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ES&D SPECIAL: BAAINBw

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Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support

The major organizational element of equipment, information technology and in-service support – in German abbreviated AIN – is responsible for satisfying the armed forces' requirements in terms of materiel and for managing the in-service use of materiel fielded in the Bundeswehr with the aim of maintaining the operational maturity of that materiel.

Partner of the Armed Forces

The AIN major organisational element is made up of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) and its subordinate agencies comprising six Bundeswehr Technical Centers, two Bundeswehr Research Institutes, the Naval Arsenal and the German Liaison Office for Defense Materiel, U.S.A./Canada. It supports the armed forces as a reliable partner.

BAAINBw's core task is to ensure that the Bundeswehr is supplied, at economic conditions, with state-of-the-art technology, efficient and safe equipment as well as defense-related services, in line with what the armed forces need and request. Although, in some cases, commercially available equipment may be used, it is in many cases necessary to initiate the specific development or advancement of military materiel. Tasking, developing and testing complex technical solutions is time-consuming. Not every idea from the development phase passes the practical trials at the first go. A realistic schedule combined with efficient armaments project management is of the essence.

Responsibility for the Entire Life Cycle

BAAINBw, which was established in October 2012, bases its procurement and in-service management on three main pillars:

- procuring and using complex services,
- satisfying Bundeswehr non-project needs by Bundeswehr Purchasing as well as
- providing materiel solutions and services in accordance with the Customer Product Management (CPM) procedure.

The CPM procurement procedure deals with and supports products and services throughout their entire life cycle in a holistic way. Apart from fulfilling all tasks related to the procurement system, this integrated approach to the entire procurement and in-service process also requires taking over material responsibility for operational viability. Thus, these comprehensive tasks, starting with the analysis phase and covering the entire in-service management of the materiel of all military organizational areas until its disposal, are covered by one agency.

Reversal of Trends

In order to achieve full equipment of the armed forces in the next decade as it has been promised, significantly more urgently required materiel will have to be procured for the Bundeswehr. The trend reversals in the areas of personnel, equipment and financing initiated by the then Federal Minister of Defense Dr. Ursula von der Leyen of course had direct implications for the work of BAAINBw and its agencies.

Between 2016 and now, a number of organizational changes have been carried out in order to operationally strengthen the office. This includes among other things the establishment of a Program Organization (PMO) for the three armaments projects MKS 180 multi-role combat ship, tactical air defense system (Taktisches Luftverteidigungssystem, TLVS) and EURODRONE (European MALE RPAS) and the organizational setup of the Complex Services/Purchasing Directorate.

Also in 2016, the Operational Management Staff was set up; a central element that purposefully manages in-house tasks and provides, with its components Portfolio Management and Controlling, essential control information to the BAAINBw Executive Group. The In-Service-Use Agenda is currently one of the most important optimization projects of the Federal Ministry of Defense (FMoD). The current implementation of In-Service-Use Agenda measures aims at increasing the operational readiness of the Bundeswehr and at focusing on tackling, in the area of in-service use, the challenges of the resource-conserving

Photo: mawibo-media

The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) is located in Koblenz.

and mission-oriented defense policy of the last decades. This is ensured, among other measures, by the optimization of supply chain management for spares and exchange parts, including a return to stockpiling, data management (harmonization of the IT landscape, SASPF Data Governance) and an increase in efficiency in the area of maintenance including performance-based contracting.

Further Adaptations and Outlook

In 2018, the FMoD started the project "Procurement and in-service organization examination and procurement optimization" (in short: BeschO). Its aim is to further increase the effectiveness and efficiency of defense procurement. Minister of Defense Annegret Kramp-Karrenbauer approved the final report "BeschO range of solutions" in September 2019. This report envisages adaptations of processes and structures within the office during ongoing operations also for the future. As a result, the report proposes 58 measures to improve BAAINBw's core tasks, i.e. project work, in four different ways. It focuses on:

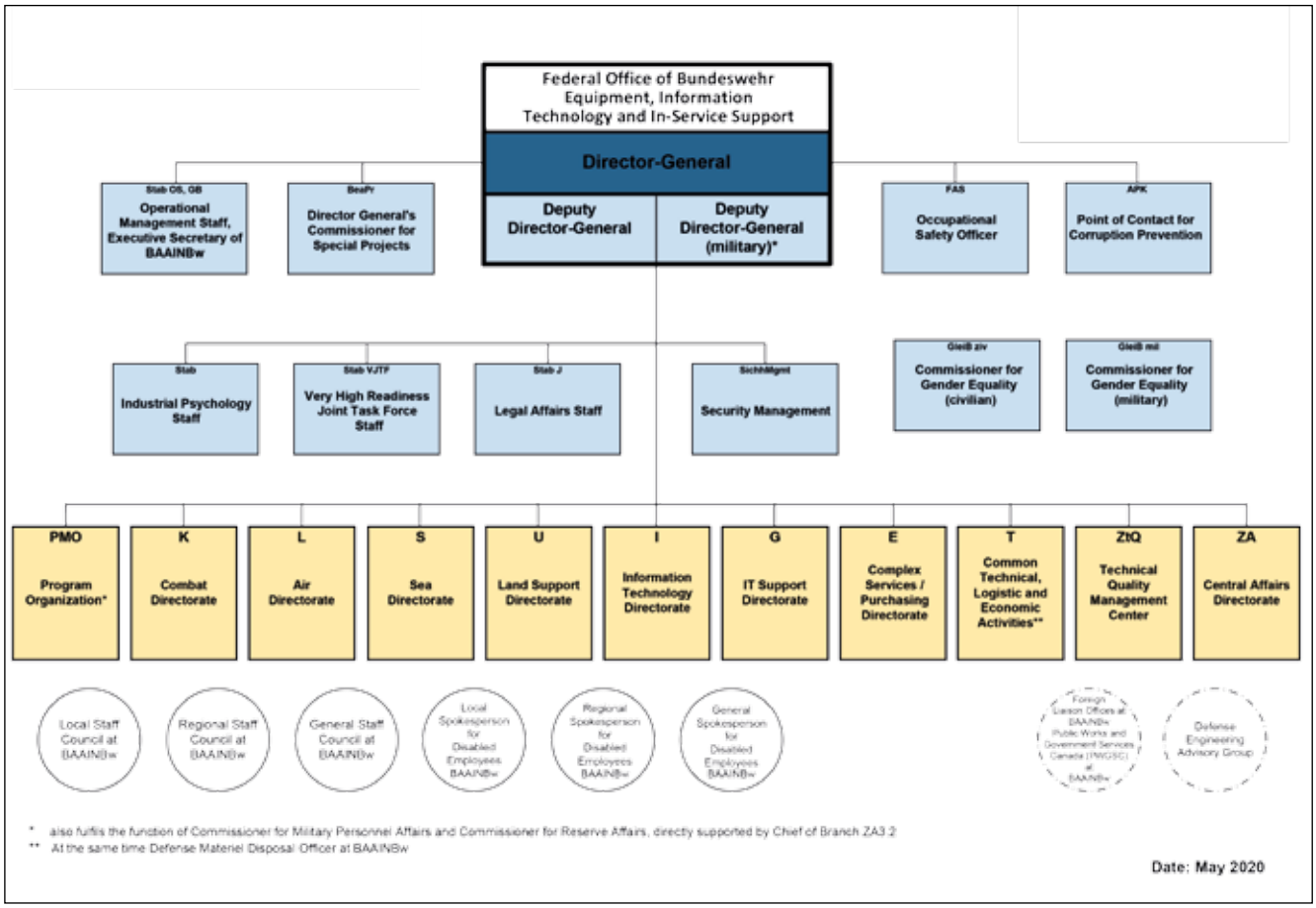
- relief for personnel resources selected for project work,
- improved project control/prioritization,
- augmentation of personnel resources selected for project work and
- improved project management conditions.

On the whole, the implementation of the recommended measures will lead to a considerable performance increase of the procurement and in-service organization and contribute to rendering work at the interfaces to industry more efficient. For instance, these measures include an extension of BAAINBw's organizational competences. This measure has already been completed. ■

Photo: BAAINBw

The "Rheinliegenschaft" compound of BAAINBw

Source: BAAINBw



Operational Management Staff

The Operational Management Staff currently comprises five divisions plus the AIN Press and Information Center (PIZ AIN). It is headed by an Executive Secretary and structured as follows for its various tasks.

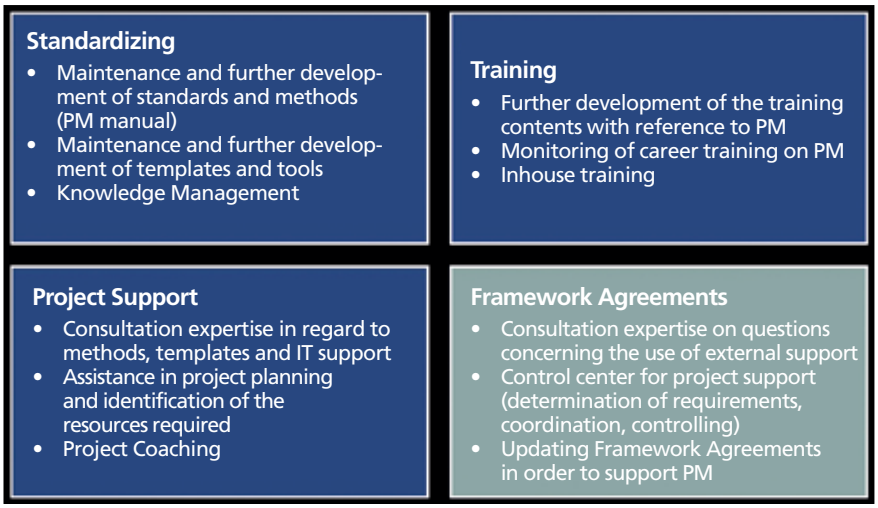
Division OS1

Division OS1 is in charge of central task management at BAAINBw level and coordinates all tasks related to parliamentary/cabinet affairs. OS1 is also the control office for German Audit Office affairs and the POC for all internal auditing affairs.
Federal government and parliamentary inquiries (e.g. major and minor interpellations, petitions (regular and political), correspondence with the Parliamentary Commissioner for the Armed Forces) are handled and coordinated here in cooperation with the respective competent elements within BAAINBw and its area of responsibility. Division OS1 also prepares the content and the execution of visits of Members of the German Bundestag and the parliaments of the Laender to BAAINBw and its agencies. This division furthermore compiles all pertinent information and documents (agendas, committee publications, etc.) which the BAAINBw Executive Group needs to prepare for their participation in Defense and Budget Committee meetings.
Furthermore, OS1 coordinates all German Audit Office affairs in the area of responsibility of BAAINBw and also all internal auditing matters. In particular, OS1 assumes lead responsibility for preparing BAAINBw's comments on the individual audit reports.

Division OS2

The tasks of Division OS2 include coordination of the cooperation with the Bundeswehr Office for Defense Planning, situation presentation and portfolio management regarding the activities and performance of BAAINBw in the sectors of projects, products and services.
In accordance with the central "Executing Integrated Planning" output process, the Bundeswehr Office for Defense Planning draws up the Bundeswehr capability situation picture and derives capability gaps from that. If these gaps are planned to be closed by means of material solutions or defense-related services, Division OS2 will initiate the work on initiatives, making use of the technological and economic assessment competence of BAAINBw. This will include coordination of the activities of the respective BAAINBw representatives in the Analysis Phase Part I of the CPM process. Division OS2 thus supports the Bundeswehr Office for Defense Planning right from the start of the procurement process in determining the characteristic data of a project across the entire period of its existence (from creation to service use) so that they can be taken into consideration in the decision-making process - a fundamental contribution to portfolio management in the Bundeswehr.

Source: BAAINBw



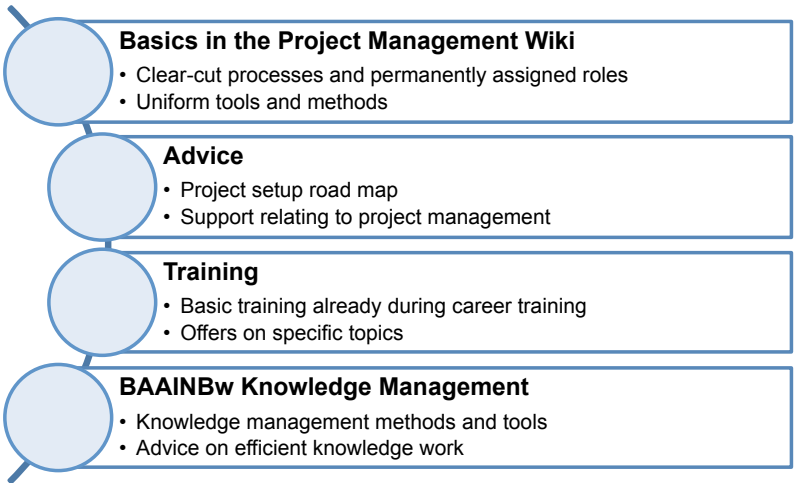
Controlling of framework agreements to support project management

In the framework of portfolio management, OS2 provides a continuous survey of the status of current and already scheduled projects, products and services including their interfaces and interdependencies. To this end, the division compiles the information available on projects, products and services in all BAAINBw directorates to draw up a situation picture. Depending on the objective and concrete problem, a relevant selection of projects, products and services is made available in a sub-portfolio. This sub-portfolio is analyzed in order to propose alternative courses of action, which are then harmonized with the Bundeswehr Office for Defense Planning and/or other organizational entities or requesting entities involved, before they are implemented on the basis of the decisions that may have to be taken.
Finally, OS2 has the function of a central element within BAAINBw for portfolio management at the project/product/service level. In this context, the Project Steering Group established together with the Bundeswehr Office for Defense Planning is of importance, which is designed to ensure maximum transparency and smooth progress of the projects in all phases. This Steering Group acts comprehensively above the level of the single projects, using a common basis of information.

Division OS3

Division OS3 is in charge of central controlling at BAAINBw, which means controlling across directorate and agency boundaries. This encompasses strategic controlling, project controlling, controlling of complex services, resource and agency controlling as well as supplementary efficiency reviews for selected government-owned companies.

On behalf of the BAAINBw Executive Group, the division performs superior-level project controlling in the form of periodic or event-related analyses and assessments regarding the progress of armaments projects and complex services. This is done on the basis of IT-supported project documentation, which includes the systematic identification and assessment of the project-related risks. As regards the standing preparatory committees for the Armaments Board at the State Secretary level, the project-specific inputs to be provided by BAAINBw for the Armaments Board at the Minister of Defense level and the biannual Armaments Report to Parliament, the division performs a coordinating function. Likewise, risk management at the level of the Director-General for Equipment in the Federal Ministry of Defense (FMoD) is supported through coordinating work. The division closely cooperates with the Project Controlling and Risk Management Group, which has been established in the FMoD as a body supporting the Commissioner for the Strategic Control of National and International Armaments Activities of the Bundeswehr.



Tasks of the Center of Expertise for Project Management

In addition to Category A and B projects, Division OS3 extends the risk management method also to Category C projects. To this end, preparatory committee meetings take place at BAAINBw Executive Group level. Division OS3 also assists the FMoD through intensive involvement in the training of the personnel working in the projects concerned.
BAAINBw strategic controlling supports the BAAINBw Executive Group's management process, which is geared toward medium-term and long-term objectives. In the future, not only BAAINBw will be considered, but a stronger focus will be placed on subordinate agencies. In addition, derivation, cascading and operationalization of objectives from the system of strategic objectives of the FMoD Executive Group are envisaged within the framework of decentralized controlling (extension of FMoD strategic controlling to the subordinate levels) in order to create the prerequisites for consistent top-down control.

Division OS4

Division OS4 is the central point of contact for BAAINBw project teams in matters concerning CPM and project management. To this end, the Division OS4 portfolio consists of the following elements:

- policy matters related to the Customer Product Management (CPM) procedural regulation and management of the CPM output process and
- the Center of Expertise for Project Management.

Customer Product Management
OS4 is responsible for implementing the requirements of CPM by preparing organizational procedures for BAAINBw and its area of responsibility. In addition, as part of process management, OS4 provides the manager for the output process called "Provision of Material Solutions in accordance with CPM", who is, among other things, responsible for modeling, maintaining and further developing the output process.

Center of Expertise for Project Management
The center of expertise for project management defines the standard for project management at BAAINBw. To this end, it provides standardized tools and advises the project teams on their selection and application in all project phases. The center of expertise is also responsible for further developing basic and advanced training of project team members. Part of the training is carried out by the center itself. All activities are supported by consistent knowledge management.

Division OS6

Division OS6 "Armaments Information Security, Information Security Officer (ISO) for the AIN organization, BAAINBw Information Security Officer" is in charge of the executive function of information security for the AIN major organizational element. This includes one particularity compared to other organizational areas. Apart from information security for the IT used and operated in the AIN organization, AIN is also responsible for preventive information security of the IT systems procured for the users in the context of armaments. This results in the following dualism of Armaments Chief Information Security Officer (CISO) and Information Security Officer:

Armaments CISO
The Armaments Chief Information Security Officer fulfills cross-project and interdisciplinary information security tasks with regard to armaments projects and BAAINBw products and services. To this end, he performs a coordinating function within BAAINBw and, at the same time, ensures that the required assistance is provided to the other organizational areas. His duties are in particular:

- advising the BAAINBw Executive Group on questions relating to information security in armaments projects
- preparing and maintening a situation picture with respect to information security in armaments projects
- providing advice and support to project managers regarding the CPM project element of information security

AIN ISO
The information security officer of the AIN major organizational element monitors the security-compatible use of IT and crypto systems at BAAINBw and the eleven agencies of the AIN organization. He issues requirements for the entire area and thus creates confidence in the information security officers of the agencies with respect to their actions and generates and consolidates consciousness for information security among the staff members.
The focus is on bringing information security requirements in line with the needs and concerns of the Bundeswehr technical centers, enforcing them and, if required, showing specific solutions. Important tasks in this field are:

- providing advice and support to the ordering superior(s) as well as to the information security officers of the agencies regarding all matters of information security including IT risk management,
- managing the information security situation specific to the organizational area,
- identifying regulatory gaps in information security and preparing requirements, recommendations and instructions for actions regarding these gaps for the respective areas of responsibility,
- processing information security incidents in the AIN organization.

AIN Press and Information Center (PIZ AIN)

The AIN Press and Information Center is responsible for all internal and external communication of the AIN major organizational element and, to this end, cooperates directly with the Federal Ministry of Defense Press and Information Office.
The AIN Press and Information Center acts as primary point of contact for all questions that are raised by media representatives as well as citizens and that concern the scope of AIN tasks. Its tasks do not only include coordinating and controlling all measures in the area of information activities but also, among others, actively informing the media on matters of interest and drawing up articles for various specialist journals in cooperation with the respective BAAINBw experts. PIZ AIN works together with authorities, institutions and multipliers and is responsible for the organization of events that are important for visibility and external image. Furthermore, it is also in charge of the central online services of the AIN organization with respect to external and internal communication. Preparing its own editorial contributions as well as the cooperation with other Bundeswehr media are also part of its broad spectrum of tasks, just like giving advice to heads of agencies regarding questions on public affairs activities. ■

The VJTF Staff (Very High Readiness Joint Task Force)

In June 2018, BAAINBw first established a VJTF working group/task force to coordinate the satisfaction of materiel requirements for VJTF 2019. Based on this, the VJTF staff element was formally included in the organisation, effective from 1 March 2019.

The VJTF Staff directly reports to the BAAINBw Executive Group.

At this Executive Group level, the representative for VJTF (Brigade General level), acting in a secondary capacity, is tasked with the level-appropriate external representation and has directive authority over all offices of the Major Organizational Element "Equipment, Information Technology and In-Service Support", abbreviated AIN.

The VJTF Staff is responsible for operation preparations in terms of the materiel build-up of the German forces in VJTF, which has a high priority on a national level. It is also responsible for control and coordination within the Major Organizational Element AIN.

The VJTF Staff is the central point of contact in VJTF capability development bodies on the levels of the Ministry of Defense, the Bundeswehr Office for Defense Planning and the Major Organizational Elements. In terms of requirement satisfaction, it also supports the timely provision of materiel for VJTF forces.

Furthermore, the VJTF Staff advises, supports and informs the Executive Group level and the BAAINBw directorates in matters relating to VJTF, generates an operational picture of the status of materiel requirement satisfaction and develops recommendations for action for BAAINBw.

In September 2014, the heads of state and government of the NATO countries decided to set up the VJTF as part of the "NATO Readiness Action Plan".

The aim was to increase the NATO Response Force (NRF) personnel strength to 40, 000 troops, and to create a coherent force package of worldwide deployable, interoperable, and sustainable forces who meet NATO's levels of ambition regarding equipment, training/exercise, and command and control. This force package was extended to include the rapid response component "Very High Readiness Joint Task Force" (VJTF).

VJTF forces are capable of operating anywhere in the world within a few days. They are comprised of land forces up to brigade strength, and, in addition, of forces from the air force, navy and special and support forces which makes them the spearhead of NATO as, in the stand-by phase, they are deployable anywhere they are needed within 48 to 72 hours.

The VJTF organization is based on a three-year rotation cycle, divided into "stand-up phase", "stand-by phase" and "stand-down phase". The forces in the "stand-up phase" and the "stand-down phase" are the so-called Initial Follow-on Forces Groups (IFFG) with a response time of 30 to 45 days, to support the forces of the "stand-by phase" at need.

After 2019, Germany as framework nation for VJTF (L) will again assume command responsibility in 2023. This means that German forces are integrated in the NRF/VJTF cycle 2022-2024.

To apply the principle "Train as you fight!" it will be necessary to train and certify these forces both nationally and internationally by the end of 2021. The necessary capabilities concerning materiel must, therefore, be provided with the support of BAAINBw as soon as possible, and by the end of 2021 at the latest. This means identifying those projects which can be realized before the start of the "stand-up phase", with a view to the defense budget and defense technology.

Projects which cannot be realized will be replaced by appropriate systems in use, in close cooperation with the Federal Ministry of Defense Directorate-General for Planning and the Bundeswehr Office for Defense Planning. In exceptional cases, the Ministry will waive individual materiel capabilities.

The VJTF Staff's main task, in close cooperation with the Bundeswehr Office for Defense Planning, will be to closely monitor already planned measures to develop materiel capabilities for the VJTF, with a view to ensuring their implementation and, therefore, their availability according to plan.

This is why it became urgently necessary to set up the coordinating VJTF staff element within BAAINBw in the course of providing VJTF 2019 with the required materiel, because this entailed comprehensive harmonization processes in VJTF panels up to Lieutenant General level, needing level-appropriate specialist support which again led to procurement tasks for the procurement office, requiring control and supervision. This will ensure the timely realization of new projects, maintenance of operational maturity of products during their service life, as well as the necessary provision of services. In this way, BAAINBw with all its directorates and the VJTF Staff, can support the German contribution to the VJTF in terms of materiel, in a targeted way and the best possible manner. ■

A Further Insight

One-on-One with Major General Gert Nultsch, Vice President of BAAINBw and VJTF Commissioner (Bea VJTF)

Photo: BAAINBw

ESD: YYou are the representative for VJTF at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support, BAAINBw for short. What does this position entail and just how challenging do you find it at this point in time? Is it possible to fully accomplish the materiel planning (including the necessary training), and which projects do you consider to be critical?

Nultsch: Since October 2019, I have been the representative for VJTF in BAAINBw, in addition to my duties as Deputy Director-General of BAAINBw.

The representative for VJTF coordinates all measures in BAAINBw relating to the the national contribution of the Bundeswehr to VJTF (Very High Readiness Task Force) in terms of materiel - politically a high priority.

To manage all the control and coordination tasks related to this, I have the support of the VJTF Staff in BAAINBw. The VJTF is a new challenge of the highest priority for BAAINBw, both from a defense technology and an economic point of view.

As representative for VJTF, I - together with my VJTF Staff - constantly supervise the timely satisfaction of VJTF materiel requirements.

It is the aim of BAAINBw to supply the national forces in VJTF with the required materiel in a timely manner and give the necessary service support, all in close cooperation with the major organisational elements, the force and financial planners within the Federal Ministry of Defense, the Bundeswehr Office for Defense Planning and also in cooperation with industry.

The interview was conducted by Michael Horst.

Legal Affairs Staff (J)

The Legal Affairs Staff, a staff element within the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), is in charge of quality assurance for contract award documents of major projects and also plays an essential role in the continuous modernization of contract management as part of the Bundeswehr procurement system. It is subdivided into the Branches J1 (procurement law), J2 (contract law policy), J3 (intellectual property rights, statement of work policy), and J4 (external support services).

Branch J1 is responsible for all general matters regarding procurement law. In particular, this includes advice on all procurement law matters for the project directorates and the BAAINBw executive group, the processing of internal work instructions, the review of individual decisions in the procurement process as well as the representation of the Office before the procurement review bodies.

Branch J2 is responsible for contract law policy matters. Besides contract counseling for the individual contract branches in the field of civil law, J2's policy development work especially involves the continuous updating of model contracts for contracts with an estimated contract value of less than 25 million euros.

Branch J3 is responsible for the functional area of Intellectual Property Rights (IPR). In this connection, the branch provides advice on user rights regulations in contracts in individual cases and also especially in the context of quality assurance in major projects. This includes regulations in the field of copyright, software, industrial property rights and/or technical know-how. In addition, J3 is responsible for principles regarding the preparation of statements of work.

Branch J4 is in charge of processing external support services rendered by industry and consultant services. One of the main tasks of the Legal Affairs Staff and its individual branches, which work in close cooperation with each other, is to perform quality assurance in their respective areas of expertise for projects with an estimated contract value of more than 25 million euros ("major projects").

This task begins as early as with the decision on the contract award procedure and ends with the finalized contract. The Legal Affairs Staff closely accompanies the various stages of this entire process, such as contract preparation, invitation to tender, contract negotiation and contract conclusion. Further, it supports the project legal advisors in their tasks and advises the project managers on the preparation of the statement of work as the centerpiece of the contract award documents.

The Legal Affairs Staff is not only responsible for quality assurance of contract documents but also for other tasks, especially with regard to general contracting policy matters. In this context, the Legal Affairs Staff's main task is to continuously modernize contract management within BAAINBw. An efficient procurement process must be able to guarantee timely availability of defense materiel and comply with all the quality requirements applicable to military equipment at economic conditions.

Contract restructuring is therefore required to ensure adequate risk distribution and promote autonomous implementation by industry. In addition to issues of digitalization and simplification in contract processing, the Legal Affairs Staff deals with further innovative approaches to contracting such as Performance-Based Contracting (PBC). The main goal is to improve availability, thereby promoting materiel readiness. ■

PMO – Program Organization

The Program Organization (PMO) combines the project management for the key armaments projects MKS 180 multi-role combat ship, tactical air defense system (Taktisches Luftverteidigungssystem, TLVS) and the European MALE RPAS in one structure optimized for the specific tasks to be performed. Specialists from various fields with technical, economic and legal expertise are directly assigned to the respective project and can focus exclusively on their project by performing their project-related tasks in a largely independent manner.

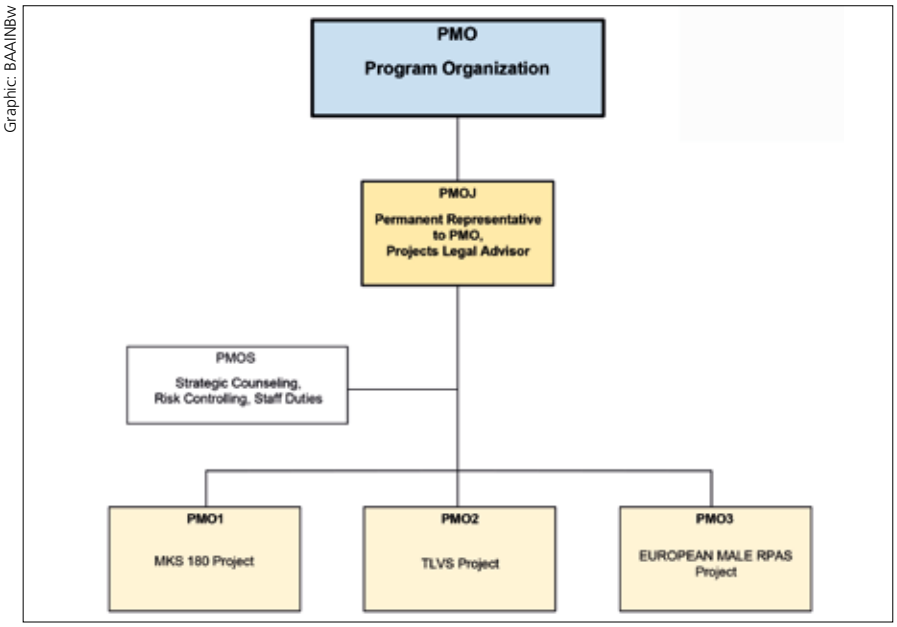
A comprehensive modernization of armaments procurement, known as the Armaments Agenda, was initiated on the basis of the 2014 "Comprehensive survey and risk analysis of major armaments projects". The results included the decision in 2015 to set up a program organization, which was implemented in 2016 within the scope of the restructuring of BAAINBw. This organizational structure serves the purpose of allowing for a better consideration of the differences and special characteristics of the three major armaments projects mentioned above.

The PMO responds to the demands of these strategically important projects by having specialists from various fields cooperate with a direct focus on the projects. The organizational consolidation promotes close information exchange and optimized coordination of technical, economic and legal aspects. In addition, the flat hierarchy in connection with the assignment to the "Selected Armaments Projects Functional Supervision Group", which reports directly to the State Secretary for armaments at the Federal Ministry of Defense (FMOD), allows for an immediate and swift management. The PMO director's right to direct access to the State Secretary is a visible sign of this flat hierarchy.

The PMO is organized into four divisions and a staff element. Three divisions (PMO1, 2, 3) are responsible for the projects. A fourth division (PMOJ), which incorporates the PMO's legal and economic expertise, is led by the projects legal advisor. Each of these experts is permanently assigned to a particular project.

The position of the PMO director corresponds to that of a BAAINBw director, including the pertinent executive functions. He is in charge of providing an overview of the current situation of each project and is a member of the project-related steering bodies at the Federal Ministry of Defense (FMOD). The projects legal advisor supports him in his capacity as deputy director and is thus not only responsible for the timely and proper legal management of the projects, but also has managerial responsibility in the PMO. The establishment of this new organizational form has provided the foundations for modern armaments management methods to be implemented in the three projects.

Graphic: BAAINBw



As an integral part of BAAINBw, the PMO also requires the expertise represented in the Office's policy and intersectional divisions for project and contract management.

The profoundly different challenges to be faced in connection with the three projects have demonstrated that this new organizational structure offers enormous potential and ensures an efficient and effective project management.

PMO1 – MKS 180 Multi-Role Combat Ship

As the future modular, maritime capability platform, the MKS 180 is to help maintain and complete the capabilities required in the maritime engagement network within the German Navy's entire range of missions and tasks. This includes defense against air attacks as well as surface and underwater warfare. In addition, the MKS 180 ship will be capable of conducting sea-based operations, including command and control of special forces, and performing support functions such as fire support, maritime interdiction and medical support. This mission spectrum will preserve the capabilities of the Class 122 and 123 frigates. In order to be able to use the MKS 180 ships during a period of up to two years on deployment while, at the same time, significantly reducing the crew size compared with units in service, the MKS 180 project builds on the existing concepts of the class 125 frigate. It is planned to procure a total of four units, with an option for another two ships.

One special feature of the MKS 180 project is the award procedure that was selected. For the first time, a maritime procurement project of this size was put out to tender under a negotiated proce-

Photo: Damen

The MKS 180 Multi-Role Combat Ship will be capable of conducting sea-based operations, including command and control of special forces, and performing support functions such as fire support, maritime interdiction and medical support.

dure after a request for interest had been published at European level (§11 para 1 of the Public Procurement Regulation for the Areas of Defense and Security, VSVgV). The procedure was designed in such a way that it allowed an intensive exchange between the customer and the bidder to improve the content, e.g. the statement of work and the contract on the construction of the ship, in several bidding rounds.

The contract award documents place special importance on the processes to be installed at the bidder's and his subcontractors' organizations. These processes refer in particular to effective project management, which focuses on risk management jointly implemented by the future contractor and the customer. Another important process is the consistent application of life cycle cost (LCC) estimates when selecting specific components in order to minimize in-service costs from the beginning.

The results from the bidding rounds underlined the suitability of the approach chosen for the MKS 180 procurement project. The strengthened position of the contracting authority allowed negotiations and cooperation to take place on an equal footing. At the same time, it became evident that the contract award procedure in this dimension was an "exceptional" challenge for all parties involved.

The MKS 180 project director makes use of a structure within PMO1 that is based on the following task areas: platform systems, employment system, establishment of operational viability, processes and common project tasks.

Photo: BAAINBw

The European MALE RPAS project aims at developing an armed MALE class reconnaissance drone, which will be designed to carry modular payloads.

PMO1 aims at selecting an effective weapon system which is cost-efficient throughout its life cycle and implementing it together with an active and competent partner by means of a low-risk procurement process.

PMO2 – Tactical Air Defense System (TLVS)

A comprehensive stocktaking formally concluded the tri-national MEADS (Medium Extended Air Defense System) program in 2014. One year later, action was started to discontinue the NATO MEADS Management Agency (NAMEADSMA) and the international development contract. The results of almost ten years of development are available to the participating nations, USA, Italy and Germany, for follow-on activities.

A capability gap in ground-based air defense will arise at the end of the next decade. To close this gap, the Chief of Defense decided in June 2015 in favor of a MEADS-based solution for a future tactical air defense system (TLVS). The first contract negotiations with industry, a bidding consortium consisting of MBDA Deutschland GmbH and Lockheed Martin Corporation, started in May 2017 and resulted in a second request to TLVS industry in August 2018 to submit a modified, improved offer on the basis of the negotiation outcome. The offer was received by BAAINBw in June 2019 and was evaluated by the PMO2 experts. Based on the findings, a third request to submit an offer is currently being prepared.

A Further Insight

One-on-One with Martin Saas, Director BAAINBw and Head of the PMO Directorate

Photo: BAAINBw

ES&D: What are the advantages of assigning certain major projects to the PMO Directorate?
Saas: The advantage of assigning certain major projects to the Program Organization (PMO) is that these projects are pooled in one structure optimized for the specific tasks to be performed. Specialists from various fields with technical, economic and legal expertise are directly assigned to the respective project and can focus exclusively on that project by performing their project-related tasks in a largely independent manner. The establishment of this new organizational form has provided the foundations for modern armaments management methods.

ES&D: What were the most important developments for your Directorate in 2019?
Saas: Without any doubt, the submission of bids for the three projects the PMO Directorate is involved in: the MKS 180 multi-role combat ship, the tactical air defense system (taktisches Luftverteidigungssystem, TLVS) and the European MALE RPAS (medium-altitude long-endurance remotely piloted aircraft system). As the award procedures for these projects are still in progress, I cannot provide any information on their content, however.

ES&D: Which progress do you expect to achieve in your projects in 2020?
Saas: We hope that – once the evaluation of the submitted bids has been completed – we will be able to initiate the parliamentary participation procedure, which is required for projects with a value exceeding 25 million euros, and to subsequently sign the contracts.

The interview was conducted by Ulrich Renn.

In the wake of this selection decision, the Chief of Defense imposed obligations to examine the development risks regarding the implementation of the TLVS project, which were identified in the proposed solution, early enough to leave the door open for an opt-out in case of problems with technical feasibility, within an acceptable cost benefit ratio. The relevant technical examinations have, in the meantime, been concluded.
The foreseeable high complexity of the future ground-based air defense system, which has a large number of different subcomponents, also calls for innovative approaches within the organization of the contracting authority. At a very early stage it became clear that the team that had worked on the predecessor project MEADS would not be large enough to accomplish the upcoming tasks of the TLVS project in light of its scope and structure, not least because, unlike the MEADS program, the national TLVS project does not involve a comparable agency such as NAMEADSMA.
The following five major specialist technical areas were set up:

- System engineering and system architecture
- Effectors and sensors
- CCI and weapons control systems
- Communication system
- Integration management and compliance demonstration

In addition, overall responsibility for technical implementation was transferred to a chief engineer and the post of a TLVS system engineer, who acts as a connecting link and coordinator between the technical areas mentioned above, was created.
An analogous approach was taken in the field of project management, resulting in the establishment of the following areas:

- Logistics and establishment of operational viability
- Quality and schedule management
- Budget planning, reporting and risk management
- Configuration and obsolescence management

Additionally, the high reliability of TLVS on the tri-nationally procured MEADS technology, US "Foreign Military Sales" contracts and the projected inclusion of other international partners in the project made it necessary to establish an independent „International Cooperation" element.

Photo: MBDA

The Tactical Air Defense System

PMO3 – European MALE RPAS

In September 2016, Germany, France, Italy and Spain started a definition study for the development of a European drone. Germany has taken a leading role in this European project for an armed MALE class reconnaissance drone, which will be designed to carry modular payloads.
The national EURODRONE project consists of the multinational OCCAR project "European MALE RPAS" (European Medium Altitude Long Endurance Remotely Piloted Aerial System) as well as national elements envisaged to fulfill all requirements of the German armed forces. OCCAR (Organisation Conjointe de Coopération en Matière d'Armement) was entrusted with the multinational project management. Division PMO3 was esta-

blished within the PMO directorate in order to perform national tasks of the EURODRONE project and to implement national requirements within the multinational project "European MALE RPAS". Unlike in previous multinational development projects, the participating nations agreed on the development of one drone that will be certified according to common standards, but still at national level. This is what the directors of the respective military certification authorities of the partner nations determined. Apart from that, the heads of the national military certification authorities decided to realize also the participation in general air traffic in Germany and Europe via a step-by-step approach with respect to the regulatory and technical possibilities. The objective is to overcome the limitations of the previous MALE systems regarding their (exercise) activities in Europe.

During the initial phase of the definition study, the participating nations agreed on the main capability parameters and requirements taking into account the resulting life-cycle costs. The requirements were defined in the System Requirement Review. Based on this, the work was continued during the second phase of the definition study and key elements of the system design were defined within the scope of numerous trade-off analyses. In December 2018, a preliminary design at system level was defined during the System Preliminary Design Review, which is the starting point for the development. In parallel with the definition study, the documents required by the nations were either prepared or are currently being prepared. For Germany, the required documents are laid down in the CPM (Customer Product Management) regulations and include the FFF document (Fähigkeitslücke und Funktionale Forderung, Capability Gap and Functional Requirement) as of 2018 as well as the Selection Decision document signed at the beginning of 2020. The Selection Decision is taken by the Chief of Staff, Bundeswehr, based on a solution proposed by BAAINBw.

In October 2018, the industry involved in the definition study was requested by OCCAR to submit an offer on the development, the procurement and the industrial support required at the beginning of the in-service phase. Airbus Defence & Space Deutschland GmbH will be the main contractor. Dassault Aviation (France), Leonardo (Italy) and Airbus Defence & Space S.A.U (Spain) will be the main subcontractors.

The lead nation principle, which was successfully applied in the definition study, is to be continued in the next stages of the project when Germany with its industry and government representatives will continue to act as lead nation.

The participating nations wish to seek financial support for the project from the EU Defense Industrial Development Program (which is part of the European Defense Fund) and are preparing the necessary steps together with industry, OCCAR and the European Commission. In addition, Germany has suggested the project as a PESCO (Permanent Structured Cooperation) project, with a particular focus on a joint, European operation of the European MALE RPAS.

The finalized contract on the development, the procurement and the industrial support required at the beginning of the in-service phase as well as the multinational agreement on the collaboration is planned to be submitted to the German parliament, the Bundestag, for approval in autumn 2020. ■

Combat Directorate (K)

Weapon systems and related components are the main tasks of the Combat Directorate within BAAINBw. Apart from main battle tanks and armored transport vehicles, it manages various armament, air defense and artillery system projects. The Combat Directorate's task spectrum also comprises infantry and engineer systems.

Three project divisions comprise the expertise of BAAINBw for the following areas:

- land-based air defense, guided missiles for ships and aircraft, dropped ordnance, antitank defense (Division K4 with five branches)
- armored combat and transport systems, bridges and crossing equipment (Division K5 with six branches) as well as
- gun systems, ammunition and explosive ordnance/explosive ordnance disposal (Division K6 with five branches)

It does not only comprise the realization of new projects but also in-service use tasks for all projects introduced.

Photo: BAAINBw

The PARS 3 LR, MELLS, WIRKMITTEL 90 and the WIRKMITTEL 1800+ projects represent the main activities with regard to anti-tank defence.

The cross-sectional divisions Economic and Technical Affairs (K1) and Economic and Legal Affairs (K2) support these three project divisions in performing their comprehensive tasks in the fields of project and in-service support management as well as research and technology. Furthermore, the K Directorate is supported by the Directorate Staff (KAS) and the Directorate Controlling (KAC) elements.

The Directorate Staff (KAS) is responsible for all central, organizational and administrative tasks in the areas of personnel, initial and advanced training as well as organization within the Directorate. In this function, the Directorate Staff is the central point of contact for the entire Directorate personnel and the interface with the other BAAINBw directorates.

The Directorate Controlling (KAC) as command support element determines and analyzes main project and performance data to prepare decisions to be made by the executive group. Its main tasks are strategic controlling, project controlling, budget and resources controlling as well as risk management.

The Economic and Technical Affairs Division (K1)

The Economic and Technical Affairs Division (K1) supports the Directorate in all technical-economic matters that affect more than one project. The chief of division is responsible for planning and realizing all research and technology activities in the field of land-based weapon systems.

Division K1 will be divided into the following four branches:

Branch K1.1 is the central armament, in-service use and logistics element for the Combat Directorate. This comprises all cross-sectional tasks in the fields of armaments management, in-service use and logistics of Directorate-specific defense materiel. In addition, the task spectrum of Branch K1.1 also includes ensuring ammunition safety and central tasks as regards the use of ammunition. Another important task is the functional supervision of the Bundeswehr Technical Center for Protective and Special Technologies (WTD 52) in Oberjettenberg (Bavaria) and the Bundeswehr Technical Center for Weapons and Ammunition (WTD 91) in Meppen.

Furthermore, Branch K1.1 is responsible for planning and coordinating initial and advanced training of Directorate K personnel. This includes e.g. the practical training of candidates for the technical administrative service career, practical training required within the scope of technical studies as well as support of practical papers and bachelor's dissertations.

Branch K1.2 coordinates the research and technology tasks for land systems and performs the related system-relevant technological studies. This includes coordinating all fields of technology within the "land systems" area of responsibility for land-based platforms, systems armament, missiles and counter-UAS, directed-energy weapon systems and air defense as well as international cooperation. The technological studies are focused on threat analyses, assessment of weapon effectiveness, risk areas of deployment, vulnerability models, innovative protection technologies, vehicle and systems electronics, gun systems, missile archi-

tectures, counter-UAS, hypersonic missiles, counter-UAS, laser effectors, air defense and simulation.
Branch K1.3 as national safety board is responsible for the introduction of new fuzes/fuzing systems into the Bundeswehr. In this context, the Branch is responsible for the safety assessment and qualification of new or modified systems and their components (explosive devices etc.). Furthermore, Branch K1.3 realizes procurement projects in the field of fuzes and performs the strategic planning, tasking and assessment of related R&D studies. In addition, Branch K1.3 is responsible for preparing and updating the Interactive Electronic Technical Documentation (IETD) for weapon systems and equipment supervised/managed by the Combat Directorate. Furthermore, Branch K1.3 is the central support element of the Combat Directorate regarding maintenance of master data in SASPF, introduction of SASPF (EFO/ENO) and data processing (including support of project-specific data processing within the Combat Directorate).
Branch K1.4 is responsible for the overall coordination of Joint Fire Support (JFS). In this context, the joint projects "Tactical Data Link Interface Team Module (TDL ITM)" are realized in cooperation with the associated joint situation center at divisional level (Joint Fire Support Coordination Group, JFSCG). The "classical" elements of indirect fire, the so-called "dismounted Joint Fire Support Team" - a network-enabled successor of the "forward observer" - as well as the Joint Fire Coordination Team (JFCT), the artillery's "fire control vehicle" on the basis of the FUCHS armored transport vehicle, are also handled by K1.4.

Division K2 "Economic and Legal Affairs"

The five branches within Division K2 "Economic and Legal Affairs" are in charge of contract management and contract award for the Combat Directorate. These branches manage contracts for the individual projects within the Directorate's area of responsibility. This includes contracts on the in-service phase of defense materiel. Furthermore, the contract branches support the projects by concluding national and international agreements. Branch K2.1 is mainly responsible for spare parts supply and repairs as well as R&T and supports the Bundeswehr Technical Centers WTD 52 and WTD 91 in contractual matters. Branch K2.2 predominantly supports the projects of Division K5; Branch K2.3 supports those of Division K4 and Branch K2.4 those of Division K6. Branch K2.5 is specialized in matters of pricing regulations for public contracts and in charge of negotiating prices with contractors.

Division K4 "Air Defence, Guided Missiles for Ships and Aircraft, Airdropped Ammunition, Antitank Warfare"

Division K4 is the competence center for guided missiles of the Combat Directorate.
Branch K4.1 deals with antitank systems, aircraft-based guided missiles engaging targets on the ground and airdropped ammunition (guided and unguided bombs).
In the field of antitank defense, the projects PARS 3 LR, MELLS, the weapon system "Wirkmittel 90 mm" as well as the future weapon system "Wirkmittel 1800+" constitute essential activities.
The essential tasks in the field of aircraft-based guided missiles are specified by the "SEAD capability maintenance" requirements for the TORNADO and "short-range powered effectors" requirements for the EUROFIGHTER. Current projects in the field of airdropped ammunition include the GBU-54 (Guided Bomb Unit) and the Mk-83 TIP.
Branch K4.2 is responsible for the ship-based missile systems RAM, NSSM, ESSM, SM-2, HARPOON and RBS 15. Further activities include active self-defense systems of submarines with missiles that can be fired by the submarine. The German Navy's long-range guided anti-ship/land attack missiles are developed and procured within the scope of a bilateral cooperation project with Norway.
Branch K4.3 deals with aircraft-based missiles for the engagement of air targets. Currently, this concerns the projects METEOR, IRIS-T, AMRAAM and SIDEWINDER.
Branch K4.4 deals with the PATRIOT projects, the Surface-to-Air Missile Operations Center SAMOC as well as air defense simulators. With regard to PATRIOT, focal points are the control of in-service support for systems fielded into the Bundeswehr, further upgrades and necessary adjustments to new operational scenarios until its replacement by the new air defense system (TLVS). The SAMOC provides the capability to connect individual systems and higher operations centers and to establish a joint situation picture.
Branch K4.5 is responsible for the short-range surface-to-air weapon systems MANTIS NBS C-RAM and the light air defense system (including the STINGER guided missile). MANTIS is a stationary short-range air defense gun system primarily used for the protection of field camps. Apart from classical air defense targets such as aircraft and helicopters, it is also used to engage so-called RAM targets (rockets, artillery and mortar).

Division K5 " Armored Combat and Transport Systems"

Division K5 "Armored Combat and Transport Systems" is divided into the following branches:
The main focus of Branch K5.1 is still on the modernization of altogether 104 LEOPARD 2 main battle tanks to the most recent LEOPARD 2 A7 version. Moreover, Branch K5.1 deals with vehicles of the LEOPARD 1 fleet (BIBER, DACHS, ARV 2 LS) as well as with the armored engineer vehicle project (successor of the AEV DACHS).

Photo: Diehl Defence

Branch K6.1 is working on the modernisation of the PzH 2000 self-propelled howitzer, the standard gun of the German artillery, which is to be given the ability to fire the planned VULCANO guided munitions.

Branch K5.2 has reported about the PUMA armored infantry fighting vehicle several times. Another focus is on the planned service life extension of the MARDER armored infantry fighting vehicle.
Branch K5.3 "Heavy Weapon Carriers/Armored Transport Vehicles" deals with the BOXER multi-role armored vehicle and the FUCHS 1 armored transport vehicle.

The main focus of the work conducted by Branch K5.4 is on dealing with the extensive in-service support tasks of the FENNEK weapon system which is currently in use both in Mali and in Afghanistan. Furthermore, the Branch works on the development of measures to extend the in-service life of the WIESEL 1 fleet, the construction of a system and function demonstrator "Airmobile Weapon Carrier" as a replacement for the WIESEL 1 fleet from 2025 onwards as well as on the successor system for the BV 206 S and D vehicles.
The task spectrum of Branch K5.5 „Bridges and Crossing Equipment" comprises bridges, ferries, footbridges and light crossing equipment and also the systems which are closely linked to them in terms of functional dependencies, namely systems designed to improve the trafficability of soils like the folding trackway. One particular feature of this Branch is that it also calculates and determines the Military Load Classes (MLC) of Bundeswehr vehicles.

Branch K5.6 is responsible for the bilateral Franco-German Main Ground Combat System (MGCS) project, which is intended to replace the LEOPARD 2 and LECLERC main battle tanks from 2035 onwards.

Division K6 – Guns, Ammunition, Ordnance and Ordnance Disposal Systems

Division K6 deals with small, medium and large caliber guns of the Bundeswehr, including their corresponding ammunition as well as explosive ordnances and explosive ordnance disposal systems.
Branch K6.1 is tasked with the PzH 2000 self-propelled howitzer, the MARS rocket launcher, the ARES artillery rocket control system and the mortars as weapon systems for indirect fire support of the Army. The PzH 2000 self-propelled howitzer is the standard gun of the German artillery and

A Further Insight

One-on-One with Brigadier General Thorsten Puschmann, Head of the Combat Directorate (Directorate K)

ES&D: How challenging does the Combat Directorate find the VJTF (Land) 2023 material requirements, and which projects are affected?
Puschmann: The material requirements for VJTF 2023 place high demands on the Directorate and, of course, its entire portfolio. This concerns weapons and ammunition as well as vehicles or engineer equipment, for example. We have accepted this effort as a high-priority task which is actively pursued by all members of the Directorate. To this end, extensive system interrelations must be considered and coordinated to achieve the deadline. The improvement of the VJTF command and control capability, which is the responsibility of another Directorate, means, for example, that we have to establish the prerequisites for installing the hardware and software into the FUCHS ATV and other affected vehicles in a timely manner. This involves the consideration of certification-related aspects like seats, restraints, axle loads, escape routes, EMC tests, IT security as well as the timely establishment of the logistic principles – to name just a few aspects of our challenges and daily work.

ES&D: The first LEOPARD 2 A7V MBT was handed over to the Bundeswehr in October 2019. Have other capability enhancements been planned for the LEOPARD 2 main battle tank fleet?
Puschmann: The Main Ground Combat System – MGCS – has been envisioned to replace the LEOPARD MBT in a binational project with France. The planning of any additional capability enhancements will, of course, be based on the entire replacement planning, not just the first MGCS. In other words, when will the last LEOPARD 2 MBT be replaced by the successor system? Until that time, it must be kept in operational readiness and appropriate to the threats. Since this question cannot be answered reliably at this time, we are actually looking into possible measures and technologies together with the Army. On the one hand, we see that the tank still has potential. On the other hand, its limits are also becoming evident. Beyond a package to remove obsolescence, we are thus far from any concrete plans.

ES&D: What is the current status of the realization of the second lot in the Puma project?
Puschmann:
Puschmann: To provide the armored infantry with all the equipment required to perform its tasks, plans to procure a second lot of PUMA AIFV are currently pursued and put in concrete terms.
The plans to procure the second lot must also be considered with a view to the upgrades of the first lot of PUMA AIFVs that are required to achieve full operational capability (FOC). A large number of vehicles will be in industry workshops for the upgrades, and this lack of vehicles in the troops will then have to be compensated by the second lot.
According to current plans, the first vehicles of the second lot will be fielded already in 2023 with a significantly improved capability profile compared to the present condition. The PUMA AIFV which will have all capabilities and system components required to achieve full operational capability (FOC) will be available from 2025 according to current plans.

ES&D: Are there any new ideas to achieve an appropriately high protection level for the main battle tanks and armored infantry fighting vehicles, also in view of the threats in national and collective defense that are posed by large KE projectiles, for example?
Puschmann: Our experts are continuously dealing with new or changed threat situations. To this end, these threats must both be analyzed technologically and at a regional level in potential scenarios. From these analyses, possible needs for action must then by derived. In the last twenty years, the focus of effort has shifted several times. Even though the orientation towards national and collective defense intensifies the duel situation and thus the traditional KE threat to MBTs, we are also seeing new challenges like the threat posed by mini-drones. In the end, our goal is to ensure the optimum overall protection and to continuously gear the overall protection concept towards the changing threat spectrum. KE protection is certainly one aspect to be considered but not the only one.

The interview was conducted by Michael Horst.

has also been fielded in five other nations. International logistic support is provided by the NATO Support and Procurement Agency (NSPA). Firing of the planned VULCANO guided munition is planned as one of the modernization measures.

Branch K6.2 is responsible for personal and small-arms weapons, the appropriate ammunition, pyrotechnic ammunition, hand grenades and nonlethal weapons. In this context, the Branch deals with the Bundeswehr assault rifle project.

Branch K6.3 works e.g. on the following projects: heavy machine gun, programmable 40 mm airburst ammunition (automatic grenade launcher), programmable 30 mm airburst ammunition (PUMA AIFV) and 30 mm ammunition with reduced range for training purposes as well as naval ordnance including all Navy guns from 12.7 to 127 mm.

Improvised explosive devices (IED) have increasingly been a threat to our soldiers in many of the Bundeswehr countries of deployment. Protection against these threats is a main focus of Branch K6.4. The FUCHS KAI ATV project improves the capability of mechanized explosive ordnance and IED disposal from a protected position, in particular in the vicinity of roads and infrastructure (buildings, bridges).

Photo: Rolf Hilmes

The main focus of Branch K5.1 is still on the modernization of altogether 104 LEOPARD 2 main battle tanks to the most recent LEOPARD 2 A7 version.

The procurement of large-caliber tank, artillery and mortar ammunition is carried out by Branch K6.5. Relevant ammunition will, by means of regeneration, always be adapted to the state of the art and the operational requirements and will be fielded upon completion of the risk reduction phase. Currently, the fielding of guided artillery ammunition in the Army and Navy is being prepared. In the field of naval ammunition this will be ensured by the 127 mm VULCANO ammunition for joint fire support by the F125 frigate from sea to land. In addition, the unguided 127 mm standard ammunition is currently being qualified. As far as the Army's capability of point target engagement is concerned, the VULCANO 155 mm GPS/SAL (Semi Active Laser) is intended for use with the PzH 2000 self-propelled howitzer. ■

Land Support Directorate (U)

The Land Support Directorate (U) of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) handles a very wide spectrum of tasks, ranging from individual equipment for Special Forces, security technology, military camps, medical equipment, CBRN protection, military wheeled vehicles, special vehicles and equipment to EW (electronic warfare), reconnaissance, air traffic control, robotics and training/simulation.

In addition, the Land Support Directorate exercises the general functional supervision over the Bundeswehr Technical Center for Automotive and Armored Vehicles (WTD 41) in Trier, the Bundeswehr Research Institute for Protective Technologies and NBC Protection (WIS) in Munster and the Bundeswehr Research Institute for Materials, Explosives, Fuels, and Lubricants (WIWeB) in Erding.

Photo: Bundeswehr

The new trucks of the Central Exhibition and Event Marketing of the German Armed Forces are almost 17 metres long, almost seven metres high and nine metres wide when assembled and offer entirely new ways for information and advice on two floors.

As in other directorates, the core tasks of the Land Support Directorate include:

- project management in accordance with CPM (Customer Product Management) throughout the entire life cycle of the materiel,
- systems engineering, and integration,
- research and technology,
- contract management and price negotiations.

Compared to the other directorates in which project work is carried out, specific characteristics of the Land Support Directorate are:

- an unusually broad spectrum of technology-related tasks,
- a large number of projects, many of them small-scale,
- distinctive procurement activities, in particular fast-track initiatives for operations.

The U Directorate is supported by the Directorate Staff (UAS) and the Directorate Controlling (UAC).

Project work is done in five project divisions with a total of 24 branches, with support from the Economic and Technical Affairs (U1) and Economic and Legal Affairs (U2) divisions.

Economic and Technical Affairs

The Economic and Technical Affairs division (U1) performs general, overarching tasks for the projects and the Directorate's management level. The U1 division with its four branches serves as the Directorate's central point of contact for the following:

- U1.1: Situation picture on equipment, in-service support and IT, POC in analysis phase I towards the Bundeswehr Office for Defense Planning, operational and user support for SASPF, coordination and IT architecture support across projects, IT security concepts and databases;
- U1.2: Central process support and control within Directorate U, IETD support, terminology;
- U1.3: General functional supervision of WTD 41, WIS and WIWeB, R&T coordination (AB 50), coordination of legal regulations, in particular REACH;
- U1.4: Expert team for coordination and support of master data processing, master data process control for systems in use/SASPF.

Economic and Legal Affairs

The Economic and Legal Affairs division (U2) with its six branches is responsible for contract management and price negotiations for the project divisions, and is organized as follows:

- U2.1 to U2.5: Contract management for project divisions U3 to U7;
- U2.6: Price negotiations.
- The five project divisions carry out project work in accordance with CPM throughout the entire life cycle of the materiel (realization, in-service use, segregation), as listed below:
- U3: Camp technology, camp protection and supply, CBRN material and medical equipment, Mountain infantry and military police equipment, Special forces individual equipment;
- U4: Protected wheeled vehicles, Special vehicles & equipment, Integration, Protection, R&T processing;
- U5: Ground-based EW (electronic warfare) / SIGINT and electronic gathering measures; Ground-based radar reconnaissance, tactical air command and control service and identification, Air traffic control, Optics/optronics for ground-based reconnaissance / Future Infantryman system / FAC/SOTAC,

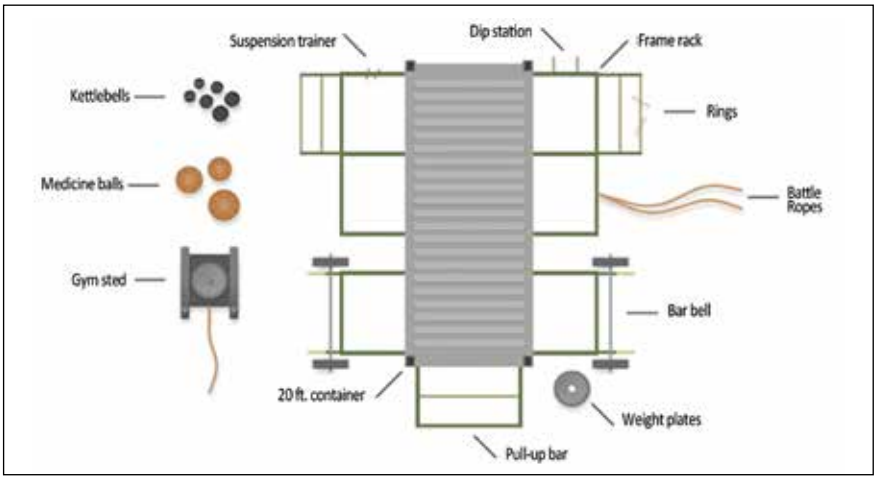
Media technology (Bundeswehr operational communication, public affairs, general),

Positioning, navigation and timing (PNT), Space surveillance and reconnaissance;

- U6: Training technology, Simulation, Robotics;
- U7: Military pharmacy, Medical treatment facilities and medical equipment, Digital transformation of Bundeswehr health care.

The following will provide an overview of selected projects of the Directorate.

U3.1: Achieving and Maintaining Physical Fitness – Material Component (HuEdKLF)



Graphic: Bundeswehr/

Typical design of a part of the fitness centre on the basis of a 20-foot container

Using gasoline cans as dumbbells, doing pull-ups on a roof strut of the accommodation container, exercising your calves on a transport box? With the new exercise equipment, soldiers will no longer need to improvise or make inventive use of the items at hand.

There are few jobs as physically challenging as that of the soldier – be it on long marches, when tackling obstacles while carrying heavy field packs, or while driving through difficult terrain at extreme temperatures. In order to cope with the enormous peak and constant strain, soldiers need a very high degree of physical fitness. Regular exercise is a crucial prerequisite for achieving and maintaining it. Doing sports is not only about exercise to ensure physical fitness, though. It also helps keep soldiers healthy in the long term, providing a much-needed balance to the mental and physical challenges of duties both in Germany and abroad. Young soldiers in particular have a great interest in physical fitness and state-of-the-art exercise opportunities. This is where cryptically named HuEdKLF (short for "Achieving and Maintaining Physical Fitness – Material Component"), a project by BAAINBw, comes in. The aim is to procure three systems differing in size and equipment: a small exercise box (for up to 5 people) and ISO containers of 10 and 20 ft, respectively, for bigger groups. Each of these systems will feature a large variety of sports equipment. This may include mo-

A Further Insight

One-on-One with Rainer Krug (M.Eng), Head of the Land Support Directorate

ESD: The Land Support Directorate is responsible for an unusually wide variety of tasks. What are the priorities in terms of procurement and in-service support in your area of responsibility?
Krug: VJTF 2023 is the current priority for the Land Support Directorate in terms of procurement and in-service support. Our goal is to ensure that the required procurement capabilities for VJTF 2023 are achieved on time and in accordance with the applicable requirements. Precisely due to its wide range of products, the Land Support Directorate is involved in various activities. Ensuring sustainability is one of the most important matters that we are working on; tactical ground mobility and operational accommodation are of great significance in this regard.

ESD: With regard to projects managed by Directorate U, what do you consider the biggest challenges regarding equipment and in-service support in order to provide the required materiel for VJTF 2023?
Krug: The very tight schedule is one of the main challenges regarding the provision of the equipment required for VJTF 2023. This is a major problem in the case of new equipment that has not yet been fielded in the Bundeswehr as all equipment will need to be made available to the armed forces by the end of 2020 to ensure proper training if it is to be used in the context of VJTF 2023. In addition, it is necessary to ensure that all products required for VJTF 2023 can be supported. In this context, ensuring the spare parts supply is of vital importance. This aspect must already be accounted for in procurement contracts.

ESD: The Bundeswehr has undergone a paradigm shift with a new focus on national and collective defense – while also having to fulfil its obligations within the context of international crisis management – and it is therefore once again necessary to ensure the armed forces are fully equipped. How does this affect the procurement and in-service support of the Directorate U projects?
Krug: In my opinion, providing sufficient quantities of the materiel needed to achieve new capabilities as well as procuring sufficient quantities in order to ensure that the Bundeswehr is fully equipped will be of particular importance. This applies to products already in the in-service use phase as well as to products that are still in the realization phase. In order to provide the required quantity of the materiel needed to ensure full equipment, BAAINBw aims at concluding open-end procurement contracts wherever possible. This allows us to be flexible and to place orders depending on the availability of budgetary funds.
It is essential that the functional requirements for materiel required to ensure new capabilities are clearly and definitively described in the analysis phase so that we can be flexible and act fast within the scope of the contracts to be concluded.

ESD: Tactical ground mobility projects fulfil essential tasks in all capability categories. What do you consider to be the future challenges in this area?
Krug: I believe we will be facing two challenges in terms of tactical ground mobility. In terms of the equipment required to ensure national and collective defense, we will need to determine and provide a healthy mix of both protected and unprotected vehicles depending on the requirements of each operation. Future vehicles will be able to feature both protected and unprotected driver's cabins, which will allow us to adapt these vehicles to tactical requirements, i.e. for the purposes of national and/or collective defense as well as for operations in the context of international Alliance commitments. The effects of the demographic development on Bundeswehr weapon systems will also become a challenge in the future. I am thinking in particular of the fact that we will not always have sufficient staff, for example to carry out transport tasks in operative scenarios. In my view, this illustrates both the opportunity and the necessity to implement technical concepts in connection with autonomous and/or partially autonomous vehicles. The need for qualified personnel could be reduced in appropriate operative settings, for example by using an "electronic tow bar", which describes a system of several vehicles controlled by electronic means following a lead vehicle.

ESD: How important are Fast-Track Initiatives for Operations in your directorate and what is your opinion of this procurement option?
Krug: Fast-Track Initiatives for Operations are an important tool to enable Bundeswehr personnel to perform their tasks while on deployment abroad. They therefore take strong precedence over other procurement measures. However, they must not replace any procedures that are part of the overall procurement procedure in accordance with CPM. They should not be too complex so that they can actually be implemented within the defined deadline.

The questions were asked by Michael Horst.

dern training equipment such as suspension trainers, gym hammers, or fascia trainers, but also classic sports equipment like medicine balls, skipping ropes, and rings.
All three systems are based on a transport casing that can be equipped with outside frame racks to set up additional exercise opportunities such as, for instance, pull-up bars, a barbell bench or a deadlift station. Training takes place outdoors. It is possible to attach a sunshade to provide protection from strong sunlight.
During small-scale operations or in the early stages of a major operation in particular the infrastructure needed to provide exercise opportunities to soldiers is often not (yet) in place. Exercise rooms with bicycle ergometers, wall pulleys, etc. require a lot of space and time to set up and rely on a supply of power and water for the sanitary facilities. Doing away with electrical elements, and making use of the sanitary facilities available in the accommodation sections, the HuEdKLF systems are perfect for the earliest as well as all later stages of an operation. Thanks to the three different sizes available, the systems can be adapted to any given situation and unit strength. If necessary, more systems can be added to scale up training capacities. Even in the case of a personnel buildup, all soldiers of a contingent are thus provided with an opportunity for state-of-the-art functional training.
The Federal Office of Bundeswehr Infrastructure, Environmental Protection and Services (BAIUDBw) plans to procure identical systems for the garrisons in Germany to allow soldiers to become familiar with the system before leaving for deployment. By procuring a modular sports equipment system, the Bundeswehr takes steps to prepare for current and future responsibilities while increasing its attractiveness as an employer by offering an appealing state-of-the-art training concept both at home and abroad.

U5.1 Air Force Interception System for Baltic Airspace Operations Support

The Air Force Interception System (Luftwaffenerfassungstrupp, LwErfTrp) is a highly specialized sensor system. No other electronic warfare (EW) sensor has comparable capabilities. It comprises two elements, LwErfTrp I and LwErfTrp II, and reconnoiters electronic communications in the area of operations. Its objective is the reconnaissance of enemy communications using military and civilian communication resources as well as enemy radar emissions that are continuously becoming more advanced and complex. Another essential element is the reconnaissance of state-of-the-art guidance and command/control systems. Compliance with Article 10 of the German Basic Law on the privacy of correspondence, posts and telecommunications is of particular significance in this context.
LwErfTrp is operated from transportable booths that can be deployed using organic capacities and are set up as two separate sites. Due to the physical separation, operation has to follow the master-slave principle, with a control function and additional analysis capabilities held by the master unit. For the most part, the LwErfTrp renders support to the tactical commander of an Air Force operational unit, providing them with relevant SIGINT information in a timely manner.
Under the fast-track initiative ENHANCED BALTIC AIR POLICING (VAPB) this system was first enabled and enhanced for the VAPB 2018/2019 standby commitment. Branch U5.1 has provided a new recce technology that now forms part of the

Photo: Bundeswehr

Alongside the fighter jets, air policing had air force reconnaissance units stationed in Estonia, which monitored air traffic all the way into Russia. Depicted is the setup of the antenna.

Air Force Interception System for Air Force operations support and replaces older system components. This technology allows the experts of the EW battalion to provide German Air Force forces deployed to the Baltic as part of NATO's Air Policing mission with a more informative operational picture right on site. Hence, military decision-makers have at their disposal even more comprehensive information on possible changes in the situation.

The LwErfTrp system was successfully employed as part of ENHANCED BALTIC AIR POLICING (VAPB 2014, 2015, 2016 and VAPB 2018/2019) and relocated to Germany in April 2019. This was the fourth time that the Electronic Support Measures Task Force (ESM-TF), provided by the EW Battalion 912, contributed to successful mission performance, rendering valuable support to early warning and force protection capabilities. The Air Force considers support by the LwErfTrp for their operations to be indispensable and without alternative. With regard to the upcoming deployment to VAPB 2020/2021, U5.1 will need to conceive and implement further improvements to the LwErfTrp by mid-2020.

U7.4 Coherent Architecture: Groundwork for Digitalizing Bundeswehr Health Care

In early 2017 the Federal Ministry of Defense set up a task force under the direction of the Armed Forces Staff division II to coordinate the varied and complex IT projects concerning Bundeswehr health care. On behalf of this task force BAAINBw has joined forces with the Bundeswehr Medical Service Headquarter (KdoSanDstBw) and Bundeswehr IT company BWI to interweave all the loose ends of those projects into one coherent project: "Digital Transformation of Bundeswehr Health Care (DigitGesVersBw)". This will provide the groundwork for a modern, future-proof and sustainable IT system for Bundeswehr health care.

As a first step, the DigitGesVersBw project will set up a holistic process-based

architecture by late 2020. This will lay the foundation for future-proof digitalized health care in the Bundeswehr harnessing all opportunities of current information technology.

The project aims to map the highly complex overall Bundeswehr health care system with its operational requirements and legacy IT landscape in line with the NATO Architecture Framework for architecture building. This ambitious approach requires close cooperation between the actors involved, i.e. BAAINBw, KdoSanDstBw and BWI.

In essence, the DigitGesVersBw project controls the fields "Operational Architecture" and "IT System Architecture". In addition, all ongoing individual initiatives, projects and solutions as well as those just about to kick off will be integrated into the field "Ongoing Infrastructure Projects & Operation".

A survey into the existing processes at Bundeswehr hospitals, regional medical treatment facilities, supervisory centers for public law tasks of the Bundeswehr Medical Service, health care during operations, as well as department B of the Bundeswehr Institute of Preventive Medicine has already been completed.

All pending surveys, e.g. at the central institutes of the Bundeswehr Medical Service, will be completed by mid-2020.

At the same time, there have been significant advances in key infrastructure projects. To mention two examples: Last year, all Bundeswehr hospitals and the Bundeswehr Medical Academy were provided with MedSAN, a storage area network for medical data. In addition, patient beds in the Bundeswehr hospitals are now equipped with multifunctional terminals.

By now, the holistic approach to architecture is starting to bear fruit, proving its worth as a nucleus for further and bigger tasks.

When it comes to the digital transformation of Bundeswehr health care, we pursue the following long-term objectives:

1. Implementing the Bundeswehr electronic health record (eGABw) – A comprehensive individual medical record held by the employer that will include all health records maintained today by unit physicians, medical specialists, and Bundeswehr hospitals.
2. Providing digital situation pictures of Bundeswehr health care – These are the modern prerequisite for the evidence-driven command and control of Bundeswehr health care.
3. Relieving some of the strain on staff and patients by making data available without media disruptions, and supporting them in handling their daily workload.
4. Adding value for patients by offering a digital patient case file, with patients having full control of its contents.

In order to achieve these objectives, a joint data information and exchange platform is a key prerequisite. This platform, a digital database called Health Information Management System (HIMS), will be covered by a first high-priority implementation project based on the Bundeswehr health care architecture.

HIMS will be implemented first and foremost in line with the SASPF program strategy and the HERKULES follow-on project. ■

Air Directorate (L)

Photo: Thomas Fuhrmann / LHT

Lower fuselage side of the Airbus A319 OS showing the camera windows

The Air Directorate of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) manages the Bundeswehr airborne weapon systems. Its project divisions L3, L4, L5, L6, L7 and L8 are responsible for implementing the projects in accordance with the CPM (Customer Product Management) process and supervising the in-service support management for the fielded products until their disposal. In addition, Directorate L exercises functional supervision of the Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (WTD 61).

The Directorate's project portfolio ranges from highly agile fighter jets, transport aircraft as well as special aircraft, all helicopter systems, unmanned aircraft, tactical drones and space-based reconnaissance systems to rescue and protection systems for the crews, simulators and training equipment. Almost all large-scale projects are implemented in the framework of multinational, predominantly European partnerships and management agencies.

The Air Directorate is in charge of ensuring operational viability throughout the entire life cycle of (weapon) systems that have been assigned to it. Prior to implementation, it does so through:

- applied basic research and user-focused defense research and technology (R&T levels 1 and 2) as well as system and solution-oriented studies (level 3),
- partaking in analysis phase, part I by contributing to the field of planning and
- preparing proposed solutions in the analysis phase, part II,
- and throughout the realization and in-service support phases through:
- acquisition life cycle management,
- management of all in-service support activities in terms of maintenance of materiel readiness of all manned and unmanned aircraft as well as space-based reconnaissance systems fielded in the Bundeswehr,
- supervision of system engineering and integration of subsystems, including armament,
- life cycle management including obsolescence management and
- risk management.
- This also includes highly prioritized procurement in the context of „fast-track initiatives for operations".

Division L1 "Economic and Technical Affairs, Policy/Fundamentals of A/C, Aeronautical and Non-Essential Equipment" and Division L2 "Economic and Legal Affairs" as well as the Directorate Staff and Directorate Controlling support the Directorate's project branches by working on cross-sectional and common tasks.

Current Challenges

A significant challenge arises out of the Directorate's simultaneous management of mission-relevant, tried and trusted systems in the in-service support phase, such as TORNADO or C-160, as well as new weapon systems that are still in the realization phase, such as A400M, and future projects, e.g. NTH SEA LION, the heavy transport helicopter or the Future Combat Air System (FCAS). In order to set up efficient project structures for these new projects, the Air Directorate has adapted its organization. The supervision of the NH90 weapon system was transferred from the previously responsible Branch L4.4 to the newly established Division L8, which is also responsible for the NTH SEA LION project management.

In addition, L6.4 is also a new branch in which the activities for implementing the successor systems for the TORNADO multirole combat aircraft and the Next Generation Weapon System (NGWS) are pooled. The branches L5.5, L5.6 and L5.7 were established in order to manage new projects in the field of self-protection and electronic warfare of airborne weapon systems.

The core tasks performed by Directorate L consist of ensuring the operational maturity of the materiel for which it is responsible and providing new, needs-based systems. The following examples serve to illustrate the work priorities for the year 2019.

National Open Skies Observation Platform

On 21 June 2019, the then Federal Minister of Defense, Dr. Ursula von der Leyen, accepted a specialized Airbus A319 aircraft. This aircraft is equipped with optical camera systems as well as an infrared camera system and will be used within the scope of the OS Treaty between Vancouver and Vladivostok.

In July 2019, the extraordinary and unique Airbus A319 aircraft enhanced the Special Air Mission Wing fleet of the Federal Ministry of Defense. Although it is painted in the familiar „White Fleet" pattern, this Airbus aircraft will not primarily be used for government transport. Its flights will serve arms control purposes within the scope of the Treaty on Open Skies (OS Treaty). Germany thus has the most modern aircraft of this kind.

The OS Treaty is an agreement of the year 1992, allowing the currently 34 participating nations to conduct observation flights. In the context of confidence-building as well as arms control, photo, radar and infrared images may be made of the respective national territories.

The requirement of a suitable national observation platform is not derived from the armed forces' portfolio of capabilities but rather originates from the German government's coalition agreement for the 18th legislative period.

The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) was tasked with implementing an appropriate procurement project within the scope of

Customer Product Management (CPM) in November 2015.
By setting up a small but effective project team, it was possible to harmonize the extensive requirements catalog of the future aircraft holder, the Air Force, with the mission experience of the original user, the Bundeswehr Verification Center (ZVBw), in conclusive tender documents.
The objective of the project team was to exploit the industry's innovation potential by means of a functional statement of work. It was thus no less important to closely accompany the contractor in the implementation of the project, but not to restrict him in the conduct and the selection of a technical solution under his responsibility.
The project was implemented within approximately two years after it was approved by Parliament at the end of March 2017. Using a used, civilian aircraft type as a test aircraft, activities were focused on fitting and converting it to an observation platform.
The project is specifically characterized by the strict requirements established in the Treaty on Open Skies with respect to the technical selection and installation of the required sensor systems to be able to maintain the accreditation of the surveillance aircraft by all participating nations. The entire OS mission equipment including the cabling in the aircraft must be verifiable for correct installation and function by the OS nations at all times for reasons of transparency, which directly affects the overall design. This required regular consultation by the project team with the OS Treaty experts.
Finally, the coordination of the multitude of stakeholders was a challenge not to be underestimated as it involved conflicting interests arising from the justified and reasonable participation of the nations with a simultaneous focus on the implementation of the treaty within the time and cost framework.
These and all further possible factors affecting project success were identified within the scope of active risk management, which was conducted in full transparency by the contractor and customer project teams.
After successful tests on the ground and in the air as well as the demonstration of compliance with all contractually agreed supplies and services, the new German Airbus A319OH observation aircraft was eventually handed over to the then Federal Minister of Defense, Dr. Ursula von der Leyen, on 21 June 2019. This event was attended by high-ranking representatives from politics and industry and attracted considerable interest in the media.
BAAINBw and the involved German aerospace industry were able to effectively prove that technically ambitious and complex projects can indeed be projected and implemented for Bundeswehr demand within the given time and cost framework. In retrospect, the constructive and trustful cooperation between all participants, in particular, was stated as one of the most important factors of success. This cooperation can be prescribed neither in CPM nor in the contract; rather, it is a part of corporate culture and the self-conception of the acting persons, which must be maintained and promoted.

Fielding of A400M Aircraft in the Bundeswehr

The delivery of the first German AIRBUS A400M on 19 December 2014 initiated the use and step-by-step augmentation of capabilities gained by the Bundeswehr with this new weapon system. The example of the A400M aircraft illustrates that it is not only the technical capability of the aircraft which is required to provide the users with capabilities. Indeed, various further requirements must be set out following acceptance and delivery of the aircraft. These requirements include numerous tasks to be fulfilled during the in-service use of the A400M aircraft. To this end, the complex interactions and interdependencies with respect to design and tasking must be taken into consideration.

- Training of personnel involved (e.g. technicians, pilots, loadmasters, flight operating personnel)
- Provision of mission-specific equipment (NVGs, customized parachutes, airdrop systems, etc.)
- Modification of regulations and processes (e.g. for maintenance, aviation procedures, airdropping of personnel and cargo, provision of electronic documentation)
- Adaptation and provision of IT systems for operation on the ground and in the air
- Operational suitability tests for evaluating weapon system capabilities and identifying further need for action

Compared to the Transall C-160 predecessor from the 1960s the fully digitalized A400M aircraft represents a technological quantum leap. For this reason, there was an extraordinarily high need for adaptation in many areas, e.g. training or setup and further development of IT-based ground support systems. This is also due to the fact that the A400M aircraft has capabilities which the C-160 aircraft could not provide, e.g. an air refueling capability.
Due to the partly very challenging and technologically highly complex capability requirements, the A400M development was deliberately divided into various development stages in order to minimize risks and make initial basic capabilities available at an early stage. For this reason, many capabilities are already successfully in use in the Bundeswehr, while the aircraft itself is still undergoing development.

- The following basic capabilities have already been developed to full initial operational capability, certified and released for operation:
- Capability for operation as a tanker aircraft for jet aircraft
- Air transport of patients, including intensive care (MedEvac)
- Global, partly protected air transport to Bundeswehr mission areas
- Operational night vision capability (using NVGs - night vision goggles)
- Operational capability on unpaved airfields
- Airdropping of personnel and material

In part, these capabilities still have to be further developed over the next few ye-

Photo: Airbus

The Naval Transport Helicopter (NTH) SEA LION

A Further Insight

One-on-one with Ralph Herzog, Acting Director BAAINBw and Head of the Air Directorate (L)

ESD: What were the most important developments with respect to the equipment of the German Air Force in 2019?
Herzog: It is difficult to single out individual highlights from the multitude of important projects. The contract award procedures for new Global 6000 and A350 aircraft for the Special Air Mission Wing of the German Federal Ministry of Defense, which were conducted successfully within the shortest time possible, were certainly of significance. The increase in the A400M fleet size and the completion of the EUROFIGHTER fleet achieved upon taking delivery of the final aircraft will also markedly improve the equipment situation of the German Air Force.
In addition, an important milestone was also reached for the German Navy as a "customer" when the first SEA LION NTH was delivered on schedule. As an example from the field of in-service support management of airborne weapon systems, I would like to mention the significantly increased materiel readiness of the EUROFIGHTER fleet. The measures initiated to that end over the past two years are starting to take visible effect.

ESD: What are the priority tasks of Directorate L in 2020 from your point of view?
Herzog: The preservation and further improvement of the materiel readiness of airborne systems will continue to be a priority in the Air Directorate in 2020, too. Utmost importance will also be attributed to the realization of ongoing and new projects, in particular in the context of the VJTF 2023. Apart from that, activities in 2020 will focus on the continued implementation of EMAR in the "world of airborne military weapon systems" and the associated set-up of a CAMO in the major organizational element of equipment, information technology and in-service support (CAMO AIN).

ESD: Which challenges still persist in the context of improving the availability of airborne weapon systems in general?
Herzog: Improving the availability of airborne weapon systems is always a high priority task for the Air Directorate. The measures already taken in the past and the measures still to be taken to reach this goal interact with each other in a complex manner in the light of maintenance processes, the availability of spare parts and replacement parts as well as maintenance cycles. The first clearly visible success was already achieved with the conclusion of performance-based contracts for the EUROFIGHTER weapon system. Extensive work is also being performed to gradually improve the maintenance processes, including the timely availability of spare and replacement parts.

ESD: What is the current status of the upgrades planned for the EUROFIGHTER, in particular the development of the AESA radar?
Herzog: In the face of changing threats, the capabilities of the EUROFIGHTER multi-role combat aircraft need to be continuously adapted. For this purpose, the partner nations successively develop additional capability packages for subsequent retrofit into their respective fleet. After the successful realization of the air-to-ground role thanks to the GBU-48 all-weather precision weapon, Germany is presently preparing the retrofit of the METEOR air-to-air missile. Further capability packages are currently being coordinated at international level.
The development of the AESA radar was commissioned by four nations at the end of 2014. In 2018, the hardware design was frozen so that the industrial company tasked with implementation can now focus on the challenges related to software development. At present, intensive work is in progress to deliver the first EUROFIGHTER aircraft to be equipped with an AESA radar to the export customer Kuwait in 2020.

ESD: Which other challenges do you see with respect to enhancing the capabilities of the A400M weapon system?
Herzog: Due to the demanding and technically sophisticated capability requirements, the A400M development program was deliberately divided into different development phases. Thanks to this approach, the first capabilities such as employment as a tanker aircraft for jet aircraft, medical evacuation of patients requiring intensive care or the operational night vision capability were already implemented. Reaching the full capability spectrum in November 2022 will be one focus of the work in the years to come.

ESD: The first NH90 SEA LION MTH will be delivered before the end of 2019, but the helicopters will presumably only be available in the final configuration from 2021 onwards. Which capabilities will the first helicopters to be delivered lack?
Herzog: As contractually agreed, the first NH90 SEA LION NTH was handed over to BAAINBw on 24 October 2019 in the Step 1 configuration.
As provided for in the procurement contract, the Step 1 configuration is not yet equipped with the features of an integrated automatic identification system or upgrades of the IFF mode 5 and mode S transponders, which can only be implemented at great effort due to the necessary software adaptations. This is why priority was deliberately given to providing the first helicopters to the German Navy as early as possible in the SEA LION NTH project. Based on the project plan, which is very ambitious in terms of time, this goal could only be reached by introducing a "Step 1 configuration as an interim step".

The interview was conducted by Ulrich Renn.

ars to completely fulfill the given requirements. Other capabilities, e.g. air refueling of helicopters or simultaneous airdropping of parachutists should be completed and retrofitted in the next years. The delivery of the first A400M aircraft in accordance with the final development standard cannot be expected before November 2022 at the earliest. To provide our units with a weapon system capable of countering current threats, the advancement of the A400M aircraft is a crucial work focus.
Tactical A400M aircraft are equipped with a self-protection system consisting of a radar warning receiver, missile warning system as well as decoys and jamming devices. In order to be prepared for expected future threats, further development steps have already been initiated today. One of the enhancements to be implemented is the improvement of the self-protection system using a guided missile defense system based on laser technology with an infrared seeker head (DIRCM) within the scope of a cooperation between Germany and Israel. The type integration of the first system is planned to be completed by 2023.
All in all, the initial operational experience with A400M aircraft is quite positive and the augmentation of capabilities achieved to date is significant. This was only possible due to the intensive cooperation of all parties involved within the Bundeswehr. The A400M aircraft has the potential of developing into an efficient transport aircraft and becoming the backbone of modern air transport. Due to its enormous potential for upgraded capabilities it is also able to keep up with future requirements.

H145 Light Utility Helicopter for SAR Service

After more than five decades of flight operations with Bell UH-1D aircraft (HUEY), the next generation has been initiated for the Bundeswehr search and rescue service (SAR). In December 2019, the first of a total of seven new H145 LUH SAR aircraft was handed over to the Bundeswehr. In contrast to the H145M LUH SOF aircraft already used by the Special Forces, the Bundeswehr LUH SAR is the civilian H145 variant with only a few military components (e.g. tactical radio). In late 2018 a contract had been concluded between BAAINBw and Airbus Helicopters on the procurement of these seven helicopters as well as their maintenance, repair and provision for flight operations. Logistical services will be provided for nine years beginning with the delivery of the first helicopter to the contractor's works as well as the Niederstetten, Holzdorf and Nörvenich SAR sites.

The available implementation period was very restricted considering the upcoming end of the Bell UH-1D in-service life in the year 2021. It is thus even more remarkable that the first helicopter was transferred at the Donauwörth site three months prior to the contractually agreed date. This was made possible only due to the close cooperation between the government agencies and industry. The next four helicopters will also be delivered ahead of schedule in the first half of 2020. Two other H145 LUH SAR aircraft already approved for flight are used by the contractor to fulfill the crew training and retraining requirements that were also agreed until late 2020. These two helicopters will also be delivered afterwards. The operational suitability test was initiated immediately after the transfer of the first helicopter. The objective is the initiation of flight operations for missions with the new type at the first SAR site in Niederstetten in June 2020. The whole transition process at three SAR sites is to be completed by April 2021.
The main SAR mission-related tasks will thus be performed by the new H145 LUH SAR aircraft type in the future - 24 hours a day on 365 days a year as before. The abbreviation LUH SAR stands for Light Utility Helicopter Search and Rescue. SAR is performed 24 hours a day on 365 days a year. The core task is to search for missing or crashed civilian and military aircraft and their occupants but also to transport casualties. Unlike civilian air rescue services at the respective hospitals the Bundeswehr air rescue teams conduct their missions even under severe weather conditions. This also includes missions after sunset using pilot night vision devices.
In the future, the Army aviation units will be very well equipped for these missions with the new H145 LUH SAR aircraft. This helicopter has a broad spectrum of sensors and rescue equipment. This includes the use of infrared and thermal imaging sensors, a bearing system for tracking emergency signals, an external rescue winch, a high-performance searchlight and a system for localizing mobile radios. All these systems combined make the new helicopter a highly effective and powerful rescue asset.

Photo: Airbus

An A400M during a test flight for paratrooper deployment

Bundeswehr CAMO Network

In addition to these projects, another focus is the establishment of a Continuing Airworthiness Management Organisation (CAMO) network.
With the objective of implementing consistent military certification, the defense ministers tasked EDA (European Defence Agency) with the establishment of the so-called EMAR (European Military Airworthiness Requirements) in 2008. Based on EMAR, DEMAR (German European Airworthiness Requirements) were initially applied within the scope of A400M procurement.
With the introduction of the A400M weapon system, the DEMAR M regulation, which specifies requirements for maintaining airworthiness, resulted in the need to establish an organization for the administration of continuing airworthiness (CAMO). As opposed to the civilian regulations, the functions of this organization have to be performed by the armed services and BAAINBw in the Bundeswehr. In order to ensure that the roles are standardized and the interfaces and procedures are defined, the Federal Ministry of Defense has established a so-called standardization board for setting up the Bundeswehr Continuing Airworthiness Management Organization network (CAMO Vbu Bw). There is close cooperation in this board between the three armed services, BAAINBw and the Bundeswehr Aviation Office.
The work at BAAINBw is initially focused on the training of the relevant, project-specific CAMO structure and processes of the NH90 and A400M weapon systems.
In the meantime, the DEMAR rules have been established by the ministry as a standard certification procedure, so other airborne weapon systems will follow step by step and CAMO will be adapted accordingly. ■

Sea Directorate (S)

Directorate S is responsible for matters related to the realization and in-service use of Navy ships and boats, the Navy-specific shore-based systems, communication systems, training installations and other Navy-specific equipment. It supports the units from the first stages of realization to the disposal of decommissioned units and their subsequent handover to the disposal organization. Thus the Sea Directorate is responsible for maintaining and restoring the operational maturity of the products assigned to it and therefore bears the material responsibility for these products „from the cradle to t he grave".

Directorate S consists of seven divisions, each with a different focus of activities, and the Directorate Staff and Directorate Controlling. Within this organization, four project divisions support the units afloat:

- Division S3: Frigates and corvettes
- Division S4: Mines, mine countermeasures, subsurface weapon systems,
- Division S5: Support units, auxiliaries and support systems
- Division S7: Submarines

For every ship class, there is one project manager in charge of the armaments and/or in-service support management tasks. Starting with part 2 of the CPM analysis phase, the project managers lead "integrated project teams".

Apart from the project divisions, Directorate S has three specialized divisions that support the projects. These divisions are: Economic and Technical Affairs (S1), Economic and Legal Affairs (S2) and Navy C2 Systems (S6).

In addition to its specialized tasks, Division S6 is also in charge of the project management of the shore-based systems, training installations and operational training centers of the Navy, as well as of the project management for the integration of the enhanced Rolling Airframe Missile (RAM) missile system into the combat systems of corvettes and frigates. Branch S6.4 tests the operational and functional safety and IT security of software and hardware in combat direction systems and releases IT system configurations for use on the Navy ships and boats and associated shore-based systems, training installations and combat training centers.

In order to adapt to the increasing challenges in the field of in-service use, the position of deputy director and in-service use representative was created in the Sea Directorate.

The following is an outline of the status of selected projects of Directorate S:

Photo: Bundeswehr

The BADEN-WÜRTTEMBERG enters port for the first time in Wilhelmshaven on 18 July 2016.

Obsolescence Removal for the Long-Range Sensor and Capability Enhancement of F124 in Air Defense (Obs WuF LV F124)

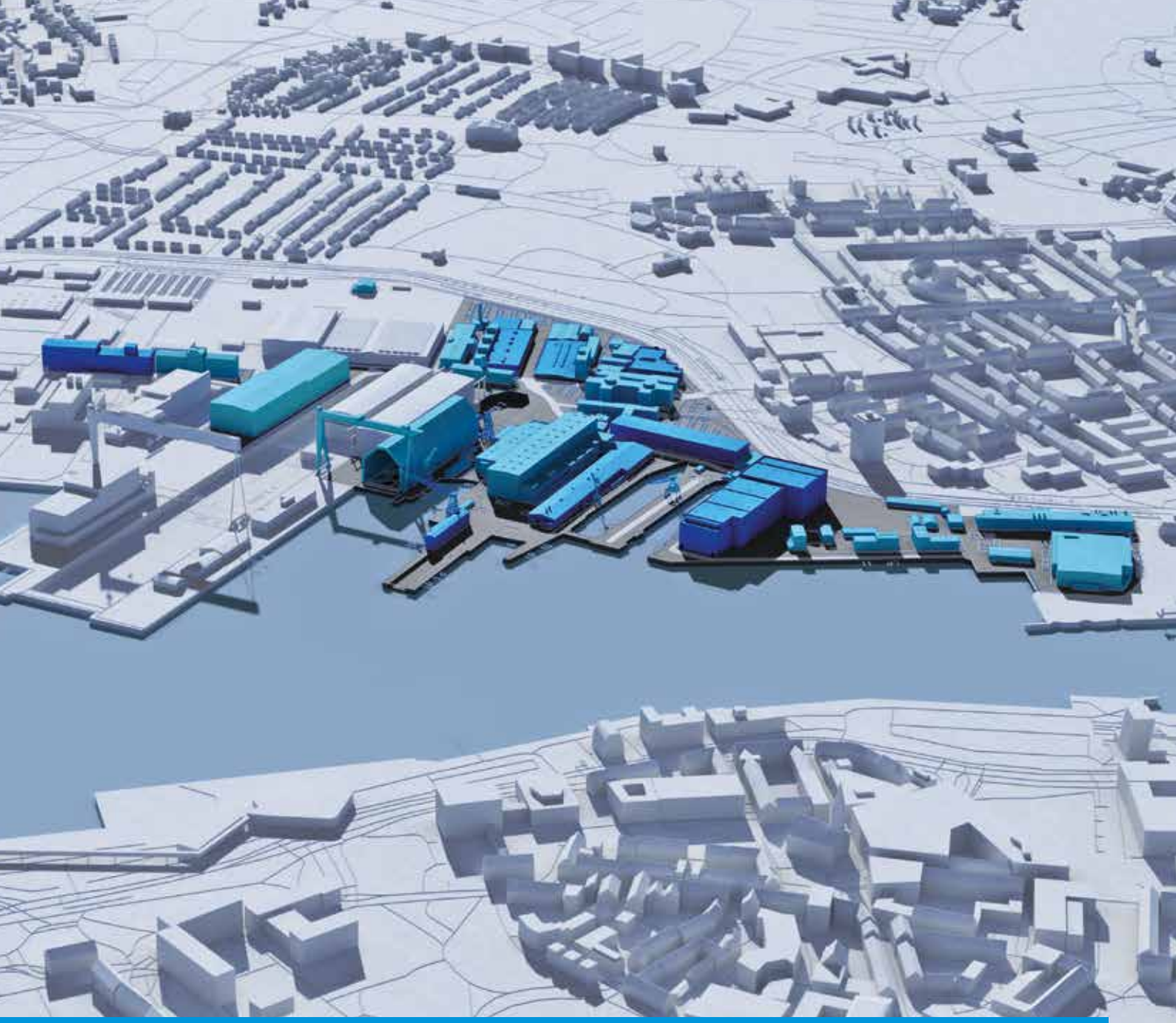
With its three F124 class frigates the German Navy operates ships specifically designed for force air defense and joint air defense. The main sensor for generating a large area air picture is the SMART-L air surveillance radar, which is, however, severely affected by obsolescence.

The main aim of the „Obs WuF LV F124" project is retaining the F124's air surveillance capability by removing the obsolescence of SMART-L. Additionally, the F124 will be enabled to contribute to NATO Ballistic Missile Defense (BMD) in a manner that reflects Germany's leading role in Cluster Air and Missile Defense (AMD) in the fields of early warning and slew-to-cue.

The realization will consist of two stages. Stage 1 includes the removal of obsolescences by procuring a new long-range sensor and integrating it into the F124 class frigates. Apart from the three ship systems, in order to minimize risk, a test, reference and training (TRT) facility is to be set up at the Naval School of Technology in Parow and will later also be used as a maintenance training facility. The first trials and demonstrations with the long-range sensor will also be conducted at the TRT facility, in conjunction with a derivative of the Combat Direction System (CDS) F124. The CDS F124 version available at the TRT facility will already have been adjusted to the new long-range sensor, especially in terms of sensor simulation and sensor control.

The long-range sensor will not be released for integration on board of the F124 until the demonstrations at the TRT facility have been completed successfully.

This means that a total of four long-range radars will be procured. The schedule for fitting and integrating the new long-range radars into the F124 class frigates is strictly based on the scheduled maintenance in-



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A Further Insight

One-on-one with Rear Admiral Andreas Czerwinski, the Head of the Sea Directorate (S)

ES&D: Is the naval armament sector caught in a complexity trap?
RADM Czerwinski: Today we are living in a highly complex world involving technology, processes and an overall framework which needs to be defined. In this process, we must ensure that we do not end up creating an over-defined system. This already starts with the specification of requirements, i.e. at the early analysis stage. It is easily understandable that there is a wish to think ahead and be prepared for all kinds of contingencies that might arise during the future in-service use phase. However, we should remove the technological "gold plating" from these justified requirements early on and continuously assess all requirements in light of the development risk involved (in terms of time and money) and the foreseeable effort required during the in-service use phase. Failing to do so will inevitably lead to individual solutions in mini-series with procurement processes which cannot be managed either by industry or by the customer, solutions which successfully forego any attempt at logistic supportability. At this point, we have to get much better by introducing a continuous, stringent mechanism for controlling requirements. The system complexity requires a much closer examination before a construction contract can be awarded. Let me mention Frigate F125, our most modern naval ship to date, as an example: Aboard this ship, more than 20,000 signals are processed for ship automation alone, the main networks comprise over 400 computers on which 20 different operating systems are running, the introduction of the combat direction system (CDS) increased the number of CDS variants in the German Navy by yet another one and the mere documentation of the production and distribution of electrical energy, the circuitry and lighting fills more than 20,000 pages. All of this equipment must be coordinated, examined for mutual interference, tested, operated and kept in operation against the backdrop of increasingly shorter cycles of innovation. The limiting factor in this process is Man, both in terms of project and in-service use management as well as aboard the ship, as the highly complex system still demands a sufficient degree of understanding and command of the system to be able to act appropriately on operations. We are called upon to make every effort to contain the wide variety of variants and to arrive at new architectures. We will no longer be able to afford fielding a "zoo" of new equipment items with each new class of vessel, which are outdated upon commissioning, need to be regenerated at great cost and which require a large logistic support effort during the entire life cycle of the weapon system as well as training for each system variant. Only standardized solutions and yes, product specifications, will allow us to do that much better than before. I am also thinking along the lines of the complexity and the effort that our required technical documentation standards entail for industry. For Frigate F125, we have called for compliance with "industry standard" ASD1000M and ASD2000M for the first time. The basic documentation according to ASD1000D comprises more than 2,000 pages in the English language, complemented by an over 800 pages-long national style guide as well as the guidance documentation. What we are currently getting from this requirement, which we spend a huge sum of money on, is very unsatisfactory. We need to ensure that the project managers on both sides receive expert advice so that the standard requirements are understood and reduced in an approach tailored to the specific project.

ESD: Is international cooperation on national key technologies, in particular on submarines, not a contradiction in itself?
RADM Czerwinski: The aim of binational and international cooperation is to strengthen the national and alliance-oriented abilities to act. Of course, we contribute our national key technologies towards that goal. In the Sea domain, small numbers represent a special challenge for maintaining operational viability and for the resulting availability on operations. This is why our cooperation with Norway on the joint procurement and in-service use of identical submarines points the way to the future. Cooperating with reliable partners makes it possible to cut costs and to procure and stockpile spare parts more effectively, for example. For this reason, we have - together with Italy - been pursuing the path of a close cooperation in the area of in-service support for more than 15 years. This year in July, we won over Portugal as the third partner in the cooperative project on the joint operation and logistic support of the submarines in our navies. This enables us to strengthen our national key technology in the long term and to preserve the operational viability of the weapon system more effectively. Therefore, international cooperation does not conflict with national key technologies, but helps to promote them in a focused manner.

ESD: Has the "Reversal in Personnel Trends" strategy found its way into the Sea Directorate?
RADM Czerwinski: At full steam – as I would like to put it as a former destroyerman. The measures initiated under the Reversal in Personnel Trends program are showing tangible effects. All things considered, the Directorate experienced a net increase of 25 billets and more than 80 staff members in the period from October 2018 to October 2019. Thanks to the successful pilot process of "direct recruitment into the BAAINBw Sea Directorate" in particular, we have so far been able to recruit personnel in the double-digit range. I am confident that this success story will be continued and will continually increase staffing levels in combination with other personnel recruitment initiatives. This is a very positive and motivating signal for my entire Directorate.

The interview was conducted by Hans Uwe Mergener.

tervals so as not to affect the availability of the F124 class.
The current plans foresee the integration of the first long-range radar into the test, reference and training facility (TRT) in 2023. The frigate HESSEN will be the first ship to be equipped with the new long-range radar during its scheduled maintenance period in 2024.
All manufacturers of radar systems suitable for this particular purpose employ the Active Electronically Scanned Array (AESA) radar technology and use gallium nitride semiconductors in their products. It is important to make use of the advantages this technology offers, such as the flexibility of the transmission diagrams (waveform). These software-defined radars can be adjusted and improved much more easily simply by changing the software for, e.g., control and processing.
Stage 2 includes the implementation of the sensors' basic BMD (Ballistic Missile Defence) capability, in this case early warning and target cueing. The F124 class frigates will not be equipped with a shooter capability to engage ballistic missiles.
This future contribution of the German Navy to BMD has been included in the "Territorial missile defense" concept.
For stage 2, a supplementary solution proposal in accordance with CPM is to be prepared by the end of 2021.
In order to be able to make a meaningful contribution to NATO BMD or the US-European Phased Adaptive Approach (EPAA) the entire functional chain, from the long-range radar on F124 to a missile (e.g. SM-3 as interceptor) used by a different ship (such as a US destroyer), must be taken into account. The sensor performance regarding range and range resolution of the long-range radar selected in stage 1 considerably contributes to achieving the required quality of the target information gained. In addition, extensions in the Tactical Data Link (TDL) segment are required, among other things.
In order to keep the required adjustments to the CDS F124 to a minimum and thus as low-risk as possible, the intention is to integrate a separate „ballistic missile defense" (BMD) module in the F124 combat direction system.
The BMD module plans the BMD missions and will also "control" the long-range sensor. The BMD must also include the required threat database for ballistic missile classification.
In this context, a risk reduction analysis is to be performed together with the US Missile Defense Agency (MDA) in order to assess whether the US AEGIS BMD (HW/SW) is suitable. This offers a valuable op-

Photo: Bundeswehr

LUDWIGSHAFEN AM RHEIN was the fifth and last of the first lot of K130 corvettes commissioned. Procurement of the second lot is underway.

portunity to share in the USA's 30 years of experience in the field of ballistic missile defense. The risk reduction analysis was started in April 2019; the partial results will be included in the supplementary solution proposal for stage 2 of the ObsWuF LV F124 project.

If the supplementary solution proposal for stage 2 is approved and then implemented, the German Navy will cross the threshold to an entirely new warfare area. The impact on operational training must also be taken into account.

Class 125 Frigate Project

The four new class 125 frigates (F125) have been designed for long-term low and medium-intensity joint and combined military operations. Their design was determined by several important requirements: heavy use, worldwide operation and defense against asymmetric threats. In order to be able to support long-term stabilization missions, the F125 was designed to allow for in-theater deployment periods of up to two years without scheduled yard periods and a considerably increased number of underway steaming hours per year to 5,000. At the same time, the manning level was reduced to about half the size of what it had been for classes F122 to F124, i.e. to a permanent crew of approx. 120 persons. This new concept is realized by selecting robust and low-maintenance systems and equipment, a high degree of automation and various other technical and organizational measures. The vessels are built by the consortium ARGE F125, a joint venture of ThyssenKrupp Marine Systems (TKMS) and Fr. Lürssen Werft. The first ship of this class, the frigate BADEN-WÜRTTEMBERG, completed the yard trial in April 2016 and began the test and evaluation program at sea. The sea acceptance trial for the marine engineering systems was successfully completed in July 2016. The trials for the combat system were confirmed by the completion of the acceptance trial in August 2018. On 30 April 2019, the frigate BADEN WÜRTTEMBERG was the first unit of the

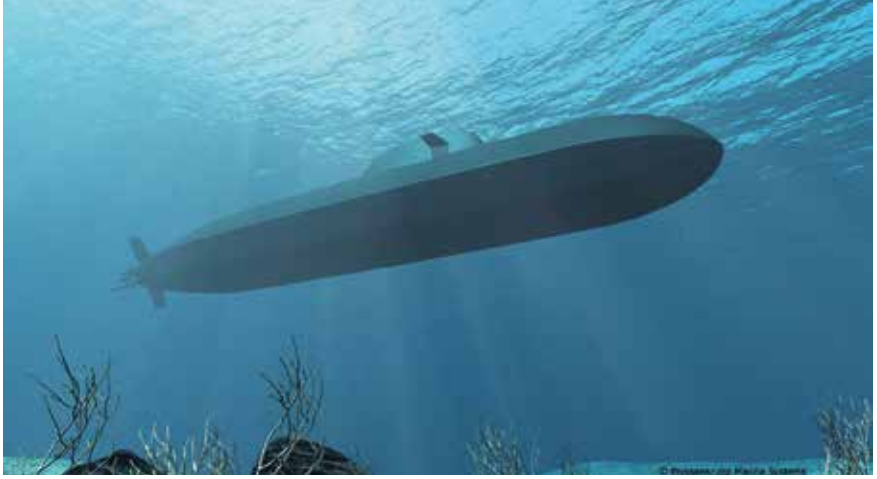


Photo: thyssenkrupp Marine Systems

The 212CD draft design

F125 class to be successfully accepted; it was commissioned by Federal Minister of Defense Dr. Ursula von der Leyen on 17 June 2019. The twelve-month operational suitability test by the Navy started in July 2019. Acceptance of the three remaining F125 class ships is intended to be achieved by the start of 2021. The second F125, NORDRHEIN-WESTFALEN, started sea trials in January 2017. It was accepted by the Bundeswehr on 3 March 2020. SACHSEN-ANHALT, the third F125 class frigate, successfully completed the sea acceptance trial for the marine engineering systems in February 2018. In June 2019 the breaking of the commissioning pennant took place, and SACHSEN-ANHALT now has a military crew and is conducting further acceptance trials. In May 2017 the fourth frigate of this class was named RHEINLAND-PFALZ. Its yard trial was performed in July 2019. The breaking of the commissioning pennant is planned for May 2020.

Second Lot of Class K130 Corvettes

With the first K130 lot, a very modern, highly complex weapon system with high technical standards was procured. The initial defects in some components, such as the gearing or the air-conditioning, were successfully corrected some time ago. The Navy's current and future requirement for additional maritime platforms is explained by increasing operational commitments and, simultaneously, declining availability of naval platforms. This demand is met by the procurement of five additional K130 corvettes. At the same time, the realization risk is minimized by continuing the successful corvette K130 concept. The tried and tested basic design of K130 will be retained for the procurement of ships 6 to 10. Thus, the supplementary procurement of ships 6 to 10 is the most economic and efficient solution:

- new surface vessels will be commissioned in the near future,
- compared to a new design it is more cost-effective and available sooner,
- it reduces the realization risk that a system this complex would carry, and
- it uses synergies within the Navy; only a high degree of system homogeneity will permit the use of existing training assets (personnel and infrastructure) as well as an identical logistic chain.

To facilitate future-oriented in-service use for another 30 years, the obsolescences which have occurred after a 10-year service life must of course be removed, and adjustments must be made to comply with currently valid laws, regulations and standards.

The keel laying of ship 7 took place on 30 January 2020 during an official ceremony in Wolgast.

Ships 6 to 10 are planned to be commissioned from 2022 onwards.

Photo: PIZ Marine

Class 123 Frigate MECKLENBURG-VORPOMMERN at sea

New Submarines for Norway and Germany

In February 2017, the Norwegian government announced that it was going to procure new submarines for its Royal Norwegian Navy together with Germany as strategic partner. The cooperation is based on a memorandum of understanding concluded by the ministries in June 2017. Five areas of cooperation have been agreed in the "Naval Defense Materiel Cooperation" memorandum of understanding between the defense ministries of the Kingdom of Norway and the Federal Republic of Germany, also including Common Design, the cornerstone of the U212CD project.

The partners have agreed upon a profound long-term cooperation that is not just limited to the procurement of the submarines but also includes their in-service support. After a common catalog of functional requirements had been prepared, ThyssenKrupp Marine Systems GmbH (TKMS), formerly known as Howaldtswerke-Deutsche Werft (HDW), was invited to prepare an offer. In the subsequent work-intensive phase, the project teams of the two procurement agencies and TKMS harmonized their efforts.

Procurement Cooperation

A total of six identical boats are meant to be procured from TKMS, as prime contractor, on the basis of a common catalog of functional requirements. The boats are scheduled to be delivered from 2028 to 2033 so as to enable the Norwegian Navy to seamlessly transition from the Ula class submarines to U212CD. Further partners to the U212CD project are highly welcome, regardless of whether a long-standing partnership of 20 years already exists or a new partnership will be entered into.

The design of the new U212CD class is based on the class 212A boats in service with the German Navy since 2005. In light of the anti-submarine warfare (ASW) systems, which are continuously becoming more advanced, the requirements the navies are faced with have developed accordingly. The challenging signature requirements of U212A are combined with a greater range

and speed as well as increased endurance at sea. An essential point will be U212CD's capability to use a missile to defend itself against airborne threats. Reducing and optimizing a submarine's target strength is more relevant than ever, in particular so since the Frigate Bayern managed to detect the extremely small U206A class submarines at an outstanding range using the LFTAS Low-Frequency Towed Active Sonar in the Bay of Biscay.

In submarines, batteries that have been based on the tried and tested lead-acid technology for more than 100 years are intended to be replaced by Li-ion batteries, which have a much improved energy density. Although they facilitate operation quite a lot, e.g. through a discharge time that is up to four times higher during maximum speed, these Li-ion batteries also call for considerably higher safety requirements.

In-Service Support Cooperation

In order to avoid duplicate structures and ensure maximum availability of the units, the partners agreed to closely cooperate in terms of logistics and maintenance. Apart from common spare parts management, which has been performed with other partners, the cooperation will include materiel maintenance and in-service support management specifically geared towards U212CD in the future. The German side intends to repair the submarines at the planned new Navy shipyard in Norway in future. This is not an entirely new situation for the German submariners: several class 205 and 206 boats have been repaired in Norway. The fact that the submarines are identical offers new possibilities in terms of joint and reciprocal training or even mixed crew operation. So far, it is planned to preserve the training capacities in the two countries. Despite all the excitement sparked by the new boat class it should be remembered that the 212A class submarines still remain in service. Germany thus

Photo: PIZ Marine

Combat support ships - equipped for the future

Photo: PIZ Marine

Class 704 support tanker A1443 „RHÖN"

faces a special challenge to equip the first lot of U212A submarines with as much CD technology as possible in the context of the midlife refits; this is necessary in order to prepare the submarines for the future and allow for training and logistic activities across classes. It is these synergies that make it possible to put the available personnel resources to efficient use and tackle obsolescence across the different classes at an early stage.

Class 123 Frigate – In-Service Use up to 2030

The class 123 frigates have proved their worth in numerous international operations. In order to keep the four BRANDENBURG class units operational up to 2030, extensive measures will be taken to remedy obsolescence. These measures will be considered by the F123 project manager in the system context within a master plan; the project manager will also be responsible for continuous updates. Measures such as the capability adaptations of the combat direction system, a modernization of the engineering automation system, renewal of the tactical radar and fire control systems, the integration of RAM Block 2 and the removal of obsolescence from the electronic warfare system have been contracted or are being prepared. The closely coordinated implementation and integration of all measures taken on board of F123 will be conducted in parallel with scheduled maintenance to the greatest possible extent in order to preserve the units' operational availability as far as possible based on financial planning and using synergy effects.
In the context of a holistic, generic measure the tactical radar systems will be commissioned in parallel with a performance based logistics contract which is to guarantee efficient obsolescence management and last but not least an increased availability of systems in the in-service support phase.
In order to guarantee continuous capability maintenance and the availability of operational, robust platforms before the fielding of multirole combat ships MKS 180, a service life extension to 2035 is currently under consideration. For this purpose, the maintenance of self-defense capabilities and long-range antisurface warfare as well as capability gaps in the field of generating underwater situation pictures are being investigated.

Combat Support Ships (CSS)

CSS embody 19 years of replenishment at sea worldwide and at any time, reliable, comprehensive and tried and tested. Their relevance for the Navy becomes evident in their operational times - the propulsion systems of the first two CSS were designed for 1400 hours of operation per year, but they far exceed this requirement, having been in operation for up to 2500 hours per year for several years.
CSS therefore also stands for change and adaptation to the constantly changing requirements. Up to 40 technical modifications per repair project (3-year intervals) are implemented, from better performing on-board cranes to additional boat capacities to state-of-the-art communication equipment.
For the two CSS of the first lot, the entire engineering automation system was successfully replaced within the planned period and scope of performance without exceeding the cost ceiling. Moreover, the replacement procurement of the integrated naval surgical hospital (i-MERZ), the integration of the new SEA LION on-board helicopter to be fielded and the regeneration of the replenishment-at-sea facilities have been initiated.

i-MERZ - "Medical Care at Sea"
The mobile naval surgical hospital on the CSS, abbreviated MERZ, with its comprehensive surgical and intensive care treatment facilities constitutes the central link in the medical care chain from first response to clinical treatment. After the complete loss of the MERZ due to a fire (previously deployed on the CSS FRANKFURT AM MAIN) a new solution based on long-standing operational experience was developed in cooperation with the naval medical service. The container concept will be replaced with a system that is permanently connected to the ship, i.e. an integrated naval surgical hospital (i-Merz.). This creates the prerequisites for a room layout optimized for medical treatment processes independent of the container design.
Patients can safely be moved from the helicopter hangar to the integrated naval surgical hospital now that the hospital is firmly connected to the CSS deckhouse, and for the first time a fully protected transfer to the wards inside the ship is possible. A weight reduction of more than 50t will benefit the CSS's maintenance margin, and the design sustainably reduces maintenance efforts. The integrated naval surgical hospital will be manufactured, completely equipped and subjected to functional tests independently of the CSS, which limits operational availability restrictions on CSS FRANKFURT AM MAIN to the integration and connection of the i-MERZ. The implementation has been in progress since contract conclusion in April 2019. Mounting and connecting the integrated naval surgical hospital (i-MERZ) on the ship will be combined with the maintenance project CSS FRANKFURT AM MAIN, which is to begin in September 2020.

SEA LION

The first SEA LION was finally handed over to BAAINBw in Donauwörth on 24 October 2019. Since then the helicopter has been subjected to an extensive operational suitability test. In parallel CSS BONN is being retrofitted since the end of 2019 in the context of the scheduled maintenance project in order to become the first unit to operate SEA LION. This was preceded by a wide range of analyses in order to specify conversion measures and prepare for the invitation to bid.

The on-board helicopter intended for tactical air transport of personnel and materiel and SAR tasks poses numerous challenges in the context of the conversion of the CSS. Apart from current regulations and a considerably bigger set of embarkation equipment, linking up the IT systems should be mentioned here. The flight deck will be fitted with a high-strength landing grid, and adjustments to the lighting of the flight deck and the power supply will be made. For the first time, a low-floor aircraft tow that is independent of the ship will be used. Maintenance costs are significantly lower while the tow's availability is considerably higher than that of the previously used fixed traversing system for on-board helicopters. The prerequisites necessary for maintenance and repair work are ensured by adjustments to the hangar area, maintenance platforms, air-conditioning system, tie-down points and material holds. A connection to the on-board communications facilities must be set up and the additional IT equipment must be integrated in order to take care of the operational mission planning and plan and control the technical flight operations.

Photo: MTG Marinetechnik GmbH

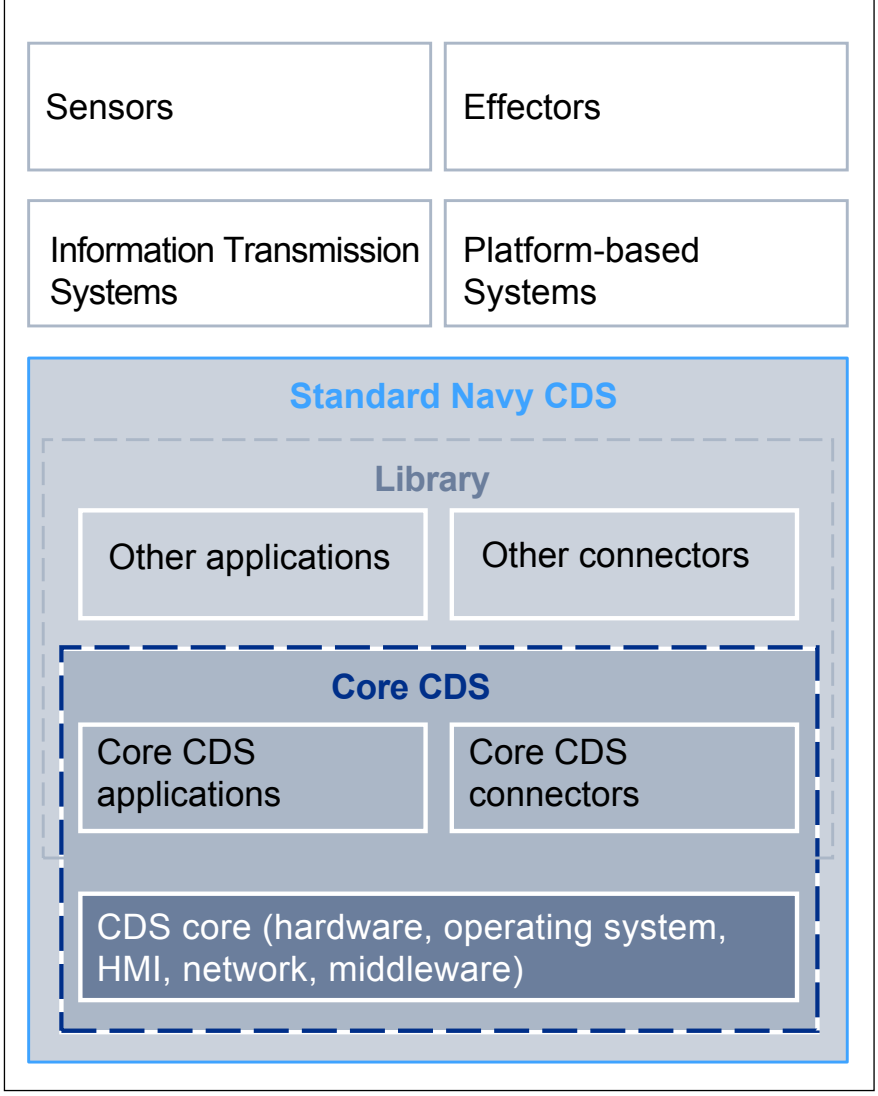
Sample ship design for a "new" naval support tanker

Capability Maintenance on the Replenishment-at-Sea Facilities

The replenishment-at-sea (RAS) facilities are crucial for the main task of the CSS – replenishment at sea with wet and dry goods. After 19 years in service, they have become increasingly obsolete. The complex design of the starboard side and port side RAS facilities as a mechanical, hydraulic, pneumatic and electric system with electronic control and operation components frequently poses major challenges for the maintainers and project management. Therefore, several measures aimed at guaranteeing the RAS facilities' operational readiness are under way.

POL Supply for Seagoing Units

The two Navy support tankers RHÖN and SPESSART have been in use for more than 40 years. Originally, they were built for Terkildsen & Oldsen A/S, a civilian Danish shipping company, under the names of OKENE and OKAPI. On 18 March 1976, the German Navy took over the two support tankers and, after necessary alterations, commissioned them in 1977.
The support tankers RHÖN and SPESSART fulfill the supply mission for national and international naval units at sea. With their three on-board RAS systems, they can supply other ships with fuels and freshwater at any time of the day and night.



This significantly increases a naval unit's sustainability. Always remaining in the background, the two support tankers reliably perform their duties up to this day and provide a major contribution to the fulfillment of the German Navy's tasks within the context of mandated missions, such as ATALANTA.

A large number of missions coupled with the old age of the support tankers has caused the maintenance costs to rise over the past few years. This circumstance and the fact that environmental protection regulations have become more restrictive over time, such as the requirement for a double hull, as well as stricter requirements regarding the emission of nitrogen oxide make it necessary to procure two support tankers to replace the support tankers RHÖN and SPESSART, which will meet the projected end of their service life in 2023+.

The capability to supply seagoing units with POL products is an essential part of the German Navy's portfolio and must be ensured beyond the service life of the Navy support tankers RHÖN and SPESSART. The requirements catalog containing the indispensable capabilities to be supported by the new support fuel tanker was compiled and handed over to BAAINBw for the preparation of possible solutions. Apart from the operating profile and the fuel quantity to be transported, it includes requirements concerning the military communication equipment, operation in different climates, helicopter operation and protection of the crew, among others. The goal is to provide a powerful product with which the future operational scenarios of the Navy can be mastered.

Subsequent to the selection of one of the solution proposals by the Bundeswehr Chief of Defense on 17 September 2019, the project progressed to the realization phase. The award procedure is to begin in the 2nd quarter of 2020, a construction contract is expected for mid-2021. The delivery of the first unit in early 2024 is expected to ensure that the Navy can seamlessly continue to supply seagoing units with POL products while the support tankers RHÖN and SPESSART can enter their well-deserved retirement.

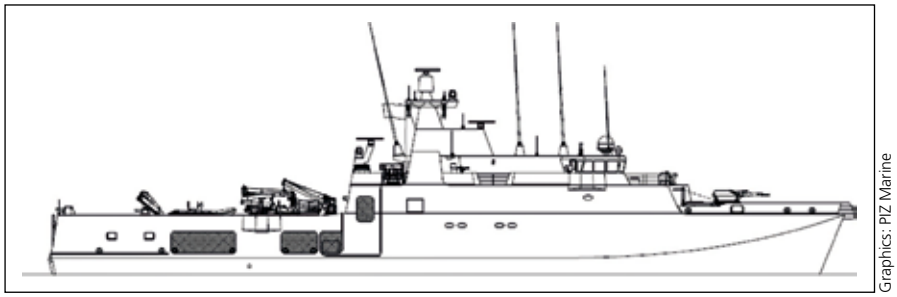
Operational Training Center for Frigates/Combat Support Ships

Within the scope of training modernization, the efficiency and advantages of simulation systems become ever more apparent. They make it possible to practice complex military scenarios in a reproducible manner and without putting the soldiers' lives and health at risk. There is no threat to the environment, and the costs are lower than the costs of training at the original facilities. In addition, the Navy has more ships and boats available for operations instead of them being occupied for training purposes. In order to account for this modern and professionalized training, operational training centers will be set up for land-based individual crew training and mission preparation also without their units. The F125 frigates, with their rotational crew concept, are intended to be the first ship class to benefit from this. The first operational training center for frigates/combat support ships will be established at the base of Flotilla 2 in Wilhelmshaven. It will mainly consist of a complex integrated simulation system which makes it possible to practice on individual stations as well as in the form of a "total ship training" with the entire crew. This way, the training participants can experience and practice internal and external battle situations in true-to-life environments and within the context of common scenarios. Simulations that are identical to the situations on board for the areas of NBC defense and the medical service and a realistic fire and flooding control exercise will supplement the integrated simulation system. Classroom training aids will also be procured. Branch S6.3 of BAAINBw is responsible for the operational training center project for frigates/combat support ships, which is currently in its realization phase. The procurements required for this major project will start in 2021.

Standardization of Maritime Combat Direction Systems (Standard CDS)

In the past, a proper combat direction system was developed for each new class of surface combatant to account for technological progress, among other things. This approach resulted in a fragmented landscape of combat direction systems, which poses some challenges for training, personnel, system maintenance and modifications. In order to significantly reduce the complexity of system maintenance and modifications, which is caused by the great number of systems, as well as the pertaining costs, a standard combat direction system fit for every ship class is intended to be implemented as a strategic project of the Sea Directorate.

For this purpose, the term "standardization" was defined as:



Graphics: PIZ Marine

Simplified sketch of the future capability platform for combined naval mine countermeasures

- identical structure as well as identical controls and functions of the user interface (human-machine interface) of the combat direction systems across all capability platforms to improve operational safety, and
- the possibility to increasingly have the Bundeswehr determine the way ahead for future developments and how such developments are to be implemented.

The intention is to perform the integration into the ship, as overall system, with the help of integration projects that are specific to individual ship classes.

The basic technical principles for the standard combat direction system are meant to be established by implementing a core CDS around a CDS core.

The standard CDS supports all functions and processes in the areas of command and control, effects, reconnaissance and support, which are, so far, implemented in class-specific CDSs.

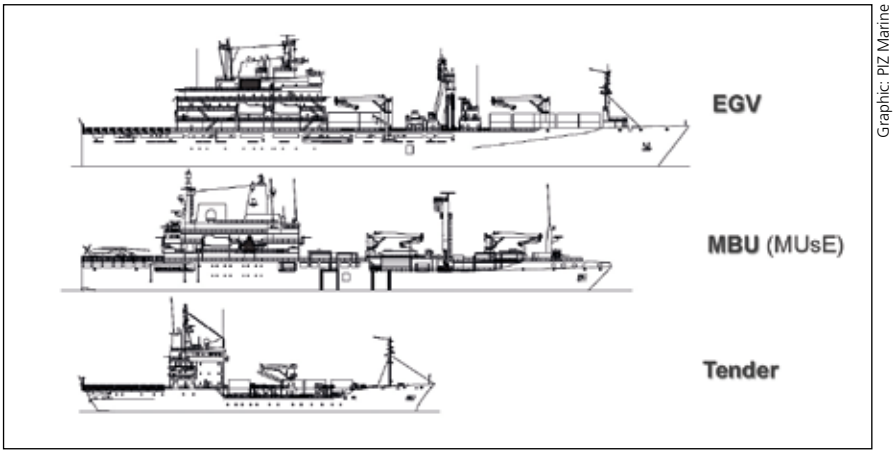
The standard CDS will be available in different types that meet the requirements laid down in the task and operation profiles for the various capability platforms.

Outlook on Future Projects:

Apart from the selected projects introduced here, there is a multitude of big and small projects and product modifications which are currently being implemented by the Sea Directorate in close cooperation with WTD 71, the Navy Arsenal and the Navy and with the support of other areas. They range from davits, boats for special forces and electronic warfare systems, to fleet service vessels. Finally we would like to take a look ahead using three selected projects as examples.

Capability Platform for Combined Naval Mine Countermeasures

The continuous availability of mine countermeasure capabilities required within the Alliance framework after the end of the service life of the class 332 minehunters will be guaranteed by a seemless transition to a capability platform for combined naval mine countermeasures. Its basic capabilities should include the capabilities of the sonar-based mine hunting chain, the basic version of the system for clearance diving operations and the ability to control unmanned systems. Modular mission components for enhanced mine hunting, mine clearance and clearance diving as well as mine operations are to supplement and extend the required capabilities.



Graphic: PIZ Marine

Comparison of sizes CSS – MBU – tender

Medium Support Unit

Mobility and sustainability, flexibility and responsiveness, survivability and effectiveness distinguish naval forces - in order to guarantee all this globally and independently, supply and support at sea are of central importance. For smaller and medium-sized units, such as corvettes, mine countermeasures units and submarines, six class 404 tenders, one of which was specifically refitted to serve as a submarine support unit, currently guarantee this.

Graphic: PIZ Marine

NGF concept outline

The age of the tenders, which were commissioned in the early 1990s, is taking its toll. Labor and cost-intensive high-risk maintenance give rise to demands for a replacement.

- Command and control functions exercised by an embarked staff or with the support of an international mine countermeasures force,
- support of submarine operations and training measures,
- evacuation operations and support of Special Forces,
- drone reconnaissance and the deployment of international headquarters,
- protection against asymmetric sea and air threats,
- logistic supply and support
- This represents only a small synopsis of the comprehensive range of tasks.

Next Generation Frigate (NGF), Class 127 Frigate

The intentions for the NGF are that it will replace the F124 class and become the new air and missile defense frigate with additional ballistic and hypersonic missile defense capabilities. The next generation frigate will be operated with a crew of approximately 150, there will be space for an additional 90 persons to embark and it will reach a stationing speed of >30 kn. The Directorate-General for Planning approved the project sketch for the next generation frigate in February 2020. The first of a total of 6 ships is to be delivered in 2032 according to the current plans. The ships' intended service life is 35 years. ■

Information Technology Directorate (I)

The Information Technology Directorate (Directorate I) is the element of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) in charge of procuring any IT equipment used by the Bundeswehr and of maintaining the operational viability of this equipment.

Directorate I has some 1,000 employees in Koblenz, Lahnstein, and Dresden. Its remit includes many major leading-edge projects, such as the German Mission Network (GMN), the digitalization of land-based operations (D-LBO), or the modernization of Bundeswehr crypto operations. Furthermore, it handles about 100 projects in the analysis or planning phase, plus another 150 projects in the in-service phase.

The projects of Directorate I have implications for every single major organizational element of the Bundeswehr. They lay the groundwork for command and control during exercises, national and collective defense, and in particular during operations abroad. The Digitalization of Land-Based Operations (D-LBO) program with its individual projects is a perfect example of the extremely wide range of tasks and diverse workflows handled by Directorate I.

Multinational Cooperation – Together Towards a Digitalization of Land-Based Operations

The digitalization of land-based operations connects all relevant actors, platforms, facilities, sensors and effectors to enable the conduct of operations on the battlefield. This requires a multitude of IT services and a suitable link between participants as well as information processing capabilities and data storage on a high number of mobile elements. In order to tackle the challenge of digitalizing land-based opera-tions, Germany has joined forces with the Netherlands to initiate the Tactical Edge Networking (TEN) cooperation program.

Multinational interoperability on the battlefield is a crucial prerequisite for successful operations shoulder to shoulder with international partners. This capability plays a pivotal role in light of increasing Alliance commitments and international cooperation. Acknowledging the extent and depth of the existing cooperation and integration between German and Dutch armed forces, on 17 May 2018 Ministers of Defense Ursula von der Leyen and Ank Bijleveld-Schouten signed a joint Letter of Intent concerning further cooperation aimed at the digital integration of their respective armed forces. On 26 June 2019, the Dutch and German Ministries of Defense signed a Memorandum of Understanding to tackle the networking and digital transformation of their re-spective armed forces together. Since 2014, Germany and the Netherlands have been placing a number of military units and formations under each other's command. Both countries have placed their national digitalization programs D-LBO and FOX-TROT under the umbrella of the bi-national TEN program. The TEN program aims to harmonize digitalization efforts for the Dutch and German armed forces both on an armaments level and during operation, capitalizing on economies of scale. To this end, plans have been made to develop, test, procure, integrate and operate common solutions to link the German and Dutch armed forces on a tactical level. The German TEN components relating to D-LBO will be focused on milestones 2023, 2027 and 2031 as specified in the Bundeswehr's capability profile.

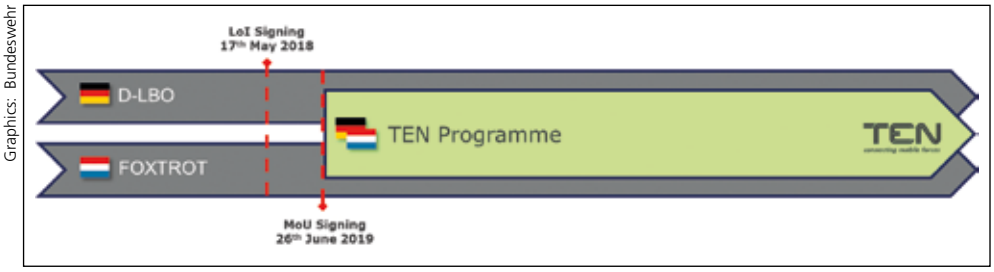
The collaborative concept of TEN is based on an iterative (spiral) approach to provid-ing equipment to national sets of forces as part of Dutch-German Force Packages (FP) according to a jointly predefined and documented requirement status. The first spiral will cover the provision of state-of-the-art and TEN-compliant communications equipment to the 1st national set of forces (KD1 = „Kräftedispositiv 1") as part of FP1.

Further units will be equipped successively so that the remaining brigades of the German Army and their enabling services and organizational elements will undergo digital transformation, achieving equipment configurations that may be different but compatible.

The TEN staff is based in the Deines-Bruchmüller barracks in Lahnstein. The pro-gram will be managed by two (DEU/NLD) program directors with the assistance of a bi-national Program Management Office (PMO).

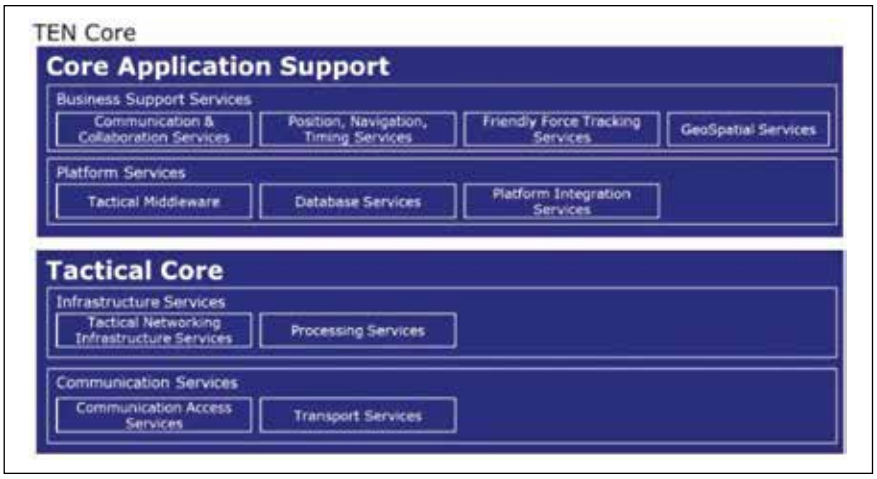
Down the road, a number of fully integrated German-Dutch entities (such as a Design and Prototype Center) will be set up in line with a jointly agreed Value Chain. This Value Chain (see Figure 2) will represent the complete value creation process of the program. The scope of the program will also include the development of different system architectural levels (Overarching, Reference and Target Architecture) to convert the joint German-Dutch requirements on the ope-

Graphics: Bundeswehr



The bi-national TEN program

TEN Value Chain



Generic overview of building blocks in the TEN Core

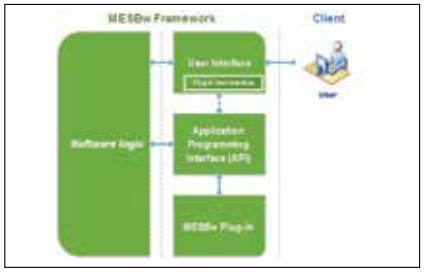
rational level into a model-based objective. This architecture will then be evolved towards an operable solution. Prototypes will be developed on the basis of results that are not available off the shelf. They will be validated as soon as possible so that either the procurement process can be continued, or another solution can be found. This process ends in a full spiral.

Developing Future-Proof Services as Illustrated by TEN – Tactical Core for Complexity Reduction

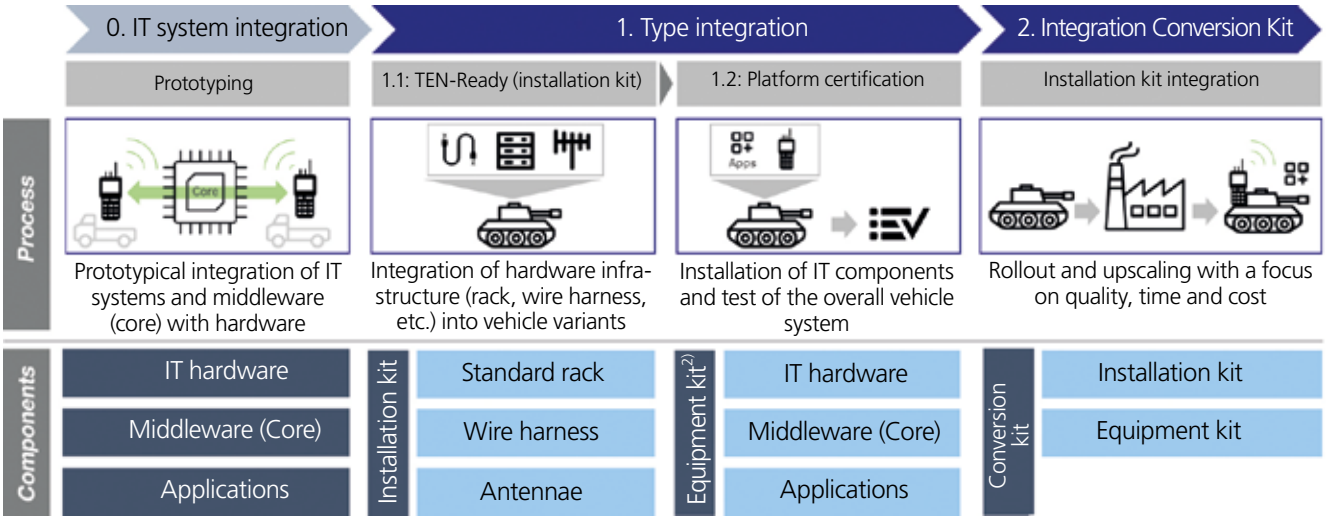
To achieve a flexible decoupling of tactical applications from tactical infrastructure, TEN will use a Government-Owned Tactical Core as middleware. This Tactical Core not only supports the flexible use of heterogeneous transfer resources based on tac-tical operational needs; it also enables the implementation of quality-of-service mechanisms to ensure dynamic availability of services contingent on the data trans-fer rate available at any given time. In addition, this middleware will ensure imple-mentation of the information security architecture within the TEN program.
Decoupling is the only way to reduce and manage the complexity of TEN. If there are any changes to transmission resources or applications, only the core middleware needs to be modified instead of all connected systems.
Given its fundamental importance for the information and communication network of TEN, in realizing the Tactical Core we will be breaking new ground. The TEN Design and Prototype Center will be in charge of realization, system integration, and any ad-aptations. The rights to the software and any know-how concerning this crucial system element will hence remain with the German and Dutch governments.

Implementing Services as Illustrated by the Bundeswehr Mission Enabling Service

The Bundeswehr Mission Enabling Service (MESBw) will provide a uniform basis for realizing a variety of military applications. Its scope will be determined by require-ments posed by many different military users (community of interest) and will in particular include the display and editing of military situations. It offers a user interface providing users with direct access to the functions of MESBw and also makes its functions available to other software products by means of standardized application programming interfaces (API). The MESBw will thus become a framework for realizing specific upgrades in the future. Users will be able not only to use the (basic) func-tions of MESBw but also to easily add their own functions using the user interface.
To implement the framework component currently being realized, commercial standard software products SitaWare Headquarters and SitaWare Frontline will be used. Thanks to the framework approach, it will be possible to award third-party contracts for plug-ins, keeping the market for upgrades open.
New functions can be implemented through upgrades to MESBw. Another option is to use the API to interface independent applications including their UI. This means that existing applications (such as vehicle information systems) and other commercial tools can be connected to the MESBw without needing to include the framework manufacturer in the software development. This matters especially in such cases where the Bundeswehr does not hold the necessary rights to the interfaces of the application to be connected. As the API of the MESBw is an open one, the holder of the rights to the existing application can be contracted to develop the required adapt-er on its own.



Use as a platform API/framework API



Type and series integration into TEN

Solutions combining both options are possible, too. For instance, an independent application could be connected to the framework using a plug-in to display infor-mation on the MESBw's user interface. Examples include reconnaissance systems that show recce results on the MESBw's map display.

Integrating IT in Combat Vehicles – A Challenge not only in a Dutch-German Context

One of the main challenges in the digital transformation of the land forces is the

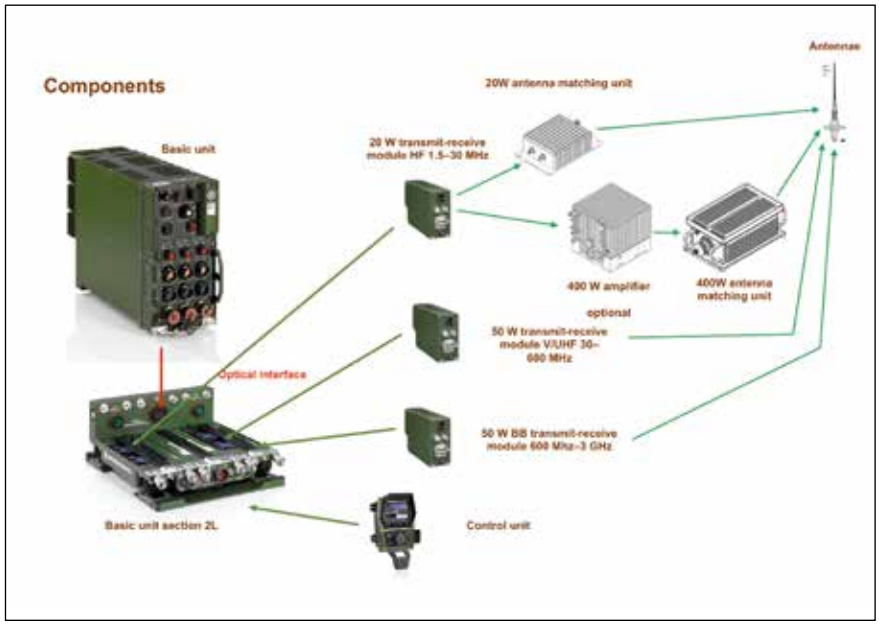
Use as an external API

integration of D-LBO TEN system components into combat vehicles. According to the tight time frame stipulated by the German side so far, conversion of the platforms of the first set of forces (KD 1) is scheduled for late 2024, leaving no room for mistakes or delays although a wholly new system concept with a multitude of functionalities has to be incorporated exactly in line with the specific particularities and parameters of the different platforms.

On the one hand, the specifications and interfaces to be defined need to be as standardized as possible to enable the integration of IT components that have yet to be specified. At the moment, the location and way of mounting components vary among vehicle types. This is due to the differences in equipment characteristics and passenger compartment/cab construction of the individual vehicle types. Each component has its own mount or support, and the connecting cables between components or antennas are individually designed based on conventional wiring.

Standardized mounting systems with specified racks will be used as much as possible. As a minimum, standardized specifications and form factors based on the results of the StaRSBw study (Integration of Standardized Bundeswehr Conversion Kits Compliant with the NATO Generic Vehicle Architecture into Bundeswehr Vehicles) will be applied.

On the other hand, in most combat or operational vehicles the substantial equipment



The highly flexible modular system of SVFuA: The standardized modules can be adapted and switched quickly for every mission

SVFuA line configuration

and the specified crew size leave no payload or stowage reserves for further installations. Depending on the functions to be performed, the expected equipment size is likely to conflict with the available space, the admissible gross weight, the airconditioning and/or the power supply. This problem will only be exacerbated by the binational approach and differing national regulations with regard to technology and certification.

In order to ensure qualification of the overall system and minimize the risk of failure, it is crucial that the integration process be broken down into type and series integration.

Type integration will also include the necessary demonstrations to support the successful approval for later inservice use. Given the prevailing legal situation, type and series integration can in many cases only be conducted with the participation of the Original Equipment Manufacturer (OEM). This is to ensure the necessary level of detail as well as hard and fast vehicle data, facilitating demonstrations of compliance and adaptations to the material documentation.

Sometimes, integration of the system components is one of the key touchstones throughout the digital transformation of land forces. And while many unknowns have already been identified and many more will be identified in the future, success remains possible but by no means certain.

From Development to Series Production – State-of-the-Art Communications Equipment for the Bundeswehr

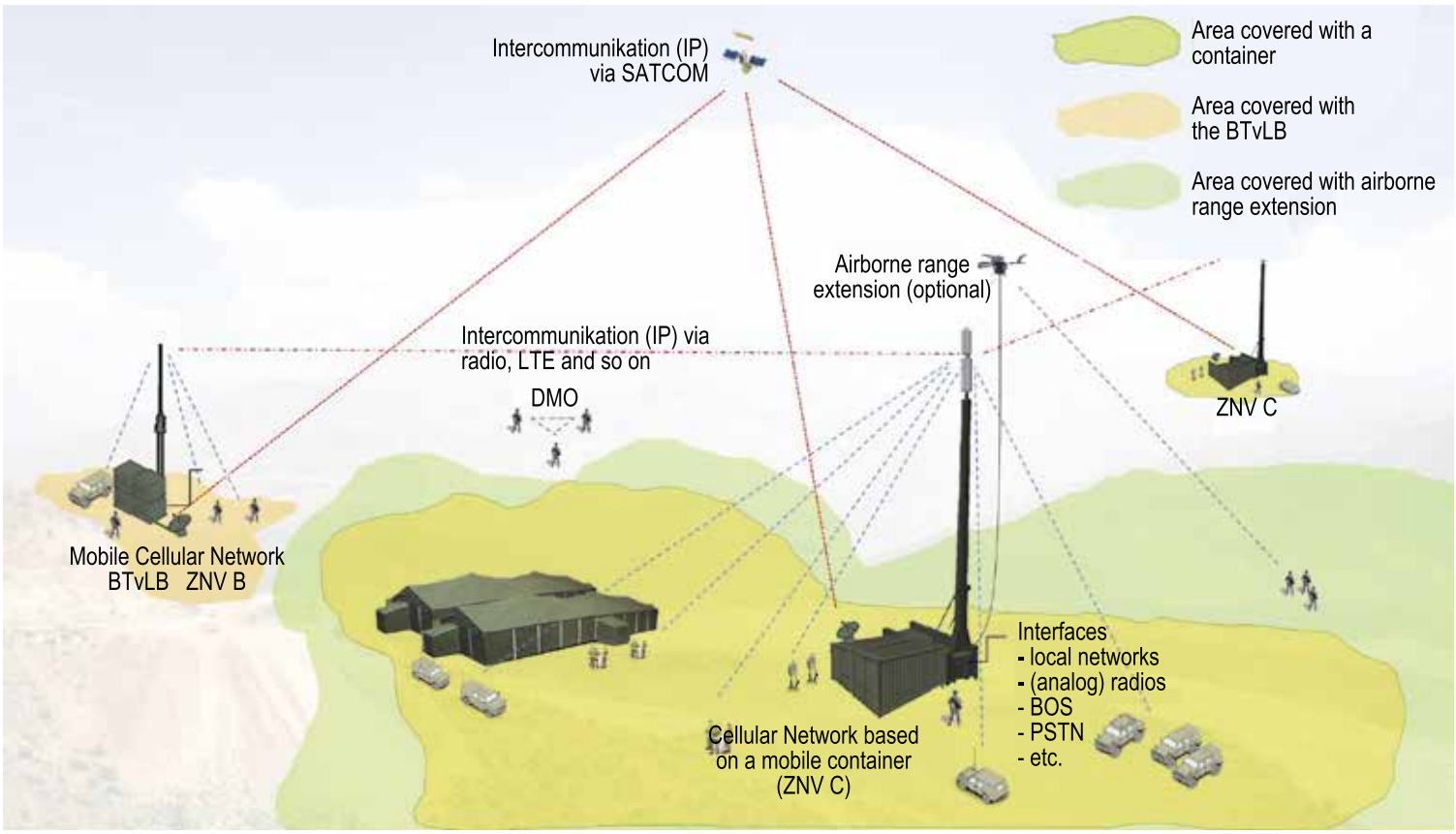
Starting in May 2020, the phase-in of SVFuA (Armed Forces-Wide Networkable Radio Equipment) will take secure and interference-resistant tactical wireless communication to a whole new level of technical progress. Long gone are the days when a radio was explicitly procured and used for one task only. At that time, any capability changes or growth, or simply a change to operational requirements, would result in the radio being replaced. The consequence was an excessive variety of equipment. These days are over.

At long last, interoperable state-of-the-art radio equipment ready for the challenges of the future is finding its way into the changing communication and digital transformation of the land forces. SVFuA is the only radio set capable of transmitting information up to DEU GEHEIM and NATO SECRET on three lines simultaneously. Each of these lines offers the full spectrum of functions of a complete radio set across the HF, V/UHF and broadband (1.5 MHz through 3 GHz) range.

Considering that modern waveforms are capable of transmitting voice and data at the same time, are self-organizing and, thanks to ad-hoc networking, can achieve ranges far beyond the physically possible, future users are understandably excited. The technology has already made the paradigm shift. The above-mentioned capabilities are no longer a distant dream but proven and, as of May 2020, commercially availa-ble solutions.

On the road to the future, it would not do to completely cut off the old and deprecated radio technology of the past and present, though. Consequently, SVFuA is backward compatible, allowing a connection to legacy systems and bridging the gap between the old radio technology and state-of-the-art digital IP radio equipment. An old waveform is used to enable such connections.

A confident look at what is ahead reveals the potential of this technology: By using and adding new waveforms, more powerful, state-of-the-art network-based transmis-sion techniques can be developed. The SCA-compliant software-defined radio devel-oped in Germany has received awards and praise all over the world, earning a prom-inent position as the software-defined radio of armed forces both nationally and inter-nationally (e. g. by adopting the European ESSOR waveform for SVFuA) following its implementation into the digitalization of Bundeswehr land-based operations.



ZNV system overview

Boosting Trunked Radio Performance: From Planning to Realization

As an accompanying measure to D-LBO, a follow-on system for the TETRAPOL Bw trunked radio system will be procured. The project is called ZNV (Transportable Cel-lular Network) and will boast enhanced performance values in particular with regard to data transmission.
ZNV is a cellular radio system transmitting voice and narrowband data based on the TETRA (Terrestrial Trunked Radio) standard. Broadband data transmission will take place based on the LTE (Long Term Evolution) standard.
In addition, the TETRA standard enables the required integration into the networks of German authorities and organizations with security tasks as these already use TETRA for their national networks.
To meet the differing size and coverage-related requirements of the German users, there are plans for two system variants:

- system components, integrated in a container (ZNV C);
- system components, integrated in an operation, shipping and storage container (BTuLB) (ZNV B).

As a rule, commercially available products will be used for realization. The project includes procurement of the transportable network infrastructure (switches, base sta-tions, etc.), end-user devices (hand-held, vehicle and table-top radio sets) and stationary training/reference facilities. The Army Combat Training Center will also be equipped with a Transportable Cellular Network system.

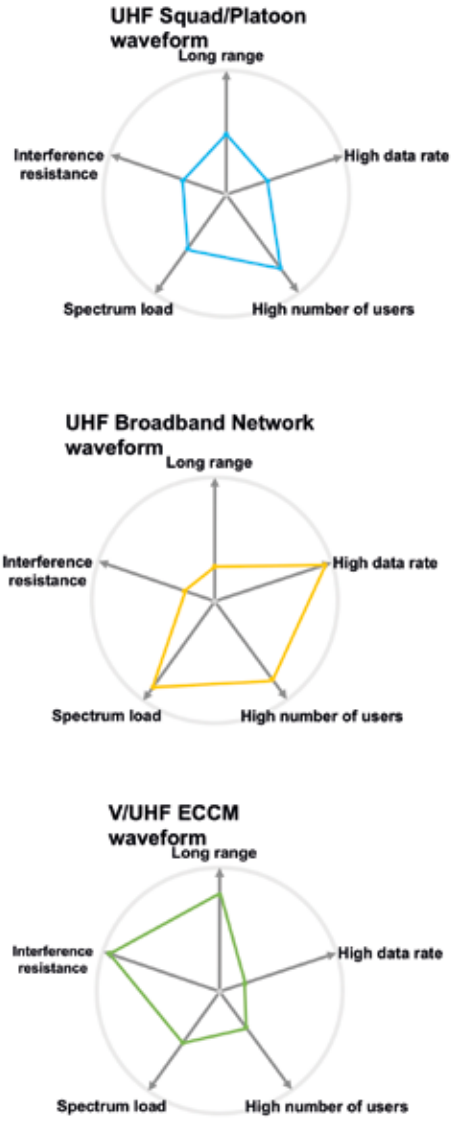
Maintaining Operational Viability as Illustrated by the Elimination of Obsolescence Effects in SEM 80/90

The SEM family of radio devices has been in use for several decades, and the pro-curement of spare parts has for some time now been hampered by obsolescence. To ensure continued operational viability of these devices, the obsolescence effects have to be eliminated. In addition to the availability of spare parts, keeping the SEM devices operationally viable is directly contingent on repair capacities. Annual costs for maintaining operational viability vary depending on these two limiting factors. We expect to see a continuous rise in obsolescence, resulting in a steep increase in annual costs as the systems continue to age. In January 2020, a service life extension to 2028 and beyond was approved.

Given that the digitalization of land forces will take place successively, SEM 80/SEM 90 radio sets will likely still be needed even after 2028 by those units still waiting to be reequipped. With this in mind, project management will – in close coordination with the D-LBO TEN program – additionally and simultaneously make preparations for a complete removal of obsolescence through a replacement procurement, e. g. a re-design, to maintain operational capabilities.
To this end, a feasibility study was conducted in 2019 to look into potential solutions. The Bundeswehr has not yet completed its analysis of the results. A first assessment indicates that the approach is promising. This matter highlights once again the dependence on the specific vehicle/platform. SEM radios are used in almost all land vehicles, and the vehicles in stock have little to no reserves when it comes to space, weight, or power.

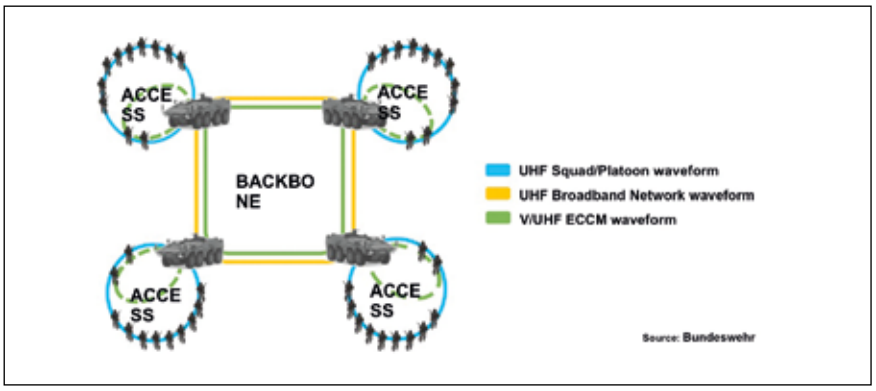
Conceptual Design – Renaissance of Conventional Combat Net Radio in the Infantry

Conventional V/UHF combat net radio used to be the communications medium of choice for combat and combat support forces to maintain command and control at the front line even in high-intensity combat. Due to the changed threat situation, however, the SEM 52/70/80/90 devices currently in use with the Bundeswehr are no longer adequate for current threats for reasons of security, reliability, and performance. This is why, with the D-LBO program, BAAINBw Directorate I is again making conventional combat net radio a priority.
In addition to software-defined radio (SDR) architecture, state-of-the-art transmission techniques – i.e. waveforms – will provide a massive performance boost to V/UHF combat net radio. Directorate I will provide three waveforms for the Bundeswehr's next-generation radio equipment that differ in network capability, signal bandwidth,



Comparison of waveform characteristics

interference resistance, data transmission capacity and transmission latency and are thus optimized for different applications and types of communications.
The UHF Squad/Platoon waveform is a mobile ad-hoc network (MANET) for voice and data transmission. Its main



Waveform usage according to the D-LBO system concept

users are infantry and armored infantry. If required, this waveform can create a network including all forces of a platoon (i.e. some 40 to 50 members), enabling communications within squads as well as command and control links within one platoon. As is the rule for MANET, it offers re-broadcast mechanisms that mitigate the range deficits of the UHF range, among other things.
The UHF Broadband Network waveform also provides a MANET and is used first and foremost for broadband data transmissions among vehicles. This waveform, too, enables the re-broadcast mechanisms that are typical for MANET to create a self-organizing self-healing network.
Given that the UHF Squad/Platoon waveform and the UHF Broadband Network waveform are limited with regard to interference resistance due to restrictions of the electromagnetic frequency spectrum, the V/UHF ECCM waveform with a reduced range of functions is provided as a fallback position to ensure availability in case of electronic countermeasures. This waveform will be used for simultaneous voice and data transmissions and will most likely support the trunking of 25 kHz VHF channels to improve data transfer capacities as needed.
With D-LBO, Directorate I will provide different types of state-of-the-art combat net radio devices, each with a different range of functions. The equipment provided will include hand-held radio sets for infantrymen and commanders as well as vehicle radios and backpack radio sets for communications operators. The radio sets will feature integrated encryption based on commercial algorithms. Both the waveforms described above and the radio devices will be based on commercially available solutions.

Information Technology – The Key to Success

The diverse range of tasks handled by the Information Technology Directorate reflects the versatility of the Bundeswehr as a whole. The directorate makes a valuable contribution to ensuring the success of military projects and operations. Our modern team is a mix of civilian and military employees bringing to the table a wide scope of experience, pooling and complementing their respective expertise. They are looking forward to welcoming new civilian and military colleagues into this attractive working environment, be they B.A. or M.A. graduates, technical engineers, reserve duty soldiers, or ex-soldiers. ■

A Further Insight

One-on-one with Brigadier-General Michael Hauschild, Head of Directorate I

ESD: You are in charge of the directorate whose technology is subject to the fastest innovation cycles. How do you manage to keep up?
Hauschild: Continuous market observation as well as follow-on training allow my employees to have an excellent overview of the performance and development of cutting-edge information technology. BAAINBw never procures any information technology simply for the sake of technology or innovation but in order to close capability gaps within the Bundeswehr.
At the start of the procurement procedure, we do not describe the needs of the Bundeswehr in terms of technical specifications but rather in terms of the necessary or required functions. We wait until the very end to make a final decision regarding the technical solution; therefore, upon selection of the final product, we can take into account innovations that could be implemented in a manner suitable for the Bundeswehr during the procurement procedure.

ESD: How do you bridge the gap between your directorate and research and science?
Hauschild: Our directorate regularly evaluates study results and commissions studies on specific problems as well as studies to assess the medium and long term developments in the areas of digitalization, information technology and cyber-related activities. BAAINBw also cooperates with the institutes of the Fraunhofer-Gesellschaft and the Bundeswehr universities on selected topics.

ESD: What are your most important and/or biggest projects at the moment?
Hauschild: As is the case for BAAINBw as a whole, projects that are necessary to honor the obligations of the Federal Republic of Germany in relation to the NATO Very High Readiness Joint Task Force (VJTF) take absolute precedence within the Information Technology Directorate. The Digitalization of Land-Based Operations (D-LBO) program, which includes both information transmission and information processing components as technical systems, is of particular importance. The purpose of the D-LBO program is to set up a secure, end-to-end, joint, cross-echelon, nationally and multinationally interoperable information and communications network. The BAAINBw Information Technology Directorate will provide numerous IT services to support network-enabled operations. Vehicles of all kind, including tanks, command post vehicles and trucks, as well as the equipment of dismounted soldiers containing IT components are covered under the D-LBO program.
Essential parts of the D-LBO program are implemented bilaterally in cooperation with the Netherlands. The binational program is known as Tactical Edge Networking (TEN) and covers the bulk of the D-LBO program.
It is also important to mention the Harmonization of the Command and Control Information Systems (HaFIS) program. The purpose of the HaFIS program is to migrate the current command and control information systems (CCIS) of the services into a joint, modular, flexible (both in terms of the mobility of terminals and the portability of IT applications and IT services), customizable and scalable command and control information system. My answer to your next question will perhaps illustrate the particular challenges arising from this migration.

ESD: What challenges are you facing as a result of the need to network all Bundeswehr systems?
Hauschild: In the past, fulfilling specific requirements set down by individual user groups, e.g. the armed forces, to the greatest extent possible took precedence during the procurement of IT and communication systems for the Bundeswehr. As a result, the systems that are currently in use may vary in terms of their technological development, the large number of standards used and the different levels of complexity and performance capabilities.
The challenge we are facing is to counteract this multitude of systems and to provide standardized IT services on the basis of a uniform architecture instead.
To ensure better management of complex IT services, the Bundeswehr – or more specifically, the IT departments within the Federal Ministry of Defense (FMoD), BAAINBw and the German Cyber and Information Domain Service Headquarters (KdoCIR) – will adopt an approach based on components, also known as "cluster logic".
In a wider sense, the Directorate-General for Cyber/Information Technology within the FMoD has already been reorganized into a digitalization platform and has assigned clusters to each branch. The BAAINBw Information Technology Directorate will mirror this reorganization in order to be able to develop and procure IT services and technology on its own terms in the future. In other words: the Information Technology Directorate will be able to provide IT services and technology by identifying the technology that is both required and available rather than waiting for the user to make a request. It will no longer be of consequence whether technology is procured, for example, for the Army or the Bundeswehr Joint Medical Service. Such technology will always be integrated into the architecture, it will contain components from different projects for the armed forces and it will increasingly promote interoperability while also complying with the requirements laid down by the armed forces or other users.

The questions were asked by Dorothee Frank.

Information Technology Support Directorate (G)

Until the turn of the millennium, the Bundeswehr processes were focused on individual task and organization-related procedures. The consequence was a grown but inhomogeneous IT landscape consisting of many partly self-developed and separate systems.

In 1999, a need for action was identified because of the high operating effort with regard to the already emerging innovation thrusts of the information age, the lacking release capability of the stand-alone solutions as well as the increasingly complex interface architecture resulting from the integration requirements. It was decided to optimize the Bundeswehr processes through harmonization and standardization and to support them with an inter-organizational standard software based on experience gained by the private sector of the economy. After an in-depth investigation, the Bundeswehr opted for the products of the German DAX30 company SAP, which was already well-established on the market. This was the birth of the Standard Application Software Product Family (SASPF) project.

With the introduction of the Bundeswehr Personnel Management System (Personalwirtschaftssystem der Bundeswehr), the logistic-administrative support (L-Schiene) and the Business Intelligence (BI) procedures in the years 2001 to 2004, a clear-cut course was set for the future of information technology support (IT-U) for the entire process landscape of the Bundeswehr. In the following years, the SASPF product portfolio was constantly expanded due to new or modified requirements. Currently, around 63,000 staff use SASPF on a daily basis, during routine duty in Germany and during missions abroad such as European Union Training Mission (EUTM) in Mali or Resolute Support (RS).

The G Directorate of BAAINBw is responsible for the operation of SASPF and the integrated systems in use (Systeme in Nutzung - SinN) as well as the further development of the SASPF program. The expansion of the product portfolio for the coming years is determined on the basis of the SASPF program strategy. The G Directorate thus makes a significant contribution to the continuous digitization of the Bundeswehr processes.

Photo: Bundeswehr / Jana Neumann

Digitization of Bundeswehr Health Care

The digitization of health care is a challenging goal both in the civilian environment and for the Bundeswehr. In contrast to the civilian health care system with its many distributed digitization approaches, the holistic and process-oriented digitization of Bundeswehr health care focuses on the inter-institutional (regional medical facilities, Bundeswehr (Central) Hospital, institutes, etc.) harmonization of medical sub-processes (such as treatment, assessment and prevention) and the availability and usability of the data obtained from it. The solutions are designed and implemented in the context of projects of the SASPF program strategy using commercial (standard) software. Currently, 14 SASPF projects are in the realization stage or in operation, 18 more are planned.

The increasing digitization of health data which are merged/integrated on a common data platform as well as the integration of additional medical facilities and external institutions such as health insurance funds by means of a telematics infrastructure are the key to a more comprehensive individualization in patient treatment, to the preparation of precise, highly up-to-date medical situation pictures and to the prevention of medical emergencies.

The data obtained can - always in compliance with the very restrictive data protection regulations - also be used as a basis for an electronic health file (elektronische Gesundheitsakte) and for scientific evaluations (e.g. forecasts).

A successful digitization of Bundeswehr health care is of high strategic importance, as it creates the necessary conditions for an effective and efficient accomplishment of the Bundeswehr Medical Service's mission both in Germany and abroad.

Optimized patient care contributes significantly to increasing the operational readiness of the Bundeswehr.

Digitization of Procurement

The optimization of operational readiness is also driven by the IT-U Customer Product Management (IT-U CPM) project. From 2023, this will offer integrated, efficient and consistent IT support for the project management of armaments projects in accordance with the requirements of the internal procedural provisions for requirement identification and procurement in the Bundeswehr.

In three sub-projects, six legacy systems, e.g. the electronic management information system EMIR, which is relevant for the project management of armaments projects, as well as the „integration of project management budgets" system network with the system component of project monitoring and controlling (IVF/VOCON), will be transferred to an SAP-based solution (SASPF). In addition to traditional project management tasks such as work/time/financial planning,

reporting and scheduling, project managers are now able to plan and apply for the necessary funds. Full budgetary integration is achieved through initialization of the procurement process without media discontinuity from the project management of an armaments project including the necessary and already digitized contract awarding process. In addition to comprehensive controlling, risk management and risk reporting, it provides a solution for the planning and management of research & technology projects.

Further technical solutions are planned for the field of Government Quality Assurance. They provide comprehensive support for the planning and implementation of Government Quality Assurance activities and supplier audits. In the IT-U CPM project, an integrative approach is always pursued in all parts of the solution.

As early as 2016, two solution elements that are relevant to the whole Bundeswehr were put into service. One of them is the purchasing analysis, which now offers comprehensive evaluation methods to the Bundeswehr's strategic purchasing activities and thus substantially contributes to policy decisions. The other one is Contract Lifecycle Management (CLM), which makes the work of contract management considerably easier and more efficient through the use of legal clauses and electronic staffing of draft contracts. With its portfolio of solutions, the IT-U CPM project as a whole contributes to modernizing armaments management in accordance with the objectives of the Armaments Agenda and supports the requirement for a full-coverage IT support of the major organizational element of Equipment, Information Technology and In-Service Support with SASPF, thereby making an indispensable contribution to the digitization of the Bundeswehr.

Photo: Bundeswehr

Digitization of Logistics

Efficient IT support is the essential prerequisite for bringing forces and assets to bear in a combination of command and control, reconnaissance and effects and to ensure their use is demand-oriented and sustainable. Logistics and various other support services thus form the backbone for the mission accomplishment of the Bundeswehr. For decades, logistics has been supported by numerous IT processes, but nevertheless the pressure to achieve digitization without media discontinuity and transparent networking of all logistic processes and procedures continues to be high.

In the mid-2010s, the SASPF roll-out in logistics had largely been completed, while central logistics was still characterized by a complex interaction of SASPF and the logistic systems in use (SinN). By 2022, this parallel operation will be terminated by the SASPF IT-U central logistics project. The first ten out of the more than 30 SinN systems to be replaced have already been taken out of service, nine more will follow until the end of 2020. The way has thus been paved for closing functional gaps in SASPF for central logistics and designing the prerequisites for the further digitization of logistics. This also includes the integration of external logistic service providers into the SASPF system, because the current complex logistic challenges can only be tackled in close cooperation with trade and industry. As a result of the Extended Warehouse Management project that has just begun, all warehouse management processes of the Bundeswehr will be uniformly converted to the latest standard of the SASPF system by the end of 2024. This actively strengthens the effectiveness and efficiency of an essential pillar of logistics, the timely and demand-oriented provision of material at all logistic levels.

The LogIT-U project for the F125 frigate represents a milestone in the replacement of the SinN systems for all ships and, furthermore, it forms the basis for the self-sufficiency capability of SASPF for all services, as is shown by the first F125 frigate ("Baden-Württemberg") at sea equipped with a decentralized SASPF system. With the large-scale rollout of the Naval Arsenal, the complete integration of a competent service partner for the Navy into the central logistics network with SASPF will be carried out.

This represents a further evolutionary step towards complete transparency of material and value flows within the Bundeswehr, which is achieved by integrated, modern SASPF solutions for all actors involved in the logistics network. SASPF thus provides the answer to the requirement of continuous IT support of the processes.

Source: Bundeswehr / BAAINBw G1.2

A Further Insight

One-on-one with Colonel Dietmar Hartung, Head of Directorate G

ESD: What are the most important factors influencing the SASPF Program right now?
Hartung: The full development of the potential offered by digital solutions as well as the definition of a digital identity are going to have an impact on future military capabilities, and the increasing momentum at which these developments occur is also going to affect the SASPF Program.
The approach favored by the Bundeswehr with regard to the digital transformation of its area of responsibility focuses on digitizing situation pictures, health care and infrastructure management and has a direct effect on the priorities of the SASPF Program and thus on the work of the IT Support Directorate (Directorate G).
Additionally, the results provided by the Procurement Organization Task Force (TF BeschO) aim at substantial optimization, also regarding the procurement and in-service use of IT services. In terms of the SASPF Program, we expect to see positive impacts following the transfer of operative tasks to BWI and the implementation of a cluster program.

ESD: What milestones do you expect to reach in 2020?
Hartung: According to current assessments, we expect to reach important milestones in 2020.
First, the IT Support for Central Logistics project will further build on the successful approach that began with the replacement of systems in use (SinN) in the area of logistics, and it will replace other legacy systems and advance the inclusion of external logistics service providers in the SASPF system.
In addition, we expect to see substantial progress on the IT Support for Customer Product Management (IT-U CPM) projects and the projects for the inclusion of procurement channels (BeKa).
Furthermore, development activities within the Extended Warehouse Management project are about to begin.
In 2020, we will see the multi-step development of a modern platform for project managers/equipment desk officers as part of the Logistics Information Requirements for Weapon Systems (LogInfoBed WaSys) project; all logistics information required for the in-service use and operation of weapon systems within SASPF will be available on this platform.
We also expect to see the initial deployment of the Electronic Personnel
File Management Project (ePa Project) and the military assessment solution (BUmil), which will allow us to process all assessments entirely electronically.
Finally, the switch to the SAP HANA database will signify an important technology change. This switch will allow the Bundeswehr to access data in real time, which will lead to a significant increase in performance. This switch also marks the fielding of a future-proof technology which at the same time serves to prepare the S/4HANA migration.

ESD: How do you determine whether digitization measures can be integrated and/or implemented?
Hartung: First, a harmonized user requirement must be submitted by the respective staff member authorized to order IT products.
In the case of bigger and more complex SASPF-related projects (CPM basic procedure), Directorate G is also involved in the preparation of the requirement (Capability Gap and Functional Requirement) via the authorized staff member within the IPT (Integrated Project Team). In these cases, BAAINBw evaluates the technical and economic feasibility in advance based on the applicable strategy documents and with regard to the available resources.
As regards the shortened CPM procedure for the procurement of commercial information technology as well as the implementation of measures related to the change procedure, we assess the feasibility of a measure when the preparation of a proposal begins on the basis of the submitted user requirement and the techno-economic conditions. In each case, implementation measures within the SASPF Program will be in accordance with the quality assurance and certified regulations of the Customer Center of Expertise (CCoE).

ESD: Are there any applications that have been developed and implemented by the Bundeswehr?
Hartung: The purpose of SASPF is to provide a mostly uniform platform for the inhomogeneous IT systems supporting the logistical and administrative data processing procedures within the Bundeswehr that have been developed over time, many of which have in fact been developed by the Bundeswehr. Bundeswehr developments in the SASPF environment are therefore limited to customization in areas in which the SAP standard is functionally insufficient.

The interview was conducted by
Dorothee Frank

Photo: Pixabay Creative-Commons-Lizenz

Digitization of Situation Pictures

The digitization of situation pictures is another important initiative for digitization in the Bundeswehr. Previously isolated situation pictures within a wide range of very different technical systems and isolated software solutions will be identified in the course of the work and merged into one "situation picture", a kind of management cockpit. They are linked by the technical requirements for information needs arising from the tasks of the Bundeswehr. This includes, for example, necessary information on the tasks "deploying combat-ready forces" or "providing reliable logistic information" as well as "providing IT services".

The digitization of situation pictures therefore has a direct impact on different technical and hierarchical areas of the Bundeswehr and the Federal Ministry of Defense (FMoD) and promotes the digital transformation of the armed forces at all levels. The aim is to create a strategic overall situation picture of the Bundeswehr forces and assets, based on 13 situation pictures. This is achieved on the basis of current data from subordinate elements and in coordination with other projects. On this path, the roadmap of digitization is to be effectively used to achieve a concrete military advantage - C2 superiority.

An agile approach is key to success: Iteratively, gradually building on each other, a use case of the technical concept will be developed in parallel. With the resulting application, digitization will become tangible for the Bundeswehr. The technical requirements will be implemented in immediate succession in an agile development, based on the SCRUM method. The implementation will start in 2020.

Recourse to and processing of the data already available in SASPF ensures that a uniform data basis is used, so that there is no contradictory information in the different situations, even with different views or aggregation levels (single source of truth).

Enhanced with the SAP Predictive Analytics functionalities, future trends can be identified and forecasts derived.

The Future is Called SASPF X.0

The Bundeswehr has made digitization one of its central topics in order to secure its ability to act in the long term and to sustainably strengthen this ability. SASPF X.0 contributes significantly to that goal. The term stands for the transfer of today's SASPF system landscape to S/4HANA – the next generation SAP solution.

As part of SASPF X.0, the Bundeswehr is converting its logistic-administrative information system into a powerful, digital platform, thereby replacing the SASPF system in its current form by the end of 2025. Besides the digitization of operations, this product change is one of the Bundeswehr's largest digitization projects.

S/4 Hana provides access to new functionalities that the current SASPF system of the Bundeswehr cannot offer. This includes, for example, the mobile and networked use of data in real-time, comprehensive simulation and analysis possibilities and modern applications which can be used intuitively during missions. This makes business processes easier, more flexible and more intelligent.

S/4HANA represents a fundamental technological change that requires extensive adjustments. In addition to changing data models and processes, the new SASPF system landscape has to be designed to cope with significantly shorter release cycles. After all, this is also a defining feature of S/4HANA: SAP wants to set a high pace for updates in order to be able to map innovations quickly in the system.

The manufacturer's product strategy entails another significant change: SAP has announced that it will focus on cloud solutions in the future. Hence, the cloud is to become the standard operating form for SAP software. As a result, the Bundeswehr is also required to face this new situation.

The IT system company of the Bundeswehr and the Federal Government is currently working on further developing the Bundeswehr IT system into a Bundeswehr cloud - a private cloud. This cloud could also become the foundation for the new SASPF system landscape based on S/4HANA. ■

Photo: Pixabay Creative-Commons-Lizenz

Complex Services/Purchasing Directorate (E)

Directorate E is in charge of a very broad range of tasks: Bundeswehr purchases, the satisfaction of demand via complex services and the procurement of material solutions in compliance with Customer Product Management (CPM) principles. In fulfilling these tasks, Directorate E is active in all three pillars of the procurement and in-service support management process.

All staff members of the directorate consider it their mission to make their own, high quality contribution towards achieving the objective of armaments management: Providing task-tailored equipment and professional services to the entire Bundeswehr directly and immediately contributes to ensuring the operational readiness of the armed forces.
These tasks are being performed at the sites in Lahnstein and Koblenz by three divisions with a total of thirteen branches which are supported by the Directorate Staff (EAS) and the Directorate Controlling (EAC) elements.

Bundeswehr Purchasing (EinkaufBw) – Divisions E1 and E2

Bundeswehr Purchasing is defined as the procurement of commercially available and/or Bundeswehr-specific material goods as well as rights and services which serve to maintain the operability of the Bundeswehr during missions, exercises and routine duty at home and abroad. Procurement by Bundeswehr Purchasing also encompasses the satisfaction of demand for follow-on spare parts for weapon systems/equipment during their in-service use phase and requirements which are met via interdepartmental procurement (e.g. "Kaufhaus des Bundes", the Federal Government's virtual marketplace). The number of supply items to be procured amounts to roughly 2 million, of which nearly 500,000 are purchased regularly. The items purchased range from small, i.e. ordinarily off-the-shelf parts, such as screws, nuts and gaskets, to Bundeswehr-specific materiel for equipment and complex weapon systems.
Bundeswehr Purchasing has established an economically optimized and legally compliant process for satisfying materiel requirements using modern methods, following a comprehensive Bundeswehr-wide approach, and clearly assigning responsibilities.
The core principles of Bundeswehr Purchasing are as follows:

- a strategic method of work including a centralized and overarching command and control process;
- stringent material segment management oriented towards the procurement market; and
- a process-oriented organizational structure.

By implementing Bundeswehr Purchasing, a strategic tier of procurement has been added to the mostly operational-level tier represented by the procuring agencies. The intention is to ensure an optimized and comprehensive purchasing process. The overall responsibility for the purchasing process lies with Division A III at the Federal Ministry of Defense. It is at that level that the organizational framework for Bundeswehr Purchasing is set, i.e. this is where the purchasing strategy is adopted and the relevant guidelines are issued. The responsibility for further developing the process and enforcing it at agency level lies with the Director of Directorate E at BAAINBw. The Purchasing Manager ensures that the guidelines are put into operation by the approximately 1,000 purchasing agencies of the Bundeswehr.
A key element of the Bundeswehr Purchasing system is the fact that it is based on material segments as strategic business units which are controlled through stringent, independent material segment management. Based on a holistic approach, the material segments constitute clusters of supply items which are procured on the same or similar markets. The organizational structure of Divisions E1 and E2 mirrors this logic.
By introducing the strategic purchasing process, sustainable success could already be achieved owing to optimized requirements planning which was coordinated with the users. The main focus was to conclude a large number of framework and multiple-delivery agreements with a term of several years, instead of frequently inviting tenders in order to satisfy recurring small-scale demands.
From a logistic point of view, this strategic approach has also brought about a transition from a largely depot-based supply of the units (depot-level logistics) towards cost-efficient direct deliveries to the place of receipt. Satisfying demand by means of direct deliveries (distribution logistics) has changed the processes and procedures in the area of procurement.

As part of the further development of Bundeswehr Purchasing, the quality and availability of data, in particular, need to be optimized. In order to standardize Bundeswehr Purchasing, data on creditors and the framework agreements that had so far been managed in a decentralized manner were now centralized and transferred to a creditor master data management system. In addition, uniform information on the framework agreements of the entire Bundeswehr is now available to all procurement agents in a common framework agreement database for the Bundeswehr. However, collecting, maintaining and displaying all data related to framework agreements down to item level with the help of the SASPF software (short for Standard Application Software Product Family) remains the objective.

In the context of the purchasing development and planning process, the following material segments were merged into the strategic purchasing process:

- foodstuffs, beverages, tobacco products;
- information, communication and media technology;
- auxiliary supplies, additives, cleaning agents;
- machine parts, fasteners, fittings;
- office supplies, office furniture, office equipment, stationery;
- general services (related to the major organizational element of Infrastructure, Environmental Protection and Services (IUD));
- energy, extraction products, recycling products and residues, petroleum, oil and lubricants (POL) partial segment;
- energy, extraction products, recycling products and residues, electricity and gas partial segment;
- electrical engineering, automation engineering, process control engineering;
- automotive engineering;
- housekeeping, housekeeping technology;
- aboratory material, laboratory technology;
- medicine, medical technology;
- machinery, appliances;

- operational equipment, workshop equipment, tools (related to the major organizational element of Equipment, Information Technology and In-Service Support (AIN));
- operational equipment, workshop equipment, tools (related to the major organizational element of Infrastructure, Environmental Protection and Services (IUD));
- packaging material;
- occupational safety, accident protection;
- piping technology;
- construction technology;
- organic chemicals;
- semi-finished products, materials, and
- in-vitro diagnostics.

Preparations are currently ongoing to ensure that the complex „general services" material segment will be implemented as fast as possible in the major organizational elements AIN, IUD and P (Personnel).

The target of Bundeswehr Purchasing is to satisfy demand in a time-, quality- and performance-oriented manner while taking full advantage of cost efficiency potentials and on the basis of a comprehensive service-oriented approach.

In order to improve the management of the Bundeswehr Purchasing process in the long term, the instrument of the purchasing plan, which formerly had to be submitted for approval once a year, was expanded. Updates now have to be submitted on a quarterly basis to allow for better strategic planning and control in the individual material segments. As a consequence, any arising obstacles and difficulties can be identified, analyzed, and appropriate action can be initiated, at an early stage. In addition, the purchasing manager's and the purchasing director's task of controlling the Bundeswehr Purchasing process is facilitated by a system of targets and indicators.

Bundeswehr Purchasing is undergoing constant development and evaluation. Lessons learnt are gradually being implemented in the framework of future optimization measures and/or incorporated into other optimization projects (e.g. supply chain management).

Division E1 is divided into three branches and pursues the following tasks:

Branch E1.1:

- addressing policy issues and purchasing trends;
- planning the purchasing process;
- continuously developing the Bundeswehr Purchasing process, drawing up policy documents;
- managing the Bundeswehr Purchasing performance process and the procurement business process;
- analyzing the purchasing process, purchasing statistics;
- managing catalogues ("Kaufhaus des Bundes", the Federal Government's virtual marketplace);
- ensuring sustainability in procurement.

Branch E1.2:

- service master records, contract entry and framework contract database;
- order information, contract statistics, managing contractor- and creditor-related data;
- business information and information from the Central Trade and Industry Register.

Branch E1.3:

- reviewing and managing demand requests;
- SASPF coordination, technical coordination;
- statistics on materiel requirements requests;
- drawing and engineering office, managing drawings;
- collection of company proposals and preliminary taking into stock of items

Division E2 is organized into five branches, carrying out both strategic and operational tasks at the material segment level in the Bundeswehr Purchasing system. It is divided according to the different material segments of the eCl@ss structure.

This enables the division to conduct targeted searches for required supplies and equipment on the procurement markets by developing and implementing specific procurement strategies for each material segment. Each material segment is controlled by a material segment manager who has directive authority cutting across the boundaries of the major organizational elements. Support in terms of purchasing process analysis is provided for all specific material segments by BAAINBw Branch E1.1. This facilitates a common procurement process throughout the Bundeswehr for the individual material segments with the view to generate economies of scope and synergy effects.

In Branch E2.1, the strategic tasks for the material segments are organized into weapon system-specific tasks and common tasks. Therefore, the strategic "tools" needed for the development of the operational procurement activities have been concentrated in one organizational unit for most material segments.

Supplier Management in the Bundeswehr Purchasing Context

In addition, Branch E2.1 is in charge of supplier management in the Bundeswehr Purchasing process, an area which has been in the set-up phase since 2018. To start with, reminder procedures in the Bundeswehr Purchasing system were revised in this area during a pilot phase. After the different process flows had been evaluated and adapted, the reminder procedures of the Bundeswehr Purchasing system became binding instructions guiding the operative purchasing tasks performed in Division E2 from October 2019 onwards. The processes are primarily aimed at monitoring compliance with the delivery dates that have been contractually agreed with the respective contractor of the Bundeswehr. This is realized through close cooperation with the operative purchasing units of Branches E2.2, E2.3, E2.4 and E2.5. Since the onset of the "Coronavirus Pandemic" the supplier management unit has above all been assisting the employees of Branch E2.4 who are in charge of the interagency procurement of material necessary for medical reasons. In this domain, the supplier management unit is monitoring compliance with all delivery dates, both for orders placed in the framework of requests for administrative assistance and the Bundeswehr's own orders, in order to be able to reduce the burden of work in monitoring compliance with contractually agreed delivery dates for the operative purchasing officers of Branch E2.4 who are successfully performing their duties even though they have been pushed far beyond their limits since the beginning of the pandemic. To that end, all orders are evaluated on a daily basis in order to identify and minimize any irregularities in the delivery process early on. The data obtained are also communicated for information to the executive level.

Furthermore, the supplier management team lends support in cases of faulty deliveries as well as in the improvement of the process flows of incoming and outgoing goods in fixed logistics facilities, including the Bundeswehr material warehouses. These efforts exclusively aim at optimizing BAAINBw processes. In future, supplier management is intended to support the strategic and operational-level parts of the Bundeswehr Purchasing system in monitoring the market and, above all, to provide information on the reliability of suppliers in the process. The increased use of supplier management in the field of Bundeswehr Purchasing shall, in a first step, be realized within the directorate and, as a second step, within the entire agency with the objective of being able to work on behalf of all Bundeswehr procurement agencies in an interagency approach once the organizational set-up has been completed.

Strategic activities for material segments which are not weapon system-specific and do not touch policy are pooled in Branch E2.4. This includes the material segment of medicine and medical technology as well as

closely related material segments, for instance laboratory equipment and technology. Both Branch E2.1 and Branch E2.4 have the authority to conclude strategic contracts.
While carrying out the strategic activities mentioned above, E2.4 is also responsible for strategic contracting (standard and interdepartmental indefinite-quantity agreements) in the POL (petroleum, oils, and lubricants) material segment, ensuring POL supply at home and abroad, and for procuring office supplies and print products.
Moreover, Branch E2.4 is in charge of procuring all individually issued, expendable medical supplies needed, such as drugs, vaccines, blood products, personal protective equipment, etc. and is this also concerned with operational tasks.
Operational tasks concerned with the actual procurement of goods are concentrated in Branches E2.2, E2.3 and E2.5. Essentially, this encompasses the following activities:

- implementing the procurement strategies and standards in case any have been set;
- carrying out the public contract award process;
- order processing (including the assertion and enforcement of warranty rights);
- assessing deficiencies in the performance of services from a legal point of view and asserting the corresponding claims;
- checking deliveries and invoices;
- carrying out monetary transactions.

These branches are responsible for procuring almost all of the follow-on spare parts which are required by the armed forces for weapon systems/equipment during the in-service use phase. A considerable share of the contracts is tendered competitively and with SMEs taking part in the process.
Branch E2.5 was established on 1 April 2020. Its sections are not specialized in categories of products, but in weapon systems so that the demand for follow-on spare parts is met on the basis of specific weapon systems. As a consequence, spare parts procurement in Division E2 is, for the first time ever, organized on the basis of individual weapon systems. This brings together the expertise on specific weapon systems in one branch and promotes the cooperation with the corresponding project team.
In future, the procedures of operational procurement are intended to be developed further by continually optimizing the Bundeswehr Purchasing process. This can be achieved, for instance, by further increasing the number of framework agreements that are initiated via material segment planning, with the purpose of using the available resources even more effectively and efficiently.

Complex Services – Division E3

Public-private partnerships (PPP) – Complex Services constitute the third pillar of the procurement and in-service process.
It is a form of satisfying requirements which can occur in all Bundeswehr task areas and processes whenever a demand cannot, or is not supposed to be, met by using Bundeswehr-owned resources alone. Unlike procurement in accordance with the CPM, this procedure focuses not on the product, but on the service itself.

The structure of the division is as follows:

Division E3 has assumed its new structure as of 1 September 2019 and now consists of five (instead of six) branches. The tasks formerly assigned to Branch E3.1 are now being performed by Branches E3.2 to E3.4.
Branches E3.2 through E3.4 take on project management responsibilities for complex services of which Directorate E is in charge. These include:

- Bundeswehr Vehicle Fleet Service System (BwFPS): meeting the Bundeswehr's mobility requirements involving commercial, unprotected vehicles;
- Army Maintenance Logistics (HIL): complex maintenance services for entire Bundeswehr land systems;
- Package 1 CBRN supplies: supply management of the Bundeswehr's individual CBRN protective equipment and clothing;
- Package 2 CBRN supplies: supply management of both common and weapon system-specific material for Bundeswehr CBRN defense;
- PPP Bundeswehr air traffic control training: training of Bundeswehr air traffic controllers and aeronautical information officers (Flugberater);
- Central Bundeswehr Spare Parts Logistics (ZEBEL): supplying civilian and selected military maintenance facilities with government-owned spare parts via a private service provider;
- clothing management (supplying the military and civilian personnel of the Bundeswehr with clothing and personal equipment).

Branches E3.2 through E3.4 have been set up as organizational elements for the project management of complex services projects, taking both technical-logistic and overall control of the aforementioned projects. Projects for complex services are systematically developed and/or moved forward and implemented by these branches. Integrated project teams provide the framework for interdisciplinary cooperation across organizational boundaries which significantly contributes to the success of the project work. The objective always is to develop customized capabilities for our forces in a timely manner while at the same time complying with the legal framework conditions and providing cost-effective solutions.
The task spectrum of Branch E3.5 primarily involves price negotiations and contracting for the Bundeswehr Vehicle Fleet Service, the Army Maintenance Logistics and the Clothing Management projects. Furthermore, the price negotiators of Branch E3.5 provide support to all branches of Division E3 in matters of pricing law. Notably, they provide assistance in contract negotiations up to the point of contract conclusion to Branch E3.6 and, beyond Division E3, to Branch T1.1. On behalf of Branch T1.1, prices are negotiated for recycling and/or disposal contracts, for study contracts as well as for contracts about the operation of Government Quality Assurance offices. Moreover, Branch E3.5 has assumed responsibility for price negotiations on behalf of the branches in Division E2. Extensive service contracts and/or fra-

Photo: BwFPS GmbH

Workshop equipment provided by BwFPS GmbH

mework contracts (BwFPS) have been concluded with the three government-owned companies within the remit of the German Federal Ministry of Defense, i.e. Bundeswehr Fuhrparkservice GmbH (BwFPS), Heeresinstandsetzungslogistik GmbH (HIL) and Bundeswehr Bekleidungsmanagement GmbH (BwBM GmbH), whose company shares are meanwhile fully owned by the Federal Republic of Germany, with 24.9% of the company shares held by Deutsche Bahn (DB) AG in the case of BwFPS. These contracts are being continuously adapted on the basis of contract amendments. Amendments involving large sums of money exceeding 25 million euros are subject to the participation of the Budget Committee of the German Parliament (Bundestag).

Branch E3.6 is responsible for processing contracts and dealing with issues related to contract award law for the projects.

Additionally, Branch E3.6 is in charge of processing and awarding contracts related

Photo: HIL

A HIL GmbH workshop

to transportation in the Bundeswehr (for transport by road, rail, air and sea). As such, Branch E3.6 is the central contracting authority ensuring that the demands for transportation in the Bundeswehr are met both during routine duty (including exercises) and during missions (e.g. EUTM Mali, ATALANTA resupply etc.).

In that context, their area of activities also extends to processing cases of impaired contract performance, for instance transport damage.

Additionally, Branch E3.6 is in charge of managing the project "PPP Bundeswehr air traffic control training in Kaufbeuren" in terms of procurement and contract law. This contract provides for the training of Bundeswehr air traffic controllers and aeronautical information managers (Flugberater), including related services such as board and lodging.

Lastly, E3.6 is entrusted with handling the procurement law- and contract law-related aspects of the projects involving CBRN supplies (Package 1 CBRN supplies and Package 2 CBRN supplies) and with the Central Bundeswehr Spare Parts Logistics (ZEBEL) project.

As a result, both the project management and the legal and economic expertise related to complex services are concentrated in one division, thereby making it easier to tap into potentials for optimization.

The following list of outcomes drawn from current projects serves to illustrate the broad spectrum of activities:

Bundeswehr Vehicle Fleet Service System (BwFPS)

The Bundeswehr Vehicle Fleet Service System serves to meet the mobility requirements of the Bundeswehr in an economically viable manner by providing commercial, unprotected vehicles. The services offered by BwFPS GmbH include the provision of commercial vehicles, commercial special-duty vehicles, commercial vehicles with special military equipment as well as services.

Apart from performing regular tasks in order to provide commercial, unprotected vehicles for the Bundeswehr, the BwFPS system has been implementing measures necessary for satisfying so-called "instances of demand for BwFPS support" arising in the context of the 2019 Very High Readiness Joint Task Force (VJTF). Such instances arise when, based on the situation in a mission country, military forces assume control, maintenance, material management, spares management and data management of vehicles which are provided by BwFPS GmbH. Key measures include the detailed planning and holding of specialized training courses for the military maintenance personnel, the provision of measuring equipment, special tools and diagnostic tools for vehicles from the BwFPS system as well as the provision of workshop equipment (workshop containers and spare parts containers) which enables the military maintenance personnel to perform defined maintenance tasks on BwFPS vehicles.

Another area of activity of the BwFPS system is the target-oriented implementation of electric mobility in potential areas of the Bundeswehr. For this purpose, BwFPS GmbH is setting up 219 charging stations in 56 Bundeswehr garrisons which allows to efficiently charge the 200 electric vehicles provided by BwFPS GmbH which in turn can thus contribute towards reducing the local emission of pollutants. The potential need for further electric vehicles is currently being ascertained by the Bundeswehr Office for Defense Planning. The actual need which will presumably lie well above the previously defined quantity of electric vehicles, with one charging station allocated to one electric vehicle, is to be determined by the fall of 2020.

Photo: Bundeswehr

Vehicle decontamination

Army Maintenance Logistics (HIL)

When the open-ended service contract on the HIL follow-on solution was signed on 13

Photo: Bundeswehr

Campus area in Kaufbeuren

July 2017, the "HIL" success model was continued and extended. With the launch of the HIL follow-on solution on 1 January 2018 HIL GmbH was established as a key service provider and thus continues to be an integral part of the Bundeswehr logistics system.

At present, HIL GmbH is confronted with one of the largest challenges in its company history due to the fourfold increase in its portfolio of products. In addition, the company is providing successful and competent support to the Bundeswehr in the context of numerous exercises both in Germany and abroad. With HIL GmbH, the Bundeswehr has a strong and innovative partner at its side who is able to ensure that all current and future tasks in the fields of maintenance and logistics of mission-essential equipment can be performed without fail.

Central Bundeswehr Spare Parts Logistics (ZEBEL)

With the "Central Bundeswehr Spare Parts Logistics" (ZEBEL) cooperative project, spare parts which are required for individual maintenance requests are provided from a warehouse within the framework of a public-private partnership (PPP). To that end,

A Further Insight

One-on-one with Bettina Knapppke, Head of BAAINBw and Head of the Purchasing Directorate (Directorate E):

ESD: How do you ensure that there is always a sufficient amount of expendable supplies available, an amount that certainly varies depending on the area of deployment?
Knappke: The expendables for the areas of deployment are managed by the operational logistics organization, which, for this purpose, resorts to the basic logistics organization. The Bundeswehr Logistics Center is responsible for coordinating the procurement of spares and replacement parts. It regularly provides lists specifying items with only a small reserve inventory. These items are prioritized for procurement in close coordination with the Bundeswehr Logistics Center. Mission-relevant items are procured with highest priority so that they are always available in sufficient quantities. Also, whenever possible, items are bundled in spare parts packages so that they are available as and when required.

ESD: Which type of invitation to tender is required for the different order sizes?
Knappke: First of all, the type of invitation to tender depends on the applicable threshold values. These values are determined and/or checked by the EU Commission every other year. If contracts are awarded above the threshold values, the Act against Restraints of Competition - Part 4 - applies as well as other specific regulations, depending on the subject of the award (Regulation on the Award of Contracts, Regulation on the Award of Public Contracts for Defense and Security, etc.). German Budgetary Law applies in the case of contract awards below the EU threshold values. In such cases, if contracts are awarded by the Federal Government and its authorities, the Regulation on the Award of Public Supply and Service Contracts below the EU Thresholds applies. For instance, the current EU threshold for defense- and security-relevant contracts, which BAAINBw deals with on a regular basis, is EUR 443,000 (net). For Supply and Service Contracts for supreme federal authorities and higher federal authorities, the EU threshold is EUR 144,000 (net). In each case, the selection of the type of procedure depends on the type of contract subject, the potential range of bidders and on the applicable type of procedure for the respective threshold values. For instance, within the Regulation on the Award of Public Contracts for Defense and Security, the negotiated procedure with a call for competition is generally applied. There are no open award procedures, which are usually made use of below the thresholds.

ESD: How do you organize cooperation with the Army Maintenance Logistics (HIL) and the Bundeswehr Vehicle Fleet Management Company (BwFuhrparkService GmbH)?
Knappke: Open-ended services contracts were concluded with both in-house companies. They are thus essential service providers and important elements of the Bundeswehr Logistics System. They cooperate closely with the project managers in my directorate. Due to a fourfold increase in their equipment range, HIL is currently faced with one of the biggest challenges in the company's history.

ESD: Were you able to achieve positive results by changing your supplier management?
Knappke: During the delivery management pilot phase of Bundeswehr Purchasing, several changes were implemented in close coordination with both Operative Purchasing and the respective experts handling incoming goods so that the processes with respect to material received from industry at Bundeswehr material storage sites could be improved. Furthermore, by means of targeted controlling of delivery dates, we could see a positive development of the delivery reliability of Bundeswehr contractors. We would like to strengthen this approach in the future.

ESD: Are there currently any special challenges in procuring clothing?
Knappke: Our uniforms, which have not been changed for almost six decades, will be modernized with the "Modern general purpose and dress clothing" project. This is a challenge for the users and the procurement organization as the uniform influences the impression that the public has of the forces. In fact, the media and members of parliament have already stated their expectations. Apart from the different Chiefs of Service, the generation of soldiers under the age of 30 is to be involved in the design of the outer appearance of the new uniform. This FMoD Executive Group initiative is aimed at achieving that the soldiers accept the new uniform and like wearing it.

The interview was conducted by Dorothee Frank.

the civilian logistics contractor is connected to the Bundeswehr IT system. Apart from the provision of spare parts from a central warehouse, the scope of services provided under the ZEBEL project also include the transportation of these parts to the respective maintenance facilities and the performance of all relevant management tasks.
Currently, a total of about 290 customers receive supplies from the ZEBEL 7 project, around 80 of whom can be attributed to HIL GmbH or its subcontractors. Meanwhile, the ZEBEL project, for which the seventh contract extension is presently in place, has been expanded by material and data management services for Bundeswehr-owned stores which are not self-sufficient. Since the year 2000, the Elektroniksystem- und Logistik-GmbH (ESG) has been the contractual partner for the ZEBEL project. The current ZEBEL 7 contract will run until 2024.

CBRN Supply Management Projects

The purpose of the CBRN cooperative project is ensuring the logistic supply of the military and civilian members of the Bundeswehr with CBRN protective equipment and clothing. This makes it possible to significantly enhance performance in the area of supply management, to reduce the workload of the armed forces and to realize economies of scale. The services are provided by Bw Bekleidungsmanagement GmbH (formerly LHD Group GmbH). The scope of services includes the disposition, warehousing and maintenance of all CBRN 1 supplies in stock in Kassel (Hunsrueck) as well as reporting and controlling.
Within the framework of the CBRN 2 cooperative venture, the common and weapon system-specific material which is part of CBRN supply management in the Bundeswehr is managed and maintained in cooperation with a private partner.

Bundeswehr Air Traffic Control Training Project

For the training of Bundeswehr air traffic controllers in Kaufbeuren, the necessary training activities are conducted by Deutsche Flugsicherung GmbH (DFS, German air traffic control service). Since 2018, the project has been managed by BAAINBw Branch E3.3. The open-ended contract covers basic and advanced military training in the areas of air traffic control, aeronautical information service, flight service and flight dispatch service of the Bundeswehr. As the parameters have changed since the introduction of the current training concept, for example in terms of the number and the qualification

of applicants, plans are currently underway for adapting the training of future military air traffic controllers. The new training concept is planned to be implemented from 2021 onwards.
The new campus area was completed ahead of schedule. Therefore, the move to the new premises which had originally been scheduled for 2020 could already take place in August 2019. The campus is located in the immediate vicinity of Kaufbeuren air base so that the military facilities available there, such as messing facilities, sports facilities and the library, can also be used by the military instructors and the course participants.

Bundeswehr Clothing Management (BwBM)

The Bundeswehr Clothing Management is tasked with meeting the Bundeswehr's demand for clothing and personal equipment, providing the Bundeswehr's military and eligible civilian staff with such items.
BAAINBw Branch E3.4 assumes the duties of project management and of materiel responsibility for operational viability in the area of clothing and personal equipment. Thus, clothing and personal equipment are entirely developed within the CPM framework, with procurement policy documents (CPM documents, statements of work and/or technical specifications) being drawn up and clothing and personal equipment being managed by the materiel manager for operational viability during the in-service phase.
Bundeswehr clothing management, a complex service, is substantially supported by a clothing services provider, i.e. the in-house company Bundeswehr Bekleidungsmanagement GmbH (BwBM GmbH).
BwBM is tasked with:

- materiel planning (requirements planning and control);
- procuring clothing and personal equipment according to BAAINBw quality standards;
- warehousing;
- planning and carrying out distribution;
- issuing and taking back clothing of Bundeswehr members on agreed dates, during routine duty and for deployment (issuing clothing in Germany and/or providing clothing in Germany for deployments abroad);
- exchange, refitting, laundry, dry cleaning, modification and maintenance of clothing and personal equipment;
- drafting specifications, which can also be used for tenders, for commercial and/or close-to-the-market products.

The following clothing projects currently stand out from a vast array of individual projects:

New Armed Forces Combat Boots System (KSS SK)

Within this project, servicemen and -women are issued two pairs of heavy, and one pair of light, newly fielded combat boots. The new aspect in Bundeswehr terms is that service members can choose between models from two different manufacturers in each case. Implementation of the KSS SK project was initiated in the second half of 2017. By the beginning of 2020, more than 650,000 pairs of light combat boots (replacing the "Einsatzkampfschuh" combat mission boots) and heavy combat boots (replacing the "Kampfschuh, allgemein") had already been procured. By the end of 2018, almost all service members had been provided with a first pair of the new heavy combat boots. Corresponding state-of-the-art functional socks will also be introduced. Due to the size of the procurement project, it is not possible to issue the new combat boots to all service members at the same time. Accordingly, the service branches have drawn up an order of priority for their supply. Outfitting the entire Bundeswehr along the lines of the Armed Forces Combat Boots System project is planned to be completed by the beginning of 2022. To this end, more than one million pairs of combat boots are being procured.

Armed Forces Combat Clothing (KBS SK)

The Armed Forces Combat Clothing project sees the fielding of functional clothing for service members which helps to enhance survivability, protection and sustainability of armed forces on deployment around the globe. The clothing is meant to support the human body in conducting operations even under extreme conditions, at day and night, under any weather conditions, and in almost all climatic regions, terrain conditions and urban environments.
To that end, the following components will be introduced:

- KBS SK combat suit jacket (short, 3- or 5-colour camouflage print)
- KBS SK combat suit jacket (long, 3- or 5-colour camouflage print)
- KBS SK combat suit trousers (3- or 5-colour camouflage print)
- combat shirt (3- or 5-colour camouflage print)
- hardsided knee protector
- slide-in protective pads for elbow and knee
- cold-weather liner jacket and trousers
- waterproof liner jacket and trousers
- multi-layered undershirt/underpants
- SOFCOM undersocks
- insulation suit (insulation layer II), consisting of jacket and trousers
- underwear (hydrophilic, short)
- underwear (flame-retardant, brown)
- gloves
- dust protection cloth
- mobile waterproof protection hood (3- or 5-colour camouflage print, consisting of jacket and trousers)
- suspenders and belts

In the context of the roll-out of Armed Forces Combat Clothing, it is intended to procure 50,000 Armed Forces Combat Clothing kits by 2021, 60,000 kits by 2023 and to ensure that 164,000 service members will be outfitted with KBS SK kits by 2031. It should be noted that regeneration takes place in parallel which results in a correspondingly higher number of systems to be procured.

Modular Ballistic Protection and Load-Carrying Equipment (MOBAST)

The Modular Ballistic Protection and Load-Carrying Equipment for soldiers (MOBAST) consists of a modular body armor system and the corresponding basic load-carrying equipment (multi-purpose magazine pouches, fast rope bag, multi-purpose bags etc.) as well as underwear with integrated protection against micro fragments. The aim of this project, which falls within the wider framework of what is called "task-oriented equipment", is to replace all previous common versions of ballistic body armor and to considerably increase the total quantity of available body armor in the medium and long term. To this end, the procurement of around 46,000 systems by 2025 will be tasked. In the long term, a further considerable increase is planned to be completed by 2031.

New Combat Helmet

This project aims at replacing the common combat helmet introduced in the 1990s and its variant for airborne infantry with a more modern model, including capability upgrades (e.g. integrated mounts for night-vision devices and other additional equipment). At present, the solution proposal is being developed on the basis of the Functional Requirements document.

Directorate T – Common Technical, Logistic and Economic Activities

At Directorate T, the essential common technical, logistic and economic activities of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) are pooled and managed centrally.

Thus, Directorate T has a wide range of responsibilities:

- controlling (e.g. research and technology projects, enhancing and enabling projects),
- coordination (e.g. mission review, fast-track initiatives for operations),
- support (e.g. BAAINBw executive group, projects, other directorates, all logistic processes),
- external representation (e.g. other major organizational elements, agencies, departments and international organizations),
- licensing authority (e.g. transportation licenses), expert assessments (e.g. accident investigations, price audits).

Cross-disciplinary tasks are combined within Directorate T, which thus forms an important cogwheel in the BAAINBw machinery. In addition, Directorate T is deeply involved in the strategic topics of the Armaments Agenda, the strategic control of research and technology matters and the In-Service Support Agenda. Consequently, it also plays an important role for efficient armaments management.

Division T1

The scope of tasks assigned to Division T1 includes: mission-related matters, overall coordination of research and technology (R&T), international cooperation and project-related international departmental agreements, administrative assistance as well as enabling and enhancing assistance.

The spectrum of Division T1 is complemented by tasks relating to policy and technology for Modeling and Simulation (M&S) and for Concept Development and Experimentation (CD&E) as well as tasks relating to foreign defense materiel, national and international standardization and technical specifications.

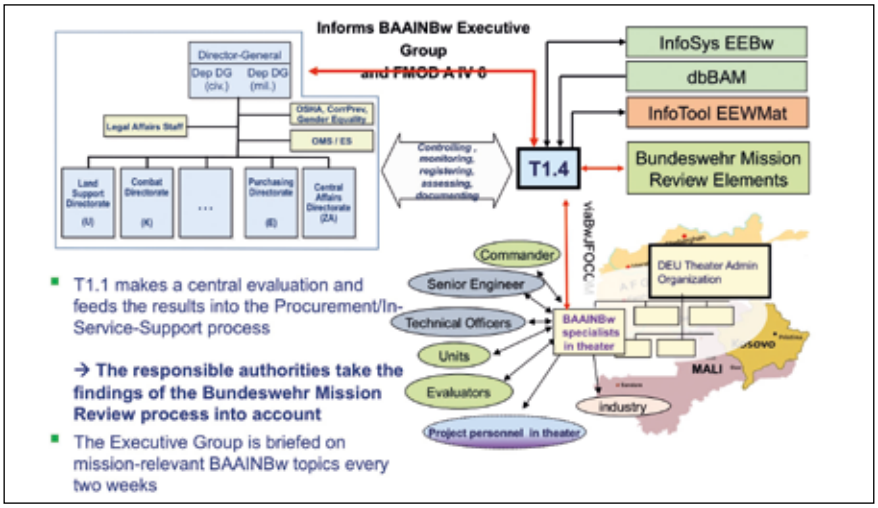
Branch T1.1 acts as central contract branch for the ZA, T and ZtQ directorates and for the Operational Management Staff / the Executive Secretary as well as the Legal Affairs Staff of BAAINBw. Furthermore, it is responsible for administrative and equipment assistance and concludes the recycling/reuse/disposal contracts required for the further handling of discarded materiel. This branch is also in charge of coordinating the task of "enhancing and enabling programs". The objective of enhancing and enabling assistance is to strengthen partner nations and allies in order to enable them to perform peacebuilding tasks and post-crisis rehabilitation as well as crisis prevention and management in their own responsibility and in a sustainable fashion.

Branch T1.2 has the lead responsibility for negotiating and concluding project-related international armaments cooperation agreements with other nations, including the cooperation with different international organizations and agencies (NATO, EDA and OCCAR). Moreover, the Branch supervises the German side of the Foreign Military Sales (FMS) program of the US Department of Defense. The agreements to be drafted and negotiated in the field of armaments cooperation include Memoranda of Understanding (MoUs), Project Arrangements (PAs) and Data Exchange Arrangements (DEAs). The FMS task covers procurement contracts for weapon systems and associated spare parts via the US military procurement authorities.

Branch T1.3 coordinates and manages international cooperation in the field of common defense technological cooperation that is not linked to specific projects. This branch is BAAINBw's central point of contact in general matters related to OCCAR and EDA and for Bundeswehr-wide liaison activities. In addition, it is responsible for preparing technical specifications (TL) and for managing and coordinating Bundeswehr standardization activities.

Branch T1.4 performs coordinating and controlling responsibilities in different mission-related subject areas. On the one hand, this branch coordinates the procurement of mission-essential and urgently needed items; on the other hand, it manages mission review tasks. Thus, lessons learned can directly be used for further development of the materiel or for the provision of services. Moreover, this branch coordinates the staffing of decrees and orders related to missions, exercises and civil-military cooperation in order to ensure that BAAINBw-related aspects are adequately taken into account in these documents.

Source: Bundeswehr



Branch T1.5 coordinates all BAAINBw activities in the area of defense research and technology (R&T). Common objectives of all R&T activities are:

- to ensure that in the MoD area of responsibility there is an organic analysis and evaluation capability available to identify new technologies and their impacts on threats to and capabilities of the Bundeswehr; and
- to provide scientific and technological insights into all relevant fields of technology to permit practical, intelligent and

cost-effective decisions about equipment.
- In addition, Branch T1.5 is responsible for the evaluation of foreign defense materiel. The findings thus gained provide a valuable basis for the analysis of capability gaps and the technical adaptation of Bundeswehr in-service systems in line with existing threats.

Branch T1.6 is responsible for Modeling and Simulation (M&S) as well as Concept Development and Experimentation (CD&E) at BAAINBw. The M&S controlling authority coordinates existing and newly established Bundeswehr M&S standards both nationally and internationally (NATO, EDA). This authority also manages several R&T projects with regard to the application and in-service use of M&S to further develop the simulations infrastructure and the cross-linking of simulation systems and real systems for experimental and training purposes. Current topics are, for example, the use of artificial intelligence and virtual reality, studies on 3D printing in the Bundeswehr (CD&E project), propaganda awareness and human enhancement.

A BAAINBw GeoInfo Element was created in February 2020 with the task of providing advice to the BAAINBw project managers concerning geoinformation services as a project element. In addition, the GeoInfo Element coordinates the provision of geoinformation simulation data.

Division T2

During design and use of defense materiel - whether during tests, in routine duty or in operational environments - the legal and the Bundeswehr-specific provisions on occupational safety and health, on the one hand, and on environmental protection, on the other hand, must, as a rule, be observed. After all, Bundeswehr civilian and military staff are entitled to the same standards of health protection and ergonomics at their places of work as employees working in commercial industry. Furthermore, Bundeswehr activities - e.g. in training, in theaters of operations and in weapon system maintenance - must have no inadmissible impacts on the environment.

In the course of procurement of defense equipment, the project managers are responsible for ensuring compliance with regulations and standards concerning occupational safety, environmental protection, ergonomic design of workplaces and weapon system/ammunition safety. In performing these responsibilities, they can draw on the advice of the „product-specific protection activities" experts of Division T2.

Apart from these traditional responsibilities in the field of occupational safety, the focus of the Division's work is also increasingly on functional safety and/or software securitywhen assessing system safety, due to technical progress and the predominance of smart system components in weapon systems.

It is not always possible to reconcile military requirements with the technical rules and standards of occupational safety, environmental protection and ergonomics. In such cases, alternative solutions have to be found and an assessment has to be made whether the protection of the personnel or the environment, as applicable, can still be adequately ensured with these measures. The assessment of the proposed solutions, which may involve waivers and deviations from the occupational safety and environmental protection regulations, is another responsibility of Division T2.

In addition, Division T2 deals with the investigation of accidents during weapons and ammunition handling. Part of the team in charge is the "Officer for Design Safety of Ammunition and Firing Safety at BAAINBw". Another task of Division T2 is to take care, at an early stage, of the further disposition of materiel that the Bundeswehr no longer needs or uses. To this end, the specialists in charge of this task control and monitor the recycling/reuse or disposal of Bundeswehr materiel. They ensure that the resulting costs are minimized and a maximum financial return is achieved from recycling or reuse. In doing so, special attention has to be paid to observing the provisions of the War Weapons Control Act, weapons law and environmental law. If the suitability criteria are met, the materiel is sold - via the German utilization company VEBEG - to third parties or transferred to friendly nations / organizations entitled to receive such materiel.

The name „WTS" stands for the BAAINBw archives and a collection of defense engineering specimens with functional demonstrators. As such, the WTS contributes to preserving know-how in the armaments sector and thus supports the career training of civil servants as well as pre-deployment training of forces by lending out foreign weapons. The collection of equipment items, which is located in Koblenz-Lützel and comprises 2,500 exhibits, is, moreover, a public exhibition that offers citizens interested in defense engineering the possibility to obtain a picture of the main lines of development in military technology from the late 19th century until today.

Finally, Division T2 coordinates and monitors the occupational health management activities offered to the BAAINBw personnel in Koblenz/Lahnstein.

Division T3

Division T3 is divided into the following branches:
- Cost Competence Center (T3.1)
- Price Auditing Policy / Common Price Auditing Issues (T3.2)
- Price Auditing - Airframe / Engine (T3.3)
- Price Auditing - Maintenance in the Armed Services, Missiles, Other Aeronautical Equipment (T3.4)
- Price Auditing - Electronics, Sensor Systems (T3.5), and
- Price Auditing - Weapons and Ammunition, Tracked and Wheeled Vehicles, Ships and Boats, Other Equipment (T3.6)
- The task of the cost competence center is to provide support for the economic execution and implementation of projects and organizational measures in all CPM phases by means of
- parametric and calculated cost estimates,
- economic efficiency evaluations for armament projects,
- assessment of alternative forms of satisfaction of demand, and
- review and staffing of phase documents.

In particular cases, additional economic efficiency evaluations are conducted outside of

Source: Bundeswehr

A Further Insight

One-on-one with Ralf Bäumler, Head of BAAINBw and Head of the Common Technical, Logistic and Economic Activities Directorate (Directorate T):

ESD: What is the current main focus of the directorate and where do you see room for improvement in the execution of its tasks?
Bäumler: At Directorate T, the essential common technical, logistic and economic activities of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) are pooled and managed centrally. We have a wide range of responsibilities and provide targeted expert advice. Directorate T is a cooperative unit and supports the project directorates in all technical, economic and logistical matters across projects and products. This becomes particularly evident with its integration into project implementation processes. In addition, we are involved in controlling and coordinating strategic issues, and we are the central interface to other ministries as well as to civilian and military agencies. This also means, however, that we always have a wide spectrum of tasks, be it in the project elements of occupational safety, environmental protection, ergonomics and logistics, international project arrangements, mission-related matters or cost estimation services and cost-effectiveness evaluations. Currently, we are in charge of an In-Service-Use Agenda subproject, coordinate the extension of the spare parts stock and deal with the improvement of supply chains. So, optimization is a permanent process. This year, Directorate T in particular has taken many initiatives to intensify the interlinking between the project directorates, common activities and other agencies. This is increasingly taking effect.

ESD: What are the challenges and the priorities when it comes to the overall coordination of R&T projects?
Bäumler: The main challenge of R&T overall coordination is to satisfy all stakeholders and their particular interests. This requires a sound balance between technology preparation for new armaments projects and an evaluation capability for all relevant fields of defense technology. The annually updated documents from the field of planning provide orientation in this regard. Within the parameters laid down by the FMoD and coordinated by my directorate, those responsible within BAAINBw for R&T activities and technology fields then develop the specific content. It is also essential to bring in civilian research institutes, Bundeswehr research institutions and universities and other members of the defense research community.
Currently, the focus is on international R&T cooperation and orientation towards objectives (content-related connection between specific R&T projects and the sub-objectives of the Medium-term Plan).

ESD: Which R&T activities (type and scope) are there with respect to the future multinational projects "Main Ground Combat System" and "Future Combat Air System"?
Bäumler: For these two projects, the bilateral harmonization process is still ongoing. Please understand that I cannot make specific statements on this yet. However, measures have already been taken to substantially support these projects with R&T.

ESD: Are there any lessons learned from the mission in Mali that, in your opinion, should lead to optimization possibilities?
Bäumler: In Mali, the material and the equipment of our soldiers is really put to the test. Some of the reasons for this are the extreme climatic conditions, the poor road conditions as well as the dust that settles everywhere. Due to an initiative taken by my directorate, we now have BAAINBw personnel on site to provide optimum support to the Mali contingent. This way we solve problems between the users and the project managers fast, directly and constructively, and lessons learned can also directly be incorporated into the procurement process. The forces have received this initiative very positively.

ESD: Logistics are a key component for the operational readiness of defense materiel. How does the directorate's project support contribute to shaping and further developing the Bundeswehr Logistics System? Are there any new considerations/requirements in this respect?
Bäumler: We see ourselves as the link between the Bundeswehr Logistics System and the Logistics Project Element in the projects. Thus, we are actively involved in the further development process of the Bundeswehr Logistics System and in charge of an In-Service-Use Agenda subproject with respect to spare part and exchange part management.
For us, it is important to give tools to the project managers to shape the logistic basics so that each project seamlessly fits into the Bundeswehr Logistics System.
In this context, the large number of different pieces of equipment in the Bundeswehr is a great challenge. Currently, we are pursuing the strategic approach to improve logistics down to the user and make it more transparent through communication between the parties involved via so-called Supply Chains from the supplier via our office to the user.

The interview was conducted by Michael Horst.

CPM. Furthermore, T3.1 is BAAINBw's central point of contact for matters regarding life cycle cost management.
The tasks of Branch T3.2 range from

- central control of price audits,
- answering questions regarding fundamental aspects of pricing law, business administration and cost auditing,
- developing work instructions and guidelines for the BAAINBw price audit branches and price negotiations,
- model contract price and cost arrangements, to
- cooperation with the pricing agencies of the German states,
- support to multinational organizations and NATO program offices and
- official assistance services for foreign governments.

The task of the operative price audit branches T3.3 through T3.6 is to evaluate whether the cost prices claimed by contractors are appropriate in terms of technical and economical aspects and whether they are in conformity with pricing law. For this evaluation, they use detailed cost data and documents and assess the quoted quantities and values.
Against the background of these tasks, the involvement of BAAINBw - as the biggest national public customer - in the ongoing work of the Federal Ministry for Economic Affairs and Energy on the review of the German pricing law is currently a main responsibility of Division T3.
Other issues of major importance are, for example, the pricing law aspects to be taken into account in re-drafting the different BAAINBw model contracts or the OCCAR contract guidelines and the ongoing implementation of Life Cycle Cost Management at BAAINBw.

Division T4

In Division T4 "Common Activities Relating to Expenditures for Equipment, In-Service Use and Logistics", responsibilities of a primarily common technical, economic and logistic nature have been combined.
The tasks of Division T4 focus on project support in managing logistics as a project element. It serves as a link to Bundeswehr Logistics Command and is, as such, an essential service provider in the implementation of product-related logistic processes. Furthermore, BAAINBw, in cooperation with Logistics Command, strongly contributes to the tailoring and further development of the Bundeswehr Logistics System.
Branch T4.1 deals with policy matters related to equipment, in-service use and logistics and, within the framework of technical support tasks, advises the projects with regard to logistics as a project element. Tasks of

a different nature are performed by the Branches T4.2 through T4.5, which provide operational support to the project directorates and agencies.

Branch T4.2 provides the project directorates with technical advice on all issues of materiel management (with the exception of bulk expendable supplies). This includes, for example, the management and forecasting of follow-on spare parts requirements. It also gives advice regarding the monitoring of budget planning, the recommendation of target figures, the definition of the annual spare parts requirements of HIL GmbH (the state-owned industrial company to which Army logistic tasks are outsourced) in cooperation with the project directorates and the implementation of arrangements on the provision of government-furnished property (e.g. in the field of ammunition).

In addition, this Branch assists the project directorates in all matters of disposal of defense equipment and it coordinates all disposal measures at BAAINBw. Final decisions on all disposal measures are made by authority of the officially appointed Defense Materiel Disposal Officer.

Branch T.4.3 maintains the catalog of materiel planning objects for the Bundeswehr across organizations, thus providing the basis for materiel target planning in all agencies. Furthermore, the Branch advises and supports the project directorates of BAAINBw with regard to codification of materiel (on individual request), is responsible for user administration in the "Complete Equipment Schedule Annex Sheet" data processing procedure, assigns project identifiers and defines technical responsibilities for supply items.

Branch T4.4 provides operational support to agencies subordinate to BAAINBw (Bundeswehr technical centers and research institutes, Naval Arsenal) and exercises functional supervision of how the agencies perform their logistic tasks regarding the organization of work, materiel management, maintenance and equipment planning. Branch T4.4, moreover, has the in-service and supply responsibility for the AIN major organizational element (Equipment, Information Technology and In-Service Support).

Branch T4.5 is responsible for the management of imports based on procurement contracts of BAAINBw and its subordinate units, the Federal Office of Bundeswehr Infrastructure, Environmental Protection and Services (BAIUDBw), the Bundeswehr universities and the Bundeswehr Geoinformation Office. It is also responsible for exports/shipments for disposal purposes, and for Bundeswehr materiel transfers to other countries including requests to the Federal Office for Economic Affairs and Export Control (BAFA), for customs clearance and export control at BAAINBw. In addition, the Branch is responsible for and manages transport activities, fundamental transport issues as well as Bundeswehr materiel loans, free-of-charge transfers and the end use of defense materiel as well as maintenance activities for equipment loaned by HIL GmbH.

In addition to these primary tasks, Division T4 is involved in several special organizations and task forces, such as the subproject for the optimization of the spare parts and exchange parts management and the development of principles for the preparation/management of the project-related logistic concept as part of the In-Service Use Agenda, the re-structuring of the fixed logistics facilities (oIE 2019+) or the preparation and continuous updating of the General Publication for the Performance of Tasks in the In-Service phase. Moreover, Division T4 coordinates the build-up of an operational stock of spares and replacement parts ensuring 30 days of supply. ■

Masthead

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Technical Quality Management Center (Directorate ZtQ)

The quality assurance activities of the Technical Quality Management Center (Zentrum für technisches Qualitätsmanagement - ZtQ) reflect the interests of economical administrative practice as well as the special responsibility of the Bundeswehr as an employer vis-à-vis its servicemen and women to ensure the functional reliability and operational safety of their equipment.

Directorate ZtQ is independent of project directorates and contracting branches, and its work is mainly directed at bidders and contractors, meaning external partners as viewed from within the Federal Defense Administration.
The Directorate primarily takes action in those cases in which the contracting authority cannot establish beyond doubt, on the basis of the contractor's quality management activities, that the contractor's supplies and services are rendered in conformity with the contract and in a cost-effective way, always con-sidering the relevant context. This includes the quality assurance activities for which the contractors are responsible vis-à-vis subcontractors or suppliers.
This especially applies in the case of risky projects - such as complex, time-critical, expensive, potentially harmful or groundbreaking technological developments, procurements and maintenance.

Photo: Bundeswehr

A winter night-time test firing for functional verification as part of the Official Technical Quality Assurance procedure

Activities Prior to and after Contract Conclusion

Directorate ZtQ's work is meant to support, through a risk-based approach, the contractor in rendering the contractually agreed supplies and services, and document this in a manner that is appropriate for revision. It is mandatory to follow a tiered sequence of tests, ranging from audits at irregular intervals to hundred-percent inspections of parts carried out by the public authorities. Notwithstanding the above, a contractor ensuring the contractually agreed properties of a product or a service is always responsible in such cases.
Thus, technical quality assurance touches both on what is called (pre)contractual quality assurance and on quality assurance within individual projects. By the time a contract is concluded, project-internal quality assurance has to ensure that within the context of requirements management, unambiguous, weighted, realistic and measurable requirements are determined in a clearer way for both the product and the contractor (cf. pre-qualification); and that possible insufficient performance may be sanctioned more systematically.

Directorate ZtQ's major tasks after contract conclusion are:

- monitoring the contractor's quality management systems in terms of their effectiveness and, if appropriate and required (risk-based), performing supplementary official inspections,
- legal tasks, such as airworthiness product conformity inspections and re-verification, weapon overload firing tests and inspections of hazardous goods packaging,
- operational tasking and performance monitoring of "open-end contracts for maintenance at the contractor's works", as well as
- within Germany, handling requests for Government Quality Assurance made by NATO partners and friendly third countries in accordance with STANAG 4107, which regulates the mutual recognition of Government Quality Assurance measures performed in application of the NATO Allied Quality Assurance Publications (AQAP).

Attested Quality Management System

Directorate ZtQ is the only directorate of a higher authority within the area of responsibility of FMoD that employs an attested quality management system, in accordance with ISO 9001:2015, that has been approved and certified by an independent third party. By means of this system, Directorate ZtQ increasingly committed itself to being a "service provider" for the relevant interested parties. These especially include project managers and contract branches of BAAINBw, FMoD and the parliamentary level, employees of Directorate ZtQ and personnel representation bodies.

The Challenges of E-Leadership and E-Administration

The Technical Quality Management Center consists of four divisions. In matters

related to technical quality management, especially the operational conduct of Government Quality Assurance measures, Division ZtQ1 has power of direction within the remit of the Federal Ministry of Defense. Through the competent specialist branches, it is particularly involved in the pre-contract phase vis-à-vis the project directorates. The quality assurance teams (QA teams) of the ZtQ2 to ZtQ4 regional divisions, based in Hamburg, Mainz and Manching, perform their work right at the contractors' sites. They have 63 field offices that support the project managers in an indirect and decentralized manner in gradually implementing and enforcing contract requirements, also during production. In addition, they independently handle individual maintenance contracts concluded with trade and industry.

Its QA teams are quite far apart from each other, which is why Directorate ZtQ started using assets like electronic information and communications technology, centralized file servers, integrated intelligent database systems (such as in SASPF), webinars and wikis quite early on. The introduction of the Quality Management Module (QM Module) ensures that the work of the technical government quality management is reflected in SASPF, for instance pre-contractual specification of quality assurance requirements, planning, execution and documentation of quality management activities during development, production and maintenance of Bundeswehr equipment, audit management, etc. These measures towards the paperless Government Quality Assurance file implement the strategic objectives of Directorate ZtQ in terms of digitization. In doing so, one of the challenges is to reduce the multitude of quantitative data collections to a manageable amount and to avoid letting this secondary task of the official inspection organization ("acquisition, plausibility check and documentation of data") gradually become the dominating core task.

Similar considerations and limits apply to e-leadership.

The fact that Directorate ZtQ's regional offices are spread out all over Germany required the Directorate from early on to develop progressive ideas as to what good leadership means. One thing is clear: E-leadership calls for different leadership skills and methods than its "face-to-face" counterpart. Thus, an ever-present challenge remains for modern leadership within dynamic working environments. At the same time, all people involved should be aware that "remotely supervising" the employees working from home or in field offices might become a time-consuming activity when a common code of values is to be ensured. In addition, it is recognized that reorganizations designed to make individual jobs more attractive and potentially change the job's range of activities do not necessarily result in the overall success of a company; however, they could have such an effect if they are well-conceived and different perspectives are considered right from the beginning.

International Context

The NATO AQAPs are the main basis for Directorate ZtQ to perform Government Quality Assurance during the development, procurement or maintenance of defense material for the Bundeswehr or its partners.

They have the status of standards and are part of the Standardization Agreement (STANAG) 4107:2016 "Mutual Acceptance of Government Quality Assurance and Usage of Allied Quality Assurance Publications", which has been ratified within NATO.

Photo: Bundeswehr

An MG6 undergoing the Official Technical Quality Assurance procedure

This is why BAAINBw contracts often contain agreements, in the form of an applicable AQAP regulation, on requirements regarding the contractor's quality management system or on the right to perform Government Quality Assurance at the contractors' or respective subcontractors' sites, all depending on the individual risks identified in the contract.

The latest amendments of ISO 9001 and EN 9100 more rigorously emphasize the contractor's responsibility for the entire production cycle. Some other major points are risk management, quality management planning, material and supply chain traceability (including subcontractors and suppliers), processing of and procedures for counterfeit parts, handling of nonconformities and corrective actions.

The above-mentioned amendments of international standards resulted in the updating of AQAP. The current status is as follows: AQAP 2120 and AQAP 2130 have been incorporated in AQAP 2110:2016. This master regulation can now be tailored to all individual cases.

The NATO nations have agreed to perform Government Quality Assurance activities for other partner nations free of charge (as a rule) if a contract on military equipment or services has been concluded with a domestic company and the resource of the domestic GQA service allows for such action. Non-NATO nations are increasingly employing the standardized and internationally harmonized AQAPs and also include them in their contracts. However, as a rule, they cannot make use of supporting activities performed by other Government Quality Assurance Authorities (GQAA) without compensating such authorities for their efforts. In addition, the FMoD's approval as well as a Memorandum of Understanding (MoU) are required.

Changing Government Quality Assurance Procedures for Aeronautical Equipment and Systems

Government Quality Assurance is performed on all aeronautical equipment and systems, as is the case with all other contractually agreed supplies and services for the public purchaser. This is done in order to check their conformity with contract requirements. In order to do so, the Government Quality Assurance mea-

sures are supplemented with additional elements derived from statutory requirements. The required military peculiarities pertaining to the Bundeswehr were regulated and promulgated within a Type A1 General Publication, in keeping with the Federal Aviation Act. This General Publication includes legally substantiated additional steps of inspection that go beyond the activities performed within the framework of Government Quality Assurance; it also defines the required level of experience and competences of the official inspection personnel responsible. The airworthiness inspection process performed by this official personnel mainly consists of product-specific inspections that are conducted independently, recurrent support for industrial inspections and inspections regarding the contractor's documentation and demonstrations. This sequence of measures must be performed and demonstrated for each aircraft or aeronautical equipment.

Within the national military set of regulations, as defined in Type A1 General Publication A1-1525, it is permitted under specified conditions to have inspections performed by qualified inspection personnel other than the official licensed inspectors, and these can be accepted as airworthiness inspections (by delegation). This inspection by others must be contractually agreed; its implementation will then be monitored by the competent ZtQ regional office as part of Government Quality Assurance.

In recent years, the Bundeswehr has built a foundation that can serve as a unified common basis for Europe-wide defense projects, similar to the civilian EASA (European Aviation Safety Agency) standards. An important step in this context is the introduction of an internationalized military set of regulations, called EMAR (European Military Airworthiness Requirements).

In general, further conditions will have to be fulfilled for their implementation, both by official agencies and industry. Airworthiness inspections of aircraft types that are entirely delegated to third parties in accordance with EMAR will be conducted by the relevant aeronautical company, which is fully responsible in this matter. These inspection services are procured (from a commercial contractor, based on a contract) with public funds. For this reason, it is necessary to have ZtQ regional offices check, in relation to each contract, whether the contractor applies the pertinent operating manuals and the QM documentation. However, the focus of official inspections is shifting within the EMAR set of regulations; it is moving away from checks aimed at technical aspects regarding airworthiness towards inspections that build trust in how the contractor fulfills all of his contractual obligations.

Source: Bundeswehr

Agreement	STANAG 4017 AQAP 4107
Procedure	AQAP 2070
Contractual	**Prime QA Conditions** AQAP 2110 (on basis ISO 9001:2015) AQAP 2131 AQAP 2310 (on basis ISO 9001:2016) **Supplement QA Conditions** AQAP 2105 AQAP 2210
Policy & Guidance	AQAP 2000 AQAP 2009
Supporting information isssued as standard relatet documents	List of National QA Authorities Poinst of contract for GOA AQAP 2110 Implementation Guidance AQAP Guidance

Updating the AQAP regulations

Increased Use of IT Requires a Change of Competences

The assets used for the transmission and processing of information are continuously being modernized within the Bundeswehr. This becomes apparent, for example, in the programs for the digitalization of land-based operations (D-LBO), the harmonization of command and control information systems (HaFIS) or, in the future, the German Mission Network (GMN) together with its pertaining subprojects. These modernization efforts are becoming even more important in the context of the German contribution to the NATO Very High Readiness Joint Task Force (VJTF).

Generally speaking, it is true that information technology is increasingly becoming an integral part of military systems. Operational safety as well as IT security must be ensured, which is an example of the demands placed on quality assurance in this regard. In the area of information technology, Government Quality Assurance is faced with:

- an increasing complexity of the overall systems that are meant to be implemented, consisting of older already fielded parts and modern new ones,
- a pertaining large number of interfaces between individual subsystems,
- the need for coordination of Government Quality Assurance between different sites and system components,
- tight time frames and
- the expected fast-paced regeneration of hardware and software.

Apart from supporting development and procurement projects, Government Quality Assurance will increasingly be involved in the maintenance and modification of software. This applies to the different large weapon systems that have been fielded in the Bundeswehr as well as to the multitude of medium-sized or smaller ones, both internally (at the Bundeswehr systems support centers, for example) and externally with regard to the contractors.

Directorate ZtQ answers this trend by expanding its know-how regarding IT inspections.

Improving the Dialogue between Public Purchaser and Contractor

The dialogue with (future) contractual partners will focus on the consistent use of harmonized QA standards and their demonstrated application within the entire supply chain. In addition, another goal must be to specifically improve the collection and evaluation of operating and usage data of costly weapon systems and military equipment, as is already common, for the most part, in the field of aviation. This must be achieved in order to be able to incorporate the findings in the in-service process through improvements of parts or assemblies. On-demand repairs may indeed represent a disruptive business model; however, in the context of military operations, they can only serve to supplement reliable, fact-based lifetime predictions for parts and resilient maintenance strategies. This dialogue is currently being further improved by means of new cooperation agreements between the projects and ZtQ.

This is Directorate ZtQ's invitation to face the common challenges hand in hand and on the basis of an established dialogue. ■

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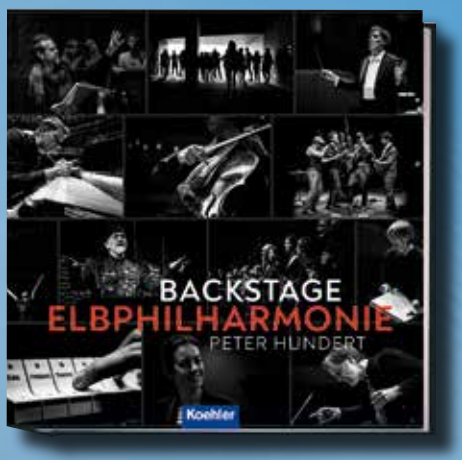

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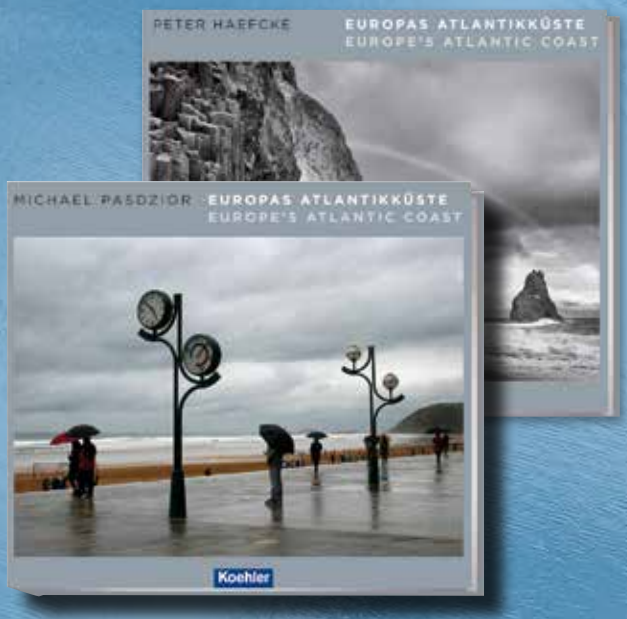

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Central Affairs Directorate (ZA)

The Central Affairs Directorate (ZA) of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) is in charge of central administrative affairs.

Four divisions with a total of 19 branches and one directorate office deal with interdisciplinary and general administrative matters.
The Directorate Office directs, coordinates and controls matters that affect all divisions.

Division ZA1

Division ZA1 consists of the branches ZA1.1, ZA1.2, ZA1.3 and ZA1.4.
Branch ZA1.1 is responsible for organizational structures and procedures of BAAINBw and its subordinate agencies. In addition, ZA1.1 handles tasks relating to administrative control, military complaints and requests according to the Freedom of Information Act.
Branch ZA1.2 deals with organizational consulting (organizational studies and manpower requirement calculation), cost and performance accounting (CPA), process orientation and the BAAINBw continuous improvement process (CIP).
Branch ZA1.3 is responsible for military and industrial security at BAAINBw, the request for visit process as well as functional supervision of the subordinate sphere with regard to the above-mentioned task areas.
The BAAINBw technical information center ZA1.4 researches, acquires and archives necessary technical information, and makes it centrally available to BAAINBw and agencies staff. Bundeswehr contractors receive technical information and regulations as part of contractually agreed government-furnished items. Bundeswehr units on deployment abroad are supplied with regulations using the DvWeb internet portal, similar to the information supply to contractors. Furthermore, this Branch is responsible for administrative tasks in the area of technical regulations for the entire Bundeswehr. The Active Regulation Management functional area offers assistance to the bureaucracy reduction center at the Federal Ministry of Defense and to the Regulation Management Branch at the Armed Forces Office, providing support in implementing regulation management at BAAINBw and its remit.

Division ZA2

Structure and tasks of Division ZA2 – Finance – are marked by the particular responsibilities of BAAINBw, which is not only a major procurement agency of the Federal Republic of Germany and thus an important public customer, but has also had materiel responsibility for the operational viability of defense materiel since its foundation. The Division also administers the budgetary funds required for BAAINBw administration. The tasks of financial planning and implementation of the budget are pooled in Division ZA2.
Division ZA2 is subdivided into the following branches

- ZA2.1 "Budget Policy and Tax Affairs",
- ZA2.2 "Financial Requirements Analysis/Financial Planning and Funds Management for Investments",
- ZA2.3 "Financial Requirements Analysis/Financial Planning and Funds Management for Materiel Maintenance",
- ZA2.4 "Financial Requirements Analysis/Financial Planning and Funds Management for Other Operations, Information Technology and Administrative Expenditures",
- ZA2.5 "Contract Accounting", and
- ZA2.6 "Reviews of Grants; Public Grants Law Policy; Functional Supervision over Grants Awarded by Subordinate BAAINBw Agencies".

Branch ZA2.1, besides processing general questions on tax and budgetary law, is involved in contract review and contract consulting in accordance with §§ 58, 59 and 63 of the Federal Budget Code. Beyond that, this Branch supervises all outstanding government claims (e.g. recoveries, contract penalties, interest etc.), does the relevant accounting and performs the payment of taxes for BAAINBw and its agencies. ZA2.1 is also tasked with ordering all payments of BAAINBw.
The main task of ZA2.2 is funds management for R&T, and for development and procurement of defense materiel. Since 1 July 2017, central tasks of financial requirements analysis have also been part of its responsibility. Besides funds management for development and procurement, ZA2.2 handles budget item management for non-specific investment-related budget chapters/items. Furthermore, this Branch is home to the SASPF accounting process manager. He is in charge of developing the conceptual basis for accounting under SASPF for the major organizational element of Equipment, Information Technology and In-Service Support (AIN).
Branch ZA2.3's tasks include financial planning and funds management for materiel maintenance in the framework of materiel responsibility for operational viability.

Branch ZA2.4 is responsible for financial planning and funds management of the funds required for maintaining the operability of BAAINBw and its subordinate agencies. Furthermore, the funds for information technology and the Bundeswehr information and communication system, as well as operator solutions are planned and managed in this Branch.
The tasks of Branch ZA2.5 include, besides contract accounting for BAAINBw contracts, the supervision of delivery dates, final pricing agreements, and recovery of and interest on overpaid amounts after price review.
Branch ZA2.6 was newly established on December 18, 2019. It is responsible for staffing all notifications of government grants intended to be given by the Federal Ministry of Defense and the FMoD's subordinate authorities in accordance with §§ 23 and 44 of the Federal Budget Code as well as for reviewing the use of the grants in accordance with § 44 of the Federal Budget Code. In addition, ZA2.6 is charged with processing fundamental issues regarding public grants law, and exercises functional supervision over the processing of grants by subordinate BAAINBw agencies.

Division ZA3

Division ZA3, "Requesting Agency-related Personnel Activities, Functional Supervision of the BAAINBw Agencies, Common Legal Affairs", consists of five branches and handles, among other responsibilities, the tasks assigned to BAAINBw for civilian and military personnel.

Branch ZA3.1 coordinates matters concerning civilian BAAINBw staff and is, as such, the main point of contact for all Bundeswehr personnel management offices.
In particular, its responsibilities include personnel management for BAAINBw as employing agency.
The Branch's responsibilities also include support for the Federal Ministry of Defense, the Federal Office of Bundeswehr Personnel Management and the Bundeswehr Service Centers in matters of personnel.
Branch ZA3.2 is responsible for decentralized personnel management as well as any personnel affairs relating to military personnel of BAAINBw and its subordinate agencies. The chief of Branch ZA3.2 also is the „officer in charge of matters concerning military personnel" and the disciplinary superior – in accordance with the Ministerial Directive Governing Superior-Subordinate Relations, Art. 3 – of all officers up to level A15 at BAAINBw, and deputy officer in charge of reservist matters within the AIN major organizational element. The assistant chief of the section "Leadership Development and Civic Education" doubles as disciplinary superior in accordance with the Ministerial Directive Governing Superior-Subordinate Relations, Art. 3, of all noncommissioned officers at BAAINBw.
Therefore, ZA3.2 is the central link for military BAAINBw staff to all personnel management offices.
Branch ZA3.3's tasks encompass general and common personnel affairs (civilian and military). Aside from support to an employing agency's staff-related policy work, this includes, in particular, user administration and management for SASPF, time and attendance recording, absence time management, maintaining local personnel files and preventive occupational medical care for all employees of the agency.
Branch ZA3.4 – "Strategic Planning of Training and Continuous Professional Development for AIN Personnel, Attractiveness Agenda" – is responsible for the coordination of matters pertaining to basic and advanced training of civilian and military staff of BAAINBw and its subordinate agencies. The Branch's responsibilities also include support for the Federal Office of Bundeswehr Personnel Management and the Bundeswehr Service Centers in matters of personnel recruitment measures.
Branch ZA3.5 is responsible for various common legal affairs. The tasks of the Branch include processing of disciplinary matters and providing advice to the BAAINBw executive group on general matters of the equal opportunities, staff representation and persons with disabilities law. Branch ZA3.5 also deals with liability and damage investigation, and matters concerning the compatibility of family life and work/duty, in particular the establishment and overseeing of BAAINBw childcare facilities in Koblenz and Lahnstein. Beyond this, ZA3.5 is charged with co-reviewing the consequences of legislative changes in hardship and functional allowances, and exercises functional supervision over procurement activities at subordinate BAAINBw agencies. The BAAINBw administrative data protection commissioner and the person in charge of the major process „Personnel" are also part of the ZA3.5 staff.

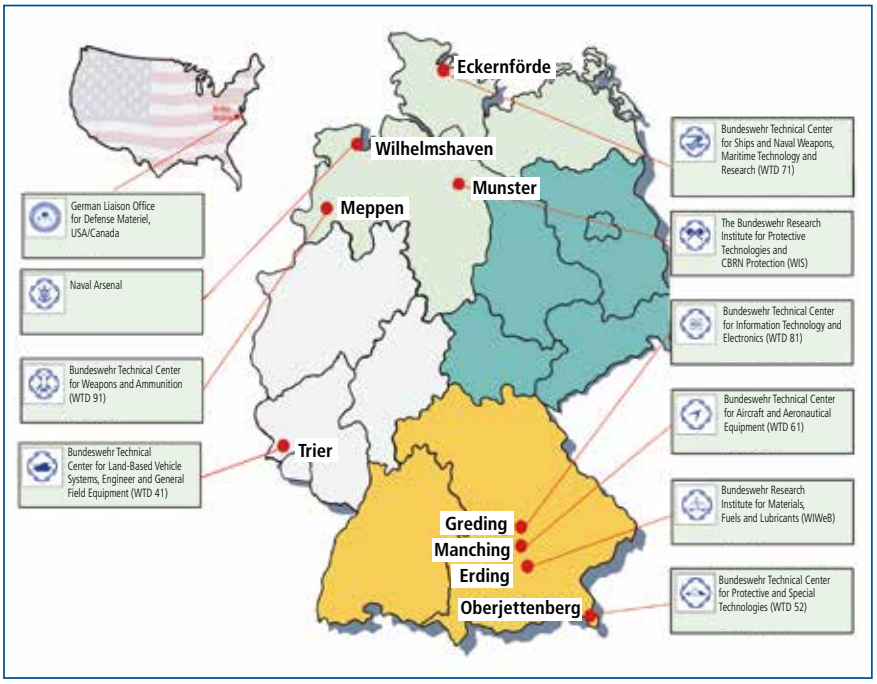
Division ZA4

Division ZA4 consists of the branches ZA4.1, ZA4.2, ZA4.3 and ZA4.4.
Branch ZA4.1 is responsible for the BAAINBw IT service. The term "IT service" encompasses all typical activities relating to the provision of services in IT. For instance, the personal IT requirements (hardware and software) of all personnel are managed in this Branch and made available, either as the standard, via the Bundeswehr-owned IT-company BWI, or as a special application via ZA4.1 itself. Individual areas of activity are, among others, the provision of mobile IT and dedicated servers for special applications, teleworking places, programming of databases and the introduction of a modern document management and groupware system into BAAINBw.
The Equipment, Information Technology and In-Service Support (AIN) organization is responsible for the determination and specification of its own infrastructural requirements, similar to the rules applicable to the services. This task has been given by the Federal Ministry of Defense Branch A I 4 to BAAINBw Branch ZA4.2. It includes all agencies and institutions dealing with defense technology, i.e. BAAINBw and all its technical centers, defense research institutes and the Naval Arsenal, as well as the Fraunhofer Institutes partly funded by the Federal Ministry of Defense. The – mainly atypical – infrastructural requirements of the AIN major organizational element are primarily aimed at satisfying requirements for trials, investigations and R&T. In addition, Branch ZA4.2 handles infrastructure tasks for the Federal Government's in-house companies overseen at BAAINBw (HIL GmbH, BwBM GmbH, BwFPS GmbH, BWI GmbH).
The scope of responsibility of Branch ZA4.3 includes internal services for BAAINBw with the areas "Procurement of own requirements" / "Budget" / "Logistics and material provision" / "Motor pool". The area "Activities in Representation of the User" coordinates all matters concerning the sites, facilities and accommodation of the user BAAINBw in Koblenz, Lahnstein and Bonn.
Branch ZA4.4 ensures internal operations by running postal and messenger services, a print shop and a classified material registry. ■

The BAAINBw Agencies

A total of six defence technology departments, two military science departments and the Naval Arsenal are subordinated to the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw).

Graphic: mawibo-media



Bundeswehr Technical Center for Land-Based Vehicle Systems, Engineer and General Field Equipment (WTD 41)

WTD 41 is the Bundeswehr center of expertise for the technical assessment of land based vehicle systems as well as of engineer and general field equipment.

The office on the Grüneberg hill in Trier provides the main expertise for the assessment of wheeled and tracked vehicles including their assemblies while the office in Koblenz focusses on engineer and general field equipment studies that include, in particular, the technical assessment of engineer vehicles, POL supply and camp systems.

In order to ensure their expertise, WTD 41 has highly qualified personnel and a unique infrastructure at both locations. With a current staff of 453, WTD 41 is a reliable partner for the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), its main customer, as well as for further customers from Germany and abroad. In addition to the above-mentioned core activities, WTD 41 is increasingly involved in recruitment and training. It thus makes a significant and valuable contribution to maintaining Bundeswehr defense technology expertise in their task areas in the future.

Current Studies

Operation of Vehicles with Modern Exhaust Emission Control Systems (Euro VI) with Highly Sulfurous Fuels

The Bundeswehr satisfies its vehicle requirements also by using the BwFuhrparkService (BwFPS) GmbH, which provides commercial vehicles, commercial special-purpose vehicles, and commercial vehicles with special military equipment. These vehicles comply with the Euro VI emission standard and require diesel fuel that is particularly low in sulfur for proper exhaust gas treatment, which is often unavailable in theaters of operation. The same applies to the implementation of a single fuel capability, which is also frequently associated with the use of fuels with higher sulfur contents.

In order to examine the effect of fuels on engines with state-of-the-art exhaust technology, BAAINBw tasked WTD 41 with performing a test series comprising driving tests with sulfurous diesel fuel as well as test runs on the engine test bed (NATO 400-hour endurance test with F63 jet propulsion fuel).

Future Energy Supply Systems in Military Camps: Motivation and Objective

The worldwide commitment of the Bundeswehr and the associated accommodation in camps entail a significant logistical effort to ensure the supply of energy. In military camps, energy is usually supplied conventionally, i.e. by diesel generators, which are refueled by means of tank vehicles.

The non-negligible risk for vehicle crews to become the target of attacks as well as the high transportation cost suggest the use of regenerative energy sources in state-of-the-art camps.

The efficient and mission-tailored use of regenerative energies, however, requires that resulting technological challenges have been sufficiently met. In addition to energy production, this applies in particular to energy storage and conversion. The studies focus on the mastery of individual technologies available on the market and their implementation into an energy network (smart grid) capable of intelligent energy distribution. The basic aim is to provide the energy required in a camp over the entire energy-related process chain from energy generation to consumption in a manner that is tailored to operations and largely self-sufficient.

Key Technologies for a Future Energy Supply System – Implementation of Research Results

In order to plan and design future energy networks, WTD 41 uses innovative software solutions that facilitate developing networks and analyzing and optimizing their economic efficiency. In addition, WTD 41 uses specifically developed R&T demonstrators to evaluate different energy supply concepts (see pictures).

WTD 41 uses the following key technologies for its studies:

- block-type thermal power station with absorption refrigeration machine for more effective waste-heat utilization,
- heat and cold storage using latent as well as sensitive storage technologies,
- air conditioning in billeting containers by means of phase change materials in the wall compound,

Photo: WTD 41

Block-type thermal power station/solar thermal power/adsorption refrigeration machine technologies for heating/cooling and service water heating

- ice storage/heat pump system in connection with solar thermal power,
- stand-alone photovoltaic (PV) system with battery storage systems,
- energy management for controlling thermal and electrical energy flows,
- vehicle-to-grid mobility with renewable energies,
- distributed control system for test control and visualization.

Qualification of the HFC Hydraulic System in the FUCHS 1 Armored Transport Vehicle (ATV)

BAAINBw project managers make regular use of the technical expertise of WTD 41. In the present case, a flammable medium in the FUCHS 1 ATV hydraulic system was intended to be replaced by a flame-resistant fluid (HFC fluid). The aim was to significantly reduce the risk potential for vehicle crews, in particular when under fire, and to technically release the design status of this HFC hydraulic system. To this end, the hydraulic components and the fluid were assessed in depth, and installation tests were conducted with a FUCHS 1 ATV. In a final step, the vehicle equipped with the HFC system was subjected to a heat test on the WTD 41 drum test stand. Since the individual study steps were successfully completed, WTD 41 announced the technical release of the design status of the HFC hydraulic system.

Bundeswehr Technical Center for Protective and Special Technologies (WTD 52)

The core competence areas of WTD 52 are the fields of both direct and indirect protection.

Their focus is on ensuring survivability on the battlefield and preventive defense measures against weapon effects and asymmetric threats. This includes:

- protection of infrastructure against weapon effects and Improvised Explosive Devices (IED) as well as ammunition storage safety
- numeric simulation of protection and effects
- indirect protection (camouflage, concealment and deception)
- non-lethal weapons (NLW) and
- physical detection of IEDs

Special technologies include a variety of different topics which can be dealt with by WTD 52 in an ideal manner due to a year-long build-up of competences and specific conditions of infrastructure prevailing at the Technical Center. This includes the simulation of nuclear blast waves, aerodynamic load tests, mobile antenna supporting structures, primary batteries with a high risk potential, detection of landmines and underwater testing.

WTD 52 benefits from particular geographic and geological conditions which are unequaled in this combination. The underground facility in the "Reiteralpe" massif, the Bundeswehr cableway and the alpine test sites and demolition ranges at an altitude of approximately 1,700 m all represent manifold opportunities for research and compliance demonstration.

Armed conflicts increasingly move to urban areas. This has far-reaching consequences for the local civilian population and a considerable impact on Bundeswehr operations as well. WTD 52 contributes in multiple ways so as to provide the best possible protection for our soldiers operating in urban scenarios. The risk potential of air blasts following a massive explosion in an urban area is of special interest in this regard. On 15 August 2019, a multinational large-scale blast and fragmentation test took place within the scope of the topic "Protection of the Infrastructure Against Weapon Effects and IEDs".

Photo: WTD 41

FUCHS 1 ATV with HFC hydraulic system on the WTD 41 drum test stand during heat testing

Super Heavy Improvised Explosive Loading Demonstration (SHIELD)

SHIELD was jointly planned and conducted with Norway, the USA, Sweden and Switzerland. The test scenario was at the upper end of the scale of threats posed by VBIEDs (Vehicle-Borne Improvised Explosive Devices).

From a national point of view, the main objective of this cooperation was to examine the infrastructure facilities and objects in use or earmarked for operation in the event of asymmetric threats caused by massive VBIEDs (MVBIED) through full-scale tests. Due to the fact that there were no experimentally determined data available for this

Photo: WTD 52

Watchtower before test

Photo: WTD 52

VBIED detonation test

Photo: WTD 52

Watchtower after test

threat scenario, a clear specification of the safety distances and an optimization and/or validation of existing damage models were expected. WTD 52 in Oberjettenberg had the national lead responsibility for this test, which included different types of revetments and housing structures (containers, tents) as well as security posts and/or towers from the perimeter zone as test objects. Among other things, our international cooperation partners examined a civilian multi-story building and various civilian and military protective structures.

The initial evaluations showed a high to very high consistency of the measured values with the pressure propagation and structural response values that had been calculated prior to the test. There were, however, some unexpected effects that need to be examined carefully.

WTD 52 is currently analyzing the test results in detail and deriving appropriate measures in the area of physical protection. As agreed upon, all knowledge acquired is exchanged among the participating nations.

Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (WTD 61)

The core mission of WTD 61 in Manching is testing and evaluating Bundeswehr aircraft and aeronautical equipment. WTD 61 is thus the Bundeswehr's technical center of excellence for military aviation and as such conducts in-flight substantiation and technical compliance demonstrations in national and international flight test projects. The broad range of WTD 61 tasks includes qualification and technical evaluation of developments during in-service use as well as the analysis of commercially available aircraft and equipment and the support of fast-track initiatives for operations. For instance, WTD 61 has the capability of competently and promptly conducting flight and ground tests with its own test aircraft in accordance with internationally approved standards. The technical center provides all test facilities required for accomplishing its tasks, reserved airspace for testing, the required measuring equipment as well as personnel which is trained and qualified to conduct a wide variety of tests. The main tasks of WTD 61 comprise specific military and mission-relevant issues such as air refueling, airdrop technology, integration of new weapons, self-defense systems, software, testing of new sensor and communications technology, night-vision capability, electromagnetic compatibility (EMC) or UAS trials.

The following selected examples give an overview of current trial projects:

- One part of the operational test for the follow-on capability of the A400M transport aircraft is the evaluation of its air refueling capability. In this context, the trials for the pairing clearance with the Eurofighter weapon system have not yet been completed.
- With respect to airdrop systems, WTD 61 is involved in the introduction of the new CDS (Container Delivery System) standard gravity airdrop procedure as well as in the development of a HALO (High Altitude Low Opening) airdrop procedure for A400M and C-130 aircraft.
- In the process of achieving EUROFIGHTER air-to-ground capability, further major trials were conducted abroad under the leadership of WTD 61, using the GBU-48 laser and GPS guided bomb to test weapon integration.
- The EUROFIGHTER aircraft was also used to conduct test flights for the Air Data System (ADS) altitude calibration in Manching.
- Currently, the ASTAA 4.1 advanced software is being integrated in the TORNADO test aircraft.
- Integration trials of IFF (Identification Friend or Foe) MOD 5 are conducted for TORNADO and NH-90 aircraft.
- An extensive TORNADO campaign was conducted for testing the new Laser-Guided SIDEWINDER (LaGS) air-to-ground missile with a laser seeker head at the Vidsel test range in Sweden.
- WTD 61 is taking further steps towards becoming a technical center of excellence for unmanned aircraft systems. In cooperation with industry as the developer, reconnaissance and scouting drones for accompanying military missions (e.g. MIDEA) are tested and evidence for the approval of new or further developments of unmanned systems of all sizes are provided. Early this year drone flight tests were conducted at WTD 61 within the scope of extensive Unmanned Aerial System (UAS) defense and R&T projects. In these tests, drones were mapped in air situation pictures and uncooperative drones were identified and stopped.
- WTD 61 supports the qualification and certification of the HERON TP UAS, the priority Navy UAS (VorMUAS) for integration into Class 130 corvettes as well as the LUNA NG, a medium-range UAS.
- Furthermore, WTD 61 is tasked with the elimination of obsolescence in target acquisition drones (KZO) as well as with R&T projects in the field of hyperspectral sensors of tactical UAS.

Photo: WTD 61 Media Service

LUH SOF hazard analysis: Flare ejection with instrumented dummies in open doors

- One of WTD 61's continuing tasks is the involvement in providing the "White Fleet" (Special Air Mission Wing of the Federal Ministry of Defense) with LAIRCM (Large Aircraft Infrared Counter Measures) systems.
- WTD 61 offers its support in the procurement and introduction of the Global 6000 aircraft, the new government fleet aircraft type.
- For several years now, the Bundeswehr has not been able to use Bundeswehr aircraft for Open Skies. After converting an A 319 aircraft for these capabilities, WTD 61 decided in favor of the new camera optics system in accordance with international requirements, subsequently conducting test and qualification flights.
- The EMC tests required for certification were conducted using the Navy version of the NH-90 aircraft.
- In flight tests with Bell UH1D and NH-90, WTD pilots tested an Electronic Flight Bag (EFB) which had to be investigated in detail in the course of a planned introduction.
- Moreover, WTD 61 was tasked with the investigation of whether the LUH SOF (Light Utility Helicopter Special Operation Forces) tactical operator is subjected to heat radiation, flue gas and fragments when flares are ejected during a flight with open doors. This investigation was complemented by tests of hazardous residues on the outer airframe as well as in the interior following flare ejection.
- Having performed various trials involving the use of the Night Vision Imaging System (NVIS) in different aircraft types, WTD 61 has increasingly become a Bundeswehr center of excellence for night vision capabilities. A permanent test environment with night vision capability was thus established for this specific purpose.

WTD 61 expertise and competence in aviation is also indispensable and required for various upcoming projects, e.g. the introduction of diverse new airborne weapon systems such as the Heavy Transport Helicopter, the development of new aircraft like the Future Combat Air System (FCAS), unmanned systems like the European MALE RPAS or for maintaining the strategic air transport capability.

The Bundeswehr Technical Center for Ships and Naval Weapons, Maritime Technology and Research (WTD 71)

Based in Eckernförde, the Bundeswehr Technical Center for Ships and Naval Weapons, Maritime Technology and Research (WTD 71) is responsible for tasks and projects in all areas of maritime defense technology and defense research.

It provides the technical expertise in maritime research and development, testing, evaluation, and acceptance required to provide suitable and safe equipment to the German Navy.

In addition, WTD 71 is in charge of projects for the construction of replacements for its ageing general-purpose vessels, which are essential for at-sea trials and testing. To exemplify the broad range of responsibilities handled by WTD 71, we will now take a closer look at two specific project areas.

Research Projects on Antisubmarine Warfare

One of the research priorities of WTD 71 is the study of acoustic techniques for antisubmarine warfare (ASW). Acoustic systems are the only means for detecting targets in the sea over long distances. Driven by political changes and the revival of national and collective defense stipulated in the White Paper, antisubmarine warfare has once again become relevant to Germany and NATO as a whole.

At the ASW Sonar Center (SONAR: Sound Navigation and Ranging), scientists of WTD 71 are researching new signal processing techniques and performance-boosting concepts for submarine detection. Over the last years, three-dimensional antisubmarine warfare (3D ASW) has emerged as the most promising technique for detecting modern submarines. This concept includes a joint use of sonar sensors by surface, subsurface and airborne units.

Combined with clever coordination of the joint sensor systems, a smart pooling of the data and information collected by a number of netted sensors and systems can provide a lasting boost to detection performance. Data is exchanged via surface and underwater communication links. This is a key prerequisite for creating a full operational picture.

Researchers join forces with German Navy flotillas and the Naval Air Wing to test these new techniques under exercise conditions, often in cooperation with other NATO partners (see figure on the left).Generally, a state-of-the-art low-frequency towed sonar system mounted to the WTD 71 research vessel PLANET is used for detection during these exercises.

In the future, netted unmanned systems – which WTD 71 has been researching for several years – will play an increasingly important role. Starting in 2020, the agency will step up its testing of stationary and mobile autonomous ASW systems as part of a multi-national NATO research project.

Photo: WTD 71

Left: Research vessel PLANET during an ASW exercise. Right: EW simulator.

Technical Projects on Electronic Warfare

WTD 71 operates the EW Sea Range (EW – electronic warfare) to study the performance of above-water electromagnetic sensors, measures and countermeasures as part of commissioned studies, technical inspections, or demonstrations. This includes computer simulations as well as field trials using original installations fitted with special instruments.

The German Navy makes use of this facility to practice and test its techniques and procedures in close cooperation with the Naval Operational Suitability Test Center and WTD 71. The Naval Arsenal uses the EW Sea Range for after-repair system and functional testing. The spectrum of tests includes the following:

- further development and verification of technical and tactical procedures;
- analysis of the performance, robustness and effectiveness of naval EW, electro-optical (EO) and radar facilities;
- radar and EO signature measurements;
- effectiveness testing for countermeasure devices and their ammunition;
- effectiveness testing for tactical and technical countermeasures to symmetric and asymmetric threats;
- simulations for preparing, evaluating and complementing the above-mentioned tests.

Over the course of the last years, WTD 71 staff have not only provided project support and performed final acceptance trials, but also refurbished many test facilities, upgrading the capabilities of the EW Sea Range to match the state of the art. There are several systems providing the capabilities mentioned above, including:

- radar signature measurement system;
- EO signature measurement facility;
- frequency and signal environment simulations and matching analysis capabilities (EW simulator, see figure on the right);
- EO homing head simulator with proximity and environmental simulations;
- display of threats in the visual/IR spectrum;
- radar/IR homing heads;
- EW facility to cover the signal environment and to test electromagnetic countermeasures.

All of the above activities are aimed at enhancing the self-protection of ships and boats.

Bundeswehr Technical Center for Information Technology and Electronics (WTD 81)

Based in the Bavarian town of Greding, the Bundeswehr Technical Center for Information Technology and Electronics (WTD 81) is the center of expertise for weapon system-related information technology (IT) and electronics of the German Armed Forces (Bundeswehr). As an agency under the remit of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support, WTD 81 can draw on its expertise to provide important support in all phases of the CPM.

Its core tasks include project monitoring and support, the performance of specialized technical tasks, the control of research and technology projects and the management of projects involving navigation systems, common measuring and test equipment as well as the test, evaluation and reference facility of the Evaluation Center for IT Security in the Bundeswehr (Prüfzentrum für IT-Sicherheit in der Bundeswehr).

WTD 81 can rely on vast technical competence in the following areas:

- Standards, protocols, procedures and technologies for information processing, information transfer and IT security in weapon systems, command and control systems and support systems,
- Information collection, reconnaissance components and technologies (radar, optronics including the associated signal processing),
- Electromagnetic compatibility (EMC), lightning protection and electrical safety,
- Electronic warfare (EW),
- Interoperability of command and control information (C2I) systems and command, control, information and weapons control systems,
- Integration of IT into platforms,
- Technical examination of overall systems as well as examination of systems of systems, i.e. individual systems interacting in a network under near-operational scenarios,
- Radar and identification technology,
- Intelligent weapon systems, homing technology, fire control technology,
- Navigation,
- Materials and technologies for semiconductors.

In order to accomplish its tasks, WTD 81 is operating laboratories equipped with highly qualified staff as well as state-of-the-art, high-end infrastructure and technology.

These facilities include, among others, one of Europe's largest fully shielded test facilities for the study of electromagnetic compatibility and electromagnetic effects.

Photo: WTD 81

Aerial photograph of WTD 81 in Greding

This is where military systems and electronic components are tested for compliance with standards-based limit values. The tested weapon systems must neither be vulnerable to interference from external electromagnetic sources, nor must they inadmissibly influence internal systems.

In order to assess the performance of fire control systems, gun stabilization systems and the seeker heads of guided missiles, hardware-in-the-loop simulations of optical and optronic components and systems are conducted in the "target simulation dome". This domed building measures 45 meters in diameter and houses a unique target simulation system. For the test objects, a scenario and targets covering different spectral ranges from UVB to long-wave IR are projected onto a spherical surface. Two powerful motion simulators simulate the motions of the test objects. The target simulation dome can be connected with other simulation facilities via standardized interfaces and protocols in order to carry out networked experiments.

Furthermore, the modern Center for Interoperability, Network Centric Warfare and Simulation (Zentrum für Interoperabilität, Vernetzte Operationsführung und Simulation, ZINS) offers the possibility to carry out multi-project networking experiments in all stages of the amended CPM to study interoperability and determine performance in a system network. To that end, the center has set up an extra-large media wall, an audio system, laboratories, multi-purpose rooms and a powerful network with numerous connection options. The facility's defining characteristic is the high degree of flexibility it provides for various test configurations.

From the wide range of activities currently being conducted, two projects will be briefly presented below:

1. **Evolutionary enhancement of WTD 81's existing assessment skills in the field of command and control capability as exemplified by VJTF-PUMA**

In the framework of the VJTF (Very High Readiness Joint Task Force) numerous upgrades are being implemented in the PUMA IFV, amongst other things, by the contracted consortium of companies. Several WTD 81 branches are contributing to the activities in the areas of communication, fire control technology, integrated test systems, navigation and EMC, both at the preliminary stage and at the compliance demonstration stage. In the VJTF context, the command and control capability (C^2 capability) of the PUMA IFV represents a special challenge. The C^2 assets currently available for the PUMA IFV must be substantially enhanced, but there are neither adequate technical solutions nor suitable compliance demonstration strategies available for this purpose. Thanks to its expertise, WTD 81 is providing important technical input to arrive at adequate solutions in this context.

In the spring of 2018, for example, extensive measurements of the changed antenna system were performed with different antennas. These results, in combination with lessons learnt in the field, offered a sound basis for the final selection of the antennas.

In addition, WTD 81 operates a wide range of radio labs and reference facilities for the technical measurement and evaluation of radio systems. The challenges arising in the VJTF context regarding the command and control capability of the PUMA IFV go far beyond an analysis of components and subsystems and require possibilities for analyzing and demonstrating complete functionalities and effect chains. To that end, the IT architecture reference system for the PU-

Photo: WTD 81

WTD 81, EMC assessment in the large test facility

Photo: WTD 81

EMC test facility and target simulation dome

MA IFV / Mechanized Infantryman system (Referenzsystem IT-Architektur SPz PUMA / System Panzergrenadier, in brief: RITA) was created. It provides the possibility to demonstrate C² capability at different echelons from squad to brigade level and permits to measure and assess the performance of systems in a network. This reference system can in future also be used to determine the perfomance of command and control assets in the event of hardware and software upgrades.
In a solution-driven approach, both static test architectures and dynamic and proprietary test methods are used to harmonize the interfaces of individual elements. Due to the combined use of resources from different WTD 81 branches, ad hoc demonstration capabilities are developed and implemented in hardware and software independent of external expertise.
RITA is continuously adapted to the technical and military requirements determined in the framework of compliance demonstration activities and field trials. From mid-2020 onwards, RITA will contribute to improving the C² capability in the series production of the PUMA IFV.

2. Project management in the area of common measuring and test equipment

The responsibilities of WTD 81 also include the management of projects involving common measuring and test equipment. The project managers and their equipment managers handle approximately 700 different material planning objects comprised of around 10,000 items in accordance with the standards laid down in the CPM (amended). As the term "common" already implies, these products are not intended for a specific purpose. Rather, these items of equipment – such as torque wrenches and oscilloscopes – are used in many different areas throughout the Bundeswehr. As a consequence, no special requirements are placed on these equipment items, so that the demand can generally be met by commercial off-the-shelf items. It is not necessary to commission expensive and time-consuming development projects.
The spectrum of measuring and test equipment supported by WTD 81 is diverse. It ranges from simple, purely mechanical devices such as weight sets for scales and electrical/electronic test equipment such as multimeters to sophisticated systems such as fault locators in aircraft wire harnesses. Installations and equipment needed for non-destructive materials testing also form part of the portfolio.
Maintaining the operational viability of these commercial products during the in-service use phase is an essential task of the project managers. This requires the regular calibration of the measuring and test equipment in the scope of maintenance activities. This is why WTD 81 also maintains a list of measuring and test equipment which contains all data needed to perform the calibration. WTD 81 also provides the equipment for the Bundeswehr Calibration Center and the subordinate calibration laboratories and mobile calibration teams.

Bundeswehr Technical Center for Weapons and Ammunition (WTD 91) in Meppen

WTD 91 is the Bundeswehr's excellence center for weapons and ammunition and has the sole specialist competence in this field within the entire armaments organization.

Apart from all weapon and ammunition tests and inspections, investigation of the specific requirements of the individual weapons carriers regarding weapons and fire control, protection and effects, reconnaissance, and target recognition also forms part of the agency's range of activities.
Moreover, the technical center holds significant competences in the fields of acoustics, optics, optronics, laser technology, battlefield reconnaissance, simulation engineering, geoinformation, special engineer infrastructure, and measurement engineering.
The agency's excellence center for explosives is the only authority in the armaments organization that is responsible for the qualification and safety evaluation of military explosives as well as for the central ammunition surveillance in the Bundeswehr.
With its specialist competence, WTD 91 contributes to all phases of the CPM.

Current Projects

Some examples are presented in the following to illustrate WTD 91's numerous tasks and current projects.

Qualification of New Gun Ammunition

Gun ammunition qualification is one of WTD 91's core tasks. It has gained new significance due to the renewed focus on national and collective defense. The aim of all tests conducted is to guarantee the safety of soldiers and the functional capability of new ammunition on operations at all times.
The current focus is on the qualification of caliber 127 mm ammunition that is to be used on the new F125 class frigates. This includes, first, a family of unguided full-caliber ammunition consisting of practice, HE and illuminating shells with propulsion and, second, the guided ammunition of the VULCANO family. The whole range of WTD 91's capabilities and facilities is used for qualification purposes, starting with chemical and physical tests of the explosives to component tests and finally test firings of the complete ammunition.
The test firings are the highlight of the qualification. To this end, WTD 91's extensive firing range with its comprehensive instrumentation is used. For long-range firings going beyond the space available at WTD 91, tests are carried out abroad, for instance in Alkantpan (South Africa). The use of state-of-the-art measuring technology ensures tracking and monitoring the projectile during its entire flight, from leaving the gun barrel to target impact. Special facilities enable the acquisition of seeker head telemetry data and thus complete in-flight functional monitoring.

Augmented Reality, Virtual Reality, Mixed Reality (AR/VR/MR)

In the cutting-edge area of virtual reality, WTD 91 carries out numerous activities and thus contributes considerably to digitalizing the Bundeswehr. Here, WTD 91 has a leading position within the Bundeswehr and has already organized two specialist conferences on the topic. Together with partners within and outside the Bundeswehr, possible applications, in particular for training, are investigated. Possible training content ranges from small arms firing training to the training of Joint Fire Support Teams. The real surroundings of the soldiers can be enhanced with virtual content and scenarios and their reactions can be evaluated in the digital situation picture.

The Bundeswehr Research Institute for Protective Technologies and CBRN Protection (WIS)

WIS is a departmental research facility concerned with the protection of Bundeswehr service members against the effects of chemical, biological, radiological and nuclear (CBRN) weapons of mass destruction. Other primary tasks include fire protection technology, protection against strong electromagnetic fields and potable water treatment. The institute develops the technical-scientific fundamentals required for this purpose and contributes to covering the demand for CBRN and fire protection equipment. As a service provider for policy-makers and the general public, WIS ensures the capability of assessing CBRN weapons.
Protecting the soldiers against CBRN threats by providing optimum equipment has become more and more pressing in view

of worldwide military deployments of the Bundeswehr. At the same time, however, recent incidents demonstrate that comparable scenarios have also become reality when it comes to civil security. With its expertise and capabilities, WIS makes valuable contributions to these areas in a whole-of-government manner. As a designated test laboratory of the Organization for the Prohibition of Chemical Weapons, WIS with its expert services also plays its part in monitoring the Chemical Weapons Convention.

Research and development with regard to subjects such as the quick and safe identification of active agents within explosive ordnance disposal activities, checking and evaluation of unknown substances by means of chemical-analytical methods, decontamination, cleaning of potable water and handling of contaminated wastewater are essential for ensuring health and the defense capabilities of field units that are deployed to war zones and need to be prepared for the use of unconventional weapons. Dealing with protection against nuclear weapon effects, detecting High-Power Electromagnetics (HPEM) which might impair the functional capability of Bundeswehr electronic systems or even damage these systems, and developing adequate safeguards are current research tasks to be performed by WIS.

The approximately 200 WIS employees, most of whom have a qualification in natural sciences, are currently working on subjects that can be subdivided into the following six research areas:

- I: detection and identification of pathogens, toxins, chemicals, radioactive substances, ionizing radiation and explosives,
- II: decontamination of pathogens, toxins, chemicals and radioactive substances,
- III: balanced hardening of defense materiel against High-Power Electromagnetics (HPEM), nuclear weapon effects and radiological threats,
- IV: protection of soldiers against pathogens, toxins, chemicals, radioactive substances and ionizing radiation,
- V: military fire protection technology,
- VI: mobile water supply and disposal focusing on CBRN.

Concrete research topics are identified in a strategic planning process that implements the requirements from Bundeswehr planning under the framework conditions of a departmental research institute. When conducting its own research, WIS draws on a network of diverse international cooperation partners. True to the phrase „the world's a stage", WIS will continue to consistently pursue an international orientation of its research on appropriate topics in the future in order to keep up to date on scientific developments and to be able to conduct competitive research. The concept „from science to product" serves as a guiding principle in this context, which is why WIS also involves industrial partners in its research programs in due time in order to develop and exploit applications outside laboratory environments.

Graphic: WIS

As a test laboratory accredited to ISO 17025, WIS is concerned with testing defense materiel within the framework of integrated compliance demonstration as part of the procurement process. For this purpose, various laboratories, pilot plants and facilities for large-scale tests are available that are able to model the entire range of CBRN threats to devices and systems in realistic experiments. Moreover, project management for extinguishing agents and small extinguishing devices is already being carried out in the field of fire protection technology. On the basis of its test procedures, WIS aspires to become accredited as product certification body in accordance with ISO 17065 in order to provide valuable support and create measurable added value for its (international) customers, also beyond the scope of procurement projects, by offering a unique and attractive range of services.

„Researching – Testing – Advising – For the safety of our soldiers" – True to this slogan, WIS with its versatile spectrum of tasks contributes to future-oriented, functional equipment of the Bundeswehr. By providing „science-based services" from a single source, WIS makes an important contribution to CBRN protection with its scientific findings, up-to-date technical capabilities and range of services tailored to different stakeholders.

WIWeB – Research and Services for our Soldiers

The Bundeswehr Research Institute for Materials, Fuels and Lubricants (WIWeB) is the Bundeswehr's center of expertise for the safety, technology and chemistry of materials and petroleum, oils and lubricants (POL).

In addition, it is concerned with the clothing and individual equipment of soldiers and with issues pertaining to chemical safety, environmental protection, occupational safety and health. It provides the technological and scientific foundation required to ensure the safety and reliability of materiel and thus contributes substantially to the technical operational readiness of the Bundeswehr.

As a departmental research institute, WIWeB monitors technological trends and innovative technologies for potential Bundeswehr use and has scientific expertise available at short notice.

WIWeB assesses the properties of materials and POL in the context of overall systems and on the basis of an interdisciplinary approach and is closely connected to all major organizational elements of the Bundeswehr, the research community, the defense industry and partners both within Europe and beyond.

Its objective is to provide optimum, safe and reliable products for use in the Bundeswehr. The tasks performed by WIWeB are of tremendous importance for the Bundeswehr:

- Materials form the basis of all weapon systems and the starting point for innovations.
- POL ensure mobility.
- Clothing and personal equipment are used for specific functions and offer protection and safety.

The facilities integrated into WIWeB also include the Bundeswehr 3D Printing Center, the Bundeswehr Center of Welding and Bonding Technology and the Bundeswehr Hazardous Substances Measuring Office South.

Current Activities

In 2019, WIWeB was one of 14 locations in Germany where the "Bundeswehr Day" (Tag der Bundeswehr) took place. Together with representatives from other agencies of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) and numerous associations, the 230 WIWeB employees presented their work to approx. 5,000 very satisfied visitors.

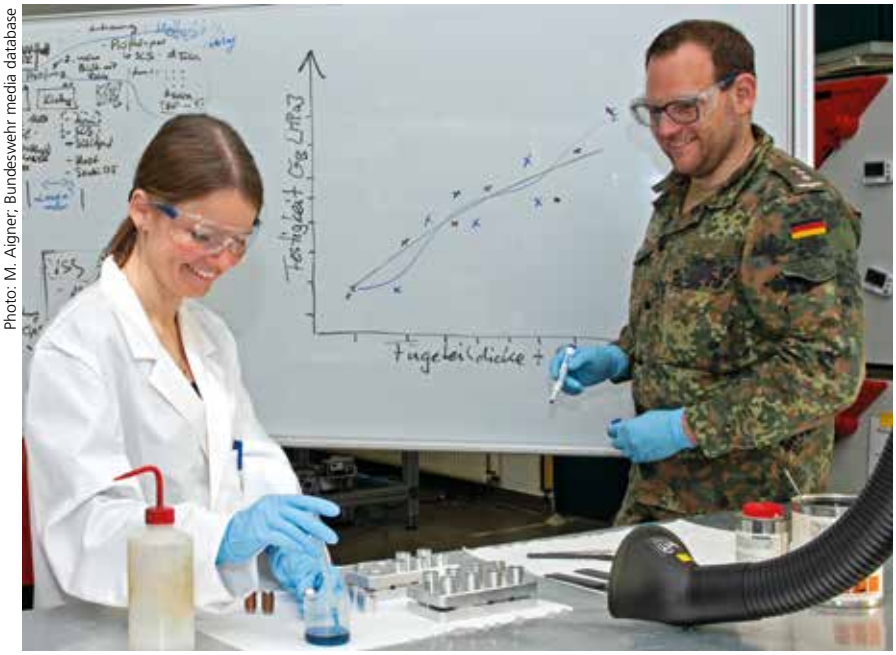
Apart from the technology field "Materials, fuels and lubricants", WIWeb also assumed responsibility for the technology field "Soldier system". Due to the establishment of a new branch, the research will be intensified and contacts to the users will be extended since it is an important topic for each soldier.

In 2019, various WIWeB research projects won prizes on the occasion of international conferences. Three employees of the research group "Structural bonding" were awarded prices for the best conference contributions in the field of new construction methods to be used for aviation. Furthermore, the head of the research group successfully completed his post-doctorate degree and lecturing qualification.

In this way, WIWeB not only provides outstanding research work but also ensures that the soldiers benefit from the knowledge gained. Compared with the number of employees, the share of service inventions reported and implemented by WIWeB is significantly above average. The WIWeB employees train soldiers and civilian employees of the Bundeswehr in the field of additive manufacturing, camouflage, packaging, POL products and material testing etc.

WIWeB also supports the Bundeswehr operations abroad. Similar to the POL containers fielded years ago which are used to check the supplied fuel quality on site, a 3D printing container was designed and put into operation by WIWeB. A WIWeB employee spent several months working in Afghanistan to help with the 3D printing and to support the manufacturing of spare parts. Today, this work is performed by the contingent. The operators as well as the Fuels Operations Chiefs are trained by WIWeB for their specific activities prior to their deployments abroad.

Photo: M. Aigner, Bundeswehr media database



WIWeB scientists in Erding during their basic research work on the safe use of bonding processes to create new methods of construction

The Naval Arsenal

What's Ahead for the Kiel Garrison?

In the aftermath of the stationing decisions made in 2011, the Naval Arsenal (MArs) for the most part was centered in Wilhelmshaven. This had implications not only for repair management but also for the capabilities and capacities needed by an arsenal to provide efficient repair services. As directed, the Kiel arsenal installation as an organizational element was closed down in late 2015.

In spite of these changes, the Naval Arsenal remains the biggest subordinate agency of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) headquartered in Koblenz. The Naval Arsenal's mission – ensuring repairs to vessels, boats and shore-based systems of the German Navy – has remained unaffected, too.

Since then, the Naval Arsenal has been aligning its extensive infrastructure improvement efforts for the Wilhelmshaven premises with the framework provided by the stationing decision. Implementation of this improvement process is about to kick off. Public infrastructure projects generally leave no leeway for a potential future buildup, though.

Even after the Kiel arsenal installation was closed down, part of the repair management as well as certain repair capabilities and capacities for submarines and mine countermeasures vessels have remained at the Kiel-Ellerbek premises because some of its specialized infrastructure (such as the periscope repair station) is available at no other garrison. The employees at the Kiel premises with their specialized know-how have been shifted within the organizational structure to be integrated into the remaining arsenal organization, and to this day continue to repair certain classes of vessels in Kiel.

Over the next few years, the trend reversal with regard to Bundeswehr personnel and equipment will result in a corresponding buildup in the German Navy. This means that the Naval Arsenal will grow, too! From an infrastructure perspective, the Wilhelmshaven premises are too limited to fully accommodate the necessary expansion because the modernized infrastructure, planning for which has already been finished, needs to be held available for future classes of ships (such as the MKS 180 multirole combat ship) in the North Sea. Consequently, it was only logical to make use of the existing infrastructure in Kiel, especially with regard to the shore bases of Flotilla 1 in the Baltic Sea.

So what is ahead for the Kiel garrison? The Naval Arsenal is making active preparations for conducting repairs to Class K130 corvettes (supplementary procure-

ment). These preparations include a number of measures relating to personnel, equipment, and infrastructure:

- As of mid-2019, the necessary posts in Kiel are available and will now be filled by the Federal Office of Bundeswehr Personnel Management in cooperation with the competent agencies. The new personnel will then undergo on-the-job training in the Wilhelmshaven workshops before completing the repair training courses procured from the manufacturers as part of the construction contract.
- The necessary infrastructure at the Kiel-Ellerbek premises has been identified. Among other installations, the armament workshop will be re-enabled in its original location.
  In cooperation with the Bundeswehr service center in Kiel and the Kiel center of expertise for construction management, all necessary steps will be taken to ensure that this infrastructure will continue to be used in the future.
- The workshops in Kiel will be furnished either under the construction contract or additionally by means of decentralized procurement as so-called unit equipment by the Naval Arsenal itself. To this end, planning is already in full swing.

Relating to the Class 212 submarine common design (U212 CD) cooperation project, the Naval Arsenal aims for a further buildup in repair staff in Kiel. There have been some preliminary considerations on the part of the Naval Arsenal that have already resulted in a bilateral German-Norwegian Program Arrangement.

The existing infrastructure will need to be prepared to accommodate upcoming tasks. For this purpose, in late 2018 the Naval Arsenal cooperated with the Bundeswehr Technical Center 71 (WTD 71) as the garrison's current main user to initiate a utilization concept which is currently undergoing approval.

In order to perform the new tasks and to replace regularly retiring employees, the Naval Arsenal depends on highly qualified specialist personnel. It thus makes a strong commitment to offering vocational training in its own training workshops which will turn out technical staff "made to measure". On 1 September 2020 training operations will thus resume at the training workshop in Kiel to augment the training workshop in Wilhelmshaven.

German Liaison Office for Defense Materiel, USA/Canada

The German Liaison Office for Defense Materiel, USA/Canada (DtVStRü USA/CAN) is a subordinate agency of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) and is based in the US federal state of Virginia.

Source: Naval Arsenal

Aerial photo of the Naval Arsenal premises in Kiel-Ellerbek

The German Liaison Office for Defense Materiel, USA/Canada represents the Bundeswehr's interests in matters of defense technology and armaments towards the armed forces and agencies of the United States of America (USA) and Canada and the industry of these countries. Transatlantic cooperation covers a wide spectrum of defense-related technologies and various weapon systems in the domains of land, air and sea.

The agency's staff largely consists of engineers and scientists but also legal experts, non-technical clerical administrative personnel and soldiers. More than half of the personnel assigned to the 50 posts are assigned to project offices:

- Rolling Airframe Missile (RAM) Project Office (RAMPO) in Arlington/VA
- NATO Seasparrow Project Office (NSPO) in Arlington/VA
- German Patriot Office (GEPO) in Huntsville/AL
- Multifunctional Information Distribution System International Program Office (MIDS IPO) in San Diego/CA
- NATO Improved Link 11 in San Diego/CA

Personnel are also employed at liaison offices at US Army and Air Force facilities. The agency's range of tasks and activities is oriented toward employing the available national resources as efficiently and effectively as possible in the context of bilateral and multilateral cooperation. The aim of our work is to strengthen national military and industrial capabilities and bring about the development of joint standards and interoperable solutions for the mission-oriented equipment of the armed forces.

In this spirit, the DEU Liaison Office for Defense Materiel, USA/Canada is a competent point of contact for initiating and coordinating armaments cooperation with the USA and Canada in the field of research and technology as well as joint development and procurement programs and contributes to maintaining and developing the capabilities of the national defense industry.

Other focuses of its work are the acquisition of US and Canadian defense goods for the Bundeswehr and the management of personnel exchange programs with defense engineers and defense scientists (Engineers and Scientists Exchange Program, ESEP) as well as administrative personnel (Administrative and Professional Personnel Exchange Program, APEP) of both nations.

Furthermore, the Liaison Office assumes government quality assurance tasks for products ordered in the USA and Canada. To this end, the agency cooperates with US and Canadian government quality assurance authorities on a regular basis.

Current Activities

Personnel Exchange Programs

Fig. 2 shows the current duty locations of the 112th ESEP/36th APEP groups. This time, it was once again possible to send one participant to Canada. Ideally, posts in bilateral or multilateral projects are identified by US agencies. In this group, no such project could be identified. However, one exchange scientist, who had cooperated with the US side via a Data Exchange Agreement (DEA) prior to the exchange, could be won for Colorado Springs.

Thus, normally, an intense, direct and project- or task-related transfer of knowledge can take place.

In-Service-Use Agenda

The topic "In-Service-Use" – the importance of which has not least been underlined by the agenda of the same name – has now also reached the cooperation between the German and US armaments organizations. In 2018, a liaison engineer was accredited

as Deputy Assistant Secretary of Defense for Material Readiness (DASD (MR)) at the DoD (Department of Defense). The DEA Material Sustainment, which is currently being staffed, is meant to be the basic working document.

Across all services, the DEA should cover all areas of in-service-use. The high level of importance of the topic of in-service-use is achieved, amongst other things, by high-ranking appointments of the Project Officers (PO), who are based at ministerial level. The Chief of FMOD Division A IV is planned to be the German PO and the DASD (MR) to be the US PO. There are plans to employ a representative of the German Liaison Office for Defense Materiel, USA/Canada as Technical Project Officer for day-to-day business in order to establish and maintain direct contact on site with the US agencies. Once the DEA has been finally signed, all in-service-use-related topics will be covered.

Examples include Advanced Manufacturing (3D printing), Performance-Based Logistics (PBL), Autonomous Processes, Enhanced Inspection Methods and Reliability Improvement.

Photo: BAAINBw

The office building in Reston, Virginia

Rolling Airframe Missile

The US-German „RAM Program Office (RAMPO)" is in charge of official RAM program management. This includes all aspects of development, procurement and in-service-use of the RAM weapon system. The RAM Block 2 missile is being further developed in order to adapt to current and future threats. Furthermore, the installation of RAM shipboard equipment on the planned new ships of the German Navy is being prepared.

Government Quality Assurance

Apart from day-to-day quality assurance within the scope of spare parts procurement for all technical Bundeswehr systems the German Liaison Office for Defense Materiel, USA/Canada was tasked with extensive government quality assurance activities for two large subsystems of the 2nd lot of the major navy procurement program K130.

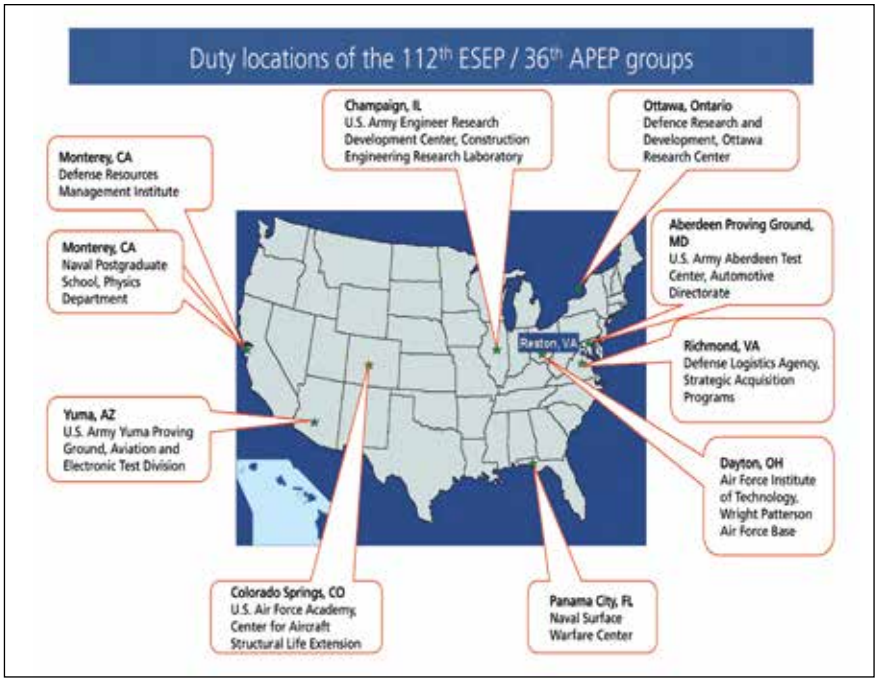
10 RAM launchers were procured from a US defense company. These launchers are subject to government quality assurance in the US. The German Liaison Office for Defense Materiel, USA/Canada tasked the US quality assurance authority (which is part of the Defense Contract Management Agency, DCMA) with government quality assurance.

The second major contract refers to the Integrated Monitoring and Control System (IMCS), an automated ship system. Contractual compliance of the systems for the five new corvettes also needs to be verified. To this end, the services ordered are performed independently by the German Liaison Office for Defense Materiel, USA/Canada at the contractor's plant.

As an extended arm of the German official services, the German Liaison Office for Defense Materiel, USA/Canada supports the Bundeswehr Technical Center for Ships and Naval Weapons, Maritime Technology and Research (WTD 71) in the testing of a core component of their new and complex vertical alternating shock test facility. This includes in particular checking the proper condition of the shock table at the contractor's plant.

After a long period of preparation regarding access and inspection authorization (export license) for the equipment which is subject to US export regulations in accordance with the International Traffic in Arms Regulations (ITAR), DtVStRü USA/CAN supported the regional GQA office in London in the clarification of maintenance questions at the OEM's plant for a subsystem of the A310 aerial refueling system of the German Air Force. As the regional office in London was disbanded on 31 August 2019 and this task was transferred to the Cologne office, a close cooperation with the regional office in Cologne has been established. ■

Graphic: BAAINBw



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