



John Arlinger

23 November 2016

Minutes StanForD2010

2016-11-23

Place:	Skogforsk, Uppsala, 2016-11-23
Participants:	Lars Henriksson, SDC John Arlinger, Skogforsk Johan Möller, Skogforsk Tapio Räsänen, Metsäteho Timo Melkas, Metsäteho Antti Korkiakoski, JohnDeere Bengt Sörvik, Otmeka Peter Sundlöf, Ponsse Mikael Eliasson, Logmax Rikard Jonsson, Skogforsk John Arlinger, Secretary Johan J. Möller, Chairman Skype participation: Teemu Paldanius, Ponsse Niclas Eriksson, Komatsu Fredrik Tjernberg, Komatsu Jonas Thorsson, Dasa Pasi Palonen, Parker Jonas Gustafsson, Sveaskog Joakim Nygren, Haglöf Jean Plamondon, FP Innovation Ângelo Conrado de Arruda Moura, Fibria Brasil

Decision summary:

- Version 3.3 will be implemented next (February 2017) year, the final release of 4.0 will not be before February 2018.

- New elements for registering reversing was added: ReasonReversing, ReversingStartPosition and ReversingEnd-Position (version 3.3)
- Updated definitions of ManualFreeBuck and TopLogFreeBuck (version 3.3).
- New mom elements added: MonitoringTimeDescription, StartTime, Extension (version 3.3)
- New "pre-release" fsp-schema (forwarding scale schema) to be presented at the meeting in February.
- New optional Tracking structure added to both hpr and fpr under Machine (version 3.3). Optional attribute diameterRaw added where increasing diameters are allowed to be used (version 3.3).
- A complete list of identity elements in English, Swedish and Finnish will be presented at the next StanForD meeting.
- New rule that ButtEndProfileExtrapolation and BarkFunction should always be used in volume calculations if they exist in the hqc (to be added to "StanForD2010_rules_tableV1p6.docx").
- Naming conventions concerning envelope was decided with the last minutes (to be added to "StanForD2010_rules_tableV1p6.docx")
- Boom angle when felling added to standard (2015-11-18)
- New logistic bark function added (2015-11-18)

Action list:

- All randomly selected stems that are rejected by the operator must be saved in an hqc-file including a reason for rejection. This file is not to be sent to the caliper but directly to the forest company (in Sweden to SDC).
- Complete randomization setting log (minimum 5 last settings) is required in element ControlStemSetting.
- It has been decided that OperatorUserID is to be set by the machine control system. It was strongly recommended that all control systems implement FirstName, LastName, BusinessName and BusinessID ASAP in order to be able to register machine owner specific information regarding operator identities. Elements FirstName, LastName, BusinessName and BusinessID must be possible to edit by the operator.
Additional comment at meeting: Swedish nomenclature for elements above to be added to general documentation.
- It is strongly recommended that it is made possible by a machine setting to include diameter vector in normal production reporting (hpr). However, it is left open to the manufacturers exactly how this

functionality is implemented (subset of stems, all stems, randomly selected with a frequency or some other method).

- It is recommended that all manufacturers make it possible to update a product (pin) during harvesting at a harvesting object and that the GUI for operators is simple when updating a product (e.g. keeping settings for grades and color matrix).
- It is important that all manual cutting codes are registered when the driver feed both manually and semi-automatic, this means that manual cuts are always registered when the cut length deviates from the optimal length according to the optimization.

§ 1 Opening of meeting

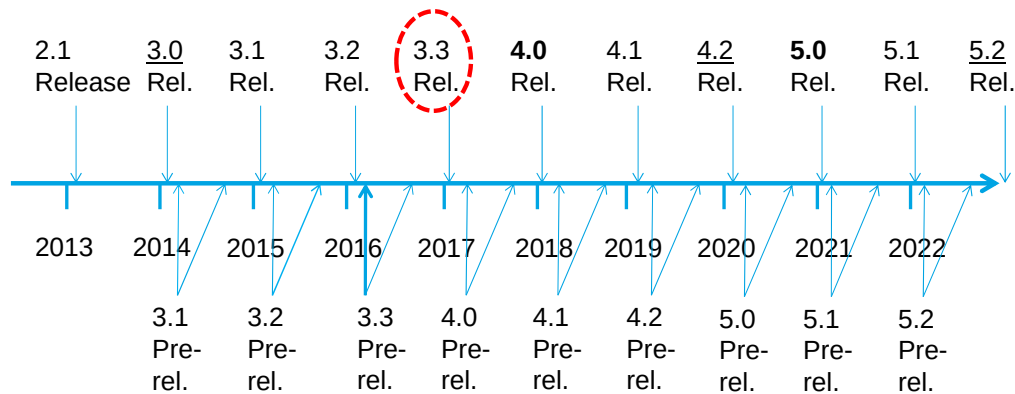
Chairman Johan J Möller opened the meeting.

§ 2 Agenda

The agenda was accepted by the meeting with no additional issues except the Finnish proposals distributed the evening before the meeting.

It was pointed out by Jonas Thorsson that the rules document must be updated according to §4 in minutes from 2016-04-04—05 (Naming convention for env-files).

Secretary John Arlinger went through the road map for implementing new standard version as decided at the previous meeting in November.



It was decided to publish 3.3 in February 2017.

The following issues are on the list for a future update to 4.0:

- ReportFilterCategory enumeration with extra "space"
- UserDefinedData elements without data types
- Renaming of bark functions?
- Older bark functions excluded?
- Attribute "agency" needed for "UserIDs?"

- ShiftKey in Individual- and CombinedMachineWorkTime?
- Decreasing hpr size by modifying element names in DiameterVector
- Fdi without SpeciesGroup- and ProductDefinition
- Some elements optional → mandatory?
- Data type for LogLength changed to float in hqc in order to increase precision.
- StemTypeCode clarified regarding usage for pulp-wood
- modificationRestricted updated for StemCode and EstonianVolumeParameter in spi-file

§ 3 Information about decisions at previous meetings

The decisions made at the previous meeting (2015-04-04—05) were presented as well as the action list compiled after that meeting.

§ 3 Proposals

REVERSING

Johan Möller, Skogforsk, 2016-03-08.

Reversing could be defined as feeding backwards away from the optimal log length or feeding backwards in order to facilitate delimbing.

We get a number of negative effects when we reverse feeding of a stem, for example a decrease in productivity and more frequent significant length errors

There are probably many different reasons for reversing such as manually decision, poor diameter measuring, difficult/bad price matrixes or complex combinations of price matrixes.

It was discussed at the previous meeting (2016-04-04--05) whether reversing could in some way be registered per log with the following definition:

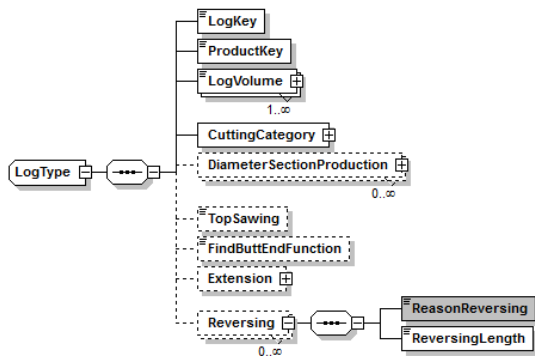
Reversing is registered if stem has been fed backwards with more than 10 cm during processing of present log.

Several manufacturers pointed out that there are a large number of different reasons for reversing. A possible solution could be to add an element with a list of different enumeration values which would be repeatable:

- Manual reversing by operator
- Automatic reversing due to pre-delimbing of next log. (settable in harvester)
- Re-bucking (new optimal length), probably due to erros in prognosis.
- Stuck-control (reversing between log ends)

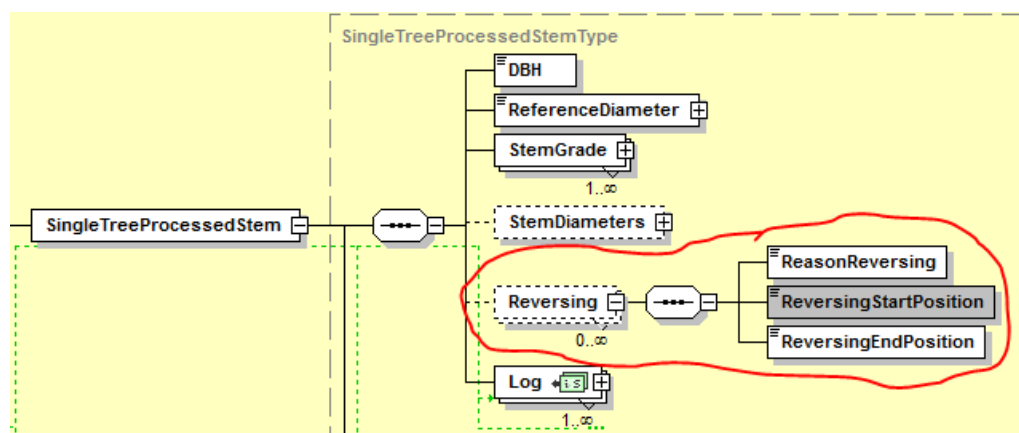
One suggestion was also to add the reversed length.

It was first thus suggested that we add two new elements according to the figure and table below.



Name	Description	Unit	Type
ReasonReversing	Reversing is registered if stem has been fed backwards with more than 10 cm during processing of present log. Enumeration values for reasons: "Manual reversing", "Pre-delimbing", "Re-bucking", "Stuck-control" and "Other" Pre-delimbing means automatic reversing due to pre-delimbing of next log which is settable in harvester. Re-bucking means new bucking optimization (new optimal length), often due to erros in prognosis. Stuck-control is automatic reversing due to difficult de-limbing/slow feeding speed (reversing between log ends).	List	string
ReversingLength	Reversing is registered if stem has been fed backwards with more than 10 cm during processing of present log. Length of reversing (feeding backwards)	Cm	negative-integer

Niclas Eriksson, Komatsu, pointed out that it would probably be more simple to register reversing on a stem level. It would also make it possible to register the exact position of each reversing. It was thus decided that we add four new elements according to the figure and table below.



Name	Description	Unit	Type
Reversing	Structure for registering reversing, if stem has been fed backwards. Only continuous reversing more than 10 cm must be registered.	List	String (optional)
ReasonReversing	Reversing is registered if stem has been fed backwards. Only continuous reversing more than 10 cm must be registered. Enumeration values for reasons: "Manual reversing", "Pre-delimbing", "Re-bucking", "Stuck-control" and "Other" Pre-delimbing means automatic reversing due to pre-delimbing of next log which is settable in harvester. Re-bucking means new bucking optimization (new optimal length), often due to errors in prognosis. Stuck-control is automatic reversing due to difficult de-limbing/slow feeding speed (reversing between log ends).	List	String (mandatory)
ReversingStart-Position	Reversing is registered if stem has been fed backwards. Only continuous reversing more than 10 cm must be registered. Reversing is registered if stem has been fed backwards with more than 10 cm during processing of present log.	Cm	nonNegative-Integer (mandatory)
ReversingEnd-Position	Reversing is registered if stem has been fed backwards. Only continuous reversing more than 10 cm must be registered. Reversing is registered if stem has been fed backwards with more than 10 cm during processing of present log.	Cm	nonNegative-Integer (mandatory)

IMPROVED DEFINITION OF MANUALFREEBUCK

Proposal based on questions from Rikard Jonsson, Skogforsk.

The definition of ManualFreeBuck was discussed at the last meeting based on a question related to whether or not ManualFreeBuck affects also the last log. The present definition is:

Any length accepted (manual cut) except forbidden lengths according to element BuckingCriteria

It was decided that we clarify the present definition according to the following text (red text is new).

Any length accepted (~~manual cut~~) except forbidden lengths according to element BuckingCriteria.

This setting affects top log handling independently of TopLogFreeBuck setting in that TopLogFreeBuck does not affect whether manual cuts are allowed. Observe that TopLogFreeBuck is an automatic function and not manual.

DEFINITION OF TOPLOGFREEBUCK

A web meeting was held in 2016-09-15 in order to discuss this issue.

Historical background

- Var119_t1 was Implemented 1993-09-28 and modified 2000, 2001, 2005, 2006
- StanForD2010 – The old var119_t1 was divided into ManualFreeBuck and TopLogFreeBuck in 2008

- Work on "best practice" for pulp wood matrixes was started in 2014
- Definition discussed at last meeting in Helsinki 2016-04-04--05
- When discussing the issue with Mikael Eliasson in August 2016 he suggested a flow chart and clarification of "Only manual cut"

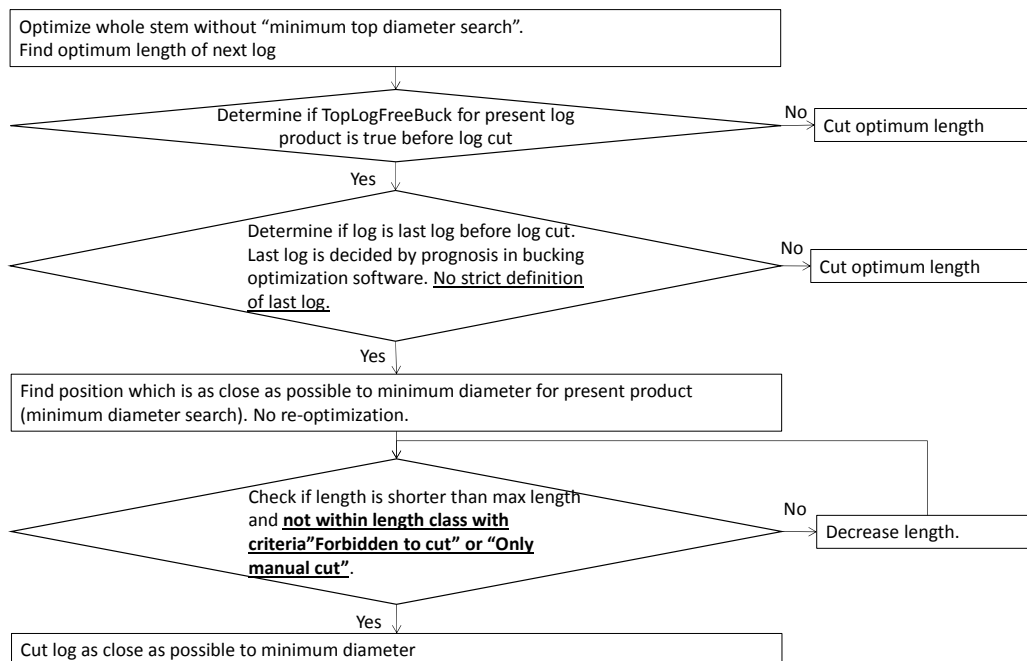
Present definition of TopLogFreeBuck is

*Reach minimum top diameter using any length (maximize volume).
Minimum top diameter for TopLogFreeBuck is the smallest allowed diameter without limitation Forbidden or Manual as registered in element BuckingCriteria. Any length accepted up to MAXLength except forbidden lengths according to element BuckingCriteria.
Highest priority is given to minimum diameter search within min and max lengths of the product, independently of value and distribution matrixes.*

Based on discussion at September meeting it was decided that we add the red text below in order to make it very clear that both limitations Forbidden and Only manual affects how TopLogFreeBuck is used:

*Reach minimum top diameter using any length (maximize volume).
Minimum top diameter for TopLogFreeBuck is the smallest allowed diameter without limitation "Forbidden" or "Only manual" as registered in element BuckingCriteria. Any length accepted up to MAXLength except "Forbidden" and "Only manual" lengths according to element BuckingCriteria.
Highest priority is given to minimum diameter search within min and max lengths of the product, independently of value and distribution matrixes.*

A flow chart was created in September 2016 as illustrated below:



Observe that no strict definition of “last log” is included above. Last log is decided by prognosis in bucking optimization software.

The meeting found the flow chart above to be an acceptable description of how to implement TopLogFreeBuck.

FILTERING OF GPS COORDINATES

Proposal from Nazmul Bhuyan, 2016-04-15

Applications conducting geographical analysis of harvester data are growing in number at Skogforsk. As a result, correct logging of GPS coordinates in the production files is of high importance. Expectations from a user perspective are that coordinates are to be included in the production files when GPS receives signal of an acceptable strength, and that coordinates are absent when signal strength is low (or GPS is not installed).

However, presence of faulty coordinates in the production files is a rare but not a non-existing problem. It is possible to post process coordinates in a receiving application, but such an algorithm must be implemented in many applications for overcoming the problem of conducting erroneous geographical analysis. Manufacturers agreeing on a common (or at least more uniform) filtering mechanism for GPS coordinates would favour future use of geographical information from forestry machines.

Faulty coordinates could be of at least three types:

- one of latitude/longitude is faulty
- both coordinates are faulty
- equal pair of coordinates are repeated

A short online search indicates that setting up filtering rules based on additional information in the standardised NMEA GPS messages (such as HDOP values) is not easy to accomplish but should maybe not be left out of consideration. A simple suggestion that probably would improve the logging of coordinates, could look as follows:

1. Keep track of the latest pair of latitude/longitude coordinates for the present object.
2. Keep a constant for maximum distance (e.g. 5 km) between pair of coordinates.
3. Keep a counter for how many equal pairs of coordinates that are repeated sequentially.
4. Keep a constant for the maximum number (10 stems) of occurrences of repeated coordinates.

If (1) exceeds the limit in (2) or (3) exceeds the limit in (4), then no coordinates are logged for the current stem. If possible, for (3) delete stored coordinates for the last (4) number of stems; that is because there is a risk that those coordinates are faulty.

Do we include this suggestion in the “rules document”?

Comment from Per Knutsson, CGI, and Niclas Eriksson, Komatsu:

I think it would be much simpler to develop a simple "post-processing-dll" that implements the filtering algorithm described above. The dll could be made available to any one that has a need for filtering coordinates. This way the risk of having different implementations decreases.

Based on the comments above Skogforsk withdraw the proposal before the meeting.

CHANGING DATA TYPE FOR LOGLENGTH IN HQC

Mikael Eliasson, LogMax, 2016-04-07

LogMax has noted when studying length measurements that it would quite often be an advantage to be able to adjust the calibration somewhere between 0 and +1 cm or between 0 and -1 cm. Since all length measurements are registered as an integer with unit cm (without any decimals) it is difficult to do a "perfect" adjustment.

When using the DigiTape different types of roundings can be done in the caliper which might be a source of errors.

It would therefore be an advantage to be able to use at least one decimal when registering manually measured lengths using DigiTape.

It would therefore be of interest to discuss the possibility of changing the data type of LogLength (in LogMeasurementHarvestingQualityControlType) from nonNegativeInteger to nonNegativeFloat.

Comments from Komatsu, Ponsse and Haglöf before the meeting:

- *Ponsse is against datatype float. If more accuracy is needed our proposal is that we change the unit [cm] to [mm] instead and keep the data type as nonNegativeInteger.*
- *What is the measuring error? Maybe larger than 1 cm which means that an increased accuracy is questionable.*
- *Using a correct rounding (SS 14141, rule A or B) would reduce a reading error less than +/-0.5cm. The rounding was implemented in Swedish measurement rules 1 jan 2014. The setting in our systems for "rounding"/"no rounding" will be fixed to "always rounding" in next versions.*

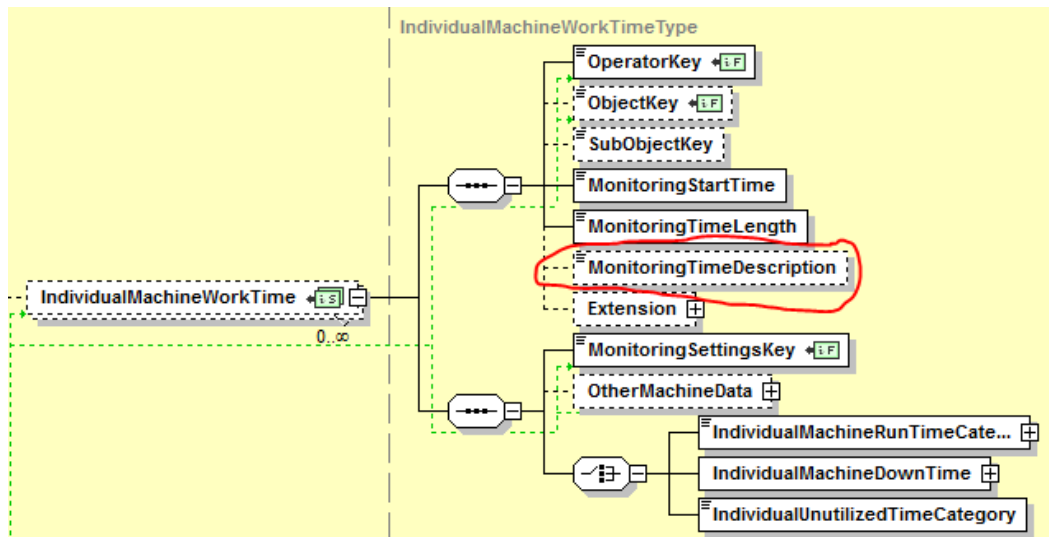
During the discussion it was confirmed by Joakim Nygren that using one decimal would indeed increase the precision also considering the measuring error.

The meeting concluded that changing the LogLength from cm to mm or a decimal number is a significant update. Thus it was decided to postpone this issue until a future update to 4.0.

DESCRIPTIVE TEXT ELEMENT PER MACHINeworkTIME

Mikael Eliasson, LogMax, 2016-04-07

An extension element has been added in the LogMate system in order to open up the possibility for the operator to register free text information per IndividualMachineWorkTime. These are possible to print out in different reports. This possibility has been appreciated by operators. It was therefore decided that we add a new optional element MonitoringTimeDescription with the definition: *Free text created by operator per IndividualMachineWorkTime.*



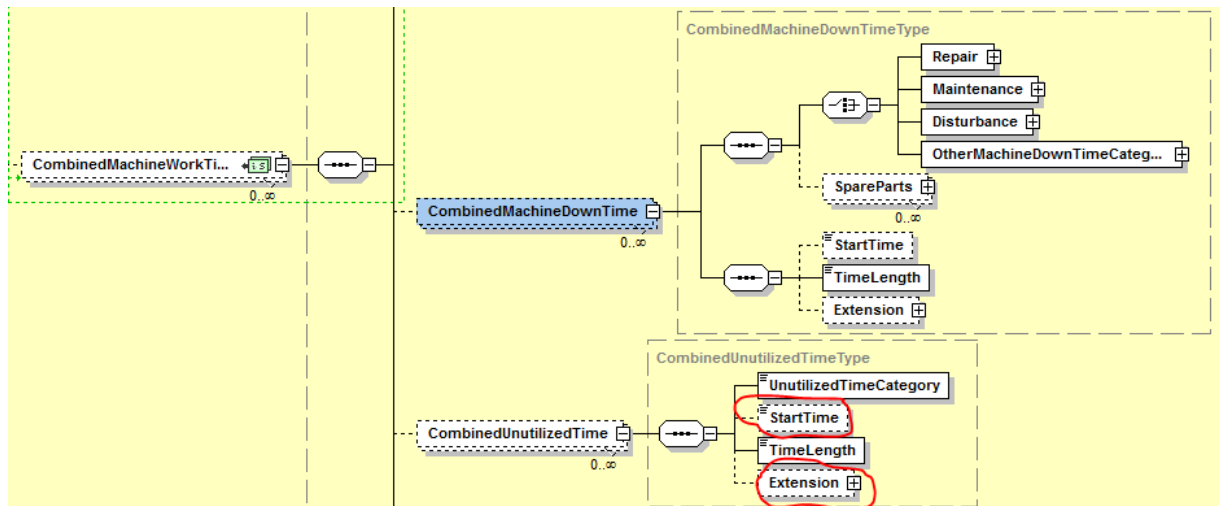
ADD STARTTIME AND EXTENSION TO COMBINEDUNUTILIZEDTIME

Niclas Eriksson, Komatsu, 2016-09-08

Meal breaks are registered as an un-utilized time. However, for some reason no extension nor a start time was added to CombinedUnutilizedTime as it was added to CombinedMachineDownTime.

It is unknown to the secretary why this difference between CombinedUnutilizedTime and CombinedMachineDownTime exists. Probably only a mistake.

It was therefore decided that optional elements StartTime and Extension are added to CombinedUnutilizedTime according to figure below:



Decided definition of new element StartTime is “Start time for a number of combined times or for individual times. Time stamp must have the following times registered: local time $\pm$ offset from UTC.”

Decided definition of new element Extension is “Extension element can include whatever data the users want. The only requirement is that it is well-formed XML i.e. it is tagged”

ANNOTATION OF VOLUMELENGTHCATEGORY

Knutsson, Per, CGI, 2016-05-20.

It was decided that a comma in annotation is deleted since it is not included in enumeration value.

VolumeLengthCategory

```

<doc:VersionCreated>1.0</doc:VersionCreated>
<doc:VarNumber>v163_t1</doc:VarNumber>
<doc:Unit>list</doc:Unit>
<doc:Description>Lengths used in price volume calculation.
Allowed list values are: "Physical length,cm", "Length as
defined in LengthClasses",
"Rounded downwards to nearest dm-module" and "Rounded
to nearest mid-dm</doc:Description>

```

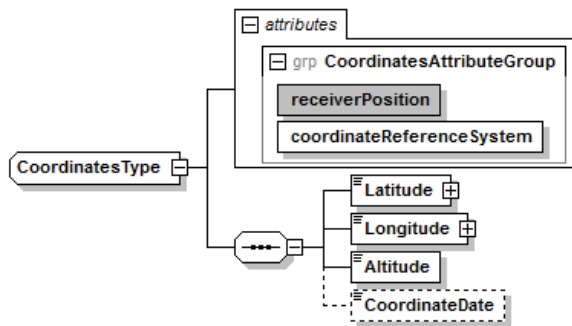
§ 4 New forwarder production structure

The objective of this paragraph is to continue a discussion regarding a possible update of the forwarded production structure.

BACKGROUND

It was decided at the meeting 2015-11-18 to update the definition of receiverPosition based on a discussion between John Arlinger and Thomas Purfurst (Bavarian State Forest) regarding coordinates in fpr-files.

All Coordinates in StanForD messages have the attribute receiverPosition. GPS coordinates are e.g. included in CreationCoordinates, LoadingCoordinates, LocationCoordinates, StemCoordinates.



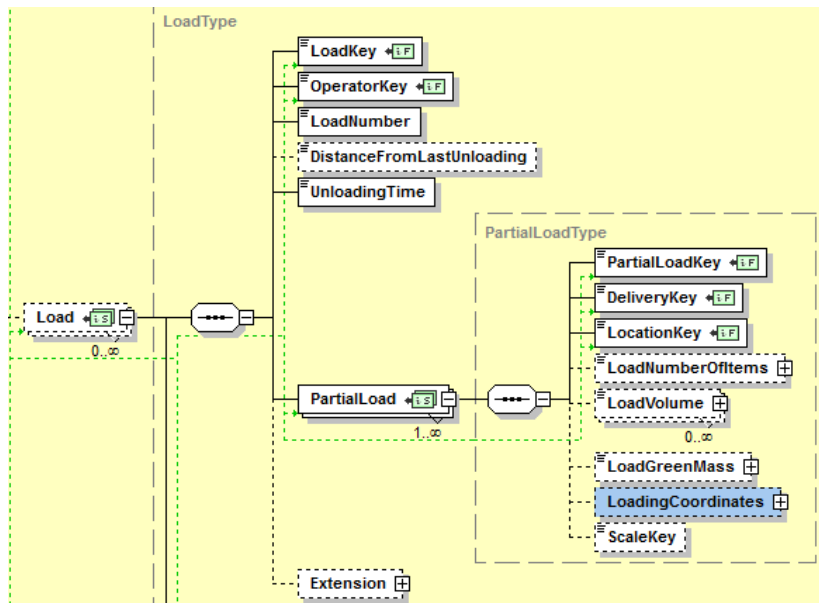
It was decided that the annotation for receiverPosition is updated according to the following text (new text underlined in red):

Position of coordinate registration in file: "Base machine position", "Crane tip position when felling the tree". Observe that only "Base machine position" is relevant for all types of coordinates. Other enumerations valid only in some specific situations.

The discussion between John Arlinger and Thomas Purfurst evolved to include whether it would be a good idea to include additional coordinates to the fpr-file. The following coordinates exist in fpr-files today:

- CreationCoordinates, LoadingCoordinates, LocationCoordinates,

Would it be relevant to add UnloadingCoordinates to PartialLoad?



Using coordinates for forwarders in PartialLoad might mean:

- New enumerations “Grapple position when opening grapple to release logs” and “Grapple position when closing grapple to pick up logs”

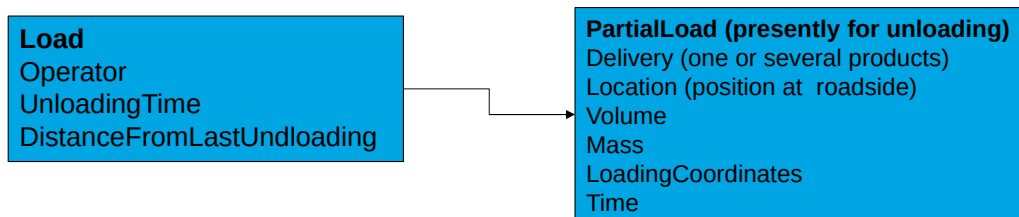
Boom angle for Unloading and PartialLoad?

- Attributes for boomAngleCategory: Felling, Last log cut, Release logs, Pick up logs.

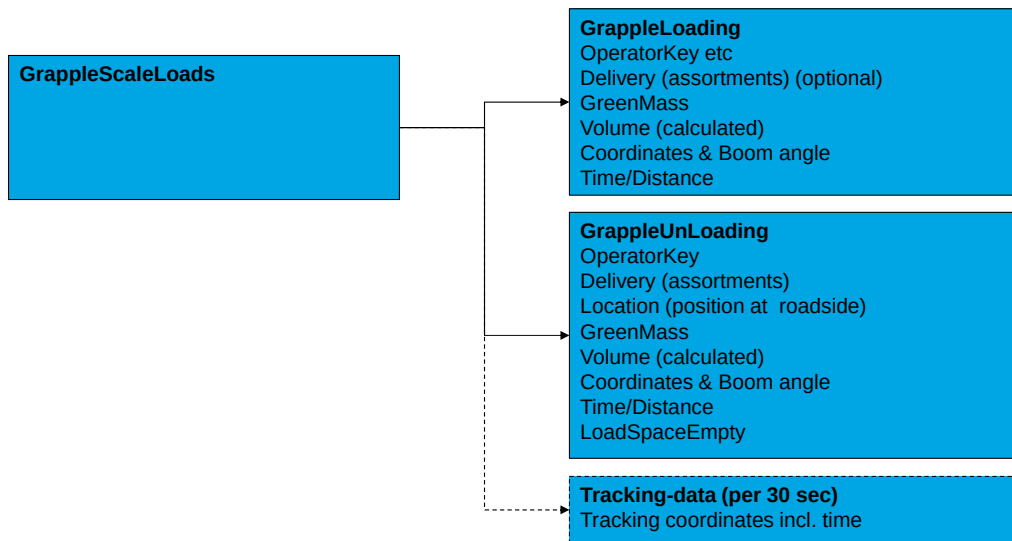
However, adding these new enumerations into the present structure will make the fpr-file even more complex than today.

Remodelling fpr-production

The present structure (illustrated below) is quite complex due to the fact that it can handle several different methods (crane scales, load space scales and manual estimations) with varying resolution.



A solution, in order to make it possible to register data with a higher resolution, could be to separate data estimated per load from data based on scaling each grapple load. A new structure could be developed for registering only grapple scale data (illustrated below). It would then be possible to register loading and unloading data with e.g. coordinates and times for both loading and unloading.



The modified structure above means that the Delivery, mass, volume, coordinates, boom angle and time are possible to register for each grapple load when loading (see figure below). The same data is also registered for each grapple load when unloading as well as the identity of the Location (landing).



GrappleLoading (new for loading)
 Delivery (assortments)
 GreenMass
 Volume (calculated)
 Coordinates
 Boom angle
 Time / Distance



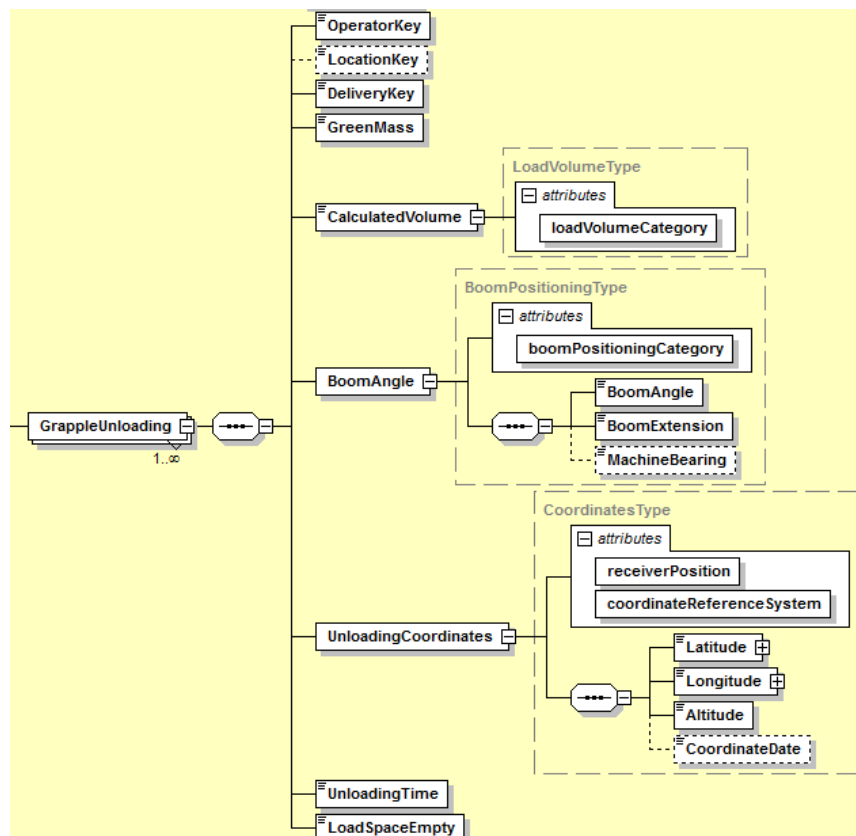
GrappleUnLoading
 Location (landing)
 Delivery (assortments)
 GreenMass
 Volume (calculated)
 Coordinates
 Boom angle
 Time/Distance
 LoadSpaceEmpty

The modified structure also includes the possibility to register tracking data in the form of coordinate points. The coordinates could e.g. be registered with a fixed time interval.

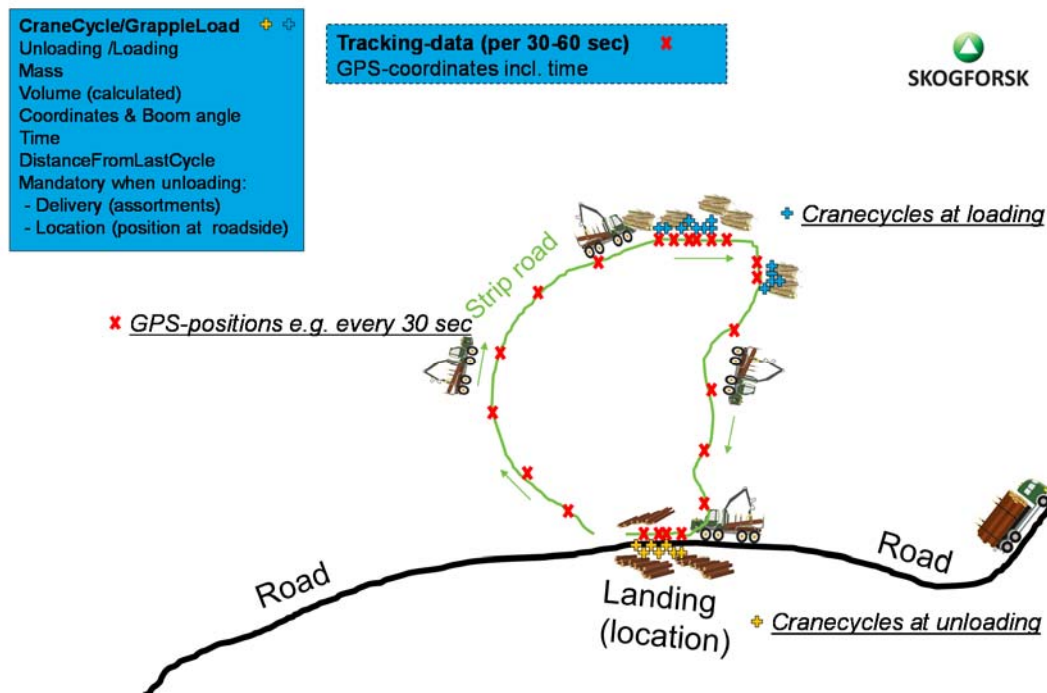
```

classDiagram
    class Machine {
        ScaleKey
    }
    class GrappleLoading {
        OperatorKey
        DeliveryKey
        GreenMass
        CalculatedVolume
        BoomAngle
        LoadingCoordinates
        LoadingTime
    }
    class GrappleUnloading {
        OperatorKey
        LocationKey
        DeliveryKey
        GreenMass
        CalculatedVolume
        BoomAngle
        UnloadingCoordinates
        UnloadingTime
        LoadSpaceEmpty
    }
    class Tracking {
    }
    class TrackCoordinates {
        Latitude
        Longitude
        Altitude
        CoordinateDate
    }
    class CoordinatesType {
        receiverPosition
        coordinateReferenceSystem
    }

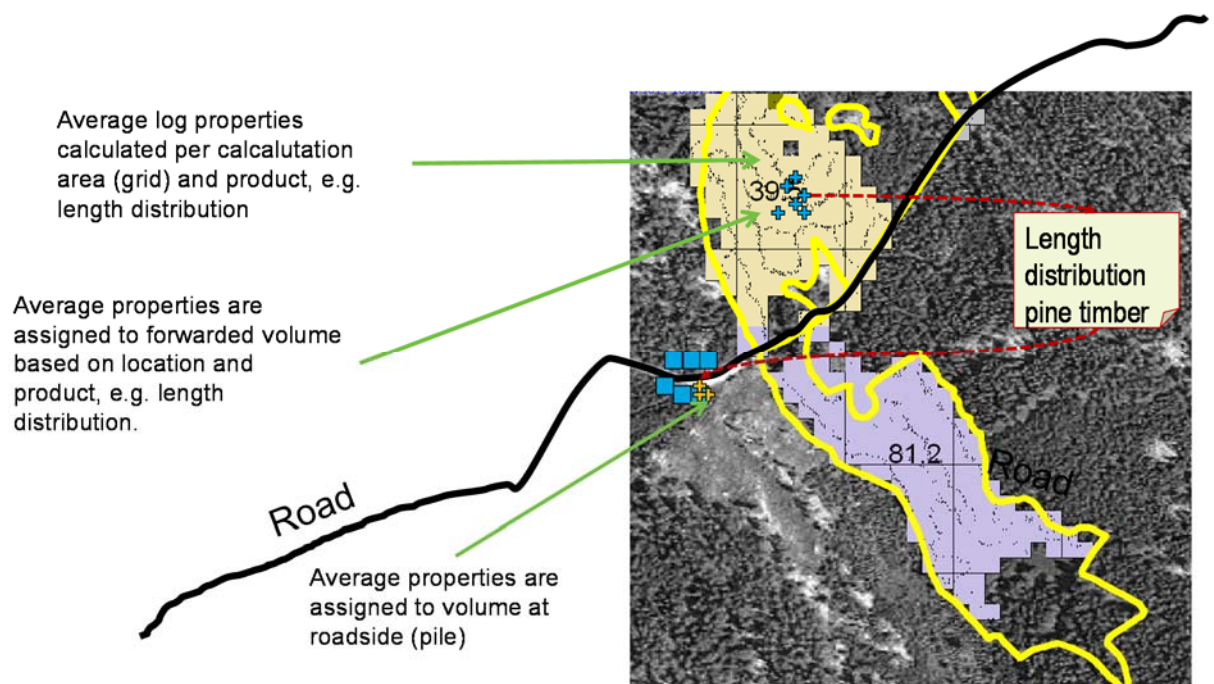
    Machine --> GrappleLoading
    Machine --> GrappleUnloading
    Machine --> Tracking
    Machine --> ScaleKey
    GrappleLoading --> CoordinatesType
    GrappleUnloading --> CoordinatesType
    Tracking --> TrackCoordinates
    
```



Below is an example illustrating when data is registered during a “load cycle”.



Example illustrating how the new detailed information can be used in order to calculate log properties for forwarded volumes:



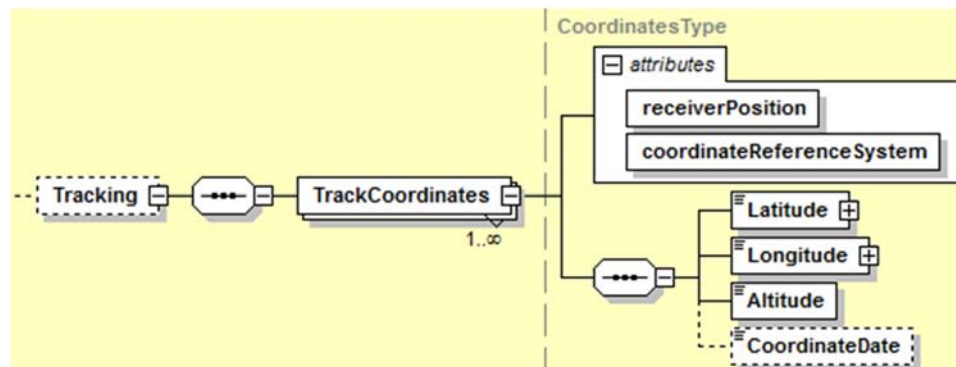
A couple of open issues are remaining:

- Possible/feasible to register product/delivery when loading?
- Defining and registering empty load space?
- New file type or extending present fpr?

There were some different opinions regarding a possible new file type vs extending the present fpr. It was both suggested that a new separate beta-schema is developed where the present element Load is replaced by the new GrappleScaleLoad and that we extend the present schema. A new schema could be called “Forwarded Scale Production” (fsp).

It was decided that we create a new ”pre-release” fsp-schema (keep in separate schema) to be presented at the meeting in February.

It was also decided that we add a new optional Tracking structure to both hpr and fpr (version 3.3) under Machine as illustrated below:



Name	Description	Unit	Type
Tracking	Structure for tracking coordinates registered with a constant time interval (between 5 and 60 seconds). Main use of this structure is in production messages (hpr and fpr).		(optional)
TrackCoordinates	Tracking coordinates and time registered with a constant time interval (between 5 and 60 seconds).		(mandatory)

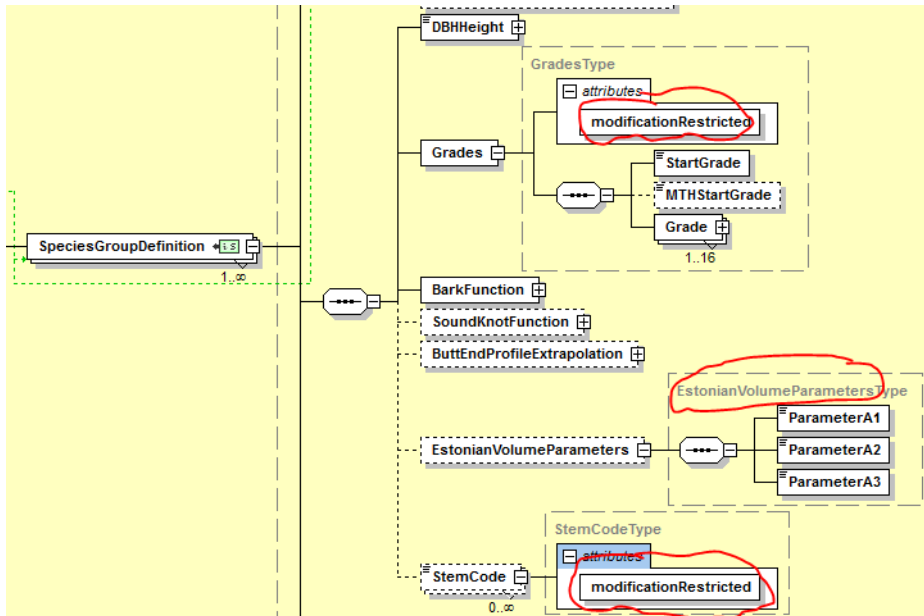
§ 5 Problems with modificationRestricted for StemCode (appendix 3)

Teemu Paldanius, Ponsse, September 13th 2016

Is it on purpose implemented so that “modificationRestricted” attribute is defined independently for each individual StemCode? Is there some practical reason for that? Should it be instead more like structures with grade or bark parameters, where the “modificatonRestricted” covers the whole structure including all grades.

This is not a very important issue, but it would be good to understand if there really is a need to restrict the modification of some specific StemCodes but not another one? This will affect to user interface design as well.

Both Juha-Antti Sorsa and John Arlinger are of the opinion that the restriction should cover all stem codes and so schema definition is not right. From our point of view modificationRestricted is correct for Grades, it is missing from EstonianVolumeParameters and very strange for StemCodes as noted by Teemu and illustrated below.

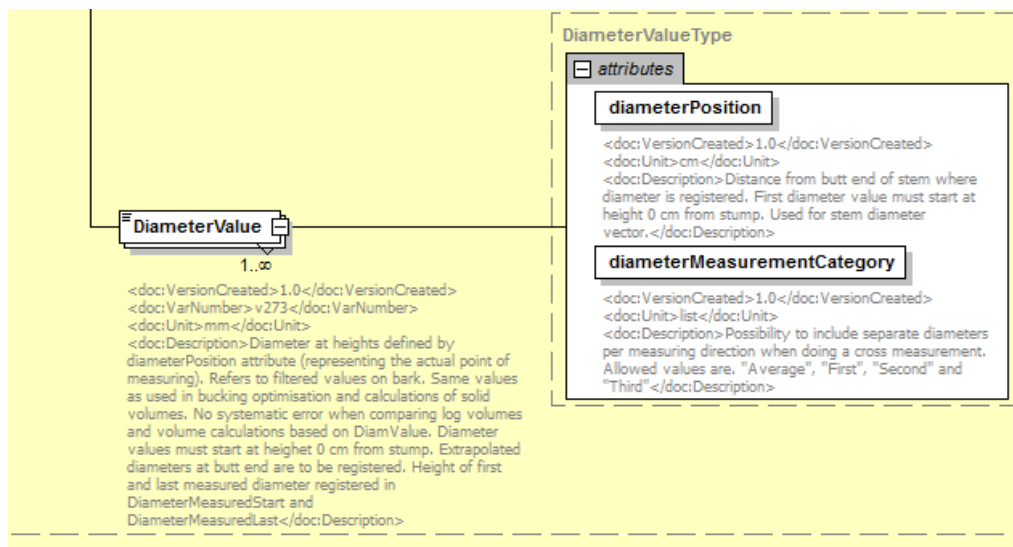


It was decided that **modificationRestricted** is not to be used (interpreted as “false”) for StemCodes. The suggestion there should be one single **modificationRestricted** for all StemCodes (just like for grades) will be postponed. However, this can probably not be solved in a convenient way until version 4.0.

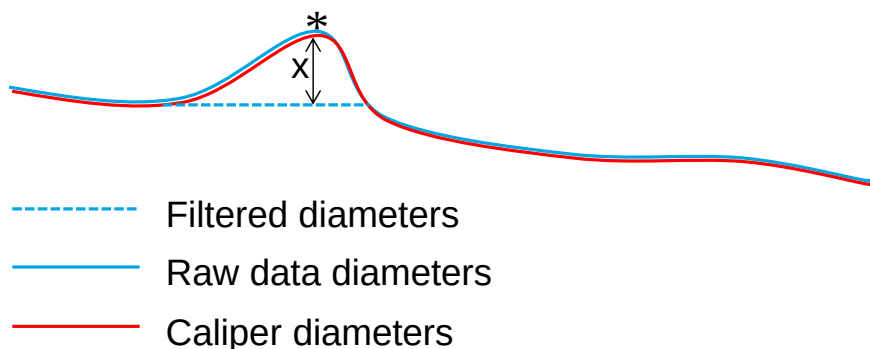
§ 6 Need for unfiltered diameter vector

Based on discussion with Peter Sundlöf and Urban Folkesson, Ponsse, 2016-05-12.

The diameter vector today includes only filtered values and it is mandatory in the hqc-message as illustrated below.

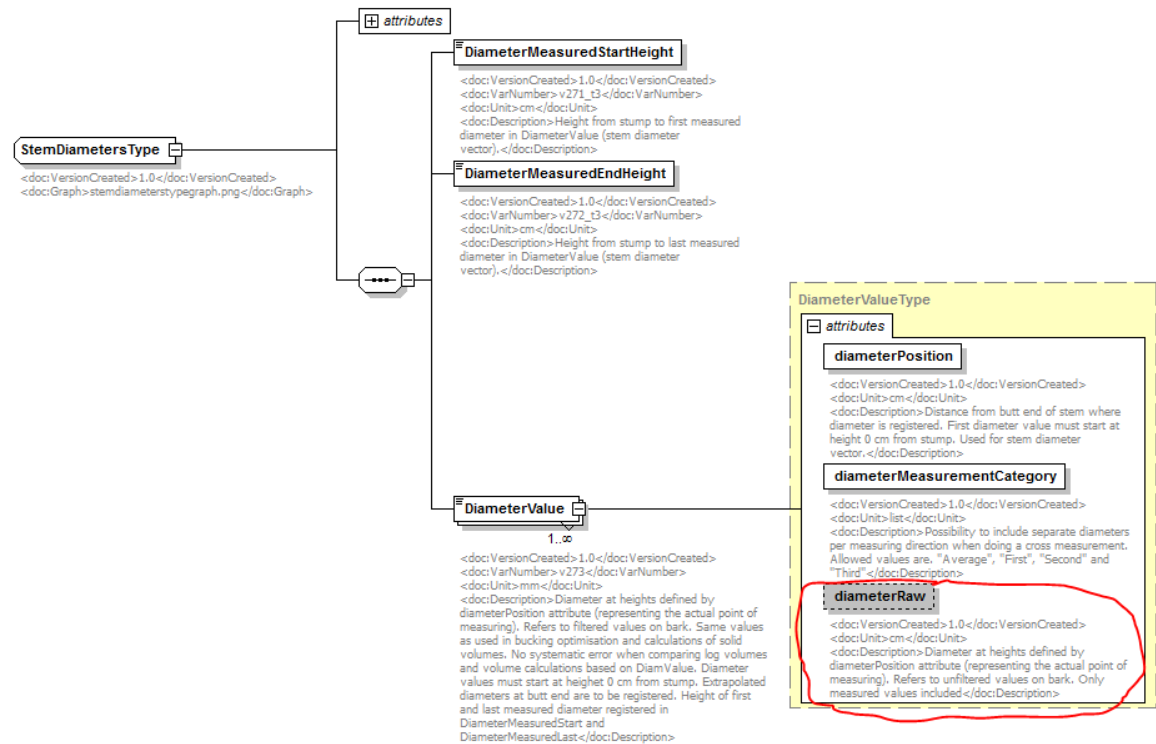


It would be an advantage, in some special cases, to use the raw measured diameters when using hqc data for calibration. A typical example is when a knot whorl with increasing diameters is measured at position * in illustration below where we might risk using the diameter error X for calibrating the harvester.



After some discussion regarding whether to implement new elements or a new attribute it was decided that we add an optional attribute diameterRaw where also increasing diameters are allowed to be used using the following definition (difference comparing with present DiameterVector in red text:

*Diameter at heights defined by diameterPosition attribute (representing the actual point of measuring). Refers to unfiltered values on bark (*increasing diameters allowed*). Same values as used in bucking optimisation and calculations of solid volumes. No systematic error when comparing log volumes and volume calculations based on DiamValue. Diameter values must start at height 0 cm from stump. Extrapolated diameters at butt end are to be registered. Height of first and last measured diameter registered in DiameterMeasuredStart and DiameterMeasuredLast *Only measured values included, means no SPP value.**



§ 7 Implementation issues

CLARIFICATION OF LIMITATION MATRIX

Not presented during the meeting due to lack of time. Presentation included in appendix 1.

IMPROVEMENTS REGARDING REJECTED STEMS AND “UNMEASURED” STEMS IN HQC

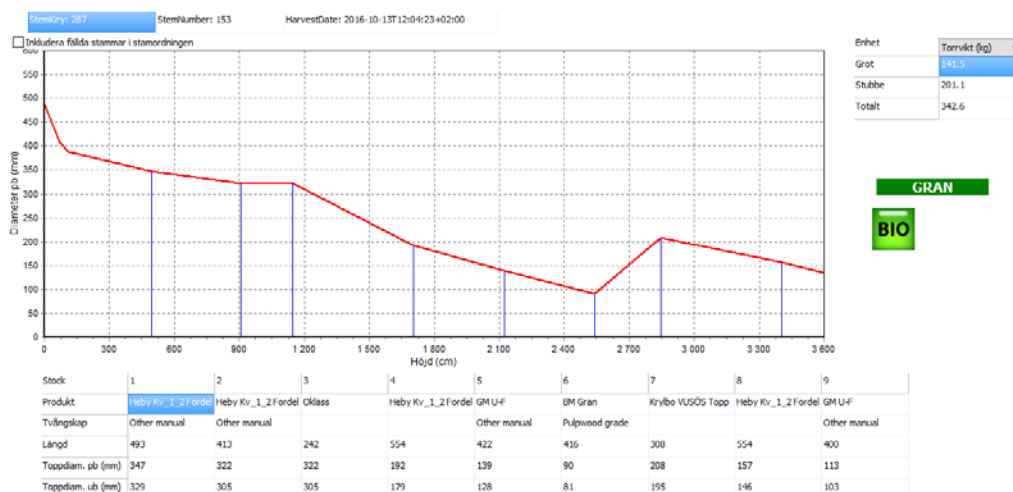
Not presented during the meeting due to lack of time.

HOW TO REGISTER DOUBLE STEMS (APPENDIX 7)

Johan J Möller, Skogforsk, 2016-11-16.

Below is a “double” stem registered in an hpr-file.

Are there any opinions regarding this way of registering double stems? Is this the recommended way?



The meeting concluded that it will always be possible to register a double stem as two separate stems or as one stem as illustrated above, in other words this issue is dismissed.

TIME SCHEDULE FOR IMPLEMENTATION

Harvesters

The following table for forwarders was compiled after the meeting (specify latest minor version that has been or is planned to be implemented).

Manufacturer	Major version 2	Major version 3
Opti (Ponsse)	2.1 - Q1 2015	3.1 – Q1 2017
Timbermatic (JohnDeere)	2.1 - 2014 (1.19)	3.0 - 2015, 3.1 & 3.2 – 2016
LogMate	2.0 – Spring 2013	3.0 - Q4 2014
MaxiXplorer (Komatsu)	2.1 - Spring 2013	3.0 - Q1 2015 3.1 - Q1 2016 3.2 – Q2 2017
Forester (Dasa)*	2.0 - Autumn 2014	3.1 Q2 2016
Motomit (Parker)		Q3-4 2015 (version 3.1)
DPII (Haglöf)	2.0 and 2.1 - Spring 2013	3.2 - Spring 2013
Silvia7	2.1 - Spring 2013	3.2 - October 2016 (2016.4.0.0)
SDC	2.1 - December 2013 (hpr) March 2015 (incl hqc)	3.1- March 2015 (incl hqc)
WoodForce/ Fifth Element		Q3-Q4 2015. Older formats converted to 3.0. Version 3.1 used from 2016

* A conversion module is available for Dasa4/5 (oin,pin,spi,hpr)

Manufacturer	Present software version released on the market
Opti (Ponsse)	Opti4G 4.731 released Q4 2016
Timbermatic (JohnDeere)	1.24
LogMate	1.08 (dec 2016)
MaxiXplorer (Komatsu)	3.10 (Dec 2016)
Forester H70 (Dasa)	1.3, 1.4 (May 2016)
Motomit (Parker)	
DP II (Haglöf)	Skalman V7.12
Silvia7	2016.4.0.0
SenderXC	1.07

Presently the following control systems can update a product, by sending a new pin, during harvesting at a site:

- Dasa
- LogMate
- MaxiXplorer (Q2 2016)
- Timbermatic (implemented in 1.25 2017)

It is not possible to use the updated pin until you start on a new site in:

- Opti (no implementation)
- Motomit(no implementation is planned)

ModificationRestricted has been implemented:

- MaxiXplorer, implemented
- Timbermatic, not implemented
- Forester (Dasa) , release 2017
- Opti (Ponsse), not implemented
- Motomit, not implemented
- LogMate, fully implemented in version 2.0 (2017)

ProductPresetnationOrder has been implemented:

- Forester, implemented for some reports
- LogMate, fully implemented
- Opti (Ponsse), implemented
- Timbermatic, implemented
- MaxiXplorer, implemented

Forwarders

The following table for forwarders was compiled after the meeting (specify latest minor version that has been or is planned to be implemented).

Manufacturer	Major version 2	Major version 3
Opti (Ponsse)	2.1 - All messages implemented if scale is used.	3.0 and 3.1 – Q1 2017
Timbermatic (JohnDeere)	2.1 - 2014	3.0 - 2015, 3.1 & 3.2 – 2016
MaxiXplorer (Komatsu)	2.1 - Fpr implemented (other files Q4, 2015)	3.0 - Fpr Q2 2015 (instructions files Q1, 2016) 3.1 – Q2 2016 3.2 – Q2 2017
Forester (Dasa)		3.1 – Q1 2017 (mom and fpr)
Motomit (Parker)		No plans
Silvia7	2.1 - Fpr implemented.	3.2 - Fpr implemented
SDC	2.1 - March 2015 (fpr)	3.1 - Q4 2015 (fpr)
WoodForce/ Fifth Element		Q3-Q4 2015. Older formats converted to 3.0. Version 3.1 used from 2016

Manufacturer	Present software version released on the market
Opti (Ponsse)	Opti4G version 4.731 released Q4 2016
Timbermatic (JohnDeere)	1.24
MaxiXplorer (Komatsu)	3.10 (Dec2016)
Forester, (Dasa)	No version released
Motomit (Parker)	Unkown
Silvia7	2016.4.0.0
SenderXC	1.07

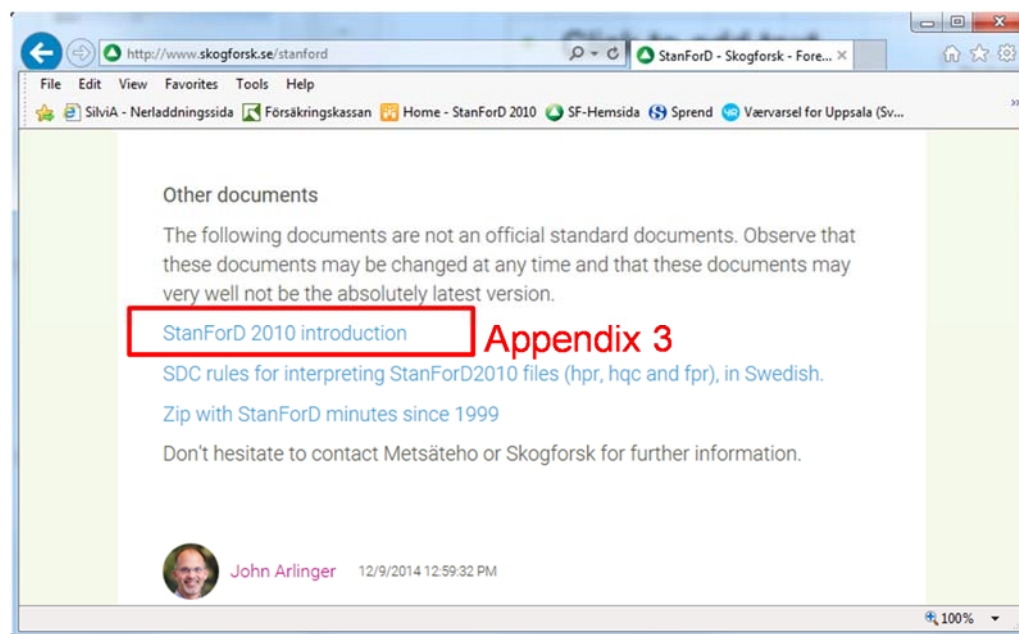
Operational monitoring

The following table was compiled after the meeting. Please fill in whether mom is implemented for both harvesters and forwarder.

Manufacturer	Major version 2	Major version 3.0
Opti (Ponsse)	Forwarder and harvester ready for test, will be released Q3 2016	Forwarder and harvester ready for test, will be released with version 4.740 Q1 2017
Timbermatic (JohnDeere)	2.1 - Forwarder (2014) 2.1 - Harvester (2014)	3.0 - Forwarder (2015) 3.0 - Harvester (2015)
MaxiXplorer (Komatsu)	2.1 - Forwarder (2014) 2.1 - Harvester (2014)	3.1 - Forwarder (2016) 3.1 - Harvester (2016)
Forester H70 (Dasa)	Harvester (2014) version 2.0	3.0 - Forwarder (2017) Q1 3.0 - Harvester (2016) Q1
Motomit (Parker)		?
Logmate	2.1 - Harvester (2013)	3.0 - Harvester (2014)
Silvia7	2.1 - Forwarder (2013) 2.1 - Harvester (2013)	3.2 - Forwarder (2016) 3.2 - Harvester (2016)

SWEDISH AND FINNISH NOMENCLATURE

A recommendation for Swedish nomenclature (naming of different elements in Swedish to be used GUI) is included in an appendix to document “StanForD2010 introduction”.



The following new translations has been added to this list:

Structure (Def)	New element	Swedish GUI name	Comments
DeliveryDefinition	Delivery	<u>Leveransenhet or Leverans</u>	
DeliveryDefinition	DeliveryInfo	<u>Leveranskod</u>	Used by SDC. Today normally assortment code (SSTE)
DeliveryDefinition	DeliveryDestination	<u>Destinering</u>	Used by SDC.
LocationDefinition	Location	<u>Avlastningsläge or Läge</u>	
LocationDefinition	LocationInfo	<u>Lägeskod</u>	Will be used by SDC.

Metsäteho is coordinating the work on compiling an identical Finnish recommendation regarding the nomenclature. Metsäteho will compile a proposal in January and then arrange a Skype meeting with the Finnish machine manufacturers on 26th of January. English GUI name will also be added to this list and checked with Skogforsk in January.

A complete list in English, Swedish and Finnish will be presented at the next StanForD meeting.

COUNTRY SPECIFIC VARIATIONS IN CALIPER VOLUME MEASURING

Issue raised by Antti Uurtamo, Masser Oy, Finnish StanForD meeting 2016-11-15

Today selecting the right measuring settings in the caliper is a problem due to various measurement practices in different countries.

In which cases should volume calculation be based on spi content?

- Volume calculation based on spi values is used also in other countries outside Finland
 - Finnish butt end profile tables/parameters are used in Sweden and in Baltic countries
- We should agree on the rules according to which the country specific measuring variations could be recognised from the content of hqc file, e.g.
 - ButtEndProfileExtrapolation: included in hqc or not
 - BarkFunction: which function to use
 - measuring positions vary from country to country
 - positions are not saved in hqc by the harvester (diameterPosition)
 - software in caliper decides the measuring positions based on the country code
 - manufacturers have their own interpretations which have led to caliper specific variations
 - other measuring rules to be considered
- A basic rule should be that ButtEndProfileExtrapolation and BarkFunction should always be used in volume calculation if they exist in hqc.
 - *How to define the rule?*

It was decided by the meeting to add the following rule to document “StanForD2010_rules_tableV1p6.docx”

Rule#	Rule	Description/Reason	Related messages	Date
R4.23	ButtEndProfileExtrapolation and BarkFunction should always be used in volume calculations if they exist in the hqc.		hqc	2016-11-23

HQC-FILE DIAMETER MEASUREMENT POSITIONS

Finnish proposal, 2016-11-23

Values ub attribute Log.LogMeasurement.ControlLogDiameter.diameterPosition should always be registered by the harvester in hqc for control logs.

Attribute diameterPositionCaliper cannot be changed to mandatory in standard, so an implementation rule is needed.

Manufacturers' opinions?

Joakim Nygrens comment before the meeting:

This proposal would greatly reduce the flexibility of how the HQC files can be used. For example, in some applications today, the driver or auditor, can decide, in field, where to measure a diameter on a stem and also register the diameter position by use of a digital or manual tape. These positions are impossible to forecast for a harvester.

*Also, I can not see any reason to repeat the harvesters positions in
<LogMeasurement logMeasurementCategory="Operator"> and in
<LogMeasurement logMeasurementCategory="Auditor">
when the same data can be find in
<LogMeasurement logMeasurementCategory="Machine">.*

The issue was discussed during the meeting but without coming to any conclusion. It was decided to postpone this issue to the meeting in April and to invite representatives from Masser to that meeting.

Comment from Antti Uurtamo, Masser after the meeting:

The question of measurement positions is especially a harvester CALIBRATION issue. Repeating the measurement positions in every LogMeasurementCategory is the way to tell to the harvester measuring system which diameter values have been measured exactly from the same measurement positions and which measurement positions are relevant for the volume calculation.

Masser will discuss the issue with the machine manufacturers in near future in order to investigate what are the systems in each software to check the correctness of measurement positions and measured values from the point of view of harvester calibration

PIN MODIFICATIONDATE

Finnish proposal, 2016-11-23

- Product is identified by ModificationDate and ProductUserId in WoodForce service and in forest company systems using it.
 - Note: ProductVersion is not yet used for identification because it is reserved for assortment quality (version 3.0 in use for time being).

- Changes to e.g. colour matrix and grades should not automatically update ModificationDate of Product from the follow-up perspective of the forest company.
 - Link to the original version of Product disappears (if ModificationDate is used for ID).
 - Comparing the values in matrices of original and updated pin files would be difficult to arrange just to identify the possible changes in the company end.
 - modificationRestricted might work to some extent, but not practical in all cases
 - However, a practical solution to the problem has been found in WoodForce so far before changing to the use of ProductVersion.
- Meeting 2014-11-20
 - ... the meeting did agreed to recommend that some manufacturers test implementing a solution where ModificationDate is not to be updated in cases where ColorMatrix, CuttingWindow and Quality settings are changed in the harvester.
 - No testing has been done yet?
 - “R3.3 Key: and ModificationDate MUST be updated when modifying a Definition in the machine, e.g. updating prices and length classes of a ProductDefinition. Not to be updated if ProductKey is updated only because SpeciesGroupDefinition was modified and SpeciesGroupKey was updated.”

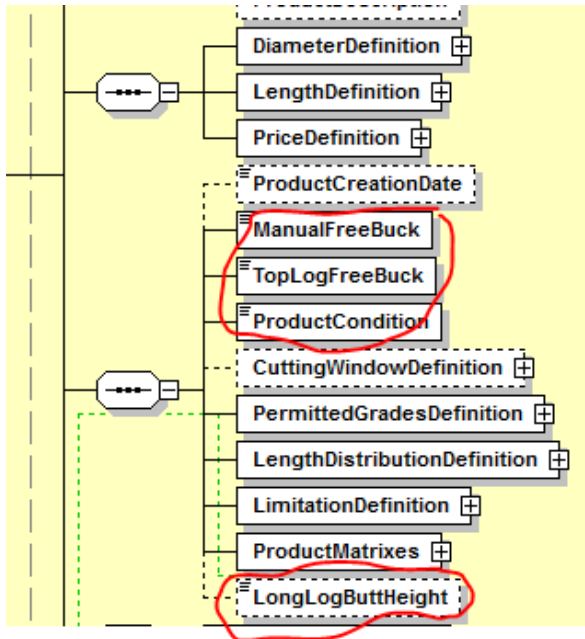
Possible solutions

- a) ModificationDate is not updated if such settings are saved in harvester that have not been sent in the original pin from a forest company
 - ModificationDate does not change when e.g. values to LogColorMarking and PermittedGrades are saved
 - What about CuttingWindow? Some companies specify it, some not.
 - Probably would be very difficult to implement in the harvester system because
 - harvester can not know for sure what is the “original” pin
 - it would be complicated to make the comparing of the matrix values.

- No support for this in the Finnish meeting.
- b) StanForD 2010 Rule to specify those elements which harvester system may change with updating also ModificationDate
 - Not those that affect the bucking results
 - how about e.g. CuttingWindow or diameter and length classes?
 - No changes to forest company systems is needed?
 - This was seen the best alternative in the Finnish meeting, but it should be analysed further.
 - We already have separate modificationRestricted – attributes for ProductMatrixes (price, distribution, limitation ...)
- c) Add ModificationDateMachine to standard
 - Specification of the elements to which ModificationDateMachine is added.
 - Implementation rules for ModificationDateMachine might also be needed.
 - No support for this in the Finnish meeting: ”No more new date elements.”
 - Reference to meeting decision 2014-11-20.
 - “ ... we should perhaps decrease the focus on ModificationDate. “

Comment from secretary:

Observe that only four control settings do not include modificationRestricted presently:



The issue was discussed during the meeting but without coming to any conclusion. It was decided to postpone this issue to the meeting in April and to invite representatives from WoodForce to that meeting.

PRODUCTPRESENTATIONORDER

Finnish proposal, 2016-11-23

“Indicates the order of products per SpeciesGroup. May be used in presentation tools in order to show the products in a certain order, for example if sawlog product are always to be presented before pulp wood and fuel wood in a printed report. The element should be considered as an optional hint given by forest company.”

WoodForce way of implementation

- The presentation order (integer value) will be given in forest company system per tree species and based on the “base price” of the assortment
- the assortments are sorted into order in the company system: most valuable ones on top of the list
- ProductPresentationOrder is saved in pin for each assortment
- WoodForce then creates oin file for each Object, but does not do anything to the order value.
- In the machine system ProductPresentationOrder is read into the system and based on the value sorting is possible to be done.

- There might be same values for different assortments, but that does not matter.

Is ProductPresentationOrder implemented already by machine manufacturers?

It was decided to let Skogforsk check if and how the different manufacturers have implemented ProductPresentationOrder (check section “Time schedule for implementation under §7).

STEMTYPECODES AND PULP WOOD

Discussion between John Arlinger and Teemu Paldanius, 2016-11-18

It was discovered during the wood value test that at least one manufacturer was using the StemTypeCode per product in order to determine if the product was a “pulpwood” assortment. It was assumed that the Finnish PMP-codes are used. By using these codes it is possible to set in the control system that certain functions should only be available when the PMP-codes for pulpwood are registered in element ProductDefinition.StemTypeCode.

In the old StanForD var124_t2 had the following description:

Code for stem type/ stem type/ tree species: 1...var122_t1/ 1...var111_t1.

The stem types are described with Finnish PMP-codes:

<i>Pine</i>	<i>Timber stem type 11.</i>
	<i>Pulpwood stem type 12</i>
<i>Spruce</i>	<i>Timber stem type 21.</i>
	<i>Pulp wood stem type 22.</i>
<i>Birch</i>	<i>Timber stem type 31.</i>
	<i>Pulp wood stem type 32.</i>
<i>Aspen</i>	<i>Timber stem type 41.</i>
	<i>Pulp wood stem type 42.</i>
<i>Other species</i>	<i>Other species timber stem type 61.</i>
	<i>Other species pulp wood stem type 62</i>

The standard today does not have any strict definition regarding what codes are to be used. StemTypeCode (ProductDefintion) has the following description:

Code for stem type. This is a reference to StemTypeCode element in StemTypeDefinition in SpeciesGroupInstruction message. Free text (usually finish PMP-codes).

There could be a few different solutions:

1. Strictly define that PMP-codes are to be used. What about other species?
2. Add new boolean element “Pulpwood” per product.

3. Use TopLogFreeBuck or ManualFreeBuck in order to determine if it is a “pulpwood” product.

The issue was discussed during the meeting but without coming to any conclusion. It was decided to postpone this issue to the meeting in April.

CLASSIFYING LOGS CUT OUTSIDE CUTTING WINDOW

It was discussed how different manufacturers handle the case of a saw log with ManualFreeBuck de-activated (false) being cut outside the cutting window. All manufacturers registers such a log as the most valuable log with ManualFreeBuck allowed or if it inside the cutting window.

CLARIFICATION OF DBH DEFINITION

Not presented during the meeting due to lack of time.

It is known that at least one manufacturer does not follow the present definition of DBH since the butt-end extrapolation function does not seem to be considered:

DBH (on bark) measured at height according to DBHHeight (in SpeciesGroupDefinition). Same diameter used in optimisation and volume calculation. DBH is based on butt-end extrapolation function (old SPP) if such function is used at DBH position.

This issue will be discussed with that manufacturer.

§ 8 StanForD2010 projects

No StanForD-projects were presented during the meeting due to lack of time.

REPORTING PRODUCTION DATA AND DISTRIBUTING HARVESTER INSTRUCTIONS IN SWEDEN (SDC)

Not presented during the meeting due to lack of time.

NEW USE OF HPR-DATA IN SWEDISH FOREST COMPANY SYSTEMS

Not presented during the meeting due to lack of time.

USING STANFORD IN FP SUITE

Not presented during the meeting due to lack of time .

USING STANFORD IN WOODFORCE (METSÄTEHO)

Not presented during the meeting due to lack of time (appendix 2).

HARVESTING QUALITY CONTROL AND SELF-CONTROLLING SYSTEMS (METSÄTEHO)

Not presented during the meeting due to lack of time (appendix 3).

§ 9 Other issues

No other issues.

§ 10 Next meeting

Web meeting 2017-02-06, 10:00 CET

StanForD meeting 2017-04-25--26, Metsäteho, Vantaa

Meeting start at 12:00 EET and ends at 16:00 EET

§ 11 End of meeting

Chairman Johan Möller closed the meeting and thanked for the participation.

Examples limitation matrix

- Question from Anders Nylund 2016-10-10

Total volume, m3 per product

- No limitations regarding volumes when all cells have value 0.

	140	150	160	165	170	180	190	200	210	220	230	240	260	280	300	320	360	420
335	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
365	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
425	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
455	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
485	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
515	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
545	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0

Total volume, m3 per product

- Max 3 m³ for the whole product!

	140	150	160	165	170	180	190	200	210	220	230	240	260	280	300	320	360	420
335	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	3	0	0	0	0	0	0
365	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
425	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
455	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
485	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
515	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
545	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0

Total volume, m3 per product

- Max 5 m³ for whole product!

	140	150	160	165	170	180	190	200	210	220	230	240	260	280	300	320	360	420
335	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	3	0	0	0	0	0	0
365	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
425	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
455	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1	0	0	0	0	0	0
485	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
515	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
545	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	1

Volume per diameter class per product

- Dia.class 240 has max 4 m³
- Dia.class 420 has max 1 m³

	140	150	160	165	170	180	190	200	210	220	230	240	260	280	300	320	360	420
335	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	3	0	0	0	0	0	0
365	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
425	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
455	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	1	0	0	0	0	0	0
485	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
515	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0
545	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	1

Volume per length class per product

- Length class 335 has max 3 m³
- Length class 455 has max 1 m³
- Length class 545 has max 1 m³

VT16_10_06_NybySetraKv3_Ta... x

Product infoSettingsValueDistributionLimitationsColor markingRestrictionsContact info

Limitation type

Volume per length classActionProduction stopped, no manual c

	140	150	160	165	170	180	190	200	210	220	230	240	260	280	300	320	360	420
335	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	3	0	0	0	0	0	0
365	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	0	0	0	0	0	0	0
425	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	0	0	0	0	0	0	0
455	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	1	0	0	0	0	0	0
485	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	0	0	0	0	0	0	0
515	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	0	0	0	0	0	0	0
545	-1	-1	1	-1	-1	-1	-1	1	-1	-1	0	0	0	0	0	0	0	1

WoodForce

In Brief

WoodForce™ is a planning and operations control system for harvesting operations and forestry services. It enables the contractor to operate with multiple customers and increases supply chain productivity. WoodForce™ enables contractors to work for several forestry companies using one common software solution. The WoodForce™ service works connected or disconnected and consists of a web-based work planning application, a mobile app for field operations, and an on-board harvester application.

WoodForce™ Functionality:



Timber and Forest Energy Harvesting

Facilitates the planning and management of harvesting and forwarding as well as worksite navigation and quality audits.

Automated work planning takes into account the harvest period and the environmental and occupational safety aspects. The Service utilizes the latest StanForD standards to transmit information to key stakeholders.

- WoodForce testing and pilot use has been going on since summer 2016 in Metsähallitus
 - John Deere, Komatsu and Ponsse machines piloting
 - during the end of the year also machines with measuring systems of Eco Log, Parker and Technion will be tested
 - some problems have been found with ktr and in forwarder files
 - software installations and PC updates are starting soon
 - productive use scheduled to start Q2/2017
- Tests on harvesting sites of Stora Enso have been started in November (lasting 2 weeks)
 - John Deere, Komatsu and Ponsse machines piloting
 - integration tests with the new company system in January
 - productive use scheduled to start 06/2017
- Metsä Group will start field tests and pilot use 01/2017 increasing the number of machines gradually
 - schedule for system launch open
- Next two years version 3.0 will be supported only in the service
 - ver. 3.1 will probably not be supported at all
 - later the status of the version of each machine will be fed into the service
 - now only info if the machine is using either StanForD 2010 or StanForD Classic

Harvesting quality control and self-controlling systems

- Goal of the project is to develop quality management and quality reporting of the operations in harvesting and silviculture.
- Quality control and reporting is gradually changing from forest companies for contractors to take full responsibility
 - development of self-controlling systems are needed to support this
 - WoodForce has a system to do the self-control reporting based on the Finnish forest data standard.
- A long run objective is to develop quality reporting applications in which the reporting content would be based on automatically generated information and data from forest machine information systems and devices.
 - Preliminary studies and pilot tests have been carried out or will be started.
- Meanwhile, implementation of **User Defined Data** of StanForD 2010 in the machine systems could be a common solution to the quality reporting done by the operator
 - in WoodForce machine it is not needed.



StanForD meeting 2016-11-23

1

Attributes of
harvesting quality
self-control
measurements
after thinning

From TLS or
camera?

From stem
locations with GPS
coordinates?

SamplePlots	Array (1..n)		
StandId	Kuvion tunnistus	String	10
SamplePlotNumber	Koealanuero	Number	
MeasureDate	Mittausaika	DateTime	
Measurer	Mittaaja	String	50
MeasurerType	MittaajaTyyppi	String	3
Geometry	Mittauspisteen sijainti	gml	
isGPSLocation	Onko koealan sijainti mitattu gps:llä	String	1 K/E
District	Alue, jonka laskenta taulukoita käytetään	String	10
Radius	Koealan säde (aina 11 m)	Number	
ManipulationMethod	Käsittelytapa	String	3
ForestType	Metsätyyppi	Number(2.0)	
StemCountPine	Runkoluku mänty	Number(2.0)	
StemCountSpruce	Runkoluku kuusi	Number(2.0)	
StemCountHardWood	Runkoluku hieskoivu + muu lehtipuu	Number(2.0)	
StemCountSilverBirch	Runkoluku rauduskoivu	Number(2.0)	
MeanHeight	Keskipituus	Number(2.1)	
BasalAreaPine	Pohjapinta-ala mänty	Number(2.1)	
BasalAreaSpruce	Pohjapinta-ala kuusi	Number(2.1)	
BasalAreaHardWood	Pohjapinta-ala hieskoivu + muu lehtipuu	Number(2.1)	
BasalAreaSilverBirch	Pohjapinta-ala rauduskoivu	Number(2.1)	
Storey	Jakso	Number(1.0)	
DiameterMax	Läpimitta 1 (suurin)	Number(3.0)	
DiameterMin	Läpimitta 2 (pienin)	Number(3.0)	
MeanDiameter	Keskiläpimitta	Number(3.0)	
StemCountTarget	Tavoitepuusto	Number(2.0)	
VehiclePathDistance	Ajourväli	Number(2.1)	
VehiclePathWidth	Ajouraleveys	Number(2.1)	
ThinningTooExcessive	Hakattu liikaa	String	1 K/E
ThinningTooExcessiveCount	Hakattu liikaa määrä	Number(2.0)	
ClearCutting	Avohakkuu	String	1 K/E
OtherTreeSpecies	Puulajikohtaiset mittaukset (0..n)		
TreeSpecies	Muu puulaji (pl. mä, ku, rko, hko)	String	3
StemCountOtherTreeSpecies	Runkoluku muu puulaji	Number(2.0)	
BasalAreaOtherTreeSpecies	Pohjapinta-ala muu puulaji	Number(2.1)	



StanForD meeting 2016-11-23

2

Quality management of logging operations

Aim is to develop new methods to self-control of logging quality

- Camera and laser scanning technology combined with CAN bus data of forest machines and production data
- Systems to detect automatically damages to terrain and standing trees caused by harvesters and forwarders
 - depth of tracks
 - stem bark injuries and damages to roots

Vision: real-time application on cloud services, which

- receives the image
- detects and identifies damages
- calculates total amount of damages
- creates a report

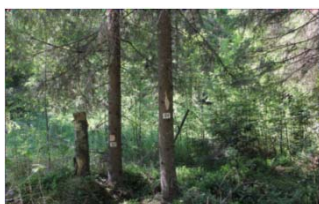


Picture: Mikko Miettinen, Argone Oy



Picture: Jyry Eronen, University of Eastern Finland

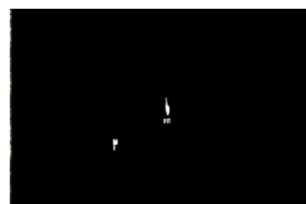
An example of automated image processing phases



Phase 1



phase 6



phase

Challenges

- varying light conditions in forests and during the work (amount of light, reflections, shadows caused by machine's work lights)
- branches and other obstacles
- colours
- unknown distance to the tree

