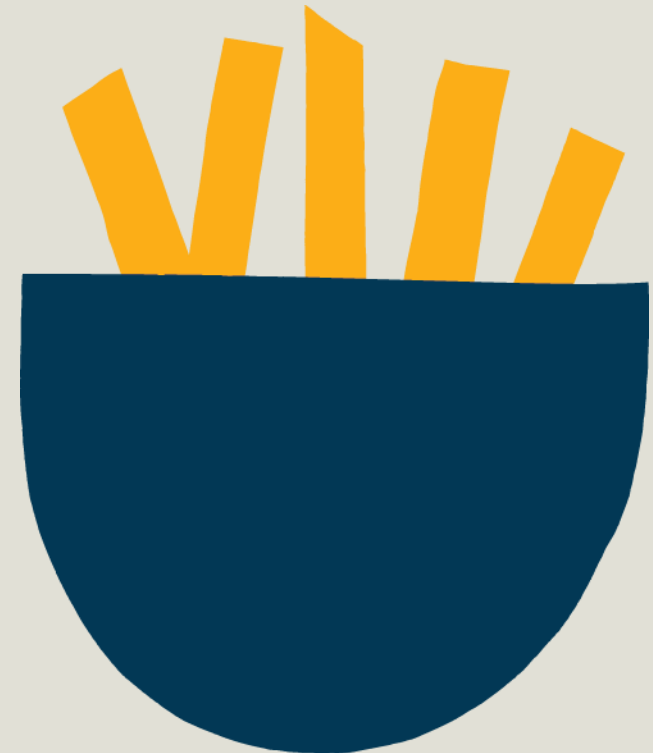




# Conditioned Goods: temperature tracking with connected sensors

June 2022, Maxime Bouillon

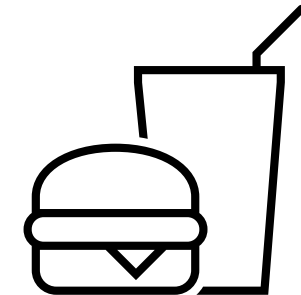
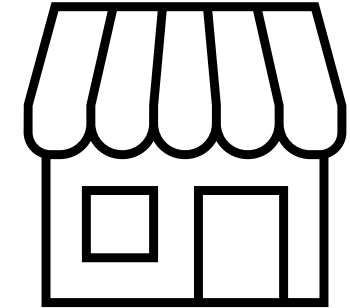
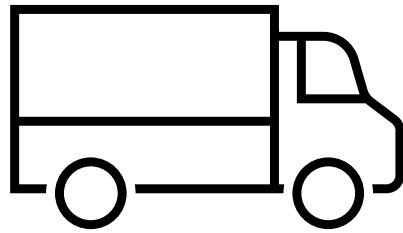
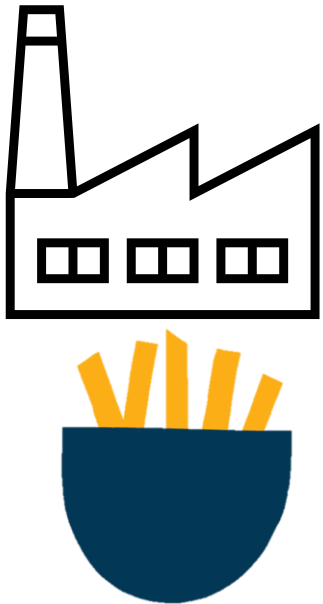




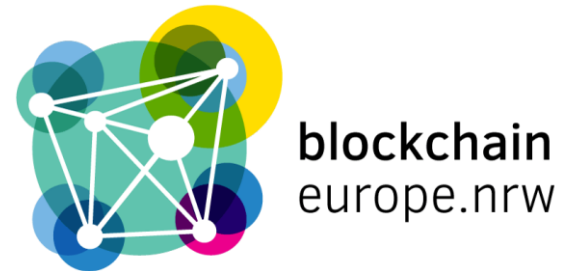
## Maxime Bouillon

- Industrial system engineer, 3 years @Faurecia
- 3 years of ZZP, social entrepreneur
- Researcher & teacher @Windesheim since 2020
- Ecology, supply chain, emerging techs

# Picture a cold chain



# Who are we?



# Research questions



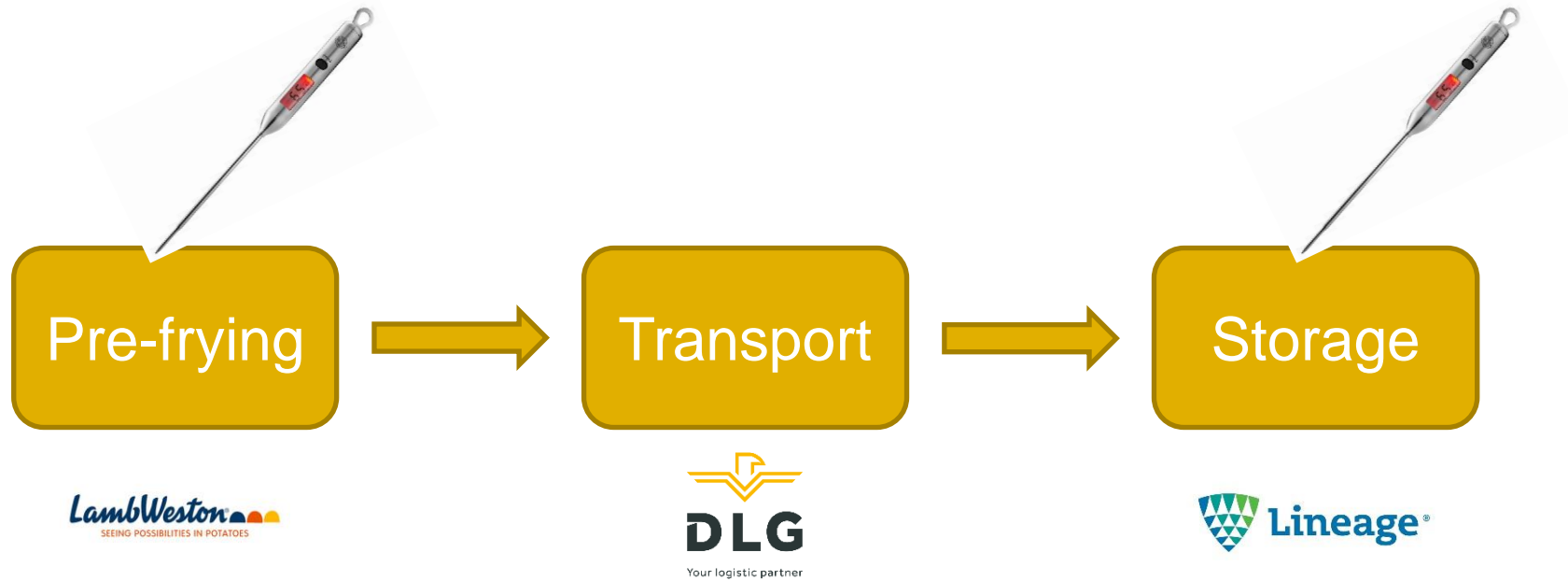
- 🟡 What is the value of real time data for the stakeholders in the process studied ?
- 🟡 Can blockchain help Lamb Weston to manage their data between pre-frying & storage?
- 🟡 What further process optimization can be achieved next?

# Current situation

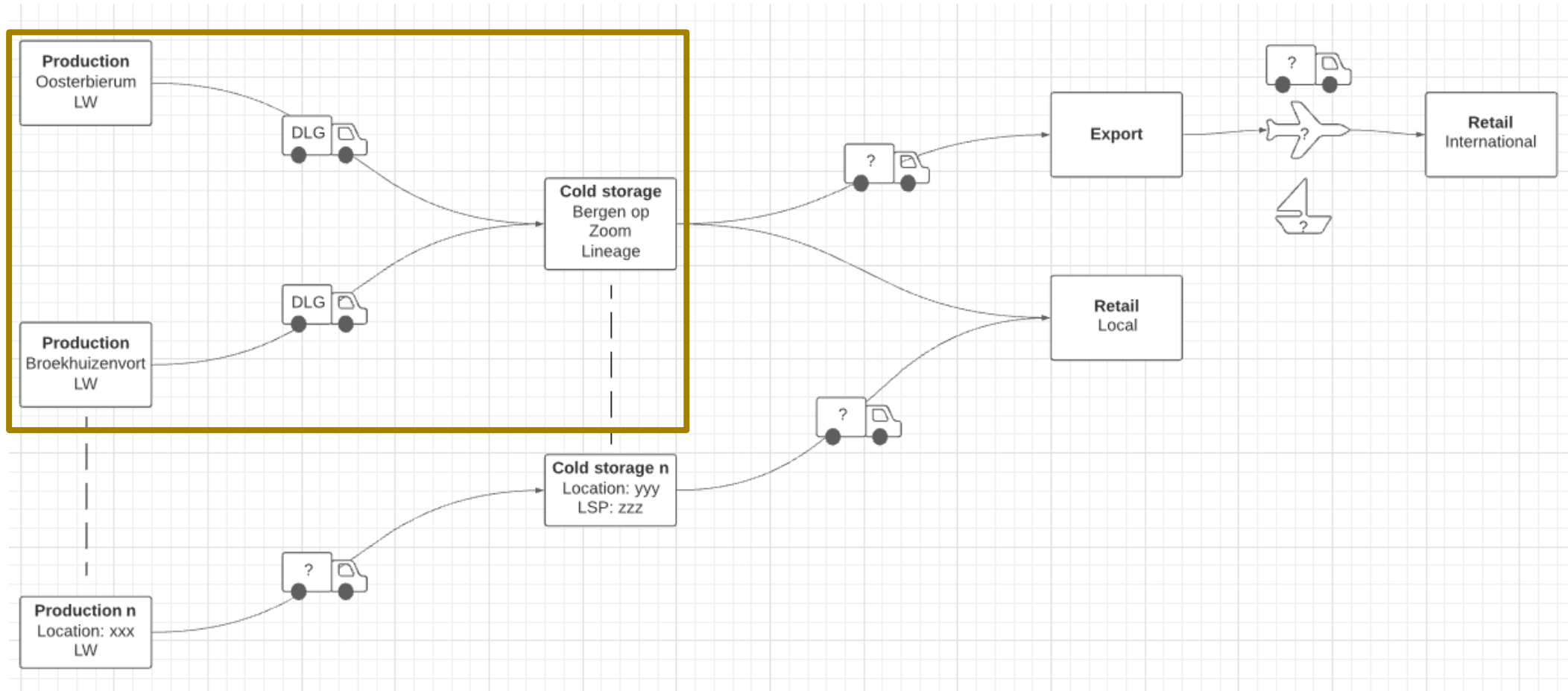


- 🟡 A producer, a transport, a cold storage (3PL)
- 🟡 About temperature logging and recording
- 🟡 Normally processed **manually** via thermometer & recorded by hand
- 🟡 Leading to **inaccuracies** in processes and **wastes**

# Current situation



# Current situation





# Envisioned solution



- 🟡 Not a big problem (yet)
- 🟡 Expansion of the chain soon (multi modal & stakeholders)
- 🟡 There is a potential for a better temperature management (a.k.a. energy saving)

A tool to get **insight on temperature, facilitate dispute management and enable process improvement**

# Work done during use case



🟡 Feasibility study

🟡 Sensor experiment

🟡 Blockchain-based web application

# Work done during use case

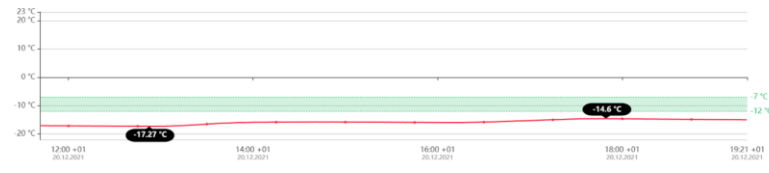
Both sensors attached inside a box

Both sensors attached outside a box

- Sensor placed inside the box with fries
- Attached to pallet



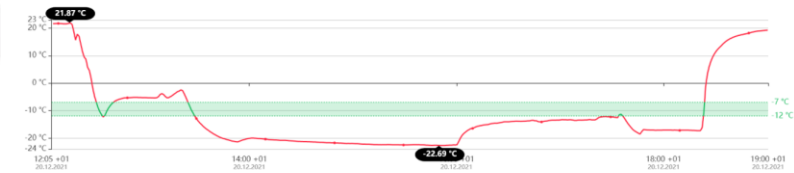
Sensor xxx346



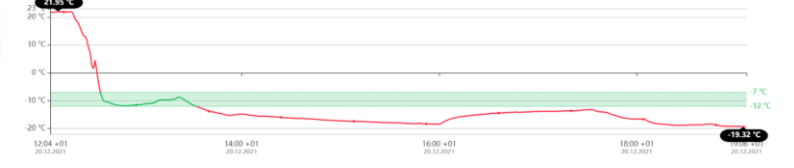
Sensor xxx660



Sensor xxx393



Sensor xxx402

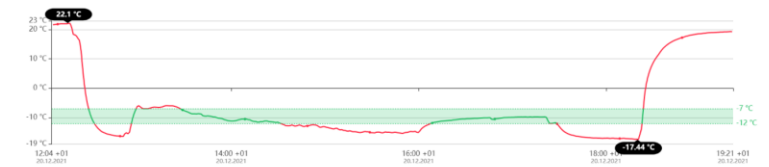


Both sensors attached outside a box

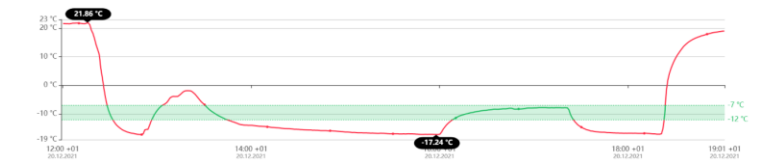
Both sensors attached outside a box  
One inside the reefer, the other in the driver's cabin



Sensor xxx415



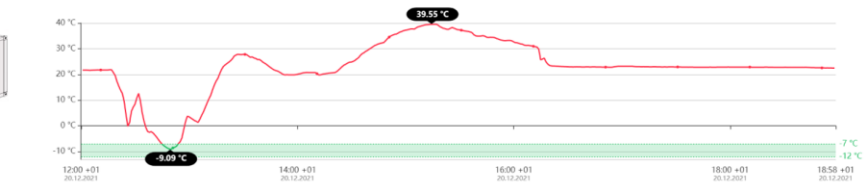
Sensor xxx021



Sensor xxx506



Sensor xxx369



# Work done during use case



CONDGOODS

PAGES

- DASHBOARD
- ALL SHIPMENTS
- ADD SHIPMENT

DASHBOARD

ID	SENSORS	TEMPERATURE	LAST UPDATED	CREATED ON
#1	0	-	-	01-06-2021 00:11:27
#11	1	-	-	01-06-2021 13:56:50
#12	0	-	-	01-06-2021 13:56:56
#13	1	-	-	01-06-2021 13:57:00
#14	1	-	-	01-06-2021 13:57:03
#15	1	-10	-	01-06-2021 13:56:49
#2	0	-	-	01-06-2021 00:11:31
#3	0	-	-	01-06-2021 00:11:35
#4	0	-	-	01-06-2021 00:11:39
#5	0	-	-	01-06-2021 00:11:42
#7	1	-	-	01-06-2021 00:11:48
#8	1	-	-	01-06-2021 00:11:52

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CONDGOODS

PAGES

- DASHBOARD
- ALL SHIPMENTS
- ADD SHIPMENT

DASHBOARD

Add Shipment

Shipment ID:

shipment ID

Add Shipment

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CONDGOODS

PAGES

- DASHBOARD
- ALL SHIPMENTS
- ADD SHIPMENT

DASHBOARD

Shipment

**-6** °C

Last temperature

Shipment ID  
#1

Sensors  
2

Creation date  
01-06-2021 00:11:27

HISTORY

Temperature

Measurements

SENSOR	VALUE	TIMESTAMP
#5	-6	01-06-2021 14:05:33
#5	-10	01-06-2021 14:18:53
#5	-10	01-06-2021 14:02:13

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CONDGOODS

PAGES

- DASHBOARD
- ALL SHIPMENTS
- ADD SHIPMENT

DASHBOARD

Search shipment

ID	SENSORS	TEMPERATURE	LAST UPDATED	CREATED ON
#1	2	-10	01-06-2021 14:02:13	01-06-2021 00:11:27
#11	1	-	-	01-06-2021 13:56:50
#12	0	-	-	01-06-2021 13:56:56
#13	1	-	-	01-06-2021 13:57:00
#14	1	-4	01-06-2021 14:02:13	01-06-2021 13:57:03
#15	1	-10	-	01-06-2021 13:56:49
#2	0	-	-	01-06-2021 00:11:31
#3	0	-	-	01-06-2021 00:11:35
#4	0	-	-	01-06-2021 00:11:39
#5	0	-	-	01-06-2021 00:11:42
#7	1	-	-	01-06-2021 00:11:48
#8	1	-	-	01-06-2021 00:11:52

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# Hurdles & benefits



## Hurdles

- 🟡 Sensor testing and operationalization
- 🟡 Multi-stakeholder coordination
- 🟡 Picking and adapting the best blockchain environment
- 🟡 Combining sensors & blockchain

## Benefits

- 🟡 Give a controlled access to information
- 🟡 Receives data from smart sensors
- 🟡 Facilitates disputes
- 🟡 Enables process improvement with weaknesses highlighted
- 🟡 Better energy management

# What's next?



- 🟡 Gathering learnings in a one-pager

- 🟡 Closing consortium in July

- 🟡 Currently in discussion to expend work on sensors with Lamb Weston