



Strategic Foresight Analysis 2015 Interim Update to the SFA 2013 Report

North Atlantic Treaty Organization
Headquarters Supreme Allied Commander Transformation



FOREWORD



This Strategic Foresight Analysis 2015 Update Report is the second iteration of the Strategic Foresight Analysis (SFA) effort and follows closely behind the release of the first Framework for Future Alliance Operations (FFAO) as a contribution to the Allied Command Transformation (ACT) Long Term Military Transformation (LTMT) programme.

The analysis of the rapidly evolving security environment and its emergent trends and future military implications supports a common understanding of NATO's strategic fit within tomorrow's geo-political landscape as we seek innovative transformation solutions to address the potential challenges in NATO's long-term future.

The fluidity and complexity of recent developments across the globe validate the trend analysis of the SFA 2013 Report, and today's security environment includes multiple emergent destabilizing factors. Most critically, rising powers and a resurgent Russia are increasingly adapting an approach towards using power politics, while increasing defence expenditures can be seen across the entire Asia-Pacific region. Power is shifting among, below and beyond nation states. The shift is intensified by the rapid rate of technological change and the growing scale of economic interconnectivity. Governments must conduct the administration of mega-cities while being more accountable to non-state actors such as environmental organizations and human rights groups, multinational corporations, super-empowered groups and individuals. Lastly, malicious, non-state actors are exerting a greater influence not only in challenging the status quo within nation states but also by undermining regional and global security through increased illegal activities including organized crime and terrorism.

To meet the challenges of the future, NATO needs operationally agile forces that are resilient, strategically aware, supported by proactive strategic communications, and networked with a wide range of security partners. Our work ensures that Alliance, national leaders and defence planners have a common perspective from which to anticipate the challenges facing the Alliance in the decades to come.

This report, as an integral step in ACT's LTMT aim of supporting the NATO Defence Planning Process (NDPP), is meant to maintain the effort in transforming NATO forces across manpower and capabilities. However, it is not solely the NDPP that we wish to influence; we seek to generate discussion and inform National Defence planning while influencing concept and doctrine development that will enrich the training and education of all Alliance forces.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

General Denis Mercier
General, French Air Force
Supreme Allied Commander Transformation

This page intentionally blank

Table of Contents

EXECUTIVE SUMMARY	1
INTRODUCTION.....	3
CHAPTER 1 - CHARACTERISTICS OF THE FUTURE	5
CHAPTER 2 - POLITICAL THEME	7
CHAPTER 3 - HUMAN THEME.....	11
CHAPTER 4 - SCIENCE AND TECHNOLOGY THEME	15
CHAPTER 5 - ECONOMICS AND RESOURCES THEME.....	19
CHAPTER 6 - ENVIRONMENT THEME.....	23
CONCLUSION	25
BIBLIOGRAPHY.....	27

This page intentionally blank

EXECUTIVE SUMMARY

1. The Strategic Foresight Analysis (SFA) 2013 Report was the product of initial efforts to establish institutional foresight within ACT to provide NATO, national leaders and defence planners with a common perspective of the challenges facing the Alliance in the decades to come. The requirement for institutional foresight is affirmed by recent events, including unexpected crises in NATO's immediate vicinity. In the East, Russia's illegal and illegitimate annexation of Crimea and continuing support to separatists in Eastern Ukraine, and in the South, failed or failing states, deepening civil war in Syria and the emergence of Daesh¹ have been compounded by chronic economic problems in the Eurozone, unstable energy prices, and increasing environmental concerns. These emerging issues and the convergence of trends reinforce the need for continuous future horizon scanning in order to support improved decision making.
2. The SFA 2015 Update Report largely reaffirms the findings of the SFA 2013 Report, with a few noted exceptions, and identifies several emerging trends that warrant additional analysis in future studies. The future is neither completely predictable nor predetermined, and there is always the possibility of strategic shock. Thus, the SFA Update defines the boundaries of the problem in order to facilitate future analyses.
3. The world is becoming increasingly more complex, more challenging, and less secure, even though globalization and developments in technology are expected to provide ample opportunities for positive developments in health, welfare and security. Increasing interdependency amongst countries has the potential to create stability in the long-term. However, the ongoing transition from a unipolar to a multipolar and multi-dimensional world has created instability that is likely to continue. This transition will test the Alliance's ability to adapt to the challenges of a rapidly changing global security environment.
4. Fault lines between civilisations have the potential to promote the growth of extremist, radicalized groups. The global economy is changing, with power shifting from the West to other regions and also within the nation-state system. Advances in technology and the worldwide sharing of ideas and ideologies, research and education, supported by social media and big data, are accelerating these developments. It is not feasible to prepare for every eventuality that might occur. However, having the ability to handle the unexpected is important. This will require individual and organisational level measures and long term strategies. The institutional foresight capacity within ACT will provide NATO with advanced notice of potential discontinuities to assist the Alliance to perform its core tasks in a rapidly changing, complex and multipolar future security environment.

¹ The US *National Security Strategy*, Foreword. This terrorist group is also called as "The Islamic State of Iraq and Syria (ISIS)" and "Daesh (al-Dawla al-Islamiya al-Iraq al-Sham)."

This page intentionally blank

INTRODUCTION

AIM

1. Strategic Foresight Analysis (SFA) is an essential component of ACT's Long Term Military Transformation (LTMT) efforts as it provides input to the Framework for Future Alliance Operations (FFAO) and the NATO Defence Planning Process (NDPP). The aim of the SFA 2015 Update Report is threefold: first, to review existing trends identified in the SFA 2013 Report; second, to identify any emergent trends that will be further developed in the SFA 2017 Report; and finally, to maintain the transparency of ACT futures work through open collaboration with NATO and Partner nations, academia and industry.

BACKGROUND

2. The SFA 2013 Report was the successful culmination of a two-year project that analysed key future trends to develop a shared vision of the future. The SFA 2013 Report established the groundwork to advance the FFAO effort, which will assist NDPP in the identification of the forces and capabilities required for NATO to fulfil its Core Tasks beyond the mid-term planning horizon.

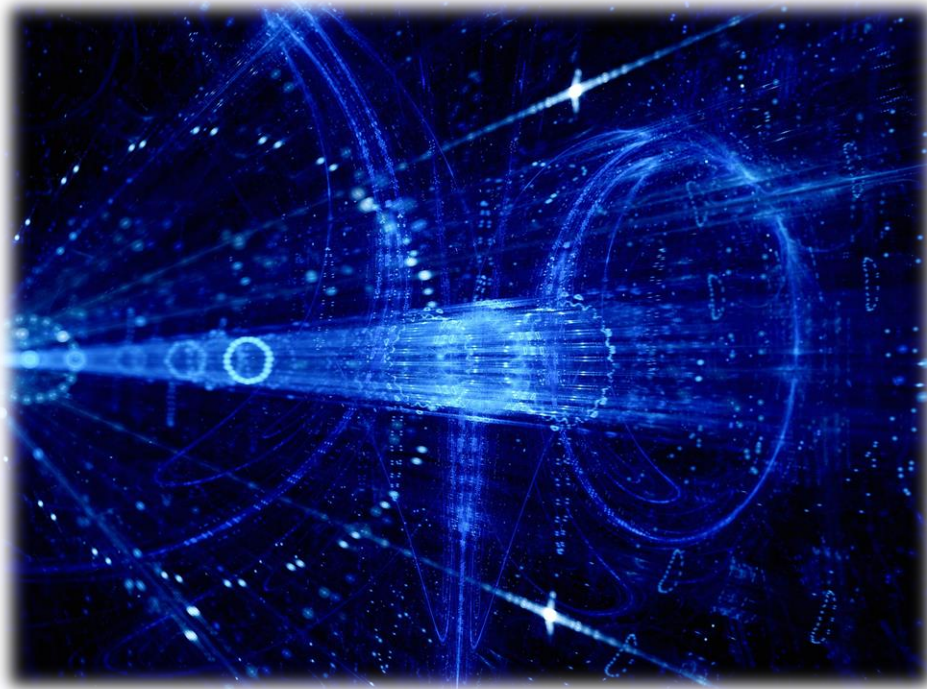
3. The SFA 2015 Update Report builds upon the findings of the SFA 2013 Report and is based on recent national and international futures works and studies that reflect the continuing changes in the political, human, economics and resources, technology, and environmental themes of the future security context. This Update Report also benefits from other ACT futures-related analyses and the results of ACT-led workshops dedicated to the analysis of the SFA 2013 Report findings. The workshop findings revealed that no trend from the SFA 2013 Report will remain totally unchanged and that a number of emergent trends warranted further research and analysis. The initial findings captured here will be analysed in greater detail in the development of the SFA 2017 Report. This effort keeps the SFA findings fresh and the futures community engaged, providing a solid departure point as work commences on the next full iteration of the SFA 2017 Report.

SCOPE

4. The SFA is intended to aid understanding of how current trends could affect the world. These trends could interact or even counteract each other to produce unanticipated consequences. Equally unpredictable are unforeseen events that could transform situations rapidly from stability to instability. Trends may also converge to create a compound complexity or an instability situation that produces a different or an unanticipated trend. Additionally, the accelerated rate of change within the complex and uncertain future security environment makes reliable anticipation of the future even more difficult. Therefore, the SFA Reports provide a shared vision of relevant trend patterns that inform FFAO and support the development of Military Implications (MI) from which defence planners may then derive the capability requirements to cope with the complex future security environment.

5. The SFA 2015 Update is designed along similar lines to the SFA 2013 Report, grouping trends into five broad themes: Political, Human, Science and Technology, Economics/Resources, and Environment. The report provides a review of existing trends in the SFA then identifies potential emergent trends. Unlike the SFA 2013 Report, 'Defence and Security Implications' are not included in this iteration as these will be reviewed in development of the SFA 2017 Report. These activities will continue over the coming years as part of a persistent, formal horizon-scanning programme at ACT.

CHAPTER 1



CHARACTERISTICS OF THE FUTURE

1. The SFA 2013 Report identified the following characteristics of the future: Period of Transition, Rapid Rate of Change, Uncertainty, Globalization and Complexity. These five characteristics were used as the foundational framework for the SFA 2013 Trends. These characteristics continue to be seen in recent national, international, and think tank future studies as they support the understanding of the future security environment.

2. The period of transition from a unipolar world, dominated by the United States, is exemplified by a relatively unstructured hierarchy of old and emerging powers. Additionally, a diffusion of power from state to individual and non-state actors exacerbates this change. History repeatedly tells us that rapid change and periods of transition may bring many dangers. In addition to the recent financial volatility, which may well reoccur, risks in this transition period include the growing prospect of a more self-confident and potentially more aggressive Russia, a potential nuclear arms race in the Middle East, and possible interstate conflicts over scarce resources.²

3. Globalization remains a reality. The globalized world is a huge networked system, like a spider's web. Movement or damage in one spot has the potential to be felt throughout the entire web; therefore, national security issues always need to be considered within a global focus. Globalization, supported by the rapid development of technologies in

² Munich Security Conference, *Collapsing Order: Reluctant Guardians*, (Munich Security Report, 2015), 4-6.

communication, transport, and trade, is likely to speed up the pace of change even further.³ However, unrealized promises of globalization in some regions/countries have resulted in self-interested foreign policies and the rise in nationalist sentiment.⁴

4. The future is not all dire, as exciting opportunities may also arise. The rate of change is accelerating with an unprecedented intensity,⁵ creating cumulative effects on other aspects of the strategic environment, and technological innovation, behavioural change, and globalization all offer significant opportunities to leverage digital technology, share ideas, and discover new resources.

³ European Union, *Global Trends to 2030: Can the EU meet the Challenges Ahead?* (European Strategy and Policy Analysis System, 2015), 9-12.

⁴ World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), 29.

⁵ European Union *Global Trends to 2030*, 5.

CHAPTER 2



POLITICAL THEME

1. **Shift of Global Power:** A potential rebalance of power from the West to other regions of the world could present political, economic, and military challenges for NATO members.

FINDINGS

- a. All indicators suggest that this trend is still valid and the rebalancing of power across a multi-polar world is gathering momentum. That said, there is a need for conceptual clarification of terms such as 'power'. The shift of economic power continues and likely will be associated with an increase in hard power in East and South⁶ Asia, Eastern Europe and the Middle East. Militarization, particularly in developing nations, might present challenges to international security and result in instability. Historically, major power shifts between states and regions occur infrequently and are rarely peaceful.
- b. Former Soviet territory and neighbouring countries will remain susceptible to Russian political, economic, and military pressure and other elements of the hybrid threat. Russia's actions are likely to be more assertive towards those neighbouring regions and countries that present security concerns. Use of hybrid techniques will also increase concerns over states' capacity to influence the actions of non-state actors. Additionally, hybrid activities do not necessarily meet the threshold to trigger collective response, which may lessen the political leverage of Western political and military institutions in the future security environment.

c. The international political system will be congested by various overlapping international organizations and political systems. The challenge will be finding common ground. Additionally, international organizations could struggle to respond rapidly to the dramatic changes of the modern political, military, and economic environment. Finally, the shift of global power and the use of hybrid strategies needs to be analysed further in development of the SFA 2017 Report to identify their impact on the employment of power outside traditional norms.

2. **Shifting Political Structures:** The transition of autocratic and theocratic regimes towards more democratic forms of government will continue.

FINDINGS

a. Although this trend remains valid, its rate of development is slowing. Transitions have moved from autocratic-to-democratic or democratic-to-autocratic, and in some instances states have failed. The optimistic western expectation that the Arab world would potentially become more democratic has faded. As internal authority weakens and states collapse, different actors have pursued sectarian strife, ethnic conflict, and even civil war to expand their standing in the international system at regional and global levels. In this pursuit, democratization has not been one of their immediate objectives. A further analysis of power shifts will be conducted in developing the SFA 2017 Report.

3. **Polycentric World:** The world is becoming increasingly interconnected and polycentric.⁶ The state will continue to play a significant role in a polycentric world, albeit in a more complex security environment. The Western view is that there is an implicitly agreed set of rules and norms, but in a polycentric world, this set of rules will likely be less evident and more contested, resulting in a need for dialogue and negotiation. This may pose a considerable challenge if some degree of common ground is to be found. “Peacefully managing the onset of a polycentric world will require compromise, tolerance, and recognition of political diversity.”⁷ Simultaneously, NATO must adhere to the norms and rules that are the basis of its own identity.

FINDINGS

a. Polycentrism has been suggested as one of the key characteristics of the future and may be moved to Chapter 1 of the SFA 2017 Report.

⁶ European Union, Institute for Security Studies, *Citizens in an Interconnected and Polycentric World: Global Trends 2030*, (2014), 12, 18-20. Polycentrism is the principle of the organisation of a region around several political, social, or financial centres. Multipolarity is defined as the distribution of power in which more than two nation states have nearly equal amounts of military, cultural, and economic influence.

⁷ Trine Flockhart et al. *Liberal Order in a Post-Western World*, (Transatlantic Academy, May 2014), 8.

EMERGENT TRENDS

4. **Increasing role of non-state actors in domestic and international affairs:** Although it has been widely covered, non-state actors and their increasing role deserve to be monitored as a separate trend. This trend does not necessarily mean that the state is weakening. Analysis indicated that non-state actors continue to add complexity which presents both challenges and opportunities. Increased potential to access technology, state-controlled technologies including WMD/E, can amplify the role and impact of non-state actors. Some of the non-state actors of recent interest, such as Daesh, have even developed state-like qualities. This trend will be reviewed with **“Shifts in global (and regional) institutional structures.”**

5. **Return of power politics, challenges to the liberal world order and increasing potential for interstate conflict:** Although it was considered a valid trend, there were different interpretations of it mainly because of different understandings of the term ‘Power Politics’. Therefore, the trend potentially will be renamed to **‘Increasing use of power politics’** or **‘Increasing potential for conflict including the use of military force’**. This trend should include all aspects of power not just hard power.

6. **Increasing democratic discontent:** Increasing democratic discontent exists in both old and new democracies due to income inequality and the governments’ inability to enable employment opportunities and provide social security to the masses. This trend will be considered with the existing trend – **Shifting Political Structures**.

7. **Ideas that require further analysis in development of the SFA 2017 Report:**

a. **Tensions within the West:** As a result of the financial crisis and the current refugee crisis, tensions within the West and their implications on the transatlantic relationship will be monitored. Additionally, existing western institutions increasingly are losing buy-in from their respective populations.

b. **Resurgence of regional dynamics:** Emerging regional hegemon may strive to change regional dynamics and establish regional structures to support their objectives. This ought to be further analysed and monitored. Although this relates to the existing trend ‘Shift of Global Power’ and the suggested new trend ‘Shifts in Global Institutional Structures’, the specific regional dynamics may require separate monitoring.

c. **Shifts in Global Institutional Structures:** In parallel with the increasing role of non-state actors, shifts in global/regional institutions may warrant a separate trend as the existing multilateral institutional framework appears to be called into question.

d. **Potential retreat or disengagement of the West:** This emergent trend has a direct impact on the Alliance's Cooperative Security core task. Negative experiences with democracy promotion and nation-building, the high costs of interventions both in blood and treasure with few tangible (positive) results coupled with resource constraints might deter the West from engaging in global/regional affairs that would have otherwise led to a NATO out-of-area involvement.

e. **New challenges to NATO's decision-making process:** Recent use of hybrid techniques illustrates the possibility of increasingly aggressive behaviour that lies below the Article 5 threshold. Whether or not future actions are a new form of hybrid warfare, they have the potential to paralyze the Alliance's decision-making process.

CHAPTER 3



HUMAN THEME

1. **Changing Demographics:** Future demographics will be driven by diverse effects.

FINDINGS

a. Changing Demographics as a trend is still valid. The effects of population change will become more evident than they are today and will challenge the ability of states to provide for the needs of their populations. Increased social welfare spending, as a response to changing demographics (e.g. healthcare in regions with ageing), could lead to decreased spending on defence and security. The review of data shows how each demographic variable, and its consequent projections, is not only subject to different interpretations and estimates, but may also interact in many ways with other demographic variables, as well as with variables and trends in other sectors.

b. To comprehend the complex causal mechanisms that underlie change in demographics, the SFA 2017 Report will need to consider trends in economy, energy, technology, health, environment, gender equality and politics to understand how these factors could influence or interact with demographic indicators.

2. **Urbanization:** By 2040 cities will contain 65% of the world's population and 95% of urban population growth will occur in mega-cities within developing nations.⁸

⁸ French Ministry of Defence, *Strategic Horizons*, (Paris: Delegation for Strategic Affairs, 2012), 118.

FINDINGS

a. Urbanization as a trend is still valid and increasing but at a slower rate. Cities may cross national borders, which is likely to have implications for effective future governance. At the same time, cities are expected to gain political power and greater influence over national authorities.

b. Albeit at a different rate, region by region or country by country, population shifts from rural to urban areas are expected to continue. Better planned urbanization can help alleviate certain risks that concentrate in urban areas.⁹ However, the new threats and risks emerging from the current rapid pace of urbanization, and a lack of effective governance in large and mega-cities, are both expected to be a source of instability, with resiliency of urban areas becoming a national security issue. The NATO Urbanization Working Group's key findings, such as how to address instability situations in large and mega-cities, will be reflected in the SFA 2017 Report.

3. **Human Networks:** Human networks are expanding at an exponential rate with many varying effects.

FINDINGS

a. This trend is still valid. Human networks will become increasingly decentralized thereby creating unforeseeable threats. The future level of mobility and population interconnectivity will provide opportunities for global communication and collaboration, increasing the complexity of the security environment. Furthermore, the increased flow of people and goods in the future may also bring a higher risk of pandemic diseases.

b. Improved accessibility, in combination with other trends (e.g. urbanization, access to technology, economy), will support transnational crime, terrorist activity and illegal immigration, potentially challenging national social and security systems. Urban centres in particular may become sources of power for human networks trying to replace the legitimate authorities and creating a potential source of friction and conflict. To counter such threats, it will be important to understand and monitor evolving networks (e.g. structure, processes, and key elements), and adapt and react accordingly.

4. **Fractured Identities:** Several contributing factors may lead to fractured national identities.

FINDINGS

a. This trend is still valid and will increase in influence and complexity as it involves a greater number of actors. In combination with readily accessible technology and existing or emerging human networks, fractured identities may create unforeseen threats. The combination of different cultures, values, ideologies, and the inability to

⁹ World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), 12.

integrate migrants effectively into the existing society may perpetuate the fracturing of identities and the risk of conflict. It will be more difficult to distinguish between friends and adversaries and to take decisive actions as individuals may demonstrate an allegiance to several actors. The preservation or creation of a shared identity is crucial for the long-term aspects of stability and security for the Nations and the Alliance. It is important for Nations to understand social dynamics, not only in their own countries but also in NATO's areas of interest. To maintain shared identity, Nations will likely need to continue addressing inequalities amongst stakeholders at every level in order to enable opportunities, protect choices, promote capabilities, promote self-esteem, and support good governance.

EMERGENT TRENDS:

5. **Transparency:** Intertwined with the increase of democratization of technology, the process by which access to technology rapidly continues to become more accessible to more people, the drive for increased transparency is expected to be significant enough to be considered as a stand-alone trend. It might have diverging effects on all parties involved. On the one hand, the individual and their privacy may be challenged by state authorities and state control measures. On the other hand, state authorities may face challenges in regards to internal affairs and the disclosure of information through private and individual means concerning subjects such as malfeasance or corruption within government agencies.

6. **Ideological Polarisation:** This trend should not be considered as a stand-alone trend. Self-radicalization and the individual's perceived identity seems to be a consequence of the trend "Fractured Identities". Therefore, it may be considered within the development of the SFA 2017 report to merge the effect of polarization with the Fractured Identities trend.

7. Ideas that require further analysis in development of the SFA 2017 Report:

a. **Migration:** Migration as a cause of crisis is not only an ongoing challenge but might have long-term effects, thereby presenting a potential test not only for Allied Nations but the Alliance itself. However, current situations (e.g. refugee situation in Europe) should be considered more a shock than a result of migration as a trend. Nevertheless, the integration of immigrants not only within a nation but also in the labour market will be crucial for state security in the future.

b. **Gender issues:** Gender is a cross-cutting issue that has the potential to function as a driver in different security-related issues. New perspectives on the role of men and women might evolve which could initiate change in civil societies in general and the military in particular.

c. **Human enhancement:** There will continue to be controversial perspectives concerning the intertwining of human enhancements with biotechnology. Western nations may be reticent in using human enhancement whilst other nations may be more receptive. Regardless, application of human enhancement by opponents might be a challenge in future conflicts and should therefore be explored further.

d. **Increased privatization of security forces:** Privatization of security forces will not only provide military capabilities but enable nation states as well as non-state actors to influence the security environment or exploit power vacuums. The use of “private warriors” may create challenges in regards to legal aspects and the International Law of Armed Conflict.

CHAPTER 4



SCIENCE AND TECHNOLOGY THEME

1. **Technology Accelerates Change:** Accelerating cycles of exploration, discovery, and exploitation of technologies, along with the innovative fusion of existing, emerging, and new technologies, will combine to bring about rapid change in the future.

FINDINGS

a. All indicators suggest that this trend remains valid. Technology is a catalyst for change. Creativity and spontaneity are human factors that help to structure and accelerate new technologies. The general acceleration of innovation and technological change is a stable trend, but the concrete direction, speed of innovation and diffusion are very uncertain. In particular, information and communication technology is advancing at a pace that is surpassing societies' ability to manage and adapt. It is the scale and speed with which this progress is taking place that is creating the challenge. These changes may be quite disruptive because increased automation may reduce jobs in manufacturing, assembly, freight transportation, and retailing.¹⁰ Another important consideration is the lag time between the emergence of a technology and the development of policy and legal frameworks to govern its use. However, national or industrial policy choices made through regulation and investment can promote development and use of technology to mitigate disruptive effects in a social, or human, context. In development of the SFA 2017 Report, this trend will need to be monitored at global, regional, and local levels.

¹⁰ Institute of Electrical and Electronic Engineers Computer Society, *What will our world look like in 2022?* (2014), 83.

2. **Increased Access to Technology:** Commercial research and technology continues to outpace that of governments in the development of new technologies.

FINDINGS

a. All indicators suggest that this trend is still valid and it needs to be monitored at global, regional, and local levels. Technology has enabled other actors as well as states to enter and play in global and regional power structures. The ability of malicious non-state actors to access new technologies or seek to obtain restricted information or technology, e.g. WMD/E, and harness their use will continue to have an effect on all regions. It may soon be the case that states will be characterized not by geography, population or economic development but by their technological standing. One of the side effects of technological accessibility is the loss of monopolies of government and state in the technology field. The emergence of non-state actors exploiting technology will cause both political and economic hardships for some states and may challenge their security.

b. Autonomous systems will evolve further, integrate into everyday life, and will increasingly be employed outside the military. Their use in other sectors, such as post-disaster relief, mining, geological survey, police surveillance and transportation, will continue to grow. These key aspects of access and use of technology will be studied further in development of the SFA 2017 Report.

3. **Centrality of Dynamic Networks:** A globally connected and networked world creates a universal availability of information.

FINDINGS

a. All indicators suggest that this trend is still valid. However, it should be modified to focus less on the computer aspect and more on the network. Networks will become ubiquitous.¹¹ This is due mainly to the fact that networks will become so embedded in everyday life that networks will seamlessly fade into the background. Therefore, the 'Centrality of Dynamic Networks' is a more realistic title of this trend.

b. It is expected that there will be an increased potential for cyber-intrusion, espionage and attacks against Alliance networks and military systems. Open access to information within these networks drives the requirement for robust network security and electronic resources for strategic communications and influence. Control of such networks is expected to remain a primary concern. This trend continues to change at an accelerated rate and it

¹¹ Tsukayama, Hayley, "What Eric Schmidt meant when he said 'the Internet will disappear'," *The Washington Post* (23 Jan 2015). <https://www.washingtonpost.com/news/the-switch/wp/2015/01/23/what-eric-schmidt-meant-when-he-said-the-internet-will-disappear/>

is important that it be monitored as a source of both conflict and stability that might directly or indirectly impact the security of the Alliance.

EMERGENT TRENDS

4. **Proliferation of autonomous systems enabled by Artificial Intelligence.** Autonomous weapon systems are defined as weapon systems with autonomy in the ‘critical functions’ of acquiring, tracking, selecting and attacking targets. The next step for autonomous weapon systems would be weapons that can be programmed to determine their own actions, make complex decisions and adapt to their environment independently. The complexity of autonomous weapon systems may not reach that level of autonomy within the time scope of the 2017 Report; however, the implications for international security and strategic stability should autonomous weapon systems be further developed and integrated into the military structures of states or non-state armed groups need to be addressed.

5. **Breakthrough in Energy Technologies:** Ground-breaking technological advances in safe, reliable, and affordable energy solutions have the potential to radically impact the future of energy. While breakthrough technologies have the potential to revolutionize energy production, they are particularly difficult to forecast accurately because research initiatives are high-risk, extremely unpredictable and prone to disappointing or inconclusive results.¹² Therefore, this is not perceived as a trend in itself. However, there is a growing trend of a movement away from fossil fuels, driven partly by the non-economic broader concern nations are adopting that something must be done about climate change. Additionally, the use of energy is growing and there is an increasing need for mobile or transportable sources of power and decentralized production. This trend will be further reviewed in either the Technology theme or Economics and Resources theme, depending on the major influencing factors under consideration and could be renamed as “Increasing Reliance on Mobile, Decentralized Energy.”

6. Ideas that require further analysis in development of the SFA 2017 Report:

a. **Loss of state/government monopolies over advanced technology.** This could be brought about due to technological advances and the exponential increase in the use of technology by non-state actors. This should include control of sensitive technologies that could be used for malicious intent. The trend should take into account governance, the strategic political environment, and defence budgetary constraints.

¹² The US Joint Chiefs of Staff, *Anticipating the Future Security Environment - Key Conditions for Future Joint Force Operations*, (May 2015), 38-39.

This page intentionally blank

CHAPTER 5



ECONOMICS AND RESOURCES THEME

1. **Globalization of Financial Resources:** The financial networks and communication systems that manage the world's critical resources are increasingly intertwined.

FINDINGS

- a. All indicators suggest that globalization of financial resources as a trend is still valid and the potential threats to the financial system are increasing. The financial resources of the West are almost entirely interconnected and the global financial system is expanding with participation of developing states in the global market. The unregulated digital monetary revolution, the emerging powers' increasing influence on international institutions and their potential challenge to the international economic system, and the changing balance of international economic power are sub-trends that will be further analysed in the SFA 2017 Report.

2. **Increased Resource Scarcity:** Nations need increasing amounts of energy and raw materials to sustain growth and maintain an advantage in the globalized world.

FINDINGS

- a. Energy security will remain a major concern with large resource deposits located in unstable regions of the world. Availability of resources to maintain a steady growth for developing countries is just as critical for the developed countries that aim to maintain the standard of living of their societies. The energy demand is expected

to increase by nearly 40% by 2035.¹³ This might result in competition for resources that leads to instabilities in different regions from the Middle East to the Arctic, and from the South China Sea to South America. Energy resources increasingly will be used to achieve political ends, and balancing this behaviour by developing new technologies to reduce dependency will be given higher priorities in national security agendas. Oil price instability will continue to have a direct impact on the geopolitical stability of major producer countries and their national budgets should be monitored closely.

b. Rapid urbanization, which is taking place in a great majority of developing countries, will exacerbate the competition to control and/or access water. The energy nexus with water and food will occupy agendas and be part of the discussion about access to fresh water, availability of food, environmental protection, and climate change. It is expected that competition for water will mount between urban and rural communities, agricultural, household and industrial consumption and between countries.

3. **Decreasing Defence Expenditures in the West:** Governments faced with slow or non-existent growth, rising unemployment and increasing debt burdens will continue to have competing priorities.

FINDINGS

a. All indicators suggest that this trend is still valid. Over the last decade, military spending has grown significantly in several parts of the world. China and Russia have seen increases of 170% and 79%, respectively, while US military spending has been declining since 2010.

b. Alliance Secretary General Jens Stoltenberg, commenting on the declining trend in Allied defence expenditure, warned that, “we need to redouble our efforts to reverse this trend. Because we are facing more challenges, and we cannot do more with less indefinitely.”¹⁴ There is growing disparity in defence investments and capabilities between the United States and NATO European members in general, and there will be growing pressure on the larger European countries, to compensate for the reductions in their armed forces. This trend risks further eroding the strength of NATO solidarity and continues to be a source of concern within the Alliance, notwithstanding the Defence Investment Pledge from the Wales Summit. This validates it remaining a critically important trend that might impact on the Alliance’s ability to meet its three core tasks and respond to emerging future threats.

¹³ *BP Energy Outlook 2035*, (February 2015), 11. Primary energy consumption [is expected to] increase by 37% between 2013 and 2035.

¹⁴ Jens Stoltenberg, “Press Conference,” NATO website (22 June 2015).

EMERGENT TRENDS

4. **Global Inequality:** While material conditions for most people are likely to improve over the next 30 years, the gap between rich and poor is likely to increase.

a. Globalization and the accelerating technological revolution bring many economic opportunities but also reinforce growing economic inequality in both developed and developing economies. Rising disaffection with the economic, financial and social system is accompanied by a conspicuous contraction in traditional employment and employment contracts in the digital economy. Technologically-based multinational corporations will continue to wield growing influence at the international level, which may boost their status toward parity with state governments in the future. Governments will be confronted by the increasingly complex economic and social challenges of automation, robotics and temporary access to paid employment. Failure to successfully respond to these challenges will aggravate disillusionment, magnify unfulfilled expectations and intensify risks of extremism and increase the disparity between the advantaged and disadvantaged. Increasing economic inequality needs to be monitored more closely as it impacts on social and international stability.

b. The allocation of financial resources will become further concentrated as asset-based wealth grows quicker than income-based wealth, which is diverging between high and low skill labour sets. The replacement of labour with capital investment (automation and robotics) will move economic rewards towards those who have the capital. Increasing automation, long-term unemployment, economic stagnation, lower incomes, and zero marginal cost are likely to fuel grievances. European/Western populations will experience a widened gap between the 'Haves and Have nots'. For these nations, this could result in a greater demand for entitlement support for those 'left behind', thereby resulting in higher social expenditures.

5. **Ideas that require further analysis in development of the SFA 2017 Report:**

a. **The rise of a network-based smart economy:** The developments in disruptive technologies are expected to transform societies, economic organizations and decision-making in the economic systems. These developments will be evident in the increasing application of 3-D printing (additive manufacturing) and human and biological engineering. These and other changes herald a potential renaissance in small-scale manufacturing together with a reappraisal of the ownership of intellectual property rights and national/supranational legal frameworks. Additionally, Bitcoin digital currency and other peer-to-peer digital payment systems increasingly will have the ability to disrupt existing international currency and payment systems and crypto-currencies utilizing 'blockchain' technologies will revolutionize decentralized distributed ledgers (bookkeeping).

This page intentionally blank

CHAPTER 6



ENVIRONMENT THEME

1. **Environmental and Climate Change:** Global environmental change and its impacts are becoming readily apparent and are projected to increase in the future.

FINDINGS

a. All indicators suggest that the trend is still valid and increasing in regard to severity of extreme weather events and other impacts such as melting polar and glacial ice. However, it is still uncertain what the environmental effects will be by the end of the 21st century. This uncertainty is complicated further by the fact that climate change-related environmental effects may have second or third order effects on other domains (e.g. economic, resources, urbanization, and demographics) and may also be affected by future trends in these domains. The severity of this development will potentially increase the number of conflicts based on a mix of different trends and drivers in combination with environmental and climate change. These conflicts may threaten global stability and security and may therefore impact directly or indirectly the members of the Alliance.

2. **Natural Disasters:** The impacts of natural disasters (e.g. storms, floods, earthquakes) are becoming more devastating.

FINDINGS

a. This trend is still valid and increasing in frequency and intensity. It is primarily driven by the construction of infrastructure in disaster-prone areas magnified by the effects of climate and environmental change. Though natural disasters are not of themselves the sole source of conflict or instability, the Alliance could be required to provide humanitarian assistance and disaster relief. This trend is entwined with the challenges emerging from different phenomena (e.g. urbanization, technological development, climate change). The underlying drivers will increase and thereby very likely will magnify the destructive effects of natural events. The increasingly interconnected global system will exacerbate the effects of natural disaster. Although natural disasters can occur anywhere, they will be especially challenging for the political and security system where the social and infrastructural resilience is already weak. This trend might challenge the stability and security in regions within the area of interest of the Alliance.

CONCLUSION

1. The SFA 2015 Update provides a review of existing SFA 2013 trends and identifies emergent trends while maintaining interaction with Nations, NATO Commands and Agencies, think tanks, industry and academia. The review of existing trends allows the present to be viewed from a wider perspective and enables a better understanding of potential future challenges. The findings in this update will establish a departure point for development of the SFA 2017 Report. The key findings from each of the themes are summarized below.

2. **Political Theme.** All indicators suggest a continuing rebalancing of power across a multi-polar world. The shift in economic power has increasingly been associated with the growth of hard power.

- Transitions have moved from autocratic-to-democratic or democratic-to-autocratic, and in some instances states have failed.
- The increasingly important role played by non-state actors, both in domestic and international affairs, has been identified as an emergent trend.
- The return of power politics and the increasing potential for interstate conflict as a consequence of challenges to the liberal world order¹⁵ is expected to continue.
- The increasing income inequality and the ability of governments to provide employment and social security will continue to be a challenge over the coming decades.

3. **Human Theme.** Changing demographics, urbanization, human networks, and fractured identities will continue to shape global, regional, and local security considerations.

- Population growth, composition, and ageing in some areas, as well as migration, will continue to have diverse effects on developed and developing nations.
- Urbanization will continue steadily, but at a slower rate, and will potentially have a significant impact on future operations.
- Human networks will continue to increase in number due to the proliferation of technology and expanding interconnectedness.
- Fractured identities, accelerated by the democratization of technology, may create potential threats as different cultures, values and ideologies create fault lines in societies. There will be a greater demand for transparency from governments driven by the public's growing access to information.

¹⁵ Ikenberry, G. John, "The Future of the Liberal World Order: Internationalism after America," *Foreign Affairs* 90 (May/June 2011), 56-62, 63-68.

4. **Science and Technology Theme.** Science and technology will remain key catalysts for change and will have cross-cutting effects on all trends and all aspects of everyday life. Developments will enable states, non-state actors, and individuals to exert influence in international structures.

- Access to information and the use of dynamic networks will increase exponentially as these networks become ubiquitous and seamlessly fade into the background.
- Autonomous systems are expected to evolve further and will be employed militarily and in other sectors such as post-disaster relief, mining, geological survey, and transportation.
- Efforts to obtain safe, reliable, and affordable energy solutions will demand ground-breaking energy technologies.

5. **Economics and Resource Theme.** Resource scarcity and energy security remain serious concerns as most of the world's large energy reserves are in unstable regions of the world.

- Access to water will increasingly impact security considerations.
- Increase in energy demand might result in a search for new sources leading to competition and potential instability from the Middle East to the Arctic.
- Rapid urbanisation, which is taking place in the great majority of developing countries, will exacerbate and may lead to competition to control and/or retain access to resources.
- The decreasing defence expenditures trend in NATO Nations continues to be a source of concern while military spending has grown significantly in other parts of the world. Economic, social and political inequality between both individuals and groups is expected to continue to fuel grievances and perceptions of injustice.

6. **Environment Theme.** Natural disasters are expected to intensify in frequency and severity as the impacts of climate change increasingly materialize. The impact of natural disasters will become more acute, driven by the growth of mega-cities in developing countries as rapid urbanisation continues.

- The cascading effects of large scale natural disasters will be exacerbated by an increasingly interconnected global economic system, which may amplify the scope of regional disasters toward global impact. Resilience of infrastructure and resources, such as food, water and energy, is increasingly important to mitigate the effects of natural disasters.

BIBLIOGRAPHY

BP Energy Outlook 2035, February 2015. <http://www.bp.com/energyoutlook>.

European Union. *The European Union in a Changing Global Environment. A More Connected, Contested and Complex World*. Report by the High Representative of the EU for Foreign Affairs and Security Policy and Vice-President of the European Commission, 2015.

European Union. *Global Trends to 2030: Can the EU meet the Challenges Ahead?* European Strategy and Policy Analysis System, 2015.

European Union. Institute for Security Studies. *Citizens in an Interconnected and Polycentric World: Global Trends 2030*. 2014. http://europa.eu/espas/pdf/espas_report_ij_01_en.pdf.

Flockhart, Trine, Charles A. Kupchan, Christina Lin, Bartłomiej E. Nowak, Patrick W. Quirk, and Lanxin Xiang. *Liberal Order in a Post-Western World*. Transatlantic Academy, May 2014.

French Ministry of Defence. *Strategic Horizons*. Paris: Delegation for Strategic Affairs, 2012.

Ikenberry, G. John. "The Future of the Liberal World Order: Internationalism after America." *Foreign Affairs* Vol 90 No. 3 (May/June 2011): 56-62, 63-68.

Institute of Electrical and Electronic Engineers Computer Society. *What will our world look like in 2022?* <http://www.urenio.org/category/strategic-intelligence>.

Munich Security Conference. *Collapsing Order: Reluctant Guardians*. Munich Security Report, 2015.

Rasmussen, Anders Fogh. "NATO after Libya: The Atlantic Alliance in Austere Times." *Foreign Affairs* Vol 90 No. 4 (July/August 2011): 3-5.

Stoltenberg, Jens. "Press Conference." 22 June 2015. NATO website. http://www.nato.int/cps/en/natohq/opinions_120869.htm

Tsukayama, Hayley. "What Eric Schmidt meant when he said 'the Internet will disappear'." *The Washington Post*, 23 Jan 2015.

The US Joint Chiefs of Staff. *Anticipating the Future Security Environment - Key Conditions for Future Joint Force Operations*. May 2015.

The United States. The White House. *National Security Strategy*. February 2015.

World Economic Forum. *Global Risks 2015*. World Economic Forum Report, 2015.

Sources and Acknowledgements

The SFA 2015 Update Report will be used as the basis in development of the SFA 2017 Report. The SFA 2015 Update Report is based on a review of existing trends identified in the SFA 2013 Report and includes emergent trends identified in many national, think tank, international organizations and industry future studies. Sources also comprised studies and contributions from Partners. Additionally, workshops held in Vienna, Austria and Helsinki, Finland, combined with interactions with some national future studies organizations, provided a comprehensive view of the existing and emergent trends. SACT acknowledges the contributions provided by Nations, Partners, think tanks, academia, and representatives from industry. The extensive assistance and advice received in developing this update report is greatly appreciated.

Strategic Foresight Analysis Team Contact Details

Address:

Strategic Analysis Branch

HQ SACT Strategic Plans and Policy

7857 Blandy Road Suite 100, Norfolk Virginia USA 23551-2490

Telephone: +1 757 747 3374, +1 757 747 3991, +1 757 747 4275

E-mail:

sfa@act.nato.int

<http://sa.collab.act.nato.int/SitePages/Strategic%20Foresight%20Analysis.aspx> (NATO only)



