

THE CHALLENGE TO TRACE THE SOURCE OF CONTAMINATION IN THE INTERNATIONAL FOOD AND FEED SUPPLY CHAIN

Oeiras, 22nd February 2023

DISCLAIMER

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CONTENTS

- EFSA's role in tracing outbreaks
- Complexity of Tracing
 - 1st step: Processing
 - 2nd step: Transport
 - 3rd step: Information flow
 - Granularity
- The revised data model



THE DEFINITION

Product traceability¹

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**.

“Reconstructing the food & feed chain”

¹ Adapted from the General Food Law (EC regulation 178/2002) Article 3(15)



THE PERSPECTIVES ON TRACING

Tracing the food & feed chain is in all interest

Industry

- Optimization
- **Tracking**
- Ensure supply
- Ensure quality

Consumer

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

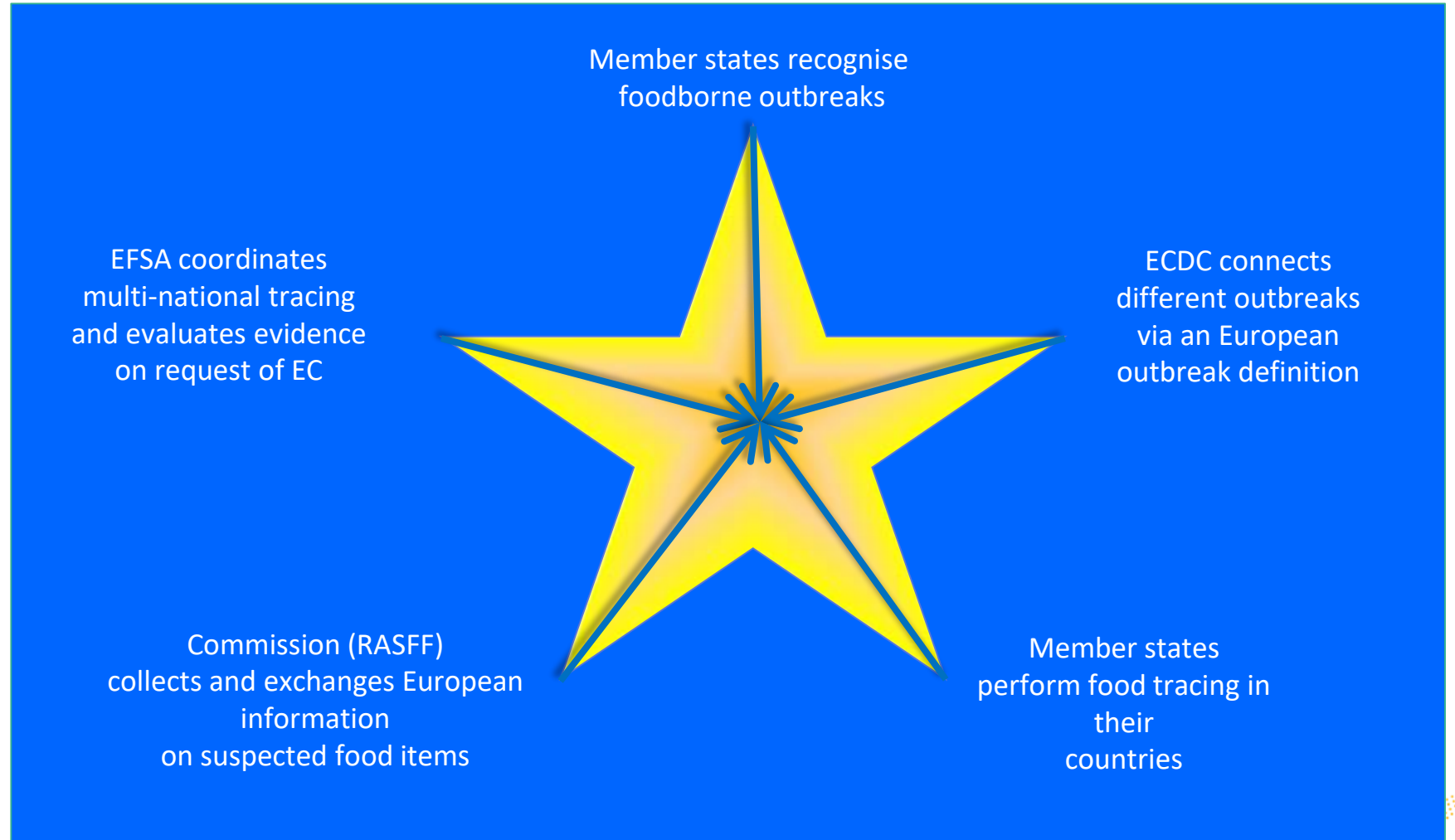
Administration

- **Recall**
- Prohibit food fraud
- **Tracing**
- Ensure food safety
- Ensure food security



EFSAS ROLE IN TRACING

When EFSA gets involved...

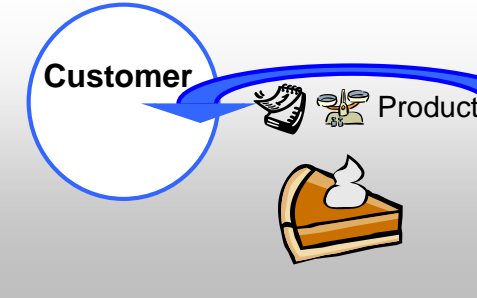
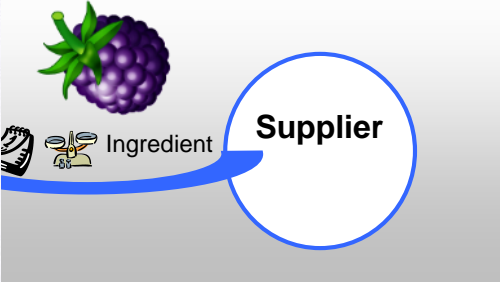


THE PROBLEM

Food business operators shall be

- able to identify any supplier
- to identify any client

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

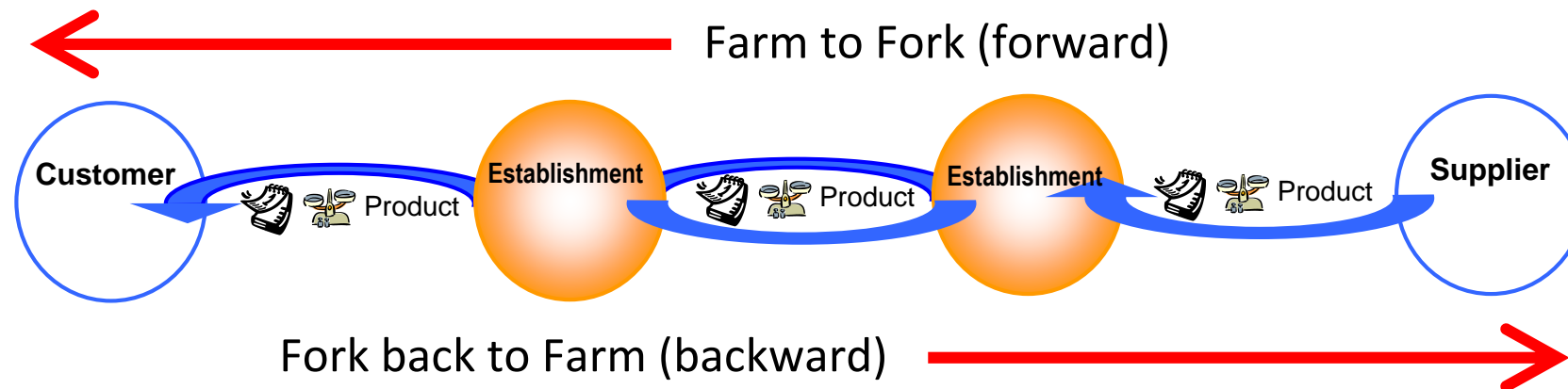
- Information is
- scattered
 - unstructured
 - not machine readable



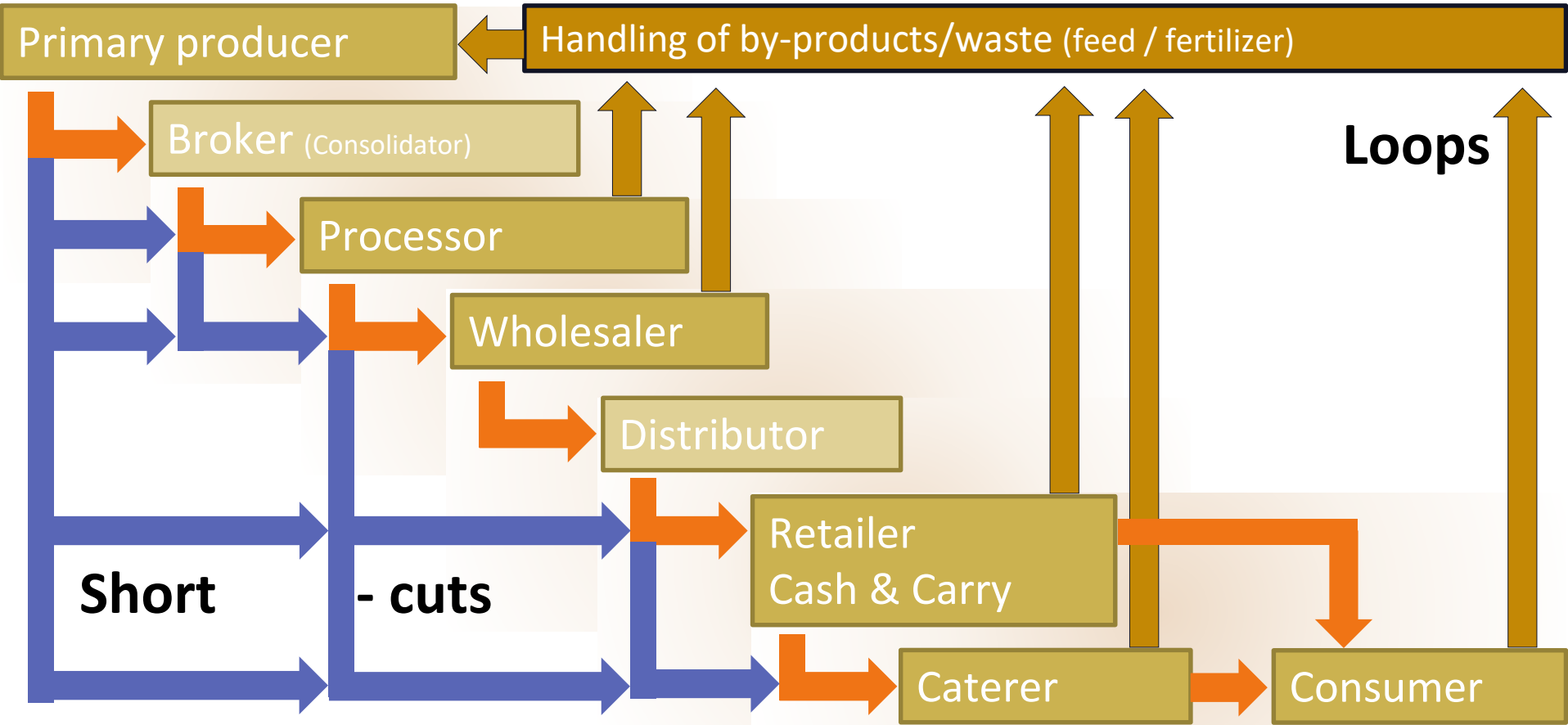
RESULT: THE FOOD SUPPLY CHAIN

Results per analysis:

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



A FOOD CHAIN WITH ITS STAGES / ACTORS



TOOL: FOOD-CHAIN-LAB

The screenshot displays the Food-Chain-Lab software interface. On the left, a database table titled 'Choose [4/268] - Station...' is visible, listing two entries for 'Salad harvester Ltd' with IDs 30 and 31. A dialog box titled 'Replacing dataset '30'' is open, prompting the user to insert the ID of the dataset to be replaced, with '31' entered. On the right, two network visualizations are shown: a detailed network graph on the left and a map-based network visualization on the right, both featuring blue nodes and connecting edges. The map shows a network of nodes across Europe.

Primary production
Processing
Distribution
Final preparation

Contamination

Specialized software:

- collects data in the right structure / performs data validation
- filters and visualizes food supply networks
- performs data analysis: Scoring, cross-contamination, regional analysis



THE COMPLEXITY



THE START: DEMOS PROJECT

Review of tracing methodologies

- General data structure to collect tracing data
- Extensive literature search on existing guidance
- Expert hearings for several food areas:
 - fresh meat
 - Fish
 - ready-to-eat food of animal and non-animal origin
 - and the retail sector



TRACEABILITY SYSTEMS

How to evaluate and define a traceability system:

Data structure:

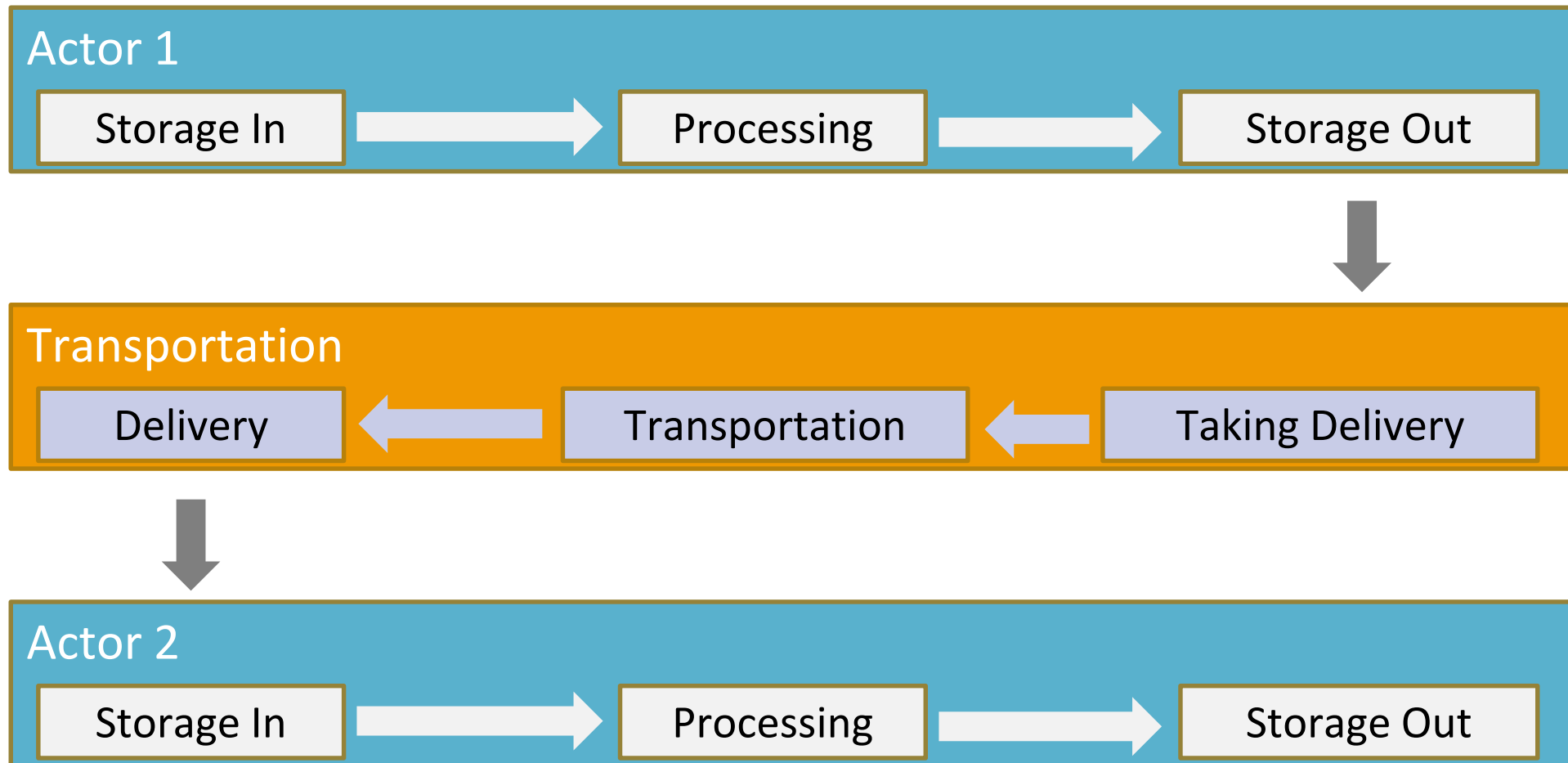
Primary activities	Traceable resource units
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Data collection:

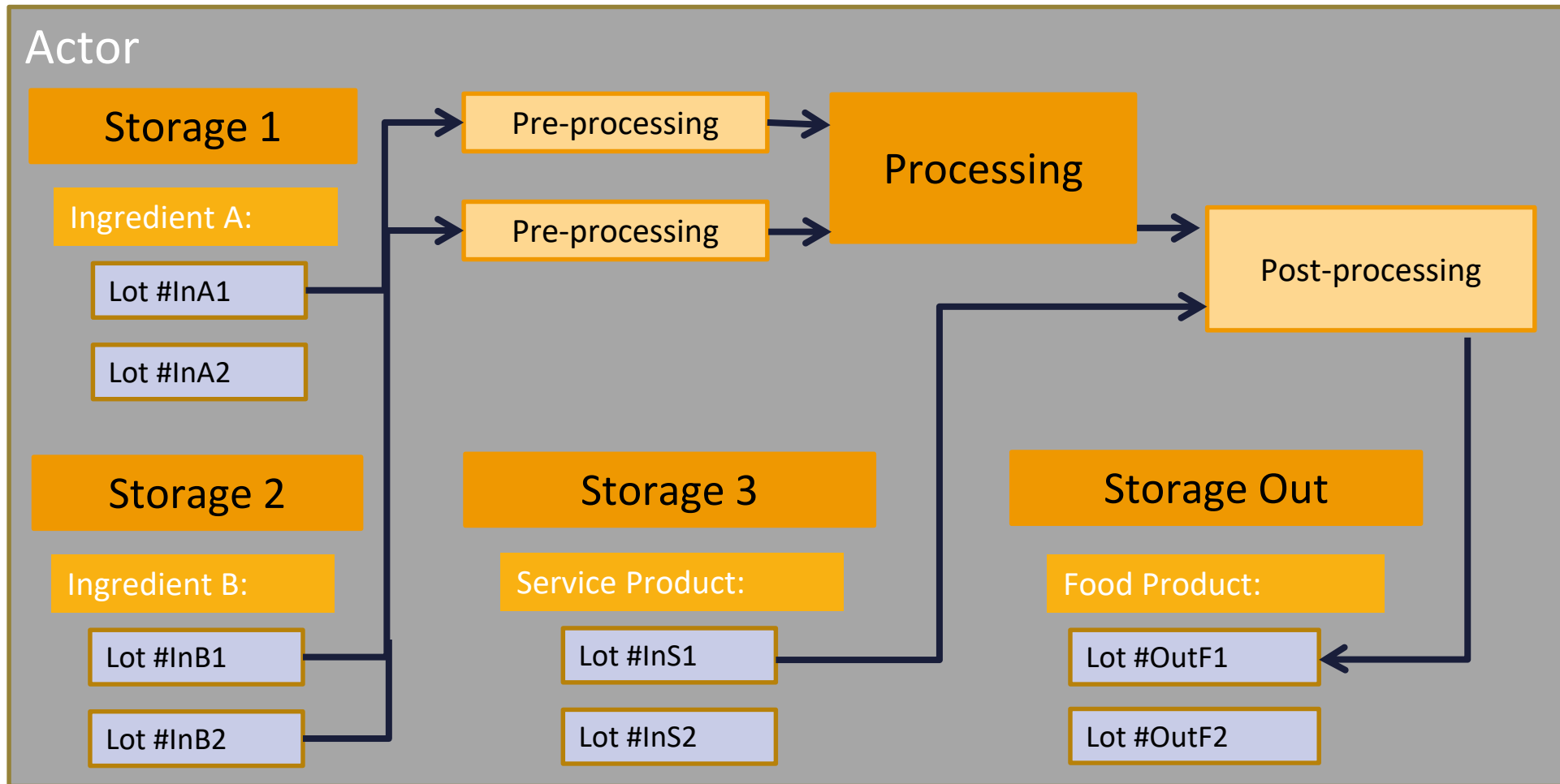
Critical tracing events	Key data elements
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MICRO STRUCTURE



GRANULARITY OF PROCESSING



PROCESSING

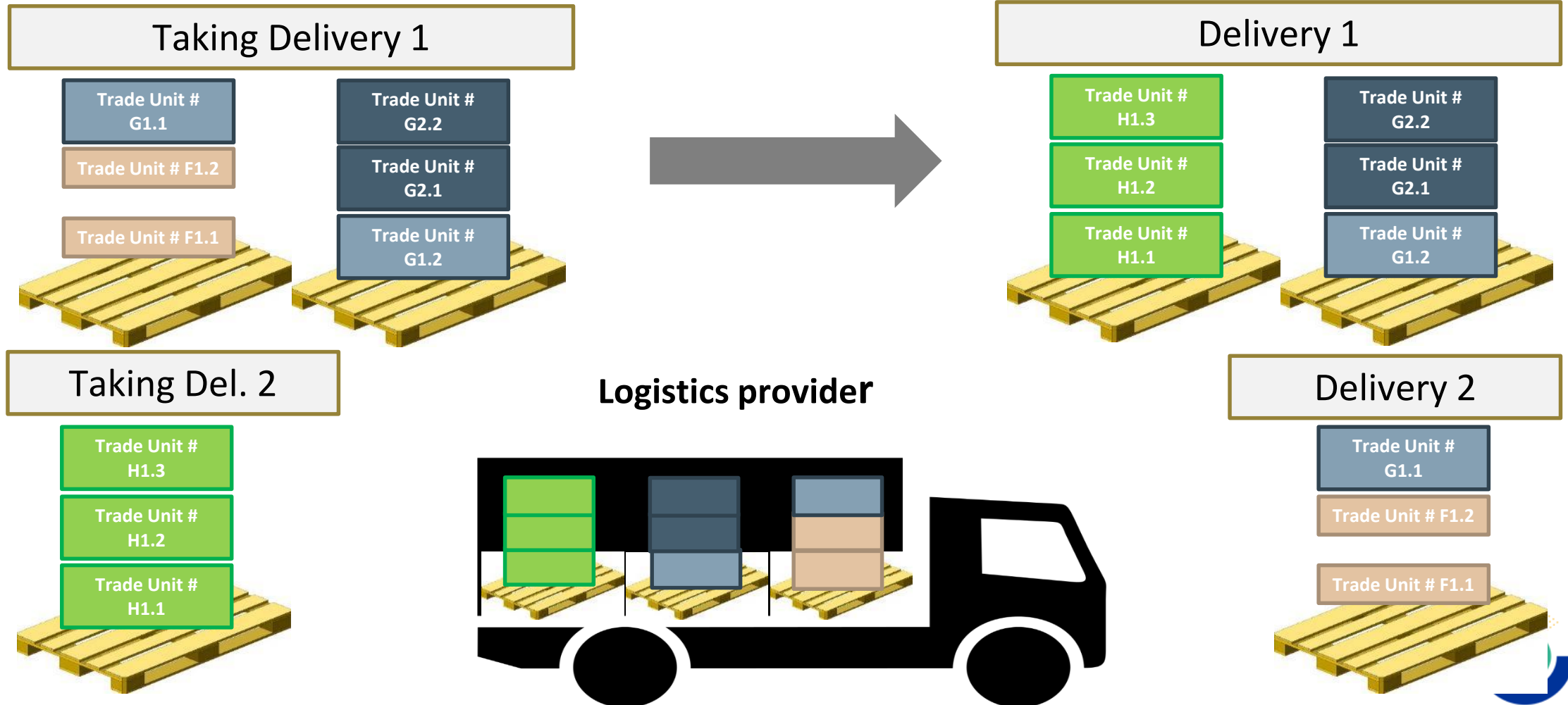
Processing is any change of the product:

Name	Change
Preparation	New product / new lot (time)
Storage	New product characteristics / time
Processing at distribution:	
Trade	New contact (information owner)
Blending, repacking	Merged lots / new consignments
Dividing, splitting	Splitted locations / multiple consignments
Transport as processing:	
Transport	New location (time)



COMPLEXITY OF TRANSPORT

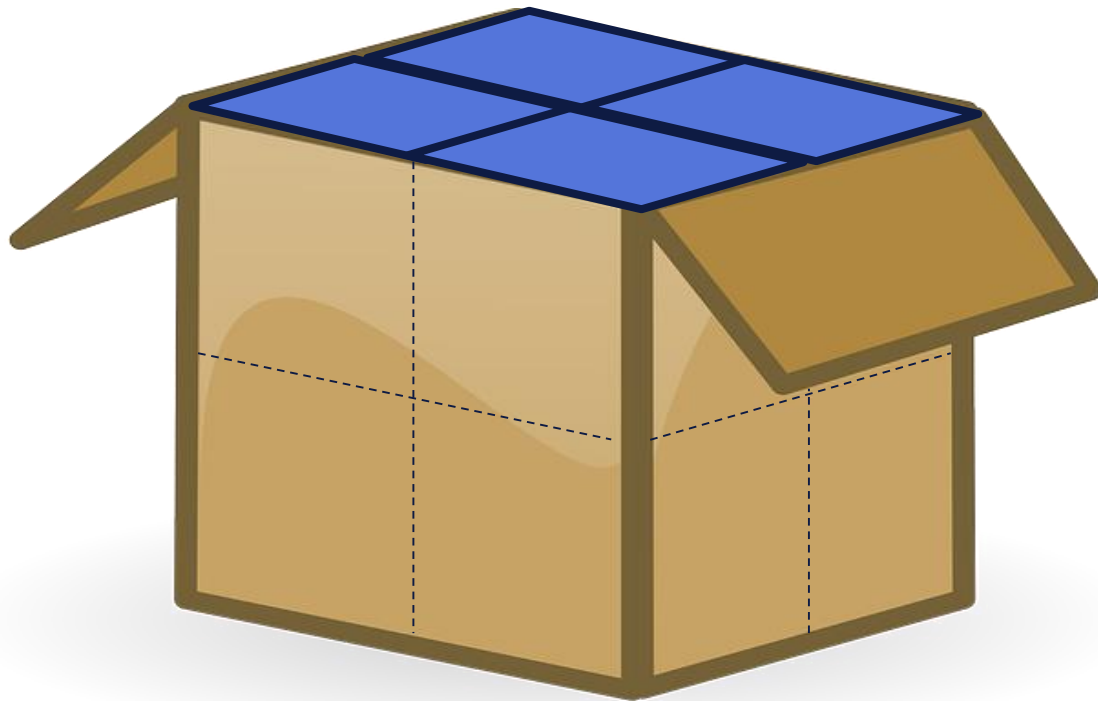
The units of transportations are Logistic Units, e.g. pallets, container etc.



DIVISION OF PRODUCTS DURING DISTRIBUTION

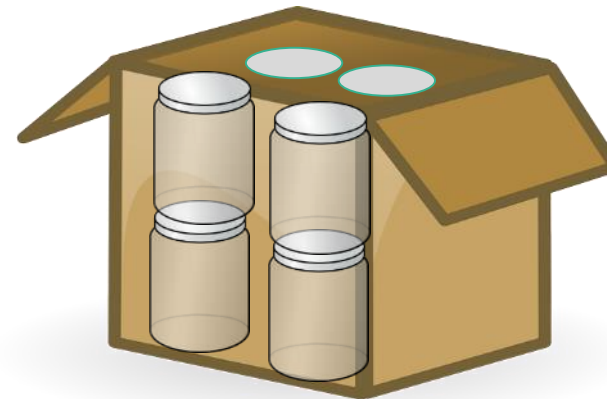
The trade units can change in the food chain, ...

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



... but they are usually defined in the
Product Information Sheet

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



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





DIFFERENT LAYERS OF TRACING

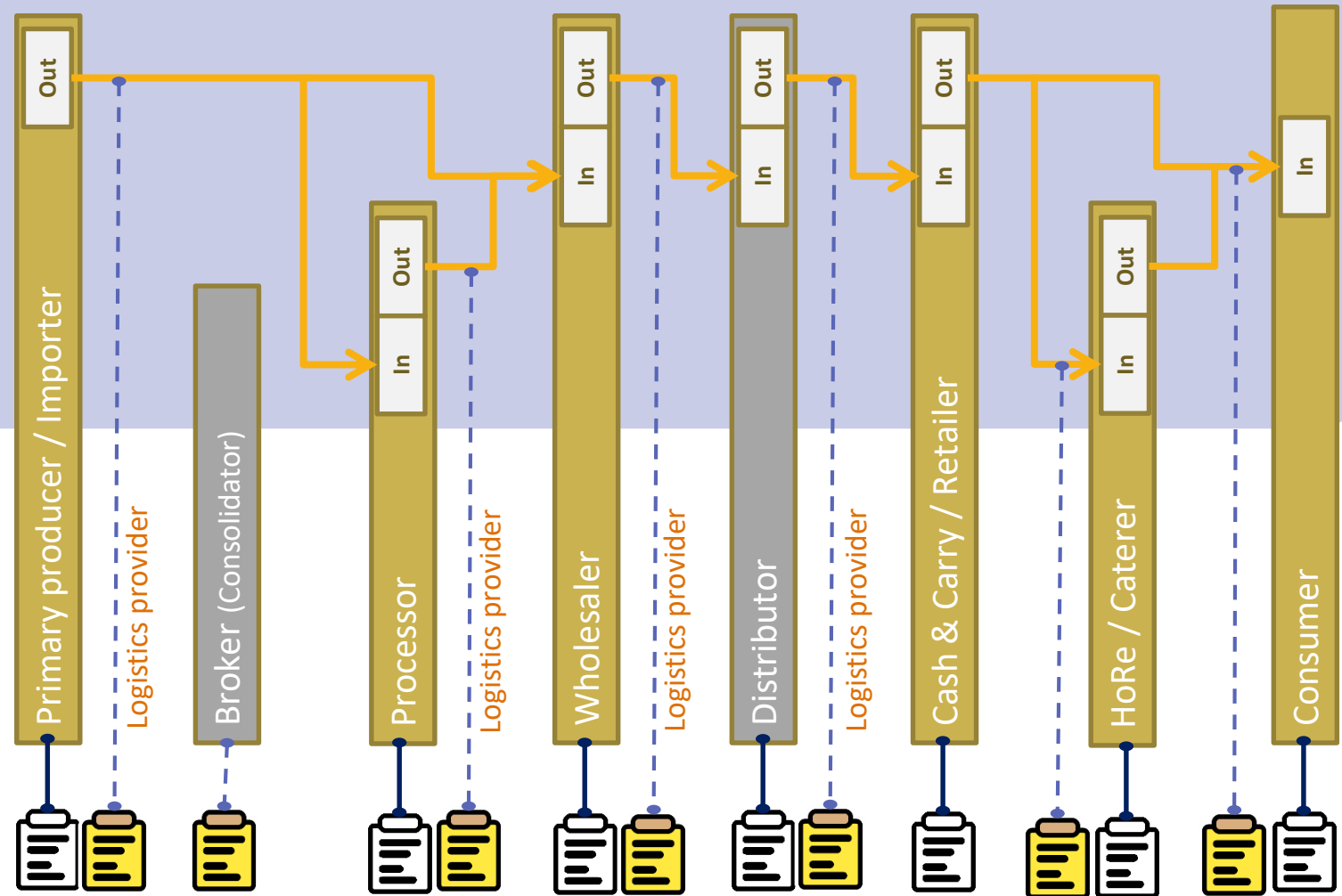
Physical material flow
in the food-supply-chain

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

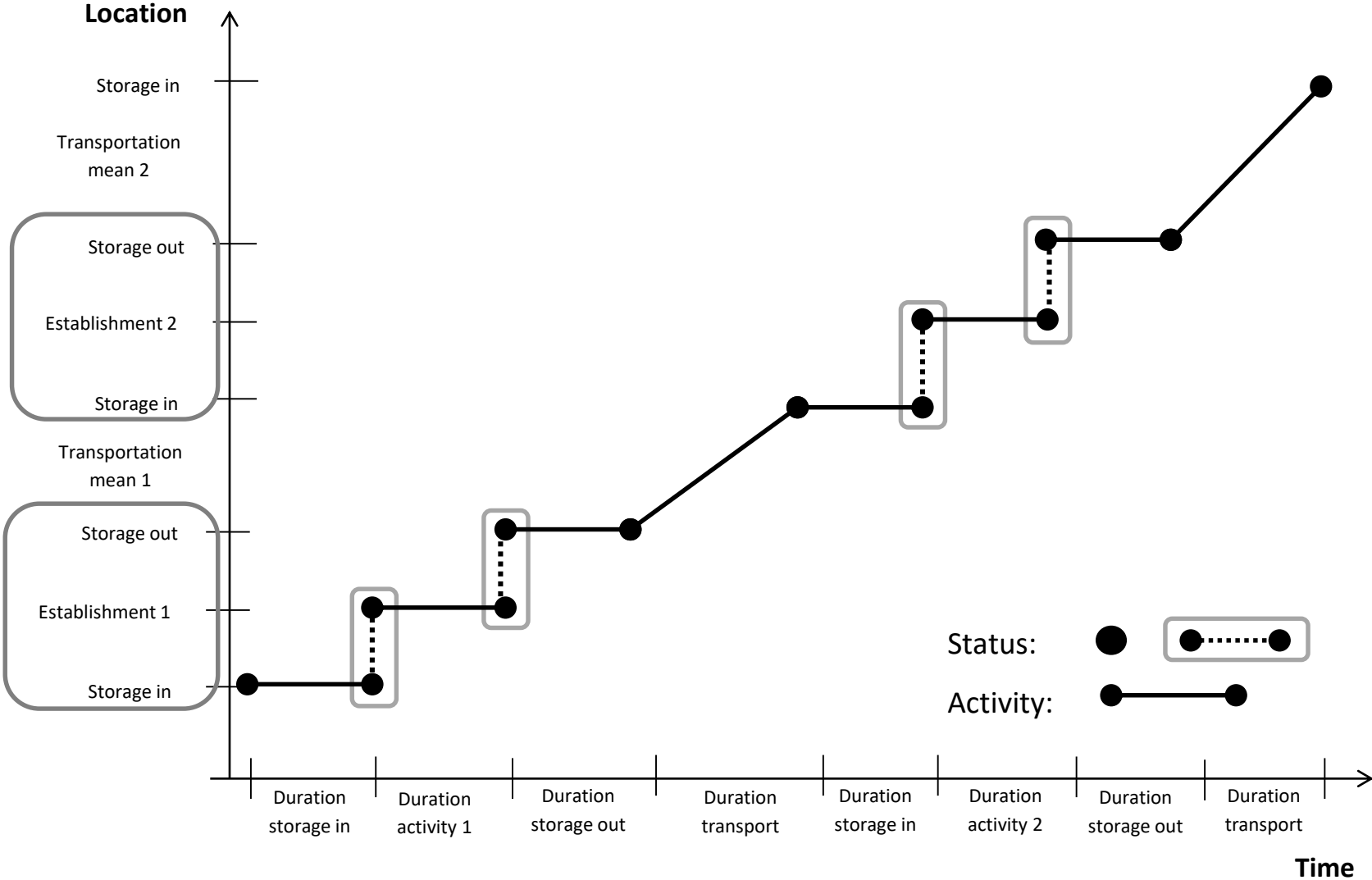
Information holder:

 = product,
 transport

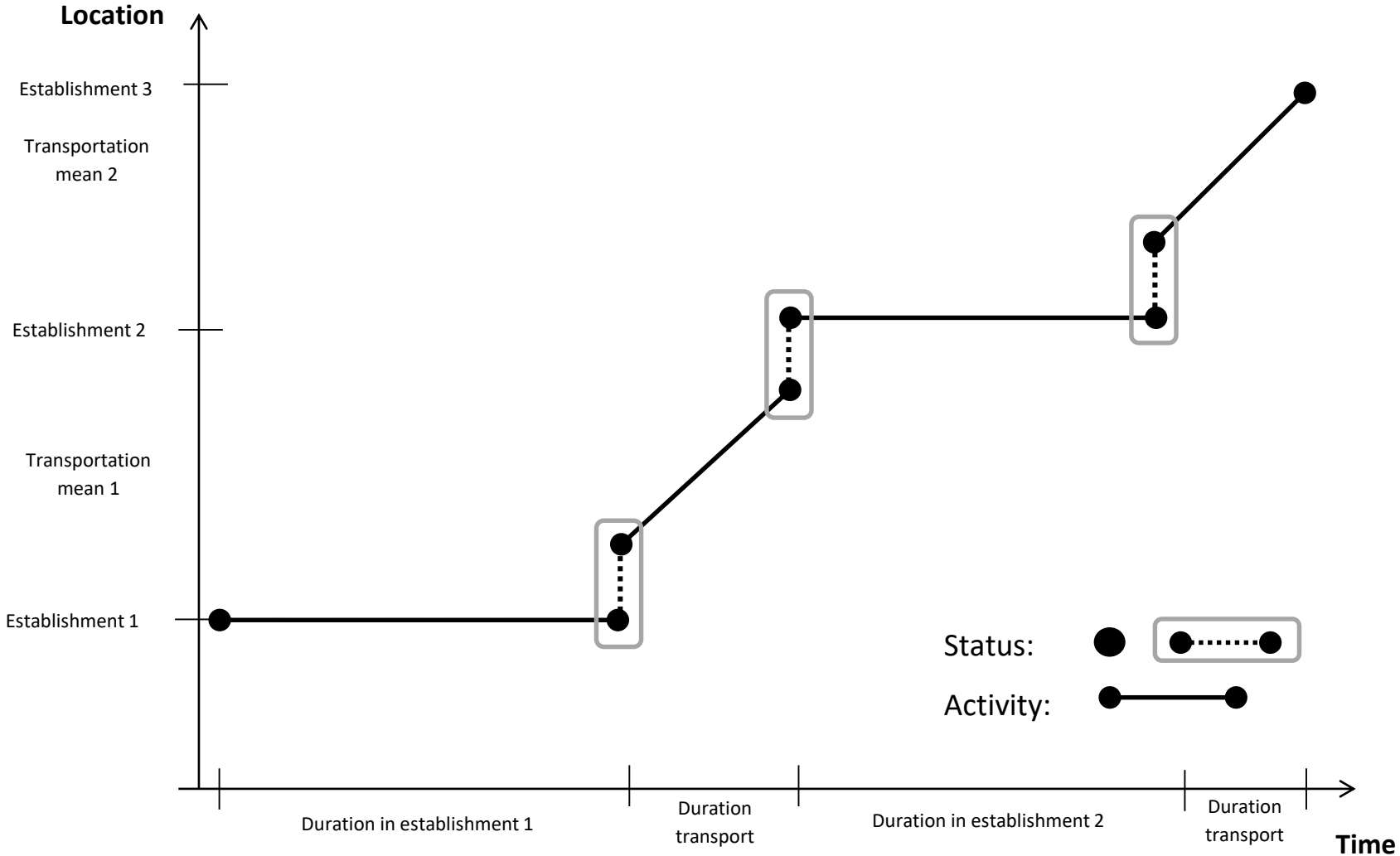
Time 



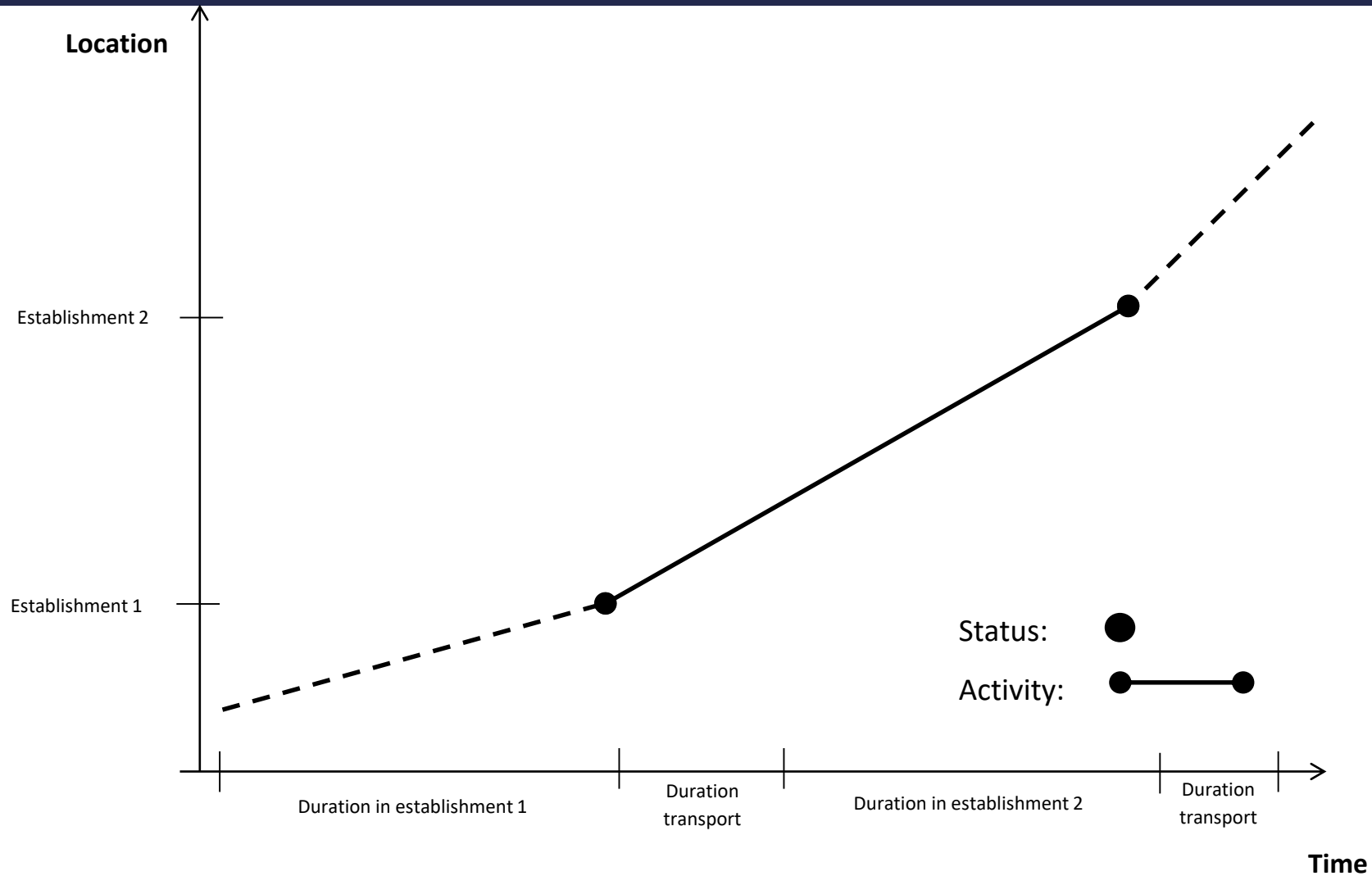
STATUS AND ACTIVITY RECORDS (DETAILED)



STATUS AND ACTIVITY RECORDS (MEDIUM)



STATUS AND ACTIVITY RECORDS (ROUGH)



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.



TRACEABILITY SYSTEMS

Which data do we need
to reconstruct the history of a food item
(suspected to be the cause of a disease) ?



DATA STRUCTURE

Which data are needed for tracing?

- Basic tables:
 - Status: Product, Lot, TRU (WHICH OBJECT?)
 - Transformation: FBO (WHO?), Establishment (WHERE?), Activity (WHAT CHANGE?)
- Coding manual, e.g. granularity, format
- Adaptations, e.g. specific food sectors, actors
- Classification, e.g. food chain, food item, addresses
- Enrichment, e.g. GIS coordinates, register data
- Consistency, e.g. rules, completeness



REVISED DATA STRUCTURE: 9 TABLES

**Food Business
Operator**

Establishment

Activity

Transformation

Product

**Lot / batch
(Logistic unit)**

**Traceable
Resource Unit**

Status

Investigation

**Information
source**

Measurement

Information



THANK YOU 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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