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**NORTH ATLANTIC TREATY ORGANISATION
HEADQUARTERS
SUPREME ALLIED COMMANDER TRANSFORMATION**



**Strategic Foresight Analysis
Interim Update 2015**

**COORDINATED DRAFT
FOR COMMENTS AND CONSIDERATIONS**

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FOREWORD

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EXECUTIVE SUMMARY

1. The Strategic Foresight Analysis (SFA) 2013 Report was the product of initial efforts to establish institutional foresight within HQ SACT. The requirement for institutional foresight has been emphasized by recent events, including unexpected crises in NATO's immediate vicinity. In the East, Russia's annexation of Crimea and in the South, failed/failing states, deepening civil war in Syria and the emergence of the Islamic State of Iraq and Levant (ISIL) have been compounded by chronic economic problems in the Eurozone, unstable energy prices, and increasing environmental concerns.

2. The SFA Interim Update 2015 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. It also confirms a key futures caveat: the future is neither completely predictable nor predetermined and that there is always the possibility of strategic shock. The world is becoming increasingly more complex, more challenging and less secure, even though the benefits from globalisation and developments in technology are expected to provide ample opportunities for positive developments in health, welfare and security. Increasing interdependency amongst countries will create further pressure on the existing international order, making the ongoing period of transition from a unipolar to a multipolar, multi-dimensional world more unstable. This transition will test the Alliance's ability to adapt to meet the challenges of a rapidly changing global security environment.

3. The world is constantly changing in every dimension, including demographics, urbanisation and societal. There are also developments in identities and culture resulting from fault-lines between civilisations that have the potential to promote the growth of extremist, radicalised groups. The global economy is changing, with power shifting from West to East and also within the state system. Technological developments and worldwide sharing of ideas and ideologies, research and education, social media, and big data are also driving these developments. However, instead of seeking to be prepared for all (un)imaginable future eventualities, it is important to have the intrinsic ability to handle the unexpected. This will require individual and organizational level measures, and long term strategies. This institutional foresight capacity will provide NATO with the ability to adapt to a rapidly changing, complex, uncertain and diffused multilateral future security environment.

INTRODUCTION

AIM

1. Strategic Foresight Analysis is an essential component of ACT's Long Term Military Transformation 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 Interim Update 2015 is threefold: first, to review existing trends identified in the SFA 2013 Report; second, to identify any emergent trends that will be further reviewed and 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 future trends. It was formatted to review key trends across the major recognised themes commonly used in most futures studies, focusing on a shared vision of the future. The SFA 2013 Report established the groundwork to advance the FFAO effort that will assist in the identification of the forces and capabilities required to succeed beyond the mid-term planning horizon. The SFA Interim Update 2015 builds upon the findings of the SFA 2013 Report and is based on recent national and international futures works and studies that reflect the recent changes in the political, human, economics/resources, technology and environmental domains of the future security context.

3. The SFA Interim Update 2015 also benefits from other ACT futures related analyses including results of an ACT-led workshop dedicated to the analysis of the SFA 2013 Report findings. The workshop findings reveal that no trend from the SFA 2013 Report will remain totally unchanged and that the emergent trends warrant further research and analysis. The initial findings captured here will be analysed in greater detail in development of the SFA 2017 Report. This will keep 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 Interim Update 2015, like the 2013 and 2017 Reports, does not attempt to predict the future, but is intended to aid understanding of how current trends are affecting the world around us. Any attempt to predict the future has purposely been avoided as it is impossible to predict which trends will interact or even counteract each other to produce unanticipated consequences. Equally

unpredictable are unforeseen events that could transform situations from stability to instability rapidly. Trends may also come together to create a compound complexity or an instability situation that produces a different or an unanticipated trend. Additionally, the accelerated rate of change, complexity and uncertainty makes the ability to reliably predict the future even more difficult. Therefore, the SFA reports provide a shared vision of relevant trend patterns which inform FFAO and allow Military Implications to be developed which defence planners may then use to develop the capabilities required to cope with the complex future security environment.

HOW TO READ THE SFA INTERIM UPDATE 2015

The SFA Interim Update 2015 is designed along similar lines to the SFA 2013 Report, gathering trends into five broad themes: Political, Human, Science and Technology, Economics/Resources, and Environment. The report includes a review of existing trends in the SFA then identifies potential emergent trends that have been the result of recent developments within the various themes. Unlike the SFA 2013 Report, 'Defence and Security Implications' are not included in this iteration and these will be reviewed in development of the SFA 2017 Report. However, the key point to take away from this interim update, and subsequent reports, is that the horizon scanning efforts within ACT continue and development of the next full report has begun.

CHAPTER 1

CHARACTERISTICS OF THE FUTURE

1. The Strategic Foresight Analysis (SFA) 2013 Report identified the following characteristics of the future: *Period of Transition, Rapid Rate of Change, Uncertainty, Complexity* and *Globalisation*. These five characteristics are used as the foundation to comprehend the SFA 2013 Trends, and they continue to be part of other recent national, international, and think tank future studies as they support the understanding of the future security environment. Of these characteristics, a *rapid rate of change* is accelerating with an unprecedented intensity¹ and creating cumulative effects on other aspects of the strategic 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. Despite the recent financial volatility, which may well reoccur, risks in this transition period also include the growing prospect of a more self-confident (and thereby likely more aggressive) Russia, a potential nuclear arms race in the Middle East, or possible interstate conflicts over scarce resources.²
3. The potential return of great power politics and the emergence of Islamic State of Iraq and Levant (ISIL), indicate major shifts not only in the area of international security, but also in the areas of economy, technology, energy and the environment. The heightened *complexity* and *uncertainty* resulting from the world's highly interconnected nature and the exponentially increasing rate of change, continue to be major drivers of a volatile and uncertain world.³ Additionally, complexity and uncertainty increase the potential impact of major crises at local, regional, and global levels.⁴ These developments increasingly challenge decision-makers and demand the application of a wide range of traditional and innovative strategies and tactics to counter threats and to take advantage of opportunities.
4. Although *globalisation* is increasingly blamed for self-interested foreign policies and the rise in national sentiment,⁵ it remains a reality. The globalised 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 and national security issues always need to be considered within a global focus. Globalisation,

1 EU "Global Trends to 2030: Can the EU meet the challenges ahead," (European Strategy and Policy Analysis System, 2015), p 5

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

3 World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), p. 6.

4 EU, European Strategy and Policy Analysis System Report, *Global Trends to 2030*, 2015, p. 13

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

supported by the rapid development of the technologies in communications, transport, and trade, is likely to speed up the pace of change even further.⁶

5. The characteristics of the future are not all doom and gloom, however, for many of these trends will also provide numerous exciting opportunities. Additionally, technological innovation, behavioural change, and globalisation all offer big opportunities to leverage digital technology, share ideas, and to discover new resources.

6. While the *Polycentric World* was identified as one of the trends in the SFA 2013 Report, subsequent analysis indicates that it remains an enduring element of the future security environment. Therefore, it will be considered as one of the key characteristics of the future in development of the SFA 2017 Report.

7. The polycentric world could be defined as the dangers facing the existing international order and the weaknesses in the institutions supporting it.⁷ The increasing interdependence of countries has not been effectively supported by the weakening international order, and the post-war international system may come under increasing pressure. At the same time, super-empowered individuals and destructive non-state actors may increasingly take advantage of the multiple loopholes in the international system. Associated with the rapidly shifting group identities, increasing ideological polarization, and an accelerated diffusion of power, the international community is struggling to support weak and failed states.⁸

8. The world is constantly changing in every dimension, including demographics, urbanisation and societal. There are also developments in identities and culture resulting from fault-lines between civilisations that create radicalisation and extremist groups. The global economy is changing, with power shifting from West to East and also within the state system. Technological developments and worldwide sharing of ideas and ideologies, research and education, social media, and big data are also driving these developments. These aspects of change have all been identified in the SFA 2013 Report. However, instead of seeking to be prepared for all (un)imaginable future eventualities, it is important to have the intrinsic ability to handle the unknown.⁹ SFA 2017 Report will review *adaptability* as another characteristic of the future. This will provide options for adaptation within a rapidly changing, complex, uncertain and diffused multilateral future security environment. This will require individual and organizational level measures, and long term strategies.

⁶ EU, "Global Trends to 2030: Can the EU meet the challenges ahead," 2015.

⁷ Trine Flockhart, "The Coming-Multi Order World," International Affairs, 2015, page 2.

⁸ EU, "Global Trends to 2030: Can the EU meet the challenges ahead," 2015

⁹ Tulip Time Conference, April 2015, Dutch and Canadian presentation on Future and Adaptability.

CHAPTER 2

POLITICAL THEME

Existing SFA 2013 Trends:

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

Key Facts, Developments and Future Considerations:

- **Economic:**

- China's economy surpassed that of the US as the world's largest in 2014.¹⁰
- There are major structural and policy related challenges within the developing economies; however, their growth rate is expected to remain higher than that of the developed world.¹¹
- China's predicted GDP growth rate will be approximately 7%, while predicted European growth continues to be less than 1%. This will result in an overall decline in the EU nation's share of global GDP.
- India surpassed Japan as the world's third largest economy in 2014.¹²
- Looking beyond 2020, the Eurozone is expected to maintain a steady growth rate of around 1.2%, while the US economy slows down from 2.4 to 1.7%.¹³
- World Bank, IMF and OECD estimates suggest that the current economic power shift is expected to continue.

- **Military:**

- The majority of NATO member states have slashed their defence spending, several by more than 10%, since the 2008 economic crisis.
- Defence spending in Asia, in particular in Southeast Asia, has been increasing exponentially during the last two decades. Since 2000, European defence expenditure has increased only 14%, while Asia and Oceania's defence expenditures increased by 101%.¹⁴

10 IMF, *World Economic Outlook data October 2014*, based on purchasing power parity (PPP)
<http://www.imf.org/external/pubs/ft/weo/2014/02/weodata/index.aspx>.

11 OECD, "Economic Outlook for Southeast Asia, China and India 2014, Beyond the Middle-Income Trap," 2014, p.2-12

12 Ankit Panda, "World Bank- India Overtakes Japan as World's Third Largest Economy", *The Diplomat*, 1 May 2014,
<http://thediplomat.com/2014/05/world-bank-india-overtakes-japan-as-worlds-third-largest-economy/>.

13 Using Purchasing Power Parity rather than using Market Exchange Rates data from the OECD and World Bank.

14 Data taken from the Stockholm International Peace Research Institute Military Expenditure Database, accessed on 29 October 2014, http://www.sipri.org/research/armaments/milex/milex_database.

○ China's defence spending increased by 170% while the US observed a 36% reduction between 2004-2013. In 2014, China's military spending increased by 9.7%.¹⁵ If current trends continue, China's defence spending is projected to be equal to that of the US by 2025.¹⁶

- **Diplomatic:**

○ Emerging powers will continue to increasingly challenge the current world order to reshape the international system in ways that reflect their interests, rules, norms, and values.

○ China is not expected to adopt the same global leadership role which was developed by the US to protect its interests, rules, norms, and values. Managing this power transition period will be the paramount challenge for the US and international community over the next two decades.¹⁷

○ While the US remains committed to the defence and security of Europe, the Middle East and the North Africa region, it is not expected to take a leading role in Europe's affairs in these regions.¹⁸

○ Overall, this period is expected to manifest a change in the West's ability to influence global affairs.

- **Changing nature of power:**

○ Russia's use of hybrid strategy during the recent crisis in Ukraine has demonstrated issues with the utility of hard power alone as a deterrent. A hybrid strategy aims to undermine a target state, region or alliance of states' geopolitical characteristics including its border integrity, by influencing its population, economy, military, and political power through a synchronised application of ambiguity and coercion.

○ Energy politics and other non-conventional approaches are just one example of how the hybrid threat may manifest itself in an attempt to influence a target state. In the future, the likely use of hybrid techniques will further complicate the Alliance's response since each hybrid strategy will be different.

○ Russia's approach may set a precedent for Southeast Asia, where China's rise as a regional power has potential regional and global consequences. As China improves its ability to better apply its soft power, the continued growth of its military and economic power is likely

¹⁵ Data taken from the SIPRI Military expenditure Database, April 2015, <http://books.sipri.org/files/FS/SIPRIFS1504.pdf>.

¹⁶ C. Layne, "The Global Power Shift from the West to the East," *The National Interest*, May/June 2012, no.119, p. 21- 31.

¹⁷ Ibid, p. 23

¹⁸ Doug Stokes and Richard G Whitman (2013). "Transatlantic Triage? European and UK grand strategy after the US rebalance to Asia," *International Affairs* v 89, n. 5: 1087-1107.

to intimidate its neighbours into seeking coalitions to establish security equilibrium in the region.¹⁹

- There are a range of transnational issues, such as global financial stability, climate change, cyber-terrorism, and pandemics that will require international cooperation and which cannot be solved by hard power alone.

Findings: All indicators suggest that this trend is still valid and the transfer of power from West to East is gathering momentum. The shift of economic power continues and it will be associated with an increase in hard power in Southeast Asia. Militarization of Southeast Asia, particularly in developing nations, might present challenges to international security and result in instability. Historically, major power shifts between states/regions occur infrequently and they are rarely peaceful. However, power shifts towards a more equal distribution, may also prove to be positive and could lead to greater stability and more equality between and within regions. Additionally, there is a need for conceptual clarification of terms such as 'power'. Finally, the shift of global power and the use of a hybrid strategy need to be further analysed 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/theocratic regimes towards more democratic forms of government will continue.

Key Facts, Developments and Future Considerations:

- **The autocratic/theocratic regimes in the Middle East and North Africa:**

- The Arab Spring protests successfully produced regime change in some countries, but failed to do so in others. The call for basic freedoms, such as the right to choose political leadership and to participate in governance continues to reshape the Arab world.²⁰ A one-size-fits-all solution will not provide explanations as to why political changes are successful in some countries and fail in others.

- Political transitions appear stalled in Egypt, Libya, and Yemen, while most other protest movements have failed to seriously challenge other regional leaders. Western aspirations for a more democratic Middle East have withered with developments in Syria and Iraq, as the chronic deficit of government action and legitimacy, and power vacuums have been filled by extremist groups.²¹ The ongoing civil wars in Libya, Syria and Yemen and the emergence of Islamic State of Iraq and Levant (ISIL) have shown that failed/failing and weak states cannot

19 Interview with Joseph Nye, "The Second Term: Joseph Nye on U.S.-Chinese Relations." Conducted by Doug Gavel, *Harvard John F Kennedy School of Government*, 22 Jan 2013.

20 Stephen R. Grand, *Understanding Tahrir Square*, (Washington, DC: Brookings Institution Press, 2014).

21 Jane Kinninmont and Abdullah Ali, "ISIS will not be beaten by a kneejerk reaction from the west", *The Guardian*, 6 September 2014, <http://www.theguardian.com/commentisfree/2014/sep/07/isis-reaction-from-west-military-strikes-not-best-option>.

provide effective governance. In future, improving governance in failed/failing states should be considered as a priority.

- Social, economic, and political factors, as well as demographics have been used to explain the causes of such unrest and instability,²² but they all fail to explain the variance satisfactorily.²³

- Further analysis reveals that oil wealth, hereditary monarchy, structures of states and loyalty of the security apparatus, have all played a significant role in the fate of such regimes.²⁴

- The level of foreign intervention has also helped determine the outcome in some countries, such as NATO's intervention in Libya, which enabled the Qaddafi regime to be ousted. However, Libya is still embroiled in civil war and chaos, lacking a central authority since the Qaddafi regime was toppled.²⁵ Therefore the outcome of any short-term intervention in failing or failed states cannot be predicted due to decreasing appetite in Western societies for regime change and nation building.

- This shift in political structures is not just about the domestic sphere and transition from authoritarian rule to democracy, but also includes changes in international organisations and the overall structure of the international system.

- There is potential for several different international orders, only some of which may be compatible with western values. It is important to acknowledge that other political models exist, and that the western democratic model may not be the answer for all.²⁶

- **The political and social developments in the former Soviet space:**

- Many of the former Soviet states are still going through a challenging transformation toward adoption of freedom and democratic values.²⁷

- There have been several Western attempts to increase democratic standards in the region, through political dialogue and NGO assistance. These attempts have been subjected to constant scrutiny and pressure from the international community. They have also been closely monitored by the Kremlin, which still claims a special role in the affairs of its 'near

22 Youth bulge, economic grievances, high unemployment and limited social mobility, impact of globalization and widespread application of technology and social media – Twitter, Facebook, and YouTube. Jason Brownlee, Tarek Masoud, and Andrew Reynolds (2013). "Tracking the Arab Spring: Why modest harvest?" *Journal of Democracy*, v 24, no 4: 29-44.

23 Brownlee, Masoud and Reynolds, "Tracking the Arab Spring: Why modest harvest?"

24 Scott Williamson and Caroline Abadeer, "Protest, Uprising & Regime Change in the Arab Spring", *Muftah*, 28 Jan 2014, <http://muftah.org/protest-uprising-revolution-regime-change-explaining-outcomes-arab-spring/#.VXWzOFXtl1Q>.

25 Nick Robins-Early, "Was the 2011 Libya Intervention a Mistake," *The Huffington Post*, 7 March 2015, http://www.huffingtonpost.com/2015/03/07/libya-intervention-daalder_n_6809756.html.

26 Trine Flockhart, "The Coming Multi-Order World.," *International Affairs*, 2015

27 Olesea Ghedrovici and Nikolai Ostapenko, (2013). "The Glaring Socioeconomic Meltdown in Post-Soviet Ukraine, Moldova, and Belarus: A Distorted Mind-set in Search of a Way Out," *The Journal of Business*, v 3, n 5: 202-211.

abroad'.²⁸ Russia fears losing influence in critical countries such as Ukraine and Georgia, which are important to them for security, geopolitical, and economic reasons.

- Since 2013, Russia has been using hybrid techniques against Ukraine to destabilise the country.²⁹ These have been both conventional and unconventional, and have included the threat and use of energy and trade related restrictions, interference with national politics, and support to separatist elements in the east.

- In addition to Ukraine, the Baltic States and Eastern European countries including Georgia and the Central Asian Republics are concerned with renewed Russian assertiveness in the region. This development has resulted in growing Nationalist sentiment and an increased potential for autocratic governments in the former Soviet space.

Findings: Although this trend remains valid, its rate of development is slowing. Transitions can either be autocratic-to-democratic or democratic-to-autocratic. The optimistic western expectation that the Arab world may potentially become more democratic has since faded. As internal authority weakens and states collapse, different actors have pursued sectarian strife, ethnic conflict and even civil war to expand their standing. Democratization has not been one of their immediate objectives. A further analysis of power shifts will be conducted to provide better insights in development of the SFA 2017.

Former Soviet space will increasingly be susceptible to the Russian hybrid threat. Russia's actions are likely to be more assertive towards those neighbouring regions and countries that present it with security concerns. Use of hybrid techniques will also increase concerns over state's capacity to influence non-state actors' actions.

The Future Security Environment is expected to offer western political/military institutions less political leverage and we will likely see various overlapping international organisations and political systems. The key will be to find common ground.

3. Polycentric World: The world is becoming increasingly interconnected and polycentric.³⁰

The state will continue to play a significant role in a polycentric world, albeit in a more complex security environment. The Western assumption is that there is an implicitly agreed set of rules and norms, but in a polycentric world, these will likely be less evident and contested, producing a need for discussion 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

28 Donnacha Ó Beacháin and Abel Polese, *"The Color Revolutions in the Former Soviet Republics,"* (London: Routledge, 2010).

29 Jan Marinus Wiersma, "Signing full EU Association Agreement at last: outlook for Ukraine," *Clingendael*, 17 June 2014, <http://www.clingendael.nl/publication/signing-full-eu-association-agreement-last-outlook-ukraine?lang=nl>.

30 Polycentrism is the principle of the organisation of a region around several political, social or financial centres. European Union, Institute for Security Studies, "Citizens in an Interconnected and Polycentric World: Global Trends 2030," 2014, http://europa.eu/espas/pdf/espas_report_ii_01_en.pdf.

compromise, tolerance, and recognition of political diversity.”³¹ **Therefore polycentrism has been identified as one of the key characteristics of the future and has been moved to Chapter 1.**

Emergent Trends in the Political Theme:

4. Increasing role of non-state actors both in domestic and international affairs: The role of non-state actors and super-empowered individuals will increase as the legitimacy of state authority erodes.

- **Diverse impacts of non-state actors and super-empowered individuals:**

- Non-state actors include those groups, movements, organisations, and individuals that are not part of traditional state structures. Such groups and individuals are expected to have growing impact on the policies and position of nation-states.³²

- The number of IOs and NGOs almost doubled between 2009 and 2013, and reached a total of 67,000 in 2014.³³ This exponential increase is expected to continue in the future.

- Non-state actors have either taken over some of the responsibilities of institutional governance structures, or advocated civic rights towards them. As a result, non-state actors now have ability to impact global stability and security.

- States have increasingly empowered non-state actors to evade political and legal constraints. State control over the activities of non-state actors, whose actions are not accountable to the citizens of any one nation-state, have eroded, as a result of state power outsourcing.

- Grey areas represented by organisations such as ‘*new citizens’ movements* that do not accept the existing system, but refrain from resorting to violence (e.g. the Occupy movement), will increasingly be used and exploited by both state and non-state actors in the future. Other non-state actors that resort to violence to achieve their objectives will use these grey areas to gain public acceptance.

- It is particularly important to distinguish between non-state actors that act against or ‘abuse’ the established system (e.g. terrorists and criminal organisations) and those that try to exercise their influence within the rules of the prevailing system (e.g. traditional IOs and NGOs).

Findings: Although it has been widely covered, non-state actors and their increasing role deserve to be monitored as a separate trend. These developments indicate that the role of non-

31 Transatlantic Academy, “*Liberal Order in a Post-Western World*,” T. Flockhart, C. A. Kupchan, C. Lin, B. E. Nowak, P. W. Quirk, and L. Xiang, p. .

32 Jan Rood and Rosa Dinnissen, “*An Uncertain World*,” (The Hague: Clingendael Strategic Monitor, 2013.)

33 Union of International Association, IOs, IGOs and NGOs increased 33,000 between 1950 and 2009.

state actors will continue to increase as their numbers multiply. There is a need to look critically into western political structures and the potential consequences of unintended social exclusion of groups/individuals. There is also a need to recognize the individual within domestic political structures (esteem). The influence of non-state actors in decision-making is expected to continue to increase and to challenge existing structures – including some states. Whether or not Article 5 can be considered if future attacks are funded/orchestrated by proxies or non-state actors requires further analysis and will be decided at the political level.

Return of power politics, challenges to the liberal world order and increasing potential for interstate conflict:

- **Russian intervention and conflict in Ukraine:**

- Since 2014 it has become more evident that the world is entering a new era of strategic competition among global powers. There are also indications of a growing nationalist movement around the world: in Russia, as seen in the Crimea crisis; in India, with the rising popularity of nationalist politicians; and in Europe, with the rise of far-right, nationalistic as well as Eurosceptic parties in a number of countries.³⁴
- The conflict in Ukraine is prompting many European countries bordering Russia, in Central Europe, the Baltics, and the Nordic countries, to increase their military spending, often revising previous plans and reversing falling trends. However, there is less evidence of a similar trend in the rest of Western Europe, despite the Wales Summit pledge to spend 2 % of GDP on defence.

- **Emerging powers and challenges to the liberal world order:**

- In July 2014, Brazil, Russia, India, China, and South Africa launched a New Development Bank - nicknamed the 'BRICS Bank' - that combines features of the World Bank and the International Monetary Fund (IMF). China has proposed an 'Asian Infrastructure Investment Bank' (AIIB) that could compete with the Asian Development Bank (ADB). Although these initiatives represent the first serious institutional challenges to the global economic order established at Bretton Woods 70 years ago, AIIB will help meet Asia's enormous infrastructure needs, which are well beyond the capacity of today's institutional arrangements to finance.³⁵ Arguably, both the BRICS Bank and AIIB have been

³⁴ World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), p. 16.

³⁵ Joseph Stiglitz, "In Defence of AIIB", *The Guardian*, 14 April 2015, <http://www.theguardian.com/business/2015/apr/14/in-defence-of-the-asian-infrastructure-investment-bank>.

motivated by three similar objectives of the Bretton Woods system, detailed in the footnote,³⁶ but prioritised in reverse order.

- The BRICS Bank is a wake-up call to the advanced economies of North America, Europe, and East Asia as they appear unwilling to share power. They may need to strengthen their own economic management to avoid recurring financial and fiscal crises, and do more to share power in the Bretton Woods institutions.³⁷
- Having made a real concession by embracing the G-20, which includes the BRICS as equal members, as the "premier forum for our international economic cooperation," Western powers should endeavour to restore the G-20's effectiveness and credibility. At the same time, advanced countries should remind the BRICS that the existing rules-based multilateral order has served them all well in substantive terms and is worth preserving and building upon.³⁸

Findings: As a result of greater strategic awareness among the world's population, people will increasingly share their future perspectives,³⁹ aspirations, and grievances on global issues, ranging from climate change to global warming, from income inequality to high levels of unemployment. By 2035, the demands and concerns of citizens in many different countries of the world are likely to converge, creating major impact on national and international politics.

Regionally, the worsening relationship with Russia and the long term effects of the Ukraine crisis might present potential for a return to power politics in the European security landscape. Furthermore, the Western liberal international order is unlikely to be universalised, and Western nations may need to find common ground with emerging powers. For example China is committed to such Western principles as free trade and floating currencies, however, its broader values remain one of the biggest obstacles to their full implementation. Moreover, Beijing is doing business with rogue regimes like Iran, Sudan and North Korea, disregarding their human rights records while not demanding reforms in return.⁴⁰ Therefore, the de facto rules (liberal) for existing world order are

36 When representatives of 44 nations established Bretton & Woods system in 1944, they had three principal goals in mind. First was to construct a rules-based international economic architecture that would help prevent a recurrence of the chaos and devastation of the previous 30 years. Second was to rebuild the war-torn economies of Europe and Asia and lay a foundation for long-term global prosperity. To meet these first two objectives, the delegates at Bretton Woods created the IMF to promote macroeconomic cooperation and discourage beggar-thy-neighbour currency policies, the World Bank to oversee reconstruction and development, and the building blocks of what later became the World Trade Organization to discipline global trade. The North Atlantic powers then met their third objective - preserving their leadership in global affairs - by tilting governance of these institutions in their favour.

37 Matthew P. Goodman, "The Right Order" *Centre for Strategic & International Studies*, 6 August 2014, <http://csis.org/publication/right-order>.

38 Matthew P. Goodman, "Can the BRICS dominate global economy," *The National Interest*, 12 August 2014, <http://nationalinterest.org/blog/the-buzz/can-the-brics-dominate-the-global-economy-11063>.

39 European Union, "Citizens in an Interconnected and Polycentric World."

40 Patrice Hill, "Emerging economic powers to challenge U.S., IMF with own aid bank", *The Washington Times*, 2 August 2014, <http://www.washingtontimes.com/news/2014/aug/5/emerging-economic-powers-to-challenge-us-imf-with-/?page=all>.

409 expected to be further challenged. New patterns for cooperation will need to be developed with the
410 (re)-emerging powers such as the integration of the Asian Infrastructure Investment Bank (AIIB) and
411 establishing new mechanisms for partnerships. The potential return of power politics and a
412 challenge to liberal world order will be further examined in development of the SFA 2017 Report.

413 **6. Increasing democratic discontent:** Discrepancy between strong support for democratic
414 principles and widespread discontent with the way democracy works.⁴¹

- 415 ○ Since 2008, severe economic and financial constraints have reduced the ability of
416 Western Democracies to provide employment opportunities and social security to the
417 masses. Additionally, the divide between rich and poor has widened in developed nations.
418 According to the OECD, economic disparity increased more between 2007 and 2010 than in
419 the preceding 12 years.⁴²
- 420 ○ These developments have created a gap between citizens and those institutions at the
421 regional, national, and transnational levels that are responsible for providing effective
422 governance. It has been argued that national governments were not able to adjust to the
423 new international contexts, including globalisation and the shift of the global economy and
424 that this has resulted in a disconnection between citizens and institutions.⁴³
- 425 ○ Especially among the Western democracies, the inability of states to address income
426 inequality and provide employment, education, and access to social services for all
427 segments of the population has fuelled public discontent and has led to violent
428 demonstrations.⁴⁴ This discontent has not been limited to the Western World or developed
429 countries. Protesters occupied major districts in Hong Kong to demand full suffrage for the
430 city, a culmination of decades of frustration among the city's democratic activists.
- 431 ○ It is argued that non-state actors are bypassing states and penetrating national
432 boundaries, making it more difficult for national governments to deliver effective economic
433 and social policies. Lack of effective response to emerging economic and social challenges
434 have created democratic discontent not only in western developed nations, but also in
435 developing countries that may exacerbate social conflicts in the BRICS. One of the most
436 explosive problems both in old and new democracies is rising income inequality.

41 Stefan Dahlberg, Jonas Linde and Sören Holmberg (2015). "Democratic Discontent in Old and New Democracies," *Political Studies*, v 63, no s1: 18-37.

42 Eliza Mackintosh, "Income inequality rising in most developed countries," *The Washington Post*, 16 May 2013, <http://www.washingtonpost.com/blogs/worldviews/wp/2013/05/16/report-income-inequality-rising-in-most-developed-countries/>.

43 Transatlantic Academy, "The Democratic Disconnect: Citizenship and Accountability in the Transatlantic Community," 2013, p. 3, 9-13

44 Ibid, p. 59

- 437 ○ Non-state actors, in particular citizens and human rights-claiming networks, empowered
438 by increased communications, advanced technology and transportation, have increasingly
439 attempted to shape outcomes in political, social, economic, and environmental issues
440 across borders. However, these attempts have had no residual impacts on governing
441 institutions causing frustrations and social discontent amongst populations. While the roles
442 of non-state actors are being increasingly legitimized and opportunities to expand their
443 influence are materializing, states are losing some aspects of their power.⁴⁵

444 **Findings:** Increasing democratic discontent exists in both old and new democracies due to income
445 inequality and governments' ability to provide employment opportunities and social security to the
446 masses.⁴⁶ It is argued that new democracies systematically perform worse than older democracies
447 when it comes to corruption, rule of law and bureaucratic quality. This trend will be further
448 monitored in development of the SFA 2017 Report.

45 Stratton Trevin, "Power Failure: The Diffusion of State Power in International Relations," *Infinity Journal*, v 1, n 1: 1-8.

46 Dahlberg, Linde & Holmberg, "Democratic Discontent in Old and New Democracies: Assessing the Importance of Democratic and Governmental Output Input," p. 18-37

CHAPTER 3

HUMAN THEME

Existing SFA 2013 Trends:

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

Key Facts, Developments⁴⁷ and Future Considerations:

- **Population growth:**

- In 2011, the global population reached 7 billion and it is projected to increase to 8.7 billion in 2035, an increase of 1.7 billion. The global population is projected to climb to between 9.0⁴⁸ and 9.6 billion⁴⁹ by 2050.
- Population growth rate is projected to slow from 1.2% per year in 2005-2010 to 0.66% in 2035-2040 and to 0.51% per year in 2045-2050. This is largely due to diminishing fertility rates in the developing world. However, this trend will not occur evenly in all countries and regions.
- The growth patterns will be asymmetric and more than 40 countries (including Russia, Germany, Japan and most of other European countries) are expected to experience an overall decline in population.
- At the global level, total fertility is projected to decrease by 2035, independent of ethnic or religious differences. However, fertility rates will increase on average by one more child per family in Africa than in Asia or Latin America. Afghanistan, Angola, DRC, Nigeria, and Somalia are expected to be among the countries with the highest fertility rates.

- **Geography of population growth:**

- Most of the increase in population will occur in the less developed world. From 5.9 billion in 2013, it is expected to reach 7.4 billion in 2035 and 8.2 in 2050. Within the developing world, the least developed countries are expected to grow dramatically, almost doubling by 2050.⁵⁰
- In 2035, 85.2% of the world population is expected to live in the less developed world. Asia will see its population grow until 2050, after which a decline is predicted to occur; on the contrary, Africa's population is projected to increase still further in the second half of the century.

⁴⁷ Unless it was referred to any other source, the data is taken from the PREDICT Final Report, December 2014.

⁴⁸ UN Population Fund, World Population Trends, <http://www.unfpa.org/world-population-trends#sthash.iej79ov6.dpuf> last accessed on 15 May 2015.

⁴⁹ Data taken from UN Population Division World Urbanization Prospects, 2014 revision, <http://esa.un.org/unpd/wup/DataQuery/>. Last accessed on 15 May 2015

⁵⁰ United Nations Population Fund, *State of World Population*, (New York: UNFPA, 2014).

○ India's population is likely to surpass China's by 2028: at that time the two countries together will account for 35% of the world's population.

○ By 2035, Bangladesh, Ethiopia, DRC, and Tanzania, currently among the least developed countries, will be among the twenty most populous countries in the world. On the other hand countries such as Belarus, Bulgaria, Croatia, Cuba, Georgia, Latvia, Lithuania, Republic of Moldova, Romania, the Russian Federation, Serbia, and Ukraine will see their populations decline by more than 15% by 2050.

- **Changes in life expectancy and aging:**

- At the global level, life expectancy at birth is expected to increase to 74.5 years in 2035-2040 from 69 years in 2013, further increasing to 76 years in 2050.⁵¹
- The developed world will see life expectancy increase to 81.5 years in 2035-2040 from 77 years in 2013. The life expectancy is projected to increase to 73 years for the less developed world in 2035-2040 from 67 years in 2013, while the least developed world would reach 68.1 years in 2035-2040 from the current level of 58 years.
- Proportionately, the impact of aging will most likely be felt in smaller working age populations, which will be decreasing at different rates in both the developed and developing world. The calculus of working age population, however, may change as well, a factor that would impact on health, economic, and welfare planning.
- Working-age (25-59) population is expected to change asymmetrically in developed and developing countries between 2013-2035. In developed countries, it is expected to decline from 49% to 43%. In the less developed countries it would shift from 44% to 45%. In the least developed countries, it would increase to 40% from 34%. Consequently, the more developed regions will experience a decline in their share of working age populations.

- **Population composition:**

- The ethnic composition of the world population is projected to further diversify in the upcoming decades. Migration and increasing inter-racial marriages contribute to increasing inter-ethnic mobility, i.e. the change of ethnic identification over time.
- In general, the fertility rates of immigrant populations have tended towards convergence with the national average of industrialized countries and this process continues. However, fertility differences are likely to persist if immigrant groups fail to achieve socio-economic equality, or if they maintain a strong attachment to elements of foreign religion or culture that reinforce their separation from the hosting countries.

51 United Nations, Department of Economic and Social Affairs, "World Population Prospects," *Population Division*, 2013.

○ Changes in ethnicity are most likely to be confined to countries of the developed world, as a consequence of immigration. However, some countries have nonetheless experienced only modest immigration, mostly due to policies that oppose change in the composition of society. The developing world is not expected to experience a substantial change in the composition of its populations, as native populations are large enough to absorb considerable amounts of globalised migration.

○ Most foresight analyses suggest that Christianity was and remains the single largest major world religion, representing slightly over 30% of the world's population. This proportion has remained fairly stable since 1945. Islam has increased to become the second-largest religion in the world, accounting for roughly 22% of the world's population by 2010. Since the late 1960s, the number of independent states with a majority Muslim population has not changed significantly. However, the proportion of Muslims in existing states has been on the rise.

- **Alternative demographic projections:** There are several different views and alternative projections about each of the demographic dimensions examined, challenging UN data and mainstream analyses. Thus, although global population estimates for 2035 are very consistent, there can be significant variations at the country level, and even the same data can lead to different interpretation. Given its fundamental role, assumptions concerning fertility are widely debated, as are its consequences in terms of population composition. Although a general consensus exists about the trend in ageing, its meaning and impact are essentially contested as is its relationship with life expectancy and economic growth. Finally, given the dependence of migration on push and pull factors, effective flows of immigrants and refugees may well deviate from expected UN figures and alternative projections sometimes depict a world characterised by substantially higher migration flows.

Findings: Changing Demographics as a trend is still valid. The effects of population change may become more tangible than they are today depending on 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.

In order to comprehend the complex causal mechanisms that underlie change in demographics, the SFA 2017 report should focus on trends in the economy, energy, technology, health, the

environment, and politics to understand how these factors could influence or interact with demographic indicators.

8. Urbanisation: By 2040 cities will contain 65% of the world's population and 95% of urban population growth will occur within developing nations' mega-cities.⁵²

Key Facts, Developments⁵³ and Future Considerations:

- **Growth in urban areas:**

- Globally, more than half of the world population lives in urban areas with 54% in 2014 and 66% projected to be urban areas by 2050.⁵⁴
 - By 2020 Asia is expected to reach the 50% urbanised threshold, and Africa will only reach that level by 2035. Northern America, Australia, and New Zealand already had an urban population of over 80% in 2011, Latin America and the Caribbean 79%, while Europe remains at 73%, thus being the least urbanised region of the developed world.
 - The likely increase in population up to 2035 and beyond will mostly be absorbed by urban spaces. Approximately 6.3 billion people are projected to live in urban areas by 2050.⁵⁵ In 2035, Asia will be home to most of the urban population of the world, followed by Africa (57% and 21%). Moreover, still more people will move from rural to urban areas worldwide.
 - Around 2020-2030, after a steady increase in the developing world and in Africa in particular, the rural population in this area will start declining and by 2050 some 300 million people will leave rural areas.
 - Future urbanisation will increasingly occur in 'large cities'⁵⁶ with 'megacities'⁵⁷ experiencing the largest percentage increase.
 - As the pace of urbanization continues, population growth will become more concentrated in cities, and the use of energy and other resources is expected to grow even faster than the population. Recent research indicates that "the proportion of global energy use in cities will rise from 66% in 2010 to around 80% by 2040."⁵⁸
- **Pace of urbanisation:** The pace of urbanisation has varied in different regions of the world with cities growing most rapidly in Asia and Africa. In more developed regions, urbanisation will move from 78% to 86% by 2050 while in less developed regions, just three countries –

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

53 Unless otherwise references, data is taken from PREDICT Final Report, December 2014.

54 United Nations, Department of Economic and Social Affairs, "World Urbanization Prospects," *Population Division*, 2014.

55 Shell Global, "New Lenses on Future Cities", June 2014, <http://s04.static-shell.com/content/dam/shell-new/local/corporate/Scenarios/Downloads/newlensesonfuturecities-june-2014.pdf>.

56 Large cities contain 1 million or more inhabitants.

57 Mega cities contain more than 10 million people.

58 Shell Global, "New Lenses on Future Cities."

India, China and Nigeria – together are expected to account for 37% of the projected growth of the world's urban population between 2014 and 2050. India is projected to add 404 million urban dwellers, China 292 million and Nigeria 212 million.⁵⁹ While the urban population grew at an average rate of 2.6% per year between 1950 and 2011, the rate is expected to slow to an average of 1.7% per year until 2030, while it will further decline until 2050, when the average rate would equal 1.1%. Thus, the pace of urbanisation is expected to be slower than in the past.

- **Geographic distribution of urban areas:**

- The increase in world urban population will be particularly relevant to China and India (together 37% of the increase of the urban population by 2030). Nine more countries will contribute 26% of the urban increase by 2030: Nigeria and the DRC in Africa, Bangladesh, Indonesia, Pakistan and the Philippines in Asia, Brazil and Mexico in Latin America, and the United States of America.
- Between 2030 and 2050 India and Nigeria are expected to contribute most to further urbanisation which will account for 31% of urban growth in that period. Although China will have the largest urban population by 2050, it will only contribute 44 million to the increase of urban population between 2030 and 2050.
- Ukraine and Bulgaria are expected to witness a decline in urbanisation between 2011 and 2030, and between 2030 and 2050 other countries, amongst which Japan, the Russian Federation, and the Republic of Korea will see a decrease in their urban population. On the contrary, in Latin America and the Caribbean, Northern America, and Asia the urban population is expected to be highly concentrated in large cities.
- Dissatisfaction with spatial distribution of the population especially in developing countries (Africa and Asia) has resulted in government policies to mitigate migrant flows towards large cities.

- **Increasing connectedness in urban areas:**

- Cities are more connected than ever before, both internally and to the wider world. Connectedness means people can have access to information very quickly; an intelligent population that can crowd-source knowledge will have the ability to produce a new capability very quickly. This connectedness is expected to increase through the introduction of new, widely accessible, and cheaper technologies.

⁵⁹ United Nations, "World Urbanization Prospects."

- Urban centres are likely to demand more autonomy to deal with other urban centres in the conduct of business and other activities that may not necessarily align with the nation state. This may result in a challenge to a state's authority.
- Social media is a relatively recent phenomenon that has changed the way news is reported, as well as giving urban populations a tool to quickly organize themselves into large groups. The recent demonstrations in Hong Kong, in October 2014, are an excellent example of how such groups organise themselves rapidly without any specific leadership. Connectedness might also make unintended 'boomerang effects' more likely, as the spread of information goes further and more quickly.

- **Threats resulting from rapid urbanisation:**

- Large cities may be particularly vulnerable to natural disasters due to the density of population and aging infrastructure.
- The resiliency of urban areas has become a serious concern. Diseases and pandemics may also be a big threat in the future. This threat may be exacerbated not only by population density but also by the connectedness of people to other parts of the world.
- Gangs and organised criminal networks are often prevalent in cities and may increasingly become a threat. Self-radicalisation (people who become radicalised who have no direct links to other countries) is becoming an increasing problem.
- Hybrid techniques are likely to be a key feature of urban operations in the future.
- Many large and mega cities are in the littoral and rising sea-levels may exacerbate problems, resulting in large transnational population movements out of urban areas.

Findings: Urbanisation as a trend is still valid and increasing but at a slower rate. Cities may start to cross national borders (e.g. San Diego-Tijuana), which is likely to have implications for effective future governance. At the same time, cities will gain political power and influence with the possibility to overpower national authorities.

Albeit at a different rate, region by region, or country by country, population shifts from rural to urban are expected to continue. Failure of effective urban planning could present significant risks in the regions where the largest population shifts occur. Better planned urbanisation can help alleviate certain risks that concentrate in urban areas.⁶⁰ However, the new threats and risks emerging from the current rapid pace of urbanisation, 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 Urbanisation Working Group's key findings, such as

⁶⁰ World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), p. 12

how to address instability situations in large and mega cities, should be reflected in the SFA 2017 Report.

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

Key Facts, Developments and Future Considerations:

- **Transparency:** Although it is closely linked with human networks, due to recent developments, transparency will be considered as a new trend in development of the SFA 2017 Report. Therefore it has been removed from the human networks trend and will be considered as an emergent trend on its own.
- **Technological acceleration and increased connectedness:**
 - Information and communications technology will be a key enabler in the creation and spread of human networks (e.g. the Arab Spring). Statistics show that internet access in the Middle East and North Africa grew more than 2,500% between 2000 and 2012, and access is likely to increase in the future.⁶¹ This will boost the use of social media as a means to contribute to socio-political mobilisation even more in the future, which may support the disintegration process of governments and regimes.⁶²
 - The accelerated access to technology may enable people from outside specific networks to become affiliated to them (e.g. impoverished groups) by offering new engagement opportunities (e.g. crowdsourcing of activism, formation of new civil society communities online, real-time organisation of offline protest).⁶³
 - Technology enables and supports the decentralization of human networks. Decentralized networks are characterised by peer-to-peer networks. They have no obvious leadership, which make them harder to influence or disrupt than a centralised network with a distinct chain of command.
 - The spread of network connections doesn't follow any particular pattern because linkages are led by individuals and/or groups who gain the greatest advantage from them.

⁶¹ UK Ministry of Defence, Development, Concepts and Doctrine Centre, *Global Strategic Trends – Out to 2045*, 2014. Also see The World Bank, *Broadband Networks in the Middle East and North Africa*, 2014.

⁶² Facebook, for example, reached 100 million users in only two years, which makes social media very likely more influential in the future. Manuel Castells, "CH@NGE: The impact of the internet on society – a global perspective," *Open Mind*, 2013. <https://www.bbvaopenmind.com/wp-content/uploads/2014/03/BBVA-OpenMind-Internet-Manuel-Castells-The-Impact-of-the-Internet-on-Society-A-Global-Perspective.pdf>.

⁶³ Civicus: World Alliance for Citizen Participation, "State of Civil Society 2013: Creating an enabling environment," 2013. http://socs.civicus.org/wp-content/uploads/2013/04/2013StateofCivilSocietyReport_full.pdf.

The increase of information technology nodes in the future will enable the creation of ever more complex virtual structures.⁶⁴

- These decentralised and ungoverned complex networks may result in frictions between different human networks, as well as between networks and state authorities. Furthermore, it may support criminal and terrorist organisations in keeping their activities secret.

- **Flow of people and goods:**

- Increased global flows of goods, services, finance, and people are expected to create prosperity and interconnectedness, thereby empowering regions, nations, and individuals.
- Within the next decade global flows could triple,⁶⁵ depending on the transforming effects of digital technologies.
- New economies will emerge and join human networks with consumer demands, products, international trade, and immigration demands.⁶⁶
- Immigration demands may create strong new global threats with regard to the rapid spread of infectious disease. The Ebola crisis in 2014, which started an epidemic in Africa,⁶⁷ had the inherent potential to transform into a pandemic with serious global impact. Insufficient countermeasures or delayed international response, combined with a lack of sufficient global vaccination capabilities, would increase the risk of the spread from a regional medical emergency to a global crisis.
- This situation becomes more challenging with the emergence of new antibiotic-resistant viruses which may spread globally, thereby threatening nations' health services abilities to treat common infectious diseases. The increase of multidrug-resistant diseases may exacerbate this in the future.⁶⁸
- The risk of local disruption to a national/regional health system has the potential to become a global break-down in an interconnected world.

- **Shift in urbanisation:**

- Just 600 urban areas currently generate approximately 60% of global GDP.⁶⁹ This concentration of global wealth will continue in the future.

⁶⁴ Research indicates, that the development of human networks is related to the number of devices connected to the internet and the number of nodes. It is expected, that in 2015 more than 200 billion devices will be connected to the internet, which is four times more than 2010. M. Castels, "CH@NGE: The impact of the internet on society – a global perspective."

⁶⁵ \$26 trillion in 2012 or 36% of global GDP. James Manyika et al, "Global flows in a digital age: How trade, finance, people and data connect the world economy," (London: McKinsey Global Institute, 2014).

⁶⁶ J. Manyika et al, *Global flows in a digital age*.

⁶⁷ Jeremy Ashkenas et al, "Ebola Facts: When Did Ebola Arrive and Spread at a Dallas Hospital?," *New York Times*, 31 July 2014, <http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html>.

⁶⁸ World Health Organisation Fact Sheet, "Antimicrobial resistance," 2015.

⁶⁹ Richard Dobbs et al, *Urban world: Mapping the economic power of cities*, (London: McKinsey Global Institute, 2011).

- Immigration into urban areas will continue both in the South and East.⁷⁰ These immigrants will be young, unemployed but often technologically savvy.
- Such immigration into the urban centres may not only boost economies, but provide innovation and interconnectedness through the creation of new human network areas based on the use of internet.⁷¹
- On the other hand, inequality is likely to increase in the future, which will push people into cities in search of better economic opportunities. If these flows of people are not integrated in the host city this may lead to social isolation of individuals or groups. This in turn may lead to the creation of under-governed urban spaces which could give human networks the opportunity to substitute the legitimate governance, thereby weakening state authorities even more.
- A combination of these trends may amplify negative impacts, and will likely increase the complexity and influence of the networks involved. The exponential pace of technological advances will allow these networks to remain fluid and flexible in their structure and membership, challenging monitoring efforts. Human networks will likely be formed in new and fast ways. This may result in instability and security challenges.

Findings: This trend is still valid and decentralisation will increase, 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 future increased flow of people and goods may also raise the risk of spread of disease globally. Improved accessibility, in combination with other trends (e.g. urbanization, access to technology, economy), will support transnational crime and terrorist activity, as well as immigration processes, potentially challenging national social and security systems. Urban centres in particular may become sources of power for human networks trying to substitute 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, key elements), and adapt and react accordingly.

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

Key Facts, Developments and Future Considerations:

- **Connected world:**

⁷⁰ Dobbs, *Urban world*. See also, Department of National Defence, Directorate of Capability Integration, *The Future Security Environment 2013-2040*, (Ottawa: Government of Canada, 2014).

⁷¹ M. Castels, "CH@NGE: The impact of the internet on society – a global perspective."

- Increased access to accelerating communication tools and technology will enable more people to articulate their individual interests, express their opinions, influence public opinion, and create alternate identities which can be changed easily and rapidly as desired.⁷²
- Moreover, the development of the internet in the future will likely speed the creation of network societies, which are labelled in research as Me-centred societies, or so called individuation.⁷³
- National identity may cease to be the most important type of individual identity, as individuals may value their ethnic or religious associations, above those of the state.
- These competing aspects of individual identities (such as ethnic, religious, racial) may not attract the current levels of social stigmatism in the future, but may still generate a destabilising social impact overall.
- The speed at which information can be spread and shared through use of the internet might allow the rapid build-up of social tension between competing identities. Under these circumstances technology, coupled with different identities, could facilitate the more rapid transformation of a minor issue into serious problem.⁷⁴
- **Social tensions:**
 - Social inequality and global population dynamics will accelerate the process of creating fractured identities.
 - The flow of immigrants per year to developed regions may slightly decrease between 2040 and 2050, but it will change the population structure with regard to age,⁷⁵ religion, and cultural affiliation. This may bring opportunities for affected countries as well as strain their ability to incorporate the immigrants into the host country. In combination with a future increase in social media and new internet technologies, immigrants will remain connected to their culture and countries of origin, further hampering or slowing down the process of assimilation.⁷⁶
 - The inability to integrate immigrants on the national level, as well as on the individual level, may lead to unassimilated urban enclaves, causing social tensions and unrest.

72 . M. Castels, "CH@NGE: The impact of the internet on society – a global perspective."

73 . Ibid.

74 Karin Frick, Bettina Höchli "Die Zukunft der vernetzten Gesellschaft," *Gottlieb Duttweiler Institute*, 2014.
<http://www.gdi.ch/de/Think-Tank/Studien/ProductDetail/611>.

75 European Environment Agency, "Assessment of global megatrends – an update," 2014,
<http://www.eea.europa.eu/publications/global-megatrend-update-1-diverging>.

76 Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022," 2014,
<http://www.computer.org/web/computingnow/2022-Report#top>.

- 765 ○ Immigration as a complex part of the population dynamic is often linked with the loss of
766 jobs, a lack of economic competitiveness and weak governance in the country of origin.⁷⁷
- 767 ○ The future working age population will largely come from the youth of developing and
768 less developed countries.⁷⁸ This labour force will not only be young, but well-educated, and
769 from different cultural and ethnic backgrounds.⁷⁹
- 770 • **Loss of national identity:**
- 771 ○ Globalisation is a multi-dimensional process affecting the political, economic, and
772 cultural identity through the free flow of goods and services, supported by technological
773 means such as media and the internet. The impacts of globalisation, combined with other
774 factors, such as inequality, weak governance, and existing social tensions (e.g. ethnicity)
775 may result in a loss of national identity. This may lead alternative identities to become more
776 assertive (e.g. race, religion, gender, class), thereby uniting diasporas through increasing
777 interconnectedness.
- 778 ○ Steady streams of migration and increased technological accessibility may support
779 individuals' identifying with a virtual community, thereby weakening the national identity of
780 origin.
- 781 ○ The development of the internet in the future will allow people to change their virtual
782 preferences at any time, which might affect all areas of possible identities such as societal,
783 political, cultural and economic.⁸⁰
- 784 ○ Underdeveloped and developing countries may threaten their own national identity due
785 to a lack of effective governance. This may create the permissive conditions for specific
786 groups and human networks to spread their ideas and beliefs, causing polarisation amongst
787 different identities and factions, and potentially leading to sectarian violence.
- 788 ○ Identity can also be used as a hybrid tool. Loss of national identity may be used as a
789 way and means of politically challenging the Alliance and its Member nations by exploiting
790 ethnic or religious minorities and creating civil unrest through extremism.
- 791 ○ Social tensions due to loss of national identity within Member Nations may indirectly
792 affect the security of the Alliance. Fragile conditions are likely to support radicalisation, and

77 Constanze Stelzenmueller and Joshua Raisher, *Transatlantic Trends 2014*, (Washington, DC: German Marshall Fund of the United States, 2014). See also, The World Bank, *2014 World Development Indicators*, 2014.

78 Daniel Gros et al, *The Global Economy in 2030: Trends and Strategies for Europe*, (ESPAS, 2013).

79 World Economic Forum, *Global Risks 2015*, (World Economic Forum Report, 2015), p. 15, 21

80 In 2013, over 2.5 billion internet users were counted, starting with 40 million in 1996. This process is even more accelerating with wireless technology. In 2013 there were 7 billion subscribers of wireless devices. In 1991 there were about 16 million subscribers. Castels, "CH@NGE: The impact of the internet on society – a global perspective."

transnational criminal and terrorist activities, thereby undermining the cohesion of the Alliance.

Findings: This trend is still valid and will increase in influence and complexity because it will involve 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 migrants, cultures, values, ideologies, and less ability to integrate new people in the existing society may increase the process of fractured identities and the risk of conflict. They are not likely to be a sole source of threat to national security themselves, but they may have the dynamic to affect the Alliance because they will make it more difficult to distinguish between friends and adversaries and to take decisive actions. The preservation of an existing, or the 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. In order to prevent loss of shared identity it will be necessary to keep track of disparity thresholds, to enable opportunities, to protect choices, to promote capabilities, to promote self-esteem, and to support good governance.

Emergent Trends in Human Theme:

11. Transparency: Transparency is closely linked to the democratisation of technology as a process where people gain the access to more advanced information, public participation and effective accountability. This provides people with easy and cheap technological means to control state activities and to be better informed about governance.

- **Interconnectedness:**

- In the future, privacy is likely to become more at stake than ever before. The growth of social media forums such as Facebook and Twitter will continue to accelerate and the number of companies, like credit card companies, which already use client's personal data for their own goals, is only likely to increase in the coming decades. On the other hand, individuals are taking increasing measures to protect their privacy.
- The rapid increase in communication and access to information gives people the opportunity to scrutinize state authorities, which may challenge them not only in regards to corruption, but in executing trustworthy political power in general.⁸¹

⁸¹ In general, corruption is the abuse of entrusted power and encompasses various parts of the life. It becomes especially conflicting in politics and government. Transparency International, "Strategy 2015", 2011, http://www.transparency.org/whatwedo/publication/transparency_international_strategy_2015.

- Transparency will likely increase with the growing number of internet users and the devices connected to it. Improving technology will enable better analysis of big data which can be used to monitor every aspect of the real world.⁸²
- The new opportunities that a future internet may present are not yet foreseeable. The internet of things and the development of smart cities will affect transparency in unknown ways, but is unlikely to increase it.⁸³
- Transparency, in combination with the democratisation of technology, not only support groups of people but enables individuals to be destructive in new ways. For example, whistle-blowers are likely to increasingly use cyberspace as a medium for their idea of transparency.
- Big Data may increase transparency. Today more than 98% of the world's information is stored digitally and the use of big data provides the ability to collect and analyse large amounts of information in specific ways.⁸⁴
- Big data, as with very technological or communicational development, is neutral and can be used in a harmful or positive manner. For example, big data is already used to predict consumer behaviours, which can be helpful for the individual but releases private information into cyberspace.⁸⁵
- **States and state authorities:**
 - Transparency may give state authorities leverage in the control and the fight against violent human networks, criminal and terrorist groups. This could be realized by sharing information and cooperation not only within a nation but globally.
 - Political corruption is especially evident in developing countries and in Asia, Africa and South-America.⁸⁶ If unchallenged the development of corruption is likely to exacerbate global inequality.⁸⁷
 - Technology may have both a positive and a negative impact on transparency. The increased interconnectedness and the easy access to technology, combined with the growth of new social media will enhance the dialogue between the citizens and the state authorities.
 - On the other hand, the rapid spread of technology will present potential state adversaries with new opportunities to plan and execute more complex and severe attacks.

82 Castels, "CH@NGE: The impact of the internet on society – a global perspective."

83 Ibid.

84 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*.

85 Steve Lohr, *Data-ism: The revolution transforming decision making, consumer behaviour, and almost everything else*, (New York: Harper Collins Publishers, 2015).

86 Transparency International, "Corruption Perception Index 2014," 2014, <http://www.transparency.org/cpi2014>.

87 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*.

○ Furthermore, it may be easier in the future to hide state, financial, and criminal transactions in cyberspace.

- **Secrecy and privacy:**

○ Transparency is a balance between security, privacy and public access to information. Individuals as well as corporations and state authorities accept a certain level of intrusion, if at the same time a certain level of security is provided. This balance might be a challenge, especially for governing bodies to foster public trust.⁸⁸

○ For states and governing bodies as well as for corporations, human networks and individuals, secrecy as a measure to avoid becoming scrutinized is an important form of power.⁸⁹

○ Privacy may become unachievable for people and companies that can't afford appropriate security measures in the future. States and state authorities may fall behind corporations in regard to security and privacy because they may not be able to invest resources (including legal) to adequately secure their information.⁹⁰

Findings: As a result of a greater number of people being connected and taking advantage of more advanced and accessible mobile technology, state authorities and the execution of power will be scrutinised more in the future. This development is likely to impact both sides of power. From the individuals and human networks perspective, it will create opportunities to ensure greater transparency in state activities. This may generate leverage in state affairs, but secrecy might be jeopardised by that. Conversely, state adversaries may exploit the states' transparency to pursue their own interests, thereby threatening societies. The SFA 2017 report should monitor this phenomenon and consider it as a new trend.

12. Ideological polarization: Polarization is an extreme difference in views between people and groups of people based on their values, beliefs and norms. When polarization turns extreme, it becomes an ideological polarization which is likely to result in conflict between competing groups or such groups and state authorities.

- **Technological development:**

⁸⁸ Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022."

⁸⁹ Frank Pasquale, *The Black Box Society: the secret algorithms that control money and information*, (Boston: Harvard University Press, 2015).

⁹⁰ Ibid.

- The increase of personalized information flow in the future will reinforce ideas and beliefs of individuals.⁹¹ This process will accelerate exponentially if certain ideas are unchallenged by competing ideas.
- Globalisation, cheap technology and easy access to information in combination with the increased interconnectedness between individuals and groups will speed the growth and the spread of ideological polarization.
- Social media will be crucial as a tool being used to express extreme ideas and values.⁹²
- Virtual space with no boundaries will support the spread of extreme ideologies globally.
- **Human factors:**
 - Ideologically polarized individuals and groups are likely to ignore alternative belief systems which may lead to violent conflicts between different groups if their values are threatened or they think their values are valid without exception.⁹³ This will be even more radical if the ideology is based on, or combined with, religious beliefs.
 - Criminal and terrorist groups may try to take advantage of ideologically polarized individuals and groups, which will likely threaten other groups and state authorities intrastate, interstate and transnational.
 - The possible increase of sectarian tensions throughout the world in the future is likely to be fuelled by ideological polarization, which may lead to an escalation of conflict, terrorist attacks of unforeseen dimensions, or cause civil wars within countries or regions characterized by bad governance or weak authorities.⁹⁴
 - Ideological polarization will increase in importance as a component of people's identity and will therefore affect individuals as well as human networks.

Findings: Although ideology is already part of different trends like fractured identities or human networks, it may increase in prominence in the future. Ideological polarization, such as ISIL in the Middle East and North Africa, is likely to accelerate globally in the future. This could result in greater individual radicalization and intolerance even within Nations. Second and third generation of former immigrants are young, well-educated and technologically savvy, and are likely to be the main focus of terrorist groups or state sponsored proxies. In order to comprehend the complex causal mechanisms that underlie the dynamic of ideological polarization, the SFA 2017 report should monitor this phenomenon and consider it as a new trend.

91 Department of Defense, US Joint Staff, "Anticipating the Future Security Environment, Key Conditions for Future Joint Force Operations."

92 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*."

93 Department of National Defence, *The Future Security Environment 2013-2040*.

94 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*."

CHAPTER 4
SCIENCE/TECHNOLOGY THEME

Existing SFA 2013 Trends:

13. 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.

Key Facts, Developments and Future Considerations:

- **The dynamics of science and technology** will expand into all domains of everyday life and will put economic, political, and technological structures into a continued state of transition.
- **Advances in computer technology:**
 - Cycles of innovation and technological change are only likely to accelerate as they are further augmented by continued exponential increases in supporting computing power.
 - The numbers, shapes, and sizes of computing devices, from micro-scale to mega-scale, combined with increased connectivity, both locally and globally are expected to grow exponentially. As a result of this pervasive penetration of computing and communication capabilities, human knowledge, intelligence, and connectivity are expected to be increasingly enhanced and augmented by information technology.⁹⁵
 - There is no end in sight to the increase in computing power: silicon-based chips are likely to be replaced with faster technologies. Through their use, human abilities to understand and monitor environmental change and develop problem-solving strategies will be greatly improved.⁹⁶
 - Over the last 50 years, the pace of innovation and technological change has accelerated consistently. The time needed for basic inventions to enter mass use has steadily decreased and this will likely remain the case.⁹⁷
 - Multiple computing device-level technologies, including tunnel field effect transistors (FETs), carbon nanotubes, superconductors and fundamentally new approaches, such as quantum computing and brain-inspired computing are expected in the future, rather than one dominant architecture.⁹⁸
 - At the heart of this computing evolution is seamless networking, where the transition from one network device to another is transparent and uninterrupted. Various wireless

⁹⁵ Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022."

⁹⁶ European Environment Agency, "Assessment of global megatrends."

⁹⁷ Ibid.

⁹⁸ Sandia National Laboratories, 'Get Ready for Computers of the Future', 27 May 2014, last accessed 19 May 2015, https://share.sandia.gov/news/resources/news_releases/beyond_moore/#.VX_WYzDkrRI

networking technologies are likely to be integrated with high-speed wired networking and the Internet, allowing anywhere-to-anywhere access.⁹⁹

- **Other impacts of technological change:**

- With the increasing population growth (3 billion more consumers predicted by 2030),¹⁰⁰ and the number of users connected to the Internet, energy consumption related to information technology is also expected to rise.

- Technological developments may mean that the same amount of food, shelter and comfort for any single individual can be produced in the future with far fewer resources.

- Technological innovation will continue to develop exponentially. While never without risk, positive technological breakthroughs promise innovative solutions to the most pressing global challenges of our time, from resource scarcity to global environmental change.

- **Greater Global Interconnectedness and Cooperation:**

- Rising levels of education, together with increased per capita incomes in many parts of the world, mean that demand for new products is growing, leading to shorter product innovation cycles.

- The increased growth rate in the volume and speed of access to information and communication has numerous effects. It can generate new markets and challenge existing institutions.¹⁰¹

- **The transition to digital additive manufacturing (i.e. 3D printing) and fabrication:**

- In today's manufacturing, products are usually assembled from components that are separately created using specialised machinery. With 3D printers capable of handling multiple materials, it may become possible to fabricate many such items entirely in one place, close to the consumer.¹⁰² As the manufacturing production process becomes increasingly additive, waste will essentially be eliminated.

- More goods will be manufactured at or close to their point of purchase or consumption. This might even mean household-level production of some goods.

- Elimination of shipping and buffer inventories is expected to lower or offset higher per-unit production costs.

99 Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022," last accessed 21 May 2015, <http://www.computer.org/cms/Computer.org/ComputingNow/2022Report.pdf>

100 M. Castels, "CH@NGE: The impact of the internet on society – a global perspective." Also see Richard Dobbs, Jeremy Oppenheim, Fraser Thompson, Marcel Brinkman and Marc Zornes, *Resource Revolution: Meeting the World's Energy, Materials, Food, and Water Needs*, (McKinsey Global Institute, 2011).

101 KPMG International, *Future State 2030: The Global Megatrends shaping governments*, (The Mowat Centre, 2014).

102 Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022."

- On the other hand 3D printing may be highly disruptive because it could make many jobs obsolete. For example, if entire mechanisms can be created directly by 3D printing, then this may eliminate many assembly jobs.¹⁰³
- With local manufacturing of goods, there may be less freight to transport.¹⁰⁴ The economic impacts on shipping and transportation industries could be enormous.¹⁰⁵
- The utility and real impact of 3D printing has yet to be fully realised. It is however, expected to be significant and revolutionary.¹⁰⁶

Findings: All indicators suggest that this trend remains valid. Technology is a catalyst for change. Creativity and spontaneity are human factors which 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.¹⁰⁷ However, there are choices that free nations can make through regulation and investment that can either lead to a better world or one that we do not desire. In development of the SFA 2017 Report, this trend needs to be monitored at global, regional and local levels.

14. Increased Access to Technology: Commercial research and technology has begun to outpace that of governments in the development of new technologies.

Key Facts, Developments and Future Considerations:

- **Growth of the Internet:**

- The Internet is potentially the most critical innovation in the technology trend since it has allowed users to gain knowledge of, and access to, other technologies.
- The Internet has played a critical role in modern life in developed countries and is a typical feature of most households globally. It has been important in the democratisation of knowledge. At the end of 2014, almost 3 billion people were using the Internet, up from 2.7

¹⁰³ Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022," last accessed 21 May 2015, <http://www.computer.org/cms/Computer.org/ComputingNow/2022Report.pdf>

¹⁰⁴ Ibid

¹⁰⁵ Michael Czye, "CSCMP Hot topics: 3D Printing Changes Everything," *Liberty Advisor Group*, October 2013.

¹⁰⁶ Ibid.

¹⁰⁷ Institute of Electrical and Electronic Engineers Computer Society "What will our world look like in 2022."

billion at the end of 2013,¹⁰⁸ with China accounting for the largest number of Internet users.¹⁰⁹

- Internet access differs substantially across the 32 emerging and developing countries, with the lowest rates of internet use in South Asian and sub-Saharan African nations.¹¹⁰
- As a relatively new tool available to a fairly wide public, the Internet is already the key catalyst of the most extensive and fastest technological revolution in history.¹¹¹ The acceleration of technological development is driven by better access to information, increasing scientific cooperation, and demands for economic growth and trade.
- Users can learn of new developments more quickly and purchase high-tech products otherwise only actively marketed to recognised experts. However, Internet use is the highest in the wealthiest of the emerging nations, particularly in Chile and Russia, where more than 70% have internet access followed by China (63%). The lowest internet access rates are in some of the poorest countries such as 8% in Pakistan, 11% in Bangladesh, 15% in Uganda, 19% in Tanzania, and 20% in India.¹¹²
- Despite the encouraging progress achieved recently in access to the Internet, there are important digital divides that need to be addressed: 4.3 billion people are still not online, and 90 per cent of them live in the developing world.¹¹³
- Income inequality within countries is one of the reasons why broadband remains unaffordable to large segments of the population. Mobile broadband is six times more affordable in developed countries than in developing ones.¹¹⁴
- Arguably cloud computing is expected to have a major effect by allowing users greater access through mobility and pay-as-you-use capacity.
- **Social Media:**
 - Social media has empowered users to become contributors and critics of technological developments.
 - The increase in new media and communications has significantly impacted globalisation in the recent decades.

108 International Telecommunications Union, "Measuring the Information Society Report," (Geneva: ITU, 2014). (The report includes data from Eurostat, OECD, IMF, Informa, the UNESCO Institute for Statistics, the UN Pop. Div. and the World Bank.)

109 Castels, "CH@NGE: The impact of the internet on society – a global perspective."

110 PEW Research Centre, "Communications Technology in Emerging and Developing Nations", 19 March 2015, <http://www.pewglobal.org/2015/03/19/1-communications-technology-in-emerging-and-developing-nations/>.

111 M. Castels, "CH@NGE: The impact of the internet on society – a global perspective."

112 Ibid.

113 International Telecommunications Union, *Measuring the Information Society Report*.

114 Ibid.

1022 ○ International travel and communication are easier now than ever before. The
1023 popularisation of smartphones and social media allows the world to be constantly and
1024 conveniently connected.

1025 ○ When a technology is developed its use may be difficult to predict. Social media tools
1026 could be used in new ways to drive development and experimentation.

1027 ○ The ubiquity of information and social media will present both challenges and
1028 opportunities, with the cycles of technology-induced societal and economic change
1029 becoming increasingly fast.

1030 • **Cultural Impacts:**

1031 ○ Widespread access to cheaper technology has been critical for the transition to the new
1032 economic model. Similarly, democratisation of technology has also been fuelled by this
1033 economic transition, which has produced demands for technological innovation and
1034 optimism in technology-driven developments.

1035 ○ The ability to create relationships based solely on mutual understandings and shared
1036 common interests have fed the social media phenomena.

1037 • **Industry Impacts:**

1038 ○ The decreased costs and expertise necessary to use products and software may result
1039 in many professionals losing work when replaced by easily accessible technology.

1040 ○ Technology is now more user-friendly so that even complex equipment can be operated
1041 by users without specialised training.

1042 ○ The process of consumerisation has led to an influx in the number of devices in
1043 businesses that can access private networks that IT departments cannot control or access.
1044 This has introduced new security concerns that most businesses are unable to address at
1045 the pace of the spread of technology.

1046 ○ The Internet is expected to further expedite distributed access to technological advances
1047 that may lead to lowered operating costs and increase innovation.

1048 • **Political Impacts:**

1049 ○ Increased access to information by advanced technology, particularly via social media,
1050 may bring about a third wave of democracy.

1051 ○ The Internet has been recognised for its role in promoting increased citizen advocacy
1052 and government transparency.

1053 ○ The spread of the Internet and other forms of technology have led to increased global
1054 connectivity. It has been associated in the developing world not only with increased Western

influence, but also with the spread of democracy through increased communication, efficiency, and access to information.

- Technology can be of benefit to democracy in the developed world as well. In addition to increased communication and transparency, some electorates have implemented online voting to accommodate an increased number of citizens.

- **Increased Commercial off-the-shelf technology:**

- Commercial off-the-shelf (COTS) technology products are becoming much more attractive to nations because they offer government agencies proven, affordable solutions while reducing risk and implementation time. However, the steady increase in COTS also allows non-state actors, or even nations that would not otherwise be able to fund the R&D required for such technologies, access to high-end technologies, normally only available to larger, modern states. Many of these technologies could have dual-use potential where they could support weaponisation or be included as part of a weapons system.

- Governments are expected to be more attracted to the COTS approach due to their inability to complete projects on time, or within budget, as well as the growing availability of COTS packages for business and administrative functions. This could be exacerbated by the availability of specific expertise in the public sector.

Findings: 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 for non-state actors to access new technologies and harness their use will continue to have an effect on all regions. Additionally, the power that non-state actors possess will continue to grow with the advance of technology. It may soon be the case that states will be defined not by geography, but by technology. One of the side effects of technological accessibility is the loss of monopolies of government/state in the technology field. The emergence of non-state actors exploiting technology will cause both political and economic hardships for some states.

Access to technology covers the entire spectrum: InfoTech, Biotech, Nanotech, medical, energy, transportation/logistics and weaponry. These emergent clusters of technology bring both opportunities and risk, specifically Artificial Intelligence (AI), which could be of value or a detriment to both society and NATO. It needs to be established if AI is a technology in itself, or just an enhancement of a group of technologies. These key aspects of access and use of technology need to be studied further in development of the SFA 2017 Report.

15. Centrality of Dynamic¹¹⁵ Networks: A globally connected and networked world creates a universal availability of information.

Key Facts, Developments and Future Considerations:

- **Growth of the use of Networks:**

- The Internet is a vast collection of different networks that use certain common protocols and provide certain common services.¹¹⁶

- Societies, governments, banks, and industries are establishing their own networks that stand alone or use certain aspects of these common networks.

- Linked networks now bring gigabit speeds to major urbanized areas. The failure of individual components impacts the performance of the whole networked system.¹¹⁷

- The original function-specific infrastructure of various networks is converging into complex, interdependent systems. The permeation of information and communications technologies (ICTs) into the transport and energy networks in particular, fosters this trend. Ultimately, different national infrastructures will converge across national borders.

- **Increased Social Networks:**

- Social networks, message boards, content sharing sites, and a host of other applications, allow people to share their views with like-minded individuals.

- Events like the Arab Spring may demonstrate the capacity of social networks in potential future use as part of arranging social movements.

- It has been argued that the Arab Spring spawned a series of social movements that are unique in that they used social media as an effective means to spread information and promote their agendas.

- Social media affects public opinion and international support, allows the rapid dissemination of news, widespread messaging, and the ability of an individual to spread information globally.

- Regimes and insurgents can implement social media to meet their own agendas in ways never seen before.¹¹⁸

- **Business and Industry reliance:**

¹¹⁵ This trend has been renamed in order to more focus on networks itself than computer aspect of the networks.

¹¹⁶ Newman M, *Networks: An Introduction*. (London: Oxford University Press, 2010).

¹¹⁷ Réka Albert, Hawoong Jeong and Albert-László Barabási (2000), "Error and attack tolerance of complex networks," *Nature*, v 406, July: 378-382.

¹¹⁸ Richard A. Lindsey, "What the Arab Spring Tells Us about the Future of Social Media in Revolutionary Movements", *Small Wars Journal*, 29 July 2013, <http://smallwarsjournal.com/jrnl/art/what-the-arab-spring-tells-us-about-the-future-of-social-media-in-revolutionary-movements>.

- Most companies have a substantial number of interconnected computers, potentially with a computer for each worker.
- Business networking will allow all programs, equipment, data and most importantly, information, to be available to anyone on the network regardless of the physical location of the resource or the user.
- Companies are vitally dependent on computerized information. Most companies have customer records, product information, inventories, financial statements, tax information, and much more online.¹¹⁹
- **Political Issues:**
 - States have struggled to ensure security and privacy on networks such as the Internet, which remains unregulated.
 - Several significant political changes associated with Internet and digital technologies have created both new opportunities and challenges.
 - Access to information online about freedoms in the world's democracies has become a key instigator of change. This will likely continue to impact future political change events, especially in non-democratic states and countries with poor governance. This may become a major contributing factor to the political future of Middle East and North African countries. The challenge for those countries attempting to restrict access to information is now more pressing than ever.

Findings: 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. Google Executive Chairman Eric Schmidt stated at a World Economic Forum that the Internet will disappear.¹²⁰ This is due in part to the fact that it will become so imbedded in our lives and interwoven into everything that we do that it will seamlessly fade into the background. Therefore, the 'Centrality of Dynamic Networks' is a more realistic definition of this trend.

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 is important that it be monitored as a

119 Larry L Peterson and Bruce S Davie, *Computer Networks: A Systems Approach*, Fifth Edition, (San Francisco: Morgan Kaufmann, 2012).

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

source of both conflict and stability that might directly or indirectly impact on the security of the Alliance.

Emergent Trends in Science/Technology Theme:

16. Evolution of Autonomous Robotic Systems: Robots are expected to be more autonomous, operating independently based on pre-programmed instructions with some degree of human interaction and control or even without any human intervention.

- **Autonomous robotic systems and their use in non-permissive and/or dangerous environments.**

- Autonomous robots are increasingly going to be used to perform more complex actions, deliver more lethal force, and provide more intelligence, surveillance and reconnaissance (ISR) coverage over wider areas of the globe.

- The key advance in robotics is expected to be in the employment of increasing levels of autonomy on-board the platform itself. However, the exclusive use of completely autonomous robots in the future is not likely, because these systems will have difficulty executing precise actions in uncontrolled, unexpected, and unstructured environments. Therefore a mix of autonomy and human intervention remains likely.

- Future advances will include the miniaturization of robotic systems and their increasing use at sea and on land.

- Nations may be more willing to enter conflict or use lethal force given the lower potential loss of their own soldiers through the use of either autonomous or semi-autonomous robotic systems.

- Many nations may place limits on the use of fully autonomous robotic systems on moral grounds, or to avoid the risk of collateral damage. However, potential non-state adversaries might not be bound by these constraints.

- **The emergence of robots working together in groups and as swarms.**

- Swarm robotics is a new approach to the coordination of multi-unit systems which consist of large numbers of mostly simple physical robots.¹²¹

- A desired collective behaviour emerges from the interaction between the robots and the interaction of robots with the environment.

- Swarm robotic populations could be quite large and they may be able to deal with multiple targets in one task. This indicates that a swarm could perform these tasks rapidly whilst distributed over vast ranges in any environment.

121 Ying Tan and Ahong-yang Zheng (2013). "Research Advance in Swarm Robotics," *Science Direct*, v. 9, no. 1: 18-39.

- The swarm can adapt to the change in the number of units through implicit task re-allocating schemes without the need of any external operation.
- The swarm robotics systems are not affected greatly even when part of the swarm is eliminated due to use of superior force.
- The cost of swarm robotics could be low in terms of design, manufacturing and daily maintenance. The whole system is cheaper than a complex single robot even, if hundreds or thousands of robots exist in a swarm.

Findings: Swarm robotics can be applied to sophisticated problems involving large amount of time, space or targets, and where a certain danger may exist in the environment. The typical applications are as follows: post-disaster relief, mining, geological survey, military and cooperative transportation. Swarm robotics can complete these tasks through cooperative behaviour that emerges from individuals while a single robot can barely adapt to such situation. In development of the SFA 2017 Report, the evolution of autonomous systems and their use as swarms will be considered as a separate trend.

17. Breakthrough in Energy Technologies: Increased focus into ground-breaking technologies exploring safe, reliable, and affordable energy solutions have the potential to radically impact the future of energy.

- **Increasing efficiency of current systems and processes.**

- Efforts to focus on making current systems and processes more efficient have often produced significant but incremental improvements. Potential advances in nuclear fusion, solar, and biofuel applications might lead to new, innovative energy sources.
- Lockheed Martin's Skunk Works department recently demonstrated the feasibility of constructing a very small fusion reactor that produces 100MW of energy.
- Polywell fusion, which uses an innovative electrostatic plasma confinement device, may be capable of producing more power than is injected into the system.
- Harvard and MIT successfully demonstrated the viability of photo-switches, which are nano-enabled devices that can store solar energy indefinitely and release it on demand.
- Additionally, Boeing in partnership with Etihad Airways and the Masdar Institute of Science and Technology reported the discovery of a new viable biofuel feedstock called halophytes, which thrives in arid regions and can be irrigated with salt water.

- **Some energy breakthroughs might be closer to maturity than originally expected.**

- 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.
- Many programs rely on sizable and persistent capital investments, which are often insufficient or unreliable. However, development efforts focused on fusion, solar, and biofuel applications are likely to endure because of their potential to be significant game-changers.
- **Potential effects of energy breakthroughs.**
 - Innovative fusion, solar, and biofuel technologies might enable the integration of smaller but more powerful reactors for naval surface and subsurface vessels; facilitate the fielding of highly mobile, lighter weight, and more efficient power sources for ground units; lead to dramatic improvements in the range and lethality of directed energy weapons; and potentially enable the development of solar-powered aircraft.
 - Additionally, innovative energy technologies may significantly reduce, or even eliminate, dependence on traditional, petroleum-based fuel sources, which could lessen transportation and storage burdens, while also minimizing attacks on vulnerable logistics nodes.

Findings: Energy breakthroughs could potentially provide not only military but significant economic, social and political advantages to Nations and the Alliance over potential competitors. Researches focused on transformational change, instead of incremental advances, could also facilitate conditions for breakthrough technologies.

CHAPTER 5

ECONOMICS/RESOURCES THEME

Existing SFA 2013 Trends:

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

Key Facts, Developments and Future Considerations:

- **The financial system continues to be vulnerable** mainly because of the increase of debt (government, corporate, and household), inequalities (inter and intra nations), long-term economic stagnation, vulnerable critical infrastructure and volatile capital flows.
- **Expansion of the international financial market**
 - Global economic growth is slowing, increasing by only 0.1 % between 2013 and 2014, compared to 3.3% between 2011 and 2012.¹²²¹²³ Developing countries still represent the fastest growing economies, indicating that the pace of growth is decreasing in the most developed countries.
 - Financial globalisation may have peaked in the developed world, but remains an upward trend in developing countries and regions.¹²⁴
 - The international financial system continues to be vulnerable to potential fiscal crises because of the increase of debt across all market levels. Inequalities within and between states, long-term economic stagnation, and vulnerable critical infrastructure, may lead to volatile capital flows.
 - Globalisation also continues to create economic opportunities, despite the tensions between emerging powers and the keepers of the Bretton-Woods system. The nexus between economic competitiveness (demography, innovation) and relative energy prices will continue to remain in favour of the United States, imposing further pressures on the European financial system.
 - There may be an increase in third party participation in global financial markets as private corporations are brought into the fold to act as security providers against cyber-attacks.¹²⁵ They may become a point of key vulnerability as the reliance to them increases.

122 World Bank, "Global Economic Perspectives: Having Fiscal Space and Using It," *World Bank Group*, 2015, https://www.worldbank.org/content/dam/Worldbank/GEP/GEP2015a/pdfs/GEP15a_web_full.pdf.

123 Heather Stewart, "IMF slashed global growth forecasts," *The Guardian*, 24 January 2012, <http://www.theguardian.com/business/2012/jan/24/imf-slashes-global-growth-forecasts>.

124 Daniel Gros et al, "*The Global Economy in 2030*."

125 Booz Allen, "Booz Allen Releases Annual Financial Services Cyber Trends for 2015," 19 November 2014

<http://www.boozallen.com/media-center/press-releases/2014/11/booz-allen-releases-annual-financial-services-cyber-trends-for-2>.

- China is viewed as a potential threat to the balance of the international financial system.¹²⁶ Current global growth is dependent on Chinese growth, and a slowing economy there could destabilise markets worldwide. Additionally, the amount of foreign debt, particularly in western states, held by China is also an economic concern.
- Financial instability in Eurozone may have consequences for the EU as a whole, which would have a direct impact on the Alliance, as the most of the EU members are also part of the NATO.
- **Potential threat of the non-state based actor**
 - The Post- Second World War financial institutions face increasing competition for economic influence from emerging powers and international institutions.
 - The number of potential threats to the international financial market is increasing: rival states, state proxies, non-state actors, and individuals could all represent the source of a future cyber-attack.¹²⁷
 - Rising economic institutions (such as the Asian Infrastructure Investment Bank), organised crime and terrorist networks, and individuals with significant wealth, continue to challenge financial markets and may threaten international economic stability. On the national scale, tax evasion and black market economics may undermine public finances. Internationally, the global financial infrastructure remains vulnerable to attack from these actors.

Findings: All indicators suggest that globalisation of financial resources as a trend is still valid, and the potential threats to financial system are increasing. While the financial resources of the west are almost entirely interconnected with the global financial system, globalisation is increasing in this area because of the emergence of developing states on the global market. Access to technology will allow more actors to participate in the global flow of financial resources, and may present additional areas of threat to the Alliance. SFA 2017 should consider the following sub-trends: the unregulated digital monetary revolution; the emerging powers increasing influence on international institutions and their potential challenge to the Bretton-Woods system; and the changing balance of international economic power. Increasing economic inequality needs to be monitored more closely as it impacts on the social and international stability. In the area of resource scarcity, the oil price instability and its direct

¹²⁶ Daniel Gros et al, The Global Economy in 2030.

¹²⁷ Vormetric Data Security, "Vormetric Insider Threat Report," 2015, <http://www.vormetric.com/campaigns/insiderthreat/2015/pdf/insiderthreatreport-financial-0224.pdf>.

1301 impact on geopolitical stability of major producer countries and their national budgets should be
1302 monitored closely.

1303 **19. Increased Resource Scarcity:** Nations need increasing amounts of energy and raw materials
1304 to sustain growth and maintain an advantage in the globalised world.

1305 ***Key Facts, Developments and Future Considerations:***

1306 • **Changes in energy demand:**

- 1307 ○ By 2035, the world's population is projected to reach 8.7 billion, which means an
1308 additional 1.6 billion people will need energy.¹²⁸
- 1309 ○ By 2035, GDP is expected to more than double, with non-OECD Asia contributing nearly
1310 60% of that growth. Globally, GDP per person in 2035 is expected to be 75% higher than
1311 today, an increase in productivity which accounts for three-quarters of global growth.¹²⁹
- 1312 ○ As a consequence of increase in population and GDP growth, the International Energy
1313 Agency (IEA) suggests that global energy demand will increase 37% by 2040.¹³⁰ Although
1314 the demand is expected to increase, world markets for petroleum and other liquid fuels have
1315 entered a period of dynamic change.
- 1316 ○ The projected growth rate of global energy consumption by 2035 is significantly slower
1317 than the 2000-2013 period. This reflects the end of the phase of rapid growth in energy
1318 demand in developing Asia driven by industrialization and electrification.¹³¹
- 1319 ○ The global vehicle fleet will more than double from around 1.2 billion to 2.4 billion
1320 between 2015- 2035. Almost 90% of that growth is expected to take place in the developing
1321 world.¹³² This will drive the potential for growth in demand for liquid fuels in the emerging
1322 economies of China and India, while liquid fuels demand in the US, Europe seems to have
1323 peaked.¹³³
- 1324 ○ The discovery and potential for new supplies of oil from tight and shale resources have
1325 raised optimism for significant new sources of global liquid fuels. However, the short-term
1326 picture of a well-supplied oil market should not disguise the challenges that lie ahead as
1327 reliance grows on a relatively small number of producers.¹³⁴

128 BP, "Energy Outlook 2035", 2015, http://www.bp.com/content/dam/bp/pdf/Energy-economics/energy-outlook-2015/Energy_Outlook_2035_booklet.pdf.

129 Ibid.

130 International Energy Agency, "World Energy Outlook 2014- Executive Summary," 2014, http://www.iea.org/publications/freepublications/publication/WEO_2014_ES_English_WEB.pdf.

131 BP, "Energy Outlook 2035."

132 Ibid.

133 US Energy Information Administration, "International Energy Outlook 2014", 9 September 2014, <http://www.eia.gov/forecasts/ieo/pdf/0484> (2014).pdf.

134 International Energy Agency, "World Energy Outlook 2014- Executive Summary."

- By 2035, fossil fuels continue to provide most of the world's energy. Gas will gain share steadily, while the shares of both oil and coal fall in the global energy mix.
- Even if the use of renewables triples over the next 25 years, the world is likely still to depend on fossil fuels for at least 50 % of its energy needs¹³⁵. This will result in a search for new areas to explore and to access new energy resources that might trigger competition for resources in the global commons. In this respect the interest in regions such as the Arctic is expected to increase.
- Though global energy resources are adequate to meet the growth in consumption, significant investment and political action are needed now to ensure the resources are developed.¹³⁶ As the primary contributor to climate change, continued use of fossil fuels will bring with it additional global problems that will need to be addressed.
- **Rare Earth Elements (REE):**
 - An increasing number of new technologies and products use REE. Due to high demand, uncertain supply and lack of substitutions, the importance of REE has grown substantially.¹³⁷
 - China, the world's largest source of REE, provides over 90% of the world's total output and has occasionally reduced quotas on its REE exports.
 - The prices of REE fluctuated much more than that of the energy prices for example, the price of one kg *lanthanum oxide* rose 13 times between 2008 and 2011.¹³⁸
 - China's unilateral actions and near monopoly in the production of REE and high prices raised serious concerns for companies and governments across the globe.¹³⁹
 - Motivated by expected increases in demand, the US, Japan and Australia have already opened rare earth mines and are building new processing capabilities. Other countries like Canada, South Africa and Kazakhstan are following suit.¹⁴⁰
 - A December 2013 report to the US Congress suggests that "new mining projects could take as long as 5-10 years to reach production, in the long run it is expected that global reserves and undiscovered resources are large enough to meet demand."¹⁴¹

- **Use of energy as a political tool:**

135 Chevron, "Energy supply and demand," 2014, <http://www.chevron.com/globalissues/energysupplydemand/>.

136 Sarah Kent, "Global Energy Demand May Outpace Supply in Future," *Wall Street Journal*, 11 Nov 2014.

137 Namibia Rare Earths Inc, "High Demand for Rare Earths," accessed 26 October 2014,

<http://www.namibiarareearths.com/market-demand.asp>.

138 Erik Els, "China's 2013 rare earth production, export caps can't stop prices diving," *mining.com*, 8 January 2013, <http://www.mining.com/chinas-2013-rare-earth-output-export-caps-cant-stop-prices-falling-87874/>.

139 Congressional Research Services (CRS), Marc Humphries, "Rare Earth Elements: The Global Supply Chain," 16 December 2013, <https://www.fas.org/spp/crs/natsec/R41347.pdf> last accessed on 22 May 2015

140 Eugene Gholz (2014). "Rare Earth Elements and National Security," *Council on Foreign Relations*, October 2014.

141 Marc Humphries (CRS), "Rare Earth Elements: The Global Supply Chain," (Washington, DC: Congressional Research Service, 2013).

- 1355 ○ The discussions on the possibility of Russian use of energy as a tool in international
1356 politics began with the move towards greater state interference in the energy sector in
1357 2003/4. Before that period, the Russian authorities had been promoting policies such as
1358 privatisation, liberalisation, and international integration of the Russian energy sector.
- 1359 ○ The recent crisis in Ukraine demonstrated that Russia has changed these liberal
1360 approaches and Ukraine, Belarus, Moldova, and Georgia have become the most visible
1361 targets for the new Russian 'energy diplomacy'. These changes affect western and eastern
1362 European countries corresponding to their level of dependency on Russia.¹⁴²
- 1363 ○ The crisis in Ukraine has yet to be resolved. In September 2014, the European Union
1364 (EU) warned Russia not to use gas supplies as a weapon in its standoff with Ukraine.
1365 Although Ukraine still transports volumes of gas intended for Russia's other European
1366 clients, it is feared that Kiev may be forced to tap into those flows in emergencies.¹⁴³
- 1367 ○ In response, the EU Energy Strategy aims to increase energy efficiency and energy
1368 production in the EU whilst diversifying supplier countries and routes. It also entails
1369 negotiating effectively with EU's current major energy partners such as Russia, Norway, or
1370 Saudi Arabia, as well as new partners such as countries in the Caspian Basin region.¹⁴⁴
- 1371 • **Energy, water, and food nexus:**
- 1372 ○ Energy and water systems are increasingly becoming interdependent. All sources of
1373 energy require water in their production processes: the extraction of raw materials, cooling
1374 in thermal processes, in cleaning processes, cultivation of crops for biofuels, and powering
1375 turbines. Energy is itself required to make water resources available for human use and
1376 consumption through pumping, transportation, treatment, and desalination.¹⁴⁵
- 1377 ○ Energy and water face rising demands and constraints in many regions as a
1378 consequence of economic developments, population growth and climate change, which will
1379 amplify their vulnerability.
- 1380 ○ By 2035, energy consumption will increase by 50% which will increase the energy
1381 sector's water consumption by 85%.¹⁴⁶

142 Milov, Vladimir, (2006). "The Use of Energy as a Political Tool," *The EU-Russia Review*, no 1: 12-21.

143 Dmytro Gorshkov and Oleksandr Savochenko, "EU to Russia: Let's Not Use Natural Gas as a Political Tool," *Business Insider*, September 2014, <http://www.businessinsider.com/afp-eu-warns-russia-not-to-use-gas-as-weapon-in-ukraine-crisis-2014-9>.

144 European Commission, "European Energy Security Strategy", 2014, <https://ec.europa.eu/energy/en/topics/energy-strategy/energy-security-strategy>.

145 United Nations, Department of Economic and Social Affairs, "Water and Energy," accessed 19 May 2015, http://www.un.org/waterforlifedecade/water_and_energy.shtml.

146 Ibid.

- Water constraints can occur naturally, as in the case of droughts and heat waves, or be human-induced, as a result of growing competition among users or regulations that limit access to water.¹⁴⁷
- The use of water for energy production can impact freshwater resources, affecting both their availability and quality.¹⁴⁸ The IEA suggests that the scale of water used for energy production is likely to reach 580 billion cubic metres, which is about 15% of the world's total water withdrawal. The figure is second only to agriculture.¹⁴⁹
- The use, ownership of, and access to water gives rise to tensions which will only be exacerbated as time goes on. It is estimated that 40 countries in the Middle East and Africa will suffer from water insecurity, or scarcity, by 2025.
- Water shortages could boost food imports. How states with a high national debt and poor water access can generate revenues to finance these food imports will become a crucial issue.

Findings: Energy security was, and remains, 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 as critical for the developed countries that aim to maintain the level of welfare of their societies. The increase in demand might result in competition for resources that might lead to instabilities in different regions from the Middle East to the Arctic, and from the South China Sea to South America. Energy resources will increasingly be used to achieve political ends and balancing this behaviour by developing new technologies to reduce dependency will be increasingly given higher priorities in national security agendas. Faced with unstable prices and supply availability concerns, manufacturers across the globe are looking for ways to reduce their dependence on REE. This includes in some cases dropping products with a high dependency, in other cases engineering alternative approaches to the material mix, and increasing use of recycling techniques. Rapid urbanization, which is taking place in the great majority of developing countries, will exacerbate the competition to control and/or access water. The energy nexus with water and food will occupy liberal 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 and household consumption and between

¹⁴⁷ General Assembly of the United Nations, "UN Thematic Debate of the General Assembly: Water, Sanitation and Sustainable Energy In the post 2015 development agenda," 18/19 February 2014, <http://www.un.org/en/ga/president/68/settingthestage/1wsse.shtml>.

¹⁴⁸ International Energy Agency, "Water for Energy," *World Energy Outlook*, 2015, <http://www.worldenergyoutlook.org/resources/water-energy-nexus/>

¹⁴⁹ Ibid.

countries. All these aspects of resource scarcity and their interactions will be further analysed in development of the SFA 2017 Report.

20. Decreasing Defence Expenditures:

- The legacy of the 2008 economic and financial crisis will continue to hinder a significant increase in defence expenditures (DEFEX) in most Western countries.

Key Facts, Developments and Future Considerations:

- **Global Defence Expenditure:**
 - Global military expenditure in 2014 was almost \$1.8 trillion, down slightly from 2013, with an expenditure equivalent to 2.3 per cent of global gross domestic product (GDP). This is the third consecutive year that total global military expenditure has decreased.¹⁵⁰
 - The pattern of the past few years, where military expenditure has fallen in the US and Western Europe, but increased elsewhere, largely continued in 2014.¹⁵¹
 - The Russia-Ukraine crisis and the rise of Islamic State of Iraq and Levant (ISIL) are sources of instability but have not led, so far, to any major reinvestment in defence.
 - Global military spending remains high because US military spending influences other major or intermediate powers, such as Brazil, China, Russia and India, to maintain pace or risk loss of any regional influence. China and India are demonstrating a sustained increase in their military expenditure.¹⁵²
 - The change in perception of emerging threats ultimately may increase defence spending in NATO countries, but will be constrained by the growing costs associated with aging demographics, welfare and health care systems, and energy prices.
- **Reduction in Alliance Defence Expenditures:**
 - During the last decade most NATO member states have decreased their defence expenditures.
 - A review of implementation effectiveness of the 2014 Wales Summit decision to reverse the trend of declining defence budgets revealed six out of fourteen countries examined will cut defence expenditure in 2015. Only one of the fourteen countries will spend 2% of GDP on defence in 2015.

¹⁵⁰ Sam Perlo-Freeman, Aude Fleurant, Pieter D. Wezeman and Siemon T. Wezeman, "Fact Sheet: Trends in World Military Expenditure," (Stockholm: Stockholm International Peace Research Institute, (SIPRI) 2015).

¹⁵¹ Ibid.

¹⁵² Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2014," United States Government, 2014, http://www.defense.gov/pubs/2014_DoD_China_Report.pdf.

- Six of the fourteen states will increase their defence spending in 2015 but are not expected to meet the 2% target.¹⁵³
- **Effectiveness of Smart Defence measures:**
 - Certain states' national tasks and responsibilities will continue to be handled on a national basis. Furthermore, the idea of pooling and sharing a capability that cannot be counted on as nationally controlled will be unacceptable.¹⁵⁴
 - Nations may remain averse to collaborative efforts which might compromise sovereignty.
 - The desire to decrease overall defence spending within a nation may affect defence industries adversely through job losses and reductions of industry capacities.
 - Uneven burden sharing could be very harmful to Alliance cohesion if NATO Capability Targets shed by one nation as a result of defence cuts are simply shifted to another nation, which is not reducing its defence spending, under the pretext of specialisation and Smart Defence.
- **A Declining defence industrial base:**
 - Continued reductions in defence spending could have detrimental trends in the health of the defence and security industrial base.
 - Some companies may altogether abandon their activities in the defence sector, which would result in a thinning of the industrial base.
 - Fewer industry participants may ultimately mean less innovation, reduction in Research and Development investment, reduced industrial capabilities, and less competition.
 - Amalgamation or sharing of production burdens designed to reduce acquisition costs could raise unemployment in defence sectors, while hampering industrial base sites. Many nations may choose to not share burdens at the expense of increased cost solely to ensure economic strength in their defence industries.¹⁵⁵

Findings: 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 has introduced a 170% increase, the Russian defence budget has grown by 79% and US military spending has risen by 59%. Former Alliance Secretary General, Anders Fogh Rasmussen, has warned that “if European defence spending cuts continue, Europe’s ability to be a stabilizing force even in its neighbourhood

¹⁵³ Jeremy Bender, “Only the US and Estonia are meeting NATO’s defence budget goals,” *Business Insider*, 2015, <http://www.businessinsider.com/only-us-and-estonia-meeting-nato-budget-goal-2015-2>.

¹⁵⁴ Trevor Taylor, European Defence Agency, “Pooling & Sharing: What projects offer the best chances of success?” *European Defence Matters* Issue 3, 2013, p. 39-42

¹⁵⁵ Joachim Hofbauer, Priscilla Hermann, and Sneha Raghavan, “*European Defense Trends 2012: Budgets, Regulatory Frameworks, and the Industrial Base*,” (Washington, DC: Centre for Strategic and International Studies, 2012).

will rapidly disappear".¹⁵⁶ There will be growing pressure on the larger European countries, in particular France, Germany and the United Kingdom, to compensate for the reductions in the armed forces of smaller European states. At a time when large NATO allies are also trying to scale back the size of their armed forces, such a trend risks further eroding the concept of NATO solidarity. It is also likely to weaken the ability of smaller countries to influence political decisions within the Alliance.¹⁵⁷ The trend of declining defence expenditures continues to be a source of concern within the Alliance and validates it remaining a critically important trend to be monitored as a study of the Alliance's ability to meet its three core tasks and respond to emerging future threats to Alliance.

Emergent Trends in Economy Theme:

21. Global Inequality: Economic, social and political inequality between both individuals and groups will continue to fuel perceptions of injustice among those whose expectations are not met.

- **Information and communication:**

- Increasingly affordable and accessible technology will allow currently underprivileged human networks the opportunity to influence the decision processes and/or create civil unrest in unanticipated ways rapidly, thereby taking advantage of existing inequalities and allowing little response time by national security systems and protocols.
- Furthermore, increased interconnectedness leads to a greater awareness of disparity amongst people, thereby accelerating the grievances. Technology will create easy access to networking and economic opportunities not previously within easy reach of the majority. This may erode the perception of national identity further and may create challenges for state authorities.
- Anti-government and extremist groups, such as religious, criminal and terrorist organisations are already challenging national identities and state authorities (e.g. in India, Middle-East, Africa). This process is likely to increase and become more complex as technological advancement creates the necessity to better understand and monitor the process of fracturing identities.¹⁵⁸

- **Social and economic factor:**

- Inequality is growing globally. This may create serious challenges considering that almost 86% of the world's population will be living in less developed countries in the future

¹⁵⁶ Anders Fogh Rasmussen (2011). "NATO After Libya: The Atlantic Alliance in Austere Times," *Foreign Affairs* v. 90, no 4.

¹⁵⁷ Clara Marina O'Donnell (ed.), "The Implications of Military Spending Cuts for NATO's Largest Members," (Washington, DC: Centre on the United States and Europe at Brookings, 2012).

¹⁵⁸ Institute of Electrical and Electronic Engineers Computer Society, "What will our world look like in 2022."

and more than 80% of the global GDP is generated in cities.¹⁵⁹ Disadvantaged people are more vulnerable to different kinds of shock. The unequal distribution of wealth and development in some countries and between countries exacerbates existing disparities, threatening social cohesion and fuelling social tensions.¹⁶⁰ This may cause the development of fractured identities as people increasingly demand access to wealth and social equality.

- Inequality in itself is a driver for instability and may affect various societal sectors (e.g. access to natural resources, economy, and demographics). It may also result in the creation of human networks in reaction to such inequalities.
- Poor people, living along inequality fault lines are likely to move to more wealthy regions and connect to networks that promise more economic prosperity and support individual endeavour.¹⁶¹ This immigration process may lead to civil unrest in the affected regions and across national borders.
- Every disparity will have the inherent potential to threaten the social contract if not recognised and understood.
- Urban inequality and its consequences will increase the complexity of security situations. Key players in human networks will likely be unknown, but will be interconnected and therefore difficult to disrupt. They may unintentionally destabilise nations due to their cascading ways-and-means of expressing their demands.

Findings: 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. This may increase tension and instability, both within and between societies and result in expressions of unrest such as disorder, violence, criminality, terrorism and insurgency. Absolute poverty will remain a global challenge. Significant per capita disparities will exist within most countries and across some regions. Differences in material well-being will be more explicit, highlighted by increased access to more readily and cheaply available telecommunications. Associated grievances and resentments are likely to increase despite growing numbers of people being materially more prosperous in the future than ever before. Inequality may also lead to the resurgence of not only anti-capitalist ideologies, possibly linked to religious, anarchist or nihilist movements, but also to populism and even Marxism. Conversely, it may also lead to a demand for greater access to the benefits of globalisation and greater connectivity for the least developed states.

¹⁵⁹ World Economic Forum, *Global Risks 2015*, p. 35

¹⁶⁰ Khalid Malik, "Human Development Report 2014", *United Nations Development Programme*, 2014.

¹⁶¹ Emma Aguila and John Godges, "Rand Review," Vol 37 No. 2, *RAND Corporation*, Fall 2013.

CHAPTER 6

ENVIRONMENT THEME TRENDS

Existing SFA 2013 Trends:

22. Natural Disasters: The effects of natural disasters (e.g. storms, floods, earthquakes) might become more devastating.

Key Facts, Developments and Future Considerations:

- **Probability and Impact:**

- The increase of climate and environmental change in regard to severity is likely to affect the frequency and the impact of natural disasters.¹⁶²
- The Tsunami that hit Japan in March 2011 had a destructive effect that has not been seen before. The combination of an earthquake, a tsunami, a nuclear power plant accident, power supply failures, and large- scale disruption of supply chains was not manageable by one nation.¹⁶³
- The increasing complexity of the world and social systems influences the probable consequences of a mass event. Moreover, the complexity will be increased because of a lack of understanding of the patterns of natural disasters and the fact that climate models are not always reliable.¹⁶⁴
- If a natural disaster with this complexity occurs in a region characterised by poverty and inequitable conditions, it could have tremendous consequences for the region's security and stability.

- **Interconnected world:**

- The devastation of natural disasters will be exacerbated by the cascading effect of the increasingly interconnected global economic system.
- The disruption of the supply chain in Japan after the Great East Japan Earthquake interrupted certain global supply chains due to the effects on key manufacturers and distribution nodes. Global companies and corporations (e.g. the automobile industry) were confronted with setbacks in their processes and suffered financial losses.¹⁶⁵
- Natural disasters in the future might have the potential to endanger the global ecosystem and thereby stability and security.

¹⁶² European Union, "Global Trends to 2030: Can the EU meet the challenges ahead." 2015, ESPAS Report

¹⁶³ Frederica Ranghieri and Mikio Ishiwatari, "Learning from Mega disasters: Lessons from the Great East Japan Earthquake," (Washington, DC: World Bank Group, Open Knowledge Repository, 2014).

¹⁶⁴ Leslie MacCarthy, *Increased Rainfall in Tropics Caused by More Frequent Big Storms*, (New York: Goddard Institute for Space Studies, NASA, 2015).

¹⁶⁵ F. Ranghieri and M. Ishiwatari, "Learning from Mega disasters: Lessons from the Great East Japan Earthquake," 2014

1559 • **Resilience:**

- 1560 ○ Natural disasters may result in a lack of resources, the resultant destruction of
1561 infrastructure and/or the disruption of functional government.
- 1562 ○ Natural disasters may be a large threat to cities in the future. 15 of the world's 20
1563 megacities are located in coastal zones.¹⁶⁶ Even if the frequency or strength of the disasters
1564 does not increase, the impact may be increased due to the density of the population and
1565 aging infrastructure in urban areas.
- 1566 ○ In areas that were already stressed due to other factors such as shortages of food and
1567 water, the outcome of the disaster may be greatly magnified lessening the ability of local
1568 authorities to deal with it.
- 1569 ○ At times, the impact of man-made disasters such as industrial accidents could approach
1570 the magnitude of natural disasters.
- 1571 ○ Resilience will be a necessary investment in order to mitigate the effects of natural
1572 disasters. Resilience needs investment in infrastructure as well as the engagement of all
1573 stakeholders including the population itself.¹⁶⁷
- 1574 ○ The mitigation procedures for natural disasters have to be established before an event
1575 occurs. Security and stability is dependent on the ability to cope, recover, adapt, reconstruct
1576 and thereby minimize losses.

1577 **Findings:** This trend is still valid and increasing in frequency and intensity. Natural disasters are
1578 not of themselves the sole source of conflict or instability. They are entwined with the challenges
1579 emerging from different phenomena (e.g. urbanisation, technological development, climate
1580 change). The underlying drivers will increase and thereby very likely will magnify their destructive
1581 effects. Although natural disasters can occur anywhere they will be especially challenging for the
1582 political and security system where the social and infrastructural resilience is already weak and
1583 systems are not resilient enough. The impact will be most acute if a megacity is affected by a
1584 natural disaster. This might challenge the stability and security in regions within the area of interest
1585 of the Alliance, thereby having an indirect impact.

1586 **23. Environmental/Climate Change:** Global environmental change and its impacts are becoming
1587 readily apparent and are projected to increase in the future.

1588 **Key Facts, Developments and Future Considerations:**

1589 • **Policies and Regulations:**

166 Elizabeth Warn and Susana B. Adamo, "The Impact of Climate Change, Migration and Cities in South America," *World Health Organization Bulletin*, Vol. 63 (2), 2014.

167 European Union, "Global Trends to 2030: Can the EU meet the challenges ahead," *ESPAS Report*, 2015

- To date, decisions on Climate Change and mitigation policies have been considered globally, but have been largely taken at the national level in line with national interests.
- These policies are influenced by layers of uncertainty due to the pressure created by the environmental change in combination with social and economic challenges.¹⁶⁸
- Decision makers face various challenges in implementing and enforcing policies because of the second and third order effects that go beyond national boundaries.¹⁶⁹
- There is a requirement for regulation in response to climate change as the evidence of human impact on the environment continuous to grow.¹⁷⁰ Without stronger actions, research data shows, that the global average warming may exceed 2°C within the next two decades and warming could exceed 4°C by the end of the century.¹⁷¹
- Enforced mitigation policies would affect the environment only in the long run and may have to be backed up with short and mid-term response actions. Research shows that it may be crucial in the future to integrate climate and other environmental impact into core economic development and investment strategies.¹⁷²
- The implementation of possible global policies will likely need to consider resilience as part of the adaption measures.

Global Warming:

- Regardless of the natural imbalances effecting global warming, the combined land and ocean surface temperature rose constantly over the last decades.¹⁷³ Statistics show a clear long-term global warming trend, despite year-to-year fluctuations in temperature due to natural processes such as El Ninos, La Ninas, and volcanic eruptions.¹⁷⁴
- Climate change will increase the risks from heat stress, flooding, storm surges and resource scarcity, thereby affecting the global eco system.¹⁷⁵ Research shows that extreme weather phenomenon may increase in the future even if related drivers decline. For example flooding may intensify, even in areas and regions where total precipitation is projected to decline.¹⁷⁶

168 Organization for Economic Co-operation Development, "Environmental Outlook to 2050, The consequences of inaction," 2012, <http://www.oecd.org/env/indicators-modelling-outlooks/oecdenvironmentaloutlookto2050theconsequencesofinaction.htm>.

169 Intergovernmental Panel on Climate Change, *Climate Change 2014, Mitigation of Climate Change*, Eds. Ottmar Edenhofer et al. (New York: Cambridge University Press, 2014).

170 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*.

171 Global Commission on the Economy and Climate, "The New Climate Economy Report," 2014, <http://newclimateeconomy.report/>.

172 Ibid.

173 European Environment Agency, "Assessment of global megatrends."

174 U.S. Global Change Research Program, "Climate Change Impacts in the United States," 2014, <http://www.globalchange.gov/browse/reports>.

175 U.S. Environmental Protection Agency, "Climate Impacts on Global Issues," 2014, <http://www.epa.gov/climatechange/science/>.

176 "Climate Change Impacts in the United States."

- 1616 ○ Raising resource efficiency and different systems of subsidies may in future lead to
1617 economic growth and emissions reduction at the same time. 2014 subsidies for clean
1618 energy amounted to \$100 billion but subsidies for polluting fossil fuels were estimated at
1619 around \$600 billion per year.¹⁷⁷
- 1620 ○ Arid and semi-arid areas will expand and desertification will result in an estimated 135
1621 million people being at risk due to water shortages and decreased agricultural output.¹⁷⁸ On
1622 the other hand, new technologies and water management could support food production in
1623 the future. Restoring just 12% of the world's degraded agricultural land could feed 200
1624 million people by 2030, thereby strengthening climate resilience.¹⁷⁹
- 1625 ○ Additionally, predictions for global sea-level rise state that by the year 2100 the levels
1626 are likely to rise about 0.1 to 0.9 meters depending on how aggressively greenhouse gas
1627 emissions are tackled.¹⁸⁰
- 1628 ○ The mitigation effect of the implementation of new technology (e.g. geo- or genetic-
1629 engineering) and back-up response actions (e.g. planting of trees or certain plants) may
1630 slow down the process but are unproven.
- 1631 • **Reciprocity with other trends:**
- 1632 ○ The interconnection with other themes and trends such as urbanization, energy
1633 resources, and land use will exacerbate the severity of the effects of climate change.¹⁸¹
- 1634 ○ The related impacts could be tangible more broadly. Critical infrastructure might be
1635 affected thereby interrupting essential services (e.g. global supply chains).
- 1636 ○ Continuing urbanization in coastal areas and the growing size and number of urban slum
1637 areas on marginal land that is prone to inundation and more vulnerable to extreme weather,
1638 will exacerbate the impact of climate change and sea level rise.
- 1639 ○ The application of new technologies (e.g. geo- and climate engineering, genetic
1640 engineering) may be used by nations in order to support the mitigation process of
1641 environmental change, but is unprecedented.
- 1642 ○ Climate change may create serious challenges in regard to human health. In the 15
1643 countries with the highest greenhouse gas emissions, the damage to health from poor air

177 Global Commission on the Economy and Climate, "The New Climate Economy Report."

178 UK Ministry of Defence, *Global Strategic Trends – Out to 2045*.

179 Global Commission on the Economy and Climate, "The New Climate Economy Report."

180 The Atlantic Council, "Middle East 2020: Shaped by or Shaper of Global Trends," 2014,
<http://www.atlanticcouncil.org/publications/reports/middle-east-2020-shaped-by-or-shaper-of-global-trends>.

181 European Union, *Global Trends to 2030: Can the EU meet the challenges ahead*.

quality, largely associated with the burning of fossil fuels, is valued at an average of more than 4% of GDP.¹⁸²

- **Economic Pressure:**

- Climate change and other anthropogenic factors will have a corresponding environmental impact on bio-diversity, land use and fresh water.¹⁸³
- These impacts will be unevenly distributed across the globe, but will have a greater impact on those areas that are already expected to be resource stressed.¹⁸⁴
- These conditions will likely lead to the displacement of large numbers of people and a corresponding increase in conflict rooted in the competition for resources and living space.¹⁸⁵
- The inequality of energy resources will potentially increase the destabilizing effect. Developing countries will consume 75% more energy than developed countries in 2030.¹⁸⁶ This may fuel the cycle of emissions, accelerate environmental change and contribute to future conflicts. Historically though, these nations have added little to the compounding problems of climate change, while they will be expected to share the burden of mitigation measures along with the developed nations. This will lead to claims of unreasonable burden sharing on the part of the developing nations as they attempt to reach economic improvement goals for their populations.

Findings: All indicators suggest that the trend is still valid and increasing in regard to severity of extreme weather events. 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 the members of the Alliance directly or indirectly.

¹⁸² Global Commission on the Economy and Climate, "The New Climate Economy Report."

¹⁸³ European Union, *Global Trends to 2030: Can the EU meet the challenges ahead*, ESPAS Report, 2015

¹⁸⁴ Ibid.

¹⁸⁵ European Union, "Citizens in an Interconnected and Polycentric World."

¹⁸⁶ European Environment Agency, "The European Environment, State and Outlook 2015 – Synthesis Report," 2015, <http://www.eea.europa.eu/soer/synthesis/synthesis>.

CONCLUSIONS

1. The SFA Interim Update 2015 provides a review of existing SFA 2013 trends and attempts to identify emergent trends while maintaining interaction with Nations, NATO Command 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 interim 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. In the Political theme, all indicators suggest that the ongoing shift in global power will continue to see a transfer of power from West to the East. The shift in economic power has increasingly been associated with the use of hard power.

- The transition from autocratic/theocratic regimes towards more democratic forms of government continues, albeit at a slowing rate. Additionally, this transition can take both directions: autocratic-to-democratic or democratic-to autocratic.
- The increasing 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 increasing potential for interstate conflict as a consequence of challenges to the liberal world order is expected to continue.
- The increasing income inequality and the government's ability to provide employment and social security will continue to be challenged over the coming decades.

3. In the Human theme, changing demographics, urbanisation, 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 the developed and developing worlds.
- Urbanisation will steadily continue, 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 democratisation of technology, may create potential threats as 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.

1704 4. Science and technology will remain key catalysts for change and that will have cross-
1705 cutting effects on all trends and all aspects of everyday life. Developments will enable
1706 individuals and non-state actors to exert influence in international structures.

- 1707 • Access to information and use of dynamic networks will increase exponentially as these
- 1708 networks become ubiquitous and seamlessly fade into the background.
- 1709 • Autonomous systems will evolve further and become an increasing part of everyday life.
- 1710 Swarms will increasingly be employed not only militarily, but also post-disaster relief as well
- 1711 as in mining, geological survey, and transportation.
- 1712 • Efforts to obtain safe, reliable, and affordable energy solutions will demand ground-
- 1713 breaking energy technologies.
- 1714 • The globalisation of financial resources will continue and these flows will become
- 1715 increasingly vulnerable.

1716 5. Resource scarcity and energy security remains a serious concern with most of the
1717 world's large energy reserves in unstable regions of the world.

- 1718 • Access to water will increasingly impact security considerations.
- 1719 • Increase in energy demand might result in a search for new sources leading to
- 1720 competition and potential instability from the Middle East to the Arctic.
- 1721 • Rapid urbanisation, which is taking place in the great majority of developing countries,
- 1722 will exacerbate and may lead to competition to control and/or retain access to resources.
- 1723 • The decreasing defence expenditures trend in NATO Nations continues to be a source
- 1724 of concern while military spending has grown significantly in several parts of the world.
- 1725 • Economic, social and political inequality between both individuals and groups is
- 1726 expected to continue to fuel grievances and perceptions of injustice.

1727 6. Natural disasters are expected to intensify in frequency and severity as the impacts of
1728 climate change increasingly materialize. The impact of natural disasters will become more acute
1729 driven by the growth of mega-cities as rapid urbanization continues.

- 1730 • The cascading effects of large scale natural disasters will be exacerbated by an
- 1731 increasingly interconnected global economic system, thereby creating instability situations
- 1732 globally.
- 1733 • Resilience of infrastructure becomes increasingly important to mitigate the effects of
- 1734 natural disasters and mitigation procedures need to be established to avoid shortages of
- 1735 food, water and energy.

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APPENDIX A: Summary of Existing SFA 2013 Trends and Draft Emergent Trends

THEME	EXISTING SFA 2013 TRENDS	EMERGENT TRENDS
POLITICAL	Shift of Global Power: All indicators suggest that this trend is still valid and the transfer of power from West to East is gathering momentum.	Increasing role of non-state actors both 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.
	Shifting Political Structures: Although this trend remains valid, its rate of development is slowing. Transitions can either be autocratic-to-democratic or democratic-to-autocratic.	Return of power politics, challenges to the liberal world order and increasing potential for interstate conflict: As a result of greater strategic awareness among the world's population, people will increasingly share their future perspectives, aspirations, and grievances on global issues.
	Polycentric World: Polycentrism has been identified as one of the key characteristics of the future and has been moved to Chapter 1.	Increasing democratic discontent: Increasing democratic discontent exists in both old and new democracies due to income inequality and governments' ability to provide employment opportunities and social security to the masses.
HUMAN	Changing Demographics: Changing Demographics as a trend is still valid. The effects of population change may become more tangible than they are today depending on the ability of states to provide for the needs of their populations.	Transparency: As a result of a greater number of people being connected and taking advantage of more advanced and accessible mobile technology, state authorities and the execution of power will be scrutinised more in the future.
	Urbanisation: Urbanisation as a trend is still valid and increasing but at a slower rate. Cities may start to cross national borders and is likely gain political power and influence with the possibility to overpower national authorities.	Ideological polarization: Although ideology is already part of different trends like fractured identities or human networks, it may increase in prominence in the future. Ideological polarization such as ISIL in the Middle East and North Africa is likely to accelerate globally in the future.
	Human Networks: This trend is still valid and decentralisation will increase, thereby creating unforeseeable threats.	
	Fractured Identities: This trend is still valid and will increase in influence and complexity because it will involve a greater number of actors.	

SCIENCE / TECHNOLOGY	Technology Accelerates Change: All indicators suggest that this trend remains valid. Technology is a catalyst for change.	Evolution of Autonomous Robotic Systems: Swarm robotics can be applied to sophisticated problems involving large amount of time, space or targets, and where a certain danger may exist in the environment.
	Increased Access to Technology: All indicators suggest that this trend is still valid and it needs to be monitored at global, regional and local levels.	Breakthrough in Energy Technologies: Increased focus into ground-breaking technologies exploring safe, reliable, and affordable energy solutions have the potential to radically impact the future of energy.
	Centrality of Dynamic Networks: 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.	
ECONOMICS / RESOURCES	Globalization of Financial Resources: All indicators suggest that globalisation of financial resources as a trend is still valid, and the potential threats to financial system are increasing.	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.
	Increased Resource Scarcity: Energy security was, and remains, a major concern, with large resource deposits located in unstable regions of the world.	
	Decreasing Defence Expenditures: All indicators suggest that this trend is still valid. The trend of declining defence expenditures continues to be a source of concern with the Alliance and validates it remaining a critically important trend to be monitored.	
ENVIRONMENT	Natural Disasters: This trend is still valid and increasing in frequency and intensity.	
	Environmental/Climate Change: All indicators suggest that the trend is still valid and increasing in regard to severity of extreme weather events.	