

**DARIUSZ ŁUKOWSKI\***

Biuro Bezpieczeństwa Narodowego, Warszawa, Polska

**WOJCIECH PROKOPOWICZ\***

Inspektorat Wsparcia Sił Zbrojnych RP, Bydgoszcz, Polska



## LOGISTICS IN TODAY'S AIRFORCE SHAPE OF MANEUVER

**ABSTRACT:** In the era of dynamically developing unmanned systems and standoff ammunition, special attention should be concentrated on a new way to increase the viability of aviation differ from the concept of centralized single-capability air bases with advanced anti-aircraft systems. The concept of diversification of airports and landing sites, with the simultaneous location of multi-domain aviation task forces there, creates information saturation of the potential enemy and increases survivability of the force. Air bases become centers responsible for development of capabilities in order to establish properly prepared air forces task groups, capable to operate both closer to the FEBA (Forward Edge of Battle Area) and deeper into the own territory. This requires the creation of decentralized appropriate multi-domain logistics support systems. Provision based on autonomous logistic elements composed with resource packages located at appropriate operation level to firmly, flexibly and quickly secure aviation operations. The key is to depart from the philosophy of conducting operations, using specialized task groups of people and equipment, towards comprehensive multimodal and modular packages of combat and logistic capabilities.



**KEYWORDS:** logistics, mobility, survivability, aviation, maneuver, module

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\* **gen. dr inż. Dariusz Łukowski**, National Security Bureau, Warsaw, Poland

 <https://orcid.org/0000-0002-1894-761X>  [darek2064@gmail.com](mailto:darek2064@gmail.com)

\* **ptk. dr inż. Wojciech Prokopowicz**, Inspectorate for Armed Forces Support, Bydgoszcz, Poland

 <https://orcid.org/0000-0002-8424-5181>  [w.prokopowicz@ron.mil.pl](mailto:w.prokopowicz@ron.mil.pl)

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## INTRODUCTION

Currently the geostrategic situation of NATO nations including Poland has been dramatically changed. For last decade allied nations were convinced that there is no real deterrence coming from significant power including Russia in Europe. It was the main reason that many nations has been reducing their military budgets and downsizing forces together with associated infrastructure. That environment, with fiscal and political constrains coming was also translated into smaller footprint of permanent air force bases in support of US Air Force. The number of permanent overseas air bases was reduced from 93 during World War II to 33 today (65% reduction)<sup>1</sup>

Today's new challenges coming from Russia and China including hostile narration of the first one and unprovoked attack on Ukraine has changed an altitude towards military aggression risk within majority of democratic nations.

Additionally, uncontrolled development and introduction of a new military technologies by Russia and China strongly limited capability of the US Air Force to effectively deploy air power across spectrum of potential operations. The new technologies such as advanced long distance intelligence, anti-access and area denial zone, long distance precision munitions with hypersonic capability create new challenges for projection and survivability of the air assets and infrastructure.

In order to reduce current risks US Air Force introduced new concept called Agile Combat Employment (ACE) as: a proactive and reactive operational scheme of maneuver executed within threat timelines to increase survivability while generating combat power throughout the integrated deterrence continuum<sup>2</sup>.

Such approach determines high quality, flexible and effective new logistics system design that will be fully integrated with the concept.

Looking at the lessons learned from Ukrainian conflict we may see how important is to adopt new thinking into the Polish Air Force (PAF) operational and logistics concepts. This paper will focus on key aspects of ACE and possible solution on to adopt such design within our forces.

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<sup>1</sup> Department of Defense, Base Structure Report – Fiscal Year 2018 Baseline (Washington, DC: Deputy Assistant Secretary of Defense [Infrastructure], 2018)

<sup>2</sup> Agile Combat Employment; US. Air Force, 1 December 2021, [https://www.doctrine.af.mil/Portals/61/documents/AFDN\\_1-21/AFDN%201-21%20ACE.pdf](https://www.doctrine.af.mil/Portals/61/documents/AFDN_1-21/AFDN%201-21%20ACE.pdf), (accessed: 19.06.2022).

## MAIN FRAMEWORK OF THE CONCEPT

The biggest risk for air combat platforms is to be attacked while being on the ground. Nobody has enough of air force bases to effectively disperse planes and avoid mass losses. At the same time big air infrastructure is one of the top value target for saturation attack including utilization of long range precision guided munitions or unmanned aircraft systems especially multimodal Air Order of Battle (AOB) consist of manned and unmanned aerial platforms<sup>3, 4</sup>. To prevent potential losses and create dilemmas for an adversary unconventional scheme of maneuver across the theater of operation is required. For that purpose high importance should places on mobility and dispersion of forces and assets.

In case of the PAF we can use different strategies depending on type of defense operation conducted. In case of Alliance operation dispersal based on redeployment of combat air platforms to the deep rear area (i.e. air bases on territories of allied nations) can be performed in order to prevent attack at key combat elements. This way so called *save haven* for the air force behind buffer zone can be arranged. Using long range missiles and air to-air refueling effective air operations can be performed from Rear Zone (RZ) to the Joint Operational Area (JOA). On the other hand, when defense operation is limited to the national territory both dispersal maneuver of air assets between air force bases (AFB) and dispersal to the ad hoc adapted locations is a key to increase survivability for the air force. To sustain and coordinate such operations requires modular, very effective, adjustable, mission tailored and deployable logistics system.

It can be assumed that in the future there may be three scenarios for the Air Force during operations. First, where political conditions will limit access to the airspace of other countries in our rear zone. NATO decision making process takes time, so allied nations may respond to support activities with delay (possible system inertia). That case is the most demanding for ACE. Second option, with full, immediate support and access to the NATO airspace. The last one is mixed variant (some nations permit access to their airspace on bilateral basis, without waiting for NATO approval).

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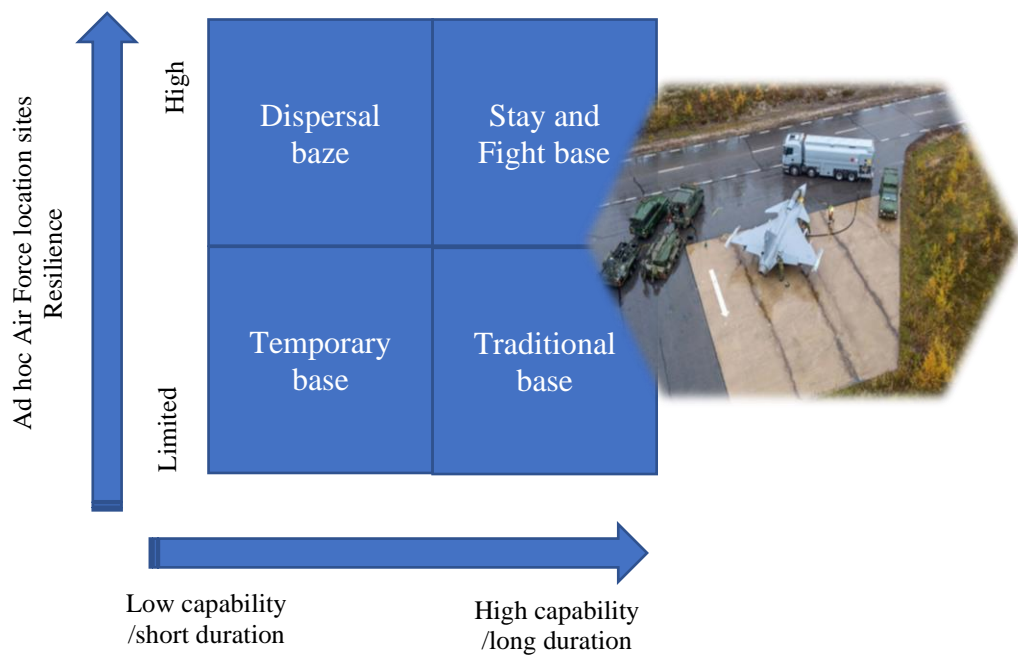
<sup>3</sup> W. Prokopowicz, R. Śniegółka, *Loyal Wingman – Examples of solutions*, Science for Defense and the Environment Conference, Volume 2, p. 187

<sup>4</sup> W. Prokopowicz, R. Śniegółka, *Pilot – unmanned aircraft interaction with regard to The Loyal Wingman concept*, Science for Defense and the Environment Conference, Volume 2, p. 201

Such scenarios put very demanding pressure on how the logistics and other support elements integrate into a flexible, multilevel system of modules covering the entire spectrum of combat readiness without losing positional advantage and surprise for an adversary. It is necessary to distinguish between tactical forward combat elements with capability to form conditions for takeoff, landing, refueling and arming of fixed wing or rotary air platforms, and less maneuverable higher level aircraft maintenance modules with capacity to repair, service and conduct technical inspections. Both types of mobile modules have to be equipped with specifically designed assets and devices (figure 1).

Fig. 1.

General diagram of the distributed model of air bases



Source: Patrick Mills, James A. Leftwich, John G. Drew and others, Building Agile Combat Support Competencies to Enable Evolving Adaptive Basing Concepts, p. 13.

The concept of rapid deployment of air force assets in to many operationally dispersed locations within the theater of operation without reducing combat capabilities is not new<sup>5</sup>. During the Warsaw Pact times, it was widely practiced by the Soviet aviation. Currently, this

<sup>5</sup> J.R. Hall, *Agile Combat Support Doctrine and Logistics Officer Training Do We Need an Integrated Logistics School for the Expeditionary Air and Space Force?*, Air University Press Maxwell Air Force Base, 2003

concept experiencing a renaissance, for example the USAF (United States Air Force) introduce the Agile Comat Employment doctrine. ACE assumes that airmen (pilots of combat aircraft or unmanned aerial vehicles, maintenance technicians and other support personnel) will be able to operate faster and at a higher level of complexity, including dispersed locations<sup>6</sup>.

Current air bases were constructed with assumption that are located beyond the enemy's range of influence. It has created long-term and safer concept of operational environment for air force infrastructure. Nowadays, with new capabilities of missile technologies (i.e hypersonic) or wide utilization of advanced UAV systems it is insufficiently protected against standoff means of the air attack.

The temporary bases, highway strips, or other landing zones are capable to provide long-term operations, only in condition that short-range air defense systems are ensured and above all, effective sustainment system that consist of permanent supply chains connected with advanced air depot supply point are established.

Temporary aviation homing sites are characterized by minimal investment in survivability and minimal force protection, in fact isolating of this sites is acceptable after the end of aircraft operation.

AGE planning process should take into consideration mission requirements including resources demand and support options. Concept should be tested and optimized in accordance with diagram of figure 2.

In fact the dispersion of aviation operation sites generates limitations for availability of personnel. Necessity to disperse aviation resources may generate more pilots and maintenance personnel per airplane than is required in traditional model. Nevertheless, human shortage can occur in the area of airspace control, security and force protection, especially for logistics. The solution may be the concept to train airman to carry out tasks of many differentiated tactical missions. For example, maintenance personnel may simultaneously be able to plan missions, maintain a runway, or operate short-range anti-aircraft systems, to say nothing about being capable to maintain different types of air platforms ( the best option is to keep single type of airframe within the air force base structure). The multicable airman can be used as logistic personnel, as well.

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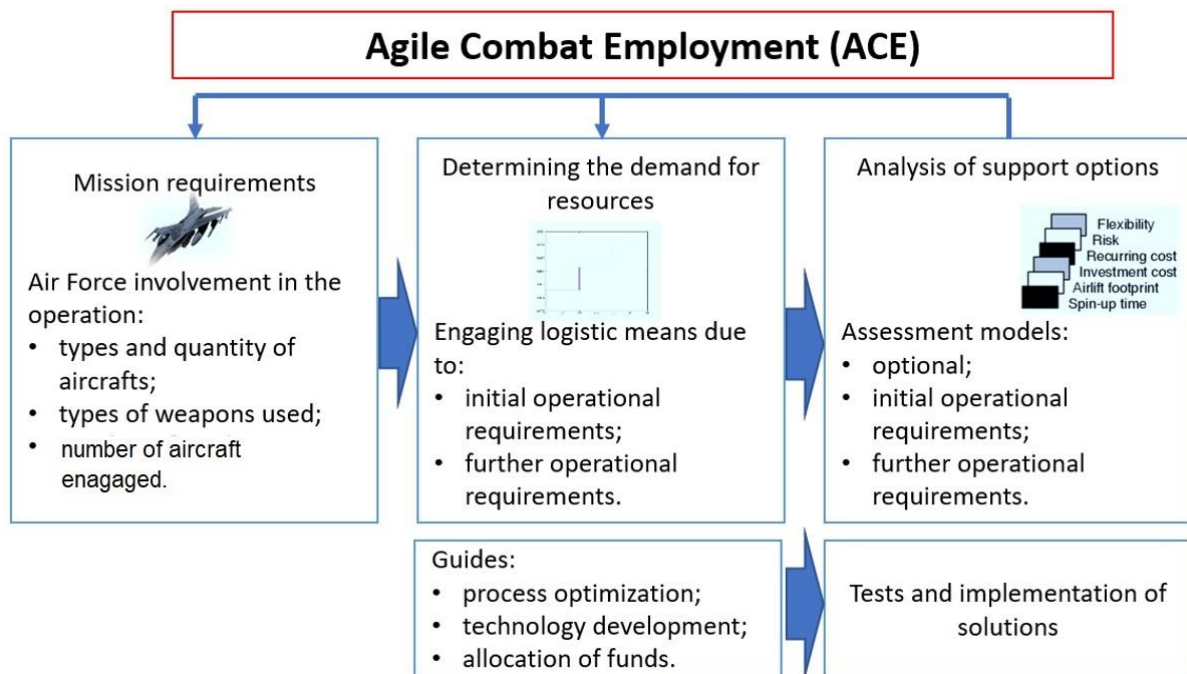
<sup>6</sup> Air Force Doctrine Note 1-21 - Agile Combat Employment, December 2021

From the logistics point of view, the supply chain to the aforementioned locations should be carried out using unmanned transport solutions. Nevertheless, it requires dedicated personnel to remotely coordinate and control automated supply chains. In this case, for example, mission planning specialists can be trained for this purpose.

The presented Agile Combat Employment (AGE) concept complicates an enemy's tracking process, creating political and operational dilemmas and providing flexibility for allied forces. The approach relies on aviation personnel (pilots and security personnel) of a multicable airman who can operate in harsh locations and move quickly<sup>7</sup>.

Fig. 2.

General diagram of the AGE strategic planning framework



Source: R. Tripp, L. Galway and others, *Supporting Expeditionary Aerospace Forces: An Integrated Strategic Agile Combat Support Planning Framework*, 1999, p. 16.

According to the ACE concept the directions of activities to increase the survivability of air force assets should be focused on two basic capabilities: tangible and intangible.

The tangible ACE orientation focus on achieving key aspects of combat missions conducted from "raw locations" through the use of appropriate force packages including logistics. The aircraft and logistic systems appropriately tailored to the mission create possibility for fast maneuver with a simultaneous projection of adequate force.

<sup>7</sup> G., *Air Force Releases First Doctrine Note on Agile Combat Employment*, <https://www.airforcemag.com/air-force-first-doctrine-note-agile-combat-employment/> (accessed: 19.06.2022).

The intangible ability is the training of airmen to achieve operational capabilities in accordance with the ACE concept by creating the aforementioned multi-task aviation personnel. Such approach to the personnel will allow to achieve aviation capabilities in many domains with high flexibility of movement and reconstruction of combat readiness.

Air force packages deployed to the different locations across full spectrum of operations require advanced well organized C2, with modern, portable early warning systems against WMD and TBM's, satellite communication systems, navigation systems and radars.. Such packages should be developed and produced to the maximum possible extent by national industry using modern solutions, including cutting edge technologies. The technology should be mobile, durable and safe to operate across the electromagnetic spectrum<sup>8</sup>.

Such altitude means provision of full, real-time situational awareness for air force commanders via resilient and secure means of communication. Logistics modules have to be equipped with systems that can operate without any access to fixed infrastructure.. The Air Force's organic logistics capabilities implemented in accordance with the AGE, could consider utilization of depot and distribution system existing within other services like army and navy. That gives even more flexibility and increases system efficiency, with some capacity savings for air force. Army network by nature has bigger density than that of air force. Nevertheless, the involvement of the formerly aggregated civil market support chains in the area of conducted operation should be also considered.

The above-mentioned strategic scenarios for the diversification of aviation location in the theater of operations narrow down the dimension of the operation conducted in this way to three concepts. The first one based on departure of aviation from the FAOR (Fighter Area of Responsibility) to airports located deep in rear zone in the allied territory. In such circumstances air force conducts air operations in allied airspace with freedom of maneuver (stealth aircrafts equipped with long-range missiles allocated to airports in other countries operating with air-to air refueling systems).

The second concept is based on conducting a defense operation in the national scenario, based solely on the territory of the country under attack (similarly to the conflict in Ukraine). In

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<sup>8</sup> S. Mulgund, *Command and Control for Agile Combat Employment*, <https://www.airuniversity.af.edu/Wild-Blue-Yonder/Article-Display/Article/2753756/command-and-control-for-agile-combat-employment/> (accessed: 19.06.2022).

this case the concept of dispersing forces and resources to conduct operations from ad hoc locations and infrastructure comes into play.

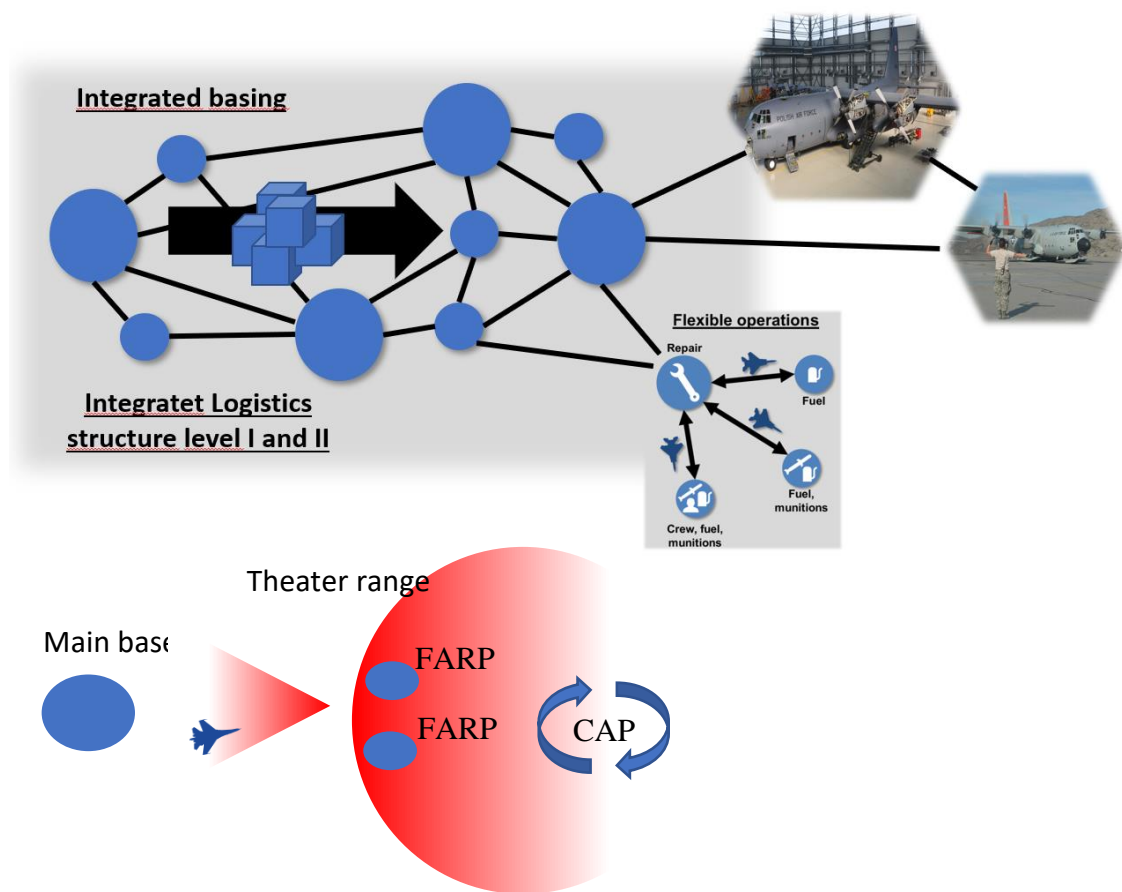
The third concept is a hybrid version that combines an airport maneuver between air bases with an ad hoc infrastructure in its own or allied territory.

According to the proposed concepts, logistics supply system can be divided into first-level logistics (tactical) for securing aviation at the site of operation (equipment consists of 10-foot containers, light-type hangars, mobile canteens, laundries, tents etc.). The second level of air force logistics that is more complex, located away from range of enemy missiles and based on civil or military airports with access to a wider range of specialized technical equipment.

When adopting AGE operation concept during a potential conflict, modernization of air force must go hand in hand with the development of appropriate integrated logistics structures of the 1st and 2nd level (figure 3).

Fig. 3.

Diagram of the distributed model of logistics level I and II



Source: own diagram based on Patrick Mills, James A. Leftwich, John G. Drew and others, *Building Agile Combat Support Competencies to Enable Evolving Adaptive Basing Concepts*, p. 14-22.

(FARP – forward area refueling point or forward arming and refueling point, CAP – Combat Air Patrol)



The military aviation industry providing services should orientate its activities (technology, design, implementation, service) in a way to enable aviation units, by delivery of adequate technology, tools and training, to achieve capability to repair and service air force platforms outside dislocation fixed installations. The logistic supply chains based on peacetime air bases should ensure the continuity of operation from temporary locations through adaptation to that purpose of spare parts delivery systems, pre-packaged in sets fuels and ammo distribution next to area of operation. Undoubtedly, this type of logistic concept, in order to reduce the logistics tail, requires in addition the autonomous energy supply systems (fuel, electricity, water, food)<sup>9</sup>.

What is more important from the logistic point of view is proper division of responsibilities than training of specialists to operate logistic units from level I-III, thus creating the ability for aviation components to be self-sufficient in the field of service and armament of aircraft. The air base should be capable of providing adequate training for its personnel, creating abilities of multicable airmen. The developed tactical capabilities of air bases then can be transferred to other locations in the form of components, or even to other types of forces (navy, army, territorial defense forces).

At the end of the mission, the logistics components return to the bases for recreation of the combat readiness of the weapon and military equipment. According to the concept of multicable airmen, the support and maintenance personnel as well as pilots should have the ability to perform tasks from many areas. Flying personnel, for example, should be able to refuel an aircraft or suspend less complex munition (e.g. cannon ammunition, non-launcher missiles).

In order to achieve the assumed operational goals, in accordance with the proposed concept, aviation must introduce five new or strongly modified basic elements: procedures, command and control, movement and maneuver, force protection and sustainment abilities. Most important in the ACE is to design a force deployment strategy that has deterrent capabilities "by being strategically predictable but operationally unpredictable". The above mentioned concept engage the enemy strategically, but requires coordination and interoperability, both within own resources and with allies.

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<sup>9</sup> Łukowski D., The importance of energy resources and energy sources in the Armed Forces, Science for Defense and the Environment Conference, Volume 2, p. 75

The training of personnel capable to conduct flexible operation from multiple locations, supported by appropriately developed procedures, will contribute to shaping the awareness of aviation personnel in order to create a multicapable airman<sup>10</sup>.

In the case of a dispersion of forces (a distributed network of airports or landing sites), command and control in all domains comes down to: centralized command, distributed control and decentralized execution. The C2 concept will force the training of air force personnel to properly understand the idea of commanders and to follow on the tasks.

The implementation of the ACE concept should focus primarily on generating combat flights. However, to achieve this goal, measures such as air or sea transportation delivery to resupply, providing basic operational support, and contracting the local resources and services must be taken.

Mobility requires careful planning, especially in the area of energy resources, to ensure that it can be moved quickly and on a large scale. It is necessary to use uniform, autonomous and mobile energy efficient systems.

The supply and maintenance facilities determine protection of bases and other landing zones under the assumption that "airbases are no longer 100% protected from attack" and require both active and passive defense. Support from the territorial defense troops (TDT) may be helpful. During the training of TDT commanders should include procedures to protect and navigate aircraft in an appropriately adapted and marked area or unused airports in their area of responsibility. The territorial defense forces equipped with short-range air defense weapons systems can be used to provide local air force protection. The TDT may be a vital source of information about commercially accessible commonly used materials that can support air force modules deployed to the sites. .

## **SUMMARY**

Maintaining aviation resources on diversified sides ensuring multiple sources of supply while reducing the burden on logistics and infrastructure requires more personnel and procedures for obtaining resources from the original bases as well as from national economy.

The concept of increasing the survivability of aviation as a result of increasing the number of operating sites requires a careful planning process as well as coordination within the

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<sup>10</sup> K. Knight, S. Writer, *Multi-Capable Airmen: Smarter. Faster. Stronger*, <https://themobilityforum.net/2021/03/15/multi-capable-airmen-smarter-faster-stronger>(accessed: 22.06.2022).

individual components to ensure a quick maneuver on a large scale and on a wide scale of operations. This requires the provision of adequate security and defense to the airfields or landing sites from which the forces operates.

The potential of air bases and many different air force location sides based on ACE concept requires the use of multiple sources of supply, both from military and civilian resources. This reduces the likelihood of paralysis in logistics supply chains. The concept of increasing the aviation sustained capabilities by diversifying aircraft operating sites should focus primarily on generating combat flights, but should also include the ability to perform tasks such as accepting air or sea transport and local contracting of equipment and supply services to restock inventory.

In summary, the concept of increasing the viability of aviation by increasing the number of landing zones requires a revolutionary change in the mentality of the airmen and way of conducting operations in a modern operational environment. It is necessary to move away from the concept of firmly located air bases with full facilities and move towards self-sufficient mobile aviation task forces operating for various locations equipped with multidomain air systems while being supported by them at the same time.

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