What does tracing mean?

Definition and steps

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European Food Safety Authority

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Definition

PERSPECTIVES (1/2)

Tracing is in all interest

Industry

- Optimization
- Ensure supply
- Ensure quality

Consumer

- Guarantee origin
- Ensure quality
- Ensure sustainability

Administration

- Ensure food safety
- Prohibit food fraud
- Ensure food security

PERSPECTIVES (2/2)

but not one fits all

Industry

- Optimization
- **Tracking**
- Ensure quality

Consumer

- Guarantee origin
- **Certification**
- Ensure sustainability

Administration

- Ensure food safety
- Prohibit food fraud
- Ensure food security

Recall
Tracing

SEVERAL DEFINITIONS OF TRACEABILITY (1/2)

But one important distinction[1]:

"**Tracking** is the informative process by which a product is followed along the supply chain keeping records at each stage, (…)." (Prospective data collection)

"**Tracing** is defined as the ability of reconstructing the history of a product, identifying its origin (…)." (Retrospective data collection)

	Retrospective	Prospective
Forward Tracing	Recall	Tracking
Backward Tracing	Tracing	

[1] Pizzuti & Mirabelli (2015): The global track&trace system for food

SEVERAL DEFINITIONS OF TRACEABILITY (2/2)

- **Product traceability** is the reconstruction of the physical product flow, the location of a product at any stage of the food supply chain.
- **Process traceability** is the reconstruction of all transformations of the product, including interactions with physical/mechanical, chemical, and environmental factors.
- **Genetic traceability** is the reconstruction of the genetic constitution of ingredients of the product. This is used to identify ingredients, their origin, or if they are genetically modified.
- **Inputs traceability** is the reconstruction of types, source and supplier of all ingredients used during production and processing.
- **Disease and pest traceability** reconstructs the epidemiology of pests and biotic hazards that may contaminate food or feed.
- **Measurement traceability** is the reconstruction of data and quality of measurements.

Reference: Opara (2003)

WORKING DEFINITION OF TRACEABILITY

There exist no common definition of traceability, but several approaches[1]

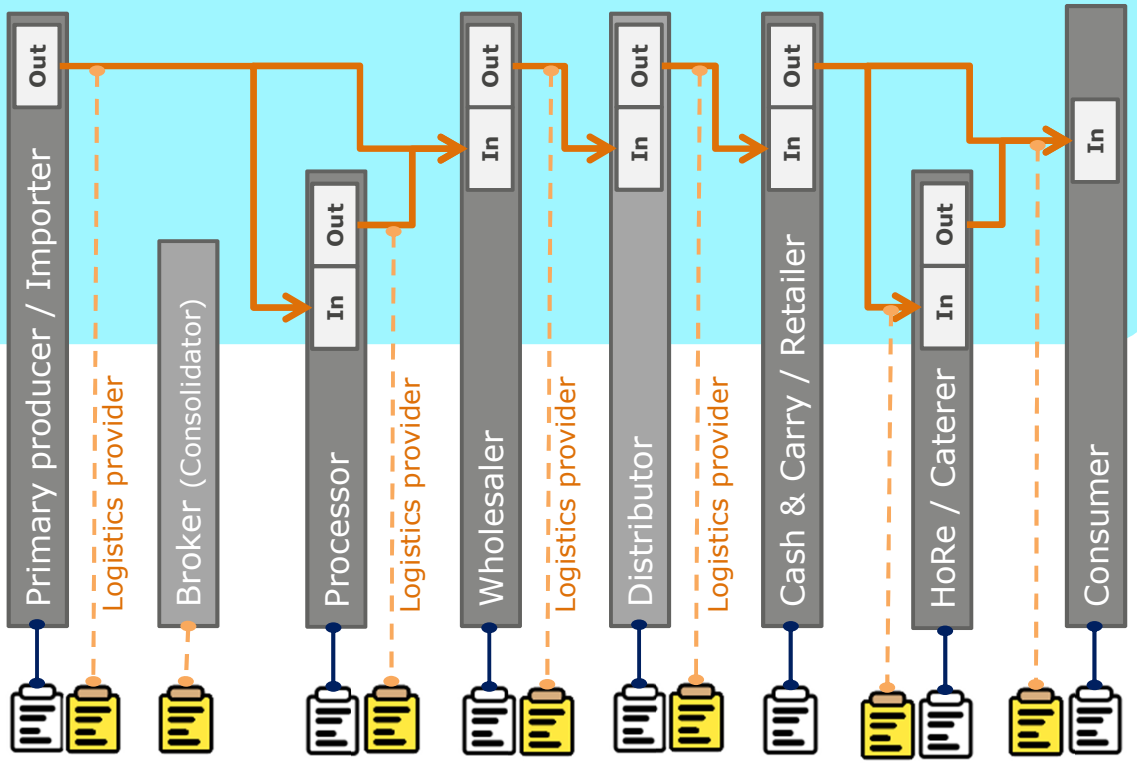
Working definition of (product) traceability

Traceability is defined as the ability to retrospectively follow the movement of food, feed, food-producing animal or substance intended to be, or expected to be incorporated into or in contact with food or feed, through all stages of production, processing and distribution by means of recorded data.

[1] Olsen & Borit (2012): How to define traceability

DIFFERENT LAYERS AND ACTORS OF TRACING

Physical material flow in the food-supply-chain



Actors and their roles in the food-supply chain (Food Business Operators)

Information holder:

= product, = transport

Time

GENERAL FOOD LAW / EC REGULATION 178/2002

Article 18: 1-step back/ 1-step forward traceability

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.*

"Traceability of food should 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.*

"Food business operators shall be able to identify any supplier"

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.*

"Food business operators shall be able to identify any client"

4. *Food or feed which is placed on the market or is likely to be placed on the market in the Community shall be adequately labelled or identified to facilitate its traceability, through relevant documentation or information in accordance with the relevant requirements of more specific provisions.*

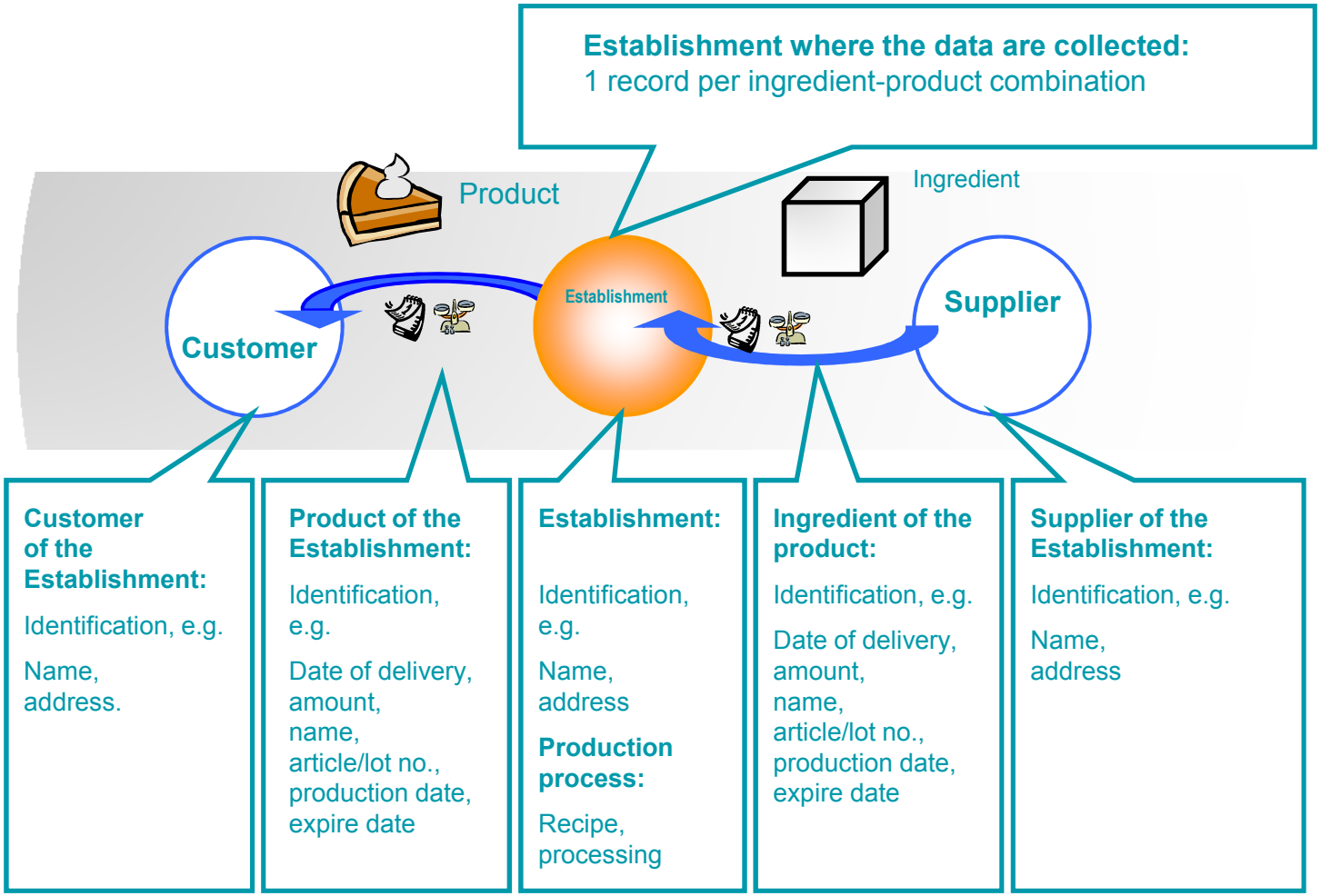
"Food shall be adequately labelled or identified to facilitate its traceability"

5. *Provisions for the purpose of applying the requirements of this Article in respect of specific sectors may be adopted in accordance with the procedure laid down in Article 58(2).*

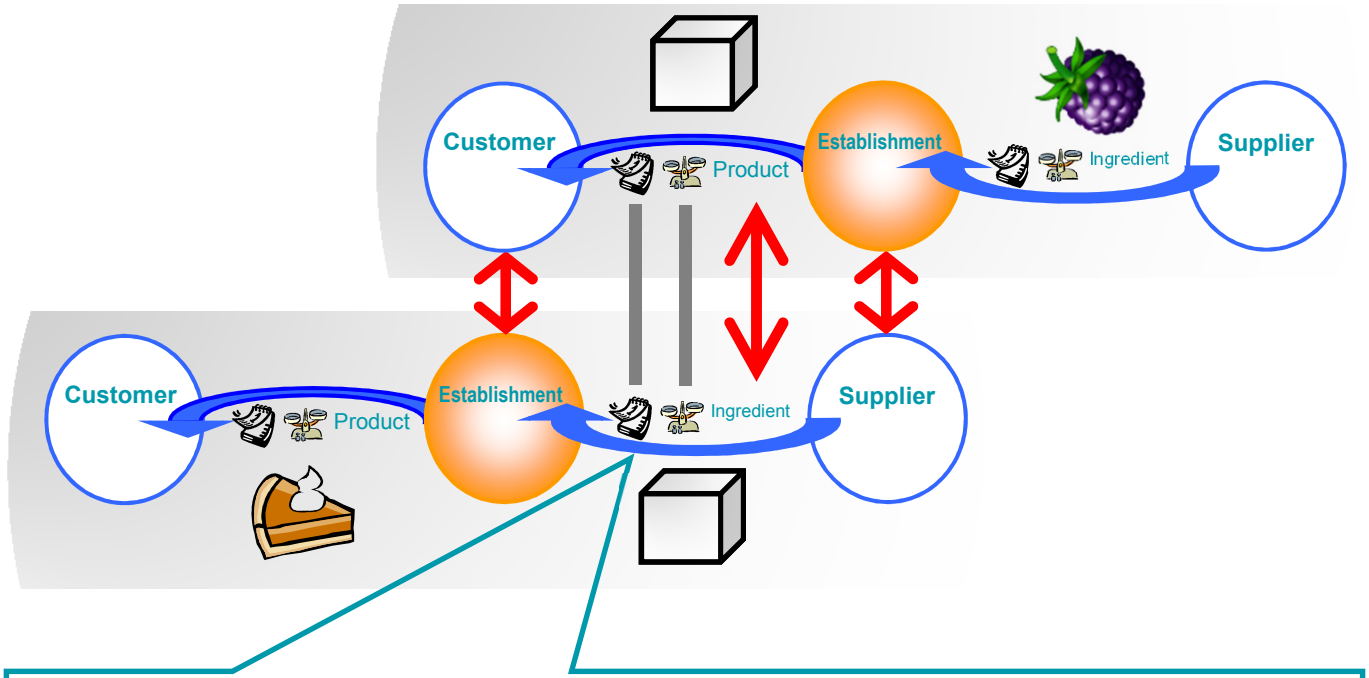
Data structure

DATA COLLECTION FOR TRACING

Data at each knot of the food supply chain



DATA ANALYSIS: BUILDING THE FOOD CHAIN



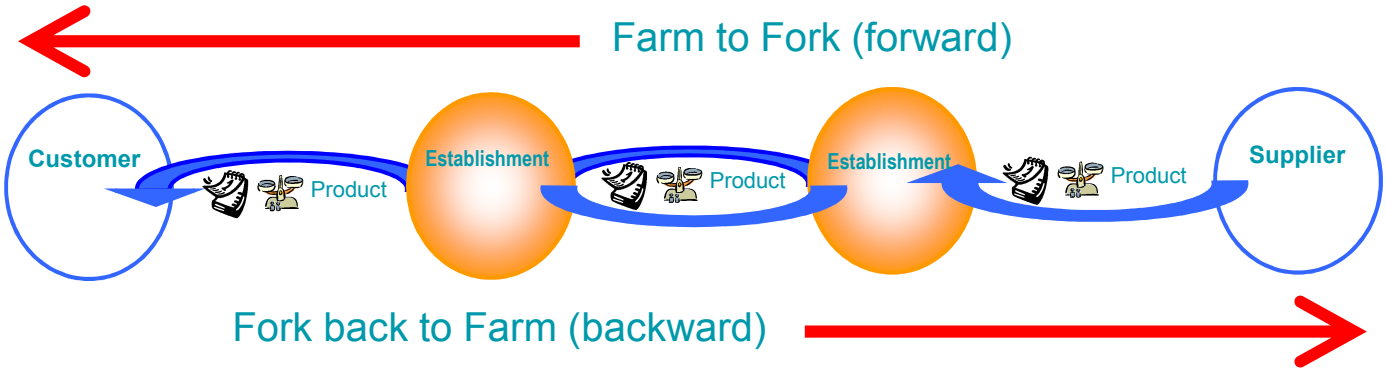
Identification of common links by Costumer=EstablishmentA / EstablishmentB=Supplier / Product=Ingredient

Verification (proof of consistency) by correct date of delivery / correct amount of the product

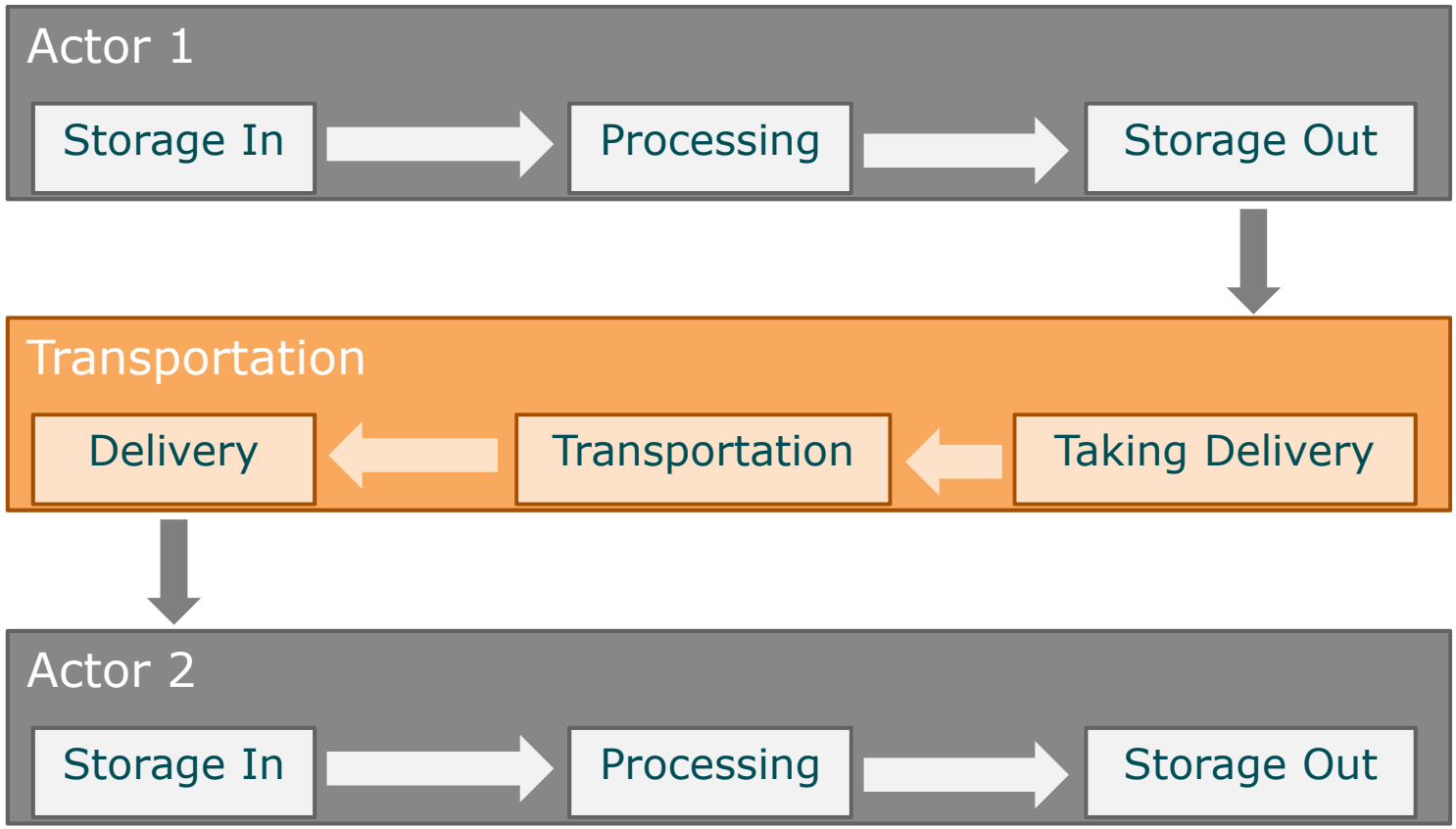
RESULTS: FOOD SUPPLY CHAIN

Results per analysis:

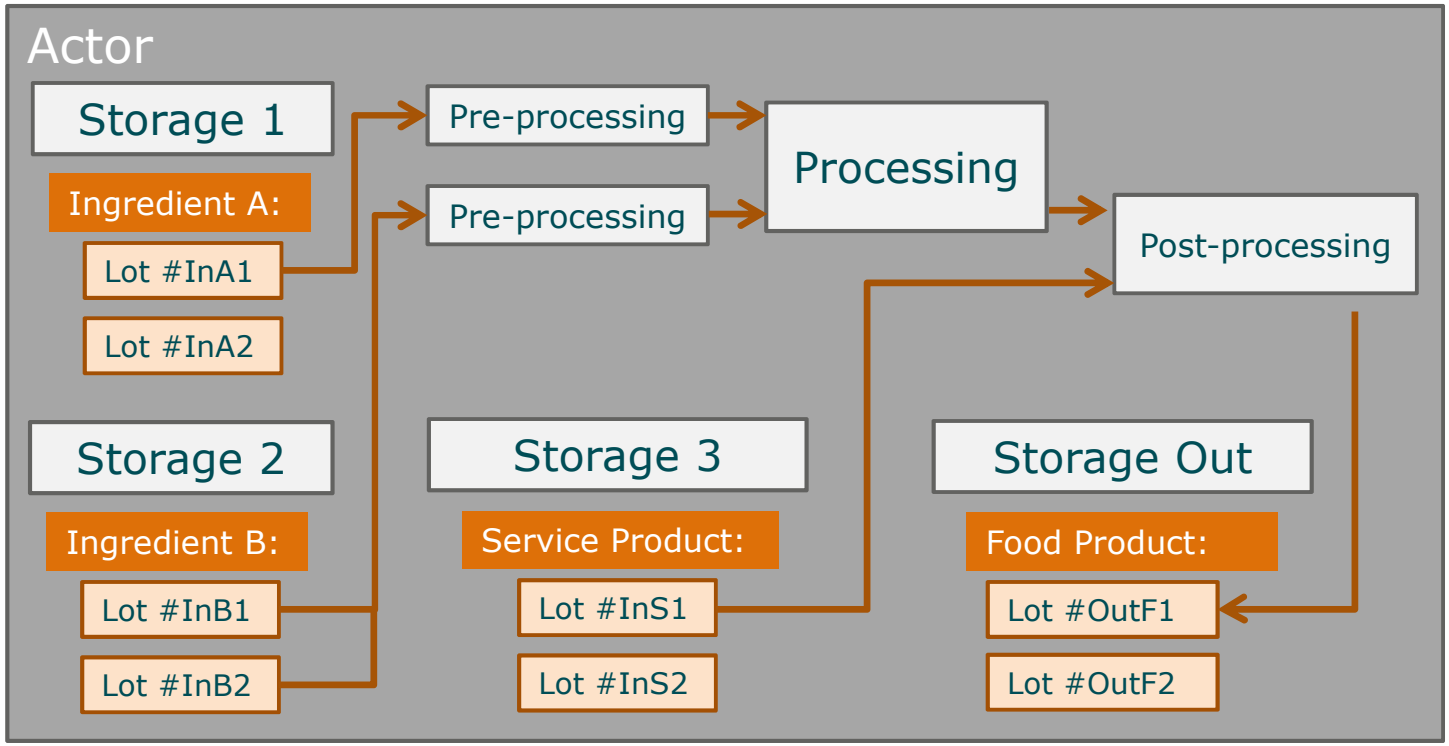
- Already established parts of the food supply chain
- Open knots (establishments) with missing data
- Missing amount of material (loss in tracing)



MICRO STRUCTURE



COMPLEXITY: INGREDIENTS AND LOTS



DEFINITIONS

'Product category' identifies the general type of a food item. Food items of the same product category have usually same food safety characteristics.

'Product' identifies the kind of the food item in the usual terminology in the food chain (e.g. product type, brand, package size etc.). Food items with the same product name are usually exchangeable in the food chain.

'Lot / batch' identifies the production process in which the food item was produced. This includes the producer, the location and the date of production. Food items with the same product name and lot number were produced under equal conditions, e.g. equal ingredients, equal production line, equal time slot of production.

'Consignment / trade unit' identifies the single unit of a product which is not divided during transportation. Food items of the same product and consignment had the same provider and recipient in the food chain.

COMPLEXITY: PRIMARY ACTIVITIES

Assemble/ load

Join / merge

Mix

Blend

Unload

Transport

Distribute

Export

Trade

Import

Store

Repack

Relabel

Primarily process

Primarily produce

Process / transform

Produce / manufacture

Retail

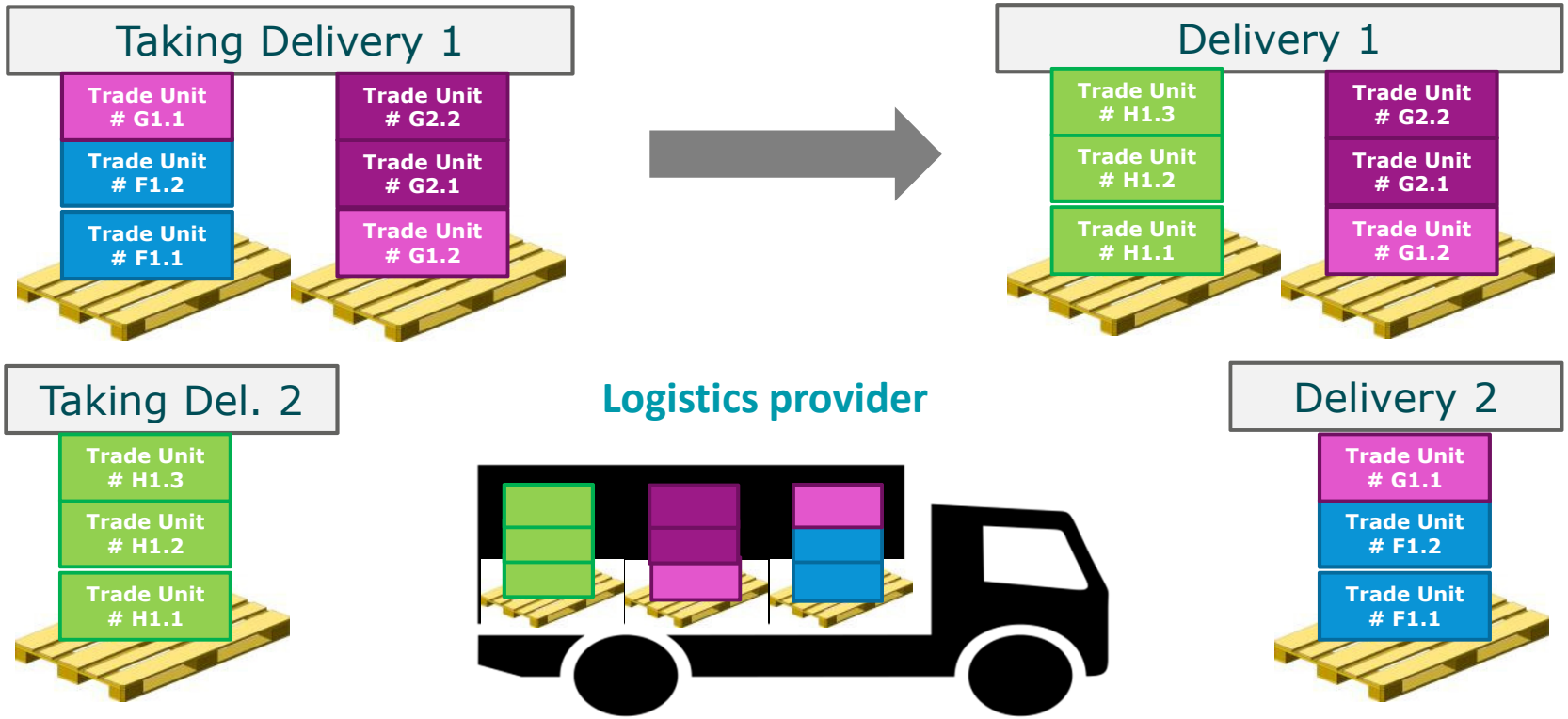
Catering

Deplete (exit)

Consume

COMPLEXITY: LOGISTIC SECTOR

The units of transportations are Logistic Units, e.g. palettes, container etc.

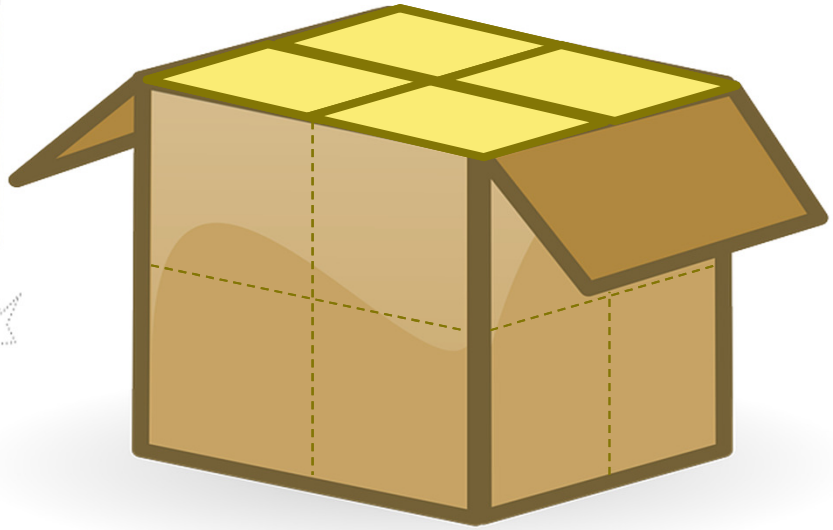


COMPLEXITY: DISTRIBUTION

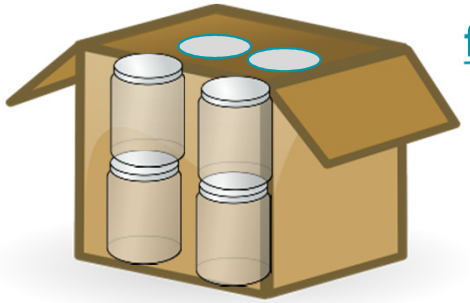
The trade units can change in the food chain, …

… but they are usually defined in the **Product Information Sheet**

Trade Unit of production,
e.g. = 8 boxes = 64 cans

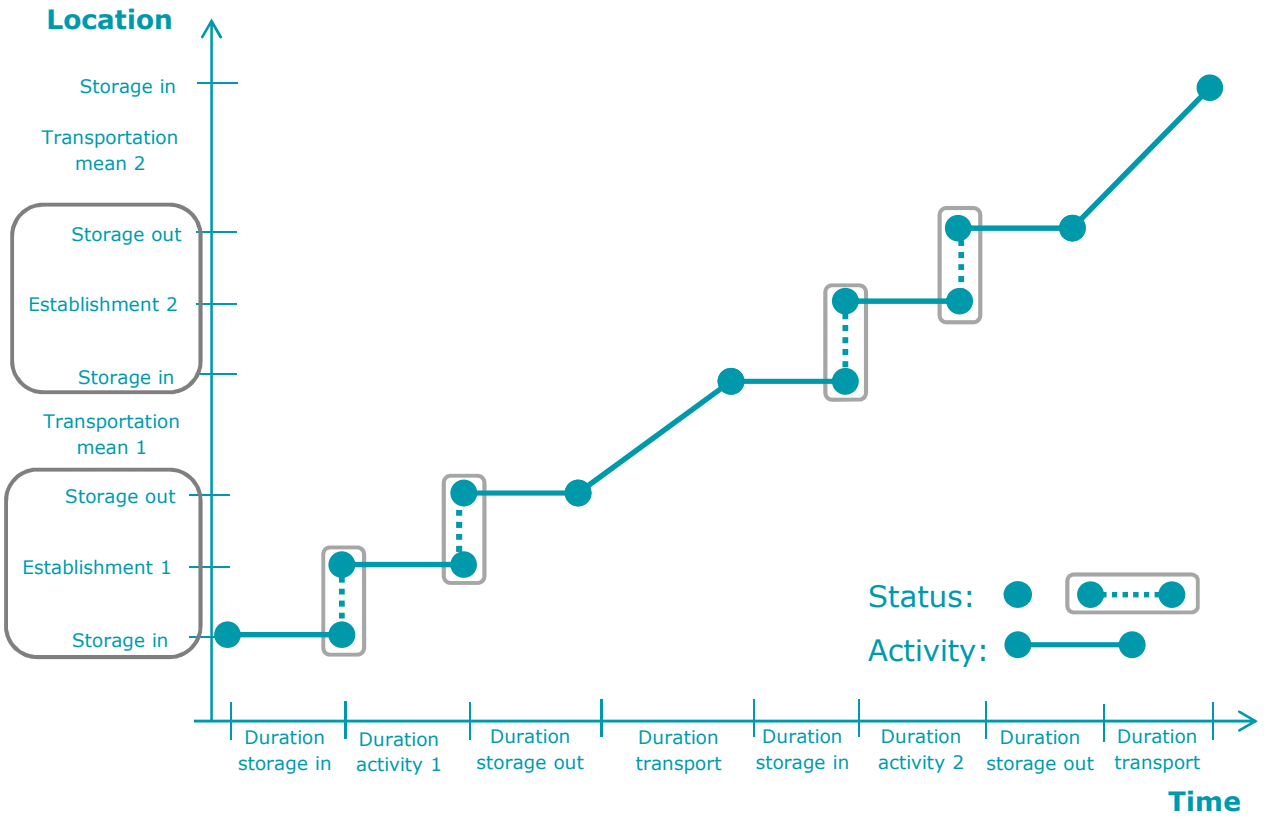


Trade Unit for distribution,
e.g. 1 box = 8 cans

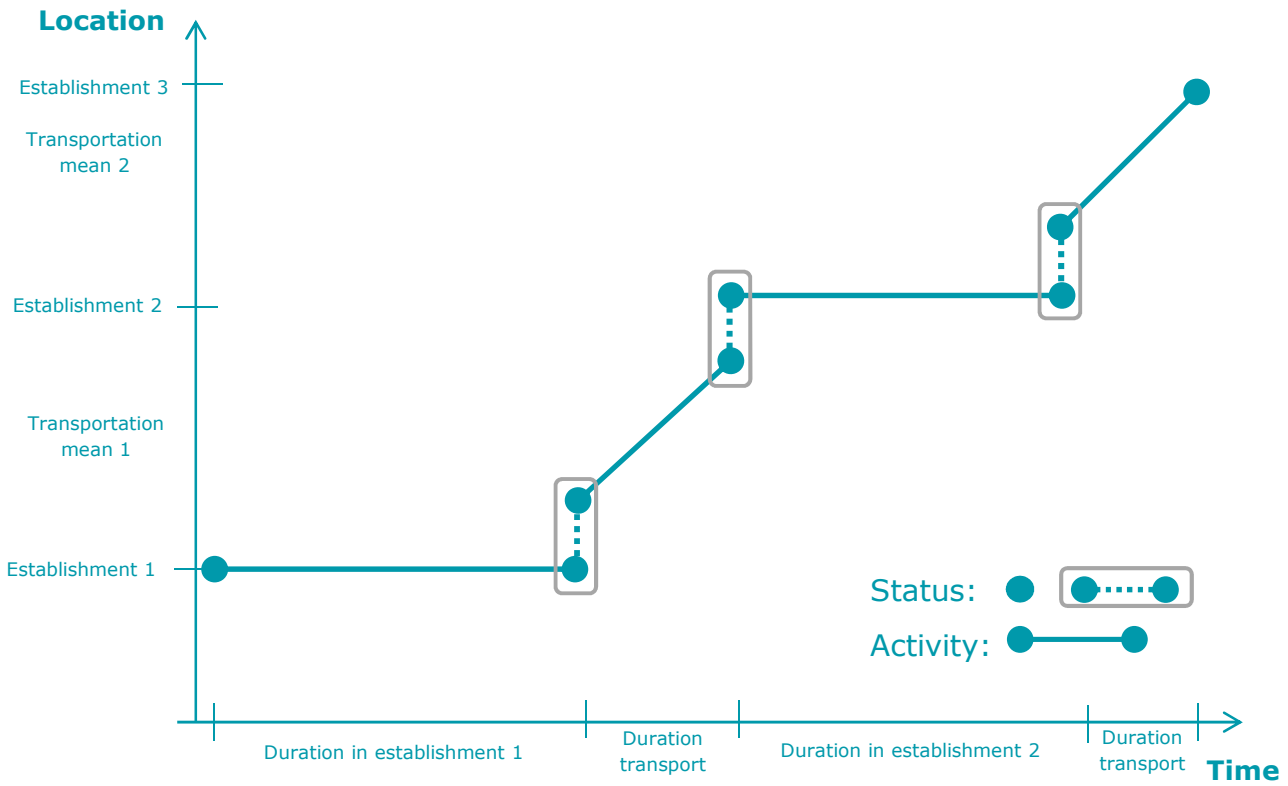


Trade Unit for the Consumers,
e.g. 1 can

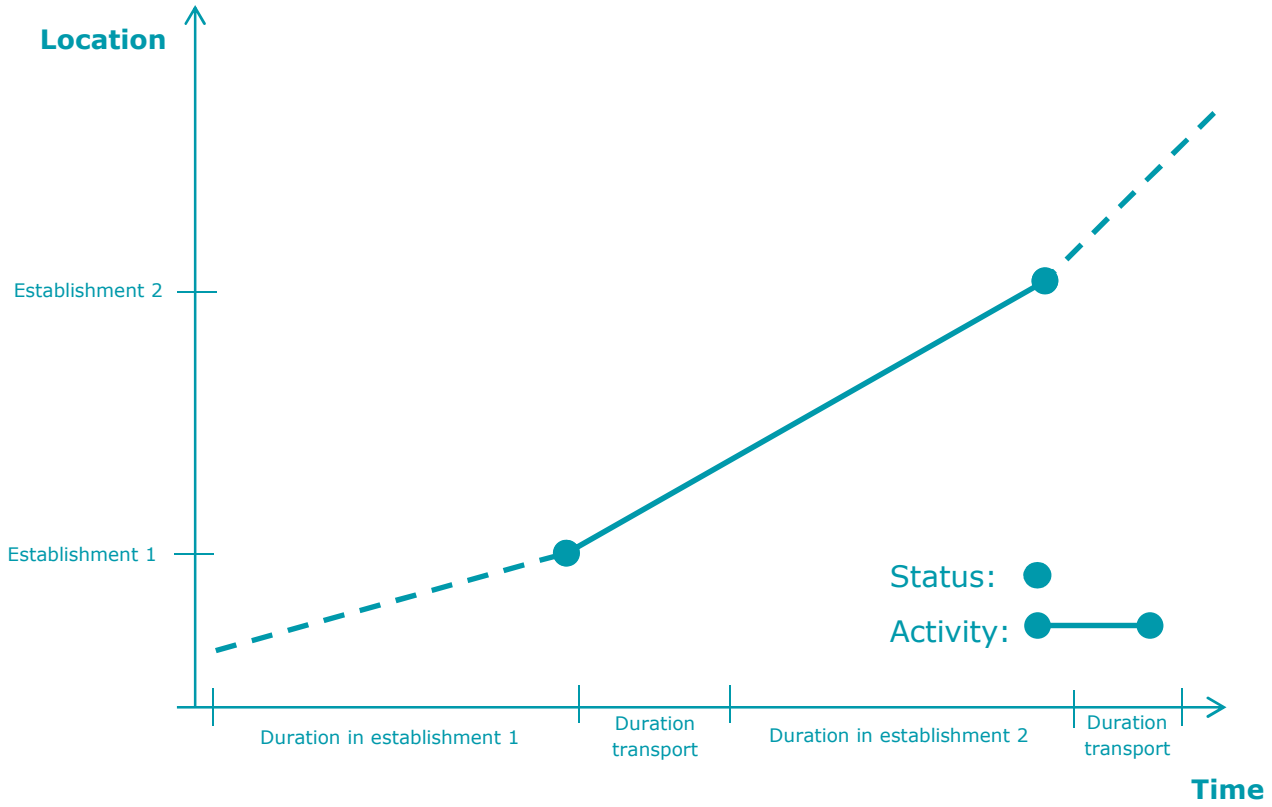
GRANULARITY: DETAILED



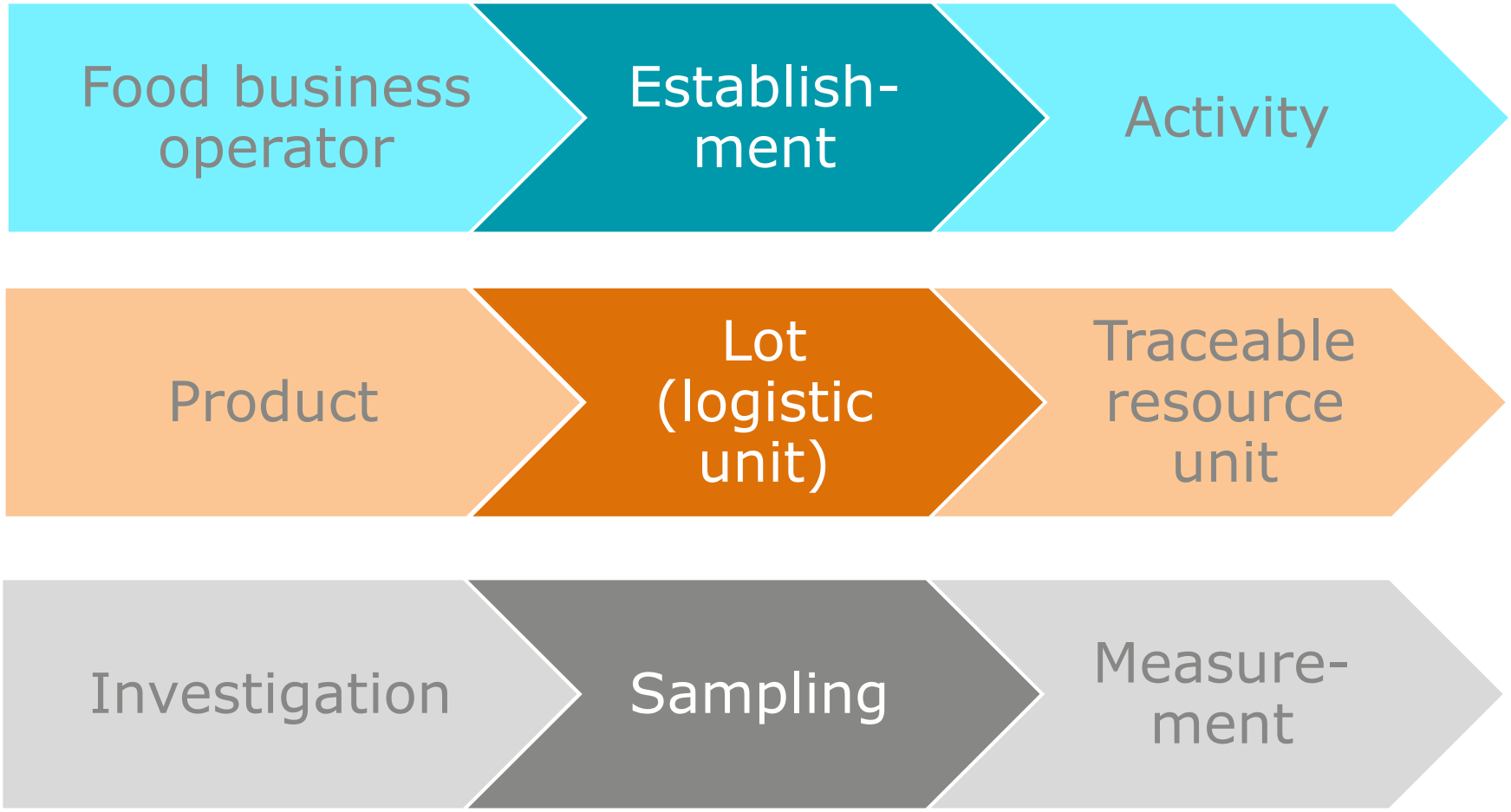
GRANULARITY: MEDIUM



GRANULARITY: ROUGH



Data master tables



Data master table: Establishment

- FBO identifier
- Registration
- Food/feed sector
- Contacts
- Investigation/ Documentation

- Station identifier
- Registration

- Activity identifier
- Activity
- Time
- List of inputs
- List of outputs

Data master table: Lot

- Product identifier
- FBO
- Product class
- Ingredients
- Investigation/ Documentation

- Lot identifier
- Station
- Quantity
- Production time
- Durability
- Sampling

- TRU identifier
- Quantity
- Time

Data master table: Sampling

- Investigation identifier
- Type
- Institution
- Contacts
- Documentation

- Sample identifier
- Time
- Material
- Laboratory
- Documentation

- Test identifier
- Contamination
- Sample amount
- Result qualitativ
- Results quantitativ

Steps of tracing

TRACEABILITY SYSTEMS

How to evaluate and define a traceability system:

Data structure:

Primary activities	**Traceable resource units**

Data collection:

Critical tracing events	**Key data elements**

QUALITY OF TRACEABILITY SYSTEMS

- **The precision** is mainly described by the granularity of the differentiation of the traceable resource units and activities.
- **The completeness** is mainly described by the percentage of necessary information, which it is possible to retrieve retrospectively.
- **The reliability** is mainly described by the accuracy of the stored information.

Tracing Workflow

- 1st step: Identification of the incident
- 2nd step: Definition of starting points
- 3rd step: Search for additional starting points

- 4th step: Search for possible sources (back tracing)
- 5th step: Generation of hypothesis
- 6th step: Analysis of the food & feed chain (Evaluation)

- 7th step: Estimation of the size of the incident (forward tracing)
- 8th step: Estimation of the impact
- 9th step: Risk and uncertainty communication

THANKS FOR YOUR ATTENTION

(Thanks to an unknown lady who permitted this photograph of her tattoo, 2016, photograph by Olaf Mosbach-Schulz)

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