



Latvia University
of Life Sciences
and Technologies



Bioeconomy and Digital Economy for Agricultural Development

Prof., Dr. habil. oec. Baiba Rivza

Latvia Academy of Agricultural and Forestry Sciences

Latvia University of Life Sciences and Technologies





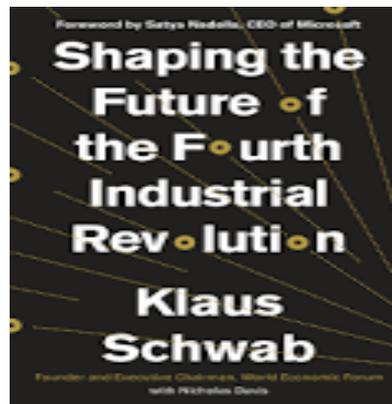
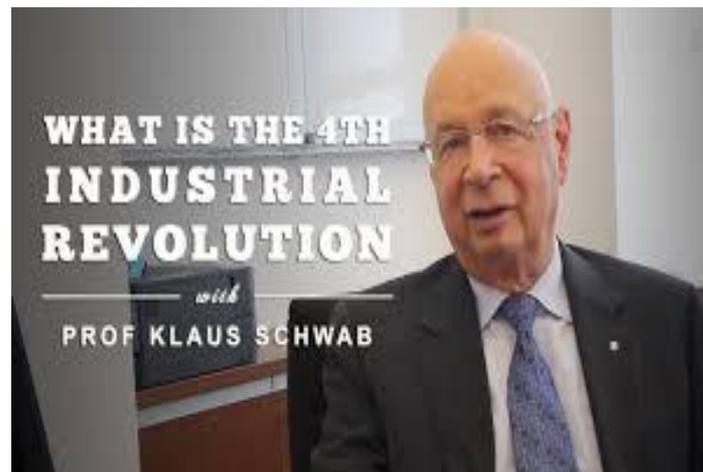
Content

- Impact of the 4th Industrial Revolution
- The Digital Economy. The Digital Economy and Society Index (DESI)
- International Projects
- E-commerce as a Consequence of Innovation: Latvian and Lithuanian Experience
- Impact of Digital Economy to Bioeconomy
- Science and Practice – Knowledge Transfer



Klaus Schwab

- **Klaus Martin Schwab** - the founder and executive chairman of the **World Economic Forum**

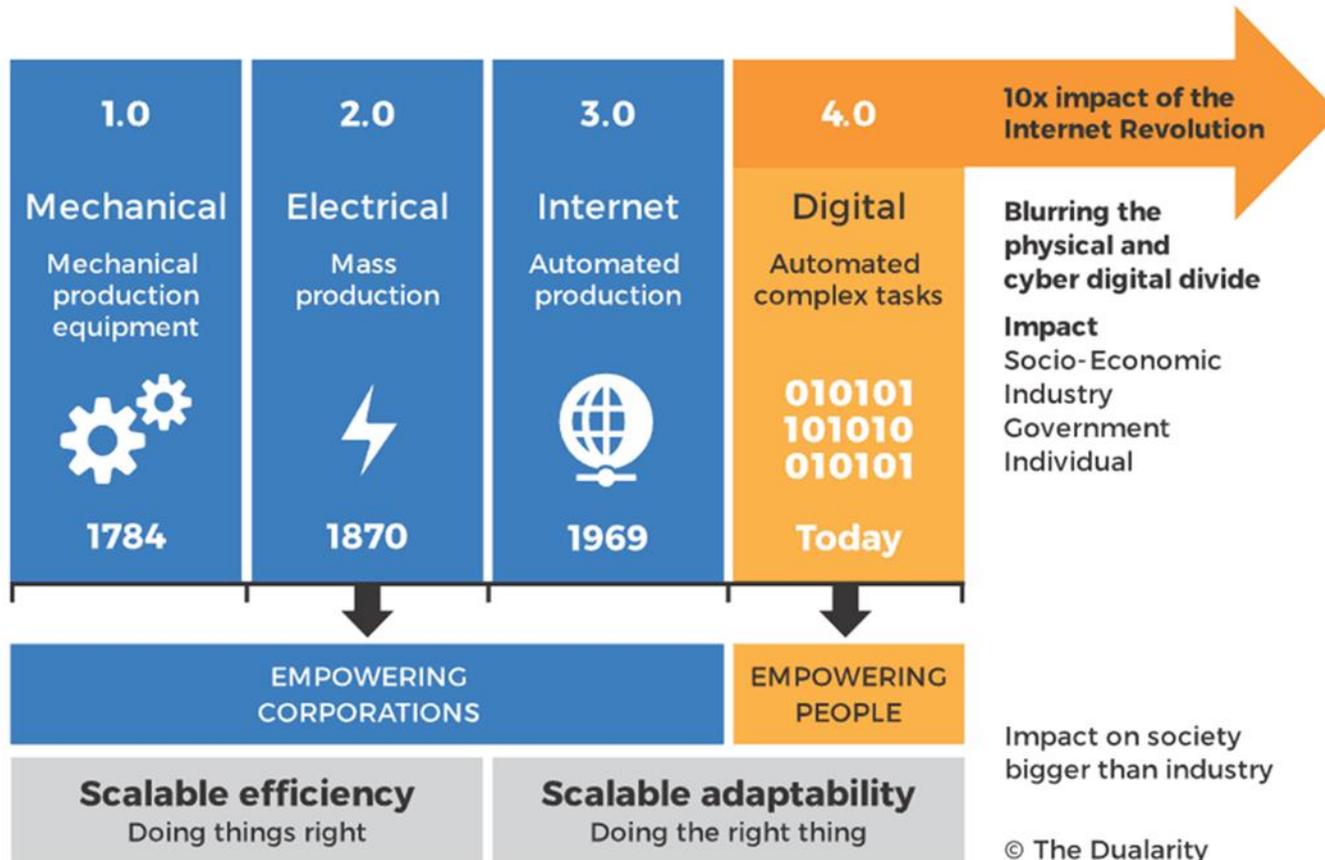




The 4th Industrial Revolution

Welcome to the Industrial Revolution 4.0

010101
101010
010101





Impact of the 4th Industrial Revolution

- ❖ Humanity is at the edge of a new technology revolution, and it will **radically change the way we live and work and treat each other.**
- ❖ It is difficult to predict development, but today it is obvious that the Industrial Revolution 4 will affect **all groups of people, almost all professions.**
- ❖ The Industrial Revolution 4 is characterized by the **convergence of technology** and the **disappearance of borders between physical, digital and biological spheres.**

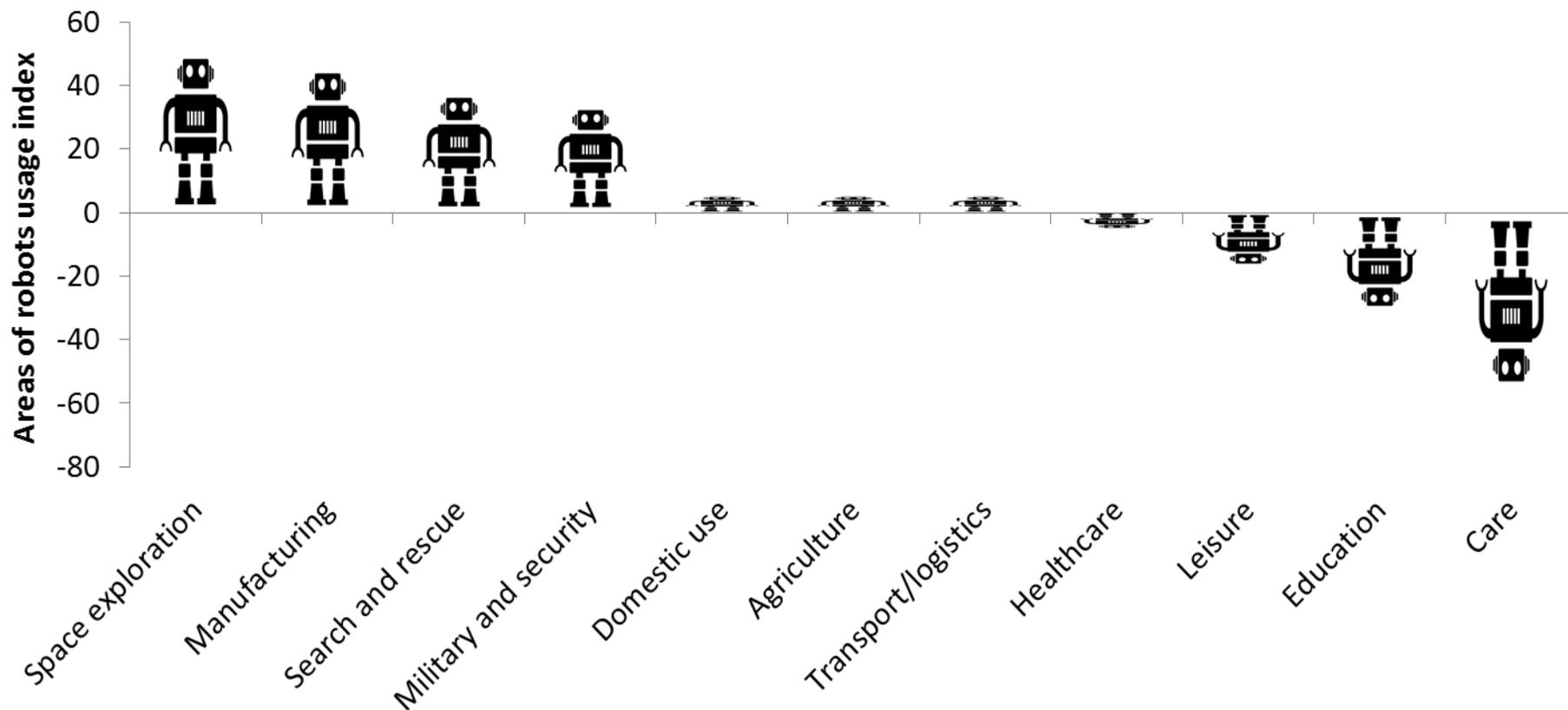


Industry 4.0 New Cycle

- **Industry 4.0's new cycle and digitalisation** have an impact on society as a whole - it means creating new technologies, programs, but it also means **using new technologies and preparing a new type of workforce and training.**
- This process should start from **the kindergarten** and continue to integrate the knowledge of the new industry wave into the mainstream **school, vocational education and university.**



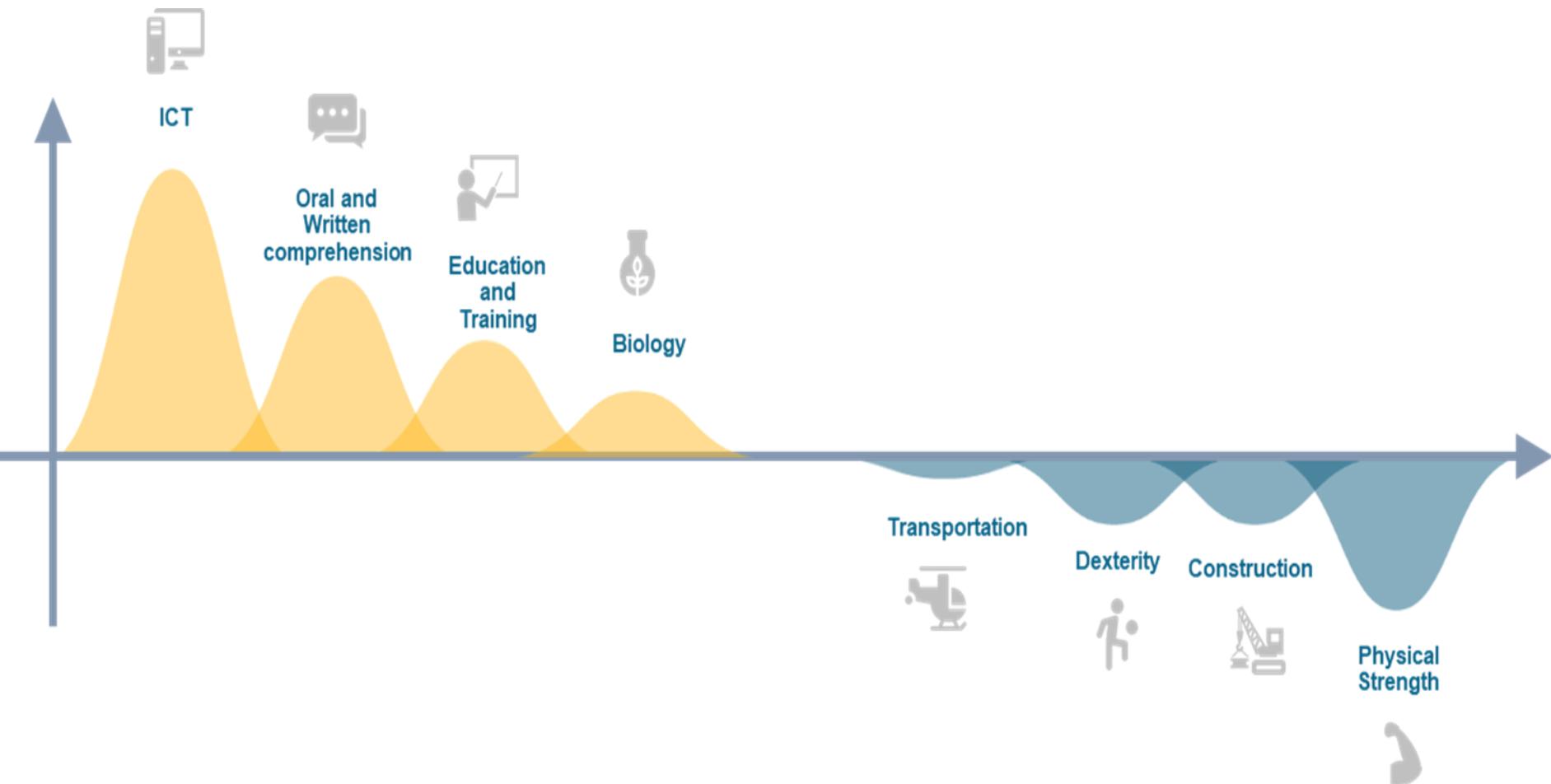
Introduction of new technologies





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What skills will be needed in the future?





Areas of New Technologies

- Artificial Intelligence
- Big Data
- Cloud Computing
- Internet of Things, IoT
- Cybersecurity
- Autonomus robots
- Virtual reality
- Horizontal and vertical system integration
- Additive manufacturing
- Simulation
- Smart Sensors
- Blockchain technology
- Development of digital ethics
- ...



Impact on university study programs

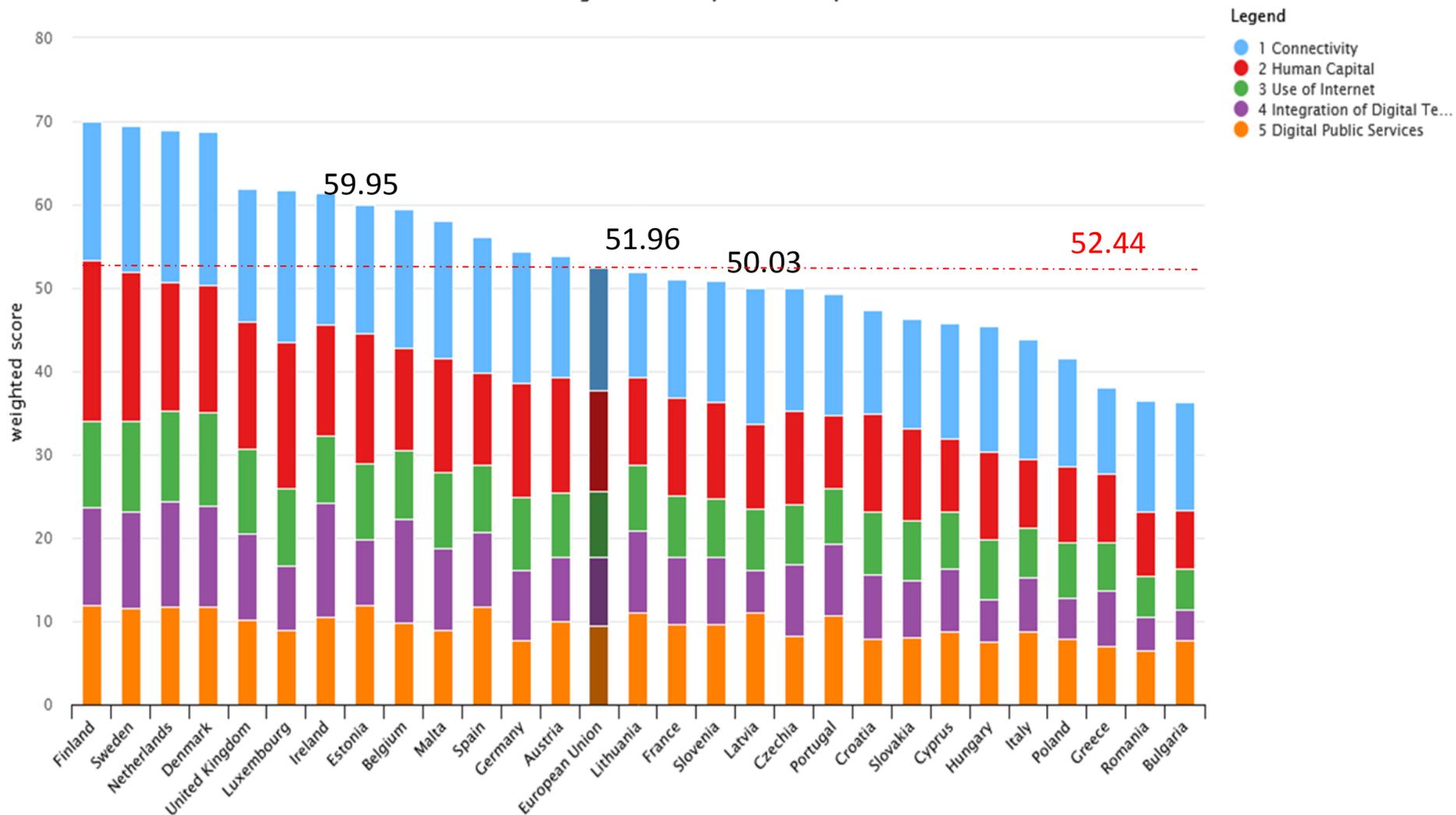
- **New study courses** in the main areas of development of the 4th industrial revolution must be introduced in the agriculture and other life sciences study programs.
- Significant changes will occur in all sectors and in all professions.





The Digital Economy and Society Index (DESI), 2019

Digital Economy and Society Index



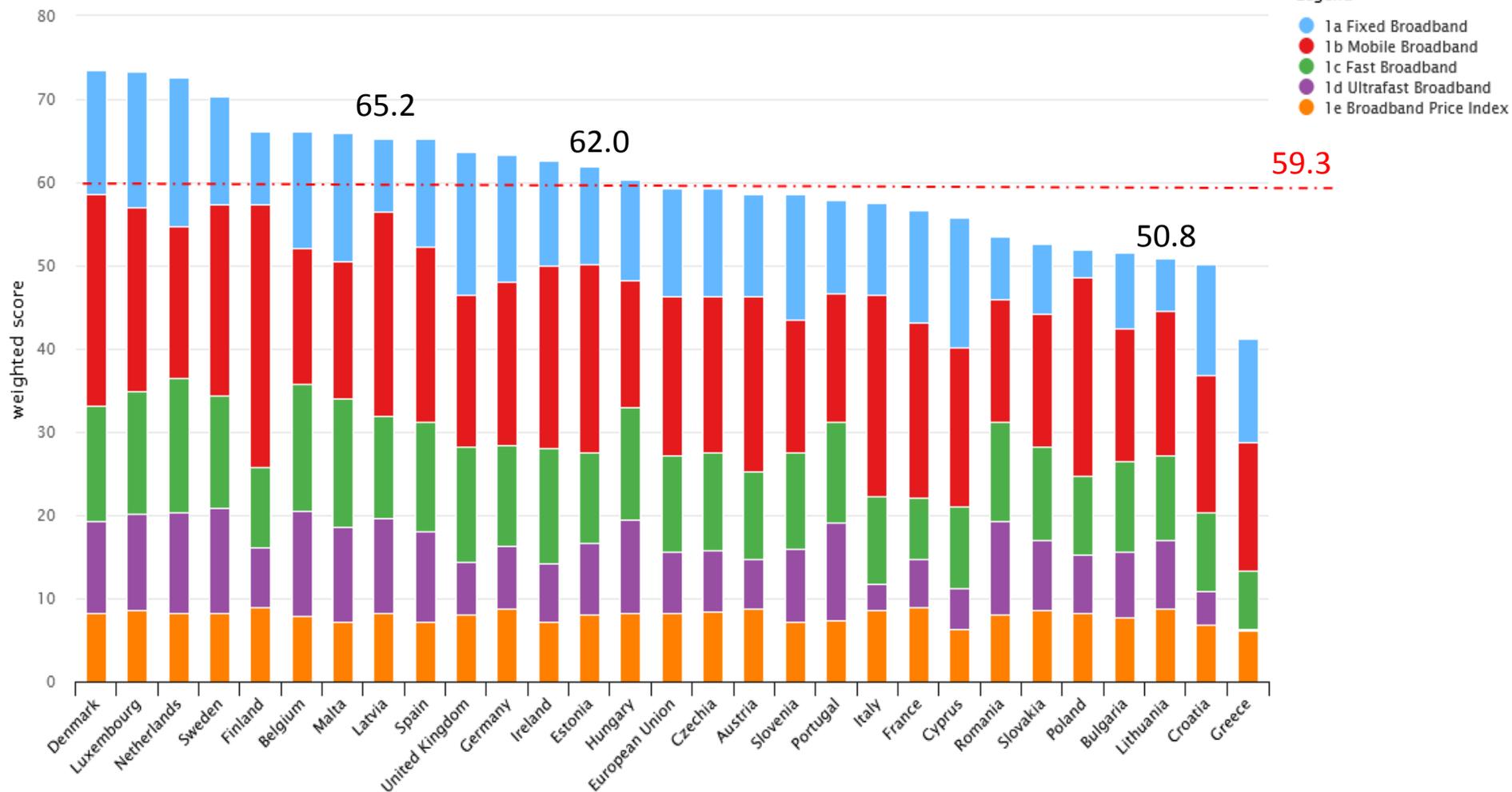


1 Connectivity, 2019

1 Connectivity, by Sub-dimensions of 1 Connectivity

Legend

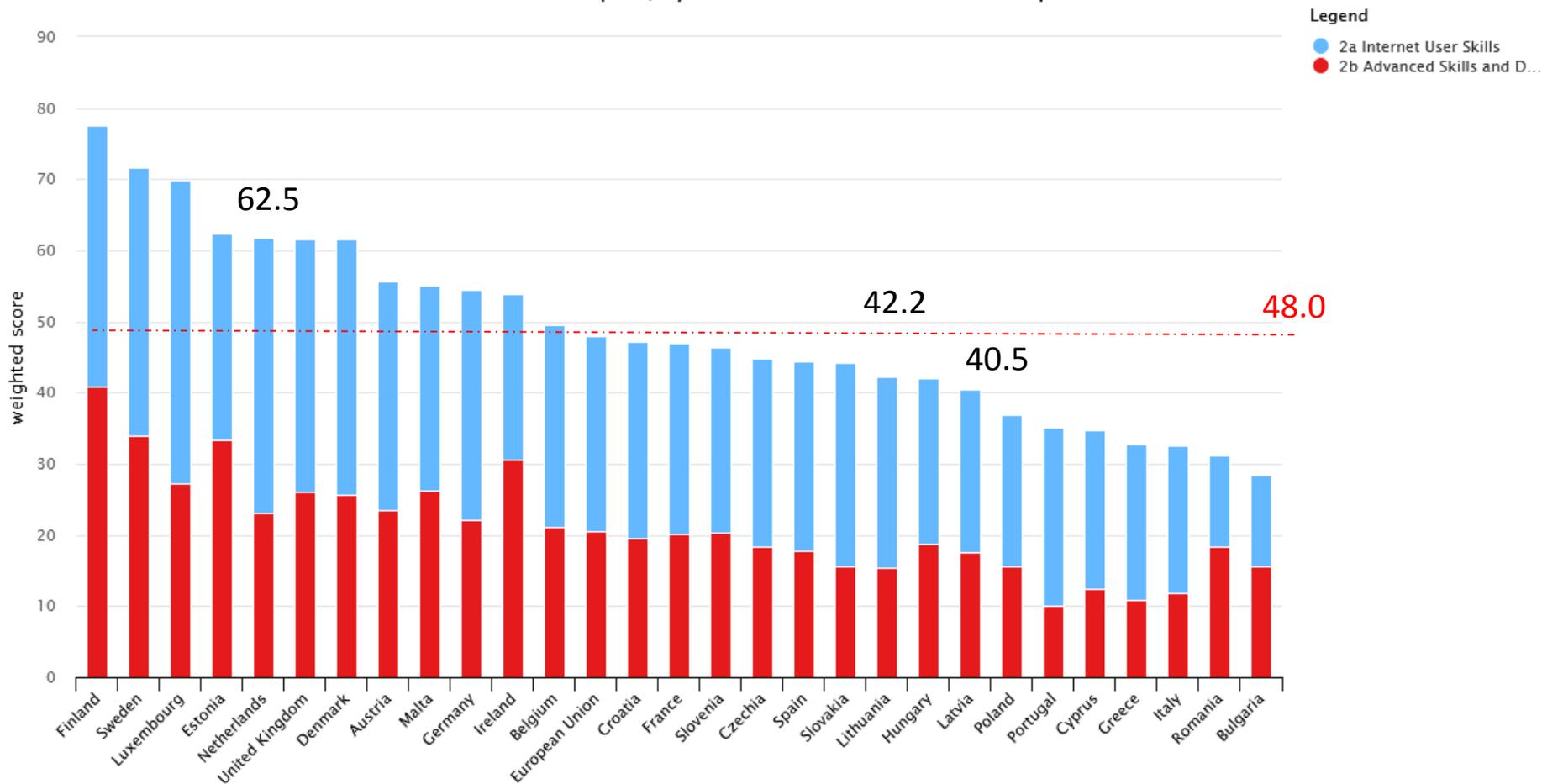
- 1a Fixed Broadband
- 1b Mobile Broadband
- 1c Fast Broadband
- 1d Ultrafast Broadband
- 1e Broadband Price Index





2 Human Capital, 2019

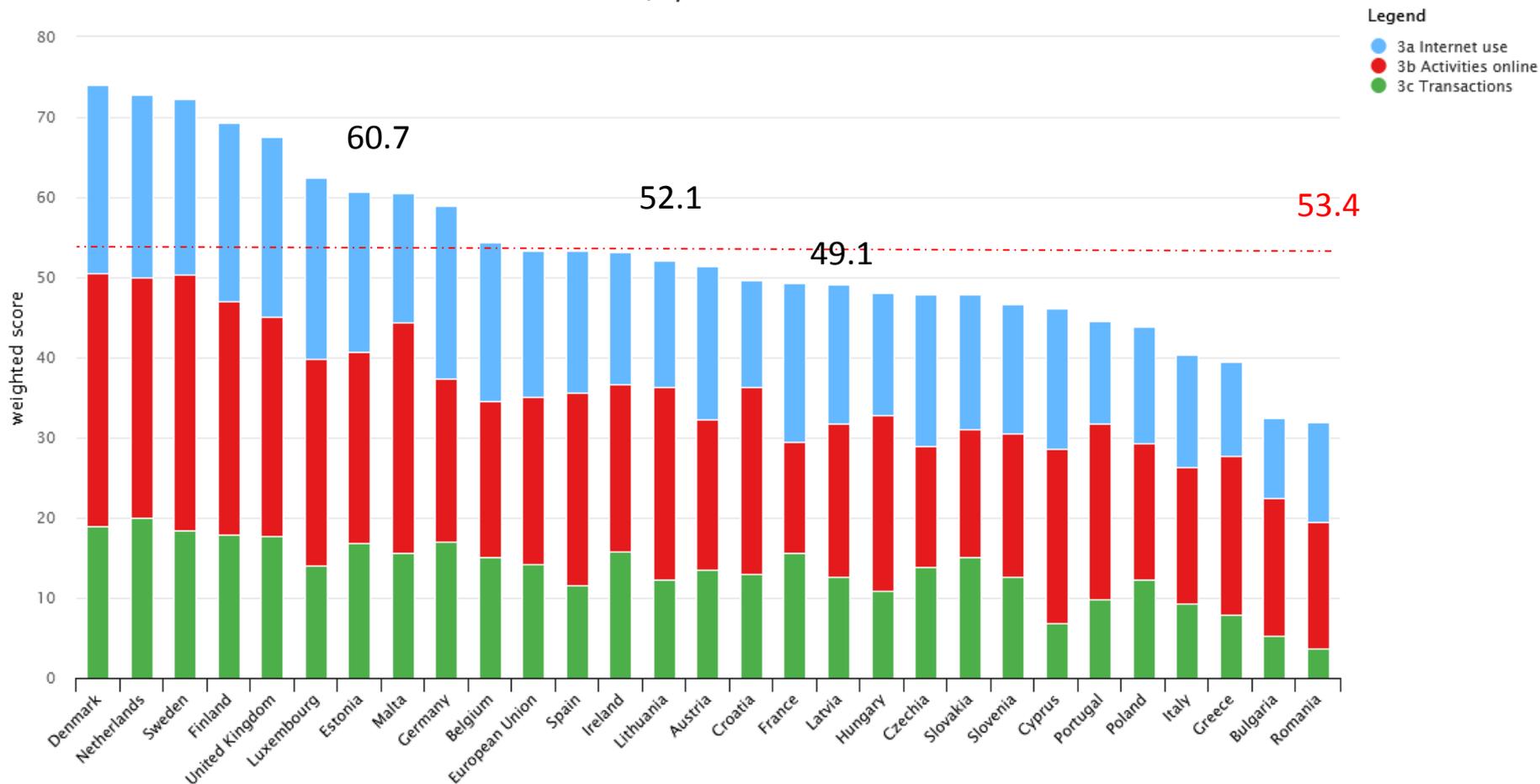
2 Human Capital, by Sub-dimensions of 2 Human Capital





3 Use of Internet Services, 2019

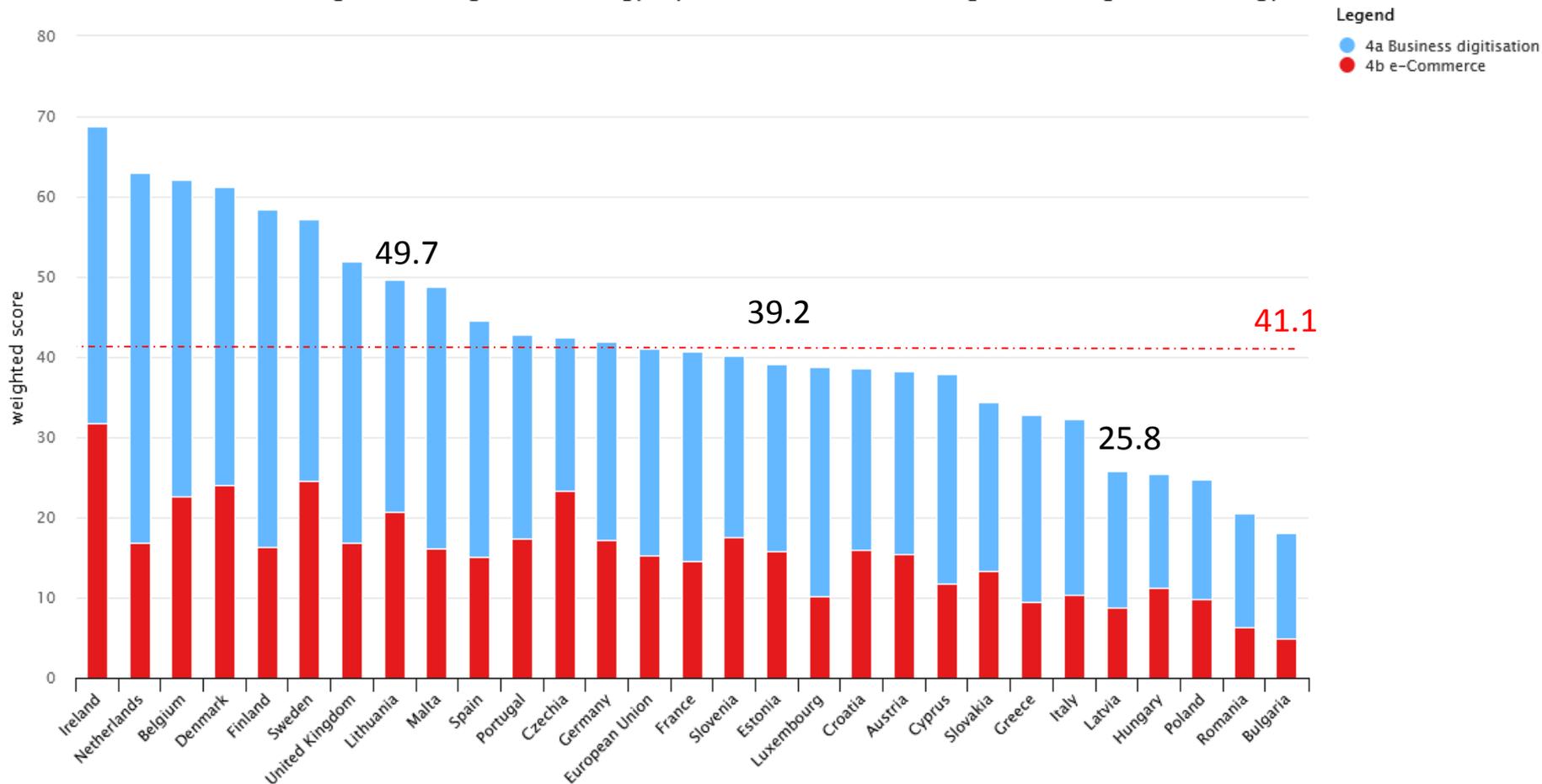
3 Use of Internet Services, by Sub-dimensions of 3 Use of Internet Services





4 Integration of Digital Technology, 2019

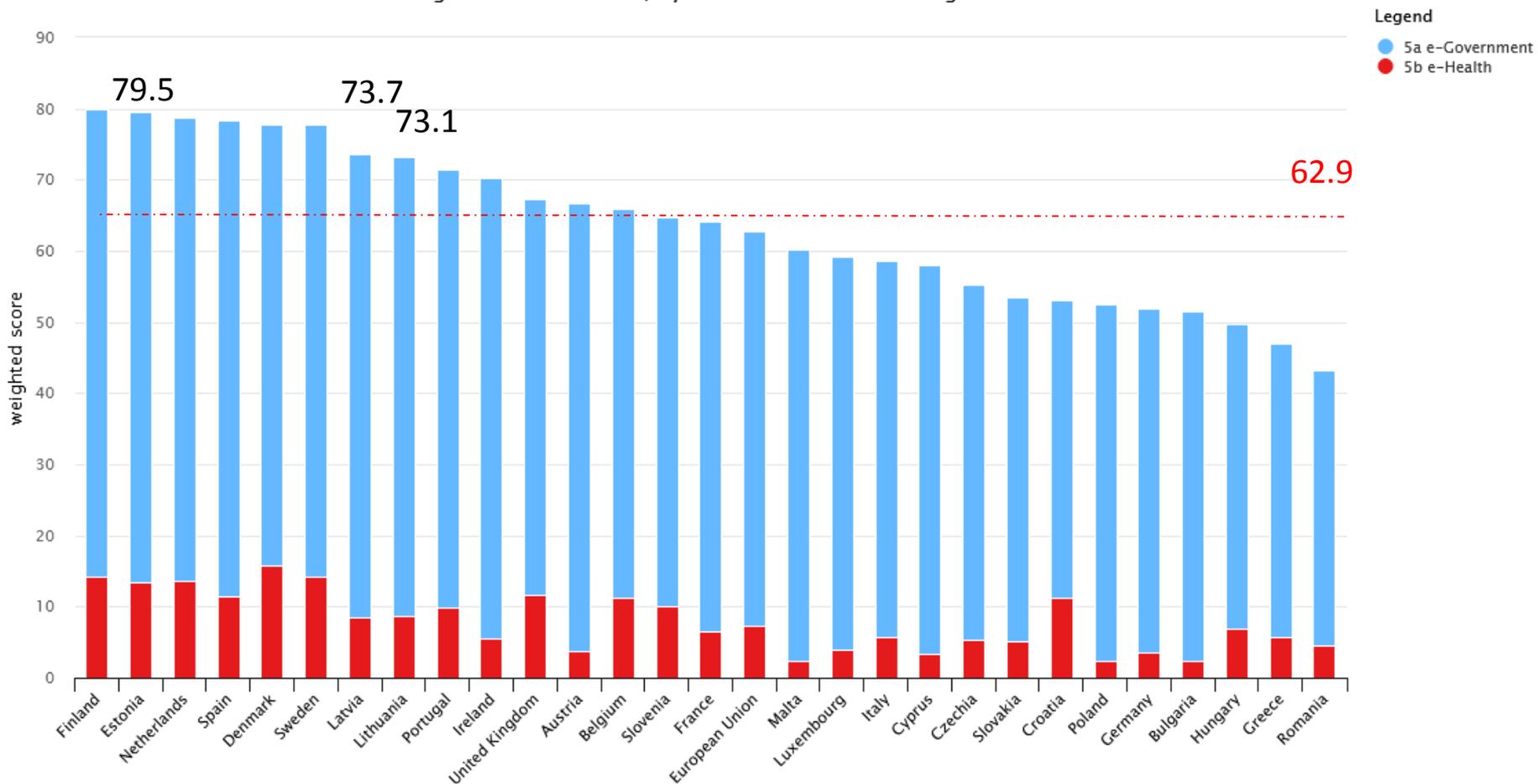
4 Integration of Digital Technology, by Sub-dimensions of 4 Integration of Digital Technology





5 Digital Public Services, 2019

5 Digital Public Services, by Sub-dimensions of 5 Digital Public Services





Data Driven Dairy Decisions for Farmers (4D4F,2016-2019)

- The project is aimed to the use of smart technologies and use of collected data in modern dairy cow and goat farming.
- The main goal is to develop physical and virtual networks to support and improve Data Driven Decisions on dairy farms
- The development of Community of Practice (COP) that is comprised of farmers, farm advisors, technology suppliers, knowledge exchange professionals and researchers.

- <http://4d4f.eu/>





Our Consortium

1. 16 Partners
2. Pan-European
3. 2 Farmer Organisations
4. 2 Academies
5. 6 Research Institutes
6. 6 Commercial Companies

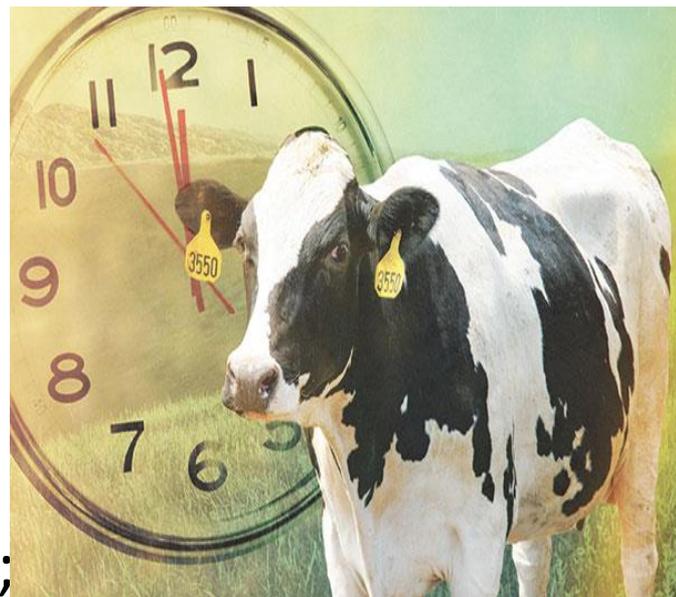


Network



Planned networking results at the end of project:

- Community of practice;
- Best practice guides supported
 - Videos,
 - Infographics,
 - Online virtual warehouse;
- Identified research priorities;
- Standard operation procedures;
- Workshops and events.



Disseminating Innovative solutions for



disarm



Antibiotic Resistance Management

www.disarmproject.eu

@projectdisarm





Disseminating Innovative
Solutions for Antibiotic
Resistance Management



DISARM has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No B1.7591

Coordinated by

Partners

ILVO
Flanders research institute for agriculture, fisheries and food



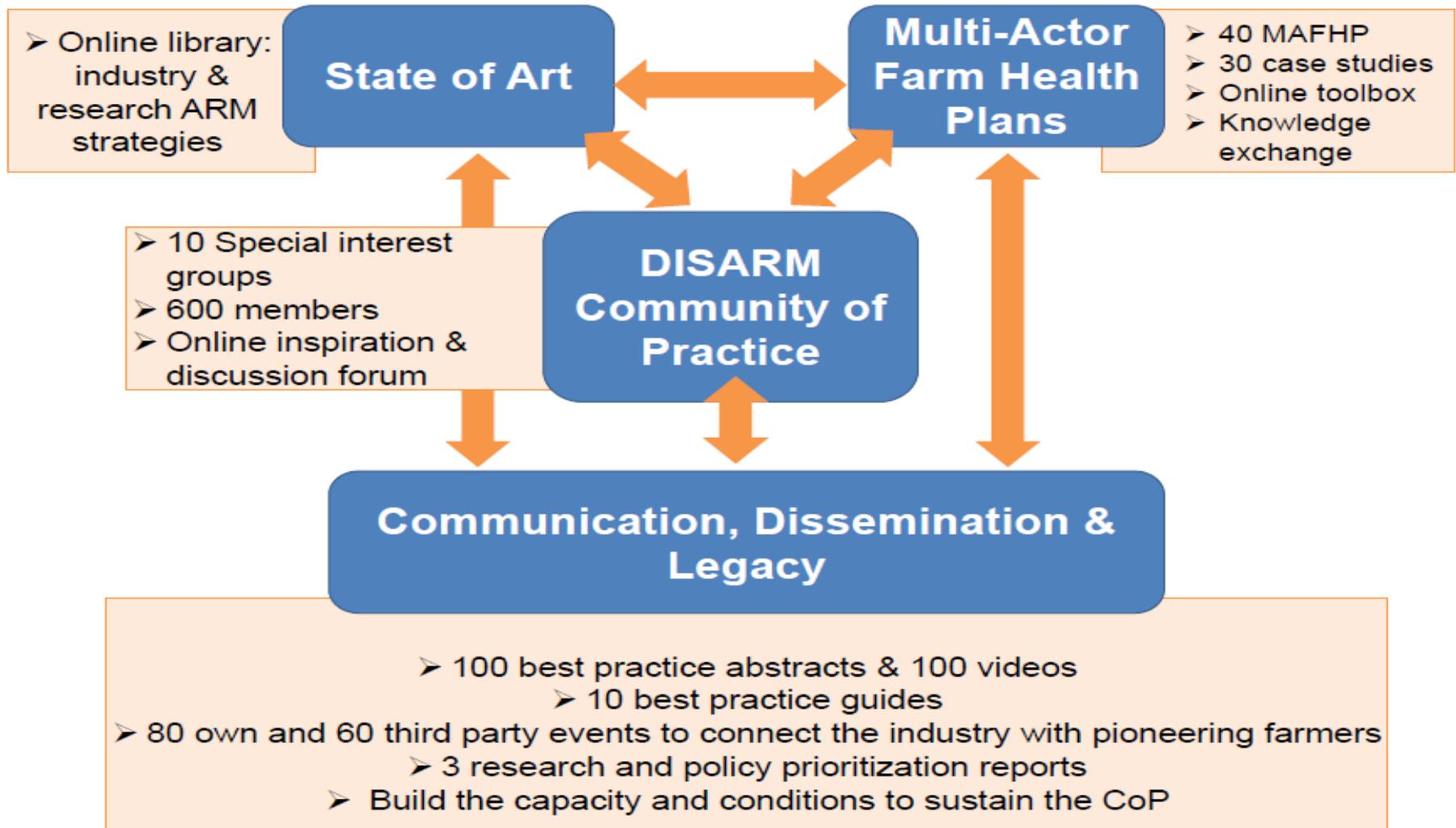


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HORISONT 2020 project:

DISARM:

Disseminating Innovative Solutions for Antibiotic Resistance Management





Smart
Apiculture
Management
Services



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 780755



german
cooperation
DEUTSCHE ZUSAMMENARBEIT

This project has received co-funding from the German Federal Ministry for Economic Cooperation and Development

International Partnership

SAMS – Smart Apiculture Management Services





Smart
Apiculture
Management
Services

The SAMS consortium

8 partner - 5 countries - 3 continents

Germany

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

**UNI KASSEL
VERSITÄT**

Latvia



Latvia University
of Life Sciences
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Austria

KARL-FRANZENS-UNIVERSITÄT GRAZ
UNIVERSITY OF GRAZ



Ethiopia



IQQO
Oromia Agricultural Research Institute

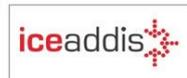
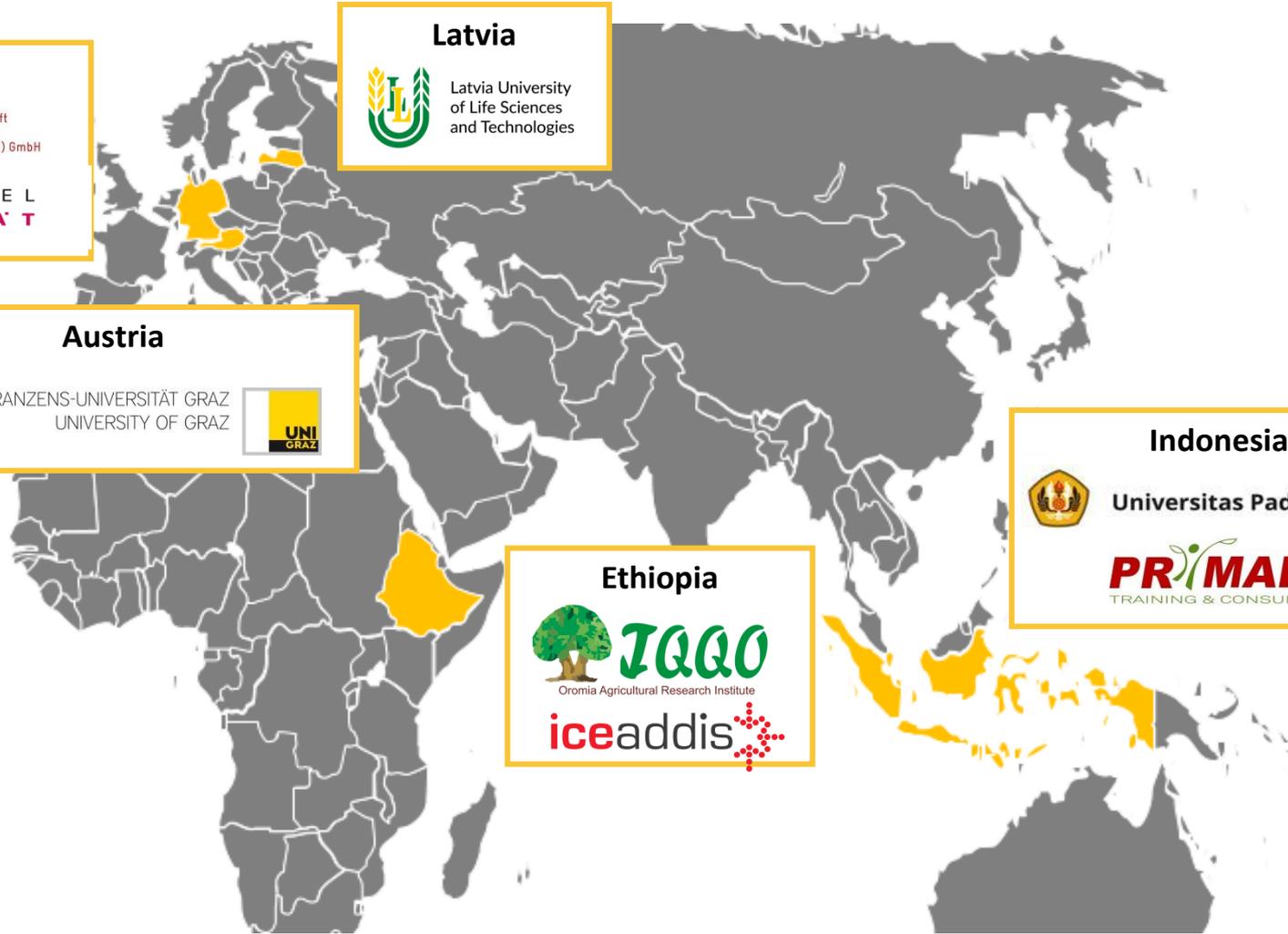
iceaddis

Indonesia



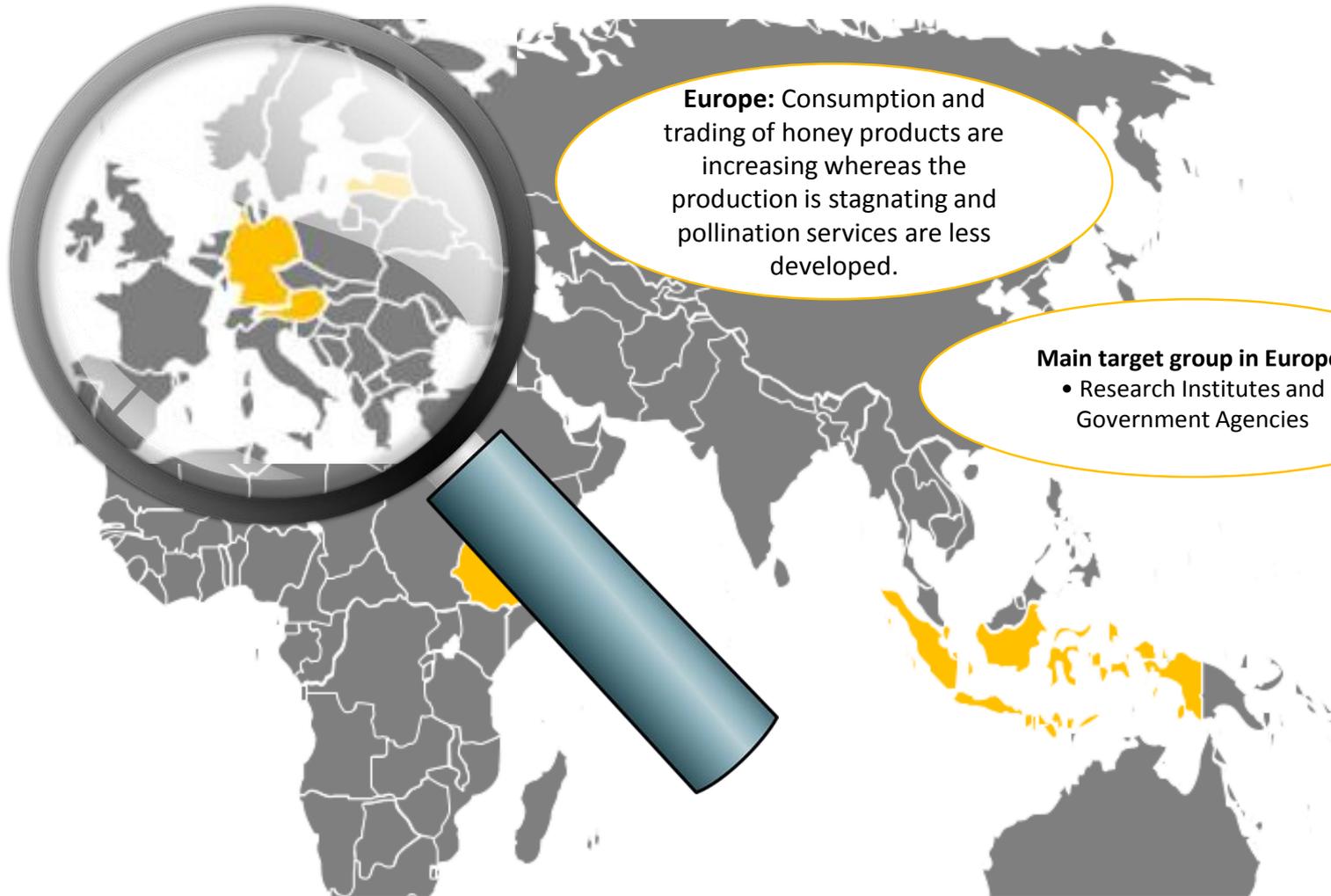
Universitas Padjadjaran

PRIMARY
TRAINING & CONSULTING



Why SAMS?

three continents – three different scenarios



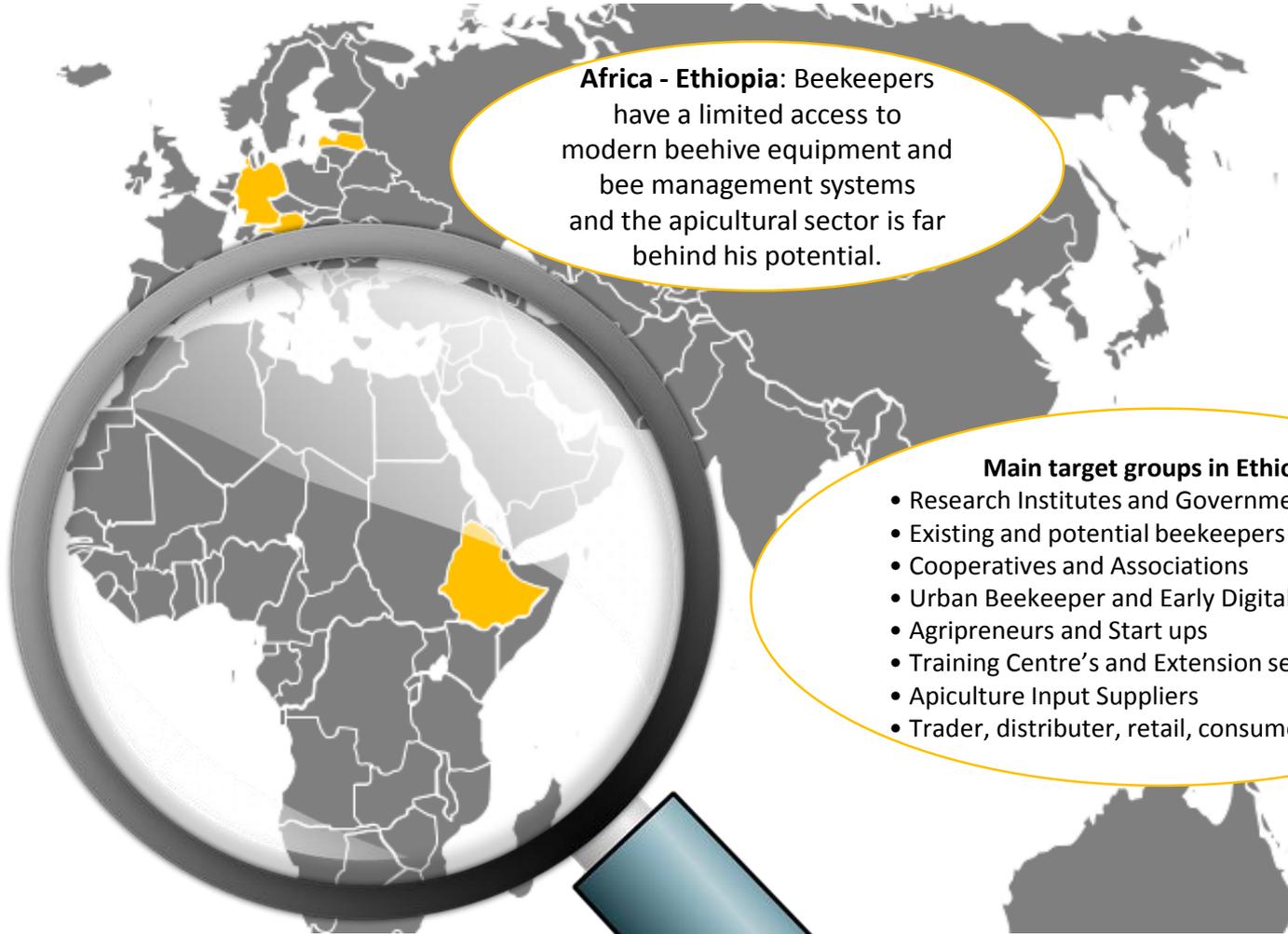
Europe: Consumption and trading of honey products are increasing whereas the production is stagnating and pollination services are less developed.

Main target group in Europe:

- Research Institutes and Government Agencies

Why SAMS?

three continents – three different scenarios



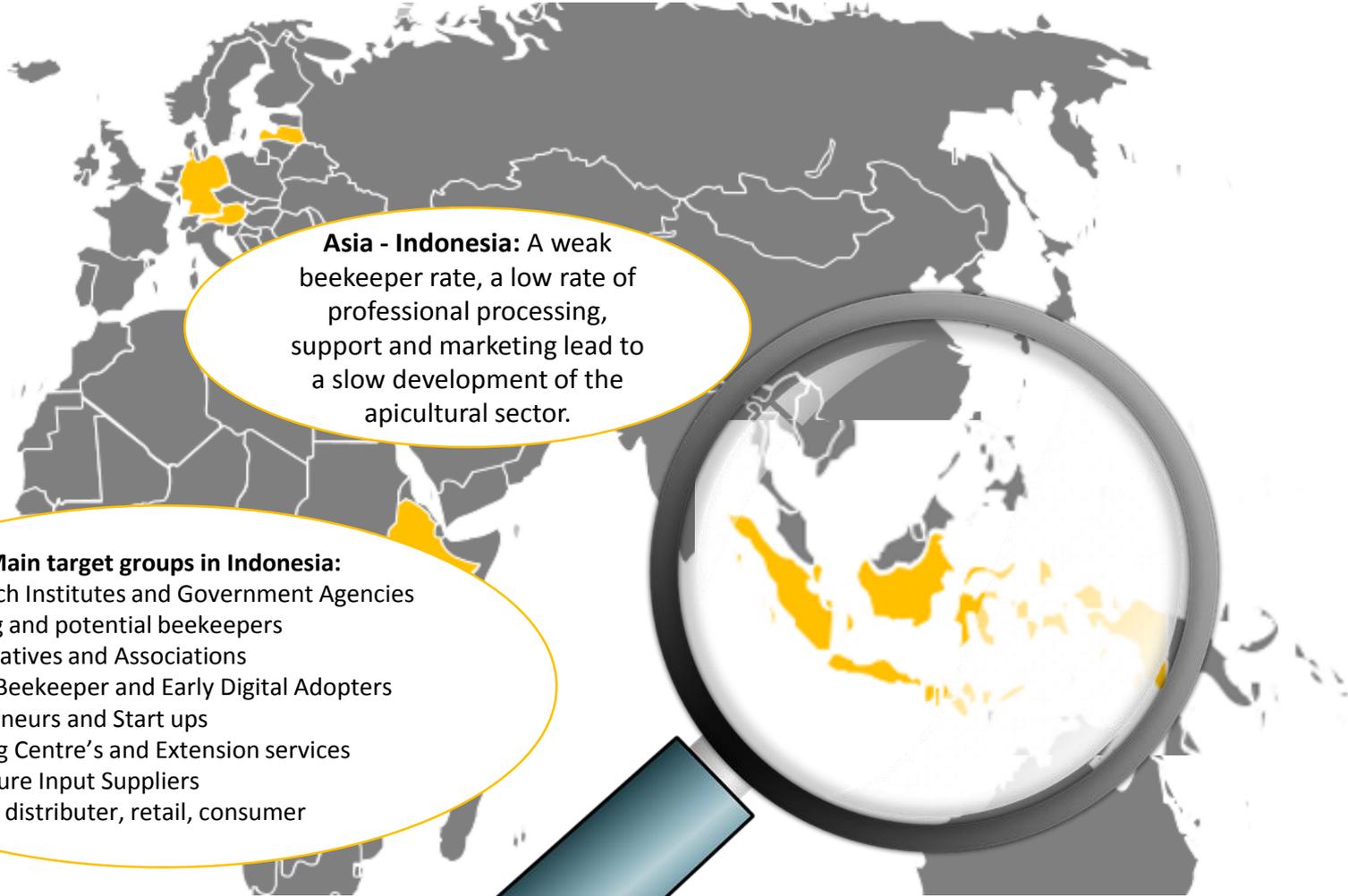
Africa - Ethiopia: Beekeepers have a limited access to modern beehive equipment and bee management systems and the apicultural sector is far behind his potential.

Main target groups in Ethiopia:

- Research Institutes and Government Agencies
- Existing and potential beekeepers
- Cooperatives and Associations
- Urban Beekeeper and Early Digital Adopters
- Agripreneurs and Start ups
- Training Centre's and Extension services
- Apiculture Input Suppliers
- Trader, distributor, retail, consumer

Why SAMS?

three continents – three different scenarios



Asia - Indonesia: A weak beekeeper rate, a low rate of professional processing, support and marketing lead to a slow development of the apicultural sector.

Main target groups in Indonesia:

- Research Institutes and Government Agencies
- Existing and potential beekeepers
- Cooperatives and Associations
- Urban Beekeeper and Early Digital Adopters
- Agripreneurs and Start ups
- Training Centre's and Extension services
- Apiculture Input Suppliers
- Trader, distributor, retail, consumer

Objectives of SAMS



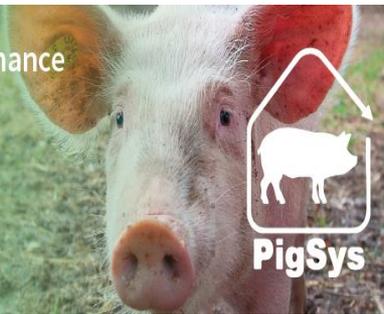
- ✓ Strengthen international cooperation of the EU with developing countries in ICT
- ✓ Address requirements of communities and stakeholders to promote and advance forms of existing beekeeping
- ✓ Monitor bee colonies in Germany, Ethiopia and Indonesia through an open source technology
- ✓ Evaluate gained information and convert them into recommendations for beekeepers
- ✓ Overcome country-specific challenges of beekeeping and simplify the management of bee colonies
- ✓ Strengthen interregional and international bee related partnership and cooperation
- ✓ Gain information on bee mortality

Expected Impacts of SAMS



- ✓ Development of relevant technology responding to specific needs and conditions of the target country and to make beekeeping more efficient
- ✓ Sustainable uptake of results within the targeted countries and beyond the project completion date through capacity building, job creation and business ideation
- ✓ Higher rate of organization of beekeepers to increase the impact
- ✓ Interconnection with stakeholders along the honey value chain
- ✓ Reinforcement of strategic partnerships

Improving Pig System performance
through application of a
whole system approach

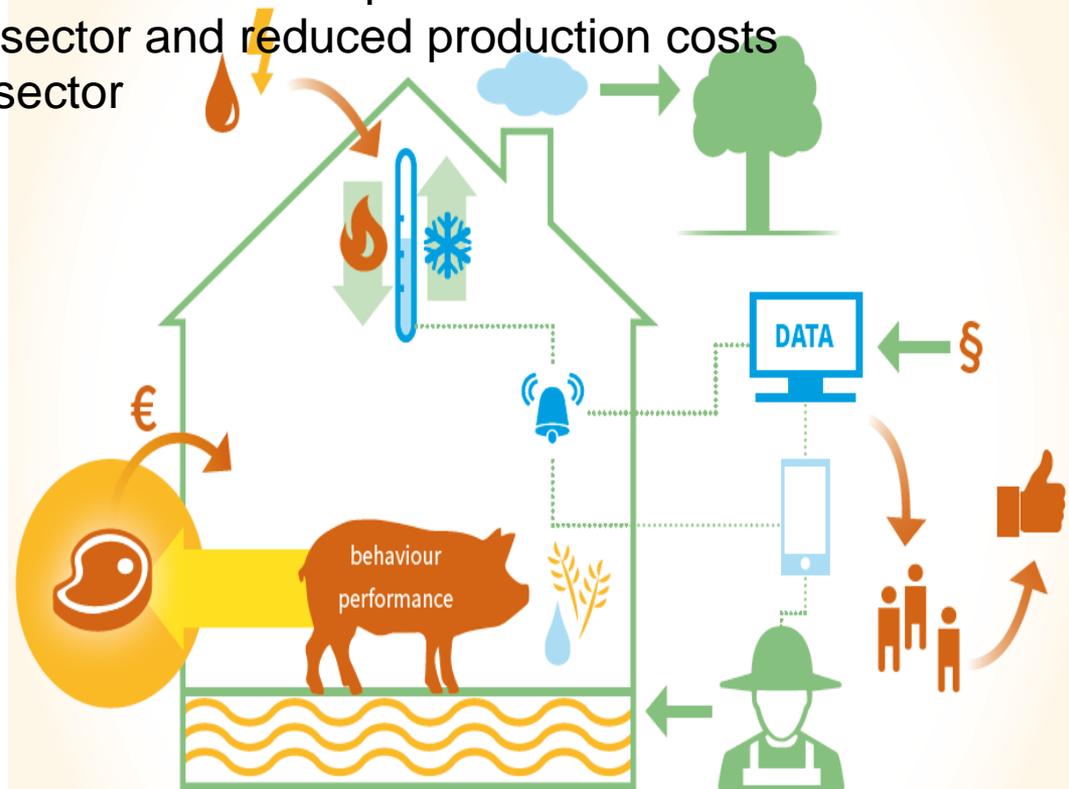


Challenge

- Current use of resources in European pig farming is inefficient and results in high emissions and losses
- Main causes: outdated building standards, control systems and barn management approaches
- High priority of animal welfare, competitiveness and public image of farmers must be maintained
- Many approaches improve individual aspects of the systems, but so far there are no solutions that consider the whole system

Expected results

- Overall system model consisting of energy and mass flows as well as a decision support tool
- Measurement and control technology for monitoring and improving barn climate control and animal welfare
- Data storage to support pen and control system development
- Comprehensive lifecycle and life cycle cost analysis
- Increased animal welfare and increased animal performance
- Increased resource utilisation efficiency
- Reduction of emissions, losses and the carbon footprint
- Improved public perception of the sector and reduced production costs
- Increased competitiveness of the sector



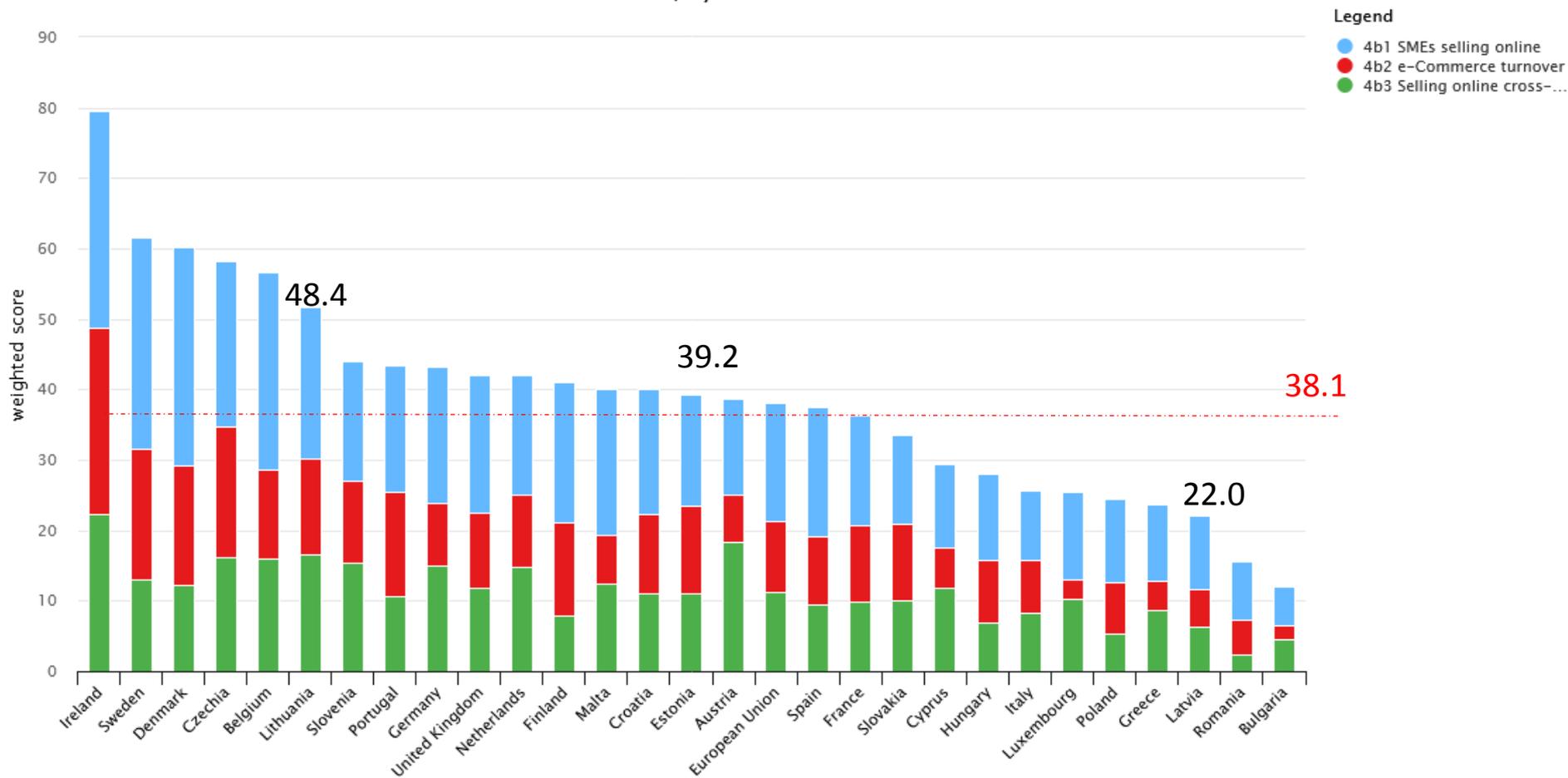
Improving Pig System performance
through application of a
whole system approach

PigSys



E-Commerce, 2019

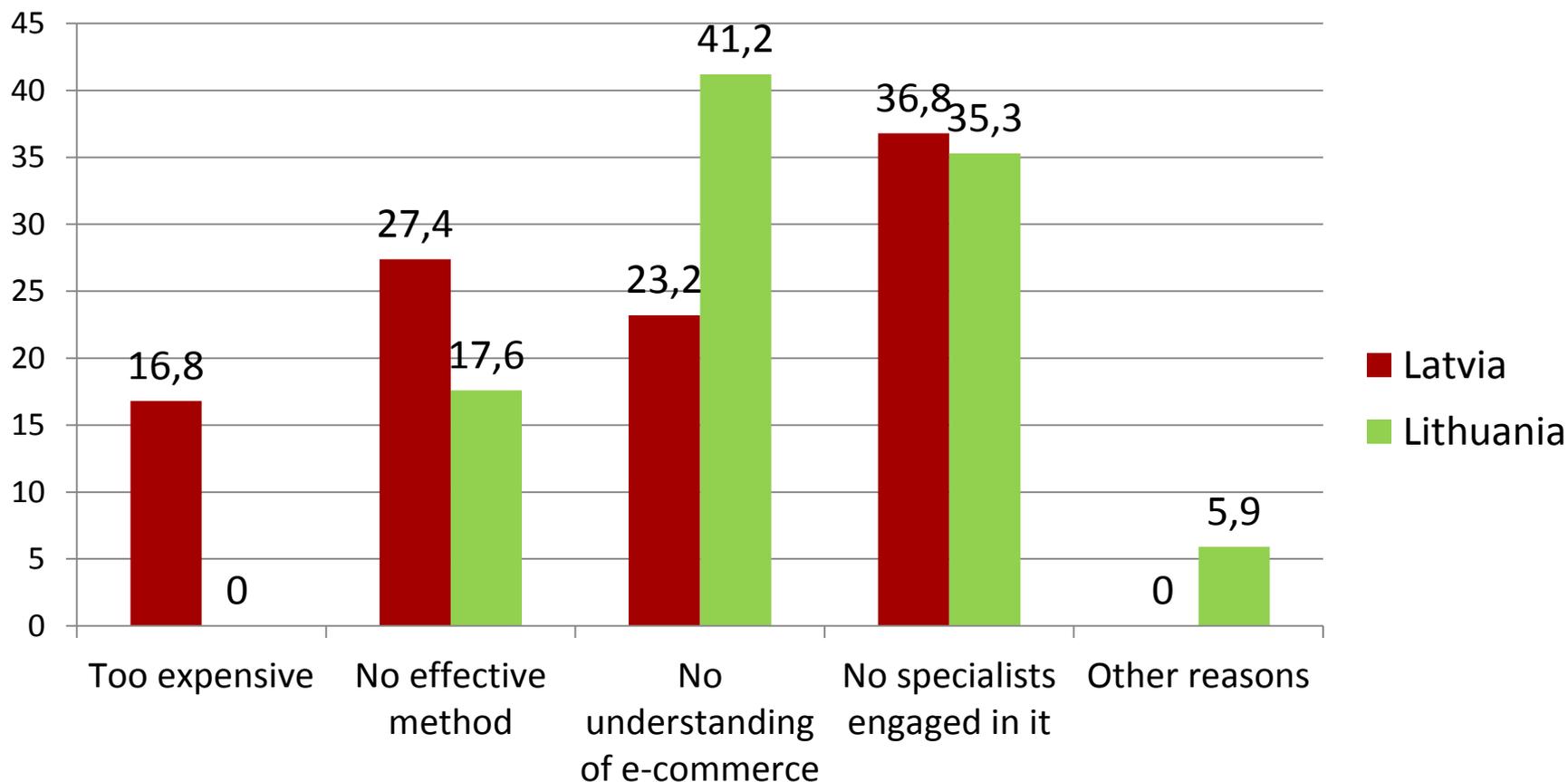
4b e-Commerce, by Indicators under 4b e-Commerce





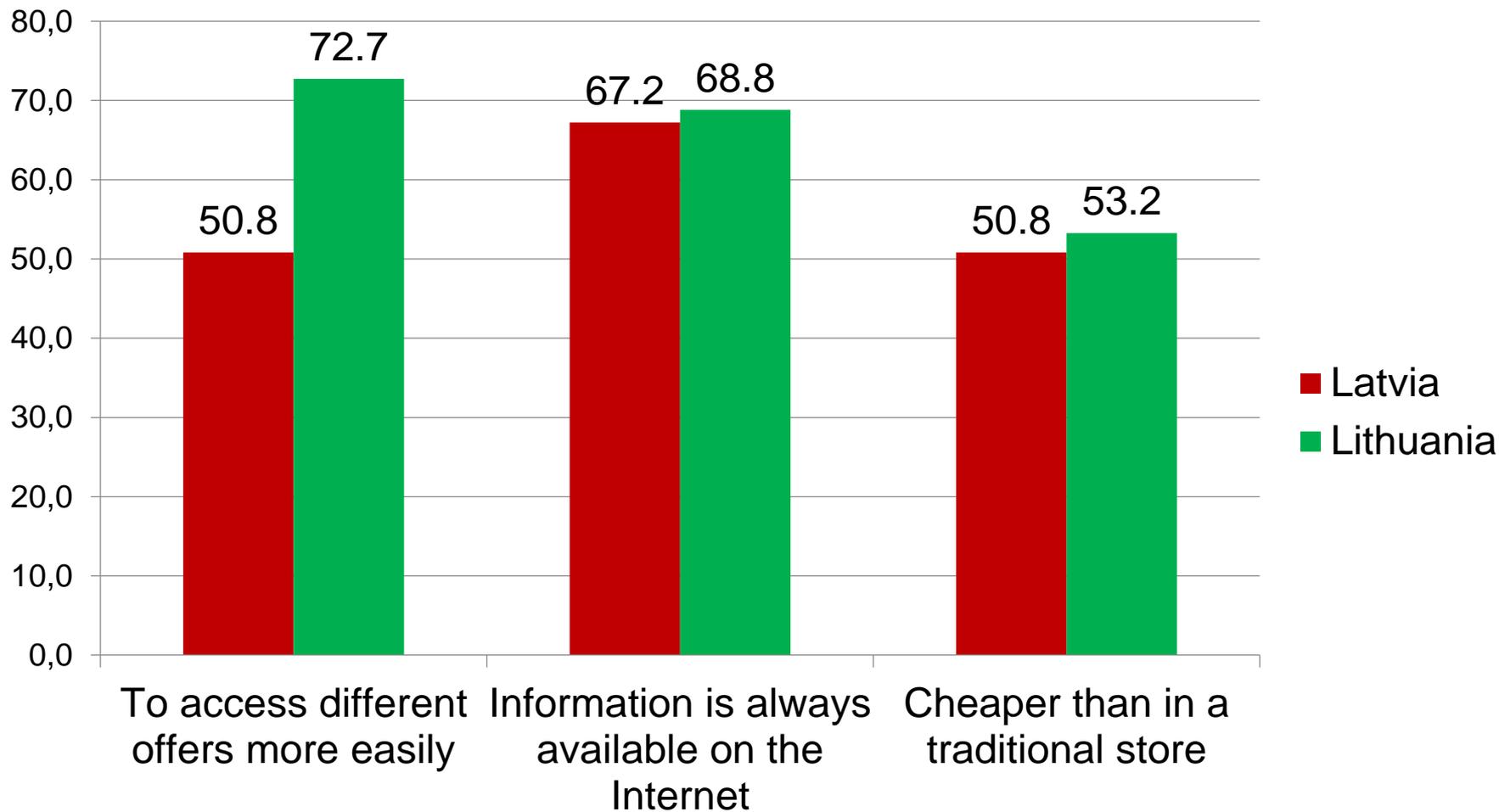
E-commerce issues in the view of the product/service vendor

- If entrepreneurs do not use e-commerce sufficiently actively, what are the reasons for this? (several answers possible)





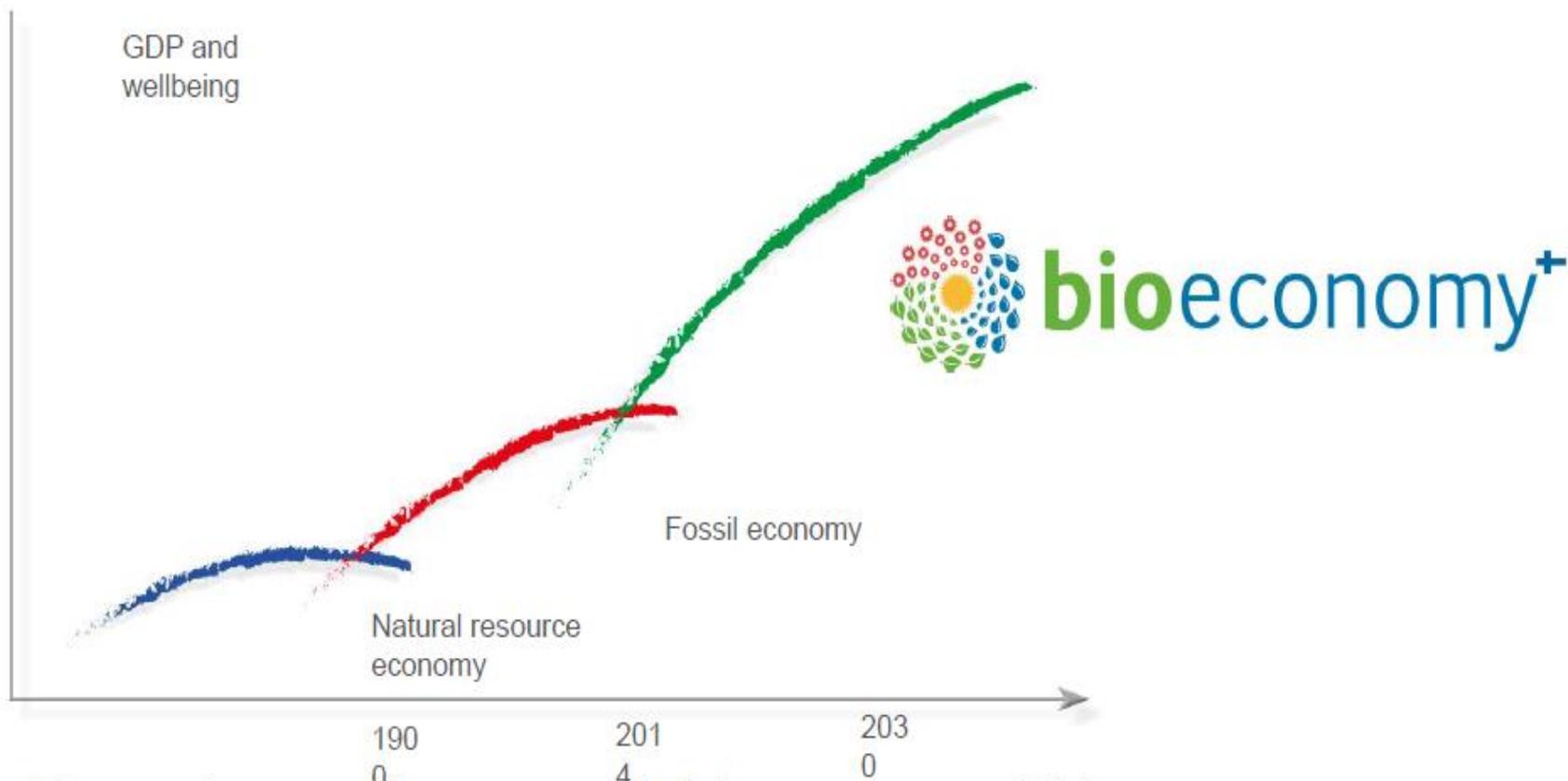
Consumer benefits from online shopping





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Bioeconomy: The next economic wave



The next wave of economy is bioeconomy, which produces economic growth and wellbeing.



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Why Bioeconomy?

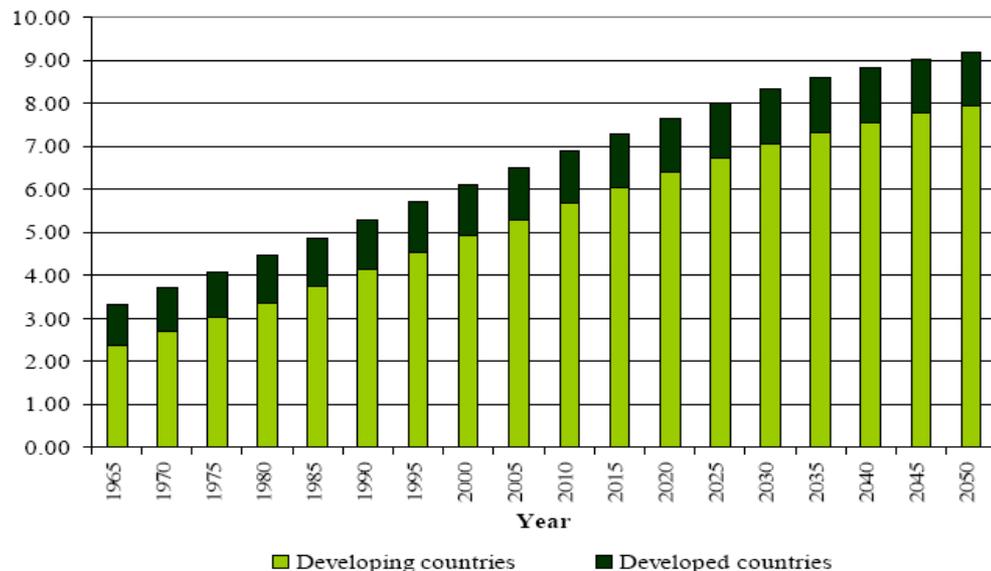


One of the greatest global challenges of the 21st century in times of climate change will be to sustain a growing world population with:

- sufficient foodstuffs
- renewable commodities:
 - for industrial use
 - for energy production

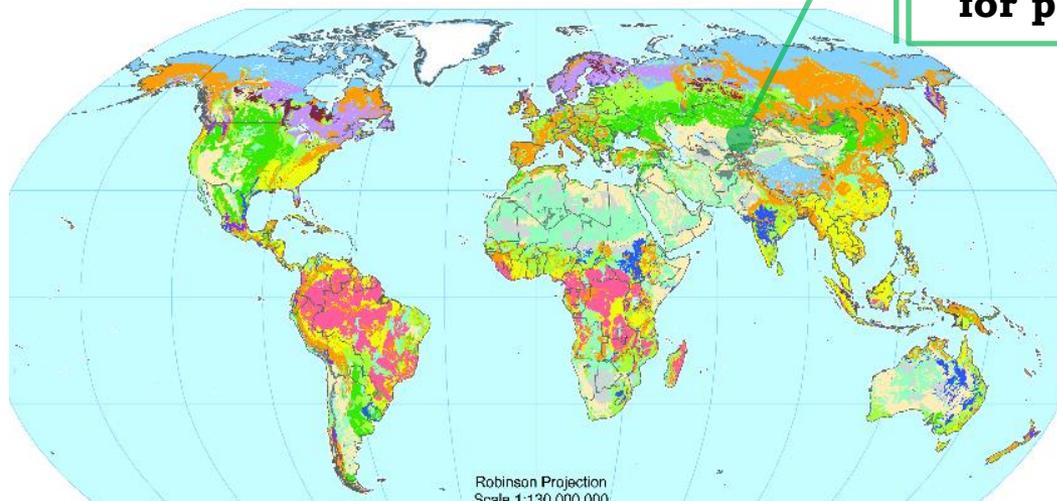


Global challenges: increasing food demand



Global population growth from 7 bn in 2016 to more than 9 bn in 2050 is estimated to lead to a 70% increase in food demand

Latvia has increasing potential of resources (from agriculture, forestry, biodegradable waste) for promoting Bioeconomy





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**Is the Bioeconomy Latvia's
competitive advantage?**

Contribution of Bioeconomy sectors

55%

**of the value added of all the goods produced
in Latvia**



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Latvia Bioeconomy Strategy

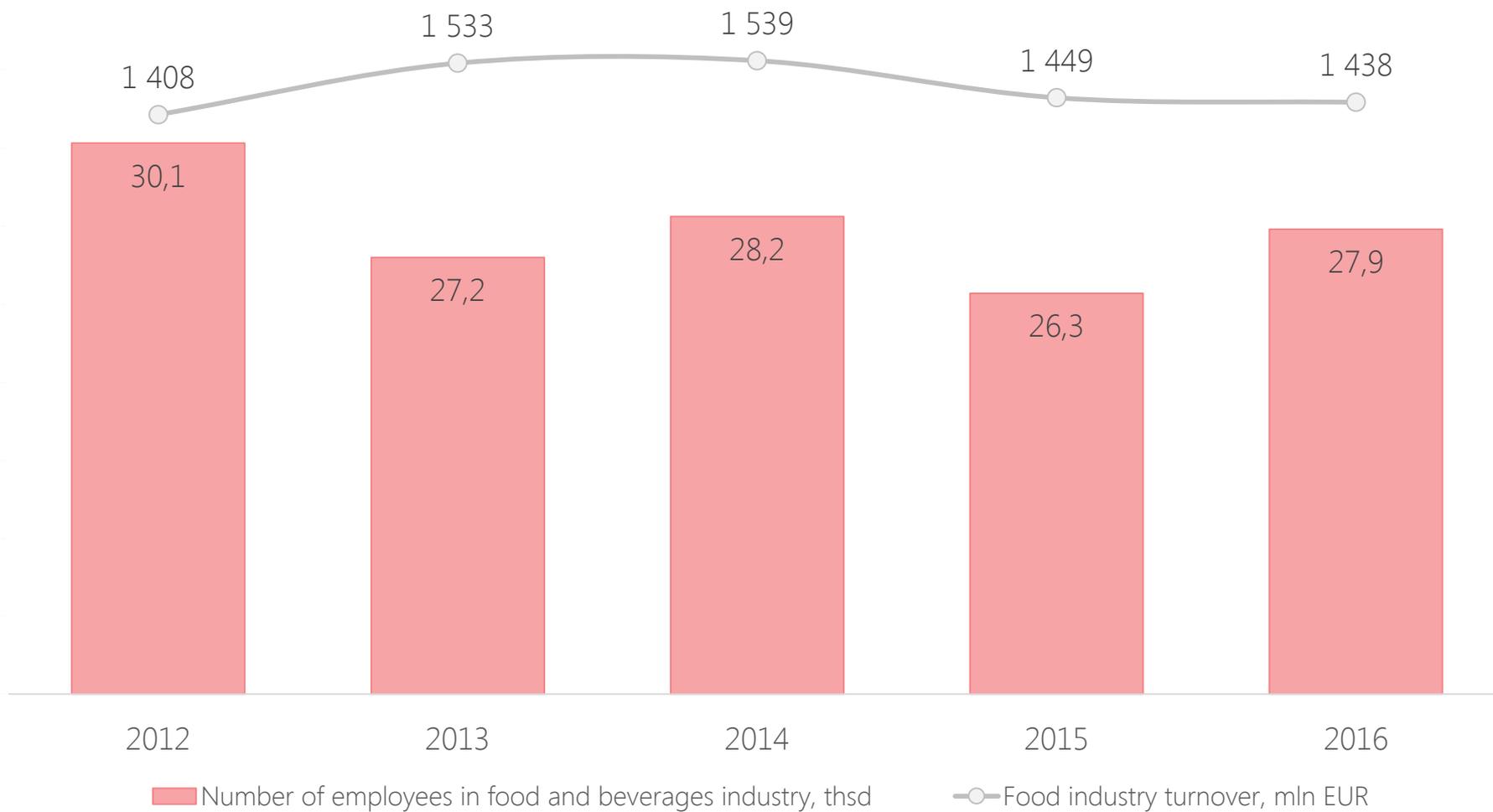


- Cabinet of Ministers -30.06.2017.
- Ministry of Agriculture
- Latvia University of Life Sciences and Technologies
- Latvian Academy of Sciences
- 45 states in the world have such strategy



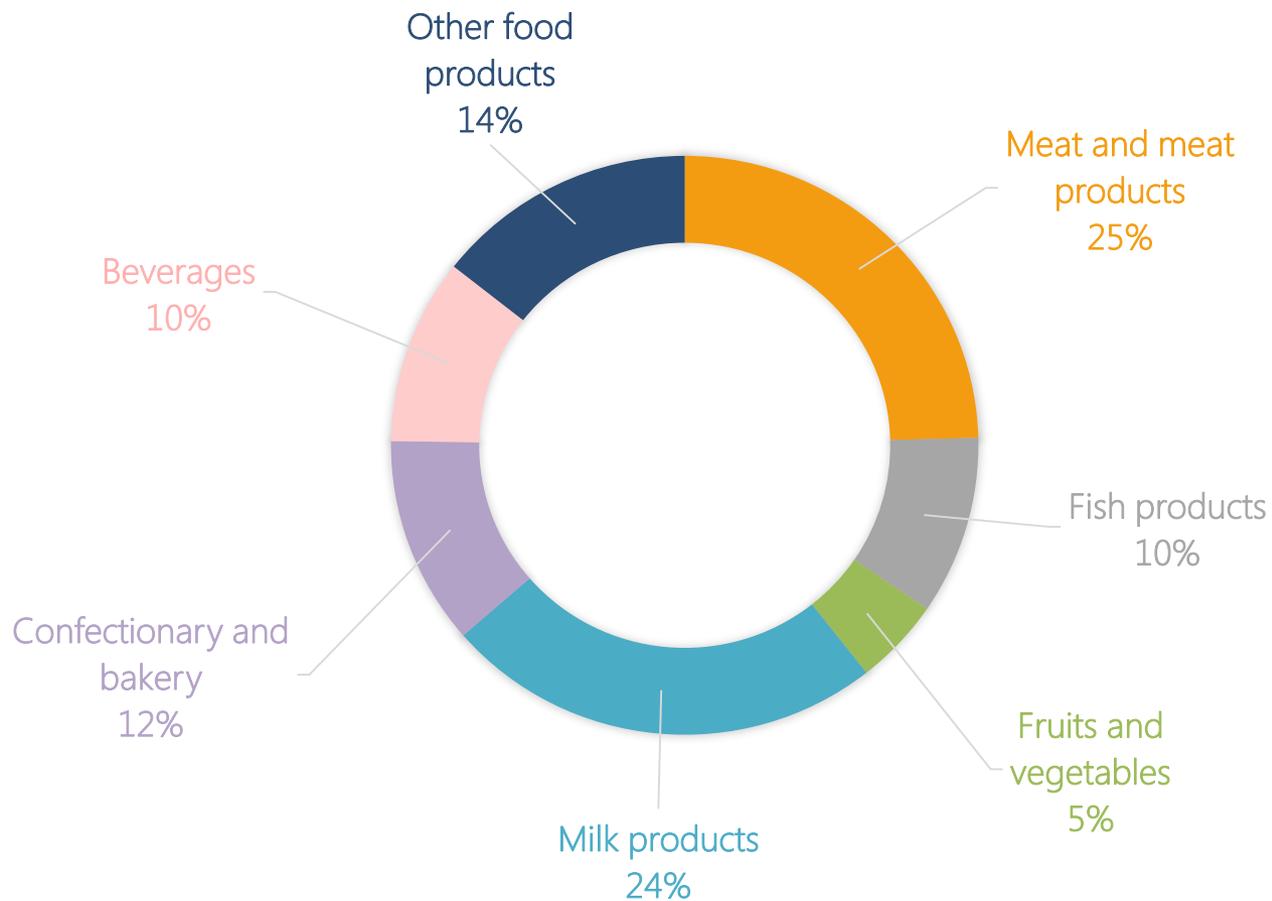


Food industry turnover and number of employees

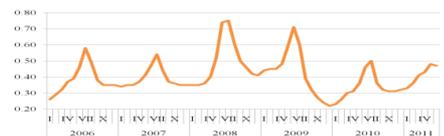




Structure of the food and drink turnover in 2016



Chain «from farm to fork»



- **Faculty of Food Technology** is the center of studies and science with more than 60 years of experience



high pressure processing equipment



microbrewery



packaging laboratory



meat processing plant



gastrointestinal tract simulator



heat exchanger-pasteurizer



sensory evaluation laboratory



evaporation unit



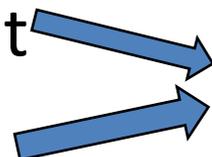
Market type analysis

New product development

Technology improvement

Resources management

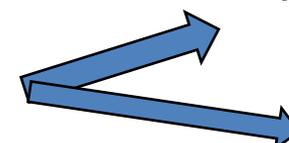
Possibilities for extended shelf life



products with high added value from local raw materials

*Fiber-rich
Protein-rich
products, etc.*

Technologies



Packaging solutions
*(convencional,
biodegradable (bio-based),
active, intelligent)*

Cooperation forms:

- **Companies seeking cooperation to develop innovative products**
- **Scientific bodies for the development of joint scientific cooperation**



FREE FROM
WHEAT
GMO
PRESERVATIVES
OIL
NUTS & EGGS

HIGH NUTRITIONAL VALUE GRAIN PRODUCTS



reddot award 2018
best of the best

Cereal Mixes "Musli Graci"
«Felici», Ltd.



RYE

- Concentrated **source of fiber**
- Rich in **natural minerals and vitamins**
- Contains **lignans**

- GRACI products all are developed in cooperation with Latvian and Norwegian scientists and tested at German Laboratories
- main focus is on natural high nutritional value
- functions of the products are all based on studies and clinical trials have been performed

Grain Flakes MILZU! Ltd. "MILZU!"



SIGNIFICANT ACHIEVEMENT 2015



TOP 10



THE BRAND OF THE YEAR – LATVIA 2014



EXPORT EXCELLENCE AWARD "THE RISING STARS" 2015



IMPORT REPLACEMENT PRODUCT 2015



RED DOT AWARD 2016 winner

OATS

- High in **beta-glucan**
- Loaded with **important vitamins**
- Making **feel more full**

Buckwheat flour as basic raw material for production of functional food products

- Extruded buckwheat snacks
- Waffles
- Pancakes

FREE FROM
Gluten
GMO
EGGS



SUGAR

- Reduced sugar

PRODUCTS WITH INCREASED PROTEIN CONTENT



FREE FROM.

- Allergens
- Food additives
- Yeast
- Added oil
- Added sugar

CHICKPEA CRACKERS
Ltd. "Krippu"

chickpeas + herbs + seeds + vegetables

High in vegetable protein! (25%)
High Fiber! (13%)



Extruded products from legumes



Roasted Faba Beans
Ltd «ZEKANTS»



Dairy FREE beverages

Plant based drink «Happea»
Ltd. «Nature Foods»

- High in plant protein
- Vit: A; D; K; B₁₂

“New sources of protein for food in Latvia”



Objective of the study - research of new protein sources in Latvia.
Project No 1.1.1.2/VIAA/1/16/190

The object of the research - Earthworms (*Lumbricina*) grown in Latvia



READY MEALS WITH REDUCED AMOUNT OF SALT AND SUGAR AND LONG STORAGE TIME



Sterilized soups and soup concentrates with long shelf life in flexible packaging



Creation of innovative products from Baltic Sea fish



These ready-to-eat products are produced using a specific technology – peeled and cut vegetables are steamed in their juice in the vacuum packaging



Processed Vegetable Products
Ltd. "Paplāte Nr.1 ", Ltd. "Nissi"

Soups
Ltd. «Kronis»

INNOVATIVE DAIRY PRODUCTS

Cheese balls
«ARCH»
Ltd.
«VZM»



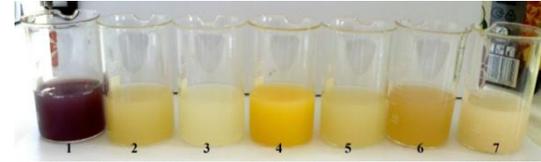
Protein Yogurt drink
Ltd. «Tukuma Piens»



It is made from cheese and curd whey and is a high-quality dietary product

Milk protein drink
«Piena spēks»

Ltd. «Smiltenes piens»



Whey

- Fermented drink from whey
- Ice cream from whey and pumpkin



Functional food

- Ice cream from decreased lactose content from whey
- Yoghurt with germinated grains
- Ice-cream with lactobionic acid
- Yoghurt with immaturation grains



Products with added value

- Lactobionic acid
- Products from colostrum



INNOVATIVE FRUIT, VEGETABLE AND BERRY PRODUCTS, AS WELL AS BEE PRODUCTS



Baby food
Ltd. «Lat Eko Food»



Fruit, berry and vegetable purees
Ltd. «Keefa»

- 100% natural and organic ingredients
- No GMO
- Great snack at any time of the day
- Contains Jerusalem artichoke
- Source of fiber, inulin
- No or low amount of added sugar

- Omega 3-6-9;
- All amino acids (both essential and non-essential);
- Vitamins A, B (except B₁₂), C, D, E and PP, K;
- Huge variety of micro-, macroelements such as Fe, Ca, Mg, Mn, Cl, P, S and many others

Chewing bee bread pastilles
Ltd. "Bee Bite"



Organic herbal tea + fresh squeezed juice from North meadows Ltd. «Dabas Dots»



Apple and pear chips "Garden Snack"
Ltd "Garden Snack"



Berry bars «Dario»
Ltd «Ric Berry»

FREE FROM
Oil
Salt
Food additives

Models of cooperation

Contracts between:

- scientists and entrepreneurs;
- scientists, entrepreneurs and incubators;
- scientists and associations;
- scientists and authorities;

Projects;

Courses;

Educational seminars;

etc. forms of cooperation.





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ACKNOWLEDGEMENTS



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**Thank you for
attention!**