

papiNet Forest Wood Supply and Bioproducts

Use Case 05 Harvesting and forwarding of logs in the forest

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2. FWSB Use Case 05 - Harvesting and forwarding of logs in the forest

2.1 Objectives

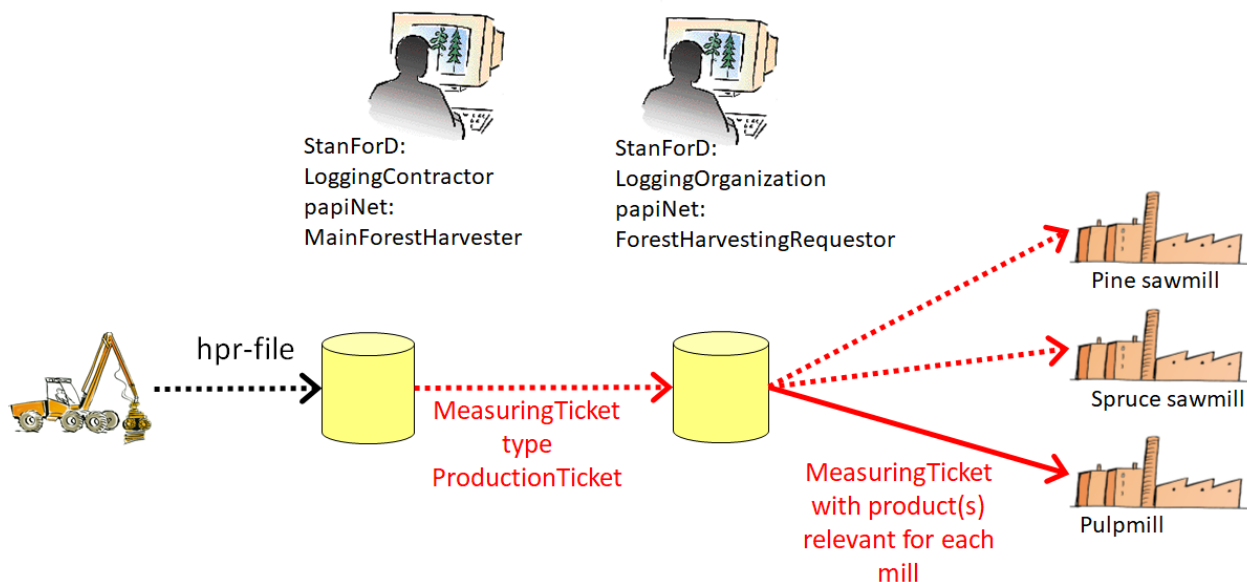
The objective of this document is to give an introduction to how StanForD2010 data can be converted into papiNet E-documents. Observe that the document does not include a complete information chain with a large number of papiNet E-documents sent between several different business partners. The examples only illustrate separate information exchanges that may occur within many different information chains.

A major reason for using the papiNet-format for StanForD data is that StanForD files must be complete (include all volumes and logs for all products). Including all data for a large number of different mills is in many cases neither suitable nor legal allowed when communicating with only one single mill, this means that the papiNet-format is a much better alternative when only one product is to be reported.

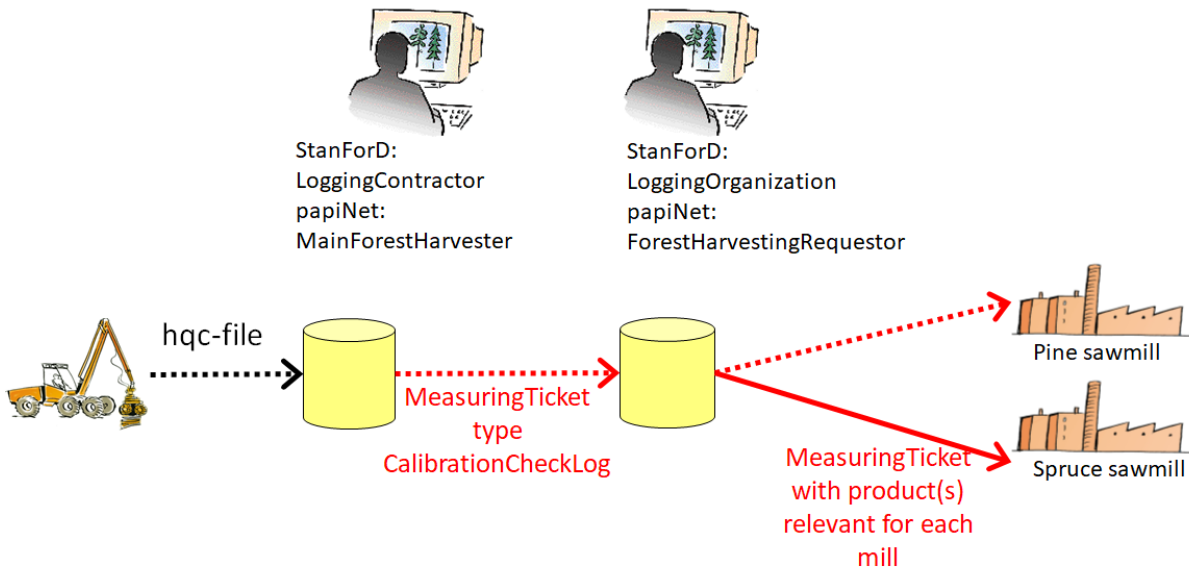
2.2 Overview

The forest company is a Forest Harvesting Requestor and Forest Forwarding Requestor, buying logging services from a logging contractor. The logging contractor is harvesting trees and the produced logs are forwarded to roadside landings. In a logging area logs are typically produced for different mills. Both harvester and forwarder machines report their production on a regular basis to the logging contractor and the harvester also reports quality control data based on randomly selected control stems automatically determined by the harvester control system. The logging contractor is MainForestHarvester if it is responsible for the harvesting service and MainForestForwarder if it is responsible for the forest forwarding service. It may be responsible for both services.

The harvested production data (StanForD2010 hpr message) is sent to a logging contractor from the forest harvester machine. The harvested production data is converted by the logging contractor (MainForestHarvester) to a **MeasuringTicket type ProductionTicket** and sent to the ForestHarvestingRequestor. The Forest Company (ForestHarvestingRequestor) can use it to create a new **Measuring Ticket type ProductionTicket** in order to inform a mill what has been produced for this specific mill.

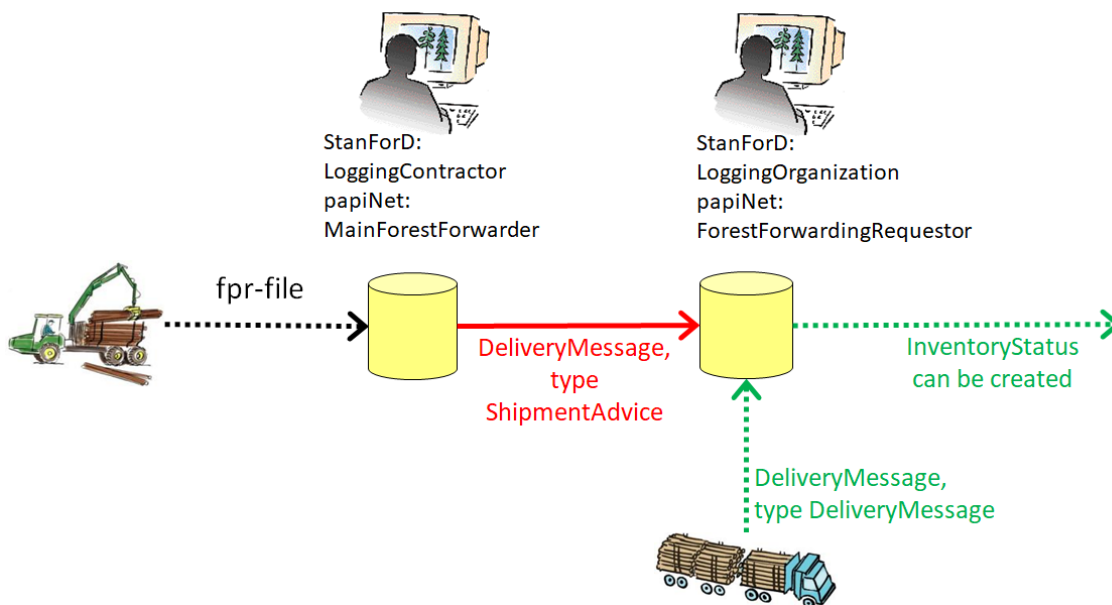


The harvesting quality control data (StanForD2010 hqc message) is sent to a logging contractor from the forest harvester machine. The harvesting quality control data is converted by the logging contractor (MainForestHarvester) to a **MeasuringTicket type CalibrationCheckLog** and sent to the ForestHarvestingRequestor. The Forest company (ForestHarvestingRequestor) can use it to create a new **MeasuringTicket type CalibrationCheckLog** in order to inform a specific mill what to expect regarding accuracy of harvester measuring data. The mill may later use this information in order to measure the same control logs again if marking of logs with e.g. RFID has been implemented and is included in the **MeasuringTicket type CalibrationCheckLog**. RFID information is not included in the present example file.



The forwarded production data (StanForD2010 fpr message) is sent to a logging contractor from the forest forwarder machine. The forwarding production data is converted by the logging contractor (MainForestForwarder) into **Delivery Message type ShipmentAdvice** and sent to the ForestForwardingRequestor. The forest company (ForestForwardingRequestor) can use the **ShipmentAdvice** to estimate total quantities forwarded to the roadside landings. An example file is provided in this use case.

The forest company may receive the papiNet document **Delivery Message type DeliveryMessage** with transported quantities from roadside landing. By combining quantities in the ShipmentAdvice with quantities transported away from each landing (**DeliveryMessage type DeliveryMessage**) it is possible to calculate the remaining inventory quantities at a roadside landing and include this information in an InventoryStatus document. The data in the papiNet e-document **InventoryStatus** can be used for operative planning of transportation from roadside. This is conceptually shown in the figure below. However, neither the **DeliveryMessage type DeliveryMessage** nor the **InventoryStatus** are part of this use case and hence not described further here.



Observe that the conversion of StanForD files into papiNet e-documents is in Sweden not done by the logging contractor. It is instead carried out by a service provider representing the forest company. Swedish forest companies do not allow the logging contractors to do any manipulations or conversions of data and StanForD files are therefore sent directly from forest machines to the forest company or their representative using some transmission and compression software.

Included in the example xml-files are commentary references to the original StanForD elements used in the conversion to papiNet format.

The comment in the following xml-snippet illustrates that the SupplyPointCode in the ShipmentAdvice originates from the StanForD2010 element LocationUserId:

```
<SupplyPointCode Agency="Supplier">2629-01</SupplyPointCode>
<!--LocationUserId-->
```

The comment in the following xml-snippet illustrates that the Identifier in the ShipmentAdvice originates from the StanForD2010 elements LoadKey and PartialLoadKey:

```
<Identifier IdentifierCodeType="Carrier" IdentifierType="Primary">241_2</Identifier>
<!--LoadKey_PartialLoadKey-->
```

The comment in the following xml-snippet illustrates that the Quantity in the MeasuringTicket originates from the StanForD2010 element LogVolume if the attribute logVolumeCategory has the enumeration value "m3sub":

```
<Quantity QuantityType="SolidWoodVolume" MeasuringMethodType="Automatic"
QuantityTypeContext="Measured" MeasuringAgency="SDC" MeasuringMethod="m3fub">
<!--LogVolume, logVolumeCategory="m3sub" -->
```

2.3 FWSB Case 05 MeasuringTicket for ForestHarvester production data

The forest company is a Supplier selling pulpwood logs to a Pulp Mill. The Pulp Mill is the End User. This forest company is also the OriginalBuyer and the buyer of the harvesting services.

The forest harvester machine sends a StanForD2010 hpr message to a logging contractor company (MainForestHarvester). It could be represented by an IT-services provider.

The logging contractor (or the IT-provider) converts the hpr message to Measuring Ticket type ProductionTicket which is sent to the forest company (ForestHarvestingRequestor) to report about performed harvesting.

The forest company (Supplier) filters the data and sends a different Measuring Ticket type ProductionTicket to the Pulp mill with measuring data from the harvester including the product(s) that were produced for this particular mill. This means that harvested products not relevant for this mill are not included.

The ForestHarvestingRequestor is also the MeasuringParty.

Scope: The Measuring Ticket contains one product from one logging area. Each stem and log are provided in separate ItemInfo elements.

XML-file: UC05_2.3_MeasuringTicket_ProductionTicket_YYYYMMDD.xml

2.4 FWSB Case 05 DeliveryMessage for ForestForwarder production data

The forest forwarder machine is transporting forest wood products from the logging area in the forest to different roadside landings (SupplyPoint in papiNet and Location in StanForD2010). The products will later be transported to different final destinations by one or more transport companies.

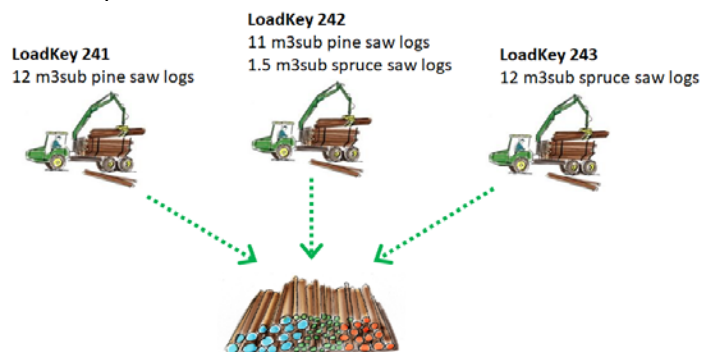
The forest forwarder machine sends a StanForD2010 fpr message to a logging contractor (MainForestForwarder), which could be represented by an IT-service provider.

This message is then converted into a DeliveryMessage type ShipmentAdvice by the logging contractor (or the IT service provider) before being sent to the forest company (ForestForwardingRequestor).

The forest company can then use the ShipmentAdvice data to update the inventory level at the roadside landing in their inventory management and logistics planning systems.

Each unique combination of SupplyPoint (roadside landing), Product and PlaceFinalDestination must be provided as a separate line item.

Scope: After the three loads 241, 242 and 243 have been transported to one roadside landing, a service provider representing the MainForestForwarder sends data to the ForestForwardingRequestor. The forest forwarder machine has transported two loads consisting of one product each and one load with two different products.



There are two products and for each product only one PlaceFinalDestination. The forest forwarder machine will deliver additional quantities of these products which is indicated by the papiNet attribute ShipmentComplete.

For every product, each load is detailed individually per PackageInformation.

XML-file: UC05_2.4_DeliveryMessage_ForestForwarding_YYYYMMDD.xml

2.5 FWSB Case 05 MeasuringTicket for ForestHarvester quality control data

The Forest Company is selling saw logs to a Saw Mill. This forest company is also the OriginalBuyer and the buyer of the harvesting services.

The forest harvester machine sends a StanForD2010 hqc message to a logging contractor company (MainForestHarvester). It could be represented by an IT-services provider.

The logging contractor (or the IT-provider) converts the hqc message to Measuring Ticket type CalibrationCheckLog which is sent to the forest company (ForestHarvestingRequestor) to report about performed measuring quality control(s).

The forest company (Supplier) sends a Measuring Ticket type CalibrationCheckLog to the Saw mill with control measuring data from the harvester including only the product(s) allocated for the Saw mill.

The ForestHarvestingRequestor is also the MeasuringParty.

Explanations of some detailed issues are provided in section 2.5.1 below.

Scope: The Measuring Ticket contains all control measured logs belonging to one product from one logging area. Each log is registered on a separate ItemInfo and each type of measurement (harvester machine, harvester operator and auditor) is registered in separate MeasuringTicketSequences.

XML-file: UC05_2.5_MeasuringTicket_CalibrationCheckLog_YYYYMMDD.xml

2.5.1 References between sequences in CalibrationCheckLog

It is possible to include three types of measurements in a StanForD hqc file. The different types of measurements that can be included are:

- Harvester machine measurements which are measured automatically by the harvester head. The harvester head is a component of the harvester machine itself.
- Harvester operator measurements which are measured manually by the operator using caliper and measuring tape.
- Auditor measurements which are measured manually by a quality auditor using caliper and measuring tape.

The different measurements (harvester machine, harvester operator, auditor) are stored in separate MeasuringTicketSequences. There must be at least one reference in each MeasuringTicketSequence and in the example files the references between the different MeasuringTicketSequences are based on the use of MeasuringTicketReference as illustrated below:

```
<MeasuringNumber>42374hjwt_2009-01-15 11:11:00+01:00_1</MeasuringNumber>
<!--MachineKey+CreationDate+_1 (harvester measurement)-->
```

```
<MeasuringTicketReference MeasuringTicketReferenceType="MeasuringNumber" AssignedBy="ForestHarvester">42374hjwt_2009-01-15 11:11:00+01:00_2</MeasuringTicketReference>
<!--MachineKey+CreationDate+_2 reference to Operator measurement-->
```

```
<MeasuringTicketReference MeasuringTicketReferenceType="MeasuringNumber" AssignedBy="ForestHarvester">42374hjwt_2009-01-15 11:11:00+01:00_3</MeasuringTicketReference>
<!--MachineKey+CreationDate+_3 reference to Auditor measurement-->
```

The example above illustrates that the operator and auditor measurements for the machine sequence are used to create unique MeasuringNumbers "42374hjwt_2009-01-15 11:11:00+01:00_2" and "42374hjwt_2009-01-15 11:11:00+01:00_3" in different MeasuringTicketSequences.

However the reader of a MeasuringTicketSequence must NOT use element MeasuringTicketReference to determine the type of measurement. Attributes LocationParty/PartyType and MeasuringMethodType are to be used in order to determine what measurement type is provided in a MeasuringTicketSequence and hence :

- Harvester machine
MeasuringLocation/LocationParty with @PartyType="ForestHarvester"
MeasuringTicketSequenceLineItem/ItemMeasuringInfo/ItemInfo/PropertyValue with @MeasuringMethodType=Automatic
- Harvester operator
MeasuringLocation/LocationParty with @PartyType="ForestHarvester"
MeasuringTicketSequenceLineItem/ItemMeasuringInfo/ItemInfo/PropertyValue with @MeasuringMethodType=Manual
- Auditor
MeasuringLocation/LocationParty with @PartyType="Auditor"
MeasuringTicketSequenceLineItem/ItemMeasuringInfo/ItemInfo/PropertyValue with @MeasuringMethodType=Manual

Logs are referenced using the same Identifier value regardless whether it has been measured by machine, operator or auditor:

```
<Identifier IdentifierCodeType="Measurer" IdentifierType="Primary">99_2</Identifier>
<!--StemKey+_+LogKey -->
```

3. Other general issues

3.1 Referencing of stem from log

Below is an example indicating how to include a reference from a log to a stem where the stem identity is included in the TrackingReferenceID for each log:

```
<PackageMeasuringInfo>
<ItemInfo ItemType="Stem">
  <Identifier IdentifierCodeType="Measurer" IdentifierType="Primary">992</Identifier>
  <!--StemKey -->
  <MapCoordinates MapReferenceSystem="WGS84" MapCoordinateType="LatLong">
    <!--StemCoordinates -->
    <Coordinates CoordinateFormatType="Degrees">+59.85143+15.59015</Coordinates>
  </MapCoordinates>
  <PropertyValue PropertyType="TreeDiameterBreastHeight" MeasuringMethodType="Automatic".....
.....
</ItemMeasuringInfo>
<ItemInfo ItemType="Log">
  <Identifier IdentifierCodeType="Measurer" IdentifierType="Primary">992_3</Identifier>
  <!--StemKey+_+LogKey -->
  <TrackingReferenceID ItemType="Stem" TrackingReferenceIDType="Parent">
    <Identifier IdentifierCodeType="Measurer" IdentifierType="Primary">992</Identifier>
    <!--Reference to stem using StemKey-->
  </TrackingReferenceID>
  <!--LogVolume -->
  <Quantity QuantityType="SolidWoodVolume" MeasuringMethodType="Automatic".....
  <PropertyValue PropertyType="DiameterSmallEnd" MeasuringMethodType="Automatic" .....
```

Observe that the stem is registered under PackageMeasuringInfo and not under ItemMeasuringInfo since the stem does not belong to any specific product. This solution also means that there is no need to register the same stem several times if logs belonging to more than one product are registered in the MeasuringTicket.

3.2 Referencing original StanForD messages

No unique identity per StanForD message exist. However, by combining the globally unique MachineKey with the CreationDate from the StanForD2010 files it is possible to create a unique id per StanForD message as illustrated in the examples below:

Reference to an hpr file

```
<MeasuringTicketReference MeasuringTicketReferenceType="StanForDHarvestedProductionNumber"
AssignedBy="ForestHarvester">uy42374hju_2009-01-15 11:11:12+01:00</MeasuringTicketReference>
<!-- Reference to original hpr file MachineKey+CreationDate. -->
```

Reference to an hqc file

```
<MeasuringTicketReference MeasuringTicketReferenceType="StanForDHarvestingQualityControlNumber"
AssignedBy="ForestHarvester">uy42374hju_2009-01-15 12:00:02+01:00</MeasuringTicketReference>
<!-- Reference to original hqc file MachineKey+CreationDate. -->
```

Reference to an fpr file

```
<DeliveryMessageReference DeliveryMessageReferenceType="StanForDForwardedProductionNumber"
AssignedBy="ForestForwarder">ab12345fri_2009-01-15 13:11:15+01:00</DeliveryMessageReference>
<!-- Reference to original fpr file MachineKey+CreationDate. -->
```

3.3 Using MeasuringMethod for properties and quantities in Sweden

No general list with MeasuringMethod will be created by papiNet. SDC has compiled a list for Swedish use based on the present needs in Sweden that is partly included below and implemented in the present examples of this use case.

List of MeasuringMethods according to SDC (vol=volume, ob= on bark, ub=under bark):

Description	UOM	QuantityType	Measuring Method
Solid Wood vol ub	CubicMeter	SolidWoodVolume	M3FUB
Solid Wood vol ob	CubicMeter	WoodVolume	M3FPB
Logpile vol ob	CubicMeter	LogPileVolume	M3T
Logpile vol ub	CubicMeter	LogPileVolume	M3TUB
Vol by top measurement ub	CubicMeter	SolidWoodVolume	M3TOUB
Vol by top measurement ob	CubicMeter	WoodVolume	M3TPB
Vol by mid-point measurement ub	CubicMeter	SolidWoodVolume	M3MIUB
Vol by mid-point measurement ob	CubicMeter	WoodVolume	M3MIPB
Solid vol by top-butt-measurement ub	CubicMeter	SolidWoodVolume	M3TRUB
Solid vol by top-butt-measurement ob	CubicMeter	WoodVolume	M3TRPB
Loose vol	CubicMeter	TippedLooseVolume	M3S
Weight	MetricTon	NetNetWeight	TON
Energy	MegaWattHour	Energy	MWH
Count	Piece	Count	STYCK
Dry weight	MetricTon	BoneDry	TTV

*Present SDC terminology/nomenclature (in Swedish "Måttslagskod" and "Måttslag")

The following table describes how to use the SDCs measuring methods when converting StanForD files into papiNet E-documents:

Description	UOM	QuantityType	Measuring Method	Comments (element and attribute values in StanForD2010)
Solid Wood vol ub	CubicMeter	SolidWood- Volume	M3FUB	LogVolume, logVolumeCategory="m3sub" OR LogVolume, logVolumeCategory="m3 (price)" *** VolumeDiameterCategory="All" VolumeUnderBark=FALSE VolumeLengthCategory="Physical length"*
				LoadVolume, loadVolumeCategory="Volume, m3sub"***
Solid Wood vol ob	CubicMeter	WoodVolume	M3FPB	LogVolume, logVolumeCategory="m3sob" OR LogVolume, logVolumeCategory="m3 (price)"*** VolumeDiameterCategory="All" VolumeUnderBark=FALSE VolumeLengthCategory="Physical length"*
				LoadVolume, loadVolumeCategory="Volume, m3sob" **
Vol by top measurement ub	CubicMeter	SolidWood- Volume	M3TOUB	LogVolume, logVolumeCategory="m3 (price)" *** VolumeDiameterCategory="Top" VolumeUnderBark=TRUE volumeDiameterTopPostion=10 VolumeLengthCategory="Length as defined in length classes"*
Vol by top measurement ob	CubicMeter	WoodVolume	M3TPB	LogVolume, logVolumeCategory="m3 (price)" *** VolumeDiameterCategory="Top" VolumeUnderBark=FALSE volumeDiameterTopPostion=10 VolumeLengthCategory="Length as defined in length classes"*
Vol by mid- point measurement ub	CubicMeter	SolidWood- Volume	M3MIUB	LogVolume, logVolumeCategory="m3 (price)" *** VolumeDiameterCategory="Mid" VolumeUnderBark=FALSE VolumeLengthCategory="Length as defined in length classes"*
Vol by mid- point measurement ob	CubicMeter	WoodVolume	M3MIPB	LogVolume, logVolumeCategory="m3 (price)" *** VolumeDiameterCategory="Mid" VolumeUnderBark=FALSE VolumeLengthCategory="Length as defined in length classes"*
Loose vol	CubicMeter	TippedLoose- Volume	M3S	LoadVolume, loadVolumeCategory=Loose volume**
Weight	MetricTon	NetNetWeight	TON	LoadGreenMass**

*Harvested production data

** Forwarded production data

*** The StanForD volume attribute "m3 (price)" is the volume which is used to calculate the monetary value of a product. The most important use for this volume is when optimizing how to cut a stem into logs in order to maximize the value of the stem. This volume is always included in Quantity while other volumes like e.g. m3sub or m3sob are registered in InformationalQuantity. Observe that StanForD enumeration "m3 price" may include many different types of volumes. It is defined by several different attributes and parameters such as VolumeDiameterCategory and VolumeUnderBark.

In all cases described above StanForD element VolumeDiameterAdjustment must be equal to "Measured diameter in mm".

Below is a list of MeasuringMethods, used for registered properties, according to SDC
(MeasuringLocation/trigger is MeasuringLocation/LocationParty/ PartyType/ ForestHarvester):

Description	Property Type	Measuring MethodType	Meas. Agency	Meas. Method	Comments (element and attribute values in StanForD2010)
Diameter small end under bark	Diameter-SmallEnd	Automatic	SDC	Under-Bark	LogDiameter, logDiameterCategory="Top ub" diameterMeasurementCategory="Average"
Diameter small end on bark	Diameter-SmallEnd	Automatic	SDC	OnBark	LogDiameter, logDiameterCategory="Top ob" diameterMeasurementCategory="Average"
Diameter by mid-point measurement under bark	DiameterMid	Automatic	SDC	Under-Bark	LogDiameter, logDiameterCategory="Mid ub" diameterMeasurementCategory="Average"
Diameter by mid-point measurement on bark	DiameterMid	Automatic	SDC	OnBark	LogDiameter, logDiameterCategory="Mid ob" diameterMeasurementCategory="Average"
Diameter butt end under bark	Diameter-LargeEnd	Automatic	SDC	Under-Bark	LogDiameter, logDiameterCategory="Butt ub" diameterMeasurementCategory="Average"
Diameter butt end on bark	Diameter-LargeEnd	Automatic	SDC	OnBark	LogDiameter, logDiameterCategory="Butt ob" diameterMeasurementCategory="Average"
Length of measured items	Length	Automatic	SDC		LogDiameter
Length of measured items	Length	Classified	SDC		LogLengthClass
The log order in the steem	TreeLog-Order	Automatic	SDC		LogKey
Code defining the tree species	TreeSpecies-GroupCode	Visual-Estimated	SDC		SpeciesGroupInfo
Breast height diameter	Tree-Diameter-BreastHeight	Automatic	SDC		DBH
Harvest date	Date-Production	Automatic	SDC		HarvestDate