result of this test was: “pass”.

3.2.3. Results

The results of the tests described in the previous section are summarized in Table 12:

Table 12: Tests performed in the Context Repository

#	Test Id	Goal	Result	Details
1	Connectivity	Check if the repository is accessible/reachable making a query to it	✓	
2	Response time	Check if the response time of the repository is appropriate according to user needs for a common query	✓	A time limit of 2 seconds has been set up to check if the response time is adequate.
3	Load test (data insertion)	Check if it is possible to insert information into the repository in a fixed time response even when trying to insert a big amount of data		There is an almost direct relation between the values obtained and the number of the documents to be uploaded. Also, the bandwidth influences the uploading time.
4	Load test (data retrieval)	Check if the repository is able to provide information in a fixed time response even when asking for the complete information of the repository		The response time is not directly related to the number of document files requested simultaneously.

5	Concurrency	Check if multiple connections to the repository are feasible without errors at the same time		There are no problems in the case of having concurrent queries to the repository.
6	Completeness	Check if the repository provides the appropriate information according to specific queries	✓	
7	Failure response	Check if the repository provides the appropriate information when an error occurs	✓	

3.3. Project repository

The Project repository stores all the data generated in the execution of the processes of the OptEEmAL platform: final information and also intermediate data created in the platform. Also, this repository contains configuration data for the different modules of the platform and default values for the cases where the user did not introduce them. Specifically, the data contained is:

- Information of the project
- Information related to IPD users
- Information related to the users of the platform
- Targets related to the DPIs
- Boundaries related to the DPIs
- Barriers related to the ECMs
- Prioritisation Criteria
- ECM Applicable Matrix
- Semantic, simulation, and simulation data models
- Scenarios
- DPIs of interest for specific project
- Result of the DPIs (for each scenario evaluated)
- Outputs
- Predefined weighting schemes
- Predefined list of errors
- Predefined list of IPD profiles
- Guidelines

As can be seen, the information is very heterogeneous and consequently the sources of the different data are very diverse. In fact, all the platform modules insert information in this repository, because in most of the transaction, the repository is used to pass information between modules, and also to allow the store of the information in a persistent way.

Currently, the Project repository does not contain information in all the fields due to the fact that the modules are not fully integrated within the platform. Because of this, the testing of the Project repository has been postponed until its integration into the OptEEmAL Platform is finalised. The results of these tests are provided in Deliverable 5.3 “Functional modules and interfaces development and testing”.

4. Validation of the data integration tools

In this section, the results obtained in the implementation of an updated version of the Data Management Module (DMM) are reported. The previous DDM version is documented in Deliverable D2.4 “District Data Model repository” [01]. This module carries out three processes in the OptEEmAL platform: (1) data transformation (ETL1), (2) data integration (ETL2), and (3) creation of instances of data simulation models for optimised scenarios. While ETL1 and ETL2 processes are embedded in a single tool (DataMapper), the generation of the instances of optimised scenarios is performed by the Instance Creator tool. The two tools have been considered in the validation of the DDM.

4.1. Introduction

As presented in Deliverable 2.3 “Functional architecture of the data repository” and Deliverable 2.5 “Report on standardised information exchange protocols”, the OptEEmAL platform calculates District Performance Indicators (DPIs) which are used to evaluate alternative scenarios to optimize refurbishment projects at building and district scale. To obtain these DPIs, the DMM integrates and transforms various data sources (BIM, city data, and contextual data) into semantic data models (ontologies) which feed the Simulation Module to carry out different kind of simulations using the tools required to calculate the DPIs. This integration and data transformation process spans across various stages (Figure 6). The requirements and the specifications of the DDM can be found in Deliverable 2.1 “Requirements and specification for the District Data Model”.

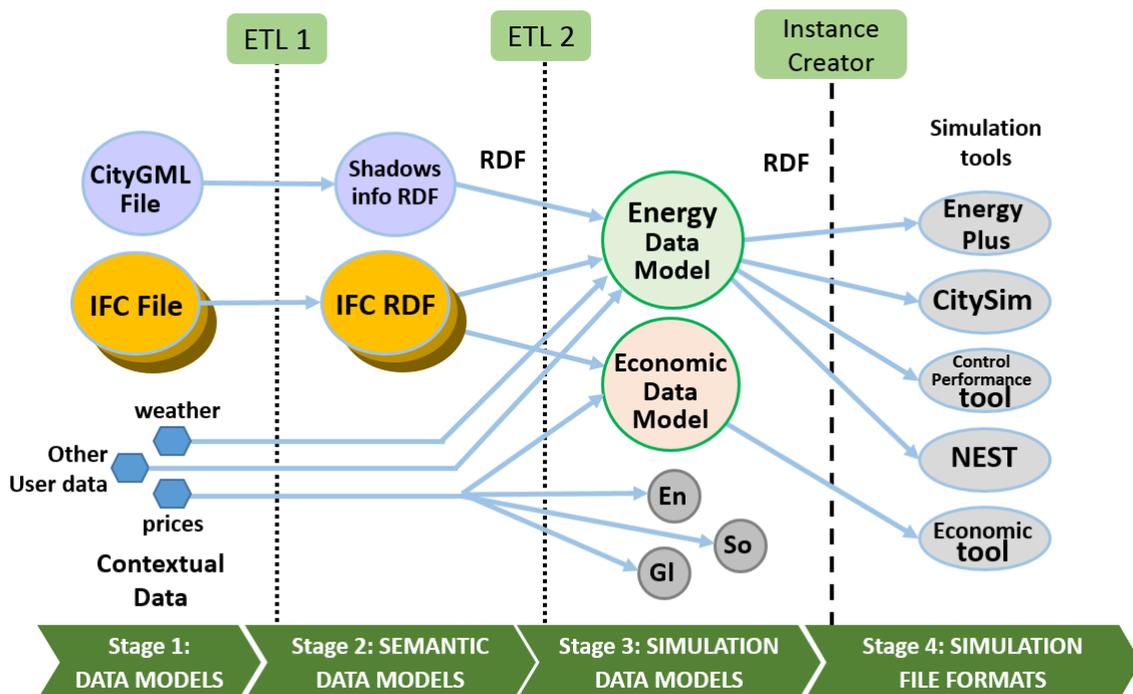


Figure 6: Overview of the simulation data integration process in the OptEEmAL platform described in Deliverables D2.3 [04] and D2.5 [05].

As described in Deliverable 2.5 “Report on standardised information exchange protocols” [05], the ETL1 and ETL2 processes – carried out by the DataMapper tool – convey a transformation of the data models into simulation data models (RDF models) which are structured according to data schemas (i.e., ontologies). Performance tests have been carried out with a set of demonstration examples using the data currently available in the pilot cases.

A Java checking tool (Figure 7Figure 9) has been developed to compare the results generated by the DataMapper with the data requirements of the Simulation Module. The two files compared are an RDF file generated by the DataMapper tool and an XML file of the SimModel [06] model generated

by an alternative implementation (e.g., SimModel files exported from Simergy). The number of classes, properties and instances represented in the XML model are compared with the corresponding RDF version of the model generated by DataMapper. The tool allows the user to select different options to carry out the verification (e.g., comparing only instances of classes or also their properties). This way, it is possible to identify possible inconsistencies, making it easy for users to fix them.

SPARQL Construct queries contain the classes and properties necessary to generate an equivalent pattern in SimModel. However, if this pattern is not correctly defined or if it does not match the corresponding input data model (e.g., IFC model) the query will not generate the expected output. By using this Java tool it is possible to avoid the manual checking of the number of generated and expected instances, while reducing the mapping process and maintenance time.

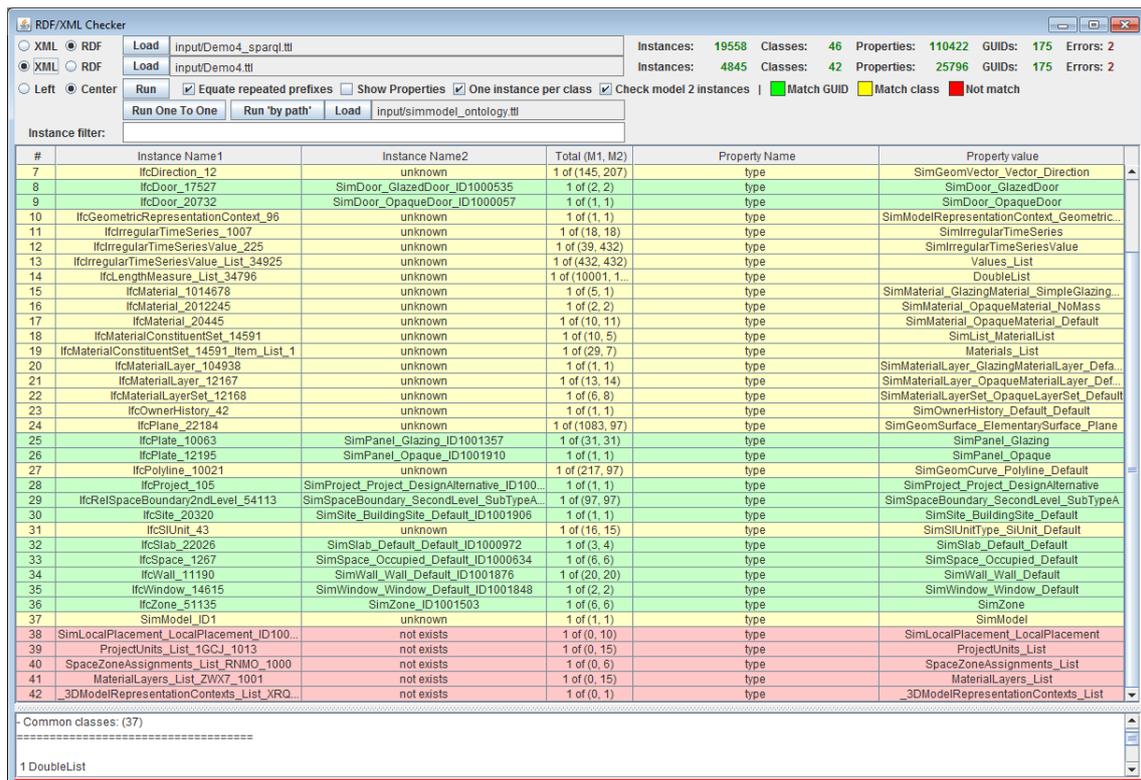


Figure 7: Benchmarking tool to compare two SimModel models

The checking tool enables to perform different checks and generate the corresponding reports. As can be observed in Figure 7, the results are shown in a table with a colour code to make it easier for users to identify conflicts. To compare the models, the tool searches first for the GUID properties of the instances. If they match, the result – one instance per row – is shown in green colour. If there is no matching, the tool looks for instances of the same class and shows them in yellow colour. The comparison is based on the number of instances having the same class and the same properties in both models. If there is no matching, instances and/or properties are shown in red colour. The tool also allows users to load the ontology on which the data model instances are based, in this case the SimModel ontology. This way, it is possible to identify and verify the names of the classes and properties, as well as their instantiation in the two models (RDF and XML).

The reports include more information than shown in the user interface, for example information on domain/prefix conflicts (instances of the same class name but different namespace in each data model). The conflicts between properties are also indicated, as can be observed in the fragment shown in Figure 8. An example of a generated report can be found in Section 7.3 of the Annex.

```

Issue: 3 properties missing or incorrectly defined in instances of class [[
SimMaterialLayer_OpaqueMaterialLayer_Default ]]
Examples of instances: IfcMaterialLayer_2370 (m1), or SimMaterialLayer_OpaqueMaterialLayer_Default_ID1000643
(m2)
http://d-alchemy.com/schema/simxml/SimModelCore#sourceModelObjectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_LayerThickness..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_MaterialName..... (missing in Model 2)

> class 'SimMaterialLayer_OpaqueMaterialLayer_Default' done (instances used to check: 'IfcMaterialLayer_2370'
and 'SimMaterialLayer_OpaqueMaterialLayer_Default_ID1000643')

Issue: 2 properties missing or incorrectly defined in instances of class [[
SimBuildingStory_BuildingStory_Default ]]
Examples of instances: IfcBuildingStorey_145 (m1), or SimBuildingStory_BuildingStory_Default_ID1000030 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

```

Figure 8: Excerpt of the report generated during the evaluation

4.2. Initial configuration

The tests carried out to check the outputs generated by the DataMapper and Instance Creator tools have been conducted on a computer workstation with these characteristics:

- Operating System: Windows 7 Professional
- Processor: Intel® Core™2 Quad CPU Q9400 @ 2.66GHz
- Installed memory (RAM): 4GB
- System type: 32-bits Operating System

4.3. Tests

Two demonstration cases have been used to test the three processes carried out in the DMM: (1) data transformation of the input models, (2) data integration to generate baseline models (DataMapper tool), and (3) application of ECMs in baseline models (Instance Creator tool). While the tests have been carried out completely on the first two processes, as documented below, this is not the case for the outputs of the Instance Creator tool because the required input data is not available yet. The tests results of this third process will be provided in Deliverable 5.3 “Functional modules and interfaces development and testing”.

The two demonstration cases are: (1) “Demo4” case and (2) “Torre Turina” building, which are briefly described below.

- **Demo4 case.** This case (Figure 9) – which was described in D2.4. “District Data Model repository” [01] – was chosen because it enables us to apply most of the measures of the ECM catalogue without having to deal with the complexities that arise with large buildings models. It corresponds to a simple two-story building with 6 rooms, façades with windows and doors, and curtain walls with opaque and transparent materials.

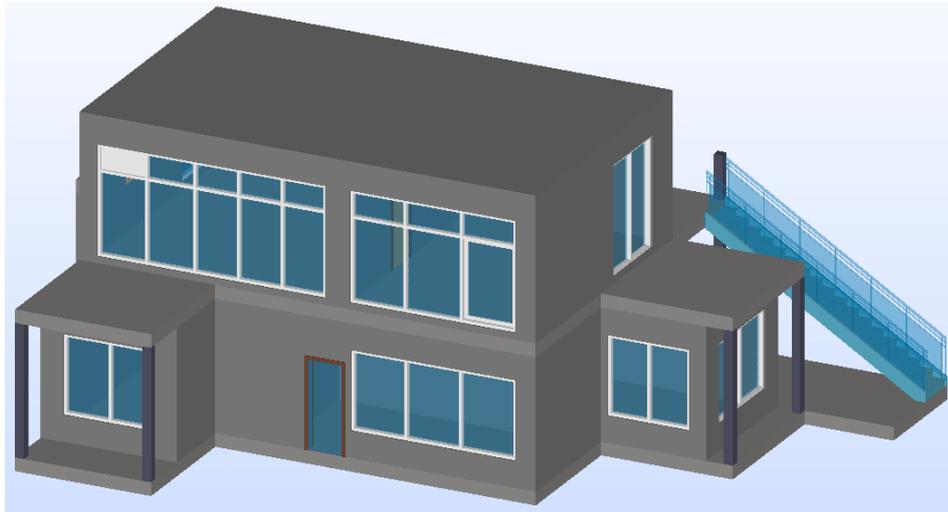


Figure 9: 3D representation of the IFC model of the “Demo4” demonstration case in Solibri

A summary of the instances contained in the input IFC file of this case, which is the main source of the data to be transformed into SimModel, is included in the Annexes (See Section 7.1).

- **Torre Turina building.** This residential building (Figure 10) belongs to the Cuatro de Marzo pilot case district in Valladolid (Spain). It is a 11-story building plus the ground floor and the roof. All the floors are the same with the exception of the first one. There are 284 rooms in the whole building. An existing model of the building has been slightly changed to suit the simulation needs. The reasons underlying these changes are explained in a guide for BIM modellers that is being prepared within WP1.



Figure 10: 3D representation of the IFC model of Torre Turina building in Solibri

A summary of the instances contained in the input IFC file of Torre Turina is included in the Annexes (See Section 7.2).

4.3.1. Verification criteria

The results of both tests (Demo4 case and Torre Turina) have been evaluated based on the two following criteria:

- **Response Time.** The purpose of this evaluation is twofold: 1. To check the time required for each query to generate each part of a SimModel baseline instance (although there is no time limit for the execution of this process, the response time should be as short as possible), and 2. The time to execute the queries 10 times to check the stability of the process. The result of this test can be “pass” / “not pass”.
- **Validation of data transformed from IFC models.** Since IFC models are the main data source used by SimModel, the Java tool introduced in Section 4.1 has been used to compare the files generated by the DataMapper and the XML files provided by third parties. In this case, the number of building components and materials matchings is evaluated. The validation is based on the results provided in the report generated by the Java tool; it can be “pass” / “not pass”.

4.3.2. Test 1: Demo4 case

4.3.2.1. Response time

The results of transforming 10 times the “Demo4 case” IFC model in STP format into RDF according to ifcOWL ontology [07] is shown below:

Response time test (ETL 1):

```
Running time: 9.596 seconds
Running time: 9.775 seconds
Running time: 12.571 seconds
Running time: 10.308 seconds
Running time: 9.834 seconds
Running time: 9.534 seconds
Running time: 9.575 seconds
Running time: 10.513 seconds
Running time: 9.927 seconds
Running time: 9.847 seconds
```

The results of the tests to generate the SimModel model in the ETL 2 process are shown below.

Response time test (ETL 2):

Running time: 2,95 seconds
 Running time: 1,483 seconds
 Running time: 1,277 seconds
 Running time: 1,845 seconds
 Running time: 1,141 seconds
 Running time: 1,233 seconds
 Running time: 1,047 seconds
 Running time: 1,029 seconds
 Running time: 1,111 seconds
 Running time: 1,043 seconds

The average time spent in the execution of the different processes is summarized in Table 13.

Table 13: Average time spent to carry out each of the operations

Demo4 Case					
Load Model	Pre-processing	ETL 1	ETL 2	Materialisation	Total Time
4,345 s.	1,376 s.	11,977 s.	1,277 s.	13,164 s.	32,140 s.

The average execution time with DataMapper is around 32 seconds for the “Demo4 case”, which is a small building. This time is considered acceptable since this whole process is only carried out when the user loads the input models.

4.3.2.2. Validation of data transformed from IFC models

The outputs of the DataMapper tool are compared to the original IFC file and also to the IFC file generated by the CBIP tool which includes the space boundaries needed for the thermal analysis of the building. The output of the DataMapper tool used to process the “Demo4 case” was the following:

```

IFC input file: files/Demo4_ENHANCED.ttl
-----
Invoking the following sparql CONSTRUCTS (40):

Triples|msec|Objects| Query
-----
25312 | 412 | 9571 | sparql_DoubleList_LengthMeasure
1142 | 25 | 10000 | sparql_DoubleList_Reallist
52 | 12 | 3 | sparql_SimBuildingStory_BuildingStory_Default
19 | 6 | 1 | sparql_SimBuilding_Building_Default
105 | 5 | 13 | sparql_SimDerivedUnitType_DerivedUnit_Default
26 | 33 | 2 | sparql_SimDoor_GlazedDoor
35 | 10 | 1 | sparql_SimDoor_OpaqueDoor
0 | 3 | 0 | sparql_SimGeomCurve_CompositeCurve_Default
5887 | 156 | 217 | sparql_SimGeomCurve_Polyline_Default
31491 | 204 | 3499 | sparql_SimGeomPoint_Point_CartesianPoint
683 | 12 | 31 | sparql_SimGeomSolidModel_SweptAreaSolid_ExtrudedAreaSolid
1068 | 25 | 97 | sparql_SimGeomSurface_BoundedSurface_CurveBoundedPlane
10831 | 86 | 1083 | sparql_SimGeomSurface_ElementarySurface_Plane_Plane
1451 | 29 | 145 | sparql_SimGeomVector_Vector_Direction
235 | 9 | 18 | sparql_SimIrregularTimeSeries_IrregularTimeSeries
178 | 90 | 10 | sparql_SimList_MaterialList
11 | 17 | 1 | sparql_SimLocalPlacement_LocalPlacement_AbsolutePlacement
2432 | 20 | 221 | sparql_SimLocalPlacement_LocalPlacement_RelativePlacement
42 | 5 | 16 | sparql_SimMaterialLayerLists
34 | 8 | 2 | sparql_SimMaterial_OpaqueMaterial_NoMass
14 | 3 | 1 | sparql_SimModelRepresentationContext_GeometricRepresentationContext_default
10 | 3 | 1 | sparql_SimOwnerHistory_Default_Default
415 | 12 | 31 | sparql_SimPanel_Glazing
25 | 8 | 1 | sparql_SimPanel_Opaque
997 | 19 | 166 | sparql_SimPlacement_Axis2Placement2D_Default
23329 | 156 | 1944 | sparql_SimPlacement_Axis2Placement3D_Default
79 | 61 | 1 | sparql_SimProject_Project_DesignAlternative
145 | 4 | 16 | sparql_SimSIUnitType_SiUnit_Default
17 | 4 | 1 | sparql_SimSite_BuildingSite_Default
71 | 9 | 3 | sparql_SimSlab_Default_Default_Slab
1773 | 22 | 97 | sparql_SimSpaceBoundary_SecondLevel_SubTypeA
0 | 12 | 0 | sparql_SimSpaceBoundary_SecondLevel_SubTypeB
0 | 44 | 0 | sparql_SimWall_Wall_Default_StandardWall
354 | 8 | 20 | sparql_SimWall_Wall_Default_Wall
34 | 7 | 2 | sparql_SimWindow_Window_Default_Window
55 | 3 | 6 | sparql_SimZone
1590 | 21 | 432 | sparql_Values_List
84 | 29 | 1 | sparql_simMaterial_Glazing
249 | 35 | 13 | sparql_simMaterial_Opaque
175 | 42 | 6 | sparql_simSpace_Occupied_Default

Queries completed in 2,949 seconds

Total objects created: 27673

Materializing classes according to: ontology/SimModelComplete.owl
Total triples before materialization: 110419
Materializing inferred types of the new model
Total triples after materialization: 110419
-----
Storing output/Demo4_ENHANCED_sparql.ttl model with a total of 110419 triples

```

Table 14 summarizes the number of instances of the “Demo4 case” building data model. The figures in the “IFC-express” column refers to the instances of the BIM model provided by the user; “IFC CBIP-express”, to the instances of the output of the CBIP tool, and “SimModel-RDF” to the instances of the outputs of the DataMapper tool. It is worth mentioning that the number of materials of the SimModel-RDF is higher than the other two because ETL2 creates virtual materials based on properties (e.g., thermal resistance) which are described in property sets of specific building components (e.g. IfcPlates, IfcDoors). The number of slabs and walls in SimModel-RDF are different to those in the other two models because the Data Mapper only transforms slabs and walls that have a space boundary attached to them.

Table 14: Number of instances in the original IFC file and in the generated SimModel

	IFC – express	IFC CBIP – express	SimModel – RDF
Building storey	3	3	3
Doors	3	3	3
Glazed doors	-	-	2
Opaque doors	-	-	1
Materials	12	12	21
Glazing materials	-	-	9
Opaque materials	-	-	11
Panel	32	32	32
Glazed panel	-	-	31
Opaque panel	-	-	1
Slabs	4	4	3
Spaces	6	6	6
Space boundaries	-	97	97
Time series	18	18	18
Walls	23	23	20
Windows	2	2	2
Zones	6	6	6

4.3.3. Test 2: Torre Turina building

4.3.3.1. Response time

The results of transforming 10 times the “Torre Turina” IFC model in STP format into RDF based on the ifcOWL ontology is shown below:

Response time test (ETL 1):

Running time: 41.469 seconds
 Running time: 40.194 seconds
 Running time: 39.023 seconds
 Running time: 38.371 seconds
 Running time: 38.825 seconds
 Running time: 44.168 seconds
 Running time: 39.029 seconds
 Running time: 38.699 seconds
 Running time: 37.847 seconds
 Running time: 38.455 seconds

The results of the tests to generate the SimModel model in the ETL 2 process are shown below.

Response time test (ETL 2):

Running time: 23,690 seconds
 Running time: 14,596 seconds
 Running time: 14,388 seconds
 Running time: 14,999 seconds
 Running time: 14,254 seconds
 Running time: 13,686 seconds
 Running time: 13,759 seconds
 Running time: 14,561 seconds
 Running time: 14,522 seconds
 Running time: 13,954 seconds

The average time spent in the execution of the different processes is summarized in Table 15

Table 15: Average time spent to carry out each of the operations

Demo4 Case					
Load Model	Pre-processing	ETL 1	ETL 2	Materialisation	Total Time
25,611 s.	2,273 s.	38,700 s.	14,388 s.	32,379 s.	113,351 s.

The result of this test is passed. All the required instances required after the transformation (Table 16) are provided in the generated SimModel model and the total time expended to carry out all the ETL1 and ETL2 processes is less than 2 minutes. This time is considered acceptable since this whole process is only carried out when the user loads the input models.

4.3.3.2. Validation of data transformed from IFC models

The outputs of the DataMapper tool are compared to the original IFC file and also to the IFC file generated by the CBIP tool which includes the space boundaries needed for the thermal analysis of the building. The output of the DataMapper tool used to process the “Demo4 case” was the following:

```

IFC input file: files/TURv19x4_ENHANCED.ttl
-----
Invoking the following sparql CONSTRUCTS (40):

Triples| msec|Objects| Query
-----
117173| 2069| 44600|DoubleList_LengthMeasure
 2505| 33| 45540|DoubleList_Reallist
 256| 86| 15|SimBuildingStory_BuildingStory_Default
 19| 14| 1|SimBuilding_Building_Default
 105| 16| 13|SimDerivedUnitType_DerivedUnit_Default
 794| 353| 61|SimDoor_GlazedDoor
 3947| 338| 279|SimDoor_OpaqueDoor
 13| 3| 2|SimGeomCurve_CompositeCurve_Default
174508| 3031| 6387|SimGeomCurve_Polyline_Default
153981| 940| 17109|SimGeomPoint_Point_CartesianPoint
 8119| 86| 369|SimGeomSolidModel_SweptAreaSolid_ExtrudedAreaSolid
43198| 292| 3927|SimGeomSurface_BoundedSurface_CurveBoundedPlane
76341| 702| 7634|SimGeomSurface_ElementarySurface_Plane_Plane
 3151| 20| 315|SimGeomVector_Vector_Direction
10011| 74| 770|SimIrregularTimeSeries_IrregularTimeSeries
 9895| 1043| 598|SimList_MaterialList
 11| 343| 1|SimLocalPlacement_LocalPlacement_AbsolutePlacement
42395| 432| 3854|SimLocalPlacement_LocalPlacement_RelativePlacement
 186| 4| 74|SimMaterialLayerLists
 23| 10| 2|SimMaterial_OpaqueMaterial_NoMass
 14| 3| 1|SimModelRepresentationContext_GeometricRepresentationContext_Default
 10| 3| 1|SimOwnerHistory_Default_Default
 0| 17| 0|SimPanel_Glazing
 0| 18| 0|SimPanel_Opaque
14707| 155| 2451|SimPlacement_Axis2Placement2D_Default
145129| 1280| 12094|SimPlacement_Axis2Placement3D_Default
 79| 52| 1|SimProject_Project_DesignAlternative
 163| 4| 18|SimSIUnitType_SiUnit_Default
 17| 5| 1|SimSite_BuildingSite_Default
 478| 14| 25|SimSlab_Default_Default_Slab
73729| 762| 3927|SimSpaceBoundary_SecondLevel_SubTypeA
 0| 43| 0|SimSpaceBoundary_SecondLevel_SubTypeB
 0| 6| 0|SimWall_Wall_Default_StandardWall
21103| 8015| 1301|SimWall_Wall_Default_Wall
3486| 40| 205|SimWindow_Window_Default_Window
 451| 6| 50|SimZone
54982| 897| 18480|Values_List
 140| 93| 1|simMaterial_Glazing
 601| 77| 37|simMaterial_Opaque
 2321| 1811| 80|simSpace_Occupied_Default

Queries completed in 25,269 seconds

Total objects created: 170168

Materializing classes according to: ontology/SimModelComplete.owl
Total triples before materialization: 963875
Materializing inferred types of the new model
Total triples after materialization: 963875
-----
Storing output/TURv19x4_ENHANCED_sparql.ttl model with a total of 963875 triples

```

Table 16 summarizes the number of instances of the “Torre Turina” building data model. The figures in the “IFC-express” column refer to the instances of the BIM model provided by the user; “IFC CBIP-express”, to the instances of the output of the CBIP tool, and “SimModel-RDF” to the instances of the outputs of the DataMapper tool. It is worth mentioning that the number of materials of the SimModel-RDF is higher than the other two because ETL2 creates virtual materials based on properties (e.g., thermal resistance) which are described in property sets of specific building components (e.g. IfcPlates, IfcDoors). The number of slabs and walls in SimModel-RDF is different to the other two models because the Data Mapper only transforms slabs and walls that have a space boundary attached to them. The number of slabs and walls in SimModel-RDF are different to the other two models because the Data Mapper only transforms slabs and walls that have a space boundary attached to them.

Table 16: Number of instances of each type in the original IFC file and in the generated SimModel file for Test 2

	IFC – express	IFC CBIP – express	SimModel – RDF
Building storey	15	15	15
Doors	341	341	340
Glazed doors	-	-	61
Opaque doors	-	-	279
Materials	21	21	40
Glazing materials	-	-	1
Opaque materials	-	-	39
Panel	100	100	0
Glazed panel	-	-	0
Opaque panel	-	-	0
Slabs	61	61	25
Spaces	347	347	80
Space boundaries	0	3927	3927
Time series	770	770	770
Walls	1370	1370	1301
Windows	205	205	205
Zones	50	50	50

5. Conclusions

The performance of the data repositories of the OptEEemAL platform has been evaluated in terms of accessibility and response time. Their capacity to facilitate end-to-end communication is reported in the Deliverable D6.1 “Report on the technology validation in relevant environment”. The results of the execution of the tests indicate that the data repositories meet the requirements of the OptEEemAL platform even in the worst-case scenarios, for example, when large files are used (which is not expected to be the most general case) and when there are simultaneous requests from multiple users (which could only happen rarely).

The DataMapper tool has been tested with two building models: (1) “Demo4 case” and (2) “Torre Turina” building. In this case, the purpose of the test has been to evaluate the performance as well as the validity of the data generated by this tool. The results showed that the data is properly generated in a reasonable time. However, it will still be necessary to make further verifications of the performance of this tool with building models of other pilot cases, when these are available.

The work to be carried out next in the project will include new tests to verify that the data repositories work properly with BIM and City models from other pilot cases. Also, once all platform modules are fully implemented, end-to-end tests will be carried out to verify the communication between modules and repositories. Regarding the Project repository, the results of its testing are provided in Deliverable D5.3 “Functional modules and interfaces development and testing” [08].

6. References

- [01] OptEEmAL Project Team, 2017, D2.4 District Data Model repository.
- [02] OptEEmAL Project Team, 2017, D3.4 Requirements and specification for the District Data Model.
- [03] OptEEmAL Project Team, 2017, D3.3 ECMs catalogue.
- [04] OptEEmAL Project Team, 2016, D2.3 Functional architecture specification, interfaces definition and overall.
- [05] OptEEmAL Project Team, 2017, D2.5 Report on standardised information exchange protocols.
- [06] O'Donnell, J. 2013. SimModel: A domain data model for whole building energy simulation. SimBuild 2011, Sydney, Australia.
- [07] Pauwels, P. & Terkaj, W. 2016. EXPRESS to OWL for construction industry: Towards a recommendable and usable ifcOWL ontology. Automation in Construction, 63, 100–133. <http://doi.org/10.1016/j.autcon.2015.12.003>.
- [08] OptEEmAL Project Team, 2017, D5.3 “Functional modules and interfaces development and testing”.



7. Annexes

7.1. Annex 1: Summary of the instances contained in the IFC file of Demo4 case

```
( 1) - 156 [ 0,312 %] IfcAdvancedBrep
( 2) - 994 [ 1,985 %] IfcAdvancedFace
( 3) - 1 [ 0,002 %] IfcApplication
( 4) - 56 [ 0,112 %] IfcArbitraryClosedProfileDef
( 5) - 4 [ 0,008 %] IfcArbitraryProfileDefWithVoids
( 6) - 105 [ 0,210 %] IfcAreaMeasure
( 7) - 166 [ 0,331 %] IfcAxis2Placement2D
( 8) - 1700 [ 3,395 %] IfcAxis2Placement3D
( 9) - 22 [ 0,044 %] IfcBSplineCurveWithKnots
(10) - 2 [ 0,004 %] IfcBoolean
(11) - 18 [ 0,036 %] IfcBooleanClippingResult
(12) - 1 [ 0,002 %] IfcBuilding
(13) - 3 [ 0,006 %] IfcBuildingStorey
(14) - 3157 [ 6,304 %] IfcCartesianPoint
(15) - 1645 [ 3,285 %] IfcCartesianPoint_List
(16) - 1 [ 0,002 %] IfcCartesianTransformationOperator3D
(17) - 1 [ 0,002 %] IfcClassification
(18) - 10 [ 0,020 %] IfcClassificationReference
(19) - 156 [ 0,312 %] IfcClosedShell
(20) - 11 [ 0,022 %] IfcColourRgb
(21) - 6 [ 0,012 %] IfcColumn
(22) - 2 [ 0,004 %] IfcColumnType
(23) - 8 [ 0,016 %] IfcCompoundPlaneAngleMeasure
(24) - 1 [ 0,002 %] IfcConnectedFaceSet
(25) - 93 [ 0,186 %] IfcConnectionSurfaceGeometry
(26) - 1 [ 0,002 %] IfcConversionBasedUnit
(27) - 2 [ 0,004 %] IfcCountMeasure
(28) - 11 [ 0,022 %] IfcCurtainWall
(29) - 1 [ 0,002 %] IfcCurtainWallType
(30) - 93 [ 0,186 %] IfcCurveBoundedPlane
(31) - 26 [ 0,052 %] IfcDateTime
(32) - 6 [ 0,012 %] IfcDerivedUnit
(33) - 12 [ 0,024 %] IfcDerivedUnitElement
(34) - 1 [ 0,002 %] IfcDimensionalExponents
(35) - 50 [ 0,100 %] IfcDirection
(36) - 3 [ 0,006 %] IfcDoor
(37) - 3 [ 0,006 %] IfcDoorLiningProperties
(38) - 3 [ 0,006 %] IfcDoorPanelProperties
(39) - 3 [ 0,006 %] IfcDoorType
(40) - 1976 [ 3,946 %] IfcEdgeCurve
(41) - 994 [ 1,985 %] IfcEdgeLoop
(42) - 42 [ 0,084 %] IfcEllipse
(43) - 200 [ 0,399 %] IfcExtrudedAreaSolid
(44) - 53 [ 0,106 %] IfcFace
(45) - 1 [ 0,002 %] IfcFaceBasedSurfaceModel
(46) - 1047 [ 2,091 %] IfcFaceOuterBound
(47) - 1 [ 0,002 %] IfcGeometricRepresentationContext
(48) - 4 [ 0,008 %] IfcGeometricRepresentationSubContext
(49) - 3586 [ 7,161 %] IfcGloballyUniqueId
(50) - 528 [ 1,054 %] IfcIdentifier
(51) - 7 [ 0,014 %] IfcInteger
(52) - 438 [ 0,875 %] IfcInteger_List
(53) - 18 [ 0,036 %] IfcIrregularTimeSeries
(54) - 24 [ 0,048 %] IfcIrregularTimeSeriesValue
(55) - 432 [ 0,863 %] IfcIrregularTimeSeriesValue_List
(56) - 460 [ 0,919 %] IfcLabel
(57) - 1 [ 0,002 %] IfcLabel_List
(58) - 2408 [ 4,809 %] IfcLengthMeasure
(59) - 8905 [17,783 %] IfcLengthMeasure_List
(60) - 1938 [ 3,870 %] IfcLine
(61) - 221 [ 0,441 %] IfcLocalPlacement
(62) - 2 [ 0,004 %] IfcLogical
```

```

( 63) - 125 [ 0,250 %] IfcMappedItem
( 64) - 6 [ 0,012 %] IfcMassDensityMeasure
( 65) - 19 [ 0,038 %] IfcMaterial
( 66) - 11 [ 0,022 %] IfcMaterialConstituent
( 67) - 10 [ 0,020 %] IfcMaterialConstituentSet
( 68) - 11 [ 0,022 %] IfcMaterialDefinitionRepresentation
( 69) - 12 [ 0,024 %] IfcMaterialLayer
( 70) - 7 [ 0,014 %] IfcMaterialLayerSet
( 71) - 6 [ 0,012 %] IfcMaterialLayerSetUsage
( 72) - 14 [ 0,028 %] IfcMaterialLayer_List
( 73) - 2 [ 0,004 %] IfcMaterialProfile
( 74) - 2 [ 0,004 %] IfcMaterialProfileSet
( 75) - 2 [ 0,004 %] IfcMaterialProfileSetUsage
( 76) - 2 [ 0,004 %] IfcMaterialProfile_List
( 77) - 14 [ 0,028 %] IfcMaterialProperties
( 78) - 1 [ 0,002 %] IfcMeasureWithUnit
( 79) - 109 [ 0,218 %] IfcMember
( 80) - 67 [ 0,134 %] IfcMemberType
( 81) - 37 [ 0,074 %] IfcNonNegativeLengthMeasure
( 82) - 19 [ 0,038 %] IfcNormalisedRatioMeasure
( 83) - 14 [ 0,028 %] IfcOpeningElement
( 84) - 2 [ 0,004 %] IfcOrganization
( 85) - 3952 [ 7,892 %] IfcOrientedEdge
( 86) - 3952 [ 7,892 %] IfcOrientedEdge_List
( 87) - 1 [ 0,002 %] IfcOwnerHistory
( 88) - 25 [ 0,050 %] IfcParameterValue
( 89) - 438 [ 0,875 %] IfcParameterValue_List
( 90) - 1 [ 0,002 %] IfcPerson
( 91) - 1 [ 0,002 %] IfcPersonAndOrganization
( 92) - 1079 [ 2,155 %] IfcPlane
( 93) - 1 [ 0,002 %] IfcPlaneAngleMeasure
( 94) - 32 [ 0,064 %] IfcPlate
( 95) - 26 [ 0,052 %] IfcPlateType
( 96) - 53 [ 0,106 %] IfcPolyLoop
( 97) - 18 [ 0,036 %] IfcPolygonalBoundedHalfSpace
( 98) - 198 [ 0,395 %] IfcPolyline
( 99) - 62 [ 0,124 %] IfcPositiveLengthMeasure
(100) - 1 [ 0,002 %] IfcPostalAddress
(101) - 16 [ 0,032 %] IfcPowerMeasure
(102) - 12 [ 0,024 %] IfcPresentationLayerAssignment
(103) - 12 [ 0,024 %] IfcPresentationStyleAssignment
(104) - 204 [ 0,407 %] IfcProductDefinitionShape
(105) - 1 [ 0,002 %] IfcProject
(106) - 18 [ 0,036 %] IfcPropertyReferenceValue
(107) - 1311 [ 2,618 %] IfcPropertySet
(108) - 1065 [ 2,127 %] IfcPropertySingleValue
(109) - 7 [ 0,014 %] IfcRailing
(110) - 1 [ 0,002 %] IfcRatioMeasure
(111) - 152 [ 0,304 %] IfcReal
(112) - 145 [ 0,290 %] IfcReal_List
(113) - 166 [ 0,331 %] IfcRectangleProfileDef
(114) - 18 [ 0,036 %] IfcRelAggregates
(115) - 6 [ 0,012 %] IfcRelAssignsToGroup
(116) - 213 [ 0,425 %] IfcRelAssociatesClassification
(117) - 186 [ 0,371 %] IfcRelAssociatesMaterial
(118) - 46 [ 0,092 %] IfcRelConnectsPathElements
(119) - 3 [ 0,006 %] IfcRelContainedInSpatialStructure
(120) - 1238 [ 2,472 %] IfcRelDefinesByProperties
(121) - 104 [ 0,208 %] IfcRelDefinesByType
(122) - 14 [ 0,028 %] IfcRelFillsElement
(123) - 93 [ 0,186 %] IfcRelSpaceBoundary2ndLevel
(124) - 14 [ 0,028 %] IfcRelVoidsElement
(125) - 125 [ 0,250 %] IfcRepresentationMap
(126) - 125 [ 0,250 %] IfcRepresentationMap_List
(127) - 270 [ 0,539 %] IfcRepresentation_List
(128) - 1 [ 0,002 %] IfcRoof
(129) - 16 [ 0,032 %] IfcSIUnit
(130) - 384 [ 0,767 %] IfcShapeRepresentation
(131) - 1 [ 0,002 %] IfcSite
(132) - 3 [ 0,006 %] IfcSlab
(133) - 6 [ 0,012 %] IfcSpace

```

```
(134) - 4 [ 0,008 %] IfcSpecificHeatCapacityMeasure
(135) - 3 [ 0,006 %] IfcSpecularExponent
(136) - 1 [ 0,002 %] IfcStair
(137) - 1 [ 0,002 %] IfcStairFlight
(138) - 161 [ 0,322 %] IfcStyledItem
(139) - 11 [ 0,022 %] IfcStyledRepresentation
(140) - 26 [ 0,052 %] IfcSurfaceOfLinearExtrusion
(141) - 12 [ 0,024 %] IfcSurfaceStyle
(142) - 12 [ 0,024 %] IfcSurfaceStyleRendering
(143) - 70 [ 0,140 %] IfcText
(144) - 5 [ 0,010 %] IfcThermalConductivityMeasure
(145) - 13 [ 0,026 %] IfcThermalTransmittanceMeasure
(146) - 1 [ 0,002 %] IfcTimeStamp
(147) - 26 [ 0,052 %] IfcTrimmedCurve
(148) - 1 [ 0,002 %] IfcURIReference
(149) - 1 [ 0,002 %] IfcUnitAssignment
(150) - 24 [ 0,048 %] IfcValue_List
(151) - 138 [ 0,276 %] IfcVector
(152) - 1294 [ 2,584 %] IfcVertexPoint
(153) - 92 [ 0,184 %] IfcVolumeMeasure
(154) - 6 [ 0,012 %] IfcVolumetricFlowRateMeasure
(155) - 20 [ 0,040 %] IfcWall
(156) - 3 [ 0,006 %] IfcWallType
(157) - 2 [ 0,004 %] IfcWindow
(158) - 2 [ 0,004 %] IfcWindowLiningProperties
(159) - 2 [ 0,004 %] IfcWindowType
(160) - 6 [ 0,012 %] IfcZone
(161) - 1 [ 0,002 %] Ontology
(162) - 10 [ 0,020 %] INTEGER
```

7.2. Annex 2: Summary of the instances contained in the IFC file of Torre Turina building

```
( 1) - 395 [ 0,089 %] IfcAdvancedBrep
( 2) - 4352 [ 0,975 %] IfcAdvancedFace
( 3) - 1 [ 0,000 %] IfcApplication
( 4) - 964 [ 0,216 %] IfcArbitraryClosedProfileDef
( 5) - 9 [ 0,002 %] IfcArbitraryProfileDefWithVoids
( 6) - 585 [ 0,131 %] IfcAreaMeasure
( 7) - 31 [ 0,007 %] IfcAxis1Placement
( 8) - 2451 [ 0,549 %] IfcAxis2Placement2D
( 9) -14008 [ 3,139 %] IfcAxis2Placement3D
(10) - 340 [ 0,076 %] IfcBSplineCurveWithKnots
(11) - 31 [ 0,007 %] IfcBeam
(12) - 31 [ 0,007 %] IfcBeamType
(13) - 2 [ 0,000 %] IfcBoolean
(14) - 209 [ 0,047 %] IfcBooleanClippingResult
(15) - 1 [ 0,000 %] IfcBuilding
(16) - 17 [ 0,004 %] IfcBuildingElementProxy
(17) - 15 [ 0,003 %] IfcBuildingStorey
(18) - 1 [ 0,000 %] IfcCardinalPointReference
(19) -17109 [ 3,834 %] IfcCartesianPoint
(20) -47130 [10,561 %] IfcCartesianPoint_List
(21) - 1 [ 0,000 %] IfcCartesianTransformationOperator3D
(22) - 620 [ 0,139 %] IfcCircle
(23) - 1 [ 0,000 %] IfcClassification
(24) - 396 [ 0,089 %] IfcClosedShell
(25) - 14 [ 0,003 %] IfcColourRgb
(26) - 424 [ 0,095 %] IfcColumn
(27) - 414 [ 0,093 %] IfcColumnType
(28) - 2 [ 0,000 %] IfcCompositeCurve
(29) - 12 [ 0,003 %] IfcCompositeCurveSegment
(30) - 12 [ 0,003 %] IfcCompositeCurveSegment_List
(31) - 8 [ 0,002 %] IfcCompoundPlaneAngleMeasure
(32) - 3 [ 0,001 %] IfcConnectedFaceSet
(33) - 3927 [ 0,880 %] IfcConnectionSurfaceGeometry
(34) - 1 [ 0,000 %] IfcConversionBasedUnit
(35) - 28 [ 0,006 %] IfcCurtainWall
(36) - 1 [ 0,000 %] IfcCurtainWallType
(37) - 3927 [ 0,880 %] IfcCurveBoundedPlane
(38) - 472 [ 0,106 %] IfcCylindricalSurface
(39) - 26 [ 0,006 %] IfcDateTime
(40) - 6 [ 0,001 %] IfcDerivedUnit
(41) - 12 [ 0,003 %] IfcDerivedUnitElement
(42) - 1 [ 0,000 %] IfcDimensionalExponents
(43) - 315 [ 0,071 %] IfcDirection
(44) - 341 [ 0,076 %] IfcDoor
(45) - 34 [ 0,008 %] IfcDoorLiningProperties
(46) - 34 [ 0,008 %] IfcDoorPanelProperties
(47) - 34 [ 0,008 %] IfcDoorType
(48) - 9575 [ 2,146 %] IfcEdgeCurve
(49) - 4549 [ 1,019 %] IfcEdgeLoop
(50) - 384 [ 0,086 %] IfcEllipse
(51) - 3106 [ 0,696 %] IfcExtrudedAreaSolid
(52) - 806 [ 0,181 %] IfcFace
(53) - 2 [ 0,000 %] IfcFaceBasedSurfaceModel
(54) - 265 [ 0,059 %] IfcFaceBound
(55) - 5090 [ 1,141 %] IfcFaceOuterBound
(56) - 1 [ 0,000 %] IfcFacetedBrep
(57) - 1 [ 0,000 %] IfcGeometricRepresentationContext
(58) - 4 [ 0,001 %] IfcGeometricRepresentationSubContext
(59) -59733 [13,385 %] IfcGloballyUniqueId
(60) - 3572 [ 0,800 %] IfcIdentifier
(61) - 2 [ 0,000 %] IfcInteger
(62) - 4804 [ 1,077 %] IfcInteger_List
(63) - 770 [ 0,173 %] IfcIrregularTimeSeries
(64) - 39 [ 0,009 %] IfcIrregularTimeSeriesValue
(65) -18480 [ 4,141 %] IfcIrregularTimeSeriesValue_List
```

```

( 66) - 5874 [ 1,316 %] IfcLabel
( 67) - 2 [ 0,000 %] IfcLabel_List
( 68) -14093 [ 3,158 %] IfcLengthMeasure
( 69) -45388 [10,171 %] IfcLengthMeasure_List
( 70) - 8549 [ 1,916 %] IfcLine
( 71) - 3855 [ 0,864 %] IfcLocalPlacement
( 72) - 2 [ 0,000 %] IfcLogical
( 73) - 609 [ 0,136 %] IfcMappedItem
( 74) - 11 [ 0,002 %] IfcMassDensityMeasure
( 75) - 32 [ 0,007 %] IfcMaterial
( 76) - 22 [ 0,005 %] IfcMaterialConstituent
( 77) - 598 [ 0,134 %] IfcMaterialConstituentSet
( 78) - 20 [ 0,004 %] IfcMaterialDefinitionRepresentation
( 79) - 38 [ 0,009 %] IfcMaterialLayer
( 80) - 37 [ 0,008 %] IfcMaterialLayerSet
( 81) - 42 [ 0,009 %] IfcMaterialLayerSetUsage
( 82) - 74 [ 0,017 %] IfcMaterialLayer_List
( 83) - 9 [ 0,002 %] IfcMaterialProfile
( 84) - 9 [ 0,002 %] IfcMaterialProfileSet
( 85) - 9 [ 0,002 %] IfcMaterialProfileSetUsage
( 86) - 9 [ 0,002 %] IfcMaterialProfile_List
( 87) - 27 [ 0,006 %] IfcMaterialProperties
( 88) - 1 [ 0,000 %] IfcMeasureWithUnit
( 89) - 310 [ 0,069 %] IfcMember
( 90) - 77 [ 0,017 %] IfcMemberType
( 91) - 113 [ 0,025 %] IfcNonNegativeLengthMeasure
( 92) - 21 [ 0,005 %] IfcNormalisedRatioMeasure
( 93) - 640 [ 0,143 %] IfcOpeningElement
( 94) - 2 [ 0,000 %] IfcOrganization
( 95) -19150 [ 4,291 %] IfcOrientedEdge
( 96) -19150 [ 4,291 %] IfcOrientedEdge_List
( 97) - 1 [ 0,000 %] IfcOwnerHistory
( 98) - 40 [ 0,009 %] IfcParameterValue
( 99) - 4804 [ 1,077 %] IfcParameterValue_List
(100) - 1 [ 0,000 %] IfcPerson
(101) - 1 [ 0,000 %] IfcPersonAndOrganization
(102) - 7634 [ 1,711 %] IfcPlane
(103) - 2 [ 0,000 %] IfcPlaneAngleMeasure
(104) - 100 [ 0,022 %] IfcPlate
(105) - 17 [ 0,004 %] IfcPlateType
(106) - 806 [ 0,181 %] IfcPolyLoop
(107) - 209 [ 0,047 %] IfcPolygonalBoundedHalfSpace
(108) - 6387 [ 1,431 %] IfcPolyline
(109) - 176 [ 0,039 %] IfcPositiveLengthMeasure
(110) - 1 [ 0,000 %] IfcPostalAddress
(111) - 293 [ 0,066 %] IfcPowerMeasure
(112) - 23 [ 0,005 %] IfcPresentationStyleAssignment
(113) - 3836 [ 0,860 %] IfcProductDefinitionShape
(114) - 1 [ 0,000 %] IfcProject
(115) - 770 [ 0,173 %] IfcPropertyReferenceValue
(116) -22819 [ 5,113 %] IfcPropertySet
(117) - 7331 [ 1,643 %] IfcPropertySingleValue
(118) - 34 [ 0,008 %] IfcRailing
(119) - 1 [ 0,000 %] IfcRatioMeasure
(120) - 1468 [ 0,329 %] IfcReal
(121) - 940 [ 0,211 %] IfcReal_List
(122) - 2447 [ 0,548 %] IfcRectangleProfileDef
(123) - 46 [ 0,010 %] IfcRelAggregates
(124) - 50 [ 0,011 %] IfcRelAssignsToGroup
(125) - 2830 [ 0,634 %] IfcRelAssociatesMaterial
(126) - 1143 [ 0,256 %] IfcRelConnectsPathElements
(127) - 15 [ 0,003 %] IfcRelContainedInSpatialStructure
(128) -22407 [ 5,021 %] IfcRelDefinesByProperties
(129) - 639 [ 0,143 %] IfcRelDefinesByType
(130) - 546 [ 0,122 %] IfcRelFillsElement
(131) - 3927 [ 0,880 %] IfcRelSpaceBoundary2ndLevel
(132) - 640 [ 0,143 %] IfcRelVOIDsElement
(133) - 609 [ 0,136 %] IfcRepresentationMap
(134) - 609 [ 0,136 %] IfcRepresentationMap_List
(135) - 5285 [ 1,184 %] IfcRepresentation_List
(136) - 3 [ 0,001 %] IfcRoof
(137) - 18 [ 0,004 %] IfcSIUnit

```

```
(138) - 5874 [ 1,316 %] IfcShapeRepresentation
(139) - 1 [ 0,000 %] IfcSite
(140) - 61 [ 0,014 %] IfcSlab
(141) - 347 [ 0,078 %] IfcSpace
(142) - 7 [ 0,002 %] IfcSpecificHeatCapacityMeasure
(143) - 2 [ 0,000 %] IfcSpecularExponent
(144) - 1822 [ 0,408 %] IfcStyledItem
(145) - 20 [ 0,004 %] IfcStyledRepresentation
(146) - 192 [ 0,043 %] IfcSurfaceOfLinearExtrusion
(147) - 122 [ 0,027 %] IfcSurfaceOfRevolution
(148) - 23 [ 0,005 %] IfcSurfaceStyle
(149) - 23 [ 0,005 %] IfcSurfaceStyleRendering
(150) - 519 [ 0,116 %] IfcText
(151) - 11 [ 0,002 %] IfcThermalConductivityMeasure
(152) - 13 [ 0,003 %] IfcThermalTransmittanceMeasure
(153) - 1 [ 0,000 %] IfcTimeStamp
(154) - 318 [ 0,071 %] IfcTrimmedCurve
(155) - 1 [ 0,000 %] IfcUnitAssignment
(156) - 39 [ 0,009 %] IfcValue_List
(157) - 432 [ 0,097 %] IfcVector
(158) - 6117 [ 1,371 %] IfcVertexPoint
(159) - 12 [ 0,003 %] IfcVirtualElement
(160) - 666 [ 0,149 %] IfcVolumeMeasure
(161) - 341 [ 0,076 %] IfcVolumetricFlowRateMeasure
(162) - 1324 [ 0,297 %] IfcWall
(163) - 46 [ 0,010 %] IfcWallType
(164) - 205 [ 0,046 %] IfcWindow
(165) - 19 [ 0,004 %] IfcWindowLiningProperties
(166) - 19 [ 0,004 %] IfcWindowType
(167) - 50 [ 0,011 %] IfcZone
(168) - 1 [ 0,000 %] Ontology
(169) - 14 [ 0,003 %] INTEGER
```

7.3. Annex 3: Results provided by the report generated by the Java comparing tool for Demo4 case

Number of top instances model 1 (input/Demo4_sparql.ttl, size=6901660): 19558

Number of top instances model 2 (input/Demo4.ttl, size=1828001): 4845

Path:

Num. of top instances: 6:

```
SimModel_ID1
IfcCartesianPoint_7635
IfcLengthMeasure_List_38884
IfcMaterialLayer_List_38114
IfcProject_105_Item_List_4
IfcCartesianPoint_List_44512
```

Issue: 3 properties missing or incorrectly defined in instances of class [[SimMaterialLayer_OpaqueMaterialLayer_Default]]

Examples of instances: IfcMaterialLayer_2370 (m1), or SimMaterialLayer_OpaqueMaterialLayer_Default_ID1000643 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#sourceModelObjectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_LayerThickness..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_MaterialName..... (missing in Model 2)
```

> class 'SimMaterialLayer_OpaqueMaterialLayer_Default' done (instances used to check: 'IfcMaterialLayer_2370' and 'SimMaterialLayer_OpaqueMaterialLayer_Default_ID1000643')

Issue: 2 properties missing or incorrectly defined in instances of class [[SimBuildingStory_BuildingStory_Default]]

Examples of instances: IfcBuildingStorey_145 (m1), or SimBuildingStory_BuildingStory_Default_ID1000030 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
```

Issue: 5 properties missing or incorrectly defined in instances of class [[SimBuilding_Building_Default]]

Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimSite_BuildingSite_Default]]

Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
```

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')



```

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')

> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_145' and
'SimBuildingStory_BuildingStory_Default_ID1000030')

> class 'SimPanel_Glazing' done (instances used to check: 'IfcPlate_16691' and 'SimPanel_Glazing_ID1000036')

Issue: 1 properties missing or incorrectly defined in instances of class [[ SimWall_Wall_Default ]]
Examples of instances: IfcWall_3346 (m1), or SimWall_Wall_Default_ID1000023 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimBuildingStory_BuildingStory_Default ]]
Examples of instances: IfcBuildingStorey_133 (m1), or SimBuildingStory_BuildingStory_Default_ID1000030 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')

> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_133' and
'SimBuildingStory_BuildingStory_Default_ID1000030')

```

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> class 'SimMaterialLayerSet_OpaqueLayerSet_Default' done (instances used to check: 'IfcMaterialLayerSet_3204' and
'SimMaterialLayerSet_OpaqueLayerSet_Default_ID1001856')

> class 'SimWall_Wall_Default' done (instances used to check: 'IfcWall_3346' and 'SimWall_Wall_Default_ID1000023')

Issue: 4 properties missing or incorrectly defined in instances of class [[ SimMaterial_OpaqueMaterial_Default ]]
Examples of instances: IfcMaterial_6689 (m1), or SimMaterial_OpaqueMaterial_Default_ID1000039 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Density..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Cond..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_SpecificHeat..... (missing in Model 2)

> class 'SimMaterial_OpaqueMaterial_Default' done (instances used to check: 'IfcMaterial_6689' and 'SimMaterial_OpaqueMaterial_Default_ID1000039')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000068')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35326' and 'Values_List_ECDY_1023')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35325' and 'Values_List_ECDY_1022')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_325' and 'SimIrregularTimeSeriesValue_ID1000066')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35324' and 'Values_List_ECDY_1021')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_323' and 'SimIrregularTimeSeriesValue_ID1000065')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35323' and 'Values_List_ECDY_1020')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_321' and 'SimIrregularTimeSeriesValue_ID1000064')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35322' and 'Values_List_ECDY_1019')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000063')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35321' and 'Values_List_ECDY_1018')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_317' and 'SimIrregularTimeSeriesValue_ID1000062')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35320' and 'Values_List_ECDY_1017')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_315' and 'SimIrregularTimeSeriesValue_ID1000060')

> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35319' and 'Values_List_ECDY_1016')

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_313' and 'SimIrregularTimeSeriesValue_ID1000059')

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> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35318' and 'Values_List_ECDY_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_311' and 'SimIrregularTimeSeriesValue_ID1000058')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35317' and 'Values_List_ECDY_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_309' and 'SimIrregularTimeSeriesValue_ID1000055')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35316' and 'Values_List_ECDY_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_307' and 'SimIrregularTimeSeriesValue_ID1000054')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35315' and 'Values_List_ECDY_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_305' and 'SimIrregularTimeSeriesValue_ID1000052')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35314' and 'Values_List_ECDY_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_303' and 'SimIrregularTimeSeriesValue_ID1000051')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35313' and 'Values_List_ECDY_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_301' and 'SimIrregularTimeSeriesValue_ID1000050')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35312' and 'Values_List_ECDY_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_299' and 'SimIrregularTimeSeriesValue_ID1000049')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35311' and 'Values_List_ECDY_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_297' and 'SimIrregularTimeSeriesValue_ID1000048')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35310' and 'Values_List_ECDY_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_295' and 'SimIrregularTimeSeriesValue_ID1000047')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35309' and 'Values_List_ECDY_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000046')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35308' and 'Values_List_ECDY_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000045')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35307' and 'Values_List_ECDY_1004')
```



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> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000044')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35306' and 'Values_List_ECDY_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000043')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35305' and 'Values_List_ECDY_1002')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000042')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35304' and 'Values_List_ECDY_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000041')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35303' and 'Values_List_ECDY_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_727' and 'SimIrregularTimeSeries_ID1000040')

Issue: 1 properties missing or incorrectly defined in instances of class [[ DoubleList ]]
Examples of instances: IfcReal_List_45538 (m1), or DoubleList_O1RT_1001 (m2)
  https://w3id.org/list#hasNext..... (included in Model 1 but not defined in the ontology)

> class 'DoubleList' done (instances used to check: 'IfcReal_List_45538' and 'DoubleList_O1RT_1001')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_45537' and 'DoubleList_O1RT_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_22461' and 'SimGeomVector_Vector_Direction_ID1000024')

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

```

```

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')
Error: SIMMODEL(8) instance of class 'SimLocalPlacement_LocalPlacement_RelativePlacement' NOT FOUND in model 2
Error: SIMMODEL(9) instance of class 'SimParameterizedProfileDef_ParameterizedProfile_Rectangle' NOT FOUND in model 2
Error: SIMMODEL(10) instance of class 'SimPlacement_Axis2Placement2D_Default' NOT FOUND in model 2

Issue: 8 properties missing or incorrectly defined in instances of class [[ SimMaterial_GlazingMaterial_SimpleGlazingSystem ]]
Examples of instances: IfcMaterial_1017596 (m1), or SimMaterial_GlazingMaterial_SimpleGlazingSystem_ID1000190 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_SolarHeatGainCoef..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_VisTrans..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_UFactor..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialUFactor..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#category..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialSolarHeatGainCoef..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialVisTrans..... (included in Model 2 but not defined in the ontology)

> class 'SimMaterial_GlazingMaterial_SimpleGlazingSystem' done (instances used to check: 'IfcMaterial_1017596' and
'SimMaterial_GlazingMaterial_SimpleGlazingSystem_ID1000190')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_54680 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000227 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_54680' and
'SimGeomPoint_Point_CartesianPoint_ID1000227')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60333' and 'DoubleList_HQTM_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60332' and 'DoubleList_HQTM_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60331' and 'DoubleList_HQTM_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_54107' and 'SimGeomVector_Vector_Direction_ID1000228')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60338' and 'DoubleList_TRBE_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60337' and 'DoubleList_TRBE_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_60336' and 'DoubleList_TRBE_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_54108' and 'SimGeomVector_Vector_Direction_ID1000229')

```



```
> class 'SimPlacement_Axis2Placement3D_Default' done (instances used to check: 'IfcAxis2Placement3D_54683' and 'SimPlacement_Axis2Placement3D_Default_ID1000230')
```

```
> class 'SimGeomSurface_ElementarySurface_Plane' done (instances used to check: 'IfcPlane_54684' and 'SimGeomSurface_ElementarySurface_Plane_ID1000231')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]

Examples of instances: IfcCartesianPoint_54674 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000225 (m2)

http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)

<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue.....> (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_54674' and 'SimGeomPoint_Point_CartesianPoint_ID1000225')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61372' and 'Points_List_RKRA_1004')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61371' and 'Points_List_RKRA_1003')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]

Examples of instances: IfcCartesianPoint_54674 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000223 (m2)

http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)

<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue.....> (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_54674' and 'SimGeomPoint_Point_CartesianPoint_ID1000223')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61370' and 'Points_List_RKRA_1002')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]

Examples of instances: IfcCartesianPoint_54674 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000222 (m2)

http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)

<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue.....> (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_54674' and 'SimGeomPoint_Point_CartesianPoint_ID1000222')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61369' and 'Points_List_RKRA_1001')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]

Examples of instances: IfcCartesianPoint_54674 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000221 (m2)

http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)

<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue.....> (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_54674' and 'SimGeomPoint_Point_CartesianPoint_ID1000221')
```



```

> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61368' and 'Points_List_RKRA_1000')

> class 'SimGeomCurve_Polyline_Default' done (instances used to check: 'IfcPolyline_54679' and 'SimGeomCurve_Polyline_Default_ID1000226')

> class 'SimGeomSurface_BoundedSurface_CurveBoundedPlane' done (instances used to check: 'IfcCurveBoundedPlane_54685' and
'SimGeomSurface_BoundedSurface_CurveBoundedPlane_ID1000232')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

> class 'SimZone' done (instances used to check: 'IfcZone_51303' and 'SimZone_ID1001503')
Error: SIMMODEL(15) instance of class 'SimMaterialLayerSet_GlazingLayerSet_Default' NOT FOUND in model 2

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34821' and 'DoubleList_HQTM_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34820' and 'DoubleList_HQTM_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34819' and 'DoubleList_HQTM_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_22' and 'SimGeomVector_Vector_Direction_ID1000228')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_27907 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000227 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_27907' and
'SimGeomPoint_Point_CartesianPoint_ID1000227')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_38420' and 'DoubleList_TRBE_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_38419' and 'DoubleList_TRBE_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_38418' and 'DoubleList_TRBE_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_7363' and 'SimGeomVector_Vector_Direction_ID1000229')

```



```

> class 'SimPlacement_Axis2Placement3D_Default' done (instances used to check: 'IfcAxis2Placement3D_28054' and
'SimPlacement_Axis2Placement3D_Default_ID1000230')

> class 'SimGeomSurface_ElementarySurface_Plane' done (instances used to check: 'IfcPlane_28055' and
'SimGeomSurface_ElementarySurface_Plane_ID1000231')

Issue: 6 properties missing or incorrectly defined in instances of class [[ SimSpace_Occupied_Default ]]
Examples of instances: IfcSpace_622 (m1), or SimSpace_Occupied_Default_ID1000038 (m2)
  http://d-alchemy.com/schema/simxml/BuildingModel#spaceConditioningRequirement..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#spaceThermalSimulationType..... (missing in Model 2)

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000095')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35302' and 'Values_List_Z48V_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35301' and 'Values_List_Z48V_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_325' and 'SimIrregularTimeSeriesValue_ID1000093')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35300' and 'Values_List_Z48V_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_323' and 'SimIrregularTimeSeriesValue_ID1000092')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35299' and 'Values_List_Z48V_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_321' and 'SimIrregularTimeSeriesValue_ID1000091')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35298' and 'Values_List_Z48V_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000090')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35297' and 'Values_List_Z48V_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_317' and 'SimIrregularTimeSeriesValue_ID1000089')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35296' and 'Values_List_Z48V_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_315' and 'SimIrregularTimeSeriesValue_ID1000088')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35295' and 'Values_List_Z48V_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_313' and 'SimIrregularTimeSeriesValue_ID1000087')

```



```
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35294' and 'Values_List_Z48V_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_311' and 'SimIrregularTimeSeriesValue_ID1000086')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35293' and 'Values_List_Z48V_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_309' and 'SimIrregularTimeSeriesValue_ID1000085')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35292' and 'Values_List_Z48V_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_307' and 'SimIrregularTimeSeriesValue_ID1000083')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35291' and 'Values_List_Z48V_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_305' and 'SimIrregularTimeSeriesValue_ID1000082')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35290' and 'Values_List_Z48V_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_303' and 'SimIrregularTimeSeriesValue_ID1000081')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35289' and 'Values_List_Z48V_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_301' and 'SimIrregularTimeSeriesValue_ID1000080')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35288' and 'Values_List_Z48V_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_299' and 'SimIrregularTimeSeriesValue_ID1000079')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35287' and 'Values_List_Z48V_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_297' and 'SimIrregularTimeSeriesValue_ID1000078')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35286' and 'Values_List_Z48V_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_295' and 'SimIrregularTimeSeriesValue_ID1000077')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35285' and 'Values_List_Z48V_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000076')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35284' and 'Values_List_Z48V_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000075')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35283' and 'Values_List_Z48V_1004')
```



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> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000074')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35282' and 'Values_List_Z48V_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000073')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35281' and 'Values_List_Z48V_1002')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000072')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35280' and 'Values_List_Z48V_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000071')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35279' and 'Values_List_Z48V_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_676' and 'SimIrregularTimeSeries_ID1000070')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000068')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35278' and 'Values_List_ECDY_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35277' and 'Values_List_ECDY_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_267' and 'SimIrregularTimeSeriesValue_ID1000066')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35276' and 'Values_List_ECDY_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_265' and 'SimIrregularTimeSeriesValue_ID1000065')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35275' and 'Values_List_ECDY_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_263' and 'SimIrregularTimeSeriesValue_ID1000064')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35274' and 'Values_List_ECDY_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000063')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35273' and 'Values_List_ECDY_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_259' and 'SimIrregularTimeSeriesValue_ID1000062')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35272' and 'Values_List_ECDY_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_257' and 'SimIrregularTimeSeriesValue_ID1000060')
```



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> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35271' and 'Values_List_ECDY_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_255' and 'SimIrregularTimeSeriesValue_ID1000059')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35270' and 'Values_List_ECDY_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_253' and 'SimIrregularTimeSeriesValue_ID1000058')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35269' and 'Values_List_ECDY_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_251' and 'SimIrregularTimeSeriesValue_ID1000055')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35268' and 'Values_List_ECDY_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_249' and 'SimIrregularTimeSeriesValue_ID1000054')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35267' and 'Values_List_ECDY_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_247' and 'SimIrregularTimeSeriesValue_ID1000052')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35266' and 'Values_List_ECDY_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_245' and 'SimIrregularTimeSeriesValue_ID1000051')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35265' and 'Values_List_ECDY_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_243' and 'SimIrregularTimeSeriesValue_ID1000050')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35264' and 'Values_List_ECDY_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_241' and 'SimIrregularTimeSeriesValue_ID1000049')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35263' and 'Values_List_ECDY_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_239' and 'SimIrregularTimeSeriesValue_ID1000048')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35262' and 'Values_List_ECDY_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_237' and 'SimIrregularTimeSeriesValue_ID1000047')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35261' and 'Values_List_ECDY_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000046')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35260' and 'Values_List_ECDY_1005')
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> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000045')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35259' and 'Values_List_ECDY_1004')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000044')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35258' and 'Values_List_ECDY_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000043')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35257' and 'Values_List_ECDY_1002')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000042')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35256' and 'Values_List_ECDY_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000041')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35255' and 'Values_List_ECDY_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_625' and 'SimIrregularTimeSeries_ID1000040')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimBuildingStory_BuildingStory_Default ]]
Examples of instances: IfcBuildingStorey_133 (m1), or SimBuildingStory_BuildingStory_Default_ID1000030 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ObjectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ObjectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

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> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')
> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_133' and 'SimBuildingStory_BuildingStory_Default_ID1000030')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000120')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35326' and 'Values_List_IB2U_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35325' and 'Values_List_IB2U_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_325' and 'SimIrregularTimeSeriesValue_ID1000118')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35324' and 'Values_List_IB2U_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_323' and 'SimIrregularTimeSeriesValue_ID1000117')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35323' and 'Values_List_IB2U_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_321' and 'SimIrregularTimeSeriesValue_ID1000116')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35322' and 'Values_List_IB2U_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000115')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35321' and 'Values_List_IB2U_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_317' and 'SimIrregularTimeSeriesValue_ID1000114')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35320' and 'Values_List_IB2U_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_315' and 'SimIrregularTimeSeriesValue_ID1000113')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35319' and 'Values_List_IB2U_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_313' and 'SimIrregularTimeSeriesValue_ID1000112')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35318' and 'Values_List_IB2U_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_311' and 'SimIrregularTimeSeriesValue_ID1000111')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35317' and 'Values_List_IB2U_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_309' and 'SimIrregularTimeSeriesValue_ID1000110')
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> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35316' and 'Values_List_IB2U_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_307' and 'SimIrregularTimeSeriesValue_ID1000109')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35315' and 'Values_List_IB2U_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_305' and 'SimIrregularTimeSeriesValue_ID1000108')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35314' and 'Values_List_IB2U_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_303' and 'SimIrregularTimeSeriesValue_ID1000107')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35313' and 'Values_List_IB2U_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_301' and 'SimIrregularTimeSeriesValue_ID1000106')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35312' and 'Values_List_IB2U_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_299' and 'SimIrregularTimeSeriesValue_ID1000105')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35311' and 'Values_List_IB2U_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_297' and 'SimIrregularTimeSeriesValue_ID1000104')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35310' and 'Values_List_IB2U_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_295' and 'SimIrregularTimeSeriesValue_ID1000103')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35309' and 'Values_List_IB2U_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000102')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35308' and 'Values_List_IB2U_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000101')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35307' and 'Values_List_IB2U_1004')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000100')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35306' and 'Values_List_IB2U_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000099')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35305' and 'Values_List_IB2U_1002')
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> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000098')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35304' and 'Values_List_IB2U_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000097')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35303' and 'Values_List_IB2U_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_727' and 'SimIrregularTimeSeries_ID1000096')
> class 'SimSpace_Occupied_Default' done (instances used to check: 'IfcSpace_622' and 'SimSpace_Occupied_Default_ID1000038')

Issue: 4 properties missing or incorrectly defined in instances of class [[ SimMaterial_OpaqueMaterial_NoMass ]]
Examples of instances: IfcMaterial_2012245 (m1), or SimMaterial_OpaqueMaterial_NoMass_ID1000637 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#sourceModelObjectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_ThermalResist..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialThermalResist..... (included in Model 2 but not defined in the ontology)

> class 'SimMaterial_OpaqueMaterial_NoMass' done (instances used to check: 'IfcMaterial_2012245' and 'SimMaterial_OpaqueMaterial_NoMass_ID1000637')
> class 'SimSIUnitType_SiUnit_Default' done (instances used to check: 'IfcSIUnit_71' and 'SimSIUnitType_SiUnit_Default_ID1000007')

Issue: 3 properties missing or incorrectly defined in instances of class [[ SimSlab_Default_Default ]]
Examples of instances: IfcSlab_4725 (m1), or SimSlab_Default_Default_ID1000137 (m2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (repeated: namespace correct in Model 1)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#name..... (repeated: namespace correct in Model 1)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimBuildingStory_BuildingStory_Default ]]
Examples of instances: IfcBuildingStorey_139 (m1), or SimBuildingStory_BuildingStory_Default_ID1000034 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

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> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')
> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')
> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')
> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')
> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_139' and
'SimBuildingStory_BuildingStory_Default_ID1000034')
> class 'SimMaterialLayerSet_OpaqueLayerSet_Default' done (instances used to check: 'IfcMaterialLayerSet_3532' and
'SimMaterialLayerSet_OpaqueLayerSet_Default_ID1001896')
> class 'SimSlab_Default_Default' done (instances used to check: 'IfcSlab_4725' and 'SimSlab_Default_Default_ID1000137')

Issue: 1 properties missing or incorrectly defined in instances of class [[ Points_List ]]
Examples of instances: IfcCartesianPoint_List_36094 (m1), or Points_List_RKRA_1001 (m2)
  https://w3id.org/list#hasNext..... (included in Model 1 but not defined in the ontology)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_10 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000222 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_10' and
'SimGeomPoint_Point_CartesianPoint_ID1000222')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_36094' and 'Points_List_RKRA_1001')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_36093' and 'Points_List_RKRA_1000')
> class 'SimGeomCurve_Polyline_Default' done (instances used to check: 'IfcPolyline_2569' and 'SimGeomCurve_Polyline_Default_ID1000226')
Error: SIMMODEL(22) instance of class 'SimLocalPlacement_LocalPlacement_AbsolutePlacement' NOT FOUND in model 2

> class 'SimMaterialLayerSet_OpaqueLayerSet_Default' done (instances used to check: 'IfcMaterialLayerSet_12168' and
'SimMaterialLayerSet_OpaqueLayerSet_Default_ID1001909')
> class 'SimPanel_Opaque' done (instances used to check: 'IfcPlate_12195' and 'SimPanel_Opaque_ID1001910')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34913' and 'DoubleList_UA2Z_1002')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34912' and 'DoubleList_UA2Z_1001')
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> class 'DoubleList' done (instances used to check: 'IfcReal_List_34911' and 'DoubleList_UA2Z_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_202' and 'SimGeomVector_Vector_Direction_ID1000126')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34821' and 'DoubleList_IFOR_1002')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34820' and 'DoubleList_IFOR_1001')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34819' and 'DoubleList_IFOR_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_22' and 'SimGeomVector_Vector_Direction_ID1000151')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_10997 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000001 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_10997' and
'SimGeomPoint_Point_CartesianPoint_ID1000001')

> class 'SimPlacement_Axis2Placement3D_Default' done (instances used to check: 'IfcAxis2Placement3D_11001' and
'SimPlacement_Axis2Placement3D_Default_ID1000004')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimMaterialLayer_GlazingMaterialLayer_Default ]]
Examples of instances: IfcMaterialLayer_104938 (m1), or SimMaterialLayer_GlazingMaterialLayer_Default_ID1000202 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_MaterialName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMatLayer_LayerThickness..... (missing in Model 2)

Issue: 8 properties missing or incorrectly defined in instances of class [[ SimMaterial_GlazingMaterial_SimpleGlazingSystem ]]
Examples of instances: IfcMaterial_104938 (m1), or SimMaterial_GlazingMaterial_SimpleGlazingSystem_ID1000190 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Name..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_VisTrans..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_UFactor..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_SolarHeatGainCoef..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialUFactor..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#category..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialSolarHeatGainCoef..... (included in Model 2 but not defined in the ontology)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialVisTrans..... (included in Model 2 but not defined in the ontology)

> class 'SimMaterial_GlazingMaterial_SimpleGlazingSystem' done (instances used to check: 'IfcMaterial_104938' and
'SimMaterial_GlazingMaterial_SimpleGlazingSystem_ID1000190')

> class 'SimMaterialLayer_GlazingMaterialLayer_Default' done (instances used to check: 'IfcMaterialLayer_104938' and
'SimMaterialLayer_GlazingMaterialLayer_Default_ID1000202')
Error: SIMMODEL(26) instance of class 'SimGeomSolidModel_SweptAreaSolid_ExtrudedAreaSolid' NOT FOUND in model 2

```



Issue: 4 properties missing or incorrectly defined in instances of class [[SimWindow_Window_Default]]

Examples of instances: IfcWindow_21009 (m1), or SimWindow_Window_Default_ID1000124 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (repeated: namespace correct in Model 1)
http://d-alchemy.com/schema/simxml/BuildingModel#windowIsExternal..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#name..... (repeated: namespace correct in Model 1)
```

Issue: 1 properties missing or incorrectly defined in instances of class [[Materials_List]]

Examples of instances: IfcMaterialConstituentSet_21014_Item_List_2 (m1), or Materials_List_MKCG_1001 (m2)

```
https://w3id.org/list#hasNext..... (included in Model 1 but not defined in the ontology)
```

```
> class 'Materials_List' done (instances used to check: 'IfcMaterialConstituentSet_21014_Item_List_2' and 'Materials_List_MKCG_1001')
```

Issue: 9 properties missing or incorrectly defined in instances of class [[SimMaterial_OpaqueMaterial_Default]]

Examples of instances: IfcMaterial_4827 (m1), or SimMaterial_OpaqueMaterial_Default_ID1000122 (m2)

```
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_SpecificHeat..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Cond..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterial_Density..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialCond..... (included in Model 2 but not defined in the ontology)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#category..... (included in Model 2 but not defined in the ontology)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialDensity..... (included in Model 2 but not defined in the ontology)
http://d-alchemy.com/schema/simxml/ResourcesGeneral#simMaterialSpecificHeat..... (included in Model 2 but not defined in the ontology)
```

```
> class 'SimMaterial_OpaqueMaterial_Default' done (instances used to check: 'IfcMaterial_4827' and 'SimMaterial_OpaqueMaterial_Default_ID1000122')
```

```
> class 'Materials_List' done (instances used to check: 'IfcMaterialConstituentSet_21014_Item_List_1' and 'Materials_List_MKCG_1000')
```

```
> class 'SimList_MaterialList' done (instances used to check: 'IfcMaterialConstituentSet_21014' and 'SimList_MaterialList_ID1000125')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimBuildingStory_BuildingStory_Default]]

Examples of instances: IfcBuildingStorey_139 (m1), or SimBuildingStory_BuildingStory_Default_ID1000034 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
```

Issue: 5 properties missing or incorrectly defined in instances of class [[SimBuilding_Building_Default]]

Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)

```
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimSite_BuildingSite_Default]]

Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)



```

http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')

> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')

> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')

> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_139' and
'SimBuildingStory_BuildingStory_Default_ID1000034')

> class 'SimWindow_Window_Default' done (instances used to check: 'IfcWindow_21009' and 'SimWindow_Window_Default_ID1000124')

> class 'SimMaterialLayerSet_OpaqueLayerSet_Default' done (instances used to check: 'IfcMaterialLayerSet_22030' and
'SimMaterialLayerSet_OpaqueLayerSet_Default_ID1000204')

Issue: 1 properties missing or incorrectly defined in instances of class [[ Materials_List ]]
Examples of instances: IfcMaterialConstituentSet_20737_Item_List_1 (m1), or Materials_List_Y6QA_1000 (m2)
https://w3id.org/list#hasNext..... (included in Model 1 but not defined in the ontology)

> class 'Materials_List' done (instances used to check: 'IfcMaterialConstituentSet_20737_Item_List_1' and 'Materials_List_Y6QA_1000')

> class 'SimList_MaterialList' done (instances used to check: 'IfcMaterialConstituentSet_20737' and 'SimList_MaterialList_ID1000061')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimBuildingStory_BuildingStory_Default ]]
Examples of instances: IfcBuildingStorey_139 (m1), or SimBuildingStory_BuildingStory_Default_ID1000034 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 5 properties missing or incorrectly defined in instances of class [[ SimBuilding_Building_Default ]]
Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimSite_BuildingSite_Default ]]
Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

```



```

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')
> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')
> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')
> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')
> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_139' and
'SimBuildingStory_BuildingStory_Default_ID1000034')
> class 'SimDoor_OpaqueDoor' done (instances used to check: 'IfcDoor_20732' and 'SimDoor_OpaqueDoor_ID1000057')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34818' and 'DoubleList_UA2Z_1002')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34817' and 'DoubleList_UA2Z_1001')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34816' and 'DoubleList_UA2Z_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_20' and 'SimGeomVector_Vector_Direction_ID1000126')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34804' and 'DoubleList_WJSM_1002')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34803' and 'DoubleList_WJSM_1001')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34802' and 'DoubleList_WJSM_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_12' and 'SimGeomVector_Vector_Direction_ID1000218')
Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_6 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000001 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_6' and 'SimGeomPoint_Point_CartesianPoint_ID1000001')
> class 'SimPlacement_Axis2Placement3D_Default' done (instances used to check: 'IfcAxis2Placement3D_93' and
'SimPlacement_Axis2Placement3D_Default_ID1000022')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34844' and 'DoubleList_O1RT_1001')
> class 'DoubleList' done (instances used to check: 'IfcReal_List_34843' and 'DoubleList_O1RT_1000')
> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_94' and 'SimGeomVector_Vector_Direction_ID1000024')

```



```

> class 'SimModelRepresentationContext_GeometricRepresentationContext_Default' done (instances used to check:
'IfcGeometricRepresentationContext_96' and 'SimModelRepresentationContext_GeometricRepresentationContext_Default_ID1000025')
Error: SIMMODEL(31) instance of class 'SimDerivedUnitType_DerivedUnit_Default' NOT FOUND in the ontology

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')

Issue: 4 properties missing or incorrectly defined in instances of class [[ SimSpaceBoundary_SecondLevel_SubTypeA ]]
Examples of instances: IfcRelSpaceBoundary2ndLevel_55023 (m1), or SimSpaceBoundary_SecondLevel_SubTypeA_ID1000233 (m2)
  http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeneral#physicalOrVirtualBoundary..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_55016 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000227 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_55016' and
'SimGeomPoint_Point_CartesianPoint_ID1000227')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34818' and 'DoubleList_HQTM_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34817' and 'DoubleList_HQTM_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34816' and 'DoubleList_HQTM_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_20' and 'SimGeomVector_Vector_Direction_ID1000228')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34804' and 'DoubleList_TRBE_1002')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34803' and 'DoubleList_TRBE_1001')

> class 'DoubleList' done (instances used to check: 'IfcReal_List_34802' and 'DoubleList_TRBE_1000')

> class 'SimGeomVector_Vector_Direction' done (instances used to check: 'IfcDirection_12' and 'SimGeomVector_Vector_Direction_ID1000229')

> class 'SimPlacement_Axis2Placement3D_Default' done (instances used to check: 'IfcAxis2Placement3D_55019' and
'SimPlacement_Axis2Placement3D_Default_ID1000230')

> class 'SimGeomSurface_ElementarySurface_Plane' done (instances used to check: 'IfcPlane_55020' and
'SimGeomSurface_ElementarySurface_Plane_ID1000231')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_55010 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000225 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)

```



```

  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_55010' and
'SimGeomPoint_Point_CartesianPoint_ID1000225')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61808' and 'Points_List_RKRA_1004')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61807' and 'Points_List_RKRA_1003')
Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_55010 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000223 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_55010' and
'SimGeomPoint_Point_CartesianPoint_ID1000223')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61806' and 'Points_List_RKRA_1002')
Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_55010 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000222 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_55010' and
'SimGeomPoint_Point_CartesianPoint_ID1000222')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61805' and 'Points_List_RKRA_1001')
Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_55010 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000221 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_55010' and
'SimGeomPoint_Point_CartesianPoint_ID1000221')
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_61804' and 'Points_List_RKRA_1000')
> class 'SimGeomCurve_Polyline_Default' done (instances used to check: 'IfcPolyline_55015' and 'SimGeomCurve_Polyline_Default_ID1000226')
> class 'SimGeomSurface_BoundedSurface_CurveBoundedPlane' done (instances used to check: 'IfcCurveBoundedPlane_55021' and
'SimGeomSurface_BoundedSurface_CurveBoundedPlane_ID1000232')
Issue: 6 properties missing or incorrectly defined in instances of class [[ SimSpace_Occupied_Default ]]
Examples of instances: IfcSpace_218 (m1), or SimSpace_Occupied_Default_ID1000302 (m2)

```



```

http://d-alchemy.com/schema/simxml/BuildingModel#spaceConditioningRequirement..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#spaceThermalSimulationType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000506')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35067' and 'Values_List_AQ9X_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35066' and 'Values_List_AQ9X_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_325' and 'SimIrregularTimeSeriesValue_ID1000500')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35065' and 'Values_List_AQ9X_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_323' and 'SimIrregularTimeSeriesValue_ID1000498')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35064' and 'Values_List_AQ9X_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_321' and 'SimIrregularTimeSeriesValue_ID1000495')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35063' and 'Values_List_AQ9X_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000492')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35062' and 'Values_List_AQ9X_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_317' and 'SimIrregularTimeSeriesValue_ID1000489')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35061' and 'Values_List_AQ9X_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_315' and 'SimIrregularTimeSeriesValue_ID1000486')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35060' and 'Values_List_AQ9X_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_313' and 'SimIrregularTimeSeriesValue_ID1000482')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35059' and 'Values_List_AQ9X_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_311' and 'SimIrregularTimeSeriesValue_ID1000479')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35058' and 'Values_List_AQ9X_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_309' and 'SimIrregularTimeSeriesValue_ID1000477')

```



```
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35057' and 'Values_List_AQ9X_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_307' and 'SimIrregularTimeSeriesValue_ID1000474')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35056' and 'Values_List_AQ9X_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_305' and 'SimIrregularTimeSeriesValue_ID1000471')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35055' and 'Values_List_AQ9X_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_303' and 'SimIrregularTimeSeriesValue_ID1000468')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35054' and 'Values_List_AQ9X_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_301' and 'SimIrregularTimeSeriesValue_ID1000465')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35053' and 'Values_List_AQ9X_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_299' and 'SimIrregularTimeSeriesValue_ID1000462')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35052' and 'Values_List_AQ9X_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_297' and 'SimIrregularTimeSeriesValue_ID1000458')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35051' and 'Values_List_AQ9X_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_295' and 'SimIrregularTimeSeriesValue_ID1000456')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35050' and 'Values_List_AQ9X_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000453')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35049' and 'Values_List_AQ9X_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000450')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35048' and 'Values_List_AQ9X_1004')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000447')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35047' and 'Values_List_AQ9X_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000446')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35046' and 'Values_List_AQ9X_1002')
```



```
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000445')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35045' and 'Values_List_AQ9X_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000444')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35044' and 'Values_List_AQ9X_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_333' and 'SimIrregularTimeSeries_ID1000442')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000369')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34948' and 'Values_List_IJ9J_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34947' and 'Values_List_IJ9J_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_267' and 'SimIrregularTimeSeriesValue_ID1000363')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34946' and 'Values_List_IJ9J_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_265' and 'SimIrregularTimeSeriesValue_ID1000360')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34945' and 'Values_List_IJ9J_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_263' and 'SimIrregularTimeSeriesValue_ID1000357')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34944' and 'Values_List_IJ9J_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000354')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34943' and 'Values_List_IJ9J_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_259' and 'SimIrregularTimeSeriesValue_ID1000351')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34942' and 'Values_List_IJ9J_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_257' and 'SimIrregularTimeSeriesValue_ID1000349')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34941' and 'Values_List_IJ9J_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_255' and 'SimIrregularTimeSeriesValue_ID1000346')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34940' and 'Values_List_IJ9J_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_253' and 'SimIrregularTimeSeriesValue_ID1000343')
```



```
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34939' and 'Values_List_IJ9J_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_251' and 'SimIrregularTimeSeriesValue_ID1000340')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34938' and 'Values_List_IJ9J_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_249' and 'SimIrregularTimeSeriesValue_ID1000337')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34937' and 'Values_List_IJ9J_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_247' and 'SimIrregularTimeSeriesValue_ID1000333')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34936' and 'Values_List_IJ9J_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_245' and 'SimIrregularTimeSeriesValue_ID1000330')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34935' and 'Values_List_IJ9J_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_243' and 'SimIrregularTimeSeriesValue_ID1000328')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34934' and 'Values_List_IJ9J_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_241' and 'SimIrregularTimeSeriesValue_ID1000325')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34933' and 'Values_List_IJ9J_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_239' and 'SimIrregularTimeSeriesValue_ID1000322')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34932' and 'Values_List_IJ9J_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_237' and 'SimIrregularTimeSeriesValue_ID1000319')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34931' and 'Values_List_IJ9J_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000318')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34930' and 'Values_List_IJ9J_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000317')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34929' and 'Values_List_IJ9J_1004')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000316')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34928' and 'Values_List_IJ9J_1003')
```



```
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000313')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34927' and 'Values_List_IJ9J_1002')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000310')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34926' and 'Values_List_IJ9J_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000307')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_34925' and 'Values_List_IJ9J_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_223' and 'SimIrregularTimeSeries_ID1000306')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_271' and 'SimIrregularTimeSeriesValue_ID1000437')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35024' and 'Values_List_UECG_1023')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35023' and 'Values_List_UECG_1022')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_325' and 'SimIrregularTimeSeriesValue_ID1000432')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35022' and 'Values_List_UECG_1021')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_323' and 'SimIrregularTimeSeriesValue_ID1000429')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35021' and 'Values_List_UECG_1020')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_321' and 'SimIrregularTimeSeriesValue_ID1000426')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35020' and 'Values_List_UECG_1019')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_261' and 'SimIrregularTimeSeriesValue_ID1000423')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35019' and 'Values_List_UECG_1018')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_317' and 'SimIrregularTimeSeriesValue_ID1000420')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35018' and 'Values_List_UECG_1017')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_315' and 'SimIrregularTimeSeriesValue_ID1000417')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35017' and 'Values_List_UECG_1016')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_313' and 'SimIrregularTimeSeriesValue_ID1000415')
```



```
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35016' and 'Values_List_UECG_1015')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_311' and 'SimIrregularTimeSeriesValue_ID1000412')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35015' and 'Values_List_UECG_1014')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_309' and 'SimIrregularTimeSeriesValue_ID1000408')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35014' and 'Values_List_UECG_1013')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_307' and 'SimIrregularTimeSeriesValue_ID1000405')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35013' and 'Values_List_UECG_1012')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_305' and 'SimIrregularTimeSeriesValue_ID1000402')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35012' and 'Values_List_UECG_1011')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_303' and 'SimIrregularTimeSeriesValue_ID1000401')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35011' and 'Values_List_UECG_1010')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_301' and 'SimIrregularTimeSeriesValue_ID1000400')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35010' and 'Values_List_UECG_1009')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_299' and 'SimIrregularTimeSeriesValue_ID1000398')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35009' and 'Values_List_UECG_1008')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_297' and 'SimIrregularTimeSeriesValue_ID1000395')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35008' and 'Values_List_UECG_1007')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_295' and 'SimIrregularTimeSeriesValue_ID1000392')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35007' and 'Values_List_UECG_1006')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_235' and 'SimIrregularTimeSeriesValue_ID1000390')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35006' and 'Values_List_UECG_1005')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_233' and 'SimIrregularTimeSeriesValue_ID1000387')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35005' and 'Values_List_UECG_1004')
```



```

> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_231' and 'SimIrregularTimeSeriesValue_ID1000384')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35004' and 'Values_List_UECG_1003')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_229' and 'SimIrregularTimeSeriesValue_ID1000381')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35003' and 'Values_List_UECG_1002')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_227' and 'SimIrregularTimeSeriesValue_ID1000378')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35002' and 'Values_List_UECG_1001')
> class 'SimIrregularTimeSeriesValue' done (instances used to check: 'IfcIrregularTimeSeriesValue_225' and 'SimIrregularTimeSeriesValue_ID1000375')
> class 'Values_List' done (instances used to check: 'IfcIrregularTimeSeriesValue_List_35001' and 'Values_List_UECG_1000')
> class 'SimIrregularTimeSeries' done (instances used to check: 'IfcIrregularTimeSeries_282' and 'SimIrregularTimeSeries_ID1000373')

```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimBuildingStory_BuildingStory_Default]]

Examples of instances: IfcBuildingStorey_133 (m1), or SimBuildingStory_BuildingStory_Default_ID1000030 (m2)

```

http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)

```

Issue: 5 properties missing or incorrectly defined in instances of class [[SimBuilding_Building_Default]]

Examples of instances: IfcBuilding_120 (m1), or SimBuilding_Building_Default_ID1000027 (m2)

```

http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/BuildingModel#name..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#simModelName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#ifcName..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#description..... (missing in Model 2)

```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimSite_BuildingSite_Default]]

Examples of instances: IfcSite_20320 (m1), or SimSite_BuildingSite_Default_ID1001906 (m2)

```

http://d-alchemy.com/schema/simxml/SimModelCore#objectType..... (missing in Model 2)
http://d-alchemy.com/schema/simxml/SimModelCore#longName..... (missing in Model 2)

```

```

> class 'SimOwnerHistory_Default_Default' done (instances used to check: 'IfcOwnerHistory_42' and 'SimOwnerHistory_Default_Default_ID1000006')
> class 'SimProject_Project_DesignAlternative' done (instances used to check: 'IfcProject_105' and
'SimProject_Project_DesignAlternative_ID1000026')
> class 'SimSite_BuildingSite_Default' done (instances used to check: 'IfcSite_20320' and 'SimSite_BuildingSite_Default_ID1001906')
> class 'SimBuilding_Building_Default' done (instances used to check: 'IfcBuilding_120' and 'SimBuilding_Building_Default_ID1000027')

```



```
> class 'SimBuildingStory_BuildingStory_Default' done (instances used to check: 'IfcBuildingStorey_133' and
'SimBuildingStory_BuildingStory_Default_ID1000030')
```

```
> class 'SimSpace_Occupied_Default' done (instances used to check: 'IfcSpace_218' and 'SimSpace_Occupied_Default_ID1000302')
```

```
> class 'SimSpaceBoundary_SecondLevel_SubTypeA' done (instances used to check: 'IfcRelSpaceBoundary2ndLevel_55023' and
'SimSpaceBoundary_SecondLevel_SubTypeA_ID1000233')
```

Issue: 1 properties missing or incorrectly defined in instances of class [[Materials_List]]
 Examples of instances: IfcMaterialConstituentSet_21014_Item_List_1 (m1), or Materials_List_AZYN_1000 (m2)
<https://w3id.org/list#hasNext>..... (included in Model 1 but not defined in the ontology)

```
> class 'Materials_List' done (instances used to check: 'IfcMaterialConstituentSet_21014_Item_List_1' and 'Materials_List_AZYN_1000')
```

```
> class 'SimList_MaterialList' done (instances used to check: 'IfcMaterialConstituentSet_21014' and 'SimList_MaterialList_ID1000003')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]
 Examples of instances: IfcCartesianPoint_7635 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000848 (m2)
http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue>..... (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_7635' and
'SimGeomPoint_Point_CartesianPoint_ID1000848')
```

Issue: 1 properties missing or incorrectly defined in instances of class [[DoubleList]]
 Examples of instances: IfcLengthMeasure_List_38884 (m1), or DoubleList_IZXB_1000 (m2)
<https://w3id.org/list#hasNext>..... (included in Model 1 but not defined in the ontology)

```
> class 'DoubleList' done (instances used to check: 'IfcLengthMeasure_List_38884' and 'DoubleList_IZXB_1000')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]
 Examples of instances: IfcCartesianPoint_20860 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000998 (m2)
http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue>..... (included in Model 2 but not defined in the ontology)

```
> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_20860' and
'SimGeomPoint_Point_CartesianPoint_ID1000998')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_44516' and 'Points_List_CPFR_1004')
```

```
> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_44515' and 'Points_List_CPFR_1003')
```

Issue: 2 properties missing or incorrectly defined in instances of class [[SimGeomPoint_Point_CartesianPoint]]
 Examples of instances: IfcCartesianPoint_20860 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000995 (m2)
http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
<http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue>..... (included in Model 2 but not defined in the ontology)



```

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_20860' and
'SimGeomPoint_Point_CartesianPoint_ID1000995')

> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_44514' and 'Points_List_CPFR_1002')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_20860 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000994 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_20860' and
'SimGeomPoint_Point_CartesianPoint_ID1000994')

> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_44513' and 'Points_List_CPFR_1001')

Issue: 2 properties missing or incorrectly defined in instances of class [[ SimGeomPoint_Point_CartesianPoint ]]
Examples of instances: IfcCartesianPoint_20860 (m1), or SimGeomPoint_Point_CartesianPoint_ID1000993 (m2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinates_MeasureValue..... (missing in Model 2)
  http://d-alchemy.com/schema/simxml/ResourcesGeometry#coordinatesMeasureValue..... (included in Model 2 but not defined in the ontology)

> class 'SimGeomPoint_Point_CartesianPoint' done (instances used to check: 'IfcCartesianPoint_20860' and
'SimGeomPoint_Point_CartesianPoint_ID1000993')

> class 'Points_List' done (instances used to check: 'IfcCartesianPoint_List_44512' and 'Points_List_CPFR_1000')

-----
NameSpace conflicts:
-----
[ name ]
  URI 1: <http://d-alchemy.com/schema/simxml/SimModelCore#name>
  URI 2: <http://d-alchemy.com/schema/simxml/BuildingModel#name>

-----
Classes missing in model 1 (see the previous part of the log):
-----

-----
Classes missing in model 2 (see the previous part of the log):
-----
SimLocalPlacement_LocalPlacement_RelativePlacement
SimParameterizedProfileDef_ParameterizedProfile_Rectangle
SimPlacement_Axis2Placement2D_Default
SimMaterialLayerSet_GlazingLayerSet_Default
SimLocalPlacement_LocalPlacement_AbsolutePlacement

```



SimGeomSolidModel_SweptAreaSolid_ExtrudedAreaSolid

 Properties missing in one or more classes of model 1 (see the previous part of the log):

 Properties missing in one or more classes of model 2 (see the previous part of the log):

simPlacement_Axis2Placement3D_Default
 simGeomSurface_ElementarySurface_Plane
 simPlacement_Axis2Placement2D_Default
 simLocalPlacement_LocalPlacement_RelativePlacement
 simSpaceBoundary_SecondLevel_SubTypeA
 simGeomVector_Vector_Direction
 simGeomCurve_Polyline_Default
 simGeomSurface_BoundedSurface_CurveBoundedPlane
 simMaterial_OpaqueMaterial_NoMass
 simGeomSolidModel_SweptAreaSolid_ExtrudedAreaSolid
 simDerivedUnitType_DerivedUnit_Default
 simSpace_Occupied_Default
 simPanel_Glazing_Vision
 simLocalPlacement_LocalPlacement_AbsolutePlacement
 simModelRepresentationContext_GeometricRepresentationContext_Default
 simMaterialLayerSet_OpaqueLayerSet_Default
 simMaterialLayer_OpaqueMaterialLayer_Default
 simMaterial_OpaqueMaterial_Default
 simParameterizedProfileDef_ParameterizedProfile_Rectangle
 simWall_Wall_ExteriorAboveGrade
 simMaterial_GlazingMaterial_SimpleGlazingSystem
 simSlab_Default_Default
 simList_MaterialList_Default
 simSIUnitType_SiUnit_Default
 simBuilding_Building_Default
 simOwnerHistory_Default_Default
 simIrregularTimeSeries_Irregular_Default
 simSite_BuildingSite_Default
 simWindow_Window_Default
 simMaterialLayer_GlazingMaterialLayer_Default
 simBuildingStory_BuildingStory_Default
 simMaterialLayerSet_GlazingLayerSet_Default
 sourceModelObjectType
 simMatLayer_LayerThickness
 simMatLayer_MaterialName
 simModelName



```
objectType
longName
name
ifcName
description
simMaterial_Name
simMaterial_Density
simMaterial_Conductivity
simMaterial_SpecificHeat
simMaterial_SolarHeatGainCoef
simMaterial_VisTrans
simMaterial_UFactor
coordinates_MeasureValue
spaceConditioningRequirement
spaceThermalSimulationType
simMaterial_ThermalResist
windowIsExternal
physicalOrVirtualBoundary
```

Classes missing in the ontology (see the previous part of the log):

```
SimDerivedUnitType_DerivedUnit_Default
```

Properties missing in the ontology (see the previous part of the log):

```
simZone
simDoor_OpaqueDoor
simPanel_Opaque
simRoot
hasNext
simMaterialUFactor
category
simMaterialSolarHeatGainCoef
simMaterialVisTrans
coordinatesMeasureValue
simMaterialThermalResist
simMaterialConductivity
simMaterialDensity
simMaterialSpecificHeat
```

