

# ISO/TC 184/SC 4 Industrial Data Quality Committee

# Be Curious!

Zaintrygowany  
好奇心旺盛な  
Занимлив کنجگار  
Koutsoμπόλης  
Merakli • Nyfiken  
فضولي  
Curioso  
Interesado  
Kiváncsi  
Utežben  
Zvědavý  
Idomus  
Merak eden  
Curieux  
Neugierig  
Interessert  
Nieuwsgierig

# Take it easy



ISO/TC 184/SC 4/QC & WG12 STEP Dev onboarding session,  
NAGASAKI, October 2025

Winner  
2007 & 2021  
Lawrence D. Eicher Leadership Award



# Learning Objectives

- Dive in the new wg12-step repository and understand the structure
- How-to make editorial updates
- How-to make update to EXPRESS, Descriptions
- Install SUMA



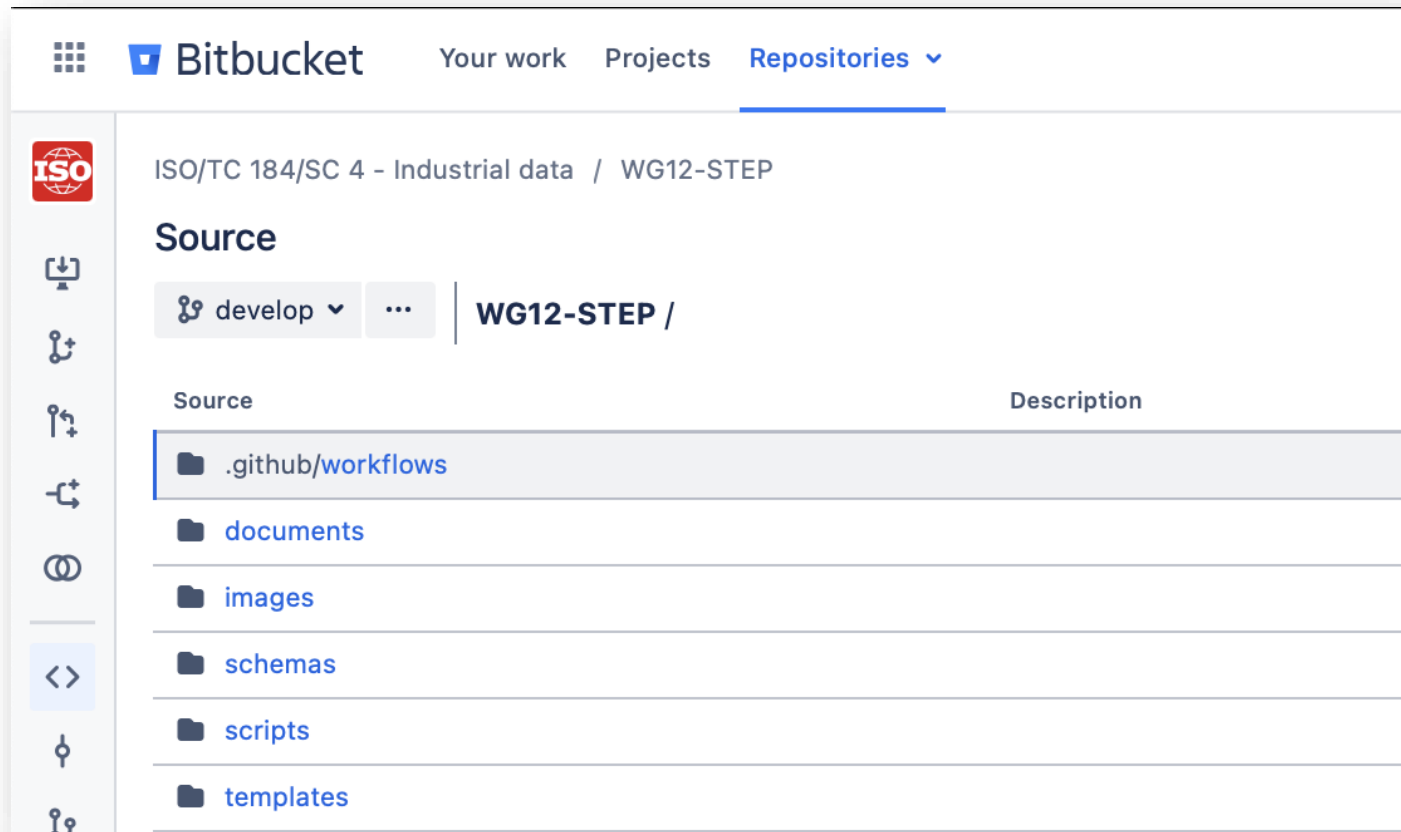
# Training material

<https://committee.iso.org/sites/tc184sc4/home/quality-committee.html>

- Git wg12-step repository  
<https://sd.iso.org/bitbucket-pilot/projects/ISOTC184SC4/repos/wg12-step/browse>
- Git STEP development training  
<https://sd.iso.org/bitbucket-pilot/projects/ISOTC184SC4/repos/wg12-step/browse>  
An instantiation has been set up at  
[https://stepdev.boost-lab.net/step\\_development\\_training/index.html](https://stepdev.boost-lab.net/step_development_training/index.html)

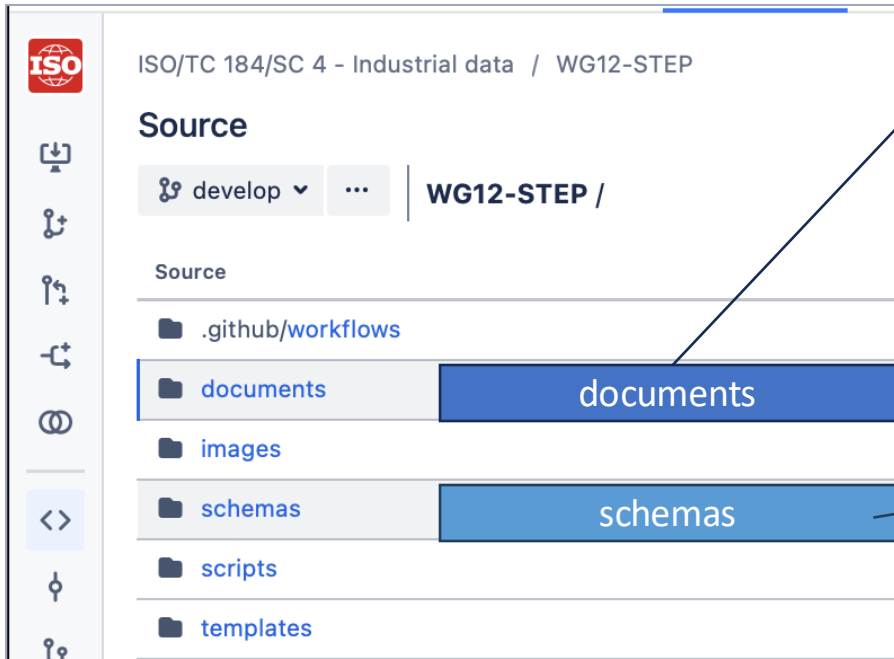
- Next online sessions schedule on ISO/TC 184/SC 4 website  
<https://committee.iso.org/sites/tc184sc4/home/forums/quality-forum/step-development-training.html>

- <https://sd.iso.org/bitbucket-pilot/projects/ISOTC184SC4/repos/wg12-step/browse>



# Structure

Dive in



**documents**

This folder is composed of one folder for each documents and inside it contains images and sections folders, as well as other files.

**schemas**

This folder is composed of modules and resources folders. Inside it contains a folder for each document that contains the EXPRESS schema(s), as well as the EXPRESS-G graphics and the .yaml file containing the source for the Change history Annex.

Editorial work

AsciiDoc  
AsciiMath  
Yaml

Technical work

AsciiDoc  
AsciiMath  
Annotated EXPRESS  
Yaml

# Folder 'documents'

ISO/TC 184/SC 4 - Industrial data / WG12-STEP

Source

develop | WG12-STEP / documents / iso-10303-62 /

Source	Description
..	
images	
sections	
collection.yml	
cover.html	fix: provide cover.html for every document, fixes #381
document.adoc	
schemas.yml	chore: restore schemas.yml

**images**

This folder contains Figure's graphics.

**sections**

This folder contains the source for editorial content (Foreword, Introduction, Scope .....Bibliography)

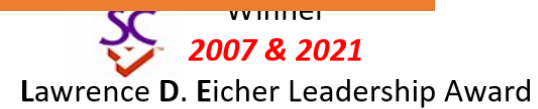
**document.adoc**

It contains the metadata and list what should be included in the document.

changes.yml
changes_paths.yml
collection.yml
cover.html
document.adoc
express-g-diagrams-arm.yml
express-g-diagrams-mim.yml
mapping.yml
schemas.yml

**module**

Please note that the content differs for a module. It also contains the change annex source file, EXPRESS-G and mapping specification.



# Folder 'sections'

Dive in

ISO/TC 184/SC 4 - Industrial data / WG12-STEP

Source

develop | WG12-STEP / docum

Source

- ..
- 00-foreword.adoc
- 00-introduction.adoc
- 01-scope.adoc
- 02-norm-refs.adoc
- 03-terms.adoc
- 95-tech-discussion.adoc
- 99-bibliography.adoc

sections

- 00-foreword.adoc
- 00-introduction.adoc
- 01-scope.adoc
- 02-norm-refs.adoc
- 03-terms.adoc
- 95-tech-discussion.adoc
- 99-bibliography.adoc

iso-10303-101

iso-10303-104

iso-10303-105

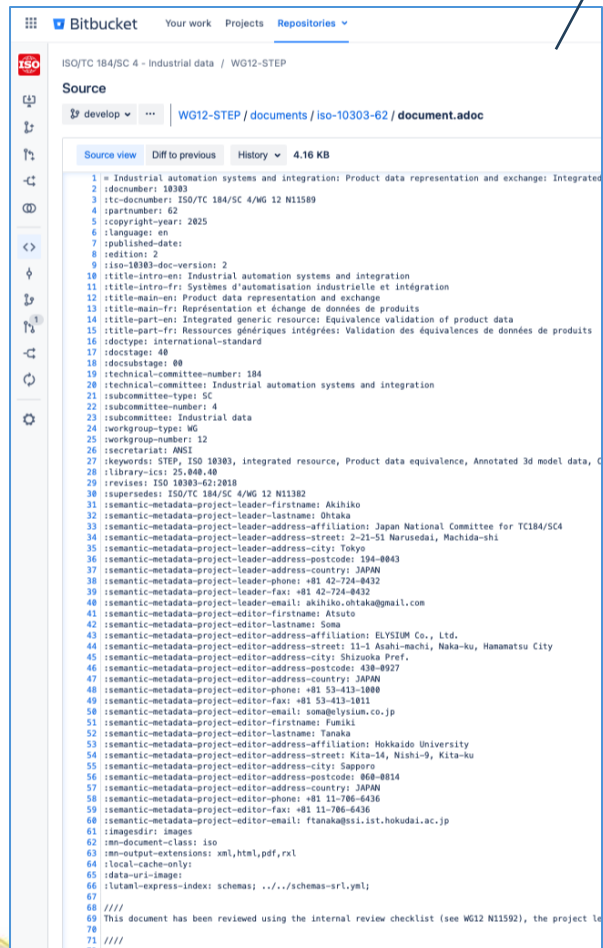
iso-10303-107

iso-10303-108

10 Before going into the details of equivalence validation, it is appropriate to discuss w  
11  
12 Comparison for the purpose of equivalence validation is conducted between two different  
13  
14 Each criterion for equivalence validation may include a corresponding inspection require  
15  
16 Inspection algorithms are outside the scope of this document since it is understood tha  
17  
18 For the assessment of equivalence validation by numerical test, thresholds play a key r  
19  
20 [example]  
21 =====  
22 An example of a typical threshold is a distance threshold for validating the maximum dev  
23  
24



# document.adoc, the starting point



metadata

Files to include

```

72
73 include::sections/00-foreword.adoc[]
74
75 include::sections/00-introduction.adoc[]
76
77 include::sections/01-scope.adoc[]
78
79 include::sections/02-norm-refs.adoc[]
80
81 include::sections/03-terms.adoc[]
82
83 include:../../templates/resources/schemas.adoc[]
84
85 include:../../templates/resources/resource_annex_short_names.adoc[]
86
87 include:../../templates/resources/resource_annex_identifiers.adoc[]
88
89 include:../../templates/resources/resource_annex_listings.adoc[]
90
91 include:../../templates/resources/resource_annex_diagrams.adoc[]
92
93 include::sections/95-tech-discussion.adoc[]
94
95 include::sections/99-bibliography.adoc[]

```



# Folder 'schemas'

The screenshot shows a Bitbucket repository for ISO/TC 184/SC 4 - Industrial data / WG12-STEP. The 'Source' view displays a list of files with their change descriptions. Three callout boxes are present:

- Change history**: A blue box pointing to the 'Description' column of the file list.
- EXPRESS file**: A blue box containing the text "The EXPRESS file contains the EXPRESS schema as well as the descriptions and the EXPRESS-G maps." It points to the file `product_data_equivalence_definition_schema.exp`.
- EXPRESS-G svg files**: A green box pointing to the three `product_data_equivalence_definition_schemaexp*.svg` files.

Source	Description
..	
<code>product_data_equivalence_definition_schema.changes.yaml</code>	chore: update acc
<code>product_data_equivalence_definition_schema.exp</code>	Establish an anchor convention for the EX
<code>product_data_equivalence_definition_schemaexpg1.svg</code>	chore: update as per new directory structu
<code>product_data_equivalence_definition_schemaexpg2.svg</code>	chore: update as per new directory structu
<code>product_data_equivalence_definition_schemaexpg3.svg</code>	chore: update acc

# Discovering Annotated EXPRESS

Dive in

The first part of the .exp file remains the schema

```
1  (*
2  ISO 10303 TC184/SC4/WG12 N11626
3
4  EXPRESS Source:
5  ISO 10303-62 ed1 Equivalence validation of product data - Annotated 3D
6
7  The following permission notice and disclaimer shall be included in all
8  and derivations of the Schema:
9
10 Copyright ISO 2014 All rights reserved
11 Permission is hereby granted, free of charge in perpetuity, to any person
12 to use, copy, modify, merge and distribute free of charge, copies of the
13 implementing, installing and using software based on the Schema, and to
14 subject to the following conditions:
15
16 THE SCHEMA IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS
17 INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS
18 IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY
19 DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR
20 ARISING FROM, OUT OF OR IN CONNECTION WITH THE SCHEMA OR THE
21 USE OR OTHER DEALINGS IN THE SCHEMA.
22
23 In addition, any modified copy of the Schema shall include the following:
24
25 THIS SCHEMA HAS BEEN MODIFIED FROM THE SCHEMA DEFINED IN
26 ISO 10303-62 ed1 Equivalence validation of product data - Annotated model
27 AND SHOULD NOT BE INTERPRETED AS COMPLYING WITH THAT STANDARD
28 *)
29
30 SCHEMA annotated_3d_model_equivalence_inspection_result_schema '{iso
31
32 REFERENCE FROM annotated_3d_model_equivalence_criteria_schema
33 (representative_value_type);
34
35 REFERENCE FROM product_data_equivalence_inspection_result_schema
36 (criterion_report_item_with_number_of_instances,
37 criterion_report_item_with_value,
38 data_equivalence_inspection_result,
39 data_equivalence_inspection_result_representation,
40 data_equivalence_inspection_criterion_report_item,
41 data_equivalence_inspection_instance_report_item);
42
```

The second part of the .exp file is the equivalent of the descriptions.xml file.

It also contains the EXPRESS-G maps.

```
END_SCHEMA; -- annotated_3d_model_equivalence_inspection_result_schema

(*"annotated_3d_model_equivalence_inspection_result_schema.__published_in"
ISO 10303-62:2025 ED2
*)

(*"annotated_3d_model_equivalence_inspection_result_schema.__identifier"
ISO/TC 184/SC 4/WG 12 N11626
*)

(*"annotated_3d_model_equivalence_inspection_result_schema.__status"
DIS
*)

(*"annotated_3d_model_equivalence_inspection_result_schema.__title"
equivalence_validation_of_product_data
*)

(*"annotated_3d_model_equivalence_inspection_result_schema"
// Note schema EXPRESS are in ..\resources\resource_name name_of_schema.xml
*)
(*"annotated_3d_model_equivalence_inspection_result_schema.__fund_cons"
*)

This schema provides a representation of the inspection results of annotated 3D
models.

As this schema deals with the inspection result of the equivalence of annotated
3D models, it is intended to be used in conjunction with the schema
annotated_3d_model_equivalence_criteria_schema.

[NOTE]
Geometric data newly created for representing inspection results, such as point
clouds, are not included in this schema.
```

```
// EXPRESS-G

*)
(*"annotated_3d_model_equivalence_inspection_result_schema"
[[annotated_3d_model_equivalence_inspection_result_schema
[.svgmap]
=====
image::annotated_3d_model_equivalence_inspection_result_schema

*)
*) <<express:annotated_3d_model_equivalence_inspection_result_schema
*) <<express:annotated_3d_model_equivalence_inspection_result_schema
*) <<express:shape_data_quality_criteria_schema
*) <<express:product_data_equivalence_inspection_result_schema
=====

*)
(*"annotated_3d_model_equivalence_inspection_result_schema"
[[annotated_3d_model_equivalence_inspection_result_schema
[.svgmap]
=====
image::annotated_3d_model_equivalence_inspection_result_schema

*)
*) <<express:annotated_3d_model_equivalence_inspection_result_schema
*) <<annotated_3d_model_equivalence_inspection_result_schema
*) <<express:product_data_equivalence_inspection_result_schema
```



AsciiDoc

- Section 'Learn' of STEP Development training website

Annotated  
EXPRESS

- Section 'Learn' of STEP Development training website, SUMA validation function and easyEXPRESS extension for Visual Studio Code

We'll review  
SUMA validate  
functions after  
SUMA  
installation

AsciiMath

- Section 'Learn' of STEP Development training website and Plurimath.org

Yaml

- Section 'Learn' of STEP Development training website and Yaml extension for Visual Studio Code

## 6 Working with Metanorma AsciiDoc .....

### 6.1 What part of the document does this apply to? .....

Table of Contents ▾

### 6.2 AsciiDoc and 10303 common markups .....

### 6.3 Figures .....

- 6.3.1 General .....
- 6.3.2 Adding a Figure without key .....
- 6.3.3 Adding a Figure with a key .....
- 6.3.4 Adding a Figure with a map .....

#### 6.2 AsciiDoc and 10303 common markups

markup	meaning	example
.	Title of that block	.Foreword
Blank line	End a paragraph or other block.	
include::	Include markup	include::../././templates/foreword_part_1.adoc[]
Image::	Image markup	image::schema_diagexp1.svg[]
[]	alt text	image::schema_diagexp1.svg[relationship]
<<>>	link	<<annex_change_history>>
[]	anchor	[[introduction]]
== text	Heading 1	== Introduction
=== text	Heading 2	=== General
[example]	Example	[example]
====	Delimiter (except for [NOTE])	==== An example .....
[NOTE]	Note	
--	Delimiter for [NOTE]	
*	list	* measure_schema is found in ISO 10303-41;
**	bold	**product_data_equivalence_definition schema:**
_	italic	_Quantities and units_
[.svgmap]	Define the map of the SVG	
[bibliography]	Style attribute	For Bibliography and [bibliography]
[[[]]]	bibliography entry	[[[ref10303-1,ISO 10303-1]]]
[heading="Terms and definitions"]		[heading="Terms and definitions"]
[source=bibitem_010303000002]		[source=bibitem_010303000002]
URL:: uniform resource locator	abbreviations	https://www.metanorma.org/guide/terms-definitions
footnoteblock:[my-anchor]	footnote	... footnoteblock ... [[[my-anchor]]] [NOTE] -- Multi-paragraph --
//	Comment line	//include:: .././template resource annex
////	Comment block (end with ////)	//// This document internal review WG12 N11592), (see WG12 N11592 checklist (see determined to ////



Welcome

Learn

- Learning Annotated EXPRESS
- Learning Metanorma
- Learning AsciiDoc
- Learning AsciiMath/ Plurimath.org



# Working with Annotated EXPRESS

How-To

<b>7</b>	<b>Working with Annotated EXPRESS .....</b>	<b>14</b>
<b>7.1</b>	<b>What part of the document does this apply to? .....</b>	<b>14</b>
<b>7.2</b>	<b>Annotated EXPRESS common markups .....</b>	<b>14</b>

markup	meaning	example
(**{SCHEMA_TAG} "\$value")		(**"action_schema" The subject of the "action_schema" these actions, and the status of these actions.  [example] ==== Reasons for action include evolving user requirements, manufacturing problems and difficulties that arise when a product is in use. ==== *)
in"\$value")	schema edition	(**"action_schema.__published_in" ISO 10303-41:2025 EDB *)
r"\$value")	Schema N number	(**"action_schema.__identifier" ISO/TC 184/SC 4/WG 12 N10693 *)
="\$value")	Schema Supersedes	(**"action_schema.__supersedes" ISO/TC 184/SC 4/WG 12 N10230 *)
(- {SCHEMA_TAG} .__status "\$value")	schema status	(**"action_schema.__status" IS *)
(**{SCHEMA_TAG} .__title "\$value")	schema folder name	(**"action_schema.__title" fundamentals_of_product_description_and_support *)
(**{SCHEMA_TAG} .__fund_cons "\$value")	Schema Fundamental concepts and assumptions	(**"action_schema.__fund_cons"  Action information can be attached to any aspect of product data. *)
(**{SCHEMA_TAG} .__expressg "\$value")	Schema EXPRESS-G diagrams. Enter a many as needed. See Adding a Figure without key	(**"action_schema.__expressg" [[action_schema_expg1]] [.svgmap] ==== image::action_schema_expg1.svg[]  * <<express:basic_attribute_schema>>; 1 * <<express:action_schema>>; 2 * <<express:support_resource_schema>>; 3 ==== *)
	Entity description	(**"action_schema.supported_item" The **supported_item** allows for the designation of an <<express:action_schema.action_directive,action_directive>>, an <<express:action_schema.action,action>>, or an <<express:action_schema.action_method,action_method>>. *)
\$value")	attribute description	(**"action_schema.action.name" the <<express:support_resource_schema.label,label>> by which the **action** is known. *)
ve")	WR description	(**"action_schema.action_request_solution.wr:WR2" Each **action_request_solution** shall be the <<express:basic_attribute_schema.name_attribute.named_item,named_item>> in at most one <<express:basic_attribute_schema.name_attribute,name_attribute>>. *)
(**{SCHEMA_TAG} .entity__note "\$value")	Note in the entity description	(**"action_schema.supported_item.__note" This specifies the use of an <<express:action_schema.action_resource,action_resource>>. *)
<<express:schemaName.entity,render text>>	Link with item to display	<<express:action_schema.action_directive,action_directive>>
//	Comment	// Note schema EXPRESS are in ..resources/resource_name name_of_schema.xml

Focus on next slide

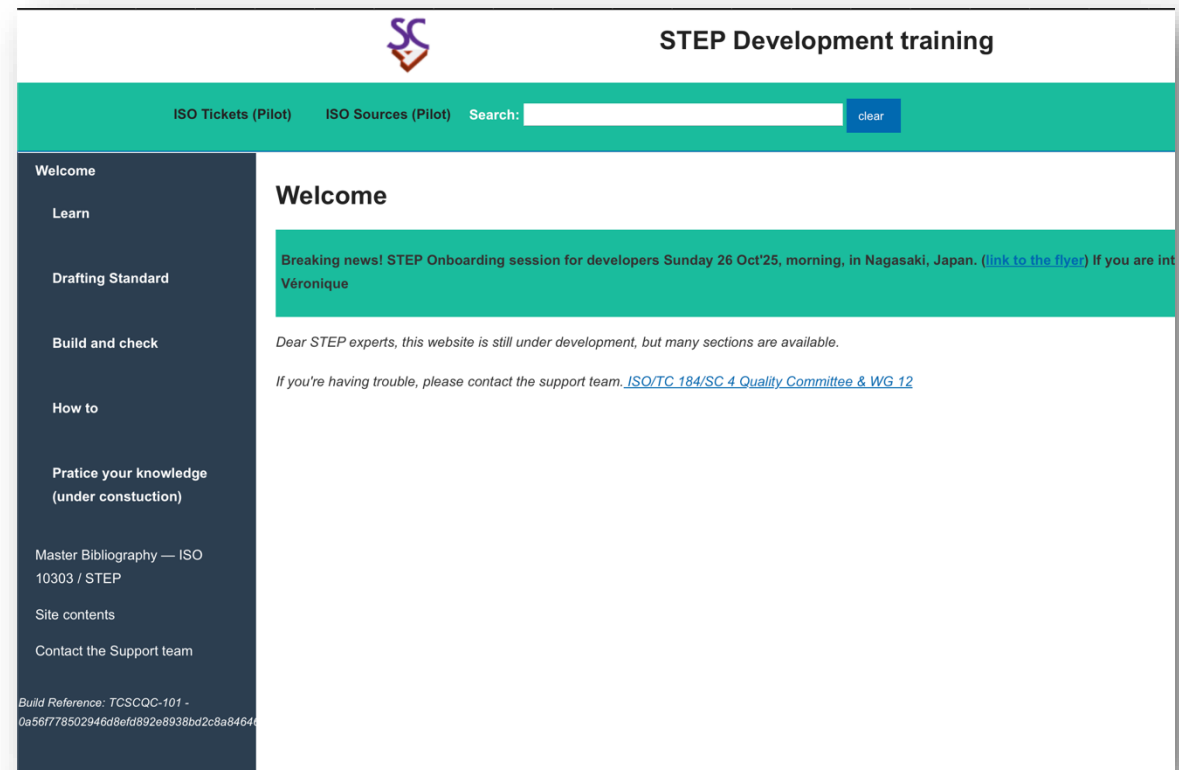
Welcome  
  
Learn  
  
Learning Annotated  
EXPRESS



# Focus on STEP Development training website

[https://sd.iso.org/bitbucket-pilot/projects/ISOTC184SC4/repos/step\\_development\\_training/browse](https://sd.iso.org/bitbucket-pilot/projects/ISOTC184SC4/repos/step_development_training/browse)

[https://stepdev.boost-lab.net/step\\_development\\_training/](https://stepdev.boost-lab.net/step_development_training/)



Using easyEXPRESS extension in Visual Studio Code

Using Yaml extension in Visual Studio Code

Relaton queries

Avoid adding comments in the metadata section of document.adoc

SUMA validation

Needs SUMA installed. See next slide

# Installing SUMA

Install SUMA

- Running SUMA .....
- General .....
- ISO 10303 development on Windows .....**
  - 4.2.1 Prerequisites .....
  - 4.2.2 Installation .....
  - 4.2.3 Building .....
- 4.3 ISO 10303 Development on Linux .....**
  - 4.3.1 Prerequisites .....
  - 4.3.2 Installation .....4
  - 4.3.3 Building.....4
- 4.4 ISO 10303 Development on MAC OS .....5**
  - 4.4.1 Prerequisites .....5
  - 4.4.2 Installation .....5
  - 4.4.3 Building.....5
- ISO 10303 Development on Docker.....5**
  - Prerequisites .....
  - Installation methods .....
- Development Virtual machine .....



# Makefile

Install SUMA

The Makefile in the wg12-step repository allows you to build resource documents and SRL, supporting cross-platform, native installation, and SUMA Docker installations.

You want to	Cross-platform	SUMA Docker
build the part 47	make 10303-47	make 10303-47 docker
build the SRL	make srl	make srl docker
Update SUMA	make update	make update docker

