

L3: Implementation specification

INDUSTRY PRACTICES FOR APPLICATION OF COCLASS IN SOFTWARE



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1 Background, purpose and scope

1.1 Background

CoClass is a modern and web-based classification system that is developed to cover the construction sector's complete information need. CoClass builds on standard, science and proven experience since it is based on international standards (see Normative references section)

The vision is that CoClass shall lead to improved communication between the actors within the construction sector. The goal is that CoClass shall be used by all parties during all stages during the lifecycle of a construction complex from early stages to maintenance, operation and demolition. An investigation performed 2014 by Svensk Byggtjänst showed that deficient communication leads to increased spending of approximately 60 billion SEK within the construction sector. CoClass may contribute to the resolution of this problem when used fully through the whole lifecycle. In other words, there is a substantial potential for savings for the sector when using CoClass.

A strive is that CoClass successively will replace the current system for classification, BSAB 96. CoClass is adapted for digital modelling and will play an important role in the realization of the full potential with BIM (Building Information Modelling). CoClass includes definitions for objects, properties and activities through the whole lifecycle for both buildings and infrastructure. This will be the backbone for the communication through the construction, maintenance and operation, from idea to demolition.

1.2 Purpose of the project

One important component to achieve the potential of CoClass is that there exists support in the software systems that are used in different stages through the life cycle. This is vital for achieving a continuous flow of data through the processes thus reducing the risk of misunderstandings and disputes and errors. Adequate support in software will also significantly lower the thresholds for getting started.

To achieve this, it is required that the software which implements CoClass does this in a uniform way. The understanding of CoClass is not allowed to change just because different software systems are used in different parts of the lifecycle.

The purpose of this project is therefore to develop guidelines and recommendations for how CoClass shall be implemented in software.

Primary purpose:

- To develop an industry practice for software implementors on how to implement CoClass in a uniform way.

Secondary purpose:

- To provide an opportunity for software implementors and other actors in the construction sector to put forward requirements on functionality and content in CoClass.

Tertiary purpose:

- To achieve software implementations with built in support for CoClass so that CoClass users can include the use of CoClass as part of their information delivery specifications.

1.3 Purpose of this document

Based from the deliverables L1 (analysis of user needs) and L2 (Requirements analysis IT), this implementation specification report provides a specification for implementation of several test cases to be implemented (in WP4) and verified (in WP5).

2 Summary of previous work in the project

In work package 1, workshops with the aim to investigate user needs, were held together with user representatives. The results from this investigation of user needs is reported in (Project Industry practices for application of CoClass in software, 2019). The results from this investigation have been compiled into a requirements analysis together with requirements from the participating software providers to capture a representative set of requirements from a large group of stakeholders.

3 Implementation specification

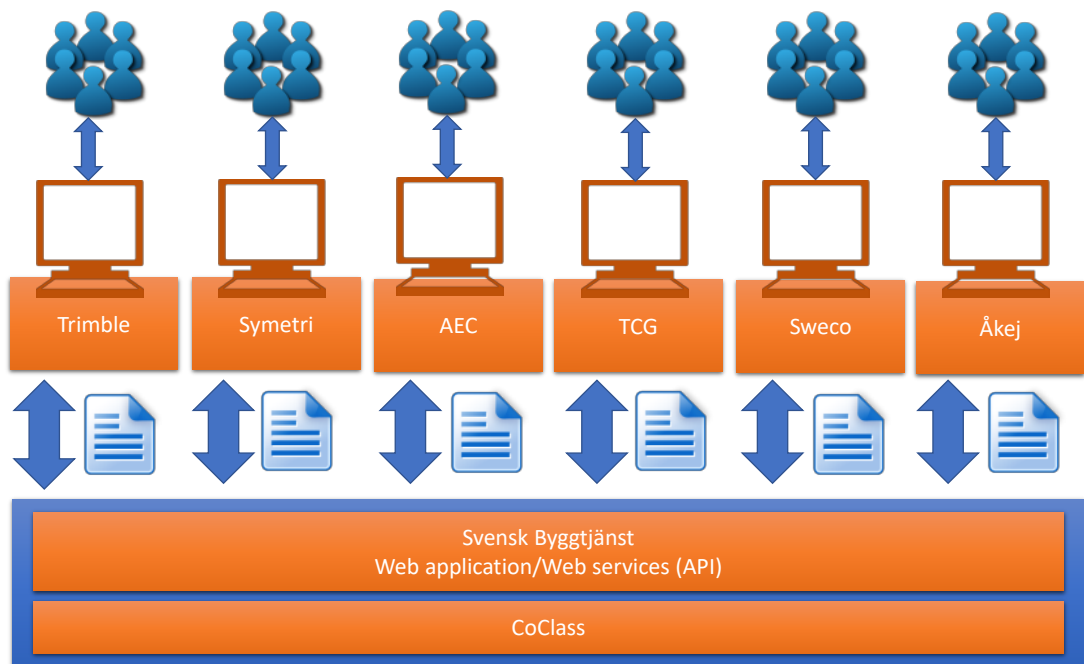
3.1 Principles and organization

Based on the requirements analysis, the implementation specification specifies several real cases to be implemented in software (in WP4) and verified (in WP5) by the project partners, including Svensk Byggtjänst.

The implementations are made in the respective software package provided by the project partners and shall cover important needs from their users regarding the use of CoClass.

The figure below gives an overview of the organization of the work:

- Each partner has some software supporting certain categories of users
- The software makes use of CoClass and the related web services
- Each partner creates an implementation specification for one or more selected test scenarios
- Each test scenario is described by detailed steps including input, processing, output, requirements mapping and a method for verification and validation



3.2 Description of the software packages

The table below gives an overview of the software packages chosen for the implementation and their dedicated market and area of use.

Partner	Software	Software market and area of use
Trimble	Trimble Novapoint & Trimble Quadri	Trimble Novapoint & Trimble Quadri is used for civil design, construction and maintenance of infrastructure projects. Mainly used by technical consultants but also contractors, municipalities and infrastructure owners.
Symetri	Naviate BIMeye Anavitor	Construction and production.
AEC	Savoir & AEC PLUS Infra	The software can be used in all phases of the lifecycle of an infrastructure project. The software is primarily used by design engineers when working on designing a project this to deploy the right codes and also for quality checking deliverables and coding. The receiving client/asset owner can also use the software for example checking that requirements are fulfilled
TCG	Master Concept (Vendor: IDES AB)	Information and documentation masterdata hub for large property owners/ plant owners with technically more complex facilities e.g. nuclear plants, district heating plants, energy distribution, process industries, hospitals and large building complexes etc. Covering all information and documentation needed by all roles in the business processes from customer inquiries to maintenance and overhaul. Fully IEC/ISO 813 46-1, -2, -10 (KKS) and -12 (CoClass) compliant including multiple aspects, version handling, item and cost aggregation at any level in the hierarchy
Sweco Position (Safe Software)	FME Desktop 2019 & FME Server 2019	FME is an ETL-tool (extract, transform, load) and is widely used in the following industries: Airports & Aviation, Architecture, Engineering and Construction, Commercial, Defense and Aerospace, Emergency Services, Energy, Federal Government, Health Care, Local Government, Natural Resources, State Government, Telecommunications, Transportation and Utilities. FME can be, and is used, in all parts of the life cycle for data management, data validation, data extraction, data transformation and data load. The software can read and write over 400 different data formats/sources.
Åkej	Software using fi2xml classlist functionality	This is to transfer classification information to final storage in FM software
Svensk Byggtjänst	coclass.byggstjanst.se , including CoClass Studio web application and CoClass API	CoClass is the Swedish classification system for all built environments. The purpose of CoClass is that the model should be used by all parties throughout the construction work's life cycle - from the early stages to management and demolition. With CoClass, all parties have access to a common language with the same concepts and terminology

in all software and in all information deliveries. CoClass is a digital language that can be read by both man and machine.

3.3 Description of the test cases

The table below gives an overview of the test cases specified by the project partners.

Partner	Chosen scenario	Purpose/benefit of chosen scenario
Trimble	Road Owner Nye Veier adopt CoClass for classification of assets	Nye Veier is a new CoClass customer that are eager to test out CoClass for classification of their assets
Symetri	Transfer information from requirements to construction and production where the result can be verified and stored in FM.	The purpose is to make the information and their properties to the classified through the whole lifecycle. E.g. That you could verify the same component through the whole lifecycle. It shall be possible to verify objects and its properties at the different delivery milestones to make sure that a complete classification has been done at the last delivery.
AEC	The Designer is working on design of an infrastructure project. The Designer have requirements to use CoClass. The designer needs to have all relevant CoClass codes for his discipline that are relevant for his project. The Designer access the codes and picks some relevant codes. When delivery to the client is to be done the Designer can check that the objects have the relevant coding. When Byggtjänst updates the CoClass to a new version the designer needs to update the project to that version. The designer needs to understand how the changes will be relevant and impact his project	Using, quality checking and selecting, defining, updating and validating CoClass codes within a project.
TCG	Splitting an existing room in two. Installing a new inner wall with a door and an automatic closer. The closer to be connected to the existing fire alarm system and the fire alarm to be tested in total i.e. including closers on the initial door and on the Elevator. The ventilation duct to be extended into the new room and an additional air vent to be installed. New parameters to be set at the ventilation system	A simple but typical scenario showing how to import existing set(s) of information for a premise. Naming new objects according to the CoClass standard, add the property sets for each new object, link all new objects into existing structures according to IEC 813 46 (placement, fire alarm and vent systems). Find all closers linked to the fire alarm circuit, updating parameter settings for the ventilation system.

<p>Sweco Position (Safe Software)</p>	<p>Semi-automatically set CoClass codes for objects in Revit files and tabular data format. The user can upload a Revit file or a file in a tabular format with objects that doesn't have any CoClass codes set. FME will read and interpret the information about the objects, make requests to the CoClass API, retrieve and transform the results and present it to the user for further handling.</p>	<p>To easy get suggestions of CoClass codes for existing data. This will hopefully speed up the implementation of CoClass at certain organizations.</p>
<p>Åkej</p>	<p>When fi2xml software requires classlist verification CoClass API simulates and fi2 classlists so that these software can verify they do with other classes.</p>	<p>The purpose is to make the information and their properties to the classified through the whole lifecycle. E.g. That you could verify the same component through the whole lifecycle. It shall be possible to verify objects and its properties at the different delivery milestones to make sure that a complete classification has been done at the last delivery.</p>
<p>Svensk Byggtjänst</p>	<p>A developer creates a structure in CoClass Studio for use in future work in planning a construction. The developer shares the structure with one or more people in order for them to continue work. Alt 1: The persons that the structure is shared to downloads it and imports it in another tool to continue work. Alt 2: The persons that the structure is shared to uses another tool and imports the structure through the CoClass API to continue work.</p>	<p>Enables a developer to create a structure and share it to other people that needs to work with it. Enables one common data source for all to work with</p>

General tests of Svensk Byggtjänst's CoClass API concerning authentication/authorization, requests and replies, error responses, documentation will be conducted implicit by those project partners that will use the CoClass-API.

3.4 Complete list of test cases and mapping of requirements

The complete list of all test cases that shall be conducted by the project parts can be found in the *Appendix - Complete list of test cases*. The following table summarize which test cases that belong to each project partner and which requirements that will be tested.

Partner	ID:s of test cases	Mapped requirements
Trimble	P1-01 to P2-09	F1, F2, F10, F21, F22, F32, F33, F39, F43, F55,1, F55,2, F68, F70, F72
Symetri	P6-01/P4-01 to P6-04/P2-04	F24, F54, IF24
AEC	P3-01 to P3-11	To be mapped
TCG	P4-01 to P4-19	F1, F2, F3, F20, F22, F23, F26, F28, F32, F33, F39, F43, F44, F45, F46, F47, F49, F50, F53, F55, F58, F62, F68, F72, F73, F74, F76, F78, F79, F83, F84, F85, F86, F88, F89, F90, F91, F92, F94, F95, F96, IF1, IF8, IF9, IF10, IF11, IF16, IF18, IF20, IF32, IF33, IF35 F25
Sweco Position (Safe Software)	P5-01 to P5-02	F18, F19, IF21
Åkej	P6-01/P4-01 to P6-04/P2-04	F24, F54, IF24
Svensk Byggtjänst	P0-01 to P0-03	F1, F2 F12, F98, F99, IF37

3.5 Test cases and lifecycle

The table below gives an overview on how the test cases map to the different stages in the lifecycle of built assets.

Life cycle stage	Trimble	Symetri	AEC	TCG	Sweco	Åkej	Sv. Byggtj.
Planning	x	x		x	x	x	x
Design	x	x	x	x	x	x	
Construction	x	x		x		x	
Maintenance	x	x		x		x	
Operations	x	x		x		x	
Demolition		x		x		x	

3.6 Gap analysis

The scenarios and test cases from each project part are chosen by respective project part to match their existing and/or prospective customer needs. The goal hasn't been to coordinate these scenarios. Symetri and Åkej has chosen to work together and therefor will aim to cover all the different stages in the lifecycle of built assets.

Almost all project parts will cover parts of the design stage in the lifecycle of built assets. The requirements of CoClass demands in the design stage are strongly controlled of the CoClass implementation at the client organization. Further studies of CoClass scenarios and IT test cases at the client organization may need to be conducted.

Further studies need to be conducted for testing how different versions of CoClass codes shall be handled.

4 Normative references

- (2019). *IEC FDIS 81346-2:2019 Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 2: Classification of objects and codes for classes*. IEC.
- (2009). *IEC-EN 81346-1:2009 Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 1: Basic rules*. IEC.
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- (2018). *ISO 81346-12:2018 Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 12: Construction works and building services*.
- Project Industry practices for application of CoClass in software. (2019). *L1 - Slutrapport behovsanalys*.



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