

ANNEX 2 - Problems and challenges for Purple NECTar 2020

Three themes have been selected for Purple NECTar 2020 including challenges for which companies can register: mission planning, situational awareness and improving the deployability of personnel and equipment. There will also be non-theme-related challenges.

Theme 1: Mission planning

By mission planning we understand all activities involved in preparing for missions and exercises and readying materiel and personnel for this purpose. Keywords: networked joint collaboration, accelerating 72-hour process, clarifying goals, focused on achieving shared objectives, etc.

Challenge 1: Planning tool for Recce DGLC (Defence Ground-based Air Defence Command) and/or DHC (Defence Helicopter Command)

Extensive recces and site surveys are always conducted prior to deployment and exercises. Positioning for a good line of sight conditions of the transmitter masts in a mesh network requires a great deal of preparation and communication. A recce is always carried out before intermediate movements of components of the systems in order to map out the route and position of the destination. To ensure faster and more efficient information processing, provision and coordination, a combination of tablets and smartphones with VPN and MDM settings with existing and adapted applications are a major improvement. Consider plotting GPS coordinates directly on site, connected to each other and other recce teams via a secure Cloud solution, producing photos and films, uploading exploratory reports to the Cloud.

Challenge 2: Joint Mission Planning

Planning a joint mission is a complex process because all stakeholders have to jointly compile a plan with their own information. The source data used to do so are often physical maps of a mission area. They are merged to produce a comprehensive whole, and are subsequently input in the various systems. The following bottlenecks have been identified in this area:

1. It is not possible to obtain a shared picture of the situation between the parties involved.
2. It is not possible to quickly elaborate different alternatives.
3. It is not possible to quickly respond to changing mission parameters.
4. It is not possible to synchronise information to different planning systems.

One possible solution is to build a demonstrator that makes the concept of joint planning supporting/transparent in a simulated environment for Purple Nectar 2020.

Theme 2: Situational Awareness

By situational awareness we understand everything involved to map out the mission and training area, maintain an overview and provide the right intel to those who need it. Keywords: Blue Force Tracking, information domain, where are our troops, where are my helis, real-time info available at all times during the mission's execution, air-to-air and air-to-surface links, etc.

Challenge 3: Sharing the flight location of Helicopters

When a helicopter is flying extremely low (tactical flying) to stay under the radar, it is not possible to remotely communicate with the transponder in the helicopter. As a result headquarters (HQ) do not know where the helicopters are. Consequently it is not possible for operational leadership to actively steer the mission's execution. Link16 will not yet be available in the short term. Making changes to a helicopter is not straightforward due to military aviation requirements (MLE/ANS) and flight safety. We are looking for a possible solution to improve the Situational Awareness of HQ.

Challenge 4: UAS system integration solution

Due to the arrival of the commercial drone, the term secure has acquired a new dimension. From 2D security to 3D security, which has a direct impact on security at Defence. The first step remains detecting a potential threat. We possess various sensors for detection, which are completely independent of each other and are on self-contained systems. This means that in the case of detection based on one or more sensors, an alarm is triggered and displayed on multiple monitors. Consequently the security staff member is not in control because he/she has to consult multiple monitors at the same time. Therefore it is desirable for all systems to be linked. A single system in which all reports are integrated. As a result the security staff member will be in control and can steer more effectively if the need arises to act against a UAS (Unmanned Aerial System).

With a view to the future we expect the possibility of linking the system to future equipment.

Challenge 5: Mission planning and preparing for helicopter operations

At Defence the thorough planning of missions and exercises is time-consuming and involves many defence personnel. This fact that it is so time-consuming is partly because it is not possible to quickly obtain a condensed overview of the availability of personnel and materiel in relation to the tasks that will have to be performed as part of the mission, or mission readiness. The information required for this can usually be found in separate information systems such as SAP, PeopleSoft, HAKOG, JEMM, TOBS, IOPD, OMIS and other solutions such as Excel sheets. This means the plans largely consist of (1) determining which pieces of information are relevant, (2) gathering together these pieces of information and (3) determining whether these pieces of information are still actually valid.

At Defence there have been ideas in the past to gather the required information together by linking the existing information systems or even setting up completely new information systems. These solutions are generally very costly and due to their size, difficult to manage in terms of product and time.

Required experiment: Extracting data from the information systems and integrating it in a Defence cloud environment that is continuously updated. The user can retrieve planning services that are stored in the cloud from a user interface.

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For PN2020 an experiment will be conducted for the DHC, in which the basis for the proof of concept is the planning for the Swift Blade exercise. There will be coordination with DHC regarding the information from SAP (weapon system readiness), OMIS and PeopleSoft (both personnel readiness) that is relevant for preparing, planning and allocating for Swift Blade. On this basis the required data will be retrieved from these systems and supplied to the user so that the latter obtains optimal insight, by not only collating the information, but also by developing algorithms that can provide the user with (partial) recommendations based on data from SAP, OMIS and PeopleSoft and the mission tasks. This proof of concept will be validated with the Swift Blade planning personnel.

In the case of positive results (go/no go) for PN2020/Swift Blade, a subsequent proof of concept will be achieved in an iterative process for a different Defence division. It will be examined whether it is possible to develop generic services for deployment planning and aspects such as data security and infrastructure will be studied in more detail. The lessons learned from each proof of concept will be included in the subsequent proof of concept with the ultimate objective of being able to plan, match and allocate from multiple (OpCo) source systems.

Theme 3: Increasing the deployability of personnel and materiel

By deployability we understand everything that affects personnel and materiel and improving the distribution thereof. Keywords: Training courses, simulations, VR, health.

Challenge 6: Swift Blade 2020: safeguarding knowledge & lessons learned

During the Swift Blade exercise and Purple NECTar, pilots will practise all kinds of scenarios, in the air as well as using the simulator. The results of the exercises will be stored and evaluated by means of after action reviews. The after action reviews are uniform, but differ for each piece of equipment and simulator. Being able to make a reliable comparison between simulation, exercise, training and education is difficult as a result.

The classroom of the future talked at Purple NECTar 2019 about the introduction of the Total Learning Training Architecture (TLTA) with the xAPI protocol. The ADL's TLTA solution offers a platform and protocol for storing the learning experiences of a member of the military from his or her arrival in a syntactic and semantic manner. As a result, the member of the military can be monitored throughout his or her entire career in talent management. This makes personal learning that involves entering at one's own demonstrated level possible. For the experiment during Purple NECTar we want to examine whether we can translate the potential learning experiences and/or results into a syntactic and semantic, appropriate storage solution so that results from diverse materiel and/or simulations can be compared. In the long term this data could also be used to find out whether results for diverse exercises improve or change. Data analysis could be used in this regard.

Challenge 7: Visual Measurement System for Dogs

At the moment it is extremely difficult to medically examine and monitor service dogs, other than when performed by the handler. This is because they are aggressive dogs, and the procedure is very stressful for the dog, veterinarian and non-permanent handler.

At the moment there are sensors and systems for large mammals (horses) that could be used if modified to meet the requirements of DEC-D (Defence Expertise Centre for Service Dogs) and CEAG (Centre of Expertise for Labour and Health). We are also looking for a system suitable for monitoring service dogs remotely in the future.

Non-theme related

Challenge 8: Data labelling

Within Defence there is a growing need for data exchange between different classification levels and domains. While structured messages can potentially be verified in terms of the content, which is known, it is different for unstructured information such as an e-mail or document. It is not known which information is sent in these cases. For example, it is possible to search for certain keywords, but this is not enough to guarantee that information that leaves a classification domain may also actually be shared. FMN focuses on Data Centric Security, which uses data labelling, see recently established STANAGS (4774/4778). The first requirements for labelling are proposed in FMN Spiral 3, and are: SM34 Information Protection Control (IPC) - Classification/Marking A. Recommended: STANAG 4774 (Confidentiality Metadata Label Syntax) and STANAG 4778 (Metadata Binding Mechanism) are to be implemented for all XML generated information. B. Mandatory: If implementation of STANAGS 4774 & 4778 are not possible, other mechanisms to label information are to be implemented.

Establishing a classification and/or label for a certain piece of information is the responsibility of the author. By offering a labelling service and linking hard labels to generated information a choice can be made regarding whether certain information may leave a system and be shared with partners.

The primary focus lies on generating labels and linking these labels to different types of data. In this process the idea to first focus on office documents and mail (XML), but use cases for other data types (such as data types that are used for joint mission planning) could also be considered.

Challenge 9: The Royal Netherlands Marechaussee wants to innovate in the field of verbalisation

The Royal Netherlands Marechaussee is responsible for (among other things) conducting criminal investigations. Suspects and witnesses are heard in the process. They are recorded and a transcription is produced later on. The current method requires a lot of time to verify the transcripts, and knowledge of language, technique or knowledge of the law. As a result processing an official report can take a very long time.

The requirement

The Royal Netherlands Marechaussee aspires to innovate in this field with resources that can make a smart transition from spoken word to text. They want to make improvements with regard to the following points.

- Speech must be quickly converted into text without any linguistic errors.
- The system must be able to recognise and translate foreign languages.
- The system must be able to recognise a voice and display it.
- The system must be able to make connections such as understanding the essence of the story and recognise patterns etc.
- The system must be mobile.
- The system must be able to operate in real time
- It must be easy to navigate an interrogation.
- The system must offer technical legal support, such as legal texts and components.
- The system must be able to recognise and indicate emotion in a voice.

Challenge 10: The ability to communicate in and between networks securely and flexibly

Defence wants to be able to communicate with diverse units through speech using peripheral equipment that is already available to the unit. Existing resources that are used are C2000 peripheral equipment and mobile phones. Coordination is handled by the control room, which determines who can and may communicate with whom. The Royal Netherlands Marechaussee strives for an innovative communication method in which the resource used is subordinate, and communication with and between mobile phones and C2000 must be possible. Communication takes place under operational conditions:

- **Static:** Operating method based on fixed, immobile infrastructures that are used for long periods of time.
- **Deployed:** Operating method based on mobile infrastructures whereby it is not possible to operate out of the infrastructure concerned when it is being moved.
- **Mobile:** Operating method based on mobile infrastructures whereby it is possible to operate out of the infrastructure concerned when it is being moved.
- **Dismounted:** Operating method in which one operates in the immediate vicinity of a fixed or mobile infrastructure.
- **On foot:** Operating method in which one operates where there is no fixed or mobile infrastructure in the immediate vicinity.

Where there is no available coverage by the regular mobile phone networks a 'support point' belonging to the above-mentioned operational conditions can be set up by the Defence unit to facilitate communication with each other. Because it concerns a critical form of communication priority must be possible on the networks to be used. Lastly, the solution offered must not be achieved using public Internet and (a form of) encryption, which Defence can manage independently, must be available.

Challenge 11: Performance assessment in simulators

NLD MoD uses simulators for education and training of personnel, for both individuals and teams. Usually the performance and progress of trainees is assessed by instructors. This assessment can be labour-intensive and subjective, and is complex for team training and tactical decision training. MoD seeks solutions to:

- objectively measure the performance and progress of trainees that use simulators,
 - both for individuals (personalised learning) and for teams,
 - regarding motor, procedural and cognitive skills, and to
- register this performance and progress such that it can be related to other learning experiences (such as live training or e-learning), and
- to provide-artificial intelligence based feedback to trainees.

For experiments during Purple Nectar the games Prepar3D and VBS3 can be provided.

Challenge 12: Live training integrated with simulation (Live, Virtual Constructive)

Integrating live training with simulations can provide a richer training environment. Live training provides realism of weapons systems and the natural environment, while simulations avoid environmental and safety restrictions, and provide flexible scenarios and large numbers of virtual players. MoD seeks to experiment with this concept.

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Challenge 13: Linking of simulators

MoD has some experience in linking simulators for collective training using DIS or HLA. Common complications are:

- usually a lot of technical support is required,
- distributed development using multiple different scenario editors is time consuming, and
- trainees have unequal training benefits.

MoD seeks solutions to mitigate these complications. For instance, artificial intelligence could be used to develop scenario's or replace team members.