



European Commission

INDUSTRIAL TRANSITION REVIEW OF ROMANIA

**Working Group Understanding and Managing Industrial Transitions:
Findings of Reviews of Industrial Transition & Launch of Support Coalitions**

14-15 July 2020

Gabriela Pirvu and Mircea Petrea - national experts
Christos Emmanouilidis - international expert

Outline

- ▶ Context and purpose of the review
- ▶ Selection of the review theme
- ▶ Review process
- ▶ Preliminary findings

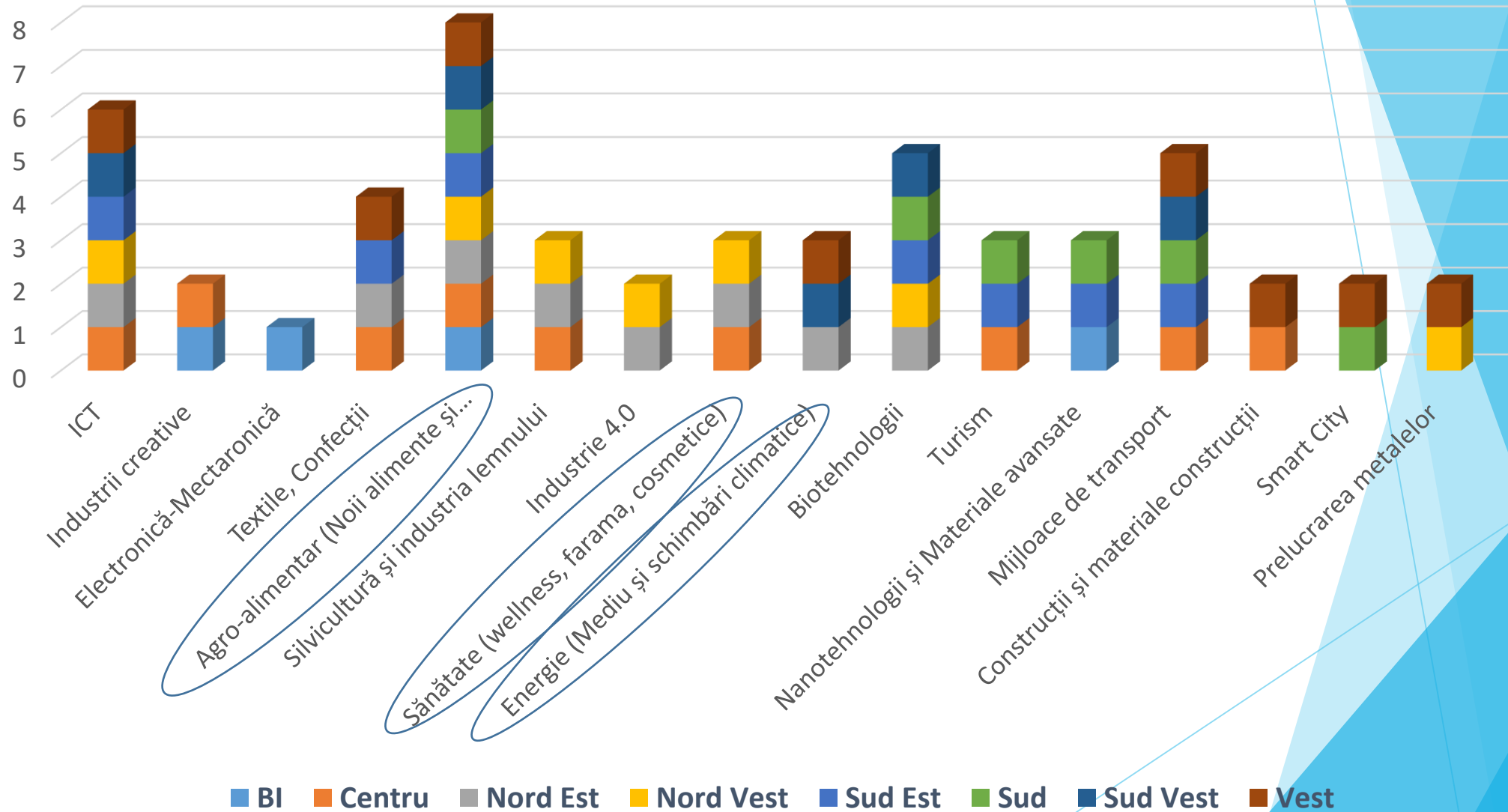
1. Context and purpose of the review

- ▶ Romania participates in the JRC projects "*Targeted Support to RIS3 in Romania*" and "*Targeted Support to RIS3 in Lagging Regions*" (2016-2020) - 8 regions and national level
- ▶ Romania joined the Working Group on Understanding and Managing Industrial Transitions and expressed interest for an Industrial Transition Review performed by JRC (November 2019)
- ▶ Review participation driven primarily by the need to fulfil Criterion 6 - "*Actions to manage industrial transition*" of PO1 - "A smarter Europe - an innovative and smart economic transformation" rather than by national economic and policy prioritisation
- ▶ Increased interest for the review determined by the COVID-19 crisis (state of emergency in Romania 16 March-14 May, state of alert 15 May-present)

2. Selection of the review theme

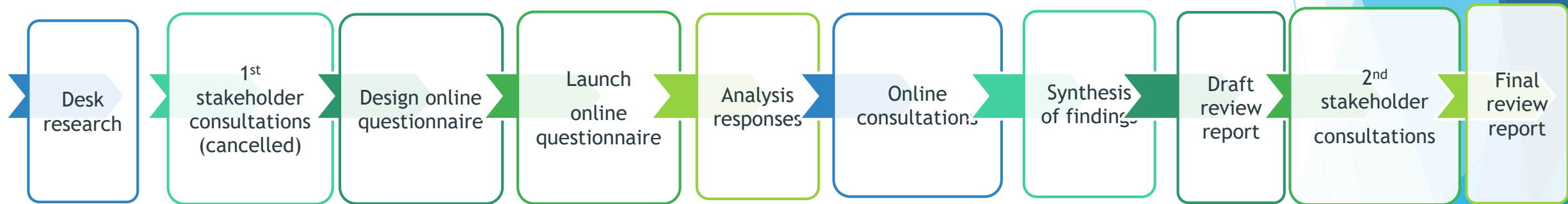
- ▶ Review theme proposed by the Romanian authorities
"Digitalisation (especially integrated solutions) for: agri-food areas (smart agriculture and food traceability), urban development (smart energy efficiency) and health (high quality services)".
- ▶ Ministry of Economy as national coordinator of economic competitiveness policies (SIPOCA project "Increasing the administrative capacity of the Ministry of Economy in view of monitoring, evaluation and coordination of public related to economic competitiveness")
- ▶ Theme selection through consultation between Ministry of Economy and Regional Development Agencies (RDAs) based on the match between:
 - ▶ RIS3 priorities identified in each of the eight regional RIS3 strategies
 - ▶ Regional concentration of innovation and technology transfer entities (EITT)
 - ▶ Regional concentration of clusters in the regional RIS3 priority areas

Distribution of RIS3 priority areas by region



3. Review process

- Initial review period: January-June 2020, later extended to December 2020
- Identification and contracting of three JRC external experts (January-March 2020)
- Actual review (April - December 2020)



Key desk research findings

1. Future value chains and impact of digitalisation on job profiles

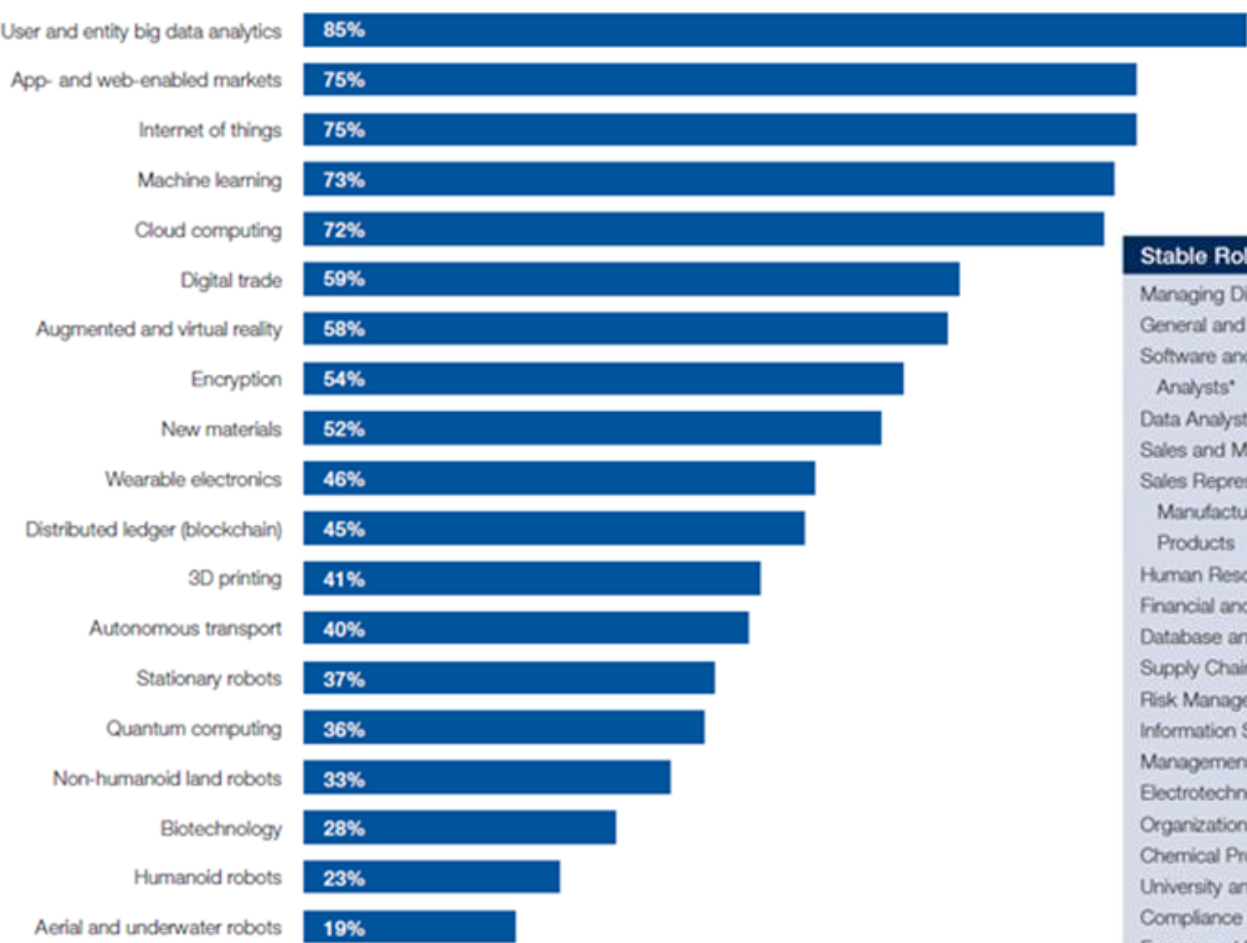
- ▶ By 2022, 59% of employers expect significantly modified production and distribution by changing the composition of their value chain
- ▶ Companies prioritize availability of skilled local talent (74%) over labour costs (64%)
- ▶ Other factors: flexibility of labour market legal framework, proximity to raw materials, 'ecosystem' effect of business concentration in a geographic area

Industry	Primary	Secondary	Tertiary
Overall	Talent availability	Labour cost	Production cost
Automotive, Aerospace, Supply Chain & Transport	Talent availability	Labour cost	Quality of the supply chain
Aviation, Travel & Tourism	Talent availability	Organization HQ	Labour cost
Chemistry, Advanced Materials & Biotechnology	Talent availability	Production cost	Labour cost
Consumer	Labour cost	Talent availability	Quality of the supply chain
Energy Utilities & Technologies	Talent availability	Labour cost	Production cost
Financial Services & Investors	Talent availability	Labour cost	Organization HQ
Global Health & Healthcare	Talent availability	Labour cost	Production cost
Information & Communication Technologies	Talent availability	Labour cost	Geographic concentration
Infrastructure	Labour cost	Talent availability	Production cost
Mining & Metals	Labour cost	Production cost	Talent availability
Oil & Gas	Talent availability	Production cost	Labour cost
Professional Services	Labour cost	Talent availability	Geographic concentration

Source: Future of Jobs Survey 2018, World Economic Forum.

2. Digitalisation introduces disruption and great opportunities in future job markets

Digitalisation and changing job profiles



Stable Roles	New Roles	Redundant Roles
Managing Directors and Chief Executives General and Operations Managers* Software and Applications Developers and Analysts* Data Analysts and Scientists* Sales and Marketing Professionals* Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products Human Resources Specialists Financial and Investment Advisers Database and Network Professionals Supply Chain and Logistics Specialists Risk Management Specialists Information Security Analysts* Management and Organization Analysts Electrotechnology Engineers Organizational Development Specialists* Chemical Processing Plant Operators University and Higher Education Teachers Compliance Officers Energy and Petroleum Engineers Robotics Specialists and Engineers Petroleum and Natural Gas Refining Plant Operators	Data Analysts and Scientists* AI and Machine Learning Specialists General and Operations Managers* Big Data Specialists Digital Transformation Specialists Sales and Marketing Professionals* New Technology Specialists Organizational Development Specialists* Software and Applications Developers and Analysts* Information Technology Services Process Automation Specialists Innovation Professionals Information Security Analysts* Ecommerce and Social Media Specialists User Experience and Human-Machine Interaction Designers Training and Development Specialists Robotics Specialists and Engineers People and Culture Specialists Client Information and Customer Service Workers* Service and Solutions Designers Digital Marketing and Strategy Specialists	Data Entry Clerks Accounting, Bookkeeping and Payroll Clerks Administrative and Executive Secretaries Assembly and Factory Workers Client Information and Customer Service Workers* Business Services and Administration Managers Accountants and Auditors Material-Recording and Stock-Keeping Clerks General and Operations Managers* Postal Service Clerks Financial Analysts Cashiers and Ticket Clerks Mechanics and Machinery Repairers Telemarketers Electronics and Telecommunications Installers and Repairers Bank Tellers and Related Clerks Car, Van and Motorcycle Drivers Sales and Purchasing Agents and Brokers Door-To-Door Sales Workers, News and Street Vendors, and Related Workers Statistical, Finance and Insurance Clerks Lawyers

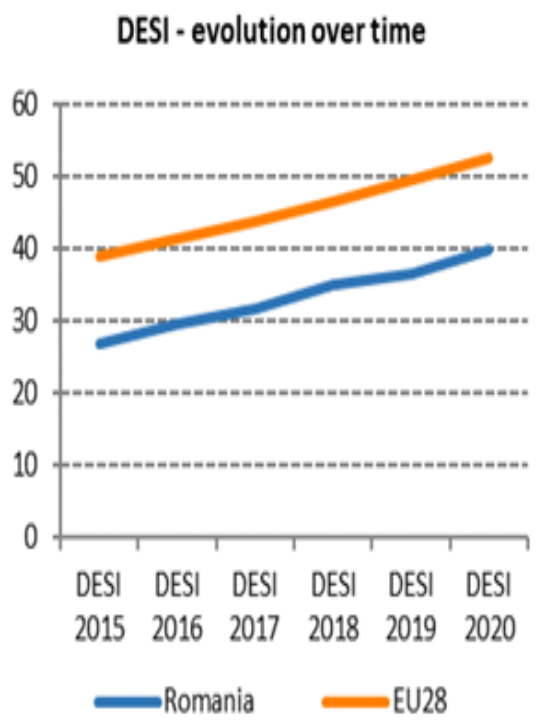
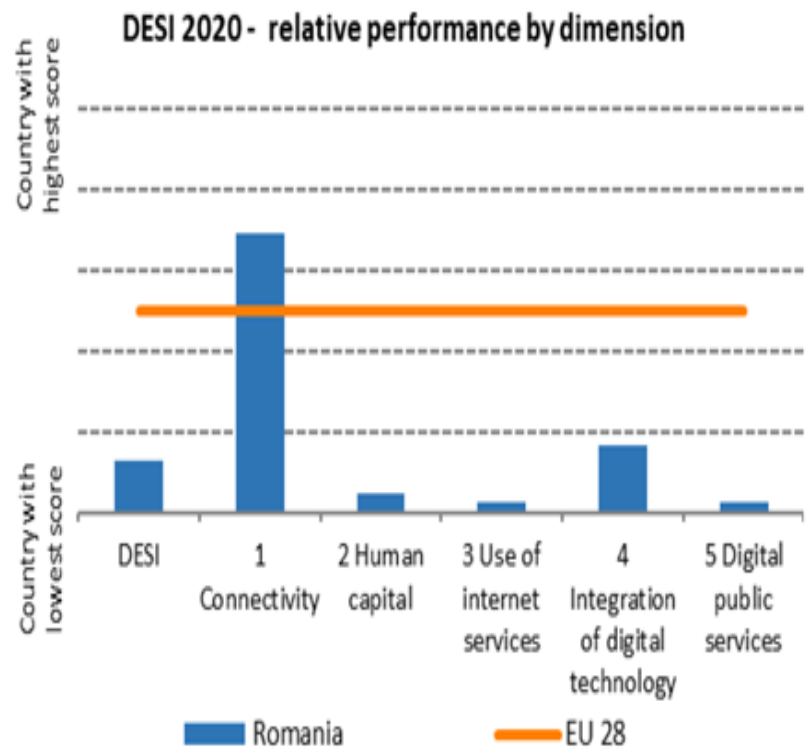
Source: Future of Jobs Survey 2018, World Economic Forum.

Source: Future of Jobs Survey 2018, World Economic Forum.

Note: Roles marked with * appear across multiple columns. This reflects the fact that they might be seeing stable or declining demand across one industry but be in demand in another.

3. Romania scores very high on Connectivity and Very High Capacity Networks

- Digital Economy and Society Index (DESI): ROMANIA -

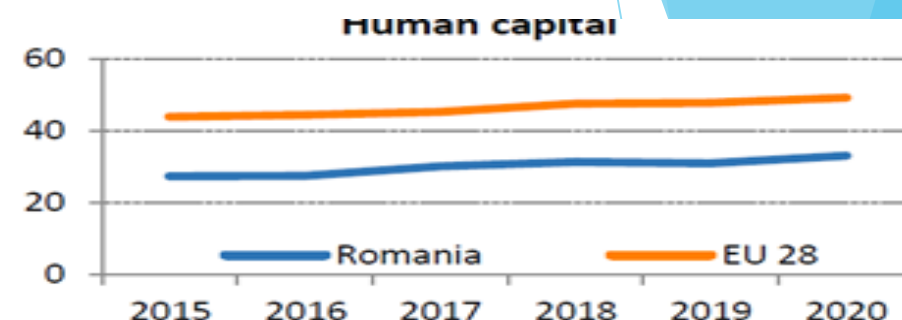


	DESI 2018	Romania		EU
	value	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
1a1 Overall fixed broadband take-up	67%	66%	66%	78%
% households	2017	2018	2019	2019
1a2 At least 100 Mbps fixed broadband take-up	44%	45%	49%	26%
% households	2017	2018	2019	2019
1b1 Fast broadband (NGA) coverage	74%	76%	82%	86%
% households	2017	2018	2019	2019
1b2 Fixed Very High Capacity Network (VHCN) coverage	61%	63%	68%	44%
% households	2017	2018	2019	2019
1c1 4G coverage	72%	77%	85%	96%
% households (average of operators)	2017	2018	2019	2019
1c2 Mobile broadband take-up	82	86	86	100
Subscriptions per 100 people	2017	2018	2019	2019
1c3 5G readiness	NA	0%	21%	21%
Assigned spectrum as a % of total harmonised 5G spectrum		2019	2020	2020
1d1 Broadband price index	NA	NA	92	64
Score (0 to 100)			2019	2019

3. Digital skills adoption in Romania is lagging: Challenge and Opportunity!

- Digital Economy and Society Index (DESI): ROMANIA -

2 Human capital	Romania		EU
	Rank	Score	Score
DESI 2020	27	33.2	49.3
DESI 2019	27	31.1	47.9
DESI 2018	28	31.5	47.6



	DESI 2018 value	Romania DESI 2019 value	DESI 2020 value	EU DESI 2020 value
2a1 At least basic digital skills % individuals	29%	29%	31%	58%
2a2 Above basic digital skills % individuals	10%	10%	10%	33%
2a3 At least basic software skills % individuals	32%	32%	35%	61%
2b1 ICT specialists % total employment	2.0%	2.1%	2.2%	3.9%
2b2 Female ICT specialists % female employment	1.2%	1.3%	1.2%	1.4%
2b3 ICT graduates % graduates	5.4%	4.9%	5.6%	3.6%

System definition, boundaries, and prospects

Observations based on analysis of Gross Value Added (GVA), enterprises, and employment figures in economic activities related to the priority themes:

Agri-food

- Some growth in 2010-2014, more in 2014-2018
- Gradual slight decline in GVA contribution
- Wages and salaries declined in 2010-2014, but rebounded sharply in 2014-2018
- Signs that manufacturing in some agri-food production activities offers much higher added value outputs compared to primary production

Urban development

- Early boost from infrastructure projects and remarkable increase in ICT
- Growth associated with accommodation and food service activities

Healthcare

- Sector-associated activities produced some of the highest added value outcomes in recent years

System definition, boundaries and prospects

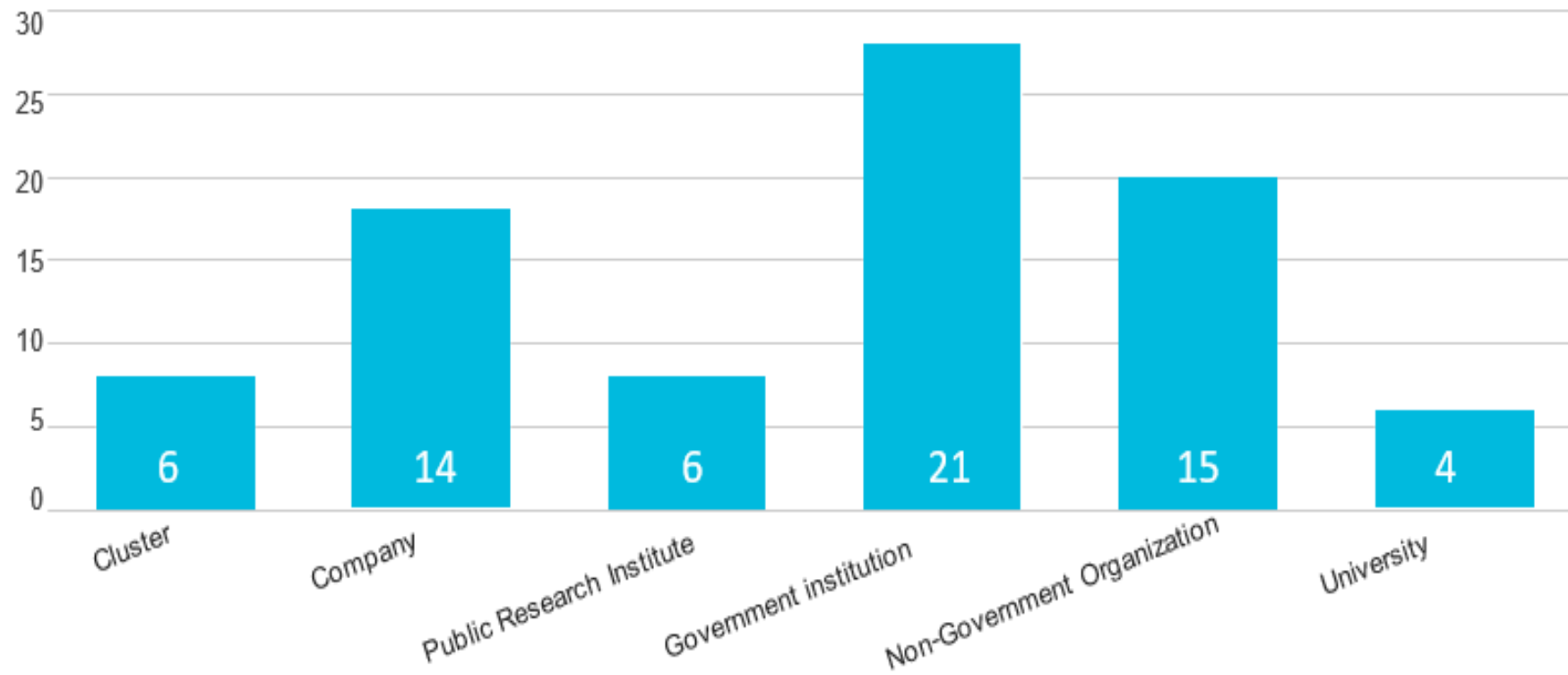
Innovation opportunities driven by digital technologies in the priority sectors: agri-food, health, urban development (international sources)

Business Subprocess	Technology	Description	Benefit / Value area	Limitations - Pre-requisites - Risks	Synergies
Public health monitoring	Big Data AI Machine Learning	<p>Data analytics by analysing large amount of unstructured, heterogeneous, non-standard and incomplete healthcare data</p> <p>Data obtained by tracking patient's status with IoT devices or introduced in the system by medical personnel</p>	<p>Enables disease surveillance</p> <p>Enables early-stage illness detection, Easier to deal with, more effectively and successfully</p> <p>Efficient</p> <p>Affordable</p>	<p>Electronic medical records or IoT generated data</p> <p>Computing power.</p> <p>Multi-centre clinical data networks</p>	<p>Clinicians</p> <p>Integrators</p> <p>Regulatory bodies</p> <p>Clinical care institutions</p> <p>Software-producers</p> <p>Cyber security and data privacy experts</p> <p>Cloud computing providers</p> <p>Government public health control institutions</p> <p>Health-related insurance companies</p>

Design of online questionnaire

Target themes	Agri-food Urban development Health
Key stakeholders from target areas by institutional profile	Government institutions (ministries) Companies Universities Public Research Institutes Clusters NGOs (Regional Development Agencies and professional associations)
Information type	General questions for all institutions (profile, SWOT relative to digitalization, digitalization as priority) Specific questions by institution type: <ul style="list-style-type: none">• Financial & human resources;• Cooperation;• Markets and value chains;• Technologies and skills, including digitalization
Approach	Closed-end questions Open-end questions (to encourage bottom-up information gathering)
Response rate	Invitations sent: 155 Answers received: 66 Response rate: 42.5%

Key stakeholders' response by institutional type



Government institutions (ministries)

- ▶ **Position/role:** Manager (8%), Counsellor (92%)
- ▶ **General aspects:** Professional experience (average 24 yrs); large institutions (250-700 employees)
- ▶ Digitalisation is important for the institution after the COVID 19 experience: Strongly agree (78%); Somewhat agree (22%)
- ▶ Digitalisation is a priority for industrial transition due to: COVID-19 crisis (29%), increasing need for digital skills (29%), transition to digital and data economy (21%), new ICT (21%), education system not ready for online education services (21%), globalisation, telework
- ▶ Experience of more advanced countries considered in developing strategies, policies and funding instruments (100%)
- ▶ Existing strategies, policies and funding instruments do not meet the current needs related to digitalization (92%)
- ▶ Assessment of employees' digital skills and training needs: Yes (50%), No (50%)

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none">• High internet speed• Staff experience• Intra- and inter-ministerial communication	<ul style="list-style-type: none">• Lack of digital skills (58%)• High bureaucracy,• Very frequent legislative changes• Migration of IT specialists from public to private sector• Lack of coordination between public institutions on digital public services
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">• Higher efficiency of activities• Better intra- and inter-institutional communication• High digitization potential• Document management applications• Online submission of documents• Lower activity costs,• Shorter communication times	<ul style="list-style-type: none">• Unemployment• Increasing the complexity of work

Companies

- ▶ **Position/role:** Owner (92%), Manager (8%)
- ▶ **Sector:** Services (56%), ICT (33%)
- ▶ **General aspects:** Professional experience (average 24 yrs); Small (88% less than 5 employees); Time since inception (average 8 yrs)
- ▶ Digitalisation is important for the institution after COVID 19 experience: Strongly agree (66.7%); Somewhat agree (22.2%), Neutral (11.1%)
- ▶ Digitalisation is a priority for industrial transition due to: COVID-19 crisis (50%), teleworking (30%), globalization (20%)
- ▶ Wide spread of competences in digitalisation-related fields
- ▶ Moderate innovation performance
 - ▶ New or improved products 22.7%;
 - ▶ New or improved services 31.8%;
 - ▶ New or improved management strategies 22.7%;
 - ▶ New or improved marketing strategies 22.7%
- ▶ Value chain position:
 - ▶ Primary activities: marketing (50%); service (33.3%), inbound logistics (8.3%), outbound logistics (8.3%)
 - ▶ Support activities: Procurement (20%), Infrastructure (40%), Human resources management (30%), Technological development (10%)

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> Employee professionalism Keeping expenses under control 	<ul style="list-style-type: none"> Lack of qualified staff on the labour market Lack of cash flow Lack of high-performance equipment and technology
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> New projects/contracts for ICT firms Increased visibility through digitization Better online presence 	<ul style="list-style-type: none"> COVID-19 crisis (75%)

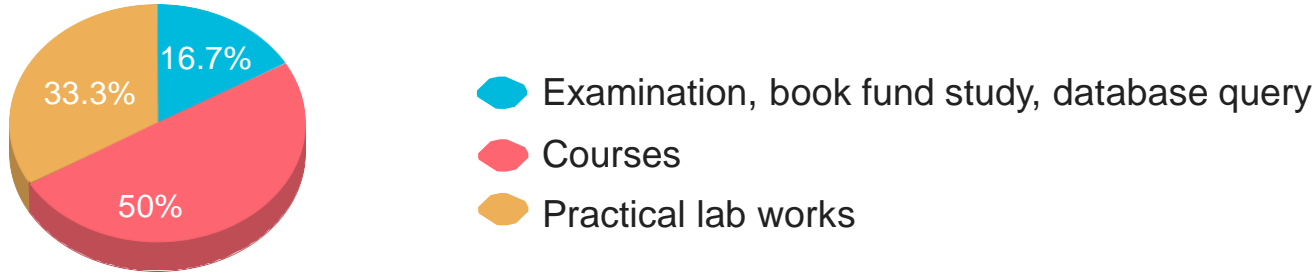
Universities

- ▶ **Position/role:** University professor (100%)
- ▶ **General aspects:** Professional experience (average 34 yrs); Number of employees (more than 200 employees)
- ▶ Digitalisation is important for the institution after COVID 19 experience: Strongly agree (100%)
- ▶ Digitalisation is a priority for industrial transition due to: COVID-19 crisis, globalization, need for digital skills, spread of new ICT

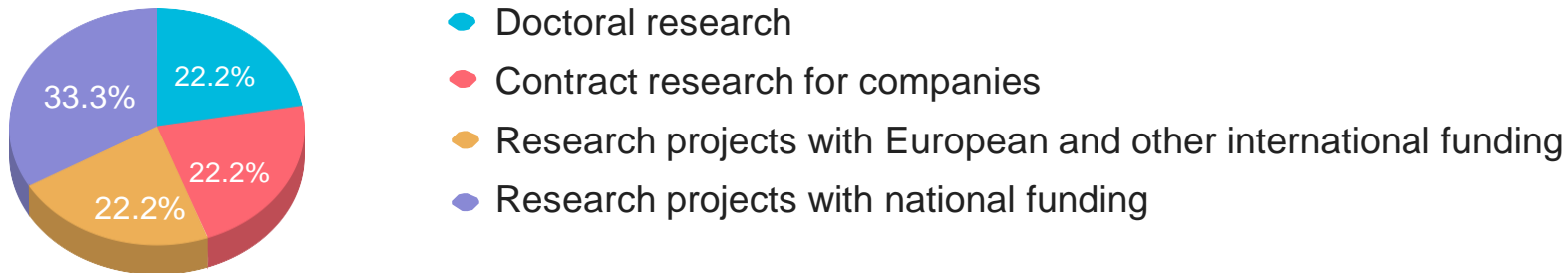
STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Large computers network • e-learning platform • Many computer scientists 	<ul style="list-style-type: none"> • Lack of digitization in administration • Inconsistencies in data collection systems • No integration of student records • Teachers' inability to implement and use available resources • Teachers' lack of time and training opportunities • Teachers' inability to use digital textbooks because of lack of knowledge of available technologies and their use for supporting curriculum delivery
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Creation of teachers' own materials and instant distribution to colleagues and students • New student assessment methods on digital platforms • Building teachers' own content by adapting digital textbooks • Reuse and customization of textbooks • Speed of data collection • Online completion of academic records • Building comprehensive databases that allows statistical analysis and other appropriate measures 	<ul style="list-style-type: none"> • Collection and processing of personal data • Teachers' digital skills below those of "digital native" students • Lack of online teaching materials • Lack of necessary digital skills in some students • Students do not have access to digital tools • No implementation of digital textbooks in schools • Lack of adequate equipment in some seminar rooms • Resistance to change in the system

Universities

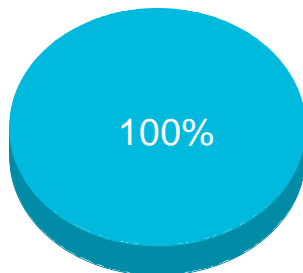
What educational activities related to the digital technologies selected above are currently provided by your university?



What type of research activities are currently performed in your university related to the digital technologies selected above?



Do you collaborate with public research institutes in the thematic domains of the study?



No 100%

Public RDI Institutes

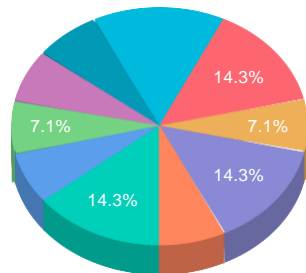
- ▶ **Position/role:** Scientist (50%), Manager (8%)
- ▶ **Sector:** Law, Agriculture, Informatics, Engineering
- ▶ **General aspects:** Professional experience (average 24 yrs); Medium size (80-350 employees);
- ▶ Digitalisation is important for the institution after COVID 19 experience: Strongly agree (75%); Somewhat agree (25%)
- ▶ Digitalisation is a priority for industrial transition due to: COVID-19 crisis, increasing use of computer systems, citizens' high expectations for online information, need for market niches adequate to the institute's current expertise and infrastructure, need for market niches that meet the needs of domestic companies

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none">• Digital skills (75%)	<ul style="list-style-type: none">• Few enterprises introducing innovation
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">• Digitization• Value-added technologies• Activity Streamlining• Access to information resources	<ul style="list-style-type: none">• Lack of competitiveness if digitization is not accelerated

RDI Institutes

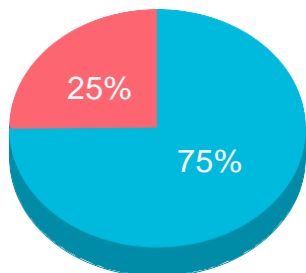
Research and entrepreneurial activities of the institute:

In which of the digital technologies listed below does your institute conduct research activities?



- Big data management
- Data Analytics
- System integration
- Internet of Things
- Cloud-based platforms
- Additive manufacturing/3D printing
- Networking and telecommunications
- Security/Cyber-Security
- Simulation
- Machine Learning/Cognitive computing/ Artificial Intelligence
- Smart Materials

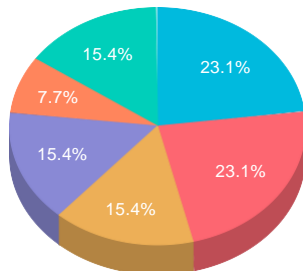
Do you collaborate with universities in the area of digital technologies?



75% Yes
25% No

Professional training needs:

What needs for professional training and competence development related to digital technologies are there in your institute?



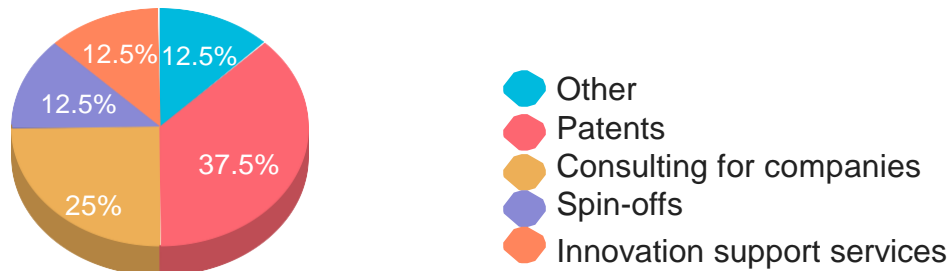
- Public procurement for innovation
- Development of digital skills in the workplace
- Training on technology futures analysis
- Digital skills training
- Participatory methods in innovation governance (citizen panels, stakeholder consultation, EDP in S3, etc.)
- Training on innovation and technology management - Intellectual property rights

RDI Institutes

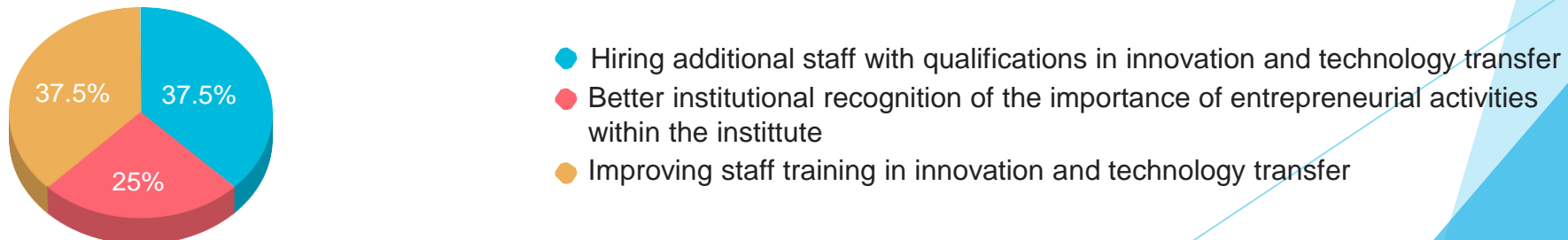
How do you ensure an effective link between your research activities and the needs of the labour market/ private sector?

- Example 'yes' answer: there is a Centre for Technology Transfer in Advanced Materials
- 'No' answer in other responses

What kind of technology transfer and research commercialisation activities are performed in your institute related to digital technologies?



What could be done to stimulate the entrepreneurial activities of the institute?



Clusters

- ▶ **Position/role:** Manager (75%), Counsellor (25%)
- ▶ **Sectors:** ICT (50%), Health (25%), Agriculture (25%)
- ▶ **General aspects:** Professional experience (average 19 yrs); small (less than 15 in 75%)
- ▶ Digitalisation is important for the institution after the COVID 19 experience: Strongly agree (100%)
- ▶ Digitalisation is a priority for industrial transition due to: COVID-19 crisis, increasing need for digital skills, transition to digital and data economy, new ICT, telework, new ICTs, competitive production costs
- ▶ Relatively balanced spread of competences in digitalisation-related areas
- ▶ Assessment of employees' digital skills and training needs: Yes (50%), No (50%)

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none">• Employee professionalism• Openness to digitization	<ul style="list-style-type: none">• Lack of digital skills• Poor funding• No use of or capacity to develop high-tech methods
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">• Tele-medicine• Higher production• Increased innovation capacity• Possibility to provide a package of services to non-digitized industries to support the digital transformation of SMEs	<ul style="list-style-type: none">• Unemployment• Resistance to change in the system

Non-governmental organisations (RDAs, professional associations)

- ▶ **Position/role:** Manager (70%), Counsellor (30%)
- ▶ **Sectors:** RDA (50%), Services (50%)
- ▶ **General aspects:** Professional experience (average 19 yrs); >100 employees (RDA), less than 10 (the rest)
- ▶ Digitalisation is important for the institution after the COVID 19 experience: Strongly agree (90%), Somewhat agree (10%)
- ▶ Digitalisation is a priority for industrial transition due to: need to ensure competitive production costs, COVID-19 crisis, globalisation, shortening value chains, increasing labour cost in Romania, de-bureaucratisation of administration
- ▶ Relatively balanced spread of competences in digitalisation-related areas
- ▶ Assessment of employees' digital skills and training needs: Yes (40%), No (60%)
- ▶ Measures taken further to this assessment: Training courses (40%); Investments in digital infrastructure (30%); Workshops (30%).

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none">• Social media presence and visibility• Digital infrastructure• Large number of employees using the computer	<ul style="list-style-type: none">• Weak government support• Low visibility of the entrepreneurial environment• Insufficient institutional capacity to realise available opportunities• Insufficient awareness of innovation in Romanian business environment
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">• Expanding national and international cooperation• Supporting Industry 4.0 processes• Training courses for the development of digital skills	<ul style="list-style-type: none">• Cyber security and data protection (50%)• Limited budget (20%)• Resistance to change in the system

Conclusions

- ▶ Very high need for digitalization overall
- ▶ Main reasons for digitalization: COVID 19 crisis, globalisation, increasing need for digital skills, transition to digital and data economy
- ▶ Digitalization needs differ by institutional type
- ▶ Lack of/poor digitalisation skills in all institutional types
- ▶ Relative strength in very high capacity networks
- ▶ General need for training, especially training for public procurement for innovation
- ▶ General need for more financing, more personnel or better trained staff



European Commission

INDUSTRIAL TRANSITION REVIEW OF ROMANIA

**Working Group Understanding and Managing Industrial Transitions:
Findings of Reviews of Industrial Transition & Launch of Support Coalitions**

14-15 July 2020

Gabriela Pirvu and Mircea Petrea - national experts
Christos Emmanouilidis - international expert