LOGNET
Innovating, Developing & Delivering
The Defence Support Network

on

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Transcribed from the Audio Recording

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[redacted] The Defence Support Robotics and Autonomous Systems sub-working group is a standing MOD industry body reporting to the DLFDB, as mentioned before. Its purpose is to guide and accelerate to development and exploitation power for RAS technology to cross Defence Support activity. The joint nature of the sub-working group is designed to promote collaboration

and mutually beneficial outcomes in the sustainable delivery of RAS capabilities across the extended Defence support enterprise. The working group has been considering the application of RAS technologies across the breadth of the Defence Support enterprise, from capability development to the delivery of support activities at the front line. The future network in delivering discrete support functions must be information led, technology enabled and distribution driven, possess an increased agility, high degrees of real time asset monitoring and visibility and it must also be able to move mass at various operational scales. For land forces in particular, the supply chain will be distribution based, with information replacing inventory, to minimise the need for stockpiles leading to a smaller deployed footprint.

So within the Defence concept note, RAS encompasses, but is not limited to, utilising proven adaptive commercial or military off-the-shelf, able to co-exist, complement and blend with those capabilities that will still be in use in the 2030 plus timeframe. The RAS enabled DSM of the future will be achieved through the augmentation or replacement of high-volume manual repeatable and long duration support functions by RAS capabilities across the Defence Support enterprise, including the digital backbone where a combination of algorithms and robotics will automate many decisions and functions. It is envisaged that the application and effects of RAS will be most notable in several key areas. Encompassing the delivery of digital transformation across defence, processes and actions including acquisitions, storage, movement distribution, maintenance, recovery and disposal and the function of delivering Class 1 to Class 5 supplies, including food and water, clothing, medical stores, fuel, ammunition and explosives throughout the DSN and joint operation areas. So the RAS sub-working group identified the five work strands that you can see on the screen to form a framework within which to investigate where RAS would enable to be beneficial in driving effectiveness, efficiencies and sustainability into the future DSN. The RAS sub-working group does remain aligned to the DSTL policy and capability enterprise support programme's logistic technology investigation on autonomy and automation, something I will come to at the end of the presentation.

So these are the five work strands, within which I will explain and give examples within some of ongoing investigations to realising the benefits of RAS within the supply chain.

Warehousing. RAS will deliver timely, automatic and error-free stock management and demand processes, including identification, counting, sorting, picking, packing, rotation, dispatch, re-ordering and replenishment and disposal functions assuring the provision of correct and serviceable items. RAS will be enabled through the digital backbone by predictive demand planning and forecasting using conditions-based monitoring and smart packaging sensors and standardised

stock size in line with commercial standards to help drive and manage optimal stock levels and its disposal.

Distribution. Rapid efficient and agile distribution, delivery and returns will be accomplished through an automated loading, unloading and distribution planning system. This will utilise effective combination of extant and unmanned and self-guiding leader/follower and platooning, surface or air platforms from the strategic to the tactical levels. Each will be capable of tracking through the identification friend or foe systems and tailored to assure last bound. This will be done through delivery via route clearance, optimal re-routing and effective load planning and allocation to the point of use. Modularisation and standardisation of load carrying containers will minimise handling and cross decking requirements and maximise delivery platforms. Information feeds will contribute to real time logistics picture available to a globally dispersed mobile device to assure timely delivery and improved trust in the DSM. So within Army Headquarters, CSS capability development is moving rapidly to investigate and understand how RAS may affect the current land CSS echelon system of supply and distribution. Building on successful work by DSTL during the autonomous last mile re-supply and the UK/US bilateral coalition assured autonomous re-supply, the plan is to further understand how autonomy can drive efficiencies into the land CSS supply chain. Part of this is Project Theseus. This was a successful bid into the Transformation Fund announced in 2018 as part of modernising Defence programme. It provided funds over three years with the aim to place the capability in the hands of the users in an operational-like environment. Project Theseus will incorporate both the last mile and the follower/leader or platooning of large and bulk carriage platforms where across the operation spectrum the adoption of RAS technology could enable us to operation more efficiently, effectively and with greater flexibility and reach, but using the appropriate level of autonomy and striking the balance between manned and unmanned operations. That will be key to optimising capability performance and mission success.

Additionally, in the deployed operation area, this technology could present multiple dilemmas to an adversary through deception by purposely executing unmanned, fully autonomous activities to potentially distract the enemy. Standardised modular material handling would enhance the efficiency of the supply chain and reduces the human interaction with consignments. Underpinning the ability to load, breakdown, secure and position the stock autonomously under modernisation and transformation is the need to embrace resilient data centric technologies, recognising that it will be a combination of senses and connectivity. A recognised logistic forecast along with the recognised logistic picture using AI will make human/machine teams possible and revoluntionise our ability to see and understand and provide consignments packaged to meet the end-user. Data will be the vital resource and its production through connected sensors and the internet of things,

it's distribution through a secure digital network and its ultimate consumption by AI will be the means by which data is converted to insight and faster more precise activity.

Moving on to data collection, there will be an increase in data-led activity in which virtual trade craft and a step change in our ability to forecast and track performance drives a shift from reactive to an increasingly proactive support effect that reduces the logistic need and enhances readiness and sustainment. Smart supply chains will exhibit highly coordinated digitised operations which complete visibility across the whole network.

Warehouse to war fighter. Visibility and control will facilitate track and trace of assets and deliver a better balance between demand and supply. Capacity will be more easily dialled up and down and resources re-directed as global demand shifts. As part of Project BOZAL, it has seen the utilisation of a long-range, low power wide area network, coupled with the sensor which is of matchbox size to provide monitoring of the environmental conditions faced by high value assets through the supply chain. In simple terms, it records trauma and events that can be analysed real-time to support decision making. All three services have completed trials with Project BOZAL. The Air Force focused on asset tracking of aircraft ground equipment and environmental condition monitoring of munitions and geolocation. The Navy have experimented with BOZAL during Joint Warrior 19 in a range of scenarios including medical air drops, RAS and serviceability within all classes of ships, and the Army have recently completed a trial to test the ground and air supply chain maintaining situational awareness, testing alerts on breaches of threshold and the consolidation of information from multiple sources.

Automated engineering. Augmented and virtual reality and wearables provide a more human-centric design with benefits including the provision of real-time information, increased performance of time sensitive tasks and improved safety. When combined with simulated environments, AR or VR offers a step change in customised remote training that can be more productive and efficient in both engineering and medical services. Monitors, diagnostics and intervention equipment will become smaller, lighter and more robust with improved battery life and reduced maintenance requirements. This should increase access to equipment in light and dismounted roles, conditions-based maintenance will also allow improved forecasting and better maintenance planning.

So, as mentioned, the aim of the sub-working group is to develop a pan defence and industry view of the different areas of RAS technology, which will have a beneficial impact on the support network and also to understand the timescales of this impact. The roadmap's aim is to define the current state, the desirable end state and the steps required to reach that end state. So the template used was developed by the University of Cambridge which is being used across industry to help structure

roadmaps. The process begins by defining the trends and drivers of the technology progression and flows through to the capability and resources required to support the development of this technology. There is an ambition to include quantifiable benefits to performance in the end state. However, this is often a challenge. The sub-working group is developing a range of roadmaps and there are some key points emerging, which include an ambition to develop targeted proof of value through trials of existing capability. Industrial solutions exist and are more mature. The roadmaps focus on bringing these into defence. There is a key focus on data which is complimentary to the AI sub-working group and automated data capture can both provide benefit and also benefit from ongoing programmes in this area. [redacted]

[Recording ends]