2018
Chiefs of Transformation Conference

Analysis Report

Prepared by:

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SUBJECT: 2018 CHIEFS OF TRANSFORMATION CONFERENCE ANALYSIS REPORT

DATE: of February 2019

1. On behalf of General Lanata, I wish to reiterate my sincere thanks to those of you who participated in the 2018 Chiefs of Transformation Conference (COTC). It is one of NATO Allied Command Transformation’s key annual events and remains the only venue where national Chiefs of Transformation (COTs) have the opportunity to interact and collaborate with the senior thought leaders involved in innovation and transformation from across NATO, its Partners and many other international organizations and industry.

2. Interest in the COTC remains strong with over 500 attendees from 50 different nations at this year’s event. In addition to Air Chief Marshal Sir Stuart Peach - Chairman of NATO’s Military Committee, and Mr. Camille Grand - NATO’s Assistant Secretary General for Defence Investment, representatives from over 20 industry / academic organizations provided diverse expertise, engaging demonstrations and insight into ways to enhance NATO’s future. Prior to the main conference SACT met with the directors of 19 NATO Centres of Excellence (COEs) for a discussion focussed on ACT’s COE Roadmap.

3. The Secretary General, in a video keynote, emphasized the relevance and timeliness of the COTC discussions. While NATO currently adapts to the ever-changing security environment, its adversaries are not standing still and our technological edge can no longer be taken for granted. The SECGEN appealed directly to the COTs to utilize their expertise, innovative ideas and creative thinking to seek actionable outcomes that influence their national leaders and help shape the future of the Alliance.

4. In his remarks, General Lanata explained how an adapted ACT, as the Alliance’s Warfare Development Command, will provide, by design, end-to-end coherence of the NATO military instrument along the three lines of effort: Deliver, Disrupt and Implement. Working with, and through, NATO HQ and with the support of the Nations, ACT will strive to ensure this Command delivers tangible and timely output to produce concrete improvements in capability for the Warfighter for today and tomorrow. He asked the audience to embrace this once in a year opportunity and start building the future in a spirit of openness, connectedness and close collaboration.

5. The Analysis Report is provided at the enclosure with the key takeaways listed in the Executive Summary and further detail in the main body and annexes. This year, each national COT was invited to bring a Young Disruptor to participate independently in the plenary and syndicate topic sessions and attend a separate Young Disruptors’ Forum. Their overall engagement, different perspective and enthusiastic contributions were very welcome and their participation will be encouraged again in future events.

6. Also new for 2018 was the COTC Principals Offsite where the 125 senior leaders visited the Lockheed Martin Center for Innovation in Suffolk, VA to witness innovative technical demonstrations followed by an evening reception. From the immediate feedback received by SACT this was a successful initiative with Lockheed Martin’s remarkable facility proving to be an ideal venue to showcase the displays and demonstrations and challenge participants.
7. Thank you once again for your attendance and input to the excellent discussions. The outcomes identified will now be linked to the Alliance’s, and in particular, ACT’s Warfare Development efforts. They will be taken forward through various Programmes of Work, new capability initiatives and upcoming ACT key events (e.g., Resilience conference in April, the Partner-360 conference in June, and the NATO Industry Forum in November).

8. Your support and partnership throughout 2018 has been very much appreciated, and I look forward to continuing our close engagement in 2019, working together to enhance Alliance capability. We are considering how to give even greater focus to this year’s event and will write again shortly.

FOR THE SUPREME ALLIED COMMANDER TRANSFORMATION:

Paul M Bennett CB OBE
Vice Admiral, GBR N
Chief of Staff

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List I
The following 2018 Chiefs of Transformation Conference (COTC) summary report is presented as a record of the conduct, discussions and key takeaways of the Conference.

The Conference remains the only venue where national Chiefs of Transformation (COTs) from the Alliance and Partners have the opportunity to interact and collaborate with the senior leadership of Allied Command Transformation (ACT) and many other senior leaders involved in innovation and transformation. Interest in COTC remains strong with over 500 registered attendees from 50 nations at this year’s event. In addition to Air Chief Marshal Sir Stuart Peach, Chairman of the Military Committee and Mr. Camille Grand, Assistant Secretary General for Defence Investment, representatives from over 20 industry and academic organizations provided diverse expertise, engaging demonstrations, presentations and insight into ways to enhance NATO’s future. Prior to the main conference, SACT held a very positive meeting to discuss ACT’s ‘COE Roadmap’ with the Directors of the 19 NATO Centres of Excellence (COEs) represented.

The stated aims of COTC 18 were to interconnect national transformation initiatives with those of ACT, particularly in the areas of innovation, longer-term capability development, and training. The national COTs, along with the other senior leaders from across NATO, industry and academia, were invited to discuss and exchange innovative ideas and best practices, and identify actionable outcomes towards improving interoperability, cooperation and partnership.

Opening the Conference with a recorded message, NATO’s Secretary General, Mr. Jens Stoltenberg, highlighted that this year’s COTC Theme - *Disruptive Advances Shaping Warfare* - was entirely appropriate as NATO can no longer take its technological edge for granted.

Building on the success and feedback of the previous year, COTC 18 was centred on a series of four topic-specific syndicates led by ACT flag officers supported by national subject matter experts:

1. **Enabling People through Disruptive Advances: Alternate Perspectives.**
2. **Data Centricity in Command & Control and Decision-Making.**
3. **How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?**
4. **Long Term Considerations from NATO’s Strategic Foresight Analysis / Framework for Future Alliance Operations (SFA / FFAO).**
As a new initiative, each national COT was invited to bring a Young Disruptor\(^1\) to participate independently in the plenary / syndicate sessions and attend a separate Young Disruptors Forum. Their contribution was very welcome and their participation will be encouraged again in future conferences.

Also new for 2018 was the COTC Principals Offsite where the 125 senior leaders were transported to the Lockheed Martin Center for Innovation in Suffolk, VA to witness innovative technical demonstrations followed by an evening reception. The venue change along with the highly professional displays proved an excellent opportunity for the COTC Principals to promote further discussion and engagement.

During the final morning, an Industry Engagement on the theme of *Innovative Technology / Autonomy for Decision Support* gave attendees the opportunity to engage directly with 15 companies and academic organizations who provided diverse expertise, engaging demonstrations and presentations.

**2018 COTC Key Takeaways:**

- Regarding Human Capital, there was a consensus that talent management, leader development, and organizational effectiveness are key elements to address. NATO must consolidate and develop educational tools to help strategic leader development and decision-making. Recruiting, and more importantly retaining, innovative people is becoming increasingly challenging. A key recommendation was to modernize strategic leader development through virtual reality and other advanced decision-making tools.

- NATO must improve its ability to identify and acquire data and then make it sharable for experimentation and analytics purposes amongst NATO and nations to support Command and Control and decision-making. Culture, Policies and Processes are the fundamental elements to address first, but the toughest to solve. Data science is iterative by its nature and therefore must be accepted in both development and operational arenas. In Experimentation, NATO and nations must resource, both people and money, the “fail, fail fast and try again” methodology of development utilizing the expertise and knowledge of the NATO Centres of Excellence. A key action item is the development of a NATO policy facilitating Emerging Disruptive Technologies, recognizing data as a strategic resource.

- The future partnerships syndicate identified that most Partner Nations do not seek to embrace Adaptive Disruptive Advances; their levels of ambition focus on the implementation of more practical solutions. It was also concluded that some challenges with classified information sharing could, with nations’ support, be addressed by utilizing existing technologies.

- The need for greater agility in adopting / adapting commercial technologies rather than building military specific platforms was stressed. Several emerging technologies are in their final development phase and NATO will require a strategic plan to ensure appropriate policy, legal and ethical concerns are considered. The Multinational Solutions community will explore these insights in the near future.

- The Young Disruptors recognized the importance and relevance of NATO as a remarkable actor for international peace and security. However, they pointed out a lack of transparency and information sharing among nations, slow decision-making, and an organizational culture that does not accept failure. They proposed that NATO considers developing “Disruptive Innovation Units” that are organizations where people from diverse backgrounds gather for short periods to solve a NATO problem thus providing NATO an external alternative analysis.

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\(^1\) A Young Disruptor was defined as a professional male or female age 22-32, either military (officer or other rank) or civilian, specialized in the field of International Relations, Diplomacy, International Security, Economy, Science, Technology, Engineering and/or Mathematics who works in a governmental agency, industry, think tank, or research institute.
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E. Syndicate Topic 4: Long Term Considerations from NATO’s Strategic Foresight Analysis / Framework for Future Alliance Operations (SFA / FFAO).
F. Young Disruptors Forum: Disruptive Technology & Innovation towards Transformation.
1. The 2018 COTC took place at the Marriott Waterside Hotel in Norfolk, Virginia, from 11-13 December 2018. In preparation for the event, two COT workshops were held; the first in Warsaw, POL in April as part of the Multinational Solutions Synchronization workshop with a second, including Partner COT representatives, held at MOD Shrivenham, GBR in September. Over 500 personnel (including 70 Flag and General Officers and senior civilian equivalents) registered to attend including representatives of 28 NATO member nations, 22 Partner nations, 19 NATO Centres of Excellence (COEs), alongside staff from NATO HQ, SHAPE, HQ SACT, NATO Education and Training Facilities, NATO Agencies and the European Union. The audience also included a total of 55 Young Disruptors and Press Students from 22 nations, and 15 representatives from industry and academia participated in the dedicated Industry Demonstration period on 13 December. The detailed Conference Agenda is at Annex A.

2. Lieutenant General Tom Sharpy, ACT’s Deputy Chief of Staff for Capability Development, opened the conference with an introductory scene setting video underlining the COTC 18 theme *Disruptive Advances Shaping Warfare*. After providing administrative remarks and an agenda overview, the conference Master-of-Ceremonies, Brigadier General Poul Primdahl, introduced a recorded keynote speech from His Excellency Mr. Jens Stoltenberg, the Secretary General of NATO.
3. In his address, the Secretary General reminded the audience that, in 2019, NATO will celebrate 70 successful years of safeguarding peace. The reason for this success is NATO’s ability to adapt continuously as the world has changed. To illustrate, he highlighted that, since the end of the Cold War, NATO’s focus shifted from collective defence to crisis management including bringing stability to the Balkans. The 9/11 attacks then saw NATO invoke Article 5 of the Washington Treaty for the first time which led to its largest and longest operation in Afghanistan. Then, in 2014, the security environment changed dramatically again with Russia’s actions regarding Ukraine.

4. Today, there is an ongoing and increasingly dangerous pattern of behaviour from Russia with its military build-up and aggressive actions from the North of Europe to the Middle East. This includes its use of hybrid tactics, such as cyber-attacks, disinformation campaigns and interference in the democratic processes of other countries. Furthermore, they have developed a new missile that undermines the Intermediate-range Nuclear Forces Treaty, one of the pillars of arms control, while the illegal annexation of Crimea and destabilization of Ukraine continues. In addition, NATO faces the enduring threat of international terrorism along with the proliferation of Weapons of Mass Destruction.

5. Nevertheless, as the Secretary General underlined, although the world has changed, once more NATO has adapted. It has strengthened its deterrence and defence ensuring the right forces, in the right places, at the right state of readiness operating under a new Command Structure. He highlighted faster decision-making and increasing defence spending along with the increased efforts to ensure that NATO, with the assistance of several Allies offering their cyber-capabilities, is as strong in cyber-space as it is on land, at sea and in the air.

6. Mr Stoltenberg concluded by emphasizing that while NATO has achieved much, its adversaries are not standing still. NATO can no longer take its technological edge for granted. Countries such as Russia and China are investing heavily in new technologies, whether modern military hardware, such as new aircraft carriers or missiles, or within the new fields of robotics, big data and cyber. Indeed, China plans to spend $150 billion to become the global leader in Artificial Intelligence by 2030. These technologies will revolutionise military affairs as dramatically as gunpowder or the airplane did in times past. It is therefore vital that NATO does not allow its technological advantage to slip and therefore, he stressed the importance of the COTC theme and discussions. In closing, he appealed directly to the national Chiefs of Transformation to influence their leaders and help shape the future of the Alliance. Their expertise, innovative ideas and creative thinking are essential and he strongly encouraged all attendees to make the most of this opportunity.
7. General André Lanata, Supreme Allied Commander Transformation (SACT), followed the Secretary General’s address with his own welcome and opening remarks. He commenced by thanking the large audience for their attendance while emphasizing that COTC remains the only annual venue that gathers the Alliance and Partner nations’ Chiefs of Transformation, and NATO’s Transformation command’s leadership, together with non-NATO organizations, industry and academia, to share perspectives on current challenges and the best ways to solve them.

Figure 5: General André Lanata, Supreme Allied Commander Transformation, provides his opening remarks.

8. He noted that the magnitude and speed of change requires continuous adaptation. There are many efforts being undertaken by all 29 Nations and partners of the Alliance; however, these need to be implemented quickly for the common good. Preparing that adaptation while remaining continuously fit for purpose is described as Warfare Development, and SACT wished to explain the latest evolutions in ACT’s role as NATO’s Warfare Development Command including his immediate priorities.

9. In recognising the main driver of change for the Alliance as a strategic environment that is growing steadily more complex, unpredictable and dynamic, the most challenging threats to security result from two factors: strategic competition and instability. The negative impact of these factors is often exacerbated by the fact that the borders between the two are increasingly blurred, often combined in the “Hybrid” scenarios or interlinked in what are called call “grey zones” of uncertainty in the strategic landscape. As such, the Alliance faces challenges and threats from both state and non-state actors, manifested in different forms, often as hybrid warfare, from sources that are regularly difficult to attribute (such as cyber-attacks, for example).

10. This interconnectedness of threats and the acceleration of technological development compel the Alliance to take a responsive 360 degrees approach at the speed of relevance. In a world that moves so fast, if NATO wants to remain relevant, it also has to move quickly and, at the same time, be constantly innovative, or as SACT suggested, “Disruptive”. To do this, national decision makers must be convinced about what capabilities are required for development and advised where to direct defence expenditure. New solutions need to be proposed that both help NATO’s forces build current capacity while maintaining ready forces to face the challenges of tomorrow. This is the raison d’être of Allied Command Transformation as NATO’s Warfare Development Command.
11. SACT continued to explain that, while, under NCS Adaptation, the three main pillars of HQ SACT: Strategic Plans and Policy, Capability Development and Joint Forces Development have not changed dramatically, their structure, approach and mindset are now focussed towards a streamlined and more coherent organization. To help understand Warfare Development, he used the analogy of the London Eye wheel with six revolving “cabins” representing the interdependent warfare development strands.

Figure 6: SACT continues his opening remarks.

a. The first strand is **Understand and Shape the Future**. NATO needs to understand the environment in which it has to operate. ACT provides that insight regularly through SFA and FFAO reports that directly inform Alliance policy and strategy development.

b. The second strand is **Common Funded Capability Development**. ACT manages an average of 31 common funded capability development programmes to deliver tangible capabilities, especially in C2 and logistics. This is the “connecting tissue” of the Alliance and in the wake of the new governance model, ACT will execute its new Capability Requirement Authority responsibilities in both the development and through-life cycle management of these capabilities, where the guiding principles will be cost-effectiveness, timeliness and transparency.

c. The third strand is **Experimentation and Demonstration**. There are myriad ideas and endless solutions to projects, but these need to testing before being fully exploited. ACT uses experimentation, demonstrations and concrete results of modelling and simulation to make ideas and innovations produce tangible capabilities for warfighters. These methods speeds up the fielding of capabilities, as practised during exercise Trident Juncture 2018.

d. The fourth strand is **Doctrine and Concepts**. To field all initiatives of warfare development and connect member nations and partners, different standards, doctrines and concepts have to be drafted, coordinated and agreed by 29. It is an important factor of interoperability.

e. The fifth strand is **Training and Educating our People**, to ensure that we have the right human capital across the Alliance. Exercises are used as a fabulous transformational tool to experiment and demonstrate the new ideas and projects in almost real conditions. Training and education also contribute to projecting stability and is another factor of interoperability.

f. The sixth strand is **Lessons and Analysis**. We learn by doing and need to ensure that past mistakes are not repeated. Lessons identified need to be recorded, learned and implemented.

12. Finally, the wheel itself is the interoperability that keeps all cabins connected, with its centre the innovation (effort) which supplies all military adaptation. It is about generating and collecting ideas so that through Warfare Development these are taken from concept to capability as quickly as possible.
13. Moving to his priorities, SACT stated that alongside the careful and smooth implementation of the NCS Adaptation in ACT, his main focus for the coming years would be to resolutely boost innovation and deliver timely and tangible capabilities to the warfighters. ACT’s centre of gravity will reside in capability development, however, and in line with the COTC 18 theme, the aim is to put a stronger emphasis on innovation.

14. Innovation feeds everything in Warfare Development but is not the same as invention. It is also how to best field, use or integrate different technologies, tools or procedures in a way that produces a “disruptive” operational result, especially through a bottom-up approach. ACT’s approach to innovation will always be its operational use. Nations’ support will be key in that endeavour, and ACT wants to keep nations closely involved through both military and civilian capacity. Nations will produce some of the concrete outputs while ACT will provide design or propose solutions.

15. In acknowledging the complexity of the security environment, SACT stressed the need for faster reaction with a quote by Klaus Schwab, the Chairman of the World Economic Forum, “In the new world, it is not the big fish which eats the small fish, it’s the fast fish which eats the slow fish.” This will require adequate tools to help deliver the best possible decisions, at the speed of relevance. More scenario analysis and tools will be utilised to aid understanding and prepare for possible contingencies.

16. SACT directly requested the support of the Nations to succeed in ACT’s implementation of the NCS adaptation. He stressed that it is not only about bringing and sharing ideas, but also about ensuring that ACT’s Manning is sufficient with Nations sending people in adequate numbers who are not only competent but are also able to think “outside the box”.

17. In his conclusion, and in recognition of the conference theme Disruptive Advances Shaping Warfare, General Lanata invited all attendees to think “disruptively” and to be innovative. He welcomed representatives from the DATAIKU company who won ACT’s Innovation Challenge earlier in the year, alongside the new initiative of the Young Disruptors Forum designed to engage top-level young professionals from across NATO and Partner Nations with the attending senior leaders. He also noted ACT’s move to work closer with innovative potentials of Industry that led to the introduction this year of the COTC Principals Offsite to Lockheed Martin’s Center for Innovation.

18. He further emphasized that only by acting together, in a “one NATO” approach will the Alliance be able to tackle the challenges faced, today and tomorrow. NATO, comprising 29 Nations who possess the best intellectual and technological capital on the planet, can achieve this but it remains a question of will - ACT has this, funding - this is improving with Nations’ 2% commitment, and new methods - which ACT need to find.

19. In closing, SACT appealed for the audience to embrace this once in a year opportunity and start building the future. He asked that all Chiefs of Transformation, partners, other senior leaders, Industry representatives, and Young Disruptors help him define what ACT’s future focus on capabilities would be. He looked forward to getting actionable outcomes from the syndicates, and wished everyone fruitful discussions in a spirit of openness, connectedness and close collaboration.
20. On completion of SACT’s address, Lieutenant General Tom Sharpy, DCOS Capability Development provided an overview of ACT’s Emerging and Disruptive Technology Roadmap that had developed in June 2018. He noted that despite there being many historical examples of militaries leading the world in technological development this is no longer the case with today’s technology and the global industrial base breaking traditional models. The roadmap, borne out of necessity, was and still is an attempt to look to those now leading the way in innovation and technology development - not the military but industry partners. The roadmap is ACT’s attempt to identify a few selected technologies that led to the Lines of Effort, and quickly demonstrate their value and impact on enhanced decision-making, capability development and enablement of SACEUR’s AOR.

![Figure 8: DCOS CAPDEV providing an overview of ACT's Emerging & Disruptive Technology (EDT) Roadmap.](image)

21. The roadmap, designed to increase awareness and foster discussion at the political-military level with regard to the need to develop appropriate Policy, will enable quicker transition of these technological advances into capabilities. As warned by the Secretary General, NATO’s potential adversaries are not waiting, therefore these advances must be leveraged and incorporated into the capability development processes to implement change, disrupt the status quo and deliver capabilities at the speed of relevance.

22. He then introduced a short clip of Amazon’s CEO, Jeff Bezos that highlighted the need to innovate and experiment in a culture of “fail, fail fast and try again”. General Sharpy’s key takeaway was that NATO must now look to the future and embrace experimentation; it must reduce its risk adverse attitude; rapidly incorporate new emerging technologies into the capability development process, and deliver faster by embracing innovation and capitalizing on its extensive Human Capital. In closing, he introduced his counterpart from NATO HQ’s Defence Investment Division, Mr. Camille Grand.

23. Mr. Grand commenced his address by proposing that, disruptive technology, a distinction needs to be made between those that have mostly temporary, incremental or localised impact, from those that have a more overwhelming or devastating impact, such as the potential with AI and quantum technology. This, he suggested, is why forums such as COTC are extremely valuable and required to maintain the dialogue on what the future could bring to the military.

24. He acknowledged that today’s thinking and innovations are decisively influencing the present and near future. More importantly, today’s investments are paving the way for tomorrow’s innovation. However, current operations are run with the capabilities currently held, and not with the capabilities under consideration. He refined this to the following three requirements for the Alliance.

   a. Accelerating the delivery of capabilities. Delivering faster what NATO’s commanders in the field need.

   b. Second, improving the quality of our capabilities. Time and speed matter, but quality is equally critical.

![Figure 9. Mr. Camille Grand, Assistant Secretary General for Defence Investment (ASG DI) addresses COTC 18.](image)
c. Third, to maintain the Alliance’s strategic edge, NATO has to innovate, and disrupt others, and equally, itself. This includes innovation in processes, in methods, in people and their way of thinking, and in technology.

25. In closing, Mr. Grand provided insights from the NATO Industry Forum that took place in Berlin last November 2018 that had significant relevance for the upcoming COTC syndicate topic discussions. The NIF had included some 20 Chief Executive Officers from the top-most defence and security industries who contributed to the following key takeaways: the need for NATO to move towards defining capability needs, not requirements. They also urged NATO to manage risk, rather than be risk-averse and further recommended that a user-centric approach to innovation be introduced. Through early interaction with the users, industry would be able to collect data for future improvement of the capability, and move away from the platform centric developments that exist today. Digitization, digital twins and the use of simulation, exploiting big-data and instigating artificial intelligence, were also among the topics discussed. Finally, industry suggested that Allies develop a network of national innovation hubs / labs for research and development (R&D) of common funded capabilities, over which NATO would have a coordinating role, and ACT a leading role.

26. On completion of Mr. Grand’s address, Vice Admiral Paul Bennett, ACT’s Chief of Staff, provided a detailed explanation of how the syndicate sessions would run over the following two days before, with the aid of a short video, introducing the ACT Flag Officers leading the four syndicate topics:

a. Major General Stefano Salamida (Deputy Chief of Staff Joint Force Development) introduced Topic 1 - “Enabling People through Disruptive Advances: Alternate Perspectives.”

b. Rear Admiral René Tas (Assistant Chief of Staff Capabilities) introduced Topic 2 - “Data Centricity in C2 and Decision Making”.

c. Major General Odd Pedersen (Deputy Chief of Staff Military Partnerships) introduced Topic 3 - “How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?”

d. Major General William Hickman (Deputy Chief of Staff Strategic Plans & Policy) introduced Topic 4 - “Long Term Considerations from NATO’s Strategic Foresight Analysis / Framework for Future Alliance Operations (SFA / FFAO).”

27. Concluding the Opening Plenary, and prior to the start of the first syndicate session, the Chief of Staff implored all attendees to grasp the opportunity to approach the syndicate sessions in an open and entirely positive frame of mind and be ready to engage, interact, share and fully deliberate each topic under discussion.
Figure 11: The 2018 Chiefs of Transformation Conference.

Figure 12: Syndicate Topic 1 - Enabling People through Disruptive Advances: Alternate Perspectives.

### a. Summary / Outcomes:

1. Technological advances pose challenges to recruiting and retaining innovative people in the Military.
2. Strategic leadership needs to focus on the future challenges technology pose and its impacts at all levels of decision-making.
3. NATO and Nations need to leverage synthetic learning and advanced decision-making tools in leader development.
4. Organizational design/structure needs to adapt with technological advances.

Figure 13: Syndicate Topic 1 - Enabling People through Disruptive Advances: Alternate Perspectives.

### b. Way Ahead / Future Actions:

1. Provide an open forum/collaborative tool to continue the leader development and talent management discussion across NATO and with the Nations.
   - Online tool to share best practices
2. Explore a NATO common learning architecture that focuses on leader development and talent management. Explore:
   - Synthetic learning.
   - Strategic decision-making virtual reality tools.
29. **Syndicate Topic 2 - Data Centricity in C2 and Decision-Making.**

![Image of a meeting with a presentation slide and attendees]

*Figure 14: Syndicate Topic 2 - Data Centricity in C2 and Decision-Making.*

**a. Summary / Outcomes:**

1. Make better use of data - own, partner and external.
2. Increase Experimentation - resource “Fail, fail fast, try again”.
3. Attack Cultural Inertia - education to accept risk of uncertainty.
4. Instil a Sense of Urgency - this is NOT the future.
5. Develop a more intelligent customer.
6. ‘Stress Testing’ technology denial resilience.
7. Use civilian teams to provide alternative perspectives.

![Image of a meeting with attendees engaged in discussion]

*Figure 15: Syndicate Topic 2 - COL Blunt alongside RADM Tas (ACOS CAP) responds to an audience point.*

**b. Way Ahead / Future Actions:**

1. Opportunity for ACT to take an increased lead in more experimentation with 29 nations and partners.
2. Increase the utilisation of the NATO COEs in small-scale experimentation.
3. Improved NATO Science & Technology Organisation (STO) Research ‘Pull through’ into NATO ACT’s and Nations’ programmes. This will require better tasking, identification and sharing of STO activities.
30. **Syndicate Topic 3 - How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?**

![Image](image-url)

**Figure 16:** Syndicate Topic 3 - How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?

**a. Summary / Outcomes:**

(1) Existing technologies can be adopted to address a lack of classified information sharing capability.

(2) The political will to fund this capability will require a clear representation of value to the Alliance.

(3) Most Partner Nations do not seek to embrace Adaptive Disruptive Advances. Their ambition remains to implement solutions that are more practical.

![Image](image-url)

**Figure 17:** Syndicate Topic 3 - MGEn Odd-Egil Pedersen (DCOS PD) leads the topic alongside ADM Nielson (DSACT).

**b. Way Ahead / Future Actions:**

(1) Draft statement of requirement to recognise current technological deficiency.

(2) Identify a NATO Command Structure champion

(3) Both Strategic Commands need to collaborate to chart a course for future information sharing led by ACT.
31. **Syndicate Topic 4 - Long Term Considerations from NATO's Strategic Foresight Analysis/Framework for Future Alliance Operations (SFA / FFAO).**

*a.* **Summary / Outcomes:**

1. There is an over-reliance on technology - nations still require Resilience.
2. Technology is not a silver bullet e.g. faster decision-making, agile organisations and relearning old skills (human capital).
3. ‘Tail to Tooth’ - approach to Research and Development i.e. Military controls the Technology closer to the Tooth.
4. A ‘Storm’ is coming - NATO needs a strategic plan for approaching technologies.
5. Take an aggressive approach to policy development and legal and ethical concerns (cyberspace, space, UAVs etc.)
6. NATO shaping the environment to counter increasingly corrosive activities / threats below “the threshold of Art 5”

*b.* **Way Ahead / Future Actions:**

1. Adapt NDPP for future security environment (effects-based, long-term aspects).
2. Aggressive use of Multinational Solutions Community and other partnerships for future capabilities.
3. Institute an External Advisory Group to highlight “where the puck is going to be”.
5. Maximize modelling and simulation opportunities.
32. **Young Disruptors Forum - Disruptive Technology and Innovation towards Transformation.**

![Figure 20: Young Disruptors Forum - Introduction by the facilitator Ms. Evanna Hu.](image)

a. **Summary / Outcomes:**

1. Disruption is essential to keep your technological edge.
2. Fear of failure within NATO and nations’ militaries prevents innovation.
3. Severe over-classification and unwillingness to share is an issue.
4. Lack of management of disruptive technology.

![Figure 21: Young Disruptors Forum in progress.](image)
b. **Way Ahead / Future Actions:**

(1) Develop a NATO Distributed Defence partnership with the Militaries, Private Sector, Entrepreneurships, other Civil Participants, Venture Capitalists, and Maker Camps etc.

(2) Consider the establishment of NATO Disruptive Innovation Units designed to enhance individual capabilities. Examples could be:

   (a) NATO Cyber Unit.

   (b) NATO Artificial Intelligence & Big Data.

   (c) NATO Blockchain Technologies.
COTC PRINCIPALS OFFSITE

33. Another new initiative for 2018 was the COTC Principals Offsite that took place during the afternoon/evening of Wednesday 12 December. SACT accompanied 125 COTC Principals to the Lockheed Martin Center for Innovation in Suffolk, VA to witness innovative demonstrations and presentations with a disruptive technology theme. This was followed by an evening reception co-hosted by SACT alongside the Director of the facility, RADM (ret) Greg Nosal.

Figure 24: RADM (ret) Greg Nosal, Director of the LM Center for Innovation, greets SACT, DSACT and COS.

Figure 25: The Director welcomes the COTC Principals to the LM ‘Lighthouse’.

34. Alongside Lockheed Martin who delivered the majority of the presentations, there were innovative displays and demonstrations provided by representatives from the US Joint Staff J7, Old Dominion University and the US Army’s Logistic Division. On completion of the Director’s welcome and SACT’s opening remarks, the visiting COTC Principals were split into three groups for rotation through the three sectors containing the exhibits and demonstrations.
Figure 26: Sector 4 - Lockheed Martin introduce the NATO Air Campaign study and the US Joint Staff present Project Orion.

Figure 27: Sector 5 - Lockheed Martin display several IAMD related projects.

Figure 28: Sector 6 - (left) ODU demonstrate their experimental brain-controlled and autonomous robotic projects; (right) the US Army display their Autonomous Logistics vehicle.

35. In summary, from the immediate feedback received from many of the COTC Principals, the addition of a visit away from the hotel environment during the conference was entirely successful. Lockheed Martin’s remarkable facility proved to be ideal an ideal venue to showcase the displays and demonstrations that were most professionally presented by their contributors. Many thanks are passed again to the Director of the Lockheed Martin facility, RADM (ret) Greg Nosal, and his excellent team for hosting this prestigious event.
36. Early on the second morning, COTC 18 was delighted to be joined by Air Marshal Sir Stuart Peach, the Chairman of the NATO Military Committee. In a separate plenary session, Air Marshal Peach addressed the audience and answered several interesting and challenging audience questions with his personal views on how NATO is coming to terms with the current pace of technological change.

37. In identifying the ability of data management to support NATO’s warfare development and innovation as his biggest challenge, he emphasized that the Alliance’s capacity to manage data to achieve desired effects will only be as strong as the political will of its 29 member nations. It is therefore essential to deliver an acceleration of innovation as a result of this conference.

INDUSTRY ENGAGEMENT

38. Prior to lunch on the final day, an Industry Engagement on the theme “AI and Autonomy for Decision Support” took place. Admiral Manfred Nielson, the Deputy Supreme Allied Commander Transformation (DSACT) introduced the 15 participants, including two from ACT’s 2018 Innovation Challenge with particular acknowledgement of the two winning entrants: ALX from Belgium and DATAIKU from France.
39. The following companies participated in the 2018 Chiefs of Transformation Conference (COTC) Industry Engagement:
   a. Aditer (DEU) and Prevailance (USA) - Fleet Operational Exercise Training for Warfighter Optimization (FOX TWO).
   b. Business Integra (USA) - Scenic, an algorithm for dependency clustering across measurement scales, integrating data types.
   c. Google (USA) - Big data analysis, pattern identification and machine learning model development
   d. ICASA / New Mexico Tech/Klarrio (USA / BEL) - Information Environment Assessment through data flows, analytics, processing capabilities and visualization.
   e. Improbable (GBR) - Commercial software which provides modelling and simulation capabilities that enable the creation of simulations of real-world scenarios.
   f. MASA (FRA) - SWORD - Simulation based training tool for brigade and divisional headquarters.
   g. Nexalogy Environics (CAN) - NexaIntelligence. An investigative and intelligence SaaS platform to identify hidden signals and patterns through multilingual big data analysis.
   h. Rasdaman (DEU) - Integrated situational awareness on Distributed big data using real-time analytics on massive spatio-temporal data cubes.
   i. Raytheon/ENSC/Thales (USA/FRA) - ANTICIPE. Augmented near real time instrument for critical information process experiment.
   j. Research Innovations (USA) - C2IE to be used in information environment assessment.
   k. Thales (FRA) - C4I to C8I.
   l. Thales Defence Mission (FRA) - Alexandrie. The first secured and smart digital platform dedicated to maritime intelligence which aggregates data in real time to anticipate, prevent threats and help decision makers.
   m. US Army/UK STL/Norway FFI/Netherlands TNO - BAYLEEN and SURF. Social Understanding and Reasoning Framework, Norwegian Video Indexing and Netherlands Imagery detection of text and pictures.

40. Allied Command Transformation 2018 Innovation Challenge participants:
   a. ALX Systems (BEL) - C-UAS integrated technology linkage between radar and effectors.
   b. Dataiku - AI and Big Data usage

Figure 32. DSACT acknowledges the winners of ACT's 2018 Innovation Challenge.
41. The Closing Plenary commenced with Brigadier General Poul Primdahl, ACT’s Assistant Chief of Staff for Requirements, introducing to the stage each of the Syndicate Topic leads and representatives from the Young Disruptors Forum who, in turn, provided detailed debriefs of their outcomes and way ahead (see Annexes B-F for further details).

42. The syndicate topic and Young Disruptor Forum debriefs were then followed by Lieutenant General Sharpy who summarised the two days' discussions prior to handing over to General Lanata to provide his closing remarks.
43. In closing the 2018 COTC, General Lanata thanked the audience for their valued input to the discussions over the previous two days. He particularly highlighted the very useful discussion that he had with the directors of the NATO Centres of Excellence prior to the start of the conference, the overall engagement and enthusiasm of the Young Disruptors, and to Lockheed Martin for hosting the COTC Principals Offsite so excellently.

44. He suggested that, as the principal outcome of the conference, there was now a much greater understanding regarding Warfare Development, although the achievement of its objectives would require significant effort and, he stressed, cooperation. To ensure the future of the Alliance, cooperation was required not only between member Nations, but also NATO with its partners, particularly Industry and Academia.

45. General Lanata then summarised the outputs from the syndicate topic discussions. Regarding Human Capital, he concluded that the men and women serving within the Alliance remain its greatest strength and NATO will always benefit from the shared knowledge and competencies, opinions and experiences of personnel from 29 Nations and its Partners. He recognised that the consensus from the attendees was that talent management, leader development, and organizational effectiveness are key elements to address. NATO must consolidate and develop educational tools to help strategic leader development and decision-making. Recruiting, and more importantly retaining, innovative people is becoming increasingly challenging. A key recommendation was to modernize strategic leader development through virtual reality and other advanced decision-making tools.

46. The Data Centricity in C2 and Decision-Making topic identified that NATO must recognize data as a strategic resource. The Alliance needs to improve its ability to collect, analyse and use data while making it sharable for experimentation and analytics purposes. Culture, Policies and Processes are fundamental elements to address first but also recognized as the most difficult to solve. There needs to be a common realization that data science will continue to evolve and it must be accepted in both development and operational arenas. In Experimentation, NATO and nations must provide the resources in terms of people and money. There must an adoption of the “fail, fail fast and try again” methodology supported by the expertise and knowledge of the NATO Centres of Excellence.

47. The Future Partnerships topic had identified a reluctance amongst some Partner Nations to embrace Adaptive Disruptive Advances as their current level of ambition is focussed on the implementation of more practical solutions. Once again, classified information sharing was highlighted as an issue although, with nations’ support, some solutions may already be available utilizing current technologies.
48. The syndicate topic discussing the **Long Term Considerations from NATO’s Strategic Foresight Analysis / Framework for Future Alliance Operations** stressed the need for greater agility in adopting and adapting commercial technologies combined with traditional ways of building military specific platforms. Several emerging technologies are in their final development phase and NATO will require a strategic plan to ensure appropriate policy, legal and ethical concerns are considered. In response to this challenge the Multinational Solutions community will explore these insights.

49. Finally, SACT once again thanked the national Young Disruptors and Old Dominion University students for their participation in the **Young Disruptors Forum**. They had recognized the importance and relevance of NATO as a remarkable actor for international peace and security. However, they pointed out a lack of transparency and information sharing among nations, slow decision-making, and an organizational culture that does not accept failure. They proposed that NATO considers developing “**Disruptive Innovation Units**” where people from diverse backgrounds gather for short periods to solve a NATO problem thus providing NATO an external alternative analysis.

**CONCLUSION**

50. In conclusion, General Lanata stated that COTC is a powerful tool and this year’s conference had clearly identified many opportunities for continued improvement, looking beyond the Brussels Summit, and in support of the Warfare Development of the Alliance. These improvements, particularly boosted by innovation, will significantly support NATO’s Transformation and result in a faster delivery of tangible and beneficial capabilities to our warfighters. He proposed that the most important message for all attendees to take away is to continue to work as one team to ensure that the Alliance remains “fit for purpose” able to face all current and future challenges. He thanked everyone again for the excellent discussions, and more importantly for the actionable outcomes that can now be linked to NATO’s work strands and upcoming events.
2018 COTC

2018 Chiefs of Transformation Conference
“Disruptive Advances Shaping Warfare”

11-13 December 2018

Venue: Norfolk Waterside Marriott Hotel.

Dress code:

Icebreaker / Principals Offsite Reception:
Military Personnel: Service Dress.
Civilian Personnel: Business Suit.

Plenary / Syndicate Sessions:
Military Personnel: Day Working Uniform.
Civilian Personnel: Business Casual.

Tuesday, 11 Dec 2018

pm Conference registration.

1700 NATO Naval Mine Warfare COE Memoranda of Understanding Signing Ceremony. SACT with BEL, NLD, ITA, and POL NLRs. COTs from these Framework Nations and ACT CG also invited to attend. (floor 3 Presidential Foyer).

1745-1830 SACT meeting with COE Directors (floor 3 Syndicate room 1)
COS meeting with Young Disruptors (ground floor Norfolk ballroom I, II)

1830-2030 Icebreaker.
Hosted by Supreme Allied Commander Transformation (SACT) General André Lanata.

Wednesday, 12 Dec 2018

0700 Conference Registration.

Opening Plenary

0800 Welcome.
Deputy Chief of Staff Capability, Capability Development (DCOS CAPDEV): Lieutenant General Thomas Sharpy.
0805 Administrative Remarks. Assistant Chief of Staff Capability, Requirements (ACOS REQS): Brigadier General Poul Primdahl.

0815 Keynote Video Address. NATO Secretary General: Mr Jens Stoltenberg.

0825 Opening Address. Supreme Allied Commander Transformation (SACT): General André Lanata.


0850 Opening Remarks. NATO Assistant Secretary General Defence Investment: Mr Camille Grand.

0905 Introduction to the Syndicate Topics. Chief of Staff, Allied Command Transformation (COS ACT): Vice Admiral Paul Bennett.

- “Enabling People thru Disruptive Advances : Alternate Perspectives” Major General Stefano Salamida (Deputy Chief of Staff Joint Force Development).

- “Data Centricity in C2 and Decision Making” Rear Admiral René Tas (Assistant Chief of Staff Capabilities).

- “How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?” Major General Odd Pedersen (Deputy Chief of Staff Military Partnerships).

- “Long Term Considerations from NATO’s Strategic Foresight Analysis / Framework for Future Alliance Operations (SFA / FFAO).” Major General William Hickman (Deputy Chief of Staff Strategic Plans & Policy).

1000 Coffee break.
**Syndicate Sessions**

1030-1200  **Syndicate Session “A”** (all refer to individual syndicate timetables for allocation of room / topic assignment i.e. A-1, A-2, A-3, or A-4).

- **Room / Topic 1** - “Enabling People thru Disruptive Advances: Alternate Perspectives.”
- **Room / Topic 2** - “Data Centricity in C2 and Decision Making.”
- **Room / Topic 3** - “How can NATO and Partners embrace and exploit Disruptive Technologies to enhance collaboration and information sharing?”
- **Room / Topic 4** - “Long Term Considerations from NATO’s SFA / FFAO.”

1200  **Group picture - all Chiefs of Transformation** *(stairs in lobby).*

1215  Buffet lunch.

1330-1500  **Syndicate Session “B”** (all refer to individual syndicate timetables for allocation of room / topic assignment i.e. B-1, B-2, B-3, or B-4).

1500  Coffee break.

1515-1530  COTC Principals board coaches for COTC Principals Offsite - departure at 1530.

1530-1730  **Young Disruptors Forum.** *(hotel ground floor Norfolk ballroom I, II).*

1530-1800  **COTC Principals Offsite** - Visit to Lockheed Martin Center for Innovation / Innovation demonstrations. (By invitation: National COTs (NATO and Partners) or their designated representatives, other FOGOs and equivalent senior civilians, and Centre of Excellence directors and other designated senior leaders from Industry / Academia in support of syndicate panels.)

1800-2000  **COTC Principals Reception** - Lockheed Martin Center for Innovation.

2015-2045  COTC Principals return to Norfolk Marriot Waterside by coach.
Thursday, 13 Dec 2018

0730-0815 Executive breakfast. SACT and DSACT with Air Chief Marshal Sir Stuart Peach (Chairman of the NATO Military Committee) and all national Chiefs of Transformation in Shula’s 347 Restaurant, Marriott Hotel ground floor.

CMC Plenary

0820-0900 Keynote Address and Questions. Chairman of the NATO Military Committee (CMC): Air Chief Marshal Sir Stuart Peach.

Syndicate Sessions (continued)

0900-1020 Syndicate Session “C” (all refer to individual syndicate timetables for allocation of room / topic assignment i.e. C-1, C-2, C-3, or C-4).

1020-1120 Young Disruptors Forum Outcomes Preparations.

Industry Engagement

1020-1030 Introduction to Industry Engagement Participants. Deputy Supreme Allied Commander Transformation (DSACT): Admiral Manfred Nielsøn.


1140-1300 Syndicate Session “D” (all refer to individual syndicate timetables for allocation of room / topic assignment i.e. D-1, D-2, D-3, or D-4).

1300-1430 Buffet lunch co-located with Industry Engagement.

Closing Plenary

1430 Syndicate Topic and Young Disruptors Forum Debriefs, Outcomes and Way Ahead. Presented by Syndicate leads and Young Disruptors’ representative.


1545 Closing Remarks. SACT: General André Lanata.

Executive Sessions

1600-1730 SACT - General André Lanata with NATO COTs. DSACT - Admiral Manfred Nielson with Partner COTs.
SYNDICATE TOPIC 1 - ENABLING PEOPLE THRU DISRUPTIVE ADVANCES – ALTERNATE PERSPECTIVES

Chair: Major General Stefano Vito Salamida, HQ SACT, DCOS JFD
Panellists: Dr. David Fautua, Joint Staff J7
Dr./MGen (ret) Robert Scales, US DOD Consultant
Dr. Joe Domask, Director of Learning, General Dynamics Information Technology
Dr. Edward Purse, Strategic Advisor Cyber Security Training and Education, Canadian Communications Security Establishment

INTRODUCTION

1. Each Topic 1 syndicate session commenced with a brief welcome from MGen Salamida, followed by an introduction of the panellists. Each panellist provided brief remarks about their background and thoughts on human capital development as it relates to disruptive advances. Dr. Scales focused on how strategic leaders are reluctant to embrace technology and how promotion systems select strategic leaders based on their operational and tactical abilities instead of their intellectual potential. He also discussed concerns that when Militaries fail to recognize innovation and intellectual excellence, it adversely impacts retention and promotion. Dr. Domask discussed three pillars of successful leader development; give ownership to individual learning, make learning active not passive, and leverage peer learning wherever possible. Dr. Purse emphasized that we all work in the cyber domain and need to embrace technological change as we recruit and structure our organizations. Dr. Fautua served as the moderator and summarized the key points of the three panel members.

2. The remainder of the syndicate sessions consisted of an open interactive dialogue among the Chiefs of Transformation, support staff and the young disruptors. Young disruptors and support staff were afforded the opportunity to post their thoughts on the COTC App and the discussion feed displayed on a large screen in the room. This process enabled the moderator to include them into the discussions. Despite the sessions primarily focusing on human capital related issues and not necessarily on the specific impacts disruptive advances have on people, there was a consensus that developing people, encouraging innovative thinking and leveraging technology was key to NATO’s success.

DISCUSSION

3. Throughout the four syndicate sessions, the fruitful discussions focused on talent management, leader development, organizational effectiveness, and enhanced decision-making. The participants discussed the challenges that disruptive advances pose concerning each of these themes and the subsequent impacts it has on their greatest resource, people.

KEY TAKEAWAYS

4. Talent Management
   a. Nations are finding it increasingly difficult to recruit and retain young innovative thinkers due to traditional Military cultures not fostering an environment that rewards intellect and innovation.
   b. Young innovative thinkers are attracted to the private sector that offer higher salaries and faster opportunities to promote within a private corporation.
c. Current promotion systems reward tactical performance over intellectual capabilities, the “doers” over the “thinkers”. The system hampers the Military’s ability to retain innovative thinkers. A recommendation was to develop separate career tracks or a dual promotion system the will improve retention.

d. Recruiting and selection need to change as demographics change.

e. Militaries are not recruiting the right personnel, need to look at the generation with some work force experience and not necessarily just recent high school or college graduates.

f. Establish a system with contracts in place that enable a person to leave the military for a period of time and be guaranteed an opportunity to re-join at their same rank.

g. Create more opportunities for military personnel to participate in exchange programs with government and industry in order to promote innovation.

5. Leader Development

a. Excelling at the tactical and operational level does not always guarantee a Senior leader will be an effective strategic leader. Identify strategic leadership potential earlier and provide opportunities for those individuals to develop strategic leadership skills.

b. Military systems choose strategic leaders (Flag Officers) based on tactical and operational performance. Is there a better measure of strategic leader potential?

c. Can ACT establish a common learning architecture for leader development that institutionalizes all the Education and Training Facilities?

d. NATO and Nations are lacking a program that looks at the psychology of leadership, programs and processes to teach leader reflection.

e. Exercises are designed for strategic leaders not to fail, taking away a great opportunity to learn and develop.

f. Technology allows for testing strategic thinking in simulations and games. Strategic thinking characteristics are known and can be measured.

g. Strategic thinking is developed through extensive reading/writing and graduate school education, military systems need to allow for these opportunities to develop more effective strategic leaders.

h. NATO needs to utilize technological advances in education like synthetic learning and virtual reality.

i. Leaders need to learn to embrace a culture of innovation and reward creativity and intellectual thinking.

6. Organizational Effectiveness

a. Organizations are slow to adapt their structures to keep pace with quickly evolving technological advances.

b. There is a need to develop organizations while developing people. Find synergy in developing people and organizations simultaneously.

c. Innovative people are outpacing organizational development. Organizational change needs to keep up with technological advancements and innovative people.

d. Organizations use technologies before their capabilities are completely understood and properly trained.
e. Organizations need to look to diversify, it was noted that each session consisted of mostly middle-aged men. Women are proven to be effective strategic leaders.

7. **Enhanced Decision-Making**

a. There are existing model and simulation programs that create synthetic operating environments where leaders can be tested on their decision making skills and learn to develop them. NATO needs to look at taking advantage of these programs to improve decision making among its leaders.

b. Synthetic learning and virtual reality can be used to put strategic leaders in positions to fail and learn from it without failing in front of their entire organization.

c. Leaders need to make decisions with a five to seven year outlook as technology changes at an exponential pace.

d. NATO needs to enhance their strategic leader’s decision-making skills through education. Provide a model that the Nations can use to educate their young Officers to start thinking strategically.

e. NATO needs to develop an exercise for senior leaders to practice/develop strategic decision-making skills.

**CONCLUSION / WAY AHEAD**

8. There is a collective appetite to further share ideas on how to best develop innovative leaders who embrace technological advances, how to better recruit and retain young innovative and intellectual personnel, how to accept and implement organization change to keep pace with technology and how to enhance decision-making.

9. HQ SACT intends to establish a NATO Human Capital Community of Interest in order for all NATO entities and Nations to share ideas, best practices, challenges and solutions.

   a. Human Capital workshops / conferences.

   b. Collaborative online NATO Human Capital portal.

   c. Connect NATO entities with Human Capital leading industries and academic institutions.
INTRODUCTION

1. The use of data science, big data analytics, AI, Machine Learning and Modelling and Simulation, if executed at the Strategic and Political level, may enable NATO organisations to coherently and continuously task, direct, monitor and assess the progress of activities required for an enhanced decision making process in all phases of conflict. This should enable NATO to cope better with pre-crisis/crisis situations and those that are more continuous in nature and span the three NATO tasks. To achieve this, the 4 iterations of the syndicate discussed that NATO must be convinced of the need to change the approach to decision making, understand the implications and highlighted some of the key factors in making those enhancements:

   a. As an introduction, Col Blunt recapped on some of the terminology and the read ahead content and structure. Secondly, a briefing from Mr Peter Houghton on Information Advantage brought further UK insight on Information Advantage and the concept of ‘Sense Making’. These set the context for the subsequent debate.

   b. The questions posed during the 4 syndicates were as follows:
      a. Where are the current gaps in the military decision making process?
      b. Do you consider that the field of data science (incorporating big data analytics, AI, Machine learning and Modelling and Simulation) should change the decision-making process and C2 structures? If so, how?
      c. What are the most important DOTMLPFI factors involved?
      d. How is data science expertise being incorporated into military organisations? Is there a need for Data Scientists and Computer Scientists as military trades within your national militaries?
      e. What can HQ SACT do for you as Nations, Partners and COEs?

DISCUSSION

2. The discussion was wide ranging and, although it did not get into the specifics of how to enhance the NATO decision-making process, each of the syndicates supported the need for change and the key elements that need to be considered. What follows is a summary of all of the discussions grouped into themes.

3. **The Driver for Change.** All recognised the fact that the opportunity, operating environment and technological advancement exists to warrant enhancements to the decision making process. The ability
to draw on reference material, understand better and predict better if brought together and visualised correctly will improve decision-making. NATO now must deliver on its stated aim of ‘Data Driven’ Organisation. Data, and ability to use it, should be viewed as a strategic asset and capability. This will require resource and a shift in culture, people’s awareness, changes to process and the adoption and integration technology.

4. **Trust and Sharing.** The widespread sharing of data is a problem within the Alliance. All the must recognise the value of data and the value of sharing data. This requires trust, not just in the willingness to share when necessary, but also in the ability to share data and the willingness to share continuously.

5. **Start Small and Scale It.** Once the ‘big idea’ is agreed, identification of discrete areas to develop is required to demonstrate best use for value added. The current problem set is too big and it is too easy to get overwhelmed by it. Those quick win projects must be prioritised and resourced. An ‘experiment to develop’ mindset would deliver huge benefit, by simply leveraging civilian best practice where most appropriate. Taking this iterative development process of ‘Fail, Fail Fast and Try Again’ is increasingly important but needs a true change of military approach. Military culture and the messaging of success often overrides iterative development that includes failure. Increased use of COE’s can provide a ‘safe’ environment for iterative experimentation; this must be coordinated by HQ SACT.

6. **Culture and Education.** NATO, both leaders and staff, must become more ‘Intelligent Customers’. Recruitment of data science SMEs and buying technology will not solve the problem. Success is delivered in its continued iterative application and so leaders and staff must understand enough to know what to ask for. The flow of ideas and research from the Science and Technology Officer, through HQ SACT to the operational community must be improved.

7. **Policy and Capability Development.** Both currently hinder agile, iterative development and need change. Specific areas include security accreditation of applications, an enterprise approach to data acquisition and a data taxonomy.

8. **Technology.** Many applications already offer powerful data exploration, analysis and visualisation capabilities but the integration and speed of change for classified networks and the security of systems remains a significant hurdle to overcome. Quote “We can’t have less capability in uniform than we do in our civilian attire, which is the case today!”. With all of the opportunities presented by technology, humans will continue to make the decision. Therefore, the importance of the distilling and visualising data to make it easy to digest is the key to making timely and informed decisions.

9. **Cautionary Notes.** There must be a blend of traditional methods with new data centric techniques applied where appropriate. A continued awareness of the vulnerabilities of new technology and approaches, for instance deception and use of bots. Alternative viewpoints, such as a non-military equivalent of ‘red-teaming’ and reversionary modes need to be retained to cope with an information environment that is denied.

**SUMMARY / OUTCOMES**

10. In the main, the discussion focussed on the need for cultural change, the fundamental principle of the human in the loop and the policies and processes that need to change. Technology supports the solution rather than being the solution.

11. Specifically, the broad and engaging discussions raised the following points:

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2 In one of the syndicates, a challenge was set to military leaders to take the cost of one plane/tank/ship and apply it to data centricity. This challenges the notion of the will to become truly data centric and the relative importance of it.

C-2

NATO UNCLASSIFIED
Publicly Disclosed
a. **Data Enterprise Approach.** We must improve our ability to Collect NATO data, label it and then making it sharable for experimentation and analytics purposes amongst NATO and nations. Second aspect is being able to acquire other sources of data for the same purposes. The NATO Secretary General has declared data as a Strategic Asset in his top 10 priorities.

b. **Improve Experimentation.** NATO and nations must be prepared to resource the fail, fail fast and try again methodology of development. Preferably in the hands of the warfare operator. Data science is iterative by its nature and therefore has to be accepted in both development and operational arenas. Significant quote “in order to win you need to pay for a thousand failures” (Jeff Bezos).

c. **Attack Cultural Inertia.** Cultural inertia must be combated through education to stimulate change. Education allows users to better accept the risk of uncertainty and increase speed of innovation. This is particularly relevant in terms of budgets and security.

d. **Instill a Sense of Urgency.** This endeavor requires a sense of urgency. These challenges are not tomorrow’s problems but today’s (or even yesterday’s!) and technology is already available to assist us in solving them. Culture, Policies and Processes are the fundamental elements to attack first and the toughest to solve. Purely introducing technology in the hope of solving the problem is a falsehood that has been disproved too many times. There are too many examples of failed technology insertions that have not solved the cultural, policy or process changes that need to be made.

e. **Develop an Intelligent Customer.** Linked to education to attack cultural inertia. The ability for commanders and to key staff to understand enough to task data acquisition, the analyst and the data scientist. This needs to be a continuous iterative process.

f. **Resilience and Alternate Viewpoints.** There is still a requirement to stress test and practice resilience to technology denial. Potentially use civilian teams, with the same data, to provide alternatives to the pathogen of ‘military group think’.

WAY AHEAD / FUTURE ACTIONS

12. Proposed follow-on actions:

a. ACT should integrate increasing amounts of experimentation from within and with the nations. NATO is an ecosystem where ACT’s role should be facilitating warfare development.

b. Use the dynamism inherent in COEs particularly as their ability to experiment is growing. They can provide a fail-safe environment without the reputational risk to the larger NATO organization. Experimentation must be able to run counter to STRATCOM objectives (e.g. Ex TRJE18 and the messaging surrounding a successful exercise).

c. Improve the awareness, sharing and pull through of the STO work into NATO (through HQ SACT) and the nations.
SYNDICATE TOPIC 3 - FUTURE PARTNERSHIPS

Co-Chairs: Major General Odd Egil Pedersen, HQ SACT, DCOS Partnerships
Brigadier Murray Thompson, Australian Defence Force, Commander Defence Strategic Communications

Expert Panellists: Brigadier General Philip Brennan, Defence Forces Ireland, Military Representative to EU Military Committee
Ms. Wendy Bashnan, Director NATO Office of Security
Mr Peter Bowmar, Research Scientist New Zealand Defence Force
Colonel Nir Omer, Israel Defence Force, Defence and Military Attaché to Benelux and Military Representative to NATO

INTRODUCTION

1. This year’s event was designed to build on previous Partner participation in COTC with all-inclusive involvement to explore “How can NATO and Partners embrace and exploit Disruptive Advances to enhance collaboration and information sharing?” In the spirit of inclusivity, a number of Partners were invited to support the syndicate; Australia agreed to Co-Chair and several other nations agreed to provide subject matter experts to encourage discussion and offer alternative perspectives.

2. Syndicate 3 sought to identify ways and means through which NATO can enhance situational awareness with all Capitals (NATO and Partner) to enable timely and informed decision making of NATO leaders. The topic supports SACT’s Disruptive Technologies Roadmap Line of Effort 3, Enabling SACEUR’s AOR through NATO Shared Situational Awareness, by exploring how disruptive emerging technologies or innovations may enhance information sharing systems and ensure adversaries cannot compromise these systems.

3. The intended output is to submit the considerations of Allies and Partners to key organisations by means of a letter from SACT to influence future policy and collaboration decisions (including Director General International Military Staff, Resource Policy and Planning Board, NATO Consultation C2 Board) in the area of information exchange.

DISCUSSION

4. DCOS PD introduced each of the 4 sessions by asking the attendees to consider the issue in the broad areas of; policy freedoms and constraints, platforms and technological considerations, and people or a nation’s willingness or trust to collaborate and how the conditions can be established to allow mutual confidence to do so. It became clear after the first session that an additional key consideration is that of funding and its impact on security considerations that are rarely financed within projects/development.

5. There was a good level of participation in two of the sessions and nations effectively represented their national view or experiences. The remaining sessions struggled to gain a reasonable level of contribution from the attendees. Specific questioning by DCOS PD revealed that Chiefs of Transformation/Representatives attending these sessions had little involvement with Partnership issues or in the exchange of information with Partners.

6. The topic issue was best articulated using the analogy that we are no further along with information sharing with Partners than we were at the inception of NATO (and before) with the only

method of sharing classified documents/information through hard copy and courier/hand delivery; the
challenge was to develop a way ahead to overcome these shortfalls.

Platforms and Technological Considerations.

7. There was a general consensus that technological solutions to overcome information sharing
limitations are available now; a number of nations have conducted significant investigation into various
options. By way of example, the Australian (AUS) Co-Chair presented that they have recently conducted
bilateral operations conducted with Papua New Guinea in 2018 to provide security during the Asia-Pacific
Economic Cooperation CEO Summit 2018. Whilst technological literacy is low in the country, smart
phones are ubiquitous and were used to conduct C2 for the execution of civil-military operation. Whilst
not offering a solution to the core issue, it demonstrates the effectiveness in unorthodox thinking to create
an innovative practical solution from current technology.

8. Federated Mission Networking (FMN) was considered at length and the benefits of secure data
exchange were recognised. Whilst it provides a solution for the Operational and Tactical mission level,
there is a significant challenge in establishing national support across the Partnership area; given the
need for platform/equipment investment there is little appetite for some nations to commit unless a ‘one
size fits all’ concept is adopted. Additionally, there are concerns that FMN cannot be scaled to the
Political/Institutional Strategic level and therefore does not currently provide the technological solution for
information sharing between the Capitals of Allies and Partners.

9. During the discussions, the NOS Representative queried the specification of the Statement of
Requirement (SOR) for information sharing between Allies and Partners. There was no awareness from
the attendees or Partnership Directorate of a specific requirement having been submitted. Clear
articulation of the ‘how’ and ‘why’ we need to share information is needed. Whilst a number of
technologies are recognised to have utility in this area, ‘solutioneering’ must be avoided and the SOR
must be capability focused and not platform. The Partnerships Directorate took the SOR for action to be
submitted through the chain of command.

10. Whilst not strictly related to information sharing solutions, AUS demonstrated the utility of
employing current (cutting edge) technologies to demonstrate the benefits of structured and contextual
data sharing of information. Utilising the IBM Watson Artificial Intelligence Machine Learning to process
data, a trial they conducted exceeded expectations. When information of an unclassified nature was
processed, it produced outputs of a higher classification through recognition of trends or patterns in the
data. AUS are in the process of taking this forward and increasing the classification of the processed
data to understand the type of results achievable.

11. The generally accepted methodology for development within NATO/Partnerships is to wait for all
parties to align. Interested parties should be allowed to press ahead and allow smaller nations to develop
and adopt at their own speed. Similarly, the Israeli experience suggests there are significant benefits to
early field-testing and continuing development before a technology is matured sufficiently for wider use,
although it was recognised this may be a challenge when recreating this method within NATO.

12. AUS offered that Blockchain technology, as utilised through SEER Project offering decentralised
networks, is a potential solution that effectively ‘makes the internet flat’ and would likely offers the levels
of security required by NATO and Partners. Adoption of such advances would require careful
management to implement and ensure policies are created to support the adoption. The solution may be
a programming/software solution and not equipment focussed. Commercial may offer the key and NATO
should look to expand the pool of collaboration. Small nations may have the solution.

13. New Zealand submitted the ‘hype curve hypothesis’ and advocated recognising where any
technological solution may be on the curve. A good assessment can be achieved by monitoring
industry/business and adversary development, to note success and failures, to identify when and if a
technology should be adopted. The impulse to try and predict the future should be avoided and an
approach to ‘flow with it’ would be offer a better approach. It follows that there needs to be an effective method to recognise the importance in the utility of emerging technology and which are appropriate for implementation. It was noted that the majority of advances are achieved through fundamental research\(^4\), although most national science areas have had budgets cut in recent years.

**Policy Considerations.**

14. There was a general perception in all sessions that NATO security policy was the main restriction on sharing classified information with Partners. However, the NATO Office of Security (NOS) representative stated that policy is in place and incorporates all levels of classified information that allows sharing with Partners, within set standards and criteria. If this is the case, there may be a wider issue of education to ensure a common level of understanding both within NATO and for Partners. If the NATO Security Policy is in place then Partners (and the NATO Partnership Directorate) are not seeing the results and demonstrates the need for greater education and awareness.

15. Immediately following COTC, all Partner representatives who attended the DSACT Executive Session were provided with a briefing on the current NATO policy for the sharing of classified information to ensure a common level of understanding. This has subsequently been distributed to all Partner National Liaison Representatives (ACT) and Partner National Military Representatives (ACO).

16. It was recognised that bi-lateral solutions will always be easier to identify and implement and a number of systems are already used between nations; there has been notable success in the sharing of information between FIN and SWE and this was determined to be largely down to the political will to do so. Similarly, the NORDIC cooperation is successful due to increased relevance through increased interaction. Complexity is introduced when scaling up to the 29 Allies and further complicated with the 41 Partner Nations, creating additional challenges.

17. Whereas the goal to enable information exchange with NATO, there is a broad understanding and acceptance that they cannot ‘open all the boxes’ to all Partners and requirements will be bespoke – trust does not give access to everything. Conversely, Afghanistan has proven that information sharing of classified material between Allies and contributing Partners Nations can be achieved on the battlefield when trust is imperative, but how can this be translated to wider institutional areas?

18. There was a suggestion that NATO HQ should share how/what we are developing in the information exchange/data sharing areas and make the specifications available to Partners to encourage point to point information exchange.

**People / Human Factors.**

19. With the NOS position being made clear, in that NATO Security Policy supported the sharing of information, they further stated that the weak point in this sound foundation was the human factor. It is the level of trust that needs to be further developed to establish confidence in a Nation’s ability to administer the necessary requirements to meet the standards and criteria; therefore, there is a need to demonstrably build that trust.

20. It was questioned if there was an opportunity for COEs to play a role to develop a culture of better understanding the security requirement through sponsorship. However, trust and confidence is a two-way street and the Partners must gain benefit from the sharing of information, as well as NATO, through a transparent process for all parties. It was recognised that there is a human factor that further complicates the issue with a propensity to over-classify information.

21. There is an acceptance that any information sharing accepts a degree of risk; the key is in effective management to enable collaboration. Operational necessity, such as in the Afghanistan example, increases the appetite for risk. Therefore, the level of appetite for risk must be determined and

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\(^4\) Research carried out to deepen understanding of the fundamental or basic principles of something – Collins English Dictionary.
is a key consideration. It follows that it may not be Disruptive Technology that offers a solution but the political will of nations to exchange classified information; industry likely already has the solution if the motivation to share is achieved.

22. The Young Disruptors offered that there appears to be a predominant ‘fear to fail’ that prevents swift progress. They further presented that there should be an alliance of politics, industry and academia to help in identifying the solution in the absence of an existential threat to the Alliance whilst maintaining the centre of gravity of cohesion.

23. Funding. Whilst discussions for funding were a common thread throughout discussion sessions, it was NOS that submitted that security is regularly an unfunded aspect of project development. It is often an afterthought in projects/procurement and therefore receives little attention until little finance remains; security considerations must be established at the outset of project development and in the early phases of operational and exercise planning.

SUMMARY/OUTCOMES

24. The following conclusions and key takeaways were produced within the discussion sessions:
   a. Generate and foster the political will nations to share information. The political will to fund this capability will require a clear representation of value to the Alliance.
   b. Adopt existing technology. Existing technologies can be adopted to address a lack of classified information sharing capability.
      (1) Current available solutions exist within Public Key Infrastructure or through multi caveat / multi security classification gateways guardians and should be explored.
      (2) Increase burden sharing with industry.
   c. Partners seek practical solutions. Most Partner Nations do not seek to embrace Adaptive Disruptive Advances. Their ambition remains to implement more practical or short term solutions.

WAY AHEAD / FUTURE ACTIONS

25. The following actions were identified:
   a. Draft Statement of Requirement. In the short term the Partnership Directorate will draft a Statement of Requirement to articulate the deficiency and capabilities needed to be represented to the chain of command for endorsement by both SACEUR and SACT.
   b. Identify a NCS champion within IMS to oversee the project and maintain momentum through to fruition.
   c. Partnerships Directorate draft a letter to Director General IMS, Resource Policy and Planning Board, NATO Consultation C2 Board for SACT or SACEUR signature, to influence future policy and collaboration decisions in the area of information exchange.
   d. Chart a course for future information sharing. NCS continue to collaborate to chart a course for future information sharing, led by ACT.
   e. The identified champion should consider hosting a conference specifically targeting a solution by identifying the technology to overcome current shortfalls, integrating academia and industry as necessary.
   f. Where COTS or their Representatives have little experience in the session subject area, the criticality of sufficient preparation be made to Nations to gain maximum benefit from interaction and discussions.
SYNDICATE TOPIC 4 - LONG-TERM CONSIDERATIONS FROM SFA & FFAO

Chair: Major General William Hickman, HQ SACT, DCOS Strategy Plans & Policy
Discussion Leaders: Air Commodore Ralph Reefman, HQ SACT, ACOS Strategy Plans & Policy
Captain (N) David Dominy, HQ SACT, Branch Head, Defence Planning

INTRODUCTION

1. Syndicate 4 deliberated the long-term considerations from the Strategic Foresight Analysis and Framework for Future Alliance Operations and examined the high priority capabilities needed to conduct successful operations on the complex future battlefield. Moving from a conversation on the interaction of emerging technology trends on the principle areas contained in SFA (Political, Human, Economic, and Environment) and their implications, the three smaller discussion groups considered where future defence investment should be focused to achieve the greatest military effect. Syndicate findings will inform discussions within the Multinational Solutions community in order to assist Nations in developing these capabilities, influence the development of the next iterations of SFA and FFAO and inform the next iteration of the Longer Term Aspects (LTA) of requirements within the NATO Defence Planning Process.

DISCUSSION

2. The initial dialogue within the groups focused on the overreliance of NATO forces on technology and the asymmetric threats that this overreliance could engender. Technology must enable not constrain the ability of Alliance forces to conduct operations. This is a conundrum, as the Alliance cannot afford to lose its current technological advantages or fall behind in developing new and emerging technologies, where possible adversaries are investing considerable sums. That said, not all problems will require a technological solution. Other areas, such as faster decision-making, agile organisations and improved human capital, may provide better returns on defence investment.

3. There is an absolute requirement for forces to be resilient to operations within a denied or degraded environment, which is highly likely to exist in the face of a peer or near-peer competitor. One of the overriding prerequisites is alternative methods/systems or protecting current systems for positioning, navigation and timing (PNT). Developments in the area of Quantum Sensing may produce a viable alternative that would be immune to outside interference.

4. In many areas, commercial research and development will dwarf that of defence programs to produce viable capabilities that the military could adopt or adapt for its own use. This is especially true for those capabilities more related to support or logistics functions (Tail) rather than capabilities used in engagement systems (Tooth) where the military should retain more control over applicable technologies and purpose-built systems. The military must be an intelligent customer though as overreliance on commercial vendors is not without risk of greater cost and interoperability issues. Regardless, systems must be flexible in accepting new technology from wherever it is developed.

5. The coming “storm” of new technologies will drive the obsolescence of legacy systems and wholesale change in how the Alliance will operate. An aggressive approach is required to develop the DOTMLPFI components of new capabilities as well as the necessary policy and legal frameworks to support the adoption of new systems. This will require coordination between military, policy, industrial, legal and other elements of the Alliance.

6. Many commercial industries have deployed Artificial Intelligence (AI) at scale, while the military is still trying to decide which applications it could use. The proliferation of sensors across all environments and the resulting deluge of data drives the “fog of more” within the continuing “fog of war”, where the
overflow of information could lead to a paralysis in decision-making. The growing complexity of the environment compounds these issues as it annihilates time in the decision cycle. AI can support better decision-making, if sufficient data is available and human-machine teaming is applied appropriately. Data sharing and data analytics must be persistent actions to support continuous operational activities.

7. NATO must develop graduated escalatory and de-escalatory options to respond to continuous, non-discrete activities occurring within the “grey zone” below the threshold of armed conflict. This line between peace and conflict is increasingly blurred. The Alliance must be able to react to corrosive actions taken by adversaries within the seams of civilian and military responsibility to gain political and military advantage without the use of armed conflict. These types of activities must be included in training and exercises to build-up expertise, doctrine and trust between Allies.

8. Cyber is an increasingly important domain for both activities within the “grey zone” and armed conflict. Disinformation and offensive cyber activities has become part of the continuous activity taken against the Alliance. Attribution will be a critical component of any cyber strategy. NATO must develop a common understanding of the types of offensive cyber activities that NATO could conduct. These types of actions will cross borders and could affect information infrastructure in a number of nations all having varying legal regulations. Coordinating and reaching consensus on these activities will be difficult. The cyber domain also demands new concepts of force protection as, given a soldier’s Personally Identifiable Information (PII), an opponent will be able to access and exploit a wide array of personal information.

9. The groups raised a number of recommendations regarding Longer Term Aspects of requirements. This included refocusing on a number of traditional areas of warfare enhanced by advanced technology - Intelligence, Surveillance and Reconnaissance (ISR), Ballistic Missile Defence, Assured Precision Strike, Distributed Exercise and Training, and Area Access Control. In addition, new concerns for capability development included hypersonic weapons, human performance enhancement, quantum effects, blockchain applications, protecting space assets and drones (autonomous or otherwise).

CONCLUSIONS / TAKEAWAYS

10. The following conclusions and takeaways were produced within the discussion groups:
   a. The NDPP must be adaptable to the future security environment and new and emerging technologies and military systems, which will develop rapidly driven by exponential advances in computing and associated technologies. This adaptability will require a capability-based approach reinforced by an effects based refinement in the medium to long-term to allow for the adoption of new systems and more constructive use of Longer Term Aspects of requirements.
   b. Multinational Solutions community and other partnerships can support the rapid development and procurement of interoperable capabilities while gaining efficiency across national defence industrial bases and cost sharing.
   c. An External Advisory Board should be considered to advise Allied Command Transformation on where its focus should be aimed to address the future security environment. This board would be comprised of representatives from a broad and diverse group of academic institutions, think tanks, national policy makers and industry.
   d. A crucial strength of the Alliance is its diversity of thought and its ability to aggregate opinions and take consensus action. Allied Command Transformation must leverage this diverse expertise in developing its foresight products and regional perspectives.
   e. The significant improvements in modelling and simulation that are emerging rapidly must be maximised to the extent possible to improve realistic training, develop options and courses of action and support capability development.
INTRODUCTION

1. The Young Disruptors Forum (YDF) was a new initiative at the 2018 NATO ACT COTC. It gathered 28 young professionals; “Young Disruptors” (YDs), aged 22-32 from NATO member and partner countries. By providing young professionals with a platform to discuss innovation and technological advances, the forum aimed to challenge traditional strategic thinking and provide alternative solutions.

2. In a span of three 1.5-2 hour blocks, through human-centred design methodology facilitation, the forum identified and prioritised challenges, areas of potential, and weaknesses of NATO, and came up with solutions to solve them. The key solutions were presented during the Final Plenary. Before delving into the findings, proposals, and outcomes of the Forum, it is important to note two things:

   a. The first is that there are gaping holes in the existing knowledge of many of the participants. Many, for example, did not know about NATO’s existing push for innovation beyond the NATO Centres of Excellence. Many did not understand the structure and classification system of NATO, leading to confusion and misleading recommendations.

   b. The second is that the Forum was operated on Chatham House rules in order to maximise creativity and free-flowing ideas. Unsurprisingly, the radical ideas on both ends of the spectrum cancelled out and the final proposals were mildly mannered.

FINDINGS

3. NATO has the following strengths:

   a. NATO has crafted a positive public image through a good use of social media platforms and infographics that transmits a sense of security and protection to its member countries.

   b. Through initiatives such as the Partnership for Peace Programme (PfP), NATO is able to develop more personal relationships with participants, making the organisation more familiar.

   c. NATO has strong capability development initiatives and robust defence planning processes.

4. NATO continues to work on the following areas of improvement:

   a. There needs to be more resources, both personnel and monetary, for research and technological innovation.

   b. Incentives structure need to be reformed in order for the culture to be acceptable of experimentations and failures while still ensuring that lethality and soldiers’ lives are not compromised.

   c. Both private-public and civilian-military cooperation need to be strengthened, specifically around the various roles the private sector can play in achieving mutual objectives.

5. Finally, NATO needs to address the following challenges and concerns:

   a. Technological innovations, especially cybersecurity and cyber-defence capabilities need to be enhanced. An example is the expired security certificates on the conference’s website.

   b. Cultural values of NATO need to be more acceptable of failures and allow for unorthodox thinking and experimentation.
c. The lack of trust and poor information sharing among NATO member countries have disrupted the development and progress of the Alliance capabilities.

d. Poor interoperability, relating to incompatible equipment and diverse technological advances, in terms of tactics, techniques, and procedures which lack standardisation and coordination, severely limits the Alliance’s tactical capabilities.

e. Lack of political consensus, flexibility, and adaptability limits the collective vision of the Alliance’s aims.

**OUTCOMES**

6. Overall, YDs advocated for a more integrated approach and cooperation with industry, multinational corporations, and academia, as well as more trust and consensus among NATO member countries. This theme of cooperation is evident when discussing solutions to the five challenges listed above.

a. When discussing how to advance NATO’s technological capabilities, participants identified a talent gap, whereby highly specialised personnel typically choose to work for the private sector rather than NATO. But, rather than competing with the private sector in benefits and perks, NATO could use the Lithuanian model of creating a pool or part-time or reserve staff - top specialists in the tech sector - who could be called on depending on the existing requirements. Hierarchy and physical requirements could perhaps be relaxed for tech workers, as they will not be on the frontline.

b. Cultural values could also be changed by breaking away from a purely hierarchical structure, creating more horizontal career paths that allow for mobility advances, and setting concrete standards and thresholds of risk. For example, innovations relating to kinetic operations should be held to a higher standard of testing and have back-up plans (“resiliency” while innovations on something non-kinetic, such as accounting systems, should have lower risk thresholds, as they do not interfere with human lives.

c. The lack of trust and poor information sharing can be resolved by reforming the classification system without compromising security and political goals. YDs suggest censoring of parts of the information contained in a certain document rather than (over)classifying the entire document. For example, the UK Ministry of Defence has created a machine-learning algorithm to identify and censor certain parts by using key words and surrounding texts, so that readers of different authorisation levels can see just the parts of the document that they have access to.

**PROPOSALS**

7. At the end of the Forum, all YDs voted on the solutions that they wanted to be presented at the Final Plenary. The final result is NATO Distributed Defence, which is a centralised network of start-up accelerators, maker camps, intrapreneurship training, Erasmus exchange, and venture capital funds:

a. **Start-up accelerators** are named Disruption Innovation Units, where new technologies are prototyped, piloted, and rolled out into the existing NATO structure. They will be on the following topics based on existing requirements. However, outdated ones should be retired and new ones should be stood up based on evolving needs:

   1. NATO-Cyber
   2. NATO-Artificial Intelligence and Big Data
   3. NATO- Blockchain
b. **Maker Camps**: are short events, ranging from a few hours to two-day hackathons, that allow participants to create a software or hardware as solutions to a particular problem in that amount of time.

c. **Intrapreneurship training**: Intrapreneurship is entrepreneurship within the organisation itself. The training would give participants more tools to get buy-ins from above, how to approach the problem, the importance of a minimal viable product, etc.

d. **Erasmus exchange**: modelled after the popular European university exchange programme, NATO Erasmus would allow university and young professionals to go to another NATO country to understand how the Member state works with NATO. The transfusion and exchange of ideas would lead to more creative solutions that cross domains and silos.

e. **Venture capital funds**: this would include not only partnerships with VC funds in the private sector, but also an internal VC funds for pilots, similar to what the US Air Force has every quarter, where good ideas at prototype or pilot phase receive $50,000 for three months in order to find and sign on a viable customer within the Air Force.

**CONCLUSION**

8. As this was the inaugural Forum, it was important to show that Young Professionals have different ways of thinking and creative solutions that have not been considered before, and that they add value to the strategic planning and future of NATO. While it was largely successful, a few recommendations should be taken into consideration for future Forums.