



Arlinger John

1 December 2021

Minutes StanForD

2021-12-01

Place:	Vantaa/Teams, 2021-11-30 – 2021-12-01, 12:00-12:00 EET
Participants:	John Arlinger, Secretary Johan J. Möller, Chairman Patrik Anderchen, Södra Asko Leivonmäki, Logset/Exertus Bengt Sörvik, Otmeka (day 2 only) Étienne Pilon, FP Innovation (day 2 only) Christophe Ginet, FCBA Jonas Gustafsson, Sveaskog Halvard Olderlund, Komatsu Björn Hannrup, Skogforsk (day 1 only) Henrik Persson, Logmax Jacek Nawrot, Tigercat (day 1 only) Ian Wilson, PHD Forest (day 2 only) Jean Plamondon, FP Innovation Jeremy Gibson, PHD Forest (day 1 only) Jonas Thorsson, Dasa Juha Korhonen, Technion Erik Kindlund, JohnDeere Heikki Komulainen, Ponsse Korkiakoski Antti JohnDeere Lars Henriksson, Biometria (day 2 only) Mattias Nyström, Komatsu (day 1 only) Melkas Timo, Metsäteho Mike O'Shea, Coiltte (day 1 only) Pasi Palonen, Logset (day 1 only) Per Annemalm, Komatsu Janne Pursiainen, Ponsse Räsänen Tapio, Metsäteho Juha-Antti Sorsa, Metsäteho (day 1 only) Uli Dietz, University of Frieburg

Decision summary

Decided to do the following schema updates:

- 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 (suggested with minutes)
- 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 (suggested with the minutes).

To be discussed at next meeting:

- Possibility to include coordinates of stem-bunches on the ground after felling? (Jeremy Gibson). Additional coordinates could be added to felled stems as illustrated below.
- Go through new BarkFunction names.
- Density conversions and volume units in forwarders to be discussed again.

Action list (not updated since last meeting):

- 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 trigger 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).
- 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.

§1 Opening of meeting and agenda

Chairman Johan J Möller opened the meeting.

No “other issues” were added to the agenda. The agenda was accepted.

§2 Presentation of participants

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

§3 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:

- Old element LoadingCoordinates in fpr is deleted
- Mandatory attribute coordinateReferenceSystem moved to MessageAttributeGroup from CoordinatesType.
- New ObjectPolygon added to ObjectDefinitionType
- New element LogCoordinates added to LogType and new enumeration value “Crane tip log cut” added to attribute “recieverPosition”.

§4 Proposals new major version 4.0

GNSS PRECISION

Based on suggestions and comments from Patrik Anderchen, Södra (2021-03-18), Björn Hannrup (2021-06-09) and Per Knutsson (2021-09-07).

Quality of coordinates varies significantly depending on a number of different factors such as e.g. hardware, correction and tree canopy. How to analyse and use coordinates depends on the quality of the data, it is thus an advantage to register some quality parameters.

The following proposals are based on discussion at StanForD-meeting 2021-09-15 and two separate meeting within a smaller work group consisting of John Arlinger, Mattias Nyström, Henrik Persson, Pasi Palonen, Timo Melkas, Jonas Thorsson, Per Knutsson and Björn Hannrup.

Proposals qualityIndicatorGNSS

It was decided to add a new optional attribute qualityIndicatorGNSS to CoordinateType.

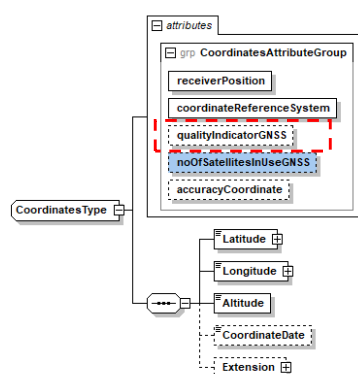
This attribute may be registered for each coordinate or only for coordinates where there is a change when comparing with the previous coordinate.

The allowed enumeration values are:

- Invalid (No Fix acquired)
- Normal (Standard position service, SPS)
- DGPS (Differential GPS Fix)
- PPS (Precise positioning service fix)
- RTK Fix (Real Time Kinematic)
- RTK Float (Float Real Time Kinematic)

- PPP RTK (Precise Point Positioning Real Time Kinematic)
- Custom (not defined, can be used when no GNSS receiver is used)
- Estimated (Estimated, dead reckoning)
- Manual (Manual input mode, e.g. used when no GNSS receiver is used)
- Simulated (Simulation mode)

Name	Data type	Unit	Description
qualityIndicatorGNSS	Enumeration list		Quality indicator of position generated by GNSS receiver. Only need to be register in case there is a quality change. The allowed enumeration values are: Invalid (No Fix acquired), Normal (Standard position service, SPS), DGPS (Differential GPS Fix), PPS (Precise positioning service fix), RTK Fix (Real Time Kinematic), RTK Float (Float Real Time Kinematic), PPP RTK (Precise Point Positioning Real Time Kinematic), Custom (not defined, e.g. no GNSS used), Estimated (Estimated, dead reckoning), Manual (Manual input mode), Simulated (Simulation mode)

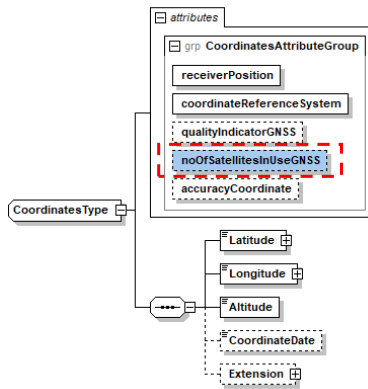


Proposals noOfSatellitesInUseGNSS

It was decided to add a new optional attribute noOfSatellitesInUseGNSS to CoordinateType.

Number of satellites in use (for estimating position) by the GNSS receiver. Observe that this is not the number of satellites in view.

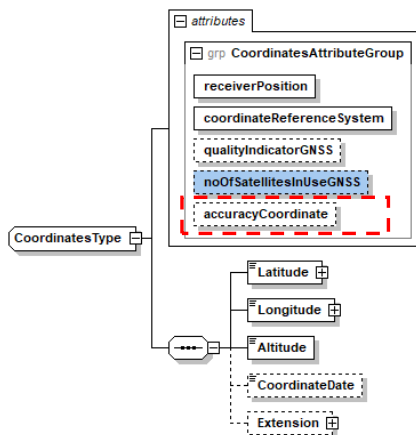
Name	Data type	Unit	Description
noOfSatellitesInUseGNSS	Integer	No	Number of satellites in use (for estimating position) by the GNSS reciever. This is excluded if GNSS is not used at all. Observe that this is not the number of satellites in view.



Proposals accuracyCoordinate

It was decided to add a new optional attribute accuracyCoordinate to CoordinateType.

Name	Data type	Unit	Description
accuracyCoordinate	nonNegativeDecimal	m	Accuracy value of position, in unit meter. Observe that the exact calculation method for this attribute is not defined at present.

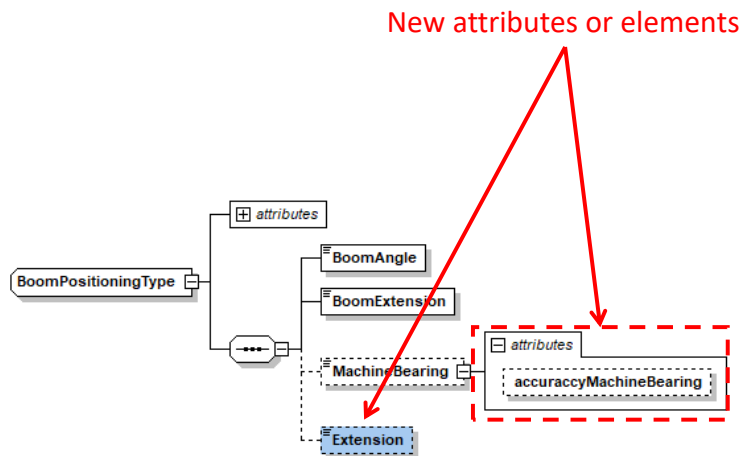


Proposals accuracyMachineBearing

It was decided to add a new optional attribute accuracyMachineBearing to BoomPositioningType.

Name	Data type	Unit	Description
accuracyMachineBearing	nonNegativeDecimal	Degrees	Accuracy value of machine bearing, unit in degrees with at least one decimal. Observe that the exact calculation method for this attribute is not defined at present.

It was also decided that we add an extension element to the BoomPositioningType as illustrated below:



Proposal receiverPosition

The present attribute includes enumeration values that are a mix of antenna position, other positions and events (e.g. tree felling, log cut).

Assuming high positioning accuracy the user of data primarily needs information about the position of the following items:

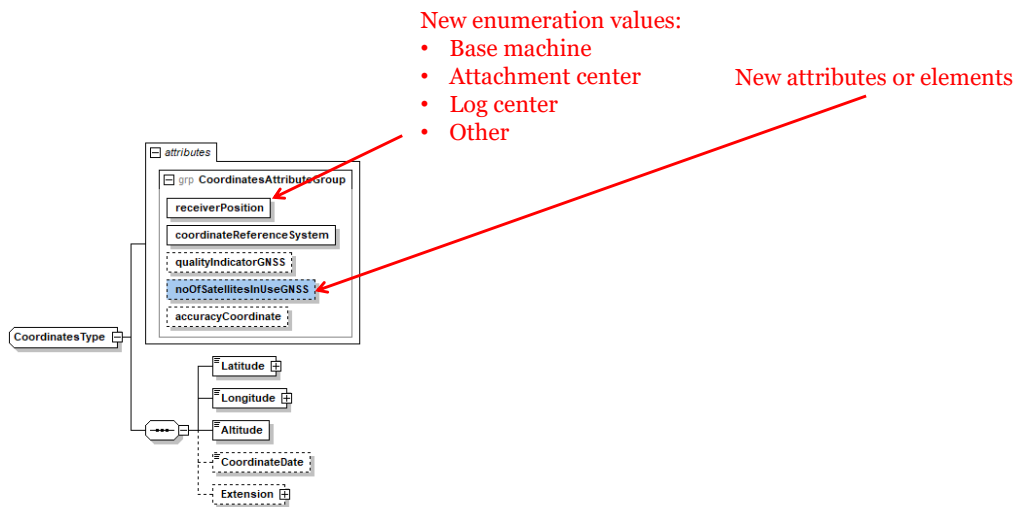
- Machine center
- Tree position
- Log position

It was therefore decided that we exclude “events” from the receiverPosition and update the enumerations according to the following list:

- “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” non standardized position, can be used together with extension

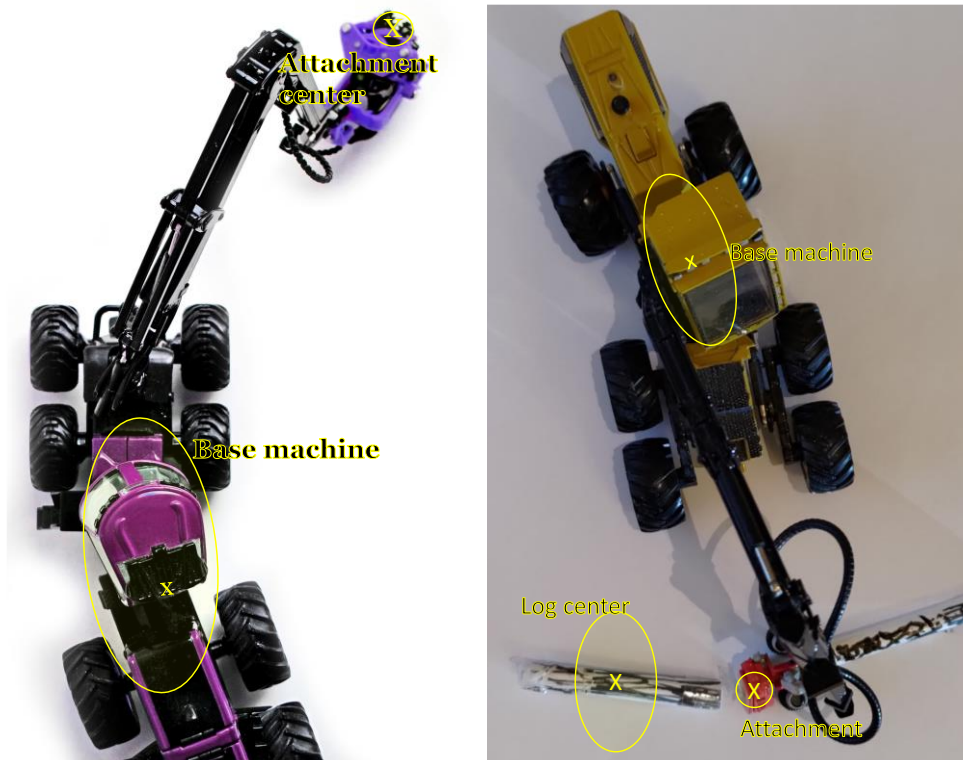
Name	Data type	Unit	Description
receiverPosition	Enumeration	list	Position of coordinates registration in file: “Base machine”, midpoint between wheel pairs or tracks along the line of driving direction, typically the cab on a wheeled machine and at the rotation point on a tracked machine. “Attachment 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. “Log center” position of physical mid point, between top and butt ends

			"Other" non standardized position, can be used together with extension
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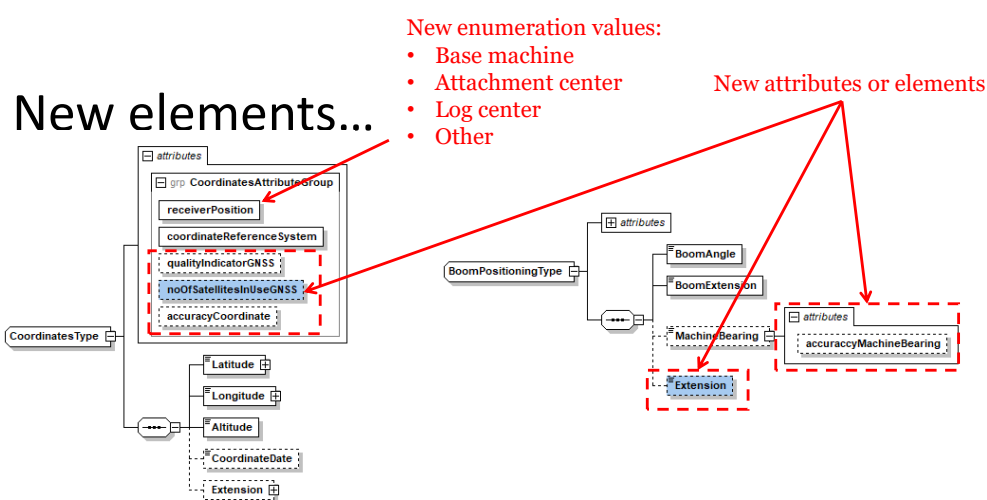
Examples receiverPosition

The size of the circles indicate how “well defined” a position is.





Illustrations of all positioning updates:



Comments

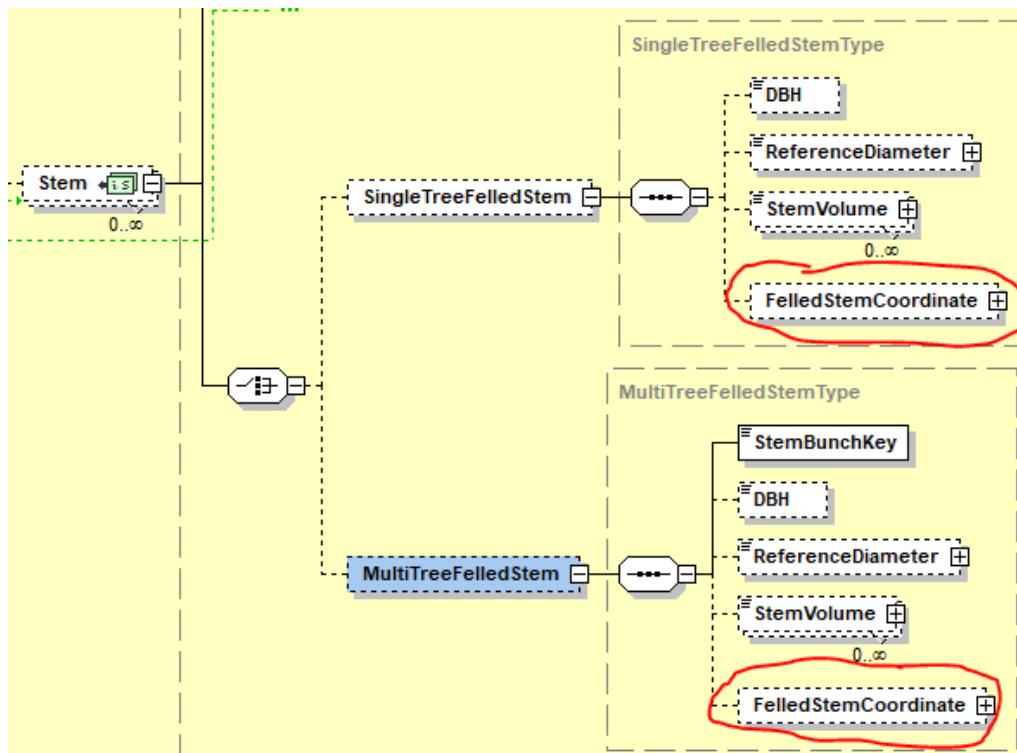
What if the location of the machine is not defined by GNSS at all? (Pasi Palonen)

A machine can be localized with other sensors (camera/lidar or both) on a 3D enhanced map quite accurately when the satellites are out or in bad reception. A robot vacuum/lawnmower with a really cheap laserscanner can do that today.

It is recommended that “noOfSatellitesInUseGNSS” is not to be included at all if GNSS receiver is not in use (maybe add to description that this is excluded if GNSS is not used at all) and that the value “Custom” is to be used for attribute qualityIndicatorGNSS.

Possibility to include coordinates of stem-bunches on the ground after felling? (Jeremy Gibson)

Additional coordinates could be added to felled stems as illustrated below. It was decided to discuss this at the next meeting.



NEW BARK FUNCTION

A significant proportion of the harvested volumes from thinning consists of birch in Sweden. Up to 18% of the harvested volumes consists of birch in the south of Sweden (Södra skogsägarna). In first thinnings the proportion increases slightly to 19%. Today this is a significant limitation in using harvester measurements for paying forest owners since the presently used bark functions gives systematic errors that are deemed to be too high. A maximum of 10% birch is allowed when using harvester measurements for payment.

Björn Hannrup, Skogforsk, has analyzed the possibility of improving bark functions for birch in Sweden. A first analyses was carried out in 2019 based on data from the southern half of Sweden. Additional data was collected in 2020 and 2021 for the northern half of the country.

To analyse the existing functions as well as studying possible new functions, a total of 422 birch trees were sampled and measured by a number of harvester auditors from the national wood measurement organization (Biometria).

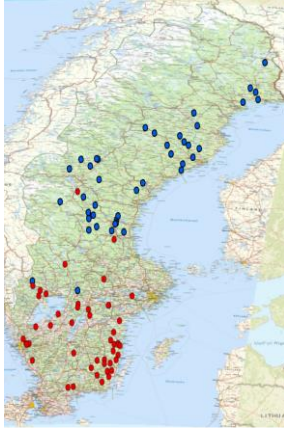


Figure 1. Map illustrating where birch trees were sampled (red=2018/19, blue=2020/21).

Table 1. Statistical key figures for sampled areas and trees.

Variable	Unit	N	Mean	Stdv.	Min	Max
Latitude	°N	422	60,7	3,1	56,3	67,1
Longitude	°O	422	16,1	2,5	12,1	23,2
Age	Years	417	48,2	21,3	10,0	140,0
DBH	Mm	422	187,9	63,8	61,0	423,0

The double bark thickness was measured at the butt and top end of each log as well as at breast height.

Two different types of bark functions were evaluated, a logistic and a logarithmic function. The logistic function is identical with the function implemented in StanForD2010 version 3.4 (2019-02-06) within element LogisticTypeBarkModel.

Logistic function

db = double bark thickness, mm

D = diameter on bark, cm

H = height in stem (distance from the stump cross section),m

$$[7] \quad db = \frac{a_3}{1 + (\frac{a_3}{a_1} - 1)e^{(-a_2H)}} + (\frac{b_3}{1 + (\frac{b_3}{b_1} - 1)e^{(-b_2H)}})D + \varepsilon$$

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

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

Parameter values for the logistic function were estimated using very advanced techniques based on an iterative process which includes the Levenberg-Marquard algorithm. Estimating the parameters of the logarithmic function is much simpler using basic regression techniques.

It can be noted from the table below that the systematic differences for the whole material are on the same levels for both functions using parameters estimated in the study while the original parameters from 2014 does not work very well on Swedish birch (generate underestimates).

Table.5. No of observations, systematical error (bias) and standard deviation for deviation between measured and calculated double bark thickness with functions developed in this study as well as logistic function where birch parameters according to Petrauskas (2014) was used.

Function	N	Bias	Stdev	Min	Max
Logarithmic, Parameters 2021	2394	0	4,92	-20,8	43,2
Logistic, Parameters 2019	2394	0,34	4,98	-19,8	42,3
Logistic, Parameters Petrauskas m. fl. 2014		2,19			

However, as illustrated below, there are large differences in the bias when analysing trees divided up into different dbh-classes for the logistic function. The bias for small trees below 12 cm is very high. This is a problem since around 16% of the harvested birch volume in thinnings is cut from trees below 12 cm (southern Sweden). This proportion is around 25% in 1st thinnings. With a bias of 2.5 mm, we will overestimate the volume under bark with approximately 6% for trees below 12 cm.

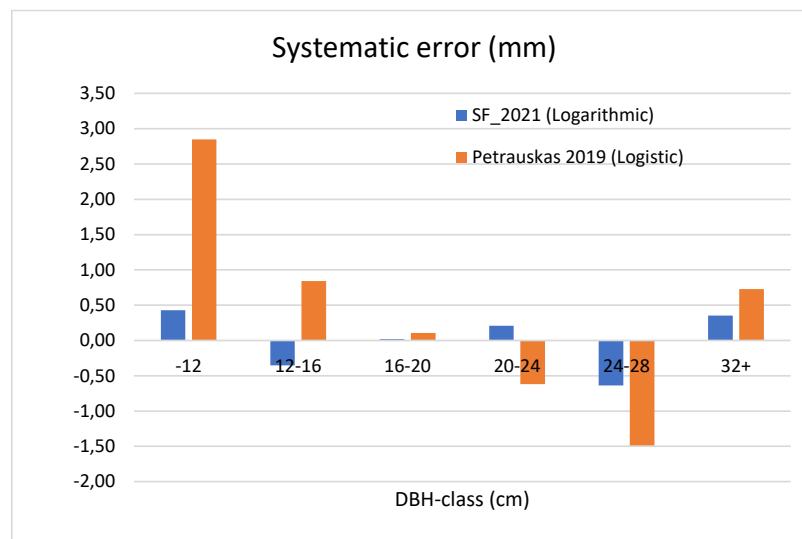


Figure 9. Systematical error (bias) per DBH-class for the logistic and logarithmic function.

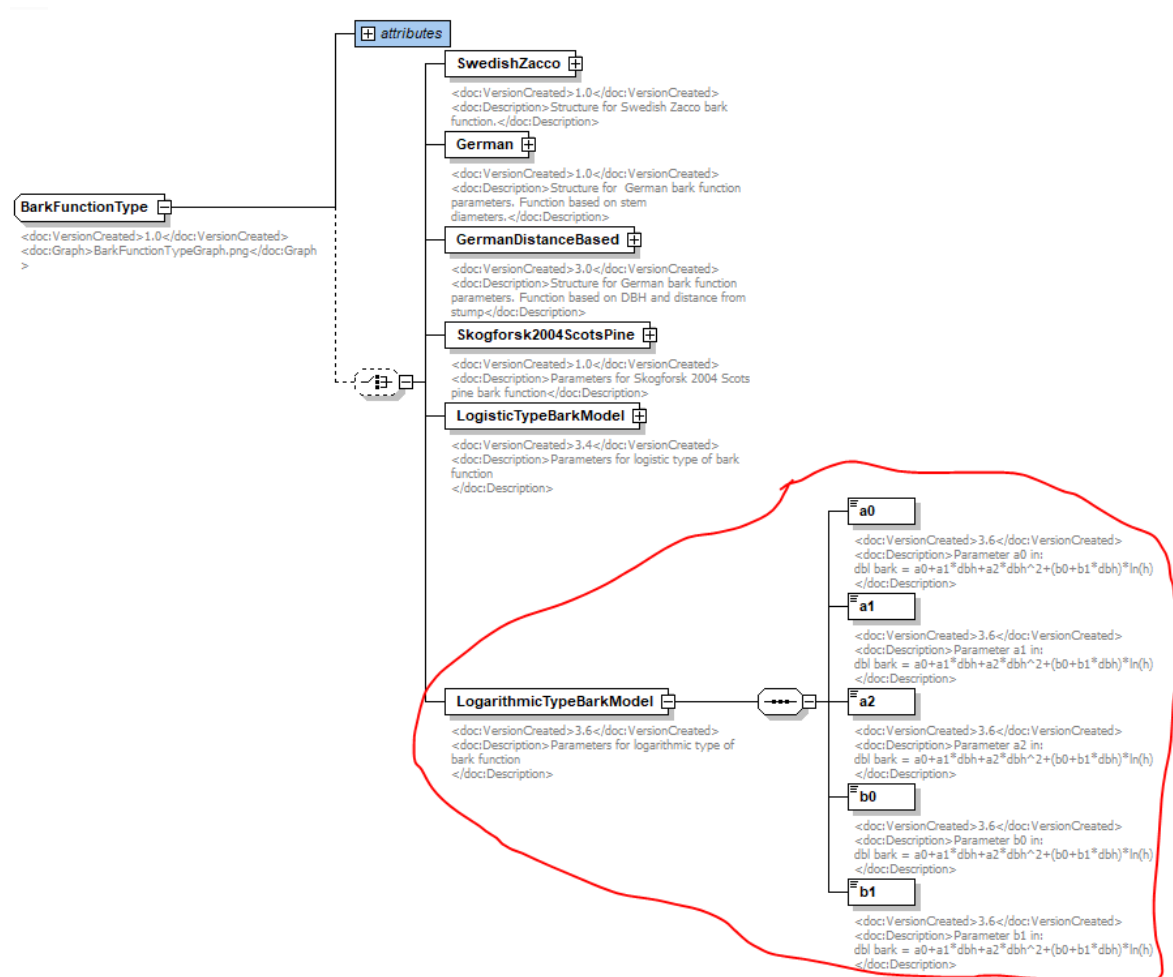
In Sweden today the bark function for Scots pine (Hannrup 2004) is commonly used for birch. This function gives a small bias for small trees while it gives significant bias on large trees (+5.6% on m³sub) above 30 cm at breast height.

It is for the following reasons suggested that we implement the logarithmic bark function for birch as an additional bark function:

- No bias in any size classes

- Much simpler to estimate and understand the new parameters
- Possible to start using harvester measurements on a wider scale where volumes are paid per m3 under bark

It was thus decided to add a new structure for logarithmic bark functions under BarkFunctionType as illustrated below:



The data type for all elements a0-b1 are to be “decimal”.

Name	Data type	Unit	Description
LogarithmicTypeBarkModel			Parameters for logarithmic type of bark function
a0	Decimal		Parameter a0 in: $dbf\ bark = a0 + a1 \cdot dbh + a2 \cdot dbh^2 + (b0 + b1 \cdot dbh) \cdot \ln(h)$ dbf_bark: double bark thickness, cm dbh, diameter at breast height, mm h: height from stump, cm
a1	Decimal		Parameter a1 in: $dbf\ bark = a0 + a1 \cdot dbh + a2 \cdot dbh^2 + (b0 + b1 \cdot dbh) \cdot \ln(h)$ dbf_bark: double bark thickness, cm dbh, diameter at breast height, mm h: height from stump, cm

Name	Data type	Unit	Description
a2	Decimal		Parameter a2 in: $dbl\ bark = a0 + a1*dbh + a2*dbh^2 + (b0 + b1*dbh)*\ln(h)$ dbl_bark: double bark thicknes, cm dbh, diameter at breast height, mm h: height from stump, cm
b0	Decimal		Parameter b0 in: $dbl\ bark = a0 + a1*dbh + a2*dbh^2 + (b0 + b1*dbh)*\ln(h)$ dbl_bark: double bark thicknes, cm dbh, diameter at breast height, mm h: height from stump, cm
b1	Decimal		Parameter b1 in: $dbl\ bark = a0 + a1*dbh + a2*dbh^2 + (b0 + b1*dbh)*\ln(h)$ dbl_bark: double bark thicknes, cm dbh, diameter at breast height, mm h: height from stump, cm

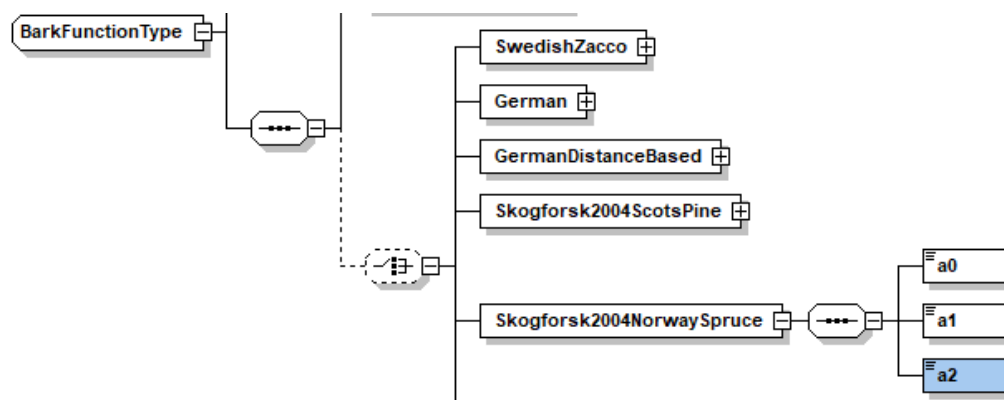
MERGING BARK FUNCTIONS

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 a0, a1 and a2 ($a0 + a1*dbh + a2*diameter_ob$) to the spi as illustrated below:



It was noted, shortly before the 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:

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

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 Skogforsk2004NorwaySpruce if a3 is set to 0.

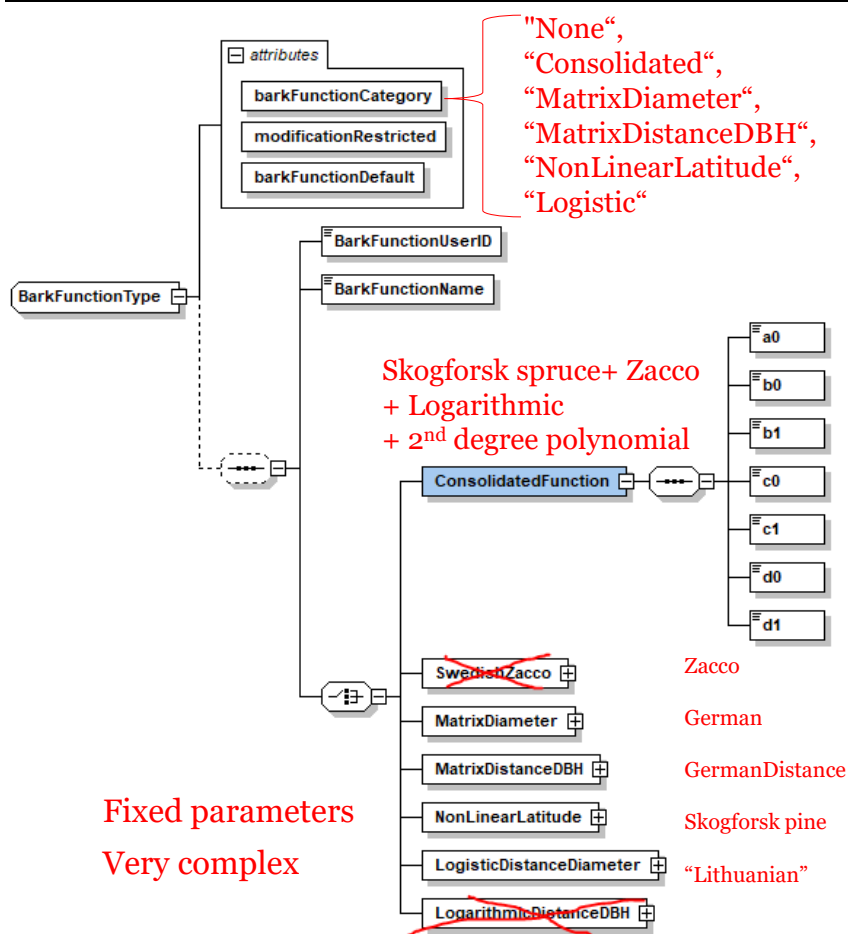
It was also suggested after the meeting (discussion with Henrik Persson and Björn Hannrup) that we also merge the logarithmic function into a new “consolidated function” as illustrated below:

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

It was decided with the minutes to add a new type of bark function “ConsolidatedFunction” with the following elements. It is also suggested with the minutes that we add two identification elements for each set of bark parameters (BarkFunctionUserID and BarkFunctionName):

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
c0	Decimal		Parameter c0 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
c1			Parameter c1 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
d0			Parameter d0 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
d1			Parameter d1 in: $\text{dbl bark} = a_0 + b_0 \cdot D + b_1 \cdot D^2 + c_0 \cdot \text{DBH} + c_1 \cdot \text{DBH}^2 + (d_0 + d_1 \cdot \text{DBH}) \cdot \ln(H)$ dbl_bark: double bark thickness, cm DBH, diameter at breast height, mm D: diameter on bark, mm H: distance from stump, cm
BarkFunctionUserID		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.
BarkFunctionName		Free text	Name per bark function



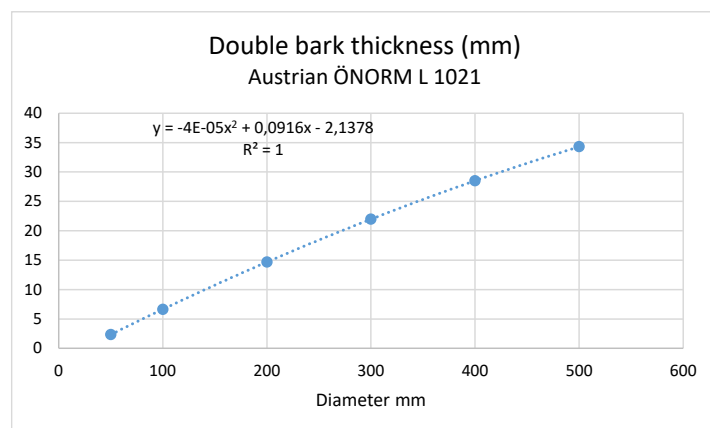
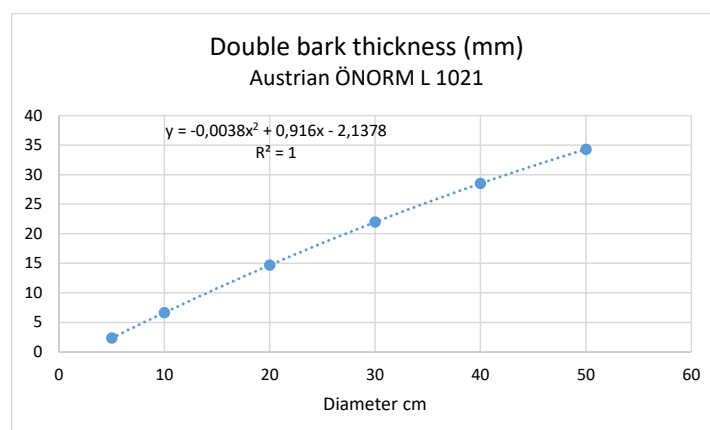
Below is an example of how to use the new consolidated bark function for a number of existing functions. Observe that "x" indicates that the element should have a value larger or smaller than zero (<>0).

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:



UPDATING BARK AND DENSITY PER OBJECT (NZ/AUSTRALIA)

Harvesters/Processors:

A lot of thinnings are carried out in Australia – a typical regime on flat sites is 2 or 3 thinnings. *Pinus radiata* (the most common species) develops very thick bark on the butt as it ages – at clearfell age 2bt could be 10-15cm on a 55cm dbh tree. Sophisticated (GPS derived) biometry of Sweden and Finland is not available so the linear Zacco function with different parameters at different ages is often used. Primarily apt-instruction files are in use and bark parameters are changed for each apt.

The objective is to have single species name and single assortment names across all sites/ages and vary the bark for each object as required similar to what the GPS derived function allows.

In theory StanForD 2010 would let us use userid and have multiple species groups with the same species name but then we would have to replicate all the assortments.

Forwarders:

We are running and recommending forwarders be run on StanForD 2010 only – fdi/foi instructions, fpr production file.

An issue for us is density kg/m³. As we see it we would like the ability to link this to the Object rather than the Delivery. We can see swings of 20% on a seasonal, soil type or age basis and would like the ability to set and communicate the density on an object basis.

An idea that has been discussed is putting the density in the foi somehow. The logic would then be that when an object is created using fdi/foi that if there is no density in the foi then the density from the fdi would be used. If there was a density in the foi then the foi density would be used. If a delivery was manually added to the object in the machine, then the fdi density would be presented but the operator could override it for the object.

Bunchers:

An area where we see great potential in the bunchers is in helping operators 'build the bunch' so that it is appropriate for the grapple capability of the yarder and the deflection (amount of lift) – Ian can explain this better than me....

We are thinking the way this might work is if there is a conversion table from the dbh or reference diameter to volume and/or weight. This would probably be per species and not too difficult for a forest manager to describe from inventory or operational data. The issue would be in communicating it in a standard way. The buncher requires an spi so this 'table' could go in there but the values are likely to be site specific so would be more appropriate in the boi. Again, there could be a default table in the spi but overridden by values in the boi. Also, to go from volume to weight species would need a density which is currently defined on delivery but is usually species derived...

An issue in here is that the diameter sensor position on a felling head is only going to be at a reference height rather than actually passing over the dbh point and each brand and model of head is probably going to have a different position, so does the butt extrapolation function (or something else) get used to convert refdiam to dbh and then a lookup table used or is the lookup table developed based on reference height?

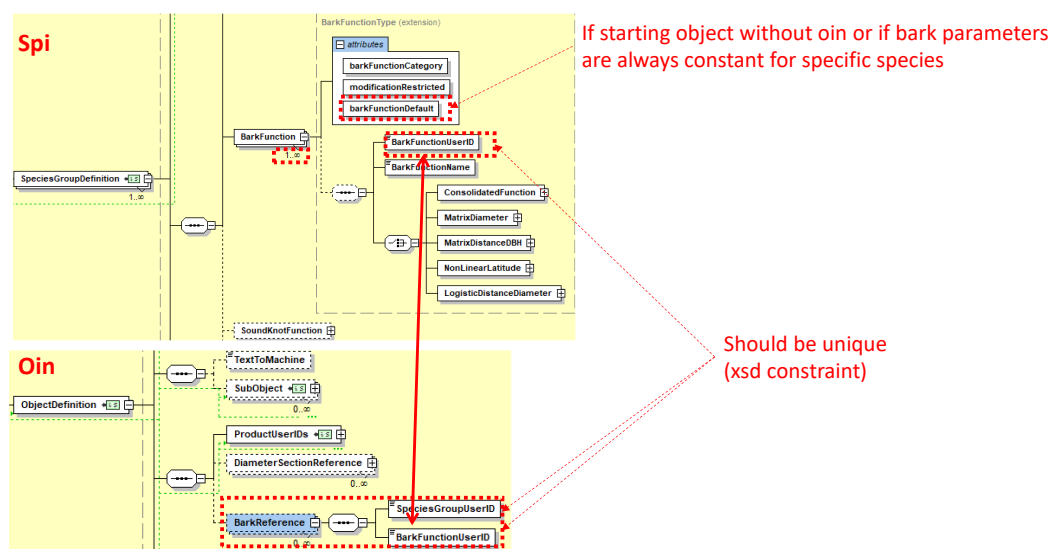
Proposal controlling bark parameters

A separate meeting was held 2021-11-08 to discuss this issue in more detail. The proposals below are based on that discussion.

Observe that this is a very complex issue since it has many different implications. E.g. it breaks the fundamental idea that all species parameters sent to a machine

are located within the spi. It does not only affect the instructions but also how to report the parameters in e.g., hpr and mom.

It was decided that the element BarkFunction is made repeatable in the spi-file and that two new elements/attributes barkFunctionDefault, BarkFunctionName and BarkFunctionUserID are added to the spi and oin as illustrated below:



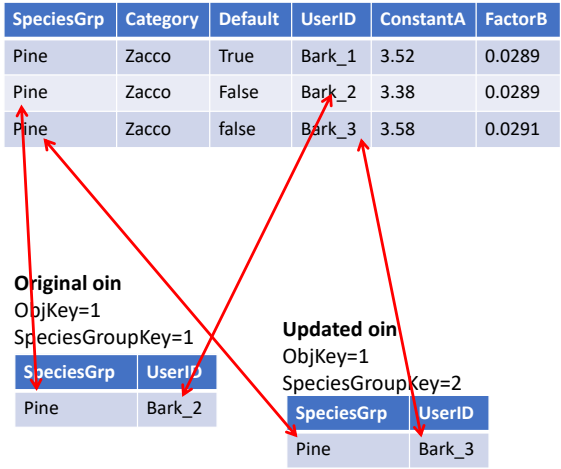
Name	Data type	Unit	Description
barkFunctionDefault	Boolean	True/false	Attribute defining the default bark function to use in case no BarkReference (BarkFunctionUserID) is included in oin-file.
BarkFunctionUserID	String	Free text	Identity per bark function defined by user of data, normally logging organisation 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), /, \, , *.
BarkReference			Structure for referencing which bark function to use at specific object.

Example with several bark settings in spi.

This example illustrates that the SpeciesGroupKey must be updated when receiving or changing the bark settings. A new version (modificationDate and

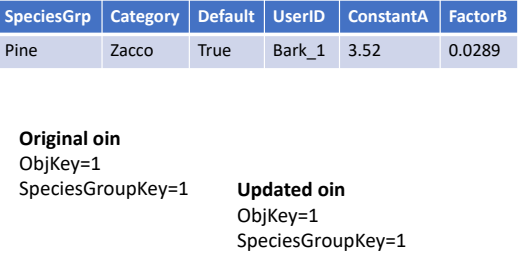
SpeciesGroupKey) is thus created for each object in cases where the bark function is changed with each object.

Spi with multiple bark setting



Example with only one bark setting per species in spi
In case the bark function is static (never changed between different objects) it is enough to include one bark function per species in the spi without a BarkReference in the oin as illustrated below.

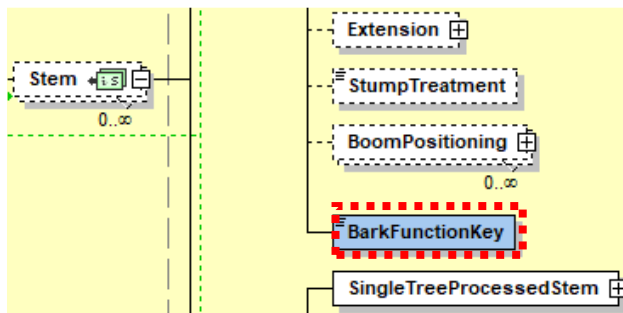
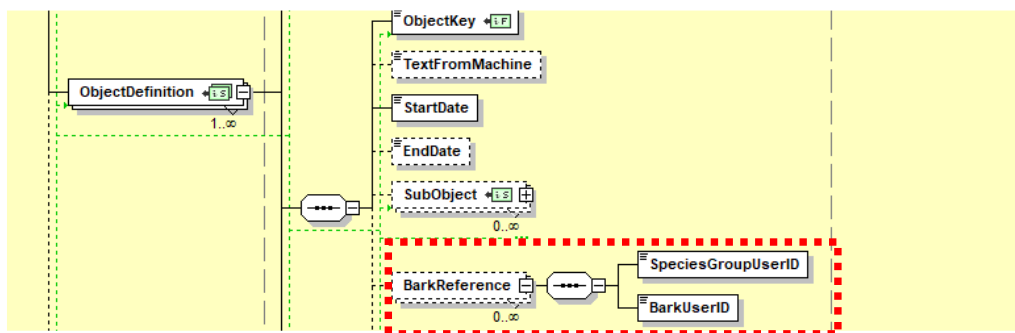
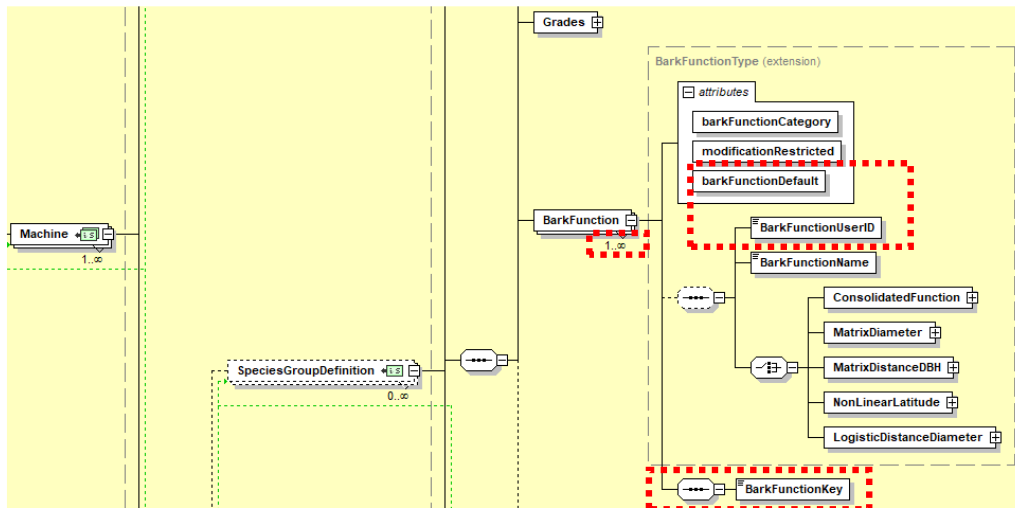
Spi with single bark setting (as today)



Proposal following up bark parameters in hpr

Following up bark parameters in hpr
A solution could have been to include all settings as registered in oin and spi. This means that we lose the possibility to identify exactly which type of bark function has been in use at a specific time. This means that the SpeciesGroupKey does not have to be updated each time the bark function parameters are changed using an updated oin.

It was decided to do the following updates to the hpr:



Name	Data type	Unit	Description
barkFunctionDefault	Boolean	True/false	Attribute defining the default bark function to use in case no BarkReference (BarkFunctionUserID) is included in oin-file.
BarkFunctionUserID	String	Free text	Identity per bark function 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), /, \, , *.
BarkFunctionKey	Integer	Sequential number	Machine specific identity per bark function set by machine. Must be updated if any modifications to function is done. Running number reset only when MachineKey is changed.

Spi with multiple bark setting

SpeciesGrp	Category	Default	UserID	ConstantA	FactorB
Pine	Zacco	True	Bark_1	3.52	0.0289
Pine	Zacco	False	Bark_2	3.38	0.0289
Pine	Zacco	false	Bark_3	3.58	0.0291

Complete hpr based on both oin-files

SpcsGrpDefinition:

SpcsGrp	Category	BarkUserID	BarkKey	SpcsGrpKey
Pine	Zacco	Bark_1	21	1
		Bark_2	22	
		Bark_3	23	

ObjectKey	Category	BarkReference
1	Zacco	Pine, Bark_3

Original oin
ObjKey=1

SpeciesGrp	UserID
Pine	Bark_2

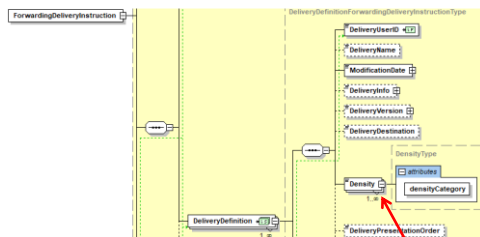
Updated oin
ObjKey=1

SpeciesGrp	UserID
Pine	Bark_3

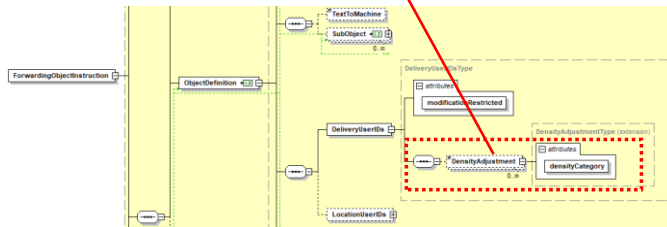
StemKey	SpcsGrp-Key	DBH	Bark-Key
1	1	345	22
2	1	234	22
3	1	343	33
4	1	237	33
5	1	251	33

Proposal controlling Density per object

It was decided that the foi is updated with a new optional element DensityAdjustment per Delivery as illustrated below.



Delivery	Density
Pine sawlog	800
Pine pulp	890

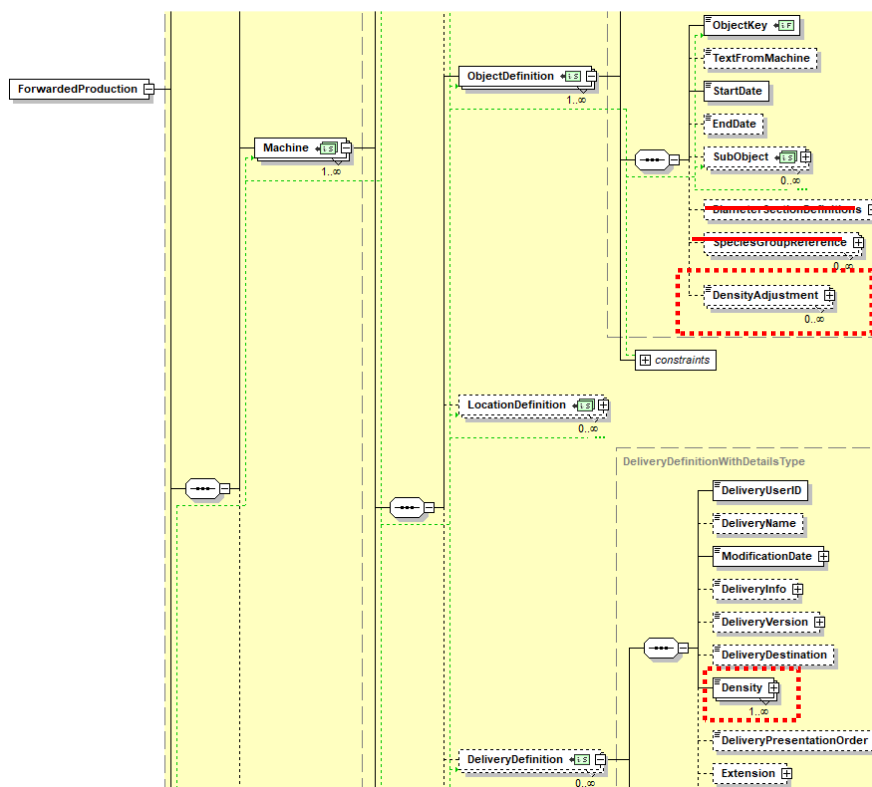


Delivery	DensityAdjustment
Pine sawlog	-15
Pine pulp	+10

(kg/m3)

Name	Data type	Unit	Description
DensityAdjustment	Decimal	kg/m3	Adjustment of basic density (kg/m3 for conversion between volume and mass per delivery definition. Observe that this means that the value in element Density is adjusted with the value in DensityAdjustment which makes it possible to use modify the density value for individual objects without distributing new fdi-files.
densityCategory	Enumeration	List	Allowed values defining volume unit in density: "Under bark", "On bark", "Not specified"
Density (in fdi)	PositiveDecimal	kg/m3	Basic density (kg/m3) for conversion between volume and mass per delivery definition. Observe that this means that the value in element Density is adjusted with the value in DensityAdjustment which makes it possible to modify the density value for individual objects without distributing new fdi-files.

It was also decided that the element DenistyAdjustment is included per object in the fpr-schema. Observe that this solution means that only the last DensityAdjustments are included in the fpr since the ObjectKey is never updated and it thus not possible to follow up when a DensityAdjustment was modified. However, this possible to calculate by comparing the mass and the volume of a forwarded partial load.



Name	Data type	Unit	Description
DensityAdjustment	Decimal	kg/m3	Adjustment of basic density (kg/m3 for conversion between volume and mass per delivery definition. Observe that this means that the value in element Density is adjusted with the value in DensityAdjustment which makes it possible to use modify the density value for individual objects without distributing new fdi-files.
densityCategory	Enumeration	List	Allowed values defining volume unit in density: "Under bark", "On bark", "Not specified"

Proposal stem volume estimations in feller bunchers

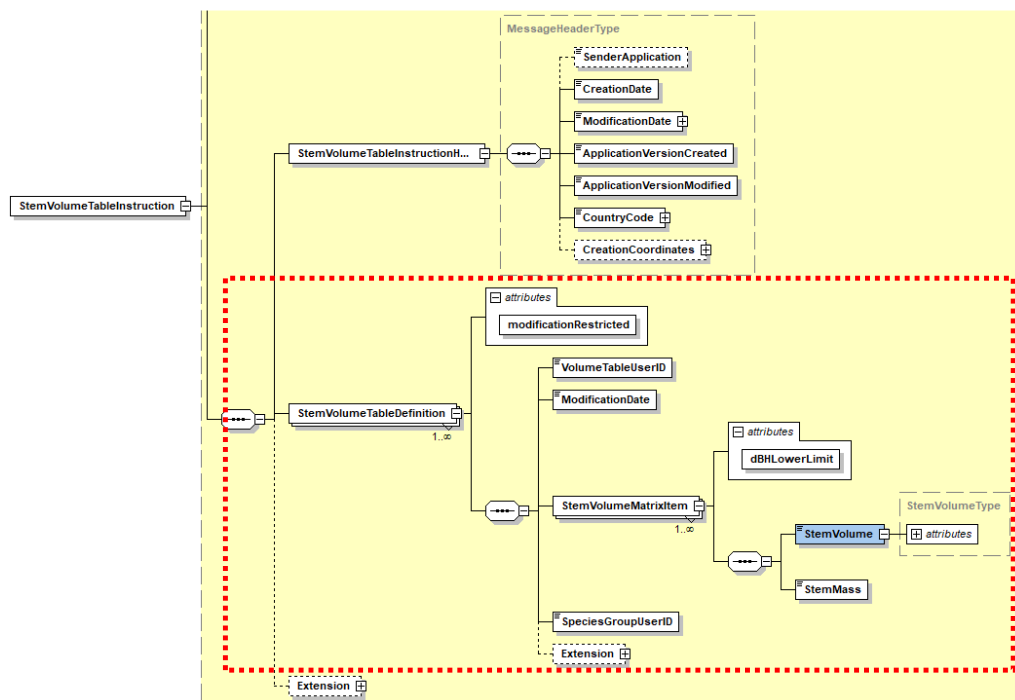
Feller-bunchers only measure a reference diameter at the butt end of the stem. There are also other machine types that handles stems without any detailed measurements such as yarders and skidders.

The objective of this proposal is to make it possible to estimate volume and mass of a stem bunch in order to help the operator make stem bunches of suitable size for transportation to landing.

Below is a possible volume matrix that could be used by feller-bunchers in combination with the ButtEndExtrapolation function (exists in spi):

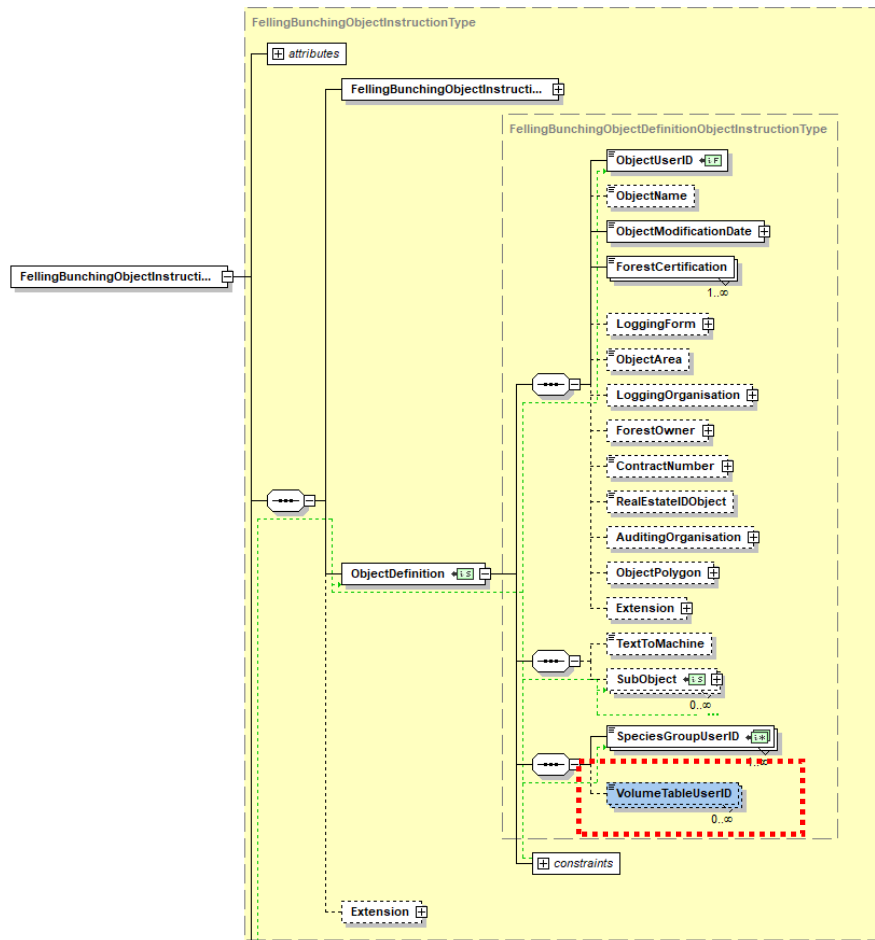
Species	DBHLowerLimit	StemVolumeOb	StemMassKg
P. Radiata	100	0.1	100
P. Radiata	150	0.15	150
P. Radiata	200	0.2	200
P. Radiata	250	0.25	250
P. Radiata	300	0.33	330
P. Radiata	350	0.35	350
P. Radiata	400	0.4	400

The possibility of adding a structure for the volume table inside the spi was discussed. However, since this type of table probably would change with each individual object a simpler solution is probably to create a separate schema. This is a simpler solution that does not increase the complexity of the oin or spi. It was therefore decided to add a new vti-schema (volume table instruction) is therefore suggested:



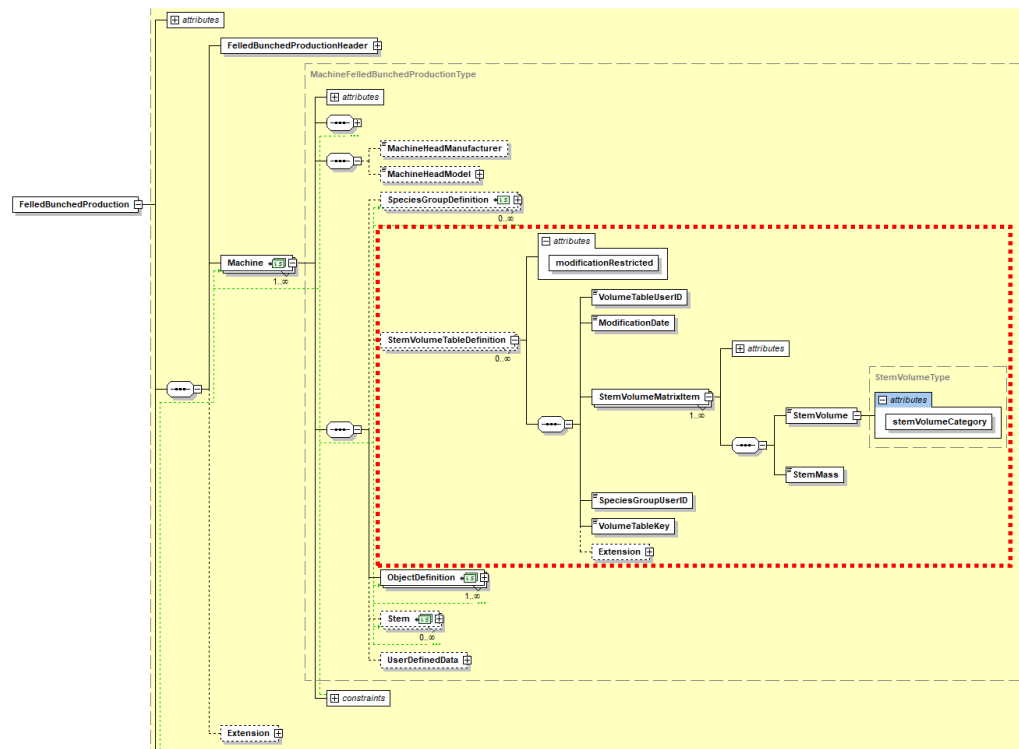
Name	Data type	Unit	Description
messageType	string	List	Enumeration list of file extensions of StanForD 2010 messages: Allowed value in VolumeTableInstruction message is: "vti"
StemVolumeTableInstruction			The root element of the VolumeTableInstruction message.
StemVolumeTableDefinition			Structure for stem volume tables used by e.g. feller-buncher
modificationRestricted	Boolean	true/false	If attributes value is "true" then modification of the definition is restricted, if "false" then modification is allowed
VolumeTableUserID	string	Free text	Identity per volume table 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, %, ?, !, @, #, \$, %, &, ' (double quote), /, \, , *.
ModificationDate		yyyy-mm-ddThh:mm:ss[+ -]hh:mm	Date and time when volume table definition was last modified. VolumeTableKey updated if modified in machine. Time stamp must have the following times registered: local time $\pm$ offset from UTC.
StemVolumeMatrixItem			Price, length distribution, color and limitation for each length and diameter class.
dbhLowerLimit	Positive Integer	Mm	Lower diameter limit of DBH class.
StemVolume	nonNegative Decimal	m3	Volume of stem
stemVolumeCategory	string	List	Enumeration list: "m3sob" = Volume m3sob, "m3sub" = Volume m3sub, "m3sobEstimated" = Estimated volume m3sob, "m3subEstimated" = Estimated volume m3sub.
StemMass	nonNegative Decimal	Kg	Mass of stem
SpeciesGroupUserID	string	Free text	Identity per species group 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, %, ?, !, @, #, \$, %, &, ' (double quote), /, \, , *.

The boi needs to be updated with a reference to a specific volume table per species group in a way similar to how the species groups are referred to. It was therefore decided to add VolumeTableUserID to the boi:



Name	Data type	Unit	Description
VolumeTableUserID	string	Free text	Identity per volume table 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), /, \, , *.

It was finally decided to update the production file (bpr) in order to include the volume tables in use:



Name	Data type	Unit	Description
VolumeTableKey	positiveInteger	sequential no	Machine specific identity per volume table set by machine. Must be updated if any modifications to volume table definition is done. Running number reset only when MachineKey is changed.

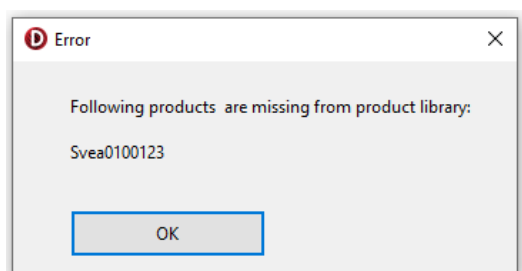
DESCRIPTIVE PRODUCT INFORMATION IN OIN

Jonas Gustafsson, Sveaskog, 2021-11-17.

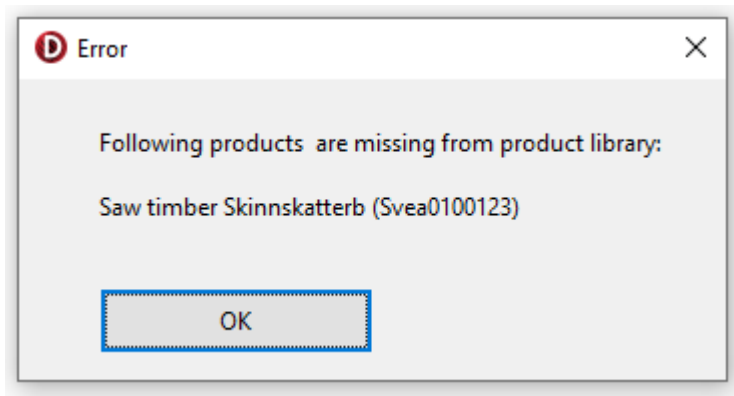
Sveaskog is starting to use the possibility of sending out updated oin-files to harvesters, typically when there is a need to change the product mix during harvesting at an object.

This means that the frequency of incorrect oin-files increases. This means oin-files with a ProductUserID that has not been sent to the harvester in a pin-file.

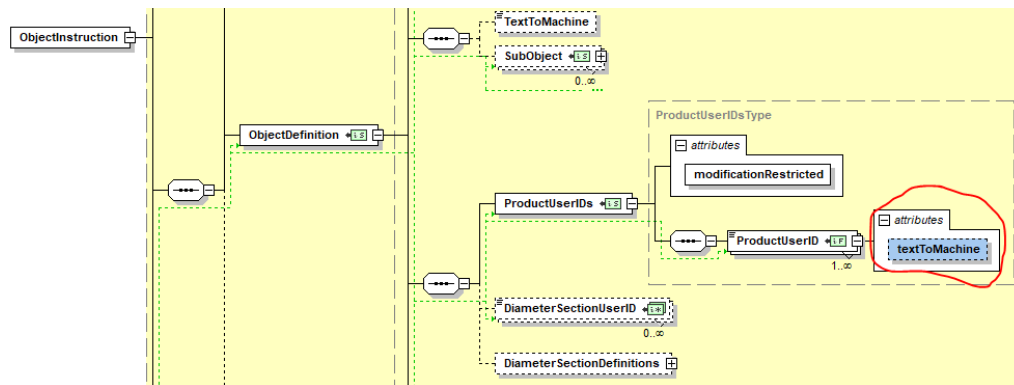
Today it is only possible to present an error message with the ProductUserID included in the oin as illustrated below:



If we add an additional attribute, it would also be possible to communicate for example the product name as illustrated below:

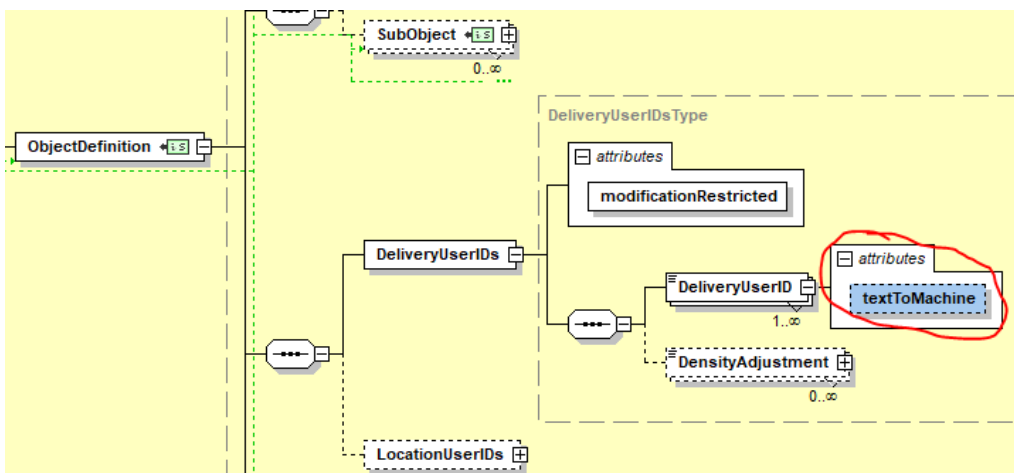


It was thus decided that a new optional attribute textToMachine is added to the ProductUserID in the oin.



Name	Data type	Unit	Description
textToMachine	string	free text	Text related to product referenced in oin.

It was also decided that a new optional attribute textToMachine is added to the DeliveryUserID in the foi.



Name	Data type	Unit	Description
textToMachine	string	free text	Text related to delivery referenced in foi.

LOGGING OF DE-ACTIVATED MOM-APPLICATION

Issue discussed at last meeting. Proposal withdrawn by Henrik Persson.

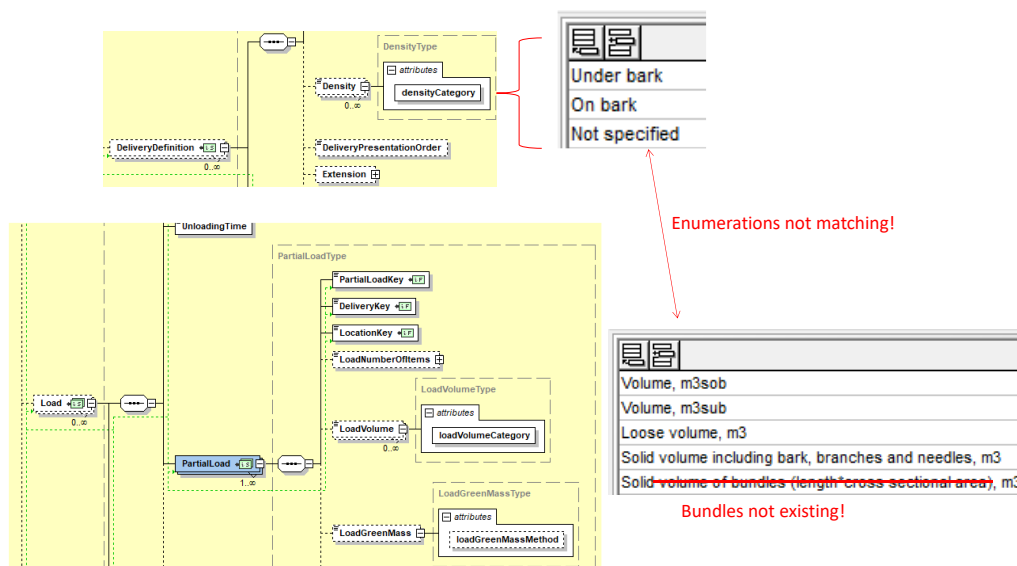
§5 Items for discussion

DENSITY CONVERSIONS IN FORWARDER

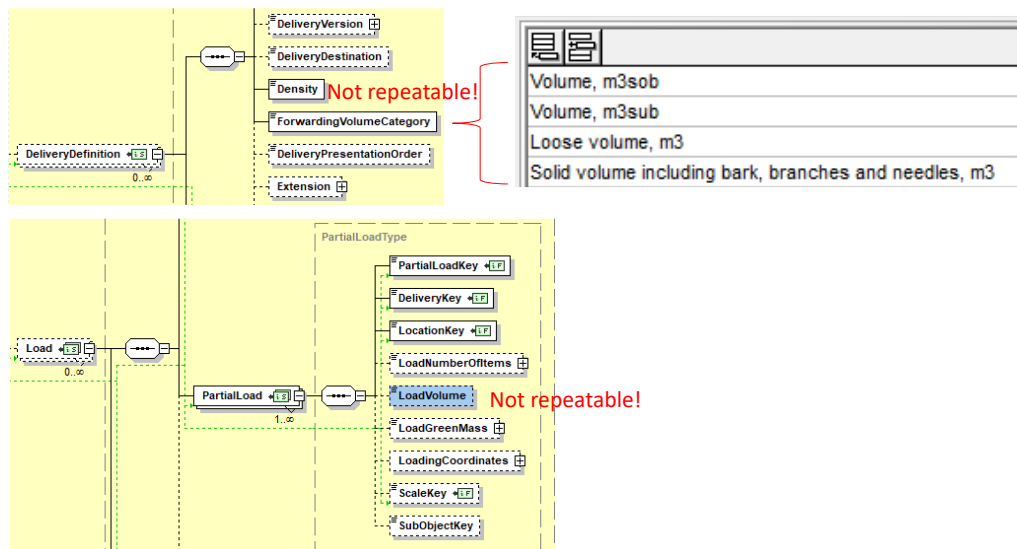
John Arlinger, 2021-11-25

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

This is due to the fact that enumeration values in densityCategory and in loadVolumeCategory are not comparable with each other.



One solution could be to modify these elements:



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.

It was decided to discuss this further at the upcoming meeting in February (2021-02-08).

FUEL AND CO₂ REPORTING IN HPR AND FPR

Tapio Räsänen, Metsäteho.

The pressure to report carbon emissions in forest industry is growing

- parties do not have a shared view if site-specific reporting will be required one day
- StanForD could be proactive in the issue

Common routines and systems are needed to monitor fuel consumption and emission developments

- Best place to calculate the emissions is outside the forest machine
 - Could be done in machine manufacturer's cloud service?
- Fuel type (share of renewable fuel) is an important parameter in emission calculation

Fuel consumption is seen as a sensitive information on contractors' side

- However, data sharing agreements can be done between the contractors and customers

Metsäteho's proposal is that adding elements of fuel consumption values to hpr and fpr should be further studied if the decision cannot be made yet regarding version 4.0.

A separate meeting was arranged prior to the StanForD meeting on the 30th of November also including a representative from the Finnish association for contractors.

The meeting discussed where CO₂ emissions are to be calculated with an important factor being what type of fuel is used. It was pointed out that the only actor with good knowledge about fuel type is the machine owner / contractor. This means that CO₂ emissions probably must be calculated in a system where contractor can define fuel type. An important factor is whether the contractors would be willing to share fuel or CO₂ data with forest companies.

Skogforsk also presented some preliminary results from studies done based on mom-files. A significant difference from Finland is the fact that the larger Swedish forest companies often own a significant number of machines themselves which means that this type of data can be used without negotiations between forest companies and contractors.

No conclusion could be reached at the meeting.

GENERAL REST API DISCUSSION

The secretary presented a summary of his conclusion from a separate Teams meeting held 2021-11-26.

Somewhat contradicting comments from the participating organizations:

- Need for local API when no cellular network is available.
File APIS better than today's e-mail
- Cloud solution most relevant, perhaps using other formats than xml-format

Important factors to consider:

- GDPR
- Ownership/security
- Existence of cellular networks
- Technology changes rapidly, focus on content. JSON?

How to go on? Will it ever fly? Depends on whether there are willing partners/market demand. Henrik Persson pointed out that things very well can change within a couple of years.

NEW ENUMERATION IN LIMITATIONCATEGORYTYPE

This is the same issue that has been discussed in several previous meetings. Proposal was last discussed 2021-06-15. That meeting suggested that Trimble should do a practical test in the forest together with some machine manufacturer before finalizing the standard solution. That way the new functionality can be tested under practical conditions.

Trimble has done only simulator tests, but no field tests

The proposal was discussed in the Finnish StanForD meeting 2021-10-28 where the Finnish forest companies (Metsä Group, Stora Enso and UPM) expressed their support for the proposal. The forest company objective is to achieve a steady log flow and to reduce the differences between the operators. Training of operators can be done beside system-based approach, but it requires resources.

Machine manufacturers have not been able to assess the impacts of change to the bucking logic, except for Ponsse that has done some preliminary analyses.

It was decided that Tapio Räsänen will arrange a work group meeting also including Finnish forest companies where we discuss the solution as well as the existing limitations in harvester control systems once some more analyses have been done by Ponsse. Skogforsk will also present how this issue has been handled/solved in Sweden.

QUESTIONS FROM ILIM (REPORTING INTERVAL AND OTHER WORK)

Mail from Evgeniy Kutiev, Ilim group, 2021-11-17

JSC Ilim Group (Russia) has joined the work on new StanForD2010 standard recently. At this stage, it is difficult for us to actively participate in the work on the new standard.

We would like our comments to be considered when developing the new StanForD2010 standard.

1. When working with the StanForD standard, we faced a problem of generating forwarders' production volume files *.PRL (on a cumulative total) for a logging site (Site). To analyze a forwarder performance in the context of an operator, it is necessary to generate production volume files in the on-board computer at the end of the operator's shift. And also, cumulatively in the on-board computer for all shifts of every operator when closing / finishing a logging site.

Ilim's proposal is to specify in the StanForD2010 standard that the production volume files of harvesters/processors with *.HPR extension and the production volume files of forwarders with *.FPR extension to be generated in the on-board computer for each work shift of each operator.

Meeting comments: Reporting of production and operational monitoring should be supported by most manufacturers today. The most suitable way to solve any existing problems regarding automatic reporting e.g., per shift, is to discuss it with individual manufacturers.

2. Currently, only one productive operation Skidding is recorded (automatically) in the forwarders' software.

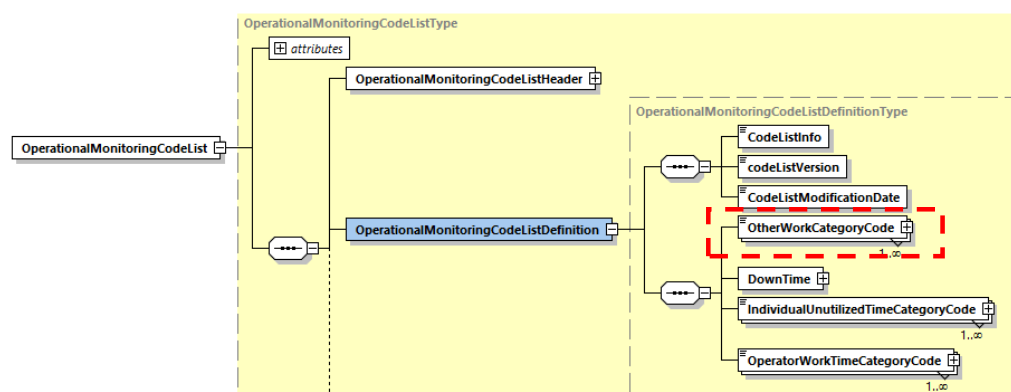
- Variable-number = 316, Type = 3 - 10,
- Variable-number = 316, Type = 4 - Processing.

In fact, forwarder operators perform other productive operations:

Operation in software	Function performed
Sorting	Sorting of logs in the storage pile: sawlogs separately from pulp wood within one plot. The operator must indicate the assortment of logs and volumes.
Re-skidding	From a pile of one felling area to a pile of another felling area. The operator must indicate: - pile A (where the logs come from), - pile B (where the logs are transported), - assortment of logs and volumes
Transfer	Transfer (transshipment) of logs from places inaccessible for direct haulage to places for loading timber trucks / railway cars. The operator must indicate the assortment of logs and volumes.
Loading transport	Loading timber trucks. The operator must indicate the volumes of wood at the end of the operation. If volumes are not specified, the operation is not ended.
Transport unloading	Timber trucks unloading. The operator must indicate the volumes of wood at the end of the operation. If volumes are not specified, the operation is not ended.
Road work	Reconstruction of the roadbed / road / runway using logs. The operator must indicate the assortment of logs used in operation and volumes.
Felling area cleaning	The operation to prepare the felling area for delivery to the regulatory authorities.
Plowing	For reforestation teams.
Fire protection actions	When machines are used to extinguish forest fires.
Towing	Any type of towing (assistance to a harvester, forwarder, towing of wagon houses when arranging a camp).

Ilim's proposal is to specify in the StanForD2010 standard the permission for forwarder operators to select additional productive operations in the on-board computer software by themselves with recording the execution of these operations in *.MOM file.

Meeting comments: The new standard version 4.0 makes it possible to create forest company specific codes for both down times and other work using the new mcl-file. The basic structure of the mcl schema is illustrated below.



§6 Presentation of all previously decided 4.0 updates

The secretary presented all updates included in version 4.0. See appendix 1. No major questions were raised which means that no further actions are needed.

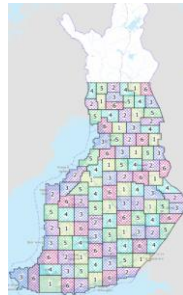
§6 StanForD2010 projects / implementations

UPDATING OF FINNISH NATIONAL FOREST RESOURCE DATA BASED ON HARVESTER DATA (SERVICE OF FOREST CENTRE)

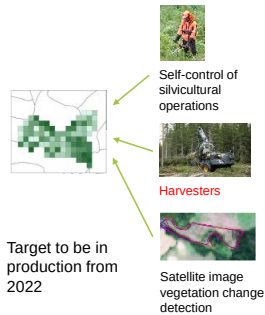
Tapio Räsänen presented an ongoing project for using harvester data when updating national forest resource data.

New forest inventory system based on laser scanning and aerial photography

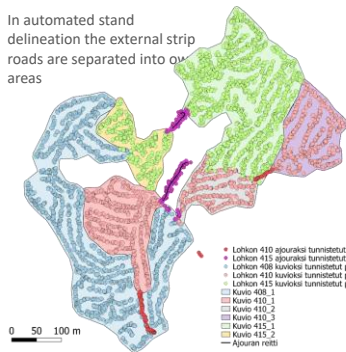
- In production from 2021 →
- Laser scanning campaigns are coordinated by National Land Survey and funded in co-operation with several organisations
- Scanning cycle 6 years
 - in Lapland 12 years
 - increase of resolution to 5 points / m² density
- Aerial photographing cycle 3 years



Update of the forest data



In automated stand delineation the external strip roads are separated into own areas



29.6.2018

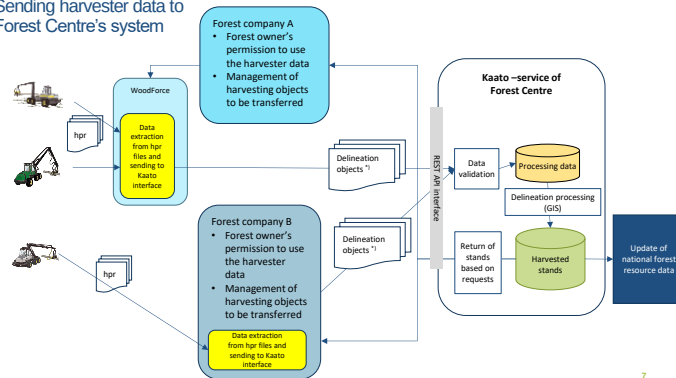


Metsäntönnön tulokasviesarja 7b/2018

Aerial photo © National Land Survey of Finland 2018

6

Sending harvester data to Forest Centre's system



7

- No tree species
- No measuring data

3

METHOD FOR ANALYSING THE OCCURRENCE OF SPRUCE ROOT ROT BASED ON HARVESTER DATA

Tapio Räsänen presented an ongoing project for analysing the frequency of root rot based on harvester data

The aim of the project is to leverage harvester data and open geographic data to develop a new method for precise and targeted prevention of *Heterobasidion* on the stand level as well as to produce precise information on the spread of the pathogen in Finland.

The results of the project will be deployed into practice, and they support both the adaption of the forestry sector to climate change as well as the development of climate change mitigation measures.

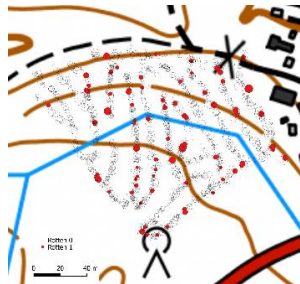
The project is part of the “Catch the carbon climate measures” initiated by the Ministry of Agriculture and Forestry in the spring of 2020, which aim to reduce the greenhouse gas emissions from forestry, agriculture, and other land use and to strengthen carbon sinks and storages. Luke implements the project in collaboration with Metsäteho Oy and Suomen metsäkeskus.

Detection of root rot infected spruce stems based on hpr data (Metsäaho's algorithm)

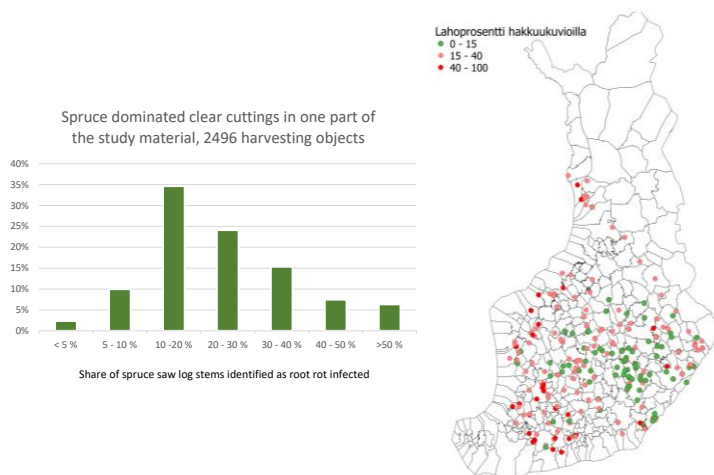
- identifying saw log sized stems based on re-calculation of stem profiles (either diameters per 10 cm or log diameters, minimum saw log dimensions)
- detection if there has been a cutting of pulpwood, energy or some other assortment than saw log from the butt end
- precise location (GNSS) is important

Clear cutting with 40 % of spruce saw log stems detected as root rot infected

Clear cutting with 12 % of spruce saw log stems detected as root rot infected



10



12

§7 Other issues

NEW TYPE FOR ANGLES AND BEARINGS

It was suggested by Henrik Persson that we add a type for registering bearings and angles that are to be in between 0 and 360 degrees.

Decided with the minutes that we implement a new type AngleType to the common definition that is limited to integers between 0 and 360 degrees. This type should be used for MachineBearing and BoomAngle

§8 Next meetings

StanForD meeting 2022-02-08, Teams (10:00-14:00 CET)

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.

§9 End of meeting

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

The change history of the schemas (Version 4.0)

This is a document for writing down changes that are made to schema files and their documentation. This document covers changes that are made to version 4.0.

Date	Schema file	Author	Change
17.12.2020	CommonDef	JOAR/JAS	- Added missing string type for tableName attribute in DataTableType - Added missing nonNegativeInteger type for columnOrder attribute in ColumnDataType - Added missing positiveInteger type for DeliveryPresentationOrder element in CommonDeliveryDefinitionType - Changed primitive type of LoadNumberOfItems from positive integer to integer in LoadNumberOfItemsType - Changed type of element LongLogButtMAX from nonNegativeInteger to positiveInteger in LongTimberDefinitionType - Added missing positiveInteger type for TrackingKey element in TrackCoordinatesType - Changed types of elements ConstantA and FactorB from NonNegativeDecimal to decimal in SwedishZaccoType - Description of messageType in boi schema updated to: <i>Enumeration list of file extensions of StanForD 2010 messages: Allowed value in felling bunching object instruction message is: "boi"</i> - Description of messageType in bpr schema updated to: <i>Enumeration list of file extensions of StanForD 2010 messages: Allowed value in felled bunched production message is: "bpr"</i> - Changed the second "LengthClassAdjustment1" is changed to "LengthClassAdjustment2" in the description of element LengthClassAdjustment in LengthDefinitionType.

			- Removed optional attribute agency from types UserIDType, LoggingFormType and RealEstateIDObjectType and after that deleted RealEstateIDObjectType and changed types of RealEstateIDObject element and RealEstateIDSubObject element to string - Made ContactInformation element optional in LoggingOrganisationType - Made countryCodeCategory attribute mandatory in CountryCodeType - Added a new mandatory attribute modificationRestricted to EstonianVolumeParametersType - Added a new mandatory element DiameterSectionModificationDate (ModificationDateType) in DiameterSectionDefinitionType - Added a new complex DiameterSectionDefinitionsHarvestedProductionType that contains a sequence of DiameterSectionDefinition elements (DiameterSectionDefinitionMachineType) and modificationRestricted attribute - Added a new optional DiameterSectionDefinitions element (DiameterSectionDefinitionsHarvestedProductionType) in ObjectDefinitionMachineType - Removed repeatable DiameterSectionDefinition element from MachineHarvestedProductionType - Removed optional SubObjectKey element from LocationDefinitionMachineType
17.12.2020	Mom	JOAR/JAS	- Removed extra space from enumeration value "Object filter" in ReportFilterCategoryType - ShifKey is changed to ShiftKey in OperatorShiftDefinitionType - Added a new optional ShiftKey element in IndividualMachineWorkTimeType
17.12.2020	Bqc	JOAR/JAS	Created a new ControlStemSettingsFellingBunchingControlType where we have removed elements RandomMINLength and RandomLogNotification that are not needed because there are no logs.

17.12.2020	Fdi	JOAR/JAS	<pre> <xsd:key name="ProductUserIDProductDefinition"> <xsd:selector xpath="sfd:ProductDefinition"/> <xsd:field xpath="sfd:ProductUserID"/> </xsd:key> <xsd:keyref name="ProductUserIDRefProductDefinition" refer="ProductUserIDProductDefinition"> <xsd:selector xpath="sfd:DeliveryDefinition"/> <xsd:field xpath="sfd:ProductUserID"/> </xsd:keyref> </pre> - Added a new constraint: - Made ProductName element mandatory in ClassifiedProductDefinitionForwardingDeliveryInstructionType
17.12.2020	Delta hpr	JOAR/JAS	- Removed DiameterSectionUserId constraint - Updated DiameterSectionDefinition constraints to follow new structure
17.12.2020	Oin	JOAR/JAS	- Added a new complex ProductUserIDsType that contains a sequence of ProductUserID elements and modificationRestricted attribute - Added a new mandatory ProductUserIDs element in ObjectDefinitionObjectInstructionType - Removed repeatable ObjectUserID element from ObjectDefinitionObjectInstructionType - Updated UniqueProductUserID constraint to follow previous changes - Added a new complex DiameterSectionDefinitionsObjectInstructionType that contains a sequence of DiameterSectionDefinition elements (DiameterSectionDefinitionType) and modificationRestricted attribute - Added a new optional DiameterSectionDefinitions element in ObjectDefinitionObjectInstructionType - Removed repeatable DiameterSectionDefinition element from ObjectInstructionType

17.12.2020	FOI	JOAR/JAS	- Added new complex types DeliveryUserIDsType and LocationUserIDsType that contain mandatory modificationRestricted attribute and sequences of DeliveryUserID and LocationUserID elements - Added a new mandatory element DeliveryUserIDs and a new optional element LocationUserIDs in ObjectDefinitionForwardingObjectInstructionType - Removed repeatable DeliveryUserID element and LocationUserID element from ObjectDefinitionForwardingObjectInstructionType
17.12.2020	Bqc	JOAR/JAS	- Made StemMeasurement element repeatable in SingleTreeFelledStemFellingBunchingControlType - Added a new complex type CalibrationValuesFellingBunchingControlType that is derived from CalibrationValuesType removing there LengthCalibration structure and changing diameterCalibrationPosition to stemDiameterCategory with enumeration values “DBH” and “ReferenceDiameter”. - Added a new complex type DiameterCalibrationFellingBunchingControlType to implement previous change - Added a new complex type DiameterCalibrationAdjustmentFellingBunchingControlType to implement previous change - Updated types of CalibrationValues elements to CalibrationValuesFellingBunchingControlType
22.3.2021		JOAR/JAS	- Added four new schemas: - YardedProduction_V4p0.xsd - YardingObjectInstruction_V4p0.xsd - SkiddedProduction_V4p0.xsd

			○ SkiddingObjectInstruction_V4p0.xsd
22.3.2021	CommonDef	JOAR/JAS	• During previous process we have added following new types to StanForD2010CommonDefinitions_V4p0.xsd-file: ○ MachineWithWinchType ○ MachineWinchModelType, ○ LocationDefinitionMachineType ○ LoadGreenMassMethodType ○ StemLoadVolumeCategoryType ○ StemLoadEstimationMethodType ○ StemLoadEstimationUnitType ○ StemLoadEstimationType ○ StemLoadGreenMassType ○ StemLoadVolumeType ○ StemLoadEstimationType ○ StemLoadType ○ PartialStemLoadType ○ SpeciesGroupDefinitionWithKeyType ○ DataTableGroupProductionType ○ UserDefinedDataProductionType

- Added a new simple type to be used for UserID:s :

```
<xsd:simpleType name="RestrictedStringType">
  <xsd:restriction base="xsd:string">
    <xsd:pattern value="([\S-[%?&lt;&gt;:&quot;&apos;/\\|*+]])+
      ( ([\S-[%?&lt;&gt;:&quot;&apos;/\\|*+]])+)*"/>
  </xsd:restriction>
</xsd:simpleType>
```

- Added a new simple type:

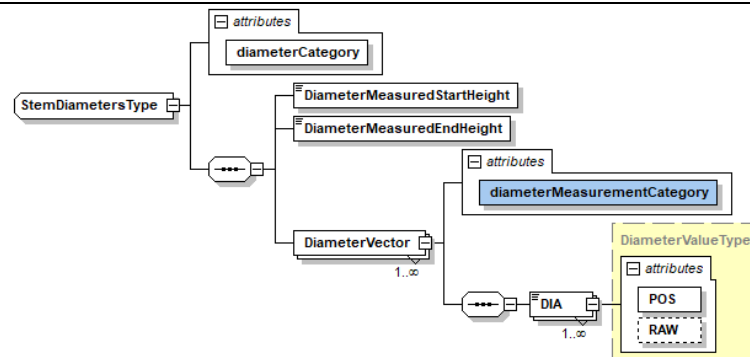
```
<xsd:simpleType name="SingleDigitNonNegativeDecimal">
  <xsd:restriction base="NonNegativeDecimal">
    <xsd:fractionDigits value="1" fixed="true"/>
  </xsd:restriction>
</xsd:simpleType>
```

and changed type of LogLength element in LogMeasurementHarvestingQualityControlType
and LogMeasurementType to SingleDigitNonNegativeDecimal

- Changed StemKey elements type from xsd:positiveInteger to xsd:unsignedLong
- Added a new structure for stem diameters that has following types:

- StemDiametersType
- DiameterVectorType
- DiameterValueType

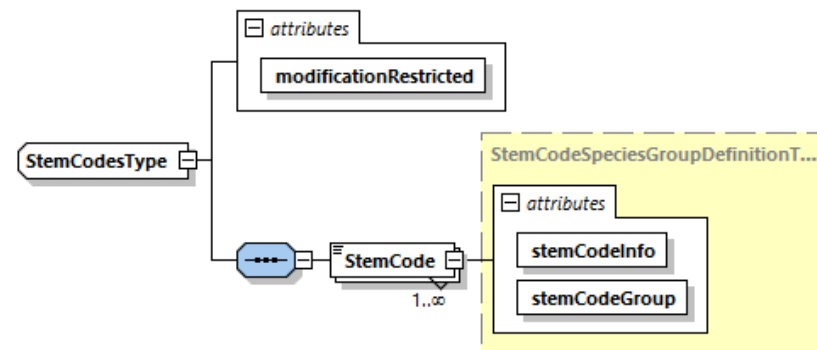
They implement following structure:



- Added a new StemCodes-structure with following types:

- StemCodesType
- StemCodeType
- StemCodeGroupType

They implement following structure:



StemCodeGroupType has following enumerations:

```
<xsd:simpleType name="StemCodeGroupType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Nature (high stumps, retention trees etc)"/>
  </xsd:restriction>
</xsd:simpleType>
```

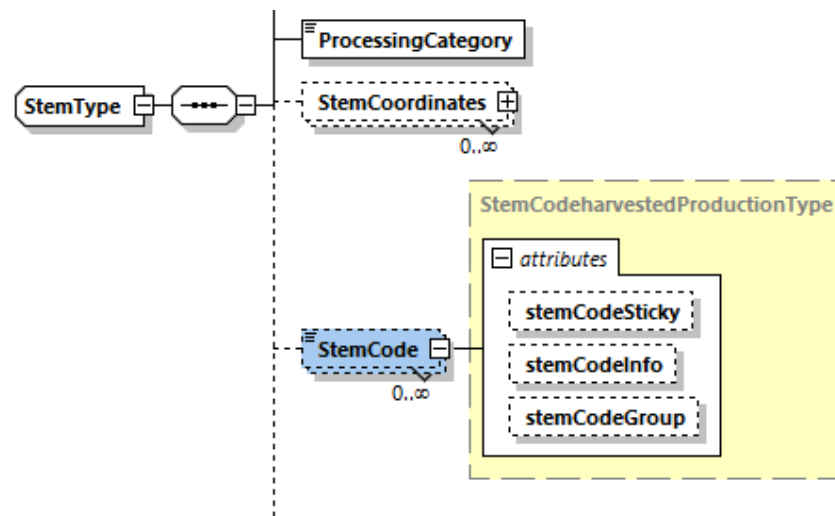
```

<xsd:enumeration value="Culture (ruin, foot path etc)"/>
<xsd:enumeration value="Special harvesting (selective cutting,
                        windthrow, snow breakage etc)"/>
<xsd:enumeration value="Other"/>
</xsd:restriction>
</xsd:simpleType>

```

- Added a new StemCode-structure with following types:
 - StemCodeHarvestedProductionType

That implement following structure:

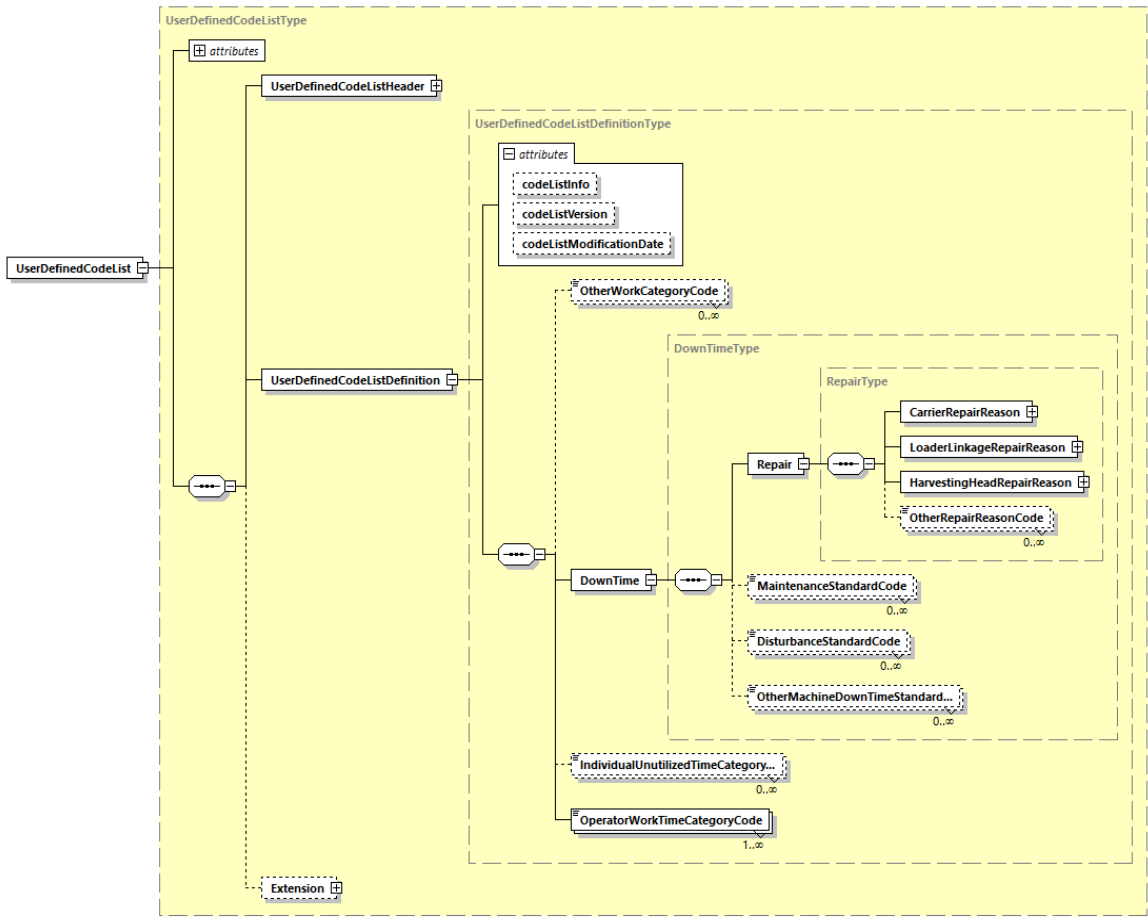


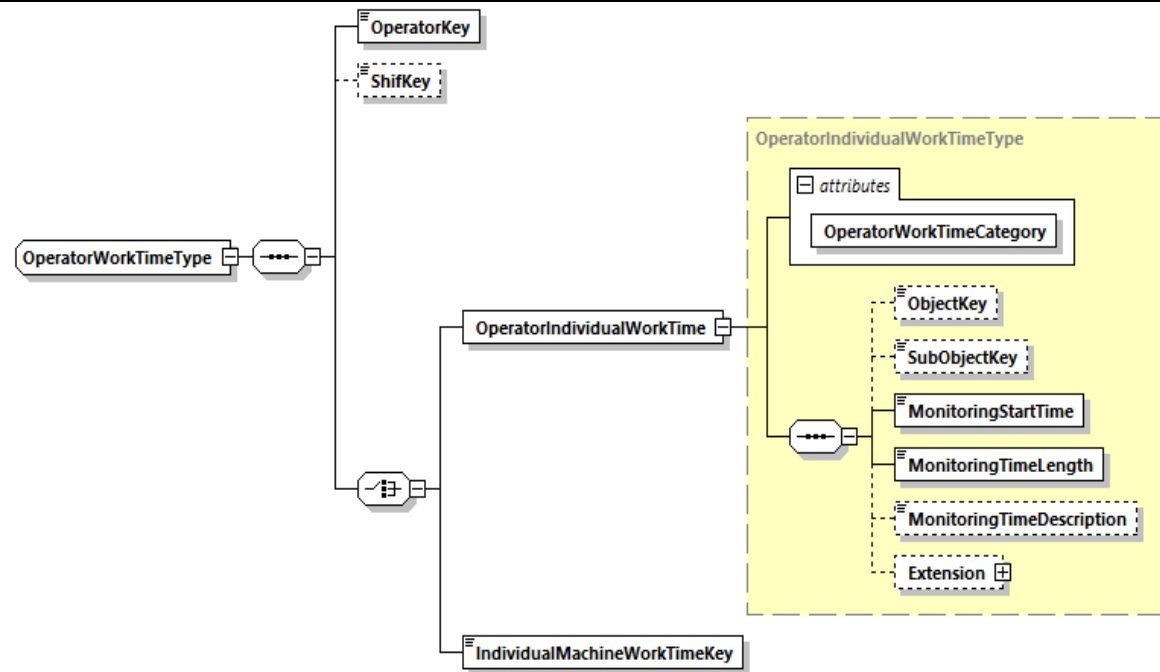
Changed type of StemCode element to StemCodeHarvestedProductionType in StemType and made it repeatable

7.4.2021		JOAR/JAS	• Added one new and one totally updated schema: ○ ObjectGeographicalInstruction_V4p0.xsd ○ DesignInstruction_V4p0.xsd
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1.6.2021	CommonDef	JOAR/JAS	Added new simple types and changed types of corresponding elements and types: Diameters/DBH → DiameterType = xsd:positiveInteger Changed diameter elements and types: DBH, DiameterClassLowerLimit, DiameterMAXButt, DiameterClassMAX, LogDiameterType, ReferenceDiameterType, DiameterValueType Volumes → VolumeType = nonNegativeDecimal Changed volume elements and types: DiameterSectionVolume, LogVolumeType, StemVolumeType, TotalProductVolumeType, TotalProductVolumeType, TotalStemVolumeType, TotalForwardedVolumeType, TotalVolumeOfHarvestedLogsType, LoadVolumeType, StemLoadVolumeType Presentation/Order → OrderType = xsd:positiveInteger Changed presentation order elements: DeliveryPresentationOrder, ProductPresentationOrder, SpeciesGroupPresentationOrder Keys → KeyType = xsd:unsignedLong Changed key elements: SpeciesGroupKey, OperatorKey, ObjectKey, SubObjectKey, LocationKey, DeliveryKey, DiameterSectionKey, StemLoadKey, PartialStemLoadKey, ScaleKey, ScaleControlKey, TrackingKey, StemBunchKey, LoadKey, PartialLoadKey, MonitoringSettingsKey, ShiftKey, ProductKey Mass → MassType = nonNegativeDecimal Changed mass elements and types: ForwardedGreenMass, StemLoadGreenMassType, LoadGreenMassType LogLengths → LogLengthType = singleDigitNonNegativeDecimal Changed log length element: LogLength
			- Removed optional Tracking-element from MachineType - Removed TrackingType

			- Added FeatureCollectionInfo element to FeatureCollection type - Added FeatureInfo element to Feature type - Added SymbolUserID element to Warning type
1.6.2021	din	JOAR/JAS	- Added Extension element to StyleDefinition and SymbolDefinition types - Added ModificationDate element to StyleDefinition and SymbolDefinition types
1.6.2021	Mom	JOAR/JAS	- Removed ShiftKey from the IndividualMachineWorkTime - Removed CombinedWorkTime and FrequencyShortDownTimes structures and after that took away also corresponding choices - Removed all constraints that belong to previous removed structures - Replaced OperatorLoginTime structure by the OperatorLoginEvent structure - Added IndividualMachineWorkTimeKey to IndividualMachineWorkTimeType - Removed all references to imported StanForD2010CodeList_V4p0 schema file and replaced those used code types with xsd:string - Excluded StanForD2010CodeList_V4p0.xsd file

1.6.2021	mcl	JOAR/JAS	- Created a totally new schema for user defined mom codes  The diagram shows the XSD Schema for <code>UserDefinedCodeListType</code>. It is a complex type containing several elements: <code>attributes</code> (a container for attributes) <code>UserDefinedCodeListHeader</code> (a complex type) <code>UserDefinedCodeListDefinition</code> (a complex type) <code>Extension</code> (a base type for other types) <code>OtherWorkCategoryCode</code> (a complex type, 0..∞ occurrences) <code>DownTimeType</code> (a complex type, 0..∞ occurrences) <code>Repair</code> (a complex type, 0..∞ occurrences) <code>CarrierRepairReason</code> (a complex type) <code>LoaderLinkageRepairReason</code> (a complex type) <code>HarvestingHeadRepairReason</code> (a complex type) <code>OtherRepairReasonCode</code> (a complex type, 0..∞ occurrences) <code>MaintenanceStandardCode</code> (a complex type, 0..∞ occurrences) <code>DisturbanceStandardCode</code> (a complex type, 0..∞ occurrences) <code>OtherMachineDownTimeStandard...</code> (a complex type, 0..∞ occurrences) <code>IndividualUnutilizedTimeCategory...</code> (a complex type, 0..∞ occurrences) <code>OperatorWorkTimeCategoryCode</code> (a complex type, 1..∞ occurrences) Generated by XMLSpy www.altova.com
22.6.2021	Mom	JOAR/JAS	- Added a new complex type <code>OperatorIndividualWorkTimeType</code> that is used to implement modified <code>OperatorWorkTimeType</code> - Modified <code>OperatorWorkTimeType</code> as follows

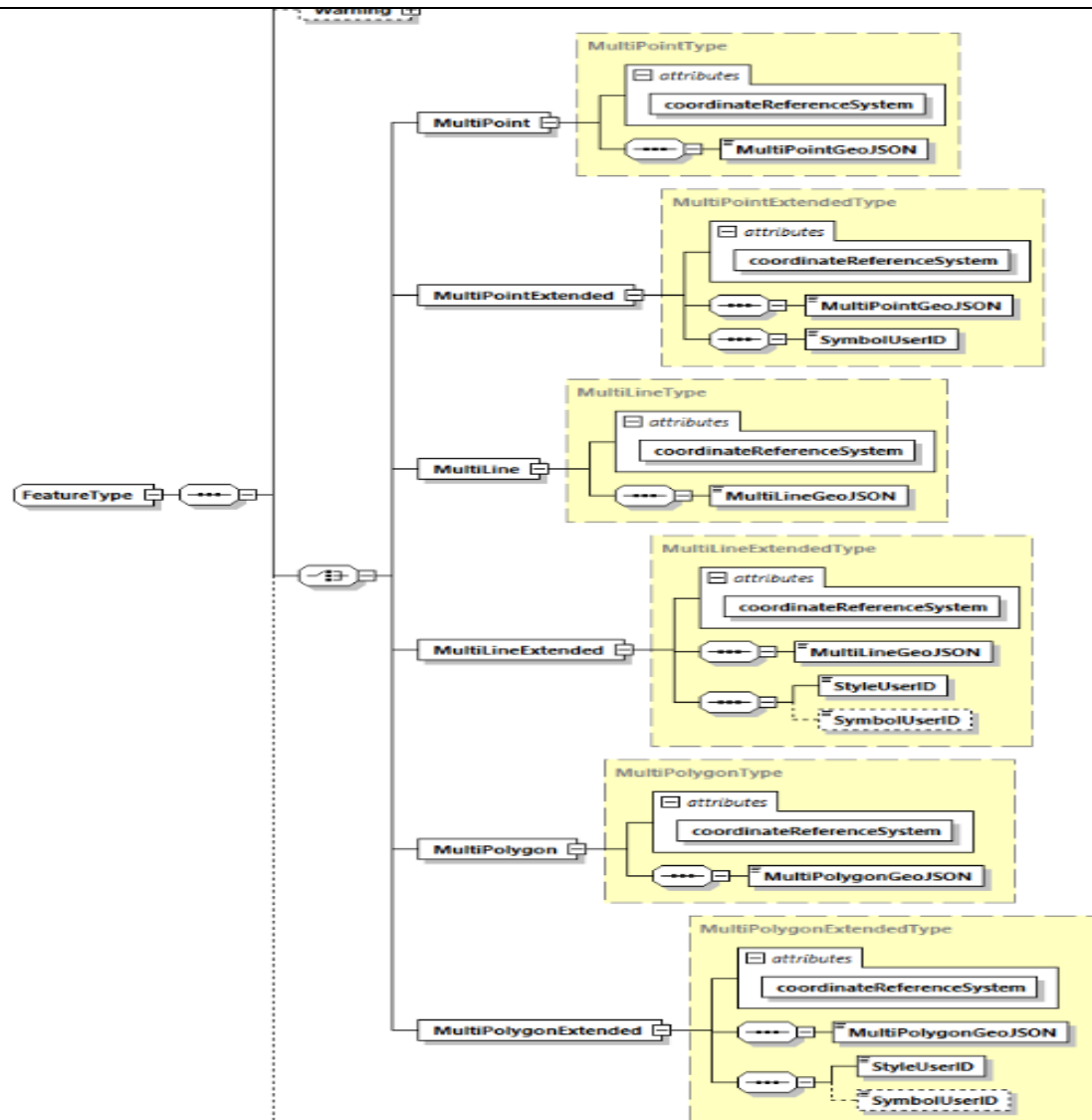


Generated by XMLSpy

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- Changed HarvestingHead elements name to Attachment
- Added a new optional name attribute for every code element
- Added a new CodeListDefinitionType which is an extension of CommonCodeListType with one additional element CodeListKey.
- Added a new mandatory and repeatable element CodeListDefinition
- Added CodeListKey element to OperatorWorkTime and IndividaulMachineWorkTlme structures
- Added IndividualMachineWorkTimeKey element to ShortDownTimeType

22.6.2021	mcl	JOAR/JAS	• Made all code elements mandatory • Added a new mandatory name attribute for every code element • Changed HarvestingHead elements name to Attachment • Modified UserDefinedCodeListDefinitionType so that common codelist identification information is moved from attributes to elements of CommonCodeListType which is then base type of UserDefinedCodeListDefinitionType • Changed schema name (and many names of elements and types also) from UserDefinedCodeList to OperationalMonitoringCodeList and changed file type from “udl” to “mcl”
22.6.2021	CommonDef	JOAR/JAS	• Added a new complex type CommonCodeListDefinitionType
22.6.2021	Ogi	JOAR/JAS	• Added an GISCoordinateReferenceSystem -attribute for every GIS type • Created MultiPointExtended, MultiLineExtended and MultiPolygonExtended types and put there non GIS data of original types and use them in FeatureType as can be seen in picture below • Added an AlarmCoordinates and BorderCoordinates structures to ObjectDefinitionObjectGeographicalInstructionType



- Added and updated element and attribute descriptions

22.6.2021	din	JOAR/JAS	Added and updated element and attribute descriptions
28.6.2021	din/mcl/mom/ commondef	JOAR	Updates to din/mcl/mom/commondef done by John Arlinger 2021-06-28 - Description of messageType should include mcl and not mom in the mcl-schema. - Descriptions for DesignInstruction, DesignInstructionHeader, DesignDefinition in the din-schema has been updated. - Descriptions for CodeListInfo, CodeListVersion, CodeListModificationDate, CodeListKey, Name-attributes has been updated in mom- and mcl-schemas - Descriptions in mom for otherMachienWorkCategory, Electrical, Hydraulics, Mechanical, Air updated in order to point out that codes come from mcl-file. - Attribute name changed from hydraulics to HydraulicsName (under AttachmentRepairReason) - Attribute name changed from otherWorkCategory to otherWorkCategoryCode in mom - Attribute name changed from OperatorWorkTimeCategory to OperatorWorkTimeCategoryCode in mom - Element name changed from IndividualUnutilizedTimeCategory to IndividualUnutilizedTimeCategoryCode in mom - Element names changed from Electrical/Hydraulics/Mechanics/Air changed to ElectricalCode/HydraulicsCode/MechanicsCode/AirCode in mom (same as in mcl)

30.6.2021	mom	JOAR/JAS	- Added otherWorkCategoryName, operatorWorkTimeCategoryName and individualUnutilizedTimeCategoryName -attributes - MachineRunTimeCategory updated with the following standardized enumeration values "Processing", "Terrain travel" and "Other work" in mom. These values not from mcl.
30.6.2021	mcl, mom	JOAR	Updates to mcl done by John Arlinger 2021-06-30 - Description of messageType should include mcl and not mom in the mcl-schema. Updates to mom done by John Arlinger 2021-06-30 - Description of otherWorkCategoryCode updated in mom. - Descriptions for OperatorIndividualWorkTime and CodeListKey per OperatorWorkTime has been updated in mom-schemas. - Attribute name changed from OperatorWorkTimeCategoryCode to operatorWorkTimeCategoryCode in mom - Element name changed from IndividualUnutilizedTimeCategory to IndividualUnutilizedTimeCategoryCode in mom
30.6.2021	mcl, mom	JOAR	- Deleted MultiLine and kept only MultiLineExtended under element Feature (same for point and polygon). - Updated the description of MultiLineGeoJSON/MultiPointGeoJSON/MultiPolygonGeoJSON: <i>Multi point string according to GeoJSON. This example includes the required tags:</i>

```
{
  "type": "MultiPoint",
  "coordinates": [
    [10, 40], [40, 30], [20, 20], [30, 10]
  ]
}
```

Multi line string according to GeoJSON. This example includes the required tags:

```
{
  "type": "MultiLineString",
  "coordinates": [
    [[10.0, 10.0], [20.0, 20.0], [10.0, 40.0]],
    [[40.0, 40.0], [30.0, 30.0], [40.0, 20.0], [30.0, 10.0]]
  ]
}
```

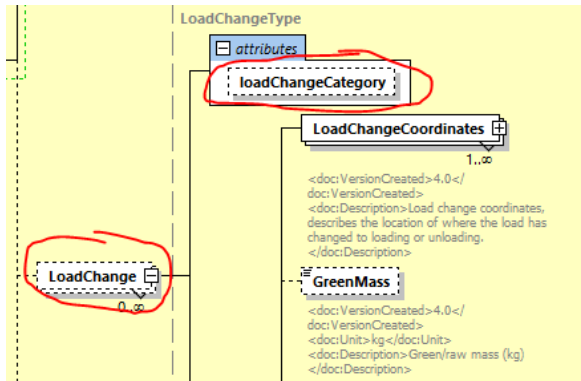
Multi polygon string according to GeoJSON. This example includes the required tags:

```
{
  "type": "MultiPolygon",
  "coordinates": [
    [
      [[40.0, 40.0], [20.0, 45.0], [45.0, 30.0], [40.0, 40.0]]
    ],
    [
      [[20.0, 35.0], [10.0, 30.0], [10.0, 10.0], [30.0, 5.0], [45.0, 20.0], [20.0, 35.0]],
      [[30.0, 20.0], [20.0, 15.0], [20.0, 25.0], [30.0, 20.0]]
    ]
  ]
}
```


Schema updates 2021-09-15

This additional text added by John Arlinger 2021-11-17

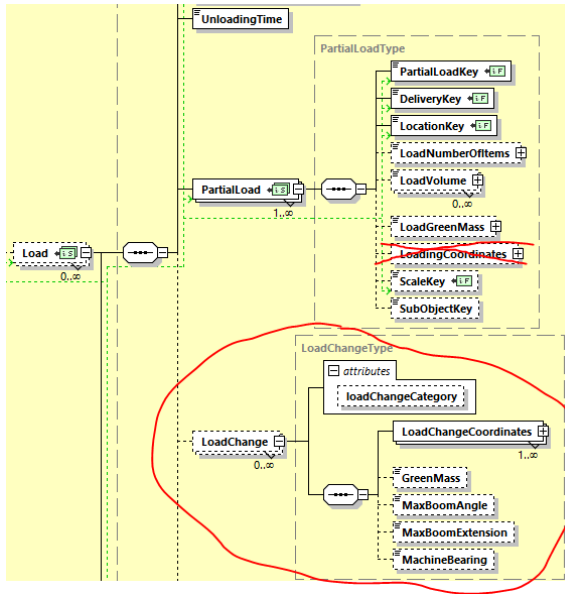
Description of LoadChangeCategory in fpr



It was decided to add the following new descriptions:

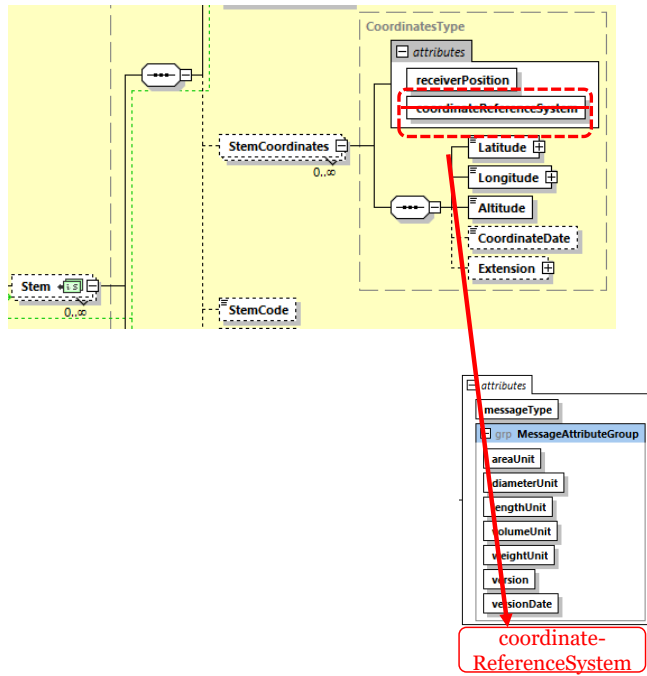
Name	Unit	Description
LoadChange		Structure for loading and loading coordinates per load. This structure includes information about where logs have been moved by the forwarder.
LoadChangeCategory	List	Describes the type of load change. Allowed values: "Loading", "Unloading"

Old element LoadingCoordinates in fpr is deleted



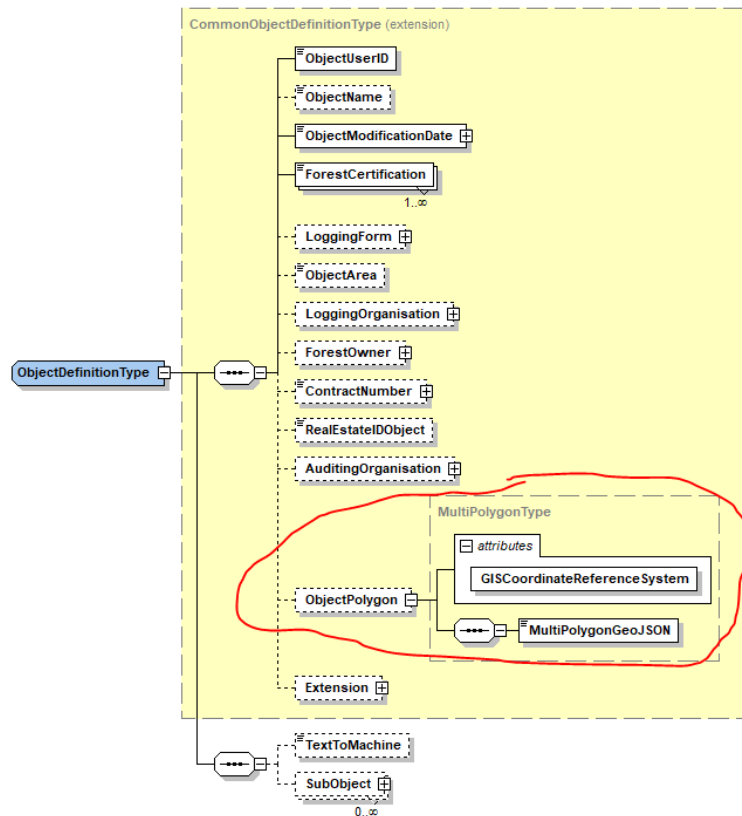
Moving coordinateReferenceSystem

Mandatory attribute coordinateReferenceSystem moved to MessageAttributeGroup from CoordinatesType.



New ObjectPolygon added to ObjectDefinitionType

New optional element ObjectPolygon added to CommonObjectDefinitionType in order to extend the scope of this element, thus making it available in all ObjectDefinitions.



The description of the new ObjectPolygon is to be:

Name	Data type	Description
BorderPolygon	MultiPolygonType	Structure for including a multi-polygon that describes the boundaries of the harvesting object. The multi-polygon normally includes the area where the trees to be felled are located. Can be used to inform operator about whether the machine is inside or outside the object and other types of status information.

New log coordinates

Add the new element LogCoordinates to LogType and to add a new enumeration value “Crane tip log cut” to attribute “receiverPosition”.

Name	Data type	Description
LogCoordinates	CoordinatesType	Log coordinates, describes the location of the crane tip when cutting the log. Value of receiverPosition must be “Crane tip log cut”
receiverPosition	list	Position of coordinate registration in file: "Base machine position", "Crane tip position when felling the tree", “Crane tip log cut” . Observe that only "Base machine position" is relevant for all types of coordinates. Other enumerations valid only in some specific situations."

