



Arlinger John
Anders Rowell

12 December 2025

Minutes StanForD

2025-12-11

Place:	Uppsala/Teams, 2025-12-12, 10:00-15:30 CET
Participants:	John Arlinger, Secretary Anders Rowell and Johan J Möller, Chairman Antti Korkiakoski, John Deere Erik Kindlund, John Deere Henrik Persson, LogMax Jonas Gustafsson, Sveaskog Lovisa Engberg-Sundström, Skogforsk Mats Richardson, Skogforsk Tapio Räsänen, Metsäteho <u>Attending through Teams:</u> Asko Leivonmäki, Exertus Bengt Sörvik, Otmetka Bobby Szwajkowski, TigerCat Daniel Nilsson, Otmetka Etienne Pilon, LogMax Canada Fredrik Tjernberg, Komatsu Forest Haneef Radzi, WoodsmanPro Hanna Edpalm, Otmetka Heikki Komulainen, Ponsse Hunter Peeters, TigerCat Ian Wilson, ForestPHD Jaakko Mäkinen, Technion Jan Rosdahl, Otmetka Janne Pursiainen, Ponsse Jean-Philippe Gaudreau, FP Innovation Jeremy Gibson, ForestPHD Jonas Hafmar, Södra Jonas Thorsson, Dasa Josh Hildebrand, TigerCat

	Juha Korhonen, Technion Lars Henriksson, Biometria Magnus Hansson, SP maskiner Mathias Håkansson, Dasa Melkas Timo, Metsäteho Mike O'Shea, Coillte Nicklas Nygård, LogSet Philip Ridderheim, SCA Siri Westerblom, Skogforsk Timo Melkas, Metsäteho Tony Shrimpton, WoodsmanPro
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Decision summary

Decided to do the following schema updates:

- Add OperatorKey to TrackCoordinatesWithStemLoadKeyType (ypr, spr), TrackCoordinatesWithStemKeyType (hpr, bpr) and TrackCoordinatesForwardedProductionType (fpr).

Other decisions:

- Secretary is to write a proposal including examples regarding a new repeatable element OtherWorkCategoryCodes to be added to the oin file. The mcl file is also in the future to be viewed as a semi-static file not to be regularly changed from object to object.
- No update with new additional structures specifically for reporting production data in the mom schema for FellerBunchers, Skidders and Yarders. Question of re-designing HarvesterData and ForwarderData to be discussed again when a new version 5 is created. FellerBunchers are to use the HarvesterData-structure (as Dasa is using today) and the ForwarderData-structure is to be used by future implementations of mom by Yarders and Skidders.
- LogReference structure in fpr not to be updated with a reference to a ProductDefinition.

Conclusions from discussions:

- **Next standard version.** Version 4.2 probably published in 2027.
- **DBHHeight.** It is probably more relevant to use DBHHeight 110 cm as default value based on data from the Swedish National Forest Inventory.
- **Geo-fencing.** To be further discussed.
- **Local reference systems.** To be further discussed.
- **OperationalMonitoringCodeList.** To be further discussed.
- **Production data tree length.** To be further discussed.
- **Stem count.** To be further discussed.
- **HprVerifier.** To be further discussed.

Action list:

- No new actions recommended.

§1 Opening of meeting and agenda

Chairman Johan Möller opened the meeting.
The agenda was accepted.

The meeting accepted the proposal to appoint Anders Rowell as a new chairman since Johan J Möller has started working for the forest company Kopparfors.
Johan will continue to attend StanForD meetings.

§2 Presentation of participants

Presentation of meeting participants and a warm welcome to our new member WoodsmanPro, NZ.

§3 Information about decisions and discussions at previous meeting

Main decisions and conclusions at last meeting (2025-05-06--07) were presented:

Decided to do the following schema updates:

- **IndividualShortDownTime.** Description of Object/SubObjectKey under IndividualShortDownTime updated with version 4.2 in order to point out that they are to be deprecated. Also to be deleted with version 5.
- **barkFunctionCategory.** Description with version 4.2 updated according to the following text as the value "None" is not allowed any more:
Allowed values: ~~"None"~~, "Consolidated", "MatrixDiameter", "MatrixDistanceDBH", "NonLinearLatitude" and "Logistic"

Other decisions:

- **Multi-leader stems.** Rule 4.18 to be updated to allow for increasing diameters when comparing different logs.
- **Use of ObjectUserIDs.** New rule was added. Some discussion regarding the use MUST vs. SHOULD at the present meeting (2025-12-11).

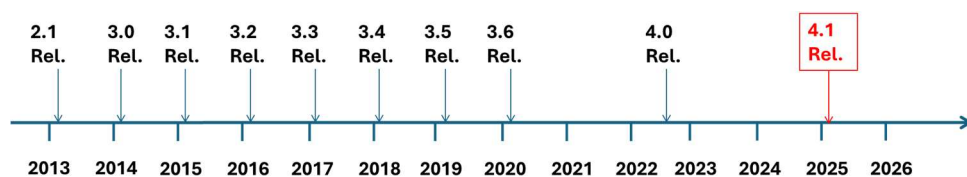
R3.18	The same ObjectUserID and SubObjectUserIDs MUST be used in all types of instructions if data from different machines is to be merged for a specific object. The same ObjectUserID and SubObjectUserID MUST NOT be re-used for what is different objects or sub-objects.	Two data entities with the same UserId are always the same data entity. Two data entities with different UserId are never the same data entity. It will thus not be possible to merge e.g. hpr and fpr data in a third party application (e.g. in a forwarder controller) if this rule is not followed.
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Conclusions from discussions:

- **Priority order of instructions.** New recommendations:
Always assume that all instructions (e.g. oin/foi/ogi) have the same identity information.
The instruction file with the latest ObjectModificationDate is to have the highest priority. This means that the latest ObjectDefinition always should replace earlier versions.
- **RelativeLimitationMatrix.** Postponed until practical test has been completed.

§4 Future frequency of StanForD updates

The figure below illustrates the timeline for publishing all versions since 2.1.



The secretary today estimates that a new version 4.2 will be finalized during 2027. No standard problems were found in connection with the harvester test that was carried October to November this year.

§5 Reporting of issues related to major version 4 EMERGENCY UPDATES AUGUST 2025

Anders Rowell and Jeremy Gibson found two errors in the 4.1 schemas when comparing with 4.0:

- *ShifKey should be ShiftKey (mom)*
- *LoadVolumeType should be xsd:decimal (fpr) and not VolumeType which is NonNegativeDecimal*
- *LoadGreenMassType should be xsd:decimal (fpr) and not MassType which is NonNegativeDecimal*

For some unknown reason these three updates, as decided in November 2022 and December 2020, were lost in the update to 4.1.

These errors are significant as they mean that backwards compatibility is lost.

A large number of controls comparing version 4.0 and 4.1 as well as going through all “change history” documents were carried out without finding any other serious errors.

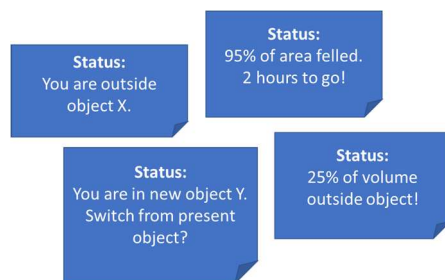
However, on the positive side was the fact that no actor so far had released any software version supporting version 4.1.

It was decided, through e-mail, that we fix these three issues and that we update the versionDate from “2025-02-05” to “2025-08-22” for the mom and the fpr schemas.

§6 New proposals

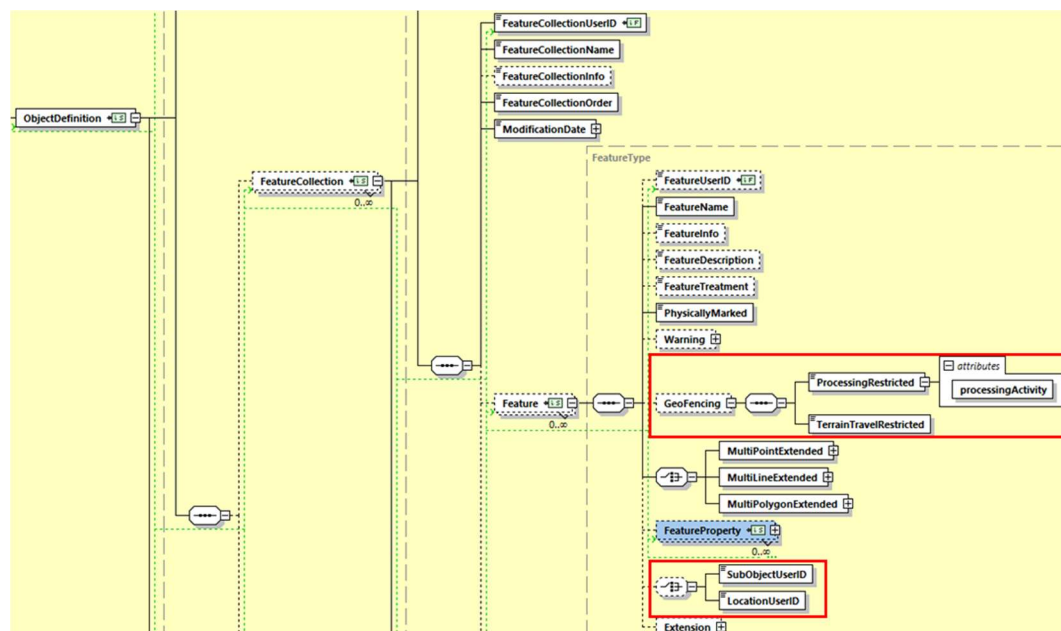
Geo-fencing

The element BorderPolygon was added to the ObjectDefinition in 2021-09-15. The objective was to make it possible to implement different types of geo-fencing functions as illustrated below:



The possibility to implement geo-fencing functions also for other features such as SubObjects and Locations were discussed during the spring of 2025. A conclusion drawn at the last meeting (2025-05-06—07) was that it is probably preferable to keep this type of functionality in the ogi-file in order to avoid “conflicts” between e.g. oin and ogi. We also focus complex geographical information to the ogi and ogr.

It was suggested that we add references to the SubObject/Location under element Feature and that the new elements ProcessingRestricted and TerrainTravelRestricted are also located directly under the Feature as illustrated below.

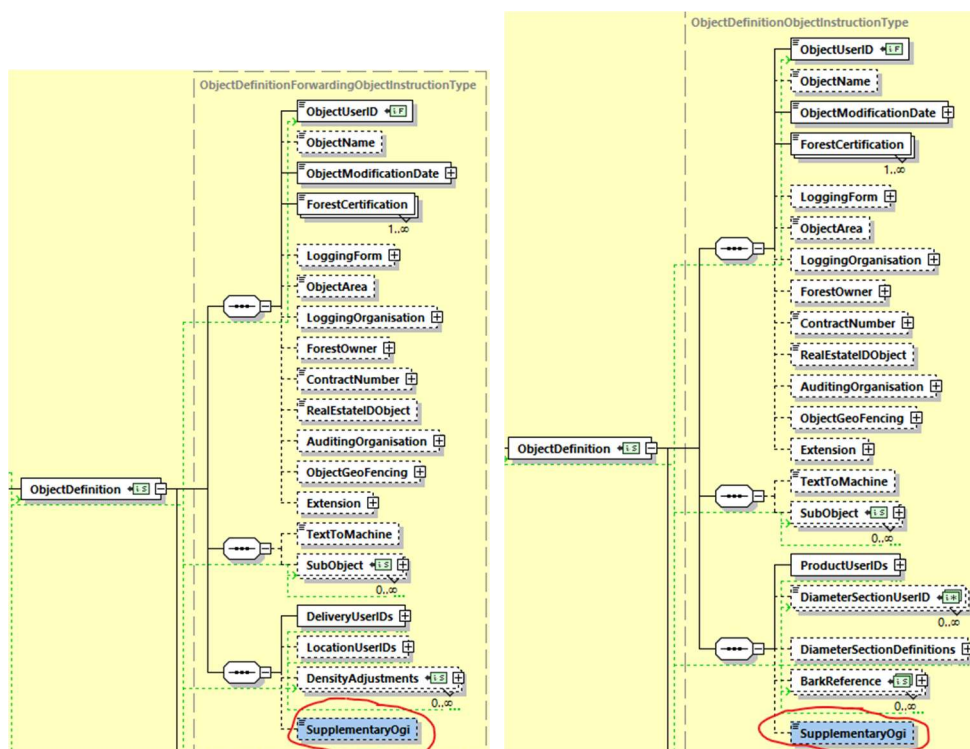


Name	Data type	Unit	Description
Processing-Restricted	Boolean	true/false	Indicates if a machine is allowed to process (unload/load) inside or on this feature. Observe that any feature with the value "TRUE" has the highest priority for a given position. Default value is "FALSE" if element is missing.
TerrainTravel-Restricted	Boolean	true/false	Indicates if a machine is allowed to drive inside or on this feature. Observe that any feature with the value "TRUE" has the highest priority for a given position. Default value is "FALSE" if element is missing.
Processing-Activity	String	Enumeration	Indicates if only specific processing activity is restricted. Allowed values: All activities, Planting, Soil preparation, Loading, Unloading

Observe that a restricted feature (where either ProcessingRestricted or TerrainTravel has value "TRUE") always have a higher priority over any feature that does not have a restriction. No restriction applied if element Processing/TerrainTravelRestricted is missing (interpreted as value "FALSE").

In case of conflicts between oin and ogi, e.g. same ObjectUserID but different ContractNumber, the latest version (last ObjectModificationDate) should take precedence.

It can also be discussed, as suggested by Fredrik Tjernberg, to include an element in the oin/foi/soi/yoi that indicates that there is a supplementary ogi available.



Name	Data type	Unit	Description
Supplementary-Ogi	String	Free text	Name of supplementary ogi file to be used for the same object.

A fairly long discussion with a number of comments:

- The attribute `processingActivity` makes the functionality much more complex. Highly questionable to include this attribute at this stage.
- What is really the difference between this new GeoFencing structure vs the existing Warning structure? Does this mean any improvement?
- An improved proposal should include a more complete description of the advantages of including a GeoFencing structure vs the existing Warning structure.
- How should the GeoFencing be used in order to determine whether the machine is inside the boundaries of the Object as well as estimating the proportion of the Object that has been harvested at any given moment?
- How should a polygon describing Locations be used?

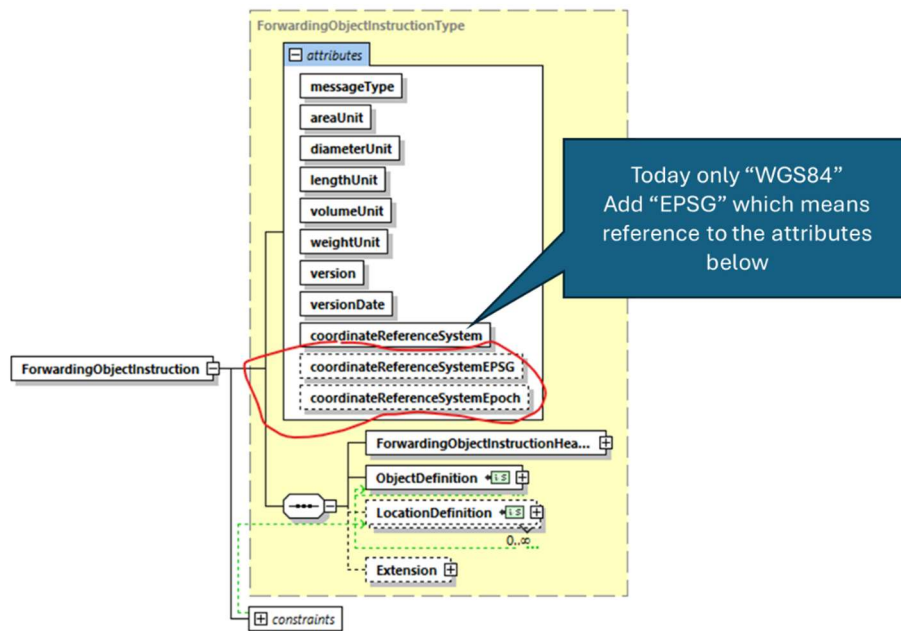
It was decided to postpone this issue in order to let the secretary create a new improved proposal for the next meeting.

Additional coordinate reference systems

The possibility of using local reference systems in StanForD coordinate elements has been discussed. In part due to modern GNSS receivers with corrections being able to generate the coordinates based on local reference systems and in part due to problems caused by different epochs (drift of continental plates).

A solution could be to update the header attribute of all schemas to make it possible to replace the WGS84 with any other EPSG codes and to define which epoch that was used in order to adjust for the movement of the continental plates. This solution is illustrated below:

- Add value “EPSG” to `coordinateReferenceSystem`
 - `coordinateReferenceSystemEPSG/Epoch` used in case value is “EPSG”
- Add `coordinateReferenceSystemEPSG`
 - EPSG code for reference system used in file (EPSG.org). Data type to be a positive integer.
- Add `coordinateReferenceSystemEpoch`
 - Decimal year used in transformation



= areaUnit	ha
= diameterUnit	mm
= lengthUnit	cm
= volumeUnit	m3
= weightUnit	kg
= version	4.1
= versionDate	2025-02-07
= coordinateReferenceSystem	EPSG
= coordinateReferenceSystemEPSG	9001
= coordinateReferenceSystemEpoch	2020.0

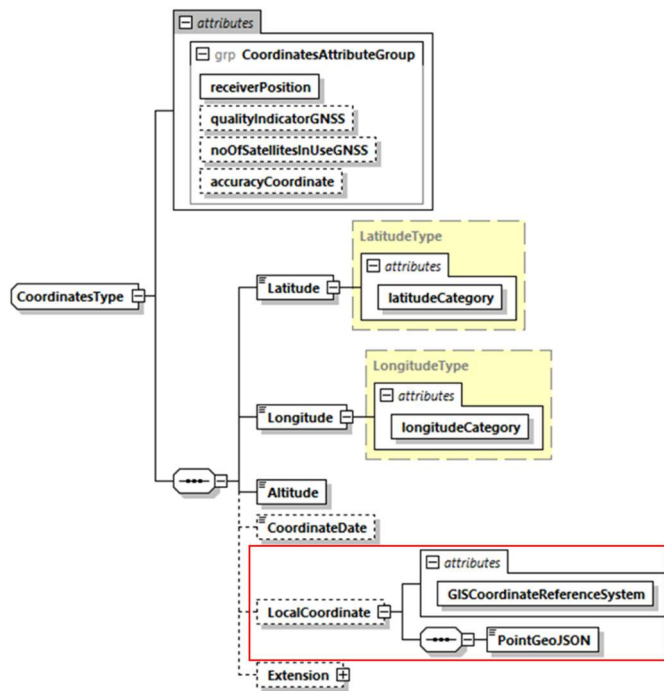
Present attributes and data type for Longitude and Latitude may cause problems when allowing for more coordinate reference systems.

This is due to that the present data type only allows for decimal degrees (0-180 degrees) and the CategoryType has one of the following enumeration values North/South and East/West.

The present limitation with a maximum value of 180 makes it impossible to use reference systems where the unit is in meters, e.g. "EPSG:3006".

This means that we either limit the coordinate reference systems to those with unit "decimal degrees" or that we exclude the upper limit of 180.

Another solution similar to what was previously discussed could be to extend the CoordinatesType according to the following figure. This solution handles the question marks above as well as the issue of backwards compatibility. However, it increases the size of the messages and makes the structure more complex.



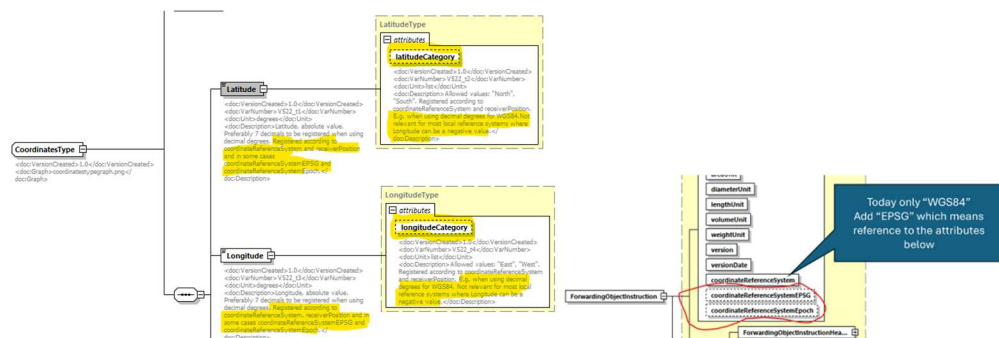
The need for extending the standard was discussed and explained by Fredrik Tjernberg.

It was pointed out by Fredrik that there are some different free libraries available to do any conversions such as proj and gdal

Conclusions from the discussion were to modify the earlier proposal presented at last meeting:

- Updating CoordinateType in order to allow for any decimal value in elements Latitude and Longitude as well as making latitudeCategory and longitudeCategory optional.
- Adding enumeration value EPSG to attribute coordinateReferenceSystem (message header)
- Adding attributes coordinateReferenceSystemEPSG and coordinateReferenceSystemEpoch to the message headers of all files.

It was decided to let the secretary create a new proposal for the next meeting according to the conclusions above as illustrated below:

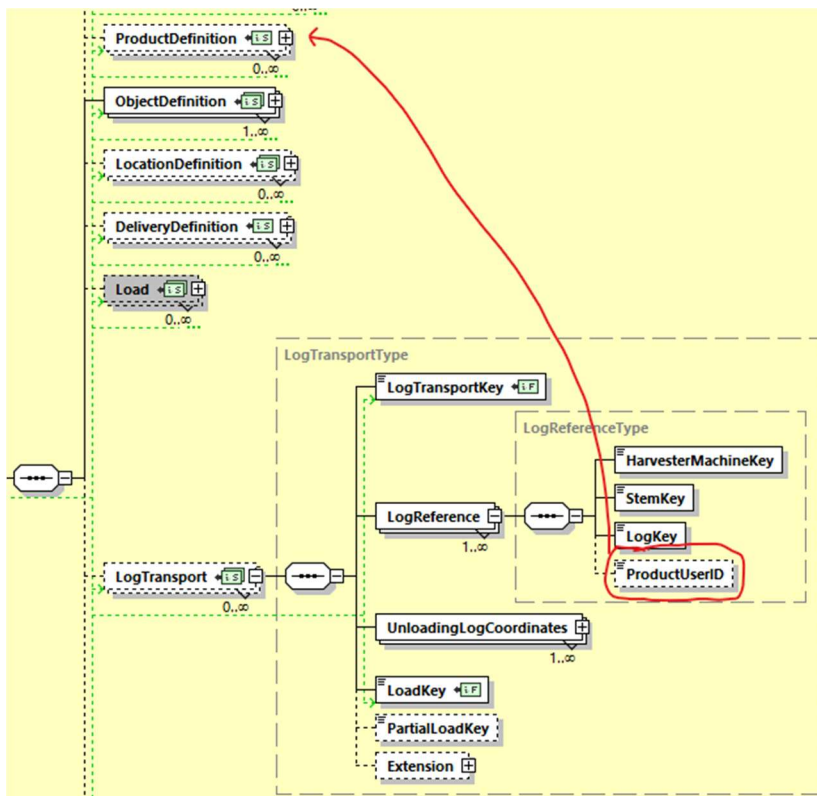


Update LogReference in fpr

Johan Möller and John Arlinger, 2025-08-14

Hpr-files are presently needed in order to extract the ProductName or ProductInfo for a specific log reported in LogReference (fpr). Retrieving some general product information for each log based on the fpr-file would probably be an advantage.

A simple solution could be to add an optional ProductUserID element to the LogReference which could be used as a reference to ProductDefinition that is already available in the the fpr-file. The ProductUserID would be extracted from the hpr-file.



Name	Data type	Unit	Description
ProductUserID	S string (UserIDType)		Extracted from hpr message. Identity per product defined by user of data, normally logging organisation Do not use a single space or null value. Do not begin or end with a space. Do not include any of the following characters: Double space, Linefeed, carriage return, %, ?, !, >, :, " (double quote), /, \, , *, +.

It was decided to postpone this proposal indefinitely as any use of the LogReference structure is deemed to be relevant only in cases where the original hpr-file is available.

OperationaMonitoringCodeList

Fredrik Tjernberg, 2025-09-05

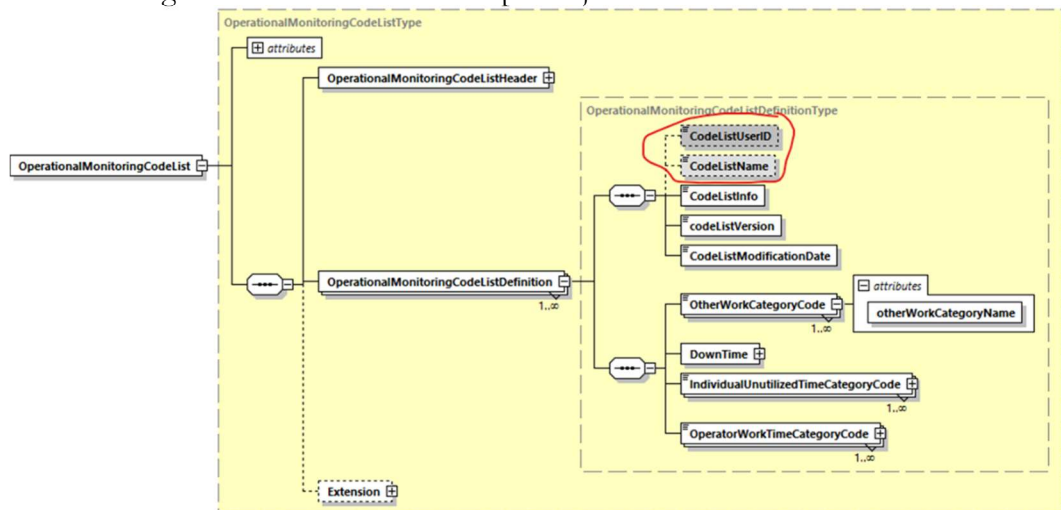
The new code list included in the mcl-schema is not constructed to be frequently adjusted from one object to another.

The idea when constructing the mcl-schema was that the code list would be fairly stable and perhaps only manually changed by the operator.

There are at least one forest company that would like to be able to change between different “other work times” from one object to another as this type of work is often paid per hour and it is paid differently depending on the experience of the operator and the site conditions.

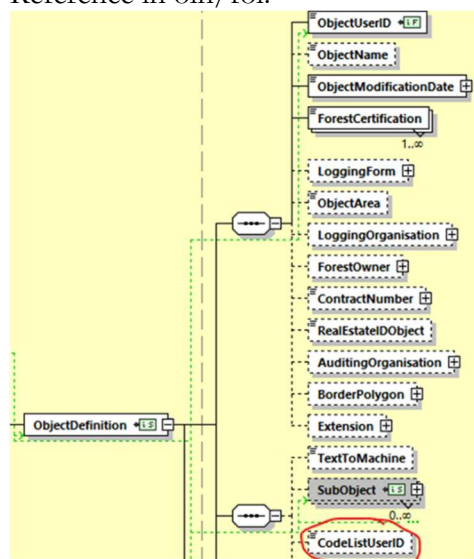
Below are some possible solutions that could be added to version 4.2:

1. Add CodeListName and CodeListUserID to the mcl and add reference with one single CodeListUserID to oin per object.



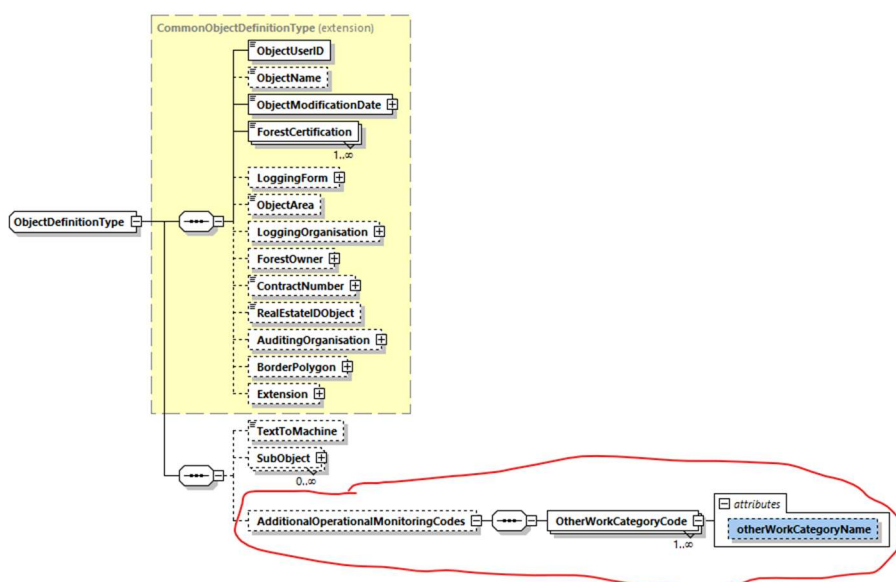
Name	Data type	Unit	Description
CodeListUserID	String (UserIDType)		Identity per code list defined by user of data, normally logging organisation Do not use a single space or null value. Do not begin or end with a space. Do not include any of the following characters: Double space, Linefeed, carriage return, %, ?, !, gt, :, " (double quote), /, \, , *, +.
CodeListName	String		Name of code list used in operational monitoring

Reference in oin/foi:



Name	Data type	Unit	Description
CodeListUserID	String (UserIDType)		Code list to be used in operational monitoring for present Object. Identity per code list defined by user of data, normally logging organisation Do not use a single space or null value. Do not begin or end with a space. Do not include any of the following characters: Double space, Linefeed, carriage return, %, ?, lt, gt, :, " (double quote), /, \, , *, +.

2. Add OtherWorkCategoryCodes to oin. These codes are to override the codes in the mcl-file.



Observe that both solutions could probably be tested/used with version 4.1 based on Extension elements.

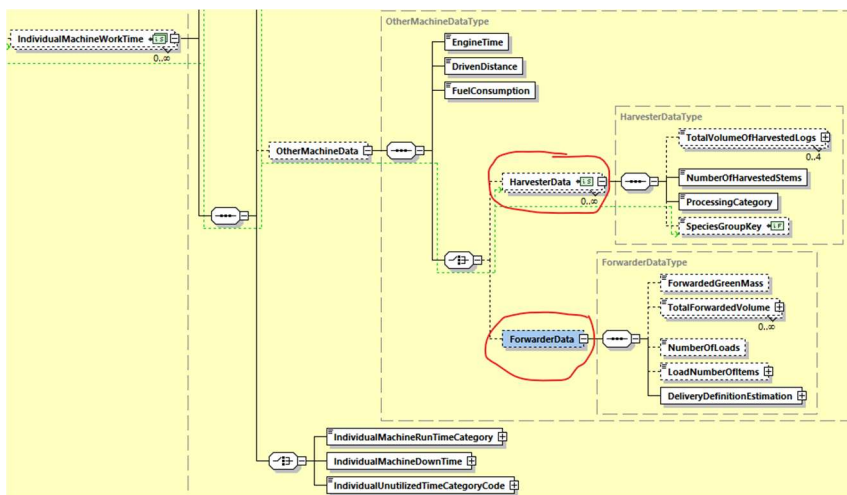
The meeting concluded that the need for updating any other activities than “OtherWorkTimes” is deemed insignificant. Codes in otherWorkCategoryCode are to be appended to the list of codes included in the mcl-file. These additional codes are only to be used at the present object.

It was therefore decided to update the proposal with a focus on adding a new optional and repeatable element OtherWorkCategoryCode to the oin with some example files. This issue is to be discussed again at upcoming meetings.

Tree length production data in mom-files

Jeremy Gibson, 2025-09-28

It has been noted that there is no definition for FellerBuncherDataType, YarderDataType nor SkidderDataType under IndividualMachineWorkTime/OtherMachineData in the mom-schema (version 4.1) as illustrated below:

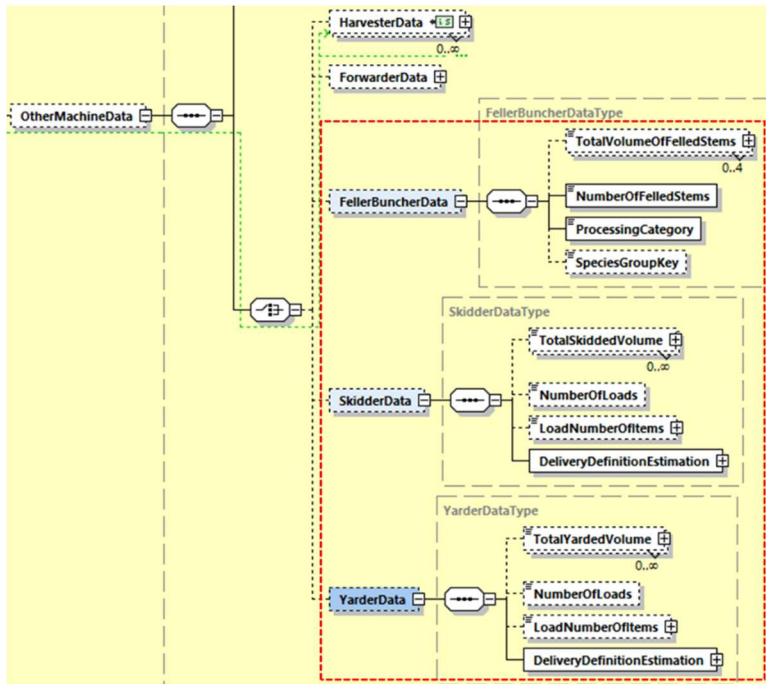


As there are some Feller Bunchers operating it would be good to add at least FellerBuncherDataType for v4.2 but may as well cover all three machine categories at once?

Comments from secretary:

The reason for these missing structures is probably because no one thought of it. If someone really wanted to implement it with an old standard version it would be possible to use HarvesterData also for FellerBunchers as it is possible to handle Single-/MultiTreeFelling categories also in the present HarvesterData. ForwarderData is probably a bit more difficult to use for skidders and yarders as the ForwarderData specifically refers to logs rather than stems.

A solution could be to add the following new structure (FellerBuncherData/SkidderData/YarderData) to OtherMachineData in the mom schema:



Dasa informed the meeting about the fact that they have used the HarvesterData structure also for FellerBunchers. The only major issue for re-using the ForwarderData structure also for Skidders and Yarders is that the attribute loadNumberOfCategory does not include the value “Number of stems”. The present HarvesterData structure does not include any data on the number of Piles that has been produced.

It was decided to not update with additional structures for reporting production data in the mom schema for FellerBunchers, Skidders and Yarders. Question of re-designing HarvesterData and ForwarderData to be discussed again when a new version 5 is created.

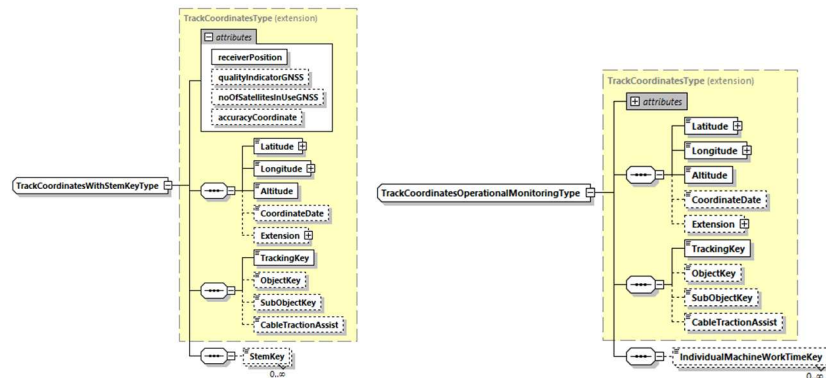
It was also decided that FellerBunchers are to use the HarvesterData-structure (as Dasa is using today) and the ForwarderData-structure is to be used by future implementations of mom by Yarders and Skidders.

The question of updating attribute loadNumberOfCategory with the value “Number of stems” was postponed to the next meeting.

OperatorKey in Tracking

Jeremy Gibson, 2025-09-28

Present Tracking structure in hpr- and mom-files:



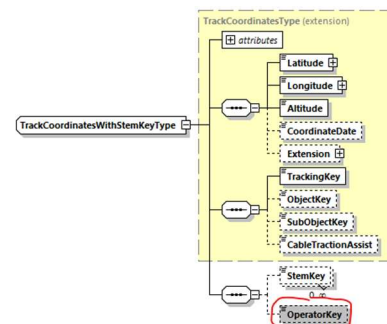
Is there a reason for OperatorKey not being included in the Tracking definition?

It seems OperatorKey is included in most other places as a mandatory element. E.g. hpr stems and therefore logs, fpr loads, bpr stems and all mom times have an OperatorKey.

As tracking becomes implemented and available, it seems reasonable that people want to not only know where the machine travelled but to be able to assign responsibility. It is not really a new concept when it is possible to assign responsibility for who felled and processed a stem, who put a load at roadside etc..

It is probably possible to infer to some extent from other recorded information – if the information is there. However, shift, login and operator work time are optional, harvestdate is optional and StemKey, LoadKey, IndividualMachineWorkTimeKey are all optional in v4.1 tracking schemas.

It was thus decided that we update the TrackCoordinatesWithStemLoadKeyType (ypr, spr), TrackCoordinatesWithStemKeyType (hpr, bpr) and TrackCoordinatesForwardedProductionType (fpr) according to the following figure where the OperatorKey has been added as an optional element:



Observe that it must be optional in order to keep backward compatibility with version 4.0 and 4.1.

§7 Items for discussion

FUEL CONSUMPTION AND EMISSION REPORTING IN STANFORD PRODUCTION FILES (METSÄTEHO)

Tapio Räsänen presented the ongoing work in Finland on reporting of fuel consumption and emissions. The shareholder companies of Metsäteho had streamlined the alternatives for the operational model of transferring and managing the fuel consumption data and emissions calculation. Companies' view is that both options 1) based on machine manufacturers' cloud services and 2) the way in which fuel consumption data is included in production files (hpr, fpr) are potential and both probably also needed for the emissions calculation and reporting system depending on what kind of solutions and tools the machine factories can provide in the near future. The discussion in Finland will continue in ACE project together with forest industry, machine manufacturers and contractor party.

It was proposed by Metsäteho to add fuel consumption in hpr and fpr files in StanForD version 4.2., but no decision was made on it in the meeting. Henrik Persson pointed out that this is a market question and should be solved outside the standard. He also mentioned that fuel consumption data could be easily added in extension structures of hpr and fpr. Johan Möller told that despite EU directives and other regulation and requirements are the same in Finland and Sweden, the Swedish forest companies have not presented any requirements regarding the fuel consumption data management in forest machines, probably due to the fact that the companies largely have access to mom files.

STEM COUNT ISSUE

Mike O'Shea sent some more example data (hpr) as well as some videos from a Komatsu where the stem count was manipulated on a number of known stems.

The secretary also did a test on two stems on the Komatsu harvester during the recent "Wood value test". This means that there are now a limited data set where we can evaluate and test some algorithms in order to estimate the number of "artificial double stems".

It was also noted by the secretary that Komatsu's registration of detailed time stamps makes it possible to determine if any "artificial stems" exist in an hpr-file.

DBHHEIGHT

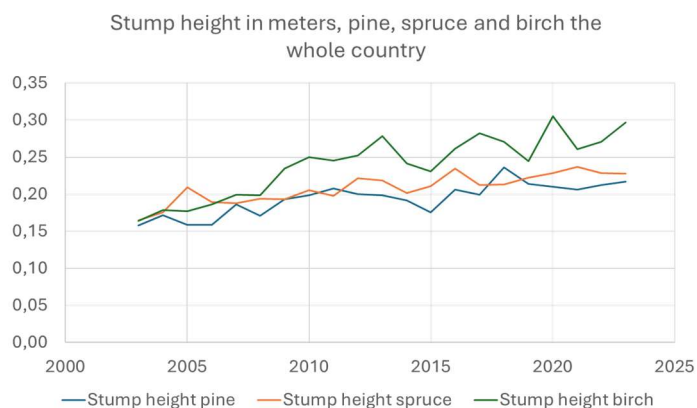
The issue of stump height vs DBHHeight was discussed at the previous meeting.

Anders Rowell discussed this issue with Björn Hannrup after last meeting. The Swedish national forest survey measures stump heights in their sampling plots. Earlier data indicates the following average stump heights in Sweden (2003-2005) according to "Behöver omvandlingstalen mellan m3f ub och m3sk revideras?, Report 7, Skogsstyrelsen 2010" (<https://shop.skogsstyrelsen.se/sv/publikationer/rapporter/behoover-omvandlingstalen-mellan-m3f-ub-och-m3sk-revideras-en-for.html>).

DBH-class	0-9 cm	10-19 cm	20-29 cm	30-39 cm	40- cm
Mean stump height, all species	3.4 cm	15.1 cm	16.5 cm	20.3 cm	25.0 cm

More recent data from the Swedish National Forest Inventory indicates (see table and diagram below) that the stump height in Sweden is today slightly higher than presented in the table above which was measured 2003-2005. The Finnish National Forest Inventory does not measure any stump heights.

Year	Arithmetic mean stump height (m)
2003	0,16
2004	0,18
2005	0,19
2006	0,18
2007	0,19
2008	0,19
2009	0,20
2010	0,22
2011	0,21
2012	0,23
2013	0,23
2014	0,21
2015	0,21
2016	0,24
2017	0,23
2018	0,23
2019	0,23
2020	0,23
2021	0,23
2022	0,23
2023	0,25



It was thus concluded that a DBHHeight of 110 cm is better than 120 cm when DBH is defined as 130 cm from the ground.

LARGE LOADS

Jeremy Gibson, 2025-08-18

A problem that very large load volumes are registered, typically one per day rather than preferably one per load.

Maybe some type of UI adjustment (warning) could be implemented in order to minimize this type of behaviour?

Anders Rowell mentioned that the opposite situation is also sometimes a problem, that means that the operator registers several separate loads in case of co-loading for several different deliveries (products).

Another comment during the meeting was that this situation probably will be a problem until we have reporting tools that are semi-automatic based on hpr-data.

§8 StanForD2010 projects / implementations

DIGITAL TRACEABILITY PROJECT

Johan J Möller presented results from a research project where the possibility of using StanForD data for tracing individual logs from forest to sawmill has been tested.

MULTI TREE CONTROL AND CALIBRATION

Several Swedish forest companies (Sveaskog, Södra and StoraEnso) have started a discussion with Skogforsk regarding implementation of multi-tree calibration as defined with StanForD version 4.1.

A project will thus probably be started during the spring 2026.

STANDARD FOR MECHANIZED FOREST REGENERATION

A number of actors including Australian forest companies have contacted Skogforsk regarding the draft proposal for standardized data on soil preparation and planting. Hopefully initiatives from the Swedish forest companies Södra and Holmen will lead to some practical tests of the standard proposal. We may therefore have a proposal for a new schema at the upcoming meetings.

HARVESTER TEST 2025

Skogforsk has completed the practical parts of the harvester test during October and November 2025. The results of the test will be presented at a conference (in Swedish) on 23rd to 24th of March 2025, Bålsta.

§9 Other issues

No other issues were raised.

§10 Next meetings

StanForD meeting 2026-05-06--07, Vantaa/Teams (12:00-13:00 EET)

By default, all financially contributing members will receive an Outlook invitation to all meetings in advance.

§11 End of meeting

The chairman Anders Rowell thanked everyone for attending the meeting.