Chapter 3. Security in a risky world

In an increasingly borderless and connected world, OECD countries are facing ever more complex security challenges. Education has an important role to play in building awareness to prevent security risks and strengthening resilience in times of crisis. This chapter explores these issues through five themes:

Personal and health security *– explores a positive trend and a negative trend: the increasing safety on our roads and the decreasing effectiveness of antibiotics.*

Cyber security *– illustrates the rapidly growing number of cyber security incidents and the rising importance of privacy and security experts in a digital world.*

National security *– highlights the decline of nuclear testing and traditional war between countries, as well as ongoing internal conflicts.*

Environmental security *– emphasises the importance of environmental protection by examining the worldwide rise in natural disasters and the consequences of air pollution.*
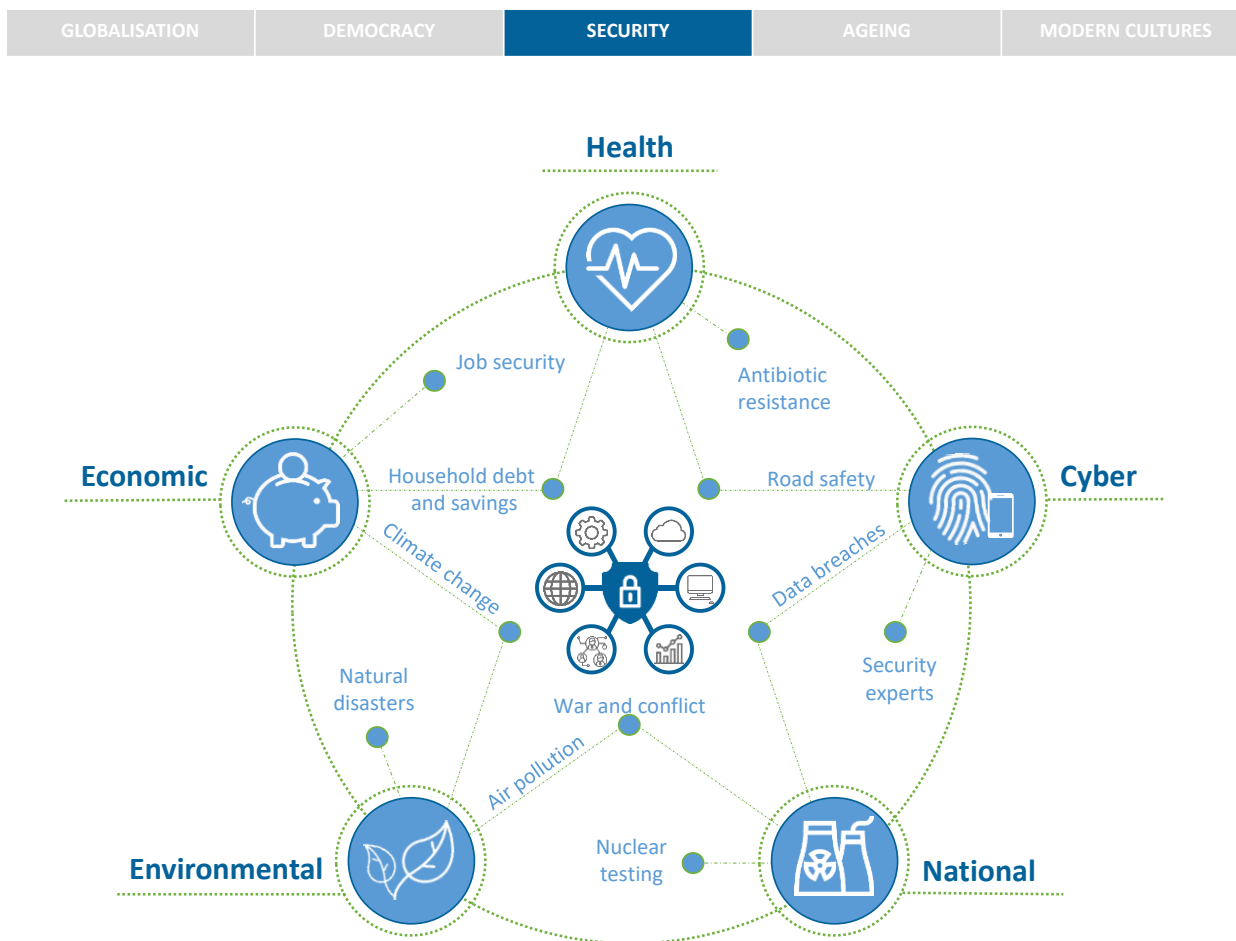
Economic security *– examines job market insecurity with the trends of increasing household debt and expected earnings loss due to unemployment.*

The security trends highlighted in this chapter are then linked to education, from early childhood education and care to lifelong learning. The chapter ends with a look at how using different versions of the future can help us better prepare for the unknown.
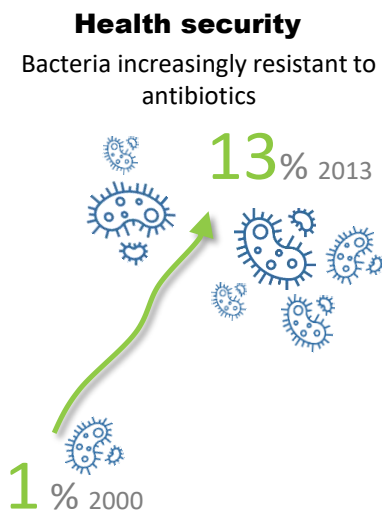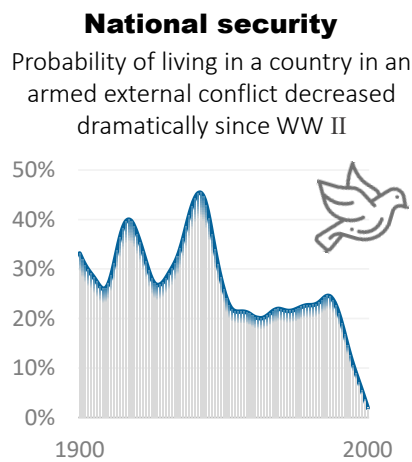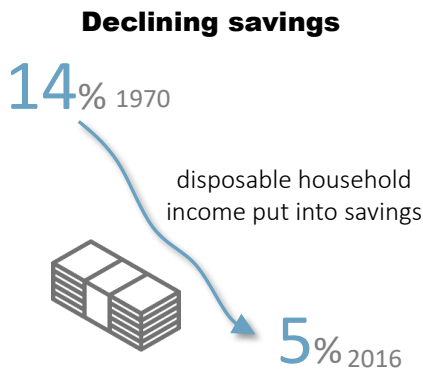

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

SECURITY IN A RISKY WORLD: A VISUAL OVERVIEW

On average OECD countries are more secure than they were in the past. They have benefited from less armed conflict on their soil, growing affluence, safer roads and more effective medicines and healthcare. However, in an increasingly borderless and connected world, we are now facing ever more complex security challenges. Climate change; disease and the risk of rapidly spreading pandemics; networks of terrorism and cyber threats all pose serious risks for society. Threats can also be very personal: Many individuals are experiencing financial and work-related insecurity and are concerned about the safety of their families and communities. Education can play a role in helping understand, prevent and mitigate security risks. It can also help build resilience and better prepare citizens for times of crisis.

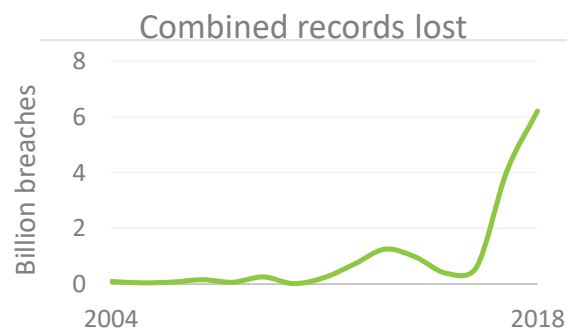| GLOBALISATION	DEMOCRACY	SECURITY	AGEING	MODERN CULTURES

Chapter highlights

Declining savings

14% 1970

disposable household income put into savings

5% 2016

National security

Probability of living in a country in an armed external conflict decreased dramatically since WW II

50%
40%
30%
20%
10%
0%

1900 — 2000

Health security

Bacteria increasingly resistant to antibiotics

13% 2013

1% 2000

Changing climate

The number of worldwide natural disasters has been increasing since the 1960s

500

400

300

Number of disasters

200

100

0

1901 — 2017
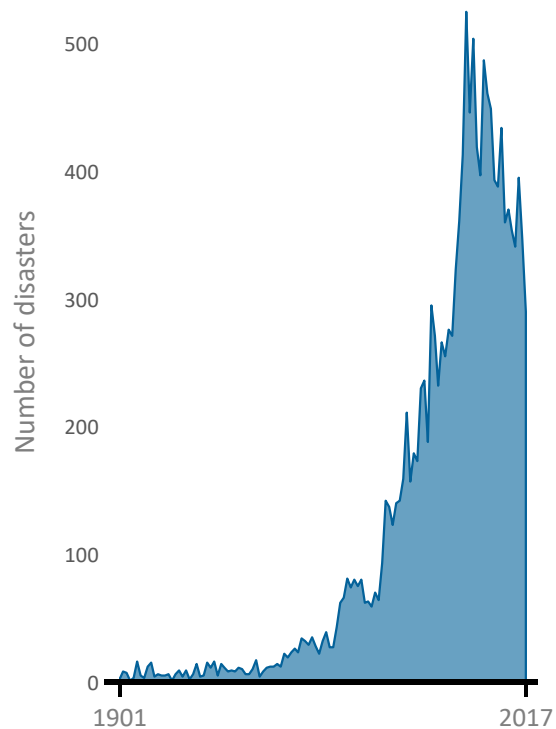
Cyber risks

Data breaches due to poor security, accidents or hacks have surged

Combined records lost

8

6

Billion breaches

4

2

0

2004 — 2018

PERSONAL AND HEALTH SECURITY

Security of person is a basic right guaranteed by the Universal Declaration of Human Rights of 1948. Though we have benefited from safer roads, more effective medicines and better food hygiene, we are now facing increasingly complex security challenges. As we travel more, diseases have a greater opportunity to spread. In a progressively connected world, networks of terrorists pose a threat in many countries at the same time. And globalised supply chains mean that the risk of faulty or contaminated products can come from many different places. Education can play a role in raising awareness and preventing newer and more complex security threats, and in helping us to manage and reduce personal risk.

Figure 3.1. Safer on the roads

Number of road fatalities per 100 000 population, 1970, 1990 and 2016
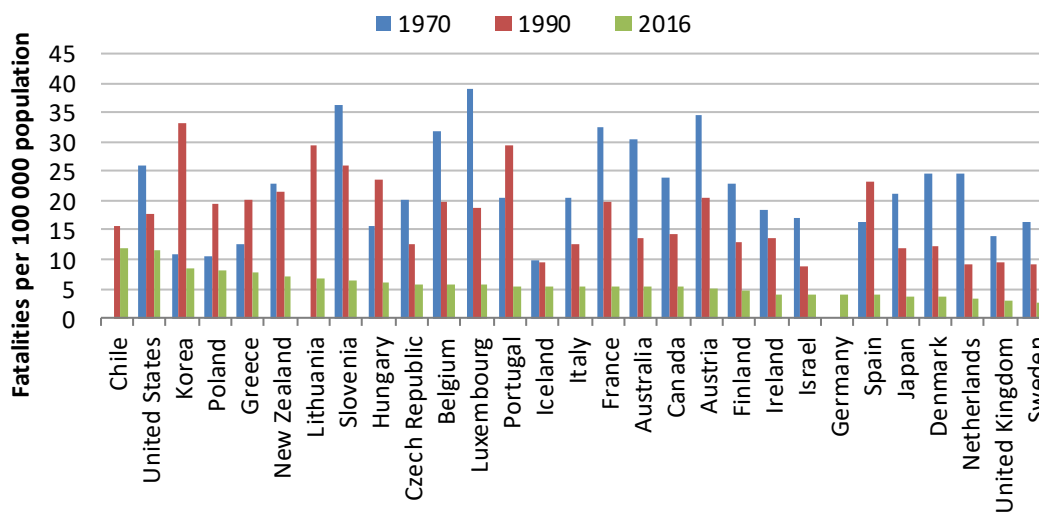
Note: Countries are ranked by descending order of 2016 data.

*Source*: OECD (2018a), "Road casualties", *Road Injury Accidents* (dataset), http://stats.oecd.org/.

StatLink 🔗 https://doi.org/10.1787/888933888621

OECD countries have benefited from a dramatic reduction in road traffic injuries since 1970. Some of the largest declines include Austria, Belgium, France, Luxembourg and Slovenia, all of which saw around 20 fatalities per 100 000 population in 1970 to fewer than seven in 2016. Korea, Lithuania and Portugal all achieved similarly impressive reductions even more rapidly, falling from around 30 fatalities per 100 000 population in 1990 to below nine in 2016. Road safety has been improved through multiple means: better road design and safety standards of vehicles, speed limits and distracted driving laws (e.g., driving while using a mobile phone or while under the influence of alcohol). As experts predict that autonomous vehicles will soon become the norm, policy makers are already considering the implications of this trend for maintaining and improving road safety.

While there have been many successes, other trends threaten our personal and health security. In particular, there has been increasing attention to antimicrobial resistance, when infectious organisms can develop resistance to antimicrobials such as antibiotics, thus rendering them ineffective. Inappropriate and excessive use of antibiotics are among many important drivers of resistance. In OECD countries the average proportion of infections caused by resistant bacteria rose from 14% in 2005 to 17% in 2015. In Greece, Turkey, and many of the BRIICS, the proportion is expected to be over 40% by 2030. Meanwhile, the number of new antibiotics receiving approval has been falling, meaning that there are increasingly limited prospects for new treatments to replace the current ones when they become ineffective.

Figure 3.2. The rise of superbugs

Average proportion of infections caused by bacteria resistant to antimicrobial treatment for eight antibiotic-bacterium combinations in 2005, 2015 and 2030
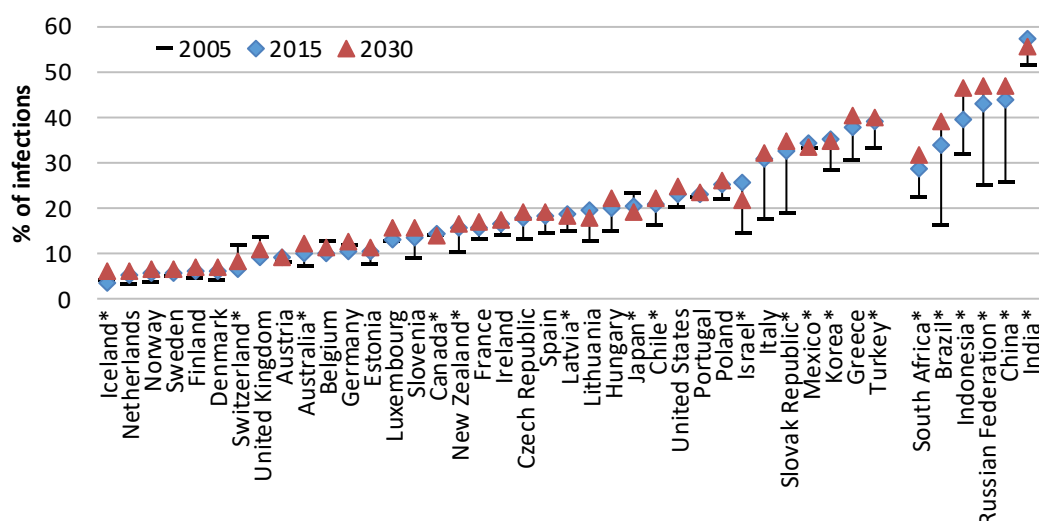
Note: * indicates country is missing more than 50% of observations, across all eight antibiotic-bacterium pairs, between 2005 and 2015. Countries are sorted left to right based on ascending proportions in 2015.

Source: OECD (2018), *Stemming the Superbug Tide: Just A Few Dollars More*, https://doi.org/10.1787/9789264307599-en.

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And education?

- What should be the role of schools in inspiring healthy behaviour? For example, to help combat obesity should schools ban sugary drinks and fast food items from their cafeterias or impose daily physical education?
- Should children be allowed to go to nursey/ kindergarten/school if they do not have up-to-date vaccinations? Is there a trade-off between personal choice and better security of society?
- Road safety is still a prominent issue. What action might educators take to raise student awareness of risks on the road, as well as ensuring safety within the physical proximity of the campus?

CYBER SECURITY

We depend on the uninterrupted functioning of information and communication technology systems for virtually all aspects of our daily lives. Physical goods, services, and much of our infrastructure are all now coordinated and delivered through computer systems. A great deal of sensitive and confidential data are stored on servers all around the world. Security risks in the event of data theft, leaks or other breaches have economic, social and political consequences. Who controls what data—individuals, firms or governments—is also a matter of discussion. Education is important in empowering individuals to make wise choices in handling their own and others' information online, keeping abreast of new developments in cyber risks, and in preventing and detecting fraud.

Figure 3.3. Too big for your (data) breaches?

World's biggest data breaches by method of leak (billions of records lost), 2004-2018
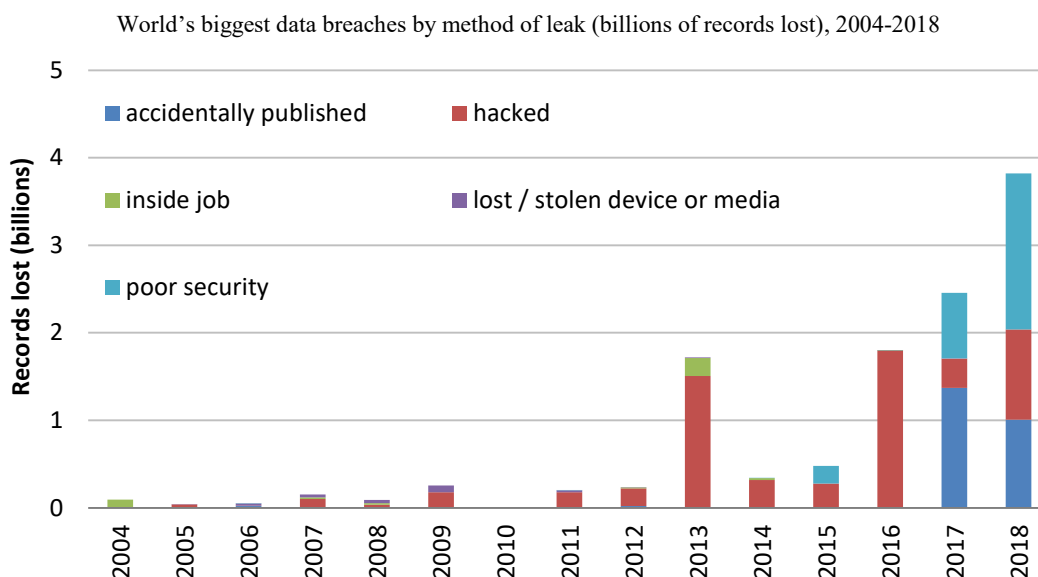
Note: Selected losses greater than 30 000 records; data compiled from DataBreaches.net, IdTheftCentre and press reports; 'inside job' refers to authorised individuals (such as employees) intentionally releasing data in unauthorised ways.

Source: Information is Beautiful (2018), "World's biggest data breaches: Selected loses bigger than 30.000 records", https://informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-static/.

StatLink ⬛⬛⬛ https://doi.org/10.1787/888933888659

We share increasing amounts of information about ourselves online. This comes with risks, with the sale of sensitive personal information increasingly valuable. The scale of data breaches has been growing: 2013's highest-profile breach was the hack of over a billion records at Yahoo. Names, telephone numbers, passwords and other data were leaked; the breach was only disclosed in 2016. One enormous leak recorded in 2017 and attributed to accidental publication is India's Aadhaar system, which keeps biometric and other data on over a billion Indian residents. And the number of government records lost or stolen in 2018 was the highest ever in one year.

Cyber security incidents have an economic price, and are forecast to cost global business over 8 trillion USD in the years 2017-2022 (Moar, 2017). There are also ethical issues concerning the use of personal data and the extent to which individuals can or should give consent for it to be collected or shared. Knowledge and skills in cyber security and privacy are valuable assets, as shown by a steady increase in the number of individuals with cyber security certifications from the (ISC)2 consortium since 2003. Privacy Professionals (IAPP) members also increased steadily, with a rise from 100 members in 2003 to over 3300 members in 2018.

Figure 3.4. Increasing need for privacy and security experts

Number of certified/professional privacy and security experts, 2003-2018
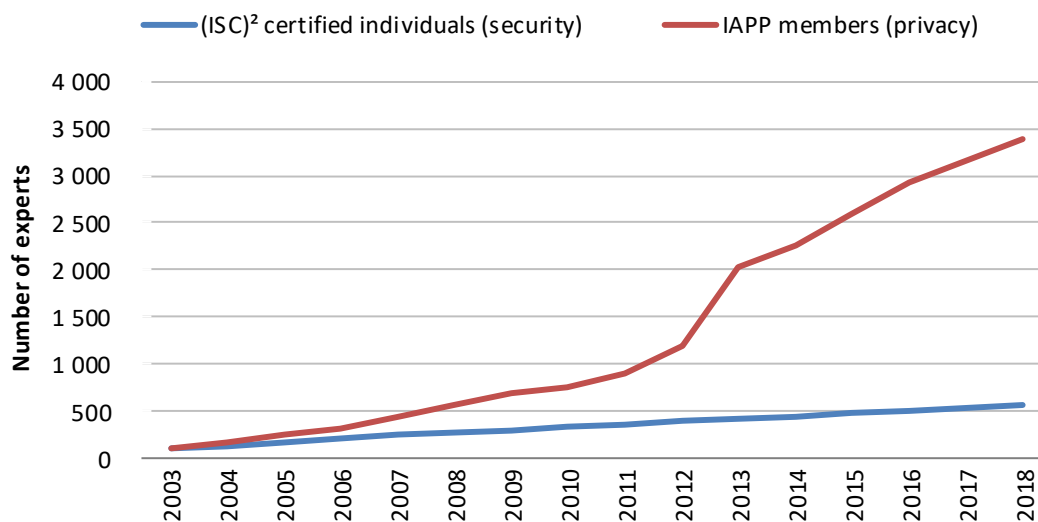
Note: Data for 2017 were unavailable. IAPP data for 2018 are approximate.

Source: OECD (2017), *OECD Digital Economy Outlook 2017*, http://dx.doi.org/10.1787/9789264276284-en; (ISC)[2], www.isc2.org/About/Member-Counts; IAPP, https://iapp.org/about/iapp-facts/.

*StatLink* ⧉ https://doi.org/10.1787/888933888678

And education?

- How can education encourage young people to make informed and responsible choices about handling personal data? And how should educators integrate digital literacy – including risk - into their lessons?
- What skills will be needed in a world of constant cyber risk? Is it possible to train "responsible hackers" to fight against illegal infiltration? Is it the role of education, and, if not, who should be responsible?
- New threats such as cyber-attacks and biological weapons require new strategies to defeat them. How can education systems produce the highly-skilled and flexible workforce with the skills necessary (ICT, problem solving, critical thinking, languages, etc.) to secure our nations?

NATIONAL SECURITY

National security commonly refers to defending the nation against invasion or occupation, although it can also have broader meanings such as freedom to maintain core values without the threat of war. National security is a priority reflected in armed forces, border controls, and the funding of research and development. As the threats facing our nations change and evolve, our perception of security changes too. Traditional inter-state war has become less common, but political violence and intrastate conflict are still present. There are also new threats such as cyber-attack. Education should play a role in helping us to learn the lessons of the past, and (hopefully) develop better foreign policy to avoid conflict.

Figure 3.5. Mutually assured détente?

Number of worldwide nuclear tests, 1945-2018
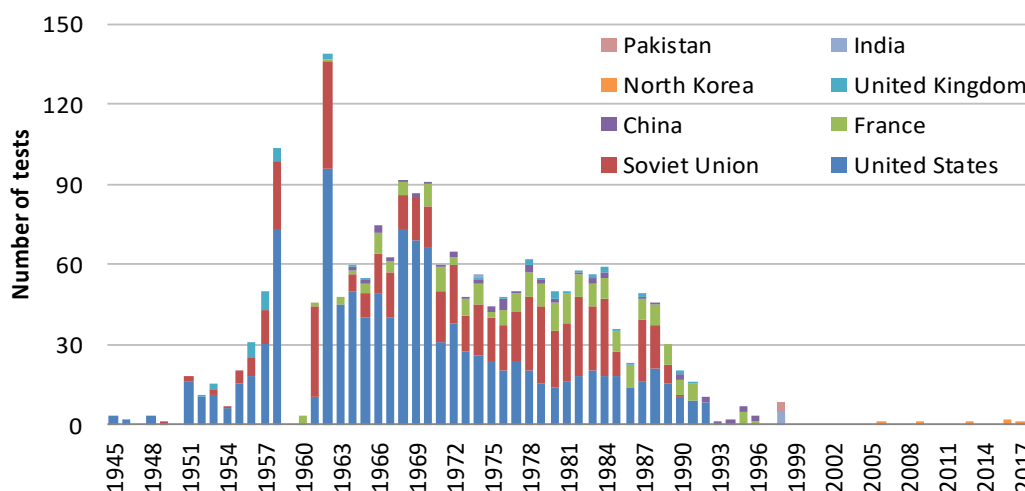
Note: Since 2014, nuclear tests have been confirmed to have taken place in North Korea.

Source: Oklahoma Geological Survey Observatory and Lawson (2014), http://digitalprairie.ok.gov/cdm/compoundobject/collection/stgovpub/id/9093/rec/1.

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Only two nuclear weapons have ever been used during warfare: the attacks on Hiroshima and Nagasaki, Japan in 1945. In the years that followed, a small number of countries raced to develop and test nuclear weapons. The United States and the Soviet Union built up such large nuclear arsenals that any hypothetical conflict between the two was widely assumed to be a scenario of 'mutually assured destruction'. By the early 1970s, a process called *détente* led to a gradual decline in the number of annual nuclear tests. These then dramatically dropped in the early 1990s amid the dissolution of the Soviet Union. There has been a total absence of nuclear testing worldwide since 1998, with the one exception of North Korea.

The decline in nuclear testing is part of a broader downward trend in armed conflict between countries. In 2000, the probability of a person inhabiting a country with an

armed conflict reached its lowest since records began in 1820. This trend has continued, although this does not include inter-state aggressions or cyber-attacks.

In contrast, intrastate war, or civil wars within a country, has continued to go up and down over time. In 2000, it stood at just over 27%, slightly above the historical annual average of 24%. There is one area where security risks are clearly increasing: Terrorism has also sharply risen by some accounts, although there is difficulty in accurately tracking and defining what counts as terrorism. As the threats faced by nations transform with the modern world, so too do the skills they require of their citizens and security personnel.

Figure 3.6. Peace across time

Probability of inhabiting a country with an armed conflict, 1820-2000
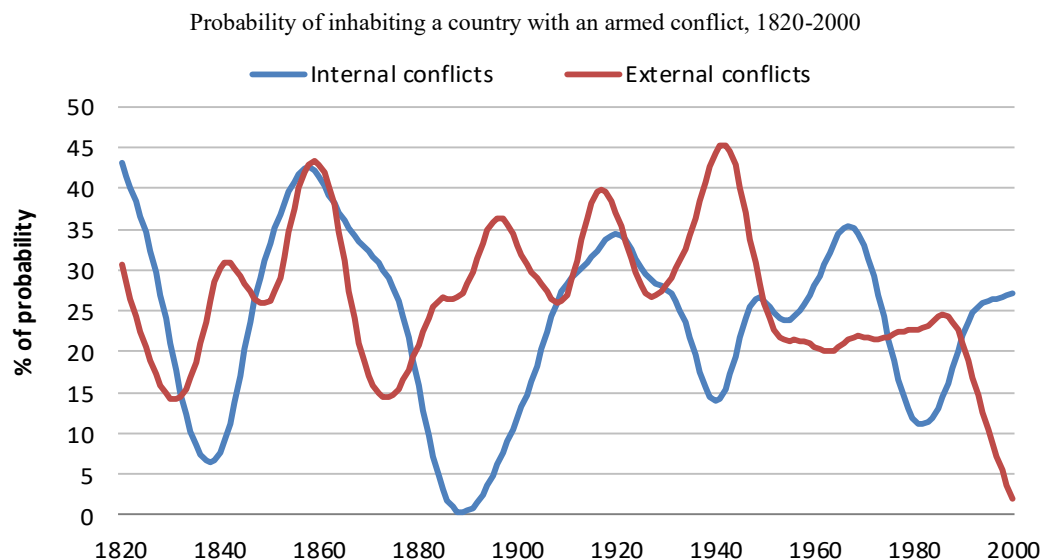
Note: The probability of inhabiting a country involved in a conflict is estimated by the average occurrences of a conflict in a given country in a given year (a binary variable) weighted by population.

Source: van Zanden, J. et al. (2014), *How Was Life? Global Well-being since 1820*, http://dx.doi.org/10.1787/9789264214262-en.

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And education?

- Civic education has been linked to increased tolerance and trust. Is this potential being fully exploited by our schools, for example in preventing radicalisation? Can we do more?
- Countries often turn to education to solve social problems. Does education have a role in preventing crime, for example, through keeping at-risk youth engaged in the system or by providing self-defence training for students? Should it?
- Learners from war zones, especially unaccompanied minors, face special challenges. Do education systems have the capacity to help, for example through mental health support and dealing with school years lost?

ENVIRONMENTAL SECURITY

Our environment is precious. It supports life and health, as well as our economies and societies. International efforts to combat climate change have the potential to dramatically reduce emissions and pollution. However, change has been slow, and we are running out of time. Forecasts currently call for rising sea levels, continuing loss of biodiversity and more extreme weather events as a result of climate change. Education is important in preventing and mitigating the risks to our planet. It can also help develop the responsible and sustainable behaviours needed for a secure, global future.

Figure 3.7. Eye of the storm: increasing natural disasters worldwide

Number of recorded events, 1900-2018
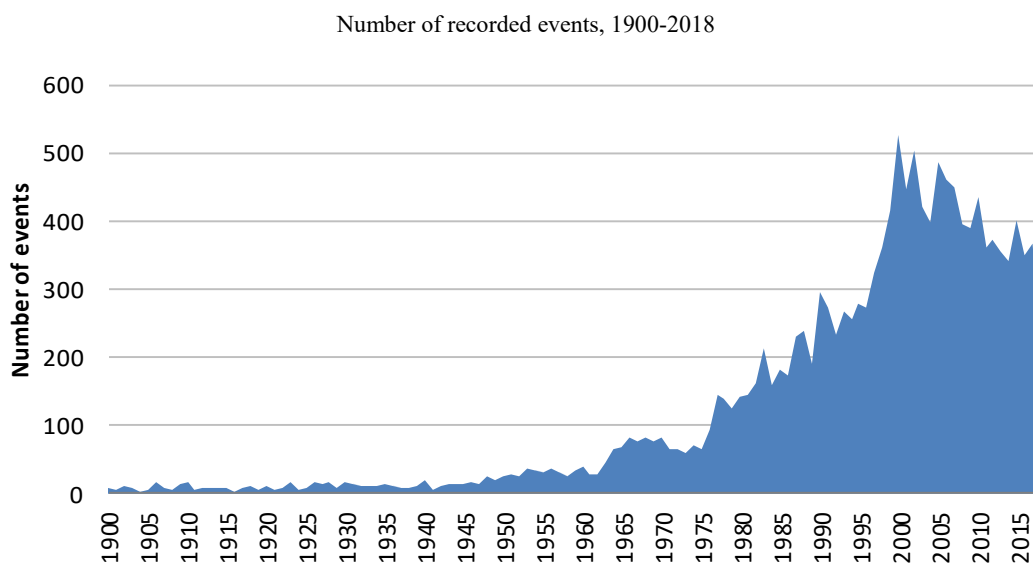
Note: Events include drought, floods, biological epidemics, extreme weather, extreme temperature, landslides, dry mass movements, extra-terrestrial impacts, wildfires, volcanic activity and earthquakes.
Source: EM-DAT (2018), *The Emergency Events Database,* www.emdat.be.

StatLink 🖳📉 https://doi.org/10.1787/888933888735

Climate change is having an impact in terms of higher temperatures, rising sea levels and more frequent extreme weather events. The number and severity of natural disasters recorded per year has been steadily rising over the last century. 2018 saw hurricanes, floods, droughts and wildfires take thousands of lives. Efforts to mitigate climate change may be bearing fruit, for example in growing use of renewable energy, but more remains to be done. In addition to reducing climate change, it will be increasingly important to build resilience so that our economies and societies can withstand environmental shocks and bounce back from them as quickly as possible.

Air pollution has been linked to multiple health problems such as cardiovascular diseases and cancers. It is a killer, claiming 3.2 million lives, and these numbers are projected to keep increasing. In the OECD, only a few European countries and possibly Australia and New Zealand are expected to see a decline in pollution-related deaths by

2060. Many OECD countries are directly addressing urban pollution in their largest cities, taking measures such as reducing vehicle and industrial emissions and increasing green spaces. The rising popularity and falling prices of electric vehicles could also contribute to reversing the trend.

Figure 3.8. Toxic air

Projected number of deaths caused by outdoor air pollution per year per million people, 2010 and 2060
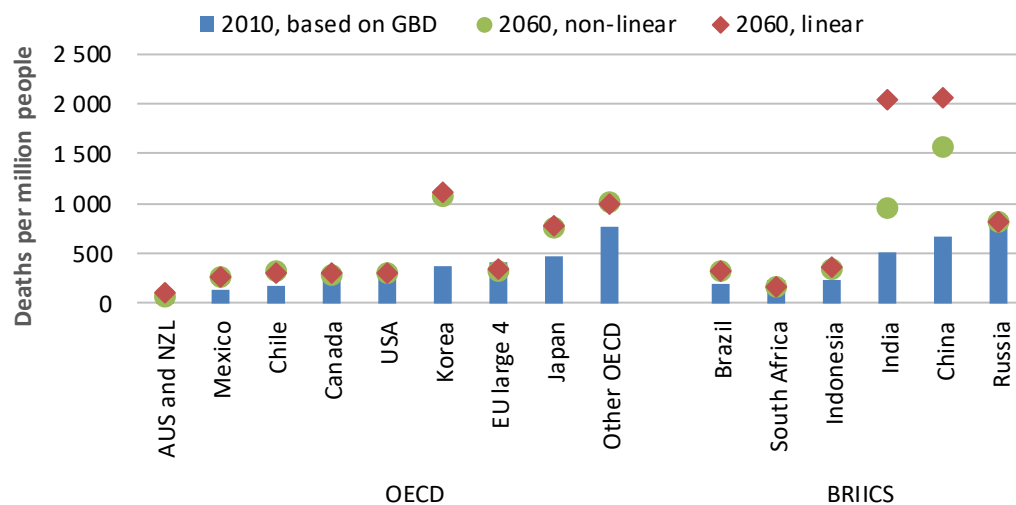
Note: 2010 data are based on the Global Burden of Disease (GBD) project. The linear projection assumes that every increase in pollution will result in the same proportionate increase of deaths; the non-linear projection considers that the rise in deaths will slow at higher pollution levels.

Source: OECD (2016), *The Economic Consequences of Outdoor Air Pollution,* https://doi.org/10.1787/9789264257474-en.

StatLink 🔗 https://doi.org/10.1787/888933888754

And education?

- How can policy makers ensure that school attendance is one of the first, not one of the last, things to return to normal after a disaster? Which skills and knowledge could schools teach to better prepare students to survive and bounce back from natural disasters?
- Our attitudes are influenced by our surroundings. How can education facilities be built to promote environmental awareness, accommodate the needs of learners and keep up to new ecological standards?
- How well do young people develop an awareness of the connections between their daily decisions and possible long-term consequences, not just for themselves as individuals but for society as a whole? How can education systems support this awareness?

ECONOMIC SECURITY

Economic security for individuals includes financial security (having adequate savings and insurance, and affordable credit), as well as work-related security such as paid employment and a safe work environment. In recent decades, OECD countries have seen trends towards lower financial security and weaker work-related security, as economies have changed in the aftermath of the financial crisis. Education will play an important role in equipping adults and children with the skills they need for the labour markets of the future, as well as in coping with the increased emphasis on personal responsibility for financial security.

Figure 3.9. Household savings and debt

Household savings (% of disposable income, left axis) and household debt (% of disposable income, right axis), OECD average, 1970-2016
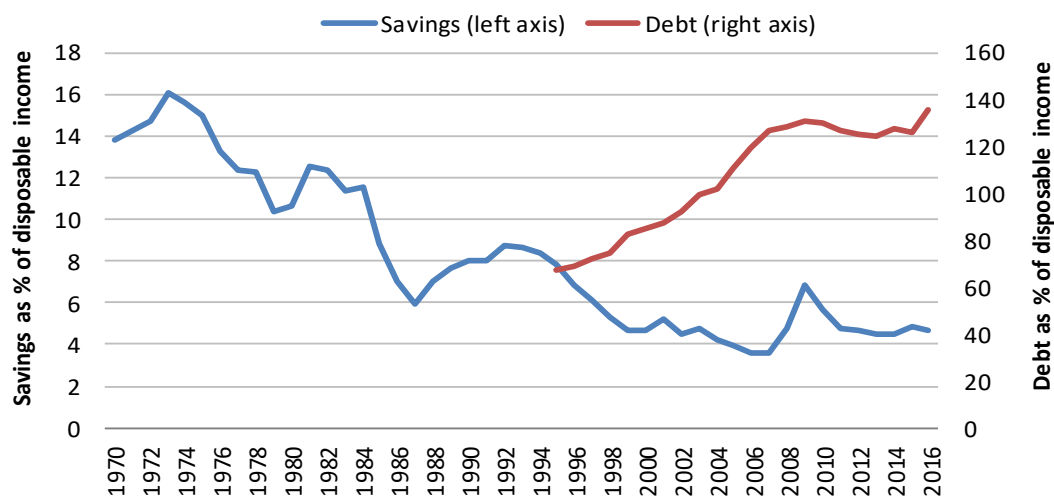
*Note*: OECD average refers to 32 countries (see StatLink for full information).
Source: OECD (2018), *OECD National Accounts Statistics* (database), https://stats.oecd.org/.

StatLink 🔗 https://doi.org/10.1787/888933888773

On average across OECD countries, household debt has been rising while savings have been declining. In 2016, household debt was at its highest level in the previous two decades. Higher debt and lower savings can be risky. Depending on the affordability of the debt and accessibility of the savings, a sudden rise in expenses or drop in income could be a more severe shock if debt is already high. When the effects of such a shock are widespread, such as during the 2008 financial crisis, large parts of the economy could be in an insecure position. With the right knowledge and skills, individuals can play a role in ensuring their own economic security. However, levels of financial literacy are low: in 2015 almost a quarter of 15-year-old students lacked the baseline level of proficiency in financial literacy, meaning that at best they could make decisions on everyday spending and recognise the purpose of everyday financial documents such as an invoice (OECD, 2017).

Job security is an important element of economic and financial security. Globalisation has resulted in many jobs moving to different parts of the world; with automation machines are able to perform tasks previously carried out by human employees; and deindustrialisation has led to more and more jobs becoming part of the 'knowledge economy' instead of manual labour. Another trend is the rise of a 'gig economy', where most work might no longer be tied to a steady job but instead coordinated through some kind of digital freelance platform. In 28 out of 33 OECD countries where data were available, labour market insecurity rose between 2007 and 2015, meaning that the expected loss in earnings associated with potential unemployment went up on average.

Figure 3.10. Precarious workers

Expected percentage earnings loss associated with unemployment, 2007 and 2015
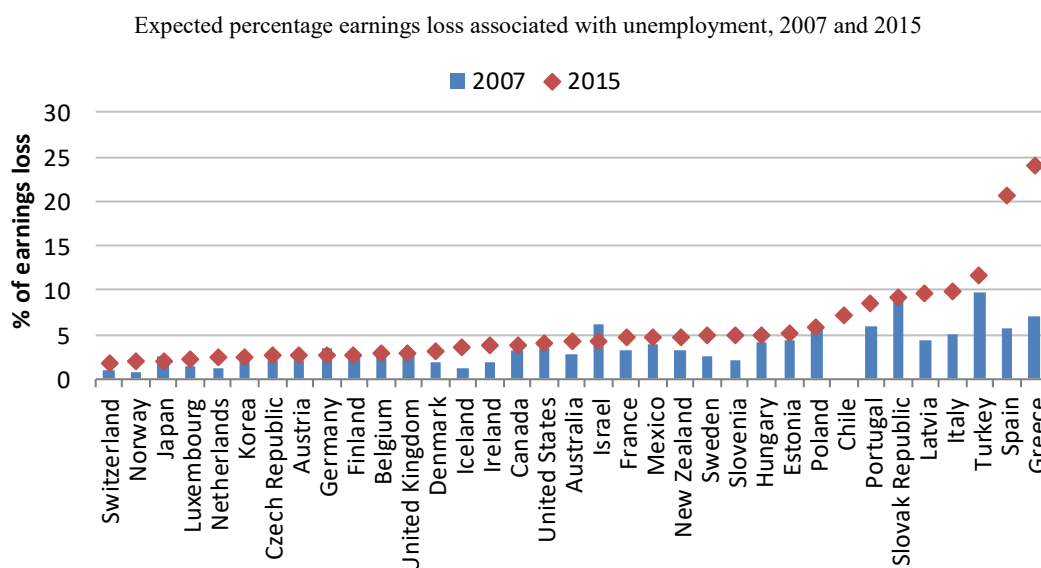
Note: This loss depends on the risk of becoming unemployed, the expected duration of unemployment and the degree of mitigation against these losses provided by government transfers to the unemployed (effective insurance). For Israel, 2008 data are used in place of 2007.

Source: OECD (2016) *Job Quality Database,* www.oecd.org/statistics/job-quality.htm.

StatLink 🔗 https://doi.org/10.1787/888933888792

And education?

- Even tertiary graduates sometimes lack the knowledge and skills to manage their finances. Do education systems need to provide more financial education, or improve what is currently on offer?
- What skills (for example, entrepreneurship, resilience and perseverance) will be important if the future of work is based mostly on freelance digital 'gigs'?
- What knowledge and skills would support individuals to adopt prudent behaviours and make informed decisions with regard to their own economic security?

SECURITY AND EDUCATION: MOVING FORWARD

What are some of the ways the security trends presented in this chapter interact with education, and how can education affect these trends? Some answers are obvious and immediate, for example, the impact of cyber risks on students, and conversely, the potential for educators to teach digital resilience. Others are longer term, for example, the need to build school buildings that can withstand extreme weather events.

Connecting education and security

Protecting mind and body

- Fostering health literacy, including informed decision-making about the proper use of antibiotics and the importance of vaccinations for all age groups
- Maintaining comprehensive education about safety standards in schools and playspaces
- Involving more actors in educational governance, such as family, community and academics

Safeguarding cyberspace

- Developing digital literacy for all citizens, especially those most vulnerable
- Strenthening digital skills of educators to help them better use technology in teaching and learning
- Building partnerships with industry leaders, experts and responsible hackers to keep abreast of new online threats and opportunities

Respecting boundaries

- Investing in R&D to strengthen national innovation systems and defense, including against cyber terrorism
- Teaching politics, history, and civic education, as well as fostering tolerance, trust and resilience
- Encouraging student empowerment through student associations and class representatives

Preserving the environment

- Fostering "green" fields of study in secondary and tertiary education to build capacity to prevent, mitigate, or defend against natural disasters
- Promoting ecofriendly schools and universities by using sustainable designs and materials, and incentivising clean forms of transport
- Supporting national and international research efforts in "clean tech" and innovative green technology

Securing financial well-being

- Strengthening financial literacy at all ages, from the youngest to the oldest
- Providing effective re-training and skills development to help the unemployed re-enter the labour market
- Strengthening VET systems and supporting apprenticeship models with diverse types of employers (including digital skills)

Future thinking: preparing for uncertainty

Despite the best-laid plans, the future is inherently unpredictable. This section explores some examples of uncertainties surrounding the trends discussed in this chapter.

⚠ **SHOCKS & SURPRISES**   **Global pandemic?**

- With a more densely populated planet and a lot more international travel than 100 years ago, it is impossible to rule out another global pandemic of the scale of the 1918 influenza. A future pandemic could be immensely disruptive as we are not sure who would be worst affected or how. A pandemic involving drug-resistant bacterial infections could be particularly destructive.

- *If this occurred, how would education systems balance the need to bring students and teachers together in spite of the possible risk of infection?*

CONTRADICTIONS   **Robots: friend or foe?**

- As the capabilities of machines and AI grow, they may gain the ability to make decisions that differ from human preferences or interests. They may also start attempting to increase their own power at the expense of humans. How much of a risk this would be to humans and how soon it could happen are matters of dispute even among informed experts.

- *Should education prepare us for a world of negotiation and possibly even conflict between humans and robots?*

DISCONTINUITIES   **Digital conflict?**

- War between countries could become more frequent again, in the form of traditional attacks or cyber warfare. Cyber attacks could also have significant physical consequences, for example on infrastructure and health care provision.

- *What kinds of partnerships might governments form with universities and other research institutions in the pursuit of the best knowledge and skills to achieve cyber-military goals?*

COMPLEXITY   **Remote learning: so far, yet so near?**

- Telecommunications and telepresence are becoming more useful thanks to improved video conferencing and augmented reality. As a result, many physical interactions are being replaced by virtual interactions. Distance learning is a well-established idea that could become mainstream. Technological development in fields such as virtual reality makes it even more promising.

- *How can education keep pace with such changes if they take off in other spheres of the economy and society, and how could it make the most of their benefits?*

FIND OUT MORE

Relevant sources

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Glossary

- **Ambient air pollution**: Particulate matter and ozone pollution of the air.

- **Antimicrobials**: Medicines which kill microorganisms or stop their growth. Antimicrobials can be classified according to the type of microorganism they treat. For example, antibiotics are a type of antimicrobial used against bacterial infections.
- **Antimicrobial resistance**: The ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotics, antivirals and antimalarials) from working against it. As a result, standard treatments become ineffective, infections persist and may spread to others.
- **Biometrics**: Measurements and calculations based on body characteristics such as fingerprints, iris patterns or DNA. The data produced from biometrics can be used to identify individuals uniquely, which makes biometrics useful for access control and surveillance.
- **BRIICS**: The BRIICS grouping of countries includes Brazil, the Russian Federation, India, Indonesia, China and South Africa.
- **Data breach**: Incident in which unauthorised or untrusted people are able to access, copy, view, steal or otherwise use data.
- **Deindustrialisation**: Process of social and economic change which occurs when industries such as manufacturing decline or disappear in a particular country or region.
- **Financial literacy**: Combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial well-being.
- **Gig economy:** A way of working that is based on people having temporary jobs or doing separate pieces of work, each paid separately, rather than working for an employer.
- **(ISC)²**: International non-profit membership association focused on inspiring a safe and secure cyber world.
- **International Association of Privacy Professionals (IAPP)**: A non-profit membership association of professionals in the field of information privacy.
- **Natural disaster**: A terrible event in nature (e.g., droughts, earthquakes, epidemics, floods and wind storms) that usually results in serious damage and many deaths.
- **Pandemic**: The rapid spread of an infectious disease throughout a large region, or even worldwide.
- **Renewable energy**: Energy generated from hydro (excluding pumped storage), geothermal, solar, wind, tidal, wave and biomass sources.
- **Security, cyber**: The protection of computer systems from theft and damage to their hardware, software or unauthorised access to information stored on those systems.
- **Security, economic**: Ability of individuals, households or communities to sustainably pay for their essential needs.
- **Universal Declaration of Human Rights**: A document adopted by the United Nations General Assembly affirming an individual's rights, such as the right to life and freedom from slavery.
- **Warfare, interstate**: Violence between two or more states, which use their respective national forces in the conflict.
- **Warfare, intrastate**: Political violence between armed groups representing the state, and one or more non-state groups.

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