Bits of Food

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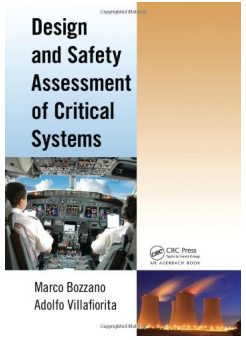
the good choice

Who I am

Adolfo Villafiorita
Co-Founder
Shair.Tech

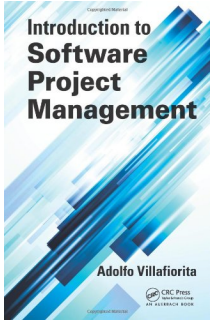
AI & Theorem Proving 1993-1997

Safety-critical systems 1997-2004

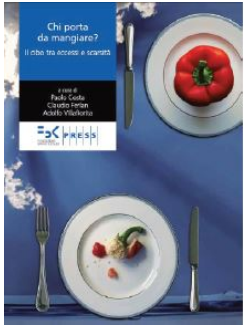


e-Voting 2004-2008

ICT4D & Maputo Living Lab 2008-2011



Surplus food recovery 2011 -



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2021-

Shair.Tech

- Mission:
  - build and run the IT infrastructure which helps move and redistribute food donations in Italy
- Activities:
  - Webapp to help recover surplus food: BringTheFood
  - Consultancies & education on food waste prevention and reduction
  - Custom software development

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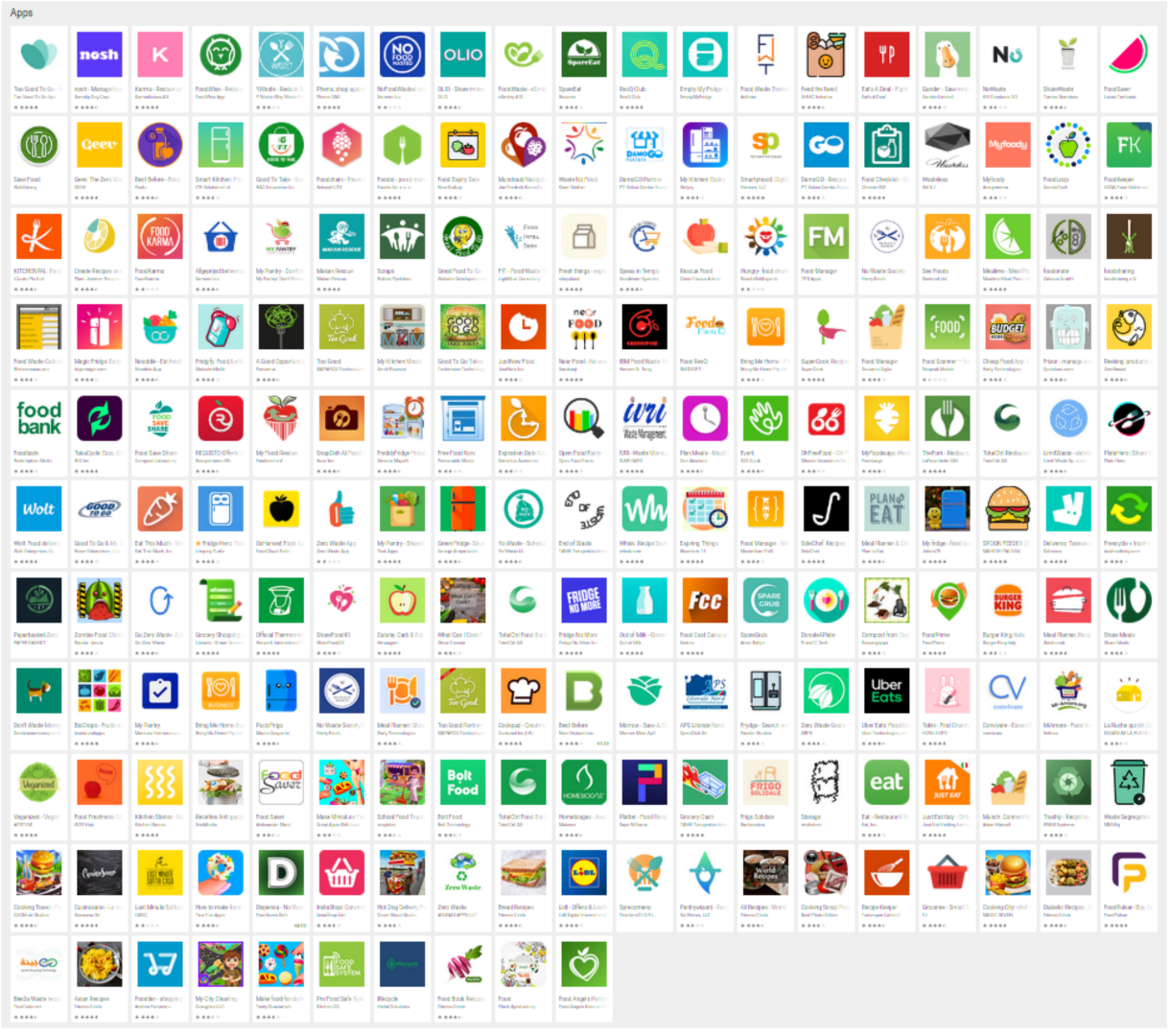
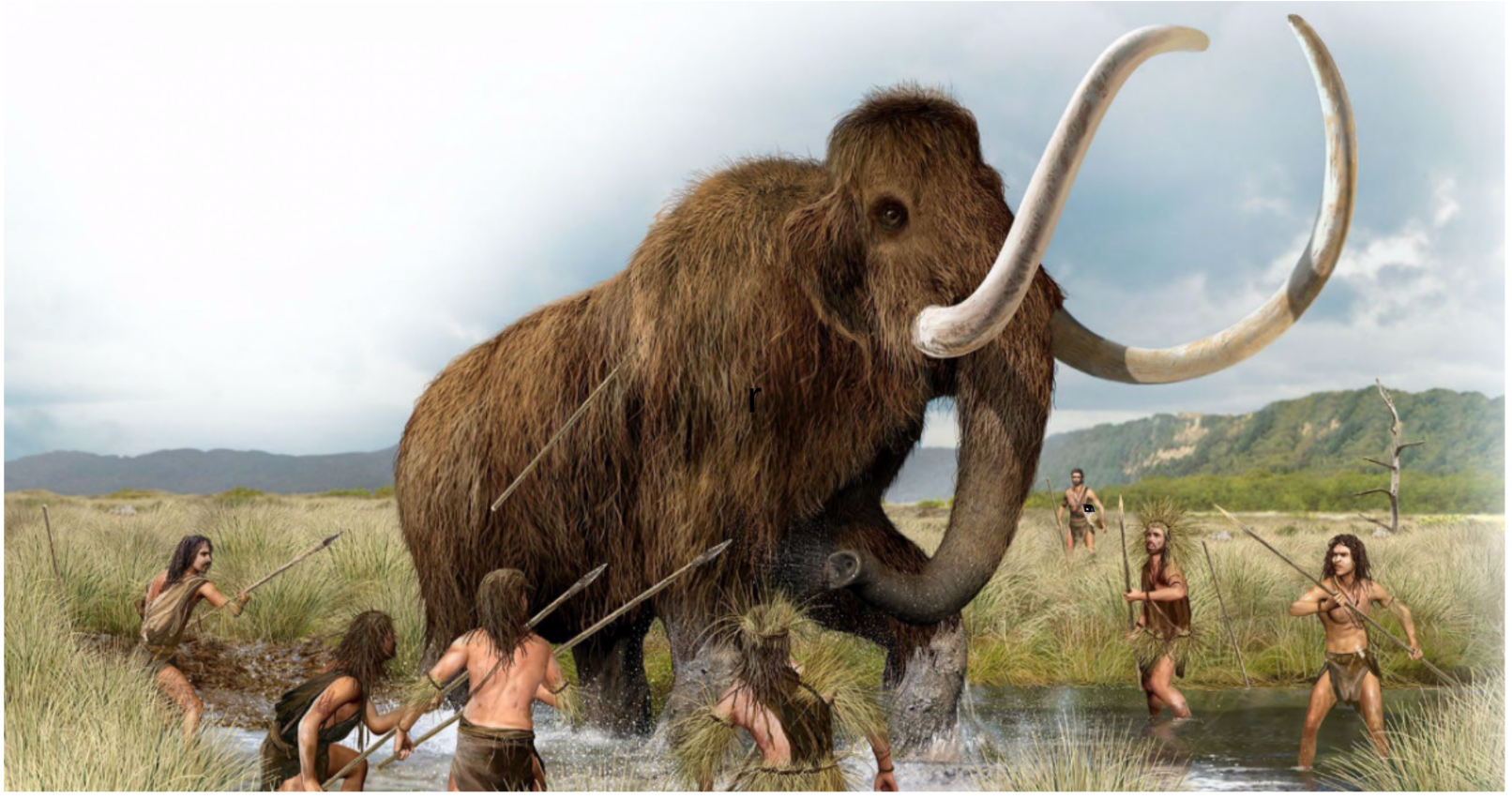
BringTheFood

- First version in production in 2011
- Basic idea: a place where demand and offers of food donations could meet (RHoK Hackathon)
- Redesigned various times, started being useful at the end of 2014



https://play.google.com/store/apps/collection/cluster?clp=ggEMCgpmb29kIHdhc3RI:S:ANO1ljJ2v3E&gsr=Cg-CAQwKCmZvb2Qgd2FzdGU%3D:S:ANO1ljIDYeM

Early Adopters of BringTheFood



Early Adopters of our webapp

Why technologies for food are so interesting to me?

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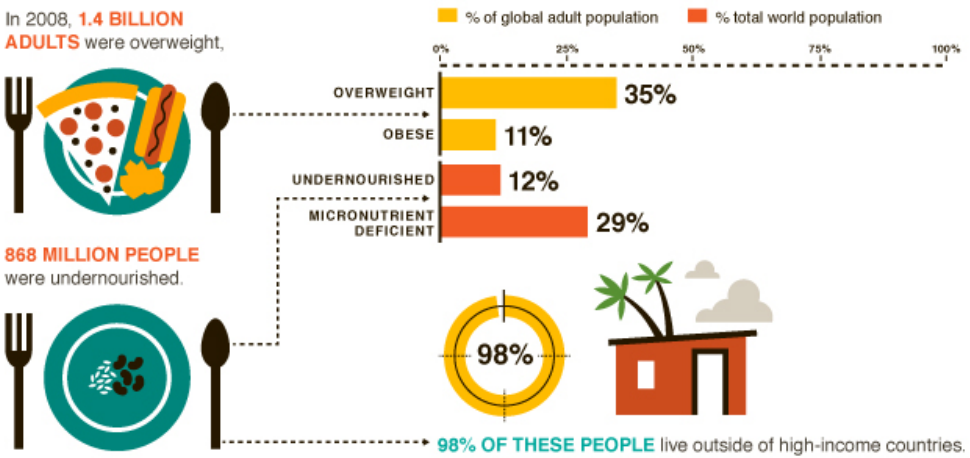
Food is a matter of life … and death

- According to WHO:
  - Number of hungry people in the world in 2018: **821.6 million (or 1 in 9 people)**
  - Adults who are obese: **672 million (13% or 1 in 8 adults)**

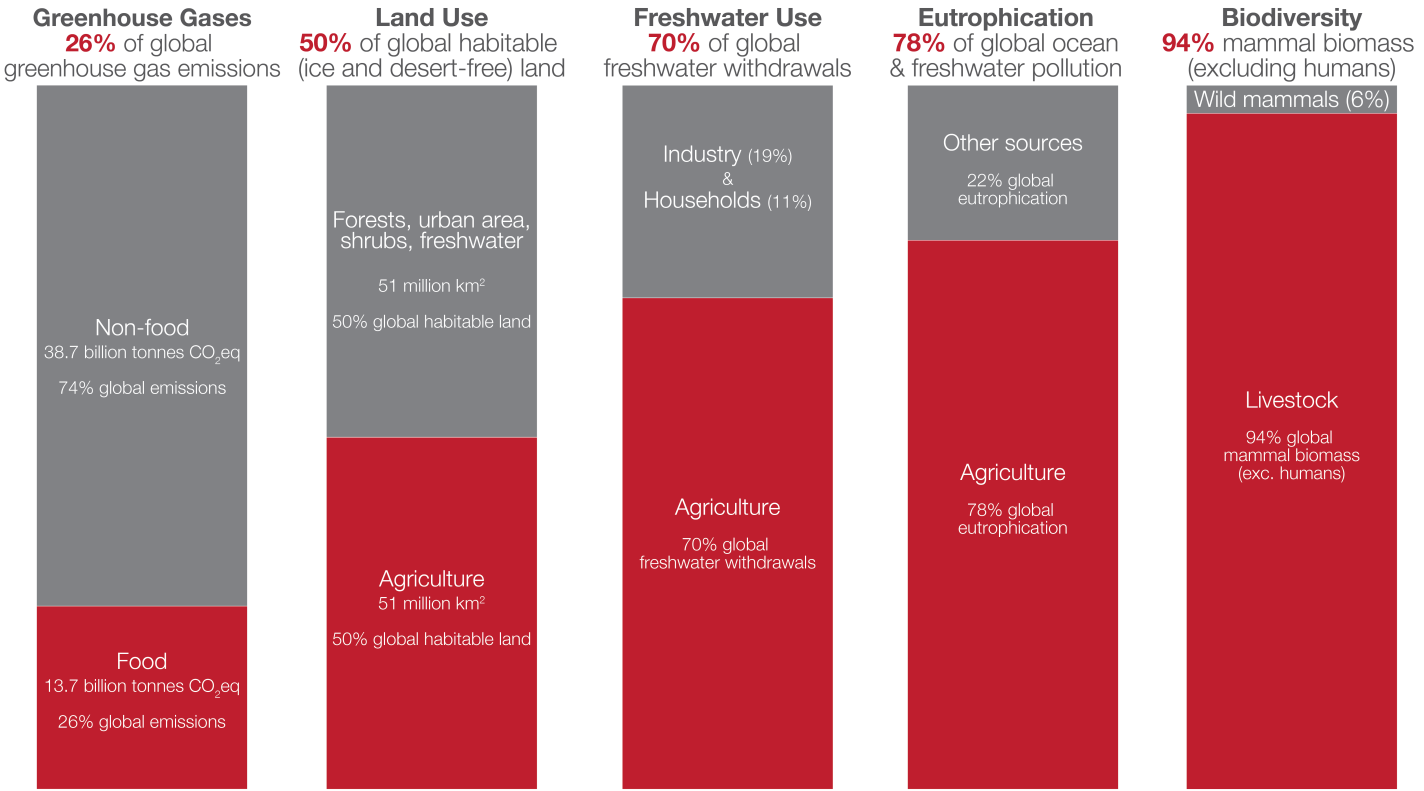


Sources:
https://ccafs.cgiar.org/
http://www.fao.org/3/ca5162en/ca5162en.pdf

… also as a species

What are the environmental impacts of food and agriculture?

Our World in Data

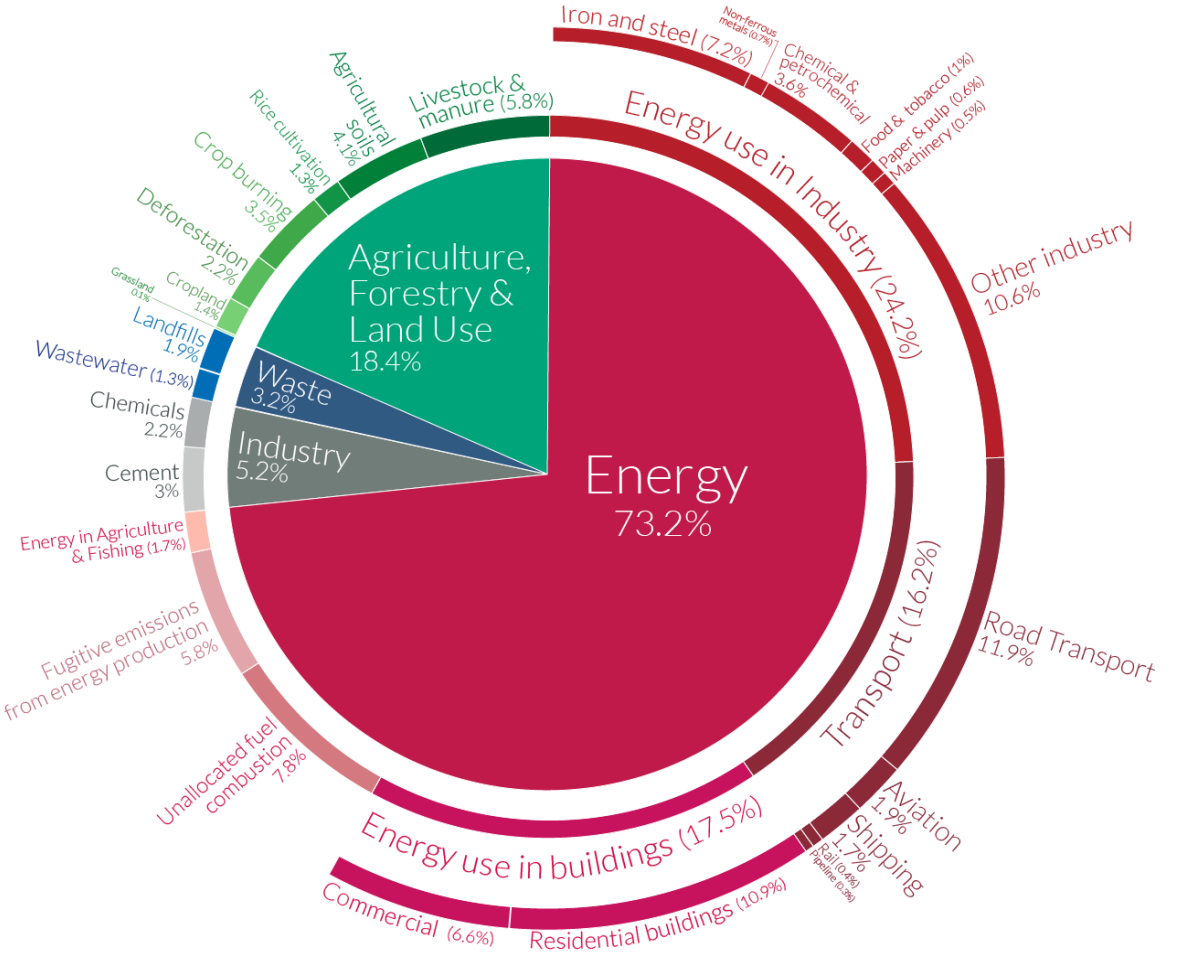


Data sources: Poore & Nemecek (2018); UN FAO; UN AQUASTAT; Bar-On et al. (2018).
OurWorldinData.org – Research and data to make progress against the world's largest problems.

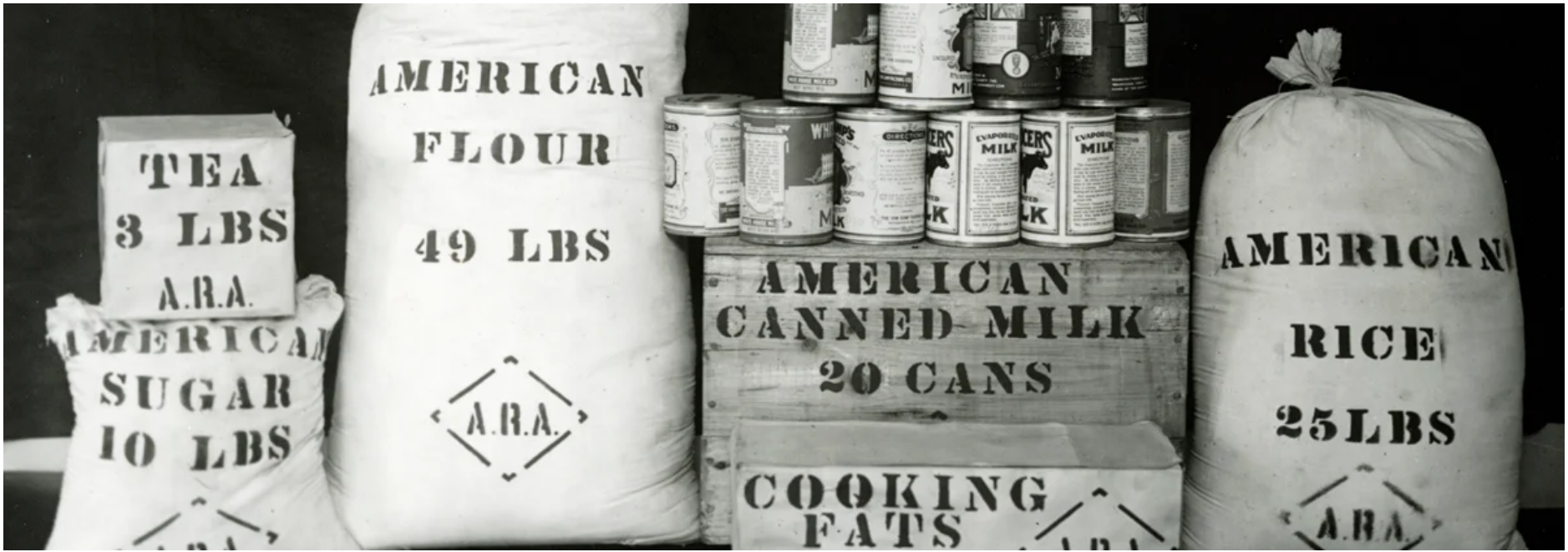
Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO_2eq.

Our World in Data



Food is rich of subtle meanings



This is a weapon

https://www.hoover.org/research/food-weapon
https://www.hoover.org/

Food is rich of subtle meanings

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Historian
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Adolfo Villafiorita
well... me!
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Food is rich of subtle meanings

This is waste

This is not waste

Food Losses and Food Waste

- We don’t know how to unambiguously define food waste

- Some classify according to the food chain: losses occur early, waste late
- Others according to purpose: edible, non edible
- Others again according to potential use: avoidable, non avoidable

… it defies our predictions

We want it like this…

http://pngimg.com/image/4985
https://www.groundzeroweb.com/oddly-looking-fruits-vegetables/

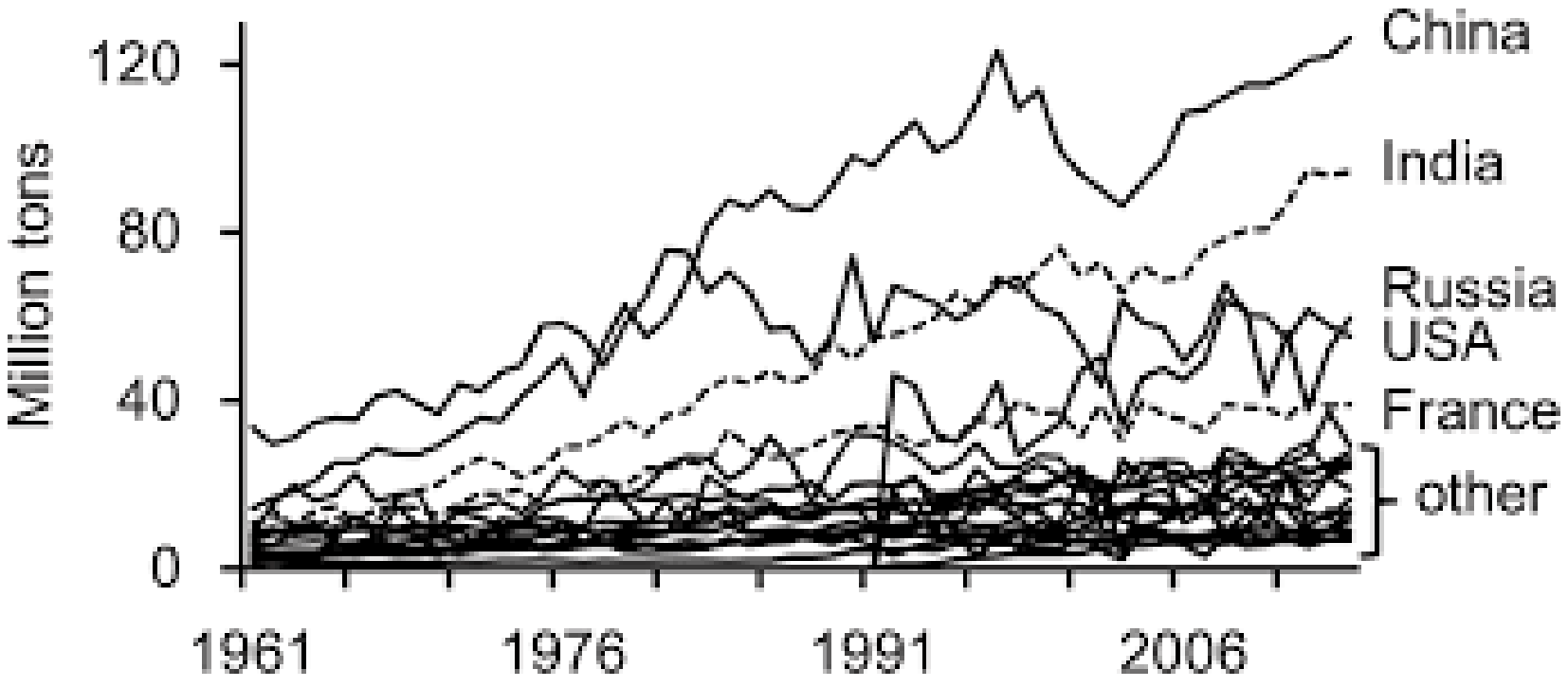
… it defies our predictions

We want it like this…

It comes like this

http://pngimg.com/image/4985
https://www.groundzeroweb.com/oddly-looking-fruits-vegetables/

… it defies our predictions



Source:
Future Agriculture Production and Distribution (Chapter 22)

… it keeps changing

https://www.beyondmeat.com/

https://www.upsidefoods.com/

https://soylent.com/

... it is delicious ...

… it has numbers difficult to picture

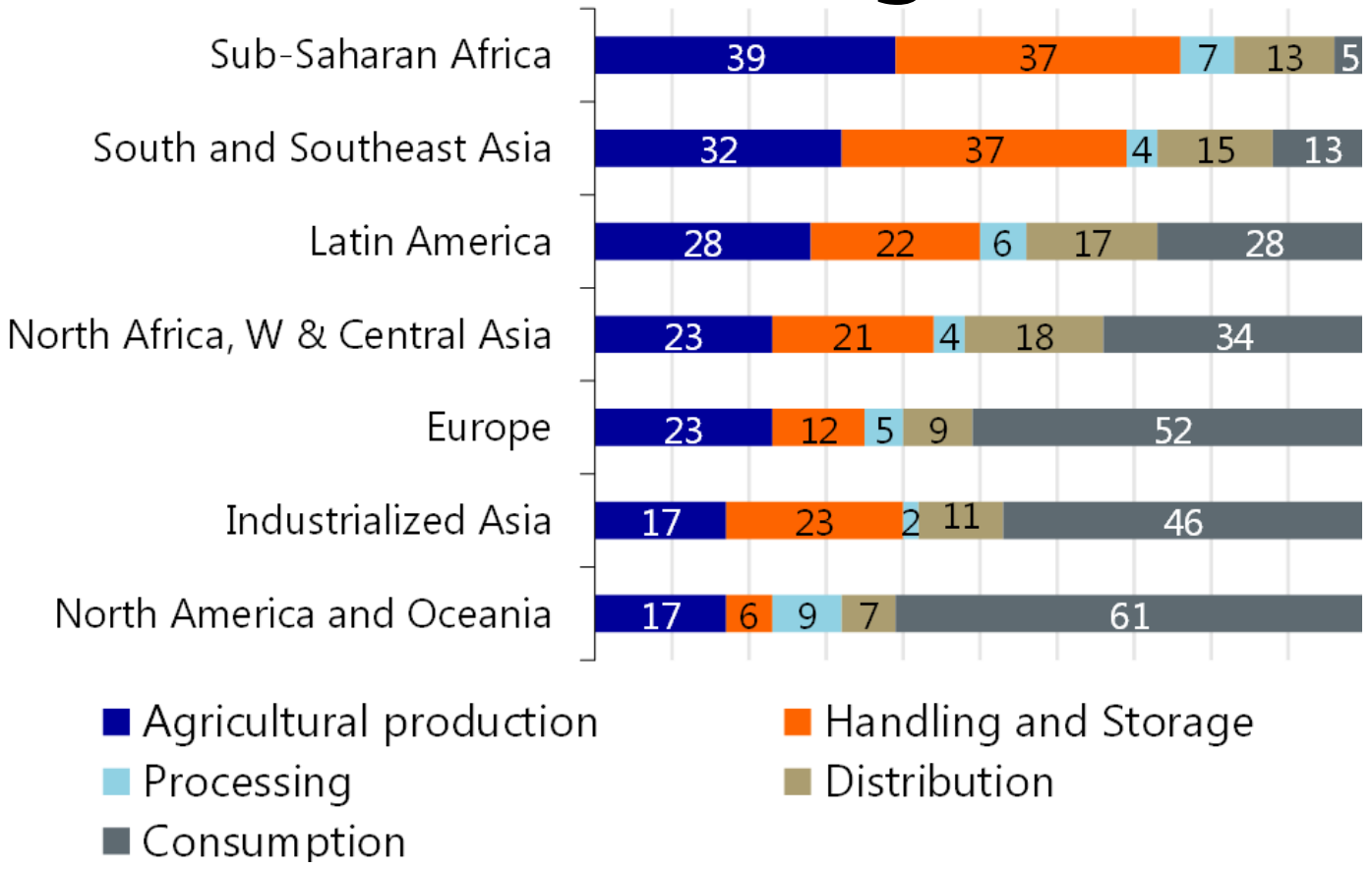
http://worldfoodclock.com/

6% of global greenhouse gas emissions come from food losses and waste

Our World in Data

Note: One-quarter of food emissions comes from food that is never eaten: 15% of food emissions from food lost in supply chains; and 9% from consumer waste.
Data source: Joseph Poore & Thomas Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*.
OurWorldinData.org – Research and data to make progress against the world's largest problems.

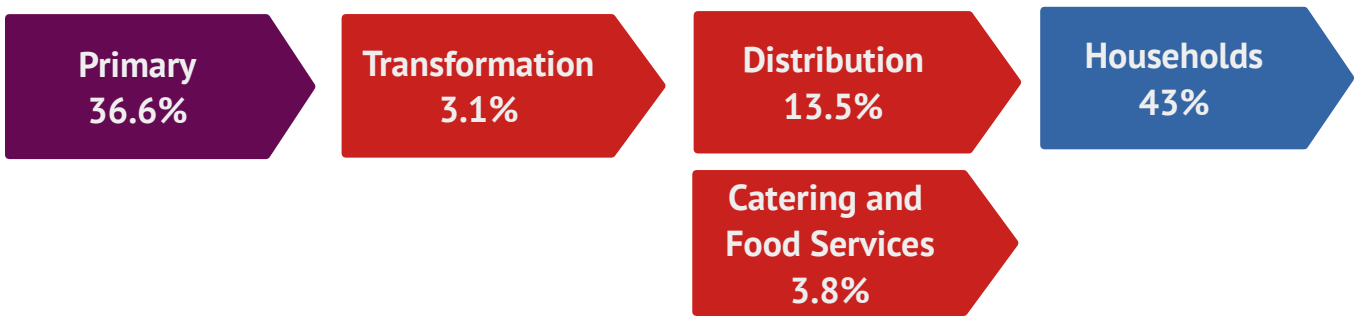
Food waste along the chain



https://economics.rabobank.com/publications/2018/march/from-food-waste-to-future-value/

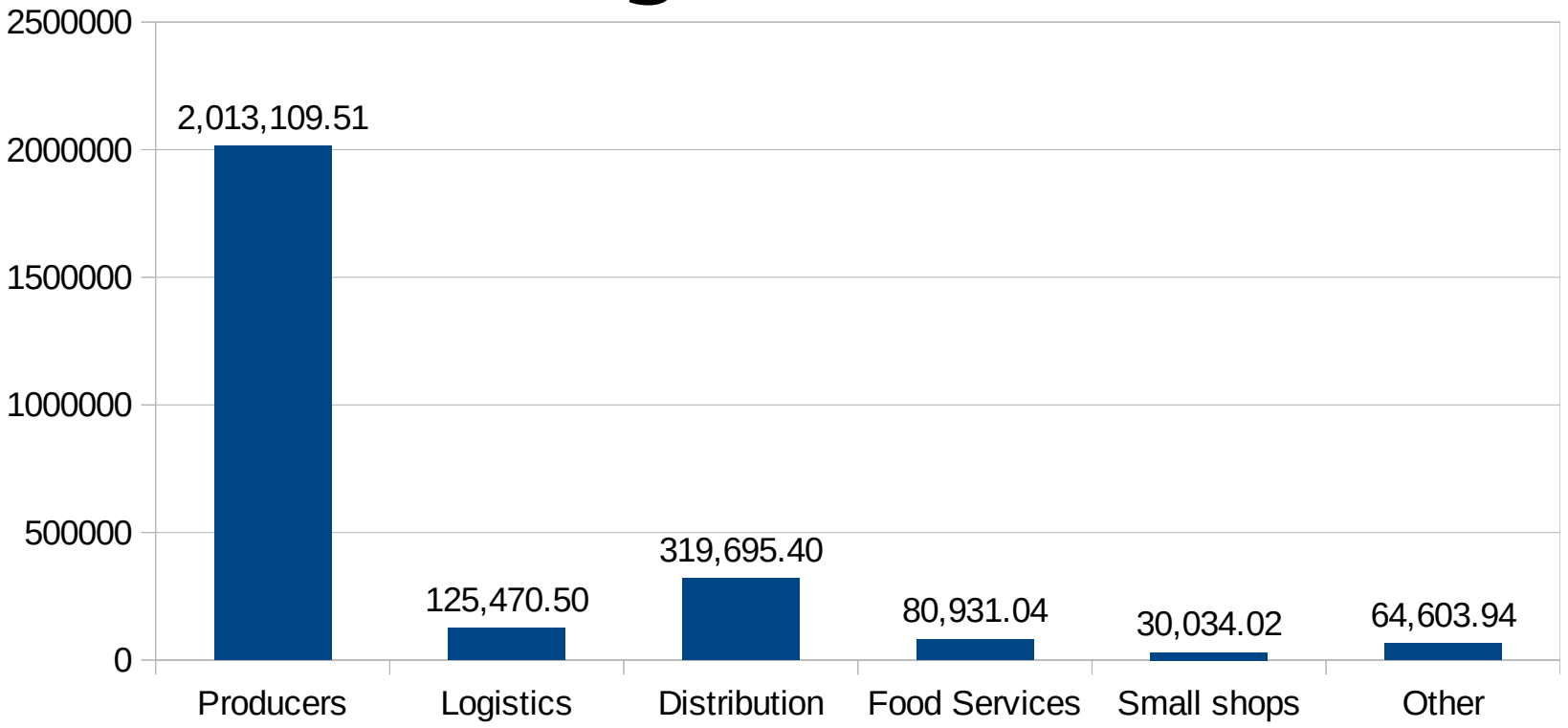
Surplus Food Streams

Surplus streams in Italy in the food sector: 5.590.000 tons/year



Source: LIFE-Food.Waste.StandUp Project (2018)
Recent data (from other sources, Waste Watchers) seems to suggest a significant reduction

Food Collected with BringTheFood



Surplus Streams in Food Services

- Food Service sector in Italy:
  - the third largest producer of food waste
  - **210 thousand tonnes of surplus per year**
  - Only 12% is currently collected

Reducing Food Waste in Canteens

- **Experience 1:** Measuring the impact of fresh produce processing
- **Experience 2:** Analyzing the consumers' behaviors in canteens
- **Experience 3:** Helping collect surplus food from canteens

Experience 1

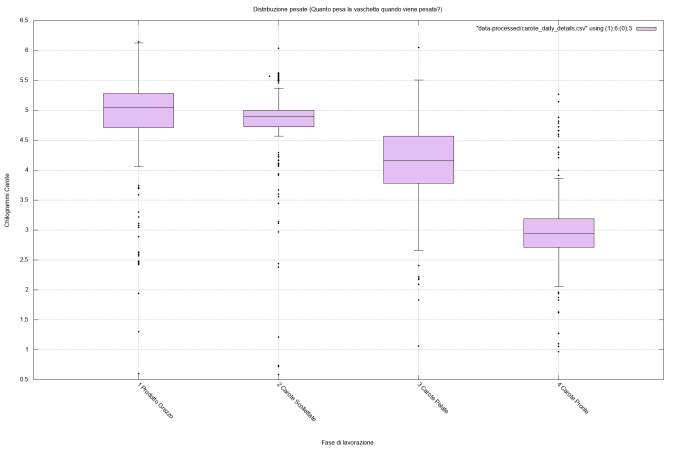
- A small canteens processes, every day, about hundred or so kgs of produce
- Preparation of fresh food in canteens is a combination of machinery and craftsmanship
- Excess processing remove edible parts
- Economic and environmental impact: 1 kg of carrots corresponds to
  - 270 g/kg CO2
  - 195 l/kg water
  - 1 m^2/kg of land (ecological footprint)

The Project

- Project in collaboration with a service provider
- We measured weight loss at all stages of processing for a selected range of products
- Measures taken daily (5/7) for various months

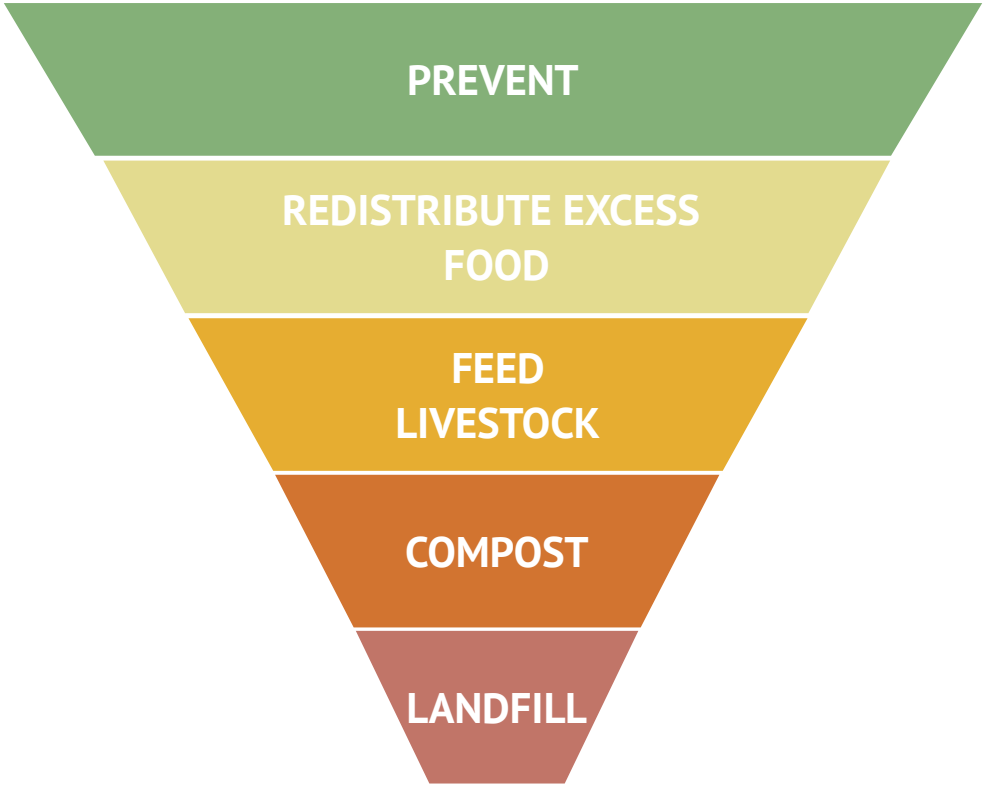
Results

- Comparison with INRAN’s, internal, and USDA data
- Suggestions on ideal working times for machinery
- Potential saving of hundreds of thousands of euros
- However: extra load on personnel, seasonal variations

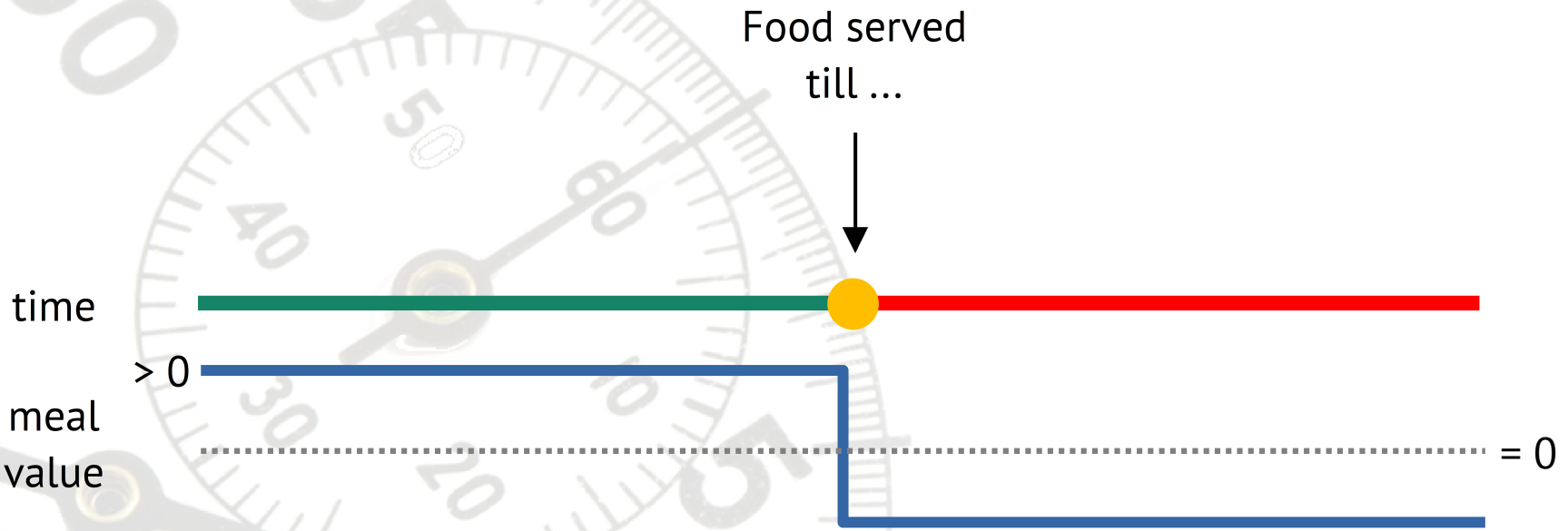


Experience 2

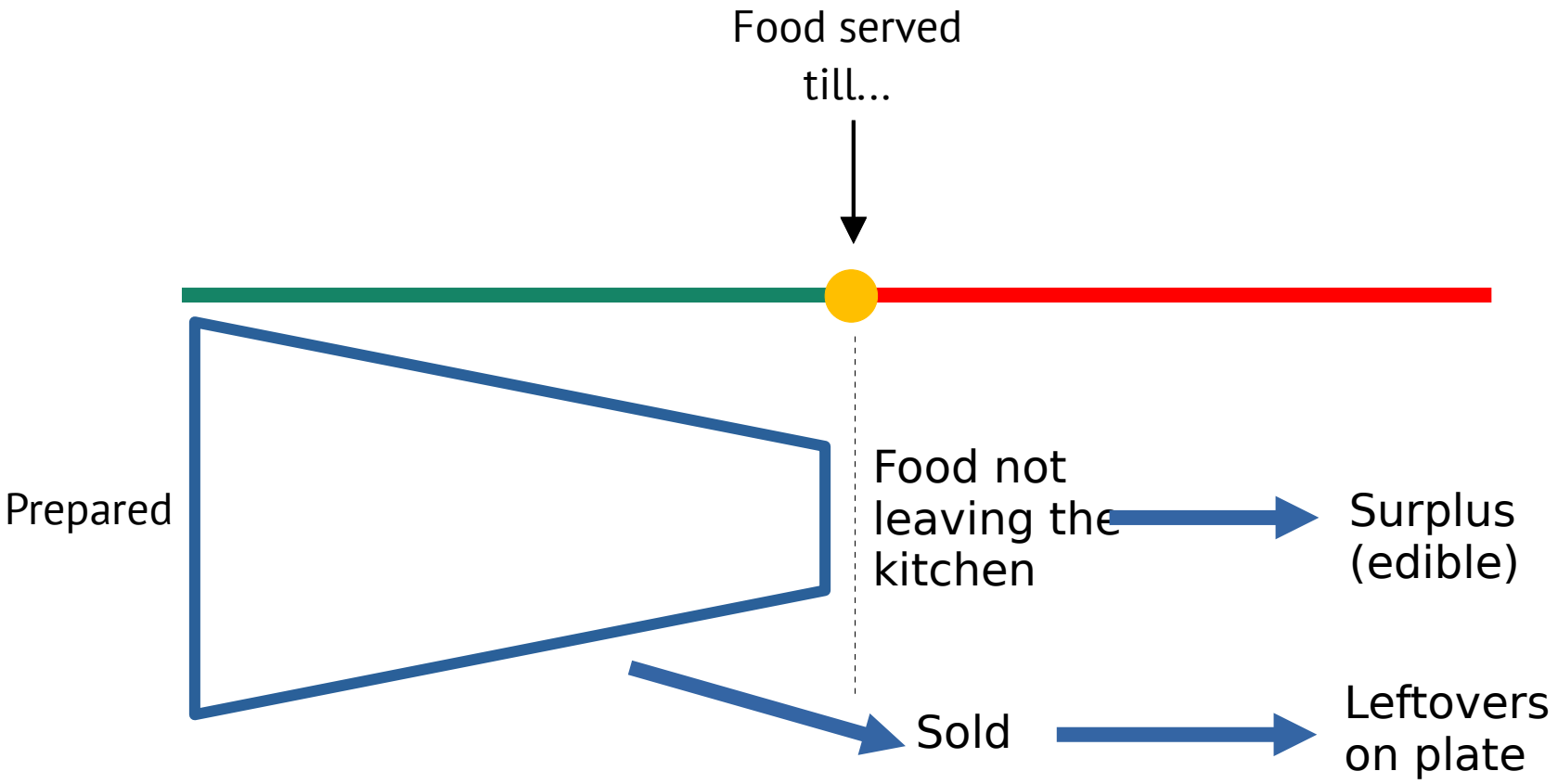
- Improving sustainability of canteen operations



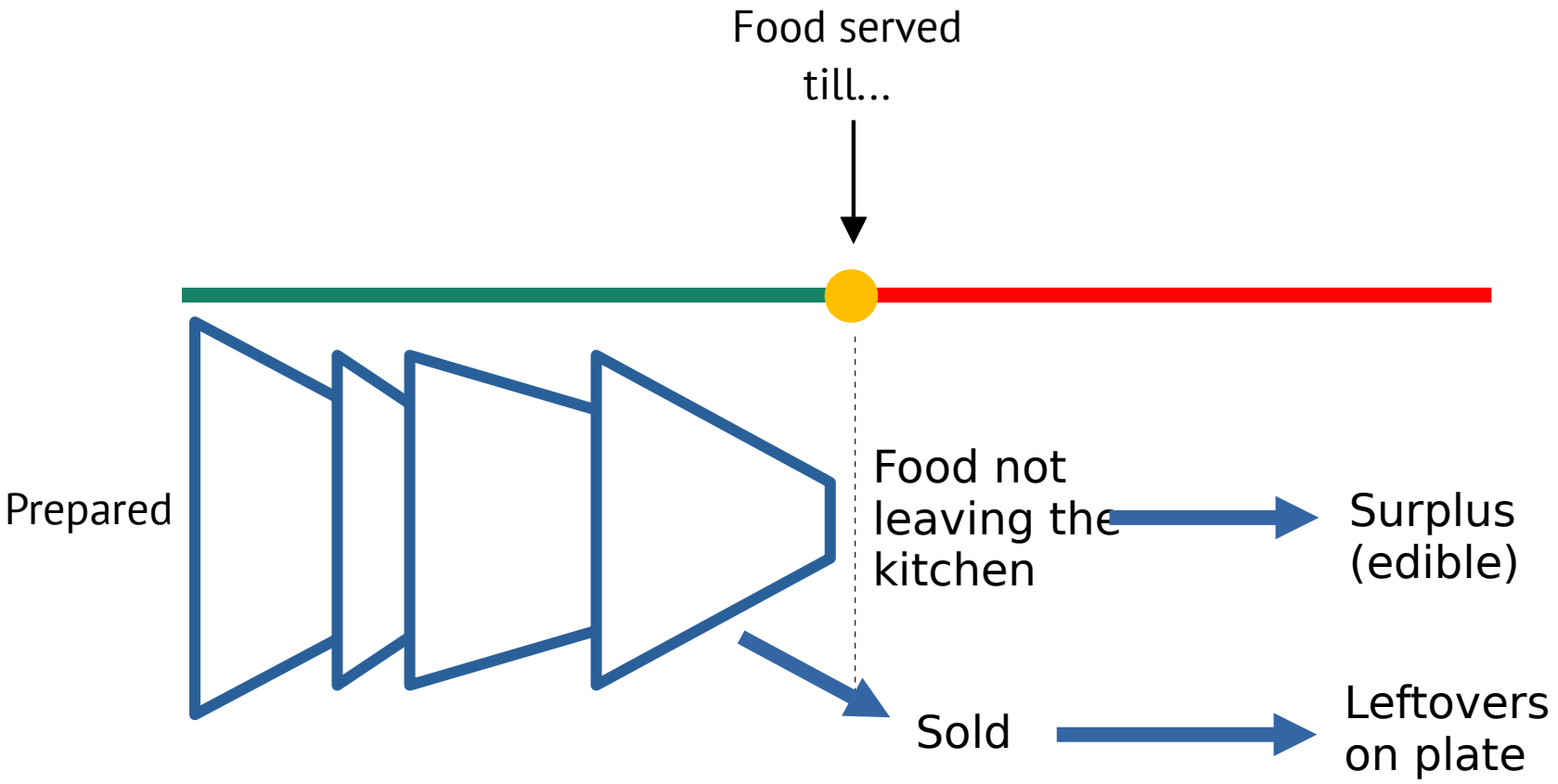
The turning point



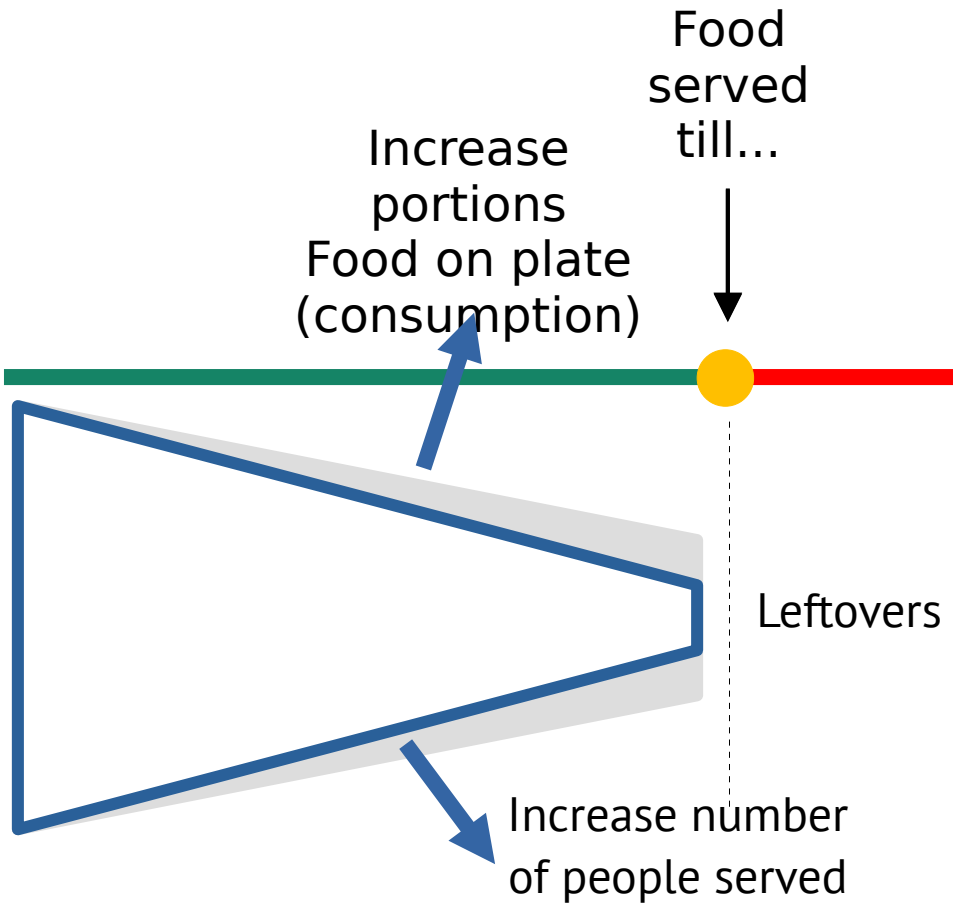
Reduce: Decrease Stock



Reduce: Decrease Stock



Reduce: Increase Output



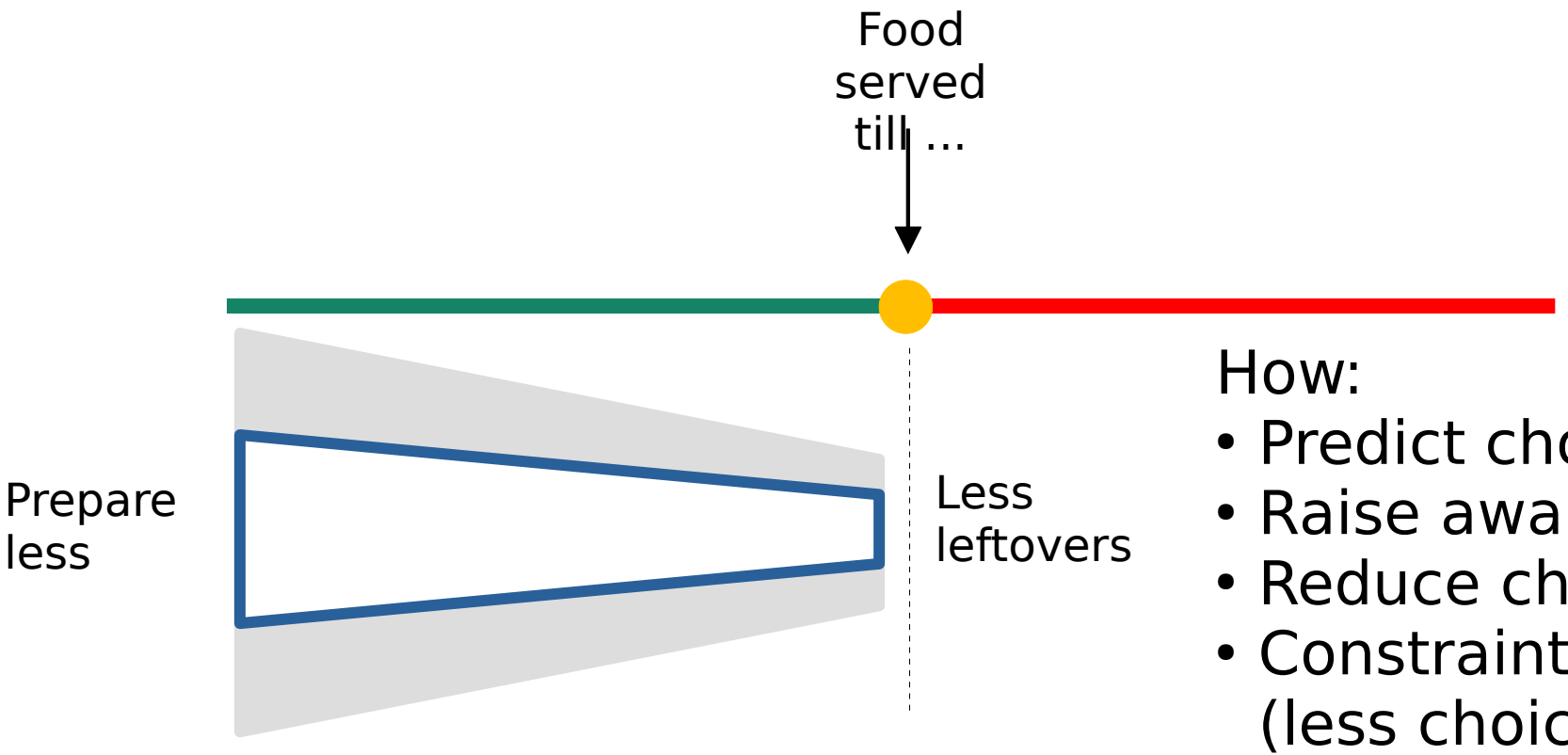
Not a good thing, for various reasons:

- More waste on plate
- Fosters unhealthy behaviors

Not always practicable:

- Throughput
- Regulations (e.g., food served in internal canteens)

Reduce

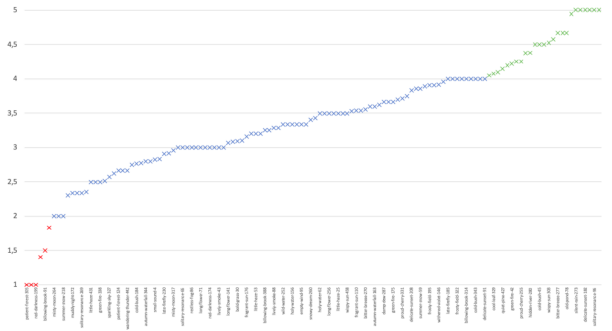


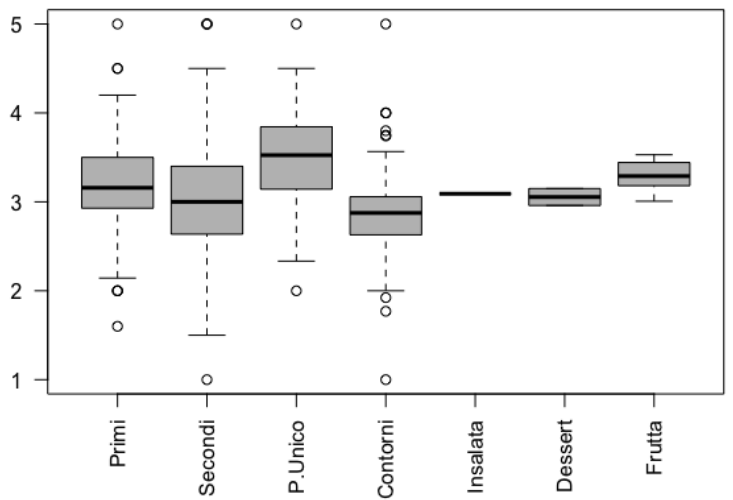
How:

- Predict choices
- Raise awareness
- Reduce choice
- Constraint choice (less choice, reservations)

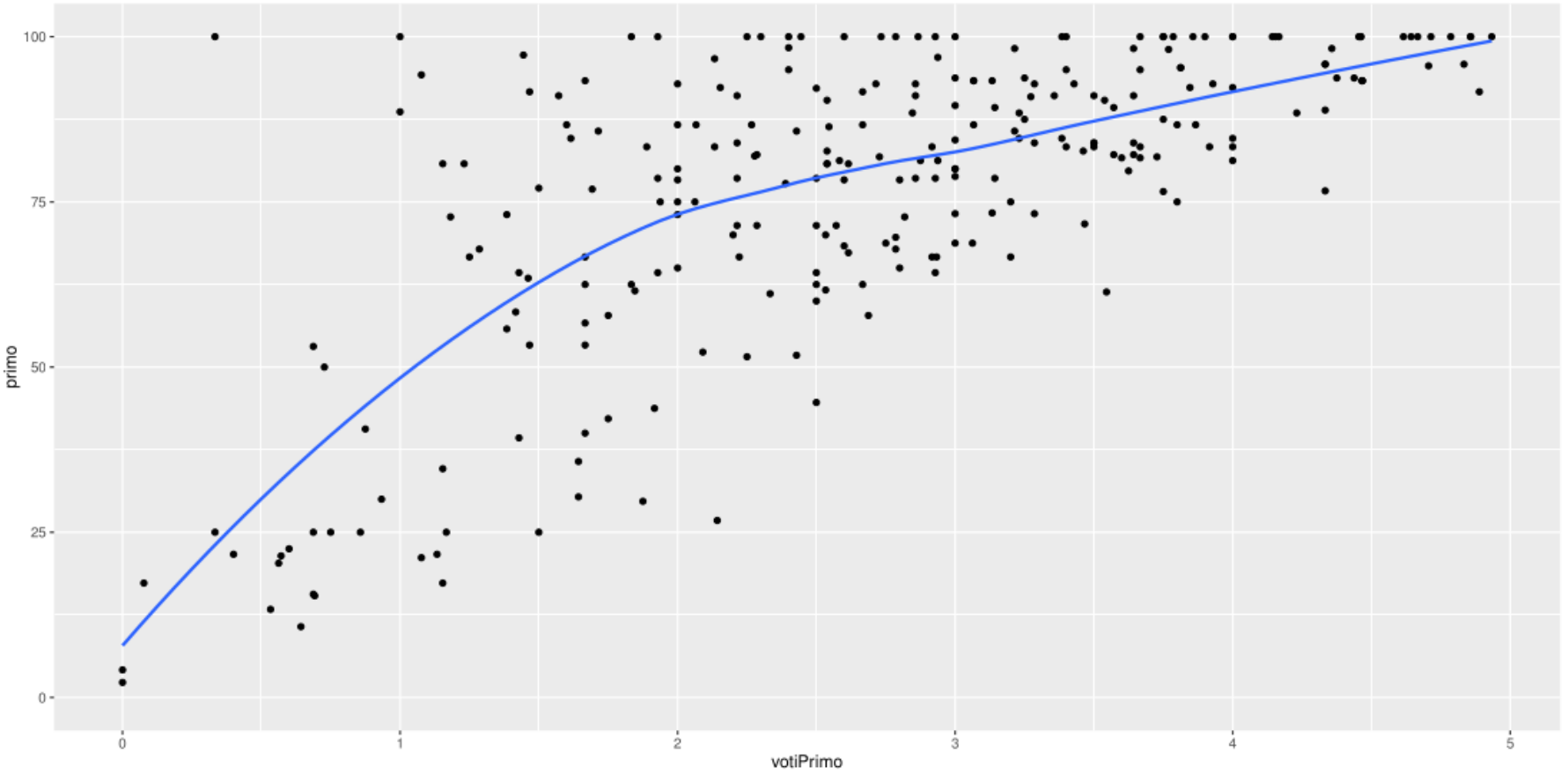
Predicting Choices

- Predicting choices
  - When
  - What (with what)
  - How much
- Example 1: Analyzing choices in a canteen in Italy
  - 31000 data points
  - Choices, non-choices, liking
  - Distribution over time
- Example 2: Analyzing choices in a school
  - Middle School (12-14 years/old)
  - Leftovers and rating

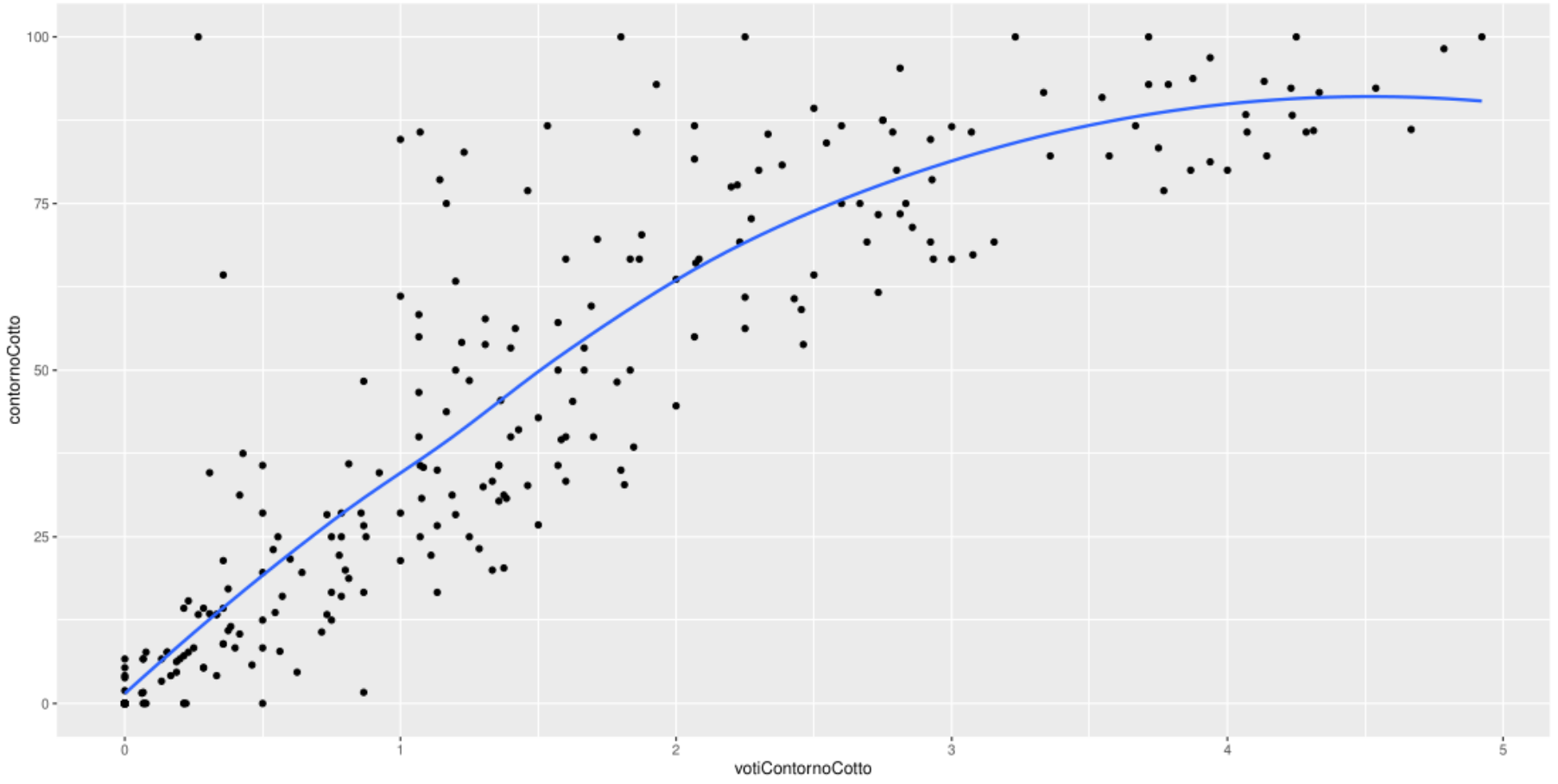




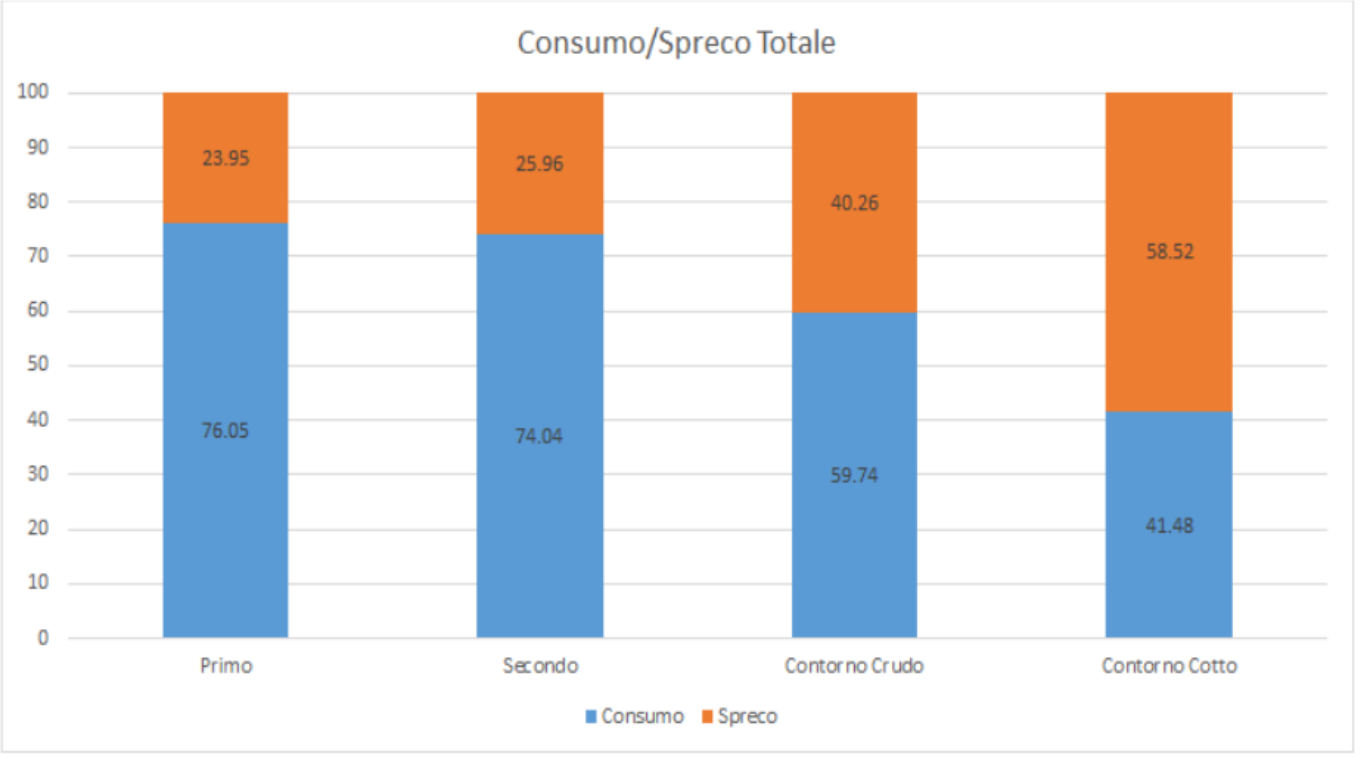
Quantity Consumed/User rating



Quantity Consumed/User rating



... e, in effetti, ...

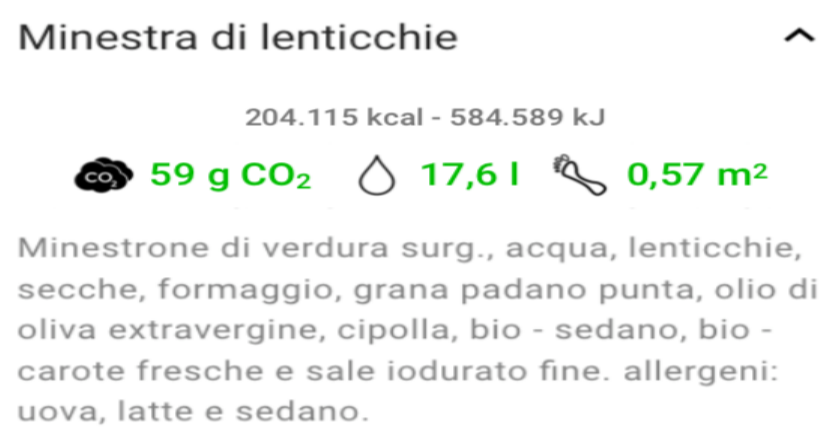

Consumo/Spreco Totale
100
90
80
70
60
50
40
30
20
10
0
23.95
25.96
40.26
58.52
76.05
74.04
59.74
41.48
Primo
Secondo
Contorno Crudo
Contorno Cotto
Consumo
Spreco

	Mangiato	Voto
Primo	Niente ☐ ☐ ☐ ☐ Tutto ☐ Bis ☒	★ ★ ★ ★ ★
Secondo	Niente ☐ ☐ ☐ ☐ Tutto ☐ Bis ☒	★ ★ ★ ★ ★
Contorno Crudo	Niente ☐ ☐ ☐ ☐ Tutto ☐ Bis ☒	★ ★ ★ ★ ★
Contorno Cotto	Niente ☐ ☐ ☐ ☐ Tutto ☐ Bis ☒	★ ★ ★ ★ ★
Pane	Quanti pezzi hai preso? 1 2 3 **4** 5	Quanti ne hai lasciati? 1 2 3 4 **5**
Frutta	Ne hai presa? Sì ☐ **No** ☒	Mangiata tutta? Sì ☐ **No** ☒

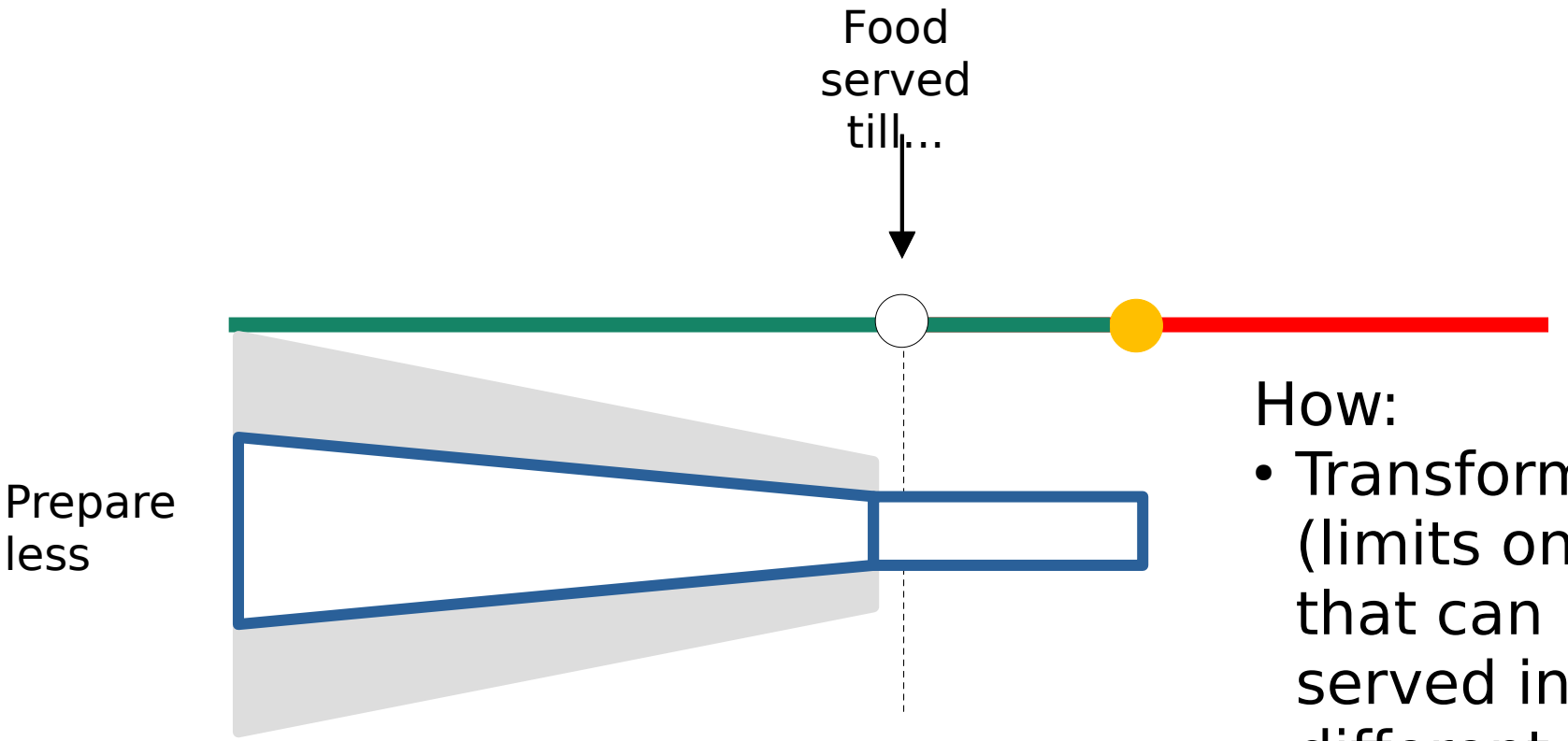
he voleva ancora

Raising Awareness

- Make customers more aware of the environmental and ethical implications of their choices
- Footprints
- <u>We didn’t do it, but I would now try with the social impact</u>



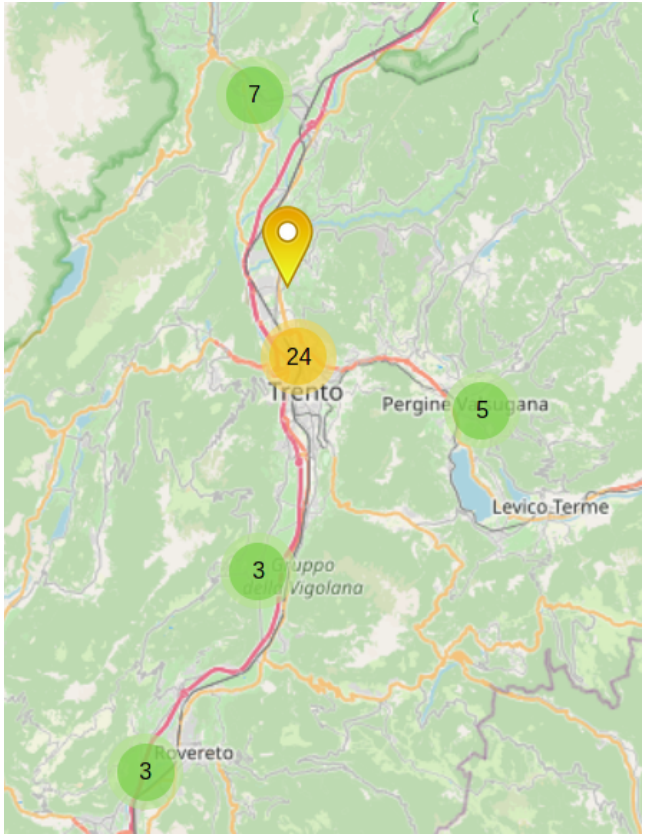
Reduce: Increase lifespan



How:

- Transformation (limits on food that can be served in different times)
- **Food donations**

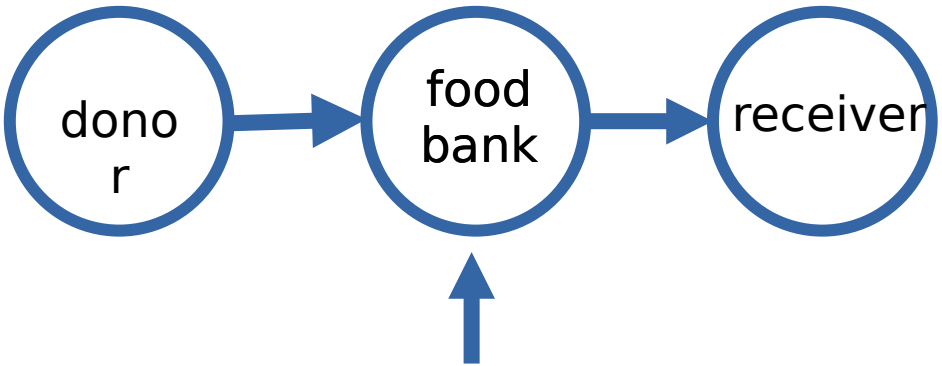
Issues: Size and Distribution



- A cup of spaghetti: 196 kcal, 3 euros
- By car: 2 liters of fuel (10 km – return trip)
- On foot: 70 kcal/mile (1.5 miles – return trip)

Timings

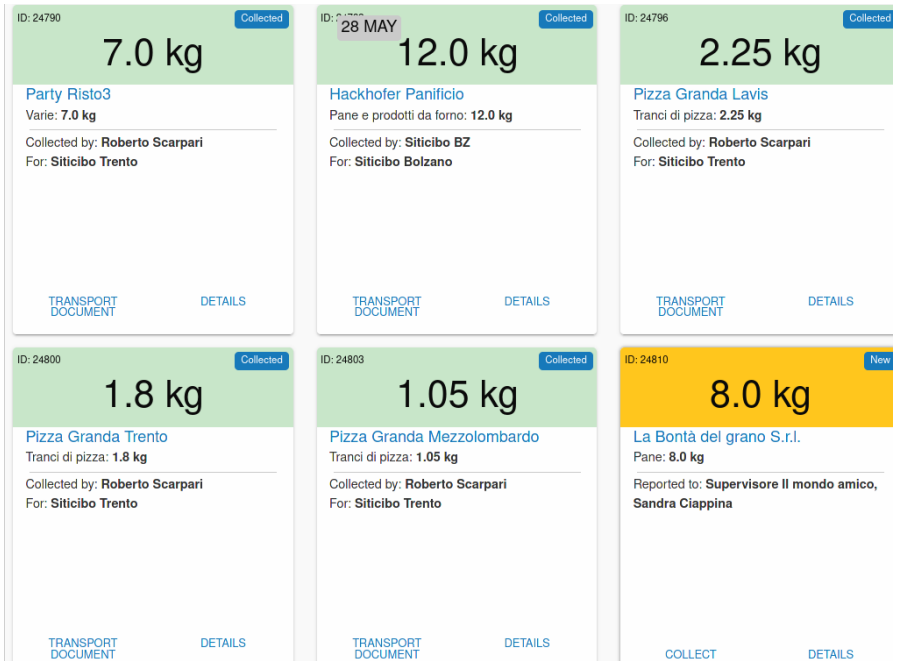
- You need to collect and serve in the same day
- If you don’t do it, waste is simply moved along the chain to the food bank



Has to negotiate requests of both sides

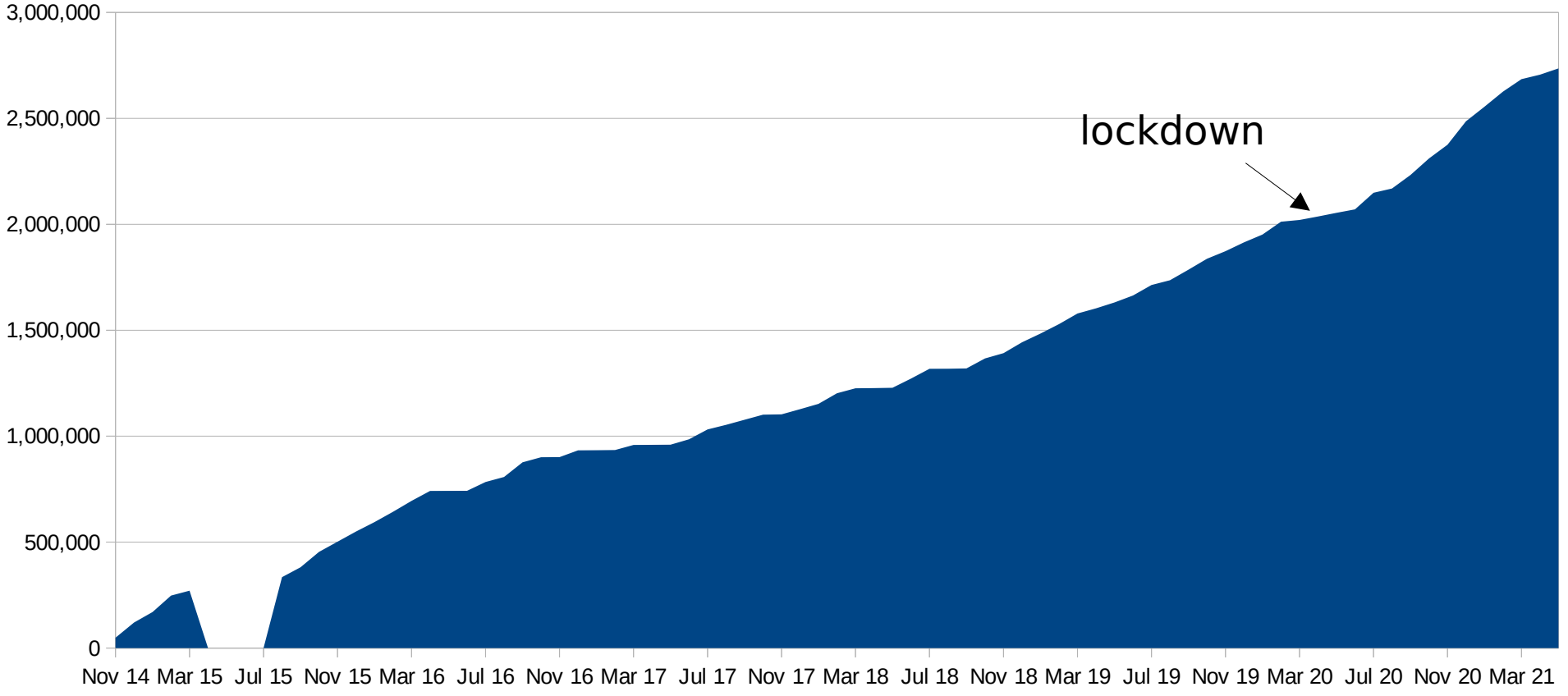
Ideally: a steady flow

Why BringTheFood

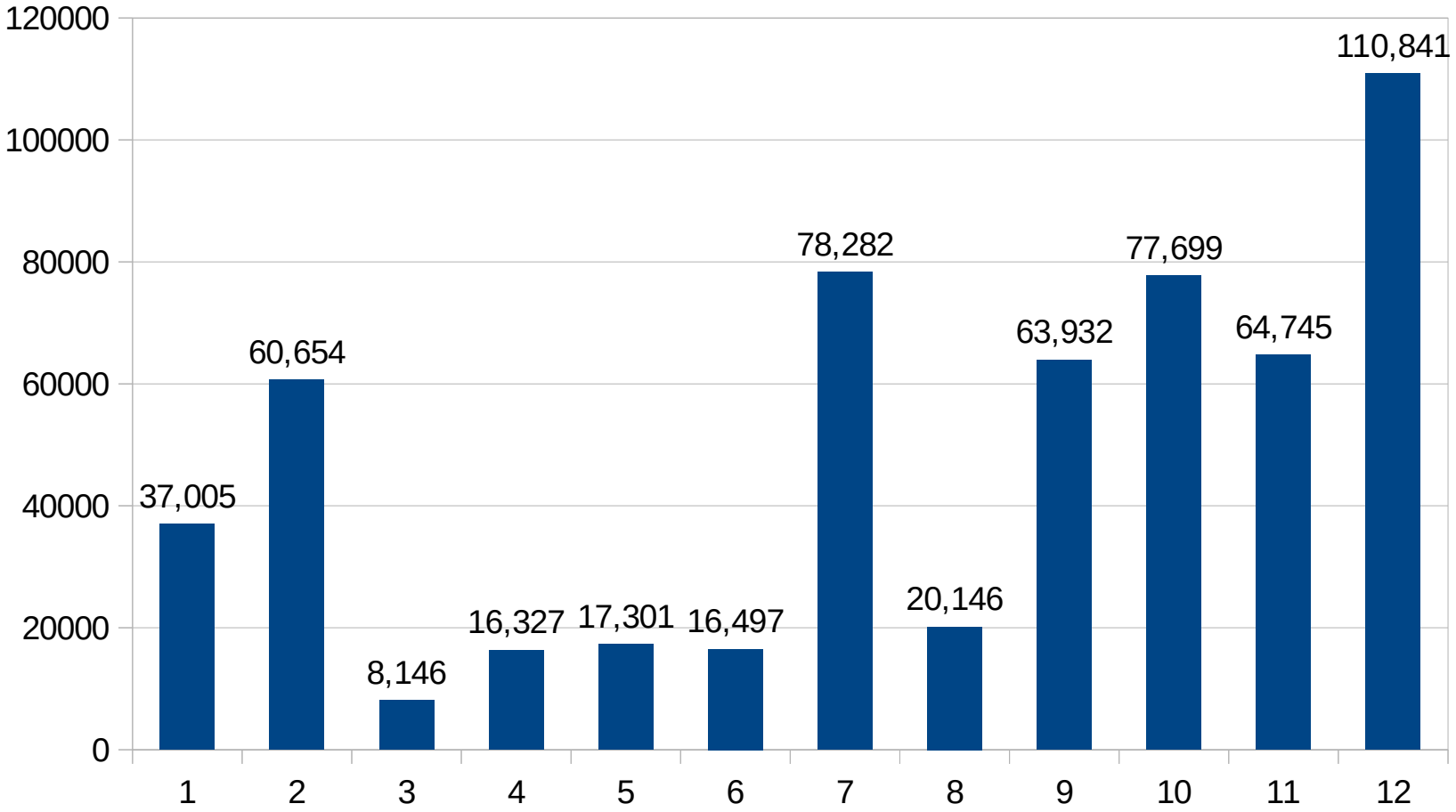


- Helps planning and organizing work (including routing and redistribution)
- Coordinates work across organizations
- Improves accountability: traces food from source to destination
- Data, Paperwork and documentation

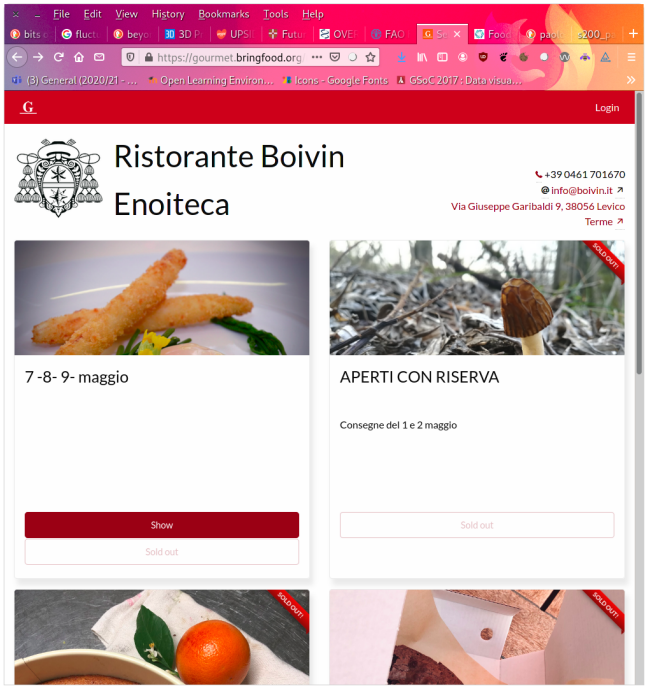
Food Collected with BringTheFood



Impact of COVID-19

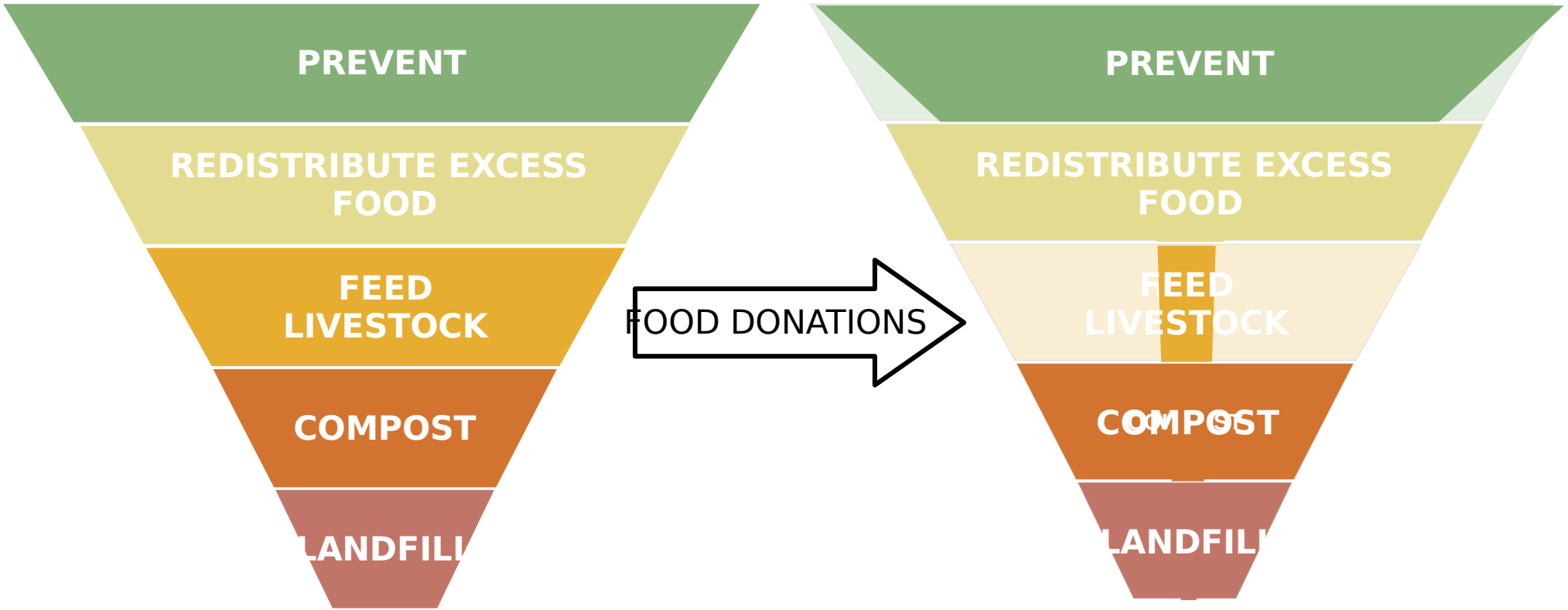


Moving from supply-driven to demand-driven systems



- Small pilot during the pandemic in Fidenza for the COVID hospital
- Now we would like to bring in production for restaurants

Our Goal


PREVENT
REDISTRIBUTE EXCESS FOOD
FEED LIVESTOCK
COMPOST
LANDFILL
FOOD DONATIONS
PREVENT
REDISTRIBUTE EXCESS FOOD
FEED LIVESTOCK
COMPOST
LANDFILL

Conclusions

- There is a lot this talk did not cover:
  - Circular food systems
  - Urban food systems and local supply chains
  - Tags and sensors for quality assurance and extending shelf-life
  - Population growth and food demand
  - ….
- … but I hope I raised a bit of interest (or just reminded you!) about:
  - The role technologies have in measuring waste and redistributing surplus food
  - Making our food system fairer and more sustainable requires a holistic approach
  - There is a need to think big, but also a need to promote small changes

Bits of Food Questions?

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FoodCAS@
ELECTRONICS FOR BETTER QUALITY FOODS

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