Now it's your turn

You have the task of developing a company towards Industry 4.0

Framework

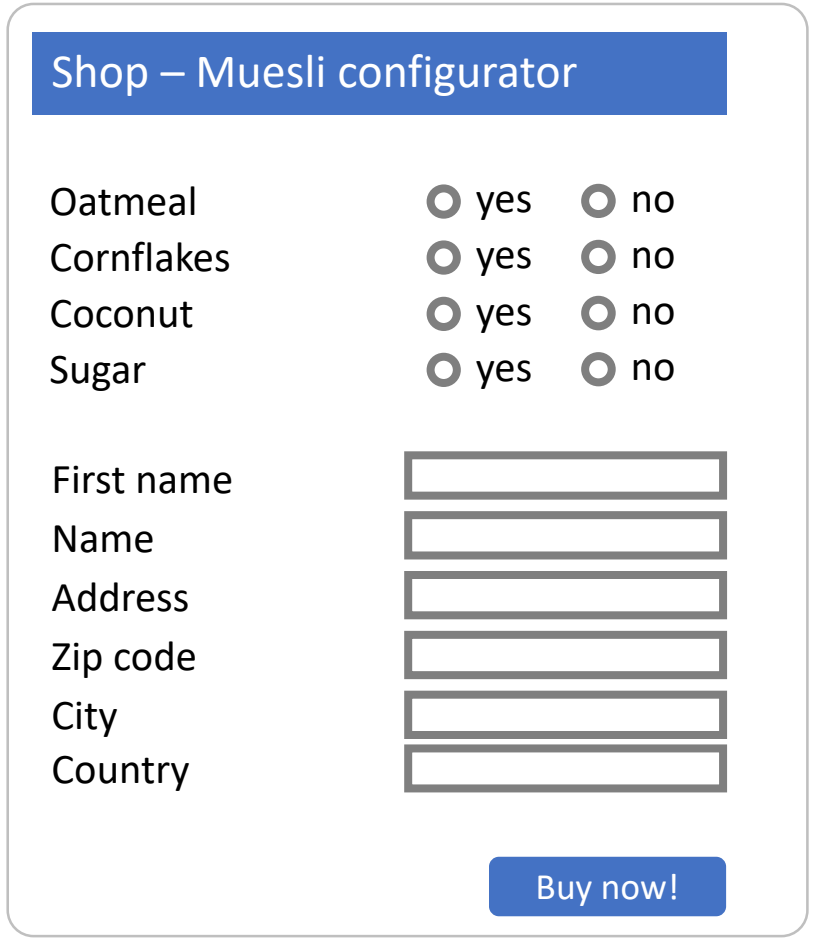
The company:

- The company's business model consists of the customized combination of mueslis and a customer-specific label.
- The customer selects the composition in an online configurator and receives his individual muesli within a few days.
- The company usually delivers within two days, but the customer is always given 1 week, as this time is needed if there are machine failures (especially the bottling plant is often clogged when it is too warm).
- Suppliers supply the company once a week.

The task:

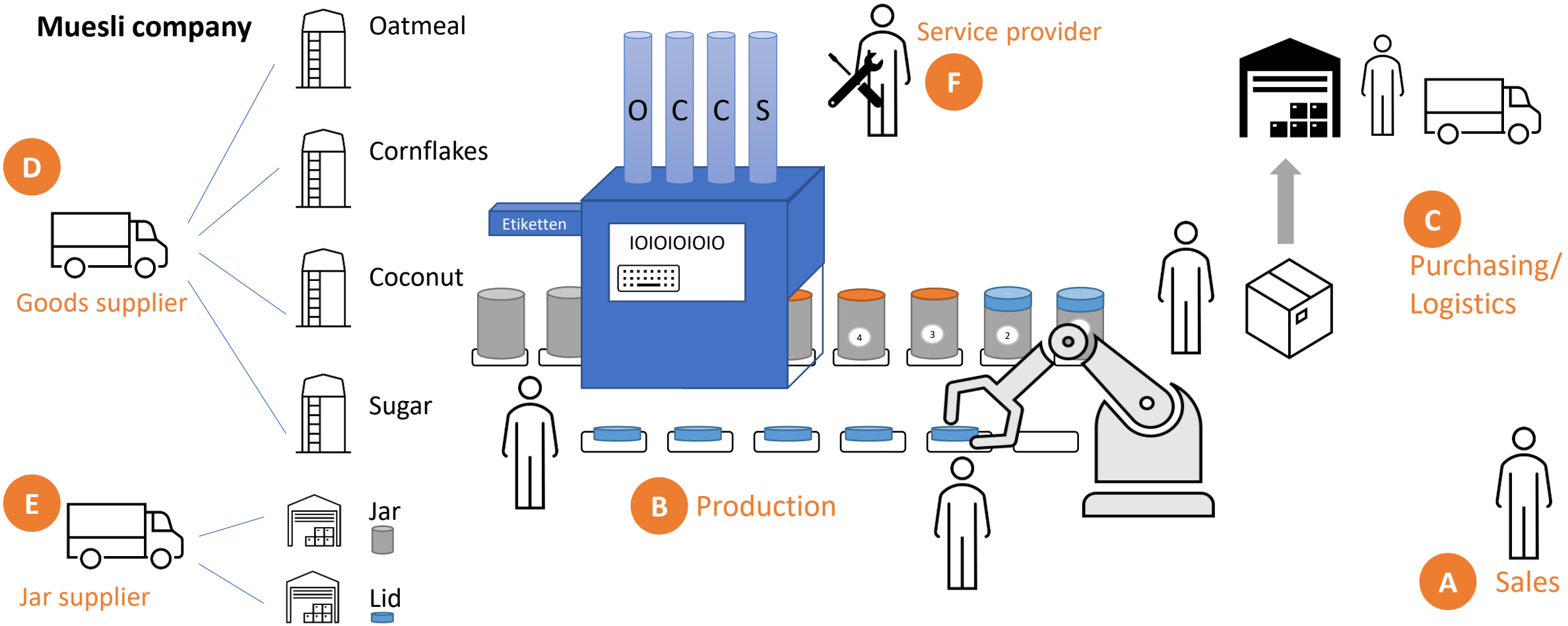
- The aim is to develop the company and its partners towards an Industry 4.0 and sustainable value-adding network
- You work in fixed groups, each of which represents a partner in the network.
- The aim of each group is to convince the other groups that your approach is being implemented and that the other partners are willing to make the necessary investments.
- Company records for a typical month are available for processing the tasks.
- The interim results are presented and discussed.
- The individual work steps build on one another and are spread over the semester.
- An exchange between the groups can also be helpful for working on the tasks.

Muesli company - configurator



- In the configurator, the customer assembles the muesli.
- To reduce the complexity of the task, the choices are very simple.

Muesli Company – Supply Chain



Tasks

Please form the following groups:
(A) Sales, (B) Production, (C) Purchasing/Logistics, (D) Goods supplier, (E) Jar supplier, (F) Service provider

The tasks:

1. Please describe in your group the processes and data that are exchanged with the other partners. Where do you see potential for improvement or innovation in terms of time, quality, costs, risks, sustainability? What is the highest potential for you? What is best for an initial implementation project?
2. Please select a topic for which you explain the necessary changes in terms of process and data. Please address the following aspects in particular: technology, standards, law, security, people‘s work.
3. On the basis of the existing sample data, please create a scenario with the changes / extensions you have proposed. Please also use suitable visualizations for this. Explain how the communication / data exchange between the partners can take place. Orientate yourself to RAMI 4.0.
4. Please create an overall concept for the implementation of your project and explain which partner is affected by which changes. Explain at leat one KPI to measure the success of your project. Please also refer to the necessary investments, the timeline and the benefits of the partners concerned. The aim of your group is to convince the partners of your plan.

1) Make-to-order process

	Step 1: Configurator	Step 2: Order confirmation	Step 3: Production planning	Step 4: bottling and sealing	Step 5: Packaging and shipping
Description	The customer configures a muesli in the online configurator and receives a confirmation of receipt.	The order processor checks the data and assigns a delivery date of 1 week, usually the delivery takes place faster.	In production, the orders for the machine are scheduled by the dispatcher. The order of similar mixtures is manually optimized.	The orders are transferred to the machines via an MES. The filling levels are controlled via the orders. The operator monitors the process and provides the jars and lids.	The production orders reported as completed from production are packed in logistics and made available on the dispatch area. The parcels are picked up daily at 2:00 p.m.
Result	customer request	Sales order with delivery date	Fixed production order	Finished Production order	Ready-to-ship package
Tool	Web shop	ERP system	ERP system	MES/SCADA/PLC	ERP system
Responsible	Sales	Sales	Production	Production	Logistics

2) Purchasing process

	Step 1: Demand planning	Step 2: Order	Step 3: Order confirmation	Step 4: Goods receipt
Description	The quantities of raw materials are planned on the basis of past values; average quantities required for one order per week are generated per supplier.	The orders are sent by email to the suppliers with a week-specific delivery date.	The suppliers send an order confirmation via email. Each supplier has a fixed delivery day per week. The supplier of goods has to come with at least two trucks, because the quantities are so large, the material supplier usually comes with a half-full truck.	The delivery is carried out by the supplier according to the delivery date. The goods receipt is posted against the purchase order.
Result	Purchase requisition	Order with desired date	Scheduled delivery date	Stock
Tool	ERP system	ERP system	ERP system	ERP system
Responsible	Purchasing	Purchasing	Purchasing	Logistics

3) Maintenance/ trouble shooting

	Step 1: Maintenance window	Step 2: Supplier Request	Step 3: Maintenance	Step 4: disorder
Description	The machine must be serviced weekly. The maintenance window is scheduled by production department.	Based on the maintenance window, the purchasing department sends the appointment request to the service provider. There is a framework agreement for this.	The service provider carries out the maintenance according to plan. Usually, the entire time window is not required for maintenance.	If a disorder occurs, it is contractually agreed that the service provider will correct the fault within 4 hours from notification.
Result	Maintenance date	Order with desired date	Maintenance log	Fixed fault
Tool	ERP system	ERP-System	MES/SCADA/SPS	MES/SCADA/SPS
Responsible	Production	Purchasing	Service provider	Service provider

Muesli company - available data (ERP)

partner
- partner_id
- first_name
- last_name
- address
- birth_date
- zip
- city
- country
- phone
- mobile
- e-Mail
- gender
- customer_creation

customer_request
- request_id
- request_created (datetime)
- partner_id
- oatmeal (no:0/ yes:1)
- cornflakes (no:0/ yes:1)
- coconut (no:0/ yes:1)
- sugar (no:0/ yes:1)

customer_order
- request_id
- customer_order_id
- order_created (datetime)
- partner_id
- oatmeal (no:0/ yes:1)
- cornflakes (no:0/ yes:1)
- coconut (no:0/ yes:1)
- sugar (no:0/ yes:1)
- delivery_date (date)

production_order
- production_order_id
- customer_order_id
- oatmeal (no:0/ yes:1)
- cornflakes (no:0/ yes:1)
- coconut (no:0/ yes:1)
- sugar (no:0/ yes:1)
- delivery_date (date)
- start_time (datetime)
- duration (min)
- status (initial, released, partlyconfirmed, confirmed, final)

Muesli company - available data (containers/plants)

bottling_plant
- bottling_timestamp (datetime)
- jar_state (0: jar in position; 1: jar labeled, 2: jar ready for filling; 3: jar filled with oatmeal, 4: jar filled with cornflakes, 5: jar filled with coconut, 6: jar filled with sugar, 7: no jar available, 8: error)
- oatmeal_state (0: empty, 1: filled, waiting for jar, 2: error)
- cornflakes_state (0: empty, 1: filled, waiting for jar, 2: error)
- coconut_state (0: empty, 1: filled, waiting for jar, 2: error)
- sugar_state (0: empty, 1: filled, waiting for jar, 2: error)

locking_robot:
- locking_timestamp (datetime)
- jar_state (0: jar in position; 1: lid in position, 2: jar ready for locking; 3: jar locked, 4: no jar available, 5: no lid available)

oatmeal_container
- timestamp (datetime)
- full (1)
- empty (0)

cornflakes_container
- timestamp (datetime)
- full (1)
- empty (0)

coconut_container
- timestamp (datetime)
- full (1)
- empty (0)

sugar_container
- timestamp (datetime)
- full (1)
- empty (0)