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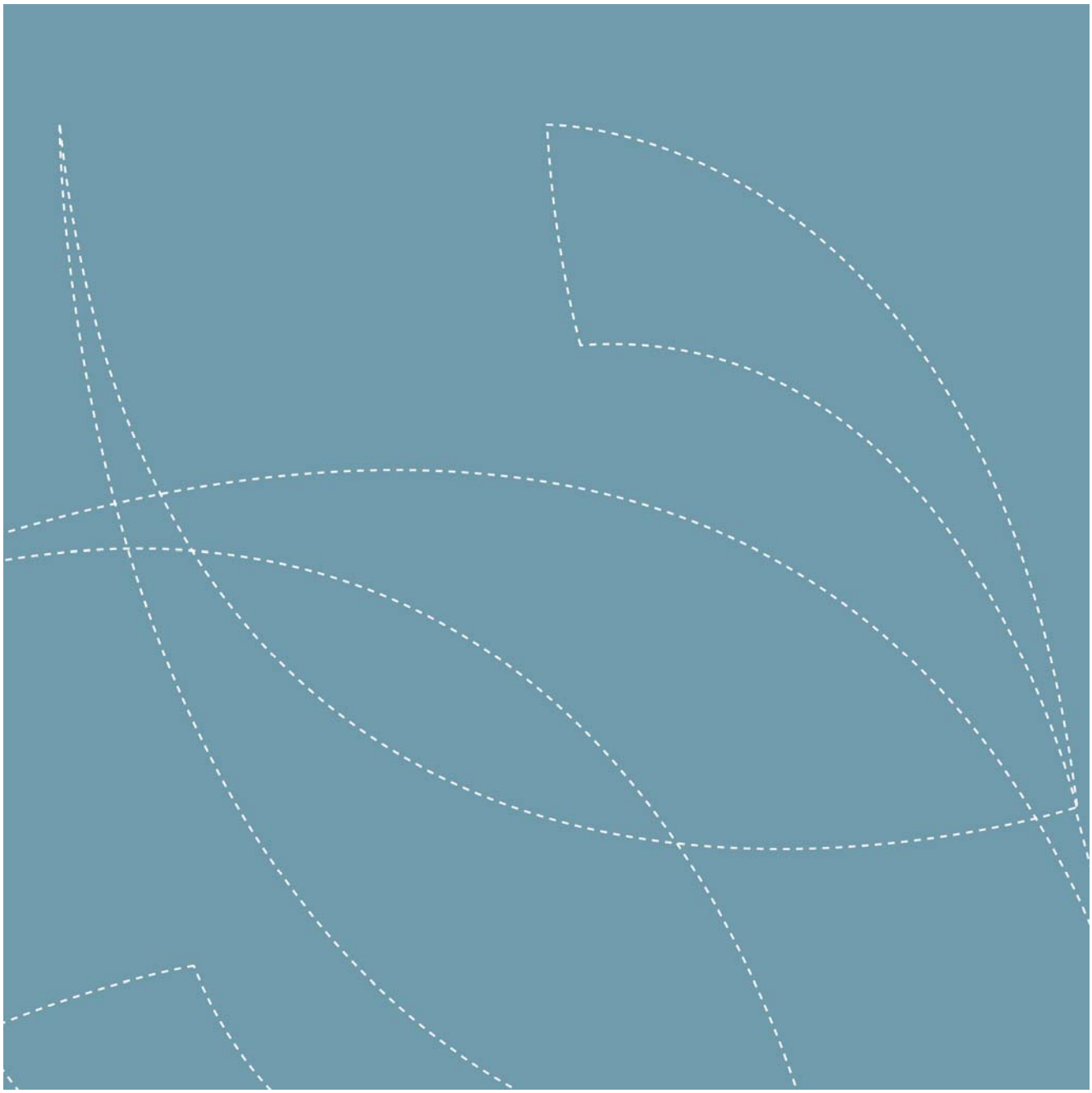
Harmonizing methods for food traceability process mapping and cost/benefit calculations related to implementation of electronic traceability systems

Workshop hosted by Nofima in association with the TRACE project
25-26 February 2009

Kathryn Anne-Marie Donnelly and Petter Olsen



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Nofima's social scientific business area offers economic analysis, perspective and foresight analysis, consumer research, market analysis and strategic consultancy. Other primary professional areas cover information logistics and traceability. In addition to servicing the industry, Nofima Market works closely with Nofima's scientific areas of business.

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Report

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Three keywords:
Process mapping, traceability, cost-benefit

Summary:

In recent years there has been increased focus on traceability in food supply chains. Process mapping for traceability in food supply chains is a way of describing where information which is necessary to maintain traceability is lost. There exist many 'methods' for this, but few (if any) of them are formalised as scientific publications. Cost benefit calculations are important in all areas of research and management. With respect to implementing traceability, an appropriate cost benefit analysis will be an important tool. A better understanding of the different methods would enable advancement of this area of research.

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1 Introduction

In recent years there has been increased focus on traceability in food supply chains (Carriquiry and Babcock, 2007, Caswell, 2000, Elbers et al., 2001, Fallon, 2001, Hobbs, 2004, Madec et al., 2001, Ozawa et al., 2001, Sporleder and Goldsmith, 2001). Sporleder and Moss (2002) described the increasing demand for vertical product information flow in the global food supply chain. This increased interest has led to the establishment of large national and international research projects. The projects are focused on both the analytical tools necessary to verify the origin of food products and the technical tools and knowledge necessary to trace product and process information throughout the supply chain. The larger European projects include, TRACE, TRACEBACK, TraceFish, ChillOn, CoExtra.

Process mapping for traceability in food supply chains is a way of describing where information which is necessary to maintain traceability is lost. There exist many 'methods' for this, but few (if any) of them are formalised as scientific publications. This makes further development and exchange of ideas challenging. Comparison of results is also difficult when there are no formal descriptions of the methods. A better understanding of the different methods would enable advancement of this area of research.

Cost benefit calculations are important in all areas of research and management. They can be used as a tool to decide whether a course of action is appropriate, how best to develop an existing solution further and to assess the outcome of a completed project. With respect to implementing traceability, an appropriate cost benefit analysis will be an important tool.

An outcome of the above mentioned projects has been further development of these methods. The aim of the workshop was to discuss and share experiences from working with methods related to food traceability process mapping and also with cost benefit calculations in order to see what could be learned and what experiences could be exchanged.

The authors hope that the workshop and this document will form the basis for a further exchange of ideas. The experience gained from this workshop is particularly valuable because of the international and intra-project exchanges and contributions.

2 Contributions

Food Traceability Process Mapping. Standard method for analyzing material flow, information flow and information loss in food supply chains.

Petter Olsen, Nofima

Harmonizing methods for food traceability process mapping and cost/benefit calculations related to implementation of electronic traceability systems

Senior scientist Petter Olsen, Nofima Marked

Intra-project meeting
Tromsø, Norway, February 25-26 2009

Nofima is the newly formed fusion of almost all Norwegian food research institutes (incorporating Akvaforsk, Matforsk, Norconserv and Fiskeriforskning) and covers all food sectors and links in the value chain.

Nofima Market is situated in Tromsoe and carries out R&D work related to economics, marketing, logistics, rationalisation and traceability of food products.

This presentation

1. What is traceability, definitions
2. Why traceability?
3. Process mapping method – background
4. Process mapping method – application
5. Process mapping method – conclusions

Definition - ISO 8402

Traceability:

Ability to trace the history, application or location of an entity by means of recorded identifications.

In a product sense, it may relate to

➔**the origin of materials and parts**

➔**the product processing history**

➔**the distribution and location of the product after delivery**

ISO 9000:

"The ability to trace the history, application or location of that which is under consideration"

EU Common Food Law:

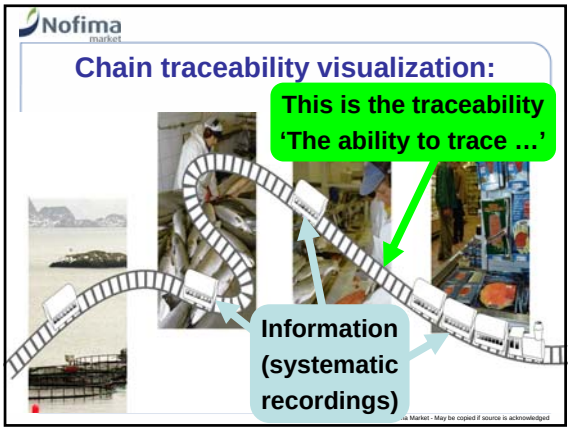
"The ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution"

Codex Alimentarius:

"Traceability/product tracing: the ability to follow the movement of a food through specified stage(s) of production, processing and distribution"

What traceability is and isn't:

- ***Traceability does not refer to the (product) data itself***
- ***There is no such thing as "traceability data"***
- ***Traceability does not mean "ability to identify origin"; that is only part of traceability***
- ***Traceability is the name of your systematic ability to access the data you have stored***
- ***Traceable data elements are connected to identifiers, and traceable data elements are connected to each other***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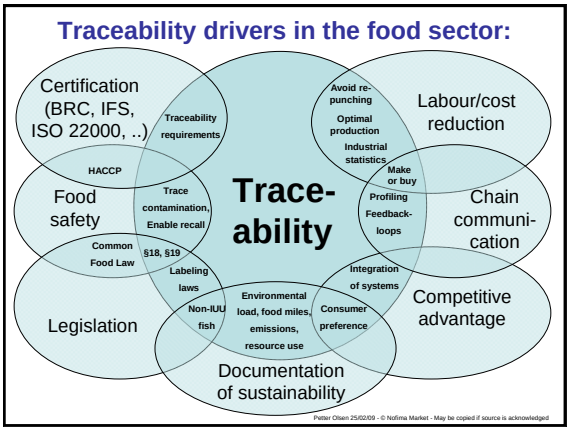
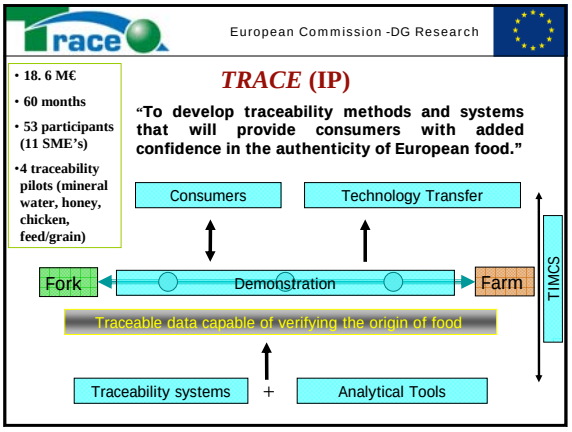
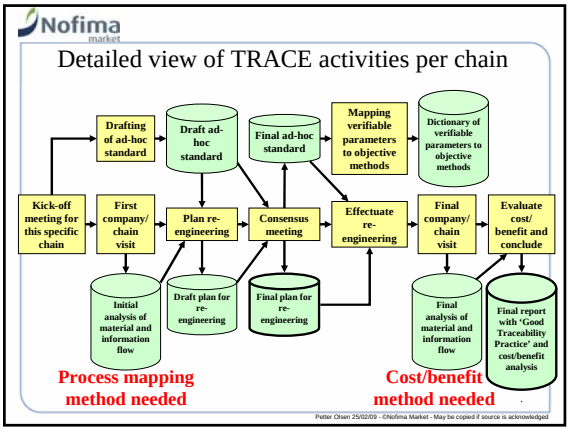
Chain traceability visualization:
This is the traceability
'The ability to trace …'
Information (systematic recordings)


Traceability drivers in the food sector:
Certification (BRC, IFS, ISO 22000, ..)
Traceability requirements
HACCP
Food safety
Trace contamination, Enable recall
Common Food Law
§18, §19
Labeling laws
Legislation
Non-IUU fish
Environmental load, food miles, emissions, resource use
Consumer preference
Documentation of sustainability
Trace-ability
Avoid re-punching
Optimal production
Industrial statistics
Labour/cost reduction
Make or buy
Profiling
Feedback-loops
Chain communi-cation
Integration of systems
Competitive advantage


race
European Commission -DG Research
• 18. 6 M€
• 60 months
• 53 participants (11 SME's)
•4 traceability pilots (mineral water, honey, chicken, feed/grain)
TRACE (IP)
"To develop traceability methods and systems that will provide consumers with added confidence in the authenticity of European food."
Consumers
Technology Transfer
Fork
Demonstration
Farm
TIMCS
Traceable data capable of verifying the origin of food
Traceability systems
+
Analytical Tools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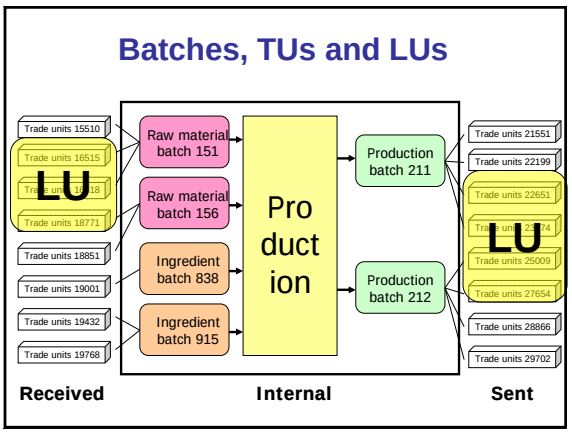
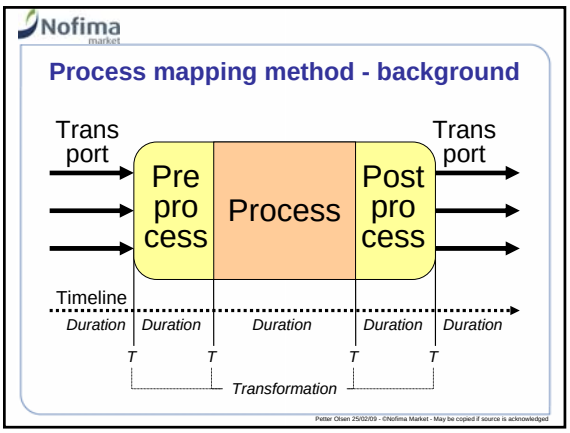
Detailed view of TRACE activities per chain
Drafting of ad-hoc standard
Draft ad-hoc standard
Final ad-hoc standard
Mapping verifiable parameters to objective methods
Dictionary of verifiable parameters to objective methods
Kick-off meeting for this specific chain
First company/ chain visit
Plan re-engineering
Consensus meeting
Effectuate re-engineering
Final company/ chain visit
Evaluate cost/ benefit and conclude
Initial analysis of material and information flow
Draft plan for re-engineering
Final plan for re-engineering
Final analysis of material and information flow
Final report with 'Good Traceability Practice' and cost/benefit analysis
Process mapping method needed
Cost/benefit method needed


Batches, TUs and LUs
Trade units 15510
Trade units 16515
LU
Trade units 18771
Trade units 18851
Trade units 19001
Trade units 19432
Trade units 19768
Raw material batch 151
Raw material batch 156
Ingredient batch 838
Ingredient batch 915
Pro duct ion
Production batch 211
Production batch 212
Trade units 21551
Trade units 22199
Trade units 22651
LU
Trade units 25009
Trade units 27654
Trade units 28866
Trade units 29702
Received
Internal
Sent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Process mapping method - background
Trans port
Pre pro cess
Process
Post pro cess
Trans port
Timeline
Duration
Duration
Duration
Duration
Duration
T
T
T
T
Transformation

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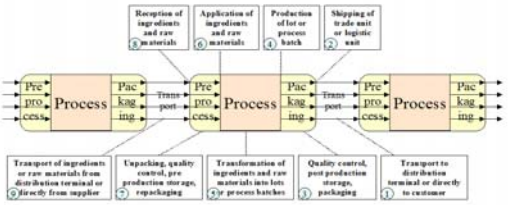
Process analysis, sequence diagram



9 sets of questions – go against the flow (or not)

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Sample form 1 – Transport (D)

Process mapping no:	Previous form no:	This form no:	Next form no:

Table 1: Transport of finished goods to distribution terminal or directly to customer (duration)

	Question to transporter of finished goods	Answer, fill in	Description or example
1.M01	What type of transport is used?		Truck / vessel/ air plane / post / courier / etc
1.M02	What type of delivery is it?		Distribution terminal or directly to supplier, either
1.X01	How is the vehicle identified?		Registration number of vehicle or name and address (or GLN)
1.X02	How is the trip identified?		SSCC, transporter code, delivery code, freight code, etc
1.T01	Is there a link from vehicle / trip to delivery?		No / Yes, indirectly / Yes, directly
1.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?	1.P01.1 1.P01.2 1.P01.3 1.P01.4 1.P01.5	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.
1.F01	Which temperature control method was used?		None / iced / iced and refrigerated / refrigerated / etc
1.F02	Is temperature logged during transportation?		No / Yes manually / Yes electronically

Hierarchy digit 0 refers to the whole transport.

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Sample form 4 – Production ends (T)

Process mapping no:	Previous form no:	This form no:	Next form no:

Table 4: Production ends (transformation)

	Transformation questions, from production	Answer, fill in	Description or example
4.M01	What type of lot / batch is used for finished product?		Daily / weekly / etc
4.M02	What is the lot / batch amount?		From-to in kg / ton / etc
4.X01	How is the lot / batch identified?		Unique / Non-unique Code structure Internal / Visible number
4.T01	Can the producer link from identification of lot / batch to shipment of finished product?		No / Yes indirectly / Yes directly (Lot / batch-ID recorded after production and linked to TU-ID)
4.T02	If the answer above is yes, how is it linked?		Electronic / manual
4.T03	Is the finished lot / batch split up, joined together or kept as one?		Split up / joined together / kept as one
4.P01	What parameters are linked to the finished production batch? How are they recorded; on paper, punched into computer system, automated data gathering?	4.P01.1 4.P01.2 4.P01.3 4.P01.4 4.P01.5	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

Hierarchy digit 0 refers to the whole production run.

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Question types

- ***Material flow (M), product or ingredient name, type, condition, location, collection frequency, etc***
- ***Parameters including media used (P), linked to TU/LU or on label, media used,***
- ***Existing or possible keys (K), identification of TU, LU, shipment, vehicle, trip, etc.***
- ***Transformations (T), link between input and output, between TU and LU, joins, splits***
- ***Food safety (F), questions about temperature and temperature logs***

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Questions related to durations

- ***What is the nature of the duration? How is the vehicle / trip / tank / store identified?***
- ***What is the nature of the product in this duration? The name? The type? The size?***
- ***What is on the product label in this duration?***
- ***Who is responsible for the product?***
- ***How are products separated in this duration?***
- ***What common parameters are linked to all products in this duration?***
- ***What quality control checks in this duration?***

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Questions related to transformations

- ***Why and where did the transformation happen?***
- ***What is the frequency of this, what amounts are involved?***
- ***How do inputs relate to outputs? (one-to-one, one-to-many, many-to-one, many-to-many)***
- ***What is the relationship between LU and TU?***
- ***How are parameters that describe inputs connected to parameters that describe outputs?***

History of the method

- *First version developed in 2004 as part of Seafood Plus IP*
- *Now in version 9*
- *Submitted for scientific publication*
- *Used by various people in various projects*
- *Has been used for process mapping in supply chains for chicken, cod, herring, honey, lamb, mineral water, salmon, soy bean and tuna (and probably more)*

Experience using the method

- *A process mapping done using this method is in itself not sufficient for subsequent implementation of traceability software*
- *The focus is on the identifiers and the transformations, not the parameters connected to the identifiers, so additional questions are needed if you want to investigate something related to the value of the parameters (hygiene, recall readiness, sustainability, resource use, etc.)*
- *It is a good tool for first company visit, it ensures that relevant questions are not forgotten, and it significantly helps in standardizing reporting from pilots*

Thank you for your attention

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Process mapping publications

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Analysis of Food Processes: an Application for Traceability using 'Tracepoints'

Jorge Molina, Ainia

ainia

"Traceability Methods Workshop: Process Mapping and Cost-Benefit Analysis"

Jorge Molina
Food Safety, Quality and Environment Research Projects
ainia – Technological Center

NOFIMA – Tromso-Norway 25-26 February 2009

Outline of the Presentation

- Thanks to...
- ainia: about us
- 1 - Traceability Methods
- 2 - Tracepoints in Traceability Methods
- 3 - Traceability Methods Comparative

Thanks to...

- Thanks to Mr. Petter Olsen....
- Thanks to NOFIMA...
- Thanks to the support of EU projects...
- Pleasure to share this workshop...

Jorge Molina Food Engineer	 ainia – Valencia SPAIN

ainia: about us

Our mission is to **actively participate** in the attainment of **excellence** in **companies** through **innovation**, anticipating the requirements of **society** and establishing ourselves as an **organization** of professionals recognized as a **qualified** and **committed collaborator**

- 190 professionals on the staff
- 70 % doctors and university graduates
  30 % trained technicians

Continuous training

Our professionals are trained in the technologies that are most important for us, in the principal centers and universities in the world.

Multi-disciplinary teams

Food technicians, agronomists, chemists, physicists, industrial engineers, doctors in telecommunications, lawyers, psychologists, sociologists, economists, journalists, marketing experts, biologists, etc.

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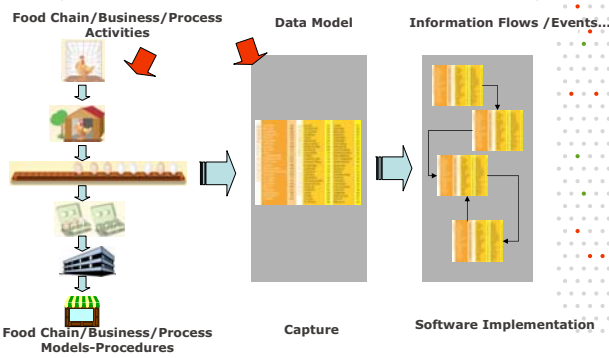
Part 1: Traceability Methods

objective

The presentation is focused to the analysis and performance of some process mapping techniques oriented to traceability analysis and requirements definition for services implementation.

Scope of the Presentation



Some Methods Overview

	Description	Origin	Scope	References
"Avante Method"	Food Chain & Traceability Systems Analysis Methodology	2003. ainia Technological Center, J. Molina & team. In collaboration with Food SME´s. Technological and Non-Technological Approach	Food Chain and Food Players Internal Processes	Several Spanish Research Projects, EU Research Project. Some elements applied in TRACEBACK
Tracepoints	Description of Traceability Activities	Several EU Research Projects. VI FP	Food Players Internal Processes mainly	EU Research Project. Food-Reg / TRACEBACK...
"SCOR"	Supply Chain Operations Reference Model	1996. Independent Non-Profit Global Corporation.	Supply Chain Processes, high level approach. Do not Implementation level	www.supply-chain.org
"B.T.P" 2006	Analysis of Traceability Systems	Fundación Chile Trazabilidad and others	Food processes. Legislation and Food Standards compliance	Fundación Chile

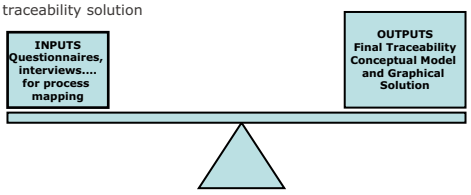
"Avante"

Introduction

- "Avante" is a Food Chain and Process Mapping Traceability Methodology (Including Food Safety and Quality approach)
- Started in 2003 in research spanish projects. Applied in TRACEBACK project later
- Firstly based on ainia´s experience in food applied projects
- Method oriented to food chain analysis and traceability objectives
- Applied to: Research and Innovation Projects, EU projects and in Consultancy Projects
- Tested in meat sector (processed), wine sector, vegetables sector, DDGS (Dry Distilled Grains /Feed as a by-product for feed sector obtained from Bio-ethanol industry), grain sector (rice), honey sector, dairy sector and spirits,

"Avante"

"Avante" maps the current situation of the food chain and/or food player traceability (INPUTS) using some traceability indicators and the method processes the information for producing an (OUTPUT) final report and graphical representation for an added value traceability solution



"AVANTE-Process Mapping: a Balance Between Method Inputs and Method Outputs"

"Avante" Scope: Food Items

Food Items Scope

Food Product
- **Raw materials and Ingredients**
- **Semi-processed products**
- **Semi-processed products with destination to feed industry**
- **Final Products**

Packaging materials
- **In direct contact with food content (packing, lid...)**
- **Special sectors (spirit): barrels...**

Technological Auxiliaries
- **Inorganic filtering materials (active carbon materials, diatomea materials...)**

"Avante" Scope: Food Players

Processes Scope

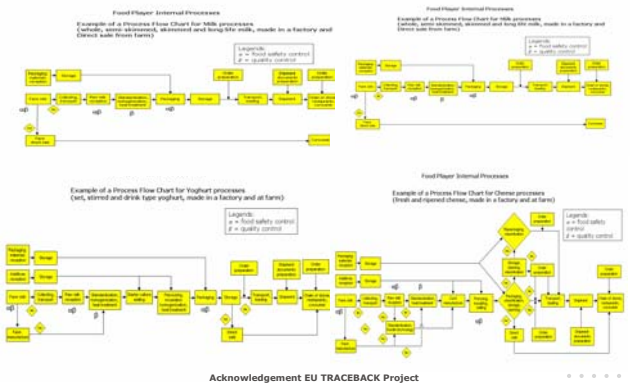
Food Chain Configuration Level
- **Analysis of Contextual Scenarios**
  - Regulatory, Non-regulatory requirements...
- **Analysis of Specific Supply Chain Configurations**

→ Traceability Food Chain Requirements

Food Players Level
- **Internal Processes Mapping (linking with external processes) Decomposition:**
  - Flow Chart Steps
  - Food Item involved
  - Logistic Unit Involved (Trace Unit)
  - Data for Trace Unit ID
  - Associated records
  - Data in associated records
  - Lot criteria creation

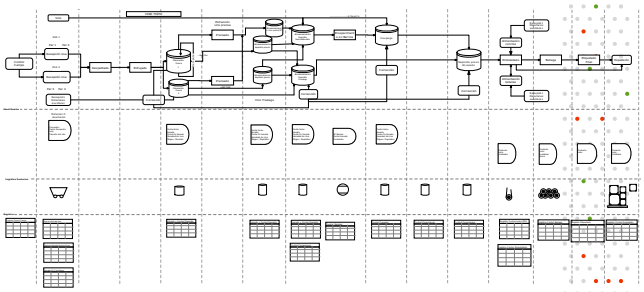
→ Food Players Traceability Requirements

Example Process Mapping: flow chart example (INPUT)

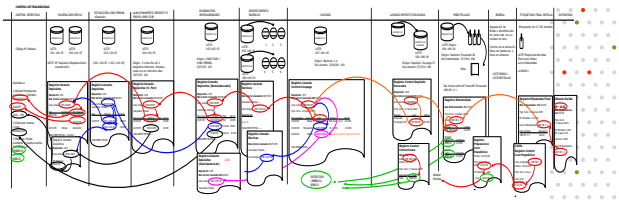


Acknowledgement EU TRACEBACK Project

Example Process Mapping: Traceability Conceptual Model (OUTPUT)



Example Process Mapping: Traceability Conceptual Model Tracking and Tracing Models (OUTPUT):



ainia

Part 2: Tracepoints in Traceability Methods

Tracepoints as a Tool for Traceability Analysis

We can define Tracepoint as an action or event related to a process indicating a breakpoint in traceability, due to a change in the product state or the associated info.

From: www.tracecheck.com

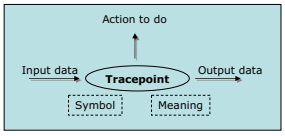
This is a very good option to model internal operations and in addition linking internal with external traceability, and one of the crucial pieces to construct an optimum traceability system.

Tracepoints have been benchmarked in TRACEBACK project trying to benchmark and identify new tracepoints for the specific tomato and feed-dairy chain as well as including a set of rules of information management for IT management systems applications.

Acknowledgement EU TRACEBACK Project

Tracepoints an overview

Tracepoints break each production process into representative steps/actions: TRACEPOINT. The path composed by the flow or combination of tracepoints wil reflect the "traceability operations" needed to maintain traceability along interna processes and therefore in supply chain.



- **Name of the corresponding action**
- **Symbol of the action**
- **Information relative tot he process practices**
- **Data inputs necessayr to traceability**
- **Data outputs necessary to traceability**
- **Importance of data**

Acknowledgement EU TRACEBACK Project

Tracepoints an overview

Tracepoint name and symbol	Meaning	Some Processes associated… *And examples of cases where the tracepoint is used*
Receive	The trace unit is introduced into a food player	Reception *A food player is taking possession of the tomatoes/ dairy products*
Entry/ Flow in	A trace unit is entered into a process equipment or location in the food player/process.	Unloading *The tomatoes/dairy products are transferred into a recipient so as to be introduced into the process*
Top up/fill	One or various receptacle(s) is (are) fulfilled with the trace unit content.	Filling the bottles *The tomato juice is used to be spread out into receptacles* *Milk product is packed into the bottles or cups by filling machine.*
New ID	New pieces of information about the trace unit internal or external identification (name, code, etc) are visibly attributed to the trace unit. 2 possibilities: or the trace unit has not been identified before and this is the first identification or the trace unit is already identified and this identification may replace the existing one .	Labelling *A code is given to the product, or a new label is placed on the product*
Store/ Stock	A trace unit is kept located in a specific location without being processed (sometimes in specific conditions) between two stages.	Storage *The tomatoes/milk products are warehoused into a cold room*

Tracepoints as a Tool for Traceability Analysis

Tracepoint name and symbol	Meaning	Some Processes associated… *And examples of cases where the tracepoint is used*
Split	A bigger trace unit is divided into various smaller trace units with identical characteristics (but not necessarily the same weight).	Depalletization *The different boxes of a pallet are separated*
Modify (NEW)	The trace unit is affected by a modification which may change other parameters of food safety.	Washing and drying Sterilization Pasteurization *The tomato juice is sterilized but its ingredients and texture are not changed* *Milk is heat treated to improve hygienic quality*
Repack(NEW)	A trace unit which is already packed is repacked into a new pack.	Palletization *A product which is already packed (for example a tomato juice bottle) is put into a second packaging (for example the bottles are put into a box)*
Measure (NEW)	The value of a parameter, or condition, of the trace unit, or of the process conditions, is measured (before or after a stage).	Weight the received tomatoes *The received tomatoes ate put in a machine which evaluates their size*

Tracepoints description: example

Tracepoint name: EXIT

Symbol :

Meaning:

A trace unit gets out from a process equipment or location or the food player.

Action to do

- Record ID of the product which will be moved

Incoming items	Generated items	Links
Identification ID_x of the TU to exit	Destination of the product after exit D	$ID_x(T, D)$
Timestamp T		

- **Does the trace unit change?** No
- **Does the identification change?** No
- **Info type:** Logistic aspects
- **Example**: Sale of the tomatoes in the supermarket
- **Related tracepoints:** Charter, carry, give, throw, measure

Tracepoints description: example

Tracepoint name: FILL

Symbol:

Meaning:

One or various receptacle(s) is (are) fulfilled with the trace unit content.

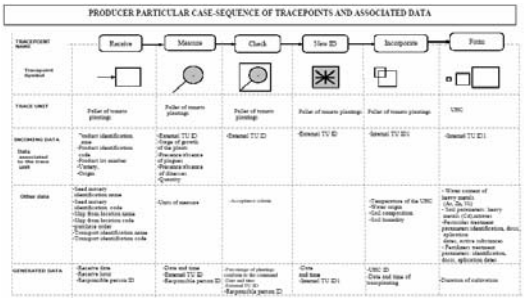
Action to do

- Record the filling conditions (pressure, temperature…)
- Record the criteria that the product has to satisfy previously to be fulfilled
- Record the receptacles that will be filled

Incoming data	Generated data	Links
Identification ID_r of the receptacle (s) to fill	Identification ID_f of the trace unit TU; result of the filling	
Identification ID_{tu} of the TU used to fill	Filling conditions Cf	$ID_{tu} \rightarrow ID_f(T, ID_r, Cf, ID_l)$
Identification of the location ID_l		
Timestamp T		

- **Does the trace unit change?** Yes
- **Does the identification change?** yes
- **Info type:** Process aspects
- **Example:** Filling the bottles
- **Related tracepoints:** New ID, bundle up, measure, check

Tracepoints description: example



Part 3: Traceability Methods Comparative

Methods Comparative

	"AVANTE" Method	TRACEPOINTS
Method Characteristics	Interviews, questionnaires and Record Searching. Graphical representations, oriented to provide final conceptual model solution	Data Searching, interviews, Representative process language; for IT services implementation
Assuring data Representativeness…	Deep Process Analysis, To be complemented with data proposed by standards	Deep Process Analysis, To be complemented with data proposed by standards
How to analyze data collected	Conceptual Model: templates and Graphical representation	Each single tracepoints has a standard information set. Graphical representation
Experience with method	High. Applied to both research and consultancy projects. Several food sectors	2-3 EU projects. It facilitates communication with ICT developers…trying to be a common language. New approach in TRACEBACK
Weaknesses	It needs the incorporation of information from standards; not using a standard graphical representation.	It needs a tool for a quick translating of information into ICT systems
Strengths	Practical, tested, easy to understand… Includes lot criteria. Easy to understand for SME´s, a previous step for IT systems development	Clear link for developing ICT services

"Traceability Methods Workshop" ainia

Thank you very much

Jorge Molina
jmolina@ainia.es

Collection of data for optimizing operations in a fish chain

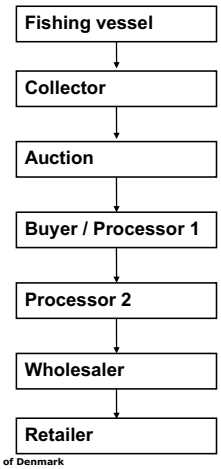
Maria Randrup, DTU Aqua

Collection of data for optimizing operations in a fish chain

Maria Randrup, Ph.d. student
Traceability Methods Workshop
Tromsø, Feb. 25, 2009

DTU Aqua
National Institute of Aquatic Resources

The fish supply chain



How to get data?
Interviews!

Agenda

- Ph.d. project
- Objectives of the interviews
- Characteristics, considerations
- Outline of the interview guide
- Data analysis
- Strengths and weaknesses
- Summary

Objectives of the interviews (1/3)

- Processes
  - what processes take place onboard fishing vessels and at collectors and auctions
  - what procedures exist for these processes
- Quality, quality variation, quality assurance
  - which criteria are the most important for the companies when buying fish
  - how is the variation in the quality of the fish
  - what the company does to maintain the quality of the fish

Working title: Validated traceability and quality assurance for improved chain operation

- Two project aims
  - To develop a simple, effective quality assurance system for the fishing vessels, collectors and auctions to maintain the quality of fish.
  - To map the knowledge and information flow in two fish supply chains to shed light on how the chain operations can be optimized. To find out what information is exchanged, why, and how this information and possibly other types of information can be used to optimize the operation of the individual company and the operation of the chain.

Objectives of the interviews (2/3)

- Information
  - what information is exchanged between the steps in the chain, the importance of the information, the use of the information
  - other types of information they would like and the use of these types of information
- Traceability
  - what is the level of internal and external traceability

Objectives of the interviews (3/3)

- Feedback and trust
  - do the companies in the chain give feedback to each other on the quality of the fish
  - how is the relationship of trust between the steps in the chain

Characteristics

- Qualitative personal in-depth interview
- To be used on few companies of each type
- Interviewer listens and reacts to the respondent's answers
- Recorded on tape or MP3-recorder
- Explorative: Acquire knowledge on not only what they do, but also why and how
- Open questions and answers
- Can be supplemented with observations, tour of the production site, photographs, documents
- Can interview more than one person at each company
- Approach the same topic from different angles

Considerations before making the interview guide

- Aim and objectives of the project
- Given setting
  - Context of the companies to be interviewed (chain, network)
  - Legislative requirements
- Aim and objectives of the interview
- Target group
  - Types of companies
  - Who in the company; maybe more than one person
- Length of time for the interview
- Why is it interesting for the companies to participate?

Outline of the interview guide

- Introduction to the interview
  - Purpose of the project
  - Purpose of the interview
  - The respondent is asked to give an introduction to the company
  - Drawing of the company's supplier-customer network
- Main points
  - Introductory question
  - Supplementary questions
  - Checklist
  - If there is time, ask the respondent about…
- Closing

Main points (1/2)

- Fish quality, variation in the quality, quality assurance
  - Use of respondent's drawing of the company's supplier-customer network
- Information
  - Use of index cards
  - Information required by EU Regulation 2065/2001
  - Most important information, Next most important information
  - Not important information

Main points (2/2)

- Traceability
  - Use of diagrams showing two different levels of internal and external traceability
  - What is their smallest traceable unit?
  - How do they mark and identify their batches? Any mixing of batches?
- Feedback and trust
  - Relations with suppliers and customers
  - Feedback related to the information supplied
  - Relationship of trust; do they trust the information supplied?

Data analysis

- Transcribe the interviews
- Extract the essential topics, ideas, statements
- Data in prose form; processes can be in diagrams; tables can be used to compare current practices in two of the same types of companies

---

Strengths and weaknesses

- Strengths
  - In-depth, get the reasons and motivations behind their actions, find out why and how
  - Use most time on what the company finds important
  - Possibility of acquiring new angles and ideas that one may not be aware of beforehand
- Weaknesses
  - Transcribing is time-consuming; data processing is extensive
  - One interview guide per company type

Summary

- Qualitative personal in-depth interview about current practices
- Reasons and motivations
- Few persons/companies to interview
- To be recorded and transcribed

DTU Aqua
National Institute of Aquatic Resources

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Internal traceability system implementation in the Polish fish processing pla

Olga Szulecka, Sea Fisheries Institute in Gdynia

The internal traceability system implementation in the Polish fish processing plant

Olga Szulecka
Sea Fisheries Institute in Gdynia

25-26.02.2009 Tromsø

Agenda

- Sea Fisheries Institute in Gdynia
- Traceability - requirements
- Aim of the project
- Methodology
- Benefits
- Conclusions

Sea Fisheries Institute in Gdynia

- The SFI in Gdynia is the oldest marine and fisheries research institute in Poland.
- The SFI conducts scientific research in the fields of fishery oceanography and marine ecology, processing technology and mechanization, food and environment chemistry and fishery economics.
- The SFI also acts in an advisory capacity for the Ministry of Agriculture and Rural Development.

Traceability - Reg. No 178/2002

1. The traceability of food, feed, food-producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at **all stages** of production, processing and distribution.

2. Food and feed business operators shall be able to identify any person from whom they have been supplied with a food, a feed, a food-producing animal, or any substance intended to be, or expected to be, incorporated into a food or feed.
   To this end, such operators shall have in place **systems and procedures** which allow for this information to be made available to the competent authorities on demand.

3. Food and feed business operators shall have in place **systems and procedures** to identify the other businesses to which their products have been supplied. This information shall be made available to the competent authorities on demand.

(…)

Traceability - Reg. No 178/2002

- Legislation requires the external traceability system implementation.
- The internal traceability system is not directly required by the food law but without internal system it is difficult to detect the cause of the danger and selectively withdraw only the unsafe product batches.

The presented pilot project:
„The implementation of fish raw materials and products traceability system" was co-financed from European Union fund the Financial Instrument for Fisheries Guidance.

Aim of the project

The main aim of the project was the implementation of advanced, electronic, based on the GS1 standard traceability system in the medium Polish fish processing plant.

www.sfr.gdynia.pl

Stages of the implementation

1. Analysis of production processes (interviews with the employees, observation);
2. Preparation of:
   - the identification and collecting data principles in according to GS1 standard for fish production chain;
   - the technical specification of the equipment and software used in the project;
   - the functional guidelines for system application in co-operation with the computer company;
3. Installation of the equipment;
4. Training of the management and production staff;
5. Preparation of the procedure and testing the effectiveness of traceability system - tracking from the raw material batch to the final products batches and in opposite direction (record searching).

www.sfr.gdynia.pl

Scope of the system

The system comprises all the stages in the production process for example: reception of the raw materials, primary processing (e.g. heading, gutting, filleting), freezing, pre-smoking or pre-frying storage and distribution.

www.sfr.gdynia.pl

Process mapping

- During the production process analysis of the interviews with the managers and production employees were carried out.
- The information was compared with the observations.
- The results enabled to prepare the flow diagrams and to determine the process stages in which the data must be recorded.

www.sfr.gdynia.pl

Methodology

During the traceability system implementation the following European standards were used:

- CEN:CWA 14659:2003 Traceability of fishery products – Specification of the information to be recorded in farmed fish distribution chains.
- CEN:CWA 14660:2003 Traceability of fishery products – Specification of the information to be recorded in captured fish distribution chains.

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Methodology

Standard GS1 was used to established the structure of:

- localization numbers;
- production staff numbers;
- logistic labels with GS1-128 barcode.

Standard GS1 was also used for defining which data must be recorded in particular stages of production and which data must be transfered between the stages.

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GS1 standard

During the whole production process (from the reception to the final distribution) the pallets with raw materials, semi products and final products obtain the labels with GS1-128 barcodes what enables to identify the particular product.

All used data structures are compatible with the GS1 standard what facilitates the data transfer between the operators in the international trade.

GS1 Standard
- Application Identifiers (AI)

- **AI 00** - SSCC - Serial Shipping Container Code. AI 00 was used to identify the pallets with raw materials and products;
- **AI 01** - GTIN - Global Trade Item Number, was used to identify product in particular type of packaging;
- **AI 02** - Content - Identifier of Trade Items contained in the logistic item;
- **AI 10** - Production Batch Number. In the implemented system AI 10 has 8-12 digits.

Application Identifiers

- **AI 15** - Best before date;
- **AI 31nn** - Quantity. In the implemented system AI 3103 was used to present the net weigh of fish boxes;
- **AI 37** - Count - Number of Trade Items contained in the logistic item. AI 37 was used to present the number of boxes with fish on the pallet;
- **AI 90-99** - Internal information. Those numbers were used for coding the numbers for particular localization of production stages and particular employees.

Logistic label

- Data on the label:
  - Content - GTIN - Global Trade Item Number;
  - Net weight;
  - Count;
  - Batch;
  - SSCC – Serial Shipping Container Code.

Software

- BcsTiger software was used in the implemented traceability system.
- BcsTiger supports the production and storage operation management.
- The software was prepared in according to Microsoft .NET framework 1.1 technology and MS SQL Server.

Equipment

- Barcode printers,

- Wireless terminals with Access points,

- Panel computers,

- PC computer – data base server.

Benefits

- Quick access (less than 3 min.) to the information about each raw material or product batch;
- In the case of recall the small particular batch of product can be quickly and efficiently withdraw from the supply chain;
- Resignation from the of majority of paper document fulfilment;
- Better management of production processes using the lots of system reports;
- Flexible response for changes (e.g. new products or suppliers);
- Possibility of integration with WMS system.

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Methodology of the verification

- During the verification process 40 batches of raw materials were traced to the final products batches and 50 batches of products were traced back to the raw material batches;

- The information about particular batches was obtained from the labels or reception and distribution documents.

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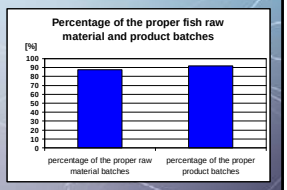
Results

- The 35 from the 40 (87,5%) surveyed raw material batches and 46 from the 50 (92%) surveyed product batches were traced efficiently.
- The verification of the implemented traceability system confirms that more then 87% of the batches were traced efficiently and also all the information about the particular product batch was obtained in less then three minutes.



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Conclusions

- The verification of the implemented traceability system confirms that almost all of the raw material and final product batches were traced efficiently.
- The traceability system implemented in the Polish fish processing plant is efficient and in the case of recall the small particular batch of product can be quickly and efficiently withdrawn from the supply chain.
- The presented system can be easily adapted in the other fish processing plant and also in other industry operator in the supply chain.

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Traceability in the Danish Fish Sector - a tool for sustainable and legitimate fishing operations

Erling Larsen, DTU Aqua

Traceability in the Danish fish sector
A tool for sustainable and ligitimate fishing operations

Erling P. Larsen
DTU Aqua
Senior adviser scientist
National Institute for Aquatic Resources

Traceability is…

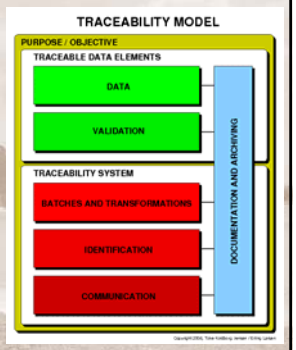
… a lot of things – depending who you ask:

- Simple physical tracing and tracking of product entities
- Instrument for regulation and control
- Complete information management systems handling product properties
- Part of supply chain management systems including supply chain modelling and optimization

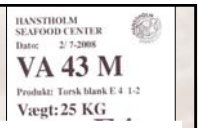
- **We need to consider traceability basics:**
  - **Batches and batch transformations – splitting, joining,**
  - **Unique identification of relevant entities – number systems, etc.**
  - **Communication systems – barcodes, RFID tags, paper notes, etc.**
- **… but also traceability purposes:**
  - **Recall: e.g. batch sizes should probably not be too big.**
  - **Efficient recall: e.g., relevant data regarding contamination, etc.**
  - **Story telling: e.g., if the ”story telling” is provided by simple printed labels, then advanced communication may not be needed.**
- **… resulting in specific traceability requirements:**
  - **Batch sizes, identification systems, data parameters, etc.**

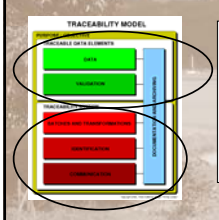
Generic traceability model

- **Improved understanding of traceability**
- **Splitting of basic traceability issues and purpose specific data**
- **Use of model for:**
  - **Holistic analyses of traceability**
  - **Local analyses of needs for specific traceability issues**
  - **Traceability requirements**



Traceability and Supply Chains





Future:

- Holistic supply chain management
- Exploiting existing and new traceability data
- Analysis and modelling of value adding activities
- Mathematical optimization and simulation

The project

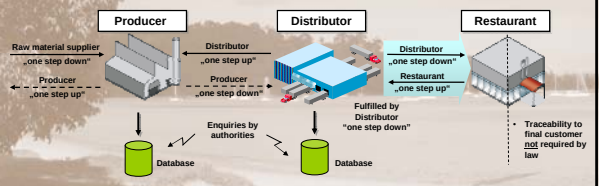
- **How can we design a system defining a platform that**
- **supports an EU policy relying on correct catch registrations ?**
- **Supports the intended ban on discards ?**
- **encourage the fishing vessels not to circumvent the rules ?**
- **verifies without any doubt and dispute - that fishery is sustainable ?**
- **..and legal ?**

SIF organisationsplan

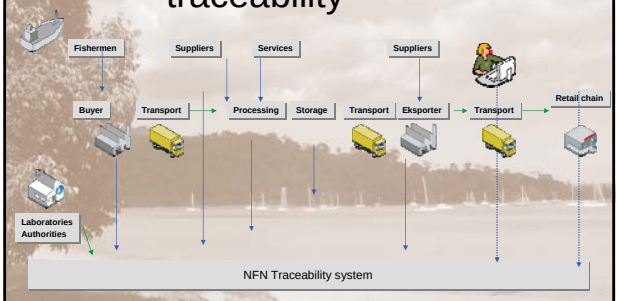
Fase	Timer	Tidsplan 09
1. Projekt fokus	245	Januar-marts
2. Status på fiskeridata i dag	890	Januar-maj
3. Konceptbeskrivelse	293	Maj
4. Eksisterende IT systemer	566	Maj-september
5. Demoversioner	400	August-september
6. Præsentationsseminar	230	Oktober
7. Kravspecifikation	1035	Maj-december

Terminologies

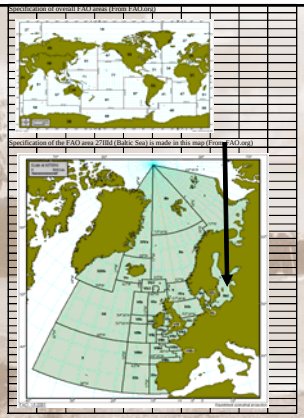
- Traceability : all apply to 178/2002



NFN external chain traceability



Data input:
Compulsory: Received batch ID, Item type, Batch ID, time stamp
Optional: Storytelling, quality features



Eksempel på udviklet Map-service:

Find kortet på hjemmesiden:
www.seafoodplus.org


Tak for opmærksomheden

Traceability Profiling for fruit and vegetable SMEs in developing countries

Gwynne Foster, Consumer Goods, Council of South Africa

Traceability Profiling: Fruit & vegetable SMEs in developing countries

Traceability Methods Workshop

25-26 February 2009

Gwynne Foster
SA Fresh Produce Traceability Project
Consumer Goods Council of South Africa

Presentation

- Comments on costing
- Positioning the methods
- Experiences with Fruit&Veg SMEs
- Strengths and weaknesses
- Improvements

Comments on Costing

Experience in SA, East Africa and findings in FAO studies

- **The Food Hygiene Act** (882/2004) **has greater influence than the Food Safety Act** (178/2002)
  - Third country governments are held accountable to EU
  - Export requirements are set to meet EU requirements
  - The EC Food and Veterinary Office (FVO) audits national systems
- **Traceability is bundled into food safety**
- **Compliance costs are usually at organisation level**
  - Standards are viewed as trade barriers – benefits are seldom discussed or achieved due to incomplete implementation
  - The domino effect of supply chain demands hurts the small guys who cannot afford the additional costs
- **The SA FPTP target for cost-benefits is thus the SME!**

Positioning the methods

- **Profiling approach and characteristics**
- **Workunit profiles**
- **Interchange profiles**
- **Traceability control points**
- **Assurance and project management**

Profiling approach and characteristics

- **Facilitated sessions**
- **Graphic profiling techniques**
- **A framework for analysis**
- **Adjusted to suit the requirements, situation and/or participants**

Profiling approach and characteristics

- Facilitated sessions / Graphic profiling techniques
- A framework for analysis / Adjusted to suit the situation
- **Core elements:**
  - **Entities:** Anything that has purpose and which can be described
  - **Interfaces:** Anything exchanged between entities
  - **Contexts:** The structure of the (present) analysis
- **Each with its own profiling techniques**
- **The techniques apply equally well to supply chains, business, data and technical apps**

Profiling approach and characteristics

- Facilitated sessions / Graphic profiling techniques
- A framework for analysis / Adjusted to suit the situation
- Work with “entities”, “interfaces” and “contexts”
- Apply equally to business, data and technical apps
- **Everyone is equal within the session**
- **Keep a running “issues board” for other items and things that come to mind**
- **Records of sessions are factual**
- **Source of information is anonymous other than the list of participants**

Profiling approach and characteristics

- Facilitated sessions / Graphic profiling techniques
- A framework for analysis / Adjusted to suit the situation
- Work with “entities”, “interfaces” and “contexts”
- Apply equally to business, data and technical apps
- Everyone is equal within the session
- Keep a running “issues board” for other items
- Records of sessions are factual and anonymous
- The facilitator owns the outcome and issues
- **The scope of the exercise and sessions will determine how results are recorded and the nature of the documentation system(s)**

Origin and evolution of profiling

Spreadsheets / CAD / Critical path context

Custom-built database system “Universe”

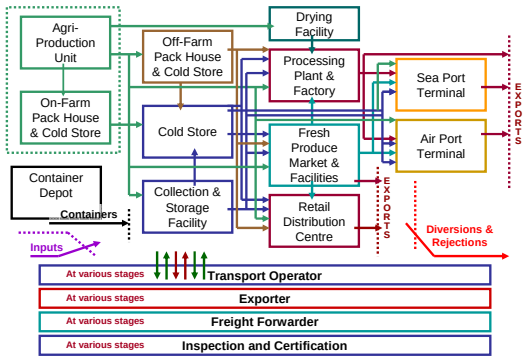
“Universe II”

Mind-mapping tool

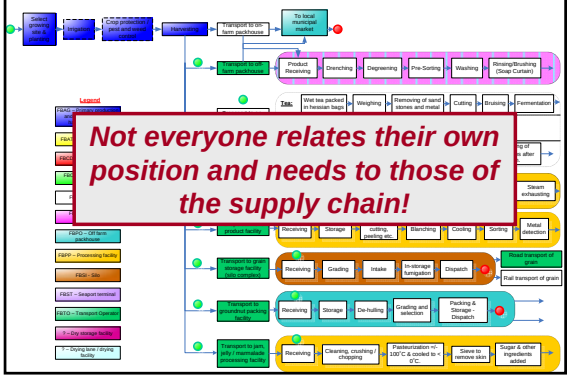
- **Broadly based on IPO-4Gen-JRP-JAD-RAD principles**
- **Mossgas (oil platform) engin**
- **IPO = Input–Process–Output**
- **4Gen = 4th generation syste**
- **JRP = Joint Requirements Plan**
- **JAD = Joint Application Des**
- **RAD = Rapid Application Deve**
- **Retailer group’s data integrity requirements in preparation for change of enterprise systems** (2000-02)
- **Wine industry info communication protocols** (2006-07)
- **Traceability of SME fruit exports** (just starting…)

All use(d) generic templates!

Generic template for F&V export supply chain



Generic template for processes and flows

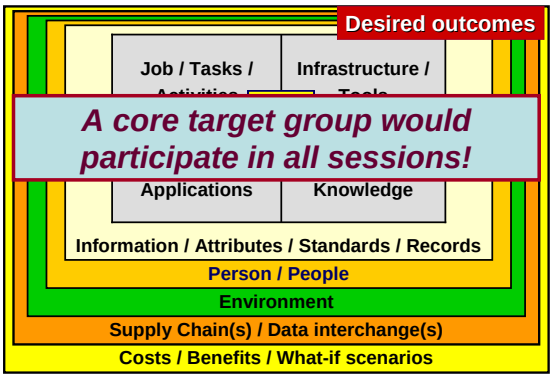


Not everyone relates their own position and needs to those of the supply chain!

Workunit profiles

- **Workunit: Any entity that performs activities in order to achieve a specific outcome.**
- **Workunit profiling helps multiple parties and diverse disciplines to decide /agree /get into step with needs, expectations, priorities.**
- **This is proving to be a useful tool for bringing SME producers and processors on board with requirements of retailers and record keeping.**

Workunit Profiles

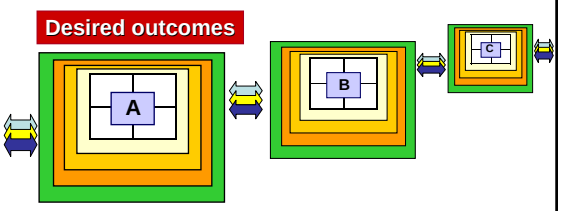


Interchange Profiles

Desired outcomes

Interchange Profiles

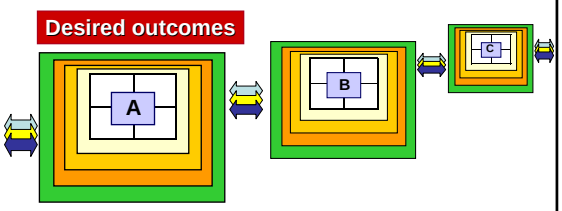
Desired outcomes



From	What	To whom	Factors	Rules	What ifs

Interchange Profiles

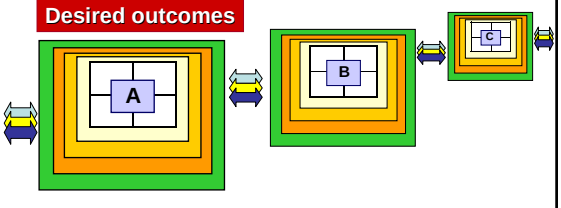
Desired outcomes



From	What	To whom	Factors	Rules	What ifs
Workunit No	Goods or				
Party No	Document or				
Location No	Message or				
Relevant id…	File…				

Interchange Profiles

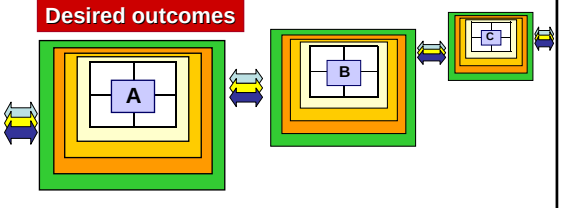
Desired outcomes



From	What	To whom	Factors	Rules	What ifs
Workunit No	Goods or	Workunit No			
Party No	Document or	Party No			
Location No	Message or	Location No			
Relevant id…	File…	Relevant id…			

Interchange Profiles

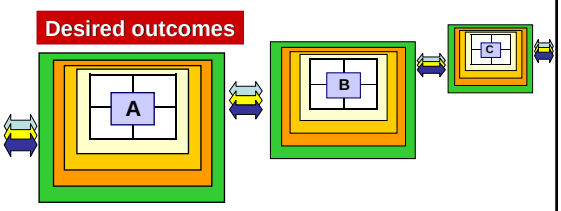
Desired outcomes



From	What	To whom	Factors	Rules	What ifs
Workunit No	Goods or	Workunit No	Triggers		
Party No	Document or	Party No	Timing		
Location No	Message or	Location No	Accuracy		
Relevant id…	File…	Relevant id…	Completeness		

Interchange Profiles

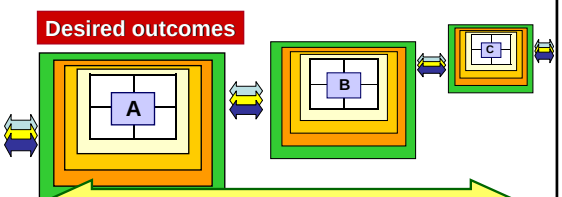
Desired outcomes



From	What	To whom	Factors	Rules	What ifs
Workunit No	Goods or	Workunit No	Triggers	Associated	
Party No	Document or	Party No	Timing	with each	
Location No	Message or	Location No	Accuracy	workunit /	
Relevant id…	File…	Relevant id…	Completeness	factor	

Interchange Profiles

Desired outcomes



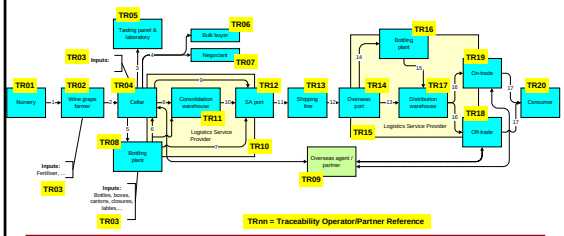
Basis for performance factors, measures and SLAs

From	What	To whom	Factors	Rules	What ifs
Workunit No	Goods	Workunit No	Triggers	Associated	Hi-Lo scenarios

This is where the dominant players and factors come to the fore!

High-level representation of physical flows in export wine supply chain

TRACEABILITY REFERENCES



The outcomes are conventional, with credible underlying detail and buy-in.

Traceability Control Points (TCPs)

Useful once participants and processes are identified

- A TCP occurs at any point at which there is a change to a product or its circumstances that could affect traceability of that product
- TCP analysis can be applied at all levels of supply chains, processes and data systems
- Can use generic templates to illustrate the concept and get a rough sketch of processes and supply chain entities

Traceability Control Points (TCPs)

- A change in any one of the following factors could give rise to a traceability control point.
  - Identity
  - Location
  - Ownership
  - Responsibility
  - Form or Composition
  - Packaging
  - Constitution
- Linking to specific products and Time are critical factors.


Arrival at packhouse (Location, Responsibility?)


Drench (Composition)


Offloading (Location, Responsibility)


Bin tip (Identity, Constitution, Composition, Ownership?)


Packing (Identity, Composition, Ownership?)


Palletising (Identity, Constitution)

Assurance and project management

Turn everything into a project

- **Standards questionnaires taken as the baseline**
  - (GlobalGAP, TNC, ETI, Fair Trade, GS1 Traceability,…)
- **Within a business entity, each standard is treated as a project and each item is managed as a project task**
- **Responses to audit questions and follow-up actions are recorded and prioritised for implementation**
- **Audit/assurance system** (ICMAS from Capespan)
- **Preset all answers to "No" for SME assessments**

Presentation

- Comments on costing
- Positioning the methods

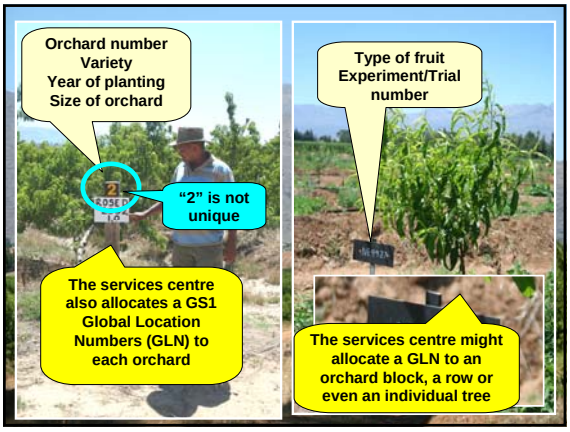
- **Experiences with Fruit&Veg SMEs**

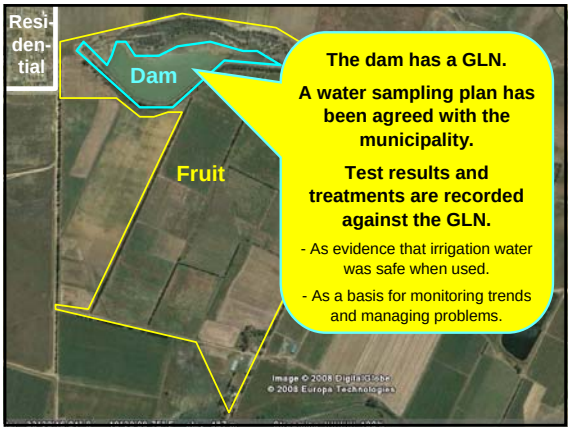
- Strengths and weaknesses
- Improvements

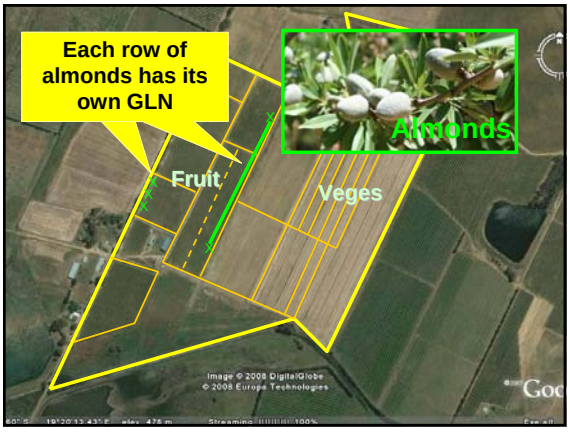
Conclusion:

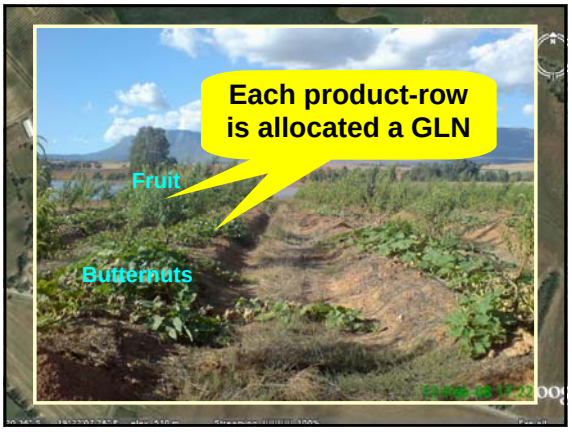
Meeting the requirements of traceability and relevant vital records is beyond the experience and capacity of most small-scale fruit & vegetable farmers

Experiences with a group of farmers in the Western Cape led to a community-based "traceability services centre".









Presentation

- Comments on costing
- Positioning the methods
- Experiences with Fruit&Veg SMEs

- **Strengths and weaknesses**
- **Improvements?**

Strengths and weaknesses

+ The profiling approach is efficient and flexible
+ People enjoy learning about their businesses
+ The session outcomes are usually accepted and provide a basis for next steps
+ Easy to call a session
+ And easy to stop a session that isn't working

Strengths and **Weaknesses**

- Quality and focus of orchestration determines the rate of progress and value of the results
- Not easy to transfer trust or change facilitators
- Not easy to transfer the knowledge gained
- Maintenance is an issue in large projects
- Not in the books and so it needs championing
- Needs a strong support team to keep focus
- Needs strong commitment and intent to respond to the intelligence

Qualifications

Improvements?

- Formalise the profiling discipline and procedures
- Develop documentation support tools
- Develop training for facilitation teams
- Deskill the facilitation . . . ?
- Determine the characteristics of a good profiler
- Revise in the light of this workshop!

Factor assessments

For each factor…

Factor requirements

Desired Outcomes

SKILLS & KNOWLEDGE	Reading, writing numeracy	Information systems	Agriculture (& records)	Business (& records)	Values & attitude
Competent	Aim	Aim	Aim	Aim	Aim
Capable					
Able					
Aware					
Unaware					

Training and capacity building programmes *in line with desired outcome and specific needs highlighted in the competency profile*

SUPPORT

?

Personal competencies

Development of traceability applications in Iceland

Sveinn Margeirsson, MATIS

25.2.2009
Development of traceability applications in Iceland

Sveinn Margeirsson, Head of Value Chain Division

Workshop: **Harmonizing methods for food traceability process mapping and cost/benefit calculations related to implementation of electronic traceability systems, Tromsö.**

Matis – Icelandic Food Research

Food safety and risk assessment

Value chain and processing

Consumers and products

Biotechnology and ingredients

Genetics and aquaculture

Analysis and consulting

Petter said

- What method was used (for process mapping or for cost/benefit analysis)?
- What are the characteristics of the method used? How is the data obtained? (interviews, surveys, questionnaires, observation, record searching, etc.)
- How to ensure valid and representative data using this method?
- How to analyze the data collected using this method?
- Where did the method come from?
- What other methods were considered?
- What was the experience using this method?
- What are the strengths of this method? What are the weaknesses?
- How can the method be improved?
- What type of method is needed in this area? What properties should the ideal method have?

What Matis has been doing

Processing forecast of cod – MSc + PhD (2002-2008)

FisHmark – software development (2006-2009)

- Electronic log-books (Trackwell: Seadata)
- Information systems in fish processing (Maritech: Wisefish)
- Decision Support System (FisHmark: AGR/Trackwell/Maritech/Matis)
- www.trackwell.is
- www.maritech.is
- www.agr.is
- www.matis.is

SeaData

WiseFish

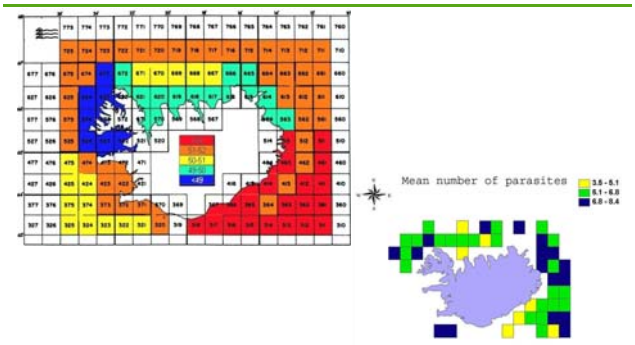
Improvements in the value chain of meat (2008-2009)

- Retailers, meat processors, AGR, Matis, SI
- Minimise waste
- Stock management and more

Processing forecast of cod 1 (Scientific publication, "basic research, with industry angle on it")

- What are the characteristics of the method used?
- Manual recordings
- How to ensure valid and representative data using this method?
- Organise, audit, look for outliers, communicate
- How to analyze the data collected using this method?
- Multivariate analysis, traditional and Bayesian statistics
- Where did the method come from? Collaboration with industry (seafood)
- What was the experience using this method?
- Precise but expensive, sufficient data?
- How can the method be improved?
- Use more recordings already in place (HACCP systems)
- What type of method is needed in this area? What properties should the ideal method have?
- Flexible, cheap, easy to increase number of variables measured (recorded), using data already in place, not requiring much work on typing and/or outlier analysis

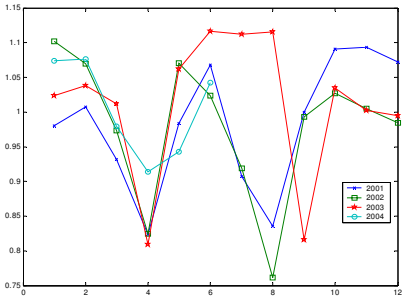
Processing forecast of cod 1 (Results)



Processing forecast of cod 2

-What are the characteristics of the method used?
-Automatic recordings in information system (WiseFish) – One company
- How to ensure valid and representative data using this method?
-Organise, look for outliers, discard suspicious data
- How to analyze the data collected using this method?
-Simple time series analysis
- Where did the method come from? Collaboration with industry, young scientist not believing that WiseFish was just for day-to-day operations
- What was the experience using this method?
-Coarse data, but very cheap
- How can the method be improved?
-Take into account the requirements of research studies when recording
- What type of method is needed in this area? What properties should the ideal method have?
-Standardised, so comparison is made easier (different years, different processing equipment, different staff, different companies)

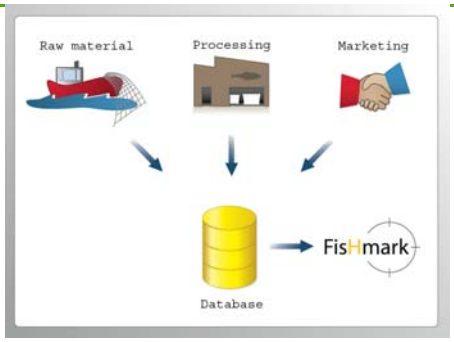
Processing Forecast of Cod 2 (Results)



FisHmark
- Software development for industry
Matis, software companies, seafood companies

-What are the characteristics of the method used?
-Automatic recordings in information systems (WiseFish + Seadata) – Many companies. Use of standards (TraceCore), Coarse data in high volumes
- How to ensure valid and representative data using this method?
-Automatic outlook detection (limits), discard suspicious data
- How to analyze the data collected using this method?
-Various methods available – from simple to very complicated
- Where did the method come from? Matis collaboration with seafood industry and software companies (Trackwell, Maritech, AGR).
- What was the experience using this method?
-In testing phase – Looks good.
- How can the method be improved?
-Test more widely, adapt (also to other industries than seafood), Use to support decision in FBOs, develop...
- What type of method is needed in this area? What properties should the ideal method have?
-Easy to use, Easy to utilise for economic profits in FBOs

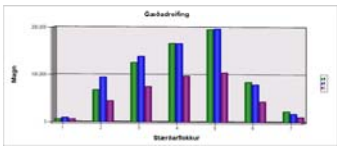
FisHmark - structure



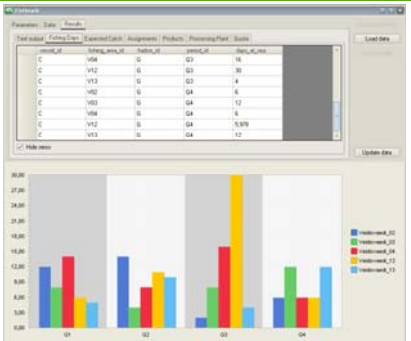
FisHmark – result 1

Reporting Services 1

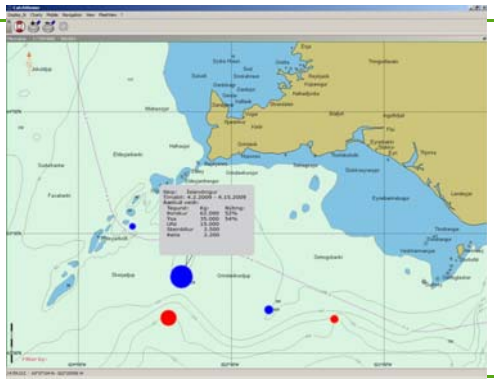
Reporting Services 2



FisHmark – results 2 (Optimisation/Planning)



FisHmark – Results 3 (Optimisation/Planning)



Improvements in the value chain of meat (2008-2009)

Similar methodology as in FisHmark

Meat business first rather closed

Now: Are asking if we can not include the farmers

Main reason: Cost reduction (less stock, processing management and more production related cost)

Concluding – Traceability applications in Iceland

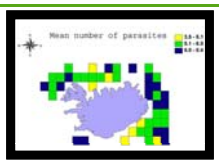
2001-2008: Scientific research

2006-2008: Prototype of DSS - seafood

2008-2010: Improved prototype – tests - commercialisation

2008-2010: Adjustments to meat – further development

2010.....: Further development – what kind of management (stock, processing,....)



Identification, monitoring and traceability of ice cream products in the supply chain

Roy Doornbos, ITENE

Identification, monitorization and traceability of products in the cold supply chain

Tromsø, 25-26 February 2009

Roy Doornbos

RFID in ITENE

- **ITENE has the knowledge and experience to develop RFID soltions and is able to integrate RFID in packaging**

- **References:**
  - Member of AENOR (Spanish Association for Standardisation and Certification) in workgroup AEN/CTN49/GT9
  - Pilot in production of a customer in ceramics
  - Pilot in cold food supply chain; ice-cream manufacturers and FMCG Distribution Centre
  - SmartLog: intelligent supply chain in distribution of FMCG
  - Participation in European funded proyect CHILL-ON in the cold/frozen fish and chicken supply chain
    - Integrating RFID tags into packing
    - Mapping temperature in the Chile-Spain fresh hake supply chain

Index

- **FP6 project Chill-On**
- **Identification and monitorization of Ice cream products in the supply chain: the "Why´s and How´s"**
- **Field trial – Monitoring Ice Cream in the Spanish cold supply chain**

Chill-On

The project CHILL-ON is partly financed by the European Commission within the 6th Framework Program and proposes to develop a holistic approach ensuring food quality, safety and traceability throughout the entire food supply chain. The 31 participants aim to provide stakeholders along the frozen and chilled food supply chain with a system that ensures fulfillment of European legislation and applies current standards.

RFID in ITENE

Services

- RFID system testing and performace evaluation
- Dynamic Door Portal and Convevor test (in accordance with EPCglobal)
- Site assessment service
- RFID tagging strategy service
- RFID system design
- RFID hardware evaluation service
- RFID software evalution
- Collision avoidance
- Measuring services
- Consulting, training and education
- Identification and traceability knowledge portal for customers
- RFID Warehouse Management System evaluation

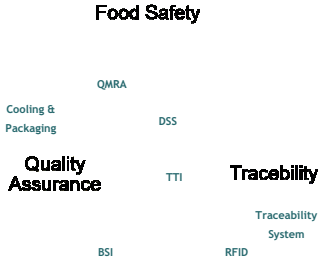
Chill-On

QMRA - Quantitative Microbial Risk Assessment. The mathematical forecast model, takes into consideration the characteristics of a product in order to predict the progeny of bacteria. The result makes it possible to estimate whether the product will be contaminated to an unacceptable degree at the forwarding steps of the supply chain.

RFID-TTI - Radio Frequency Identification. For the identification of a product's location. RFID and TTI are not used as stand alone technology only. Combining both is the technological challenge in the project.

TTI - Time-Temperatur-Indicator: TTIs help determine "sell-by-dates" without additional information about how the product was stored.

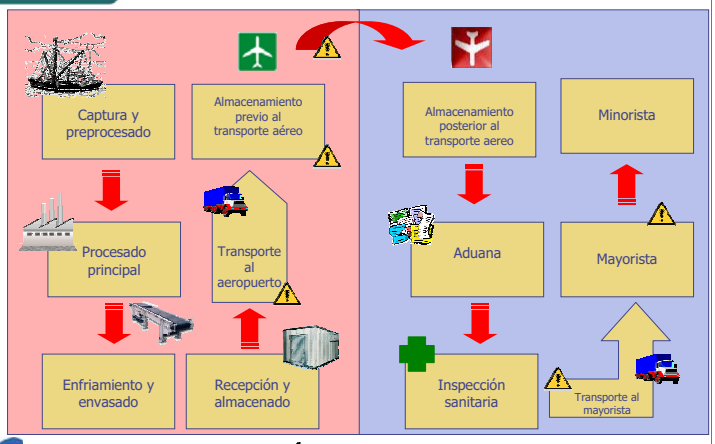
BSI - Bubble Slurry Ice: Liquid ice with ice crystals smaller than 5µm inside the cooling medium, instead of on the crystallizer's walls.



MBDs - Molecular Biological Diagnostics: Microbiological analyses to detect food borne pathogens and spoilage bacteria. Existing and new nanomaterials will be applied in complex food matrices. The enhanced sensitivity of the detection of target sequences is prerequisite for a reliable and reproducible quantitative PCR measurement of contaminants.

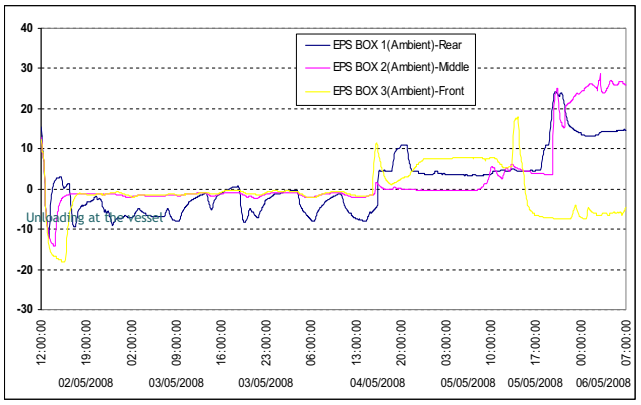
DSS - Decision-Support-System: To identify the mos critical points and predict microbial risks in the food supply chain a novel QMRA-HACCP tool will be developed and implemente into a DSS to achieve real time inputs for the risk assessment.

The Fresh Hake Supply Chain Chile-Spain



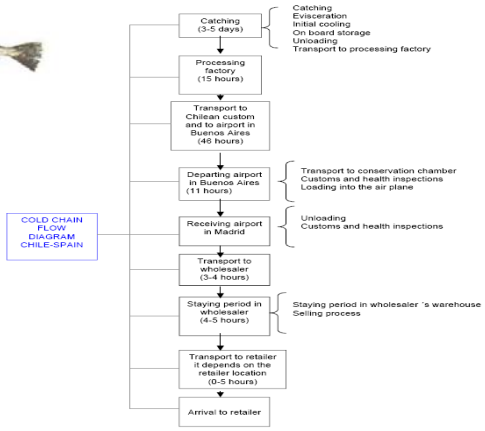
⚠ Puntos críticos en la cadena

The Fresh Hake Supply Chain Chile-Spain

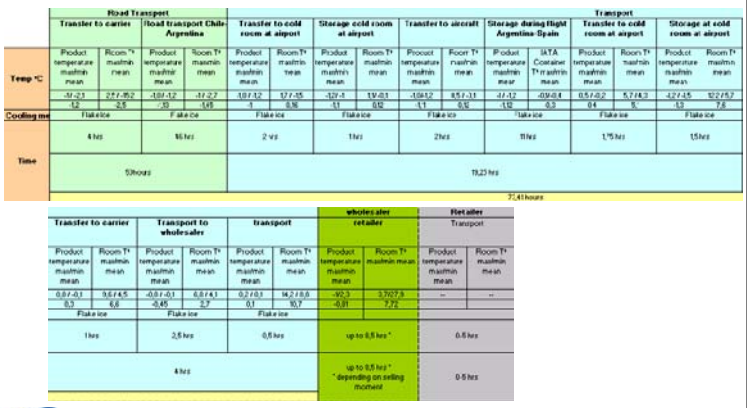


Dataloggers data

The Fresh Hake Supply Chain Chile-Spain



The Fresh Hake Supply Chain Chile-Spain



Time-Temprerature mapping

The Fresh Hake Supply Chain Chile-Spain Temperature Mapping

Unloading at the vessel

EPS Packaging with fresh water ice

Datalogger (iButton) placed inside product

Loading in the truck

The Fresh Hake Supply Chain Chile-Spain

Other tasks within the Chill-On project are e.g.:

- Optimize packaging
- Heat transfer modelling
- Integrating RFID tags and TTI into packaging

Packaging with integrated RFID.
Source: Promens Iberia

The Fresh Hake Supply Chain Chile-Spain

CHILL-ON

Methods used:

- desk research
- interviews
- questionnaires
- to come: field trials, field trial validation

Identification, monitorization and traceability of ice cream products in the supply chain

- **How ?**
  - **Using RFID, GPS, GPRS/UMTS and Tsensor**
  - **Analyse ice cream supply chain and agents involved**
  - **Possible use of indicators like Cool Chain Quality Indicators (CCQI)**
    - **Truck transport CCQI**
    - **Long term storage CCQI**
    - **Short term storage/DC CCQI**
    - **Retailer CCQI**
  - **Define critical ´hot spots´in the chain: time/temperature mapping**

Identification, monitorization and traceability of ice cream products in the supply chain

globalog

Time-Temprerature mapping

Business Case

RFID in the Cold Food Supply Chain: globalog

Identification, monitorization and traceability of ice cream products in the supply chain

- **Why ?**
  - **Ice crystals are very sensitive to temperature fluctuations: even at a constant temperature they change**
  - **There are many critical ´hot spots´in the supply chain: during loading, unloading of the cargo etc.**
  - **Guarantee product quality**
  - **All agents in the supply chain have their responsibility: transparency not only for the products…**
  - **… and last but not not least: optimize processes**

Business Case

RFID in the Cold Food Supply Chain: globalog

- Project participants: Ice Cream Factory Comaker, Grupo Mazo, Consum
- Objective: improve traceability of products and monitor its temperature
- Initial situation: ice cream manufacturer expedition area

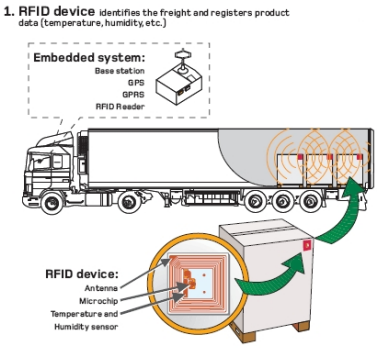
Business Case

RFID in the Cold Food Supply Chain:

- Proposed blueprint
  - **Tags RFID with Tsensor at pallet level**
  - **On-board system with RFID reader in truck**
  - **Central server**

Business Case

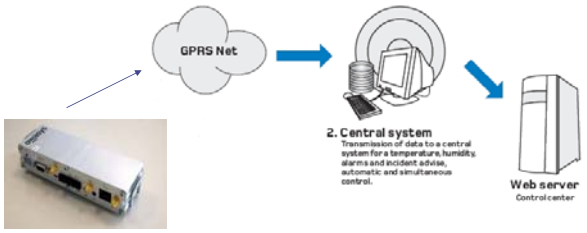
RFID in the Cold Food Supply Chain:



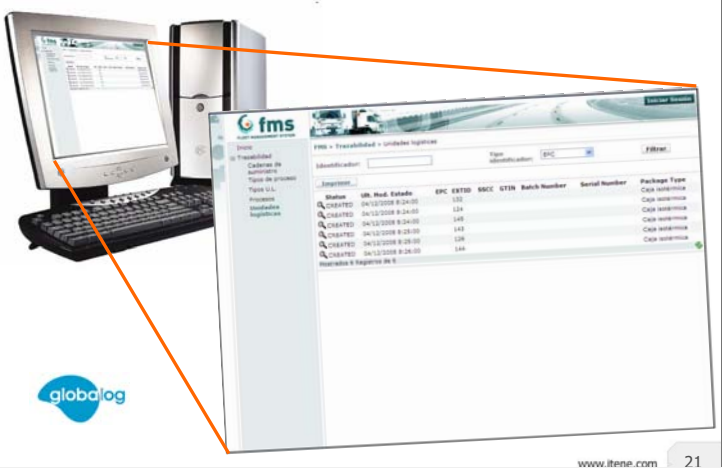
Business Case

Business Case

RFID in the Cold Food Supply Chain:

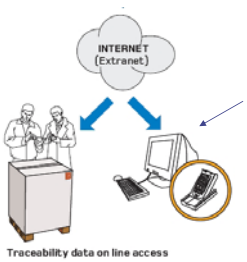


Business Case



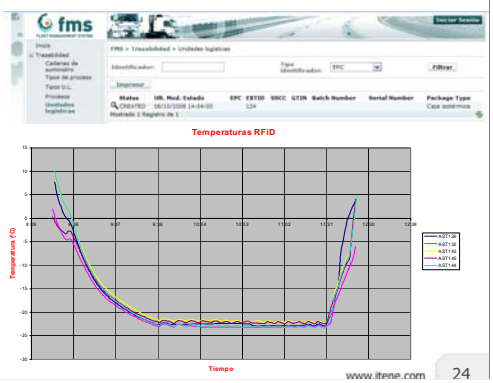
Business Case

RFID in the Cold Food Supply Chain:



Traceability data on line access

3. Chargers and customers can control products transport and distribution on line.



Takk!

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3 Cost/benefit calculations related to implementation of traceability systems

Global traceability standards for food supply chain - Traceback perspective

Tomasz Dowgielewicz, ILIM

Global Traceability Standards for Food Supply Chain

Traceback perspective

Institute of Logistics and Warehousing
Tomasz Kawecki

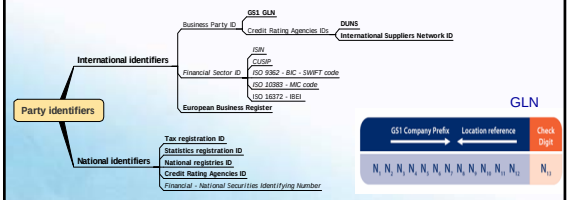
Agenda

- Standards identification process and methods
- Product identification
  - Recall scope
- Goals and problems

Standards identification

- Research on traceability related standards
  - Products identification
  - Parties identification (all locations)
  - Transport means identification
  - Other areas
- Questionnaire and interviews in companies

Party identification



STANDARD NAME	AREA	ISSUER	PAYMENT
GS1 GLN	Business		+
D-U-N-S	Business	CRA legacy	-
ISIN	Business	CRA legacy	+
EBR	Business	National Registries	+
BIC Code (ISO 9362)	Finance	Standardizing Body	NA
MIC Code (ISO 10383)	Finance	Standardizing Body	NA
CUSIP "Prefix"	Finance	Standardizing Body	NA
BEI ISO 16372	Finance	Standardizing Body	NA
ISIN	Finance	Standardizing Body	NA

Interviews

- Questionnaire and interviews in companies
  - Direct questions on standards
  - Business process questions
  - Other traceability related questions

Products / items identification

	receiving	storage	production	completation	transport
raw materials					
semi-finished					
components					
final goods					
packaging					
pallets					

1. How are products identified ?
2. Where is the data stored ?
3. How long is it stored ?
4. Is it transferred ?

Party – location identification

	Suppliers	Receivers	Locations	Subcontractors
Cooperators identification				
Mandatory identification data				
Global identifiers				
Contact persons				
Data storage				
Transportation means identifiers				
Data link : party - product				

Interview outcomes

- Business processes models
- Traceability information items identified
- Standards application areas identified

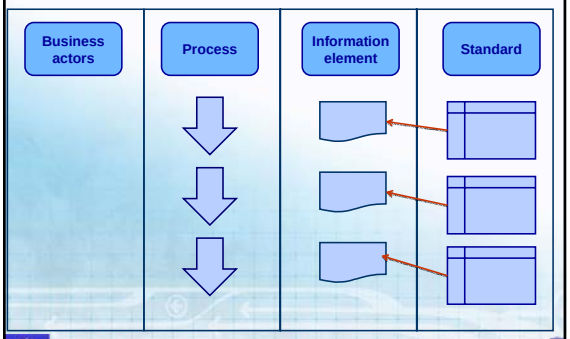
Situtation in companies:

- Mostly paper based traceability – HACCP
- Market leaders have already sofisticated tools for internal traceability
- Different levels of identification

Example: Milk processing

- Milk collection at farmers
- Milk examintation at manufacturer
- Reception
- Raw materials warehouse
- Production
- Final products warehouse
- Compiling of orders
- Truck loading
- Transportation

Example – information items and standards



Traceability Reference Model

- Provided detail analysis
- Data elements defined and listed

Possibility:
ADOPT STANDARDS TO THE ELEMENTS

Data Requirement	Specific Standards	Cat
Product identification name *	string	M
Product identification code *	GS1: GTIN	M
number *	INTERNAL NUMBERS / PRODUCTION DATE	T
Quantity*	number	T
Unit of measure *	ISO SI SYSTEM/ UNECE Rec. 20	M
Variety	string	T
Origin	string	T
Category /Class	string	T
Size	number	T
Packaging date *	CCYY-MM-DD HH-MM	T
Best before / end	CCYY-MM-DD HH-MM	T

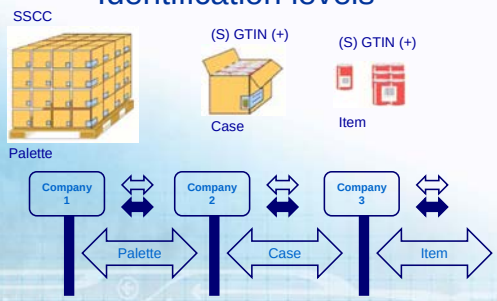
Use by date	CCYY-MM-DD HH-MM	T
Display until	CCYY-MM-DD HH-MM	T
Product temperature	number	T
Harvesting order code	string	T
Supplier identification * name / code	GS1: GLN / DUNS / VAT no / Address	M
Ship from location * name /code	GS1: GLN / DUNS / VAT no / Address	M
Homogeneous Cultivation Unit Identif. *	string	T
Sowing date */hour	CCYY-MM-DD HH-MM	T
Receive date */hour	CCYY-MM-DD HH-MM	T
"Food player" identification * name/code	GS1: GLN / DUNS / VAT no / Address	M
"Food player" address	UN CEFATC / GS1	M
Purchase order code	string	T
Delivery note code	string	
Consignee identification* name*/code	GS1: GLN / DUNS / VAT no / Address	M
Ship to location * name /code	GS1: GLN / DUNS / VAT no / Address	M
Ship date */ hour	CCYY-MM-DD HH-MM	M
Transport identification* name/code	ISO/IEC 15459 / ISO 17363 / GS1: GRAI / ISO 13556:1998 / ISO 3779:1983	M

SUPPPLIERS OF RAW MATERIALS AND

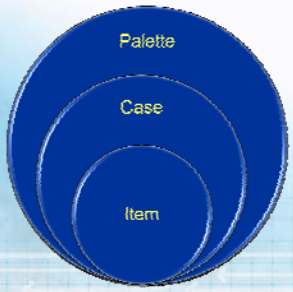
PRODUCER

Data Identifier	Description	Symbology
SSCC	Serial Shipping Container Code – for logistics purposes to identify: palettes, container, crates, boxes etc.	GS1-128
GTIN	Global Trade Item Number – for identification of trade units like: boxes, crates, single items etc.	EAN-13, GS1-128, Data Bar
GTIN+	Global Trade Item Number plus – GTIN plus identification of attribute of GTIN like: GTIN + lot number, GTIN + BBD (best before date), GTIN + PD (production date)	GS1-128, Data Bar, Data Matrix
SGTIN	Serialized Global Trade Item Number – GTIN with serial number of this GTIN	GS1-128, Data Bar, Data Matrix
GLN	Global Location Number – for identification of location in the context of physical or formal location, like: entity, greenhouse, cultivation unit	GS1-128

Identification levels



Recall / withdrawal scope



Single item level identification is very hard to achieve

The closer to that level we come the lower the costs are in withdrawal processes

Conclusions

- Data for traceability purposes should be (and can be) transferred with business data
- More detailed identification provides more accurate withdrawal – lower cost.
- Standard identifiers are vital – but sometimes generate cost - traceability systems should provide solutions for both – global identifiers and own identification schemes

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THANK YOU FOR YOUR ATTENTION

QUESTIONS ?

On the Use of Stochastic Simulation to Measure Traceback Solutions Economic Impact”

Andres Silva, University of Kent

TRACEBACK

Contract n° FP6-2005-FOOD-036300

On the Use of Stochastic Simulation to Measure the Impact of Traceback Solutions

Andres Silva
Kent Business School
University of Kent

Motivation

What are we **looking for**?

Who are our **consumers**?

What is our **central message**?

Central Message

Presentation Outline

- Definition of Stochastic Simulation
- Illustrative Example
- Stochastic Simulation in Traceback

Definition of Stochastic Simulation

- **Quantitative** methodology that estimates **how likely** can an event happen and the **magnitude** of its consequences.
- We need to determine the distributions of the variables under study and later on; the **software** generates a **distribution** of possible outputs.

Definition of Stochastic Simulation

Attributes

- ✓ Quantitative approach
- ✓ Business oriented
- ✓ Supported academically
- ✓ Association of output and probabilities: **risk**
- ✓ Scenario analysis: hypothetical conditions
- ✓ User friendly outputs
- ✓ Customization to firm or chain levels

Ilustrative Example

Impact of Traceback Solution in Inventory Control

Company: Tomato processing company
Device: **Accuracy test at the entrance level**

Operational benefit: Increase quality certainty supply
Simulation variable: **Profit**

Ilustrative Example

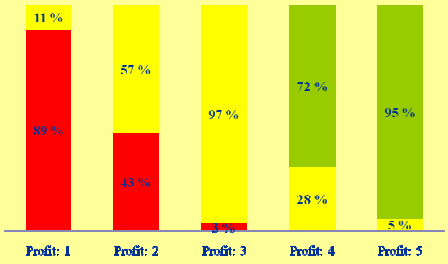
Impact of Traceback Solution in Inventory Control

Assumptions: Five quality of products
Inventory order under a threshold level
Costs: Product cost
Storage costs
Order costs
Unsatisfied demand penalty cost

Ilustrative Example

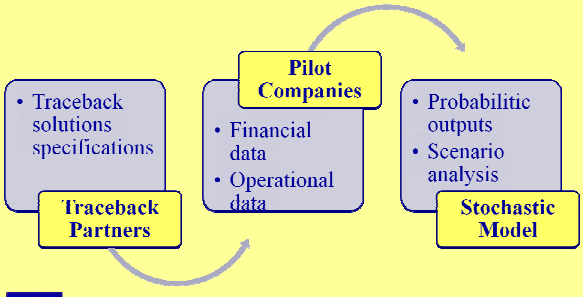
Scenario	Test Accuracy
1	45%
2	55%
3	65%
4	75%
5	85%

Ilustrative Example



Cut Off: 0 and 2,000 pounds per week

Stochastic Simulation in Traceback



Stochastic Simulation in Traceback

Five real case applications:

1. We want to model **the most critical variables** for the company.
2. Coordination with **pilot testing**, **devices developers** and **diffusion WPs**.

Ammonia content in dairy processing plant
(*work in progress*)

Summary

Using **stochastic simulation**, we are able to **quantify** and **show in a graphical way** to **internal and external consumers** the impacts of **Traceback solutions** in terms of **profit and time saving**.

Thanks

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Cost-benefit analysis of implementing traceability - a case study

Mai Thi Tuyet Nga, University of Iceland

Cost-benefit analysis of implementing traceability – a case study

Nga Mai
University of Iceland

Questions to discuss (by PO)

- What method was used?
- What are the characteristics of the method used?
- How is the data obtained? (interviews, surveys, questionnaires, observation, record searching, etc.)
- How to ensure valid and representative data using this method?
- How to analyze the data collected using this method?
- Where did the method come from?
- What other methods were considered?
- What was the experience using this method?
- What are the strengths of this method? What are the weaknesses?
- How can the method be improved?
- What type of method is needed in this area? What properties should the ideal method have?

Contents

- Cost benefits analysis concept
- Benefits of traceability:
  - Willingness to pay (WTP) as a measure of benefits
- Opportunity costs
- Net present value (NPV) model for calculation in cost-benefit analysis (CBA)
- Case study

Cost benefits analysis concept

- Calculate benefits
- Calculate costs
- Discount all benefits and costs to present value→

Net present value (NPV) of project (implementation of traceability) > 0 → recommended

Compare between alternatives → recommend the one with the highest NPV

Benefits of traceability

- Market and Revenue Growth (e.g. competitive advantage, sustainable issues)
- Recall cost reduction (reduce scope and time of recall)
- Claim, lawsuit and liability inssurance cost reduction
- Labour cost reduction
- Process improvement (reduce tied up inventory costs, reduce spoilage, improve quality, reduce cost of material procurement, movement and storage; implement JIT management of manufacturing; improve planning, lower cost of distribution systems, etc.)

Summary of traceability benefits

Category	Quantitative	Qualitative
Market Recovery Improvement	x	
Market and Revenue Growth	x	
Recall Costs Reduction (less frequent recalls, less severe recalls)	x	
Liability Savings	x	
Liability Insurance Cost Reduction	x	
Inventory Turnover Improvement	x	
Spoilage/cost-of-date cost reduction	x	
Yield improvements	x	
Regulatory & Legislative Compliance		x
National Security		x
Enhanced Customer Confidence		x
Litigation Risks Mitigation		x
Resolution of Track Trace Data Gaps		x
Company Reputation - Customers		x
Company Reputation - Consumers		x
Company Reputation - Government & Public		x
Improved Customer Service		x
Company Reputation - Suppliers		x
Being Technological Proficient and an Industry Leader in New Technologies and processes		x

(Can-trace, 2004)

WTP as a measure of benefits

WHAT?	WHO?	HOW MUCH?	Authors
EU-labeled steak	Chicago & Denver consumers	about 10%	Anthon Umberger *et al.* (2003)
"Certified Beef" labeling of ribeye beef steaks, pork chops, veal chicken breasts	US consumers	2.5-2.9% over the original market price	(Lusk & Umberger, in press)
"U.S. Certified" label	Colorado consumers	20% for steak & 30% for hamburger	(Lusk & Umberger, 2003)
Traceable to the farm	US consumers	$1.50/lb. of steak	Lusk & Umberger (2007)
Guaranteed BSE tested beef	Customers in Alberta (Canada) and Montana (US)	$7.41/lb	Salin & Yang (2007)
Traceable hamburger sandwich	Canadian consumers	$0.27 (4.9% premium over the base sandwich value of $5.67)	Hobbs *et al.* (2005)
Italian extra-virgin olive oil (lack of traceability information)	Italian consumers	Loss of about €1 per liter of oil purchased	Cioia *et al.* (2006)
Some food products	European consumers	Not WTP, or opinions diverged (not statistically significant result)	Chryssochoidis (2007)

Opportunity costs (example)

- RFID tags
- RFID readers
- Software
- Data accumulator (laptop)
- Changes to current processes
- Education & Change Management
- Outside Consultants
- Policy Development, Compliance and Audit
- Implementation Services (Internet; power)
- (Tag loss replacement)

Opportunity costs (some figures)

WHAT?	WHERE?	HOW MUCH?	Authors
RFID tags for chilled foods on recyclable plastic transportation crates	Sainsbury's	£18 million to £24 million (can be as low as £3,500); £5,000 to £8,000 for readers; and 30p to 65p for a tag, payback period 2-3 years.	Kelkkanen (2002)
RFID tags on Parmigiano Reggiano cheese		0.5% increase in product cost (i.e. 0.07 €/kg of cheese)	Regattieri *et al.* (2007)
RFID for aquacultural shrimp from farms	Thailand	Less than US$ 1/kg of export shrimp	NECTEC

NPV model for calculation in CBA

- Formula:

$$NPV = \sum_{t=0}^{n} \frac{NB_t}{(1+r)^t}$$

- Where
  - t – the time of the cash flow;
  - n – the total time of the project;
  - r – the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk);
  - NB_t – the net benefits at time t; $NB_t = B_t - C_t$.
  - B_t – the benefits arise at time t;
  - C_t – the costs arise at time t.

Payback Period

- One of alternatives to NPV is the Payback Period method which determines the point in time at which cumulative net cashflows exceed zero. This method has several major weaknesses:
  - it does not discount cashflows;
  - it does not take account of cashflows beyond the payback period, which might be large enough to affect the desirability of undertaking the project;
  - it is a measure of time, not a measure of value, thus it does not give a true economic picture.

A case study: an ex ante CBA of implementing RFID traceability system from the firm perspective

- A one-page questionnaire was sent out to technology developing partners to get the costs of traceability systems/solutions.
- Interviews was conducted with seafood processing/trading companies to get the estimated/expected benefits of implementing traceability systems/solutions. A five-page questionnaire with 7 sections and 21 questions was used for the interviews.

Methodology

- Net present value as a main criteria
- Marginal, not average (overhead), benefits and costs were used in the analysis (Business-Analysis-Team, 2005; HM-Treasury, 2007).
- Before-tax/pre-tax real "dollars" and real discount rate were used.

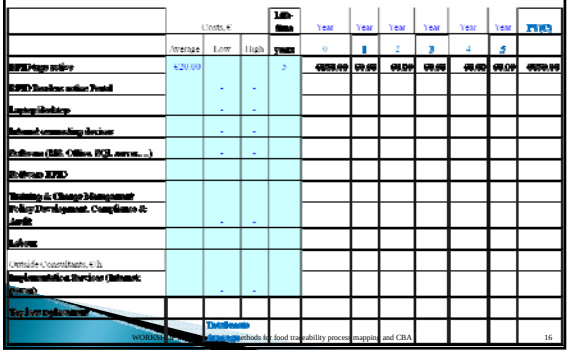
Assumptions

- A default real discount rate of 4.5% was used; sensitivity analysis was performed with the discount rate between 2.4 and 7% (Evans and Sezer, 2005);
- Time frame of the system is 5 years
- The first cash flow occurs at the end of each year (from the first year).

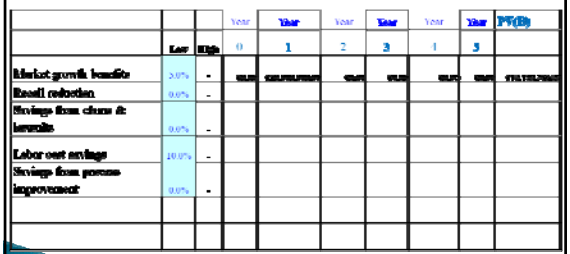
Data Inputs (example)

Inputs	Inputs requiring sensitivity analysis		
	Average	Low	High
Average size, ton/yr			
Size of a box, kg			
Size of a pallet, boxes			
Discount rate, %			
Percent to RFID			
Tag loss replacement			
(System) Life-time, years			
Yearly turnover, €			
Number of readers			
Number of tags per pallet			
Outside Consultants, €/h			
Consulting time, h			

Opportunity Costs – Base Case with the discount rate of 4.5%, tag loss replacement of 3%



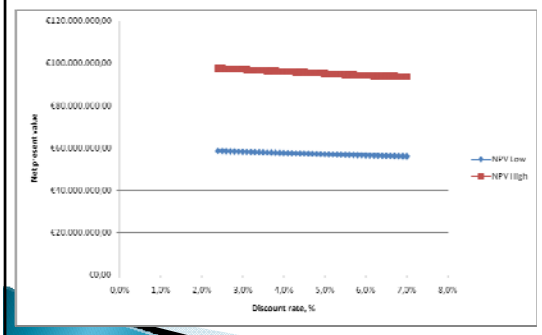
Estimated benefits (Base case–Lower bound) with the discount rate of 4.5%



Summary of traceability net present value

	NPV Low	NPV High
Worst case scenario	€	-
Base case scenario	€	€
Best case scenario	-	€

Sensitivity analysis (example)



Thank you

Economic Evaluation of Technological Innovations in Food Traceability Systems

Freddy Brofman, University of Kent

Kent Business School

Economic Evaluation of Technological Innovations in Food Traceability Systems

Freddy M. Brofman E.
Dr. Marian Garcia Martinez
Dr. Diogo M. Souza Monteiro

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Presentation Outline

Kent Business School

1. Research Background
2. Research Aim
3. How does Technological Innovations in Food Traceability Systems Affect Firm Performance?
4. The Research and its Link to Cost-Benefit Analysis
5. Case Study Method
6. Conclution

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Research Background

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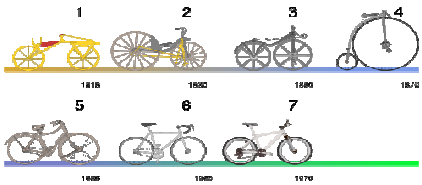
Just like bicycles food traceability systems are not new; they have evolved over time.



These 'new' technological evolution needs to generate ***value*** to the implementing firm to survive.

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Research Aim

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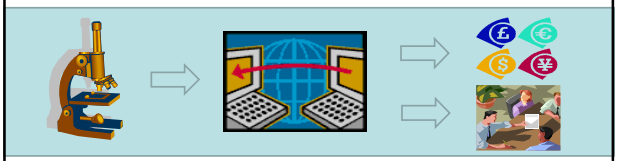
How does implementation of technological innovations in food traceability systems affect firm performance?



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How does Technological Innovations in Food Traceability Systems affect Firm Performance?

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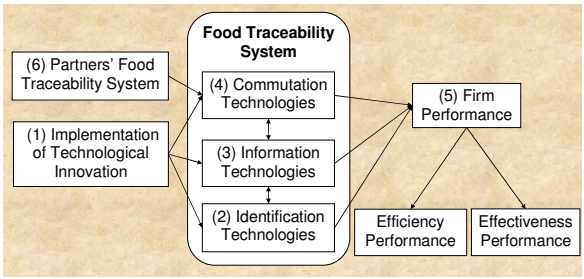

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Impact of Innovating Identification Technologies

Kent Business School

Impact on Efficiency Performance of the Firm			
Account	**Revenue margin**	**Cost savings**	**Source:**
Sales costs	+		Starbird and Amanor-Boadu (2006)
Lost sales	+		Saatkamp et al. (1997)
Production appraisal costs		+	Chryssochoidis et al. (2008)
Recall/withdrawal costs		+	Chryssochoidis et al. (2008)

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Impact of Innovating Identification Technologies

Impact on Effectiveness Performance of the Firm		
Account	**Expected impact**	**Source:**
Ability to protect the reputation of the product	+	Chryssochoidis et al. (2008)
Ability to improve how firm is perceived by regulators	+	Sparling et al. (2006)
Ability to manufacture new products	-	Sparling et al. (2006)
Ability to manufacture different products	-	Koenderink and Hulzebos (2006)

Impact of Innovating Information Technologies

Impact on Efficiency Performance of the Firm			
Account	**Revenue margin**	**Cost savings**	**Adapted from:**
Inventory costs		+	Scheer (2006)

Impact of Innovating Information Technologies

Impact on Effectiveness Performance of the Firm		
Account	**Expected impact**	**Adapted from:**
Customer relations		
Ability to assure product claims	+	Chryssochoidis et al. (2008)
Ability to asses customer performance	+	Chryssochoidis et al. (2008)
Ability to protect brand	+	Chryssochoidis et al. (2008)
Ability to avoid liabilities affecting goodwill	+	Chryssochoidis et al. (2008)
Ability to access new markets	+	Sparling et al. (2006)
Ability to increase share of existing market	+	Sparling et al. (2006)
Ability to enhance product and service quality	+	Chryssochoidis et al. (2008)

Impact of Innovating Information Technologies

Impact on Effectiveness Performance of the Firm		
Account	**Expected impact**	**Adapted from:**
Supplier relations		
Ability to assess supplier performance	+	Chryssochoidis et al. (2008)
Regulator relations		
Ability to meet regulatory requirements	+	Chryssochoidis et al. (2008)
Ability to meet regulatory requirements faster	+	Chryssochoidis et al. (2008)

Impact of Innovating Communication Technologies

Impact on Efficiency Performance of the Firm			
Account	**Revenue margin**	**Cost savings**	**Adapted from:**
Procurement costs		+	Bottani and Rizzi (2008)
Recall/withdrawal costs		+	Chryssochoidis et al. (2008)

Impact of Innovating Communication Technologies

Impact on Effectiveness Performance of the Firm		
Account	**Expected impact**	**Adapted from:**
Ability to asses customer performance	+	Chryssochoidis et al. (2008)
Ability to communicate reliable and faster with customer	+	Chryssochoidis et al. (2008)
Ability to asses supplier performance	+	Chryssochoidis et al. (2008)
Ability to communicate reliable and faster with supplier	+	Chryssochoidis et al. (2008)
Ability to communicate reliable and faster with regulator	+	Chryssochoidis et al. (2008)

The Research and its Link to Cost-Benefit Analysis

	Revenue			
Accounting perspective	Purchased Inputs	Depreciation on Capital	Profit	
Economic perspective	Purchased Inputs	Alternative Use Price of Resources	Rent on Priced Resources	Economic Profit
Payments perspective	Payments for Commodities in Elastic Supply	Payment for	Bundles of Scarce Resources	

Source: Lippman and Rumelt (2003)

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Case Study Method: Why this Method of Economic Evaluation?

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At least 4 case studies

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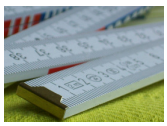
Case Study Method: Documents and Managers' Perceptions as a Source of Data?



Data Mismeasurement

Time Lag

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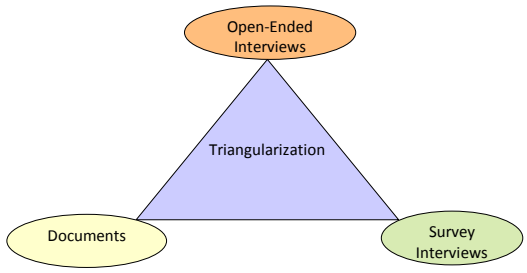
Case Study Method: Documents and Interviews as a Data Collection Method?



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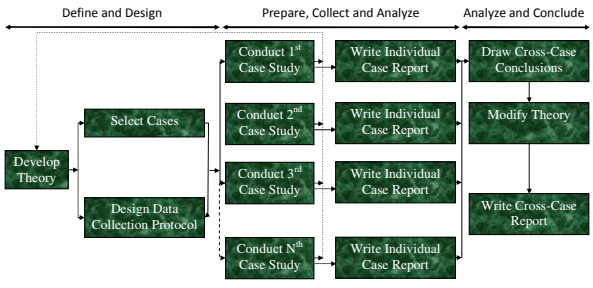
Case Study Method: Data Analysis Strategy?



Source: Adapted from Yin (2009)

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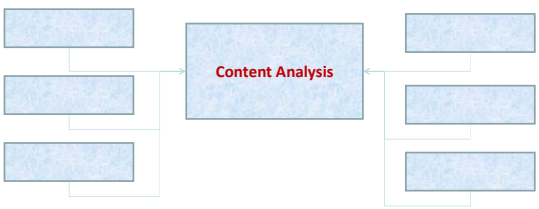
Case Study Method: How to Analyze Data to Perform an Economic Evaluation?



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Conclusion

- Literature states that the changes in the different technologies that conform the system will affect firm performance.
- The research proposed to use case studies and content analysis to perform economic evaluation.
- In the long run it would be a good practice to confirm if the manager' perceptions are true.

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Thank you!

Freddy Brofman	Dr. Marian Garcia Martinez	Dr. Diogo M. Souza Monteiro
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University of Kent

An information model to manage traceability data in service based systems

Michele Puccio, Engineering Ingegneria Informatica

An information model to manage traceability data in service-based systems

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Intelligent Systems Unit
ENGINEERING Ingegneria Informatica S.p.A.
Palermo, Italy

Traceability Methods Workshop
Tromsø, 25th-26th February 2009

Outline

- Engineering: about us
- The context: TRACEBACK
- Traceability information model
- How to use it
- Conclusion

Engineering: about us

- The Engineering Group has 16 companies, 37 branches in Italy and abroad, more than 6.000 IT professionals;
- Finance, central public administration, local public administration and healthcare, energy & utilities, industry, telco are the market covered by the commercial offer;
- 250 researchers and 50 million Euros invested in the past three years in research projects.

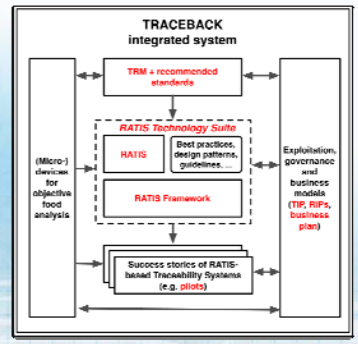
Engineering: R&D Department

- The Intelligent Systems Unit is involved in several research projects focused on:
  - software engineering
    - Agent-Oriented Computing
    - Service-Oriented Computing
    - Autonomic computing
    - Intelligent Business Process Management
  - Application domains
    - Food
    - Supply chain management
    - Logistics
    - Finance

The context: TRACEBACK

- TRACEBACK project aims at developing an **integrated solution to traceability** in food supply chains and companies, while specifically addressing the tomato and feed-dairy products and sectors;
- Engineering is one of the ICT partners of the project and is responsible of the definition of the **R**eference **A**rchitecture for **T**raceability **I**nformation **S**ystems (RATIS).

The context: TRACEBACK

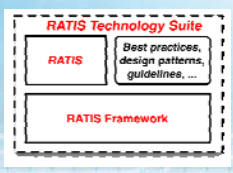


RATIS

- The **R**eference **A**rchitecture for **T**raceability **I**nformation **S**ystems aims at providing an asset base for collaborative and distributed service-oriented traceability information systems supporting:
  - **creation, acquisition, and recording of relevant traceability data** along the entire supply chain;
  - **storage of traceability data** in distributed and (semantically) interoperating repositories;
  - **semantically-sound exchange and sharing of traceability information** among parties
  - **exploitation, browsing and querying of traceability information**

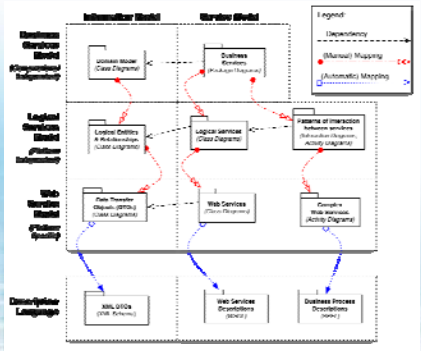
RATIS

- RATIS specifications have a reference implementation: the RATIS Framework.



- The RATIS Technological Suite is intended to be used by software and service developers, system integrators and service providers who to implement traceability systems and services.

RATIS

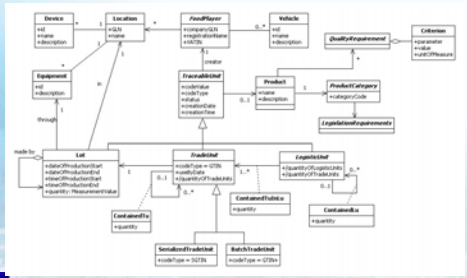


Traceability Information Model

- A model to capture, manage and share traceability data among the whole supply chain;
- It is a mean to catch relevant data from traceability processes and to make it available for an ICT (service-based) infrastructure;
- A general model: it does not mean an universal model;
- It is formally defined using the UML semantic and notation;
- It can be specialized for any specific supply chain.

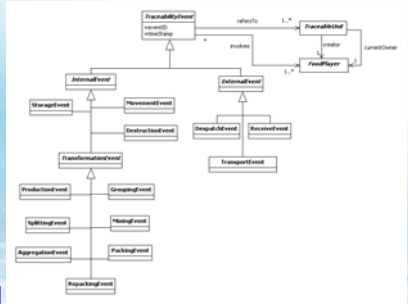
Traceability Information Model

- A core ontology defining the main entities involved in traceability processes:



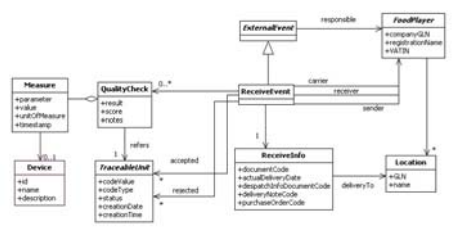
Traceability Information Model

- A set of data structures (Events) covering all traceability aspects of a supply chain process:



Traceability Information Model

- Each Event is defined with all the information needed:

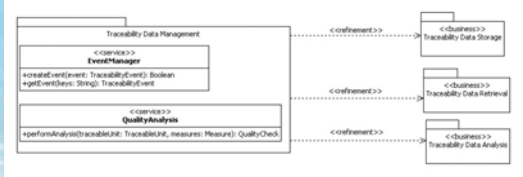


How we built the model

- Requirements analysis:
  - Creativity workshop with involved stakeholders;
  - Stakeholders interviews;
  - i* modeling to identify goals;
  - Use cases walkthrough;
  - Supply chain analysis, i.e. TRM and Trace Points
  - Traceability state of the art.

How to use it

- The main objective of the model is to enable information sharing among the supply chain;
- It will be exploited as the base ontology for the definition of Logical Services;



How to use it

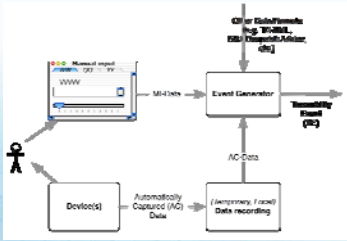
- Services are the key factor enabling information sharing in the supply chain;
- Information sharing is different from the information exchange between two food players:
  - Traceability information is shared through service invocation;
  - Traceability information is made available through service invocation to all the authorized stakeholders.

How to use it

- Starting from a (formal) traceability process description (e.g. Trace Point), we identify when a specific Event should be generated;
- According to the specific process under consideration, we define which data the Event should manage;
- We orchestrate the right service invocation in order to manage the process.

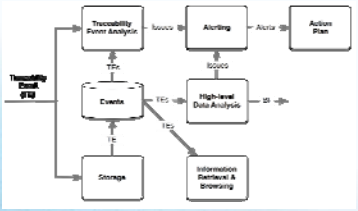
Events generation

- Traceability Events can be generated starting from several information sources:
  - Manual input
  - Legacy systems
  - Mapping/transformation from interchange languages:
    - GS1 XML;
    - TraceCoreXML;
    - ….



Events exploitation

- Generated events can be used and exploited for several objectives:
  - Information retrieval;
  - Data analysis;
  - Risk management;
  - Added value services;
  - ….



Model validation

- We are validating the model in the two supply chains involved in the TRACEBACK project
  - Feed/diary;
  - Tomato;
- We expect feedbacks to verify the completeness of the model and to improve the overall approach.

Conclusion

- An information model to manage traceability data;
- A set of Services Specifications to store, share and exploit traceability data;
- A validation process is in progress
- …

Thank you

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4 Discussion

Following the workshop we wished to summarise what we thought were some of the more important areas of discussion. We must point out that it is only possible to represent part of the actual discussion here.

4.1 Food Traceability Process Mapping

In most of the process mapping methods, both those which have been tested and those which are planned, some form of questionnaire and structured interview was used. Presentations and subsequent discussions around these methods centred around the following issues;

What method is most appropriate for which type of mapping?

How do you get the information which is most relevant, how do you get the data needed in each specific study?

- What is the most efficient way of collecting data (one person structured interview, two person structured interview, less formal interviews based on interview guides, surveys, questionnaires, etc.)?
- Should you interview employees in the company or value chain together or separately?
- Is the role of the process mapping to take a descriptive snapshot of current practise, or is it to aid in the implementing of a new, and often electronic, traceability system. This has implications for the type of questionnaire which is suitable.
- Should the process mapping method include all exchanges with the interviewees, including the initial exchanges, the set-up and surroundings of the meetings, the choice of participants and agenda, the overall investigation of the company, the presentation material, the graphs drawn, etc. Alternatively, should the aim be to have or develop a process mapping method where only the core part of the investigation / interview is specified.
- Some process mapping methods focus on the identifiers and the transformations, not the parameters connected to the identifiers, so additional questions need to be formulated if you want to investigate something related to the value of the parameters (hygiene, recall readiness, sustainability, resource use, etc.)

It was also noted that the scope of each method needs to be clarified. One area which was highlighted was the need for methods to specify whether they take into account the needs of software developers when gathering information since information technology is seen to be an important part of many food traceability systems. Another area of importance is to what extent and how the different methods can be used comparatively or together. The ‘level’ (single product, company or supply chain) of process mapping was also discussed and is thought to be a fruitful area for further work.

Representation of data gathered during process mapping was also an important debate. Many of the methods presented used some form of graphical representation. This graphical representation was not only used for analysis, but also in order to enable the companies involved in projects to validate the data gathered. Discussion here centred on the possibility of standardising such diagrams and using them as a tool for comparison. A similar debate took place regarding the vocabulary used in traceability, for example the definition of ‘critical

traceability point'. A need was identified for establishing a forum for further discussion and development of these ideas.

4.2 Cost/benefit calculations related to implementation of traceability systems

The main debate in this discussion revolved around when it was most useful and practical to conduct a cost benefit analysis and what factors should be included.

For many of the participants cost benefit was viewed as a tool for companies to use when implementing traceability.

We observed that there were many different variables which could be taken into account when carrying out cost benefit and different ways of modelling these factors.

Discussions on the cost benefit methods centred around:

- Ex ante methods compared to ex post methods
- How in particular to quantify and calculate benefits
- National and sectorial differences related to depreciation over time
- Existing courses, books and publications related to cost benefit methods

Also for cost benefit methods a need was identified for establishing a forum for further discussion and exchange of ideas and results.

5 Conclusion

During the two days of the workshop there was much useful and interesting information exchange. It is clear that there is potential for a lot more cooperation in this area and that a lot more may be done with respect to formalization of knowledge and scientific publication, especially for process mapping methods.

The workshop participants are all looking forward to exciting and fruitful cooperation in these areas in the coming years, and we hope that some institute or project will take it upon themselves to arrange a follow-up workshop in a year or two.

6 Acknowledgements

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Lively discussion during the workshop

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