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International Meeting
WORKING TOGETHER TO ACHIEVE SDG 12.3
Concrete actions preventing food waste

The virtuous cycle of food: practices to transform food waste into value

Prof. Alessandro Perego

15.05.2019, FAO - Rome

How to face the food waste challenge?

Definitions & measurement

Process optimization & innovative practices

Supply chain collaboration & local redistribution networks

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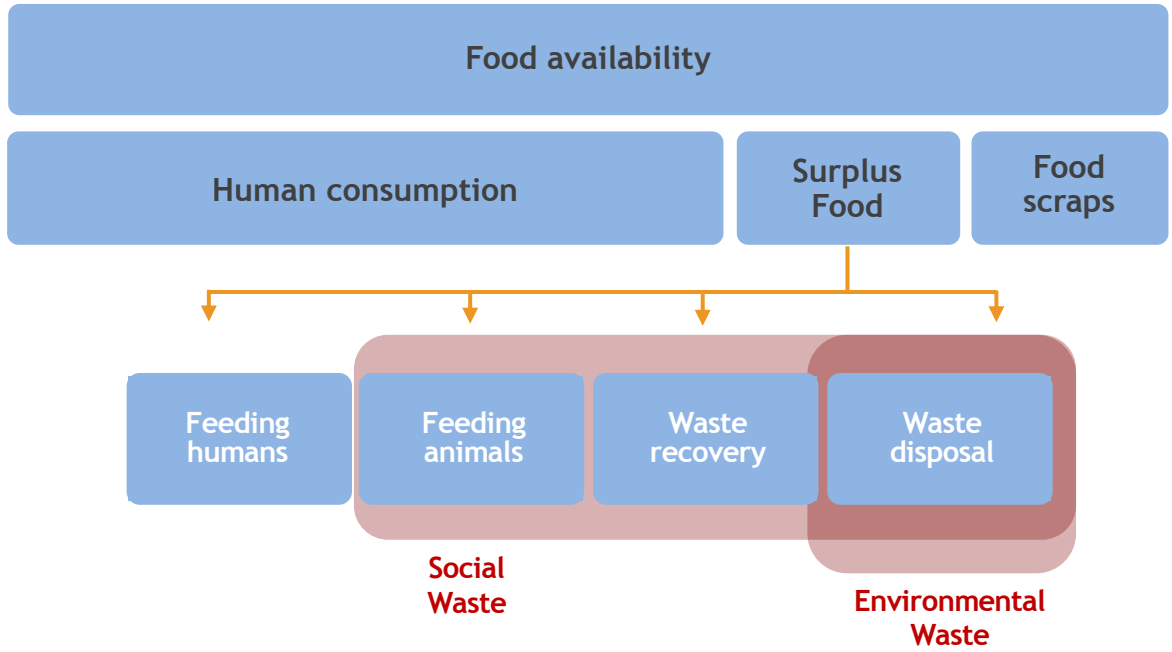
The starting point: definitions

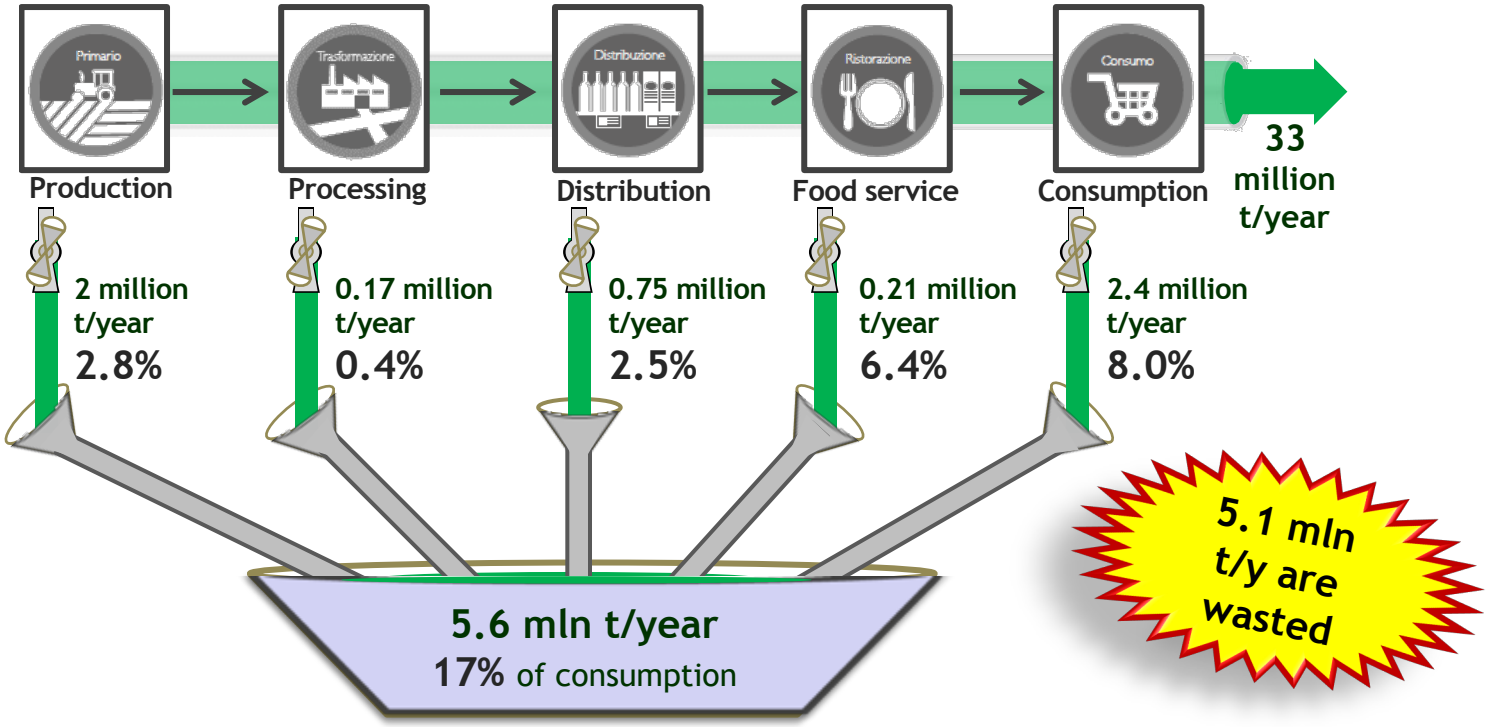
"Surplus Food" is edible food which is produced, processed, distributed or served but for various reasons is not purchased or consumed"

"Food Waste" is surplus food that is not recovered (for human consumption)



Source: Garrone, Melacini, Perego (2011)

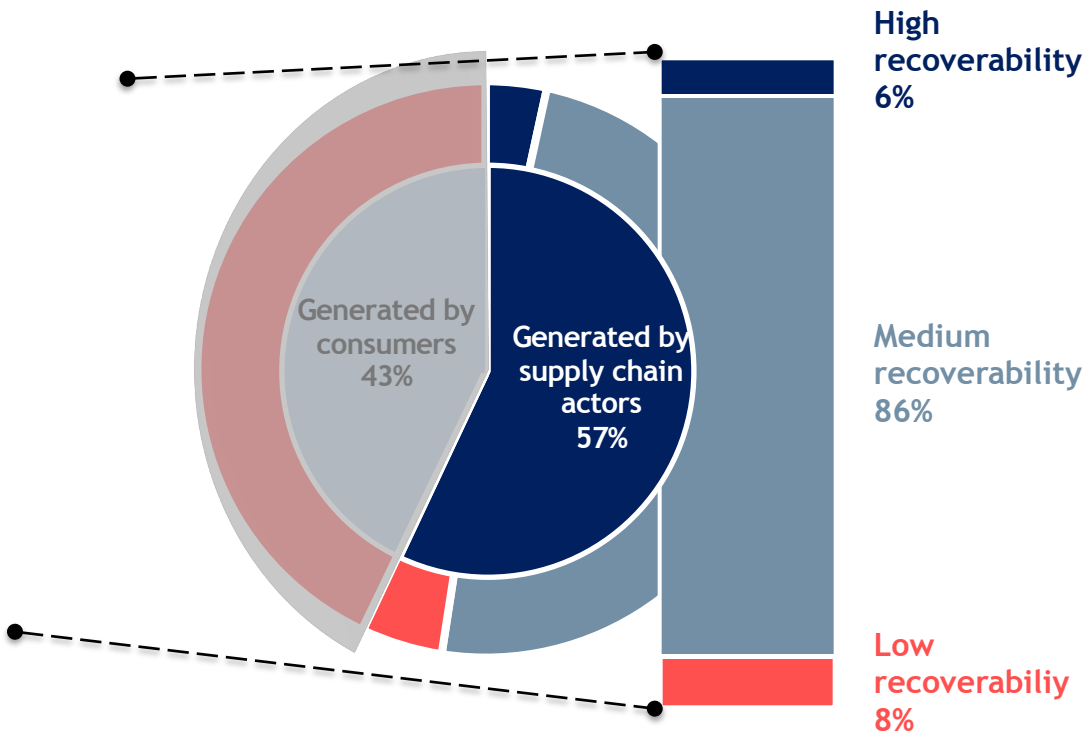
The starting point: measures



Source: Garrone, Melacini, Perego (2015)

The starting point: qualification

Surplus food is generated by **57%** within the supply chain, with a medium-high recoverability of over **90%** of surplus



Source: Garrone, Melacini, Perego (2015)

Definitions & Measurement: a «golden» decade

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2011

Study of the Swedish Institute for Food and Biotechnology – FAO, 2011

- FLW: edible food not consumed by human beings. "Food losses" occurs in production and processing, "food waste" in distribution and consumption
- *1.3 billion tons of food is lost or wasted (1/3 of total global production)*

FWL Standards – FWL Protocol, World Resource Institute 2016

- FLW: food and/or associated inedible parts removed from the food supply chain
- 10 quantification methods (direct weighting, counting)
- Accounting standards for companies, governments, cities and other actors

Food Waste Quantification Manual – FUSIONS, 2016

- FLW: food and/or associated inedible parts
- Practical guidelines for EU countries for quantifying food waste at different stages of the agri-food supply chain

Save Food Methodology – FAO, 2016

- FLW: food harvested yet not consumed (focus on developing countries)
- Tools for assessing food loss quantity / quality for individual supply chains, using 3 measurement methods (screening, survey, load tracking and sampling)

Global Strategy to improve Agricultural and Rural Statistics – GSARS, 2018

Practical guidelines for measuring food losses in agriculture for developing countries

Resource Efficient Food and dRink for the Entire Supply cHain (REFRESH), 2019

"Framework for action" to support decision-making by industry and policy makers to reduce food waste in 4 pilot countries

EU Platform on food losses and waste, 2019

Goal: develop a shared EU methodology for monitoring food waste (Ossrvatorio eccedenze, recuperi e sprechi alimentari OERSA – CREA for Italy)

2019

Definitions & Measurement: the challenges

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- **Surplus Food is not waste**
  - **Supremacy of surplus reduction and surplus re-use for human consumption**
    - **Measurement is still a problem (it is not systematic)**
      - **Qualification of surplus food is essential**

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One key enabler is «process innovation»

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PREVENTION
- Agri-product clusterization and distribution channel diversification
- Data sharing with retailers for better sales forecasting and stock management
- Promotions and ad-hoc areas for discounted products in store
- Meal order management system in canteens/restaurants

REUSE/REDISTRIBUTION
- Reuse of edible production scraps for food donation
- New contractual agreements with suppliers to reduce returns of unsold items
- Reprocessing and sale of unpacked products / residual scraps directly in store

REUSE FOR ANIMAL FEED
- Surplus food clusterizaton in production plant and pricing differentiation for sale to animal feed processors

RECYCLING
- Sale of unedible production scraps for reprocessing in other industrial products, also reused internally

Innovation and optimization require «rigorous» processes

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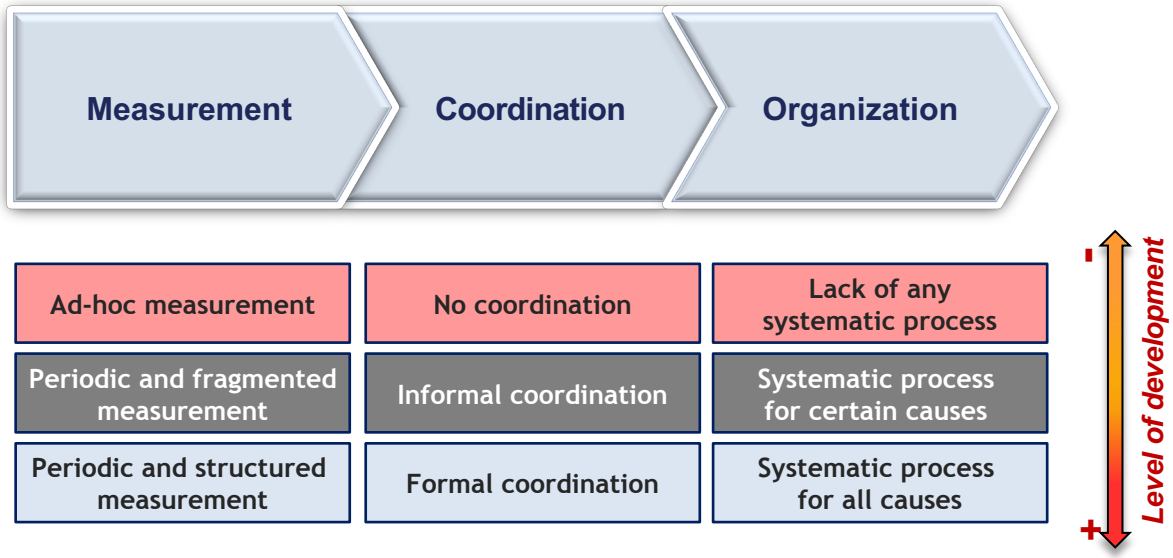
The **effectiveness** of surplus food recovery is higher where there are **structured surplus food management processes** in place

Surplus Food Management Control System



Source: Food Save Project; ECR Italy

…and the analysis of costs!

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Social efficiency: Redistribution costs v. value for beneficiaries (e.g. average product price)

[Euro/kg]	Redistribution cost	Product value
Manufacturing	0.10	2.50
Distribution	0.77	2.52
Food service	1.90	6.40

"Multiplier Effect"

Economic breakeven: Differential redistribution costs v. costs of alternative destinations (e.g. waste management)

[Euro/kg]	Differential redistribution cost	Differential waste management costs
	Differential costs	Municipal waste variable tax
Manufacturing	0.04	Mixed waste: 0.24; Separated waste: 0.19 (e.g. edible oils: 0.38; wet organic waste: 0.22)
Distribution	0.38	
Food service	1.90	

Source: Garrone, Melacini, Perego, Sert (2017)

A second formidable enabler is technological innovation

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PREVENTION
- Information systems and data analytics for better forecasting, monitoring, grouping
- Green chemical and mechanical solutions for shelf-life extension and quality upgrading

REUSE/REDISTRIBUTION
- Processing technology for shelf-life extension (e.g. dehydration)
- Mobile app and web platform for discounting, food donation and sharing

REUSE FOR ANIMAL FEED
- Unpacking and processing technology for animal feed production
- Traceability systems for product monitoring and process certification

RECYCLING
- Processing technology for alternative products inside the food industry (e.g. food packaging) or outside it (e.g textile, bio-building)

Startups are powerful «engines» of innovation

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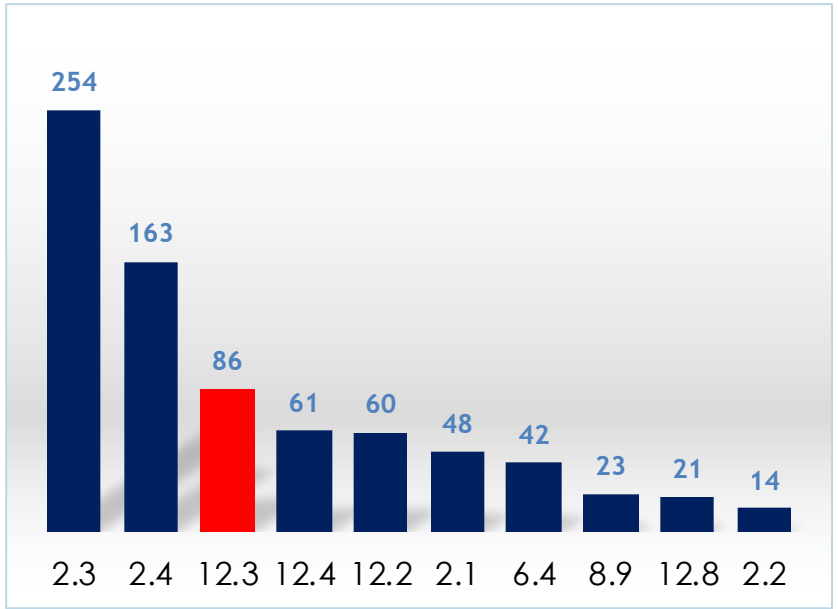
Most pursued sustainability targets
(1 target/startup - absolute frequency)



Sample of 835 agri-food startup oriented to sustainability

Priority goals and targets

- 2 ZERO HUNGER — 2.1: Access to food for all; 2.2: Food security for weaker people; 2.3: Small-scale producers; 2.4: Resilient Agriculture
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION — 12.2: Efficient use of resources; 12.3: Food loss & waste reduction; 12.4: Green chemicals; 12.8: Awareness for sustainable development and lifestyles
- 6 CLEAN WATER AND SANITATION — 6.4: Efficient use and equal access to water
- 8 DECENT WORK AND ECONOMIC GROWTH — 8.9: Sustainable tourism and local products

Source: Elaboration from the Database of agri-food startups, Food Sustainability Observatory 2018-19

Innovation for food loss & waste reduction (12.3)

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- Software optimising surplus food inventory management along the supply chain allowing traceability — Spoiler Alert
- Web platform connecting producers, retailers, restaurants, consumers and no profit organizations, to save surplus food — bring the food
- B2B marketplace selling agricolture scraps to derive other process source and biofossils — INSYMBIO
- Mobile app providing real time information to users about discounts and promotions of surplus food in supermarkets and local shops — OptiMiam
- Demand forecasts based on AI and translated into shelf replenishment indications to reduce volumes of unsold fresh food — AFRESH
- Digital smart bin able to monitor food waste in restaurants kitchens and offer AI-based reduction support — winnow
- Inside-fridge cam for remote visibility and smart recognition of consumer's domestic food supply, to optimize grocery and avoid excessive purchase of food at the supermarket — brezzl.

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Collaborations are «key» for sustainable innovation

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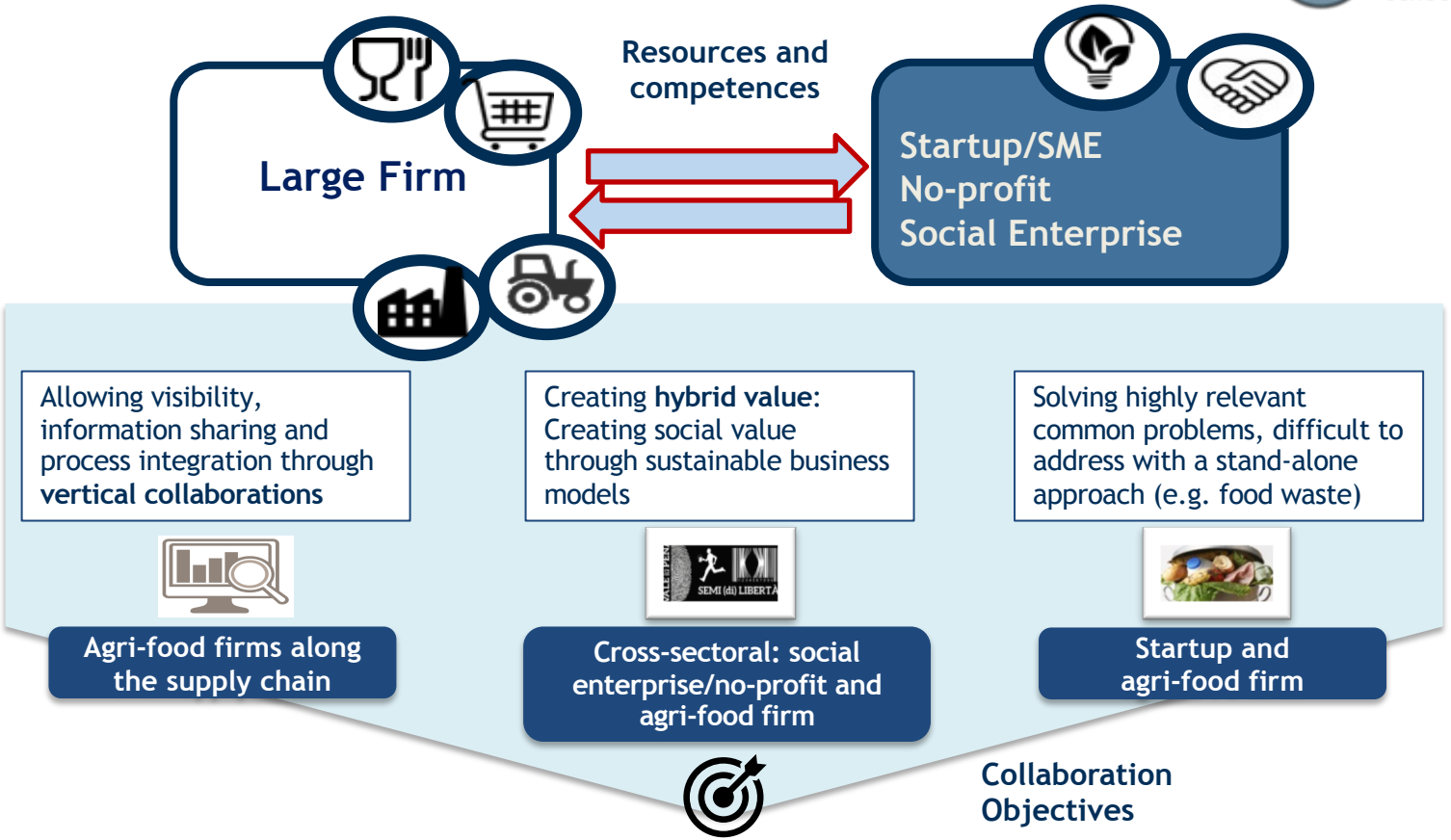

Paradigmatic example: new redistribution networks

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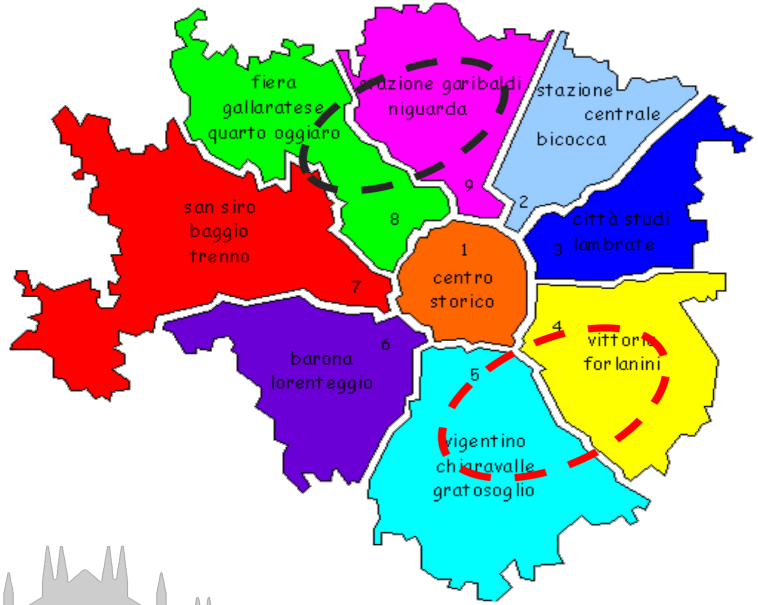
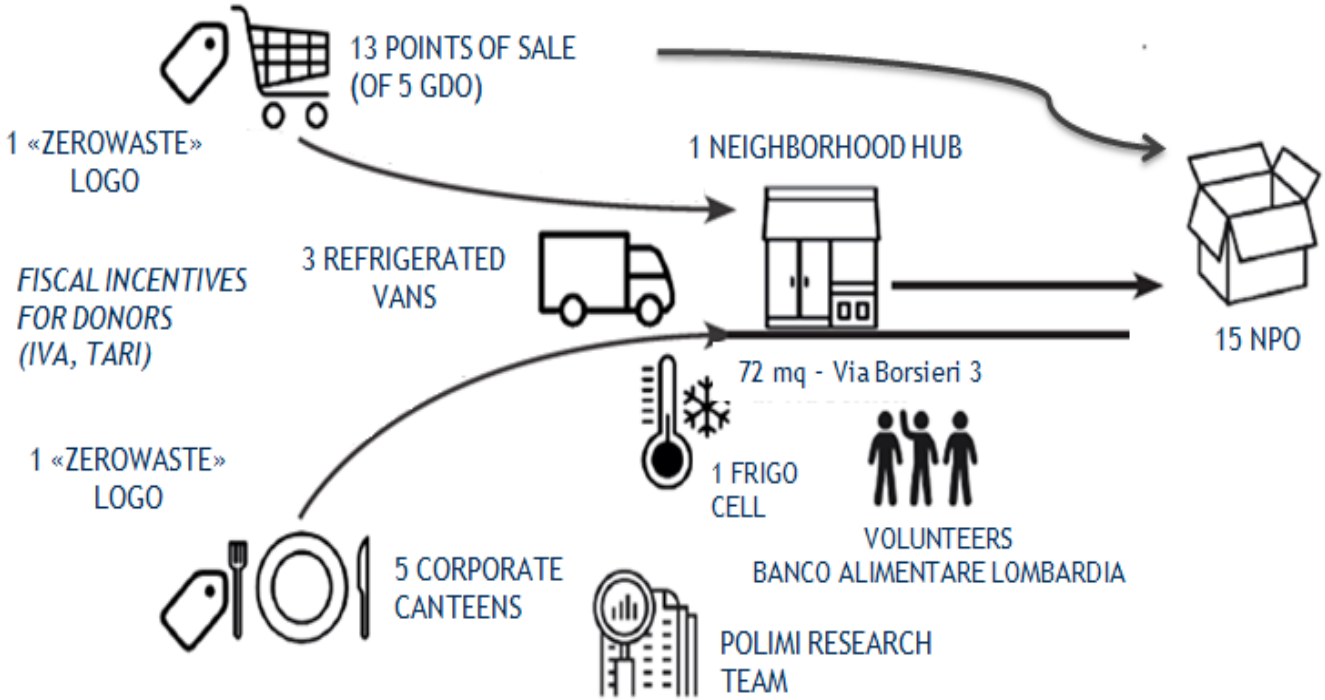
Pilot testing in Municipio 8 and 9 in Milan…
…and possible extension to Municipio 3 and 4



Surplus food redistribution system centred on 1 logistics hub

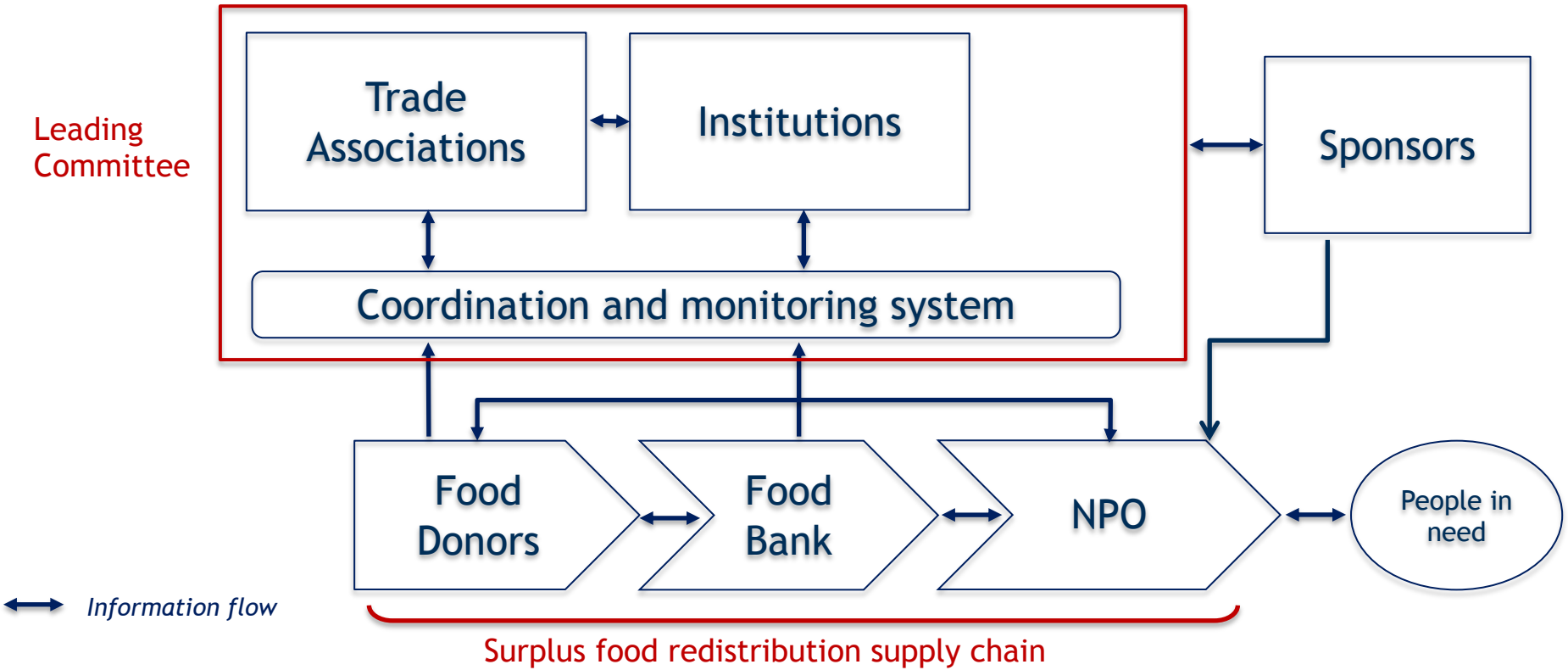
«Smart City Food Sharing» project in collaboration with:

… which require an integrated logistics system



Source: own elaboration with data updated by April 2019

… and new governance models



3 take-aways for the Food Banks

Be proactive in the definition of measurement protocols

Be open to innovation and the start-up ecosystem

Strive to play the system integrator role

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THANK YOU!

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