



Parallel Session 3

From Data to Action – Simulation Tools for FLW
Intervention Design

Agenda

- ZEROW WP3: Applications and Services- John McLaughlin
- CHORIZO: FWL Rapid Appraisal/Visualizer Tool – Caterina Rettore and Matteo Vittuari
- ZEROW WP1: Results of an economic model - Frank Pijpers



ZeroW WP3

Applications and Services

Providing data-driven intelligence services and applications, plus supporting infrastructure, to assist with aspects of FLW management cross the food supply chain

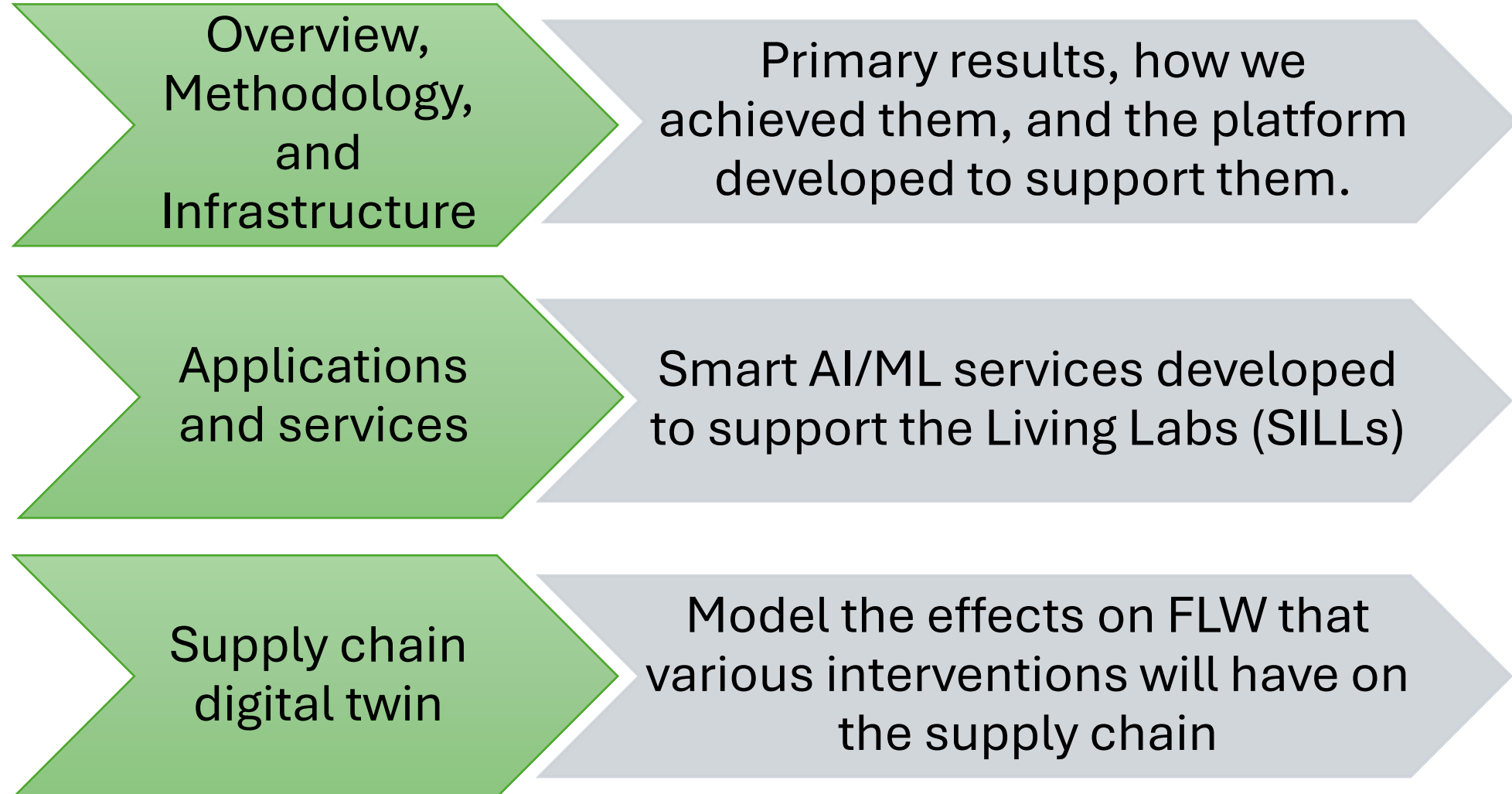
John McLaughlin

Technical Lead

South East Technological University

16th September 2025

Introduction – What We'll Cover





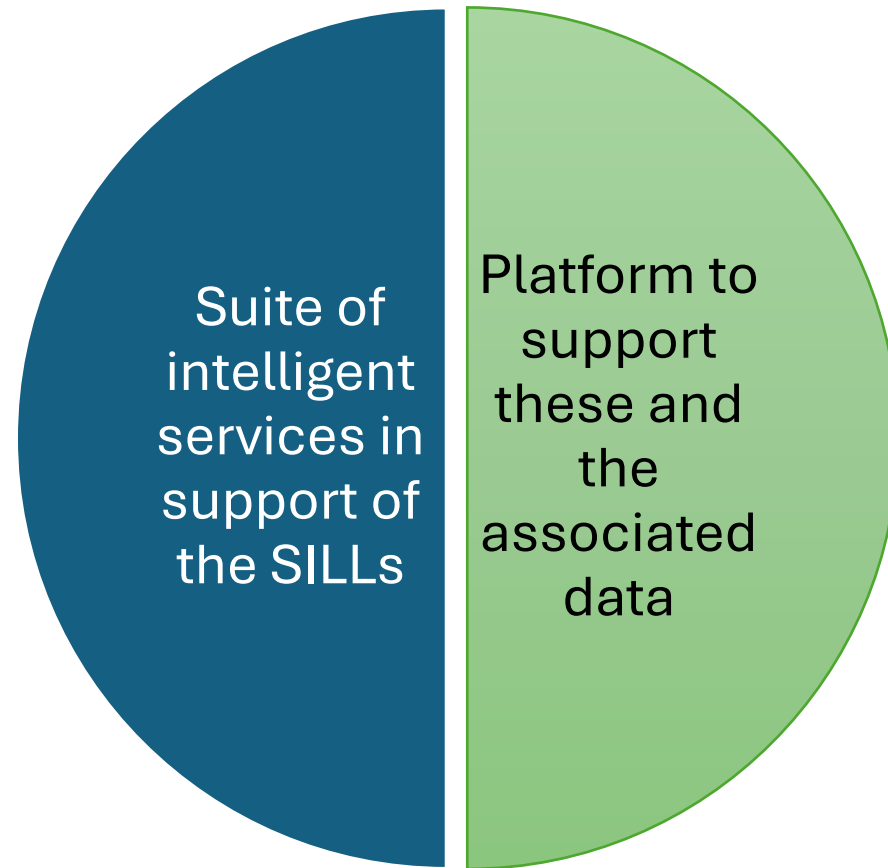
Overview, Methodology, and Infrastructure

Rational behind the development of technical services and applications to support the SILLs, and how they were developed

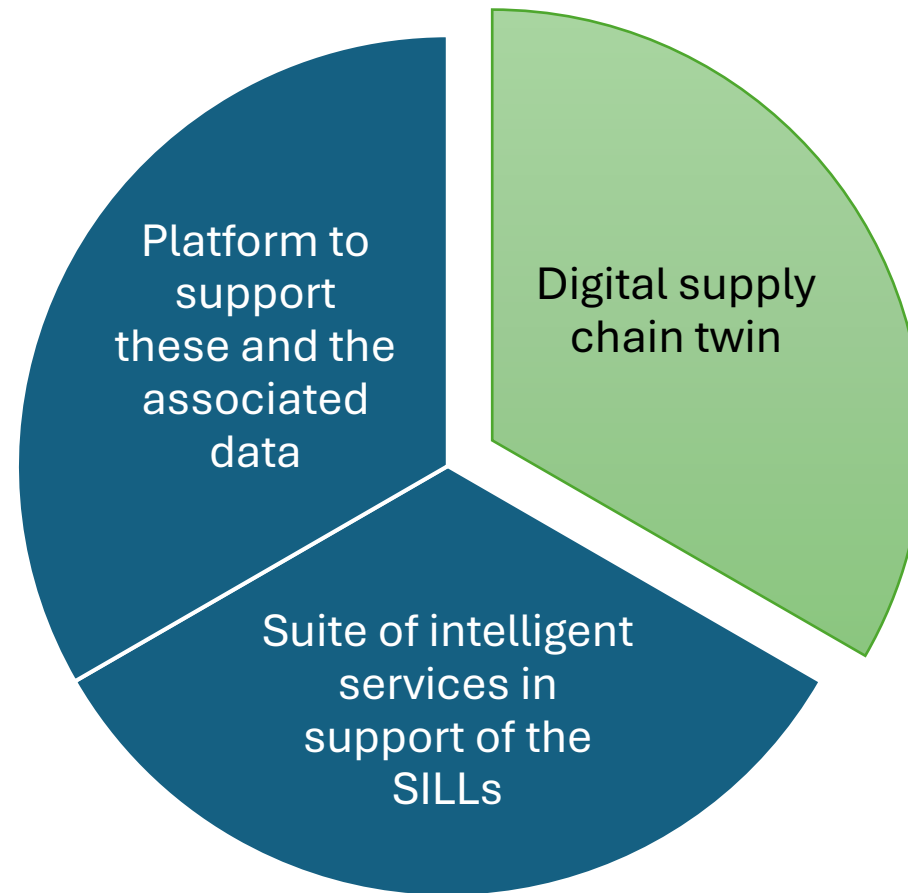
Primary Results

Suite of
intelligent
services in
support of
the SILLs

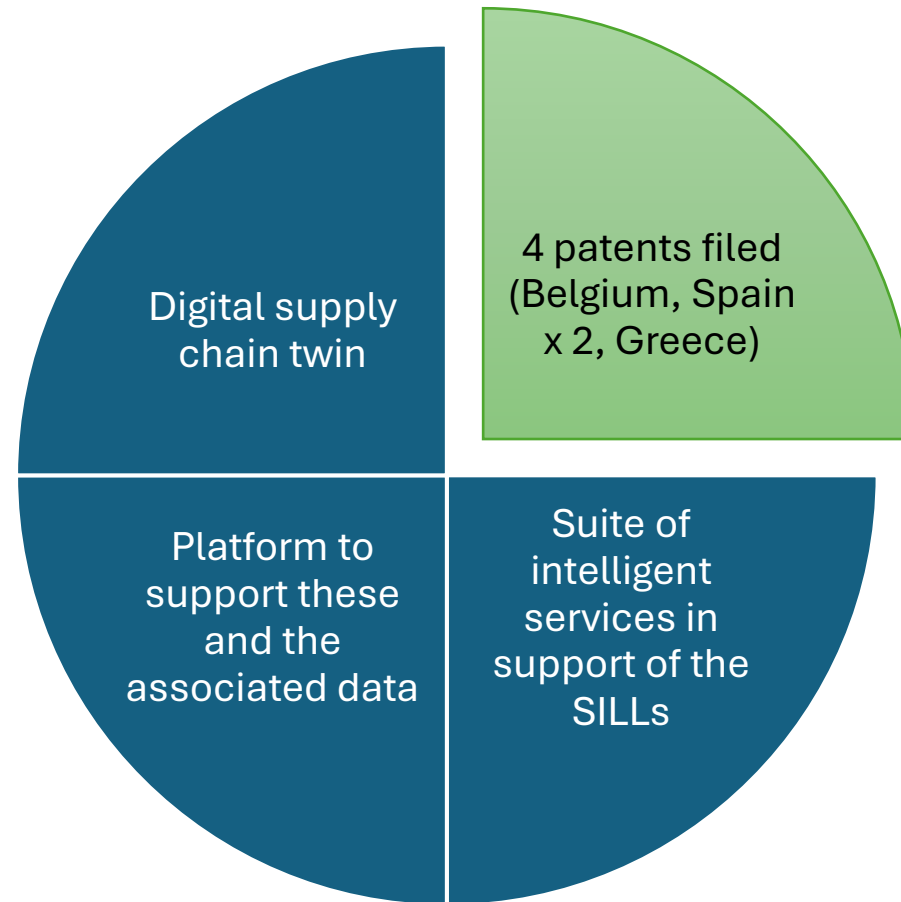
Primary Results



Primary Results



Primary Results



Methodology

Series of workshops with SILL stakeholders

Initial set of assumptions refined through further engagement

Set of SILL requirements categorized to identify commonalities

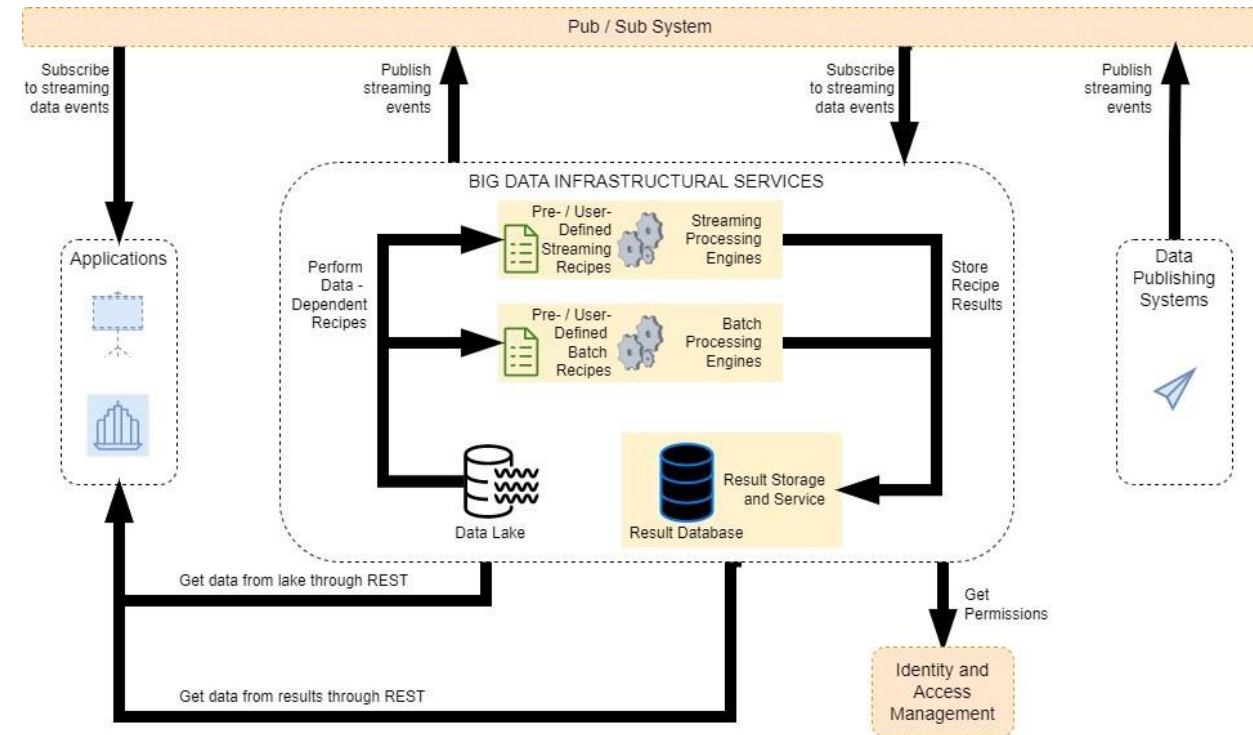
More in-depth agile approach when engaging with SILLs to actually carry out work

Colour coding for activities	WP3 help requested			
	Potential WP3 assistance			
	SILL will take care of it			
	SILL1	SILL2	SILL3	SILL4
Prediction tools		An algorithm/ML model to translate the color information of intelligent label into self-life	Harvest prediction, scheduling, yield planning for a week in advance.	
Decision support	Decision support on collecting right data in right way.		Quantity, quality, harvest estimation	Developing a Decision Support System or a planning tool for food auction.
				Developing a Decision Support System for recipe recommendations to process remaining feedstock.
Client facing application	Application to submit the amount of waste and visualization of this data to monitor the overall waste.	An application for the retailer to transform the color information from the intelligent label into remaining self life	Application to show optimal harvest scheduling, yield planning	Developing a tool for establishing communications among consumers, farmers, local food producers and food scientists etc., similar to FOXLINK App.
Classification		Develop models for use in classification for determining value of product		

Big Data Infrastructural Services (BDIS)

“BDIS cloud-based infrastructure w/ services to support storage and processing of data + simple analytics algorithms delivered. Validation through data storage in progress”

- Platform to host algorithms for AI processing
- Data and results storage
- Communications
- Focus on reliability and availability





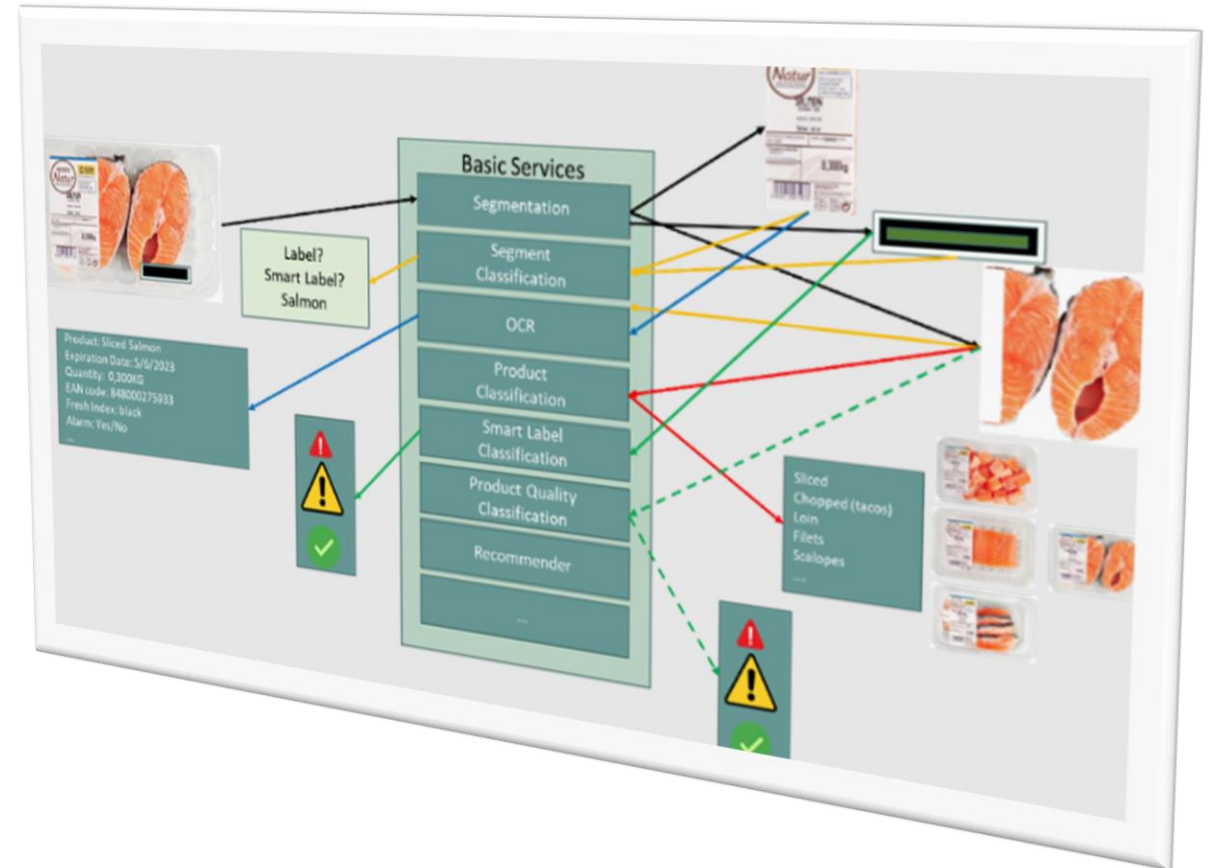
Applications and Services

Applications and services developed in support of SILL activities

Smart Labels

Instore : Read and analyse information from smart labels on produce

Actual expiry date rather than prescribed

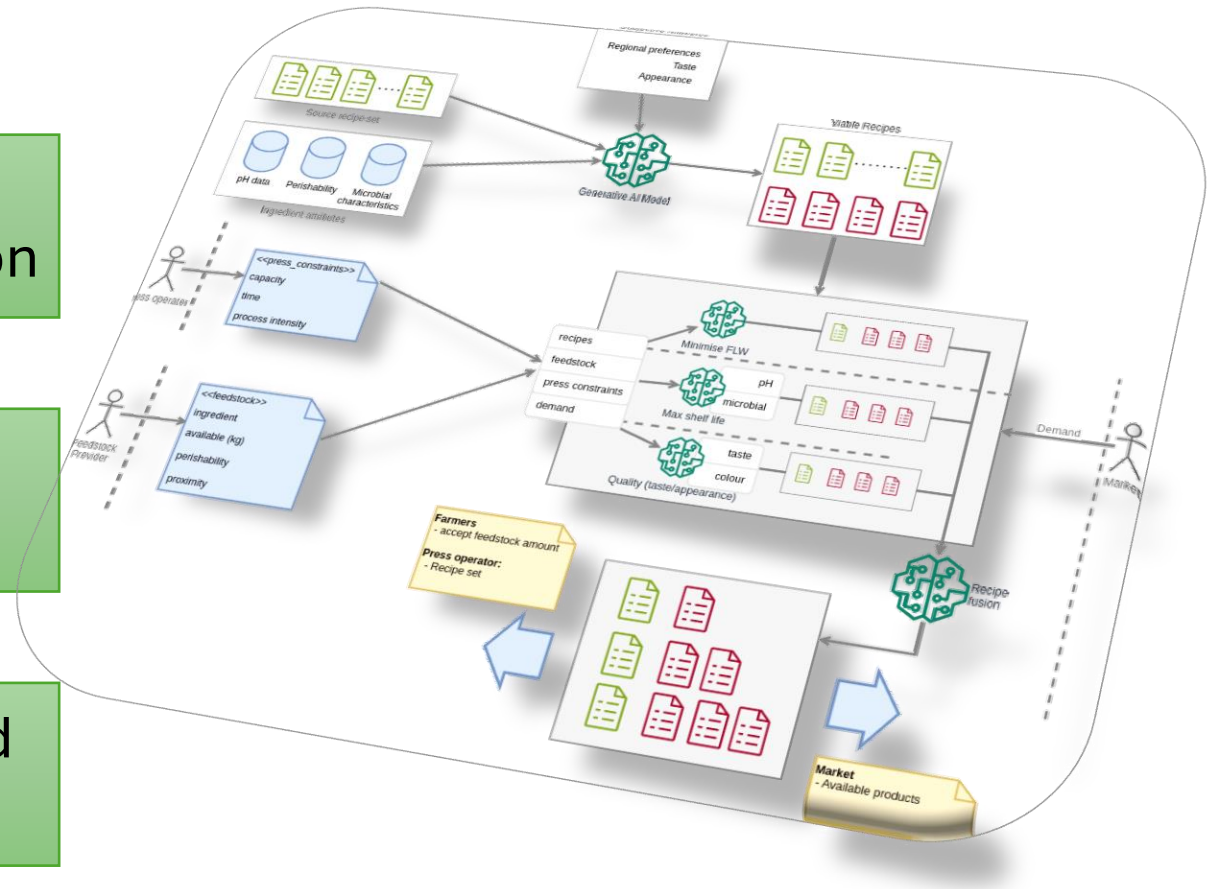


Recipe Selection

Recommendation of recipes for juice/smoothie production

AI driven optimization of use of surplus produce

Take account of demand and regional factors

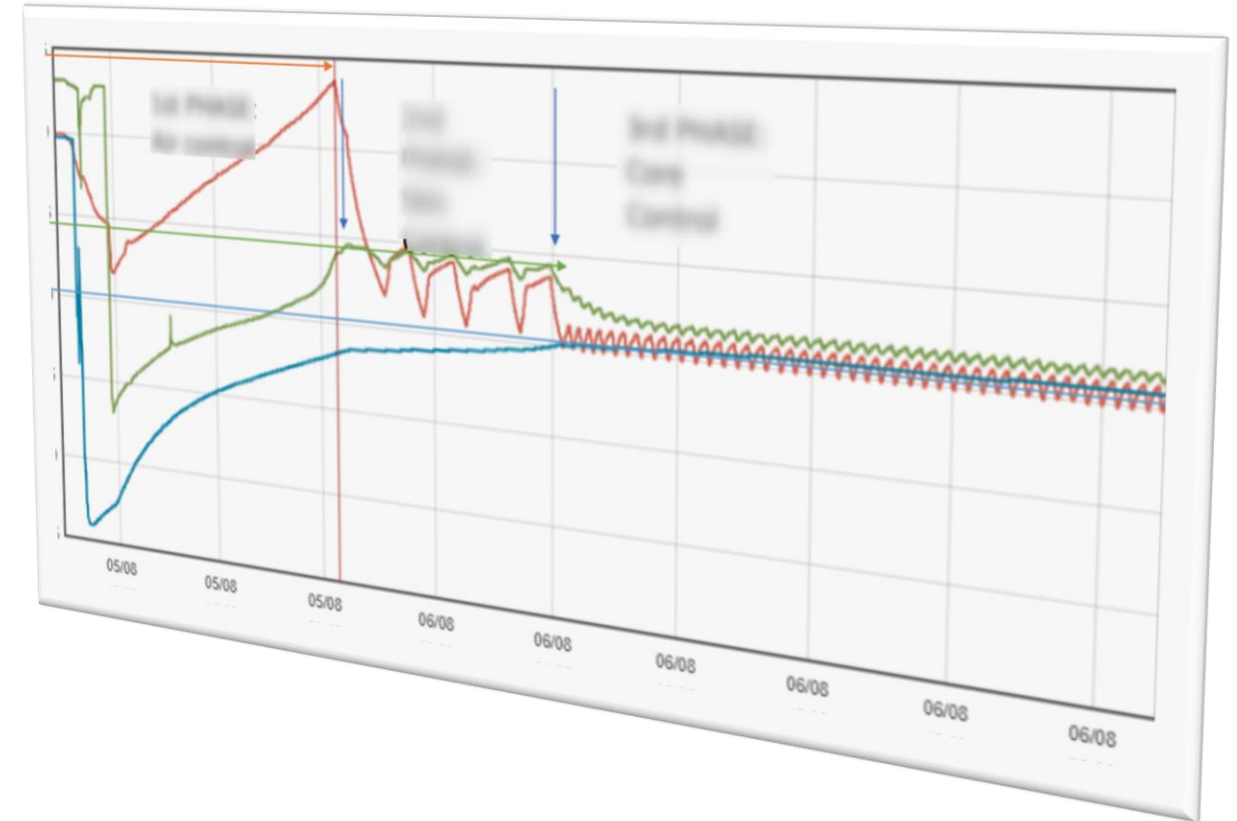


Process Control

AI prediction of deviations
on long-lived defrost cycles

Avoidance of potential
waste of large batches

Warning system for
operators



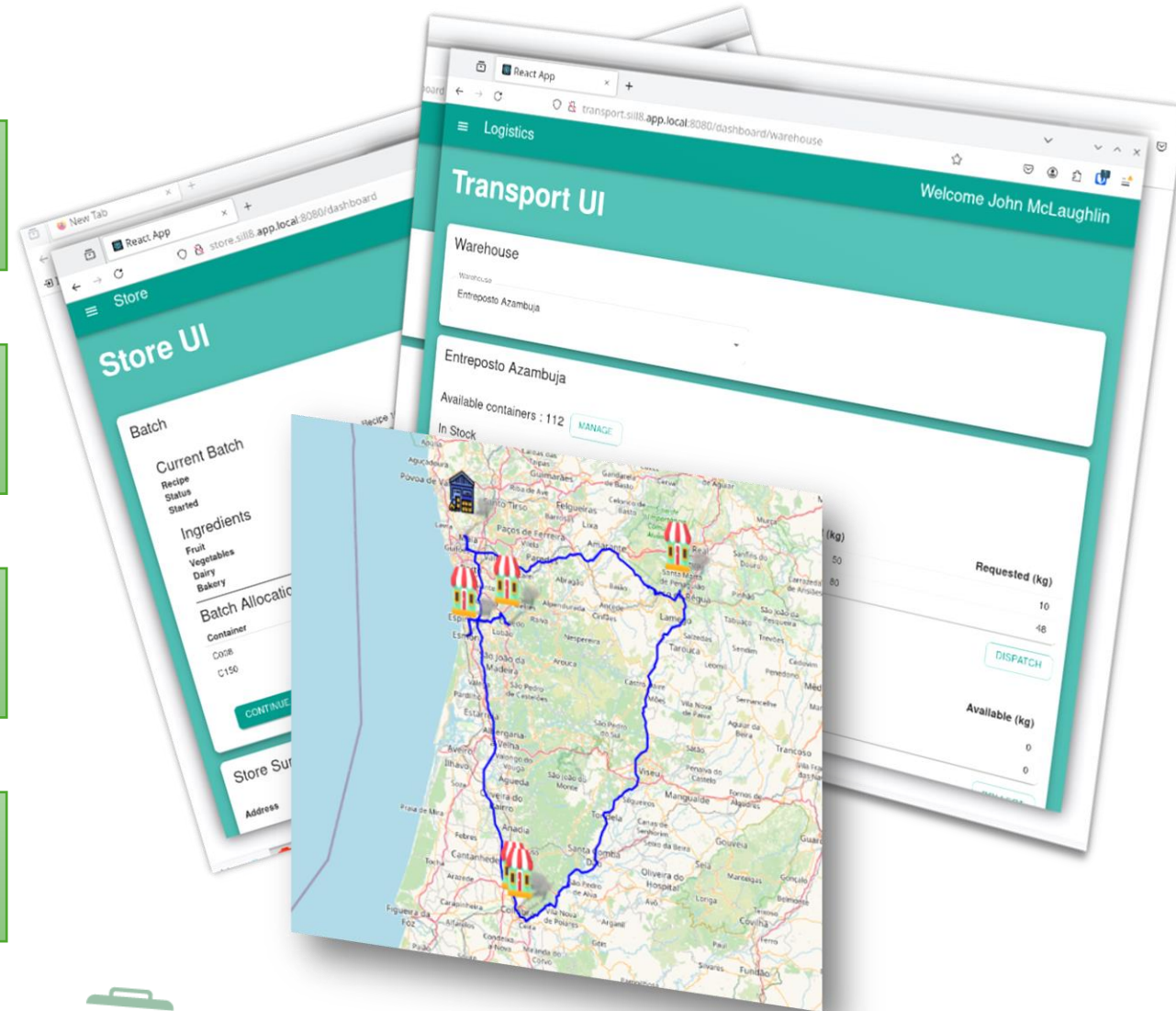
Logistics

Proof of concept management of nutrient production from dehydrated waste in stores

Used to nourish algae for value added purposes

Supply and demand management

Transportation logistics with routing



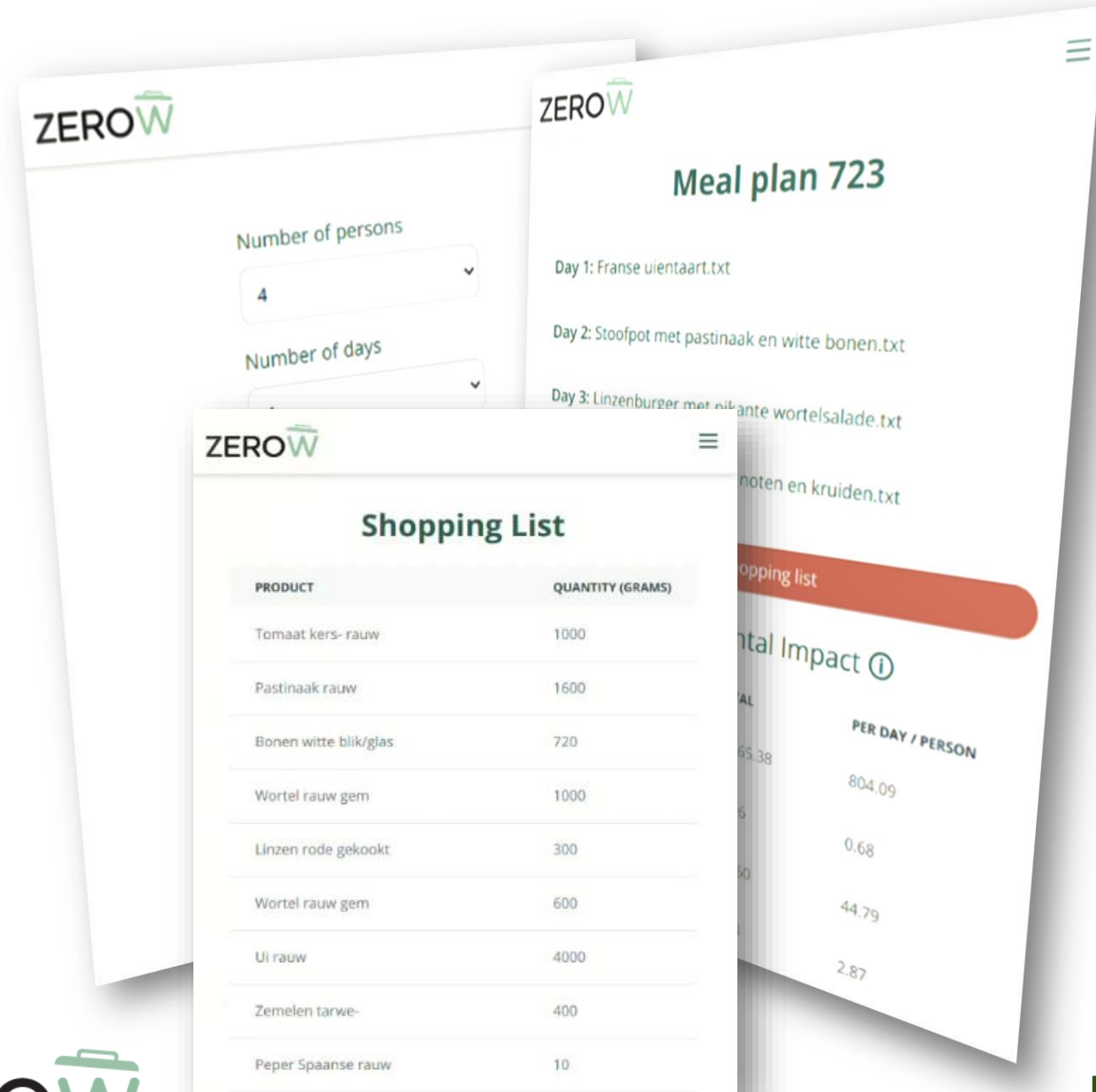
Meal Planner

Consumer nudging application

AI driven meal plan for the week, taking into account preferences

Generation of shopping list for ingredients not to hand

Inform consumers of FLW and greenhouse gas indices





Supply Chain Digital Twin

Modeling the entire supply chain and the effects of
various interventions

Supply Chain Digital Twin

Understand how different innovations (e.g., smart packaging, dynamic pricing) in the food supply chain can impact high levels of waste and costs.

AI driven modeling of the complex dynamics between production, distribution, and consumption.

Help producers, retailers, policymakers visualize the benefits of adopting new technologies.

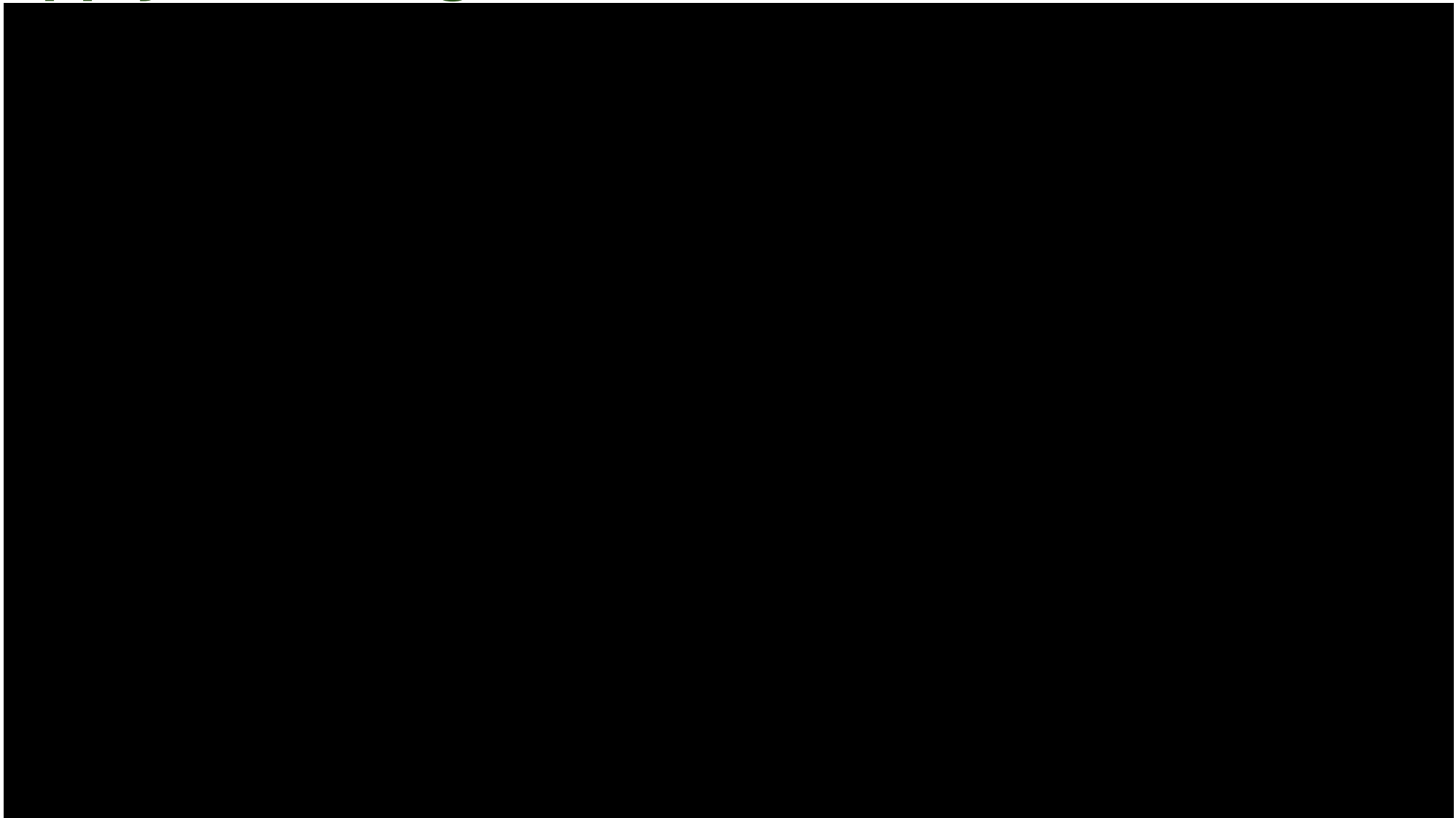
Simulation of scenarios to guide investment and policy decisions.

User friendly web UI backed by business intelligence.



ZEROw

Supply Chain Digital Twin



Questions



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CHORIZO FLW RAPID APPRAISAL/VISUALIZER TOOL

A simple way to understand, compare, and
communicate food waste simulation results

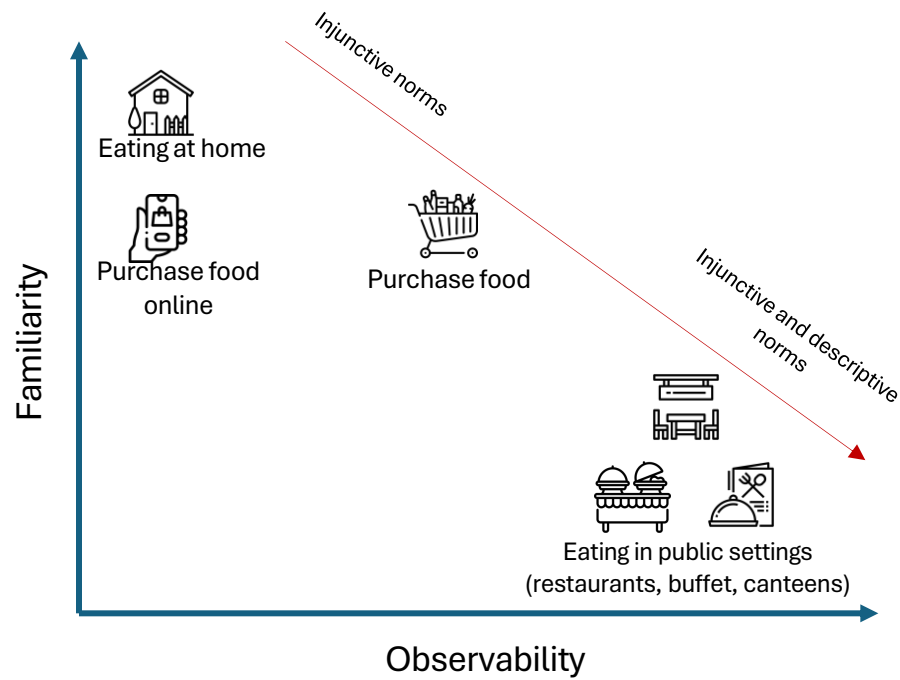


#1 INTRODUCTION

Why do we need a Visualizer?

FOOD ENVIRONMENTS

Food environments are the physical, economic, political and socio-cultural contexts in which people engage with the food system to make their decisions about acquiring, preparing and consuming food.



Adapted from D3.2

- Individuals have different social roles in different settings = different expected patterns of behaviour
- Behavioural drivers are different in different settings
 - Social norms have different importance

MODELLING FOOD ENVIRONMENTS

CHORIZO models investigate two distinctive food environments:



Establishment Diner model

- Agent-based model
- Simulates the behaviour of guests in an hotel buffet (out-of-home setting)
- Outcome: average leftovers/guest



Home Cook model

- Micro-simulation
- Simulates the FW generated at the household level as a consequence of purchasing and storing behaviours
- Outcome: average FW/household

WHAT IF SCENARIOS IN SIMULATIONS

What-if scenarios are hypothetical situations used to explore the potential outcomes of different decisions or events.



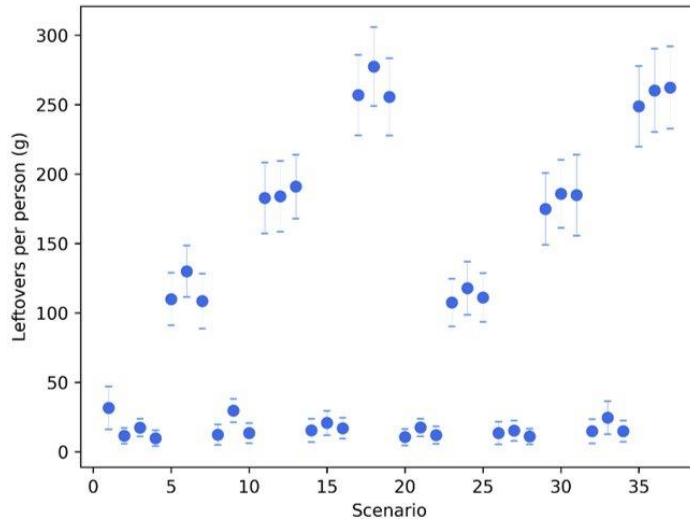
Simulated in models by altering variables and parameters to:

Anticipate future scenarios
by altering key parameters or variables within a simulation, we can examine how various factors might interact and affect outcomes

Evaluating decision alternatives
by running simulations with different scenarios, decision-makers can assess the potential consequences of their choices and make more informed decisions

DIVERSITY AND RICHNESS OF RESULTS

37 what-if scenarios



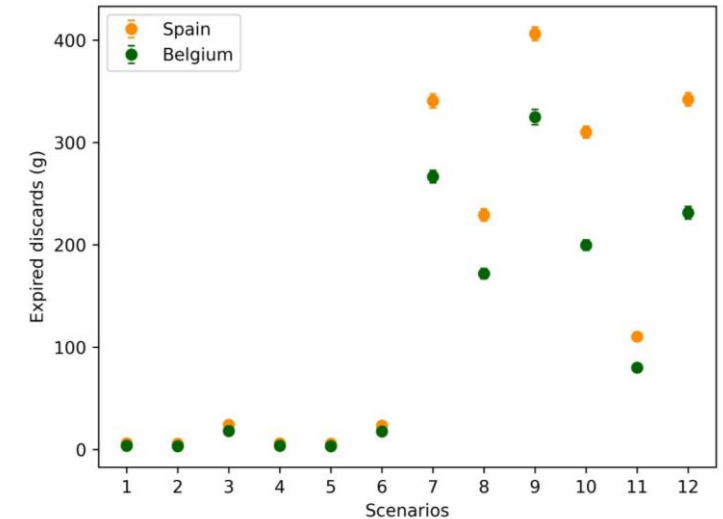
Parameters:

- Plate size (normal and large)
- Guest composition (% business and non-business)
- Sustainability awareness (based on gender)
- Communication strategy (no messages, positive messages, provocative messages)



How to communicate **scientific results** in a clearer, user-friendly way?

24 what-if scenarios



Parameters:

- Household composition (proxy Belgium and Spain)
- Consumption strategy (strict or relaxed)
- Storage conditions (normal, better, worse)
- Preference for perishables or equal consumption of perishables and non-perishables

FLW RAPID APPRAISAL/VISUALIZER TOOL

Aim: design a tool to easily access the main outcomes of the scenarios, to be accessible to a wide range of stakeholders providing them a user-friendly tool for the rapid appraisal of the impact of selected interventions and settings toward 0FLW

<https://scenarios.chorizoproject.eu/>



Explore how different behaviours and interventions impact food waste.

Welcome to the CHORIZO FLW Rapid Appraisal/Visualizer Tool.
Explore how different behaviours and interventions impact food waste.

This tool shows the results of simulations in households and food service settings. Use it to discover what works, compare scenarios, and find inspiration for action. No modelling skills needed — just select, explore, and learn.

TARGET USERS



Establishment Diner Scenarios

- Restaurant/Hotel managers
- Catering companies and food services providers



Home Cook Scenarios

- Retailers and grocery store managers
- Households and individual consumers

- Policymakers and local authorities
 - Researchers and academics
 - NGOs



#2 LIVE DEMO

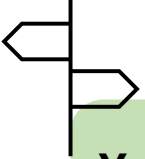


#3 HANDS ON: SET THE PARAMETERS, SEE THE OUTCOME





INTERACTIVE EXPLORATION OF FOOD WASTE SCENARIOS



How it works?



You'll answer 3–4 questions on Wooclap for each model, choosing the behaviour or condition you think best reduces food waste.



Your choices will shape the scenario: for each question, the most selected options will define the values of key variables (e.g. storage conditions, plate size, guest type...).



We'll explore the resulting scenario together using the **CHORIZO FLW RAPID APPRAISAL/VISUALIZER TOOL**, and discuss how the selected characteristics impact food waste levels

WHAT WOULD YOU DO?

AN INTERACTIVE EXPERIENCE WITH THE HOMECOOK MODEL

Imagine it's a regular Tuesday evening. You're at home, getting ready to cook dinner for yourself and those you live with.

Now reflect:

Which habits really make a difference in reducing food waste?

Please scan the QR code below and compose your scenario



Or go to wooclap.com and insert the code **GAFYZR**

WHAT WOULD YOU DO?

AN INTERACTIVE EXPERIENCE WITH THE ESTABLISHMENT DINER MODEL

It's a busy Wednesday morning at a hotel breakfast buffet. Guests are helping themselves to food before starting their day.

Now think about this:

Which factors make the biggest difference in reducing food waste in this context?

Please scan the QR code below and compose your scenario



Or go to wooclap.com and insert the code **GAFYZR**



#4 FINAL MESSAGES

TAKE-HOME MESSAGES FROM THE VISUALIZER TOOL



Based on science

The Visualizer enables the **rapid exploration of complex food waste scenarios**, turning scientific results into actionable knowledge.



Simple, yet powerful

The tool makes complex behavioural models easy to interpret.



Decision-oriented

It supports policy and operational decisions with scenario-based evidence.



Flexible and stakeholder-ready

Designed for use by public authorities, hotel managers, researchers, and educators.



Promoting change

Helps identify high-impact leverage points for reducing food waste in real-life contexts.

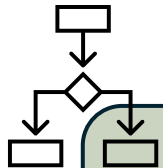
WHAT'S NEXT:

- ➡ Integration with real-world behavioural data to improve accuracy
- ➡ Use in co-design workshops with stakeholders across the food chain
- ➡ Expansion to include new settings (e.g. schools, hospitals, supply chain nodes)

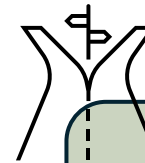
Future versions could integrate AI-assisted decision support, offering:



Automatic scenario
suggestions based on
user goals



Real-time policy
impact forecasting



Adaptive
simulations with
user feedback loops

WHAT DO YOU THINK?

**Please share your feedback.
It will help us to improve our work!**

Please scan the QR code below



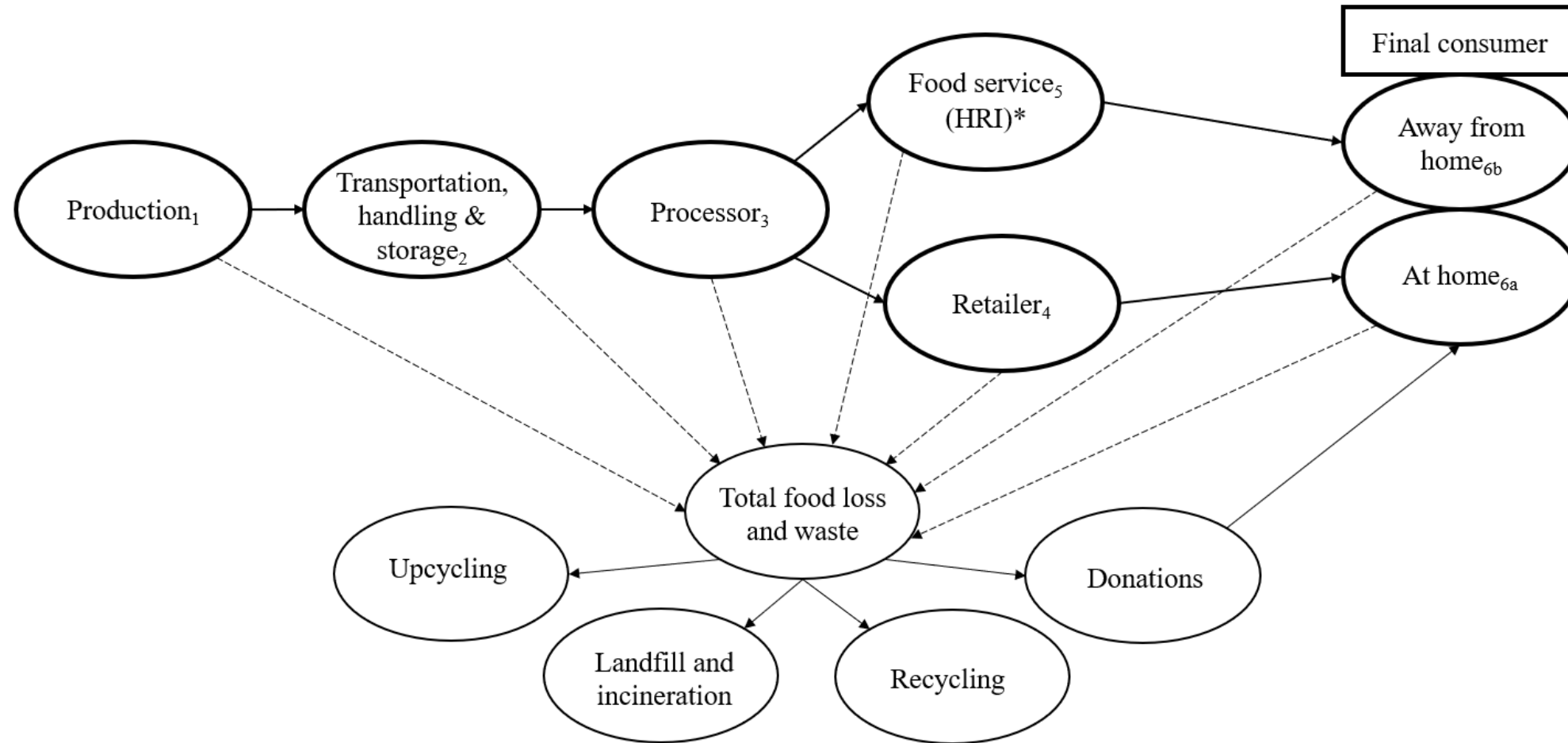


Results of an economic model

Developed by ZeroW's WP 1

Frank Pijpers & Dušan Drabik
Wageningen University

The Food Supply Chain



Policy Pathways

Table 3: FLW reduction targets in policy pathway 1 (D'haese et al., 2023).

Food waste reduction target on	Mandatory FW reduction target in 2032	Voluntary FW reduction target in 2032
Primary production	n/a	n/a
Processing and manufacturing	10% (absolute amounts in mass units)	25% (absolute amounts in mass units)
Retail	30% (per capita)	50% (per capita)
Consumption	30% (per capita)	50% (per capita)

Table 4: FLW reduction targets in policy pathway 2 (D'haese et al., 2023).

Food waste reduction target on	Mandatory 2030 FW reduction target	Voluntary 2030 FW reduction target
Primary production	50% (absolute amounts in mass units)	For higher target levels
Processing and manufacturing	50% (absolute amounts in mass units)	For higher target levels
Retail & Consumption	50% (per capita)	For higher target levels

Table 5: FLW reduction targets in policy pathway 3 (D'haese et al., 2023).

Food waste reduction target on	Mandatory 2030 FW reduction target	Voluntary 2030 FW reduction target
Primary production	n/a	10%
Processing and manufacturing	n/a	50% (absolute amounts in mass units)
Retail and consumption	15% (per capita)	50% (per capita)

Simulated policies

- A **disposal tax** that is high enough to achieve the FLW reduction targets (mandatory targets)
- Reduction of the abatement costs (voluntary targets)

Disposal tax – general findings

- A high tax on disposal is required to achieve the mandatory reduction targets (e.g., >6K% increase for chicken in policy pathway 2)
- Disposal becomes less expensive for non-targeted stages of the supply chain
- More costly to achieve the reduction targets for commodities with inedible FLW (chicken and fruit) because this cannot be reduced

The effect on the quantity of FLW (pathway 1)

% Change in the quantity of FLW of	Chicken	Fruit	Bread	Milk
Policy pathway 1				
Farmer pre-harvest	16.6	-1.0	1.9	21.3
Farmer post-harvest	16.3	-8.7	5.1	13.6
Transportation, Handling & Storage	14.6	-10.6	4.4	12.3
Processor	-10.1	-14.3	-10.1	-10.3
Retail	-30.4	-30.7	-30.0	-30.3
Hotels, Restaurants & Institutions	14.1	17.7	12.2	21.3
Food away from home	25.4	47.6	67.4	50.8
Food at home	-30.1	-30.2	-30.0	-30.1
Total post-harvest supply chain	-9.3	-21.5	-18.4	-14.2

The effects on food production and consumption – general findings

- Less food is produced in all mandatory policy pathways
- The consumer starts to eat more food away from home because the tax on disposal makes eating food at home more expensive
- Total consumer's food intake decreases by up to 30% for fruit in policy pathway 2 which implies that food becomes less accessible

The effects on the prices of food

- Prices of farmer, THS and processor empirically always decrease in the mandatory policy pathways
- Retailer and HRI prices behave ambiguously, depending on the waste rates and elasticities

Policy design of a voluntary target

- Decreasing the abatement cost of food loss and waste
- Voluntary investments in new food loss- and waste-reducing technologies

The achievability of the voluntary targets

% Change in the quantity of FLW of the	Chicken	Fruit	Bread	Milk
Policy pathway 3				
Farmer pre-harvest	3.2	0.4	-0.3	-6.2
Farmer post-harvest	-10.0	-10.1	-10.1	-10.0
THS	7.4	15.4	24.2	11.1
Processor	-49.6	-48.7	-49.9	-50.0
Retail	-97.0	-96.8	-58.7	-52.5
HRI	5.4	3.0	-2.6	4.8
FAFH	51.4	53.3	153.8	121.6
FAH	-32.9	-23.2	-45.2	-48.3
Retail + FAH	-44.3	-35.6	-50.1	-50.0
Total post-harvest supply chain	-24.0	-30.1	-35.3	-31.7

The impact of the policies on food accessibility

- Total consumers' food intake decreases by up to 30% for fruit in the mandatory policy pathway 2, which implies that food becomes less accessible
- The voluntary target could mitigate the negative impact of food accessibility, and increase the consumer's total food consumption (+25% for fruit in policy pathway 3)

The impact of the policies on food prices

Table 12: Changes in sale prices along the supply chain for the mandatory policy pathway.

% Change in price of the	Chicken	Fruit	Bread	Milk
Policy pathway 3				
Farmer	-11.5	-5.8	-4.0	-9.1
THS	-11.1	-5.5	-3.2	-7.1
Processor	-7.4	-5.4	-3.2	-6.1
Retail	-3.4	-2.6	0.1	-2.9
HRI	-3.0	-4.0	-1.5	-4.1

Table A12: Changes in sale prices for the voluntary targets in 2030.

% Change in price of the	Chicken	Fruit	Bread	Milk
Policy pathway 3				
Farmer	-0.8	-0.6	-2.5	4.8
THS	-0.9	-0.1	-0.9	2.7
Processor	13.2	-5.5	-2.8	1.1
Retail	9.3	-15.1	-10.3	-4.1
HRI	-2.8	-5.0	-3.8	0.4

Conclusions

- Only a tax on FLW disposal is unrealistic to achieve the FLW reduction targets
- Cascading effects can partly offset the FLW reductions achieved by other supply chain stages
- A tax on FLW disposal can make food less accessible for poorer households
- Technological advances such as the ZeroW's SILLs can increase access to food and simultaneously reduce food loss and waste



Reflections

Should FLW reduction targets only aim at edible FLW?

Are disposal taxes a feasible instrument the reduce FLW?

How can we drive the commitment to voluntary targets?



Questions?