



Arlinger John

9 February 2022

Minutes StanForD

2022-02-08

Place:	Uppsala/Teams, 2022-02-08, 10:00-14:00 CET
Participants:	John Arlinger, Secretary Johan J. Möller, Chairman Henrik Persson, Logmax Josh Hildebrand, Tigercat Bobby Szwajkowski, Tigercat Lars Henriksson, Biometria Emil Forsblom, EcoLog Heikki Komulainen, Ponsse Janne Pursiainen, Ponsse Halvard Olderlund, Komatsu Étienne Pilon, FP Innovation Juha Korhonen, Technion Jeremy Gibson, PHD Forest Ian Wilson, PHD Forest Räsänen Tapio, Metsäteho Melkas Timo, Metsäteho Jonas Thorsson, Dasa Erik Kindlund, JohnDeere Anders Johansson, SP Maskiner Anders Svensson, SP Maskiner Joel Gessner, SP Maskiner Jaakko Mäkinen, Technion Mike O'Shea, Coillté Jonas Gustafsson, Sveaskog

Decision summary

Decided to do the following schema updates:

- StemKey (hpr and hqc), LoadKey (fpr) and IndividualMachineWorkTimeKey (mom) added to Tracking

- New bark function elements added: ConsolidatedFunction, BarkFunctionUserID, BarkFunctionName, BarkFunctionInfo, BarkFunctionVersion
- A number of bark function elements renamed.
- Element BarkFunction made optional and enumeration “None” excluded.
- New element ForwardingVolumeCategory added to the DeliverDefinition in order to define which single volume unit to report from forwarder.
- Elements Density (DeliverDefinition) and LoadVolume (PartialLoad) are to be non-repeatable and without any attributes.
- GeographicalDirective is to be replaced by FeatureCollection and TextToMachine should be renamed to TextFromMachine in ogr schema.
- New positioning of felled stems with element FelledStemCoordinates including new receiverPosition “Product position” and new element “FelledStemBearing”.
- New element “LogBearing” added to LogCoordinates.

Decided with the minutes

- add “modificationRestricted” to the FeatureCollection

To be discussed at next meeting:

- New constraints will be presented (included in draft schemas).
- Possible adjustments to ogr and ogr.

Action list (not updated since last meeting):

- An increased interest in following-up whether the harvester or feller-buncher is using herbicides or fungicides means that it is recommended that element StumpTreatment is implemented.
- The following guidelines should be followed when implementing LongTimberDefinition:
 - Must be possible to view and edit LongTimberDefinition in administrative tools.
 - Default value equal to DiameterMAXButt in administrative tools
 - LongLogButtMAX is never to be included in pin-file if value is 0 (it is optional).
 - Value 0 (zero) is to be interpreted as null.
- It is recommended to implement stem codes for both individual trees and groups of trees (so called “sticky registration of stem codes”). Whether the “sticky registration” is triggered by double click or any other operator interaction does not matter.
- Do not mix products and deliveries in forwarder applications.

- Focus on Deliveries in the UI.
- Avoid using pin-files since it often creates operator confusion.
- Map interface when creating Locations would be good to avoid incorrect coordinates.
- TextToMachine is an urgent variable to be shown when creating new object in harvester and forwarder.
- All randomly selected stems (both rejected and not rejected) must be saved in an hqc-file including a possible reason for rejection. This file should be possible to send directly to the forest company (in Sweden to Biometria).
- Coordinates in production files should always be activated by default in all forest machines (especially important after software updates when coordinate registration is commonly lost).

§1 Opening of meeting and agenda

Chairman Johan J Möller opened the meeting.

A new issue “Positioning of felled stems” was added to item “Other issues”.

The agenda was accepted.

§2 Presentation of new member participants

Emil Forsblom gave a presentation of EcoLog which is a new member of the StanForD group. Observe that SP Maskiner is part of the EcoLog group.

§3 Presentation of participants

Presentation of meeting participants including a short report on the weather and covid!

§4 Information about decisions and discussions at previous meetings

DECISIONS MAJOR VERSION 4.0

The following decisions will affect the version 4.0 pre-release schemas:

- new optional attribute qualityIndicatorGNSS to CoordinateType.
- new optional attribute noOfSatellitesInUseGNSS to CoordinateType.
- new optional attribute accuracyCoordinate to CoordinateType
- new optional attribute accuracyMachineBearing and Extension element to BoomPositioningType.
- updated enumerations for recieverPosition:
 - “Base machine”, (midpoint between wheel pairs or tracks along the line of driving direction, typically the cab on a wheeled machine and at the rotation point on a tracked machine.)

- “Attachment center” central position of attachment which represents the center of the object held by attachment (e.g. radial mid point of standing tree). Position also identical with saw on harvester head, e.g. when cutting log.
- “Log center” position of physical mid point, between top and butt ends
- “Other”
- new logarithmic bark function added.
- renaming of all bark functions.
- Merging of logarithmic, linear Zacco and 2nd degree polynomial into a new bark category “ConsolidatedFunction
- new BarkReference added to oin, BarkFunctionKey added and BarkFunction made repeatable in spi
- BarkFunctionKey added to Stem in ghpr
- new optional element DensityAdjustment added to foi.
- new vti-schema (volume table instruction) used by feller buchners
- new optional attribute textToMachine added to ProductUserID in oin and DeliveryUserID in foi.
- new type AngleType added common definition that is limited to integers between 0 and 360 degrees. To be used for MachineBearing and BoomAngle.

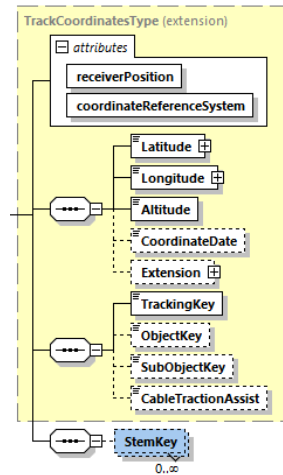
§5 Proposals new major version 4.0

Tracking updates

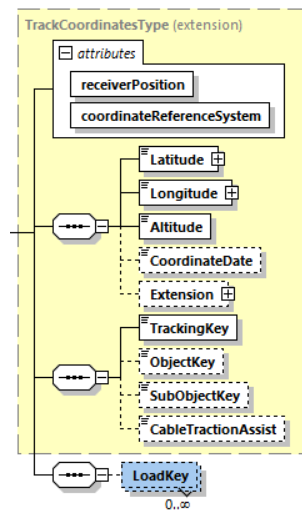
The following proposals were last discussed but not finalized 2021-06-15. The proposal was by mistake not discuss during the autumn of 2021.

The idea with this proposal is to add additional message specific information to the Tracking. This means that we, for example, can connect stems to the tracking without relying on having time stamps for both stems and tracking.

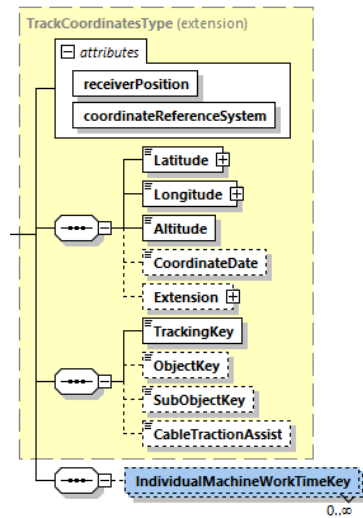
It was decided that the tracking structure is extended with StemKey in hpr and bpr tracking:



It was decided that the tracking structure is extended with LoadKey in fpr tracking and with StemLoadKey in spr and ypr:



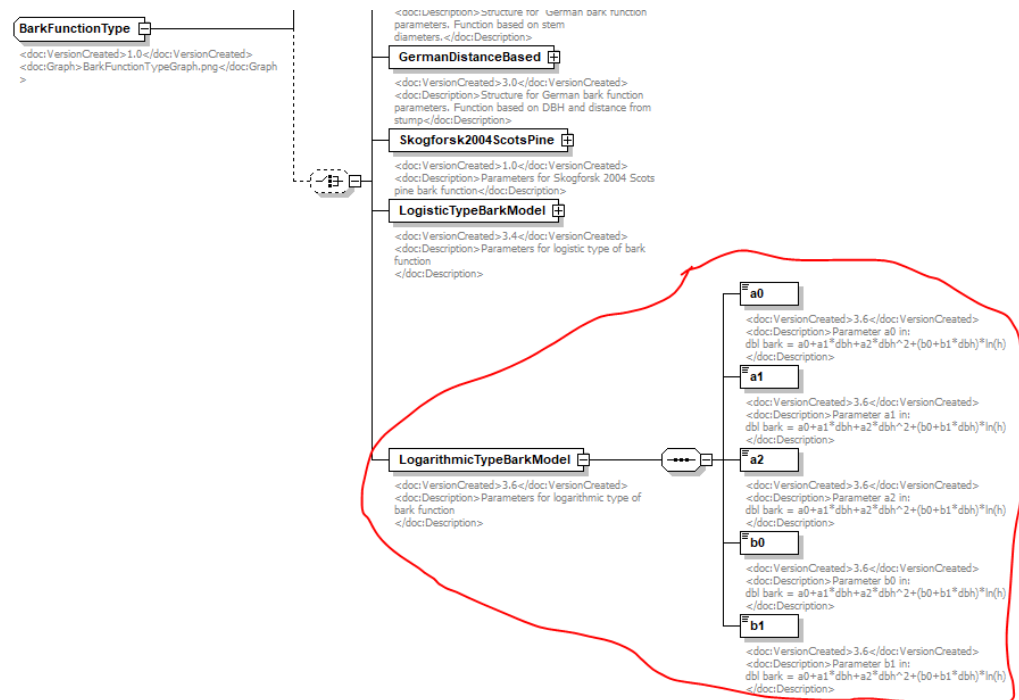
It was decided that the tracking structure is extended with IndividualMachineWorkTimeKey in mom tracking:



New bark function structure

BACKGROUND

It was decided at the previous meeting to add a new structure for logarithmic bark functions under **BarkFunctionType** as illustrated below:



Logarithmic function

db = double bark thickness, mm

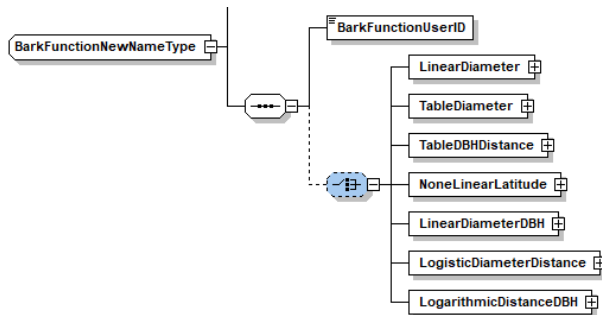
dbh = diameter at breast height on bark, mm

h = height in stem (distance from the stump cross section), cm

$$[4] \quad db = \alpha_0 + \alpha_1 dbh + \alpha_2 dbh^2 + (\beta_0 + \beta_1 dbh) \ln(h) + \varepsilon.$$

NEW STRUCTURE AND NAMING OF BARK FUNCTION

The naming of the different bark functions has been discussed previously as it can be misleading that the element names of bark functions are based on the country of origin. All bark functions could be used on all markets. It could be possible to change the names according to illustration below. However, the functionality would not change, meaning that it is more of a pedagogical/esthetical than a technical issue.

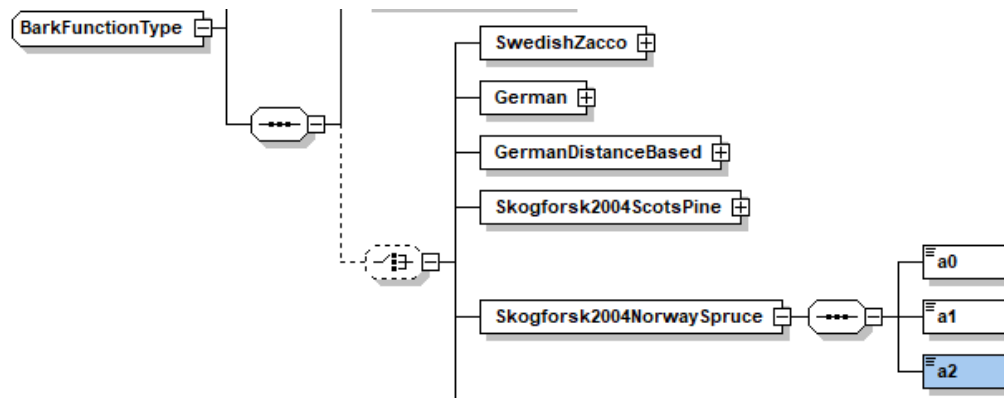


It could be possible to make the Skogforsk2004NorwaySpruce more flexible by making it possible to distribute the parameters using the spi.

This function is presently “hard coded” as follows (D = diameter on bark):

$$Dbl\ bark = 0.46146 + 0.01386 * DBH + 0.03571 * D$$

It was thus suggested to add the parameters a_0 , a_1 and a_2 ($a_0 + a_1 * dbh + a_2 * diameter_ob$) to the spi as illustrated below:



It was noted, shortly before the previous meeting, by the secretary that it would be possible to use this type of linear bark function also for the old *Zacco* function. The functions are almost identical with the only difference that DBH is not used in the *Zacco* function (D=diameter on bark):

$$dbl\ bark = a0 + a2*D$$

There is also another similar bark function in use in Austria (ÖNORM L 1021):

$$dbl\ bark = a0 + a2*D + a3*D^2$$

It was therefore decided to implement the following new function:

$$dbl\ bark = a0 + a1*DBH + a2*D + a3*D^2$$

Observe that the function is identical with *Zacco* if a1 and a3 are set to 0 and that it is identical with the *Skogforsk 2004 Norway Spruce* if a3 is set to 0.

It was also suggested after the previous meeting (discussion with Henrik Persson and Björn Hannrup) that we also merge the logarithmic function into a new “consolidated function” as illustrated below:

$$dbl\ bark = a0 + b0*D + b1*D^2 + c0*DBH + c1*DBH^2 + (d0+d1*DBH) * \ln(H)$$

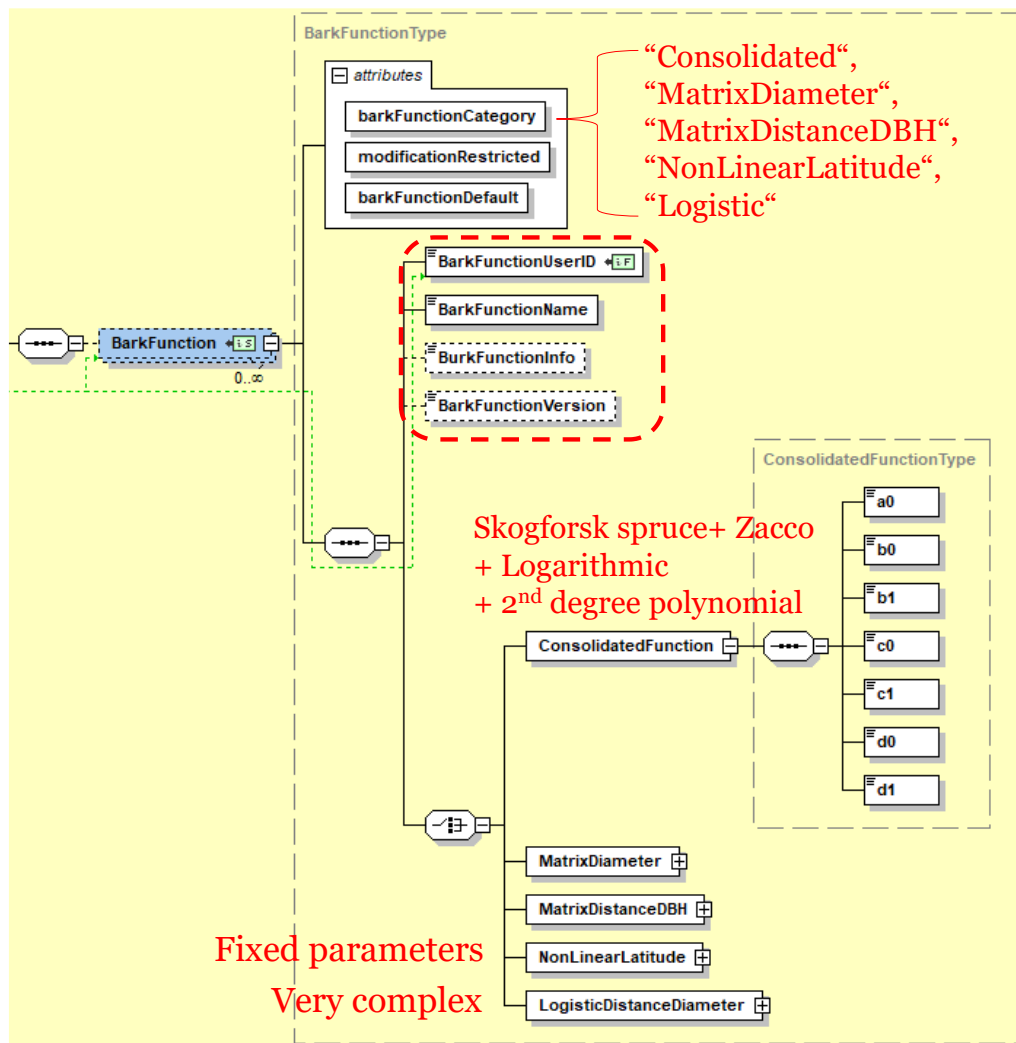
No objections raised against the solution included with the previous minutes.

It was thus decided to implement the new function “ConsolidatedFunction” with the following elements is to be added and that four identification elements for each set of bark parameters (BarkFunctionUserID, BarkFunctionName, BarkFunctionInfo, BarkFunctionVersion):

Name	Data type	Unit	Description
ConsolidatedFunction			Parameters for linear function dependent on dbh and diameter on bark. $dbl\ bark = a0 + b0*D + b1*D^2 + c0*DBH + c1*DBH^2 + (d0+d1*DBH) * \ln(H)$ Replacing both old “Swedish Zacco” and “Skogforsk 2004, Norway spruce”, also possible to use for new logarithmic function and second degree polynomials. Logarithmic function using a0, c0, c1, d0 and d1 Swedish Zacco using a0 and b0 Skogforsk Norway spruce using a0, b0 and c0 2 nd degree polynomial (Austrian) using a0, b0 and b1
a0	Decimal		Parameter a0 in: $dbl\ bark = a0 + b0*D + b1*D^2 + c0*DBH + c1*DBH^2 + (d0+d1*DBH) * \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
b0	Decimal		Parameter b0 in: $dbl\ bark = a0 + b0*D + b1*D^2 + c0*DBH + c1*DBH^2 + (d0+d1*DBH) * \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
b1	Decimal		Parameter b1 in: $dbl\ bark = a0 + b0*D + b1*D^2 + c0*DBH + c1*DBH^2 + (d0+d1*DBH) * \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm

Name	Data type	Unit	Description
c0	Decimal		Parameter c0 in: $\text{dbl bark} = a0 + b0 \cdot D + b1 \cdot D^2 + c0 \cdot \text{DBH} + c1 \cdot \text{DBH}^2 + (d0 + d1 \cdot \text{DBH}) \cdot \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
c1			Parameter c1 in: $\text{dbl bark} = a0 + b0 \cdot D + b1 \cdot D^2 + c0 \cdot \text{DBH} + c1 \cdot \text{DBH}^2 + (d0 + d1 \cdot \text{DBH}) \cdot \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
d0			Parameter d0 in: $\text{dbl bark} = a0 + b0 \cdot D + b1 \cdot D^2 + c0 \cdot \text{DBH} + c1 \cdot \text{DBH}^2 + (d0 + d1 \cdot \text{DBH}) \cdot \ln(H)$ dbl_bark: double bark thicknes, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
d1			Parameter d1 in: $\text{dbl bark} = a0 + b0 \cdot D + b1 \cdot D^2 + c0 \cdot \text{DBH} + c1 \cdot \text{DBH}^2 + (d0 + d1 \cdot \text{DBH}) \cdot \ln(H)$ dbl_bark: double bark thickness, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
BarkFuntionUserID		Free text	Identity per bark function defined by user of data, normally by 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), /, \, , *. Can be referenced in oin when several bark functions are specified per species group in spi.
BarkFuntionName		Free text	Name per bark function
BarkFunctionInfo		Free text	Free text identity information about product. Identity element normally to be used by logging organization. No constraints in standard concerning how to use this element.
BarkFuntionVersion		Free text	Additional identity information of product. Identity element normally to be used by logging organization. No constraints in standard concerning how to use this element.

It was discussed during the meeting how to make certain that e.g. BarkFunctionName/Info/Version are always included in case a bark function is in use. The following structure was thus suggested with the minutes. A major difference comparing with the old structure is that Bark Function is optional and enumeration value “None” excluded. This means that if no bark function is to be used the BarkFunction structure is to be totally excluded.



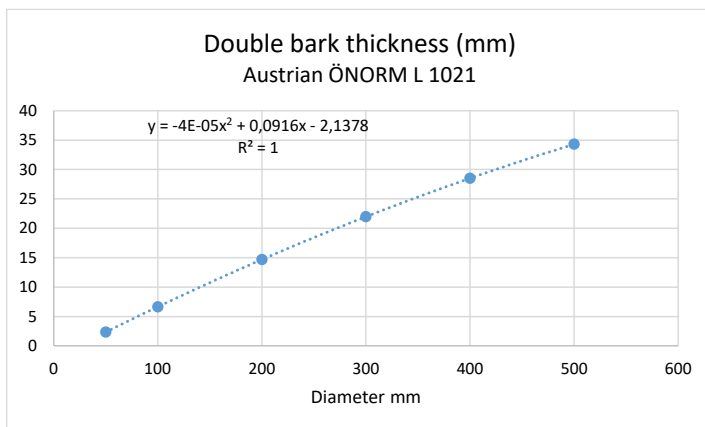
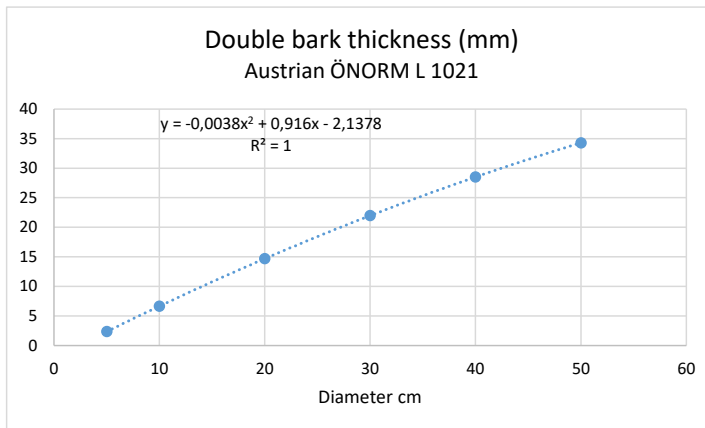
Below is an example of how to use the new consolidated bark function for a number of existing functions. Observe that “x” indicates that the element should have a value larger or smaller than zero ($<>0$).

Name of existing or new functions	a0	b0	b1	c0	c1	d0	d1
Zacco	X	x	0	0	0	0	0
Skogforsk 2004 Norway spruce	X	x	0	x	0	0	0
Logarithmic	X	0	0	x	x	x	x
2 nd degree polynomial (Austria)	X	x	x	0	0	0	0

Another example with “realistic” values:

Name of existing or new functions	a0	b0	b1	c0	c1	d0	d1
Zacco	3.2	0.3452	0	0	0	0	0
Norway spruce	0.46146	0.03571	0	0.01386	0	0	0
Birch (Logarithmic)	-4.7708	0	0	0.18173	0.000123	1.4588	-0.0266
Spruce, Austria (2 nd dgr polynomial)	0,85149	0,60934	-0,00004	0	0	0	0

Observe that the *b1* parameter value for the Austrian bark function is not identical with ÖNORM L 1021 since StanForD diameters are based on unit mm rather than cm. Re-calculating this value is simple as illustrated below:



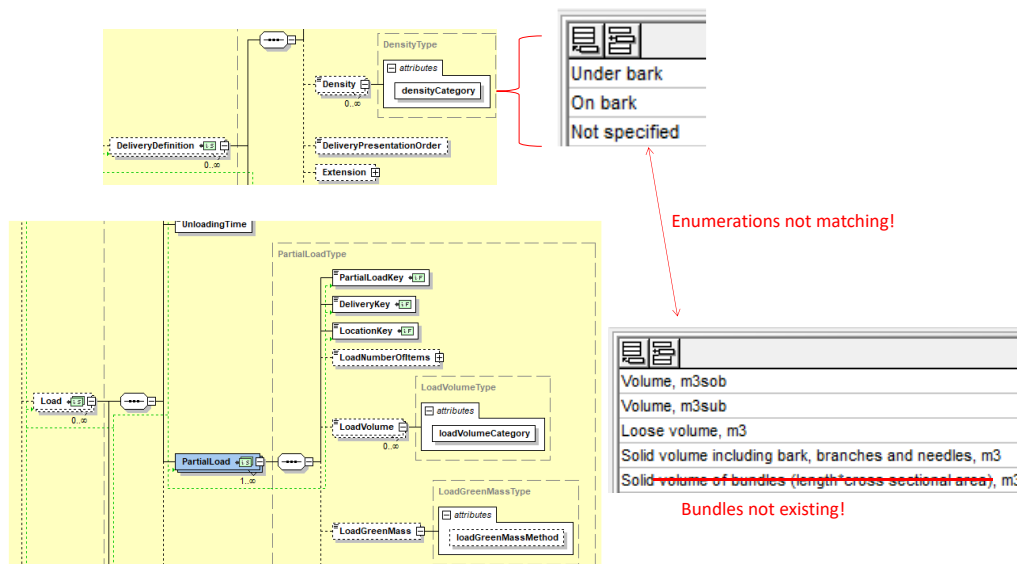
Density conversions in forwarder

John Arlinger, 2021-11-25

This issue was briefly discussed at the last meeting without any decision being made.

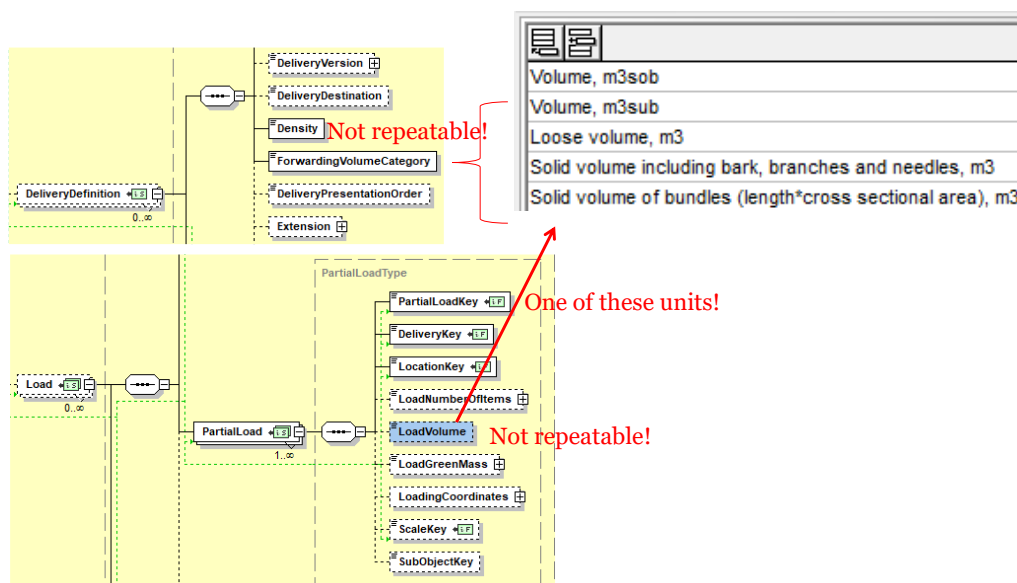
It has been noted that the parameter for density in the fdi schema is not completely logical during a practical forwarder test (2021-11-24).

This I because enumeration values in densityCategory and in loadVolumeCategory are not comparable with each other.



It was pointed out by Pasi Palonen that there still are bundlers on the market and that the unit for “bundles” should be kept.

It was decided to modify **DeliveryDefinitionType** and **PartialLoadType** in **fdi** and **fpr** as illustrated below:



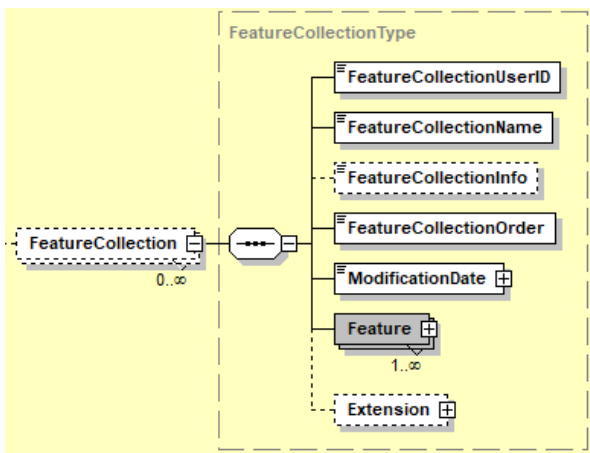
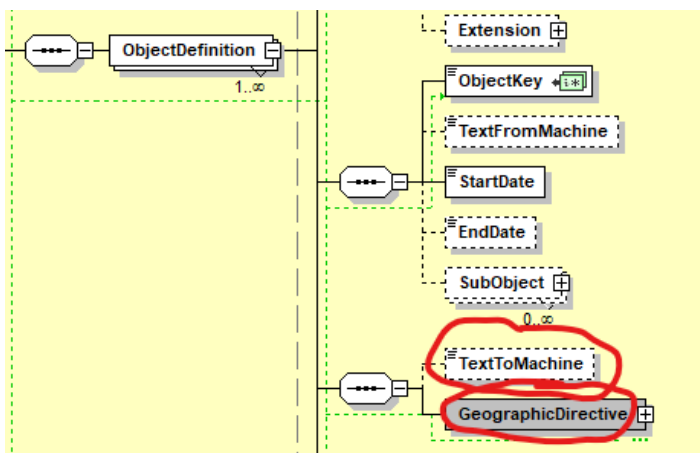
Updated description of modified elements (new text marked with red color):

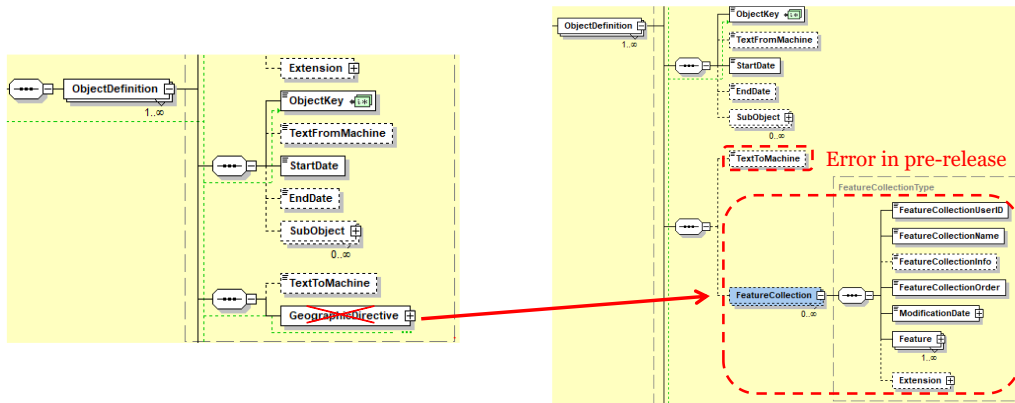
Name	Unit	Data type	Description
Density	Kg/m3	Decimal	Basic density for volume belong to delivery definition. Volume unit defined by element ForwardingVolumeCategory
ForwardingVolume-Category	Text	Enumeration	Enumeration values defining the actual content of the element. Allowed values are: "Volume, m3sob", "Volume, m3sub", "Loose volume, m3", "Solid volume including bark, branches and needles, m3", "Solid volume of bundles (length*cross sectional area), m3"
LoadVolume	M3	Decimal	Volume of Load. Volume unit defined by element ForwardingVolumeCategory

This solution means that only one density parameter is distributed and that the only type of volume to be handled per delivery is defined by the new element ForwardingVolumeCategory. This is the volume unit that the operator is estimating in case of manual volume registration, and it is the only unit that we convert to from a mass.

Ogr-schema updates according to ogi

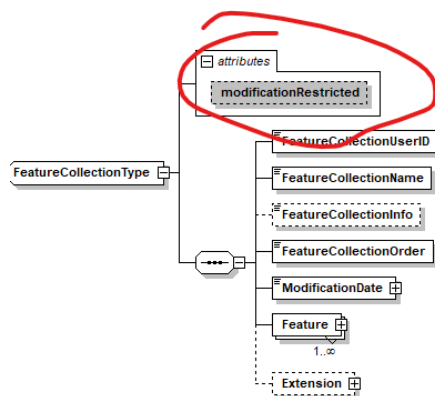
It was decided that the GeographicalDirective is to be replaced by FeatureCollection and TextToMachine should be renamed to TextFromMachine in order to make the ogr compatible with the ogi:





Observe that these changes were included in the pre-release version distributed after last meeting.

It was noted by the secretary after the meeting that no modificationRestricted was added to the FeatureCollection. It was therefore decided with the minutes that we add modificationRestricted to the FeatureCollection with the pre-release schemas as illustrated below.



Constraints

A number of missing and incomplete constraints have been found by John Arlinger and Juha-Antti Sorsa when testing the new schemas.

E.g. an error was found in the constraint for ProductUserIDs in oin. The constraint is to be changed from

```
<xsd:unique name="UniqueProductUserID">
  <xsd:selector xpath="sfd:ProductUserIDs"/>
  <xsd:field xpath=" sfd:ProductUserID "/>
</xsd:unique>
```

to

```
<xsd:unique name="UniqueProductUserID">
  <xsd:selector xpath="sfd:ProductUserIDs/sfd:ProductUserID"/>
  <xsd:field xpath="."/>
</xsd:unique>
```

</xsd:unique>

The secretary and Juha-Antti Sorsa will analyse whether the following elements should be updated with new constraints:

- All TrackingDefinitions
 - TrackingKey, ObjectKey, StemKey/LoadKey/IndividualMachineWorkTimeKey (references)
- All UserDefineDataDefinition
 - tableGroupID, tableID, rowID, columnID (unique)
 - ObjectKey, OperatorKey (references)
- Din:
 - StyleUserID and SymbolUserID (unique)
- Bpr/Bqc:
 - ObjUserID, ~~SubObjUserID~~ (unique)
- Fdi:
 - ProductUserID (reference)
- Fpr:
 - ObjectUserID (unique)
- Foi:
 - ObjectUserID, DeliveryUserID, LocationUserID (references)
- Fqc:
 - ObjectUserID, Productkey (unique)
 - DeliveryKey (references)
- Hpr:
 - BarkFunctionKey (reference)
 - SubObjectUserID (unique)
- Hqc:
 - BarkFunctionKey, SpeciesGroupKey (reference)
 - ~~SubObjectUserID~~, ObjectUserID (unique)
- Ogi:
 - FeatureCollectionUserID, FeatureName, MapName (Unique)
- Ogr:
 - FeatureCollectionUserID, FeatureName, OperatorKey, OperatoruserID, SubObjectKey, ~~SubObjectUserID~~ (Unique)
- Oin:
 - ProductUserIDs, DiameterSectionUserID (unique)

- Mom:
 - CodeListKey, IndividualMachineWorkTimeKey, OperatorKey, ShiftKey, ObjectKey, (references)
 - OperatoruserID, ObjectUserID, ~~SubObjectUserID~~-(unique)
- Spr/Ypr:
 - LocationUserID (unique)
- Soi/Yoi;
 - ObjectUserID, SpeciesGroupUserID (unique)

§6 Items for discussion

No items to discuss.

§7 StanForD2010 projects / implementations

FORWARDER TEST

Forwarders from Rottne, Komatsu, JohnDeere and Ponsse have all been tested. Skogforsk is now compiling the results before discussing a priority list and future needs with a number of forest companies (early March 2022).

STUMPTREATMENT

Several forest companies in Sweden have lately raised the issue of having StumpTreatment being implemented on a wide scale. This is to a large extent dependent on new regulation whereby stump treatment should be recorded.

§8 Other issues

POSITIONING OF FELLED STEMS

This issue was raised by Jeremy Gibson at the previous meeting when discussing positioning of logs. The objective being to make it possible to register the position of stems felled by feller-bunchers.

The existing StemCoordinates is only to be used for the positioning of standing trees as illustrated below.

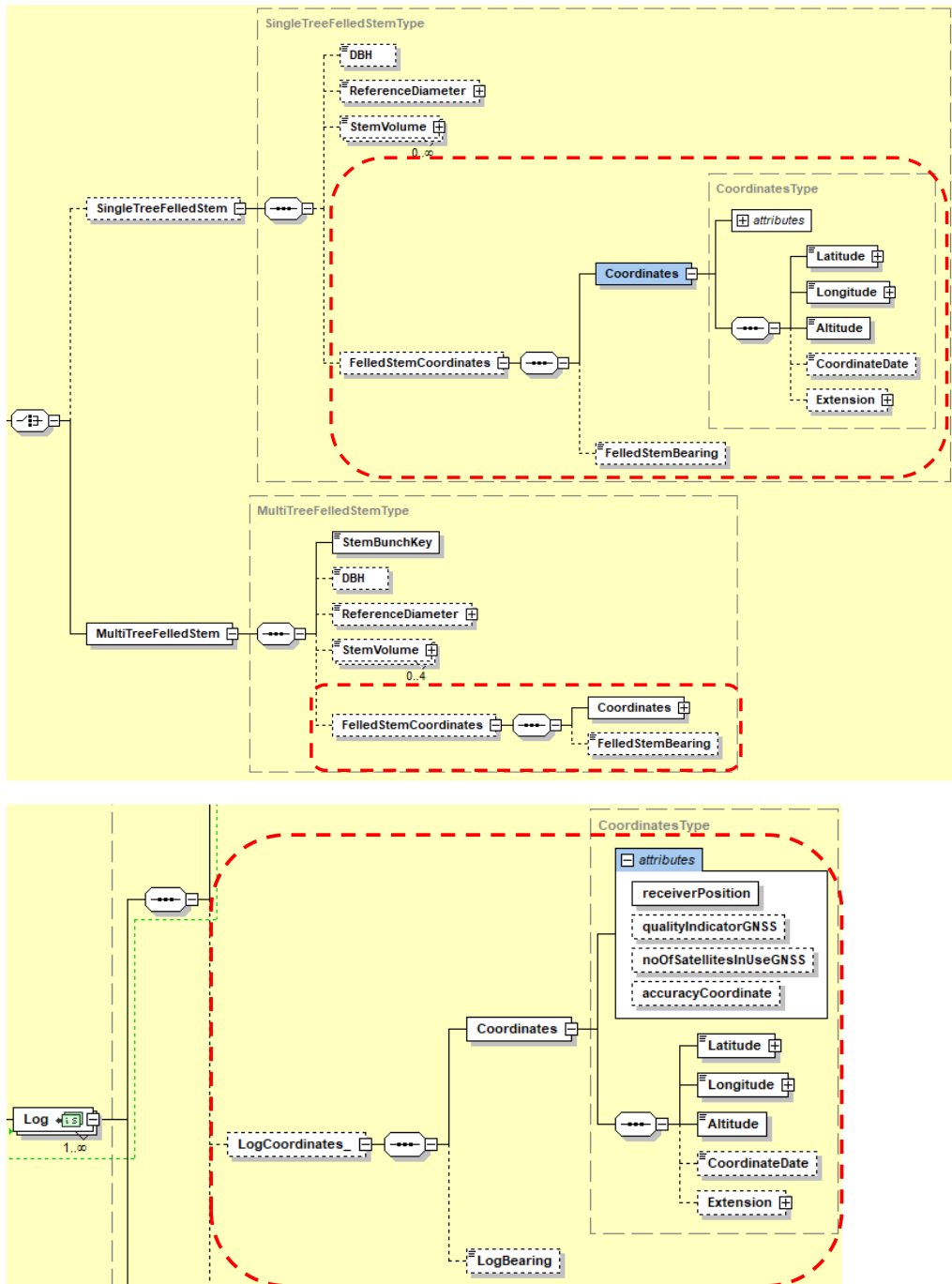


The meeting decided to change the enumeration value “Log center” to “Product position” in attribute recieverPosition in order to make it possible to use for both logs and felled stems on the ground.

	
Base machine	
Attachment center	
Product position	
Other	

It was also decided to let the secretary study the possibility of including some bearing information for logs and stems.

It is thus decided with the minutes that we implement the following structures for handling both logs and felled stems:



Updated descriptions of modified elements decided with the minutes (new text marked with red color):

Name	Unit	Data type	Description
recieverPosition	Text	List	Position of coordinates registration in file: "Base machine", midpoint between wheel pairs or tracks along the line of driving direction, typically the cab on a wheeled machine and at the rotation point on a tracked machine. "Attachment center" central position of attachment which represents the center of the object held by attachment (e.g. radial mid point of standing

			tree). Position also identical with saw on harvester head, e.g. when cutting log. "Product position" position of log or felled stem, normally where the log is picked up, e.g. mid point, between top and butt ends "Other" non standardized position, can be used together with extension
LogCoordinates			Coordinates of log
LogBearing	Degrees	Integer	The bearing (0-360 degrees) of the log on the ground. The bearing is the direction towards the small end of the log. Bearing is registered in degrees where 0° is north, 90° is east, 180° is south and 270° is west.
FelledStem-Coordinates			Coordinates of felled stem. Only used for stems on the ground or in pile.
FelledStemBearing	Degrees	Integer	The bearing (0-360 degrees) of the stem when it has been felled to the ground. The bearing is the direction towards the small end (top) of the stem. Bearing is registered in degrees where 0° is north, 90° is east, 180° is south and 270° is west.

§9 Next meetings

StanForD meeting 2022-04-26, Uppsala/Teams (10:00-15:00 CET)

The final decision to publish 4.0 will be made at the meeting in April and the schemas will be published in May 2022.

The development of version 4.0 is hereby considered "frozen" with exceptions for errors found in the pre-release schemas.

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

§10 End of meeting

The chairman Johan J Möller thanked everyone for attending the meeting.