

Minutes StanForD2010

2017-04-26

Place:	Metsäteho, Vantaa, 2018-04-17—18
Participants:	Lars Henriksson, SDC Tapio Räsänen, Metsäteho Timo Melkas, Metsäteho Antti Korkiakoski, JohnDeere Fredrik Tjernberg, Komatsu Jonas Gustafsson, Sveaskog Antti Uurtamo, Masser Pasi Palonen, Parker Jonas Thorsson, Dasa Ian Wilson, Interpine Mikhail Shilov, Ilim group, Russia Fedor Stazenko, Ponsse Jari Ala-Ilomäki, Luke (part of day 2) John Arlinger, Secretary Johan J. Möller, Chairman Skype participation: Juha Yli-Hemminki, Exertus Teemu Paldanius, Ponsse (day 2) Jakko Kuivanen Ponsse (day 2) Jaakko Mäkinen, Technion (day 2) Markku Laaksonen, Technion (day 2) Jean Plamondon, FP Innovation Joakim Nygren (day 1)

Decision summary:

- Next version to be implemented is 3.5.
- Proposals to be created for the next meeting:

- Time line for EngineTime in mom.
 - New schemas for feller bunchers and skidders
 - New element for TrackingAssist (tethering)
 - New schema for a delta-hpr
- Extensions to be added to following structures: Tracking, GeographicDirective, GISLayer
- New element MessageKey to be added to future version 4.0
- The following conclusions were reached regarding diameter positions in hqc files:
 - A linear interpolation is always to be used when interpolations are needed.
 - The preferred solution is alternative 1 where the diameter vector includes a diameter per cm. Whether to implement this or not is up to a discussion between manufacturers of control systems and calipers. This is not a StanForD requirement.
 - Calipers must be able to handle also diameter vectors with a diameter per dm.
 - It is very important that the effect on standard deviation is analysed and discussed within the StanForD group when/if a harvester implements a more detailed diameter vector. If there is any manufacture that can generate diameter vectors per cm Skogforsk would like to have these data for analysis.

Action list:

- It is strongly recommended to use the gps-latitude when importing spi or to force the operator to manually set this value in the harvester.
- The possibility of changing the products during harvesting using an oin will be a requirement on the Swedish market. Updating oin should only affect product references (ProductUserID). It is NOT to be used for changing identities or sub-objects!
- It is strongly recommended that the control system does not automatically activate a modified pin if it is not active at the present harvesting object
- 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 SDC).

- Implementation of ProductClass will be important on the Swedish market since it will be used by SDC in the new VIOL3 platform.
- Coordinates in production files should always be activated by default in all forest machines (especially important after software updates when coordinate registration is commonly lost).

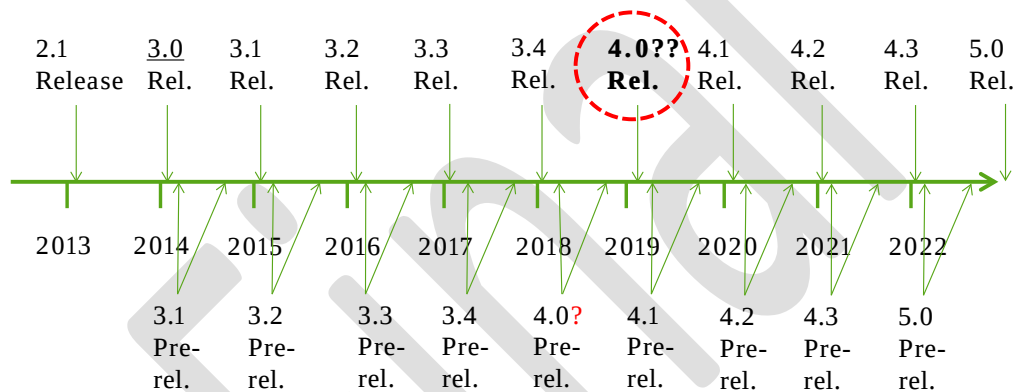
§ 1 Opening of meeting

Chairman Johan J Möller opened the meeting.

§ 2 Agenda

The agenda was accepted by the meeting with two additional issues (§ 8).

Secretary John Arlinger went through the road map for implementing new standard versions.



There was a brief discussion regarding whether there will be a need for implementing version 4.0 during the coming year or if it could be postponed another year. No one expressed a requirement for a new major version 4.0. It was decided to discuss this issue again at the next meeting with the assumption to aim for a new 3.5 in November.

§3 New StanForD member

Johan Möller informed the meeting about the fact that LogSet Oy has decided to join the StanForD group as a new member.

§4 Information about decisions at previous meetings

The decisions made at the previous meetings (2017-11-22 and 2018-02-06) were presented as well as the action list compiled after those meetings.

- Update the definition of attribute diameterPosition in the hqc message:
Control position for diameter measuring from butt end of log. Used for log diameter vector (element ControlLogDiameter). ~~The value must be the same for all~~

~~logMeasurementcategory (Machine, Auditor, Operator).~~ Element is used to connect diameter values measured by Machine, Auditor and Operator

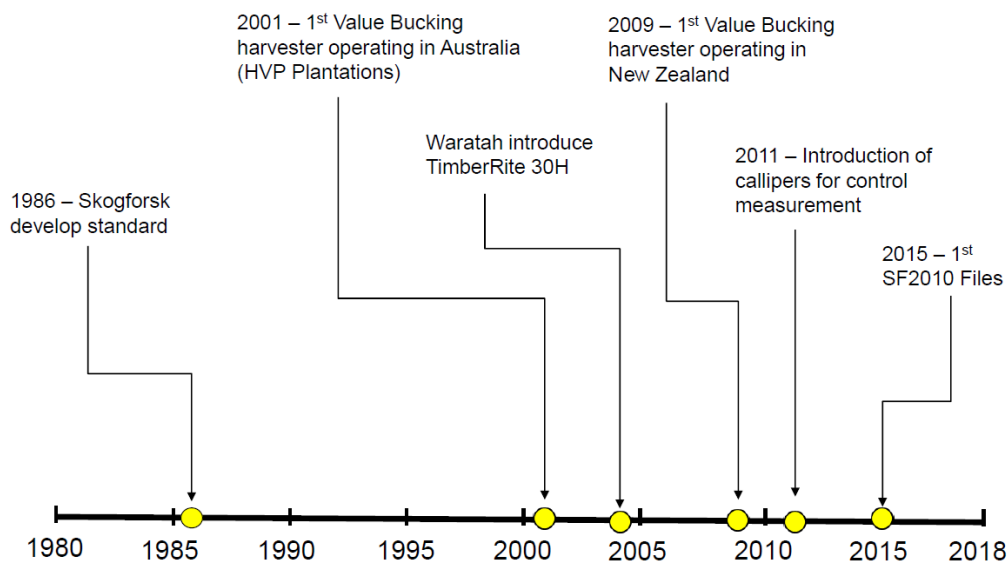
- New EnvelopeTransmissionAcknowledgement schema to be included in StanForD version 3.4.
- Coordinates to be registered with 7 decimals since 5 decimals gives too low precision. New description: *Longitude/Longitude, absolute value. Preferably 7 decimals to be registered. Registered according to coordinateReferenceSystem and receiverPosition.*
- New logistic type bark function included.
- Coordinates for downtimes in mom files added.
- Extension element added to CoordinateType.
- Optional attribute countryCodeCategory added to element CountryCode.
- New elements TrackingKey, ObjectKey and SubObjectkey added to Tracking structure. Aggregated reporting of coordinates in Tracking should be avoided.
- SubObjectKey element added to PartialLoad in fpr file in order to make it possible to analyse forwarded volumes per SubObject.
- Rule 2.3 is updated with a comment pointing out that the schemas are case sensitive and that assuming “non-case sensitive” probably will cause problems in some systems.
Observe that this means that the standard is inconsistent!

§ 5 Use of StanForD in New Zealand/Australia and possibly Russia

NEW ZEALAND/AUSTRALIA

Ian Wilson from Interpine gave an introduction to logging in Australia and New Zealand. Wheeled harvesters are widely used in Australia (85%) while the steeper terrain and larger trees in New Zealand means that tracked machines dominate in New Zealand (85%).

The development of StanForD use:



The figure below illustrates the major drivers for an increased used of value optimization control systems.

	Cost	Ease of Use	Data Capture	Value Recovery
 Length Preset Controller	\$	👍	✓	💰
 Priority Bucking Controller	\$	👍	✓	💰
 Value Bucking Controller	\$	👍👍👍	✓✓✓	💰💰💰

The major control system brands are Waratah, MaxiXplorer, Timbermatic, Dasa, Woodsman Pro, LogMate, Opti and Logset TOC.

Ian also gave a thorough introduction to the feller buncher system as a background to the proposal included under §5.

RUSSIA

Mikhail Shilov first presented Ilim Group which is a paper and pulp company with an annual logging volume of 9 million m³ in both Siberia (Bratsk and Ust-Ilimsk) and the NorthWest regions (Koryazhma).

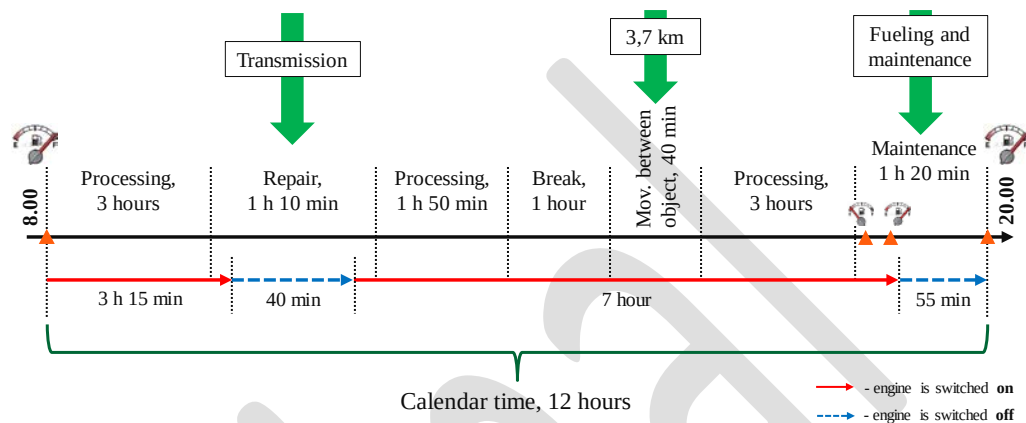
Ilim has a total of 36 wheel harvesters, 45 forwarders, 13 feller bunchers, 15 skidders and 24 tracked harvesters in their logging operations. The tracked machines are predominantly used in Siberia due to larger tree sizes.

Since 2014 JSC ILIM Group has been realizing the project of "Automatic data transfer from the field equipment not covered by mobile network operators". They transfer shift reports according to StanForD: drf, prd, ktr.

They are now planning to start transfer shift reports according to StanForD2010: mom, hpr, hqc, thp.

Mikhail proposed some beneficial updates to the standard and the machine GUI regarding the mom-files.

The most important improvements relate to fuel consumption and engine time as illustrated in the figure below.

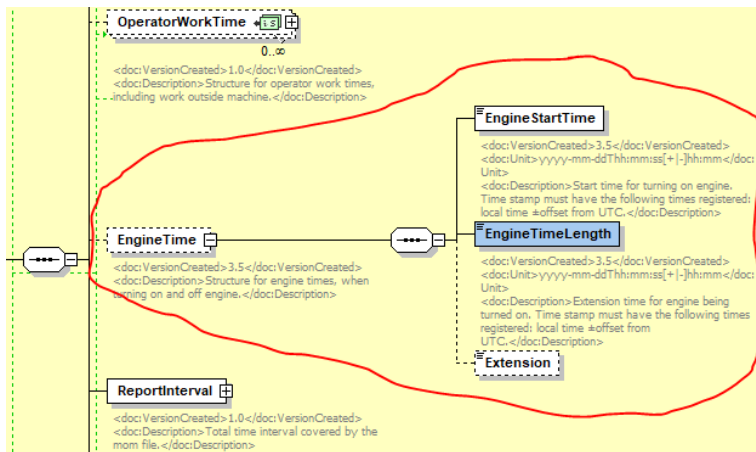


Fuel consumption per shift = balance at the beginning of the shift + Fueling – The balance at the end of the shift

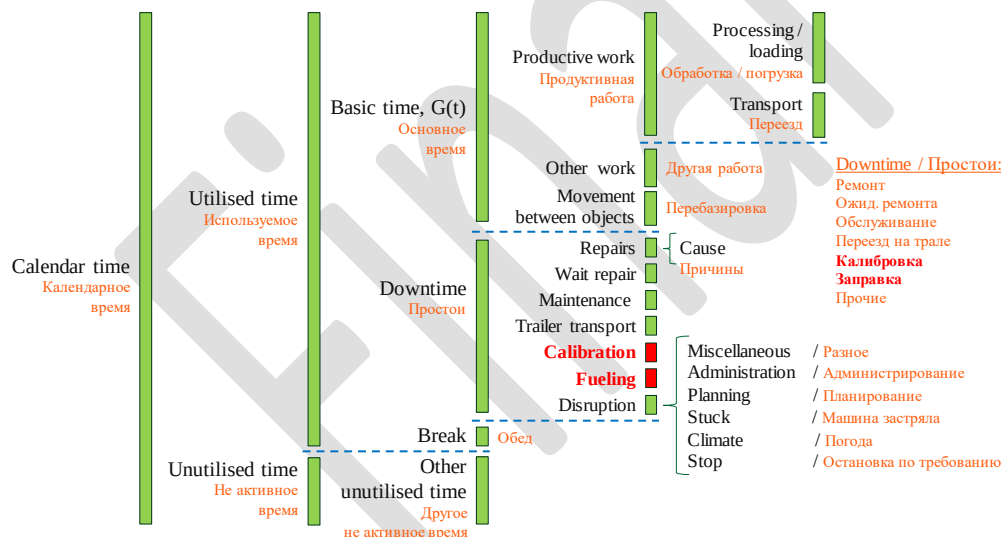
Fueling = Balance at the end of the fueling - Balance at the beginning of fueling

The major needs are to be able to register a time line with engine times in the mom-file as well as to give the operator information about the fuel level before and after refilling. Ilim would like the operator to be able to see the present fuel level in the machine GUI.

The meeting decided that the secretary is to create a proposal for adding a new time line where it is possible to register each individual engine time independently of what machine activities are registered. This time line will include when the engine was started as well as for how long it was on as illustrated by the red arrow above. A possible new structure is illustrated below (created after the meeting):



Another question from Mikhail related to the fact that *Calibration and control* is considered to be a Maintenance down time even though Ilim would like to keep this time separate from all other down times. It was pointed out by the secretary that any receiver/user of mom-data is free to calculate their own key figures. Excluding Calibration from all other down times is therefore ok to do in any analyzing application.



§ 6 Proposals

FELLER-BUNCHER, SKIDDERS, TETHERING

The idea of opening up StanForD2010 machines for tree length machines was raised by Ian Wilson in November 2017. The idea was discussed with a few manufacturers prior to the meeting.

The background section below is based on communication with Ian Wilson.

Background

There are probably some real opportunities to increase StanForD scope and utilisation into Tree Length (TL) harvesting operations, especially the feller buncher machine which is probably the most important machine in a TL

operation. Steep slope mechanised tree felling has dramatically increased in New Zealand and Australia with the use of “traction assist” winch systems and in both yarding and shovel/skidder operations. The feller buncher is critical to efficient extraction productivity of the stems to the landing (log making area). This is especially the case in grapple yarding operations where stem bunching and presentation is key to increased productivity i.e. making sure that the harvester productivity capability is fully realised

These machines are typically doing very large annual volumes (up to 280,000 m³) on a single shift system and will normally do all of the tree felling for multiple harvesting crews (teams) which are often 50 – 100 km apart as they are very efficient at tree felling. Some CTL contractors operate a feller buncher where the harvester is still performing CTL, but now not performing the tree felling task. Typically we see some very large productivity improvements (up to 20 – 30%)



Currently, the feller buncher could be considered a “dumb machine” as it doesn’t have any onboard controller for data capture, navigation/planning or operational

monitoring capabilities. Due to the task, that this machine is performing, being much simpler than a harvester or forwarder Ian Wilson suggested that a “paired back” version of a harvesters SF2010 schema would work, as the harvester schema already has all of the necessary recording such as tracking, species, coordinates per stem and of course operational monitoring.

An overall vision could be to utilise the existing SF2010 file upload system such as the OIN, SPI, OGI and produce a “scaled back” HPR style of output file. It would also make good sense to utilise the operational monitoring capabilities of the MOM file for this type of machine and from my limited knowledge, it appears that the current MOM file structure will cover things really nicely.

Due to feller buncher being less complex than a harvester or forwarder (i.e. its primary role is to only fell trees), Ian suggested that we start with looking at what’s in the HPR file and then stripping out any items that it wouldn’t need, such as any product related items (e.g. log length) as feller buncher heads on the market don’t have any length of diameter measurement capabilities and will likely never need this.

Ian also pointed out that it would be an advantage for the operator to be able to use an OIN or an ENV file (but without any Product requirements) to create a harvesting Object. The OIN/ENV would contain SPI details so that individual tree species can be recorded within the production file (the same as what’s currently done by the harvester operator when they are harvesting different species).

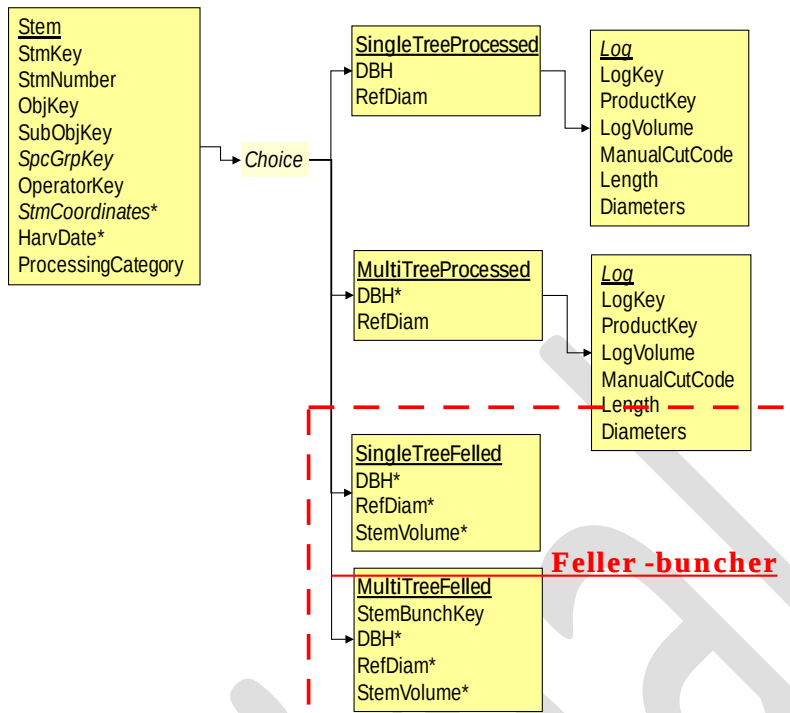
A lot of feller bunchers are now also getting “tethered” via a separate winch machine or some have the winch physically attached to the Feller Buncher due to the steep slopes that the machines are working on. Knowing when its “On Tether” or “Off Tether” would be very valuable information to record. Speaking of Tethering, a growing number of wheeled harvesters and forwarders are now utilising this technology so maybe this could be a good thing to have added to the harvester and forwarder functionality as well?

Summary of background

- Feller-bunchers (and skidders) are very important nodes in logging operations on many different markets.
- Presently no data is available in standardized format from these machines. Makes it difficult to optimize supply chain and study productivity.
- A critical amount of “smart” machines is probably needed in order to build efficient information systems (maybe at least 80-90%).

Feller buncher production

The present hpr-format includes Single/MultiTreeFelled stems that could be used for a feller buncher as illustrated below.

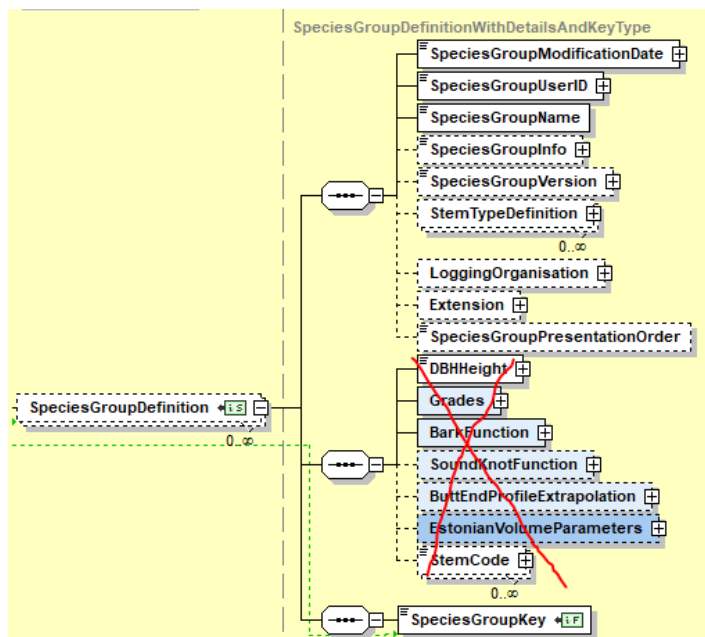


Only one significant update to the hpr-format would probably be needed in order to use it for a feller buncher:

- Add “Feller buncher” enumeration to the machineCategory in order to utilize the hpr schema.

The measurement data included for felled stems are DBH, ReferenceDiameter and StemVolume. However they are optional.

The only totally irrelevant mandatory elements are SpeciesGroupDefinition.Grades and SpeciesGroupDefinition.BarkFunction. The present SpeciesGroupDefinition in the hpr could be modified according to the following figure. This means that it is identical with the SpeciesGroupDefinition in the fpr-schema.

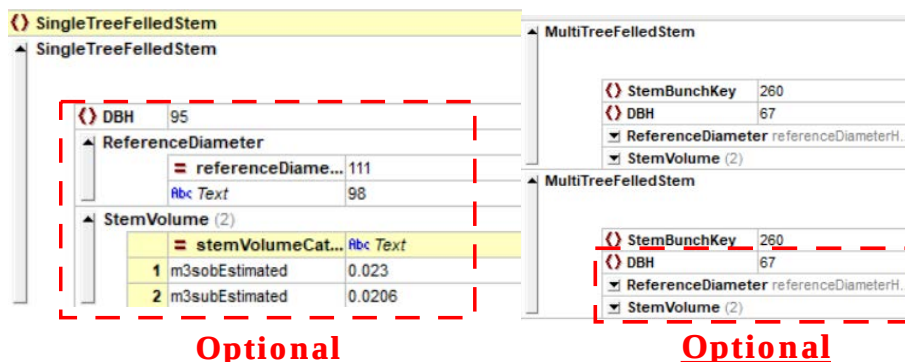


Below follows a few illustrations from an example hpr-file where the “crucial” items are inside “red boxes”:

Machine	machineCategory	FellerBuncher
	MachineKey	636128963318900000
	MachineUserID	9313021211
	MachineOwnerID	78D
	MachineApplicationVersion	XSoftware 5.32.13
	MachineBaseManufacturer	X Forest
	MachineBaseModel	585
	BaseMachineManufacturerID	9313021211
	MachineOwner	
	FirstName	Eric
	LastName	Svenson
	Address	
	Phone	
	Fax	
	Email	
	BusinessName	Big Logger Lmtd
	BusinessID	
	OperatorDefinition	
	MachineHeadManufacturer	X Forest
	MachineHeadModel	411

Stem (10)	StemKey	ObjectKey	SpeciesGroupKey	OperatorKey	Harve...	StemNumber	Processin...	StemCoordina...
1	255	6	42	5	2016-10-25 T17:05:55.4 87+02:00	3	SingleTreeFelling	StemCoordina...

Opt. **Optional**



Feller-buncher, operational monitoring

The situation is probably comparable with production data in that a very minor schema update in the form of a new MachineCategory is needed.

The only other significant modification is probably related to the definition of “Processing” time since a felling head is constructed in a different way than a harvesting head. The present definition for Processing in a harvester is:

- Time is registered as *Processing* for a harvester if feed rollers and swing are in motion (turning).

The definition of Processing in the case of a feller-buncher might be something like:

- Time is registered as *Processing* for a feller-buncher if “arms” and swing are in motion (turning).

Handling the registration of down time reasons might be problematic if only a very simple GUI is available. One possibility could be to register all down times as “undefined”.

Feller-buncher instructions

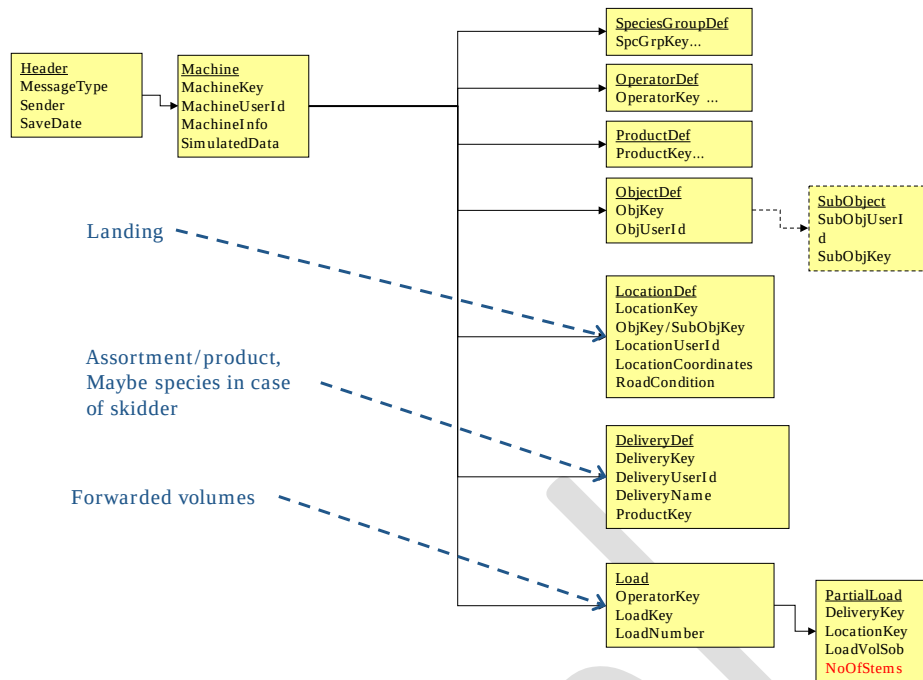
Re-using the present harvester instructions also for feller bunchers is a bit more complex since products (pin) is not relevant in the case of a feller-buncher.

A possible solution could be to introduce a new object instruction for feller bunchers (boi) that do not reference a product but only a SpeciesGroupDefinitions. The SpeciesGroup could either be included in the boi or the spi could be used.

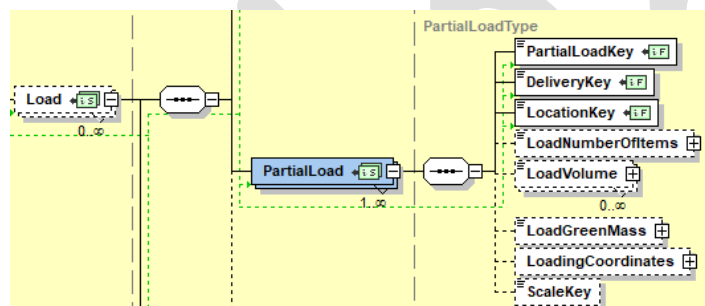
Skidder production

Ian Wilson’s original proposal only included feller bunchers. However, John Arlinger also did an analyses of the possibility to report production data from skidders.

Again the structure for forwarding reporting (fpr) could handle skidding data with a quite limited update in the form of a new MachineCategory as well as a new enumeration value “Estimated number of stems” in attribute loadNumberOfCategory.



It is possible to simplify the production reporting from a skidder to only include the number of loads (stem bunches) since volume, mass and number of stems are all included in optional elements as illustrated below:



When discussing skidders before the meeting with some manufacturers it became clear that there is a lower interest in including skidder data compared to feller-bunchers. This might be due to the fact that skidders have simpler control systems and less trained operators when comparing to feller bunchers and other forest machines. Mikhail Shilov pointed out the production data from skidders would be very valuable for them.

Conclusions

The meeting decided to let the secretary further analyse the possibility of including feller bunchers and skidders. A proposal will be written for the meeting in November. The production data will be included in separate messages while the issue of creating separate instruction messages is open since Komatsu pointed out that harvester instructions will almost always be created when using feller buncher, it would thus make life simpler to be able to use the same instructions for feller bunchers as well as harvester.

TETHERING

Ian Wilson, 2017-12-18

With the advent in use and popularity of the “Traction Assist (tethered)” machines (Feller Bunchers, Harvesters and Forwarders) in Australasia, North America and South America, along with the long standing use of this technology in Europe by existing StanForD machinery manufactures (Komatsu, Ponsse and John Deere (via HAAS), Ian proposed that we add the ability to record when the machine is or isn’t tethered. This functionality would provide the following benefits:

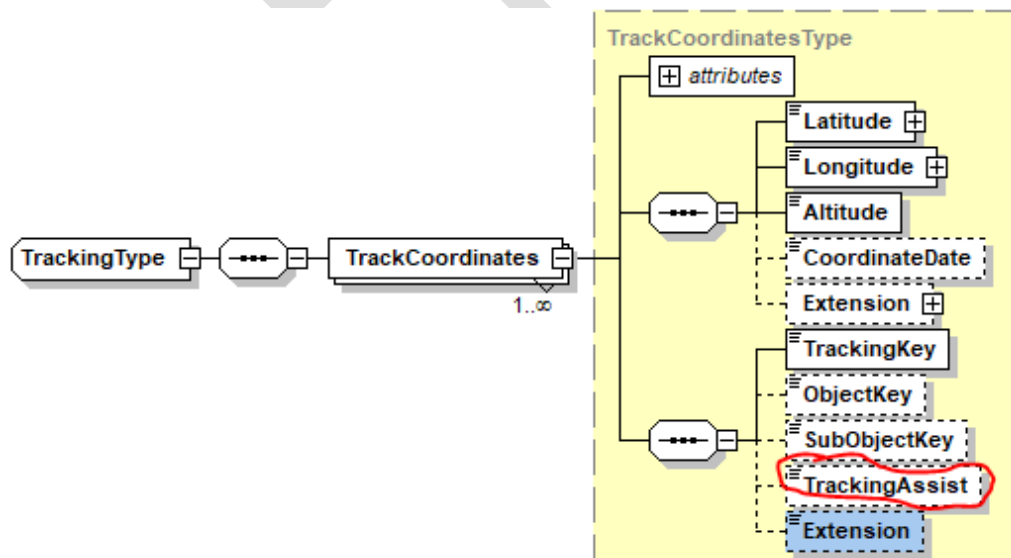
- Logging Organisations can better plan for subsequent operations (mechanical site preparation and planting) or next rotation harvesting where the machines needed traction assist technology
- Better Environmental outcomes, traction assist machines have been proven to reduce ground/soil disturbance and it could be an important component of Forest Certification
- The Logging contractor (or machine owner) can see if this technology is aiding in improved machine productivity and fuel consumption i.e. early evidence from Australasia is showing that machines on steep slopes that are tethered vs non tethered have better utilisation and lower fuel consumption

Unclear where in SF2010 is the best place to record this information, perhaps it could be tied into the TrackingType element functionality? There is probably no easy way that the determination of if the machine is Tethered or not can be automated, so it would likely need to be something that the operator activates/deactivates via a menu on the controller i.e. Traction Assist - On/Off





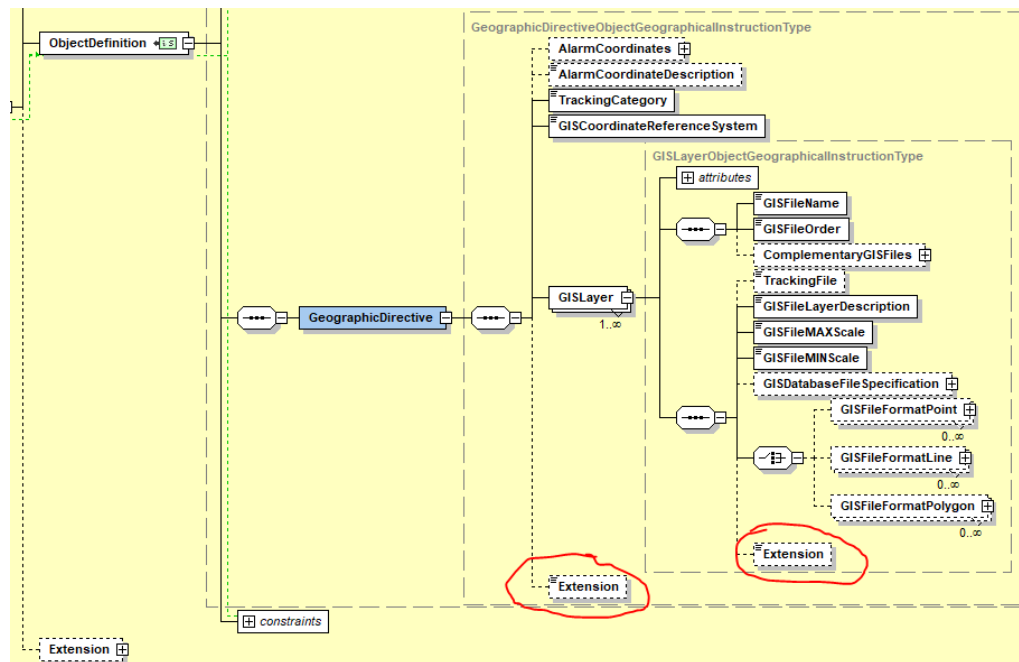
The meeting decided to let John write a proposal for the next meeting whereby a new element “TrackingAssist” is to be added to the Tracking structure as illustrated below:



It was also decided at the meeting that an Extension element is added to the Tracking structure.

EXTENSIONS IN OGI

John Arlinger discussed the possibilities of developing new functionality connected to ogi. It was then noted that the only existing Extensions are per ObjectDefinition and ObjectGeographicalInstruction. It is therefore suggested to add extensions also to GeographicDirective and GISLayer.



The meeting decided to let the secretary go through all schemas in order to check whether there are additional needs for extensions. No objections were raised regarding adding new Extensions to the ogi-schema.

§ 7 Implementation issues

BARK LATITUDE EMPTY IN SPI-FILE.

As a reminder the secretary pointed out that the bark latitude for Scots pine is optional and it is not to be affected by modificationRestricted.



The bark latitude is normally not included in Swedish default spi since the objective is that these spi files are to be used for the whole country.

It is strongly recommended to use the gps-latitude when importing spi or to force the operator to manually set this value in the harvester.

Observe that using "1" as default value gives extremely low m3sub. This must not happen!

GDPR AND PERSONAL INFORMATION

From the last minutes (2017-11-22):

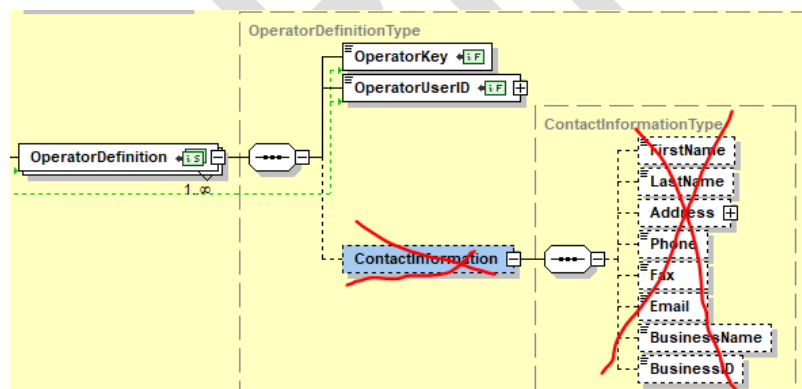
This is a hot but rather confusing Swedish discussion. The discussion often involves aspects relating to both law, technology and business relationships

What does it mean to StanForD? Anything? No one at the meeting had any clear answers.

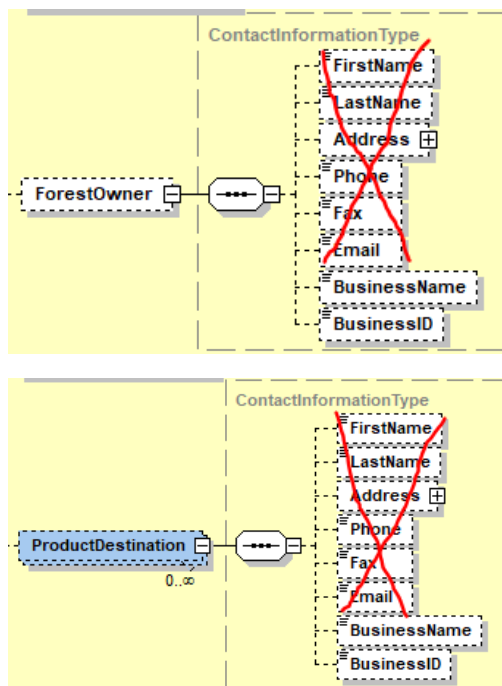
There are different ways of making it possible to exclude personal id data already in the machine if needed:

- Machine setting to exclude ContactInformation?
 - Only OperatorKey & OperatorUserID included.
- Machine setting to use only one single "anonymous operator"?

From a Skogforsk perspective part of the solution could be to have a setting whereby the ContactInformation for Operator can be completely emptied. A receiver of e.g. an hpr-file could thus not identify any individual person. It is still possible to see whether a machine is operated by one or several different operators.



It would probably not be controversial to also have a setting in order to exclude personal information (FirstName, LastName, Address, Phone, Fax and e-mail) also for actors like LoggingContractor, MachineOwner etc. It is, at least from a Swedish perspective, crucial that BusinessName and BusinessID are never removed from ProductBuyer and ProductDestination.



It was suggested by Teemu Paldanius at the meeting 2018-02-05 that we make a distinction between contact information (FirstName, LastName, Address, Phone, Fax and e-mail) registered in the machine vs those elements originally sent from the forest company.

A suggestion could thus be that a machine setting is implemented whereby only contact information registered in machine is excluded for:

- MachineOwner
- LoggingContractor
- OperatorDefinition

Observe that the Keys and UserID are always to be kept intact.

Comment from secretary before the meeting:

This is not a StanForD-requirement but I do believe it is a good idea to be able to show that this is an issue that we as a standardization group have considered. The association of Swedish forestry contractors has approached the secretary several times regarding how the StanForD-group has dealt with this issue

The main comments from the discussion regarding personal identity information are presented below:

- Both Ian Wilson (Australia and New Zealand) and Mikhail Shilov (Russia) pointed out that the operator identities are very important information on their markets.

- The secretary pointed out that the identity of the operator normally does not need to be communicated in production files. It would be enough to know that two separate anonymous operators are driving the machine as would be the case if OperatorUserID and OperatorKey are included. This means that a solution where only one single anonymous default operator is in use probably won't work.
- There is still a significant uncertainty regarding what GDPR means for the user of StanForD-data.
- The possibility to have a machine setting for excluding the ContactInformation of Operators, MachineOwner and Contractor is acceptable from a StanForD perspective but it is not considered to be a StanForD issue. Implementing this type of function is totally up to the manufacturers and the machine buyers.

The meeting postponed the issue.

Training material for Finnish contractors

An open training material for Finnish contractors is being created by Metsäteho and Trade Association of Finnish Forestry and Earthmoving Contractors. The document will be completed by the end of April.

The document will e.g. cover the following topics:

- How does GDPR apply to a logging company (contractor)?
 - background and general requirements of GDPR
 - what type of personal data is handled normally in forest machine work; what is necessary data
 - responsibilities of a controller and a processor of personal data
- How a company should prepare for GDPR?
 - actions to take
 - present state of data protection in the company
 - assessment of the possible risks related to the management of personal data and its protection
 - guidelines for the required documentation of the actions (check list)
 - Data Processing Agreement, DPA
- How to act in case of a data breach?

Metsäteho will present the document at the next Stanford meeting.

NEW MESSAGEGUID/KEY

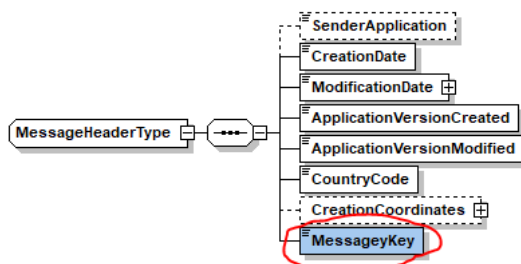
Preliminary suggestion from Per Knutsson, CGI, 2017-12-04. Briefly presented at web-meeting in February.

StanForD files will typically be processed in several steps inside an administrative system. Per gave the example of an hpr file being sent from ROM (harvester application) to VSOP to GIN to VSOP/RAPS/VIRRE and then in some cases back to ROM.



CGI has a need for tracking the individual files and nothing would be better than a GUID.

A preliminary idea is that we add a new mandatory element MessageGUID/Key to the header of each file. This GUID is written when the file is created and then never ever changed. The idea would be to include this with version 4.0.



No objections were raised. The meeting decided to add this proposal to the list of issues to be included in version 4.0.

DIAMETER MEASUREMENT POSITIONS IN HQC-FILES

A separate hqc-meeting was held in Vantaa 2017-12-19 with the following participants: Tapio Räsänen, Timo Melkas, Antti Korkiakoski, Antti Uurtamo, John Arlinger, Johan J. Möller and Joakim Nygren.

Notes from meeting below in italics.

Background

How to register control diameter positions in hqc has been discussed during the last couple of StanForD meetings. It was decided, prior to the previous meeting, to arrange a separate hqc-meeting in Finland to discuss this issue with a representative from Masser being present.

Discussions and conclusion

Three separate questions, raised by Masser, was discussed at the hqc-meeting:

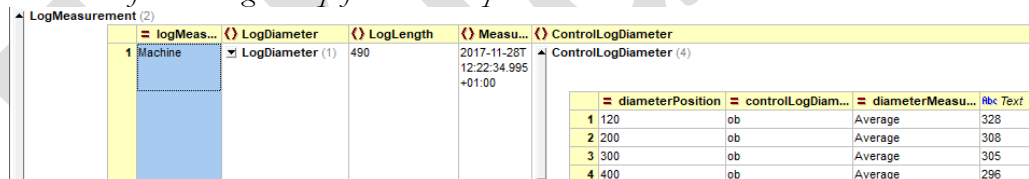
- 1. Having a diameter vector per dm means that interpolations must be done since the control measurements are normally done in between these dm-modules.*
- 2. Today the exact positions for control measurements must be determined by the caliper. The harvester does not tell the caliper where to measure as was the case with*

the old sti-files. This means that the caliper must have a setting for different markets in order to extract the correct control positions as e.g. these positions are located in a different way on the Swedish versus the Finnish markets.

3. Definition of attribute diameterPosition has changed (decided in meeting 2017-04-26). Control position for diameter measuring from butt end of log. Used for log diameter vector (element ControlLogDiameter). The value must be the same for all logMeasurementcategory (Machine, Auditor, Operator). Element is used to connect diameter values measured by Machine, Auditor and Operator. diameterPosition in element ControlLogDiameter can have a different value in different LogMeasurementcategory (Machine, Auditor, Operator). This change should be noted in harvester calibration and analysis software.

Two different solutions were discussed at the hqc-meeting:

1. The resolution of the diameter vector could be increased from dm to cm without any changes to the hqc schema being needed. This means that no interpolations would be needed any more. Joakim Nygren tested to create an hqc with diameter vector per cm after the meeting. The file size increased from 93 kb to 180 kb and the time for parsing increased from 2 sec to 7 sec. Whether this is a significant problem or not is an open issue. Masser also tested with diameter vector per cm. File size was 109kb and increased to 284kb, parsing time increased from 0.010s to 0.011s. No problems with bigger file sizes or diameter vector per cm.
2. A different solution could be to register the control diameter positions in the harvester before sending the hqc-file to the caliper as illustrated below:



	diameterPosition	controlLogDiam...	diameterMeasu...	Rec Text
1	120	ob	Average	328
2	200	ob	Average	308
3	300	ob	Average	305
4	400	ob	Average	296

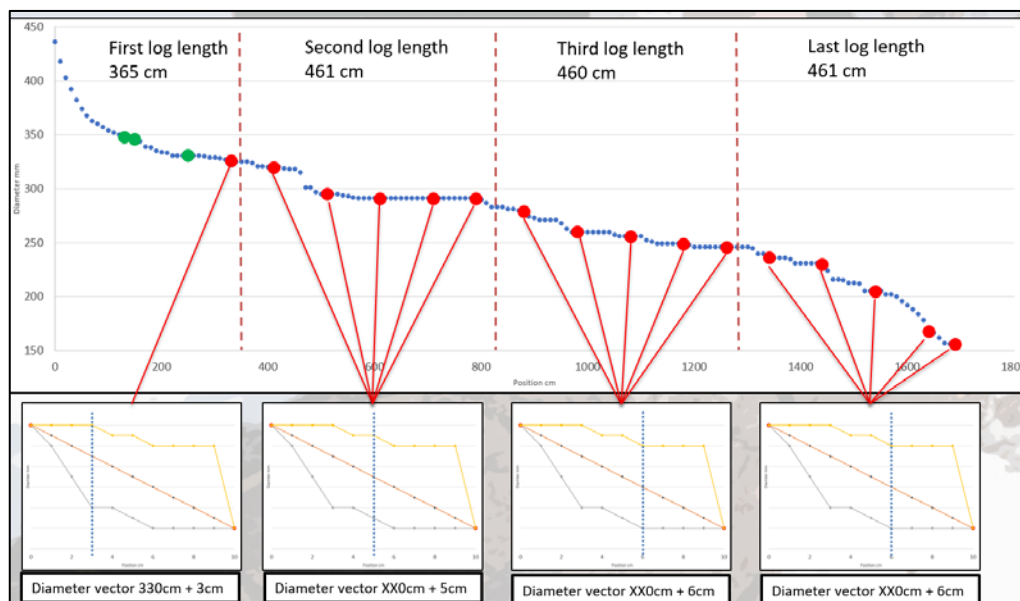
Today this data is normally created by the caliper based on the diameter vector. Pre-defined positions are already today supported by the Digitech caliper as it is already in use when carrying out auditor measurements. Pre-defined and undefined positions are already supported in all Masser caliper products in calibration and auditor measurements.

The hqc-meeting decided to discuss these two separate solutions at the upcoming StanForD meetings. Both solutions can be implemented without any schema adjustments, this means that this is primarily an issue to be solved by manufacturers of calipers and harvesters.

The StanForD-meeting pointed out that it is important to have a detailed description of the interpolation problem at the next meeting (2018-04-17—18) when this issue is to be discussed again.

Antti Uurtamo, Masser, presented a couple of slides in order to illustrate the interpolation problem. Interpolation will be necessary for almost all control

diameters when using the Finnish method as illustrated by the red dots in the figure below:



It was discussed how much the standard deviation will increase due to the interpolation. Since more detailed diameter data per cm is not available from any harvesters it has not been possible for Masser to analyse how much the standard deviation is affected (decreased).

The meeting concluded that:

- A linear interpolation is always to be used when interpolations are needed.
- The preferred solution is alternative 1 where the diameter vector includes a diameter per cm. Whether to implement this or not is up to a discussion between manufacturers of control systems and calipers. This is not a StanForD requirement.
- Calipers must be able to handle also diameter vectors with a diameter per dm.
- It is very important that the effect on standard deviation is analysed and discussed within the StanForD group when/if a harvester implements a more detailed diameter vector. If there is any manufacture that can generate diameter vectors per cm Skogforsk would like to have these data for analysis.

SWEDISH TESTS OF OPERATIONAL MONITORING USING SIMULATORS

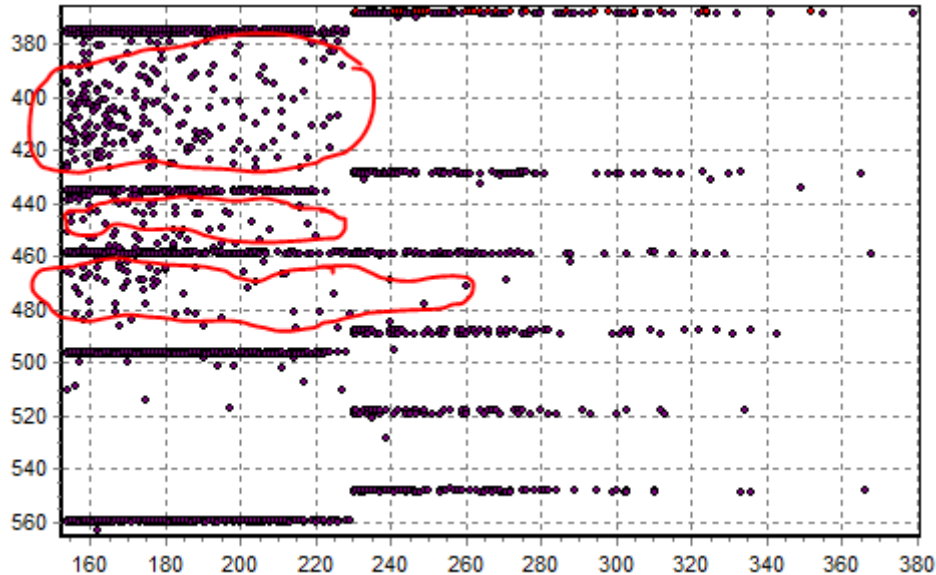
Due to time limitations this issue was postponed. The secretary will inform the manufacturers of the findings before the summer.

Manual cuts

Decay, Damage, Crook, Sweep, Grade break, Pulpwood grade, Top break,

Cutting windows

It has been noted that manually cut logs are registered as belonging to a Product even though they were cut outside a cutting window and ManualFreeBuck is false as illustrated below:



This issue was last discussed 2016-11-23. Below is a copy from the minutes:

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.

Johan and John reached the conclusion, after some manufacturer discussion, that the rule above in some special cases cannot be strictly enforced. The reason for having this type of strange handling of log lengths is basically caused by incorrect operator behavior in combination with a need to be able to do a forced cut at any given position due to operational safety. However, it is strongly recommended that the logs are re-classified to a different product or that the operator has to confirm his decision that the log should indeed belong to this product.

Questionnaire

The following questions will be discussed at the next meeting. A separate questionnaire to be sent out by September 2018.

Is CuttingReason implemented according to the decision 2012-11-18?

What are the consequences (registered as manual or not):

1. Manual moving cut position (module up or down)?
 - a. CuttingReason?
2. Semi-automatic /re-optimization decided by operator?
 - a. CuttingReason?

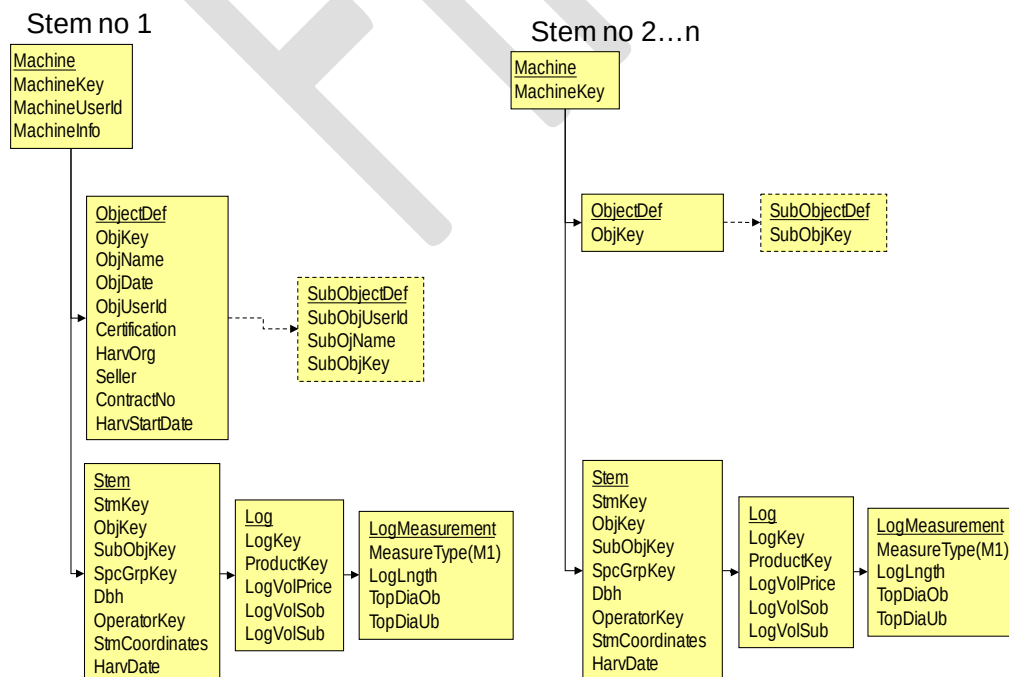
3. If operator do a manual cut at the optimal length as decided by the control system (operator and machine cut the log at the same position)?
 - a. CuttingReason?
4. Cut outside cutting window when ManualFreeBuck is true?
 - a. CuttingReason?
5. Cut outside cutting window when ManualFreeBuck is false?
 - a. CuttingReason?
 - b. Product?
6. Do we need a new enumeration “Semi-automatic” (re-optimization)?

DELTA-REPORTING OF PRODUCTION

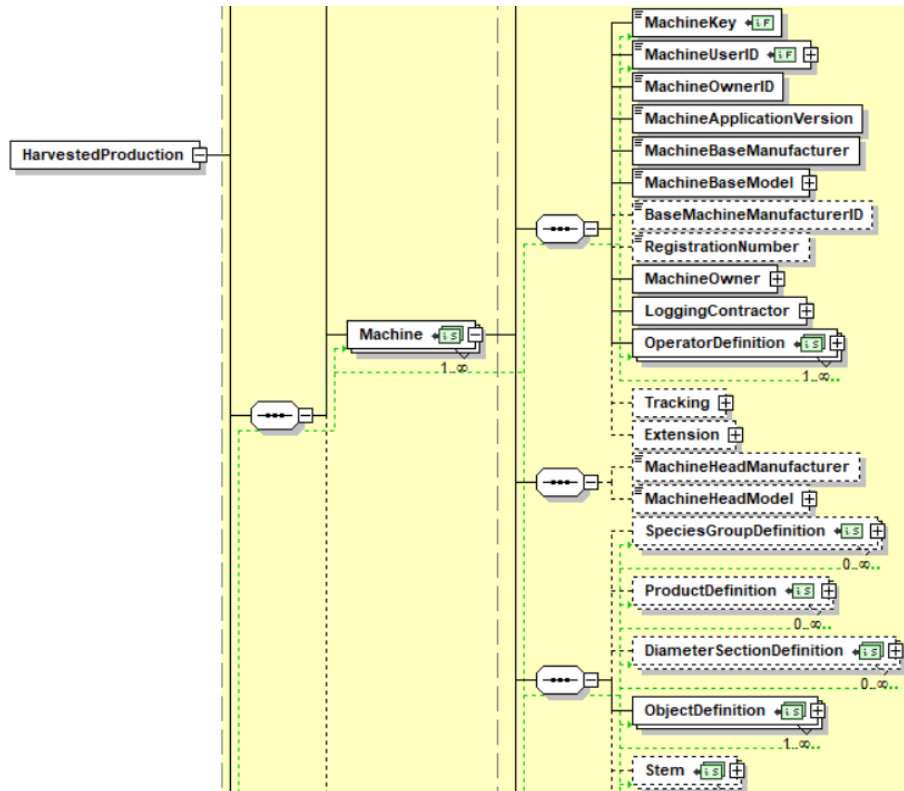
The possibility of introducing a simpler hpr-format to use for a very frequent reporting of stems (hpr generated for each stem) was discussed during the development of StanForD2010. However, it was not deemed to be an urgent issue.

The issue was brought up again when Skogforsk recently had some StanForD-related discussions with Komatsu. Maybe where a getting closer to a situation where “on-line” reporting of individual stems is relevant.

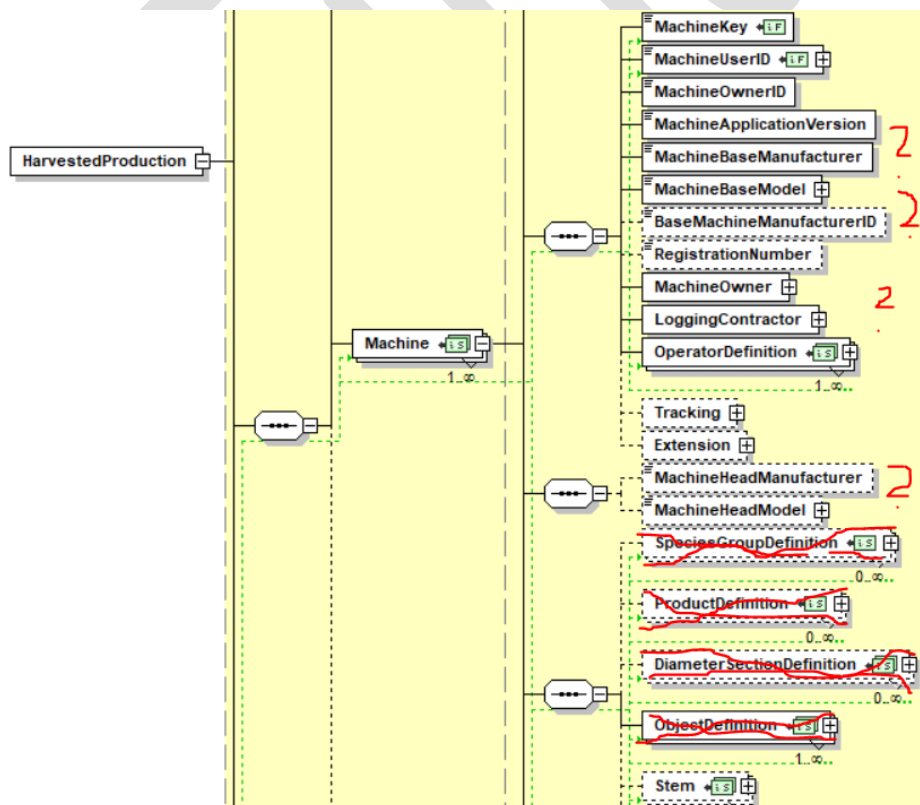
The old figure (2009) below illustrated how the hpr-format could be handled to make a new delta-format that only includes the complete definitions (e.g. object, product, species-group) in the first report (stem no 1) while basically no definitions are included in the subsequent reports (stem no 2...∞):



Possible schema-structure for first reported stem per object:



Possible schema structure for remaining stems per object:



An effect of delta reporting of single stems is that compression of these files will be less effective since there are fewer number of repeated elements. This might mean that the total amount of transmitted data does not decrease as much as expected.

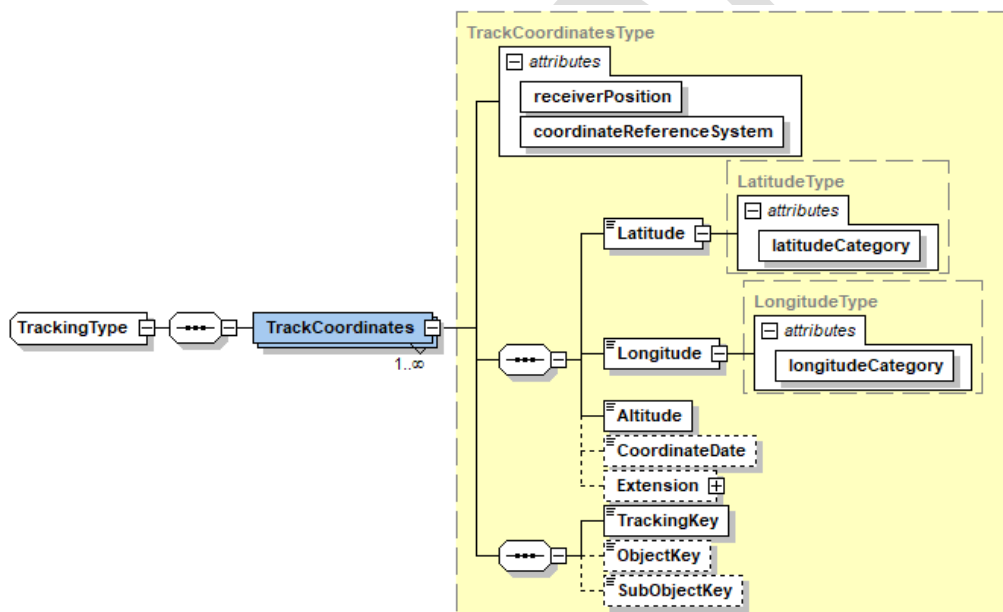
It was decided to let the secretary create a beta schema for a delta-hpr for the next meeting.

It was suggested that the main rule for reporting ProductDefinitions will be: No log to be reported if it's ProductDefinition has not been reported previously.

USING AND IMPLEMENTING TRACKING STRUCTURE

The “Tracking issue” is related to the new tracking elements and how the machine manufacturers are going to implement it.

The tracking structure was introduced with version 3.3 and then updated with 3.4:



It was decided 2017-11-22 to report all tracking coordinates within

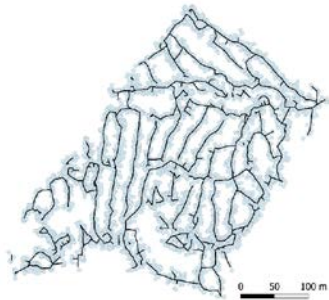
- total ReportInterval in mom,
- first to last stem (HarvestDate) in hpr,
- first to last load (UnloadingDate) in fpr.

The recently added TrackingKey has the following definition:

Machine unique tracking coordinate identity, set by machine. Must be totally unique for a certain MachineKey. This sequential number can be used in order to sort coordinates in ascending

order for re-creating a route driven by a machine, e.g. at a specific object. The identity can also be used in order to sort out duplicate positions.

Metsäteho has been developing an algorithm to produce strip road networks in order to use that in updating of forest resource data.



The method is based on harvester locations (stm/hpr), but it would be a big help or maybe even the primary source of data if the locations from both harvesters and forwarders could be achieved standardized way from this new tracking element data.

The only manufacturer that has implemented the tracking structure is presently is Komatsu in the mom-file.

It was discussed at the meeting whether it is enough to have this information in the mom-file. Several data users at the meeting pointed out that excluding this information from the hpr-file will mean that forest companies instead requires a tracking files from a GIS-application. The time stamp in the tracking file is optional which means that the structure is suitable also for the hpr format.

TIME SCHEDULE FOR IMPLEMENTATION OF STANFORD2010

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	Present software version released on the market	Last StanForD-version supported	Lower versions not supported
Opti (Ponsse)	Opti4G version 4.743	3.1	2.0 or lower
Timbermatic (JohnDeere)	TimberMatic H 1.27	3.3	2.0
LogMate (LogMax)	1.8.11 (2.0.17)	3.0 (3.3)	< 2.0
MaxiXplorer (Komatsu)	3.15	3.3	Presently not 3.2
DasaForester*	1.4.4	3.2	
Motomit (Parker)	Unkown/no answer		
xLogger (Technion)	Unkown/no answer		
TOC 2 (LogSet)	Unkown/no answer		
DP II (Haglöf)	Skalman 7.17	3.4	<1.0
Silvia7 (CGI)	2018.2.0.0	3.3	
SenderXC (SDC)	1.09	3.3	

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

Add "X" in table below if function is implemented:

Implemented functionality	Opti	Timber-matic	Log-Mate	Maxi-Xplorer	Dasa-Forester	Motomit	xLogger	TOC 2
Update a product (with pin) during harvesting at a object? Restarting object not needed.	X	X	X	X	X			
Update an object (with oin) during harvesting at an object? Restarting object not needed.	X	*	X		X			
ModificationRestricted implemented?		X, partly	(X)	X	X			
ProductClass implemented?	X	*	X	X	X			

*With next version

Additional new functions of slightly lower priority are StemCodes, UserDefinedData, Tracking and Reversing. Have you implemented any of these?

JohnDeere – No

Dasa – No

Ponsse – No

Komatsu Forest - Yes, all of these, except for Reversing

LogMate – StemCodes from 2.0.17

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	Present software version released on the market	Last StanForD-version supported	Lower StanForD-versions not supported
Opti (Ponsse)	Opti4G version 4.743	3.1	2.0 or lower
Timbermatic (JohnDeere)	TimberMatic F 1.27	3.3	2.0
LogMate (LogMax)	No forwarder implementation		
MaxiXplorer (Komatsu)	3.15	3.3	Presently not 3.2
DasaForester	1.1.1	3.1	
Motomit (Parker)	Unkown/no answer		
xLogger (Technion)	Unkown/no answer		
TOC 2 (LogSet)	Unkown/no answer		
DP II (Haglöf)	No forwarder implementation		
Silvia7 (CGI)	2018.2.0.0	3.3	
SenderXC (SDC)	1.09	3.3	

Add "X" in table below if function is implemented:

Implemented functionality	Opti	Timbermatic	Maxi-Xplorer	Dasa-Forester	Motomit	xLogger	TOC 2
Forwarder instructions implemented (foi and fdi)?	X	X	X				

§ 7. StanForD2010 projects

SITE TRAFFICABILITY MAPPING BASED ON CAN-BUS DATA (METSÄTEHO/LUKE)

Presentation of research project by Jari Ala-Ilomäki, Luke.

Harvester motion resistance can be measured using the data in harvester CAN-bus aiming at site trafficability map for the forwarder, which follows the harvester and is heavier, for route planning:

- At steady speed on level ground engine power via transmission is expended on overcoming motion resistance
- Motion resistance is mainly dependent on wheel sinkage
- Wheel sinkage is dependent on soil strength vs. loading

By extracting data from CAN-bus it is possible to calculate the key figure *coefficient of motion resistance*. This key figure is not dependent on the size of the machine.

In the study the following parameters were considered:

- Transmission efficiency determined based on test drives, where both transmission and engine power (from ECU) were measured
- Ground speed from harvester GPS/GLONASS
- Acceleration omitted, near constant speed in tests $0,4 < v < 1 \text{ m/s}$
- Inclination: GPS coordinates and DEM elevations in 10 m sections

Conclusions from pilot study:

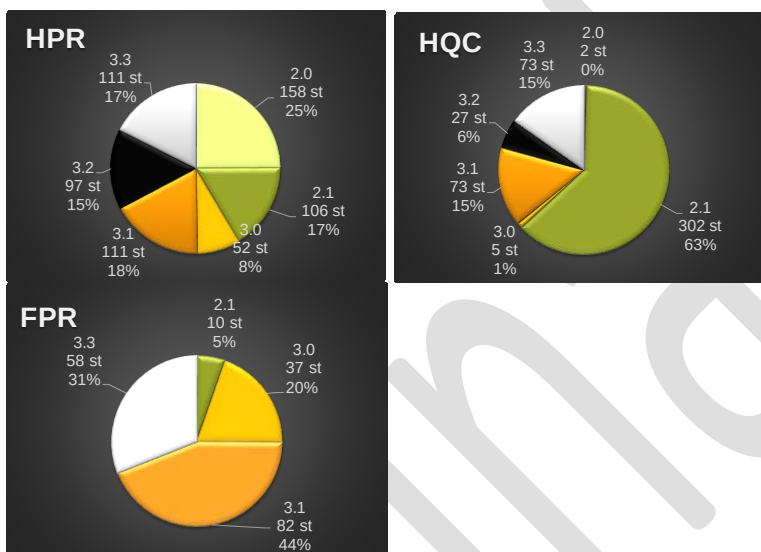
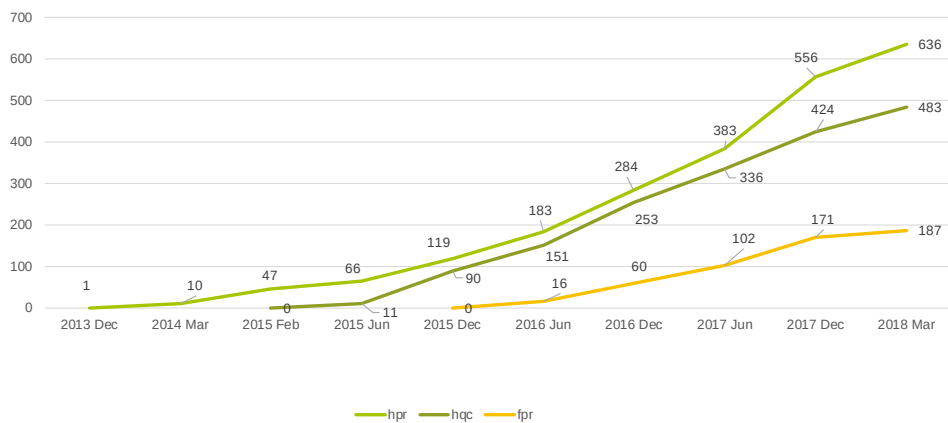
- The results are promising even in trials with limited data since the correlation between motion resistance and rut depth was significant.
- Use of steel tracks no problem
- BigData applications offer great possibilities: trafficability of vast areas could be mapped annually, if all harvesters were equipped with the system
- Machine learning could be applied to generalize the measurements for similar conditions
- The technology is readily available and improvements are more than likely in the future

The information need from a forest machine would be power from engine or hydraulic pump, forward speed and coordinates per second. The research work will continue and the new results will be discussed at upcoming StanForD meetings for a possible standardization of the necessary parameters.

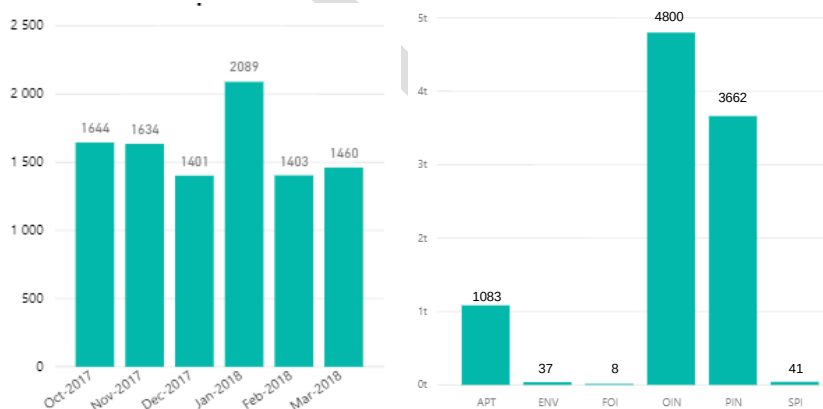
It was proposed in the meeting that the trafficability calculation could be done by a special tool in the harvester system and only the result as a form of a trafficability map would be sent from the machine. By doing the calculation this way it would be possible to avoid sending the original CAN bus data which the machine manufacturers might think to be too sensitive to be delivered.

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

The number of forest machines reporting StanForD2010 messages is continuing to increase as illustrated below.



Presently Sveaskog is the major organization using SDC for distributing instructions.



Windows versions

Today Sender XC needs Windows XP service pack 3 or later. The need to support Windows XP limits the development of Sender XC and increase development costs.

There are some issues that are difficult to solve with Windows XP:

- Direct data controls against SDC-databases to support the machine operator to report correct data in the files. Provides a better production reporting.
- “Push” functionality to the machines
- Security risks

The table below illustrates the proportion of different operating systems used by machines reporting during March 2018:

Version	Number of machines using Sender XC	%	Microsoft "End of life"
Windows 2000	3	0%	2010-07-13
Windows XP	1262	50%	2014-04-08
Windows Vista	4	0%	2017-04-11
Windows 7	697	28%	2020-01-14
Windows 8	541	22%	2023-01-10

Questions to answer before decision around further development of Sender XC:

- Is it possible to update machines from XP to at least Windows 7?
- Update costs?
- Strategy for upgrading to later versions to avoid a large number of machines with old versions in the future?

The meeting discussed whether, in the future, it will be simpler to upgrade a control system to newer operating system. The answer from several manufacturers was that this is not for certain. The manufacturers are using a large number of different software drivers connected to specific components that are often not upgraded.

USE OF STANFORD2010 IN SWEDISH FOREST COMPANY SYSTEMS (SKOGFORSK AND SVEASKOG)

John presented the work on implementing harvester instructions in Sweden (March 2018):

- StoraEnso 80 harvesters (soon also oin)
- Sveaskog 100 harvesters
- Mellanskog 20 harvesters (pin)
- Vida 30 harvesters
- Södra 40 harvesters (will increase dramatically soon)
- Karl Hedin 10 harvesters

- SCA 0 harvester. Administrative system soon ready for a large scale implementation.
- Sällskapet, Holmen, Sydved, BillerudKorsnäs are in a test-phase with a few machines each.

Tests started on limited number of forwarders together with Sveaskog.

Jonas Gustavsson (Sveaskog, Sweden) pointed out the need for updating of new harvesting object using an updated oin-files. He also emphasized the need for including TextToMachine (ObjectDefinition), ProductDescription and DeliveryDescription in the GUI when updating an object, product or Delivery, e.g. indicating that the harvester will stop cutting length 490 cm and instead start using 503 cm.

SHORT SUMMARY OF WOODFORCE AND VALUEFORCE PROJECTS (METSÄTEHO)

WoodForce

The project organization has been finished and production use of WoodForce has been started from 01/2018

- Metsä Group has started using the service but not yet in full scale
- Metsähallitus: launch of WoodForce will take place together with the new forest system (schedule open)
- Stora Enso: launch of WoodForce will take place together with the new forest system FOX (06/2018 ?)

No new needs connected to StanForD 2010

ValueForce (former KAOS)

The building phase of the service is continuing. Presently no new needs connected to StanForD 2010.

§ 8. Other issues

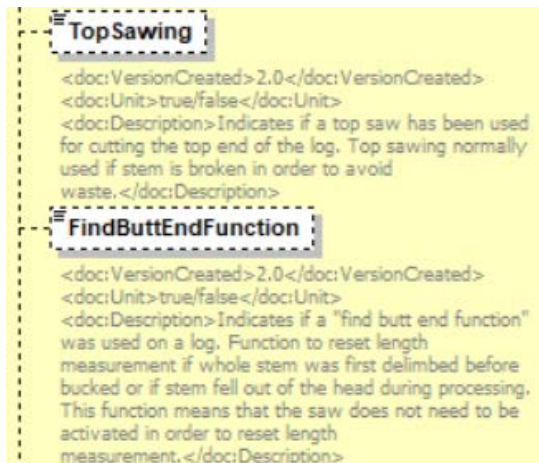
ENA

Error discovered by Henrik Bengtsson, SDC.

Attribut messageType in EnvelopeAcknowledgement should be "ena" rather than "env". This error will be fixed with version 4.0

TOPSAWING AND FINDEND

Ian Wilson pointed out the need for hpr-elements TopSawing and FindEnd in Australia and New Zealand. The possibility of making these elements mandatory in version 4.0 was discussed.



§ 9. Next meeting

Next ordinary StanForD meeting will start at 10:00 CET, 2018-11-20 in Uppsala.

Skogforsk investigating the possibility to arrange an excursion to Sveaskog on the 21st of November.

§ 10. End of meeting

Johan thanked everyone for their participation.