Analysis of traceability on board a freezer trawler

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# Report	*ISBN:* 978-82-7251-750-1 (printed) *ISBN:* 978-82-7251-751-8 (pdf)	*Report no:* 7/2010	*Accessibility:* **Open**
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Summary:

This report presents an analysis of the specific technical and organizational changes which need to be implemented in the frozen fish supply chain in order to significantly reduce the existing information loss within that chain. The current material flow and information flow of frozen fish was analyzed and recommendations of changes were made (both technical and organizational).

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1   Abstract

This report presents an analysis of the specific technical and organizational changes which need to be implemented in the frozen fish supply chain in order to significantly reduce the existing information loss within that chain. The current material flow and information flow of frozen fish was analyzed and recommendations of changes were made (both technical and organizational).

2   Introduction

This study was conducted as part of the TRACE project effort to analyze material flow, information flow and information loss in chosen chains. This study was conducted as part of Work Package 5 "*Sector Specific Traceability*" where "Task T5D.1 is described as "*Analysis of current material flow & information flow in the frozen fish supply chain*".

The company chosen for this study was the company Hermes AS. Hermes AS owns one freezer trawler "M/Tr Hermes" and is based in Tromsø, Norway. The vessel fishes all year round and delivers approximately 5000 metric tonnes of white fish and shrimps per year. The areas in which fishing take place are he North Sea, the Norwegian Sea, the Barents Sea as well as the fishing grounds around Spitsbergen[1]. Hermes AS employs 36 people with two crews of 17 people. Hermes sell fish both on contract (customer known) and for open sale (customer unknown), but for the chain we studied customer is known in advance. Hermes delivers frozen white fish to production facilities in China, Lithuania and Poland.

The product chosen for this study was frozen white fish. The blocks of fish in this study are exported to Poland for processing and sold in supermarkets around Europe.

The product was chosen because it is a high volume product which is exported and also because the company reports that traceability for this product would be important if they want to gain long term contracts with stable price. Hermes AS is already a leading exponent of traceability of its products and uses unique identifications, so the infrastructure for recording information is already in place. In addition there is a major focus on sustainable fisheries around the world and the ability to document that fish are legally caught and from a responsibly managed stock is increasingly important.

M/Tr Hermes is a freezer trawler which produces blocks of frozen white fish this involves the following processes,

1. Trawls for fish
2. Harvests and bleeds the fish
3. Sorts the fish into species and size
4. Freezes the fish into blocks
5. Delivers the blocks of frozen fish a terminal either in Tromsø or Ålesund

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[1] http://www.hermes-as.no/en/

This report describes all these five processes and makes recommendations with respect to how traceability, transparency and information logistics can be improved onboard M/Tr Hermes for frozen blocks of white fish.

3   Scope of study

The scope of this study, as it stands, is to document the current state of information flow and loss on board the freezer Trawler M/Tr Hermes with regard to frozen blocks of white fish

Most of the material documented below came from a visit to the trawler while is was docked in Tromsø on the 14th of August 2009 and in-depth interviews with Hans Ole Tørhaug (factory foreman) and Jan Roger Lerbukt (CEO) which also took place during the visit. Some details were clarified and added after the interview.

4   Method

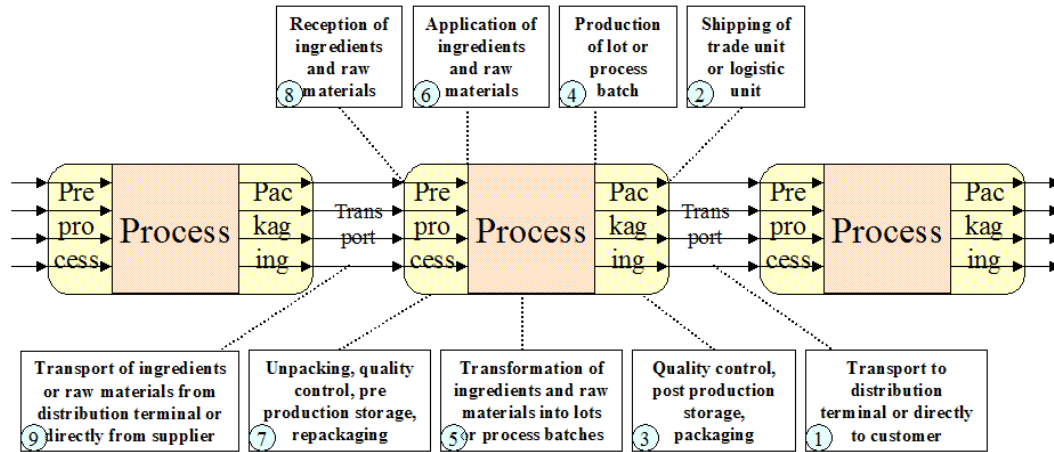## Process analysis, sequence diagram

Figure 1   Desciption of the porcess mapping method

When performing process studies to document material and information flow of the food, each of the 9 steps above can be converted to a form to be used in the mapping or interview. The lists with questions below are quite extensive and not all questions will apply to all links. In addition, some products or links may have special attributes that it is relevant to record in addition. These may easily be appended to the respective forms.

Note that step 2, 4, 6 and 8 deals with the transformation information; the documentation of what happens exactly at the point and time when the product moves from one context to the next. Steps 1, 3, 5, 7, and 9 deals with durations; what happens or what is the state during transportation, pre-processing, production and packaging of the product.

The diagram above and the lists with questions below show how to map one product, starting with a form or table where the information about the transportation of it to the next link is recorded. As the process mapping moves against the material flow, it is likely that multiple tables or forms will be needed. In particular this is true when moving from mapping the process parameters (step 5) to the application of raw materials and ingredients (step 6). If only one product, process and transportation route is documented, there will be only one set of questions to ask (one form or table) in steps 1, 2, 3, 4, and 5. If multiple raw materials or ingredients are used then each of these will be documented on a separate form 6, and each of these form 6's will then have to be traced through steps 7, 8 and 9.

4.1 Application of the process mapping method on board M/Tr Hermes

For the boat M/Tr Hermes the following forms have been filled in:

Table 2:   Reception of ingredients and raw materials

Table 3:   Raw material/ingredient unpacking, pre production storage, mixing (duration) – Each type one table

Table 4:   Application of ingredients and raw materials (transformation) - Each type one table

Table 5:   During production (duration)

Table 6:   Production ends (transformation)

Table 7:   Post production storage, quality control, packaging, labelling (duration)

Table 8:   Collection of finished product (transformation)

Table 9:   Transport of finished goods to distribution terminal or directly to customer (duration)

For details on the forms, the questions and the answers see the appendix.

5   Results

5.1   Overall material and information flow on board M/Tr Hermes

This report contains a description of each step in the M/Tr Hermes production process. In the appendix are the results of the structured questionnaire which was filled in following an interview with Hans Ole Tørhaug (factory foreman) and Jan Roger Lerbukt (CEO).

The product flow was mapped using the process mapping originally developed in previous EU-projects (the 6FP Seafood Plus in particular) and significantly refined and updated in TRACE[2]. At the time of writing, the process mapping method had been accepted for scientific publication, but exact reference was still not available. For visualization of the material flow uncovered by the method, see figure 1 below. In this instance the processes were mapped going with the material flow (rather than against, which is more common) because the production process was simple and the product involved no extra ingredients.
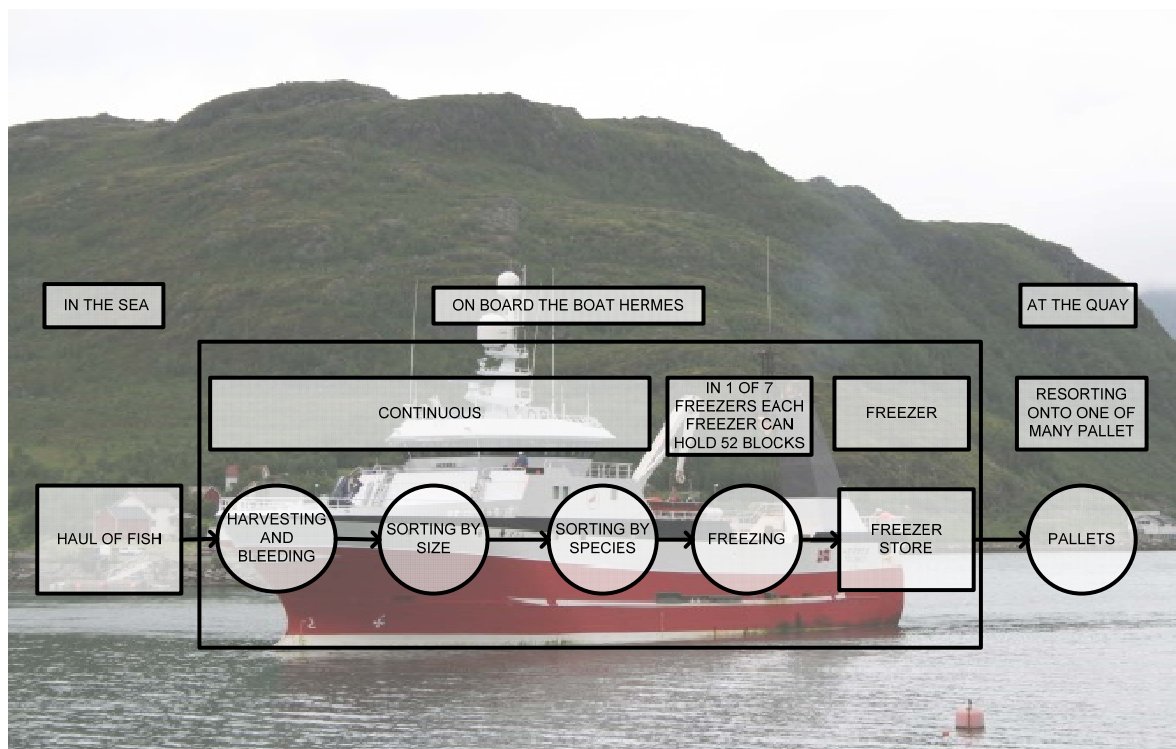

Figure 2   Summary of product flow on board M/Tr Hermes

5.1.1   Step 1. Trawling fish

M/Tr Hermes is based in Tromsø. The vessel fishes all year round and produces approximately 5000 metric tonnes of white fish and shrimps a year. The areas in which fishing takes place are the North Sea, the Norwegian Sea, the Barents Sea as well as the fishing grounds around Spitsbergen. Each time they begin a trawl, the position, time and type of trawl are registered and a trip number is generated. This number is then recorded and

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[2] Olsen, P. & Aschan, M. " Reference method for analyzing material flow, information flow and information loss in food supply chains". Trends in Food Science & Technology. In press.

linked to all fish produced from this haul. The trip numbers are proprietary and contain the date and a unique sequential number along with a haul number. Software for documenting trip and onboard production is WinCatch.

Illustration of view out towards the trawl deck

Example of the information recorded when trawling takes place

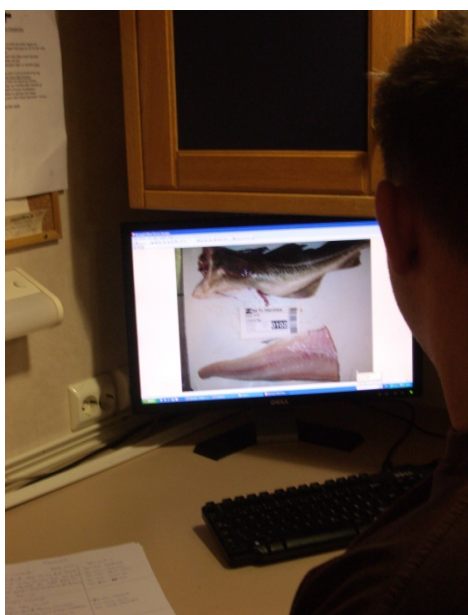### 5.1.2 Step 2. Harvesting and bleeding fish

The fish are continuously produced once they leave the trawl. The fish are harvested and bled. At this stage the product (fish) can be identified by the haul ID.

Registration of data as the haul is sent out

5.1.3 Step 3. Sorting fish by size and species

Following harvesting and bleeding the fish are automatically sorted both by size and species. At this point the fish are still identified by the haul ID.

KVALITETSKONTROLL AV FILET

DATO/HAL/FRYS	KODE	VEKT KAPPET	BLOD	PARASITTER	MERKNAD	PRØVETAKER
16.06.09-1-1	302	1360	-	-		H.O.T.
16.06.09-1-2	301	820	-	-		H.O.T.
17.06.09-1-1	102	1180	-	1		H.O.T.
17.06.09-1-2	102	1010	-	2		H.O.T.
17.06.09-1-3	102	1325	-	1		H.O.T.
17.06.09-1-4	103	3200	-	3		H.O.T.
17.06.09-1-5	102	1420	-	1		H.O.T.
17.06.09-2-1	102	2025	-	1		H.O.T.
17.06.09-2-2	102	1600	-	-		H.O.T.

Registering quality information manually

Example of a quality control form

5.1.4 Step 4. Freezing the blocks of sorted fish

Following sorting by size and species the fish were then frozen into blocks in one of seven different freezers. Each of the 25kg blocks are then stored the onboard freezer. Each block is marked with a clear text label which also contains a barcode. Each label contains a unique number as well as the haul ID.

5.1.5 Step 5. Delivery of blocks of frozen fish

The fish blocks are delievered to a freezer terminal in Norway. The fish are unloaded at the end of each trip, The vessel name and Haul ID are printed on each Trade Unit.

5.1.6 Summary of information recorded

Attached to the unique ID which is assigned to each haul of fish are a number of quality parameters listed in tab.1. In addition information about catch area, time, date, and type of trawl are recorded. The information recorded on the catch certificate is also known; this includes for example the species. As noted earlier each frozen block is marked with a clear text label and a serial number, and each of these serial numbers link to the haul ID.

Table 1   Quality control checks carried out on the Fish - Each sample sis identified with the same unique ID as described above

Weight (without head)
Presence of blood
Presence of parasites
Other comments

The haul ID is a proprietary number and contains year, trip, month, date and sequential haul number. For example 0910073103 this means the 3rd haul made on 31/07/09, which was on the 10th trip of the year.

6   Recommendations

To achieve chain traceability and avoid systematic information loss, three criteria need to be fulfilled:

1. Internal data recording needs to be good. Recorded data must be explicitly linked to unique identifiers.
2. Data must be sent to next link of the chain in a recognizable, preferably standard format. If the amount of data is significant, Electronic Data Interchange (EDI) is recommended.
3. Data must be received and assimilated into the system at the next link of the chain.

Hermes passes the first criteria with flying colours. Of the TRACE pilots investigated, it is the only company that already has implemented unique identification of trade units (TUs). The internal data recording is also very good and all data are explicitly linked to the unique identifiers. The recommendations for Hermes are all related to making the data available. Specifically we recommend that:

1. Hermes invests in software that can bundle the recorded data together in electronic messages, preferably in standard XML format.
2. Hermes ensures that their customers can receive and decode the electronic message sent by Hermes.
3. Hermes works to enable further information flow throughout the supply chains of which it is a part.

This will ensure that the investment in traceability that Hermes has made is converted to an even greater competitive advantage. Customers and consumers will see that Hermes is a fully transparent company and hopefully will give preference to Hermes products.

7   Implementation

This section outlines how these recommendations were implemented at Hermes and what effect this has:

7.1   Software for chain traceability

Hermes decided to invest in the TraceTracker GTNet solution for chain traceability. While some of the work TraceTracker did for Hermes was part of -, and funded by TRACE, most of the work was paid for by Hermes itself. With the TraceTracker software Hermes can now create and send electronic messages containing product information, and the information recorded onboard can be automatically made available on the internet .

7.2   The TraceTracker GTNet solution:

TraceTracker Global Traceability Network (GTNet®) is a web platform with a suite of solutions that capture product information from the entire supply chain so brand owners can optimize operations, manage risk and engage customers. When fully implemented across entire supply chains, TraceTracker GTNet creates a 'food passport' that tracks and traces every aspect of quality and sourcing, from production methods and ingredients to storage, shipping and retail. Working across industries, business sectors and platforms, it can be customized to fit the needs of any business from small farmers to large enterprises.
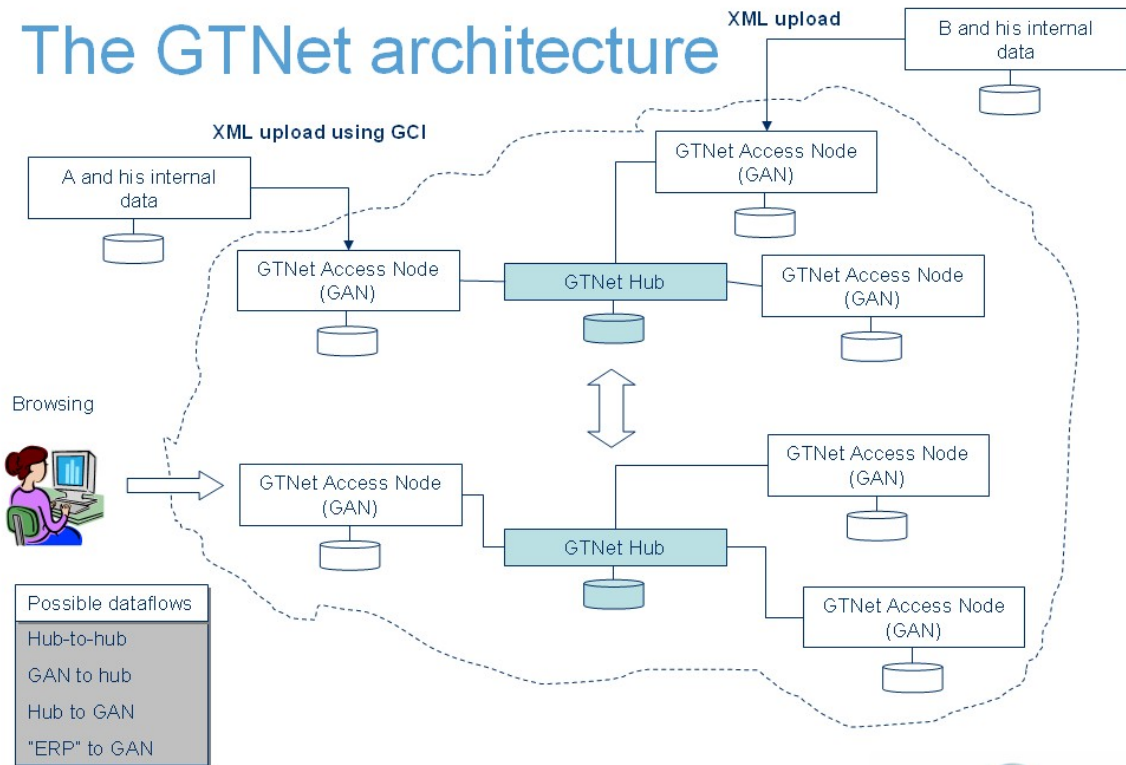
Functionality:

- Quickly enact a recall
- Quarantine products
- Monitor product temperatures
- Look up the product history of an individual product, package, or trade unit
- Search for product locations in the supply chain
- Verify safety information and certificates associated with a product
- Effectively collaborate with supply chain partners
- Check that a product is authentic, Halal, organic, or sustainable
- Order an analysis of a batch
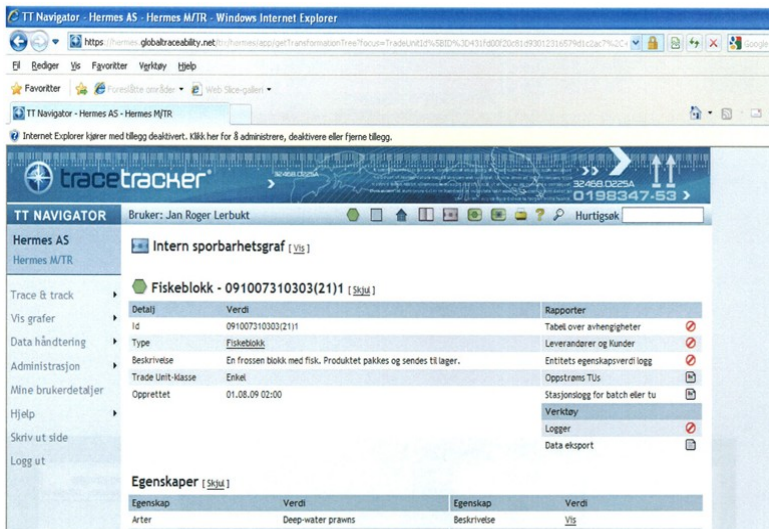- Authenticate a product

Technical specification:

Thr GTNet system is built on the Java 2 Enterprise Edition (J2EE) architecture. Ja2EE is a Java based standard for developing multi-tiered distribution enterprise applications. In addition, it uses open standards for all external data communication including XML and HTTP so it can easily integrate with other systems

The GTNet architecture

XML upload

B and his internal data

XML upload using GCI

A and his internal data

GTNet Access Node (GAN)

GTNet Access Node (GAN)

GTNet Hub

GTNet Access Node (GAN)

Browsing

GTNet Access Node (GAN)

GTNet Access Node (GAN)

GTNet Hub

GTNet Access Node (GAN)

Possible dataflows
Hub-to-hub
GAN to hub
Hub to GAN
"ERP" to GAN

Slide #9

TraceTracker Traceability Model and Architecture

tracetracker

A screen shot from the TraceTracker GTNet interface

Connecting quality parameters to the haul number
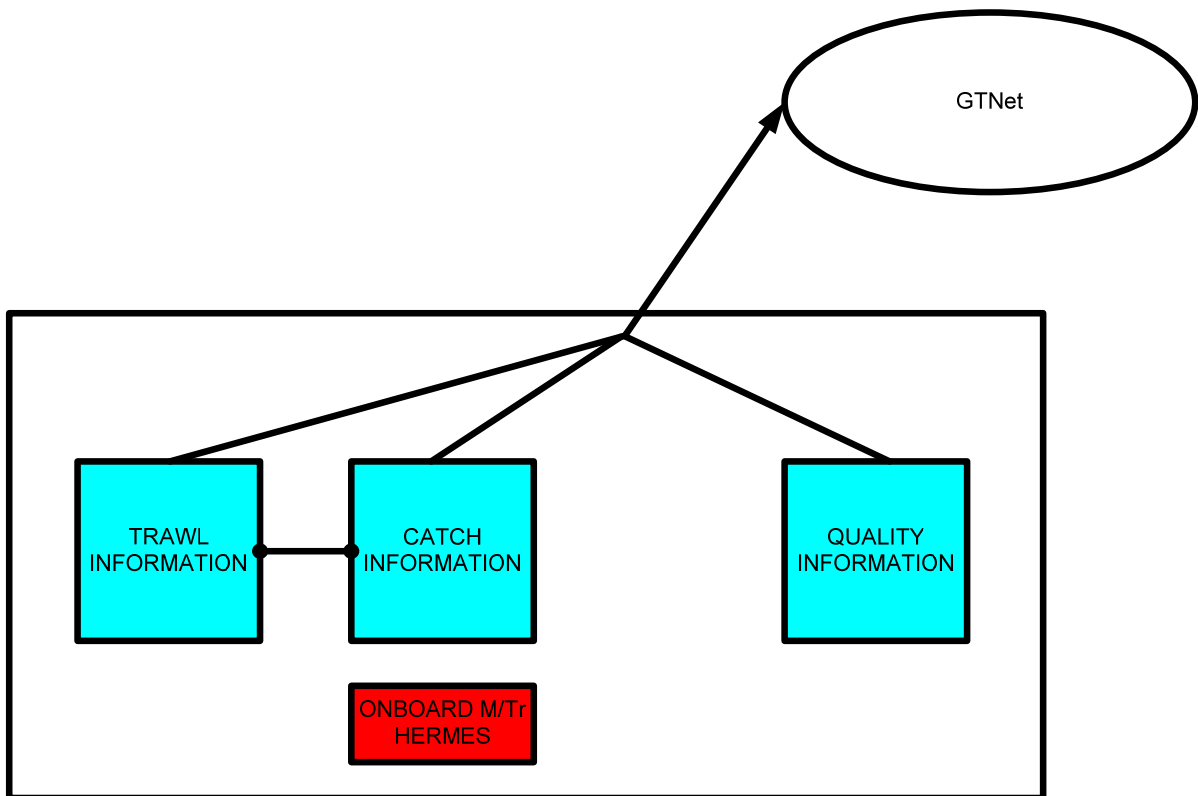
12

Figure 2. Information flow after GTNet implementation on board M/Tr Hermes

7.3   Product data available on internet

With all the recorded data linked to unique identifiers, and all internal processes and transformations documented it is simple to develop an application to make the data available.

This is the front page of the Hermes web page with link to the 'Traceability' page.

Traceability

Traceability from fishing ground to market place is crucial to secure the high standard of quality demanded by our customers. In order to be competitive Hermes AS therefore seeks to have a traceablility solution to suit our customers demands.

On board "Hermes" we have implemented this by having a total traceablility solution that trace every frozen block we produce.

On each block there is a label with a barcode where the barcodes meaning is written as a number underneath it.

The barcode or number represents a uniqe ID for this specific block which makes us able to trace this throughout the whole production on board. To the right you can see an example of the label with its barcode and ID.

By entering this ID in the searchfield below and clicking search, you will be presented with a selection of the relevant productiondata and hauldata for this block of fish, prawns or byproducts.

ID: [   ] [Search]

Powered by tracetracker

This is the 'Traceability' page with explanation on what happens.

ID: [090303010201(21)3   ] [Search] [Paste example-ID]

Powered by tracetracker

A nice gimmick is that Hermes provides an example-ID to the user if he or she doesn't have a real ID.'

Fiskeblokk

En frossen blokk med fisk. Produktet pakkes og sendes til lager.

Fryser 090303010201	details →
Arter	Saithe
Beskrivelse	Sei -
Enhets ID	7090020613017
Enhetstype	GS1
Latinsk navn	Pollachius virens
Produkt beskrivelse	H/G
Størrelse krav	U/1.2 Kg
Temperatur tilstand	Frozen
Vekt	24

This is information on one 24kg block of frozen fish, unfortunately only available in Norwegian at the time of writing. The data elements are 'Freezer ID', 'Species', 'Description', 'Unit ID', 'Unit type', 'Latin Name', 'Product description'. 'Size grade', 'Temperature condition' and 'Weight'. Note that 'Freezer ID' can provide more details.

Fryser

En mengde av en fisketype prosessert til ferdig produkt

Hal 0903030102	detaljer →
Ansvarlig for lossing	Sten Gunnar Pedersen
Fryser id	V1
Start fryser	21:38
Stopp fryser	02:46
Temperatur	-24

The is the 'Freezer ID' page with information about 'Haul ID', 'Person responsible for loading freezer', 'Freezer No', 'Start time', 'End time' and temperature. Note that 'Haul ID' can provide more details.

Hal

En mengde fisk fra en trål eller tilsvarende

Dato og tidspunkt for fangsten	01.03.2009
Fangstutstyr	1 trawl(s)
FAO sone	FAO 27
Fiskesone	NOR
ICE sone	IIa
Lokasjon	63°01'47.1"N, 5°38'55.68"E
Pollack	72
Saithe (= Pollock)	5904
Starttidspunkt tråling	12:24:29
Stopp tråling	16:34:28
Tråle tid	04:10

The is the 'Haul ID' page with information about 'Date and time', 'Gear', 'FAO map code', 'Country', 'ICE code', 'Location', 'Pollack', 'Saithe', 'Time start trawl', 'Time end trawl' and 'Trawl time'.

The location is also shown on a map.

8   Conclusion

Hermes now has excellent electronic traceability systems onboard the boat. This includes online integration with the GTNet system supplied by TraceTracker, ability to send XML in standard format and automatic upload of product information to the company internet pages.

There are three main areas where improvements could still be made. The first of these three areas is the integration of the quality control system and the traceability system. Currently selected quality control parameters have to be re-punched into the traceability system. Speed and accuracy would improve, and duplication of effort would decrease if these recordings were automatically linked to the trawl ID in the traceability system. The second problem which is not really of Hermes making that currently only one customer is using the recorded information. The third problem is that the Hermes product identifier is required to actually use the information available on the web page, and unfortunately this is not linked to the pallet identifier as palleting happens onshore after landing (there is no room onboard).

The main driver for traceability investment in Hermes was market access along with better price and better control. Traceability has been 'sold' as a success story, so workers were motivated. The workers workload had increased in some areas, especially related to quality control and documentation of quality, but the workload related to documentation had decreased in some areas, especially related to production monitoring and reporting, now done automatically and without paper involved. Overall workload related to documentation was therefore about the same as before. The production foreman was happy with the new system and indicated that the workers also were happy, especially with production to contract and perhaps slightly better price.

No complaints were noted after introducing the new system, traditionally the most common complaints had been on quality, especially relating to gutting, bleeding and gaping. Although the new system has no direct influence on these issues, it was the opinion of the interviewees that awareness of quality in general had increased as a result of the focus on product documentation.

8.1   Areas identified for further development

Palleting onboard would have solved some of the traceability problems (direct link from trade unit ID to pallet ID), but it is not currently physically possible.

The only viable way to give the customer access to the trade unit IDs would be through RF-ID tags and scanning upon reception; it is not practical for the customer to do bar-code scanning of 52 25kg trade units upon reception.

Only one customer currently has access to the XML and that is Espersen, the next link in the chain described in this report. Weakness related to the current system is that data related to quality controls cannot be recorded and integrated with the rest of the data.

9 Appendix

The "Reference method for analyzing material flow, information flow and information loss in food supply chains" contains the following tables of questions that can be used when investigating material and information flow:

Table 1: Transport of ingredients and raw materials from supplier

Table 2: Reception of ingredients and raw materials from supplier

Table 3: Raw material/ingredient unpacking, pre production storage, mixing

Table 4: Application of ingredients and raw materials

Table 5: During production

Table 6: Production ends

Table 7: Post production storage, quality control, packaging, labelling

Table 8: Collection of finished product

Table 9: Transport of finished goods to distribution terminal or directly to customer

"M/Tr Hermes" vessel is the first link of the chain, so there is no "Transport".

Table 2   Reception of ingredients and raw materials

1.	Transformation questions, reception	Answer, fill in				Description or example
2.M01	From whom are shipments of this type received?	N/A (The fish is caught at sea)				Name and address/GLN
2.M02	Where are shipments of this type received?	N/A (Onboard)				Name and address/GLN
2.M03	Description of total amount received?	One haul of fish in one trawl				Full/part containers, full/part trucks, full/part holds, etc
2.M04	Range of total amount received every time?	5-25 tons				From-to in kg, ton/etc
2.M05	How often does reception take place?	4 hauls per day, each lasting about 5 hours				Daily, weekly, etc
2.K01	How is the total received amount identified? What type of code and media? Is this identifier discarded or recorded and kept?	Each haul of fish is assigned a number. The number is proprietary and contains year, trip, month, date and sequential haul number. 0910073103 means the 3rd haul made on 31/07/09, which was on the 10th trip of the year.				Trip number/SSCC/etc Unique/Non-unique. Sequential/Structured Bar-code / RF-ID/Direct reference (label)/Indirect reference, etc.
2.P01	What parameters are linked to the whole shipment? How are they transmitted; on Label, Paper, Fax, Electronically, Other? Are they recorded on reception?	2.P01.1	Haul ID	N/A	Y, el.	List of parameters. For each parameter, indicate L/P/F/E/O for type of transmission. For each parameter, indicate "Discarded", "Kept" or "Repunched". Alternatively provide a link to a form, a screen-shot, a report or similar.
		2.P01.2	Date	N/A	Y, el.	
		2.P01.3	Trawl start time	N/A	Y, el.	
		2.P01.4	Trawl end time	N/A	Y, el.	
		2.P01.5	Position (GPS)	N/A	Y, el.	
		2.P01.6	Trawl type	N/A	Y, el.	
2.K11	If received amount is divided into LUs; how is each LU identified? What type of code and media? Is this identifier discarded or recorded and kept?	Haul is fed continuously into production				Trip number/SSCC/none/etc Unique/Non-unique. Sequential/Structured Bar-code/RF-ID/Direct reference (label)/Indirect reference, etc.
2.T11	Can the producer link from the identification of the total amount to LU?	N/A				No/Yes indirectly/Yes directly (LU-ID recorded upon collection)
2.T12	If the answer above is yes, how is it linked?	N/A				Electronic/manual

*Table 3   Raw material/ingredient unpacking, pre production storage, mixing (duration) –
Each type one table*

2.	Questions pre-production	Answer, fill in			Description or example
3.M01	Storage type for this raw material/ ingredient as it enters production?	*The fish remains in the trawl until it is fed into production, no intermediate storage*			Whole shipment as received/each LU as received/each TU as received, in local tank, etc.
3.T01	Relationship from the above to received shipments?	*N/A*			1:1 with shipment /LU/TU, split, joined, mixed, added in queue, etc.
3.K01	Identification of this raw material/ingredient as it enters production?	*Haul ID*			As before, by date/time, by tank number, by other reference
3.P01	What quality control checks are linked to the raw materials / ingredients pre-production? How are they recorded; on paper, punched into computer system, automated data gathering?	3.P01.1	*N/A*		List of parameters. For each parameter, indicate "Paper", "ComPunch" or "ComAuto". Alternatively provide a link to a form, a screen-shot, a report or similar.
		3.P01.2			
		3.P01.3			
		3.P01.4			
		3.P01.5			
3.F01	Which temperature control method was used?	*N/A*			None/iced/ iced and refrigerated/refrigerated/etc.
3.F02	Is the storage/display temperature shown or recorded?	*N/A*			No / Shown only / Recorded manually / Recorded electronically

*Table 4   Application of ingredients and raw materials (transformation) - Each type one
table*

3.	Transformation questions, into production	Answer, fill in			Description or example
4.T01	Can the producer link from identification of ingredients and raw materials to identification of lot / batch?	*Yes*			No/ Yes indirectly/Yes directly (ingredients and raw materials ID recorded under production)
4.T02	If the answer above is yes, how is it linked?	*Haul ID is known at this stage*			Electronic/manual
4.T03	Is the ingredient / raw material split up, joined together or kept as one?	*Continuously split up, each single fish must be processed separately*			Split up/joined together/kept as one
4.P01	What parameters are recorded to document the application of this ingredient / raw material? How are they recorded; on paper, punched into computer system, automated data gathering?	4.P01.1	*N/A*		List of parameters. For each parameter, indicate "Paper", "ComPunch" or "ComAuto". Alternatively provide a link to a form, a screen-shot, a report or similar.
		4.P01.2			
		4.P01.3			
		4.P01.4			
		4.P01.5			

Table 5   During production (duration)

4.	Questions production	Answer, fill in	Description or example
5.M01	How are the batches separated during production?	No separation	Physically, staged mixing, continuous mixing, etc
5.T01	1 batch only or many in parallel?	1 batch	One/Many
5.T02	If many, are they ever mixed?		No/Yes
5.K01	How are batches identified during production?	Haul ID is known at this stage	Unique/Non-unique. Code structure. Internal /Visible number
5.K02	Is this identifier retained or referred to after production?	Yes, it is available in the electronic system, linked to the trade unit ID	No/Yes

Hierarchy digit 0 refers to the whole production run.

Table 6   Production ends (transformation)

5.	Transformation questions, from production	Answer, fill in			Description or example
6.M01	What type of lot/batch is used for finished product?	Trade unit is 25kg single species frozen blocks of white fish (cod, haddock or redfish) of similar size			Daily/weekly/etc
6.M02	What is the lot/batch amount?	25kg			From-to in kg/ton/etc
6.K01	How is the lot/batch identified?	Proprietary trade unit ID, unique It contains the haul ID plus the freezer number that was used and a sequential number within the freezer			Unique/Non-unique. Code structure. Internal/Visible number
6.T01	Can the producer link from identification of lot/batch to shipment of finished product?	Yes, directly			No/Yes indirectly/Yes directly (Lot/batch-ID recorded after production and linked to TU-ID)
6.T02	If the answer above is yes, how is it linked?	Trade unit is labelled with unique ID and it is shipped directly, palleting is done in the next link of the chain			Electronic/manual
6.T03	Is the finished lot / batch split up, joined together or kept as one?	Trade unit is kept as one as long as it exists (until thawing further down the production chain)			Split up/joined together/kept as one
6.P01	What parameters are linked to the finished production batch? How are they recorded; on paper, punched into computer system, automated data gathering?	6.P01.1	Trade unit ID		List of parameters. For each parameter, indicate "Paper", "ComPunch" or "ComAuto". Alternatively provide a link to a form, a screen-shot, a report or similar.
		6.P01.2	xxx		
		6.P01.3			
		6.P01.4			
		6.P01.5			

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Table 7   Post production storage, quality control, packaging, labelling (duration)

6.	Questions post-production	Answer, fill in			Description or example
7.M01	What is the name/type of the product?	*25kg single species frozen blocks of white fish (cod, haddock or redfish) of similar size*			Identifying description or name of the product
7.M02	What is the product condition?	*Frozen*			Ambient/chilled/frozen/etc
7.M03	Which storage method is used post-production?	*Stored in onboard freezer*			Boxed/bulked/seawater tanks/brine tanks/cold storage/etc.
7.M04	What type of transport from process to packaging is used?	*Conveyor belt*			Not needed/Flow line/Fork-lift/By hand/etc.
7.M05	Is a label used, if so, what type?	*Clear text label with bar code*			Clear text, barcode/Radio Frequency Identification-number (RFID)/none/etc.
7.P01	If a label is used, what information is on it?	7.P01.1	*xxx*		Name of the company/date and time of production / date of durability etc
		7.P01.2			
		7.P01.3			
		7.P01.4			
		7.P01.5			
7.P02	What quality control checks are linked to the finished product? How are they recorded; on paper, punched into computer system, automated data gathering?	7.P08.1	*xxx*		List of parameters. For each parameter, indicate "Paper", "ComPunch" or "ComAuto". Alternatively provide a link to a form, a screen-shot, a report or similar.
		7.P08.2			
		7.P08.3			
		7.P08.4			
		7.P08.5			
7.F01	Which temperature control method was used?	Manual log of freezer temperature, not available through the electronic system			None/iced/iced and refrigerated/refrigerated/etc.
7.F02	Is the storage/display temperature shown or recorded?	*Recorded manually*			No/Shown only/Recorded manually/Recorded electronically

Table 8   Collection of finished product (transformation)

7.	Transformation questions, shipping	Answer, fill in				Description or example
8.M01	To whom are shipments of this type delivered?	*To one out of two freezer terminals; one in western Norway and one in northern Norway*				Name and address/GLN
8.M02	From where are shipments of this type shipped?	*From vessel*				Name and address/GLN
8.M03	Description of the total amount collected?	*400 tons*				Full/part containers, full/part trucks, full/part holds/etc
8.M04	Range of total amount collected every time?	*Continuous unloading of vessel*				From-to in kg/ton/other number relating to TU/LU
8.M05	How often does collection take place?	*Vessel is at sea for 14-35 days, unloads catch at the end of every trip*				Daily/weekly/etc
8.K01	How is the total collected amount identified? What type of code and media?	*No direct identification. Vessel name and Haul ID is known, and is printed on every trade unit*				Trip number/SSCC[3]/etc Unique/Non-unique. Sequential/Structured Bar-code/RF-ID/Direct reference (label)/Indirect reference, etc.
8.P01	What parameters are linked to the whole shipment? How are they transmitted; on Label, Paper, Fax, Electronically, Other? Are they kept for own use only, given to the transporter, sent directly to the buyer, or sent to the buyer via the transporter?	8.P01.1	*N/A*			List of parameters. For each parameter, indicate L/P/F/E/O for type of transmission. For each parameter, indicate "Own", "Tran", "Sent" or "Via". Alternatively provide a link to a form, a screen-shot, a report or similar.
		8.P01.2				
		8.P01.3				
		8.P01.4				
		8.P01.5				
8.K11	If collected amount is divided into LUs; how is each LU identified? What type of code and media?	*N/A*				Trip number/SSCC/none/etc Unique/Non-unique. Sequential/Structured Bar-code/RF-ID/Direct reference (label)/Indirect reference, etc.
8.T11	Can the producer link from the identification of the total amount to each LU?	*N/A*				No/Yes indirectly/Yes directly (LU-ID recorded upon collection)
8.T12	If the answer above is yes, how is it linked?					Electronic / manual
8.P11	What parameters are linked to each LU? How are they transmitted; on Label, Paper, Fax, Electronically, Other? Are they kept for own use only, given to the transporter, sent directly to the buyer, or sent to the buyer via the transporter?	8.P11.1	*N/A*			List of parameters. For each parameter, indicate L/P/F/E/O for type of transmission. For each parameter, indicate "Own", "Tran", "Sent" or "Via". Alternatively provide a link to a form, a screen-shot, a report or similar.
		8.P11.2				
		8.P11.3				
		8.P11.4				
		8.P11.5				
8.K21	If LU is divided into TUs; how is each TU identified? What type of code and media?	*Trade unit ID*				GTIN+/other Unique/Non-unique. Sequential/Structured Bar-code/RF-ID/Direct reference (label)/Indirect reference, etc.
8.T21	Can the producer link from TU-ID to LU-ID?	*N/A*				No/Yes indirectly/Yes directly (TU-ID recorded upon LU-ID)

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[3] Each logistic unit is often marked with a **Serial Shipping Container Code (SSCC)** which uniquely identifies the company and the particular logistic unit.

7.	Transformation questions, shipping	Answer, fill in				Description or example
8.T21	If the answer above is yes, how is it linked?	N/A				Electronic/manual
8.P21	What parameters are linked to each TU? How are they transmitted; on Label, Paper, Fax, Electronically, Other? Are they kept for own use only, given to the transporter, sent directly to the buyer, or sent to the buyer via the transporter?	8.P21.1	xxx			List of parameters. For each parameter, indicate L/P/F/E/O for type of transmission. For each parameter, indicate "Own", "Tran", "Sent" or "Via". Alternatively provide a link to a form, a screen-shot, a report or similar.
		8.P21.2				
		8.P21.3				
		8.P21.4				
		8.P21.5				
8.F01	Does a temperature log accompany the shipment?	No				No/Yes
8.F02	Is the temperature of the shipment measured on collection?	No				No/Yes

Hierarchy digit 0 refers to the whole collection/delivery, 1 refers to each LU in the delivery, 2 to each TU in each LU.

Table 9   Transport of finished goods to distribution terminal or directly to customer (duration)

8.	Question to transporter of finished goods	Answer, fill in				Description or example
9.M01	What type of transport is used?	Forklift truck				Truck/vessel/air plane/post/courier/etc.
9.M02	What type of delivery is it?	Distribution terminal				Distribution terminal or directly to supplier, either
9.K01	How is the vehicle identified?	N/A				Registration number of vehicle or name and address (or GLN)
9.K02	How is the trip identified?	N/A				SSCC, transporter code, delivery code, freight code, etc.
9.T01	Is there a link from vehicle/trip to delivery?	N/A				No/Yes, indirectly/Yes, directly
9.P01	What parameters are linked to this transport? How are they recorded; on Label, Paper, Fax, Electronically, Other? Are they kept for own use only, given to the buyer or given back to the supplier?	9.P01.1	N/A			List of parameters. For each parameter, indicate L/P/F/E/O for type of transmission. For each parameter, indicate "Own", "Buyer" or "Suppl". Alternatively provide a link to a form, a screen-shot, a report or similar.
		9.P01.2				
		9.P01.3				
		9.P01.4				
		9.P01.5				
9.F01	Which temperature control method was used?	None				None/iced/iced and refrigerated/refrigerated/etc.
9.F02	Is temperature logged during transportation?	No				No/Yes manually/Yes electronically