OECD Going Digital Summit - Issues Note

Session 6A: Fostering Science and Innovation in the Digital Age

Digitalisation is bringing change to all stages of the scientific process, from agenda setting, to experimentation, knowledge sharing and public engagement. Digital technology is facilitating the transition towards a new paradigm of Open Science. Open Science has three main pillars: open access to scientific publications and information; enhanced access to research data; and, broader engagement with stakeholders. Strengthening these pillars of Open Science could make science more efficient and effective and speed the translation of research findings into innovation and socio-economic benefits.

Digital technology is also changing how science is performed. For instance, artificial intelligence (AI) is enabling novel forms of discovery and greater research reproducibility.

Four trends are also evident regarding innovation and digitalisation in firms, namely:

- Data is a key input for innovation. Data is helping firms explore new areas of product and service development, gain insights on market trends, optimize production and distribution, and adjust products and services to market demand.
- Digitalisation enables services innovation. For example, predictive maintenance services are made possible by the Internet of Things.
- Digital innovations (such as 3D printing) speed innovation cycles. For instance, these innovations can accelerate product design, prototyping and testing, and enable the market launch of product beta versions that rapidly incorporate consumer feedback.
- Innovation is becoming more collaborative. Collaboration helps share the costs and reduce the risks of digital innovation, and is itself made easier by lowered costs of communication.

All of the above developments have created new emphases for policy.

Data access

The OECD first advocated for greater access to data from publically funded research in 2006. Since then, the tools supporting greater access have improved, while guidelines and principles have been widely adopted. Nevertheless, obstacles still inhibit access to scientific data. For example, the costs of data management are increasing, straining research budgets. A lack of policy coherence and trust between communities hinders data sharing across borders. In addition, new or strengthened governance mechanisms are needed to address new privacy and ethical concerns created by digital technology.

Support and incentives for digital innovation

Among other measures, innovation support policies that *de facto* exclude services innovation from the targeted activities should be revisited. Initiatives supporting digital innovation in services can be included in the policy offering. In a context of rapid change,

application procedures for innovation support instruments might be streamlined, and small-scale policy experiments deployed, and scaled up or down as evidence suggests.

Digital skills

Digital technologies are generating new demands for skills. For instance, a general skill shortage exists in AI. Strong foundational skills are needed throughout the population, such that citizens can more readily acquire specific and fast-changing digital skills throughout life. Another issue is that in many countries – in fields such as AI - male students outnumber female students. And new career structures and professions – such as 'data stewards' – are needed for data management and analysis. Digital technology is also creating opportunities to develop skills in novel ways (such as open-source intelligent mathematics tutoring).

The availability of complementary infrastructures

Broadband networks - especially fibre-optic connectivity - are essential to Industry 4.0. Policy priorities include overhauling laws governing the speed and coverage of communication services. In addition, access to high-performance computing is increasingly important in science, and for firms in industries ranging from construction, to pharmaceuticals and aerospace.

Technology- and sector-specific capabilities in government

Opportunities exist to exploit the potential of digital technologies that are only likely to materialise if governments possess deep understanding of the technologies and the sectors that deploy them. Deep expertise will also help policy makers and institutions to avoid unrealistic expectations about important digital innovations, especially those that are newly emerging from science.

Public-private partnerships and technology development

The complexity of many emerging digitally driven technologies exceeds the research capacities of even the largest individual firms, necessitating a spectrum of public-private research partnerships. For example, sophisticated and expensive tools are required for research in materials science (which increasingly relies on computational modelling and enormous databases of material properties). It is almost impossible to gather an all-encompassing materials science R&D infrastructure in a single institute.

Q1: What are the key changes to science and innovation in your country resulting from digital transformation?

Q2: How should your policies adjust to these changes? What new policies and actions are emerging?

Q3: In addressing any of the current and emerging challenges described above, what examples of policy success can be highlighted and why?

Q4: How can the OECD help in addressing these challenges?