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



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Draft Trend Analysis for SFA Workshop
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POLITICAL THEME TRENDS

1. **Shift of Global Power:** Potential rebalancing of power from the West to other regions could present political and economic challenges to NATO members.

Factors:

- The elements of traditional power: military, economic and diplomatic
- The ability of the developing world maintaining faster economic growth
- The ability of the international community to integrate rising powers and manage the associated changes peacefully
- The change in the overall nature of power and how it is employed and the elements of soft power and its employment

Indicators:

Economic: Economic power shift is expected to continue. In 2000, the U.S. produced nearly three times as much as the Chinese and initial expectations were China would only be able to catch the US around 2019-2020 timeframe¹. China's economy has surpassed the US as the world's largest economy in 2014² albeit China's population remain poor. China's GDP growth rate will be around 7.50% while European growth continues to be less than 1% for the overall EU area resulting with a decline in their share of the global GDP. India has overtaken Japan as the world's third largest economy. Looking beyond 2020, Eurozone is expected to maintain a growth rate around 1.2% while US economy slows down from 2.4 to 1.7%³. For the first time in more than two centuries—since the start of the Industrial Revolution—the majority of the world's economic growth took place in the developing world, driven in large part by China, India and other emerging economies. There are major structural and policy related challenges of the developing economies; however their growth rate is expected to remain higher than the developed world.⁴ World Bank, IMF and OECD estimates share this long term projection.

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

¹ Economist, Volume 184, 10 Sep 2014, page 50

² International Monetary Fund, 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>

³ Using Purchasing Power Parity rather than using Market Exchange Rates – OECD and World Bank.

⁴ OECD Economic Outlook,

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defence expenditures increased 101%.⁵ Specifically, China's defence spending increased 170% while US has observed a 36% change for 2004-2013 period. If current trends continue, China's defence spending is projected to be equal that of the US by 2025⁶. However, as a result of NATO's Wales Summit, NATO Nations have committed to reverse the trend of declining military spending.

Diplomatic: Emerging powers feel increasingly emboldened to test and probe the current order with an eye toward reshaping the international system in ways that reflect their interests, norms and values. It is a leap to think that China will now embrace a role as responsible stakeholder in an international order built by the US and designed to protect its interests, norms and values. Managing this period, in particular a peaceful transition of power will be the paramount challenge for the US and international community over the next two decades.⁷ While the US remains committed to defence and security of Europe and the Middle East and North Africa region, it is expected to be less keen on taking a leading role in Europe's affairs in the near abroad.⁸ Overall, this period is expected to manifest a change in the ability of the West to influence global affairs.

Changing nature of the power: Russia's use of hybrid warfare methods during the recent crisis in Ukraine has brought the question of the fungibility of hard power. Hybrid warfare aims to neutralize target state's geopolitical characteristics – the size of the territory, population, the status of the state in the world, economic opportunities, military power, and the total potential. Energy and other non-conventional means have been used to create chaos and to coerce and influence to change priorities of the target state. State actors will be accompanied with non-state actors and other proxies. This approach might set precedence for Southeast Asia, where China's rise as a regional power will have the potential regional and global impacts. Unless China proves to be able to better develop its soft power of attraction, the rise in its hard military and economic power is likely to frighten its neighbours into seeking coalitions to balance against it.⁹ On the other hand, there are a range of transnational issues such as global financial stability, climate change, cyber-terrorism or pandemics that increasingly requires cooperation to solve them. As a status quo power, the United States has much to gain from a triangle of good relations between US, Japan and China.

⁵ SIPRI Military Expenditure Database, accessed on 29 October 2014, http://www.sipri.org/research/armaments/milex/milex_database

⁶ Layne, Christopher, "The Global Power Shift from the West to the East," The National Interest 2012," page 22

⁷ Layne, Christopher, "The Global Power Shift from the West to the East," The National Interest 2012," page 23

⁸ Stokes, Doug and Whitman G. Richard, "Transatlantic Triage? European and UK grand strategy after the US rebalance to Asia", International Affairs 89: 5, 2013

⁹ Nye, Joseph, "The Second Term: Joseph Nye on U.S.-Chinese Relations", 22 Jan 2013

Analysis:

Shift of economic power continues and it will be associated with an increase in hard power in the Southeast Asia. There are contradicting reports on the ability of China to maintain its GDP growth at a higher rate in comparison with the West. International organizations such as IMF, World Bank and OECD projections suggest that developing World's share in global GDP will overtake OECD countries. More importantly militarization of Southeast Asia in particular, developing world in general might present challenges to international security and result with instability. Additionally, the use of hybrid warfare methods will be further analysed to identify its impact on the employment of power outside of the traditional norms.

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

Factors:

- The political transition in the Middle East and North Africa region and survivability of the political reforms
- The political and social developments in the former Soviet space

Indicators:

The autocratic/theocratic regimes in the Middle East and North Africa: Political transitions appear stalled in Egypt, Libya, and Yemen, while most other protest movements have failed to seriously challenge other regional leaders. Prospects for a more democratic Middle East have worsened with the developments in Syria and Iraq as chronic deficit of government legitimacy and power vacuum filled by extremist groups such as so called "Islamic State of Iraq and Syria – ISIS"¹⁰. The Arab Spring protests successfully produced regime change in some countries but not in others. Although social, economic, and political factors such as demographics issues – 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 have been used to explain the causes of these developments; they fail to explain the variance satisfactorily¹¹. A more structural analysis reveals that oil wealth, hereditary monarchy – structure of the state and loyalty of the security apparatus have played a significant role for the fate of these regimes.¹² Additionally the level of foreign intervention has

¹⁰ Jane Kinninmont and Abdullah Ali, The Observer, 6 September 2014

¹¹ Jason Brownlee, Tarek Masoud, and Andrew Reynolds, "Tracking the Arab Spring: Why modest harvest?" Journal of Democracy, Volume 24, No 4 October 2013

¹² Scott Williamson and Caroline Abadeer, "Protest, Uprising & Regime Change in the Arab Spring", 28 Jan 2014

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determined some of the outcomes in different countries such as NATO intervention in Libya enabled ousting of Qaddafi regime.

The political and social developments in the former Soviet space: Many of the former Soviet states are still going through a painful transformation on a confusing path toward acceptance of freedom and democratic values.¹³ There were several Western attempts to increase democratic standards, through political dialogue and NGO assistance. These attempts were subjected to constant scrutiny and pressure from the international community. They were also closely monitored by Kremlin, which still claimed a special role in the affairs of its 'near abroad'¹⁴ and feared of losing control of its influence in critical countries such as Ukraine and Georgia that are important for geopolitical and economic reasons. Since November 2013, Russia has been using hybrid warfare tools: conventional and unconventional against Ukraine such the energy weapon, trade restrictions, interfering with Kiev politics, supporting separatist elements in the East to destabilise the country.¹⁵ In addition to Ukraine in Eastern Europe and Georgia in Caucasus, Central Asian Republics are increasingly concerned with the increasing assertive Russian actions.

Analysis:

Recent developments in the Middle East and North Africa and Eastern Europe clearly show that transitions of autocratic / theocratic regimes towards more democratic regimes will continue to be turbulent. These changes will differ from region to region and country to country. While social, economic, political factors and impact of technological developments on societies remain useful elements for study, a structural analysis would provide better insights for specific to particular region or a country. These structural changes indicate that the role of non-state actors will continue to increase as their numbers multiply.¹⁶ One size fits all solutions will not provide explanations why political changes become successful in some countries and fail in some others. Use of hybrid warfare tools will also increase concerns over state's capacity to influence non-state actors' actions. Russia's actions are expected to be assertive to those regions and countries in which its claim for near abroad security concerns.

¹³ Olesea Ghedrovici and Nikolai Ostapenko, "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*

¹⁴ Donnacha Ó Beacháin and Abel Polese "The Color Revolutions in the Former Soviet Republics," *Routledge Contemporary Russia and Eastern Europe Series*, 2010

¹⁵ Jan Marinus Wiersma, Clingendael, "Signing full EU Association Agreement at last: outlook for Ukraine," 17 June 2014

¹⁶ Thomas G. Weiss, D. Conor Seyle, Kelsey Coolidge, "The Rise of Non-State Actors in Global Governance," 2013

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

Factors:

- New challenges to western democracies
- Diverse effects of non-state actors influencing the outcomes in political, social, economic, and environmental issues
- Increasing influence and the number of non-state actors
- Emergence of global middle class
- Emerging powers and lack of global governance

Indicators:

The Democratic Disconnect: Since the beginning of the economic crises in 2008, Western Democracies have experienced new challenges that are different from those faced earlier in the twentieth century. Severe economic and financial constraints reduced national governments' ability to provide employment opportunities and social security to the masses. Additionally, the divide between rich and poor has been widened in developed nations. According to the OECD, economic disparity has risen more from 2007 to 2010 than in the preceding 12 years.¹⁷ These developments created a gap between citizens and those institutions at the national, regional, and transnational levels that are responsible for providing effective governance. It was argued that national governments were not able to adjust to new international context such as globalization and shift of global economy resulted with disconnect between citizens and institutions.¹⁸ On the other hand, new actors, in particular citizens and rights-claiming networks across borders, empowered by increased communications and advanced technology and transportation have increasingly attempted to shape the outcomes in political, social, economic, and environmental issues. Apparently, these attempts had no residual impacts on governance institutions causing frustrations and social discontent amongst populations. This dynamic has led to a vicious circle. Especially among the Western democracies, the inability of states to provide effective governance is fuelling public discontent.¹⁹ However, this discontent is not limited with the Western World or developed countries, protesters occupied major districts in Hong Kong to demand full universal suffrage for the city, a culmination of decades of frustration among the city's democracy activists.

¹⁷ Eliza Mackintosh, The Washington Post, Income inequality rising in most developed countries, 2013

¹⁸ Transatlantic Academy, "The Democratic Disconnect: Citizenship and Accountability in the Transatlantic Community, 2013

¹⁹ Transatlantic Academy, "The Democratic Disconnect: Citizenship and Accountability in the Transatlantic Community, 2013

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Diverse effects of non-state actors: Non-state actors include groups, movements, organisations, and individuals that are not part of state structures which have growing impacts on the policies and position of nation-states.²⁰ As a result, non-state actors can directly or indirectly affect global stability and security. What is characteristic of the current era is the grey area of '*new citizens' movements*' that do not accept the existing system but refrain from resorting to violence (e.g. the Occupy movement). On the other hand, there are non-state actors that resort violence to achieve their objectives. 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 non-state actors that try to exercise their influence within the rules of the prevailing system (e.g. traditional IOs and NGOs).

Increasing role of non-state actors and individuals: The number of IOs and NGOs almost doubled within four years between 2009 and 2014 as total number reached 67,000 in 2014²¹. While the roles of non-state actors are being increasingly legitimized and opportunities are materialized to expand their influence, states are losing aspects of their power.²² As a consequence of the widening and deepening integration of societies, states are increasingly outsourcing their activities to non-state actors. IOs and NGOs – non-state actors in general either took over some of the governance institutional responsibilities or advocated civic rights towards them. These developments have also allowed states to evade political and legal constraints by empowering non-state actors that do not face such limitations on their actions. However, this also involves a loss of control over the activities of non-state actors that have been empowered by the outsourcing of state power and whose actions are not accountable to the citizens of any one nation-state.

Emergence of global middle class in developing world: Over the past decades, shift of global economy from West to the East resulted with a rapid expansion of global middle class in Asia, those consuming more than \$10/day. This rather swift development is mostly taking place in the emerging economies. The actual number of the middle class in developing countries is beginning to exceed those in advanced economies: in Asia alone over 525 million people now live on incomes between \$10-100/day more than the entire population of the European Union. This rapid economic change might also create huge income inequalities in the developing world which generated political and social implications. As long as there is a strong

²⁰ Clingendael 2013 Strategic Monitor, "An Uncertain World," <http://www.clingendael.nl/sites/default/files/Non-state-actors-and-individuals-strategic-monitor-2013.pdf>

²¹ Union of International Association, IOs, IGOs and NGOs increased 33,000 between 1950 and 2009

²² Stratton Trevin, "Power Failure: The Diffusion of State Power in International Relations," Infinity Journal

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perception of upward mobility in incomes, people particularly in the new middle classes will be more likely to accept higher levels of inequality.²³ However, recent protests in Thailand and Ukraine have revealed new conflict lines between 'modernist' and 'traditionalist'.²⁴ Protests by urban middle class appeared to be as much struggles about national identity and the distribution of power with increasingly vocal and influential – but less liberal – rural populations as they are about democracy.²⁵

Emerging powers and global governance: In parallel to the global shift of economic power during the last two decades, Europe's and North America's share of the global economy dwindled and China overtook Japan as the world's second-largest manufacturer on a gross value added basis in 2006 and the United States in 2010. 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 International Monetary Fund (IMF). China has proposed an Asian Infrastructure Investment Bank (AIIB) that could compete with the Asian Development Bank (ADB). These initiatives represent the first serious institutional challenge to the global economic order established at Bretton Woods 70 years ago. When representatives of 44 nations established Bretton & Woods system in 1944, they had three principal goals in mind. First and foremost 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-neighbor 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 favor. Arguably, both the BRICS Bank and China's proposed Asian Infrastructure Investment Bank (AIIB) have been motivated by three similar objectives however it appears that they started in reverse order. The BRICS Bank is a wake-up call to the advanced countries of North America, Europe, and East Asia. They should strengthen their own economic management to avoid recurring financial and fiscal crises and do more to share power in the Bretton Woods institutions. Having made a real concession by embracing

²³ Borge Wietzke and Andy Sumner, "The Political and Social Implications of the 'New Middle Classes' in Developing Countries: A Literature Review and Avenues for Future Research", 13 May 2014

²⁴ New York Times, 2 June 2013

²⁵ Borge Wietzke and Andy Sumner, "The Political and Social Implications of the 'New Middle Classes' in Developing Countries: A Literature Review and Avenues for Future Research", 13 May 2014

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the G-20, which includes the BRICS as equal members, as the "premier forum for our international economic cooperation," Western powers should work harder to restore the G-20's effectiveness and credibility. But 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.²⁶

Analysis:

The rapid increase in the number of non-state actors will improve their ability to influence international affairs while reducing states' ability to provide effective oversight in their actions. It was argued that non-state actors (corporations, IOs, NGOs, social movements, migrants, and militant groups) are rooting around states and multilateral institutions as well as penetrating national boundaries, making it more difficult for national governments to design and implement effective economic and social policies.²⁷ Lack of effective response to emerging economic and social challenges created democratic discontent not only western – develop nations but also emerging powers and developing countries. The economic crisis is likely to exacerbate social conflicts in the BRICS. The most explosive problem is rising income inequality.²⁸ In China, "mass incidents" – a euphemism for protests – doubled between 2006 and 2010, rising to 180,000, according to the Chinese Academy of Governance.²⁹

As a result of greater strategic awareness among the world's population, their aspirations and grievances on global issues from climate change to global warming; from income inequality to high level of unemployment the future perspectives will increasingly be shared³⁰. By 2030, the demands and concerns of citizens in many different countries of the world are likely to converge, with a major impact on national politics and international relations. However, western democracies must recognize that their own liberal international order will not be universalized, and should seek to find common ground with emerging powers. On the other hand, China not only is not committed to such Western principles as free trade and floating currencies, it remains one of the biggest obstacles. 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.³¹ Peacefully managing the onset of a polycentric world will require compromise, tolerance, and recognition of political diversity.³²

²⁶ Matthew P. Goodman, Can the BRICS dominate global economy? The National Interest, August 2014

²⁷ Transatlantic Academy, "Liberal Order in a Post-Modern World," 2014

²⁸ Walden Bello, "The BRICS challengers to the status quo," Foreign Policy Focus and The Nations, August 2014

²⁹ Walden Bello, "The BRICS challengers to the status quo," Foreign Policy Focus and The Nations, August 2014

³⁰ European Union Institute for Security Studies, ESPAS Report 'Global Trends 2030 - Citizens in an Interconnected and Polycentric World', 2012

³¹ Washington Times, Emerging economic powers to challenge U.S., IMF with own aid bank, August 2014

³² Transatlantic Academy, "Liberal Order in a Post-Modern World," 2014

HUMAN THEME TRENDS

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

Factors:

- Unbalanced population growth in different countries and regions and population projections based on fertility rate assumptions
- Geographic distribution of population growth
- Life expectancy's impacts on population structure and aging
- Population composition based on changes in ethnicity and religion in societies.
- Alternative population projections.

Indicators:

Population growth: World population is projected to increase to 8.7 billion in 2035 that is 1.6 billion people more than in 2013. 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 and further decline later on. And yet, decline in fertility has not occurred and is still not occurring simultaneously in all countries so that differences in rates keep persisting among them. As a result more than 40 countries (included Russia) will experience an overall decline in population. Diminished fertility in the developing world is behind this trend. At the global level, total fertility is projected to decrease by 2035 (from 2.53 to 2.30 children per woman). Fertility decline will take place independently of ethnic or religious differences. However, fertility levels in Africa will be on average more than one child higher than in Asia or Latin America. Afghanistan, Angola, DRC, Nigeria and Somalia will 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 that would reach 7.4 billion in 2035 (7.7 in 2040 and 8.2 in 2050) from 5.9 billion in 2013, with an average annual rate of change at 0.77% in 2035-2040 and 0.60% in 2045-2050. Within the developing world, the least developed countries are expected to grow 'dramatically', almost doubling in 2050 the 2013 level while passing from 898 million to 1.2 billion in 2030 and 1.5 in 2040. And yet, the actual rate of increase per year (2.3%) is expected to slow down in the next decades to 1.77% in 2035-2040 (and to 1.54% in 2045-2050). Overall, in 2035 85.2% of the world population is expected to live in the less developed world (16.2% in the least developed countries). Among regions, Asia will see its population grow until 2050, after which a decline would occur; on the contrary, the population of Africa is projected to increase more in the second half of the century (1.8 compared to 1.3 billion). India's population is likely to surpass China's by 2028: at that time the two countries will account together for 35% of the world's

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population. By 2035, Bangladesh, Ethiopia, the Democratic Republic of Congo, the United Republic of 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 and the Russian Federation, Serbia and Ukraine will see their population decline by more than 15% by 2050 while 43 countries or areas will experience an overall decrease in population by 2050.

Changes in life expectancy and aging: At the global level, life expectancy at birth is expected to reach 74.5 years in 2035-2040 from 69 years in 2013. 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. In the next decades most countries will experience the most significant change in the proportion of working age population, which will be decreasing at different rates both in the developed and developing world. And yet the calculus of working age population may change as well, a fact that would impact on health, economic and welfare planning. In developed countries, 2013 registered the peak of population in their main working ages (25-59); working-age population is expected to decline from 606 million to 557 million by 2035 (from 49% of the population in 2013 to 43% in 2035) and further decrease later on. Working-age population proportion in the less developed regions would shift from 44% in 2013 to 45% in 2035, while the same proportion in the least developed countries would increase to 40% in 2035 from 34% in 2013. In particular, by 2035, people aged 60 or more are expected to account for 30% of the population in developed regions, 16% in the less developed regions, and 7.5% in the least developed countries. Consequently, the more developed regions will also experience a decline in the share of their 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 making projections on ethnic composition, assumptions on levels of fertility and migration are crucial. In general, the fertility rate of foreign-origin population has tended to converge to the national average of industrialized countries, yet the process is not complete. 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. In summary, changes in ethnicity are most likely to be

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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 globalized 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 after Christianity, 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 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, while even the same data could lead to different readings. 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 migrants and refugees may well deviate from expected UN figures and alternative projections sometimes depict a world characterized by substantially higher migration flows.

Analysis:

The analysis shows how each demographic variable – and its consequent projections – not only is subject to different interpretations and estimates, but could 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, it is important to 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.

5. **Urbanisation:** Cities will contain 65% of the world's population by 2040, and 95% of urban population growth will occur within developing nations' mega-cities³³ (containing more than 10 million people).

Factors:

- Growth in urban areas, large and mega-cities
- Pace of urbanisation
- Geographic distribution of urban areas
- Increasing interconnectedness in urban areas

Indicators:

Growth in urban areas: Globally, more than half of the world population lives in urban areas although not all of the world regions have reached this threshold; thus, if by 2020 half of the population in Asia live in urban areas, Africa will reach that same level only by 2035 (45% and 40% respectively of urban population in 2011). Northern America, Australia and New Zealand already had an urban population of over 80% in 2011, Latin America and the Caribbean 79% (remarkably high among other less developed regions) while Europe stops at 73%, thus being the least urbanised region of the developed world. The increase in population that will be experienced up to 2035, and beyond, will be mostly absorbed by urban spaces. Approximately 6.3 billion people are projected to live in urban areas by 2050 (67% of the global population). 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.

The rural population is expected to start declining soon: after a steady increase in the developing world and in Africa (higher than 1.3% growth annually with the exception of Nigeria and Egypt) in particular, around 2020-2030 the rural population in this area will start decline and by 2050 some 0.3 billion people will leave rural areas. Megacities contributed to urban population at a rate of only 9.9% in 2011, while over half of the population is and will continue to be situated in small urban centres (less than half a million inhabitants; these represent 55% of the urban population in the developed regions and 50.2% in the less developed regions). Future urbanisation will increasingly occur in 'large cities'³⁴ with 'megacities'³⁵ observing the largest percentage increase.

³³ French Ministry of Defence, Delegation for Strategic Affairs, "Strategic Horizons" 2012, p118

³⁴ 1 million or more inhabitants

³⁵ Containing more than 10 million people

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Pace of urbanisation: The pace of urbanisation has differently characterised regions of the world, so that in 2011 urbanisation rates are very different within areas. In more developed regions, urbanisation will move from 78% to 86% (from 2011 to 2050) while in less developed regions, urbanisation will move from 47% to 64% in the same time-span (UN 2012). The growth rate of the world urban population is decreasing if compared to previous years: in fact, 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 would be slower than in the past.

Geographic distribution of urban areas: The increase in world urban population would be particularly relevant to China and India (together 37% of the increase of the urban population between 2011-2030). Nine more countries will contribute 26% of the urban increase by 2030: Nigeria and the Democratic Republic of Congo 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 the most (with respectively 270 and 12 million urban population) to further urbanisation (a total of 1.3 billion increase) and will account for 31% of urban growth in that period. Although having the largest urban population by 2050, China would only contribute with 44 million to the increase of urban population between 2030 and 2050. Between 2011 and 2030 two countries will see a decrease of their urban population: Ukraine and Bulgaria. Between 2030 and 2050 other countries will add to the two, among which worth noticing are Japan (with a reduction of 10 million), the Russian Federation (2.4 million), the Republic of Korea (1.7 million), and Ukraine, which will experience a further loss (1.3 million). On the contrary, in Latin America and the Caribbean, Northern America and Asia the urban population is 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. This connectedness is expected to increase by introduction of new, widely accessible and cheaper technologies. There has been a large increase in the number of people with mobile phones and connections to the internet. Social media is a relatively new phenomenon that has changed the way news is reported as well as giving populations a tool to quickly organize themselves into large groups. A recent demonstration in Hong Kong, in October 2014, is an excellent example of organizing such groups without certain leadership role

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of any. Connectedness means people can have access to information very quickly; so an intelligent population that can crowd-source knowledge can produce a capability very quickly. Connectedness might also make unintended 'boomerang effects' more likely, as the spread of information goes further and more quickly.

Threats as a result of rapid urbanisation: Natural disasters may be a large threat to cities in the future. Even if the frequency or strength of the disasters (e.g. the strength of the hurricane) does not increase, the impact may be increasing due to the density of the population and aging infrastructure. The resiliency of urban areas has become a serious concern. Diseases, e.g. pandemics, may also be a big threat in the future. This threat is exacerbated not only by population density but also connectedness of people to other parts of the world. Gangs and organized criminal networks are often prevalent in cities and are a threat. Self-radicalization (people who become radicalized who have no direct links to other countries) is becoming a big problem. Hybrid warfare is likely to be a key feature of urban operations (e.g. locals who are suspiciously well-equipped, militarily). Many large and mega cities are littoral and increasing sea-levels exacerbate problems of mega cities resulting with large transnational population movements.

Analysis:

Albeit at a different rate region by region or country by country, population shift from rural to urban is expected to continue. Future urbanisation will increasingly occur in large cities with megacities observing the largest percentage increase. In more developed regions, urbanisation will move from 78% to 86% (from 2011 to 2050) while in less developed regions, urbanisation will move from 47% to 64% in the same time-span. In parallel with the world population growth rate, the pace of urbanisation will be slower after 2050. The new threats and risks emerging from rapid pace of urbanisation and lack of effective governance in large and mega cities are expected to occupy national security agendas as resiliency of urban areas becomes a national security issue.

6. Human Networks/Transparency: Human networks are expanding at an exponential rate with many varying effects.

Factors:

- Technology enables increased communication and interconnectedness ;
- Economy boosts people, processes, goods and regions;
- Urbanization and demography have a reinforcing impact on networks;
- Inequality.

Indicators:

Technological acceleration and increased connectedness: Information and communications technology is of multiple values and a main enabler in regard to the creation and the increase of human networks (e.g. the Arab Spring). The acceleration of the technological development does not only increase communication and interaction among people who are already connected, it enables affiliation for people outside specific networks (e.g. impoverished groups) by offering new possibilities (e.g. crowdsourcing of activism, formation of new civil society communities online, real-time organisation of offline protest).³⁶ This affiliation is followed by greater participation and influencing the affected societies and regions in multiple ways (e.g. political processes and decisions, local activities, cross border actions). This spreading of connections in the networks doesn't follow certain patterns because linkages are lead by the greatest advantage for individuals and groups associated. This decentralized and ungoverned complexity may result in frictions and support criminal and terroristic actions. Furthermore, it will influence the way of intelligence and human security that have to be taken into consideration.

Flow of people and goods: Global flows (goods, services, finance, and people) create prosperity and interconnectedness, thereby empowering regions, nations and individuals. Within the next decade global flows could triple the current scale³⁷ dependent on the transforming effect of digital technologies. New economies will emerge and join the network by with consumer demands, production, international trade and sending people across borders.³⁸ Especially the latter one may create new global threats with regard to the rapid spreading of infectious diseases. The Ebola crisis in 2014 which started as an epidemic disease³⁹ had the inherent potential of transforming into a pandemic with global impact. Insufficient countermeasures or counteractions that are too late, combined with a lack of protection provided by vaccination encompass the risk of a spread from a regional to global disaster. The risk of a local disruption of the health system has the potential of becoming a global break-down in an interconnected world.

Shift in urbanization: According to statistics, only 600 urban areas generate approximately 60% of the global GDP which will continue to account. Regardless, the

³⁶ State of Civil Society 2013: Creating an enabling environment, CIVICUS, 2013.

³⁷ \$26 trillion in 2012 or 36 percent of global GDP. McKinsey Global Institute, Global flows in a digital age: How trade, finance, people and data connect the world economy, 2014, http://www.mckinsey.com/insights/globalization/global_flows_in_a_digital_age.

³⁸ McKinsey Global Institute, Global flows in a digital age: How trade, finance, people and data connect the world economy, 2014.

³⁹ Ebola Facts: When Did Ebola Arrive and Spread at a Dallas Hospital?, New York Times, <http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html>, 7/31/14.

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membership will change drastically by moving south and east.⁴⁰ This shift will bring young, often unemployed, but technology affine people to the fore. These centres may boost not only the economy, but innovation and interconnectedness with the effect of creating new human urban network areas. The combination of various trends might amplify negative impacts like degradation of national power by mass populated areas and will increase the complexity of the networks involved. This may result in instability and security deficiencies.

Disparity: Inequality can affect various sectors and appear in different qualities (e.g. natural resources, economy, and people in gender and / or age). Every disparity has the inherent potential of a threat if not recognized and understood. Especially with the technological means in the future, which might be more accessible and cheaper, human networks of the underprivileged will have the opportunity at hand to influence decision processes and / or create civil unrest in unanticipated ways and in short terms that will not allow any response time. Although the availability of information may lead to more transparency and decentralization, the complexity will increase unproportional because of unknown key-enablers and cross-linking. One successful (= with coercive ways and means) human network can have cascading effect and thereby put a nations stability and security at risk. The consequence might be instability along and within NATO's borders.

Analysis:

Supported by rapid technological advances human networks will not only increase in numbers and size but in regard to influence and importance. This dynamic will affect multiple fields of human live and function as a source for innovation and change. This new level of mobility and interconnectivity raises the possibilities of communication and collaboration globally, thereby elevating the complexity and depicting different grades of transparency and security. Whilst the decentralization of the human networks supports innovation and progress, it will also be a source of threat for the stability and security of nations. The easy accessibility in combination with growing complexity and rapid implications will support transnational criminal or terroristic activities as well as the spreading of diseases that will challenge the social and security systems of the nations. In recognition of the human networks as inevitable phenomenon the nations have to increase their awareness and understanding of the networks. Furthermore, the various national systems have

⁴⁰ McKinsey Global Institute, Urban world: Mapping the economic power of cities, 2011, http://www.mckinsey.com/insights/urbanization/urban_world. See also, The Future Security Environment 2013-2040, Chief of Force Development/Directorate of Capability Integration, 2014.

to be adaptable and flexible in order to enhance the resilience and to maintain security and stability.

7. Fractured Identities: Several contributing factor may lead to a fracturing of national identity.

Factors:

- Technology and increased interconnectedness ;
- Migration and growing influence of human networks;
- Globalisation;
- Inequality.

Indicators:

More connected world: Accelerating technology and increased accessibility enable the spreading of interconnectedness. More people will be able to articulate their individual interests, express their opinion and influence the public opinion. Being different in the future may result in an individualization process that does not lead to social isolation but influential individuals that are empowered to have a stabilizing or destabilizing impact. This process will affect the complexity and fragility of the security environment. Especially the rapidity and shortened time spans necessary to distribute messages and information for the reason of opinion making might become a challenge within societies. This will be possible through human digitalization, the process of amalgamation from the human body and technology.⁴¹ Additionally, this influence will exacerbate the disparity of wealth within certain regions. Utilizing this blurred space, anti-government and extremist groups will challenge the national identity and authorities who will need a better understanding of fractured identities.

Social tensions: The world's population dynamics will increase the relevance of human networks and thereby inevitably accelerating the process of fractured identities. Migration as a complex part of the population dynamic is often linked with unemployment in the country of origin.⁴² The future working age population will come from the developing and emerging countries.⁴³ This labour force will not only be young and educated, but will have different cultural and ethnical aspects (e.g. language, religion, traditions) and varying mind-sets. Given the future needs of the host nations and the technological opportunities the assimilation process might be

⁴¹ Die Zukunft der vernetzten Gesellschaft, Gottlieb Duttweiler Institute, 2014.

⁴² Transatlantic Trends 2014, German Marshall Fund of the United States, 2014. See also, 2014 World Development Indicators, World Bank, 2014.

⁴³ The Global Economy in 2030: Trends and Strategies for Europe, European Strategy and Policy Analysis System, 2013.

less necessary with the consequence of deepening the fragility. This situation may result in increased social tensions within nations.

Loss of national identity: Globalization as a process results partly in the assimilation of cultures. It is not only people migrating cross-border but cultures and cultural identity too. The culture as a main part of the individual identification becomes blurred, at the same time deepening and speeding the worldwide interconnectedness. Arising cultural voids may be filled with specific interests (e.g. political, religion, and ethnic) communicated through human networks. The network activity has the potential to reinforce factional identities, thereby undermining a nation's stability. All the more the state power is already weakened or rejected by certain groups (e.g. tribes, ethnos). Fragile states or social tensions within nations may indirectly or directly impact the security of the Alliance. In particular, these conditions support international radicalisation and terrorism that may spread globally.

National and global inequality: Disadvantaged people are more vulnerable to all different kinds of shock. Wealth and development in some countries predicts a more enjoyable life to individuals with the result of exacerbating existing disparities, threatens social cohesion and fuelling social tensions.⁴⁴ Furthermore, disparity increases the individualization process as a possibility not to fall below the poverty thresholds, thereby weakening the national identity. People living alongside inequality fault lines will migrate to nations and connect to networks that promise economic wealth and support individual striving (e.g. Mexican immigrants in the USA).⁴⁵ The combination of fragility factors and the human dimension will always create a principal actor problem posing a constant threat to stability and security that may not be manageable by an affected single nation. It may be crucial for the Alliance to support political settlements by enabling a shared identity in developing societies.

Analysis:

Fractured identities are not a sole national threat but have global impact. The preservation of an existing or creation of a shared identity is crucial for the long-term aspects of stability and security. In order to do so, the NATO member nations have to understand the social dynamics not only in their own nations but in the areas of interest. Regardless of the ongoing individualization there will be relations among human, groups and entities characterized by enduring patterns. These social structures with their embedded institutions, norms and key

⁴⁴ Human Development Report 2014, United Nations Development Programme.

⁴⁵ Rand Review, Fall 2013, RAND Corporation.

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players have to be analysed in order to overcome the inherent complexity. These developments are closely linked to the acceleration in technology. Technology enables the human to go beyond his social abilities, to condense the process of individualization on the one hand and to be more influential by utilizing human networks on the other hand.

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TECHNOLOGY THEME TRENDS

8. **Technology Accelerates Change:** The 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 change rapidly in the future.

Factors:

- Accelerated technology development
- Increased innovation
- Health and Quality of life issues
- Demand for cheaper, sustainable resources
- Increased global interconnectedness means new technology spreads faster and is adopted faster

Indicators:

Advances in computer technology: Computing power lies at the heart of every innovation, and with the increases in computing capacity brings about new inventions that change nearly every aspect of our existence. The accelerated rate of change in technology impacts nearly every aspect of human life and society, including politics and government, and every technical innovation is the result of some combination of previous innovations, so the more innovations that are made, the more new possibilities are created. 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. The ubiquity of information and social media will present both challenges and opportunities with the cycles of technology-induced societal and economic change becoming increasingly fast. And cycles of innovation and technology change are very likely to accelerate further. There is also no end in sight for the increase of computing power: silicon-based chips are likely to be replaced with faster technologies (for example optical or molecular computers), which are capable of much higher speeds. They will greatly improve human abilities to understand and monitor environmental change and develop problem-solving strategies.⁴⁶

Population growth: the more people we have, the faster technology accelerates (because there are more brains at work combining ideas), and one of the most important benefits of new technology is that the same amount of food, shelter, and comfort for any single individual can be produced with fewer resources. The factors affecting global human population are very

⁴⁶ Accelerating technological change: racing into the Unknown. The European environment | State and outlook 2010.

simple. They are fertility, mortality, initial population, and time. The current growth rate of ~1.3% per year is smaller than the peak which occurred a few decades ago (~2.1% per year in 1965-1970), but since this rate acts on a much larger population base, the absolute number of new people per year (~90 million) is at an all-time high. Populations in certain regions will grow; elsewhere, human numbers will stabilize or even decline. Within countries, populations will continue to shift from rural to urban areas, while becoming increasingly older and better educated. Migration between countries will be an increasingly important factor in international relations and the composition of national populations.

Greater Global Interconnectedness and Cooperation: Efforts to accelerate basic technological development cycles are driven by better access to information and increasing scientific cooperation, building upon continued economic growth and trade. The value of creation and competitiveness of many companies in the OECD world is determined not just by the price of their products but also their ability to innovate and remain at the forefront of technological progress. 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 exponential growth in the volume and speed of access to information and communication has numerous effects. It can generate new markets and challenge existing institutions.⁴⁷

The transition to digital additive manufacturing (i.e. 3D printing) and fabrication: As applications of the technology expand and prices drop, the first big indication of change will be when more goods are being manufactured at or close to their point of purchase or consumption. This might even mean household-level production of some things. Short of that, many goods that have relied on the scale efficiencies of large, centralized plants will be produced locally. Even if the per-unit production cost is higher, it will be more than offset by the elimination of shipping and of buffer inventories. Whereas cars today are made by just a few hundred factories around the world, they might one day be made in every metropolitan area. Parts could be made at dealerships and repair shops, and assembly plants could eliminate the need for supply chain management by making components as needed. The economic impacts of the shipping and transportation industries will be enormous. Indeed, a plethora of potential applications and implications seems poised to open up. Headlines describe impending revolutions in industries as diverse as art, fashion, aerospace, medicine, and construction, while pundits and politicians, in light of these new

⁴⁷<http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/future-state-government/Documents/future-state-2030-v3.pdf>

possibilities, debate topics as wide ranging as gun control and intellectual property protection. Like the digital revolution of the last two decades, the most significant, revolutionary and impactful applications coming in the physical revolution of 3D printing are those that are not yet apparent.

Analysis:

Efforts to accelerate basic technological development cycles are driven by better access to information and increasing scientific cooperation, building upon continued economic growth and trade. The general acceleration of innovation and technological change is a stable trend. But the concrete direction and speed of innovation and diffusion are very uncertain. Technological constraints are key uncertainties — many of the technologies in nano-sciences and nanotechnologies, biotechnologies and life sciences, information and communication technologies, cognitive sciences and neuro-technologies are still in the laboratory. But there are also important uncertainties regarding the availability of R&D funding because of public and corporate budget constraints, public policy development and the availability of a sufficiently skilled labour force, which could be affected by barriers to international migration. Many applications of technologies in might also trigger ethical concerns. The breakneck pace of technological change brings risks and opportunities, not least for developed regions like Europe. Innovations offer immense opportunities for the environment but can also cause enormous problems if risks are not regulated adequately.

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

Factors:

- Increased civilian use technology adapted for weapon application
- Lack of control measures in a globalised marketplace
- Innovation, research and development, production, and distribution advance away from mainly state-driven activities
- Lengthy, expensive R&D drive states to seek more COTS

Indicators:

Growth of the Internet: The Internet has played a critical role in modern life as a typical feature of most Western households, and has been key in the democratization of knowledge. It not only constitutes arguably the most critical innovation in this trend thus far; it has also allowed users to gain knowledge of and access to other technologies. Users can learn of new developments more quickly, and purchase high-tech products otherwise only actively marketed

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to recognized experts. Some have argued that cloud computing is having a major effect by allowing users greater access through mobility and pay-as-you-use capacity.⁴⁸

Social Media: Social media has also empowered and emboldened users to become contributors and critics of technological developments. The increase in new media and communications has significantly impacted globalization in the recent decades. Traveling and communicating internationally are easier now than ever before. The popularisation of smartphones and social media allows the world to be constantly and conveniently connected. When a technology is developed, you can't always predict how people will use it. Often young people are involved in 'technology appropriation' - taking social media tools and using them in new ways, developing and experimenting with new forms of communication using the tools available to them.

Cultural Impacts: Widespread access to technology, including lower costs, was critical to the transition to the new economy.⁴⁹ Similarly, democratization of technology was also fuelled by this economic transition, which produced demands for technological innovation and optimism in technology-driven progress.⁵⁰ The ability to create relationships based solely on mutual understandings and shared common interests have fed the social media phenomena.

Industry Impacts: The decreased costs and expertise necessary to use products and software may result in many professionals experiencing loss of work when replaced by easily accessible technology. In some cases technology is accessible but sufficiently complex that most users without specialized training are able to operate it without necessarily understanding how it works. However, sharp increases in job losses will indicate a tipping point of technology replacing human work. The process of consumerisation has led to an influx in the number of devices in businesses and accessing private networks that IT departments cannot control or access. While this can lead to lowered operating costs and increased innovation, it is also associated with security concerns that most businesses are unable to address at the pace of the spread of technology.⁵¹

⁴⁸ Barton, Mike. (12 March 2012). "Personal Cloud' to Replace PC by 2014, Says Gartner." *Wired*. <http://www.wired.com/insights/2012/03/personal-cloud-2014/>

⁴⁹ Alexander, C.P. (30 May 1983). "The New Economy." <http://www.time.com/time/magazine/article/>

⁵⁰ Goldman, S.L. (1989). *Science, Technology and Social Progress*. Cranbury: Lehigh University Press.

⁵¹ Moschella, D., D. Neal, P. Opperman and J. Taylor. (2004). *The "Consumerization" of Information Technology*. El Segundo, California, USA: CSC.

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Political Impacts: Increased access to technology, particularly social media, may bring about a third wave of democracy.⁵² The Internet has been recognized for its role in promoting increased citizen advocacy and government transparency. The spread of the Internet and other forms of technology has led to increased global connectivity. Many scholars believe that 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.⁵³ Scholars have drawn associations between the level of technological connectedness and democracy in many nations. Technology can enhance 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. The attraction of COTS is the ongoing trend of the inability of software developers to complete projects on time, or within or under budget, as well as the growing availability of COTS packages for business and administrative functions.

Analysis:

The pace of technology breakthroughs will accelerate faster than ever before. Existing technologies will become obsolete more quickly, challenging procurement cycles. The technological breakthroughs will help Alliance adversaries and competitors – whether nation states, groups, or rogue individuals – to leapfrog dated technology and more quickly close the technology gap. These adversaries and competitors will be able to embrace new technology, avoiding significant costs and avoiding concerns about upgrading dated legacy systems. Maintaining legacy systems is now prohibitively expensive and will limit investment in new breakthroughs as they materialize. Civilian and military technologies and users are increasingly commingling, and at some point, it will be impossible to disentangle them. That will result in loss

⁵² Ferdinand, P. (2000). The Internet, democracy and democratization. *Democratization*, 7(1): 1-17.

⁵³ Democracy and Technology." National Democratic Institute. <http://www.ndi.org/democracy-and-technology>

of our ability to control access to design-related information and availability of technology, and it will raise grave security considerations.⁵⁴

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

Factors:

- Increased reliance of highly connected networks
- Complexity of public, financial and private industry networks
- Limited deterrence measures or response options due to inadequate legal governance or regulations concerning use or exploitation
- Increases in reliance, interconnectedness and complexity makes disruption easier while increasing the impact of disruptions

Indicators:

Growth of the use of Networks: There are numerous notable examples of networks in many fields of study.⁵⁵ Important examples of networks are the Internet and the World Wide Web, but many governments, banks, societies and industries are establishing their own networks that stand alone or utilize certain aspects of these common networks. The Internet is not really a network at all, but a vast collection of different networks that use certain common protocols and provide certain common services. It is an unusual system in that it was not planned by anyone and is not controlled by anyone. Many linked networks are bringing gigabit speeds to residents and businesses in major urbanized areas. An important aspect of this is to understand the effect of failure of the individual components on the performance of the whole networked system.⁵⁶ The original function-specific infrastructure of various networks is converging into complex, interdependent systems. This holds true both within and between a vast array of sectors. The permeation of information and communications technologies (ICTs) into the transport and energy networks in particular fosters this trend. Ultimately, the different national infrastructure will converge across national borders. While it is important to understand the degree of centrality in a network to ensure the proper nodes of a network are utilized to ensure data or information spreads to all or most of the other nodes within the network, it is equally important to identify the critical nodes in a network so that they can be protected from targeted attacks.

⁵⁴ Emke, Jerry. (2008) Defense AT&L: March-April 2008. Transformation, Climate Change, Demographics, Technology, and Globalization: Their Impact on the Acquisition Community.

⁵⁵ Newman M (2010) Networks: An Introduction. Oxford University Press.

⁵⁶ Albert R, Jeong H, Barabási A (2000) Error and attack tolerance of complex networks.

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Increased Social Networks: Computer networks, like the printing press 500 years ago, allow ordinary citizens to distribute and view content in ways that were not previously possible. But along with the good comes the bad, as this new-found freedom brings with it many unsolved social, political, and ethical issues. Social networks, message boards, content sharing sites, and a host of other applications allow people to share their views with like-minded individuals. As long as the subjects are restricted to technical topics or hobbies like gardening, not too many problems will arise. However, the Arab Spring demonstrates the capacity of social networks in potential future revolutionary movements. The Arab Spring spawned a series of revolutionary movements that are unique in that they utilized social media as an effective means to spread information and promote insurgent agendas. The factors of social media affecting public opinion and international support, rapid dissemination of news, widespread messaging, and the ability of the individual to spread information globally are relatively new phenomena during revolutions. Likewise, regimes and counter-insurgents can implement social media to meet their own agendas in never before seen ways. That the future of revolutionary movements in globalized societies will involve social media is assured, but the degree to which it will is yet to be determined.⁵⁷

Business and Industry reliance: Most companies have a substantial number of computers. For example, a company may have a computer for each worker and use them to design products, write brochures, and do the payroll. Initially, some of these computers may have worked in isolation from the others, but at some point, management may have decided to connect them to be able to distribute information throughout the company. The goal is to make all programs, equipment, and especially data available to anyone on the network without regard to the physical location of the resource or the user. However, probably even more important than sharing physical resources such as printers, and tape backup systems, is sharing information. Companies small and large are vitally dependent on computerized information. Most companies have customer records, product information, inventories, financial statements, tax information, and much more online. If all of its computers suddenly went down, a bank could not last more than five minutes. A modern manufacturing plant, with a computer-controlled assembly line, would not last even 5 seconds.⁵⁸ This vulnerability will only increase as computer networks expand.

Political Issues: States are well behind in securing or ensuring privacy on networks like the internet and how it can be regulated. There have been several significant political changes

⁵⁷ What the Arab Spring Tells Us About the Future of Social Media in Revolutionary Movements , Richard A. Lindsey Journal Article | July 29, 2013.

⁵⁸ Computer Networks: A Systems Approach, Fifth Edition, by Larry L. Peterson and Bruce S. Davie (Morgan Kaufmann, 2012).

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associated with internet and digital technologies which has created both new opportunities and new challenges. In non-democratic states, countries with weaker governments or even within larger anti-government movements, access to information online about freedoms in the democracies around the world is becoming the instigator of change and will likely continue to impact future political change events. In the Middle East this was a major contributing factor in the Arab Spring, to bring and implement change. With this new access to freedoms, the challenge of countries restricting information or access is now present more than ever.

Analysis:

Information networks are based on fixed or mobile communications networks, from telecommunication satellites to radio equipment, by interconnecting with weapons systems. The centrality of computer networks says that all activity, the Alliance's and adversaries, will continue to require and utilize potentially shared, inter-connected network nodes. Nodes range from critical military infrastructure such as air and sea ports, and satellite ground stations, to strategic locations including centres of governance in urban areas and maritime choke points, and also where the adversaries' strategic interests are clustered, such as areas of major narcotics production and distribution. These nodes are centres of activity that will be threatened with attack and disruption, and will require protection and offer opportunities for exploitation.

ECONOMICS/RESOURCES THEME TRENDS

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

Factors:

- Increasingly interconnected financial markets
- World Trade expansion
- Increased migration
- More nations joining the International Market
- Complexity of public, financial and private industry networks

Indicators:

Expansion of the international financial market: Capital flows crises have been a recurrent feature of financial markets for a long time, both in periods of economic integration and in periods of economic disintegration. In fact, according to some measures, the extent of capital mobility and capital flows a hundred years ago is comparable to today. At that time, however, only few countries and sectors participated in financial globalization. The potential benefits of financial globalization will likely lead to a more financially interconnected world and a deeper degree of financial integration of developing countries with international financial markets. Probably, the main benefit of financial globalization for developing countries is the development of their financial system, what involves more complete, deeper, more stable, and better-regulated financial markets. As discussed in Levine (2001), a better functioning financial system with more credit is the key because it fosters economic growth.⁵⁹ An indicator of the expansion of the financial market is the increase of increased presence of international financial intermediaries, mainly foreign banks, in local markets.

Financial Technology Development: New technological advances and the liberalisation of the domestic financial sector and the capital account have led to new developments. The main agents driving financial globalisation are governments, private investors and borrowers, and financial institutions. At a global level, the gains in information technology have diminished the importance of geography, allowing international corporations to service several markets from one location. In developed countries, increased competition has led banks and other non- bank financial firms to look for expanding their market shares into new businesses and markets, attracting customers from other countries, what allows them to diversify risk. The ramifications and potential consequences of corrupting the Direct Market Access (DMA) system is of special

⁵⁹ Levine, R., 2001, "International Financial Liberalization and Economic Growth," Review of International Economics, 9:4, pp. 688-702.

concern. DMA or electronic trading occurs globally over a multitude of asset classes 24 hours a day, seven days a week. As electronic markets have evolved, the vulnerabilities of the financial system and national security have increased exponentially. The interconnected global financial system also allows for a new relatively unmonitored global communications network via financial asset "limit order books" that can be accessed from virtually anywhere on the globe.

Cyber network attacks: Concern about a possible state-sponsored attack on financial systems has been heightened after the hacking of computer systems at South Korean banks and broadcasters, which originated from a Chinese internet address and was blamed by Seoul on North Korea. Cyber-attacks are increasingly thought of as a threat to modern society, whether they conceived by state, non-state or individual actors. Fears that attackers will use computers to disable critical infrastructure, like the power grid or transportation networks, crippling everyday functions, are touted as the next frontier in threats to security. However, such threats go beyond physical infrastructure. Attacks facing the financial markets are now a current, valid, and present risk, even though many claim the financial industry is sufficiently resilient to face serious cyber attacks that are aimed to steal money, crash systems and disrupt equity market trading.

Political Issues: Financial markets are globally interconnected and dependent and the financial system is only as strong as its weakest link. For governments, there will be new challenges as economies are increasingly connected to risks beyond national borders. These risks not only move quickly, they also defy the scope of national regulation, demanding international cooperation. As the trend toward increased economic interconnectedness is expected to continue, governments will need to ensure that policy frameworks are in place to capture the benefits of trade and manage the risks, managing the interconnected risk related to market failures while continuing to encourage growth in trade relationships.

Growth of Multi-National Corporations (MNC): The globalization of the financial market has led to an increase in MNCs, organizations that are owned or control productions of goods or services in one or more countries other than the home country, that can contribute to or detract from global economic stability. Though MNCs play an important role in globalisation, the problem of moral and legal guiding behaviors of MNCs, given that they are effectively "stateless" actors, is one of the urgent global socioeconomic problems that emerged during the late twentieth century.⁶⁰ MNCs can give rise to large merged conglomerations that reduce competition and free

⁶⁰ Pitelis, Christos; Roger Sugden (2000). The nature of the transnational firm. Routledge. p. 72.

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enterprise, raise capital in host countries but export the profits, exploit countries for their natural resources, limit workers' wages, erode traditional cultures, and challenge national sovereignty.⁶¹

Analysis:

One of the major potential benefits of the globalisation of financial resources is to provide opportunities for reducing macroeconomic volatility on output and consumption via diversification of risk. The overall evidence of the globalisation effect on macroeconomic volatility of output indicates that although direct effects are ambiguous in theoretical models, financial integration helps in a nation's production base diversification, and leads to an increase in specialisation of production. However, the specialisation of production, based on the concept of comparative advantage, can also lead to higher volatility in specific industries within an economy and society of a nation. As time passes, successful companies, independent of size, will be the ones that are part of the global financial market. Soaring capital flows, a debt-based consumer culture and unbalanced trade between countries can all contribute to a global financial crisis. Governments will need to break the tradition of utilising a model based on self-interest and inequality to adapt one that promotes equitable development based on moral and social principles.

12. Increased Resource Scarcity

Factors:

- Changes in energy demand, emergence of new technologies and exploration of new areas
- Rare earth materials
- Use of energy as a political tool
- Water, energy and food nexus

Indicators:

Changes in energy demand: The US Energy Information Agency (EIA)'s July 2013 report Released *International Energy Outlook 2013 (IEO2013)* projected that world energy consumption will grow by 56% between 2010 and 2040⁶². However, September 2014 IEO2014 report suggests that the potential for growth in demand for liquid fuels is focused on the emerging economies of China, India, and the Middle East, while liquid fuels demand in the United States, Europe, and other regions with well-established oil markets seems to have peaked⁶³. Although the demand is expected to continue to increase, this change in assessment indicates that world markets for petroleum and other liquid fuels have entered a period of dynamic change—in both supply and demand. The main reason for this change is the potential for new supplies of oil from tight and

⁶¹ Marc 'Globalization, Power, and Survival: an Anthropological Perspective', pg 484–486. Anthropological Quarterly Vol.79, No. 3. Institute for Ethnographic Research, 2006

⁶² The US Energy Information Agency, 25 July 2013, <http://www.eia.gov/todayinenergy/detail.cfm?id=12251>

⁶³ The US Energy Information Agency, International Energy outlook 2014, 9 September 2014,

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shale resources that have raised optimism for significant new sources of global liquids. As a result, after a long period of sustained high oil prices, improvements in conservation and efficiency have reduced or slowed the growth of liquid fuels use among mature oil consumers. The changes in the overall market environment have led the U.S. Energy Information Administration (EIA) to focus on reassessing long-term trends in liquid fuels markets.

After the oil crises of the 1970s and 1980s, much of the debate about world oil markets centred on the limitations of supply. Energy security was (and remains) a major concern, with large resource deposits located in and controlled by members of the Organization of the Petroleum Exporting Countries (OPEC). In addition, strong increases in demand for oil and a limited supply response to rising prices in the mid-2000s led to increasingly vocal concerns about resource depletion. More recently, with higher sustained world oil prices—by historic measures—and advances in extraction technologies, growing supplies of tight oil and shale oil in the United States have brought new resources to market, beginning in North America and, eventually, in other parts of the world. There is also hope that recent legislative changes in Mexico will reverse that country's recent trend of slowly declining oil production. Outside North America, the potential for large production increases in Brazil, Argentina, and elsewhere could help ensure the availability of liquid fuels supplies for many years. However, the appetite for oil, natural gas, and other energy sources is expected to continue to grow, with worldwide energy consumption projected to increase by more than 40 percent by 2035. 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 percent of its energy needs⁶⁴. This would result with search for new areas to explore and to access new energy resources that might trigger competition for resources in the global commons. In that respect the interest in regions such as Arctic is expected to increase.

Rare earth material: In the last 20 years the importance of rare earth elements has skyrocketed due to three main factors: high demand; uncertain supply and lack of substitutions⁶⁵. An increasing global demand for new products is a result of emerging technologies that use rare earth elements (REE). China's near monopoly in production of rare earth metals had companies and governments across the globe in near panic state. ⁶⁶ China - the world's largest source of rare earth materials that provides over 90 percent of the world's total output of rare earths - has begun to reduce quotas on its REE exports, combat smuggling and also close some of its major

⁶⁴ Chevron, Energy supply and demand, <http://www.chevron.com/globalissues/energysupplydemand/>

⁶⁵ Namibia Rare Earths Inc. accessed on 26 October 2014 <http://www.namibiareareearth.com/market-demand.asp>

⁶⁶ Supply Chain Digest, dated 4 Feb 2014

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mines. Finally, the unique electronic, optical and magnetic characteristics of these elements cannot be matched by any other metals or synthetic substitutes.

Combined, these three factors have raised a growing level of concern that other rare earth mining sites need to be found outside of China, explored and brought online in short order. Though the US and other countries once mined these metals, most of those facilities closed by the 1980s, in no small part because processes are messy and very environmentally unfriendly. That left China as nearly the world's only producer, at a time when demand for these materials was rising rapidly from their use in new high tech and green products.

First, prices started to rise substantially and fluctuated significantly i.e. the price of lanthanum oxide – used in ceramics and fuel catalysts - rose from just \$8.71/kg in 2008 to average \$117/kg in the third quarter of 2011. By the third quarter of 2012 it was down to \$19.54/kg⁶⁷. Faced with soaring prices and supply availability concerns, manufacturers across the globe looked for ways to reduce their dependence on rare earth metals. That included in some cases dropping products with a high dependence on the materials, in other cases engineering alternative approaches to the material mix, and increasing use of recycling techniques.

Use of energy as a political tool: The discussions on the possibility of Russian use of energy as a tool in international politics began with the move towards greater state interference in the energy sector in 2003-4. Before that period, the Russian authorities, at least officially, had been promoting different types of policies such as privatization, liberalization, and international integration of the Russian energy sector. However, President Putin changed these policies and he made no secret that he wants Russia to become a 'global energy superpower'. Western post-Soviet countries like the Baltic States, Ukraine, Belarus, Moldova, and Georgia had become the most visible target for the new Russian 'energy diplomacy'. These moves affect western and eastern Europe as many countries are completely, or very largely, dependent on Russian energy supplies⁶⁸. In January 2006, Russia played the gas supply cut-off scenario with supplies to Ukraine. This was followed with another major crisis in 2009. Gazprom, the state-owned Russian gas group, cut off all supplies to Europe travelling through Ukrainian pipelines⁶⁹. While Russia wanted to maintain its sphere of influence by using its new energy policies, the indications of these two major crises were underestimated by the West that resulted with Russian annexation of Crimea. The crisis in Ukraine has yet to be resolved. Russia halted all gas sales to the ex-Soviet nation in June after Ukraine balked at paying a higher price imposed by Moscow. In

⁶⁷ Els, Frik, "China's 2013 rare earth production, export caps can't stop prices diving," 8 January 2013

⁶⁸ Milov, Vladimir, "The Use of Energy as a Political Tool," May 2006

⁶⁹ Gow, David, 7 January 2009, "Russia-Ukraine gas crisis intensifies as all European supplies are cut off,"

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September 2014, the European Union warned energy giant Russia not to use gas supplies as a weapon in its standoff with Ukraine over the fate of its neighbour's separatist east. Although Ukraine still transports volumes of gas intended for Russia's other European clients, EU nations fear that Kiev may be forced to tap into those flows once the winter heating season begins⁷⁰.

Energy, water, and food nexus: Energy and water systems are increasingly become interdependent⁷¹. Energy production depends on water. Water is used in power generation, primarily for cooling thermal power plants; in the extraction, transport and processing of fuels; and, increasingly, in irrigation to grow biomass feedstock crops. Energy is also vital to providing freshwater, needed to power systems that collect, transport, distribute and treat it. Each resource faces rising demands and constraints in many regions as a consequence of economic and population growth and climate change, which will amplify their vulnerability to one another.

For the energy sector, constraints on water can challenge the reliability of existing operations as well as the physical, economic and environmental viability of future projects. 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. In the summer of 2012, for example, a delayed monsoon in India reduced hydropower output at the same time electricity demand was running high, contributing to two days of blackouts that affected an estimated 660 million people. Equally important to water-related risks confronted by the energy sector, the use of water for energy production can impact freshwater resources, affecting both their availability and quality.⁷² The Energy Information Agency's report also suggests that the scale of water use for energy production is tremendous. Some 580 billion cubic metres of freshwater are withdrawn for energy production every year. At about 15% of the world's total water withdrawal, the figure is second only to agriculture. The vast majority of water used in the energy sector is for cooling at thermal power plants, as water is the most effective medium for carrying away its huge quantities of waste heat. Though the amount used for biofuels and fossil fuels may appear minor on a global level, this must be viewed in the context of local water resources and potential risks posed to water quality. Water withdrawal by the energy sector is expected to rise by one-fifth through 2035, while the amount consumed increases by a more dramatic 85%.

Analysis: 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 with competition for resources that might lead to instabilities

⁷⁰ Gorshkov, Dmytro, "EU to Russia: Let's Not Use Natural Gas As A Political Tool," Business Insider, September 2014

⁷¹ US Department of energy, "The water-energy nexus: challenges and opportunities

⁷² International Energy Agency - World Energy Outlook, "Water for Energy,"

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in different regions from Middle East to Arctic, from South China Sea to South America. Energy resources would be increasingly used to achieve political ends and balancing behaviour such as developing new technologies to reduce dependency will be increasingly given higher priorities in national security agendas. Energy nexus with water and food will occupy liberal agenda and be part of the discussions to access fresh water, availability of food, environmental protection and climate change discussions.

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

Factors:

- Global Defence expenditures
- Reduced Economic Growth
- Increased Social and Health Programs
- Lack of Perceived threat
- Increased cost of defence capital investments
- Increased Research and Development costs

Indicators:

Growth in Global Defence Expenditure: Global military expenditure stands at over \$1.7 trillion in annual expenditure at current prices for 2012. It fell by around half a percent compared to 2011 — the first fall since 1998. The global financial and economic crisis resulted in many nations cutting back on all sorts of public spending, and yet military spending continued to increase. This is a combination of two factors. While most developed (and some larger developing) countries have reduced military spending driven by pressures to offset the economic crisis through raising public expenditures, geopolitics and strategic interests are still factors to project or maintain power. Therefore, the rising military spending of the US, as the only superpower, has influenced the other major or intermediate powers, such as Brazil, China, Russia and India, to make the strategic choice necessary to maintain their long-term quest for global and regional influence. China and India, the world's two emerging economic powers, are demonstrating a sustained increase in their military expenditure and contribute to the growth in world military spending.⁷³

⁷³ Global Issues: "Global Financial Crisis", Last updated: Sunday, March 24, 2013, <http://www.globalissues.org/article/768/global-financial-crisis>.

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Reduction in Alliance Defence Expenditures: During the last decade most NATO member states considerably decreased their defence expenditures to the point that current military spending trends are reducing the ability of most NATO allies to contribute to international security. This decline has become even more acute since the beginning of the financial crisis in 2008. The damage to NATO member states' economies and the strain that this has put on defence budgets is already affecting NATO's critical military capabilities, particularly those of the European Allies. The abandonment of some capabilities also puts at risk the Alliance's capacity to address challenges such as cyber security and ballistic missiles. While the financial crisis has affected all NATO member countries, the impact has been uneven. The majority of the largest defence cuts have occurred in Central and Eastern European countries as part of broad austerity measures. This disparity can challenge the cohesion of the Alliance when some nations may resent the lack of commitment of others. Unless European nations change this downward trend, there is the potential threat of them becoming increasingly militarily irrelevant. As the size of US's looming federal debt materialize, the transatlantic security landscape could look very different two decades from now.⁷⁴

Effectiveness of Smart Defence measures: A NATO initiative to respond to defence cuts, the full impact of Smart Defence will need to be analysed to determine its on-going effectiveness. For many nations there will be certain national tasks and responsibilities that must be handled on a national basis and the idea of pooling and sharing a capability that cannot thus be counted on as nationally controlled will be unacceptable. The same should be considered for the specialization aspects of Smart Defence. All nations will decide what level of basic military capabilities in order to remain capable to deal with vital national requirements. Specialization agendas counter to these will likely be unacceptable. For now, politicians remain averse to collaborative efforts which might compromise their country's sovereignty. They are also wary of introducing reforms to their defense industries which would lead to job losses and harm vested interests.⁷⁵ In the light of the decrease in defence spending, Smart Defence may add to this dilemma due to uneven burden sharing. It would be very harmful if NATO Capability Goals left 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 specialization and Smart Defence.

Declining defence industrial base: Western defense spending, which decreased steadily after the end of the Cold War, began shrinking at an accelerated pace in the aftermath of

⁷⁴ Brookings Center on the United States and Europe Analysis Paper: The Implications of Military Spending Cuts for NATO's Largest Members. July 2012.

⁷⁵ Brookings Center on the United States and Europe Analysis Paper: The Implications of Military Spending Cuts for NATO's Largest Members. July 2012.

the global economic crisis of 2008.⁷⁶ Though currently somewhat stable, continued deductions in defense spending could have detrimental trends in the health of the defense and security industrial base. Some companies may altogether abandon their activities in the defense 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. Additional potential ramifications include job losses and the marginalization of specific production sites due to cross-border mergers and acquisitions. Nations will have to decide how much of this to accept and what to do to maintain a sufficient, healthy, and competitive defense industrial base.

Analysis:

Over the last decade, military spending has grown significantly in several parts of the world – China has introduced a 170 percent increase, the Russian defense budget has grown by 79 percent and US military spending has gone up by 59 percent. Former Alliance Secretary General Anders Fogh Rasmussen, has warned that “if European defense spending cuts continue, Europe’s ability to be a stabilizing force even in its neighborhood will rapidly disappear”.⁷⁷ As the armed forces of smaller European states become increasingly insignificant, there will be growing pressure on the larger countries – in particular France, Germany and the United Kingdom – to compensate for the shortcomings. 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 transatlantic alliance.⁷⁸

ENVIRONMENTAL TRENDS

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

Factors:

- Policies and regulations and its long-term environmental effects;
- Human activity;

⁷⁶ CSIS: European Defense Trends 2012. Budgets, Regulatory Frameworks, and the Industrial Base. December 2012.

⁷⁷ Anders Fogh Rasmussen, ‘The Atlantic Alliance in Austere Times’, Foreign Affairs 90: 4, 2011.

⁷⁸ Brookings.

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- Education and advance in technology;
- Natural resources and inequality.

Indicators:

Agreements and Treaties: Environmental change in combination with social and economic pressure creates layers of uncertainty to policy planning⁷⁹. Decision makers, especially in developing countries which might be resource constraint, but also politicians in wealthy nations face various challenges in implementing and enforcing policies dealing with climate change.⁸⁰ Additionally, to the national level, the progress to this effect is impeded by differences in the global risk perception. Regardless, the necessity of response regulations is current because greenhouse emissions will almost certainly increase the average global temperature and concerted actions by the international community can only slow down the impact.⁸¹ 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. Actual awareness of the environmental change including the implementation of bi- and multilateral agreements would not only enhance the socio-economic resilience but foster the stability and security.

Global Warming: Regardless of the natural imbalances effecting global warming, the combined land and ocean surface temperature rose constantly over the last decades.⁸² This process is ongoing and affecting related fundamental goods like food, water, health, shelter and economy (e.g. new transportation routes by melting of ice packs).⁸³ Heat stress and increased natural disasters may lead to reductions in harvest and livestock productivity. At higher latitudes cereal crop yields may increase slightly. At lower latitudes the crop yields will decrease. Countries and regions that are already affected by droughts will very likely experience water stress in the upcoming decades. Arid and semi-arid areas will expand and the desertification will result in estimated 135 million people at risk because of water shortage and decreased agricultural output.⁸⁴ Additionally, predictions for global sea-level rise state that by the year 2100 the levels are likely to rise about 0.1 to 0.9 meters pending on how aggressive the greenhouse gas emission will be tackled.⁸⁵ Due to the fact, that a lot of mega-cities are located in coastal areas, the sea-level rise will put them at risk. Moreover the cycle will accelerate. The reduction of the cryosphere will release higher amounts of greenhouse gasses, resulting in even higher temperatures and

⁷⁹ OECD Environmental Outlook to 2050, The consequences of inaction, OECD 2012.

⁸⁰ Integrated Risk and Uncertainty Assessment of Climate Change Response Policies, Intergovernmental Panel on Climate Change, 2014.

⁸¹ Global Strategic Trends – Out to 2045, DCDC, 2014.

⁸² Assessment of global megatrends – an update, European Environment Agency, 2014.

⁸³ United States Environmental Agency, Climate Impacts on Global Issues, 2014.

⁸⁴ Global Strategic Trends – Out to 2045, DCDC, 2014.

⁸⁵ Middle East 2020: Shaped by or Shaper of Global Trends, Atlantic Council, 2014.

rapid sea-level rise.

The mitigation effect of the implementation of new technology (e.g. geo- or genetic-engineering) and back-up response actions (e.g. planting of trees or certain plants) may slow down the process but are unprecedented.

Human Development: The development in technology increases in exponential rates, offering new ways to support and affect lives and environment.⁸⁶ The human factor cannot keep up in capitalizing all potentials of these developments (e.g. financial factor). Therefore, the alternatives given by the application of new technologies (e.g. geo- and climate engineering, genetic engineering) is unprecedented. However, it may be used by nations in order to support the mitigation process of environmental change.

One cornerstone of the advance in technological development and the utilization of it is the education of the world population.⁸⁷ Furthermore, education is vital for the environmental awareness and capacity building. Ecologically consciousness might transfer the political responsibilities in regard to the environmental change on to the individual level and might thereby support the mitigation process.

Economic Pressure: The economic world is characterized by unequally distributed natural resources like energy, food and water. This polarity is historically a source of conflict and it potentially might exacerbate under the influence of the environmental change. For example, about 80% of the world population live currently in areas with a high threat to water security. Given the impacts of environmental and climate change large parts of the world's population may face water shortage.⁸⁸ Additionally, the water scarcity will result in migration processes that may destabilize affected regions.

The inequality of energy resources will potentially increase the destabilizing effect. Developing countries will consume more than 75% of energy than developed countries in 2030.⁸⁹ This may fuel the cycle of emissions, accelerate environmental change and contribute to future conflicts.

Analysis:

Environmental and climate change is a process that will almost certainly affect human development in the next decades. Even if concerted actions will be taken by the nations and the world community, the warming of the earth and the oceans and the multiple consequences linked to this trend cannot be reversed. Therefore it is not only about mitigation, but adapting to the impacts. Furthermore, the impacts will have cascading effects in combination with specific other

⁸⁶ World Development Indicators 2014, The World Bank.

⁸⁷ Citizens in an Interconnected and Polycentric World, Global Trends 2030, Institute for Security Studies, European Union, 2014.

⁸⁸ Citizens in an Interconnected and Polycentric World, Global Trends 2030, Institute for Security Studies, European Union, 2014.

⁸⁹ The European Environment, State and Outlook 2010, Assessment of Global Trends, European Environment Agency.

trends (e.g. urbanization, demography, natural disasters). The severity of this development will potentially increase the number of conflicts in order to control key resources and the need of humanitarian assistance. Especially in those regions that contribute little to global emissions but will be specifically vulnerable to the implications of the environmental change. It appears that most of these affected regions already exist in an unstable and insecure surrounding. Increasingly worse socio-economic pressure will result in migration processes that might spread the threats for global security.

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

Factors:

- Climate change and its long-term environmental effects;
- The impact may increase because of urbanization and regions with high population density;
- Global interconnectivity especially in regard to economic systems;
- Human activity (e.g. policies and regulations, shift of power, GOs and NGOs).

Indicators:

Climate Change: The climate change is expected to continue regardless of the inherent non-linear nature. The average global temperature is very likely to increase about 2° Celsius until 2050 pending on the impact of possible countermeasures the world community will take.⁹⁰ There will be multiple and partly unprecedented consequences. Sea-level rise, ocean warming, shrinking of the cryosphere and desertification will have severe impact on the global environment, resulting in water stress, change in the agriculture and marine ecosystem.⁹¹ Furthermore, an increase of flooding, droughts and storms has to be expected. At the same time there might evolve new possibilities opened up by new sea and transport routes and economic growth for certain regions.⁹² Moreover, the access and usability of new technology (e.g. geo-engineering) in conjunction with policy making may boost the mitigation process.

Probability and Impact: The Tsunami that hit Japan in March 2011 - triggered by an earthquake in the Pacific - had a destruction effect that hasn't been displayed before. The combination of an earthquake, a tsunami, a nuclear power plant accident, a power supply failure, and a large- scale disruption of supply chain was not manageable by one nation.⁹³ The increasing

⁹⁰ Intergovernmental Panel on Climate Change 2014, Fifth Assessment Report. See also OECD Environment Outlook to 2050.

⁹¹ Global Trends 2030 – Citizens in an Interconnected and Polycentric World, Institute for Strategic Studies/European Union

⁹² Global Strategic Trends – Out to 2045, DCDC.

⁹³ Learning from Megadisasters, Lessons from the Great East Japan Earthquake, World Bank 2014.

complexity of the world and social systems influences the consequences of a mass event. The probability of occurrence for events like this is low, but the impact is devastating.⁹⁴ The devastation was a result of the cascading effect of the events and the deficiencies in infrastructural resilience although Japan belongs to the wealthy nations. If a Natural Disaster with this complexity occurs in regions characterised by poverty and inequitable conditions, it can have tremendous consequences for their security and stability.

Interconnected world: The nations are part of a complex world which is a synonym for interdependency and interconnection. This mutual dependence encompasses multiple spheres like communication, actors, culture and economy. As a consequence, one Natural Disaster with a high impact will therefore hit certain nations either directly or, at least, indirectly. The disruption of the supply chain in Japan after the Great East Japan Earthquake struck the rest of the world. Global companies and corporations (e.g. automobile industry) were confronted with setbacks in their processes and suffered financial losses.⁹⁵ The tsunami had, therefore, resulted in trade deficits and endangered thereby stability and security which may become more common the more complex the world gets.

Resilience: As a phenomenon that is not created by one source the pre-emptive and emergency measures in case of a Natural Disaster have to take multiple factors into consideration. In order to prevent destructive events, policies and regulations at the national level are not enough, coordination with the local level, NGOs, private businesses and the population are inevitable.⁹⁶ Investments into infrastructures alone do not create resilience, but the engagement of all stakeholders including the population itself does. The mitigation of Natural Disaster has to be initiated before an event occurs. Security and stability is dependent on the ability to cope, recover, adapt, reconstruct and thereby minimize losses (e.g. lives, infrastructure, industry).

Analysis:

Natural Disasters are not the sole source of conflict and life threatening scenarios. They are tangled with various hazards emerging from different phenomena (e.g. urbanization, technological development, climate change). The underlying drivers will increase and thereby very likely enforce the growth of Natural Disasters and their destructive effects. Although it may appear to have been a decrease in observed disaster events, periods of slow-down and speed-ups will always occur within a certain time period. Nevertheless, the threat for lives and likelihood

⁹⁴ Global Assessment Report 2013, United Nations Office for Disaster Risk Reduction.

⁹⁵ Learning from Megadisasters, Lessons from the Great East Japan Earthquake, World Bank 2014.

⁹⁶ United Nations Office for Disaster Risk Reduction.

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will increase due to the interrelated environmental and human factors. Human activities will have a massive impact by multiple means. The use of advanced technology in addition to ongoing processes like urbanization, industrialisation and economic utilisation of specific regions will lead to more severe natural disaster events. Although Natural Disasters can occur anywhere they will be especially challenging for the political and security system where the social and infrastructural resilience is already weak.

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