Jobs, work and skills in the digital transformation

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IBSA MANUFACTURING

JOBS, WORK AND SKILLS IN THE DIGITAL TRANSFORMATION

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BETTER POLICIES FOR BETTER LIVES

THE CONTEXT: THE GOING DIGITAL PROJECT

GOING DIGITAL:

MAKING THE TRANSFORMATION WORK FOR GROWTH AND WELL-BEING

- Help policymakers better understand the digital transformation that is taking place;
- Develop tools to help create a policy environment enabling economies and societies to prosper in a world that is increasingly digital and data-driven;
- Deliver a whole-of-house perspective on state, effects, expected benefits and issues raised by digitalisation in different sectors and policy areas;
- Provide analysis of key cross-cutting issues, including: **jobs and skills**; productivity, competition and market structure; social challenges and well-being.

2 OBJECTIVES

1 Understand

How does the **digital transformation change labour markets, jobs and the skills** that workers need?

2 Policy

How can policies help **address the challenges of the digital transformation** for jobs and skills?

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2 Policy

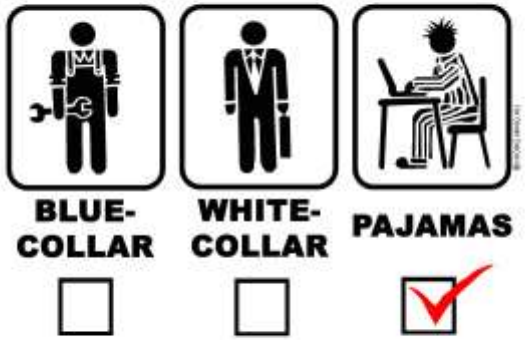
How can **policies** help **address the challenges of the digital transformation** for jobs and skills?

THE DIGITAL TRANSFORMATION:

A TALE OF MANY TALES…

Sectors differ in:

The extent to which develop and adopt new technologies;



Their human capital endowment;

Their structure and organisation of production.

THE DIGITAL TRANSFORMATION:

THE MEASUREMENT CHALLENGE

Propose a taxonomy of sectors mirroring the extent to which they have gone digital.

- Account for some of the DT's main facets, especially **TECHNOLOGY**, **MARKET** and **HUMAN CAPITAL** - related features
- Rely on data **COMPARABLE ACROSS COUNTRIES & OVER TIME,** harmonise classifications, deflate
- Provide an **OPERATIONAL TOOL** helping analysts and policy makers understand the sectoral heterogeneity of the transformation
- **BENCHMARK SECTORS** among each other – does not measure the size of the digital economy **!!!**

Source: Calvino, Criscuolo, Marcolin and Squicciarini(2018)

THE DIGITAL TRANSFORMATION:
A TALE OF MANY TALES…

PLATFORMS

Intermediate ICT services

Software

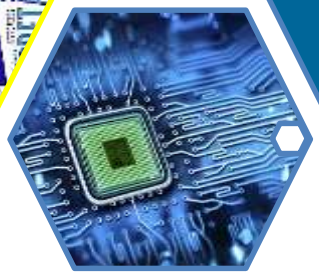
Robots

AI

Hardware

ICT specialists

BIG DATA



Intermediate ICT goods

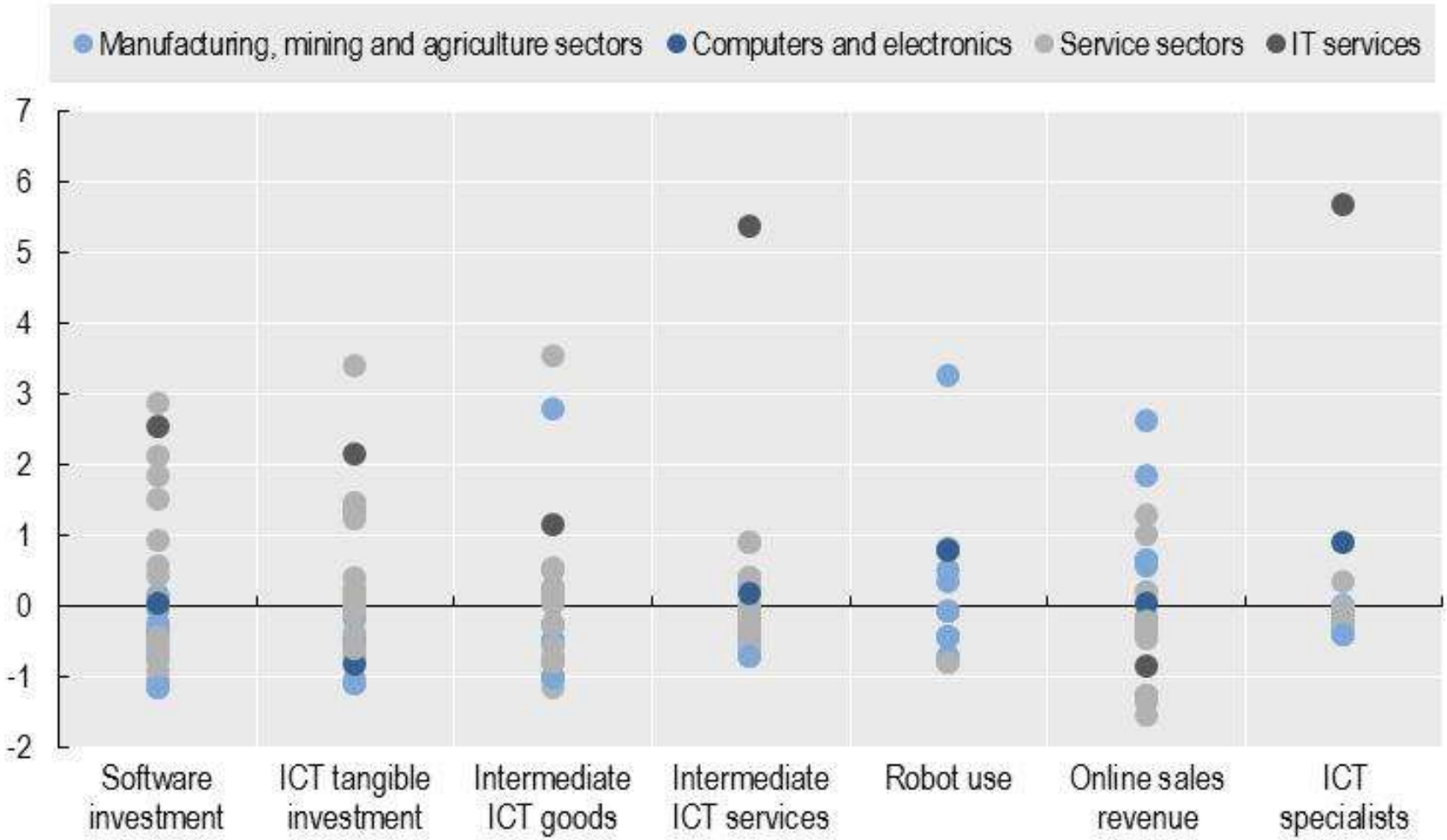
E-sales

Source: Squicciarini(2018, forthcoming)

THE DIGITAL TRANSFORMATION:

A TALE OF MANY TALES…

Dispersion of sectors in each considered dimension of digitalisation, 2013-15

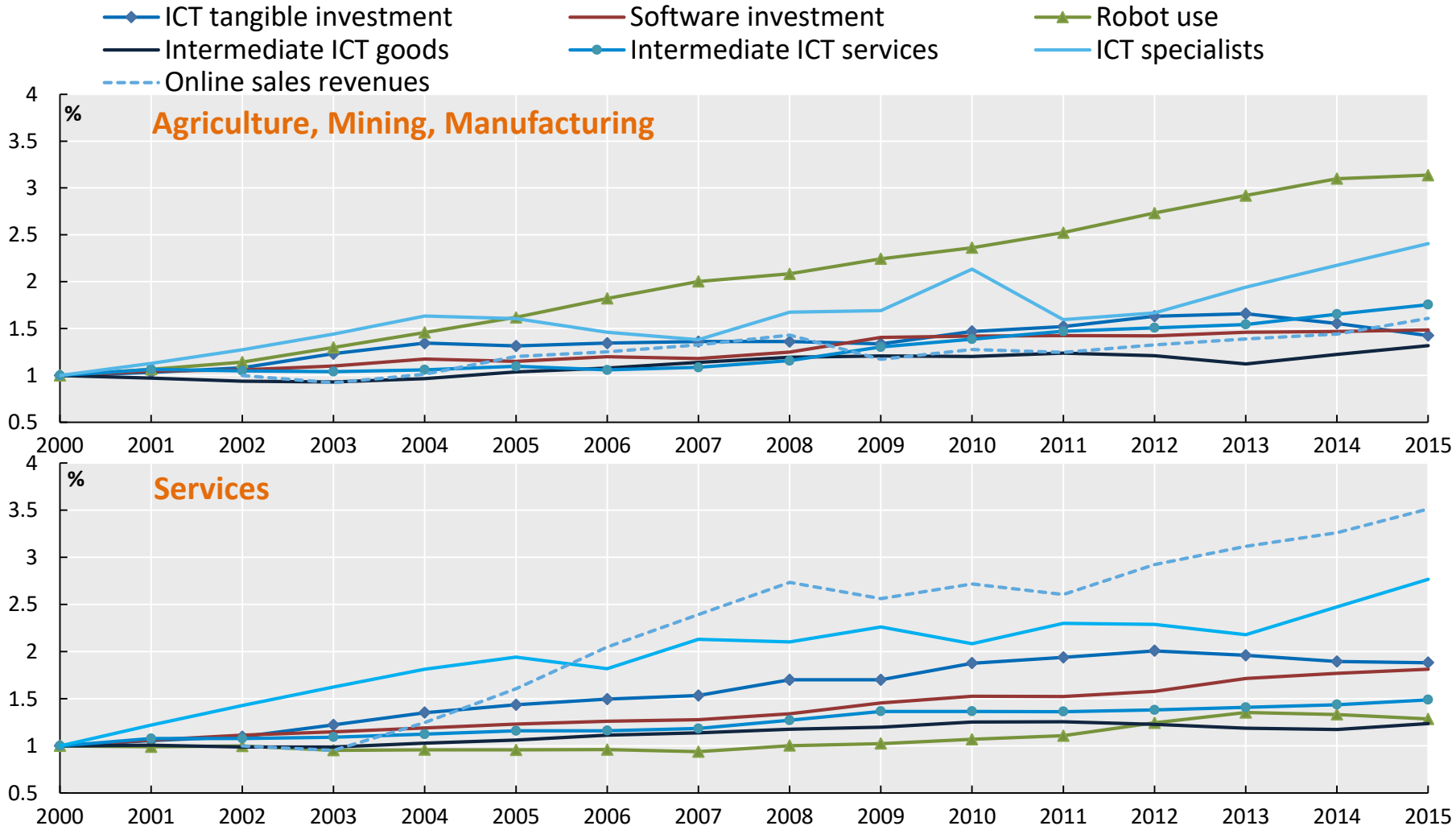


Source: OECD Science, Technology and Industry Scoreboard 2017 , Statlink: http://dx.doi.org/10.1787/888933618669
Based on : Calvino, Criscuolo, Marcolin and Squicciarini (2018)

THE DIGITAL TRANSFORMATION:

..OF DIFFERENT SPEED, SCALE AND SCOPE

Digital penetration of sectors over time, growth rate, 2001-15



Source: OECD calculations based on Calvino, Criscuolo, Marcolin and Squicciarini(2018)

AUTOMATION PUTS SOME WORKERS AT RISK

RISK OF AUTOMATION: WHAT DO WE KNOW?

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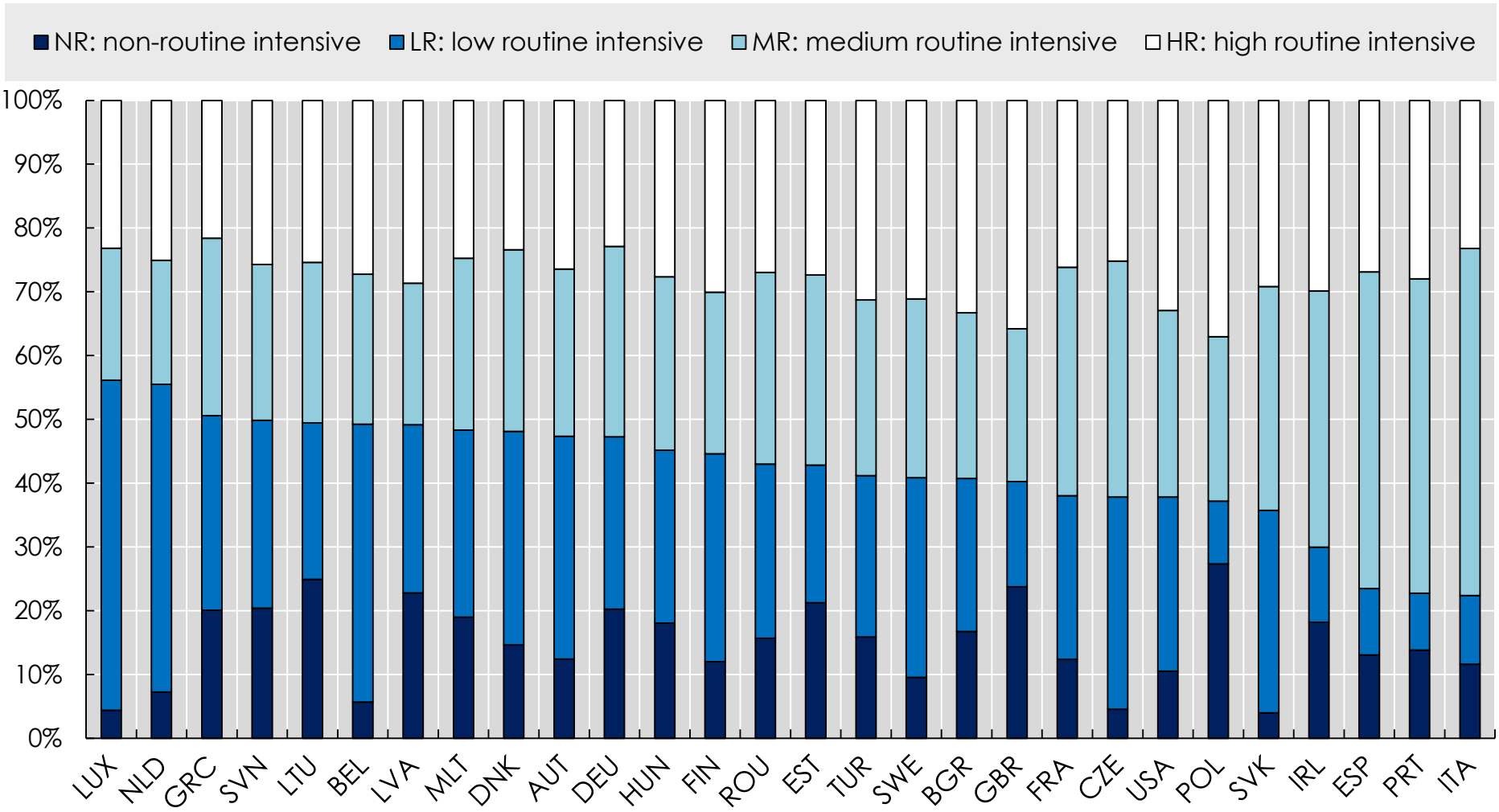
ROUTINE WORKERS ARE MORE AT RISK...



Source: Marcolin et al. (2016a), http://dx.doi.org/10.1787/5jm0mq86fljg-en

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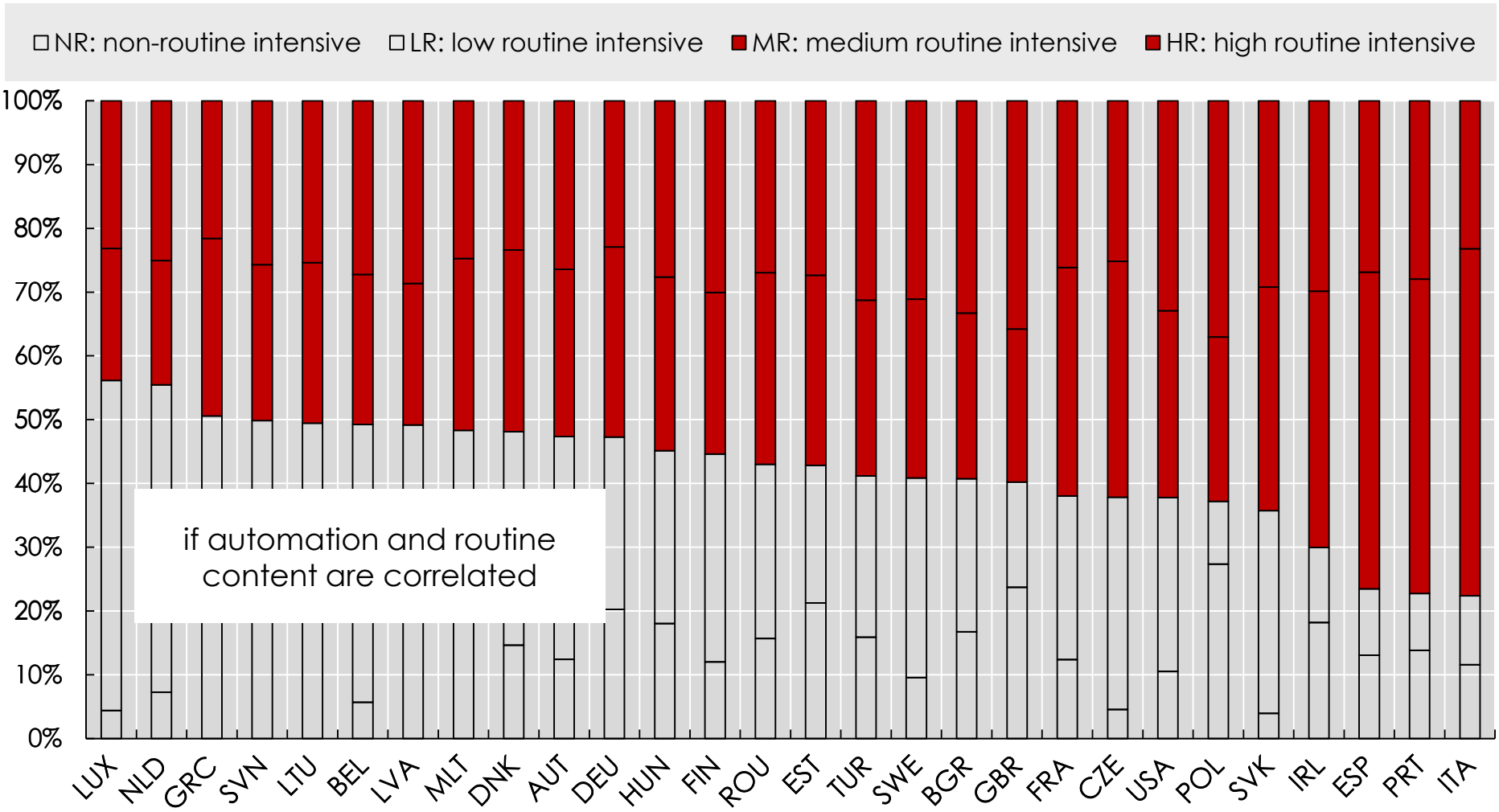

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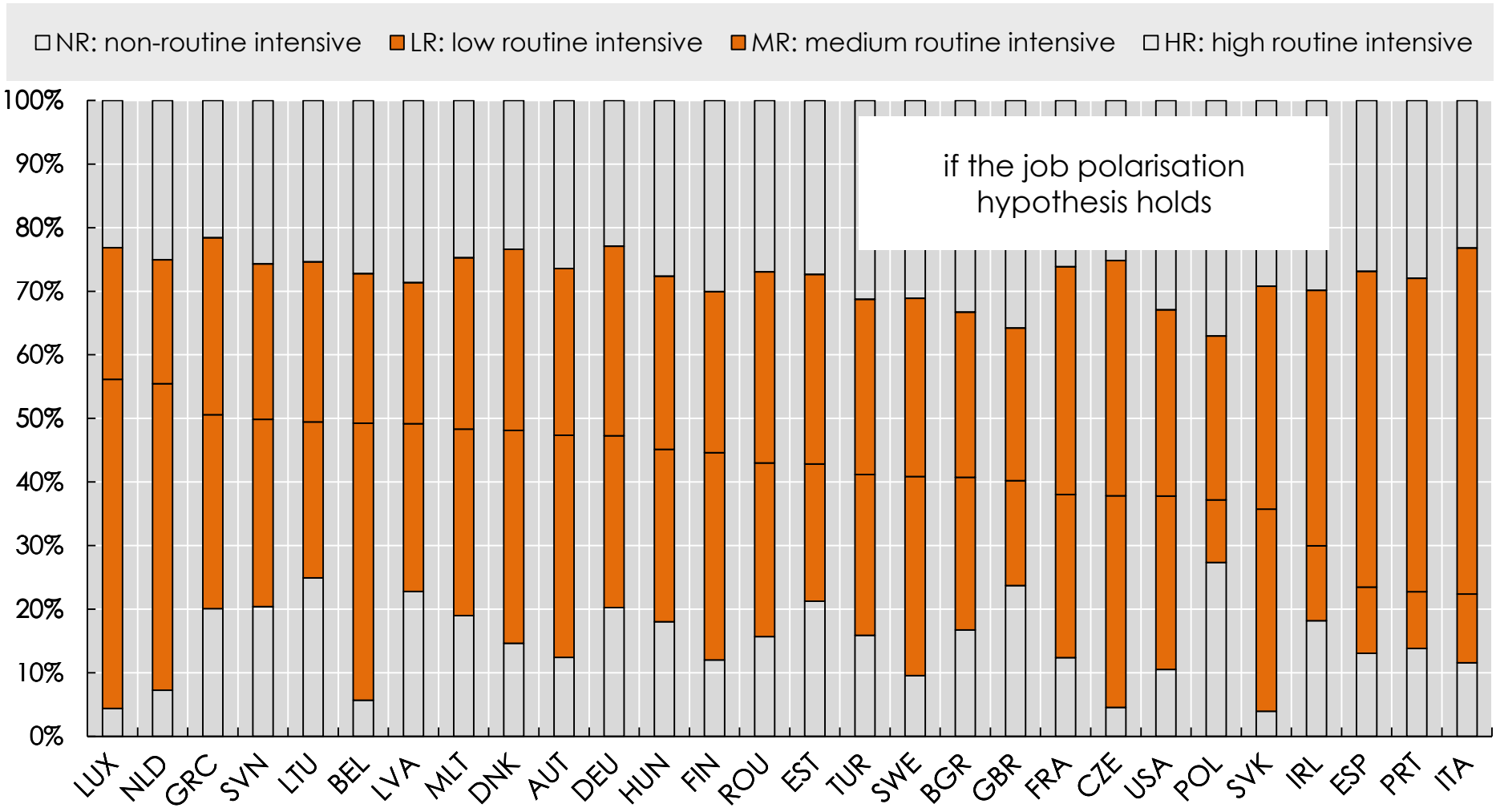
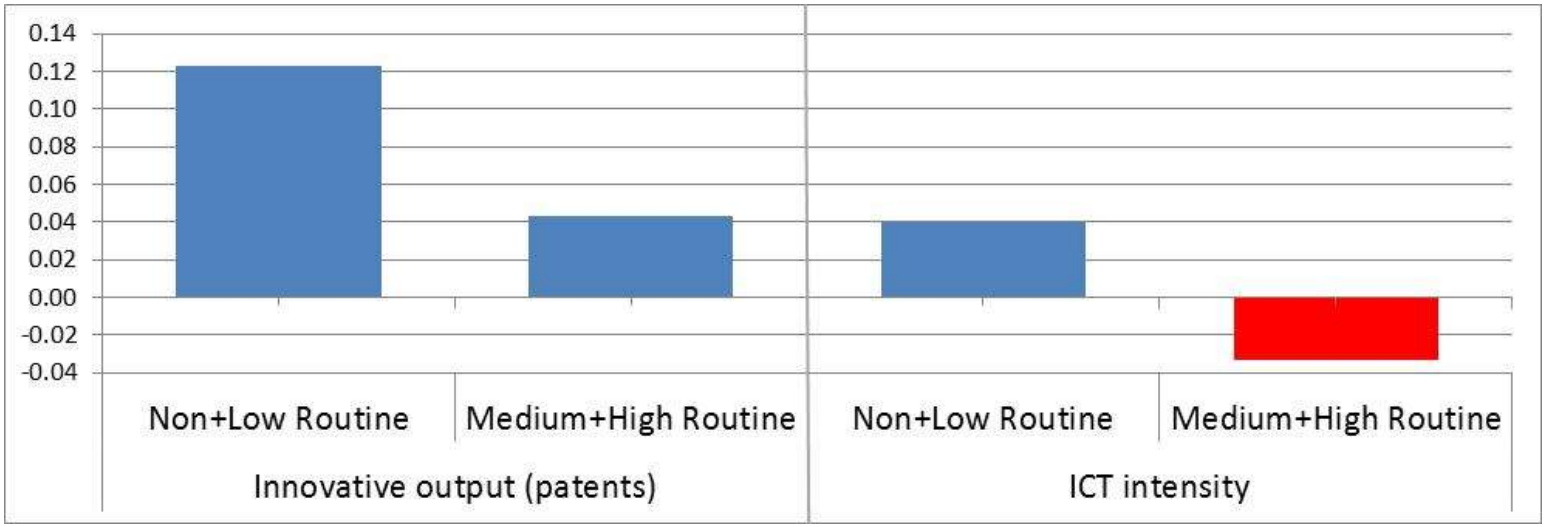
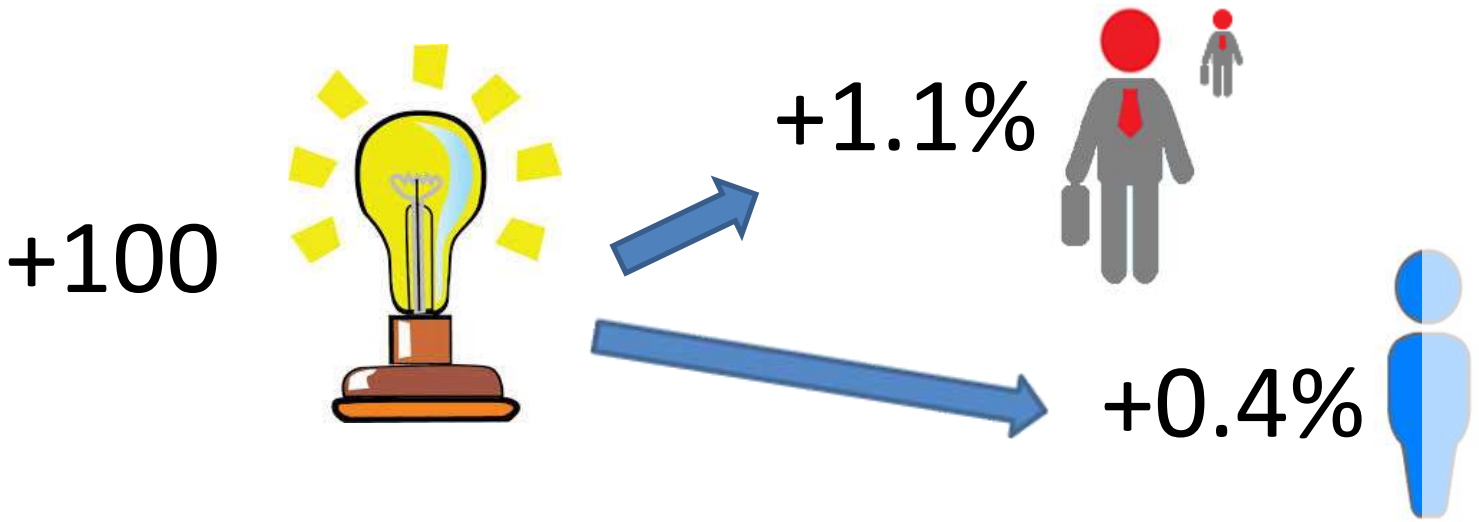


Source: Marcolin et al. (2016a), http://dx.doi.org/10.1787/5jm0mq86fljg-en

ALTHOUGH **TECHNOLOGY** MAY ACT **BOTH WAYS**



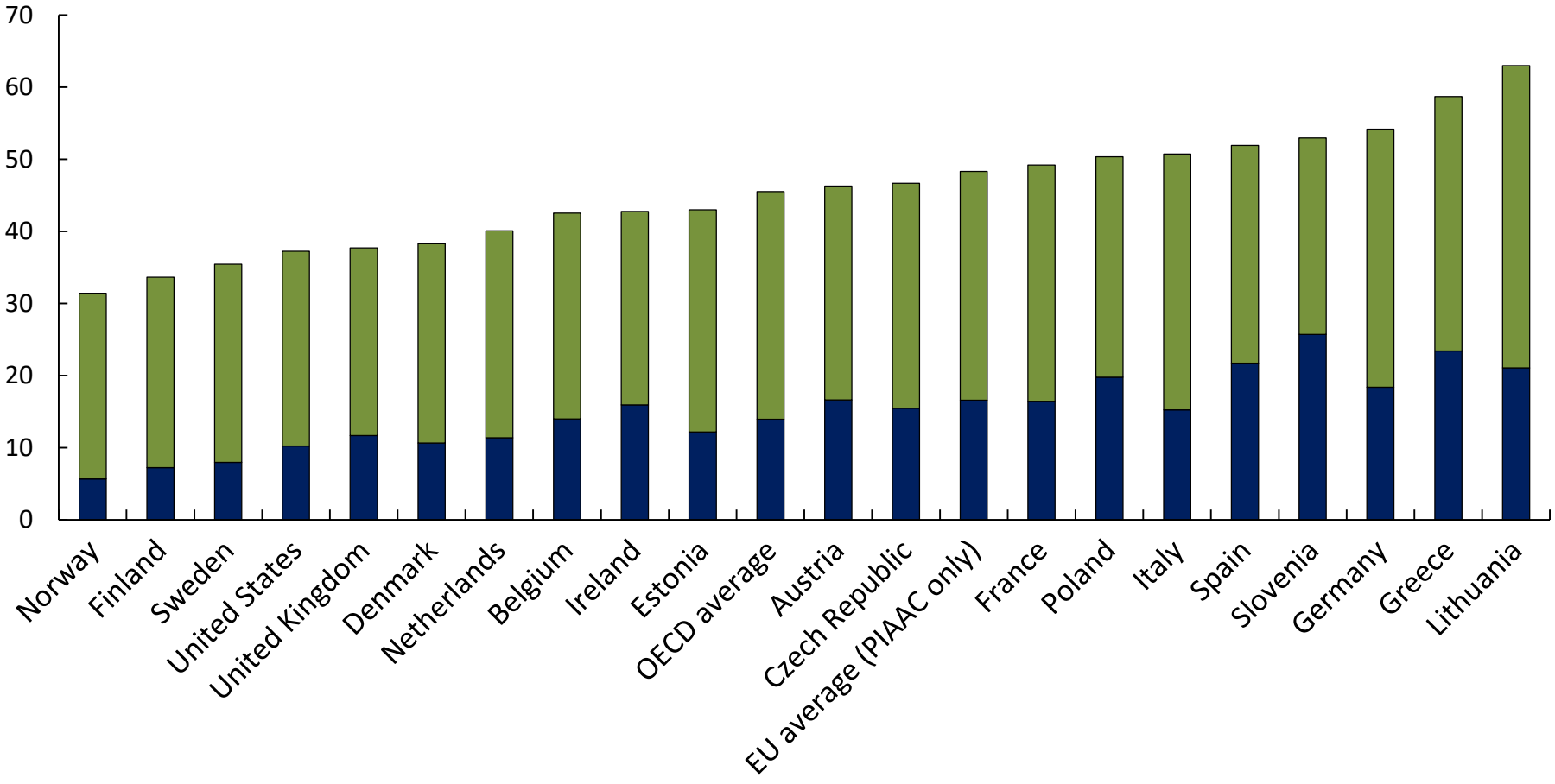


Source: OECD calculations based on Marcolin et al. (2016b), http://dx.doi.org/10.1787/18151965 .

AND FEARS OF MASS TECHNOLOGICAL UNEMPLOYMENT ARE LIKELY EXAGGERATED…

…..many jobs will experience significant change

Share of jobs at **HIGH RISK (>70%)** of automation and at **SIGNIFICANT RISK (50-70%)**



Source: Nedelkoska and Quintini (2018)

NEW BUSINESS MODELS, NEW JOBS, NEW SKILLS?

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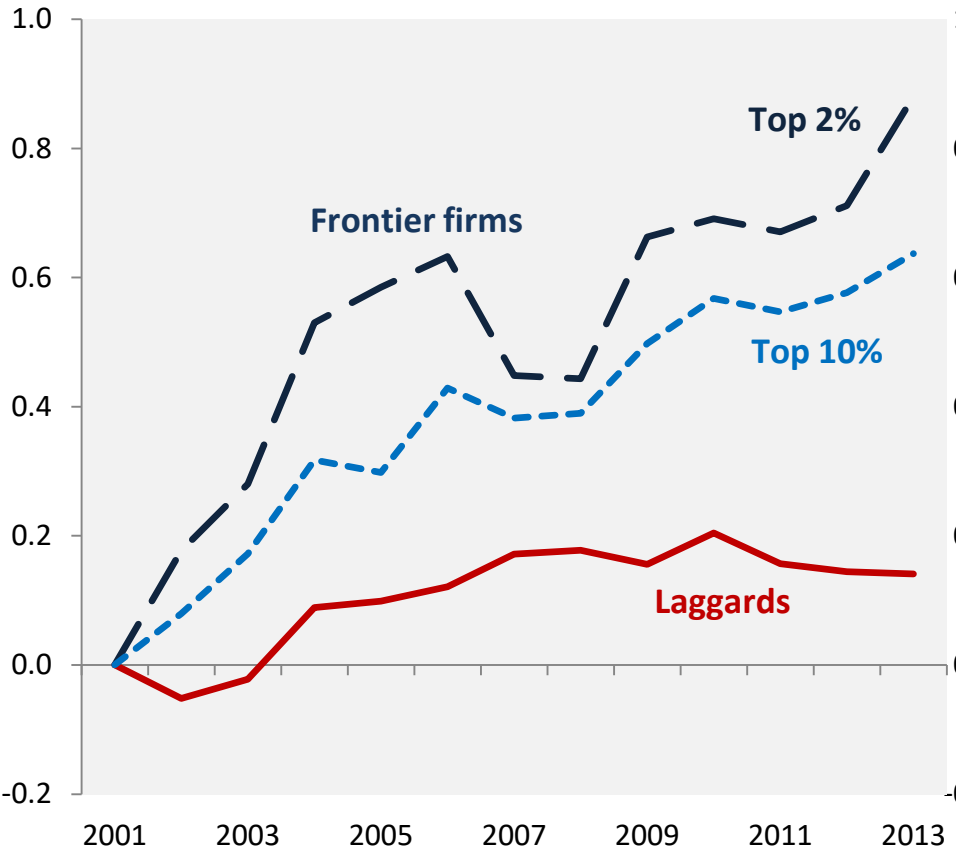
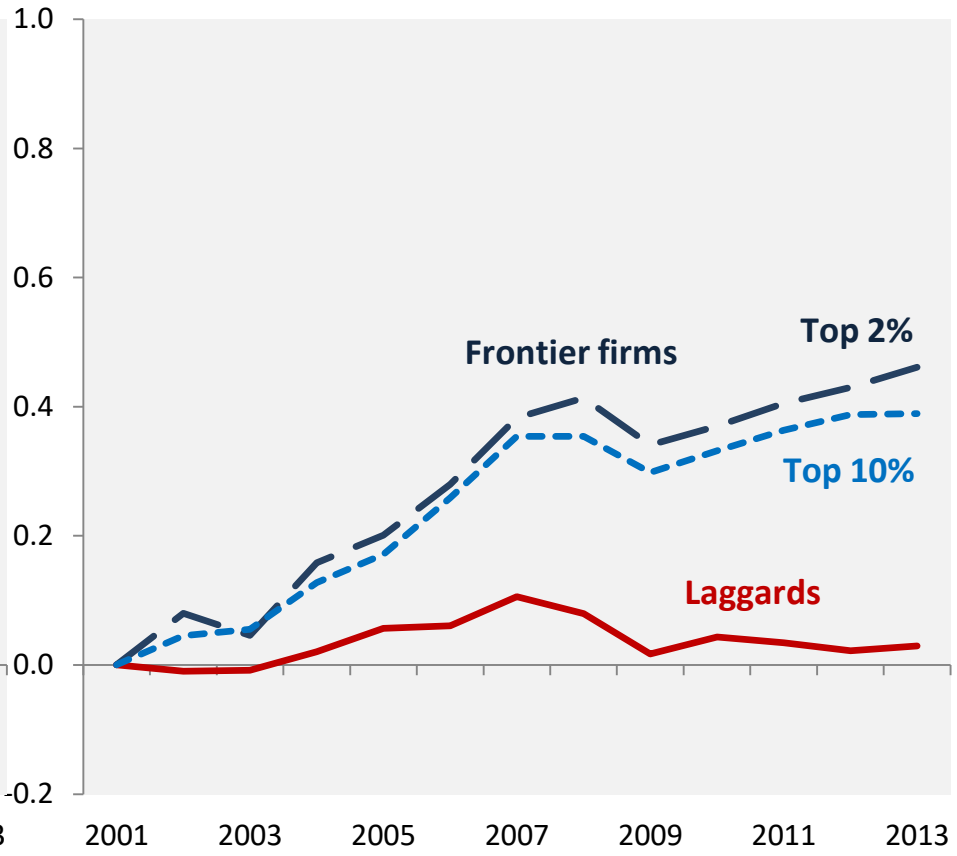
THE NATURE OF WORK IS CHANGING …

Share of non-routine employment and ICT task intensity, 2012 or 2015

Source: OECD Science, Technology and Industry Scoreboard 2017 , Statlink: http://dx.doi.org/10.1787/888933617586

… MULTI-FACTOR PRODUCTIVITY GROWTH IS DIVERGING…

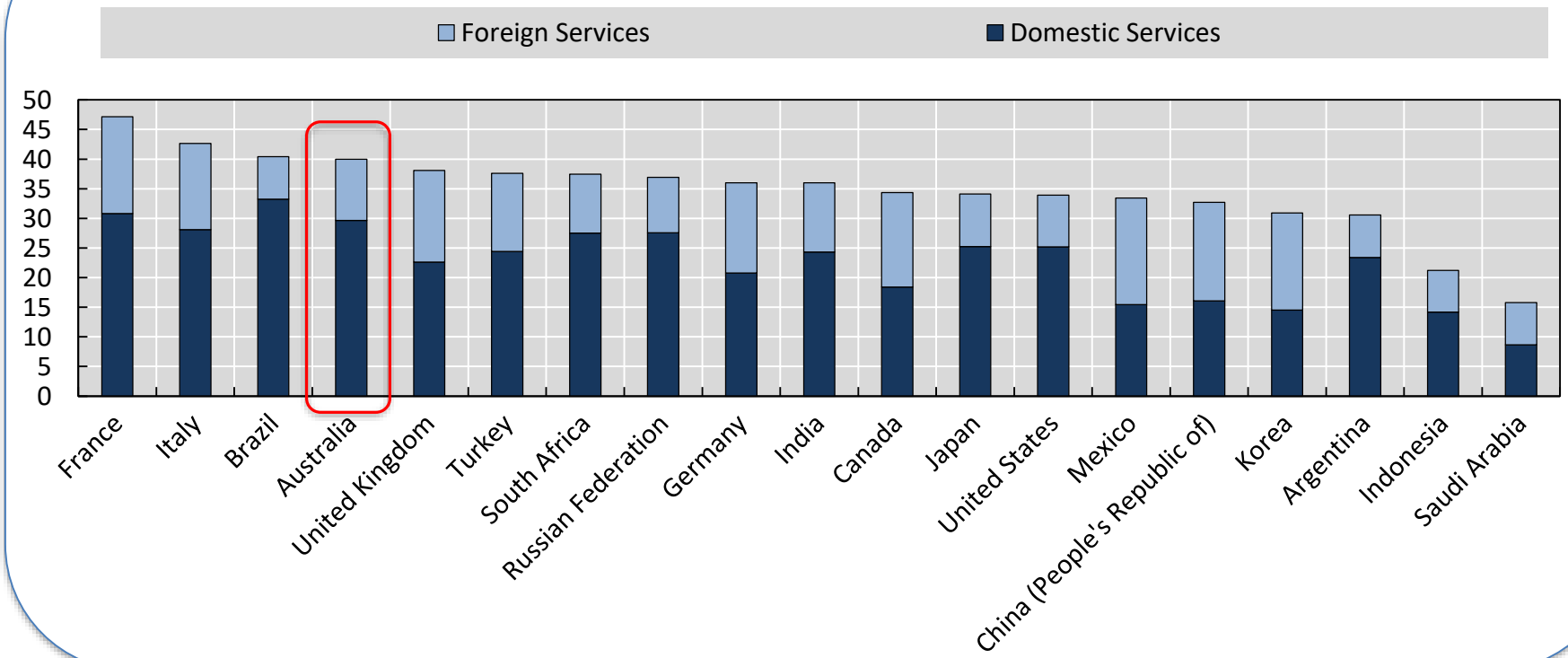




Source: Andrews, Criscuolo and Gal, 2016

...THE BOUNDARIES BETWEEN SECTORS ARE BLURRING

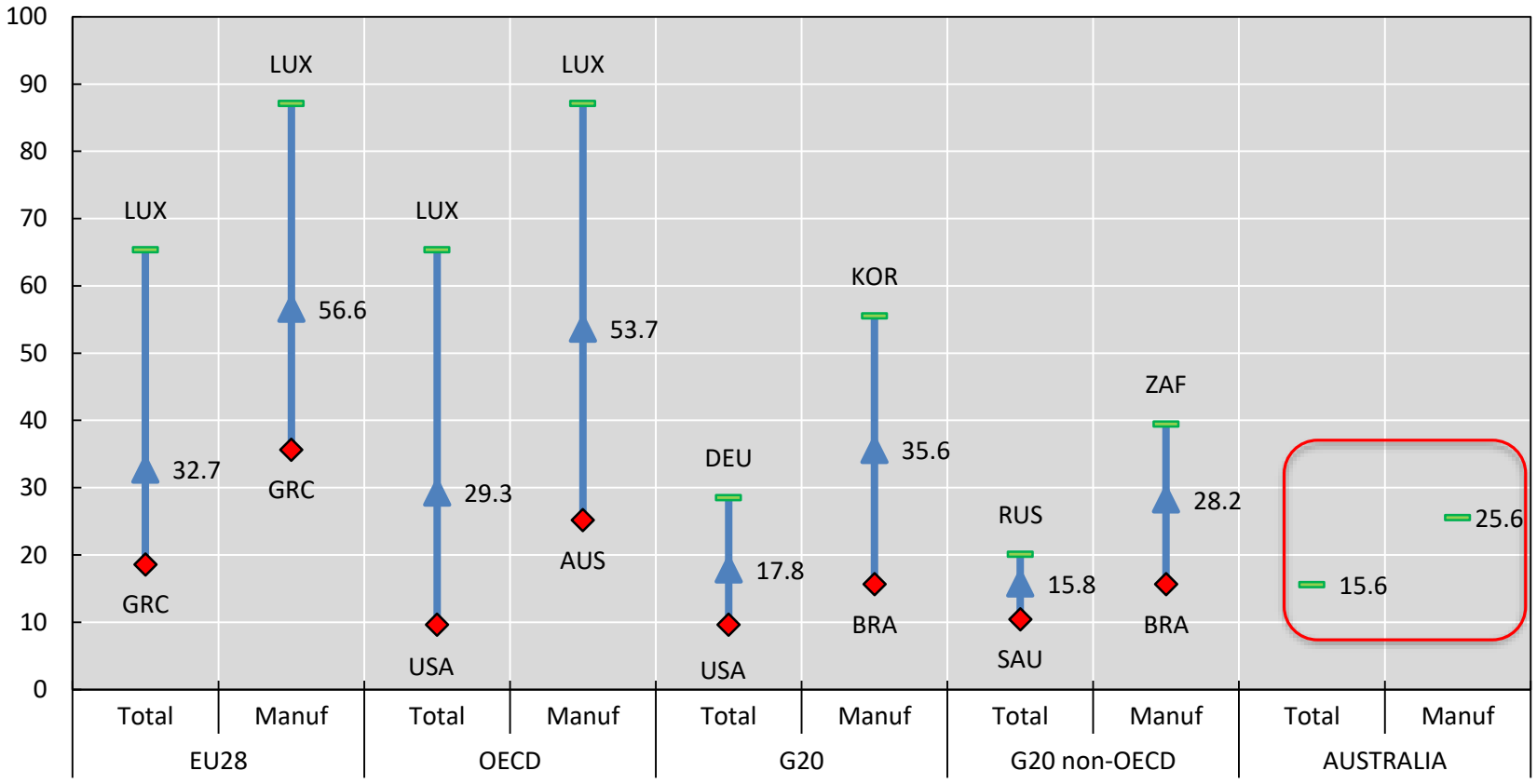
Total services value added share of gross Manufactures exports, 2014 (in %)



…AND MANY JOBS ARE SUSTAINED BY FOREIGN FINAL DEMAND

Jobs sustained by foreign final demand, as % of total employment in the industry or economy

Average value of country-specific percentages, for all countries in the macro-area, 2011



NEW BUSINESS MODELS EXPLOIT INTANGIBLE CAPITAL AND CREATE VALUE BASED ON DATA...

WhatsApp

founded in 2009
1bn users, acquired for 19bn in 2014
some 60 employees

NETFLIX

founded in 1997
USD 12bn revenue in 2017
some 3500 employees

Dropbox

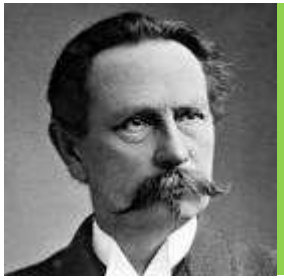
founded in 2008
500m users, 1.2bn files stored per day
some 1200 employees

Intangible capital

Servicification

WHAT FUTURE OCCUPATIONS? WE CANNOT KNOW PRECISELY….

After introduction of the PC in 1980s, more than 1,500 new job titles appeared in the US (Berger and Frey, 2014).

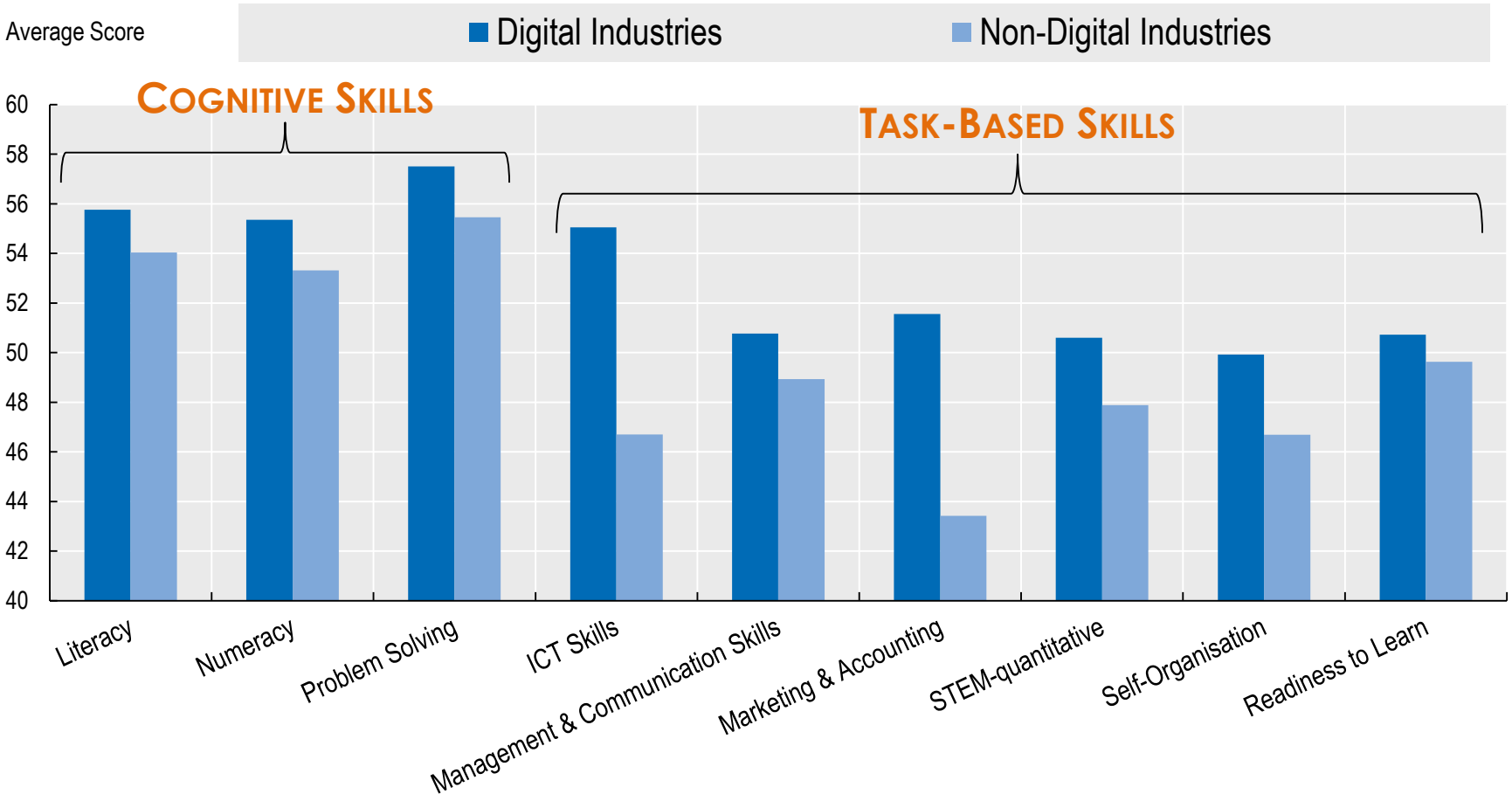


Karl Benz believed the market for automobiles would be limited by lack of drivers

Smartphones disrupt products from notebook computers to personal organisers, to niche industries making musical metronomes and hand-held magnifying glasses (now APPs).

BUT WE DO KNOW THAT **INDUSTRIES DIFFER IN** THEIR DIGITAL AND **SKILLS** CONTENT…

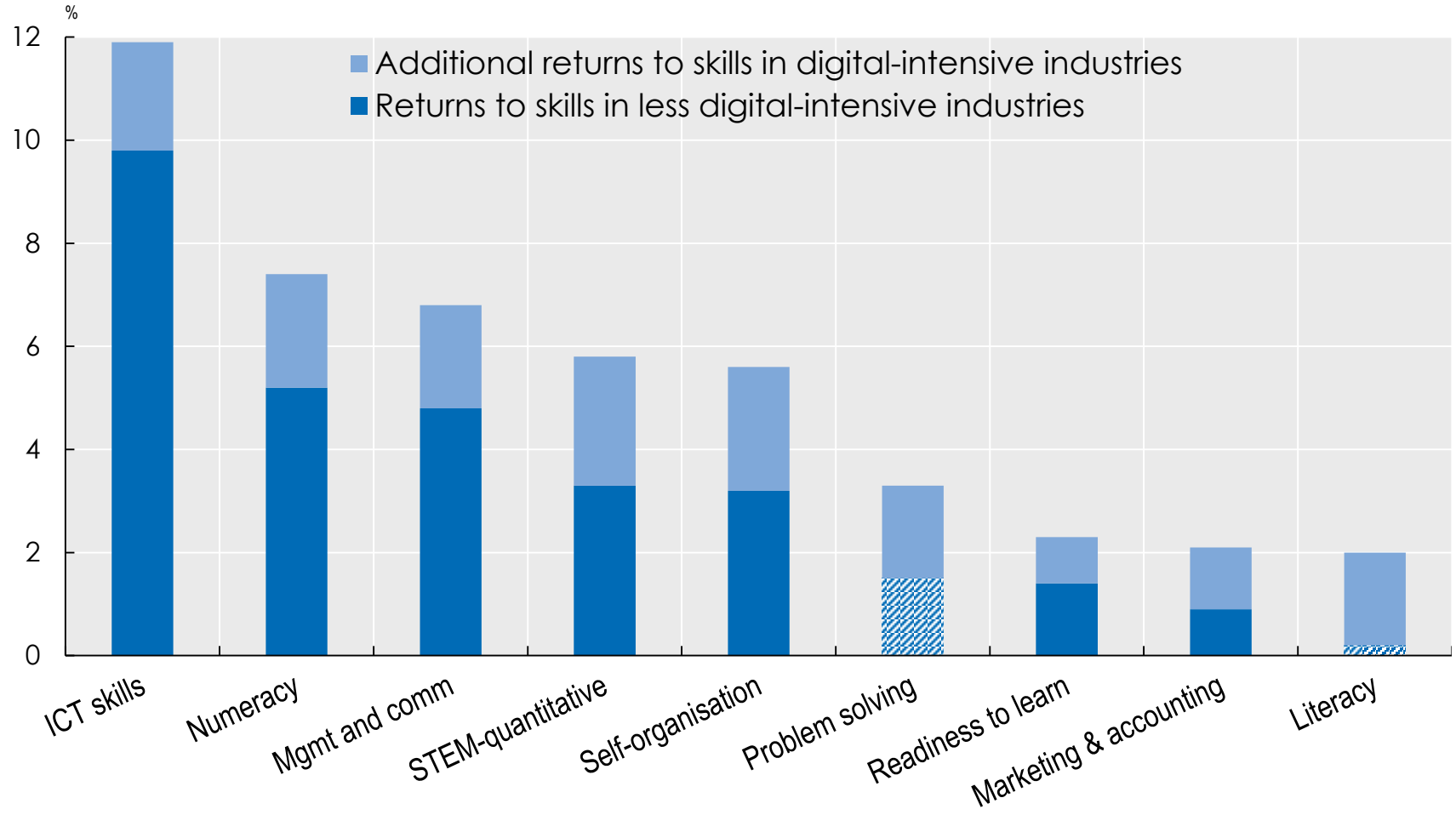
Average skill levels in digital and non-digital industries
Cross-country averages, 31 OECD and non-OECD countries, 2012 or 2015



Source: OECD Science, Technology and Industry Scoreboard 2017 , Statlink: http://dx.doi.org/10.1787/888933617453
Based on: Grundke, Marcolin, Nguyen and Squicciarini (2018), http://dx.doi.org/10.1787/9a9479b5-en

RETURNS TO SKILLS ARE HIGHER IN DIGITAL INDUSTRIES

Additional labour market returns to skills in digital-intensive industries, 2012 or 2015



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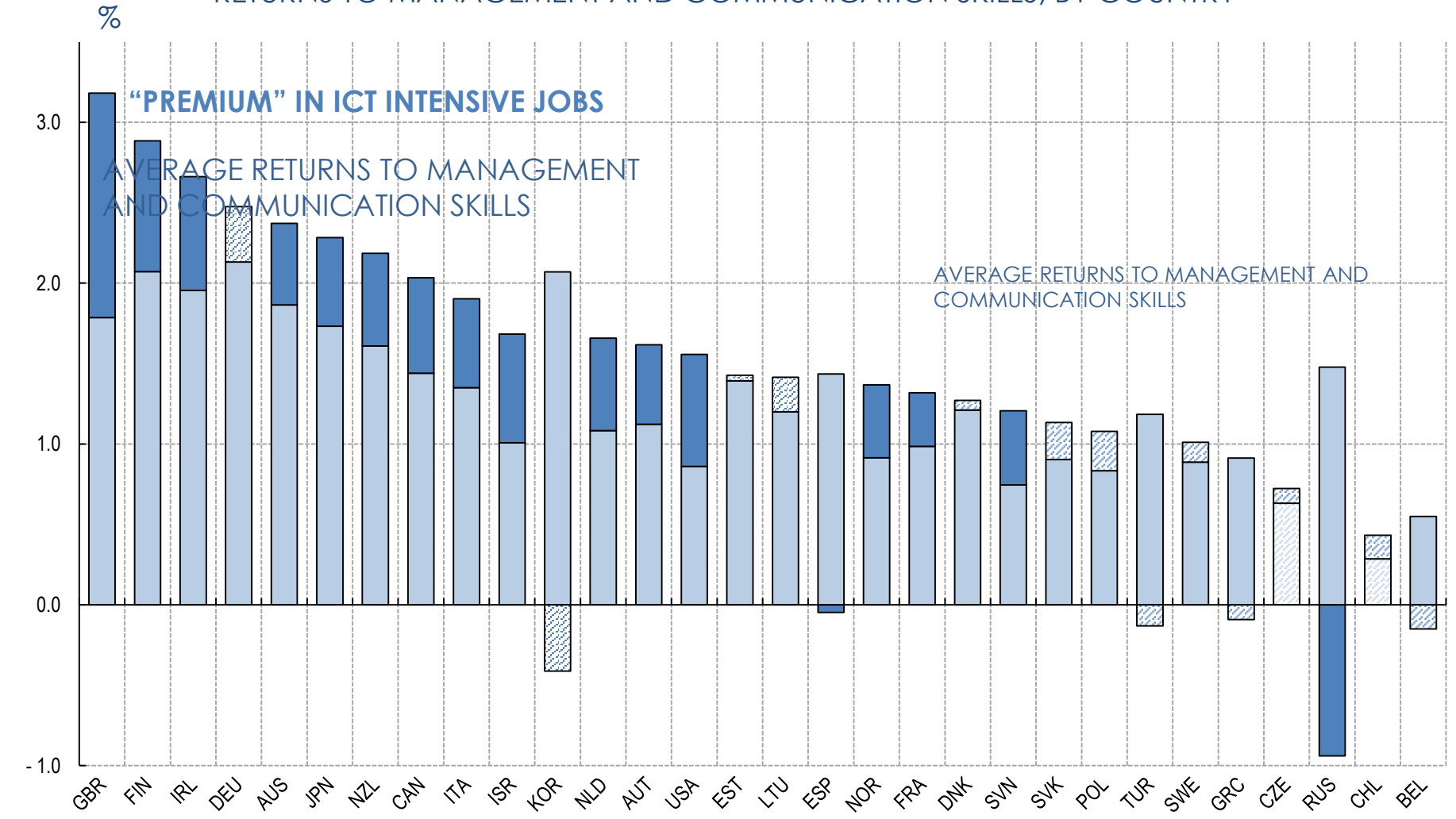
Source: OECD Science, Technology and Industry Scoreboard 2017 , Statlink: http://dx.doi.org/10.1787/888933617472

Based on: Grundke, Marcolin, Nguyen and Squicciarini (2018), http://dx.doi.org/10.1787/9a9479b5-en

SKILLS BUNDLES ARE HIGHLY REWARDED



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Based on: Grundke, Marcolin, Nguyen and Squicciarini (2018), http://dx.doi.org/10.1787/9a9479b5-en

IBSA Manufacturing "**Digital Skills Cross Sector Project - Case for Change**"(November 2017)

"…it was unanimously agreed that there were broader digital changes occurring in the workplace (and associated changes to workers' skills) that went beyond coding skills."
…"A broader scope for the project was agreed"

What kinds of challenges is technology bringing to your sector/business?

- Design/Manufacturing/Production Skills Innovation
- Adaptability and transformation skills
- Access to appropriate skills and ability of the training sector to maintain pace of change
- Interaction between technical and soft skills
- Training, reduction of staff numbers, re-deployment, spend justification

EVALUATING **DISTANCES IN TERMS OF SKILLS BETWEEN OCCUPATIONS** TO BETTER DESIGN/TARGET **TRAINING POLICIES**

Digitalisation requires **workers** to be **more mobile**

Affected workers need to **adapt to changing jobs** and/or **find new jobs**.

Policy will need to support them (e.g. matching, re-training).

(Public) resources can be **more efficiently used** if workers can more easily adapt to new jobs or **switch to occupations that are "close"** to their previous ones.

Evaluate the **distances between occupations in terms of multidimensional skill requirements** (cognitive and task-based skills) using PIAAC data for 31 OECD and Non-OECD countries.

WHAT **SKILLS** ARE **NEEDED** TO MOVE TO A **NEW OCCUPATION**?

SHEDDING LIGHT ON THE BALANCE BETWEEN **INITIAL EDUCATION** AND **ADULT LEARNING ON THE JOB**

QUANTIFYING SKILL DISTANCES BETWEEN OCCUPATIONS

COGNITIVE SKILLS ARE DEVELOPED THROUGH **INITIAL EDUCATION**

- Literacy
- Numeracy

TASK-BASED SKILLS ARE DEVELOPED THROUGH **ADULT LEARNING AND LEARNING ON THE JOB**

- ICT
- Managing/Communicating
- Accountancy/Selling
- Advanced Numeracy
- Self-organisation

SHEDDING LIGHT ON THE BALANCE BETWEEN **INITIAL EDUCATION** AND **ADULT LEARNING**

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- Advanced numeracy
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MEASURE THE DISTANCES IN TERMS OF **TASK-BASED SKILLS** AND ANALYSE **WHICH TYPE OF TASKS** DRIVE THE DIFFERENCE

A **MEASURE** OF OCCUPATION DISTANCES

- **A new measure** for skill distances between occupations considering **the direction** of the distance (Nedelkoska et al., 2015, mimeo)

- For a switch from o … ance measure includes **2 numbers**

  Skill shortage **-** We… …ces for all skills of the skill portfolio that show higher levels in occupation B (compared to …

  Skill excess **-** Weig… …s for all skills of the skill portfoli… …upation B (compared to …

  Important to minimise the cost of training (both monetary and psychological)

  Important to minimise human capital loss and to maximise wellbeing

- A switch can require higher levels in some skills (shortage) and lower levels in other skills (excess).

SPECIFIC SKILLS AND GENERAL COGNITIVE SKILLS: HOW FAR ARE OCCUPATIONS?

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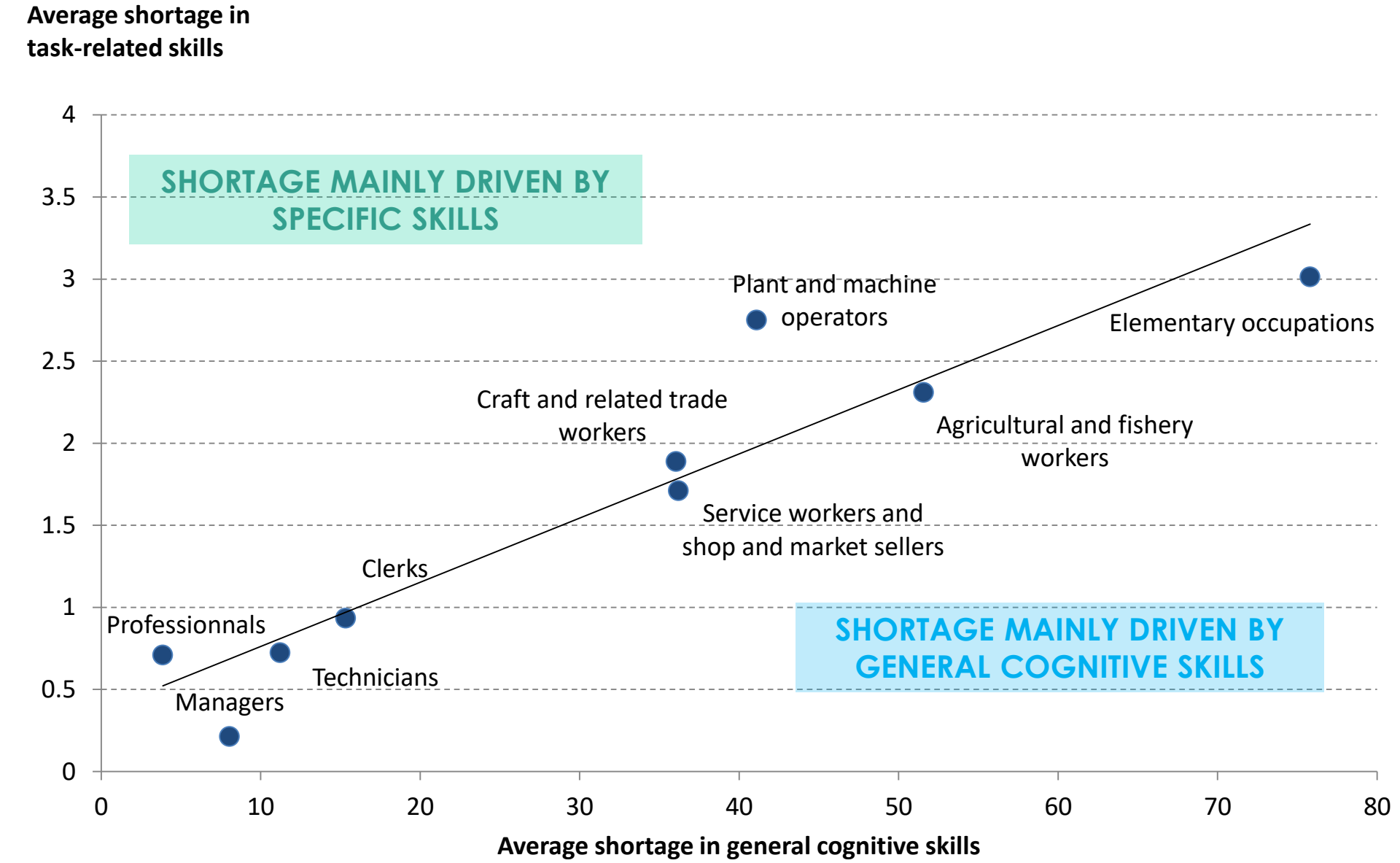
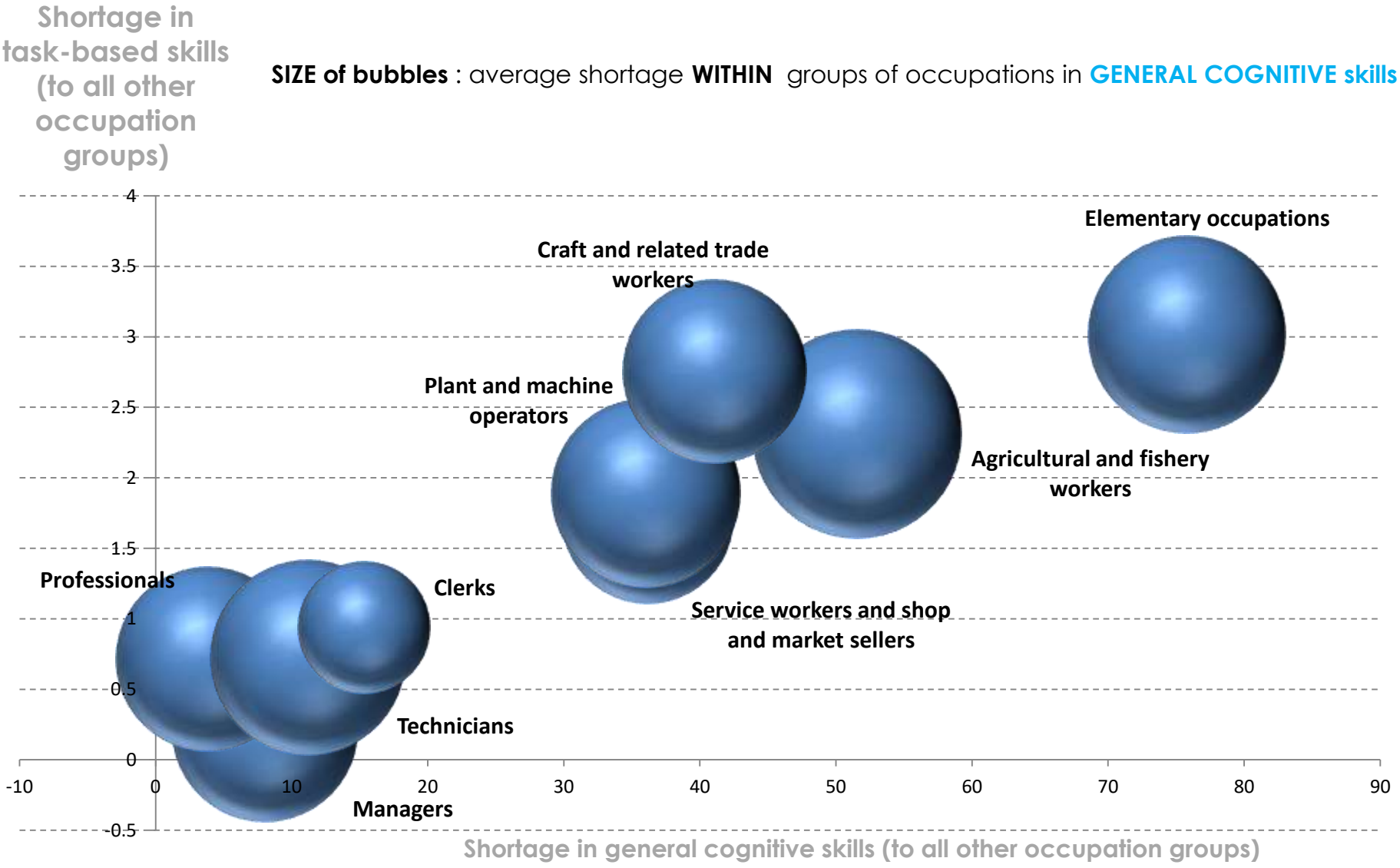
MEASURING **THE DISTANCE** BETWEEN OCCUPATIONS, ON AVERAGE TO ALL OTHER OCCUPATIONS



Source: Survey of Adult Skills (2012, 2015)

MEASURING **THE DISTANCE** BETWEEN OCCUPATIONS, WITHIN GROUPS OF OCCUPATIONS

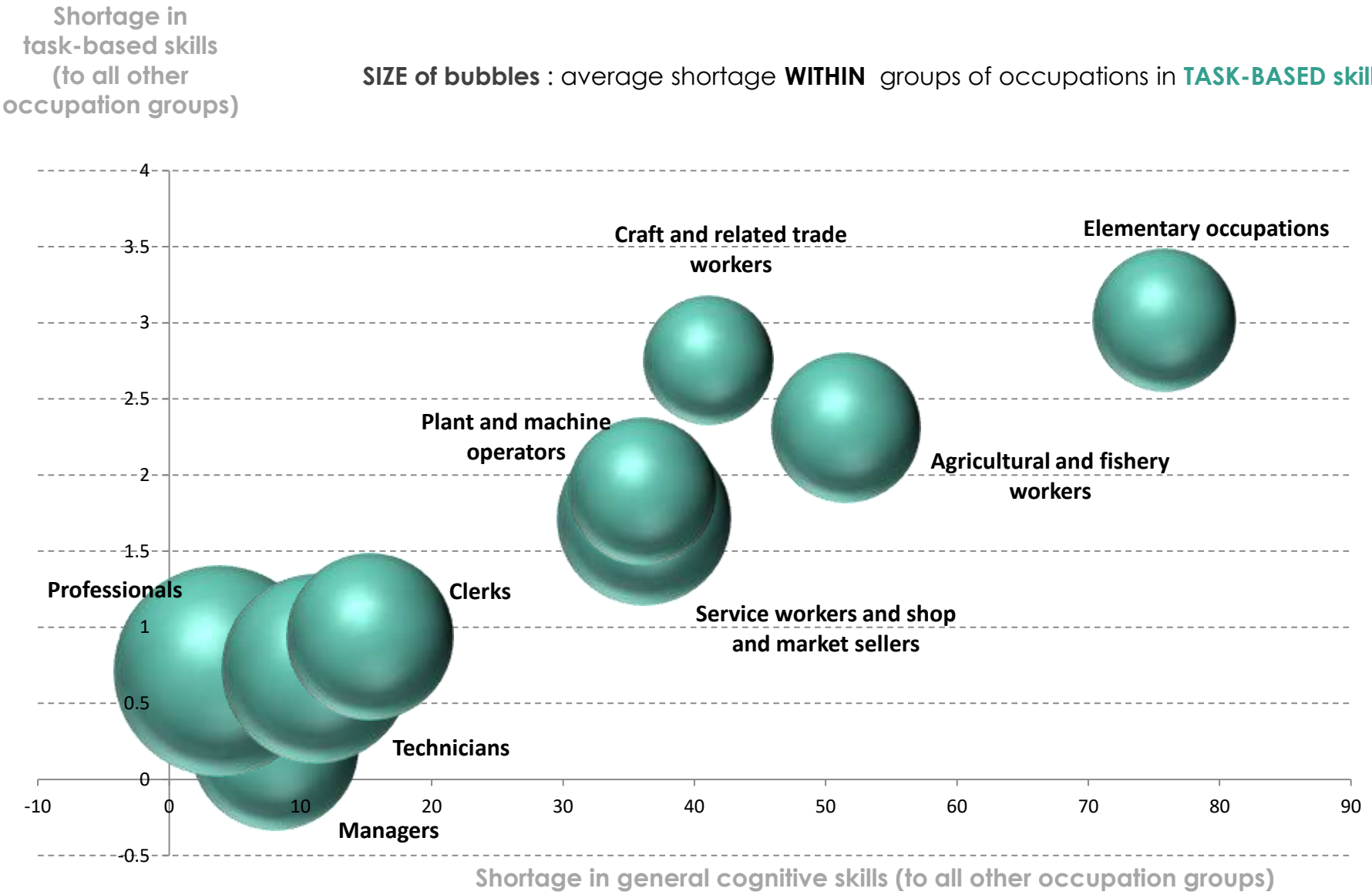
SIZE of bubbles : average shortage **WITHIN** groups of occupations in **GENERAL COGNITIVE skills**



Source: Survey of Adult Skills (2012, 2015)

MEASURING **THE DISTANCE** BETWEEN OCCUPATIONS, WITHIN GROUPS OF OCCUPATIONS

SIZE of bubbles : average shortage **WITHIN** groups of occupations in **TASK-BASED skills**

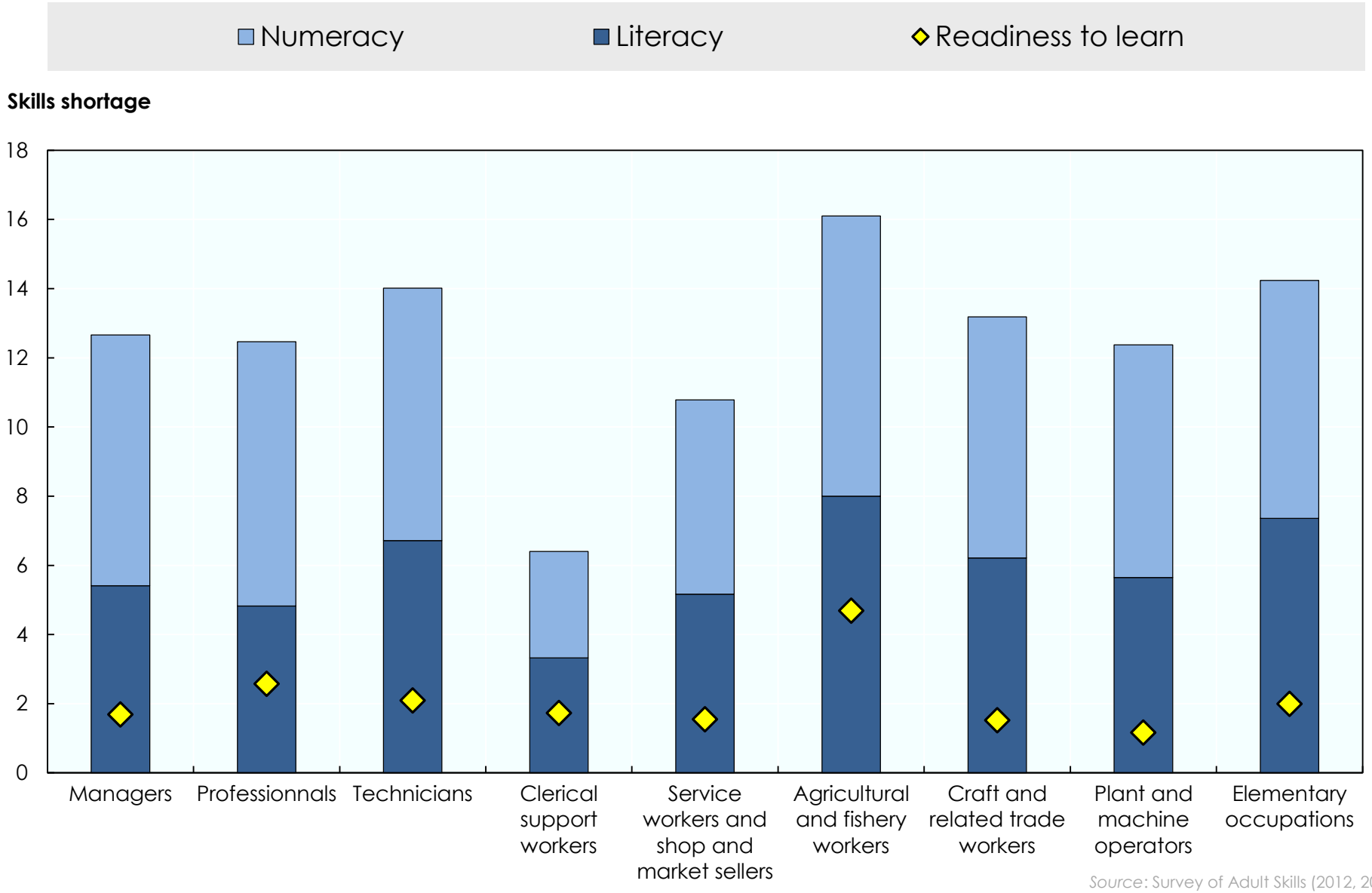


Source: Survey of Adult Skills (2012, 2015)

DECOMPOSING THE DISTANCE:

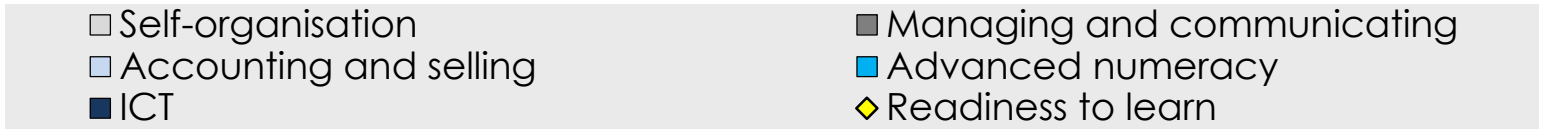
WHAT SKILLS ARE NEEDED THE MOST?

Moving within the same group of occupations - Cognitive skills

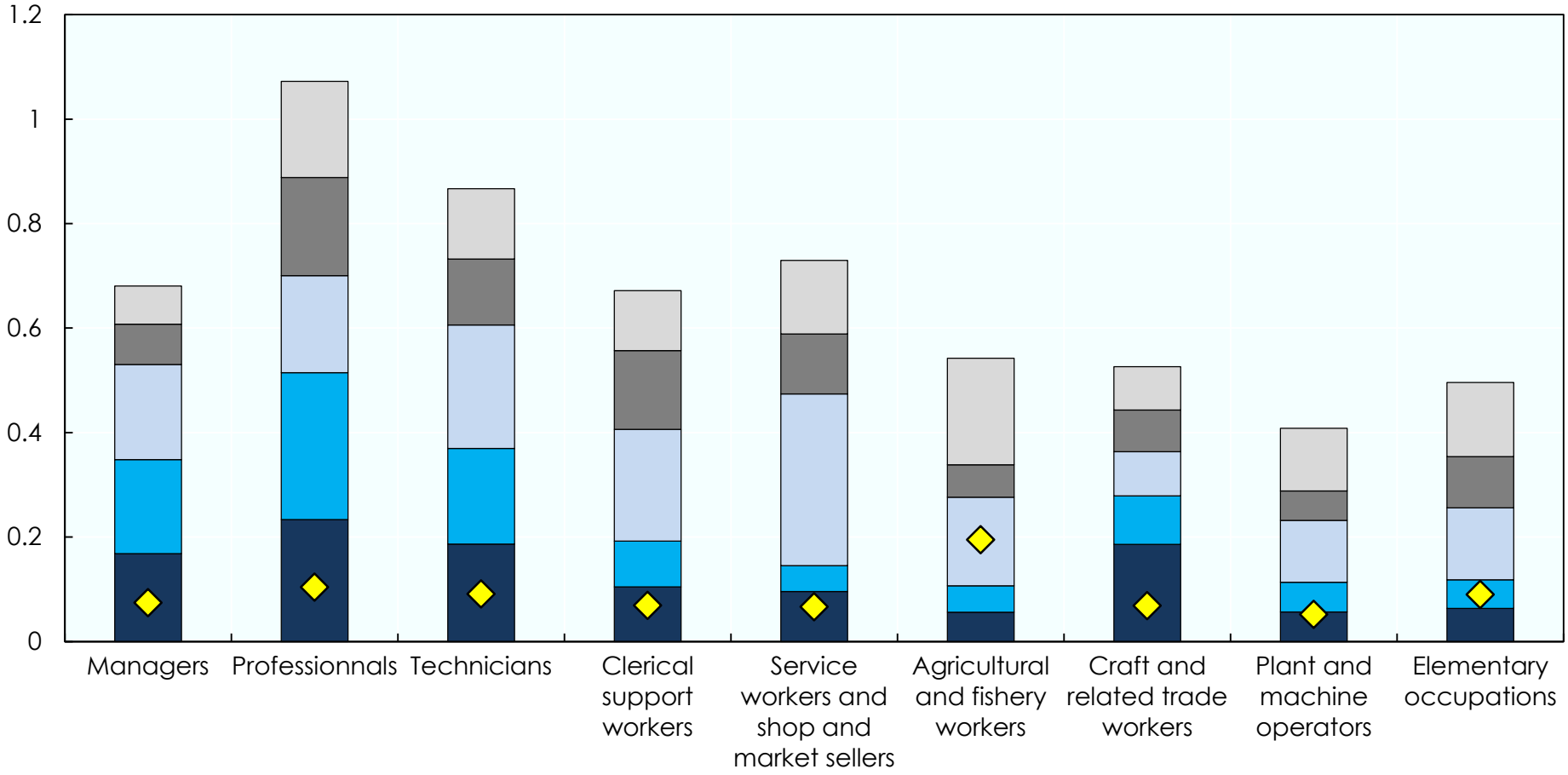


Source: Survey of Adult Skills (2012, 2015)

Moving within the same group of occupations -
Task-based skills



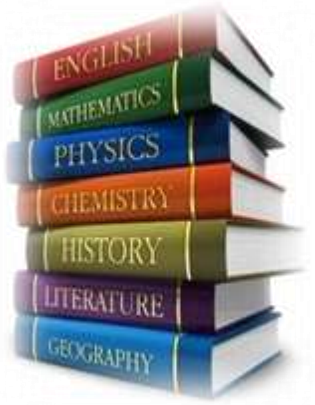
Skills shortage



Source: Survey of Adult Skills (2012, 2015)

ONGOING WORK

- ✓ Account for **differences in knowledge areas** and **differences in average wages** between occupations in the distance analysis;

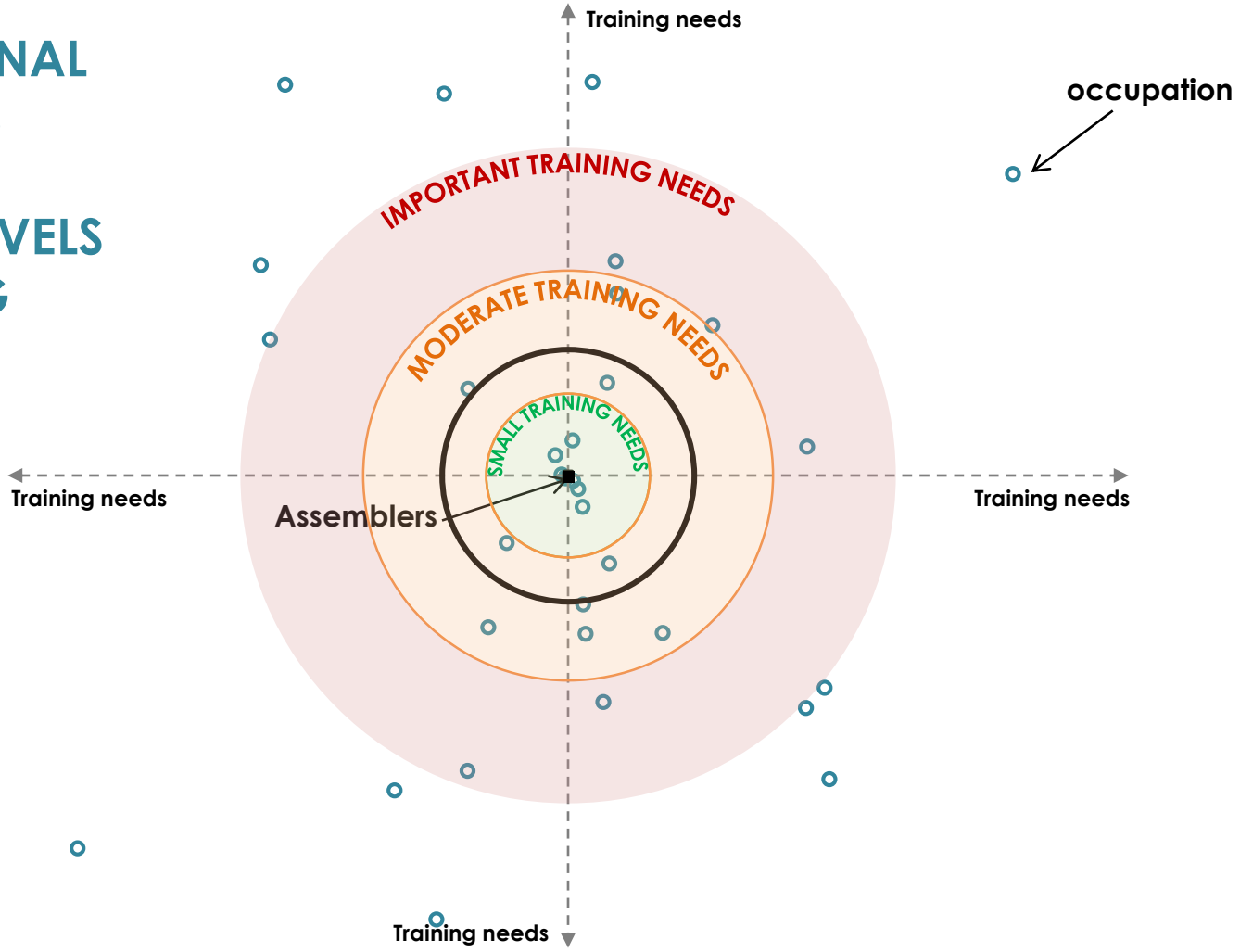


- ✓ Linking information on **distances** with estimates of the **risk of automation** to identify transitions away from high-risk occupations involving minimum skills **shortages** and **excesses**;

- ✓ Estimating the **costs of upskilling and retraining** needs for occupational switches.

In the digital era workers may need to adapt and move to different/new occupations….

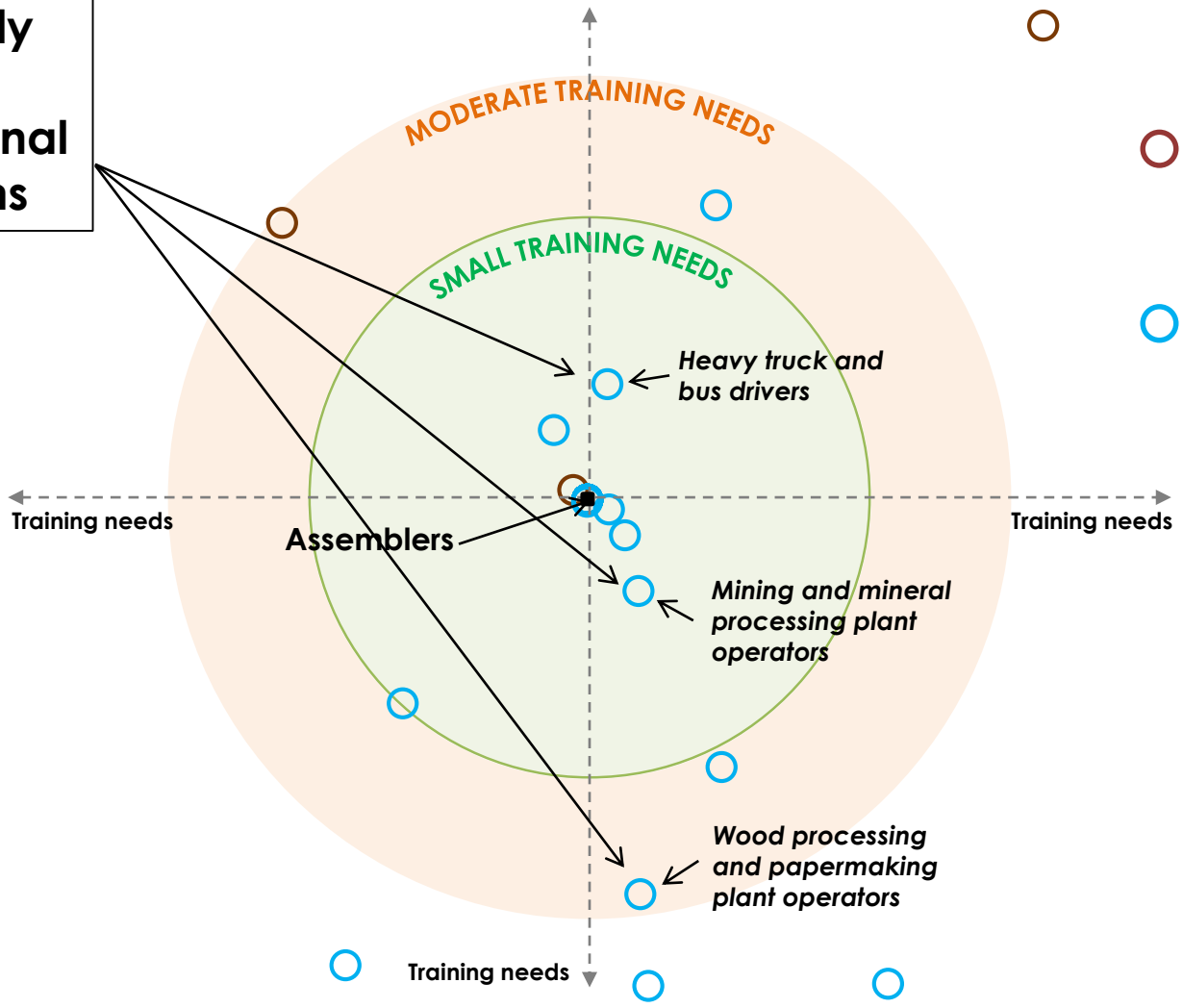
OCCUPATIONAL TRANSITIONS INVOLVE DIFFERENT LEVELS OF TRAINING NEEDS



Source: Survey of Adult Skills (2012, 2015)

… and policies need to help workers move to occupations with LOW-automation probability and SIMILAR skills requirements

Potentially viable occupational transitions



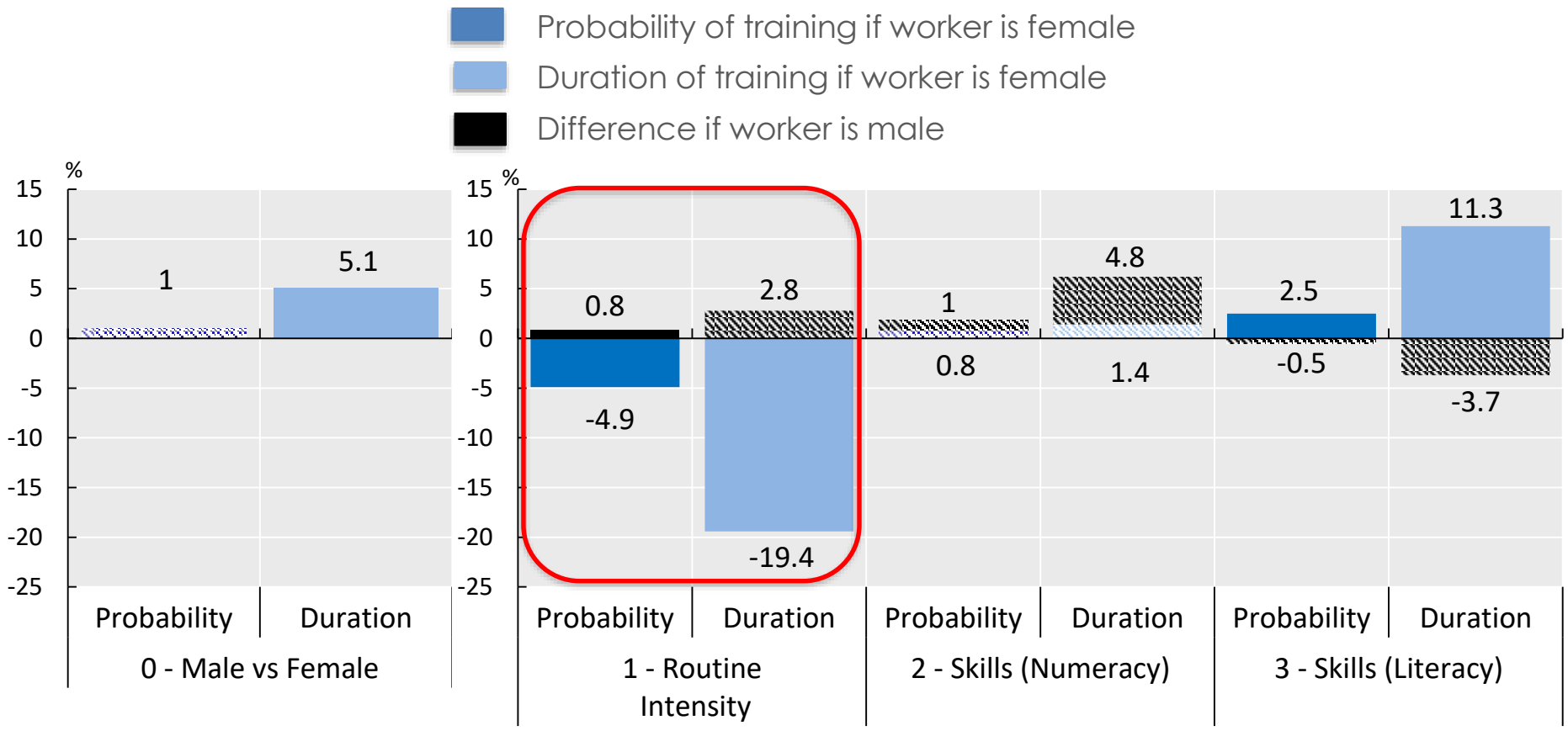
Higher automation probability

Lower automation probability

Source: Automation probabilities based on Frey and Osborne (2013)

TRAINING: HELPING WORKERS TO COPE WITH CHANGE

How is training associated with skills, gender and routine task intensity?



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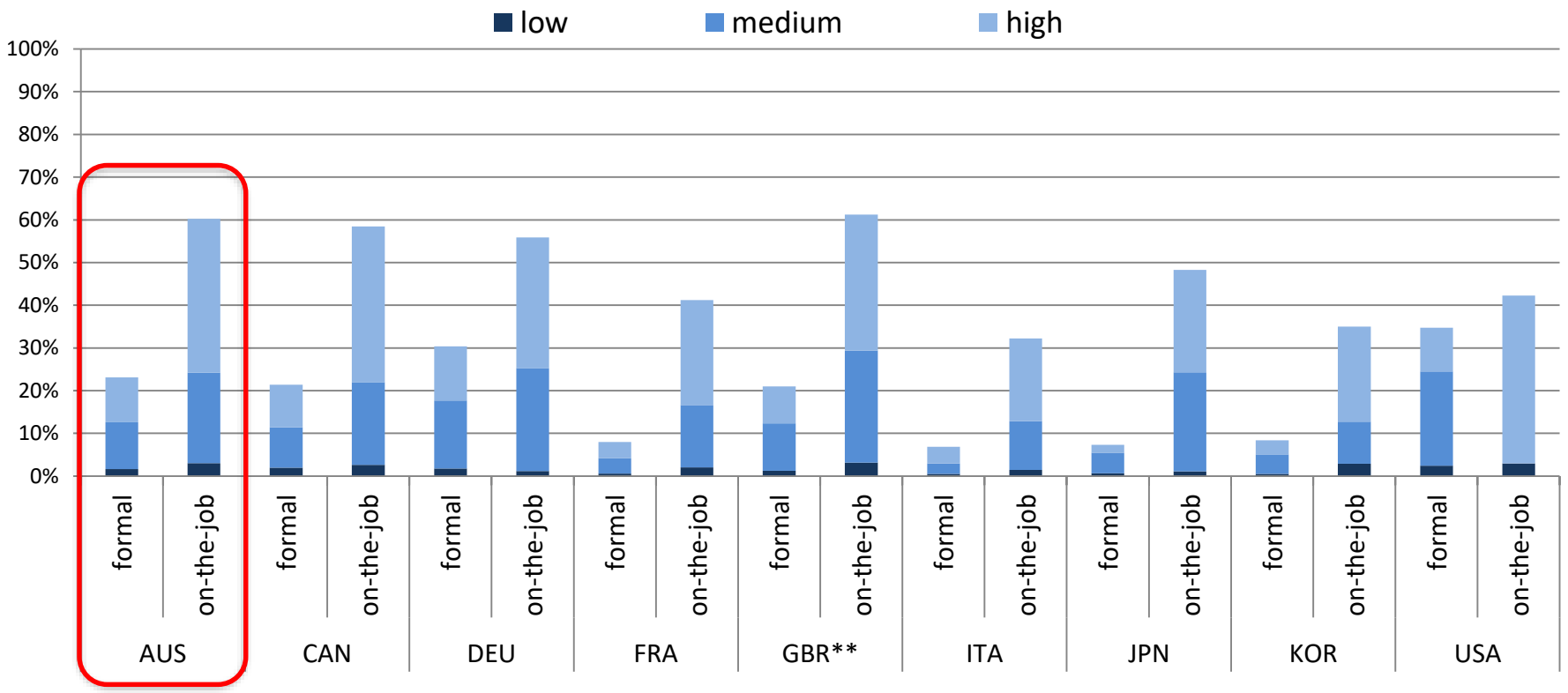
Source: OECD (2017), Key Issues for the Digital Transformation in the G20

SEIZING OPPORTUNITIES REQUIRES SKILLS, BUT THOSE MORE IN NEED OF TRAINING GET LESS

Trained individuals by type of training and skill level (2012 or 2015), as % of total employment, by country



Source: OECD calculations based on Squicciarini et al. (2015)

THE IMPLICATIONS FOR **POLICY**

- The importance of lifelong learning: mobility to more skilled occupations involves shortages in BOTH **general cognitive skills** and **task-based skills**

- Skill distances among low skilled occupations or from mid-skilled to high-skilled occupations are higher in terms of cognitive skills than in terms of task-based skills

  ➡ Training policies for low skill occupations require complementing job-specific training with programmes aimed to develop general cognitive skills (through formal education programmes for adults)

  ➡ This further calls for the need to limit the share of young people leaving education with low basic skills (e.g. vocational education need to include a strong component on cognitive skills).

THE IMPLICATIONS FOR **POLICY**

- Low-skilled occupations are far from other occupations but switches WITHIN these groups may involve relatively small reskilling needs

  → Cost-effective (re)training policies might focus on retraining workers to other low-skilled occupations (e.g. to others that show a lower risk of being automated)

- Occupational moves within the higher skilled occupations conversely show that skill distances are larger for task-based skills than for cognitive skills

  → Mobility WITHIN high-skilled occupations may involve relatively big job-specific reskilling needs

  → However, as workers in these occupation groups are more likely to learn on the job (due to their generally higher cognitive skills), they are likely to face lower difficulties in managing these transitions

QUESTIONS THAT **POLICY IS DISCUSSING**

- What policies is your government implementing to strike the right balance between formal and "front-loaded" education and training systems and "lifelong" and "life-wide" learning systems, where people can learn at all ages and in different contexts?
- What policies can help to equip people with "21st century" skills, including digital skills?
- What are the key obstacles to implementing lifelong, life-wide, flexible learning for all, and what solutions has your government developed to address them?
- How does governments promote the use of digital technologies to make learning more flexible and relevant to new needs?

https://skillssummit2018.gov.pt/

QUESTIONS THAT **POLICY IS DISCUSSING**

- Should lifelong and life-wide learning require a new approach to financing education and skills, including re-thinking how much should be invested at each stage, which trade-offs exist and who should invest?
- What are governments and social partners doing to strengthen lifelong learning and to remove obstacles to further learning, especially to promote universal access to basic skills for disadvantaged populations and minority groups?
- How can governments develop a policy package including skills development, lifelong learning, support for worker deployment and improved social protection?
- What governance systems could better involve all key actors, inside and outside government, to tackle sticky skills issues, such as improving the recognition of skills developed informally over the life cycle?

SKILLS SUMMIT'18 PORTO

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THANK YOU

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