CYBERSECURITY COMPETENCE BUILDING TRENDS

Policy options from OECD countries

Executive summary

Research commissioned by the
Federal Department of Foreign Affairs of Switzerland

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DiploFoundation
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IMPRESSUM

Cybersecurity Competence Building Trends

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Executive summary

As cyberspace becomes an essential component of our society, cybersecurity has come to the forefront of the political agenda. A growing number of reported incidents demand governments to come up with a strategic response for countering cyber-threats, especially for protecting the critical infrastructure. Developing knowledgeable and competent labour for this fast-changing area is one of the main strategic challenges faced by many countries.

DiploFoundation report Cybersecurity Competence Building Trends presents key trends and policy options for building competences in cybersecurity as identified in ten OECD countries which enjoy advanced levels of cyber-maturity: Austria, Estonia, Finland, France, Germany, Israel, the Netherlands, the Republic of Korea, the United Kingdom, and the United States.

Drivers of change: risks and opportunities

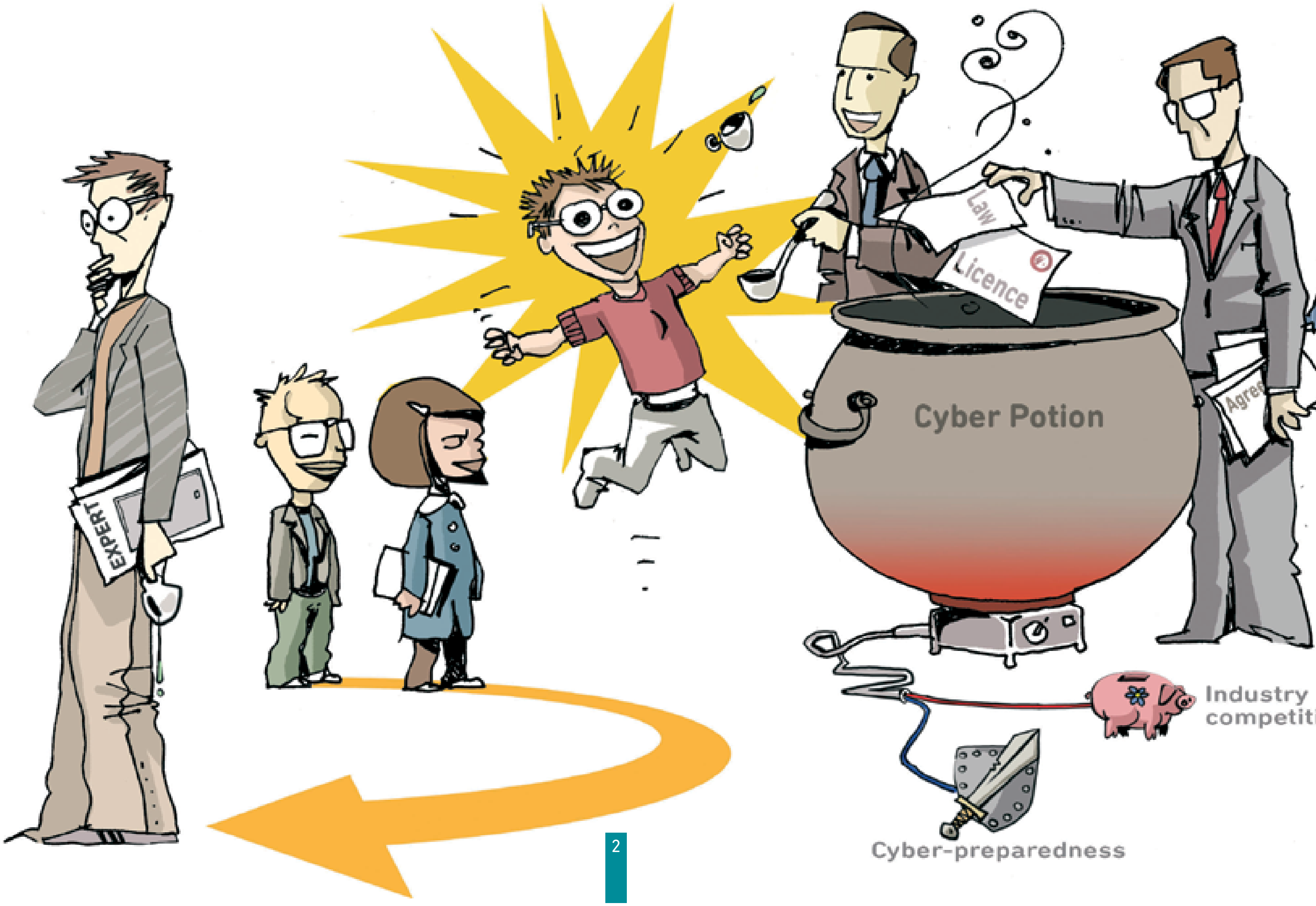
The main driver for cyber competence building in the studied states is the demand to respond to the growing number of cyber-threats experienced, especially in critical sectors. Achieving self-sustainability and (partial) autonomy in this response, while maintaining and developing international cooperation, is an incentive for states to develop national capacities rather than to outsource to foreign experts. Additionally, the increasing dependence of the corporate sector on the Internet has created a demand for qualified labour, which is being recognised by states as a possible driver for employment, economic growth, and global competitiveness. All the studied countries have recognised both sides of the cybersecurity coin, the risks and the opportunities, and are developing the means to transform the national labour market to meet the changing environment.

Cybersecurity Competence Building Trends research responds to an inquiry by the Federal Department of Foreign Affairs (FDFA) of Switzerland about collecting and analysing experiences from several member states of the Organisation for Economic Co-operation and Development (OECD) that have systematically advanced cyber competence building. Qualitative research was conducted from July to October 2015, based on reviews, analyses, and secondary analyses of publicly available sources.

This illustrated executive summary presents key identified trends.

For more information and specific examples on each trend, a reference to the chapter in the full report can be found next to this icon 📄.

The full report is available at: **www.diplomacy.edu/cybersecurity**


EXPERT
Law
Licence
Cyber Potion
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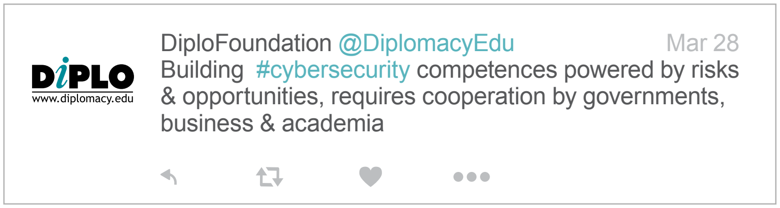
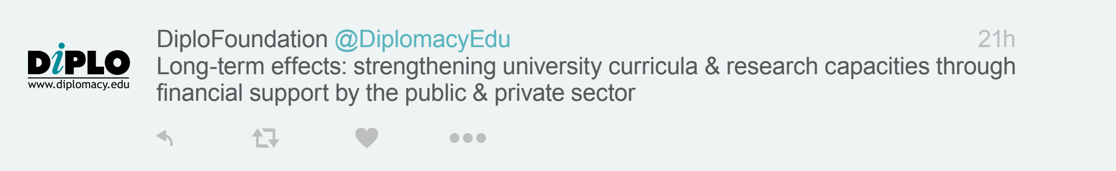
Industry
competiti
Cyber-preparedness

Comprehensive approach: public-private partnerships

The multidisciplinary nature of cyberspace, combined with the pace of technology development, demands a comprehensive approach to building competences that goes beyond traditional education and one-off training courses for institutions and companies. All the experiences from the studied countries are heavily based on public-private partnerships (PPP), whether for support of the development and certification of new university curricula and research capabilities – and the subsequent positioning of the emerging industry in cyber-advanced regions – or for outreach to and certification of professional training programmes for public institutions and the private sector.



DiploFoundation @DiplomacyEdu Mar 28
Building #cybersecurity competences powered by risks & opportunities, requires cooperation by governments, business & academia



DiploFoundation @DiplomacyEdu 21h

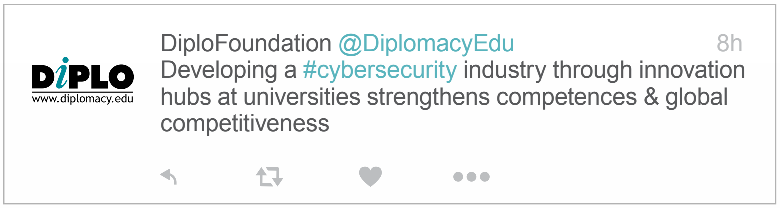
Long-term effects: strengthening university curricula & research capacities through financial support by the public & private sector

Key cybersecurity competence building trends

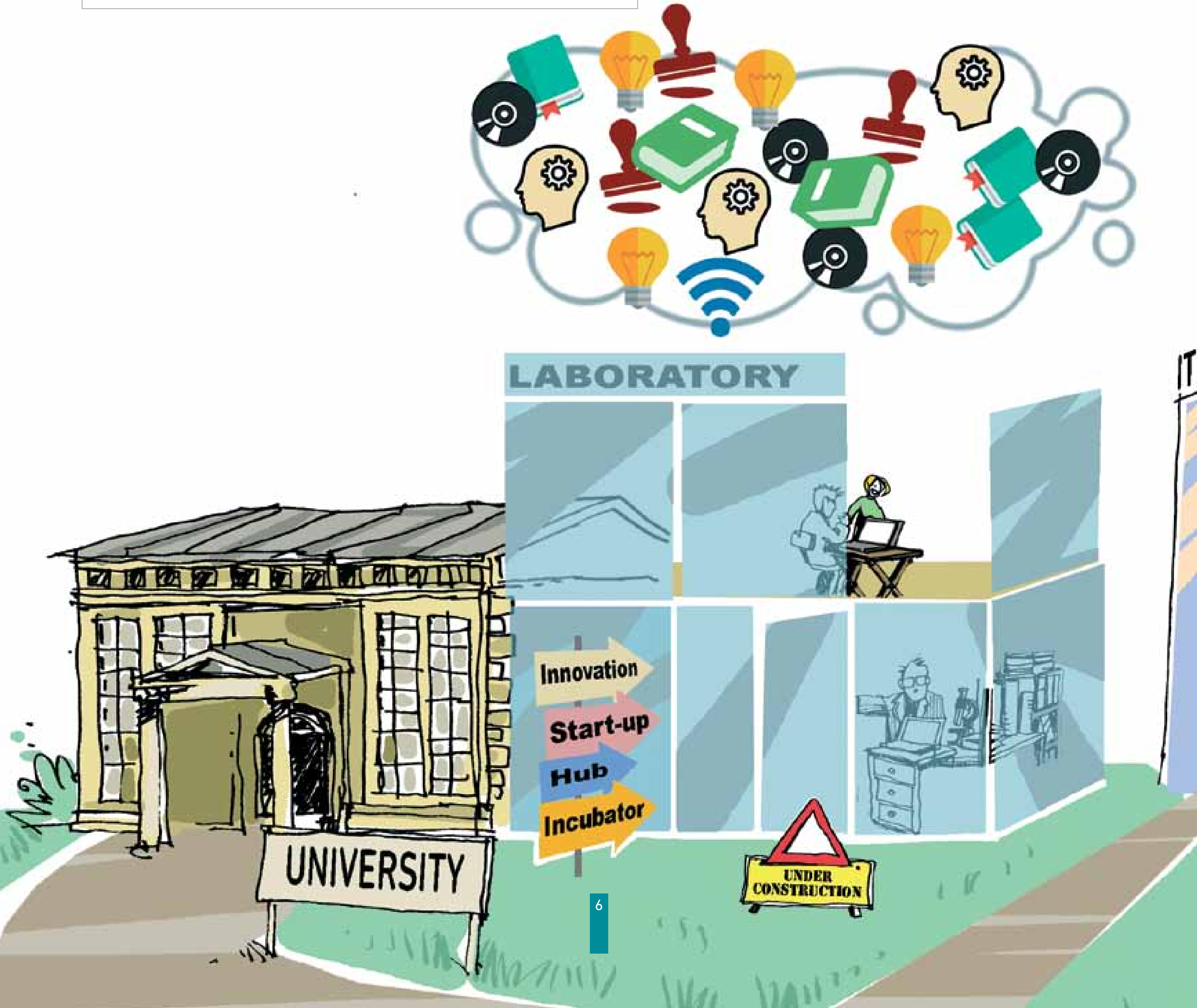
University programmes supported by the government

Strengthening academic programmes

All of the countries explored are actively supporting the development of university and research programmes. Depending on the country and its organisation, as well as its geopolitical situation, different ministries are participating in the financing of research and training centres. A substantial element of public-private partnerships is present; with support of the governments, many of the universities and their related research labs have developed cooperation with numerous private sector partners. [Report p.12]

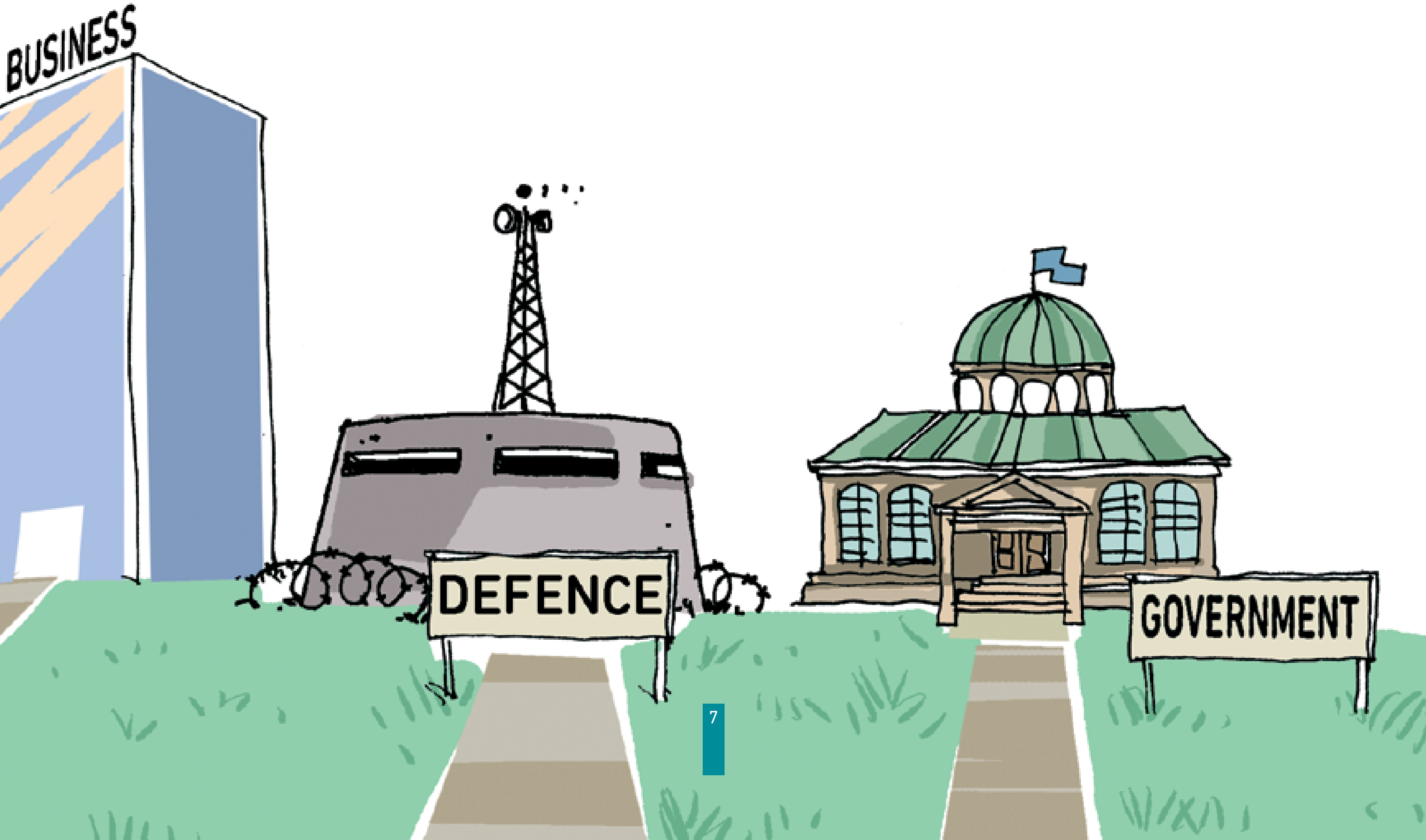


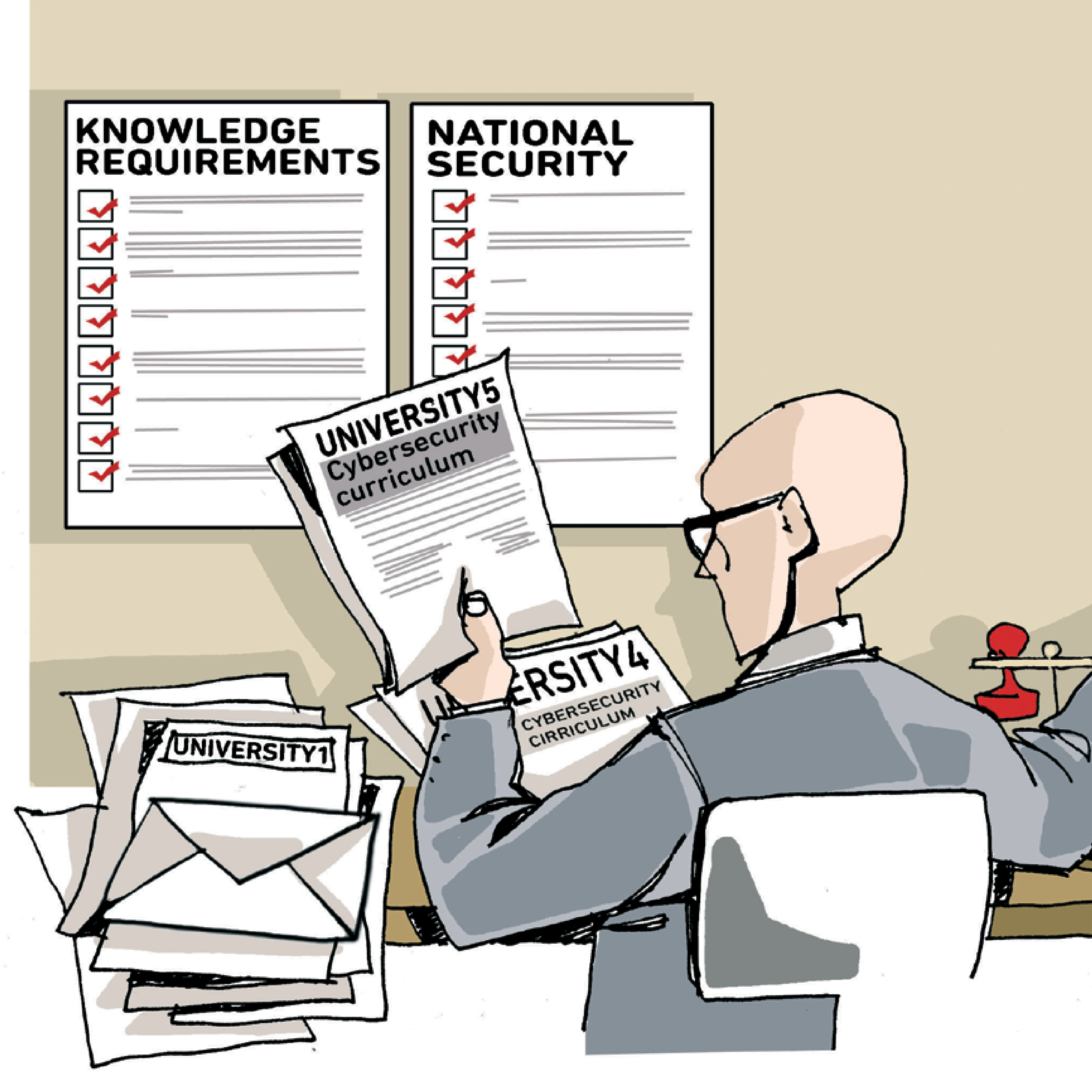
DiploFoundation @DiplomacyEdu 8h
Developing a #cybersecurity industry through innovation hubs at universities strengthens competences & global competitiveness

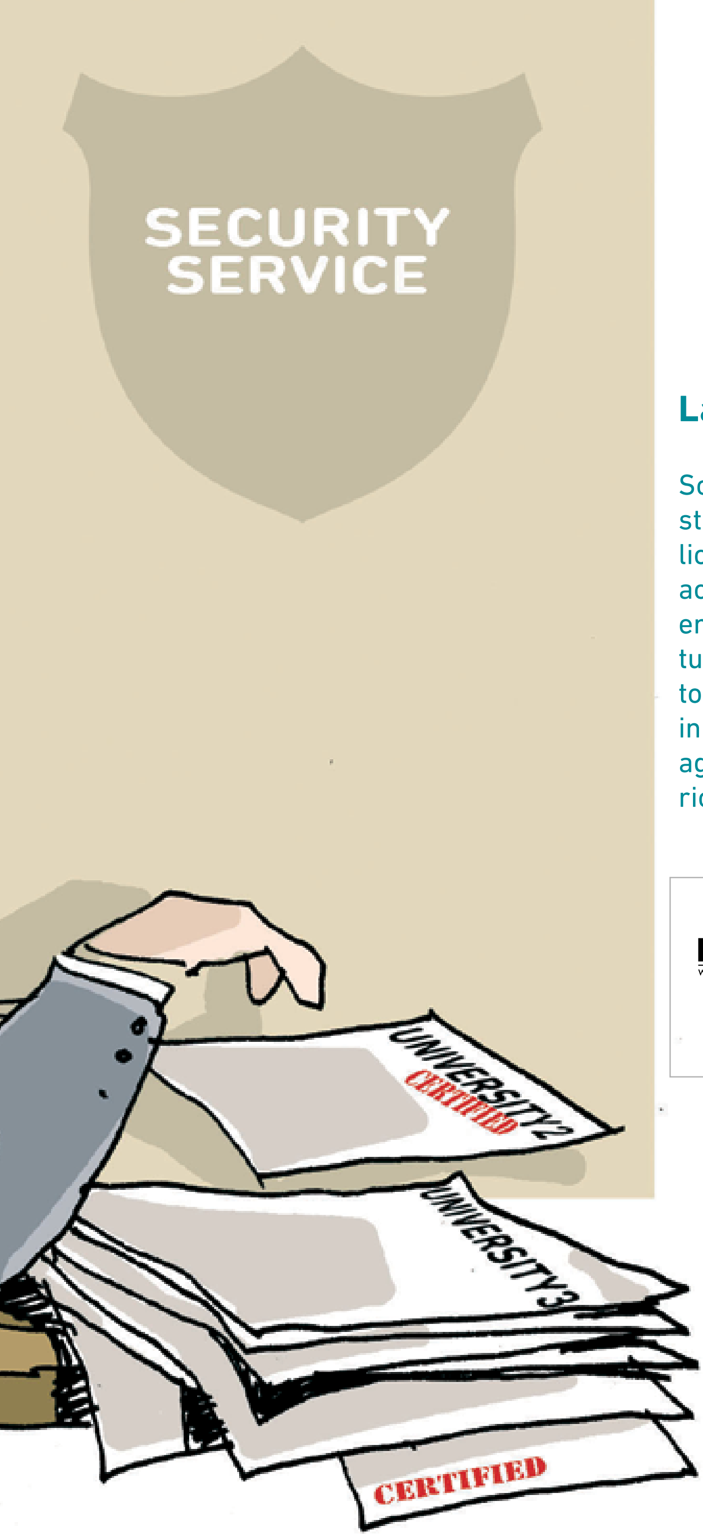


Reaping the economic potentials: regional development

Major research labs have partnered with multinational companies ranging from network technology providers such as Intel and CISCO, to general information and communication technology (ICT) companies such as Microsoft, or telecommunication providers such as Deutsche Telekom, and in some cases even defence industries such as Airbus Group SE. Such partnerships provide funds and conditions to enhance the academic portfolio, develop cutting-edge and applied solutions to technology, and increase the global competitiveness of the region and the country in cybersecurity markets. The partnerships developed at the Cyberspark Initiative in Israel, the JyvSecTec in Finland, and the Cybersecurity Centres in Germany are three leading examples that allow us to grasp their potential. Yet there are also examples of regional developments in France and the Netherlands which are being used to increase the countries' national competitiveness in the cybersecurity industry. [Report p.15]

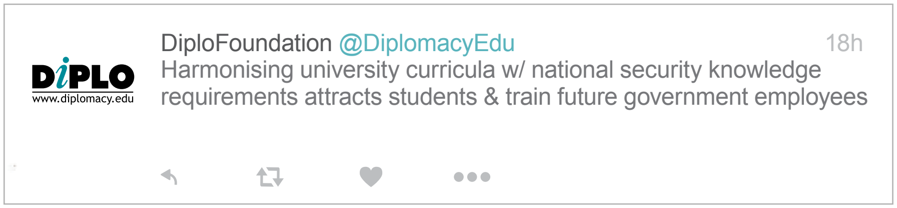



KNOWLEDGE REQUIREMENTS
NATIONAL SECURITY
UNIVERSITY5
Cybersecurity curriculum
UNIVERSITY4
CYBERSECURITY CIRRICULUM
UNIVERSITY1

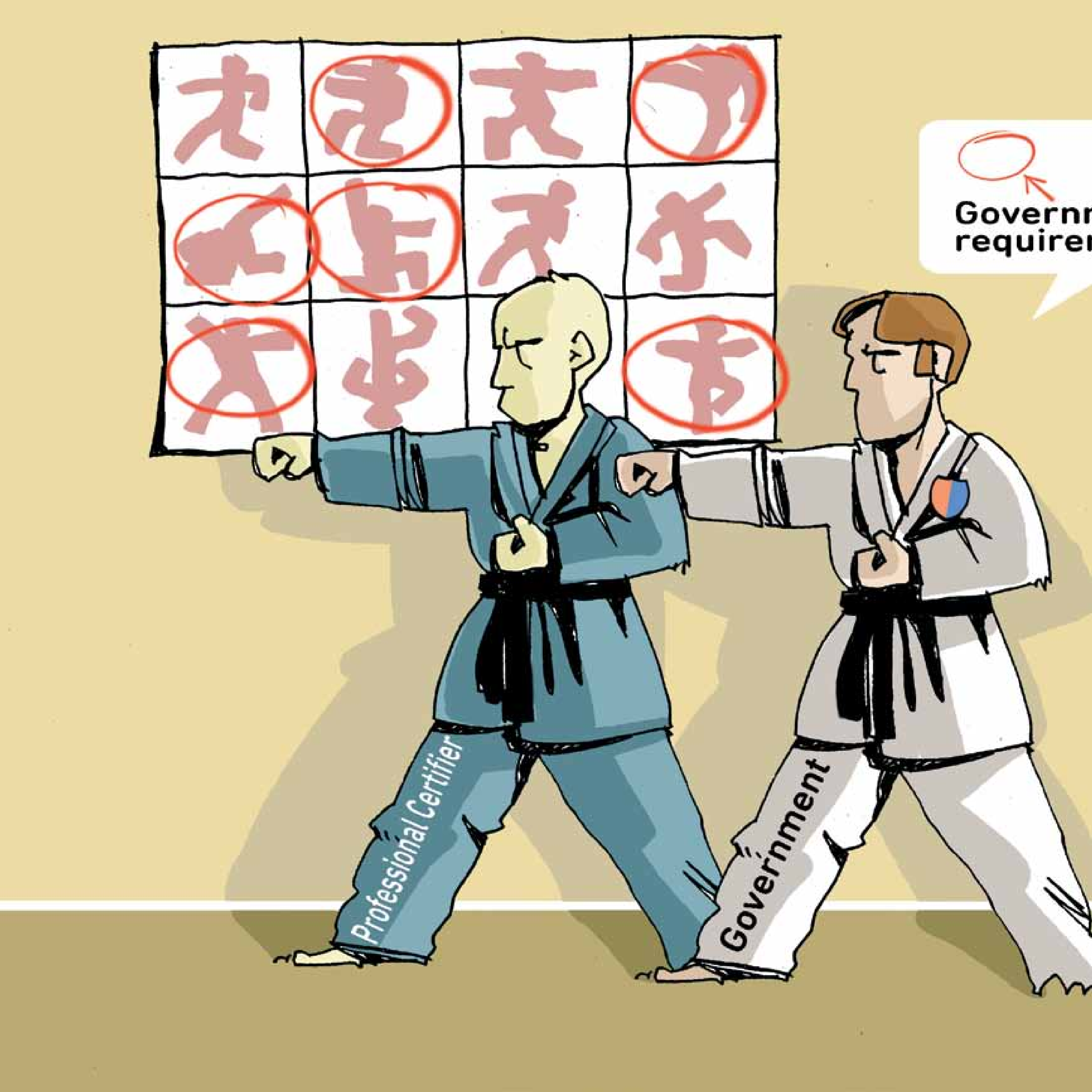


Labelling of universities

Some university training facilities tend to also have partnerships with state security institutions as in cases of the UK, the US, and the Republic of Korea. The aim seems to be to support knowledge transfer and accelerate the integration of students into the needs of their potential employers - be they the public or security sector, critical infrastructure operators, or the private sector which intends to provide services to the government. The UK and the US have taken an additional step in developing a university labelling programme which aims to encourage academic institutions to include specific knowledge in their curricula. [Report p.13]



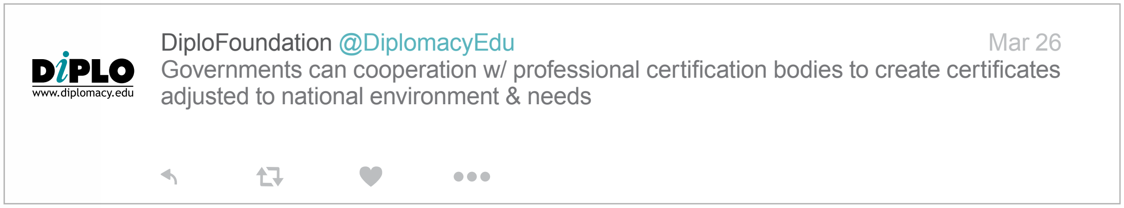
DiploFoundation @DiplomacyEdu 18h
Harmonising university curricula w/ national security knowledge requirements attracts students & train future government employees


Governm
requirem
Professional Certifier
Government

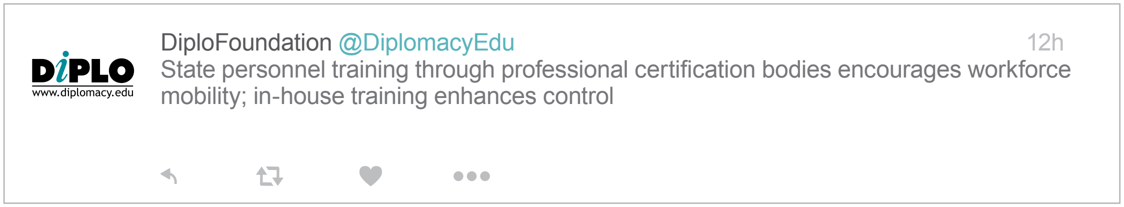
ment
ments

Collaboration with professional certification bodies

While approaches to strengthening academic programmes require larger amounts of funding and bring results on a longer-term basis, the market is also in need of short-term solutions for the current gap in qualified labour. A clear trend is the collaboration of governments with professional certification institutions, which allows a form of soft standardisation of the minimum knowledge and ability requirements for the public and the private sector, enabling rapid labour market qualification and conversion.
[Report p.18]

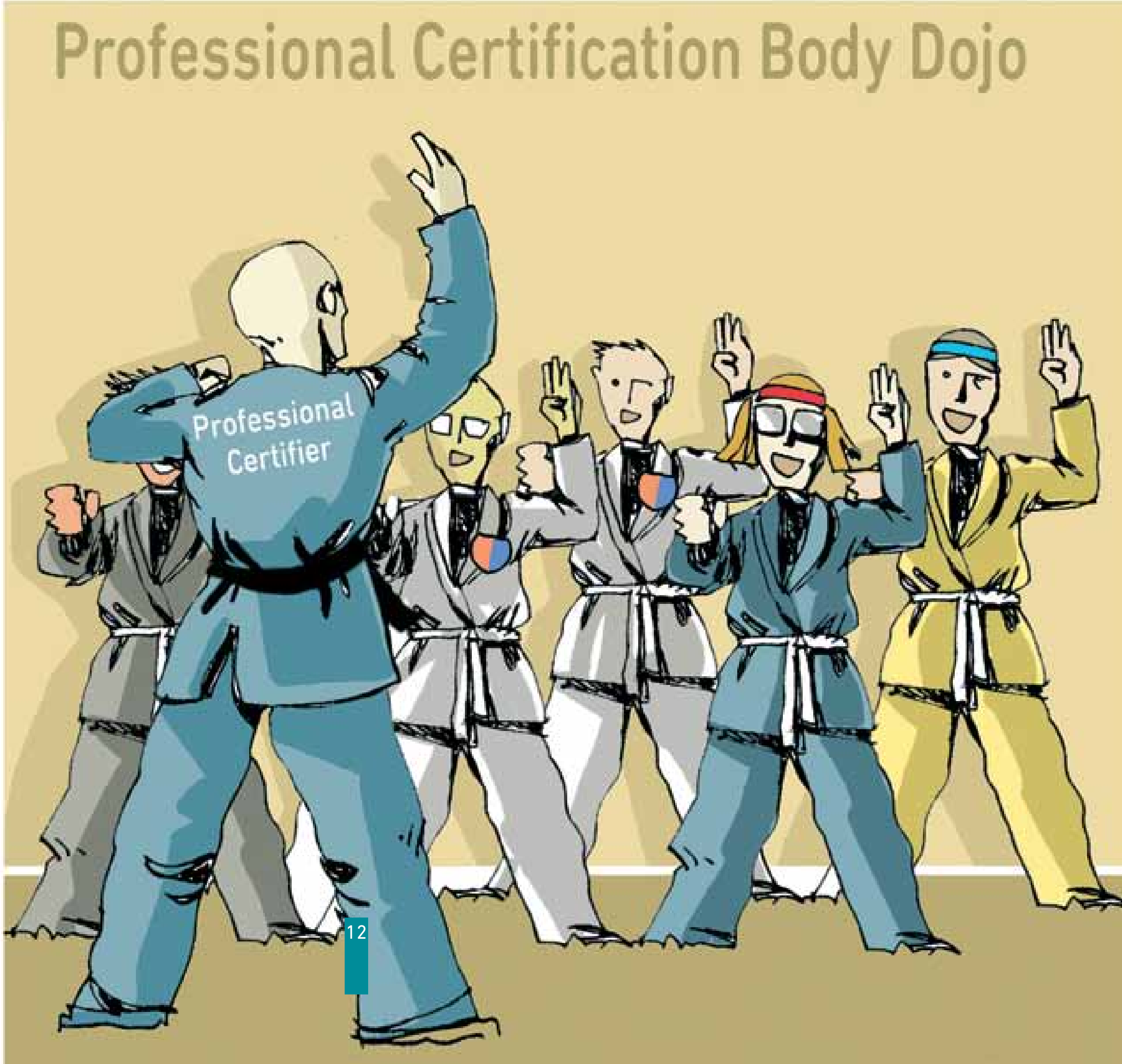


DiploFoundation @DiplomacyEdu Mar 26
Governments can cooperation w/ professional certification bodies to create certificates adjusted to national environment & needs



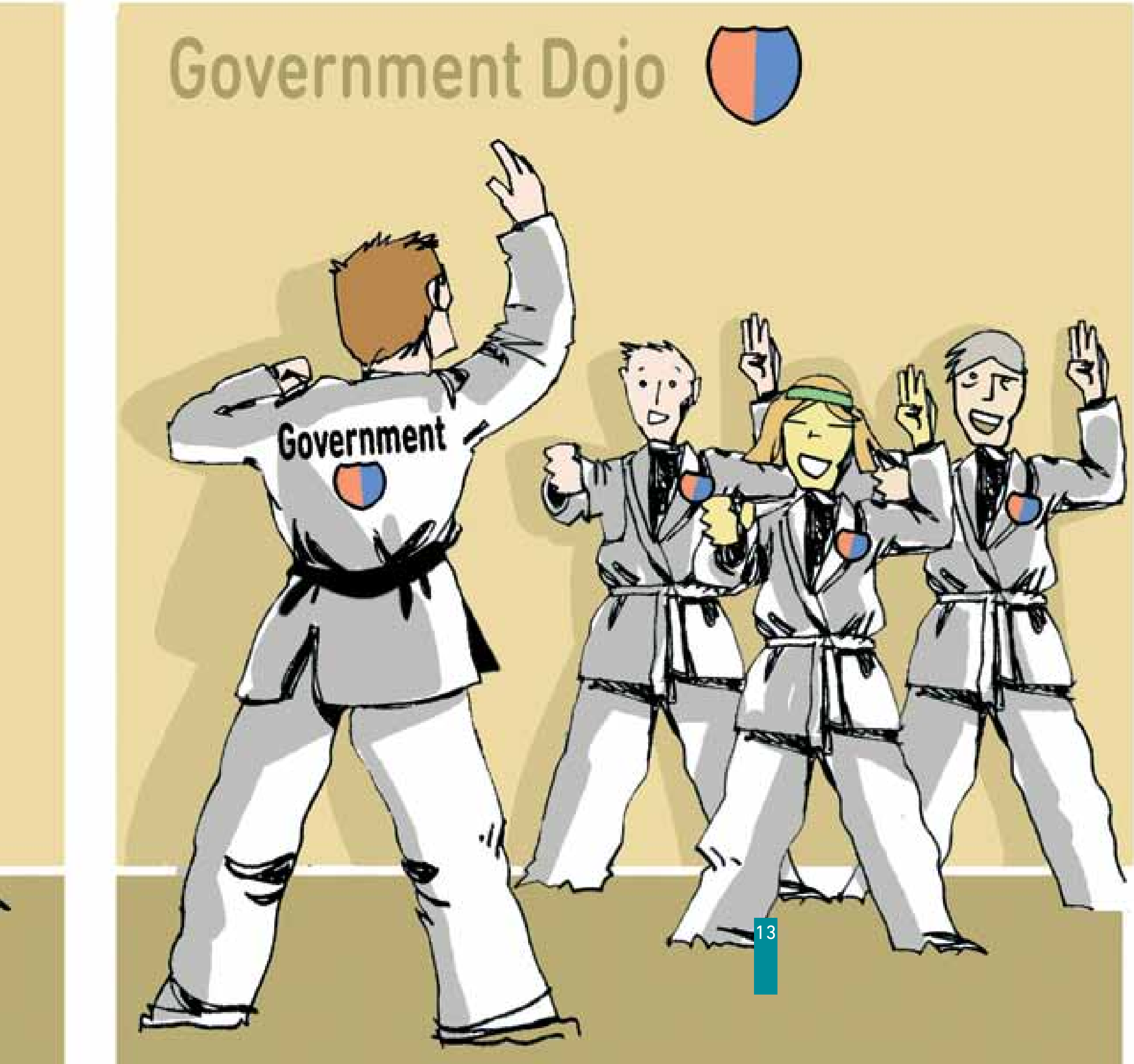
DiploFoundation @DiplomacyEdu 12h

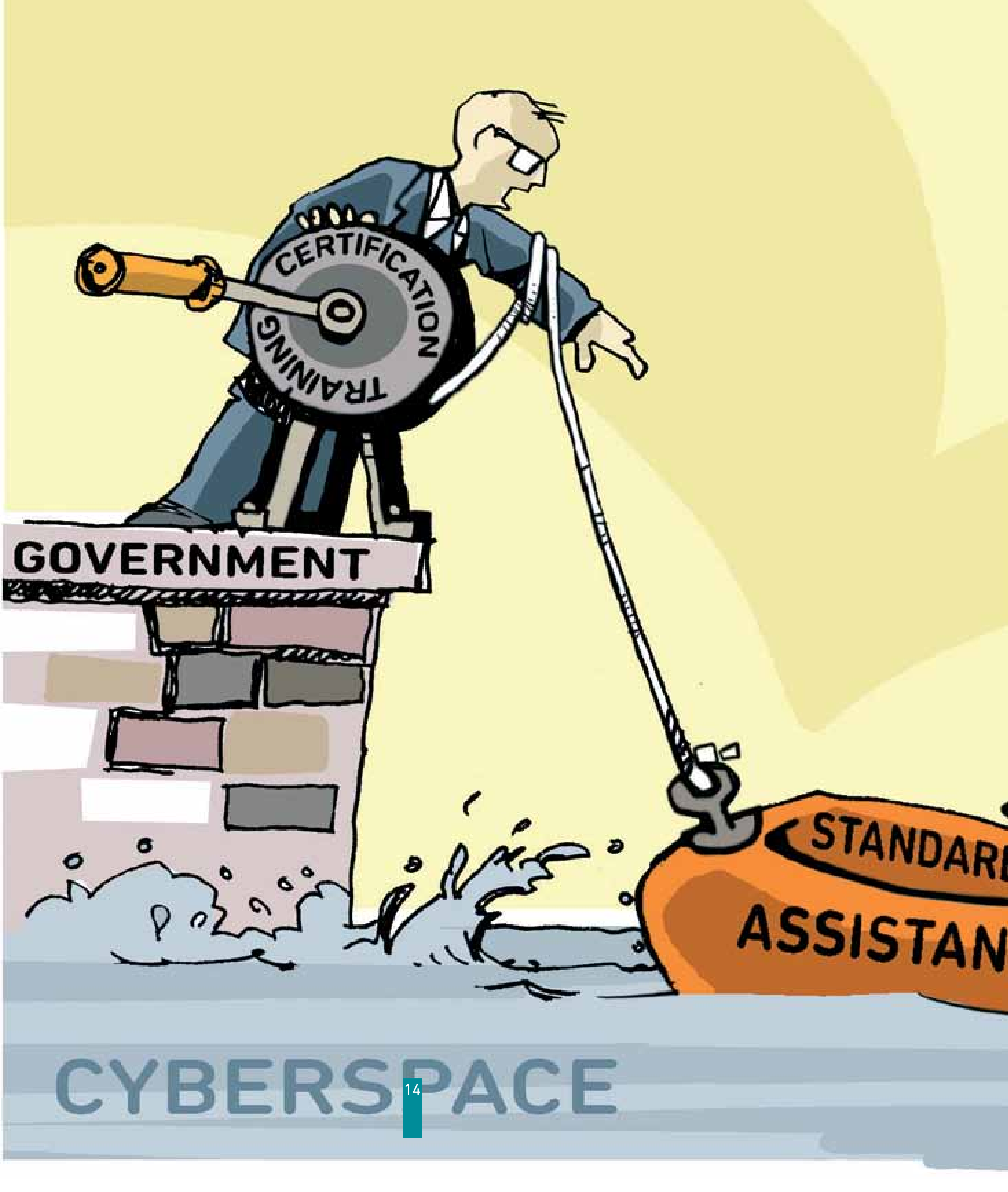
State personnel training through professional certification bodies encourages workforce mobility; in-house training enhances control



State personnel training

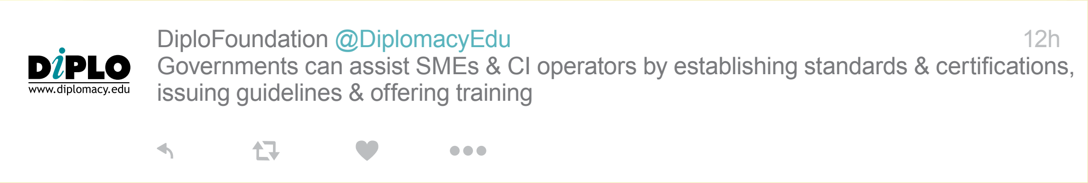
The approaches by governments range from requiring certificates from private certification institutions for government or private sector employment, such as in the US, to developing their own certification programmes in collaboration with such a private certification institution, such as in Germany. Engaging professional certification bodies for state personnel training, such as in the UK or in the US, reduces the costs and encourages workforce mobility, while in-house training, such as in France, brings greater control and specialised focus. [Report p.16]

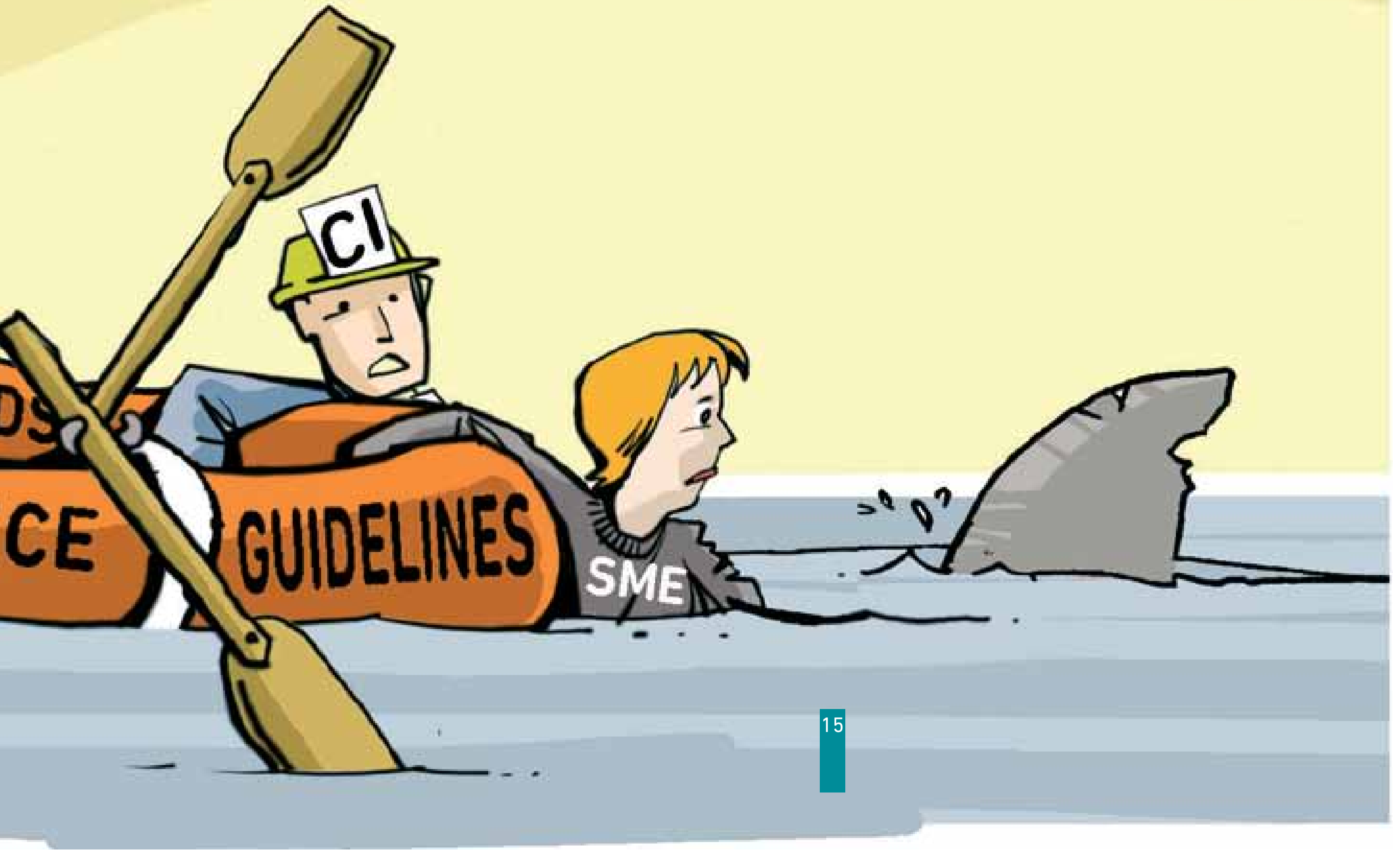



CERTIFICATION
TRAINING
GOVERNMENT
STANDARD
ASSISTAN
CYBERSPACE

Improving the competences of the private sector

Several trends have identified the need for small and medium enterprises (SMEs) as well as critical infrastructure (CI) operators to grasp the stakes at hand and develop their competencies in the cyber realm. The UK has developed its Cyber Essentials toolkit for SMEs and requires its providers to adopt it, whereas in Germany and France initiatives were developed to support SMEs and critical infrastructure operators in increasing their cybersecurity. The US has developed a flexible Framework for Improving Critical Infrastructure Cybersecurity that companies of different size should be able to adopt. [Report p.19]

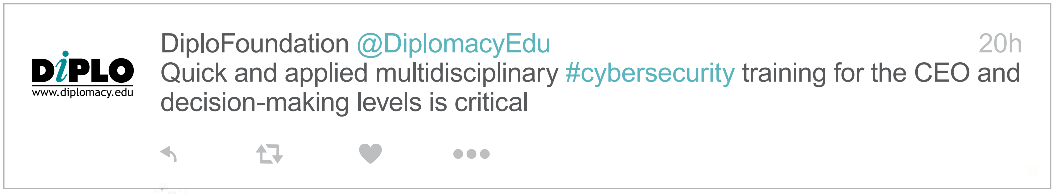

DiploFoundation @DiplomacyEdu 12h
Governments can assist SMEs & CI operators by establishing standards & certifications, issuing guidelines & offering training



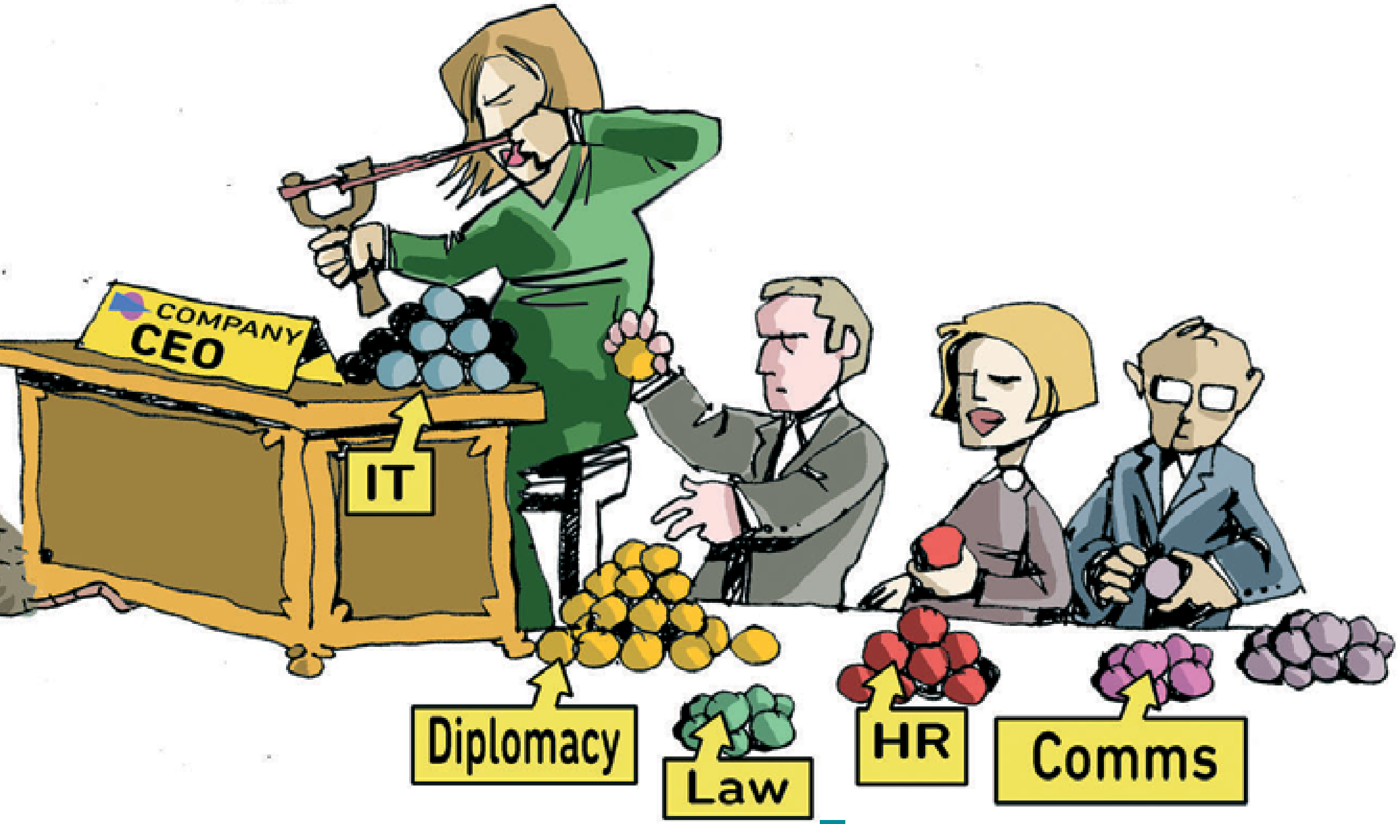
COMPANY

Manager and decision-making level training

Cybersecurity in many organisations is affected by a ‘digital divide’ between ICT departments and decision makers, managers and senior executives. Two countries at the forefront of cybersecurity - Finland and Israel - have developed university-grade degrees and executive academic programmes in order to overcome this divide that exists in both private and public sectors. Germany uses an extensive professional network in order to push for manager awareness. [Report p.20]



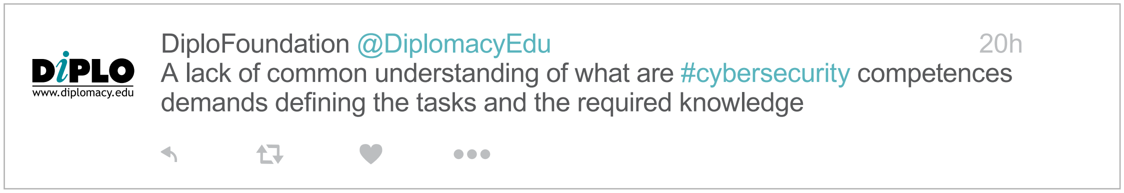
DiploFoundation @DiplomacyEdu 20h
Quick and applied multidisciplinary #cybersecurity training for the CEO and decision-making levels is critical



JOBS
JOB 1
Job description:
3.000 $
Cybersecurity
Job description: UNKNOWN
36.000 $
JOB 2
Job description:
2.400 $
Graduated

Knowledge frameworks, job descriptions and professionalisation of cybersecurity

Finally, the lack of a definition of cybersecurity-related jobs creates a number of challenges, ranging from recruitment to training, as well as to general cybersecurity organisation within an institution. Moreover, this creates hurdles for labour mobility and lags in labour reallocation, limiting the potential for employers and candidates to find the right match. Governments, such as France and the UK, have started developing job descriptions while the US has defined the required knowledge training for different jobs in its National Cybersecurity Workforce Framework 2.0. [Report p.21]



DiploFoundation @DiplomacyEdu 20h
A lack of common understanding of what are #cybersecurity competences demands defining the tasks and the required knowledge

Cybersecurity as a driving force for the transformation of the national labour market

The effects of the trends identified in the study go beyond developing national competences for response to cyber-threats. They extend to the transformation of national labour markets and greater employment and economic growth. Moreover, in many cases this leads to the establishment of a cutting-edge cyber-industry which raises the competitiveness of states in the increasingly important global cyber-markets.

The identified trends in the selected ten OECD counties can serve as policy options for strengthening national cybersecurity skills and competences, including those significant for critical infrastructure protection.

All the identified policy options combine strategy led by government with the hands-on experience and the financial potential of the corporate sector as well as the knowledge and research potential of the universities. The initiatives are shaped in such a way that each of the parties involved has an interest in strengthening local expertise.

Overview of the most prominent examples from the studied countries

STRENGTHENING ACADEMIC PROGRAMMES			
University programs supported by the government	Labelling of universities	Regional development	State personnel training
Cybersecurity Centres (Germany) JyvSecTec-JAMK (Finland) KU Graduate School of IS and Department of Cyber Defense IS / KAIST Graduate School of IS (Republic of Korea) Cybersecurity Hub within CyberSpark / *'Magshimim Leumit'* advanced cybersecurity study programme (Israel) Information Technology Foundation for Education (HITSA) (Estonia) Austrian Institute for Technology and SBA Research (Austria)	Center for Academic Excellence in Information Assurance Education (CAE) (United States of America) Academic Centre for Excellence (ACE) (United Kingdom)	Pôle d'Excellence Bretagne (France) JAMK –JyvSecTec (Finland) The Hague Security Delta – Security Cluster (Netherlands) Software Cluster Southwest Germany (Germany) NATO CCDCoE / e-Citizenship & e-Government Initiatives (Estonia) CyberSpark Industry Initiative at Ben-Gurion University in Be'er Sheva (Israel) Silicon Valley (United States of America)	State Cantered Model: Expert en sécurité des systèmes d'information (ESSI certificate by ANSSI-CFSSI) (France) Private Sector training: US DoD Policy 8570.1 – 8410 with requirements for IA Technical and IA Management (United States of America) CESG Certified Professional (United Kingdom)

PROFESSIONAL TRAINING			
State personnel training	Improving the competences of the private sector (SME and CI)	Manager and decision-making level training	Knowledge frameworks, job descriptions and professionalization
CNSS training requirements for professional training providers (United States of America) CESG Certified Professional requirements and Certified Training scheme (United Kingdom) BSI Cybersecurity Practitioner certificate with ISACA (Germany)	'Framework for Improving Critical Infrastructure Cybersecurity' by NIST (United States of America) 'Cyber Essentials' - standards/ requirements and Certification for SME (United Kingdom) 'IT Sicherheit in der Wirtschaft' with seminar 'IT-Sicherheit@ Mittelstand' (Germany) 'Référent en cybersécurité' guide with standards by ANSSI and Inter-ministerial Delegation on Economic Intelligence - D2IE) (France)	Executive Academy within CyberSpark (Israel) Master’s degree in Cybersecurity at JyvSecTec (Finland) Korean Internet Security Agency (KISA) (Republic of Korea) Club des directeurs de sécurité des entreprises (France) Deutschland Sicher im Netz (Germany) COBIT 5 by ISACA (supported by the NIST Framework for improving Critical Infrastructure Cybersecurity) (United States of America)	'National Cybersecurity Workforce Framework 2.0' by the National Initiative for Cybersecurity Education (NICE) (United States of America) ‘Inspired Careers’ (United Kingdom) *Profils métiers* job profile by ANSSI (France)

About the authors

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Vladimir Radunović is a director of e-diplomacy and cybersecurity educational and training programmes and a lecturer at DiploFoundation. He holds an MSc in electrical engineering from the University of Belgrade and a Master degree in contemporary diplomacy from the University of Malta with thesis on e-diplomacy, and has undertaken a PhD programme in cybersecurity. Vladimir was born and lives in Serbia. He can be contacted at **vladar@diplomacy.edu**

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About DiploFoundation

DiploFoundation is a leading global capacity development organisation in the field of Internet governance and digital policy.

Diplo was established by the governments of Switzerland and Malta with the goal of providing low cost, effective courses and training programmes in contemporary diplomacy and digital affairs, in particular for developing countries. Its main thematic focuses are on Internet governance (IG), e-diplomacy, e-participation, and cybersecurity.

Diplo's flagship publication 'An Introduction to Internet governance' is among the most widely used texts on IG, translated into all the UN languages and several more. Its online and in situ IG courses and training programmes have gathered more than 1500 alumni from 163 countries.

Diplo hosts the Geneva Internet Platform (GIP).

Diplo also provides customised courses and training both online and in situ, covering a wide range of subjects including cybersecurity, Internet governance, data protection and e-diplomacy.

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