

Beam me up: leadership skills in space

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Capt. Maria Soto

International Affairs Division of U.S. Space Forces in Europe & Africa
(USSPACEFOREUR-AF)

A new space age has begun: several NATO Allies are advancing their national space capabilities, and NATO is increasing its understanding and awareness of how space will feature in any strategic standoff. But space is not a domain like any other; in fact, it requires leadership skills quite different from other domains. At the moment, few space officers have the experience of leading troops, so the culture will likely evolve to one of officers as highly skilled technicians rather than as leaders, and the challenge will arise when these technically focused officers enter the Joint community.¹ As a result, space officers may not be able to compete effectively as they advance and take on joint command

Summary

As NATO nations enhance their space capabilities, there is a critical need for leadership development. Current training focuses heavily on technical skills, often overlooking essential leadership qualities such as creativity, resilience and emotional intelligence, which are crucial for effective command in joint operations.

Successful space leaders must cultivate the interconnected qualities of individual agility, trust, resilience and self-awareness to navigate the complexities of this domain.

To develop effective space leaders, NATO should integrate leadership training with technical education, prioritize cross-domain collaboration and leverage partnerships with industry.

¹ Maria Soto, *A Qualitative Analysis into Space Force Leadership Development*, Doctoral Thesis, University of Arizona, 2024.

responsibilities.² Without focused leadership development, NATO therefore risks gaps in operational effectiveness, cohesion and readiness for joint command roles. So what does space leadership development entail, and why should NATO care?

Space, the final domain

NATO utilizes Space as part of their multidomain operations under the military command structure. Space is an important enabler for air, land, maritime and special-operations forces to navigate, communicate, conduct C2 operations and employ precision-guided ammunition, hence its increasing importance to NATO nations and the decision to declare space as an operational domain in 2019. Most nations retain their space professionals under an air and space forces structure, with only seven NATO nations maintaining dedicated military space commands. Competitors such as Russia and China, too, are rapidly increasing their space capabilities.

The conventional image of space is one of radical difference: a futuristic, highly technical and emotionally detached domain. Yet this assumption obscures a crucial reality: many leadership challenges in space are not extraordinary at all. They are normal, often predictable and rooted in familiar human dynamics. In focusing too much on what makes space different, we risk neglecting the core leadership tasks that matter most. The physical characteristics of space – a domain beginning roughly 100 km above sea level (the Karaman Line), where humans do not operate directly – do set it apart in some ways. Yet the greatest unknown is not its remoteness or vastness but the human dynamics of the teams who manage these operations. It is ground-based teams that control satellites and their connections through the electromagnetic spectrum, a medium that intersects with all other services. In joint operations, it is important for leaders to understand the role these teams play in larger operations as space support must adapt to the needs of the other domains. As more Allies grow and develop their space forces, it will become increasingly important for service members to leverage their prior experiences into the space operations domain in order to support joint operations. This will help Allies learn from one another, as individual nations assert themselves in the areas of Space Domain Awareness, Satellite Communications and Intelligence, Surveillance and Reconnaissance (ISR). Ensuring that leaders can work bilaterally and multilaterally in an unfamiliar operational domain will only add value to supporting multi-domain operations within, through and by means of the space domain.

At the moment, however, NATO nations face several obstacles on the way to effective space leadership. For one, space education and training focuses primarily on technical skill rather than on leadership, even though military leadership is often described as both a science and an art. Professionals must master the technical knowledge of their domain while developing the operational art needed to achieve objectives and collaborate across organizations.³ In space, the sheer scale of the educational challenge makes this especially true. But while current space education emphasizes technical mastery – already a strength for most space leaders due to their technical or scientific backgrounds – it often overlooks vital qualities that are harder to measure: creativity, trust, resilience and the confidence to engage with the unknown. This is a problem, even more so in joint operations.

To compound things further, Allies and partner countries do not yet have enough space personnel to effectively incorporate them into a command structure or include them under the roof of their intelligence or naval organizations. This inconsistent configuration limits opportunities for learning judgement and exercising initiative. In addition, the absence of clear space law and regulation within NATO, or in space generally, complicates decision-making. Without established legal frameworks, leaders face greater uncertainty, and their decisions demand more extensive vetting and even more emphasis on leadership. Evolving tactics, techniques and procedures further blur the boundaries of what is permitted and expected.

Lastly, space operations lack the tactical-level manoeuvres through which junior officers in other branches typically develop the leadership skills and broader command skills that NATO requires. As a result, “many of the members are technologically smart but lack self-awareness skills that leaders need to foster cohesive teams.”⁴ The challenge for leadership educators is to develop officers who can adapt rapidly to change and thrive amid the uncertainty of societal complexity, technological advancement and the multinational realities of NATO operations.⁵ Developing these intangible and complex skills requires significant time and sustained effort – something that NATO nations do not yet provide at scale within the space domain.

Leadership imperatives of the NATO space officer

To prepare space leaders for the complexity and uncertainty of guiding teams through a remote and largely lawless environment, leadership development in the space domain must intentionally combine science and the humanities.

² Mark Cancian, “U.S. Military Forces in 2021: Space, SOF, Civilians, and Contractors,” Center for Strategic and International Studies, 2021, <https://www.csis.org/analysis/us-military-forces-fy-2021-space-sof-civilians-and-contractors>.

³ Christopher P. Gehler, *Agile Leaders, Agile Institutions: Educating Adaptive and Innovative Leaders For Today and Tomorrow*, USAWC Strategy Research Project, U.S. Army War College, <https://apps.dtic.mil/sti/pdfs/ADA434868.pdf>.

⁴ Daryl Watkins, et al., “Thriving In Complexity: A Framework For Leadership Education,” *Journal of Leadership Education*, 2017, 148-163, <https://doi.org/10.12806/V16/I4/T4>.

⁵ *Ibid.*

Just like military operations in other domains, commanders' roles and responsibilities are expanding fast, and space demands similarly adaptive and versatile leadership.

But space also offers a unique opportunity for NATO educators: to design educational programmes intentionally shaped to meet today's needs, free from the constraints of legacy structures. The NATO space entities are key stakeholders in building high-quality education for future space leaders. While the NATO School Oberammergau offers courses that increase space-domain IQ, none yet combines technical knowledge with leadership development. The Centre of Excellence (COE)'s plans to design new courses present an ideal moment: by focusing on leadership – particularly joint, multinational and adaptive competencies – these programmes could set NATO apart and significantly strengthen the Alliance's collective ability to operate effectively in the space domain. Particular emphasis should be placed on the following skills:

Individual agility – marked by intellectual quickness and adaptability – forms the foundation of organizational agility. While organizational agility is shaped by culture, values and established processes, it begins with individuals who can think flexibly and respond rapidly. Cultivating such individuals is therefore the essential first step. In the space environment, agility rests upon emotional resilience to be able to navigate uncertainty while upholding command responsibilities. A critical tool for fostering resilience is the development of a “meta-view” or “view from above.”⁶ This broader perspective aligns perfectly with the space vision, helping leaders see beyond immediate challenges, broaden their outlook and learn from mistakes.

The ability to build mutual trust allows leaders to capitalize upon their mental agility. An ability to take informed decisions counts for little if the leader has not built the trust needed to execute those decisions effectively. Trust can be difficult to establish without a full understanding of the problem's context, which is a challenge inherent to the space domain. Leaders therefore need self-awareness – recognizing their own limitations and strengths – while also building strong relationships with team members. In doing so, they create an environment where individual weaknesses are balanced by collective strengths. Agility and trust together form a symbiotic relationship: Self-awareness enables trust-building, and trust, in turn, reinforces resilience.

Creative problem-solving is also essential in space, as in any rapidly evolving domain. Encouraging creativity and calculated risk-taking helps drive achievement and builds team commitment. When agility combines with a readiness to act, it fosters innovation. Leaders must guide their

organizations with the understanding that transformation is ongoing – and that the cost of inaction can be greater than the risk of failure.⁷ Space as an operational domain must embrace failure to induce progress.

These leadership qualities – agility, trust, resilience, creativity and self-awareness – are not isolated traits but interconnected and mutually reinforcing. Trust enables teams to learn from failure, strengthening both individual and collective resilience. Creativity fuels adaptability, while self-awareness and communication skills help leaders navigate interpersonal challenges, promote accountability and inspire loyalty.⁸ In the unique environment of space, where uncertainty is the norm and transformation is constant, leaders must embody these attributes to guide their organizations effectively. To develop such leaders, education and assessment programmes must evolve beyond traditional models, focusing on building the complex, adaptive competencies that modern space leadership demands.

So how do we master the challenges outlined above? Because the space domain is unique in many ways, recycling what works for other domains will not be successful in meeting the needs of space leaders. Educational tools must evolve to meet these emerging needs.

Leveraging industry for agile thinking: Unlike in other domains, military operations in space depend heavily on commercial capabilities. Partnerships between military, industry and academia are driving innovation across dozens of mission areas.⁹ Space education should therefore leverage guest speakers from commerce, industry and national space agencies across NATO Allies. Learning from real-world experiences, rather than textbook examples, provides a more dynamic, relatable foundation that leaders can draw on in similar situations. Seminars and symposiums with industry panellists could challenge implicit assumptions about leadership development and shape what military leaders value and prioritize.

Building trust by fostering emotional intelligence (EI): Awareness of one's limitations encourages reliance on the team, strengthens relationships and builds trust – enhancing the agility and cohesion of operational teams. Recent studies suggest that EI traits affect different components of leadership in distinct ways, providing early evidence that EI helps distinguish great leaders from average ones.¹⁰ In the space domain, where rules of engagement are ambiguous at best, creating an environment of trust can accelerate decision-making by reducing the time needed to propose, vet and negotiate actions.¹¹ One way of training and educating space leaders for emotional intelligence would be to incorporate 360-degree feedbacks into leadership development. These are used to

⁶ Susan David, *Emotional Agility: Get Unstuck, Embrace Change, And Thrive In Work And Life*, 2017, Penguin House Publishing.

⁷ Gehler, *Agile Leaders, Agile Institutions: Educating Adaptive and Innovative Leaders for Today and Tomorrow*.

⁸ Victor Pinos, et al., “Leadership In The 21st Century: The Effect of Emotional Intelligence,” *Academy of Strategic Management Journal*, 5, 2006, 61-74.

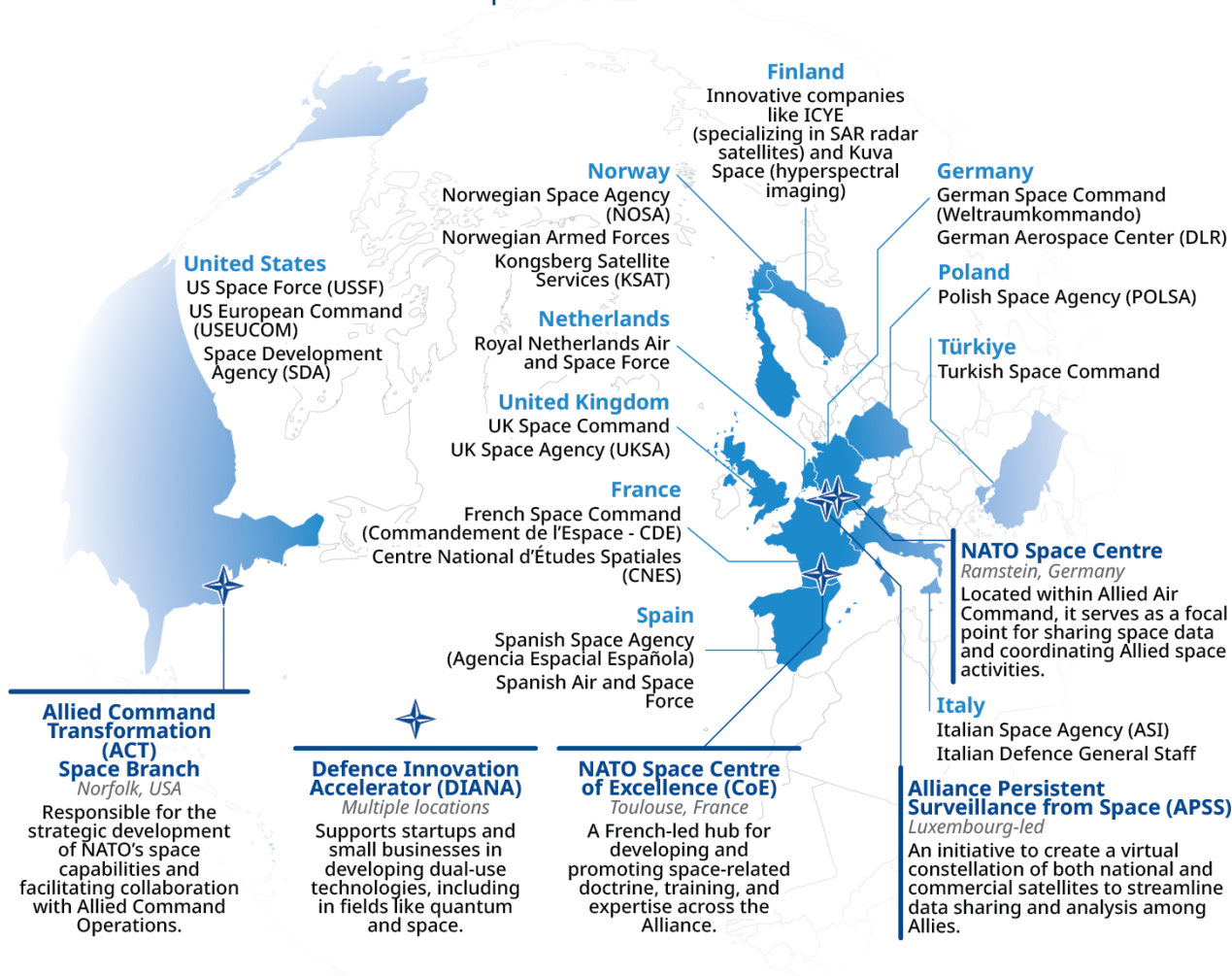
⁹ Darryl L. Roberson, and Matthew Stafford, “The Redesigned Air Force Continuum of Learning: Rethinking Force Development for the Future,” 2017, *LeMay Papers*, Air University Press.

¹⁰ Watkins et al., *Thriving in Complexity: A Framework for Leadership Education*. Annie McKee, et al., (2008). *Becoming a Resonant Leader*. Harvard Business Press, 2008.

¹¹ Nicholas Deschenes, “Enabling Leaders to Dominate the Space Domain,” *Military Review*, May-June 2019, 109, 118, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2019/Deschenes-Space-Domain/>.

NATO's Role in Space

Recognizing the growing importance of space for collective security, NATO declared space an official operational domain in 2019



gather data from subordinates, peers and supervisors on a leader's strengths and weaknesses from a holistic perspective to improve that person's attributes of self-awareness, self-regulation, social awareness and relationship management.

Cross-domain collaboration for joint problem-solving: Space requires intensive technical training, but it does not operate independently of other domains. Indeed, its primary function today is to augment operations in other domains – for example, by providing satellite communications and navigation that enable ground movements. All current space operations support

terrestrial forces, and as the U.S. *Spacepower Doctrine* acknowledges: “Spacepower cannot unilaterally win wars.”¹² Space leaders must therefore understand how other domains depend on space in order to be effective in NATO roles. Too often, service members do not see the full operational picture until they serve in a joint billet – by which time they are unprepared due to service-specific training. A proactive method to cultivate skills would be to incorporate space into the training courses for other domains and have officers that will be filling NATO space billets attend training and exercises with AIRCOM, LANDCOM and MARCOM to better understand how these domains operate and utilize space effects for their domain operations.

¹² John W. Raymond, “Spacepower - Doctrine for Space Forces,” Space Capstone Publication, United States Space Force, June 2020, https://www.spaceforce.mil/portals/1/space%20capstone%20publication_10%20aug%202020.pdf.

Integrating actionable recommendations

What do NATO educators need to know to be able to seize the opportunities and address the problems of space leadership?

First, that NATO's space education is currently provided primarily through U.S. Strategic Training & Readiness Command Space Courses and therefore overemphasizes scientific and technical aspects while overlooking the art of leadership and the practical skills required to be an effective space leader. "Successful leaders are able to balance EQ and IQ to lead in the technical environment in which space operates."¹³ Integrating leadership development tools, such as 360-degree feedbacks, would allow individuals to build self-awareness and compare their self-perception with the views of peers, subordinates and superiors, identifying gaps between perceived and actual strengths and weaknesses. Individualized guidance could then help officers address these gaps and understand how their weaknesses can be balanced by the strengths of others, fostering stronger team dynamics.

Second, the number of personnel available for space operations is limited. Educational development is invaluable,

but it must be carefully prioritized and balanced against this constraint. Courses should build tactical depth and operational leadership, keep pace with space advancements and minimize disruption to critical operational duties. The same challenge – how to make best use of scarce resources – applies to integrating space education into the curricula of other domains. Space Coordinating Elements already provide subject matter expertise to AIRCOM, LANDCOM, MARCOM, and the JFCs, fostering mutual understanding of the needs and operations of other domains and of the support that space can provide to terrestrial warfare.

Third, to enhance agility, NATO's vision for space should offer opportunities outside traditional programmes. One example is to offer space professionals dedicated NATO billets alongside educational courses. Partnerships with organizations like the Defence Innovation Accelerator for the North Atlantic (DIANA) can strengthen both innovation and industry ties for space leaders. For example, DIANA could present current challenges as part of a space capstone course, allowing students from diverse backgrounds to collaborate on potential solutions. Even if no viable solution emerges, this approach exposes learners to real-world challenges. Leadership forums focused on innovation and industry could further encourage creative solutions to problems that leaders may not be able to solve individually.

¹³ Maria Soto, *A Qualitative Analysis into Space Force Leadership Development*.

Research Division

NATO Defense College
Via Giorgio Pelosi 1
00143 Rome – Italy

www.ndc.nato.int

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