
**Draft Project plan for the CEN
Workshop on "Geometric
framework, coordinate systems
and markers for BIM
construction projects
(Coordinate Systems at BIM)"**

**Requests to participate in the Workshop
and/or comments on the project plan are
to be submitted by
2023-02-16 to
christian.grunewald@din.de**

Recipients of this project plan are kindly requested to name all patent rights known to them to be relevant to the Workshop and to make available all supporting documents.

Berlin, 2023-01-16

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Summary

The aim of the planned CEN Workshop is to provide a standardised set of consistent guidelines for handling coordinate systems, official fixpoints, surveying points and markers used in construction projects and on site for BIM construction projects.

Digitalization and the Building Information Modelling - methodology (BIM) is spreading widely in the construction industry and will soon be the standard procedure for carrying out any kind of work related to construction. All data during the lifetime of a building will be generated, processed and handled digital and three-dimensional – also by the workers on site. Providing clear and practicable rules for the general geometric framework will make sure, that measurements and all other data from the different stakeholders in a construction project (in the office and on site) are easy integratable and consistent in the BIM platform.

The planned Workshop will create a CEN Workshop agreement (CWA), which provides guidelines for handling coordinate systems, official fixpoints, surveying points and markers used in construction projects and on site for BIM construction projects. Furthermore, the CWA will define a framework to enable an automated use of different coordinate systems and an automated calibration using physical markers. This includes a naming convention of different coordinate systems, common components of coordinate systems, marker and crosshair types, a naming convention for markers and a common digital interface for the read-out-data of markers.

The document will build on existing standards and conventions and will collate them where possible.

The resulting CWA will be a valuable tool for BIM stakeholders, as construction companies, software providers for BIM visualization, planner engineers (architects, civil engineers, ...), Geo-data capturers, surveyors, UXV operators, software providers dealing with BIM, GIS, and "on site superlocal" machines/devices/systems such as drones.

1 Status of the project plan

Draft project plan for public commenting (Version 1.0)

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan. Please send any requests to participate or comments by e-mail to christian.grunewald@din.de.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on 2023-02-22.

Approved project plan for CWA development adopted at the kick-off meeting of the Workshop on 2023-02-22.

2 Workshop proposer and Workshop participants

2.1 Workshop proposer

Person or organisation	Short description and interest in the subject																
<p>Name: Prof. Dr. Ruprecht Altenburger</p> <p>Organization: ZHAW School of Engineering</p> <p>Postal address: Technikumstrasse 9, 8400 Winterthur, Switzerland</p> <p>Email: ruprecht.altenburger@zhaw.ch</p> <p>Phone: +41 (0) 58 934 77 83</p> <p>Webpage: https://www.zhaw.ch/de/engineering/institute-zentren/ims/</p>	<p>Prof. Dr. Ruprecht Altenburger is professor for control engineering at ZHAW.</p> <p>His expertise and research interests are:</p> <ul style="list-style-type: none"> - Research and development of mechatronic systems - Simulation of mechatronic systems - UAV navigation and implementation on embedded systems - Coupled simulation of finite element models with control <p>CV</p> <table border="1"> <tbody> <tr> <td>88-93</td> <td>apprenticeship and employment as mechanic at SIG/Switzerland</td> </tr> <tr> <td>94-95</td> <td>Secondary school with German Abitur in Freiburg/Brsg.</td> </tr> <tr> <td>95-01</td> <td>Physics studies in Freiburg/Germany and Glasgow/Scotland</td> </tr> <tr> <td>01-04</td> <td>project engineer in Stuttgart/Germany, PhD (Dr.-Ing.) at Stuttgart Uni</td> </tr> <tr> <td>04-07</td> <td>Project engineer at startup PKSystems in Stuttgart</td> </tr> <tr> <td>07...</td> <td>lecturer and R&D – engineer at the School of Engineering at ZHAW in Winterthur/Switzerland: control theory, mechatronic systems, mechanics,</td> </tr> <tr> <td>12</td> <td>Professor for Control Engineering ZHAW</td> </tr> <tr> <td>12...</td> <td>team leader of the Control Engineering group at the Mechatronics Institute IMS at ZHAW</td> </tr> </tbody> </table>	88-93	apprenticeship and employment as mechanic at SIG/Switzerland	94-95	Secondary school with German Abitur in Freiburg/Brsg.	95-01	Physics studies in Freiburg/Germany and Glasgow/Scotland	01-04	project engineer in Stuttgart/Germany, PhD (Dr.-Ing.) at Stuttgart Uni	04-07	Project engineer at startup PKSystems in Stuttgart	07...	lecturer and R&D – engineer at the School of Engineering at ZHAW in Winterthur/Switzerland: control theory, mechatronic systems, mechanics,	12	Professor for Control Engineering ZHAW	12...	team leader of the Control Engineering group at the Mechatronics Institute IMS at ZHAW
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2.2 Other potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that: (e. g. Research Institutes for..., Industry and commerce, academic and research, Standards developers and applicants...)

- Science and research (geolocation, IT interfaces)
- Economy (Application, geolocation)
- SME (Small and Medium sized enterprises)

will take part in the development of this CWA.

2.3 Participants at the kick-off meeting

The following persons or organisations already signed up to the kick-off meeting prior to the publication of the draft project plan.

Person	Organisation
Ruprecht Altenburger	Zurich University of Applied Sciences (ZHAW)
Gabor Sziebig	SINTEF Manufacturing (SINTEF)
Antonio Lopez-Rios	HRS Real Estate AG (HRS)
Manuel Menéndez	Vías y Construcciones, S.A (VIAS)
Miquel Cantero	Robotnik Automation S.L.L. (ROBI)

Kaj Helin	VTT Technical Research Centre of Finland Ltd (VTT)
Matthias Aust	Fraunhofer Gesellschaft IAO (FhG-IAO) Universität Stuttgart (USTUTT)
Dag Fjeld Edvardsen	Catenda AS (CATENDA)
Carmen Serna	AUSTRALO INTERINNOV MARKETING LAB S.L. (AUS)
Øyvind Kjøllesdal	AFGruppen AS (AFG)
Christian Grunewald	Deutsches Institut für Normung e.V. (DIN)

2.4 Registered Workshop participants

The following persons or organisations have registered as Workshop participants at the kick-off meeting and will actively participate in the development of the CWA.

Person	Organisation

3 Workshop objectives and scope

3.1 Background

The aim is to provide a standardised set of consistent guidelines for handling coordinate systems, official fixpoints, surveying points and markers used in construction projects and on site for BIM construction projects.

Digitalization and the Building Information Modelling - methodology (BIM) is spreading widely in the construction industry and will soon be the standard procedure for carrying out any kind of work related to construction. All data during the lifetime of a building will be generated, processed and handled digital and three-dimensional – also by the workers on site. Providing clear and practicable rules for the general geometric framework will make sure, that measurements and all other data from the different stakeholders in a construction project (in the office and on site) are easy integratable and consistent in the BIM platform.

The CWA therefore has to address the different components of the geometric frame of any construction project:

Coordinate systems

On a digitized construction site there are many coordinate systems (CS) in addition to the analogue building grid lines. To name some: the CS in the shared BIM model, different official global CSs, GPS CS, surveyors CS, CS per floor, CS of building machines and (autonomous) measurement machines like robots and drones. Clear definitions of generally applicable rules regarding CS setup, transforms between CS, CS handling on machines while measuring and working and name conventions are required. As all data finally have to be shared on a BIM platform, this would speed up work and reduce errors. A standard would also allow for a better data transfer between different projects.

Official fixpoints by surveying authorities

The officially maintained fixpoints are in the moment analogue and of various types and shapes. As they are legally binding and used for localisation of all parts of a BIM construction the project authorities are presumed to have an interest to further develop them and provide digitally readable marker data.

Surveying points of site surveyors

On site a large number of surveying points (i.e. 50 crosshairs per floor) are marked, named and measured but currently this information is exclusive to the surveyor. This CWA-standardisation should allow these points to be

named by a convention, uniquely identified and their position accessed by any accredited party. (i.e. by associating surveying points to a QR-code that provides read-out-data). Thus other accredited companies would directly work in the set geometric framework and provide their measurements relative to the correct frame or use the correct frame to carry out their work.

Markers for surveying, building machines, measurement machines, autonomous vehicles etc.

A great variety of markers is used depending on the provider (such as official surveying departments, surveying machinery producers, robotic standards like Chilitags or Apriltags etc.). Pre-BIM the use of different markers for different tasks was acceptable but now BIM requires the co-operation of all stakeholders in a single geometric frame and on a single platform. Hence the logical way of enforcing integrability is to provide all accredited parties with identical geometric data stored in the same marker types.

The main challenges for this CWA are therefore:

- naming convention of CS
- agreement on standardised components of CSs (number of DOFs, z-direction, CS origin, units etc.)
- agreement on marker and crosshair types
- naming convention for markers
- standardised read-out-data of markers

A CWA will benefit everyone involved in BIM construction projects:

- planners (architects, building authorities, civil engineers, ...)
- construction companies and contractors
- BIM software providers (BIM platforms, visualization)
- "Geo-data captures", surveyors, UXV operators (xyz-Data, laserscanning data, photogrammetric data, infrared data etc.)
- visualisation and analysis providers (progress and cost control, Virtual and Augmented Reality)
- (autonomous) building machines

3.2 Scope

The planned Workshop will create a CEN Workshop agreement.

The planned CWA provides guidelines for handling coordinate systems, official fixpoints, surveying points and markers used in construction projects and on site for BIM construction projects.

The planned CWA defines a framework to enable an automated use of different coordinate systems and an automated calibration using physical markers. This includes a naming convention of different coordinate systems, common components of coordinate systems, marker and crosshair types, a naming convention for markers and a common digital interface for the read-out-data of markers.

The planned CWA will build on existing standards and conventions and will collate them where possible.

The planned CWA is intended to be used by BIM stakeholders, as construction companies, software providers for BIM visualization, planner engineers (architects, civil engineers, ...), Geo-data capturers, surveyors, UXV operators, software providers dealing with BIM, GIS, and "on site superlocal" machines/devices/systems such as drones.

3.3 Related activities

The subject of the planned CWA is not at present the subject of a standard. However, there are committees, standards and/or other technical specifications that deal with related subjects and thus need to be taken into account - and involved, where necessary - during this Workshop:

- ISO/TC 59/SC 13 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)
- CEN/TC 442 Building Information Modelling (BIM)
- CEN/TC 287 Geographic information
- ISO/TC 211 Geographic information/Geomatics
- ISO/TC 20/SC 16 Unmanned Aircraft Systems
- CEN/TC 471 Unmanned Aircraft Systems
- ISO/TR 23262:2021 GIS (geospatial) / BIM interoperability
- ISO 19111 Geographic information - Referencing by coordinates

- EN ISO 6709 Standard representation of geographic point location by coordinates
- ISO/TS 19166:2021 Geographic information - BIM to GIS conceptual mapping (B2GM)
- User Guide for Geo-referencing in IFC
- BuildingSMART

4 Workshop programme

4.1 General

The kick-off meeting is planned to take place on Thu 2023-02-23 from 9:00 to 12:30 virtually. A draft for public commenting will be published for 30 days.

A total of 5 Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held, during which the content of the CWA(s) will be presented, discussed and approved.

The CWA will be drawn up in English (language of meetings, minutes, etc.). The CWA will be written in English.

4.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	M01 Nov 22	M02 Dec 22	M03 Jan 23	M04 Feb 23	M05 Mar 23	M06 Apr 23	M07 May 23	M08 Jun 23	M09 Jul 23	M10 Aug 23	M11 Sep 23
Initiation											
1. Proposal form submission and TC											
2. Project plan development											
3. Open commenting period on draft project plan (mandatory)											
Operation											
4. Kick-off meeting											
5. CWA(s) development											
6. Open commenting period on draft CWA(s) (optional)											
7. CWA(s) finalised and approved by Workshop participants											
Publication											
8. CWA(s) publication											
Dissemination (see 7)											
Milestones											
				K	V	V	V		V/A		P D

- B** CEN/CENELEC BT meeting deciding on establishment of a CEN/CENELEC Workshop
- K** Kick-off
- M** Workshop meeting
- V** Virtual Workshop meeting
- A** Adoption of CWA
- P** Publication of CWA
- D** Online distribution of CWA

5 Resource planning

The CEN Workshop is financed by the European research project BIMprove (Improving Building Information Modelling by Realtime Tracing of Construction Processes). This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958450.

All costs related to the participation of interested parties in the Workshop's activities have to be borne by themselves. The copyright of the final CEN Workshop Agreement will be at CEN. The final document will include the following paragraph: "Results incorporated in this CEN Workshop Agreement received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement number 958450 (BIMprove)".

6 Workshop structure and rules of cooperation

6.1 Participation in the Workshop

The Workshop will be constituted during the course of the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

- a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
- b. the expansion would not result in the Workshop taking longer to complete;
- c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
- d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
- e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
- f. the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who voted for the publication of the CWA or its draft will be named as authors in the European Foreword, including the organisations which they represent. All Workshop participants who voted against the publication of the CWA, or who have abstained, will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and any decision-making and voting procedures. The Workshop Chair is supported by the Workshop Vice-Chair and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, decides when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN/CENELEC national member, is responsible for organising and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web

conferences shall be organised by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

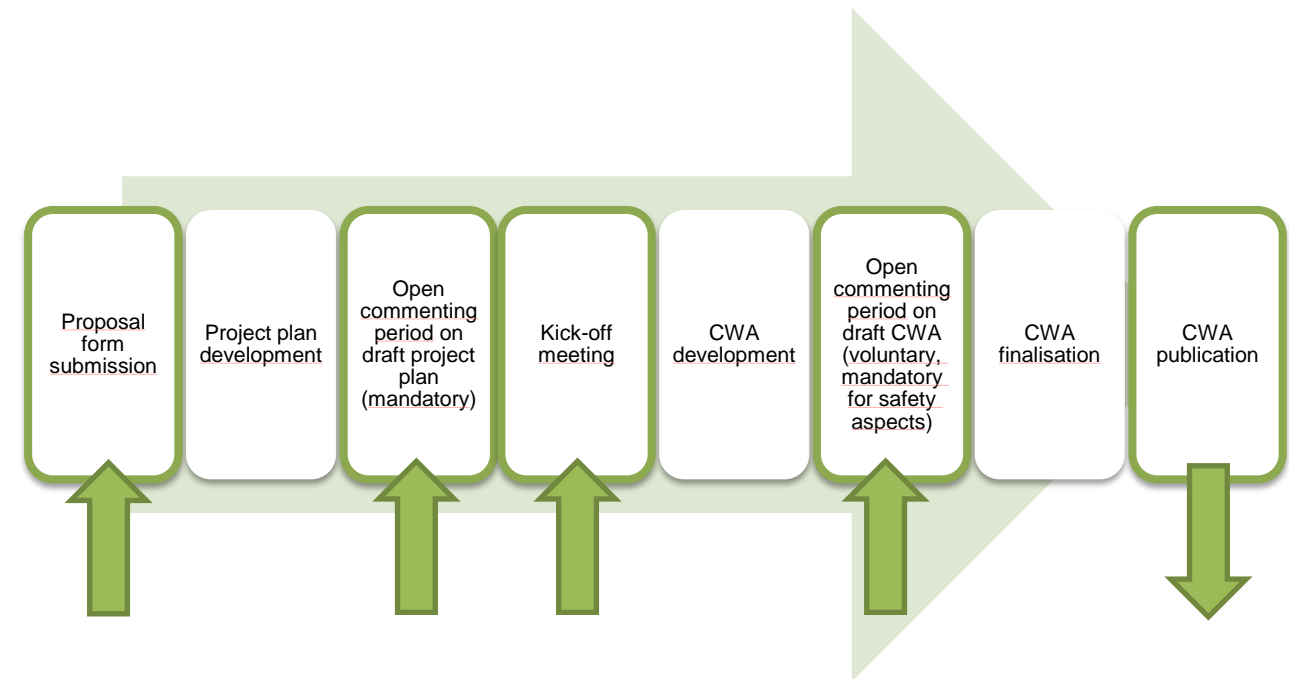
- Administrative and organisational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organisations and individuals
- Offers infrastructure and manage documents and their distribution through an electronic platform
- Prepares agenda and distribute information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manage CWA approval process upon decision by the Workshop Chair
- Interface with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and bring any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

6.3 Decision making process

Each Workshop participant is entitled to vote and has one vote. If an organisation sends several experts to the Workshop, that organisation has only one vote, regardless of how many Workshop participants it sends. Transferring voting rights to other Workshop participants is not permitted. During voting procedures, decisions are passed by simple majority; abstentions do not count.

If Workshop participants cannot be present in the meetings when the CWA or its draft is adopted, an alternative means of including them in the voting procedure shall be used.

7 Dissemination and participation strategy



Proposal form submission

The Workshop proposal will be disseminated to the following relevant stakeholders and bodies for consultation:

- standards committee, working group etc.
- European sister projects
- others

Open commenting period on draft project plan

The project plan will be disseminated to the following relevant stakeholders and bodies for commenting:

- standards committee, working group etc.
- European sister projects
- others

In addition to the CCMC website, the project plan and the date of the kick-off meeting will be advertised on the BIMprove website to raise awareness. Interested parties are requested to contribute either through commenting of the project plan (short term) or through Workshop participation (long term).

Open commenting period on draft CWA

The draft CWA will be disseminated to the following relevant stakeholders and bodies for commenting:

- ISO and CEN standards committees, working group etc.
- European sister projects
- identified stakeholders
- others

In addition to the CCMC website, the draft CWA will be advertised on the BIMprove website to raise awareness. Interested parties are requested to contribute through commenting of the draft CWA (short term).

CWA publication

The final CWA will be disseminated to the following relevant stakeholders and bodies:

- ISO and CEN standards committees, working group etc.
- European sister projects
- identified stakeholders
- others

In addition to the CCMC website, the final CWA will be advertised on:

- sector specific newsletter
- social media, such as
 - LinkedIn
 - Twitter
- EC Newsroom
- others

8 Contacts

- Workshop Secretariat:

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