



Istituto di Tecnologie Industriali e Automazione
Consiglio Nazionale delle Ricerche

from research to market



Advanced manufacturing enablers and solutions for food industry application

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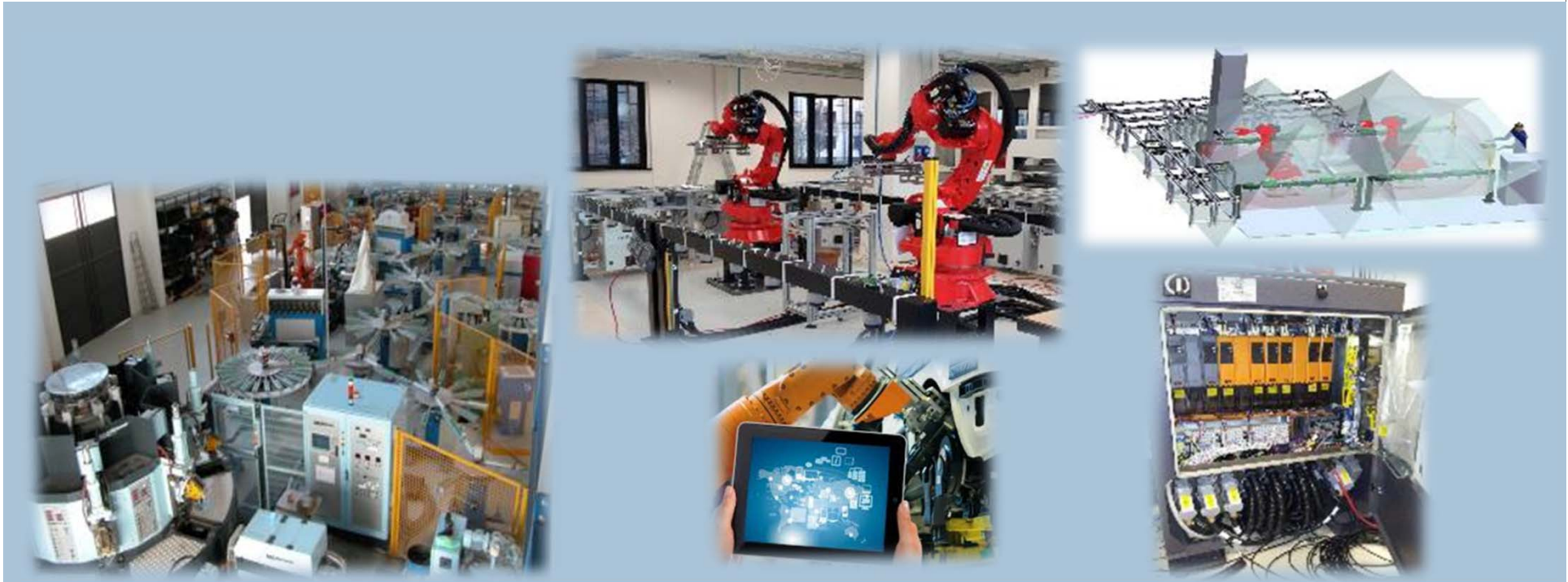
*Central European Cooperation in Smart Specialisation on Application of ICT and
Advanced Manufacturing Solutions in the Food Chain workshop
Budapest, 5 April 2018*





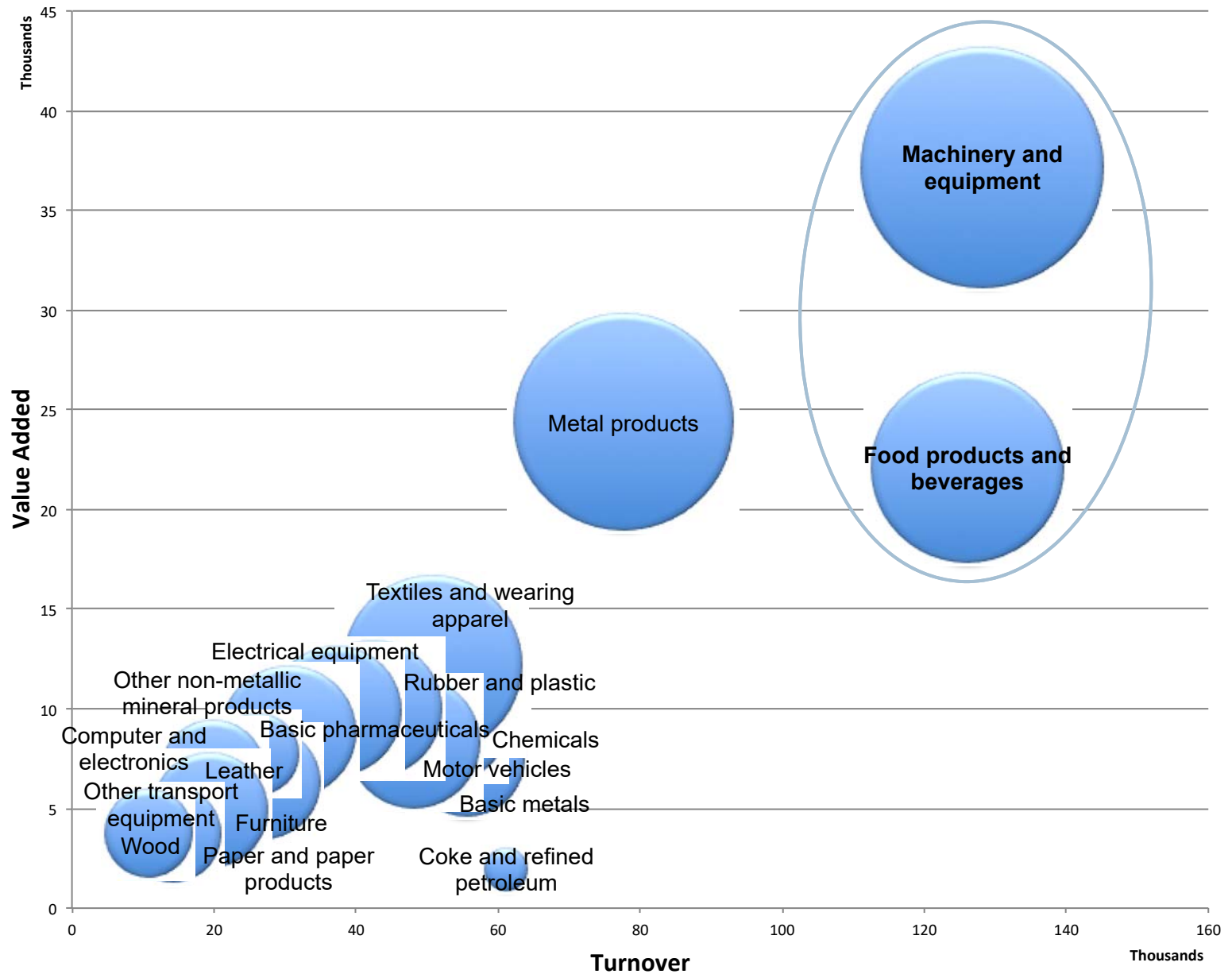
Research on Products-Processes-Production Systems:

- Robotics
- Control and Automation
- Virtual Reality and Digital Factory
- Machine design and simulation
- Micromanufacturing
- Remanufacturing and recycling technologies
- Manufacturing/De-Manufacturing business models and paradigms





Relevance of EU machinery and food sector



Source: Elaboration ITIA-CNR from Eurostat (data 2012-2013)



Four future Food Manufacturing scenarios



2011-2013

- Aalborg University
- Campden BRI
- Inesc Porto
- Spread EU Safety GEIE
- TNO
- SIK
- DIL
- CNR-ITIA
- ENEA
- Gent University
- DTI
- Fraunhofer ISI

Global Micro Systems



Ingredients-based food



Integrated value chain



Disintegrated value chain





Robotics



- ✓ Efficiency
- ✓ Precision
- ✓ Repeatability
- ✓ Safety



Robotics



- ✓ Efficiency
- ✓ Precision





Robotics

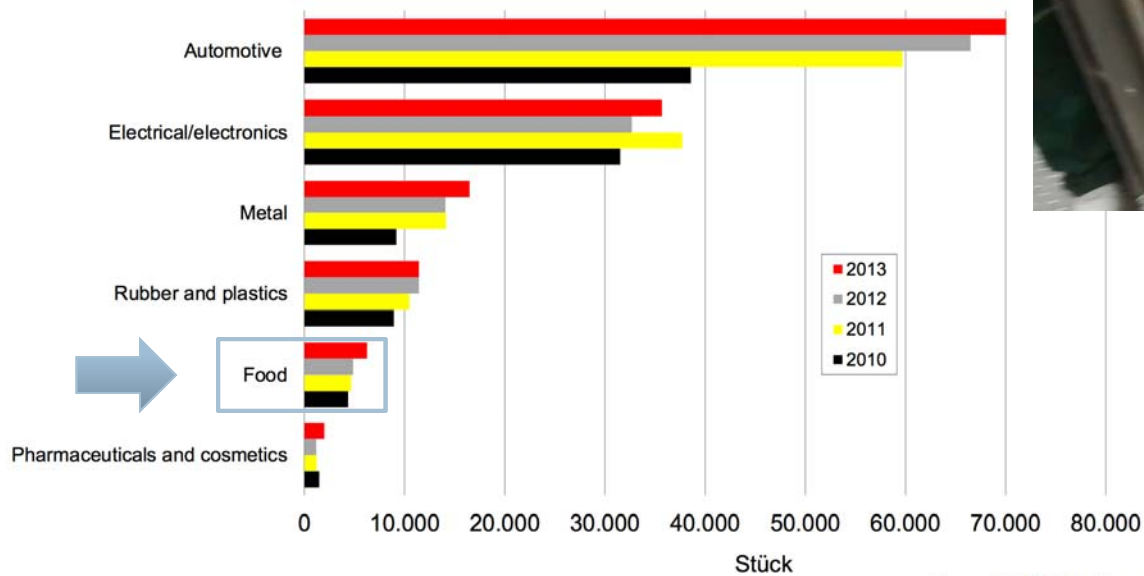


- ✓ Efficiency
- ✓ Precision





Challenges...



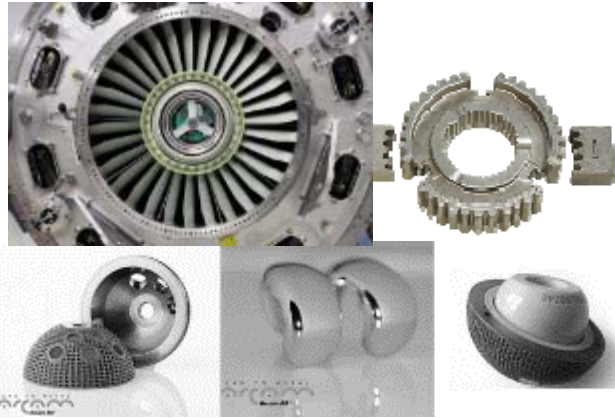
Source: IFR Statistical Department

Problems:

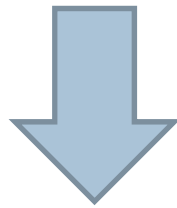
- Cost
- Operators skills
- Rigidity



Additive Manufacturing



Aeronautics, mechanicals,
automotive,
medical, ...



...Custom-printed food





Technologie for flexibility

Climate and geography

Different local processing conditions

Intrinsic variability of agricultural and animal production

Variability of food products and processes

Modular production and transportation systems for Factory reconfiguration

Flexible automation





Virtual and Augmented Reality

- ✓ Factory design and management
- ✓ Training
- ✓ Products/processes visualization

In food industry...

- Training of operators where manual skills are relevant (i.e. sorting of fruits, food packaging operations, ...)
- Layout design of areas with particular hygiene requirements
- Virtual representation of food products with genuine characteristics





Advanced manufacturing technologies and methods

Robotics and automation

Integrated flexible automation and control system

Internet of Things, Big data, ... (Industry 4.0)

Additive Manufacturing

Advanced technologies for intelligent materials and products

Sensing technologies (Hyperspectral, NIR, electronic nose, ...)

Energy efficiency technologies

Remanufacturing technologies and concepts for machinery

Supply chain/networks design and management (i.e. le-agility)

Business models design/assessment techniques

Risk management systems

...



The issue: Adaptation and uptake



The issue: Adaptation to food manufacturing needs and uptake

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PILOT PLANTS

RESEARCH
INFRASTRUCTURES



Food Research Infrastructures

Robotics and automation

Integrated flexible automation and

Internet of Things, Big data, ... (I)

Additive Manufacturing

Advanced technologies for intelli

Sensing technologies (Hypers

Energy efficiency technologies

Remanufacturing technologies a

Supply chain/networks design and

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Risk management systems

...

PILOT PLANTS

RESEARCH
INFRASTRUCTURES



Etc.

www.richfields.eu



Research Infrastructure on Consumer Health and Food
Intake for E- science with Linked Data Sharing





Food Manufacturing Pilot Plants

Robotics and automation

Interreg

Interreg

Adv

Adv

Ser

En

Res

Supply

Business model

Management techniques

Risk management

...



VANGUARD INITIATIVE
New growth through smart specialisation

ESM-Efficient and Sustainable Manufacturing



SMART SPECIALISATION PLATFORM



Project co-financed by the European Regional Development Fund



Etc.

PILOT PLANTS

RESEARCH INFRASTRUCTURES





Food Manufacturing Pilot Plants



European network of open facilities

where companies (including SMEs) can find:

- Innovative **technologies**
- Multi-disciplinary **competences**
(technology, business, innovation)
- Stimulating **cultural environment**



To understand, test, set-up and uptake innovative technologies and methods

- TRL>7
- Open
- Motivated and supported by industry
- Clearly focused on applicative domains



Thank you for attention

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