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

The major organizational element of equipment, information technology and in-service support - abbreviated AIN in German - 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 organizational 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. This also includes information technology. We focus on the development, testing, procurement and in-service support management of ma-

teriel. 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. BAAINBw handles a broad range of products, including highly complex weapon and IT systems, tanks, aircraft, vessels as well as clothing for service personnel.

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-ser-

vice management on three main pillars:

- procuring and using complex services,
- satisfying Bundeswehr non-project needs by Bundeswehr Purchasing and
- 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.





Photo: BAAINBw

The executive administration of BAAINBw is located at the "Rheinliegenschaft" compound.



Photo: BAAINBw

BAAINBw – Rauental premises

Reversal of Trends

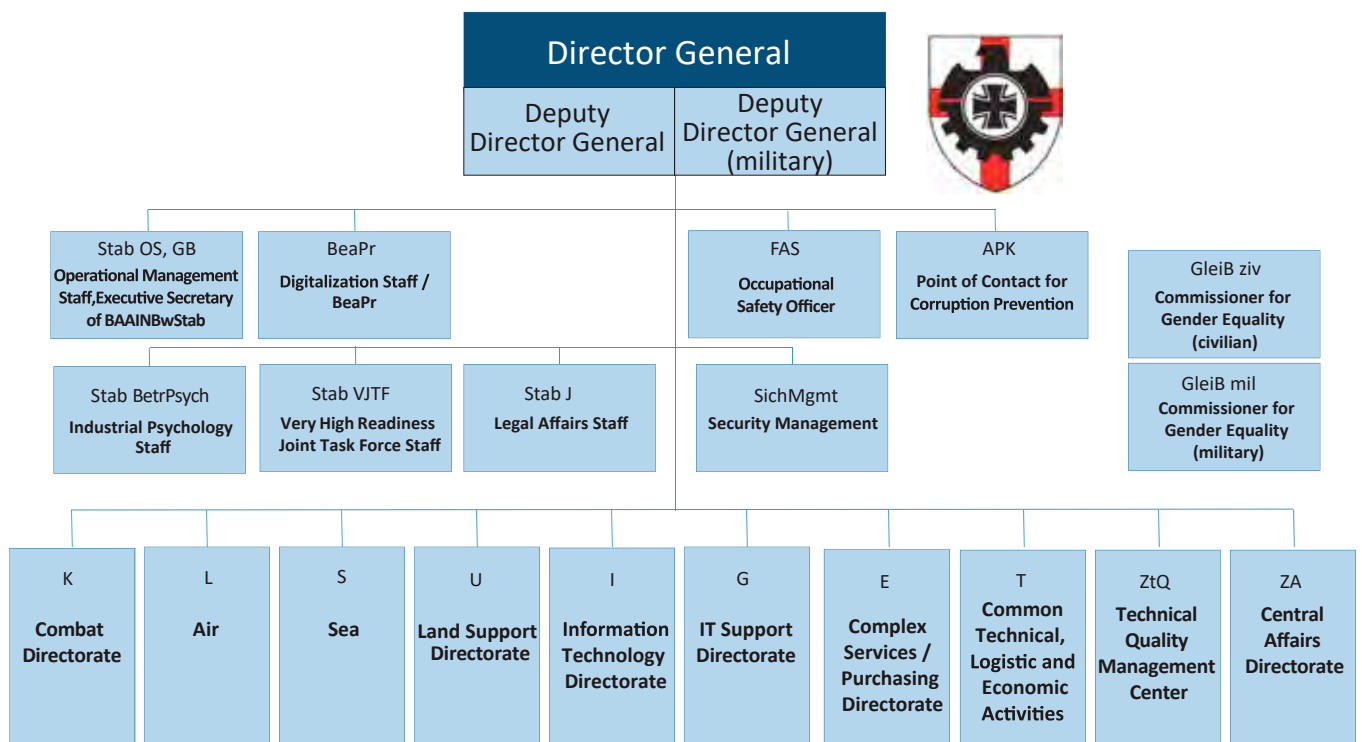
In order to achieve full equipment of the armed forces as has been promised, significantly more urgently required materiel will have to be procured for the Bundeswehr. The trend reversals in the areas of personnel, equipment and financing initiated by the then Federal Minister of Defense Dr. Ursula von 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.

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 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.

Optimization of the Procurement and In-Service Organization

Therefore, in September 2019, the Federal Minister of Defense, Ms Annegret Kramp-Karrenbauer, approved the implementation of measures to optimize pro-



Graphic: mawibo media

The BAAINBw Directorates

Combat Directorate (K)

- combat and transport vehicles, artillery weapon systems, antiaircraft and air defense systems
- infantry armaments, antitank defense, missiles
- engineer weapon systems, search and clearance systems, bridges and crossing equipment

Air Directorate (L)

- fighter jets, transport and special aircraft, helicopter systems
- rescue and protection systems for air crews
- unmanned aerial systems, tactical UAVs, space-based reconnaissance systems

Sea Directorate (S)

- surface units
- subsurface units
- support units and auxiliaries, unmanned watercraft

Land Support Directorate (U)

- accommodation in the field (i.e. camp technology and protection)
- soldier equipment (System Soldier)

- reconnaissance and EW systems, training and simulation systems

Information Technology Directorate (I)

- field-related IT systems (communication and management systems)
- subject-specific IT tasks (IT security, cyber defense technology)
- IT standards and IT conformity

Information Technology Support Directorate (G)

- Maintenance and changes of established IT systems
- Realisation of the SASPF project (Standard Application Software Product Family), including user support and product management
- Transitioning existing in-service systems to SASPF

PMO – Program Organization

- All project management tasks for the three armaments projects: F126, TLVS, European MALE RPAS

Complex Services / Purchasing Directorate (E)

- Purchasing spare parts for weapon systems

- Purchasing commercially available goods and services

Directorate T – Common Technical, Logistic and Economic Activities

- Logistics, Protection tasks, R&D coordination
- Cost Competence Center, Price Auditing
- Disposal, collecting defense technology related studies

Central Affairs Directorate (ZA)

- Organization, Security, Internal Operations, Financial Affairs
- IT services, Human Resources
- Expert Information Branch

Technical Quality Management Center (Directorate ZtQ)

- Quality Assurance activities by regional offices (Bundeswehr Quality Assurance centers) in the regions North, Central and South
- Policy matters relating to technical quality assurance, cooperation with national and international quality assurance authorities

curement and in-service use with the aim of providing the soldiers with the required equipment faster and of guaranteeing that the equipment remains operationally ready. The working group "Implementation of the procurement and in-service organization examination and optimization of procurement" at the Ministry of Defense is reviewing 58 measures focusing on the following:

- concentration on project work in the fields of defense and in-service use,
- improvement of control capabilities,
- increasing strength and flexibility of personnel resources and
- improving the conditions of project work.

New findings are incorporated in the ongoing implementation process as are the concerns of personnel and interest group representatives and equal opportunities officers in the context of accompanying participation. According to current assessments, the majority of the measures will be concluded by the end of 2021 whereas some measures will only yield effects at a later point in time. The implementation of the measures will lead to a sustainable improvement of the

procurement process and in-service management.

Some interim goals of the project have already been achieved, and individual measures have been implemented effectively, notably:

- Creation of the position and/or role of deputy director and in-service use representative in the project managing directorates Combat, Air, Land Support, Sea and IT in order to enhance the in-service role of the projects.
- Creation of a staff element for airworthiness as a basis for the future establishment of a Continuing Airworthiness Management Organization within the AIN organizational area (CAMO AIN) in order to maintain the airworthiness of Bundeswehr aircraft in the regulatory environment of EMAR/DEMAR (European / German Military Airworthiness Requirements).
- Creation of a "Customer Product Management (CPM) decision-making element" which advises and makes final decisions on potential project-related process-oriented possibilities for shaping measures in the context of the CPM regulations.

- In future, capability requirements will be reviewed for their implementability in the given time and cost framework and their cost-benefit ratio even more strictly (80% solutions that are quickly available and/or available on the market will be preferred). Requirement controlling will also be embedded in existing processes and bodies via checklists, test questions and quick decision mechanisms.

- In order to increase the ability to make full use of the legal framework, the model contract for procurement contracts with an order value of up to 25 million euros was completely revised. It now includes a modular system of recommendations concerning different clauses which can be specifically adapted to the item to be procured.

On the whole, the implementation of a great number of measures such as the extension of BAAINBw's organizational competences, which has already been concluded, will lead to a significant increase in the performance of the procurement and in-service organization and contribute to rendering work at the interfaces to industry more efficient ■

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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 by 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 FMOD planning organization, particularly with the Bundeswehr Office for Defense Planning, the presentation of situations, 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 start the work on initiatives, making use of the technological and economic assess-

ment 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.

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 select 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 State Secretary level, the project-specific inputs to be provided by BAAINBw for the Armaments Board at 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 at the Federal Ministry of Defense (FMoD) is supported through coordinating work. The division closely cooperates with the Project Controlling and Risk Management Group established at the FMoD as a body supporting the Commissioner for the Strategic Control of National and International Armaments Activities of the Bundeswehr. 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 personnel working on 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, deductions, cascading and operationalization of goals 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:

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

within BAAINBw and, at the same time, ensures that the required assistance is provided to the other organizational areas.



Customer Product Management

- CPM policy matters
- CPM decision-making element
- CPM manager
- Preparation and maintenance of the CPM output process



Center of Expertise for Project Management

- Fundamentals
- Advice
- Training
- BAAINBw knowledge management

Graphic: BAAINBw

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 awareness 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.

AIN Press and Information Center

The AIN Press and Information Center is part of the Operational Management Staff and 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.

Apart from press, public relations, and media work as well as the internal communication for the ten subordinate agencies of BAAINBw, the AIN Press and Information Center is the first point of contact for the entire major organizational element for questions by the public, media representatives, and also citizens. In addition to the daily work with (trade) journalists and all kinds of media, the AIN Press and Information Center represents BAAINBw and its agencies at events of public appeal and trade fairs, and is responsible for the production of multimedia information material.

Furthermore, the AIN Press and Information Center has its own comprehensive intranet site, contributes to the Bundeswehr internet site, and manages further social media channels such as its own Twitter account or the Facebook pages of the Bundeswehr in the federal laender as part of active public relations. ■

Tasks of the Center of Expertise for Project Management

- 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

Division 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 modelling, maintaining and further developing the output process. In June of this year, the **CPM decision-making element was established at FMOD A I 1 and BAAINBw, Division OS4**. The decision-making element can conclusively decide about project-specific deviations from the CPM procedure.

Center of Expertise for Project Management

The center of expertise for project management defines the standard for project

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

VJTF Staff (Very High Readiness Joint Task Force)

The Very High Readiness Joint Task Force (VJTF) is a rapidly deployable brigade task force. It was established by NATO in response to the events of the Crimea crisis and the 2014/15 war in Ukraine. The VJTF forms part of NATO's Readiness Action Plan enacted at the 2014 NATO summit in Wales to increase operational readiness for the protection of NATO's eastern flank. Due to its very high degree of readiness, the VJTF can deploy, fully equipped and staffed, to any operational area it may be commanded to within 48 to 72 hours, making it the most responsive and mobile element of the NATO Response Force (NRF). In 2023, it will be Germany's turn to lead this NATO task force (stand-by phase). In addition, this set of forces will be made available to NATO in 2022 (stand-up phase) and 2024 (stand-down phase), respectively.

Given this schedule, it is obvious that, if at all possible, the Bundeswehr needs to have any materiel required for VJTF operations available as early as 2021 to ensure training and handling proficiency for new equipment in a timely manner.

As the tight deadline is looming and the stand-up phase in 2022 is drawing closer, the procedural steps for planning, operations, provision and budgeting have needed to be consistently synchronized to meet the VJTF's procurement needs

in time. To this end, a streamlined, responsive and authoritative set of bodies involving representatives of all military organizational areas, other federal offices and the Federal Ministry of Defense needs to be established. This is imperative to monitor and ensure the VJTF's capability development.

These VJTF bodies focus on a set of key questions: Can a capability gap for the forces be closed by making the original procurement project available in time? If that is not the case, can an alternative solution be used? Or will forces, in a worst-case scenario, have to cope with a capability gap, being aware of the consequences? These issues are being addressed in the VJTF bodies effectively and resolutely to make sure that decisions are made and binding solutions are found.

BAAINBw as the main agency in charge of meeting the material requirements of Germany's armed forces plays a prominent role in this process, thus forming a key element of this communications network. To live up to that role, BAAINBw has implemented two main measures. BAAINBw was directed to focus on VJTF as a clear priority, and the staff element "VJTF Staff" was established in 2018 to ensure targeted participation in the bodies.

The VJTF Staff reports directly to the BAAINBw Executive Group, offering advice on any issues concerning the VJTF and preparing a situation picture regarding the current materiel-related implementation status of projects and products relevant to the VJTF. The staff has a seat and a vote in all capability development bodies for VJTF, making a valuable contribution in a key position as mediator, coordinator, catalyst, early-warning system and "temperature sensor". Working in close cooperation with the BAAINBw project directors, the staff is continuously monitoring the respective status of all projects and products relevant to the VJTF, subjecting them to an economic and technical "reality check", introducing them to the bodies for VJTF capability development in a proactive and prompt manner and providing recommendations for action.

Any decision made by these bodies is immediately implemented by BAAINBw. The VJTF Communications Network Model and the VJTF Staff have more than proven their worth in developing capabilities for the German forces in the VJTF. The objective of equipping VJTF personnel with materiel of the highest quality completely and in good time has largely been achieved, to some extent even faster than expected. ■

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 imple-

mentation 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. ■

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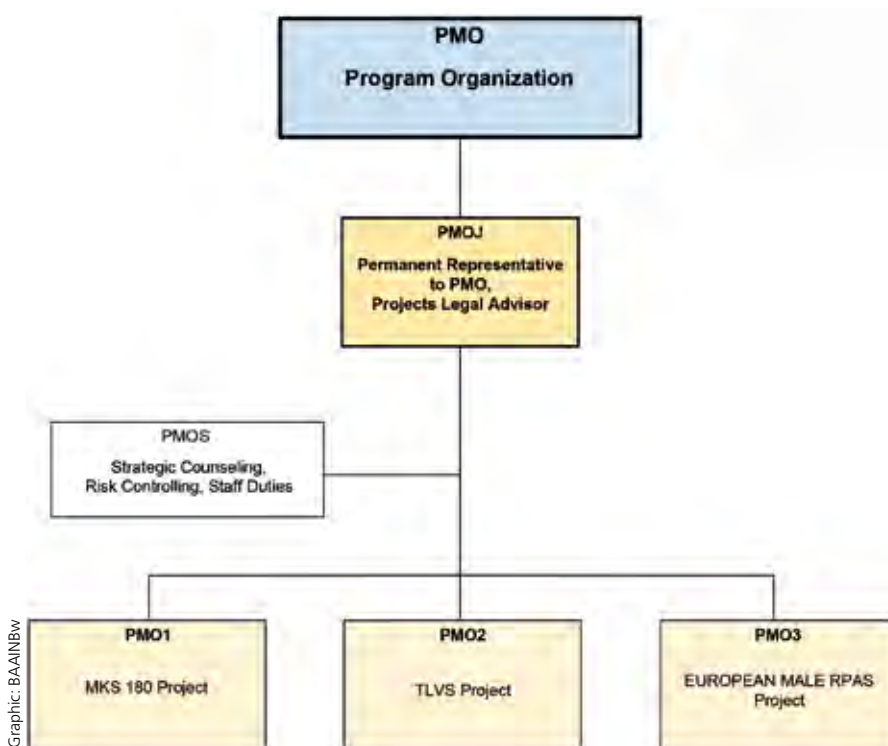
The Program Organization (PMO) combines the project management for the key armaments projects MKS 180 multi-role combat ship, tactical air defense system (Taktisches Luftverteidigungssystem, TLVS) and the European MALE RPAS (European Medium Altitude Long Endurance Remotely Piloted Aircraft System) in 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. In the context of the implementation process of the results of the “Procurement and in-service organization examination and procurement optimization” working group (known in German as BeschO), the decision was made to reassign the PMO projects to the competent BAAINBw directorates.

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 in the context of the restructuring of BAAINBw. The 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.

The PMO is currently organized into four divisions and one 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). In his or her capacity as deputy director, the projects legal advisor supports the director and is thus not only responsible for the timely and proper legal management of the projects, but also has executive responsibility in the PMO.



The establishment of this new organizational form was part of a pilot project to research to what extent a special organizational form, such as the program organization (PMO), could lay the foundations for the general implementation of modern management methods in the armaments sector. The profoundly different challenges that have been faced in connection with the three projects and the success achieved (e.g. signing of the MKS 180 contract) have demonstrated that this new organizational structure offers great potential and ensures efficient and effective project management.

Nevertheless, in the course of the implementation of the measures, the “Procurement and in-service organization examination and procurement optimization” working group decided to discontinue the pilot project and reassign the projects to the competent directorates once significant milestones had been reached. In doing so, the predominantly positive experiences of the PMO are used, and particularly important showcase projects, which should in principle have a high visibility and controllability by the BAAINBw executive group, are given due consideration in terms of organizational structure.

After an award procedure at European level of several years, the MKS 180 project reached the most important

PMO1 – MKS 180 Multi-Role Combat Ship

After an award procedure at European level of several years, the MKS 180 project reached the most important



Photo: BAAINBw

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

ES&D: What have been the most important developments for PMO in 2020?

Saas: One of the most important developments for me was the approval of the 25-million-euro budget request for the MKS 180 in June 2020 by the Budget Committee of the German Bundestag, which formed the basis for the signing of the construction contract for four Type 180 'Mehrzweck-kampfschiffe' (MKS – multi-role combat ships).

The concluded contract does not only ensure that 70 percent of the value creation and know-how will remain in Germany but also serves to complete the German Navy's capability spectrum. As the project management framework had been established be-

forehand, the project team was able to start right away and take on the great challenges associated with building a new ship.

In the TADS project, the third invitation to tender was issued to the TADS bidding consortium (MBDA Germany and Lockheed Martin) in the first half of the year. The bid was received in mid-August 2020 and most of the bid evaluation has already been completed. The project team is highly motivated to achieve success on the scale of that of the MKS team.

Concerning the Eurodrone project, the Chief of Defense signed the selection decision for the implementation of the multinational development of the new Eurodrone in early 2020. As a result of the lengthy negotiations with industry, the final terms of the fully-negotiated contract were agreed in November 2020.

ES&D: What progress/challenges do you expect regarding your projects in 2021?

Saas: Bid evaluation and budgetary situation permitting, negotiations of the third TADS bid and the subsequent submission of the 25-million-euro budget request to the Budget Committee of the German Bundestag for approval.

For the Eurodrone project, the 25-million-euro budget request is planned to be submitted to the German Bundestag at the beginning of 2021. If our partner nations France, Spain and Italy also approve the contract, it may be possible to have the contract for the Eurodrone (European MALE RPAS) concluded by the end of the first quarter.

Internally, I regard as one of the major challenges the return of the PMO projects to the individual specialist directorates which was proposed by the working group "Procurement and in-service organization examination and procurement optimization" and has already been approved at the executive level. The positive experiences of the PMO are to find further application in prominent BAAINBw projects.

The interview was conducted by Michael Horst.

milestone so far when the construction contract was awarded to Damen Schelde Naval Shipbuilding (DAMEN) and signed on 19 June 2020.

The MKS 180 multi-role combat ship will help maintain and complete the capabilities required in the maritime engagement network within the German Navy's entire range of missions and tasks.

Four MKS 180 units will be procured, with an option for another two ships. The six units are intended to meet the German Navy's conceptual requirements for worldwide deployment across the entire intensity spectrum for three-dimensional naval warfare capabilities. The delivery of the first unit is scheduled for 2028. The remaining units will be delivered by 2032.

MKS 180 is a modular, maritime capability platform that has the basic capabilities to meet the requirements of constant operational commitments in particular. Above all, these capabilities include command and control of naval forces, self-defense and sea and air target engagement capabilities.

The main capability of the MKS 180 platform will lie in large-scale anti-submarine warfare for the protection of naval forces and regions. In addition, the mission modules provide possibilities to cover the necessary requirements of other types of operations and missions. In order to adjust to the respective missions, two shipborne helicopters and an unmanned aerial system (UAS) can be boarded and

special forces, a fleet surgical team or signals intelligence personnel can embark.

Aiming to be able to deploy the MKS 180 ships for a period of up to two years and to significantly reduce the crew size compared with units in service, the MKS 180 project builds on the concepts of rotational crewing and heavy use of the class 125 frigate.

One special feature of the MKS 180 project was the selected award procedure. For the first time, a maritime procurement project of this size was put out to tender under a negotiated procedure after a request for interest had been published at European level. The aim of the MKS 180 project was to conclude a high-standard building contract in accordance with the Armaments Agenda that would serve as a solid basis for the realization of this complex weapon system for both contracting parties. The procedure was designed to allow an intensive exchange between the customer and the bidders to improve the content, e.g. the statement of work and the contract on the construction of the ship, in several bidding rounds.

It is essential to pursue a target-oriented and suitable project approach from the very start of the project to ensure the successful realization of a project. In line with this fact, the processes that must be implemented were included in the contract of the MKS 180 project by the project team at an early stage. For the first time in a new ship construction project, given parameters specified how the contractor had to organize project management, amongst other things. In this respect, it is of particular importance that the contractor sets up a project team in accordance with the relevant standards, executes the project in a way that builds on customer transparency and collaboration and manages the subcontractors' performances comprehensively.

PMO2 – Tactical Air Defense System (TLVS)

The Bundeswehr's ground-based air defense will face a capability gap from 2030 onwards, due especially to the progression of the threats and the end of the service life of the PATRIOT weapon system. To close this gap, the Chief of Defense decided in favor of a MEADS-based solution (MEADS – Medium Extended Air Defense System) for a future tactical air defense system (TLVS) in June 2015.

A comprehensive stocktaking formally concluded the tri-national MEADS program in 2014. Since then, the results of almost ten years of joint development have been available to the participating nations, USA, Italy and Germany, for follow-on activities.



Photo: MBDA

The project "Tactical Air Defense System" is processed at PMO2.

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 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. After the selection decision, the guidelines of the Armaments Agenda and the high complexity of an efficient and future-proof ground-based air defense system led to an award procedure with intensive challenging negotiations for all parties involved. The findings gained led to requesting a third offer from a bidding consortium consisting of MBDA Deutschland GmbH and Lockheed Martin Corporation in May 2020. The offer was submitted to BAAlNBw in August 2020 and is currently being analyzed and evaluated by PMO2 and approximately 40 other Bundeswehr authorities. The objective is to promptly conclude an implementation contract to ensure the timely introduction of TLVS and close the capability gap by the end of this decade. 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 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 fact that TLVS relies heavily on the tri-nationally procured MEADS technology, the existence of US FMS contracts, and the projected inclusion of other international partners in the project made it necessary to establish an independent "International Cooperation" element.

PMO3 – European MALE RPAS

For approximately two years, Germany, France, Italy and Spain executed a definition study for the development of a European MALE-class armed reconnaissance drone. The study served as a robust basis to start the European drone program. Initial results are now available.

From the start, German authorities have taken a leading role in this European project, applying the lead nation principle for the first time. This principle can also be found in new European armaments projects. OCCAR (Organisation Conjointe de Coopération en Matière d'Armement - Organisation for Joint Armaments Cooperation) was entrusted with the multinational management of the project.

The European drone project does not only consist of the multinational "European MALE RPAS" project, but also includes national elements to fully comply with the broad requirements of the German armed forces.

Despite the participating nations' initial differences concerning requirements, which were in part due to previous projects and experience gained in operations, the defini-

tion study enabled the participating nations to agree on a joint system design. A joint system configuration is being developed that will be certified according to common standards, but still at national level.

The participation in general air traffic in Germany and Europe will be realized via a step-by-step approach to overcome the existing restrictions of previous unmanned systems during training and operational flights in Europe in the long term. The first step is the integration of the drones into controlled airspace. In a second step, the system is intended also to be integrated into uncontrolled airspace.

Alongside the quadrinational definition study, the national budgetary documents were prepared. These documents are an essential prerequisite for the approval of the project in parliament.

In October 2018, OCCAR requested the industry involved in the definition study to submit an offer for the development, procurement and industrial support required at the beginning of the five-year 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.

In this way, the lead nation principle, which had been successfully applied in the definition study, was continued in the next stages of the project and was extended to include the industry.

The funding provided by the European Defense Industrial Development Program (which is part of the European Defense Fund) is another new feature. The participating nations also decided to include the European drone project among the active projects of the EU defense initiative for Permanent Structured Cooperation (PESCO). The cooperation under German leadership focuses on enabling joint European operation of the Eurodrone. ■

Combat Directorate (K)

The main task of the Combat Directorate within BAAINBw is armaments and in-service management for the weapon systems of the land forces.

In addition to battle tanks, armored infantry fighting vehicles, artillery systems and armored transport vehicles, the Combat Directorate's task portfolio also includes various air defense and engineer systems as well as guided missiles for seagoing units and combat aircraft. Apart from that, ammunition of all calibers is projected, procured and kept operational.

Three project divisions comprise the expertise of BAAINBw in 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)
- gun systems, ammunition and explosive ordnance/explosive ordnance disposal (Division K6 with five branches)

This technical expertise does not only encompass the implementation of new projects but also in-service use tasks for all projects introduced in close cooperation with all organizational areas.

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.

The K Directorate is supported by the Directorate Staff (KAS) and the Directorate Controlling (KAC) elements.

The Directorate Staff is responsible for all central, personnel-related (including training), organizational and administrative tasks of 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, as support element of the executive level of the Directorate, determines and analyzes main performance data and prepares executive decisions. Its main tasks are strategic controlling, project controlling including risk management as well as budget and resources controlling.

The Economic and Technical Affairs Division (K1) supports the Directorate in all technical-economic matters that affect



Photos: Bundeswehr

Branch K4.1 is responsible for the MELLs antitank guided missile system

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 is 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 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.

An advertisement for test ranges in Sweden. The background is a dark blue sky with a fighter jet flying and leaving a trail of white smoke. Below the jet, a ship is visible on the water. The text "Explore our Test Ranges in Sweden" is written in large, bold, orange letters. Below this, the contact information "Contact us at t&ebusiness.fmv@fmv.se" is written in smaller orange letters. At the bottom, the phrase "Testing for knowledge" is written in white. In the bottom right corner, there is a circular logo with a blue border and the text "FMV TEST & EVALUATION" around a central graphic of a ship and a plane.



A Fennek in use in Afghanistan – at BAAINBw, Branch K5.4 is responsible for these vehicles



Branch K5.1 is responsible for the upgrade of the Leopard 2 main battle tank to the Leopard 2 A7 version



The G36 assault rifle, which has been used by the Bundeswehr since the 1990s, is to be replaced

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 architectures, 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 IT (including support of project-specific IT 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 “classic” 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.

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 Di-

rectorate'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 is the competence center for guided missiles of the Combat Directorate and also responsible for the coordination of the future "territorial missile defense" program.

Branch K4.1 deals with antitank systems, aircraft-based guided missiles engaging targets on the ground and air-dropped 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.

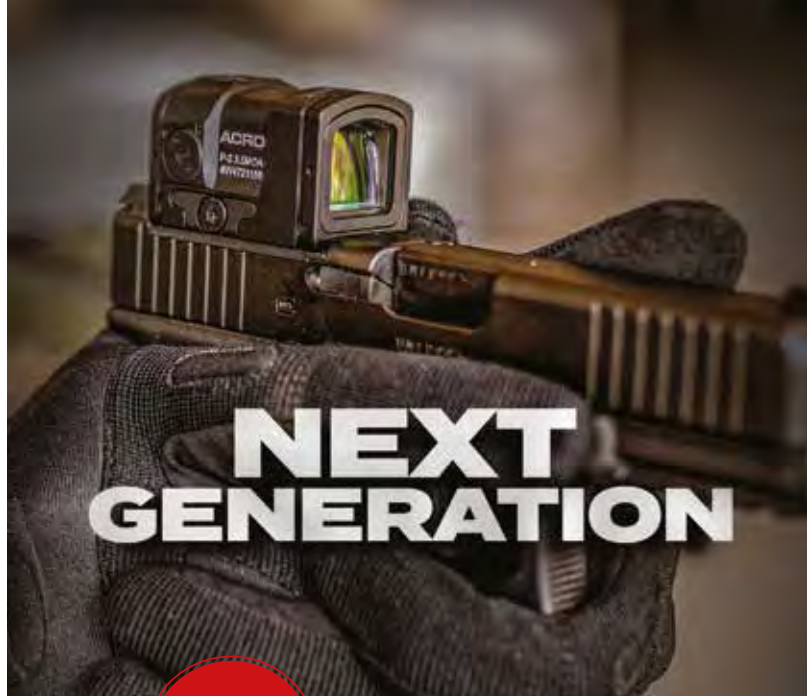
Branch K4.2 is responsible for the ship-based missile systems RAM, NSSM, ESSM, SM-2, HARPOON and RBS 15. Further activities include active self-defense systems of submarines with missiles that can be fired by the submarine. The German Navy's long-range guided anti-ship/land attack missiles are developed 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 classic 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" 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).



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A Further Insight



One-on-One with Colonel Jürgen Schmidt, Head of the Combat Directorate (K)

ES&D: What are the current priorities in terms of procurement and in-service support in your area of responsibility?

Schmidt: My Directorate's main focus is on the armaments and in-service management of weapon systems in the context of the capability profile of land operations. Currently the key element of the Directorate's daily work is to provide modern equipment for the Army and the Joint Support and Enabling Service, with special attention paid to VJTF 2023. We are also pushing ahead with introducing into service the armament

of our airborne weapon systems and ship-based missiles.

Achieving operational viability of the latest variant of the Leopard 2 MBT, the A7 V, the PUMA AIFV and the BOXER MRAV are examples of the challenges we are facing. Beyond that, the new assault rifle and the large-scale procurement of ammunition, not least against the background of national and collective defense, require extraordinary commitment from our civilian and military personnel. At the same time, we have to ensure the in-service management of products used on operations. The FENNEK, currently in service in Mali, may serve as an example in this respect.

ES&D: What do you think are the major challenges at the moment in the field of equipment and in-service support with regard to the provision of materiel required by forces earmarked for VJTF (Land) 2023?

Schmidt: The projects relevant to VJTF and the procurement of related products by 2022 require a high level of commitment of all agencies involved in the process.

This also applies to the timely procurement of the required 30-day operational stock of spare and replacement parts. One particular challenge is fitting the Battle Management System (BMS) aboard tracked and wheeled vehicles that have been in service for a long time. The BMS serves to ensure the command and control capability of Germany's contribution to NATO's spearhead force in 2023. For this purpose, it is absolutely necessary to connect all systems integrated into the force package in such a way that the commanders at their respective command echelons have access to an operational picture that is as uniform as possible. All maneuver units must therefore be modernized, including supporting elements. The modernization of the KEILER armored mine-clearing vehicle is a good example for this. This rather aged weapon system has been in use in the Bundeswehr for decades (entered into service in 1996). As part of type integration efforts, the KEILER is currently fitted the BMS. The combination of a tight timeframe, the confined space inside the KEILER and a technologically most advanced command and control system can only be brought together successfully if the project management of the KEILER mine-clearing tank, the branch in charge of the BMS and industry closely coordinate their activities.

The requirements of the Bundeswehr's major organizational elements have been identified and specified. The process of implementing these requirements is in full swing. The objective of equipping VJTF personnel with materiel of the highest quality completely and in good time has largely been achieved already.

ES&D: What is the current status of the PUMA AIFV for VJTF?

Schmidt: In July 2019, a contract to upgrade 41 x PUMA AIFV and 10 x Future Infantryman platoon kits was concluded to implement the Armored Infantry System for VJTF 2023. The related technical trials were carried out at the Bundeswehr technical centers as early as between January and April 2020. These trials were followed by the tactical suitability test at Bergen Training Area, during which the Armored Infantry system demonstrated its great potential.

Key innovations include new optical means (e.g. color displays), the integration of the MELLIS missile system, and major improvements of the command and control capability (radio equipment and BMS).

Weaknesses identified during the compliance demonstration are being addressed in a phased approach in close collaboration with industry. Our goal is to verify the improvements achieved in an additional tactical trial in February 2021.

The improvements that come with the VJTF 2023 configuration baseline are a milestone on the road towards the PUMA AIFV achieving final operational capability.

ES&D: What is the state of affairs at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) regarding the plans for the Main Ground Combat System (MGCS)?

Schmidt: The MGCS project is managed by the Franco-German Combined Project Team (CPT), which took up its operations early in September 2020. German and French civilian and military personnel closely collaborate in CPT which rests on three pillars. The Administration and Management pillar's task is to ensure that the project's parameters in terms of time, finances and quality are met. The Technology and Systems Integration pillar is responsible for planning the system architecture studies and the technological content. The Military Support pillar implements objectives and planning parameters in all military matters of CPT. In addition, BAAINBw is the competent Bundeswehr agency for contract drafting and legal issues.

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 prominent project of the succession of the battle tank. In this bilateral project with France for the future Main Ground Combat System (MGCS) that is to replace the LEOPARD 2 and LECLERC main battle tanks from 2035 onwards, the branch is set up as a Combined Project Team comprising ten French staff members.

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 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 intended 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).

The procurement of large-caliber tank, artillery and mortar ammunition is carried out by Branch K6.5.



Branch K6.4 is responsible for the FUCHS KAI armored transport vehicle

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 VUL-

CANO 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. ■

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WB GROUP 

Land Support Directorate (U)

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

This means that the Land Support Directorate covers an extraordinarily broad range of tasks, which goes hand in hand with a very high number of projects compared to other directorates in which project work is carried out.

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.

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

New Procurements in Division U4

Division U4 is responsible for the military procurement of wheeled vehicles. These include protected and unprotected vehicles of the following categories: command and functional vehicles, transport vehicles of different types and load classes, fire engines and tank vehicles as well as special-purpose vehicles.

In the last couple of years, the main focus of procurement has been on replacing



Bundeswehr Careers Truck all set up

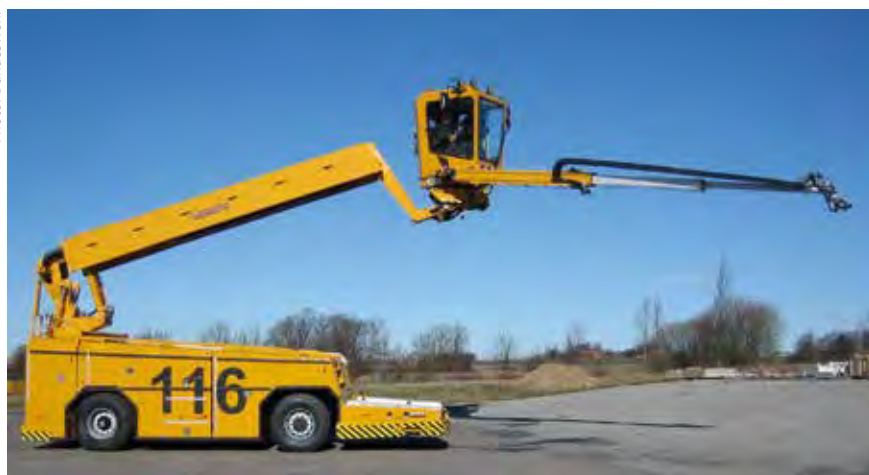
old end-of-life vehicles. The most prominent example is the replacement of CAT I vehicles with modern protected and unprotected vehicles such as protected and unprotected transport vehicles of the 5-ton and 15-ton military load classes. In the years to come, there will also be major procurement activities concerning fire engines, tractor trailers and palletized load systems. A renewal of the vehicle fleet in connection with recruitment campaigns and of ground equipment for airfields or fire services is also in the works.

The following projects – among others – illustrate the wide variety of procurement activities in Division U4.

Two new mobile media platforms for the Central Exhibition and Event Marketing Service of the Bundeswehr Personnel Office have recently been procured by Branch U4.1. A regeneration of the old Bundeswehr Careers Trucks had also become necessary after about 20 years of service use.

The Bundeswehr presents its brand at fairs and events highlighting its new professional image and state-of-the-art equipment.

Photo: Bundeswehr



De-icing vehicle

Photo: GDELS-Mowag



An EAGLE V 6x6 by GDELS, forming the base for future medium protected ambulance vehicles

The two new platforms each consist of an info truck, an 8-seater vehicle and a transport truck.

The info truck is made up of a commercially available truck tractor of the low-liner type and a semitrailer superstructure that is double-decked in the upper part and can be extended on both sides in the lower part. The info truck thereby provides space for an additional presentation room for up to 15 people and a separate careers information office. The covered stage, located in front of the prestigious entrance featuring a glass facade, helps attract visitors.

Once set up, the trucks are 17 meters long, seven meters high and nine meters wide. The total setup time amounts to less than 90 minutes.

The "medium protected ambulance vehicle" is the most recent project being implemented by Branch U4.2. The procurement contract was concluded in late March. With the EAGLE V 6x6 by GDELS, a new vehicle variant of the proven EAGLE type is introduced into Bundeswehr service.

The main tasks of the medium protected ambulance vehicle include mobile initial medical treatment and qualified medical evacuation of two stretcher patients. Inter-



Photo: Bundeswehr

Pilot rescuers next to a combat aircraft

national conflict prevention, crisis management and national and alliance defense are possible operational areas. This means that the high requirements of medical functionality and mobility and threat-appropriate protection specifications must be met within a single system.

According to current plans, delivery of the first production vehicles is scheduled to start in the third quarter of 2022.

In the field of transport vehicles, U4.3 was able to conclude the following open-end

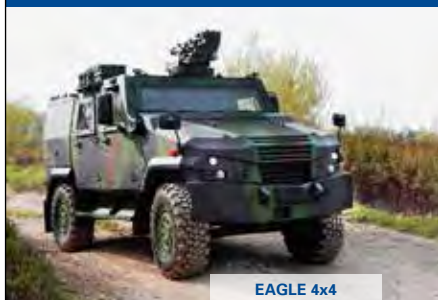
procurement contracts with the manufacturer RMMV:

- the family of unprotected transport vehicles of the 5-ton and 15-ton military load classes,
- truck tractors of the 70-ton military load class and
- the vehicle family of palletized load systems of the 15-ton military load class.

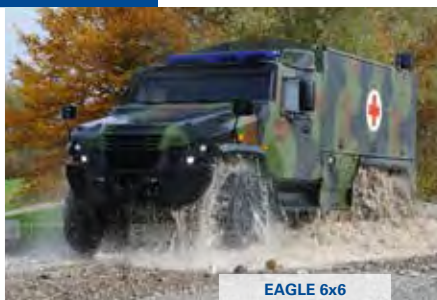
All contracts contain a fixed number of vehicles to be delivered, but also provide for the possibility of additional orders on

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short notice (depending on the respective production lead times) if it is likely that the required funds will be made available, the aim being to satisfy the approved demand of the armed forces

The first project to be implemented within the framework of an open-end procurement contract was the project related to the family of unprotected vehicles of the 5-ton and 15-ton military load classes. The agreed number of 558 vehicles was fielded as early as 2019. Towards the end of 2020, a total of 1,870 vehicles will have been delivered to the Bundeswehr.

Within the framework of project concerning tractor trucks of the 70-ton military load class, 32 vehicles have been procured so far. An additional 48 "ELEFANT 2" vehicles will be delivered in 2021 and 2022 within the framework of an economy-boosting program. A total of 155 vehicles are scheduled to be delivered by 2025.

This summer, the most recent open-end contract was concluded. It covers the procurement of vehicles in the family of palletized load systems of the 15-ton military load classes. At least 540 vehicles (230 protected / 310 unprotected) are due to be delivered to the Bundeswehr by 2025. This open-end contract also allows for the procurement of a total of 4,000 vehicles of the vehicle family of palletized load systems.

All vehicles mentioned above are designed in such a way that they can be outfitted with

equipment kits such as communication and IT equipment kits.

In summary, the procurement of the transport vehicles mentioned above marks the beginning of a regeneration and an increase in numbers of transport vehicles.

These adaptable open-end contracts have allowed BAAINBw to institute a flexible approach to effective procurement.

U4.4 procures modern aircraft de-icing equipment for the "Transport Aircraft A400 M" project. The particular challenge: The de-icers are intended to fit into the A400 M while at the same time being able to reach its exceptionally high T-shaped tail from all sides – at a considerable working height of 16 m for the operator.

The tanks of the de-icing vehicle can hold 7,200 liters of water, de-icing agents and antifreeze agents. Stepless mixture formation allows for an optimization of consumption adapted to the weather conditions and reduces the environmental impact. A diesel heater (870 kW) is included for quick heat-up.

In the past, de-icing meant heavy physical work under cold and wet conditions while wearing a protective suit. Today, in contrast, operators can operate all functions of the de-icing equipment with two joysticks from a closed cabin equipped with auxiliary and seat heating systems. All set for winter! In the summer of 2020, U4.5 delivered the first two of a total of 20 hoisting rescue vehicles earmarked for the Bundeswehr fire

services. The new vehicles feature a telescopic boom with optimized setup times including a spacious rescue basket with room for up to 5 people. They are used primarily on Bundeswehr airfields when rescuing combat aircraft pilots who find themselves in emergency situations. There exists a wide variety of possible additional uses for hoisting rescue vehicles at their respective premises thanks to their maximum rescue height of 23 m and their lateral reach of up to 16 m.

U7 / U2.5

The team of technical experts and the contract branch stand together against COVID-19

Due to the emerging COVID-19 pandemic, BAAINBw procured medical devices and drugs for the Bundeswehr and, by way of administrative assistance, for the German Federal Ministry of Health. The collaborative effort across multiple departments was highly successful and of vital importance in this situation.

Pharmaceutical experts of Division U7 and the contract component of Branch U2.5 were also constantly involved in many ways.

BAAINBw's Executive Group reacted to the office's emerging challenges as early as late February 2020. The Chief of Division U7 was appointed "Commissioner of the Executive Group in connection with the spread of the coronavirus." At the

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**One-on-One with Rainer Krug (M.Eng.),
Head of the Land Support Directorate
until June 2021**

ESD: What are currently the top priorities in your area of responsibility in terms of equipment and in-service support and what are you focusing on?

Krug: Due to the structure of this Directorate with its wide range of products, there are many projects that are important for the operation of the armed forces.

However, a special focus for me is on the ad-hoc program “Operational Readiness Initiative” of the Federal Minister of Defense, which is designed to improve the materiel readiness of the armed forces. This involves implementing a number of specific measures to significantly improve operational readiness as early as this year.

Specifically, we are looking at providing equipment in a task- and requirement-oriented manner in combination with increasing quantities up to 100%.

The current focus is on preparing procurement documentation for parliament in order to reach intermediate steps 1 (2023) and 2 (2027) of the Bundeswehr Capability Profile and to ensure timely materiel procurement.

As to materiel maintenance, the aim is to reduce repair turnaround times, to perform the necessary work to supply spare parts for in-service systems as well as to establish the important 30-day spare parts / exchange parts stock for VJTF 2023 and beyond.

ESD: Do you see any opportunities to improve the availability of military equipment (quantity and operational readiness) in your area of responsibility?

Krug: If I may interpret your question as to mean how do we intend to improve the availability of equipment to units then my answer is as follows. Due to the operational relevance of equipment in my area of responsibility, we have worked continuously on improving its availability in the past. The Operational Readiness Initiative seeks to further improve the availability of military equipment. The above-mentioned measures are specifically aimed at achieving this improvement. Already at the beginning of this year, we examined options to increase quantities in certain projects and we identified projects that were previously unfunded but can soon be funded and realized. Furthermore, as a result of the In-Service Support Agenda, we started to implement measures last year and are now in the process of establishing and maintaining the above-mentioned 30-day spare parts / exchange parts stock for fielded materiel.

Various other measures, such as the closure of the Hardheim materiel storage site, which is important for wheel assemblies, were reversed and thus maintenance bottlenecks were reduced.

In this context, other fixed logistic facilities have been reactivated as well.

ESD: What do you consider to be the major challenges regarding equipment and in-service support in order to provide the required materiel for VJTF (Land) 2023?

Krug: As part of its committee work, the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support and its VJTF Staff have taken on a major task in implementing targets. The Land Support Directorate is affected primarily by the digitalization of land forces. In this context, it is especially necessary to equip select materiel with battle management systems for the digital command and control of land-based operations.

A further challenge is to provide VJTF 2023 with task-oriented equipment, especially when it comes to mobility.

1,000 additional unprotected transport vehicles and additional heavy equipment transporters will be procured with the help of the economic stimulus program of the German Government. In addition, the palletized load system project is designed to ensure the performance of various transport tasks on operations. A basic capability for VJTF 2023 must be established.

Other important elements for forces earmarked for VJTF include light CRN reconnaissance equipment based on the MUNGO vehicle as well as mobile accommodation on operations.

ESD: What are the basic ideas and criteria underlying future procurement for tactical ground mobility? What are the procurement plans for protected and unprotected wheeled vehicles of the Bundeswehr?

Krug: The rationale underlying future procurement in the field of tactical ground mobility is to provide task-oriented equipment in accordance with the Bundeswehr Capability Profile, in particular in terms of national/collective defense and digitalization. A major element in this context is, for example, replacing old vehicles. The most prominent example is the replacement of category I vehicles by modern protected and unprotected vehicles such as the 5/15-ton unprotected transport vehicle and the 5/15-ton protected transport vehicle. In the years to come, we will also see major procurement activities concerning fire-fighting vehicles, trailer tractors and palletized load systems. Even the EAGLE and DINGO, the first tried-and-tested protected command and utility vehicles, will reach the end of their useful life in the near future. We are already considering a DINGO successor. Digitalization is another important aspect. A large share of current wheeled vehicles and, of course, any new vehicles will be equipped with digital radiocommunication equipment in accordance with D-LBO requirements. This will involve a significant effort.

Looking ahead, I would like to point out that we are closely monitoring research on developments such as autonomous driving and platooning. We are evaluating these advances for possible use in different operational scenarios. From today's perspective, such systems are not yet ready for use in difficult terrain but are promising for the upcoming decade.

This interview was conducted by Michael Horst.

same time, a central point of contact was established as a situation center and as a coordination platform for BAAINBw and subordinate agencies.

The procurement of personal protective equipment (PPE) such as face masks, disinfectants and protective coats was initiated immediately after that in the context of several requests for official assistance from the German Federal Ministry of Health.

A total of eight procurement requests on behalf of the German Federal Ministry of Health, and therefore Germany as a whole, did not just include an increasing number of protective equipment, but also disinfectants and drugs such as Resochin®, Kaletra® or Avigan®. The special organization "PPE Procurement" was established both for that purpose and for the procurement of personal protective equipment (PPE) for the Bundeswehr. Right from the start, the expertise of U7's specialists played an integral part in the evaluation of items on offer.

The special organization made an immense effort to conclude 80 contracts with a contract volume of 400 million euros for the German Federal Ministry of Health and 90 Bundeswehr contracts

with a contract volume of about 243 million euros.

Personal protective equipment meant to prevent the spread of the disease is, however, not enough to overcome the challenges of the ongoing pandemic. A higher number of medical and laboratory instruments is just as important to ensure that those affected are diagnosed and treated without issues.

Coordination and planning for the procurement of medical equipment and the provision of expert personnel was ensured by U7, drawing on the help of the "Procurement C19" cell established there.

Since March 2020, the demands evaluated by the Bundeswehr Medical Service have been subjected to a technical assessment by U7 and subsequently procured by U2.5. The varied portfolio ranges from computer tomographs to respirators, patient monitoring systems and mask testing equipment.

At the beginning of the pandemic, the main focus was on treating patients suffering from COVID-19. Respirators are an essential and limited resource due to the potentially critical course of the disease

with regard to respiratory symptoms. Therefore, BAAINBw quickly concluded contracts for devices that were still commercially available in order to make sure that they would be available for Bundeswehr purposes. The procurement of a total of 325 intensive care, transport and emergency respirators was initiated. The ongoing COVID-19 pandemic and the resulting increased global demand lead to disruptions in supply chains and longer delivery times for devices, though.

Another crucial point is the provision of diagnostics capacities. The main diagnostic focus lies on the detection of the virus by means of the polymerase chain reaction method (in short PCR). PCR test equipment must therefore be distributed as early as possible, starting at the level of medical clinics. The required portfolio of devices that can be operated without medical laboratory personnel ranges from minor items of equipment to wardrobe-sized fully automatic pipetting systems intended for the medical laboratories of Bundeswehr hospitals. The procurement of a total of over 300 new laboratory and analytical instruments was initiated, of which a majority was delivered by the end of the third quarter of 2020. ■



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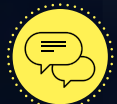
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Water shortages, disastrous flooding, environmentally induced migration – climate change is one of the biggest drivers of global conflicts. This, in turn, makes climate change mitigation a central pillar of international security policy. Sustainable power supply and energy management technologies can contribute to an improved carbon footprint.



When the heads of government of NATO member states meet, the major issues are usually on the agenda – how to deal with China, the future of the transatlantic relationship, or disagreements on budget issues. But at the summit in Brussels in June 2021, an issue was discussed that so far has not really been associated with the alliance, but is still no less important: climate change mitigation and the role the defense sector can play. After all, it has a heavy impact on the environment. A study by Boston University calculated that the US military emitted more than 200 million metric tons of carbon in 2018. Only 16 countries in the world emit more greenhouse gases per year.

"Combating climate change and security policy are inextricably linked," explains Dr. Stefan Stenzel, Managing Director of VINCORION. "The challenge is to find sustainable solutions without neglecting the core mission – safety. All stakeholders are called upon to do their part, including us as an industrial company, of course. That's why we're working hard to firmly entrench a sustainability mindset throughout all areas of our business – from secure supply chains and low-emission manufacturing techniques to the development of efficient and resource-friendly power solutions for civilian and military use."

Hybrid Power Systems for More Efficiency and Less Logistics

VINCORION's hybrid power systems are among the technologies designed to improve the sector's carbon footprint. They optimize efficiency in military platforms' power management, directly reducing greenhouse gas emissions as a result. They support the integration of self-sufficient fuel cell technology and sustainable energy sources such as photovoltaic systems via interfaces. If the infrastructure permits, electricity from existing local power grids can also be fed into the systems.

As a result, VINCORION's power systems reduce fuel consumption by up to

50 percent and cut downtime in half, as well as increasing fail-safety by a factor of four. In field camp or air defense systems, the self-sufficient, adaptable, and hybrid power architecture also becomes a tactical advantage – since fewer costly fuel transports are required, logistical operations can be significantly reduced, which are themselves responsible for much of the environmental impact and come with major risks, particularly in conflict regions.

solution that doesn't come at the expense of flexibility and performance," explains Stenzel. "This shows that a sustainability mindset is not simply an end in itself. In fact, just the opposite is true: environmentally friendly defense is already possible in many areas today."

Know-how transfer and vertical integration

When developing its new SEA systems, VINCORION drew on experience from



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Sustainable SEA gensets with exhaust gas aftertreatment

Also under development is a new generation of SEA gensets using advanced Stage V engines. The newly developed systems are operated in conjunction with suitable power storage units and come standard-equipped with state-of-the-art AdBlue exhaust gas aftertreatment to reduce emissions to a minimum. If normal diesel fuel isn't available under operational conditions, the SEA systems can be converted to run on alternative or NATO standard fuel in a very short time, even in the field, with minimal conversion effort. As a result, VINCORION's SEA systems meet stringent emission standards while providing greater self-sufficiency in the field. "Our engineers have developed a sustainable

the rail market, among others, where more stringent emission standards are already in force. The company is now applying its accumulated expertise to complex military requirements.

This is a process that involves the systematic transfer of knowledge and skills, and VINCORION is also leveraging its more than 60 years of engineering experience and long-standing partnerships with software vendors and end users in the commercial and military aviation, rail, and defense markets. In addition, the company is committed to a high degree of vertical integration. VINCORION has a total of more than 100 engineers and development employees working in its Mechanical Systems, Electrical Systems, Electronics, Software, and Systems Engineering departments at three German locations.

Air Directorate (L)

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 Customer Product Management (CPM) process and for supervising the in-service support management of 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).

- contributions to the field of planning in Analysis Phase I and
- preparation of proposed solutions in Analysis Phase II;
- and throughout the implementation and in-service support phases through:
- acquisition life cycle management,
- management of all in-service support activities for the purpose of maintaining the materiel-related operational viability of all manned aircraft, unmanned aircraft and space-based reconnaissance systems fielded in the Bundeswehr,

In-Service Support Manager

The function of In-Service Support Manager created in the BAAINBw project directorates is a result of the findings provided by the task force for the advancement of the procurement organization. As Deputy Director, the In-Service Support Manager is responsible for all in-service support issues of the projects supported and ensures a requirement-oriented, close connection between procurement and in-service use, thus ultimately contributing to an increased materiel readiness of the armed forces. The In-Service Support Manager plays an important part in the implementation of additional measures for increasing and stabilizing materiel readiness of the airborne weapon systems and acts as a central point of contact for the Services using these systems.

Airworthiness Staff and Bundeswehr CAMO Network

Due to the development of the European Military Airworthiness Requirements (EMAR) and the necessity to transfer these joint European requirements concerning military certification regulations into national law, a Continuing Airworthiness Management Organization (CAMO) had to be established. Thus, the findings provided by the task force for the advancement of the procurement organization also resulted in the decision to establish a Bundeswehr CAMO Network (CAMO Vbu Bw) in order to ensure standardized role assignments, interface definitions and procedures. This network allows the three Services, BAAINBw and the Federal Office of the Bundeswehr for Military Aviation (FOMABw) to closely cooperate on the tasks at hand. Furthermore, an Airworthiness Staff has been established in Directorate L which reflects the BAAINBw tasks in the context of the German European Airworthiness Requirements (DEMAR) in the form of three staff elements. In addition to the CAMO tasks specific to equipment, information technology and in-service support, this also includes the tasks of the military type certificate holder and the function of the BAAINBw flight safety officer. Currently, work focuses on the development of BAAINBw-relevant, project-specific CAMO structures and process landscapes. In 2020, it was possible to make significant progress in this field. In 2021, our task will consist in further re-



Photo: Bundeswehr/Miriam Altfelder

The first Airbus A350 approaching the SAMW FMoD home base in Cologne-Wahn.

The Air Directorate's project portfolio does not only comprise highly agile fighter jets. It also includes transport and special aircraft, helicopter systems, unmanned aircraft, tactical drones and space-based reconnaissance systems as well as 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 responsible for ensuring materiel-related operational viability throughout the entire life cycle of airborne systems assigned to it. Prior to implementation, it does so through:

- applied basic research and application-oriented defense research and technology (R&T levels 1 and 2) as well as system- and solution-oriented studies (level 3),

- supervision of systems engineering and integration of subsystems, including armament,
- life cycle management including obsolescence management and
- risk management.

This also includes highly prioritized procurements 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. What is new are the Airworthiness Staff and the In-Service Support Manager at the level of a deputy director.

Photo: Bundeswehr/Miriam Altfelder



A350 aircraft in the maneuvering area of Cologne-Wahn Airport

fining the “process landscape” developed so far, harmonizing it in cooperation with all parties involved and applying it to the first projects.

Current and Future Challenges

On the one hand, further acceleration and stabilization of the positive developments regarding increased materiel readiness of the airborne weapon systems has a very high priority in the Air Directorate. On the other hand, crucial Bundeswehr capabilities still depend on airborne “legacy weapon systems” that need to be replaced in order to maintain and advance essential Bundeswehr capabilities. One example worth mentioning in this context is the TORNADO succession, for which the Federal Minister of Defense has made a

groundbreaking decision this year. Without further elaborating on the various important future projects related to this, it can be said that these projects will constitute the main tasks of the Air Directorate in the medium-term future. There will certainly be more to report on this subject in the next December issue of ES&T.

The following examples of our project development activities in the year 2020 do not only illustrate the “classical” airborne major weapon systems, but also the task portfolio of the Air Directorate.

Augmentation of the Special Air Mission Wing of the Federal Ministry of Defense

The task spectrum of the Special Air Mission Wing of the Federal Ministry of Defense (SAMW FMoD) comprises the

transport of high-ranking persons from the political-parliamentary area as well as the strategic air transport of wounded, injured and sick persons (StratAirMedEvac) and of personnel and materiel. For this purpose, SAMW FMoD had at its disposal five Airbus A310MRTT, two Airbus A319CJ, one Airbus A319OH (primarily employed for verification tasks), one Airbus A321-200, two Airbus A340-300, four Bombardier Global 5000 and three recently procured Bombardier Global 6000 aircraft.

The two Airbus A340-300 aircraft constituted the only aircraft suited for long-distance flights (e.g. from Berlin to Washington). In view of the requirements of recent years, it has become apparent that two long-range aircraft cannot fully satisfy the demand in this area. Thus, the Budget Committee of the German Bundestag approved a contract with Lufthansa Technik AG (LHT) on the delivery of three brand-new Airbus A350-900 aircraft as a supplementary and replacement procurement for the existing long-range aircraft.

The first A350 aircraft with the identification 10+03 was ferried from Hamburg to the SAMW FMoD home base in Cologne already on 09 October 2020. Thus, SAMW FMoD now has at its disposal a total of three intercontinental-range aircraft. Before being ferried to Cologne, the A350-900 aircraft had been converted to a “government plane” at LHT in Hamburg over a period of several months. In order to be able to use the aircraft as early as possible (e.g. within the scope

Photo: Airbus Helicopters



Light Utility Helicopter Search and Rescue (LUH SAR) aircraft during an evaluation



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of Germany's EU Council Presidency), the first step consisted in retrofitting an "interim cabin" that—despite the provisional nature—provides all the conveniences required. The more time-consuming final installation of a "VIP cabin" will follow at a later stage.

With the Airbus A350 aircraft, SAMW FMoD receives a state-of-the-art aircraft type. This is the first Airbus A350 aircraft ever that is used as a government plane and has been converted for this purpose. It will allow flight missions to be conducted more efficiently, more reliably and with lower emissions. Implementation of the project within an extremely ambitious time schedule and with the restrictions due to the prevailing COVID-19 pandemic posed an enormous challenge that could only be met by close and trustful cooperation of all industry and Bundeswehr parties involved.

Delivery of the second aircraft with a retrofitted VIP cabin is scheduled for mid-2022. The third aircraft is planned to follow at the end of 2022. After delivery of these two aircraft, the recently delivered first aircraft will be retrofitted with a VIP cabin as well.

H145 LUH SAR

Within the scope of the initiated generational change in the Search and Rescue

(SAR) Service of the Bundeswehr, the Bell UH-1D ("Huey") is currently being replaced by the Airbus H145 LUH SAR. In December 2019, the first of a total of seven new H145 LUH (Light Utility Helicopter) SAR aircraft was delivered to the Bundeswehr. The LUH SAR aircraft is for the most part identical with the civilian variant of the H145 helicopter and is equipped with only a few military items of equipment, e.g. a command radio. In late 2018, a contract was concluded between BAAINBw and Airbus Helicopters on the procurement of the above-mentioned seven helicopters and their maintenance, repair and provision for flight operations. The logistic services will be provided at the contractor's works and the Niederstetten, Holzdorf and Nörvenich SAR sites for a period of nine years beginning with the delivery of the first helicopter.

The implementation period available was very short considering the upcoming end of the Bell UH-1D in-service life in the year 2021. Due to the close cooperation between BAAINBw and industry, it was possible to transfer the first helicopter at the Donauwörth works three months prior to the contractually agreed date. An additional four helicopters could also be delivered and accepted into service ahead of schedule in monthly intervals between February and May 2020.

The remaining two H145 LUH SAR aircraft are used by the contractor to provide the contractually agreed training and retraining of crews. The training progress is also in accordance with the scheduled timelines so that a timely completion of this milestone can be expected in late 2020. The transfer of these two helicopters is planned for February 2021. The operational suitability test started immediately after delivery of the first helicopter. Another milestone was reached in early July 2020 when the first SAR site in Niederstetten started conducting flight operations with the new helicopter type. Full transition at the three SAR sites is scheduled to be completed by April 2021.

Performance of the SAR tasks will thus be ensured by the new H145 LUH SAR aircraft type in the future. The core mission of the SAR service is to search for missing or crashed civilian and military aircraft and their occupants and to transport casualties. Unlike civilian air rescue services, Bundeswehr air rescue teams conduct their missions even under adverse weather conditions. Their pilots can use night vision devices, particularly for flights under poor visibility conditions and in the dark.

The helicopter is equipped with a broad range of sensors and rescue equipment.

This includes, for example, infrared and thermal imaging sensors, a direction-finding system for the detection of emergency signals, an external rescue hoist, a high-performance searchlight and a system for the detection of mobile radio units. Due to all these systems, the new helicopter is a highly effective and powerful rescue asset. It ensures reliable accomplishment of the SAR service core mission and provides the availability required (24 hours a day, 365 days a year). With the new helicopter type, the Bundeswehr has at its disposal a state-of-the-art system that is unrivaled.

A400M – Development Progress and Operational Readiness

On 03 September 2020, BAABNBw accepted into service the 35th A400M aircraft for the Bundeswehr at the AIRBUS site in the Spanish city of Seville. MSN 105 was the third aircraft with a German flag on its tail that passed the extensive acceptance process in 2020. However, the aircraft will remain with the manufacturer for the type integration of an additional electronic countermeasures system (DIRCM, Directed Infrared Countermeasures). Currently, the German A400M fleet consists of 18 logistic and 16 tactical aircraft fitted with equipment specifically tailored to the respective operational purpose. Delivery of an additional logistic aircraft is expected before the end of 2020. In 2026, the total quantity of 53 aircraft ordered will be reached following delivery of the last German A400M aircraft.

AIRBUS keeps pushing forward the advancement of the system and has already achieved successes regarding the certification of additional capabilities, with the result that the A400M program nations approved the NSOC 2.0 development standard on 24 July 2020. The continuous capability growth steadily and noticeably reaches the German Air Force and is used in various ways. Since September 2019, the A400M aircraft has been successfully employed for air-to-air refueling operations from the Jordanian Air Base in Al-Azraq within the scope of the NATO-led Counter-Daesh mission. The transport of patients with the MEDEVAC aircraft configuration within Europe during the persistent COVID-19 pandemic was very much appreciated.

At present, extensive test and evaluation campaigns are performed in cooperation with international partners in order to investigate the current capability spectrum and integrate it into the military processes and operations. The aircraft capabilities are the basis for Bundeswehr capabilities that can be employed during missions. This often requires a great number of additional prerequisites. In the meantime, however, much has been done in this area as well. One example is the training of personnel working on, in or with the A400M aircraft in various roles. Among others, new specialist personnel designated for medical care of patients during flight and the so-called Airmobile Protection Teams (AMPTs) of the German Air Force designated for infantry protection of A400M aircraft underwent training in the course of 2020.

However, the enhanced capability training cannot hide the fact that the operational readiness of the German A400M fleet does not yet meet the corresponding objectives. It is impaired by limited product maturity and calendar-driven maintenance planning as well as lacking spare parts and tools. There is definitely some potential for improvement in this area. The multistage retrofit program aimed at upgrading aircraft already delivered to the SOC 3 final standard also influences the overall size and availability of the A400M fleet. By combining retrofit activities with maintenance and simultaneously implementing design improvements, periodic downtimes are optimized in an attempt to counteract the trend described above. This strategy can only succeed if sufficient hangar and dock capacities are available. This is also important in order to keep the A400M aircraft up to date and prepare it for future scenarios. With the ongoing production and delivery of additional aircraft, the size of the international fleet increases continuously. However, the development of additional capabilities must not negatively affect the operational readiness situation in the process.

The Air Directorate at BAABNBw will closely accompany the further development of the A400M aircraft and increasingly focus on higher availability. Until 2022, the manufacturer will still have to meet some challenges in order to achieve the subsequent NSOC 2.5 development standard and the SOC 3 final standard. Even so, the Air Directorate is quite confident that the A400M aircraft will play an essential part in military air transport and will be much appreciated outside Europe as well. ■



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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 2020?

Herzog: I would like to extend this question to all airborne weapon systems of the Bundeswehr since the Air Directorate of the

Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) does not only “serve” the Air Force, but also the Army and the Navy when it comes to implementing projects and providing in-service support management for airborne systems. Regarding our “main customer”, the German Air Force, the milestones achieved in 2020 for the further development of the EUROFIGHTER weapon system certainly stand out. Firstly, we were able to conclude the contracts for the retrofit of the pioneering ESCAN RADAR to all German Tranche 2 and 3 EUROFIGHTER aircraft in June 2020. Secondly, the Defense and Budget Committee of the German Bundestag recently approved the conclusion of contracts for the procurement of EUROFIGHTER Tranche 4 aircraft for the successive replacement of Tranche 1. Together with the stabilization of the materiel readiness of the entire EUROFIGHTER fleet at a high level of around 70 %, this is a remarkable success. With regard to the Navy’s airborne weapon systems, initial and training flight operations with the new Sea Lion Naval Transport Helicopter (NTH) system commenced this year, and a total of six helicopters have been delivered to date. In addition, the procurement contract for the NH90 Multirole Frigate Helicopter (MFRH) that will replace the old Sea Lynx on-board helicopter is due to be concluded shortly. As for the German Army, we were able to complete a generational change for their search and rescue service after more than five decades of flight operations with the Bell UH-1D. The new H145 Light Utility Helicopter Search and Rescue (LUH SAR) aircraft from Airbus Helicopters was delivered to the German Army on time and put into service.

ESD: What are the priority tasks of Directorate L in 2021 from your point of view?

Herzog: In 2021, it will be important to continue the positive developments achieved in terms of accelerating the increase in the materiel readiness of the airborne weapon systems. The associated challenges are immense and ultimately also linked to the industry’s willingness to develop innovative contract structures in the context of support for our airborne weapon systems. In addition, we must continue to push ahead with all the projects that are intended to or required to replace “legacy weapon systems” with a view to preserving the capabilities associated with them. One example of this is the TORNADO succession. In this regard, the Federal Minister of Defense made a groundbreaking decision this year, which must now be pursued with high priority. These high-priority projects for the future also include the heavy transport helicopter replacing the CH-53, the Pegasus project, the successor to the P-3C Orion, and what I consider to be the most complex multinational project of the future—the Future Combat Air System (FCAS).

ESD: The availability of airborne weapon systems has improved over the past year. Which challenges still persist?

Herzog: In fact, in 2020, we were able to continue the trend of increasing the materiel availability of our airborne weapon systems. The EUROFIGHTER weapon system has become something of a benchmark in this respect. Therefore, it is important to transfer the experience gained with this system to the other airborne weapon

systems of the Bundeswehr. For my directorate, ensuring and continuously improving the materiel readiness of the airborne weapon systems remains a very high priority. In view of the complexity and, in particular, the specificity of the airborne systems currently used in the Bundeswehr, this is a real challenge. What I mean to say is that complex airborne weapon systems are for the most part integrated into multinational cooperation, both in their implementation and in their use. With regard to the implementation of measures intended to increase materiel availability, we are thus part of multinational structures and processes, the optimization of which must be supported by the common interests of all participating nations. This was, is and will remain a challenge.

ESD: What is the current status of the upgrades planned for the EUROFIGHTER, in particular the development of the AESA radar?

Herzog: When the contract for the development of an electronically scanned RADAR for the EUROFIGHTER was signed in 2014, the objective was to bring this RADAR to integration maturity by 2020. In June 2020, the contracts were signed under which the new ESCAN RADAR is to be retrofitted to all 106 German Tranche 2 and 3 EUROFIGHTER aircraft. The retrofit is scheduled to begin in 2023. From 2025, the ESCAN RADAR will also be the main sensor for the new Tranche 4 EUROFIGHTER aircraft, which will replace the Tranche 1 EUROFIGHTER aircraft by 2030. These are undoubtedly the two most important measures for the EUROFIGHTER weapon system. Other programs for the continuous development and improvement of this weapon system are running in parallel. Of particular note is the national improvement program “Impact 1”, which focused on improving the capability upgrade in weapons integration for air-to-ground and air-to-air missions with the IRIS-T air-to-air guided missile and the GBU 48 guided airdropped ammunition and demonstrated it during a firing campaign in 2019.

ESD: What is the current status of the new aircraft for the Special Air Mission Wing of the German Federal Ministry of Defense?

Herzog: At the Special Air Mission Wing of the Federal Ministry of Defense, the signs are pointing to innovation: The handover of the first of three Airbus A350 as government aircraft to the Special Air Mission Wing of the Federal Ministry of Defense in October 2020 was a technological milestone in terms of reliability, performance and efficiency, but also with regard to the increasingly important minimization of noise and exhaust emissions. The current fleet of Airbus A310 MRTT is scheduled to be decommissioned in 2021. The capabilities of the long-standing guarantor of strategic MedEvac and air refueling missions will be replaced by German participation in the multinational Airbus A330 MRTT fleet (MMF). For the German Air Force, we will also put two brand-new A321neo long-range (A321LR) aircraft into service in 2022 for troop and MedEvac transport.

ESD: What progress do you expect for the FCAS?

Herzog: Currently, the participating industry is preparing a proposal for the definition and construction of demonstrators (technology demonstrators). The trinational contract, which has yet to be negotiated, is to be submitted to parliament for approval in early 2021. If the partner nations and industry reach a contractual agreement in this regard in the next critical three months, the way will be largely paved for the start of the Next-Generation Weapon System (NGWS) development.

The interview was conducted by Ulrich Renn.

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 condemnation.

Directorate S consists of a total 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: Mine countermeasures, subsurface weapon systems and sensors
- Division S5: Support units, surface sensors, auxiliaries and support systems
- Division S7: Submarines

Apart from the project divisions, Directorate S has three specialized divisions that support the projects:

- Division S1: Economic and Technical Affairs
- Division S2: Economic and Legal Affairs
- Division S6: Navy C2 Systems

In addition to its specialized tasks, Division S6 is also in charge of the project management of the shore-based systems and training installations as well as of testing the IT security and the operational and functional safety of software and hardware in combat direction systems.

In order to adapt to the increasing challenges in the field of in-service use, the

Photo: Bundeswehr/Brakensiek



The SACHSEN-ANHALT frigate passes the Kaiser Wilhelm Bridge in Wilhelmshaven



WATERCAT M18 AMC



MARINE ALUTECH

Photo: Bundeswehr



Corvette LUDWIGSHAFEN AM RHEIN

position of deputy director and in-service use representative was created in the Sea Directorate.

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

Removal of Obsolescence in 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 air surveillance capability. Additionally, the frigate will be en-

abled 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 obsolescence 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 CDS (Combat Direction System) F124.

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.

The schedule for fitting and integrating the new long-range radars into the F124 class frigates is strictly based on the scheduled maintenance intervals 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 TRT facility 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 AESA (Active Electronically Scanned Array) radar technology. The advantages of this technology include the flexibility of the transmission diagrams (waveform) and electronic scanning.

Stage 2 includes the implementation of the sensors' basic capability for early warning and slew-to-cue (Ballistic Missile Defense, BMD). 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 supplemental solution proposal in accordance with Customer Product Management (CPM) is to be prepared by the end of 2021.

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.

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. The first ship of this class, the frigate BADEN-WÜRTTEMBERG, was successfully accepted as the first unit of the F125 class on 30 April 2019 and commissioned on 17 June 2019. The first phase of the suitability test conducted by the Navy on the BADEN-WÜRTTEMBERG ended in April 2020. The second F125, NORDRHEIN-WESTFALEN, was delivered by industry on 3 March 2020 and commissioned on 10 June 2020. The adaptation of the integrated 12.7 mm HMG weapon station which had been deferred for ship 1 and the connection of the KORA electronic warfare system to the combat direction system were successfully demonstrated on the NORDRHEIN-WESTFALEN and are currently being retrofitted on the BADEN-WÜRTTEMBERG. The third ship, the SACHSEN-ANHALT, is current-

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212CD draft design

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Class 123 Frigate – MECKLENBURG-VORPOMMERN at sea

ly undergoing the acceptance trials for the combat direction system with a military crew. It is scheduled to be accepted from industry at the beginning of 2021. The sea trials with the fourth and final ship of the class, the RHEINLAND-PFALZ, started on 17 June 2019. Delivery to the Bundeswehr is scheduled for summer 2021 after passing the acceptance trials. With the completion of the outstanding parts of the suitability test as well as the adaptation of the ships to the latest information security requirements, the first ships of the class will reach operational readiness as of summer 2022.

Second Lot of Class K130 Corvettes

With the 1st K130 lot, a very modern, highly complex weapon system with high technical standards was procured. The tried and tested basic design of K130 will be retained for the procurement of ships 6 to 10.

The keel laying of ship 8 took place on 6 October 2020 already during an official ceremony in Wolgast.

Ships 6 to 10 are planned to be commissioned from 2023 onwards.

New Submarines for Norway, but also for Germany

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 2029 to 2035 so as to enable the Norwegian Navy to seamlessly transition from the Ula class submarines to U212CD (Common Design).

The design of the new U212CD class is based on the class 212A boats. In light of the fact that anti-submarine warfare (ASW) systems 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.

Class 123 Frigate – In-Service Use up to 2030

In order to guarantee continuous capability maintenance and the availability of operational, robust F123 platforms

before the fielding of multirole combat ships MKS 180 and to keep the four BRANDENBURG class units operational up to 2035, extensive measures to remedy obsolescence will be carried out.

In the context of a holistic, generic measure the tactical radar systems are to 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.

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 also being investigated.

GORCH FOCK Maintenance Project

On 7 May 2020 a contract amendment was concluded between BAAINBw and ERW (Elsflether Repair Werft) to ensure that the sail training ship will be completed in compliance with the cost ceiling. Since then, work on the GORCH FOCK has clearly picked up speed.

The shipbuilding work has been completed, the large machines and aggregates have been installed, the interior work has begun and, as a clearly visible sign, the masts of the barque were set within just three days and on time for the contractually agreed date in June of this year.

The first commissioning operations will begin at the end of 2020, so that the GORCH FOCK can be undocked and will be afloat again at the beginning of March 2021. After successful com-

Photo: Bundeswehr



The GORCH FOCK with new masts on the parking platform of the Friedrich Lürssen Werft (shipyard) in Berne.

pletion of all trials, the GORCH FOCK is scheduled to be handed back to the Customer and thus to the German Navy on 31 May 2021.

POL Supply for Seagoing Units

The two support tankers RHÖN and SP-ESSART are owned by the Navy and have been in use for more than 40 years.

The support tankers 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 SP-ESSART. The procurement of two Class 707 Navy support tankers provides the foundation for continuous capability maintenance.

The award procedure started in the 2nd quarter of 2020; a construction contract is expected for mid-2021. The scheduled delivery of the first unit in 2024 will ensure that the Navy can seamlessly continue to supply seagoing units with POL products.



Class 704 Navy support tanker A1443 RHÖN

Standardization of Maritime Combat Direction Systems (Standard CDS)

In the past, a proper combat direction system (CDS) was developed for each new class of surface combatant. This approach resulted in a historically grown,

heterogeneous landscape of combat direction systems. This heterogeneity results in significant effort in system maintenance and modification, logistics, and training, and it complicates the exchange of crew members between units. In order to address this issue and significantly reduce the corresponding costs, a

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

ESD: The MKS 180/F-126 project is to become part of the regular organization again (after belonging to the so-called special organization). How have you prepared for this or how are you preparing?

RADM Czerwinski: The return of the MKS 180 project to the Sea Directorate is a result of the "Procurement Organization Working Group". What I have in mind is an organizational integration as a project division comparable to Division S7 (submarines). Hopefully, the final decision on this matter will be taken in the very near future.

A functional incorporation is not required, because the close contacts and intensive cooperative relations with the Sea Directorate and its subordinate agencies have not been interrupted since the outsourcing of MKS 180.

ESD: How do you see the MKS 180/F-126 project progressing in the future?

RADM Czerwinski: In June 2020, when the contract was signed, the MKS 180 project reached its most important realization milestone so far.

The focus of the MKS 180 project is currently on setting up the contractually agreed processes. To this end, discussions are taking place at all levels to develop further details, e.g. joint risk management or the establishment of targeted construction support.

The aim of the project is to arrive at an efficient and economical overall system.

It has not yet been decided to rename the project to Class 126 Frigate (F126), but in my opinion, it is only a matter of time.

ESD: In the last three years, the improvement of the relationship between the government agencies and industry has been a recurring theme. The Chief of Staff, Navy, likes to mention the triangle of German Navy Headquarters - BAABW - industry, expressing his wish for this triangle to be one with "short sides". What do you think about that?

RADM Czerwinski: Cooperation between BAABW, industry and Navy is exceptionally good. In this context, the K130 2nd Lot project is an example of how helpful close cooperation between industry and the Sea Directorate's project management in physical proximity with short decision-making paths can be. At this point, I would like to emphasize that this would not have been possible without the dedicated support of the Navy. However, procurement law contains clear restrictions on cooperation with industry prior to the conclusion of a contract, particularly when talking about competitive situations.

These restrictions do not exist with regard to the Navy. The latter continues to support us in launching new projects as well as in the already advanced major new construction projects such as the F125 class frigate. In this respect, we make use of the possibilities of modern communication so that this support can also be implemented at the original workplace. This way, the geographical separation between the central office in Koblenz/Lahnstein and the soldiers generally deployed on the coast can be bridged.

In the area of maintenance of the existing fleet, some of the upcoming repair projects would also have to be postponed without the Navy's support at the Naval Arsenal.

From my point of view, this side of the triangle has already become pleasingly shorter. This is impressively demonstrated by examples such as the immediate repair pilot project in Warnemünde, the appointment of an in-service use representative in the Sea Directorate, the resumption of regular discussion rounds between the Navy Headquarters, Naval Support Command, Naval Arsenal and BAABW, the continued project support by the Navy and many others. However, there is always room for improvement for the "Sea" virtual system house consisting of Navy, Naval Arsenal, WTD 71 and BAABW.

ESD: Has the "Reversal in Personnel Trends" strategy found its way into the Sea Directorate?

RADM Czerwinski: Yes, it has already become noticeable. However, this process is still ongoing.

Since the beginning of 2018, the Sea Directorate has grown by about 50 posts to a total of about 500. Up to 2027, the Sea Directorate will also benefit from a further increase based on the mid-term personnel planning.

At the same time, we have gained a total of nearly 100 employees since 2018, so that 85% of the posts of the Directorate are now filled. In addition to the filling of military positions and the new civilian personnel from civil service training, the fact that the Sea Directorate was a successful pilot project for the direct hiring of civilian employees had a favorable effect.

ESD: Could you tell us something about the status and outlook of the fleet replenishment ship and fleet service vessel projects?

RADM Czerwinski: Our two remaining Class 704 support tankers RHÖN and SPESSART will reach the end of their service life around 2023. We are therefore working flat out on the procurement of the successor Class 707.

The "Class 424 Fleet Service Vessels" project is currently in the analysis phase and thus in preparation of the selection decision by the Chief of Defense.

ESD: The German Navy is currently using more than a dozen combat direction systems (CDS) that are apparently almost impossible to manage. From your point of view, how can a standardization be achieved? Are international collaborations with the Netherlands and Norway, for instance, desirable for future CDS solutions?

RADM Czerwinski: First of all, I would like to point out that the CDS systems in service with the German Navy can be managed! However, the current heterogeneity in the CDS landscape results in a significant effort in system maintenance and modification, logistics, and training and complicates the exchange of crew members between different classes of ships. A standardization of the maritime combat direction systems would significantly increase efficiency.

Currently, possible solutions for the realization of a unified core CDS are being investigated, also taking into account international partnerships.

The interview was conducted by Hans Uwe Mergener.

standard combat direction system fit for every ship class is intended to be implemented as a strategic project of the Sea Directorate.

A standardization of the maritime combat direction systems will significantly increase efficiency.

This would simplify system maintenance and modification, logistics and crew training, thus reducing the corresponding costs.

The aim of standardization is in particular to gain design authority over future combat direction systems so that the Bundeswehr can determine the direction and type of further development to a greater extent.

Sailing Boats

The five new "Sunbeam 36.2" sailing boats on which the officer candidates of the German Navy will be trained in the future are called Phönix, Perseus, Pollux, Pluto and Pegasus. The boats were procured in record time.

The sailing boats were procured within one budget year, including a Europe-wide invitation to tender. The fact that it happened so quickly is mainly because they



Photo: Bundeswehr/Wilke

The new sailing boats of the Navy

are commercially available boats that have proven themselves in civilian shipping and did not have to be modified to meet special Bundeswehr requirements.

Outlook

Apart from the 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 and supported by WTD71, the Navy Arsenal and the Navy and with the support

of other areas. They range from davits to boats for special forces and Electronic Warfare (EW) systems through fleet service vessels. Finally, we will take a look at future activities of the Sea Directorate using three selected examples.

Capability Platform for Combined Naval Mine Countermeasures

The capability platform for combined naval mine countermeasures will be the successor for the Class 332 mine countermeas-



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NGFrig concept outline

ures units. The ten minehunters currently in service will reach the end of their service life between 2027 and 2030.

The mine countermeasures mission scenarios have been further developed. The capability platform for combined naval mine countermeasures must also be able to create and share the situation picture over water and in the air to a much greater extent than was necessary in the past. A robust self-protection capability against threats from opposing forces at sea, in the air or on land is also necessary. The commissioning of the capability platform for combined naval mine countermeasures and the unmanned systems of

the Naval Mine Warfare (NMW) toolbox is scheduled to take place between 2028 and 2033.

Like the MJ332, the capability platforms for combined naval mine countermeasures will also be able to deploy their own sea mines.

Next Generation Frigate – Air Defense (NGFrig-AD), Class 127 Frigate

The Directorate-General for Planning at the Federal Ministry of Defense approved the project sketch for the next generation frigate in February 2020. The rele-

vant project team under the leadership of the Bundeswehr Planning Office was established at the end of the third quarter of 2020.

New Fighting Craft Branch

Since summer 2020, branch S4.4 has been set up in the S4 project division. In the future, responsibilities for the procurement and use of the fighting craft across all CPM phases will be pooled at S4.4.

The first project already being implemented is the procurement of the successor boats for the H1010 RHIB (Rigid-Hulled Inflatable Boat). ■

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The Information Technology Directorate of BAAINBw (I)

The Information Technology Directorate (Directorate I) and its approximately 1,000 employees in Koblenz, Lahnstein, and Dresden are responsible for the Bundeswehr IT system. Its remit includes customer management for the HERKULES follow-on project. It is also managing around 100 IT projects in the analysis and realization phase and 200 projects in the in-service phase, relating to the areas of IT, IT platforms and collaboration.

The German Mission Network (GMN), the digitalization of land-based operations (D-LBO), SAT-COMBw and the modernization of Bundeswehr cryptographic technologies are some of the flagship projects. Additionally, the Directorate develops the fundamentals for the Bundeswehr IT system across all major organizational elements of the Bundeswehr, e.g. in the areas of IT service design and IT architecture. The following paragraphs will focus on the current projects of Directorate I.

Major Success with Less: CWIX 2020 Remote

The „Coalition Warrior Interoperability eXploration, eXperimentation, eXamination eXercise“ (CWIX) is a multinational interoperability exercise in the cyber and information domain of NATO and its allies. This three-week exercise is scheduled to take place annually and provides an opportunity for up to 1500 participants from over 30 nations to test the state of the art of current and future command and control systems from the point of view of operators, administrators, research, industry and procurement branches. Intensive discussions make it possible to drive forward programs such as “Federated Mission Network” (FMN) and carry out assessments. At the same time, participating nations also develop the fundamentals of generic reference documents for the setup and operation of future multinational mission networks.

Through its involvement in projects as well as in research and technology, Directorate I contributes to the development and verification of future service-oriented IT solutions. Technology demonstrators, such as the reference systems of the German Mission Network Service, provide the necessary hardware. Military experts use these server systems to test the procedural and operational fitness of the technology. Additionally, as part



Photo: PZ CIR

Remote site coordination

of its policy work Directorate I ensures that scientific personnel of German research institutes accompany the further development of standards for a future international mission network. Test and work results are recorded and used for subsequent decision-making during the procurement process. CWIX thus represents a work platform for the current and future state of the art.

CWIX 2020 was originally planned as a real-life exercise in Bydgoszcz/Poland but was transformed into an online event due to COVID as of March 2020, with participants being connected to the exercise network via the internet. This decision resulted in a successful CWIX 2020. The pandemic only prevented covering issues that would have required participants to take part in person during CWIX 2020. These include, for example, the FMN certification of the participating nations' command & control delivery systems. Such certification would have required a separate mission network and a local inspection team.

The 2021 CWIX cycle has begun, and the first coordinating conferences will take place virtually. The exercise is planned as a real-life event with certain individual participants taking part online; however, plans are also being made in case the exercise will once again have to take place as a virtual event.

JSEC goes HaFIS

The harmonization of the command and control information systems (HaFIS) in the Bundeswehr is progressing rapidly. Within the context of the HaFIS program, which was specifically designed for this purpose, existing command and control information systems are integrated into an overall system with a focus on service orientation. NATO Joint Support and Enabling Command (JSEC) provides a context in which HaFIS can really shine in an international environment.

JSEC was set up in order to be able to coordinate troop and materiel movements within Europe quickly and seamlessly in

times of crisis or even war. The purpose of JSEC is to enable the deployment of tens of thousands of soldiers within Europe and within a few days' notice in order to be able to counter possible threats.

In June 2018, NATO tasked Germany as the framework nation with the setup and operation of JSEC. Wilhelmsburg Barracks in Ulm was chosen as the JSEC headquarters, with the Multinational Joint Headquarters Ulm also being stationed there.

Through HaFIS, Directorate I supplies the equipment for data processing centers which was procured during the harmonization of the command and control information systems. HaFIS is adaptable and capable of integrating new IT services or adapting existing services and therefore capable of complying with new JSEC requirements. This will prove to be an advantage, especially during the initial phase of the new command. Additionally, HaFIS guarantees a high level of security, for instance due to the secure inter-network architecture (SINA).

The system is currently undergoing in-depth testing in Ulm, which will be followed by various exercises in accordance with a specified NATO procedure until full operational readiness is achieved. Despite all the progress made, equipping JSEC is and will continue to be a gargantuan task. Equipping an entire new headquarters that will cooperate



The NATO Joint Support and Enabling Command (JSEC), based at Wilhelmsburg Barracks in Ulm, will be equipped with HaFIS. This is an aerial photograph of the facility.

with many NATO facilities and partners in a short period of time is extremely challenging for all parties involved. However, equipping JSEC with the direct involvement of operators and users in a multinational environment also provides Directorate I with the rare opportunity to gain new and, most importantly, realistic insights, which will be incorporated into the further program progress.

Modernization of Crypto Systems in the Bundeswehr

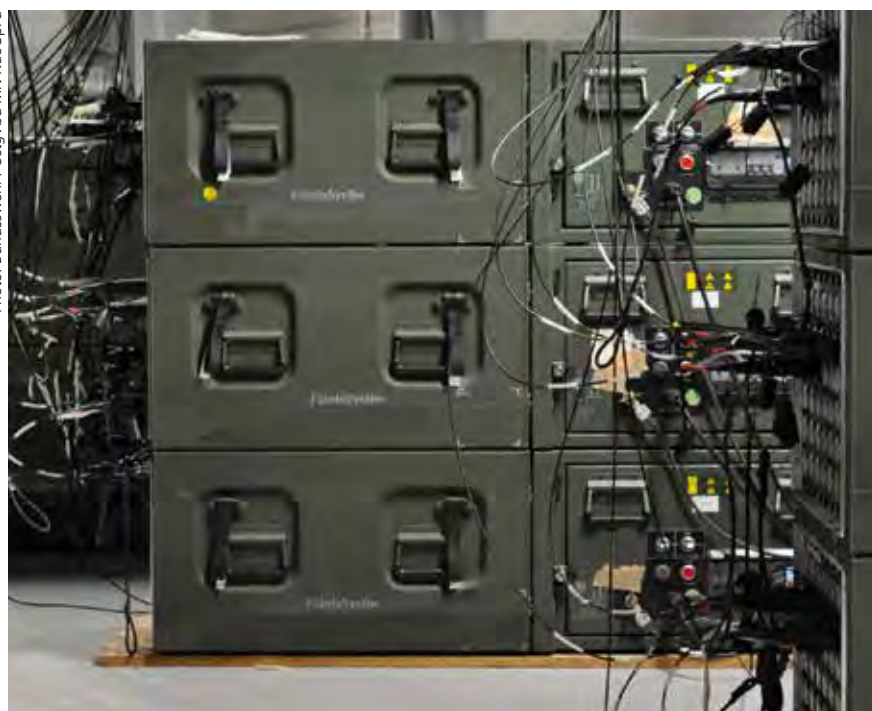
Cryptographic technology in the Bundeswehr is undergoing a comprehensive and systematic modernization process. This technology is the main basis for secure communication within the Bundeswehr and the Alliance.

Crypto technology is regarded with general suspicion for slowing down technical systems and complicating their operation. Passwords and certificates are an annoyance to users and their exposure might only be noticed once the damage is done. Furthermore, advances in research and development in the area of quantum technologies require elaborate adaptations of classic cryptological procedures. For the moment, we may only guess the date at which the first quantum computers will reach operational readiness.

In order to ensure risk mitigation it is therefore essential to constantly test crypto systems that are currently in use and to implement comprehensive modernizations.

This is exactly what Directorate I is working on already. Symmetric and asymmetric encryptions in crypto systems are being adapted based on future scenarios for the age of quantum computers.

It will be possible to achieve a higher level of security for symmetric encryption by increasing key lengths. This could mean that many crypto devices that have been



This picture shows some of the JSEC IT equipment. HaFIS is proof that fast and flexible IT solutions are possible

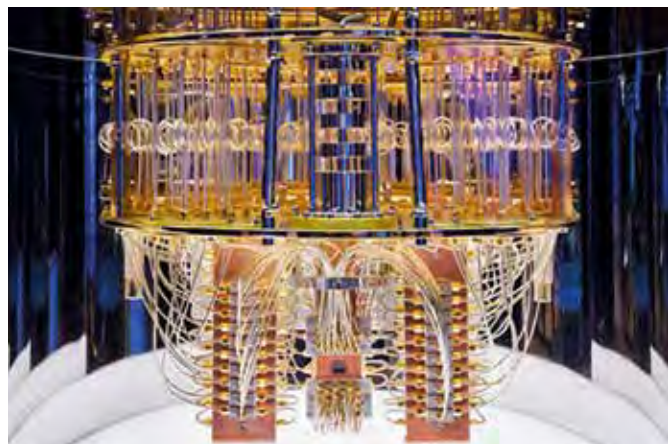


Photo: IBM

This photograph shows an IBM quantum computer (left) and its interior (right),

in use since the early 90s will already reach the end of their service life. For example, the hardware's performance will no longer be sufficient to process longer keys. If additional cryptographic procedures become even more computationally intensive, such hardware will quickly reach its limits.

But transmission technology has also changed. Throughout the past years, ISDN has been replaced by the internet protocol. "Old" crypto telephones with ISDN interfaces can certainly also function with ISDN IP gateways. Neverthe-

cluding management systems) will be introduced in the next few years. These devices will be characterized by efficient and future-proof hardware. Crypto devices can be adapted to specific mission requirements with the help of software defined crypto.

Quo vadis, SATCOMBw

A quick reminder: Satellite communication makes communication across great distances possible because radio signals are amplified by satellites in space and

components are currently being adapted. This adaptation will likely continue in the foreseeable future. This concerns both hardware and software components.

The calculated operational life/service life of the military satellites COMSATBw 1 and 2 is limited. Their continued use after 2027/2028 is unlikely due to their deterioration in space and depleting fuel supplies. A residual amount of fuel is required to fly the satellites into the graveyard orbit at the end of their service life. Considerations concerning the initial capability of the SATCOMBw Stage 3 project focus on replacing the existing satellites with new satellites (COMSATBw 1B and 2B). Possible solutions which outline the replacement of the existing satellites including possible functional extensions are currently being finalized. The goal is to ensure the timely replacement of the existing satellites.

Additionally, it is necessary to consider and to compare current and future technologies during procurement and thus to take account of the Bundeswehr's mission as well as the ever-increasing demands on data rates in order to ensure the system's overall capability.

In addition to its own satellites, the Bundeswehr also benefits from a military communications payload as a result of its involvement in the Heinrich Hertz satellite mission. The Heinrich Hertz satellite mission is jointly funded by the Federal Ministry for Economic Affairs and Energy and the Federal Ministry of Defense and is implemented by the German Aerospace Center (DLR). The purpose of this project is to construct and launch a national geostationary communications satellite and operate it over a period of 15 years. Its goal is to maintain and to continue the development of German key capabilities.



Photo: R&S

ELCRODAT 7 FN by Rohde & Schwarz (R&S) for encrypted voice and video communication via existing Voice over IP (VoIP) infrastructure

less, operating such combinations will continue to be more complicated and susceptible to failure.

Additionally, crypto keys and certifications in use must be changed regularly, and the number of systems that require them is constantly increasing. Their transfer requires considerable efforts. Currently, crypto keys are transmitted to users by electronic means; the keys are encrypted. In the future, their transmission is intended to be automated and protected by modern, quantum computer-resistant crypto procedures.

For the Bundeswehr, this means that new crypto systems (crypto devices in-

then retransmitted to earth. As part of the SATCOMBw Stage 2 project, the Bundeswehr had two military satellites positioned in space. Additionally, the Bundeswehr leases satellite capacity from commercial operators. There are also corresponding satellite ground stations for a great variety of purposes. The overall system has been successfully employed for several years and is appreciated for its flexibility. But it is time to look towards the future.

As part of several regeneration measures as well as a comprehensive service life extension for SATCOMBw Stage 2 until 2028, the ground-based system

A Further Insight



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

ESD: The Federal Government and the German Federal Ministry of Defense (FMoD) have launched a number of cyber projects this past year. How do you expect this to affect Directorate I?

Hausschild: BAAINBw and the Information Technology Directorate in particular are responsible for implementing projects relating to cyber defense, digitalization and information technology within the remit of FMoD. This includes procuring the required technical systems, providing operational systems to the Bundeswehr and keeping them operational for many years during their

in-service life.

Every new project must fit into this ever-growing system architecture. Projects are becoming more complex, innovation cycles require the project directorate to implement modernizations more quickly, and more and more IT system elements must be kept operational simultaneously.

It takes experienced and well-trained qualified personnel to ensure high-quality contracting, procurement and the roll-out of cyber projects. The challenge of recruiting this skilled personnel for my directorate from within the Bundeswehr and the labor market is pushing us to our limits.

ESD: What do you think of the Bundeswehr developing in-house expertise in software programming so that it can develop program elements and negotiate on equal terms with the IT industry?

Hausschild: Traditionally, the Bundeswehr has had in-house expertise in software programming. Rightly, this expertise is not located at BAAINBw, though. Instead, these experts are assigned to the Bundeswehr Center for Software Expertise (ZSKBw) within the Cyber and Information Domain Service (CIR), for example.

In order to be able to negotiate on equal terms with the IT industry, it is, in my experience, not so much expertise in programming that is essential. Rather, we need to be experts in system design, especially with regard to service design and architecture. Software elements in particular require knowledge of the procedures, processes and efforts related to software development. Directorate I possesses this expertise to an extraordinary degree.

ESD: At the beginning of October, the Netherlands officially initiated the hardware and software procurement for the TEN/Foxtrot project. Within the context of D-LBO, Germany is also involved in the bilateral TEN project. How does the coordination with the Netherlands work and what are the current plans for D-LBO?

Hausschild: The TEN project is highly complex and represents a major challenge for all parties involved. The cooperation with our Dutch partners is characterized by extreme professionalism, technical competence and mutual respect. Reaching our common goal is always our priority and our motivation. Working with two sometimes very different procurement procedures can occasionally be challenging, although this is true for all international collaborations. But this is not going to stop us from finding the best solution for all participants.

ESD: Which of the projects that you are working on have made significant progress this past year, and which projects will be your top priority next year?

Hausschild: We have been able to provide quite a few deliverables to our users this year. Off the top of my head, I can think of the training installation in Erndtebrück for the next generation of air mission control service personnel, the delivery of a mobile data processing center for the special operations forces based in Hardheim, and the IT equipment for the recruitment call center.

The modernization of the Bundeswehr crypto technology and D-LBO/TEN will remain priorities next year. Additionally, projects relating to satellite communication (SATCOMBw) will gain hugely in importance.

Equipping the troops with the battle management system (BMS) prior to Germany entering the stand-by phase of VJTF 2023 will also be a matter of particular urgency this and next year. Considering that the project was only launched in mid-2018, the rapid progress we have made in this context is all the more remarkable.

The interview was conducted by Lars Hoffmann.

Within the context of the D-LBO program, SATCOMBw gains a mobile component in the form of the SATCOM-on-the-Move (SOTM) subsystem. SOTM is an IP-based (backbone) transmission service within the D-LBO information and communication network. It is capable of extending operationally critical services from the Bundeswehr IT system to the mobile, tactical area.

Necessity is the Mother of Invention

Because of security specifications, Bundeswehr personnel require both a laptop and technology approved by the German Federal Office for Information (BSI) in order to be able to access the "administrative" Bundeswehr network remotely. This technology serves to set up a virtual private network (VPN) tunnel. This technical solution was based on the actual demand, both in terms of the number of terminals and of centralized access to the Bundeswehr IT system, which is why it was only available for a limited number of notebooks. As a result of the pandemic, working from home became an absolute priority for the Bundeswehr, which led to a sudden increase in demand.

Simply increasing the quantity of IT equipment required to remotely access the Bundeswehr network is only possible to a limited extent. This is due to manufacturing periods, technical requirements and, most importantly, high costs.

OpenVPN constitutes a solution in this crisis, as BSI currently permits the Bundeswehr to use OpenVPN due to the ongoing crisis. OpenVPN can be installed on existing laptops via the network like any user software and is significantly cheaper. This solution allows the Bundeswehr to temporarily and quickly enable all notebooks within the HERKULES follow-on project that cannot yet establish a mobile connection to the Bundeswehr network to be used for working from home or while on the move, for instance in crisis situations. Directorate I has tasked BWI with testing "OpenVPN" for the Bundeswehr in the course of pilot projects. If the subsequent routine operation with up to 30,000 users proves to be successful, the option of keeping OpenVPN available as a supplementary solution in future times of crisis might have to be discussed. However, it needs to be taken into account that OpenVPN does not yet comply with the high security standards of products approved by BSI. It is therefore necessary to advance

efforts to equip Bundeswehr personnel with mobile IT that is tailored to the needs of its users and has undergone security certification.

The Only Constant in Life is Change

This 2500-year-old adage attributed to Greek philosopher Heraclitus has proved to be true for Directorate I – although the more likely term to be used in the Bundeswehr would be “change of situation”. Germany taking on responsibility for the buildup of JSEC also means that, within the context of HaFIS, a multinational command will need to be equipped within a short period of time. The pandemic has become a driving force for digitalization and has unexpectedly increased demands. Technical solutions such as OpenVPN that had been deemed not even worth discussing in the past may constitute a complementary solution in the crisis. Directorate I will use the lessons learned from these changes of situation in order to continue to provide the best possible IT in times of change. ■



Photo: Bundeswehr/ Martina Pump

Thanks to the different satellite ground stations, SATCOMBw is capable of flexibly covering a great variety of scenarios; this photograph shows the small ground station



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Directorate G – IT Support

SASPF X.0: A Solid Foundation for a Digital Bundeswehr

The digital transformation of the Bundeswehr is taking shape and is being ad-vanced on multiple levels through various projects. The Bundeswehr uses SASPF (Standard Application Software Product Families) to control and moni-tor its key logistic-administrative processes. In this context, digitization tech-nology promises to enhance performance and usability significantly.

SASPF X.0 stands for the process of evolving the current SASPF system landscape into solutions providing access to new digital functionalities and processes. These include, for example, the mobile and networked use of data, comprehensive real-time analysis and simulation functionalities, and modern, easy-to-use applications. The new digital platform for logistic-administrative processes in the Bundeswehr will also encompass pioneering technologies such as advanced analytics, the internet of things, machine learning, and augmented reality.

SASPF X.0 will center around S/4HANA: The S stands for “simple”, the 4 refers to the fourth product generation, and HANA is the underlying database technology. S/4HANA is the next-generation SAP solution. SAP has announced its intention to focus on S/4HANA in the future. Consequently, the company will discontinue the support for its existing ERP (enterprise resource planning) solutions by the end of 2027. Only its personnel management system, SAP HCM, will remain unaffected by this for the time being. From that time on, only the successor S/4HANA will be sup-ported. Accordingly, the Bundeswehr will have to make the transition to the new solu-

tion quickly to avoid being cut off from essential manufacturer support.

The first step the Bundeswehr will have to take in order to use S/4HANA and thus tap into the full potential of the new digital world is to migrate all databases to SAP’s HANA database. HANA is an in-memory database, i.e. a database management sys-tem that uses the faster hardware RAM for data storage. This is a major technologi-cal advancement and especially beneficial to SASPF applica-tions. The migration of the logistics track (L track), which is the biggest and most complex system track in the Bundeswehr, was completed by the end of 2020.

The transition to the HANA database is an important, but by no means the on-ly measure to be taken in the course of adapting the SASPF system landscape to S/4HANA. The “Retrofit SASPF” project is currently laying the groundwork for the switchover to the new product. “Retrofit” stands for the abandonment of cus-tomer-specific in-house solutions and the adaptation of workflows as a prerequisite for mi-gration. A sandbox environment in which key users can simulate and test sample processes accompanies these measures.

The goal is to have finished all necessary preparations by the end of 2022.

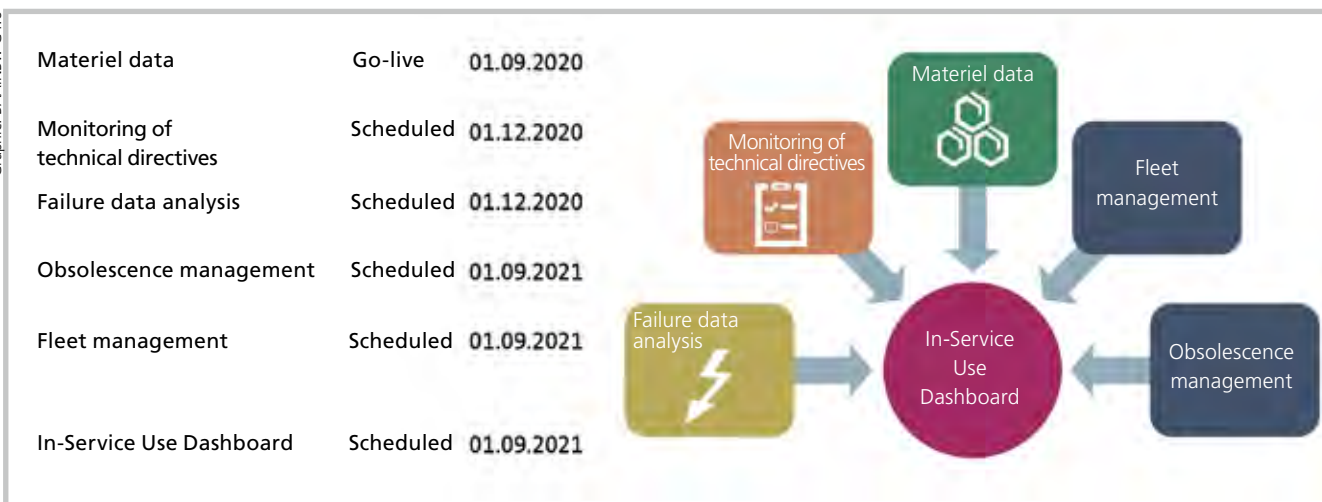
Digitization of In-Service Use – Moving From the IT Support for Bundeswehr Weapon Systems Logistics Information Requirements Project (IT-U LogInfoBedWaSysBw) to the In-Service Use Dashboard

The Bundeswehr currently has around 70 main weapon systems at its disposal and manages more than six million supply items. The task of ensuring operational readi-ness of the armed forces is divided between the Federal Office of Bunde-swehr Equipment, Information Technol-ogy and In-Service Support (BAAINBw), which has the materiel responsibility for operational viability, and the major organizational ele-ments of the Bunde-swehr, which have the in-service and sup-ply responsibility.

At the moment, all parties involved in this process still use different procedures and systems that are not part of SASPF. These “systems in use” (Systeme in Nutzung; SinN) will gradually be integrated in SASPF to keep pace with innovative ca-pabilities and procedural advancement here, too.

By the fourth quarter of 2021 (see Fig. 1), a modern platform will have been devel-oped featuring several increments

Graphic: BAAINBw G4.6



The path to the In-Service Use Dashboard

(elements building on each other) as part of the IT-U LogInfoBedWaSysBw project. The persons responsible will be able to access relevant logistics information for the in-service use and operation of weapon systems within SASPF via the "In-Service Use Dashboard".

Even though this application and the future "In-Service Use Dashboard" will primarily be used by product and weapon system officers, and by project managers, it will also help all personnel at the working levels of the organizational elements simplify and streamline their work processes. The target number of users will therefore be around 22,000. Already today, the application is referred to as the "search engine of logistics", and for good reason.

The "Materiel Data" increment has been active since September 2020 and already

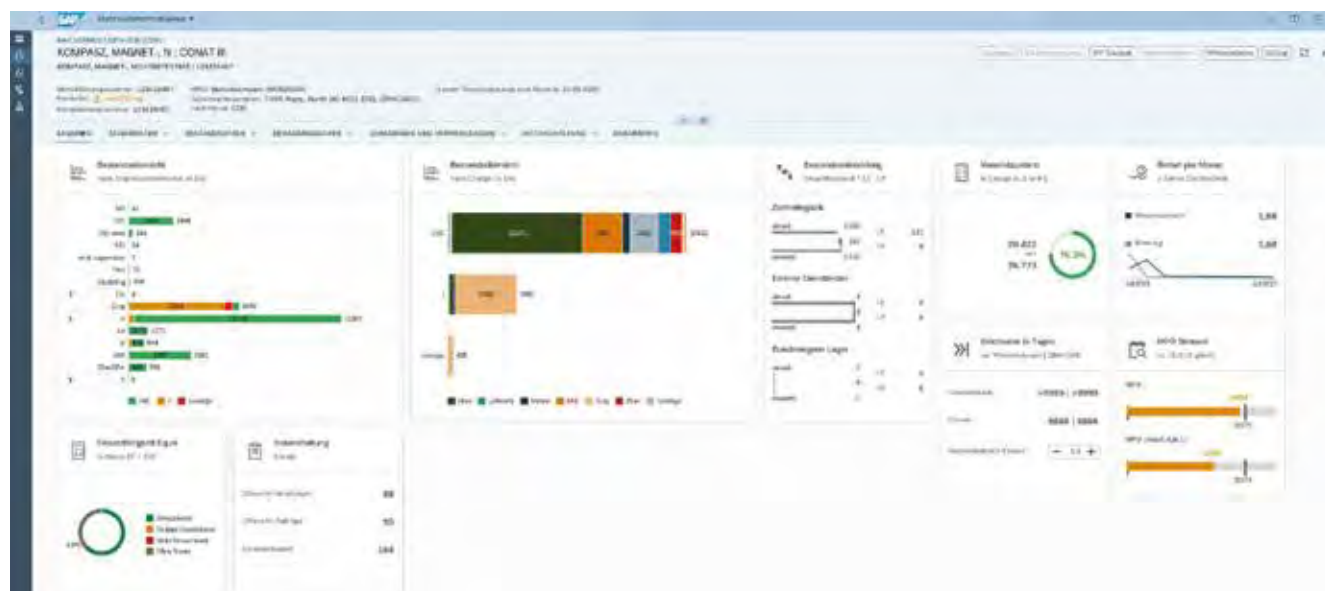
The Current Status of the IT Support Project IT-U CPM

The project "IT-U CPM, Ablösung EMIR und IVF-VOCON" (IT support for Customer Product Management and replacement of both EMIR, the armaments electronic management and information system, and IVF-VOCON, the integration of project management tools for project controlling) will provide modern, integrated, efficient, and continuous IT support for the management of defense projects. Since the contents, advantages, and objectives of the project were already detailed in the December 2019 edition, this article will instead focus on its status of implementation.

The project is currently undergoing a test rollout. This phase is aimed at migrating

the new, integrated IT-U CPM solution. In addition to technical aspects (development, implementation, migration), user acceptance will have to play a major role in the process. This is a decisive factor for the success of a project of such scope. Besides project-related initial training, acceptance can also be built through active change management.

In the current phase of the test rollout, the goal is therefore to gradually involve all the project directorates of BAAINBw in the rollout process. Crucial developments were completed by the end of last year. Thus, 2020 saw the establishment of the technical requirements for the integration of all procurement channels needed in a project – such as for the procurement of material and services via private-sector-like practices or via foreign military



Grafik BAAINBw G4.6

Situational overview of the „Materiel Data“ increment

provides the option to display general information on each supply item in an initial situational overview (see Fig. 2). The project draws on modern and customer-friendly user interfaces (SAP Fiori and SAPUI5 technology). Starting from this overview, users can access more detailed information – in accordance with their tasks and level of authorization – down to the level of order requests for individual items or maintenance reports. The application is compatible with all mobile devices, so that in the future, the "In-Service Use Dashboard" and its applications will be available anywhere and at any time to all authorized users, from the project manager at BAAINBw and the class manager at the Bundeswehr Logistics Center to the motor sergeant in the field. This is the next step towards a digital future of the armed forces.

smaller projects from different BAAINBw project directorates, focusing on functionalities and their testing. Over the course of the project, increasingly large test rollout projects will be migrated, so that in the near future, the solution will be tested to its full extent until it can eventually be approved for large-scale rollout (awarding of Rollout Maturity). Once the large-scale rollout is finished, the legacy procedures still in use today can be replaced. As the scope of project migration gradually increases, so will practical experience, which will lead to new insights for all parties involved. This is not just a question of improving the expertise of migration and implementation experts. Especially with regard to the large-scale rollout, it also concerns the more than 3000 users, who will have to take the step from the old system to

sales (FMS). In the near future, more extensive projects can therefore be migrated to the application and the proof of large-scale-rollout maturity can be provided; this is a prerequisite for large-scale rollouts.

Data Management in the Bundeswehr – the Foundation for Data-Driven Decision-Making

Data is central to the management of integrated business processes. This principle also holds true for the Bundeswehr. The transition from highly specialized individual applications to a single, integrated information platform calls for data to be stored in the form of standardized master data. The digitization process increases the relevance not only of process

A Further Insight



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

ESD: The COVID-19 pandemic has revealed the importance of IT and teleworking.

The Bundeswehr has also had to adapt. What has been your experience as an IT support provider in recent months?

Hartung: The digital transformation is not just a trend or an unexpected consequence of the COVID-19 pandemic, it is a necessary transformation to ensure that our society can continue to function in the future. The digitalization of work is being pushed ahead by the pandemic.

For us, this has meant, for example, providing employees with mobile IT equipment and no longer holding meetings in person, but rather via VTC or WebEx. These changes protect employees and at the same time ensure that they can work. However, further steps are required with regard to the availability of tools and mobile IT equipment.

ESD: Important milestones have to be reached in several projects this year. How do things stand? What do you expect in 2021?

Hartung: A major milestone in 2020 was the successful completion of the project "Logistic Support of Class 125 Frigates". Despite the difficult conditions caused by the pandemic in the last project phase, this project was completed on time, on scope and on budget.

Important milestones were also achieved with regard to efficient IT support for Bundeswehr logistics. Functional gaps are successively being closed and systems in use are being replaced by integrative solutions.

The 1/2020 Major Release (MaR) unfortunately coincided with the initial period of the COVID-19 pandemic. As a result, it was not possible for a number of participants to jointly perform the indispensable functional, integration and regression tests on site. For the 2/2020 MaR, we instead carried out the necessary tests in a decentralized manner for reasons of safety. Release components that could not be used productively before are now made available with the 2/2020 MaR. These organizational changes have proven successful and are being applied in a similar fashion in 2021.

Following the successful go-live of the project "IT Support in Regional Medical Treatment Facilities and S-Track Setup" on 23 November 2020, the large-scale rollout in approximately 180 agencies will begin in 2021 and is expected to last until the end of 2022. In addition, telematics infrastructure for participation in health insurance master data management (VSDM) will be implemented in the Bundeswehr hospitals in cooperation with BWI by the end of 2021. The project "Clinical Medical System on Operations" (KMSE) went live in November 2020 and will enter a test and trial phase of about one year at Feldkirchen in

2021. If the project is approved by the Bundeswehr Joint Medical Service, it can be used as a rollout subproject on operations abroad in the future.

With the strategic objective "Implementation of a Bundeswehr Electronic Health Record" (eGABw) and with a view to the Digital transformation of Bundeswehr health care (Digit GesVersBw), the analysis phase of the project group "Basic IT Support Services for Bundeswehr Health Care" will start on 1 April 2021. This includes, among other things, the project elements for the central storage and evaluation of medical documentation (Health Evaluation, Reporting and Analyzing System - HE-RAS) as well as a health care data exchange and integration platform (Health Information Management System - HIMS). These and other major elements will be implemented by the end of 2025.

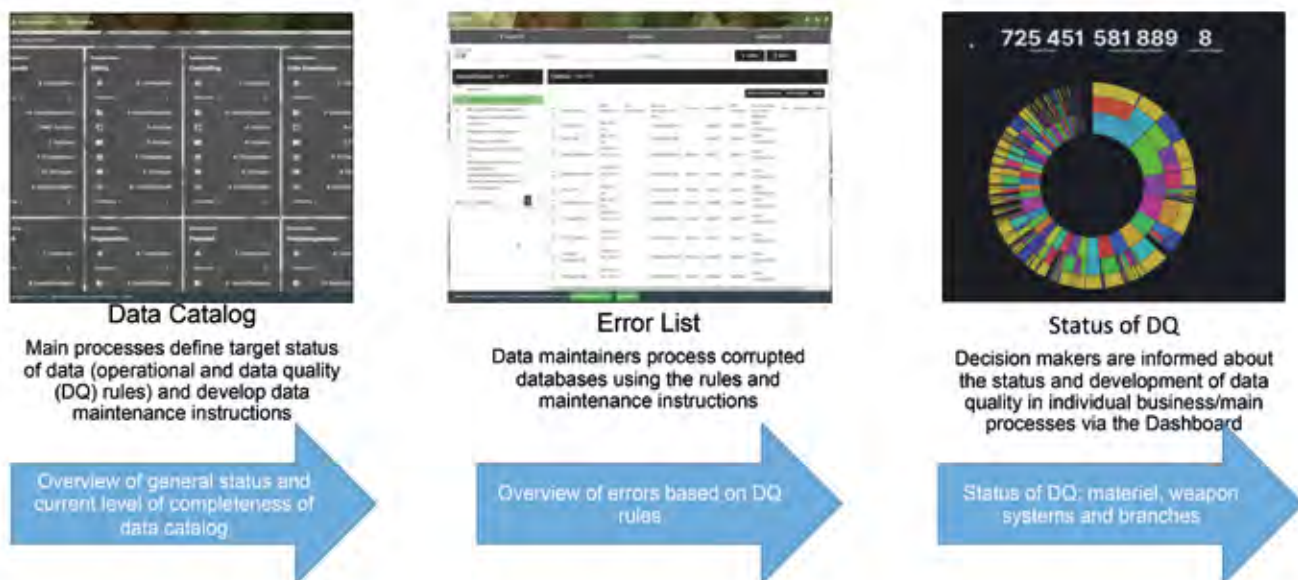
ESD: What has been your experience in migrating to the HANA database technology? What are the consequences for future migration projects?

Hartung: Planning for the migration of current databases to the HANA database technology started in November 2019 with the phases "functional adjustments of the customer code", "SQL performance optimization of the customer code" and finally "migration of the various systems and system tracks to the HANA database". Starting in February 2020, a total of 52 systems, some of them very complex, were migrated in accordance with test and deployment planning for SASPF major releases. Approximately 9,000 static code checks were performed using standard tools. In addition, customer code optimization was conducted for the TOP 10 performance issues. This was an outstanding achievement. With an enormous effort, this migration was quietly implemented without a significant drop in performance for users.

With this transition to in-memory technology, I expect significantly higher computing power, which will lead to faster database access and thus to increased user satisfaction. Analytical evaluations will run significantly better. On the whole, the migration to the HANA database is a basic prerequisite for the next big step: the migration of SASPF from ECC 6.0 to S/4 HANA, the next generation product.

Key features of S/4 HANA include new operational and practical functions, real-time information and response options, the use of predictive applications, a simplified data model, and customizable, interactive and intuitive user interfaces. This ensures that the Bundeswehr can participate in the ever-faster innovation cycles of information technology.

This interview was conducted by Lars Hoffmann.



Tools and stakeholders for high data quality

orientation but also of a reliable database. After all, digitization is based on data! Data is the backbone of economic, ecological, social, and technological development. Globally, data is a strategic resource that should be exploited as efficiently as possible.

In order to be prepared for a future characterized by digital transformation, the Bundeswehr has to evolve into a digitized, data-driven organization. With the aid of the rapidly increasing amount of collected data, decisions can be made in a more efficient and reliable manner, often in real time. This requires a reliable quality of data. In order to improve data quality, effective data governance will be established in the form of an organization monitoring the compliance with rules and guidelines for the handling of data, led by the Chief Data Officer. A successfully implemented data strategy enables leaders on all levels to actively promote mutual and transparent data exchange. Strategic goals and fields of action have to be put into practice jointly and with determination to reap more

benefit from the extensive databases. It is essential that the data be of the highest quality possible, as this is a prerequisite for automated business processes.

By pursuing an approach consistently based on digitization and data, the Bundeswehr and its partners in NATO and the industry can harness ideas from "Industry 4.0" concepts for military purposes. In this context, compliance with standards, guide-lines and processes will improve interoperability within NATO or with other systems of joint preventive security. Data has to be managed actively in such a manner that, in conjunction with applications and processes, it can support core tasks. Thus, the process-oriented Bundeswehr will be enabled to make better decisions based on high-quality data content.

The SASPF Program – Implementing a Program Organization

With the approval of the Federal Ministry of Defense's program strategy document

"Programmstrategie SASPF", objectives and implementation guidelines were specified for SASPF. The core objective of SASPF is and will be to ensure the digitization of logistic-administrative processes in the Bundeswehr using IT support services that are as standardized as possible. The official starting point of SASPF was when the director of Directorate G was appointed SASPF program director by the director-general of BAAINBw in November 2019. In order to support the program director, an SASPF program organization was established as a staff within Directorate G on 01 November 2020. The task of the SASPF program organization, led by the SASPF program manager, is to assist the program director with his cross-project control tasks and to contribute to the achievement of stipulated program objectives, taking into account the available resources, especially personnel and funds.

For this purpose, certain task areas were planned and assigned to the SASPF program organization. These are: program control, program governance, and program planning, as well as risk management and an element for technical specifications on the program level.

The groundwork is laid. Now the task is to bring to bear the SASPF program organization with its abovementioned functions in an optimal manner in order to be able to support the SASPF program director and his project managers, and thus the achievement of the program targets, in the best way possible.



Task areas of the SASPF program organization staff

Complex Services/Purchasing Directorate (E)

The task spectrum of Directorate E, the Complex Services/Purchasing Directorate, comprises all three pillars of the procurement and in-service support management process: Bundeswehr purchases, the satisfaction of demand via complex services and, to some extent, also the procurement of material solutions in compliance with Customer Product Management (CPM) principles.

These tasks are being performed at the sites in Lahnstein and Koblenz by three divisions with thirteen branches which are supported by the Directorate Staff (EAS) and the Directorate Controlling (EAC) elements. In total, Division E has around 300 staff members.

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. Procurement by Bundeswehr Purchasing also encompasses follow-on spare parts for weapon systems and equipment during the in-service use phase as well as 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. The items purchased range from small parts to Bundeswehr-specific materiel for complex weapon systems.

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 II at the Federal Ministry of Defense. It is at that level that the organizational framework for Bundeswehr Purchasing is set, the purchasing strategy is adopted, and the relevant guidelines are issued.

A key element of the Bundeswehr Purchasing system is strategic planning and control through independent segment management. 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 roughly mirrors this logic.

By introducing the strategic purchasing process, sustainable progress could already

be achieved owing to optimized requirements planning which was coordinated with the users. The main focus is to conclude framework and multiple-delivery agreements with a term of several years with Bundeswehr suppliers.

From a logistic point of view, this strategic approach has 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. The satisfaction of demand via direct deliveries (distribution logistics) has changed the processes and procedures in the areas of procurement and logistics. The target of Bundeswehr Purchasing is to satisfy demand in a time-, quality- and performance-oriented manner.

In order to improve the management of the Bundeswehr Purchasing process in the long term, the instrument of the static purchasing plan formerly approved once a year was changed into a dynamic purchasing plan submitted on a quarterly basis. 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. Any arising obstacles and difficulties can thus be identified, analyzed and eliminated through targeted measures at an early stage.

Division E1 consists of three branches. It pursues the following tasks:

Branch E1.1:

- policy issues, purchasing trends, planning the purchasing process,
- continuously developing the Bundeswehr Purchasing process,
- managing the Bundeswehr Purchasing performance process, procurement business process,
- analyzing the purchasing process, purchasing statistics,
- managing catalogs ("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,



Einkauf
der Bundeswehr

Bundeswehr Purchasing logo

- order information, contract statistics and managing creditor-related data,
- business information and information from the Central Trade and Industry Register.

Branch E1.3:

- reviewing and managing demand requests, technical coordination,
- SASPF coordination,
- 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. The structure of Division E2 is based on the ecl@ss industrial standard.

The fact that the division is structured according to different material segments 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.

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 a continuous phase of build-up and expansion since 2018. One key element is the reminder procedures element, which was established in October 2019 for the operative Bundeswehr purchasing tasks performed in Division E2 and is concerned with monitoring compliance with contractually agreed delivery dates. The supplier management team provides support to the operative purchasing branches E2.2 to E2.5. Branch E2.4, for example, has received support for the urgent procurement of medical supplies during the coronavirus pandemic.

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. In future, supplier management is intended to support the strategic and operational-level parts of the Bundeswehr Purchasing process in monitoring the market.

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 these strategic activities, Branch 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 thus 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 if 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 three branches procure almost all of the follow-on spare parts which are required by the armed forces for weapon systems and equipment during the in-service use phase. 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. This brings together the expertise on specific weapon systems in one branch and promotes the cooperation with the corresponding project team.

In future, operational procurement is intended to be developed further by continuously optimizing the Bundeswehr Purchasing process. This can be achieved, for instance, by further increasing the number of framework agreements.

PPP/Complex Services – Division E3

Public-private partnerships (PPP) – Complex Services constitute the third pillar of the procurement and in-service support 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 or through Bundeswehr Purchasing, 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. It consists of five branches. The tasks formerly assigned to Branch E.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): maintenance and repair 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. Material management services for government-owned stores of the German Air Force which are not self-sufficient and development of an interface between the IT system of the contractor and the IT system of the Bundeswehr.
- Clothing management: supplying the military and civilian personnel of the Bundeswehr with clothing and personal equipment / operating a sales network for the purchase of service clothing for persons eligible pursuant to Section 69(1) of the Federal Pay Act (self-suppliers/partial self-suppliers).

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 projects mentioned. Projects for complex services are systematically developed, 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 contract and price negotiations 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.

A Further Insight



One-on-One with Bettina Knappe, Director BAAINBw and Head of the Purchasing Directorate (Directorate E)

ESD: What is the main focus of the directorate at the moment?

Knappe: Against the backdrop of the COVID-19 pandemic spreading across the globe since the beginning of 2020, BAAINBw has been tasked with procuring items of personal protective equipment (PPE) both for the Bundeswehr and – in the context of administrative assistance – for the German Federal Ministry of Health. The Working Group on PPE Procurement, which had been established for this purpose, and Directorate E of BAAINBw assumed lead responsibility for this special task, which could be

accomplished professionally and quickly in a hot, highly competitive and volatile global market in close cooperation with other BAAINBw directorates.

The Bundeswehr demand for PPE has meanwhile been satisfied to a large extent.

The demand of the Federal Ministry of Health was satisfied in close cooperation with other governmental procurement agencies in the framework of administrative assistance.

ESD: Where do you see opportunities for improvement in the area of purchases for the Bundeswehr?

Knappe: Following the successful completion of a comprehensive evaluation process of the Bundeswehr Purchasing system until July 2020, it was decided with ministerial approval to implement a large number of measures in order to maintain and enhance the operational readiness of the Bundeswehr.

One of the most important measures is organizational optimization. This shall be achieved, amongst other things, by concentrating responsibility for the procurement of weapon system-related supply items in BAAINBw.

Furthermore, the competences in the field of contract law and contract award law shall be concentrated at one organizational level, and the workload for the operative purchasing staff shall be reduced by performing common tasks, such as the planning of education and training measures, centrally.

The automation of the awarding process, in particular for the procurement of commercial off-the-shelf items, as well as the digitalization of the purchasing process oriented towards paperless procurement also range among the measures offering considerable potential for optimization.

Personnel management measures, such as improved career opportunities in the field of Bundeswehr Purchasing, shall help retain experienced staff members and their expert knowledge in the Bundeswehr Purchasing system.

ESD: What is new with the procurement of clothing? Do you see any deficits in the clothing for military personnel?

Knappe: Last year, the budget for the procurement of clothing was raised by 1.3 billion euros. The largest portion of these budgetary funds will be used to meet the foreseeably greater demand for clothing and equipment up to the year 2025.

Projects of particular significance include the Armed Forces Combat Clothing (KBS SK), the Modular Ballistic Protection and Load-Bearing Equipment (MOBAST) and the Armed Forces Combat Boot System (KSS SK).

Armed Forces Combat Clothing kits will now be procured in significantly greater quantities, so that all servicemen and -women can in future be outfitted with them in operations, standby commitments and exercises. MOBAST will be fielded as the new generation of class 4 body armor with ballistic underwear for protection against micro fragments and a corresponding load-carrying equipment. The contract provides for deliveries up to the year 2025 at first. Follow-on procurements are planned to take place from 2026 onwards. With the Armed Forces Combat Boot System, all servicemen and -women are gradually being issued new combat boots in both a light and a heavy version, and they can choose between two different models in each case.

The Armed Forces Combat Helmet and the Special Forces Combat Helmet System are two projects which have recently been initiated. The new combat helmets will offer optimum protection with enhanced wearing comfort as well as more possibilities for attaching modern auxiliary equipment or wearing the helmet combined with the auxiliary equipment.

The interview was conducted by Michael Horst.

Extensive service contracts and/or framework 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). These contracts are being continuously adapted on the basis of contract amendments. Large-scale amendments in the relevant projects with a contract value of more than 25 million euros are subject to the participation of the Budget Committee of the German Parliament (Bundestag).

Presently, the negotiations with the current clothing supplier about extending the contract period for the interim solution by another three years from 2021 onwards are nearing completion.

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

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

In that context, its 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, Branch 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 well as the basic training of motor vehicle drivers (class D).

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 current developments in the Bundeswehr Vehicle Fleet Service (BwFPS) described below serve 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 range from the provision of commercial vehicles, commercial special-duty vehicles (such as fire-fighting vehicles, medical emergency vehicles and construction vehicles) as well as commercial vehicles with special military equipment to the provision of services.

Apart from performing regular tasks in order to provide commercial, unprotected vehicles for the Bundeswehr, the BwFPS system has been developing and 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). The work results thus achieved will be submitted to a critical review and will significantly contribute towards ensuring the supply of unprotected vehicles for VJTF 2023 and 2027. An instance of demand for BwFPS support arises when, based on the situation in a mission country, military



Workshop equipment provided by BwFPS GmbH

forces assume control, maintenance, material management, spares management and data management tasks for 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 person-

nel 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 will set up more than 4,000 "smart charging points" in the next few years, in addition to the 219 charging stations already being installed at the moment. In future, it will thus be possible to efficiently charge approximately 3,800 electric vehicles in total. ■

Photo: Bundeswehr

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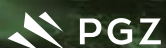


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Directorate T - Common Technical, Logistic and Economic Activities

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. Operations analysis, fast-track initiatives for operations),
- Support (e.g. for the BAAINBw executive group, projects, other directorates, all logistics processes),
- External representation (e. g. of other major organizational elements, agencies, ministries, partner nations and international organizations),
- Licensing authority (e.g. for transportation licenses), surveyor activities (e.g. accident investigations, price audits).

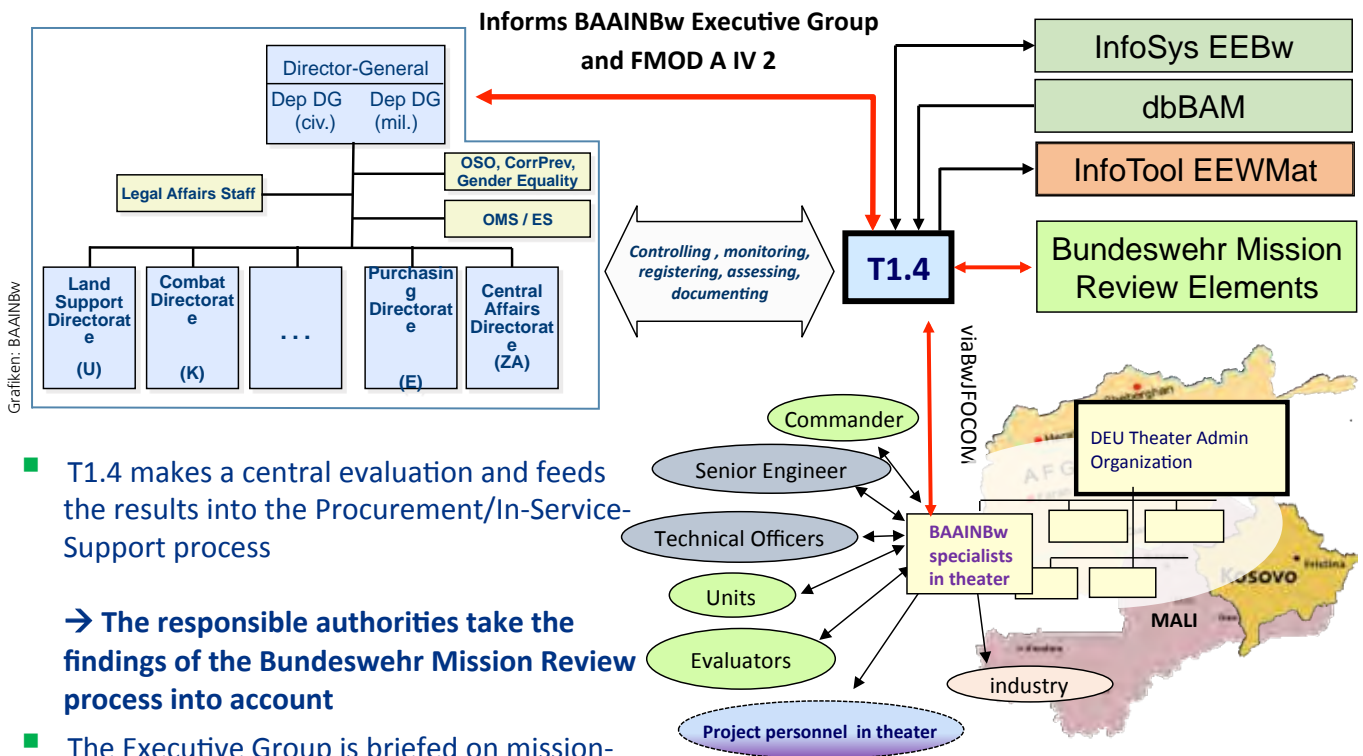
Bringing together and concentrating common specialist tasks, Directorate T plays an essential role in the sequence of BAA-INBw activities. In addition, Directorate T is deeply involved in the strategic topics

of the Armaments Agenda, the strategic control of research and technology matters and the In-Service Support Agenda. Consequently, Directorate T also plays an important role in efficient armaments management.

Division T1

At Division T1, the following tasks have been combined: mission-related matters, overall coordination of research and technology (R&T), international cooperation, project-related international departmental agreements, administrative assistance and enabling and enhancing assistance. The spectrum of the Division T1 is complemented by tasks relating to policy, technologies for modeling and simulation (M&S) and for concept development and experimentation (CD&E), tasks relating to foreign defense material, national and international standardization, and technical specifications.

Branch T1.1 acts as central contract branch for Directorates ZA, T and ZtQ, and for the Operational Management Staff / the Executive Secretary and 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. Branch T1.1 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 but also 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,



The role of T1.4 in the mission review process

European Defence Agency EDA and OC-CAR). 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 (MoU), Project Arrangements (PA) and Data Exchange Arrangements (DEA). Within the scope of the FMS procedure, procurement contracts for weapon systems and associated spare parts are concluded with the US Government.

Branch T1.3 coordinates and manages international cooperation in the field of common defense technological cooperation not linked to specific projects. This branch is BAAINBw's central point of contact in general matters related to OC-CAR 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 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.

Branch T1.5 coordinates all BAAINBw activities in the area of defense-related R&T. Common objectives of all F&T activities are:

- ensuring that the FMoD has an organic capacity for analysis and evaluation to identify new technologies and their impacts on threats to, and capabilities of, the Bundeswehr; and
- providing 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 material. The findings thus gained provide a valuable basis for the analysis of capability gaps and the technical adaptation of systems fielded in the Bundeswehr in line with existing threats.

Branch T1.6 is responsible for modeling and simulation (M&S) and 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 include, 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

The project managers of the division are responsible for the procurement of defense material, the observance of 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 experts for "product-specific protection activities" of Division T2.

During design and use of defense materiel – whether during tests, in routine duty or in



Group T2 is investigating these aspects on a protected vehicle.

A Further Insight



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

ESD: What areas of work is Directorate T focusing on at present?

Bäumler: Directorate T is where the most important technical, logistic and economic cross-sectional activities of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service

Support are pooled and managed. We have a wide range of responsibilities and provide specialized expert advice. Directorate T supports the project directorates in all technical, economic and logistical matters across projects and products. It may sound simple, but these actually include highly specialized areas affecting several projects and products. These areas comprise occupational safety, environmental protection, ergonomics and logistics, international project arrangements, cost estimates, and cost-effectiveness evaluations as well as control tasks, for example in mission-related matters or R&T. This makes it difficult to name key points, since all the services of Directorate T are requested continuously. Our current focus is on issues concerning the improvement of materiel readiness. I am responsible for an In-Service-Use Agenda subproject concerning spare parts/replacement parts management in which we are attempting to optimize the spare parts/replacement parts supply for our projects to ensure operational readiness and eliminate problems. Special attention is being paid to the establishment of a 30-day operational reserve of spare parts and replacement parts. This is part of the realignment of the armed forces towards national and collective defense and is an element that ensures logistic support in possible operational scenarios.

We are also heavily involved in the In-Service-Use Agenda subproject "Further Development and Establishment of Bundeswehr Supply Chain Management" (SCM Bw). With this project, we aim to increase information transparency for logistic stakeholders, optimize supply chains, and ensure long-term logistic effectiveness and efficiency. Let us talk about another key point, namely operational activities. In addition to ensuring direct support to German forces involved in MINUSMA in Gao (Mali) with the "Key Federal Office Personnel on Operations" cell, we are currently coordinating the materiel-related support provided for the redeployment of the German RESOLUTE SUPPORT contingent in Afghanistan with the Logistics Command and the Bundeswehr Joint Forces Operations Command. For this purpose, we are identifying those responsible for materiel at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support, are implementing their decisions about materiel with regard to its return to Germany or its disposal and recycling on site, and finally are ordering the disposal of the materiel that will not be returned to Germany.

With our French partners, we have also set up a German-French cooperation project in the field of testing and evaluation. This project aims primarily at ensuring the exchange of information and procedures and at opening up new fields of collaboration.

ESD: What current activities are there in the Foreign Military Sales program with the US Department of Defense? Are there any new considerations / requirements / trends?

Bäumler: As part of the American program Foreign Military Sales (FMS), the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support is currently managing more than 300 contracts in the "Army", "Navy", "Air Force" and "Training" subareas. These contracts are mainly long-term procurement contracts for the Bundeswehr, but also for other German agencies, with a term of several years. In addition to the actual procurement of defense material, these contracts also cover the procurement of spare parts and the contracting of services and training measures to a substantial degree. To name a few examples for 2020, there is the procurement of spare parts for the CH53 helicopter in the "Navy" area, several contracts for the procurement of GPS receivers in the "Air Force" area, the testing of M982 Excalibur 155 mm artillery ammunition for the PzH 2000 howitzer at Yuma Proving Ground in the "Army" area, and the extension of the Euro-NATO Joint Jet Pilot Training (ENJJPT) program in the "Training" area.

The FMS program therefore remains an integral part of procurement and is an example of successful transatlantic armaments cooperation.

ESD: Do you see any opportunities for improving the operational readiness of major weapon systems in your area of responsibility?

Bäumler: The demand-oriented supply of required spare parts is important for ensuring the operational readiness of weapon systems in the armed forces. These parts must be available on time at the workplaces of maintenance personnel in Germany and abroad, both at military and civilian maintenance facilities. In the context of the In-Service-Use Agenda subproject concerning spare parts/replacement parts management, for which I am responsible, we identified ways to improve the supply of spare parts/replacement parts and we initiated appropriate measures that are already showing first signs of success. For instance, we were able to improve the information flow for project managers and to optimize established processes and procedures. The objective of the SCM Bw subproject that I mentioned before is to identify problems in the supply chain and to increase information transparency for all parties involved. Such information is invaluable in an increasingly connected world. Another very challenging and important project is the "establishment of a 30-day operational reserve of spare parts and replacement parts" with a view to increasing the total amount of spare parts supplies in the logistics system of the Bundeswehr and to making them available more quickly. This will ensure readiness for possible operational scenarios, initially with a focus on the Very High Readiness Joint Task Force (VJTF) in 2023. The establishment of this operational reserve is coordinated by Directorate T at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support.

Die Fragen stellte Michael Horst.

operational environments – statutory and Bundeswehr-specific provisions on occupational safety and health and environmental protection must generally 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.

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 it has to be assessed whether the protection of the personnel and/or the environment can still be adequately ensured with these measures. The assessment of the proposed solutions, which may involve waivers and deviations from occupational safety and environmental protection regulations, is another responsibility of Division T2.

Apart from these traditional responsibilities in the field of occupational safety, the focus is also increasingly on functional safety and/or software security when assessing system safety due to progress and the dominance of smart system components in weapon systems.

In addition, Division T2 deals with the investigation of accidents during weapons and ammunition handling. The "Officer for Design Safety of Ammunition and Firing Safety at BAAINBw" is also part of the division.

Another task of Division T2 is to take care, at an early stage, of the disposal 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, of weapons law and environmental law. If the suitability criteria are met, the materiel is sold – via the government-owned trust company VEBEG responsible for the utilization of discarded property – to third parties or transferred to friendly nations/organizations entitled to receive such materiel. The Scientific Collection of Defense Engineering Specimens (WTS) is BAAINBw's

defense engineering archive and contains functional demonstrators. As such, the WTS contributes to preserving expertise in the armaments sector and thus supports the career training of civil servants and pre-deployment training of forces by lending out foreign weapons. Interested citizens have access to the public part of the exhibition, which is located in Koblenz-Lützel and comprises 2,500 exhibits, allowing them to trace the major lines of development in military technology from the late 19th century until today.

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Finally, Division T2 coordinates and supports 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 (T3.2),
- Price Auditing Airframe/Engine Aeronautical Equipment (T3.3),
- Price Auditing Materiel Maintenance, Missiles, Other Aeronautical Equipment (T3.4),
- Price Auditing Electronics, Sensor Systems (T3.5) and
- Price Auditing Weapons and Ammunitions, Wheeled and Tracked Vehicles, Ships and Vessels (T3.6).

The task of the cost competence center is to provide support concerning economic aspects for the execution and implementation of projects and programs in all phases of the CPM. This is achieved by

- parametric and calculated cost estimates,
- economic efficiency evaluations and efficiency considerations for armaments 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 the CPM. The support of economic efficiency evaluations within the context of "external advice and support (eBU)" rounds off the task spectrum of Branch T3.1. In addition, T3.1 is the central point of contact within BAAINBw for matters regarding life cycle cost management and provides the representative in the NATO Working Group WG/3.

The tasks of Branch T3.2 range from

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

The task of the operative price audit branches T3.3 through T3.6 is to provide, within the context of price audits, an expert opinion on whether the cost prices are appropriate in terms of technical and economic aspects and whether they are in conformity with pricing law. For this purpose, they assess the quantities and values quoted by contractors.

Division T4

Division T4, in charge of "Common Activities Relating to Expenditures for Equipment, In-Service Use and Logistics", combines responsibilities of a primarily common technical, economical and logistic nature.

The tasks of Division T4 focus on project support by managing logistics as a project element. It serves as the link to the Bundeswehr Logistics Command and is, as such, an essential service provider in the implementation of product-related logistic processes. Furthermore, in cooperating with the Logistics Command, BAAINBw strongly contributes to the tailoring and further development of the Bundeswehr Logistics System.

Branch T4.1 assumes basic equipment, in-service use and logistics tasks and advises the project branches with regard to the logistics project element within the framework of technical support tasks. In clear contrast to Branch T4.1, Branches T4.2 to T4.5 provide operational support to 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. The branch 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, Branch T4.2 assists the project directorates in all matters of disposal of defense equipment, and it coordinates all disposal measures at BAAINBw. The appointed Defense Materiel Disposal Officer then makes final decisions about all disposals.

Branch T4.3 maintains the catalog of materiel planning objects for the Bun-

deswehr 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 the codification of materiel (on individual request); it is responsible for user administration in the "equipment component list" data processing procedure; and it 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). It also exercises functional supervision in terms of their logistic tasks regarding the organization of work, materiel management, maintenance and equipment planning. Moreover, Branch T4.4 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 (BAIUD-Bw), the Bundeswehr universities and the Bundeswehr Geoinformation Office. It is also responsible for disposal-related exports/shipments and for Bundeswehr materiel transfers to other countries, including requests to the Federal Office for Economic Affairs and Export Control (BAFA), 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, the end use of defense materiel, and 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. This includes the subproject for the optimization of spare part and exchange part management, the development of principles for the preparation/management of the project-related logistic concept as part of the In-Service Use Agenda, the restructuring of the fixed logistics facilities (oIE 2019+), the preparation and continuous revision of the A2 general publication on 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. ■

Technical Quality Management Center (Directorate ZtQ)

Next stop: Quality 4.0

In many industries engaging in the development, manufacturing and maintenance of complex products problems related to quality are becoming ever more salient. Development phases have become shorter and therefore rarely result in robust concept readiness levels. Electronics and software components require extensive integration. Production and supply chains span the globe in an intricate web. And customers ask for modifications more often. Accordingly, tried and tested structures, procedures and methods for the coordination of project management and quality management (QM) requirements are proving increasingly less effective.

As the saying goes nowadays, the world is spinning ever faster – or at least that is how it feels to many. Errors made at the beginning of a project can therefore spin more and more out of control in more unpredictable ways, affecting many other areas negatively in the process.

Accordingly, the early and consistent integration of BAAINBw's ZtQ, the Technical Quality Management Center, is increasingly becoming a requirement for subsequent economic and engineering success. This is true especially for showcase projects, programs and products in the procurement and in-service organization within the remit of the German Federal Ministry of Defense (BMVg). Therefore ZtQ, acting in an ever more globalized and digitalized environment, needs to continuously develop its own processes, procedures and methods – whilst also keeping an eye on developments in its vicinity – in order to bolster its reputation and remain a reliable partner in the QM community.

Strategy Provides Guidance

Quality 4.0 (or Q4.0 in short) describes the path towards the comprehensive digitalization of quality management, the integration of new methodologies and simultaneously changing priorities in industrial planning, production and in-service phases for products.

Strategy isn't everything. But without strategy, everything comes to nothing.

The implementation of Q4.0 requires a clear vision of the desired goal state and a strategy defined by its comprehensive approach and level-appropriate communication, aimed at reaching the goal. The strategy takes into account not only one's own organization but also its context and



Photo: Silke Vogtmann, Vogtmann-Herold u. Co. GmbH

associated interfaces. The ZtQ Directorate has many hundreds of such interfaces: its strategic partners in the defense industry, the Federal Ministry of Defense, QM representatives in the partner nations, other authorities, agencies and offices, Bundeswehr units and commands, Bundeswehr maintenance facilities and service centers or interest groups.

This is why it is almost inevitable that sometimes the metaphorical road is bumpy and errors are made. This is especially true when the key stakeholders, that is other organizations or officials acting at the relevant interfaces, fail to formulate their own expectations in a way that is clear and mutually consistent.

Unclear or contradictory goal systems, areas of responsibility or requirements are all the more detrimental in case the stakeholders are interdependent. Digitalization is laying bare this fact ruthlessly. Actually, successful implementation of the "basic building blocks" of electronic administrative work (eFiles, electronic processing procedures, electronic cooperation, electronic functional control procedures) requires (a) far-reaching integration and interconnection of what have seemed "isolated" IT solutions until now and (b) the exploitability of hitherto decentralized data in central databases. These databases quickly highlight inconsistencies.

The Mindset – a Key to Implementation

Time and again, organizations fail not because of their strategy but because of its implementation.

It is clear that the degree of implementation of Quality 4.0 should be adapted in each company according to their specific framework conditions or staff and financial resources. The ZtQ Directorate is convinced that there is one fundamental, common requirement for success on the path towards Q4.0 – the mindset.

Change requires dynamism and an eagerness to develop. It also requires the ability to lead feed-back discussions in a way that is skills-oriented, relies less strictly on traditional hierarchy and focuses on specific tasks, shared values and the common good in an exemplary manner in order to allow for constructive criticism.

At the end of the day, it is not speeches, publications and concepts that decide how well the opportunities afforded by the digitalization of quality management are used, whether new methodologies are introduced or future-oriented priorities are applied. Instead, it is pragmatism and concrete action that make the difference. And the latter can only be achieved when all stakeholders have the right mindset.

This means that Q4.0 is inextricably linked to “Leadership culture 4.0” and must not be analyzed in isolation. Therefore, the path to modern project management and quality management always begins with the selection and training of staff and executive officers – as well as suppliers.

The Development of Suppliers: Understanding Complaints as an Opportunity for Continuous Improvement

Products are manufactured by the industry, not by BAAINBw.

However, BAAINBw can share in the planning and design process. For this reason, Q4.0 has to begin early on in the project when data surveys, ideas or project planning concepts and contract drafts are to be generated in collaboration with the project management team (with modern IT support).

Important preventive QM activities include participation in the design process of a product (key notion: a design ensuring adequate manufacturing, assembly, maintenance and quality) as well as con-

cepts and measures which support the selection of contractors and continuously ensure supplier quality and contractors’ process capability. In addition, these activities are necessary not only because project development phases become ever shorter, resulting in concept readiness levels that are often not robust. They are also necessary because customers increasingly call for modifications during the product life cycle.

It is probable that preventive QM will become even more pivotal. That is because Government Quality Assurance (GQA) and the GQA inspections carried out by the ZtQ Directorate in its framework are not only aimed at ensuring that products and services are manufactured, inspected and delivered to the Bundeswehr in accordance with individual contracts. In today’s QM, the center of gravity of activities is shifting to the continual development of contractors in order to build sustainable trust in the private sector as the Bundeswehr’s strategic partner. This kind of trust can be built and strengthened through two sorts of measures.

The first measure consists in extending ZtQ’s audit activities. During audits, the contractors’ quality management and quality assurance systems are evaluated holistically. Provided that these systems are proven to be reliable, they lay the foundation for trust in the contractors’ capacity to deliver quality. Of course, an audit only gives a snapshot. The second measure concerns consistently documenting and communicating nonconformities via complaints occurring during the quality assurance process.

Of course, ZtQ’s guiding principle is that complaints must not be understood as a “slap on the wrist” or as “finger-wagging”. On the contrary, constructive complaints and their review are to be understood as opportunities. They highlight areas of potential improvement which have to be seized upon. This approach consolidates trust in the contractors’ capacity to deliver quality over time and complements the joint audits by ZtQ and the audit partners from the private sector.

All stakeholders involved profit from this approach. This is due not only to the tried and tested procedure as such, but especially to the actual potentials for optimization that are transparently discussed. As a result, not only does the supplier improve the suitability and the value of the product from the customer’s perspective. It also becomes possible to consolidate similar processes and optimize processes that are specific to the customer or the contractor accordingly. Aptly handled

complaints management can result in shortened turnaround times, optimized development and production, less junk and rework, happy employees as well as improvements in occupational health and safety and environmental protection.

At the end of the day, the primary goal of any company competing in the defense industry is to make profit. Leaving aside the case of very short-term strategic partnerships, raised complaints do not at all run counter to the goal of profit making. Quite the opposite.

As the ZtQ Directorate is driving forward the consistent introduction of IT-based quality management in SASPF, it is now possible to evaluate the gravity of complaints on a computerized basis (starting with the roll-out of the procurement QM module in the SAP environment). This allows to require the contractors to initiate appropriately scaled measures. The software makes it easier for the agency to document and monitor complaints. In the process, the globally used 8D report methodology is applied. The standard is known to the industry and does not pose any new challenge to the contractors. Here again, the challenge consists in instilling a new mindset in all stakeholders about how to deal with complaints. Consequently, Q4.0 touches on change management in many respects.

Easing the Burden: IT Support

Focusing on problems brings more problems, but focusing on solutions opens up opportunities.

Aiming at considerably facilitating its work, ZtQ intends to provide its employees with the information required for technical government quality management and the actual quality assurance inspections at the contractors’ sites in a timely fashion and independent of location. On the one hand, one has to consider the fact that the number of GQA officials permanently assigned to one of the many contractors is being increasingly cut down, while both employers and employees are demanding a more flexible approach to working hours and workplaces. On the other hand, the companies and projects supported by ZtQ expect the GQA staff to be employed in a highly flexible and mobile manner. The only way in which it would be conceivable to provide necessary information in a timely manner independent of location is through eFiles that are updated “quasi-automatically” during task processing in the areas of project and quality management (amongst others).

Is this too much of a utopia for the Federal Defense Administration? No.

When the use of legally watertight electronic invoices became mandatory on 27 November 2020, one of the fundamental reasons for why the use of paper files had been upheld became obsolete. Since the first functionalities of the procurement QM module in the SAP software environment came into use (also in 2020), ZtQ has been coming ever closer to reaching its goal of a “paperless GQA file”, which is a central aspect in ZtQ’s strategic orientation.

In future, it is intended that entire process flows related to the repair and maintenance of products are fully stored digitally, which will make it easier to evaluate them. This could include, for instance, the transfer of defective equipment to a maintenance company, the commissioning of the company based on the damage pattern, documentation on the results of the quality assurance inspection, processing of the invoice and delivery of the partly or fully repaired piece of equipment to the military user.

In this way, it is possible to easily analyze contractors’ turnaround times and delivery reliability without manual data collection. The same is true for classic product quality indicators, such as fail-ure frequency or required maintenance expenses. The medium-term goal is to enable the computerized evaluation of more complex performance indicators, such as idle time during maintenance activities caused by missing spare parts or costs incurred for scrapping unused stored goods or wrong orders. It should be noted that the benefit derived from data analysis for future decisions must considerably exceed the effort required to collect the data. Data collection and data analysis are not ends in themselves – instead, they initially eat up goods and man-hours.

Keeping track of the huge Bundeswehr procurement and in-service organization requires that the evaluated data (information) that is important for one’s specific area of responsibility is displayed in a clearly structured manner. Dashboards – individualized graphical user interfaces made for visualizing data – have proven fit for this purpose. They are currently being implemented, helping to pave the way towards Q4.0.

Summary

**“Keep up with the times and time will not pass you by.”
(Friedrich Schiller)**

The defense industry, like many other industries, is competing globally. Therefore, it is always beneficial to continually improve one’s own processes and flows rather than to rely on the idea that in future defense projects – for purely economic considerations – will be open-handedly launched in regions of Germany where infrastructure is poorly developed.

Audits and complaints launched by ZtQ are a fundamental driver of improvements for systems, processes, procedures and products. They are to be understood as opportunities rather than as flaws. The bottom line is: competitiveness on the global markets, the promotion of Germany as a business location of excellence and Germany’s attractiveness as a partner for cooperation are in all our interest. And they are in the interest of our European, transatlantic and global partners as well. That is why every effort on the path towards Q4.0 will be rewarded. ■

Masthead

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Lehmann Offsetdruck GmbH
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Office Address:

Mittler Report Verlag GmbH
Beethovenallee 21, 53173 Bonn, Germany
Phone.: +49 228 35 00 870, Fax: +49 228 35 00 871
info@mittler-report.de, www.mittler-report.de

Managing Directors: Peter Tamm, Thomas Bantle

Advertising, Marketing and Business Development

Stephen Barnard

Phone: +49 228 35 00 886, Mobile: +44 7984 033154
stephen.barnard@mittler-report.de

Stephen Elliott

Phone: +49 228 35 00 872, Mobile: +49 1590 173 0346
stephen.elliott@mittler-report.de

Waldemar Geiger

Phone: +49 228 35 00 887
waldemar.geiger@mittler-report.de

Dr. Andreas Himmelsbach

Phone: +49 228 35 00 877
andreas.himmelsbach@mittler-report.de

Advertising Representative, Russia & CIS:

Laguk Co., Yury Laskin, General Director

Krasnokholmskaya Nab., 11/15, 132, RF-109172 Moscow, Russian Federation

Phone: +7-495-911-1340, Fax: +7-495-912-1260, Email: yury.laskin@mittler-report.de

Exhibition Management and Advertising Administration: Renate Herrmanns

Advertising Accounting: Sabine Rump

Subscription/Reader Service:

PressUp GmbH, PO Box 70 13 11,
22013 Hamburg, Germany
Phone: +49 40 38 66 66-319, Fax: +49 40 386666-299
Email: mittler-report@pressup.de

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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 agencies in the area of responsibility. In addition, ZA1.1 handles tasks relating to supervision, 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 any issues relating to military and industrial security, the request for visit process as well as functional supervision of the subordinate sphere with regard to the above-mentioned task areas.

Branch ZA1.4 is the "BAAINBw technical information center". It 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 "Publication Management Center" established at the Bureaucracy Reduction, Publication and Working Time Management Branch at the Federal Ministry of Defense and to the "Bundeswehr Regulation Management" division 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 founding. 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 "Examination of Grants; Public Grant Law Policy; Functional Supervision of Grants Issued by Subordinate Agencies of BAAINBw".

Branch ZA2.1, besides processing general questions on tax and budgetary law, is involved in contract review and contract consulting in accordance with Sections 58, 59 and 63 of the Federal Budget Code. Beyond that, this branch supervises all outstanding government claims (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 invest-

ment-related budget chapters/items. Furthermore, this branch is home to the SASPF accounting process manager, who 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 is responsible for financial planning and funds management for materiel maintenance in the framework of materiel responsibility for operational viability. Branch ZA2.4's tasks include 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, final pricing agreements and recovery of and interest on overpaid amounts after price review.

Branch ZA2.6 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 Sections 23 and 44 of the Federal Budget Code as well as for reviewing the use of the grants in accordance with Section 44 of the Federal Budget Code. In addition, it is charged with processing fundamental issues regarding public grant law and exercises functional supervision over the processing of grants by subordinate agencies of BAAINBw.

Division ZA3

Division ZA3, "Requesting Agency-Related Personnel Activities, Functional Supervision of Procurement Activities 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 pay grade 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 agencies. The branch's responsibilities also include support for the Federal Office of Bundeswehr Personnel Management in matters of personnel recruitment measures.

The tasks of Branch ZA3.5 include, beside disciplinary affairs, general administration and consulting in matters of the equal opportunities, personnel representation and disabled persons law. The branch also deals with matters regarding the balancing of work and family life, in particular with the establishment and overseeing of BAAINBw child care facilities in Koblenz and Lahnstein.

Beyond this, ZA3.5 is charged with damage and liability investigation and allowances policy. It exercises functional supervision of BAAINBw agencies' procurement activities (contracts/contract award) and advises the decentralized military personnel management on questions of military law.

The manager of the "personnel" major process in the AIN major organizational element and the BAAINBw administrative data protection officer are also part of the ZA3.5 staff.

Division ZA4

Division ZA4 includes the branches ZA4.1 "BAAINBw IT Service", ZA4.2 "Infrastructure Affairs of the AIN Organization, BAAINBw Activities in Representation of the User", ZA4.3 "Internal Services" and

ZA4.4 "Introduction and In-Service Organization for Electronic Administrative Work".

Branch ZA4.1 is responsible for IT service. This term 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 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.

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", "Postal and messenger services", "Print shop" and "Classified material registry". As introduction and in-service organization for electronic administrative work, Branch ZA4.4 is in charge of coordinating, initiating and overseeing all measures within the scope of the introduction and in-service use of IT projects in the area of electronic administrative work, related processes and IT services for the AIN major organizational element. ■

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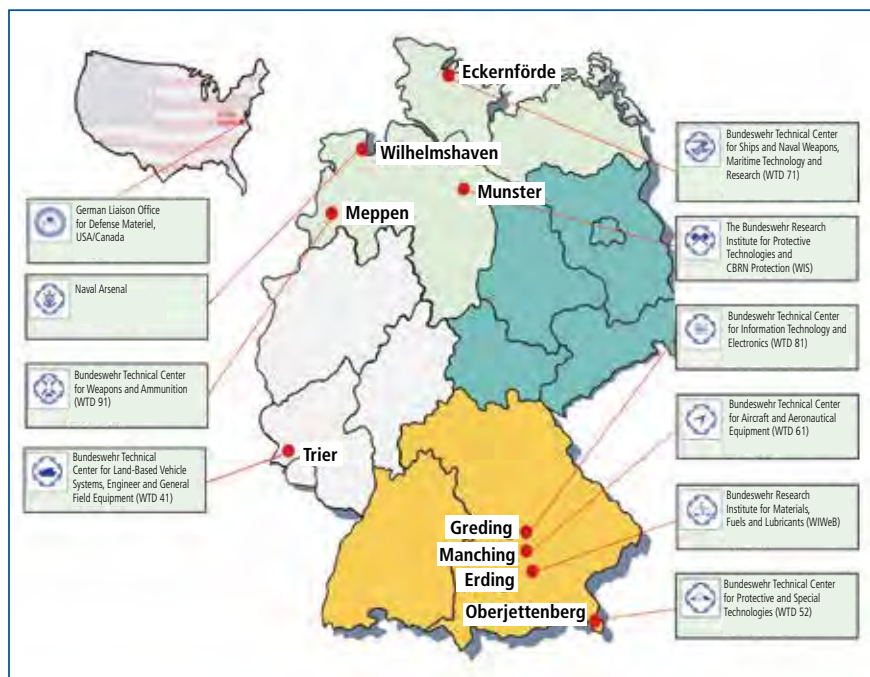
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The BAAINBw Agencies

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).



In addition, the German Liaison Office of the Armaments Division USA/Canada (DtVStRu USA/Ka) in Reston, Virginia, USA, is also part of BAAINBw.

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 and engineer and general field equipment.

The agency on Grüneberg hill in Trier provides the expertise for the assessment of wheeled and tracked vehicles including their assemblies, while the facility in Koblenz focuses on analyzing engineering and general field equipment, particularly engineer vehicles, POL supply, camp systems, wet gap crossing systems and robotics.

To perform its tasks, WTD 41 is staffed with highly qualified personnel and is equipped with a unique infrastructure at both locations. With its current staff of 460 (as of 10/2020), WTD 41 is a reliable partner for customers both in Germany

and abroad. In addition to its core activities, WTD 41 is increasingly involved in recruitment and training of new personnel. Thus, it makes an important con-

tribution to maintaining Bundeswehr defense technology expertise in its areas of responsibility, now and in future.

To verify armored, protected and unprotected vehicles with a view to the fulfillment of their requirements, standard investigations on test tracks are conducted. But beyond that, the possibilities of rescuing occupants are also assessed. In this assessment, the 'active' and independent exiting of crew members is examined. But there is also a focus on the 'passive' exit, in which rescue forces are necessary to recover crew members from inside the vehicle. Cabins and containers which are occupied during transport are also objects of investigation. Among these are, for example, the MULTI-capable container for protected personnel transport (MuCon-Pers) and the container for the protected transport of casualties (gVTC). To ensure that trial conditions are reproducible, a rollover and recovery simulator (Überschlag- und Rettungssimulator - ÜReS) was designed and procured, specifically for its use at WTD 41.

For interior surveillance, the ÜReS is equipped with an audio and video transmission system to ensure permanent contact with the crew during 'active' exiting or 'passive' recovery.

In addition to examinations of occupant recovery, other uses for ÜReS are conceivable, for instance studying conversion kit integrations. The aim here is to assess the mechanical integrity of attachment/fas-

Photo: WTD 41



Rollover and recovery simulator (ÜReS),

tening designs with a view to occupant safety in case of rollovers.

Having procured the ÜReS, the test center has now achieved the capability of simulating vehicle rollovers in a reproducible manner. This unique test equipment enables WTD 41 to continue improving the survivability of our servicemen and women during operations.

Current studies in 2020

PUMA Armored Infantry Fighting Vehicle (AIFV) trials

In the first quarter, a visual system was tested which had been newly developed for the PUMA AIFV to enable tactical driving with hatches closed. This system replaces the driver's glass optical periscope by a camera monitoring system for both day and night driving. The aim of these trials was to contribute to the verification of safe operation for the subsequent tactical suitability test. In 2023, the vehicles are to be integrated into NATO VJTF (Very High Readiness Joint Task Force).

LEOPARD 2 A7V trials

To ensure the roll-out of the newest version of the LEOPARD2 A7V for VJTF in 2023, the new system and its electrical assemblies re-

Palletized Load System Trials

In August, the future Bundeswehr palletized load system (Wechseladersystem - WLS) was tested in the WTD 41 outdoor facility in Fraulautern. The sand there increases wear effects, which was used to quickly determine possible weaknesses of vehicle and superstructure. The base vehicle is an HX 8x8 by RMMV.

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

The Bundeswehr Technical Center for Protective and Special Technologies (WTD 52) in Oberjettenberg contributes defense technology expertise in a variety of protective technologies to the Bundeswehr. These include

- 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.



Palletized load system (Wechseladersystem – WLS)

quired thorough trialing. As part of these trials, the on-board electrical power system and the internal testing system were examined, climatic chamber tests were carried out, the individual seats were examined with a view to ergonomics, and the protection against electromagnetic exposure and the fire extinguishing system were investigated. All these examinations were performed within schedule despite COVID-19.

WTD 52's responsibilities also include special technology areas, for instance aerodynamic load tests on pilot equipment, nuclear blast protection, certification of functional readiness and operational safety - in extreme environmental conditions - of mobile antenna supporting structures used in the Bundeswehr, underwater ballistics tests and underwater detonations.

The very particular infrastructure of WTD 52 is geared to its tasks and makes best use of its location in the Bavarian Alps. WTD 52 benefits from its special geographic and geological conditions which are unequaled in this combination. This is why WTD 52 is organized into three major infrastructural areas. Apart from the administrative, laboratory and office buildings in the valley, which include compliance demonstration facilities and workshops, there is an underground facility in the "Reiteralpe" massif and alpine test sites at an altitude of approximately 1,600 m, which offer a wide range of possibilities for research and verification testing. The area is linked with the facilities in the valley by our own aerial cableway, which covers an elevation difference of 1,100m.

Infrastructural Protection for Facilities and Objects

Focusing on the needs of soldiers and constantly changing threats, there is a continuous development of a substantial body of passive structural protection concepts and the passive structural protection systems based on them. Beside actual accommodation, this protection includes all infrastructure components required during missions like shelters, access areas and security posts.

Experimental Verification of ISO Containers

Standardized ISO containers are used all over the world for different purposes. Potential threats for these containers range from environmental and natural disasters to explosions. A particular challenge is the explosion load case, that is to say the effect of explosions on the container.

To develop and verify a computer simulation model for resistance testing of ISO containers, a campaign of experimental studies on the explosion load case was carried out in August 2020 on the alpine explosives area "Reiteralpe". Blast trials with different explosive loads were carried out to analyze structural damage and deformation behavior of several 20 ft ISO containers.

Specific high-speed cameras were used for the optical evaluation of the deformation behavior during testing. Deformation examples are illustrated below. The aim of these experimental demonstrations was to study important measured values which serve to determine the ISO containers' deformation behavior (elastic and plastic). To this end, the pressure-time histories were measured, and the deformation of individual ISO

Photo: WTD 41



Photo: WTD 52

Container deformation during blast



Photo: WTD 52

Extremely high expansion behavior of ISO containers

containers was determined using a laser displacement sensor and 3D scans. The measured results are used for modeling for the numerical simulation. With the aid of a verified and validated numerical model, better forecasts of structural damage to the containers and their protective effect are possible.

In future, these simulations can be used to support comprehensive risk analyses. The same applies to possible evaluations after attacks (determination of payload on the basis of damage found on site) or accidental explosions as has recently occurred in Beirut/Lebanon.

Based on these events, various campaigns with different types of container and different protection levels are planned for the next few years.

WTD 52 supports German servicemen and women in its advisory role and by promptly realizing concepts and modifications of protective measures in response to new threats, taking into consideration the indispensable use of materials which might be found locally or not. The findings are used for tools of analysis and for regulations, among others. The protection concepts thus developed and tested are applicable to both the military and the civilian sector.

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

Based in Manching near Munich, WTD 61 is the Bundeswehr's center of excellence for the safety and operational readiness of air vehicles. The technical center's core tasks encompass the testing, qualification and technical assessment of all the Bundeswehr's newly developed airborne systems and modifications to those systems that are already in use. This includes the execution of ground and flight tests and the engineering-based evaluation of the gathered data, focusing on the air vehicles' performance and characteristics and their airworthiness, i.e. their suitability to participate in air traffic.

The technical center's in-house flight testing capability ensures that the Bundeswehr has the required capacity to decide and advise autonomously when it comes to procuring aircraft and aircraft equipment. That is why WTD 61 operates an airfield including all facilities required for flight testing and a fleet of representative, mission-relevant aircraft equipped as instrumented test aircraft. The staff is specially trained and qualified for the execution of tests. In addition, required test facilities and measuring equipment as well as a dedicated airspace for testing are also available.

This allows WTD 61 to work on specifically military and mission-relevant projects. They include the integration of new weapons, self-protection systems, software, air refueling systems and airdrop systems as well as the test and evaluation of new sensor and communications technology, night vision capabilities, electromagnetic compatibility (EMC) or drone technology.

As these tasks are often complex and multi-faceted, WTD 61 partly accompanies these tests and evaluations over an extended period.

For instance, the Tornado software is being developed further on a continual basis. Currently, the ASSTA 4.1 software version is undergoing flight testing. In the area of weapons integration, guided missiles such as the Laser Guided Sidewinder (LaGS) with a laser seeker head or the GBU 54 Guided Bomb Unit are being tested, while the AARGM system is being qualified as a replacement for the Tornado's current HARM weapon system. The flight test instrumentation of the technical center's tornado fleet is currently being updated in order to ensure that future projects can be carried out.

The focus of current Eurofighter activities is on testing and integration of the Recce Lite reconnaissance system.

Both types of combat aircraft have successfully undergone qualification for air refueling via the A400M transport aircraft.

WTD 61 is also expanding its expertise in the area of unmanned aircraft systems, aiming to build up its test and evaluation capacity further. Reconnaissance and scouting drones are tested in cooperation with the industrial partners that develop them. The test center provides evidence for the certification of newly developed unmanned aircraft systems of all sizes or of development modifications. The recently founded Drone Innovation Hub (DIH) makes WTD 61 an important connecting link between the Bundeswehr and start-up companies in the endeavor to quickly realize innovative drone developments for the German armed forces.



Photo: WTD 61

A Tornado during tests on the Laser Guided Sidewinder (LaGS)



Photo: WTD 61

Firing the 70-millimeter rockets results in the generation of a considerable amount of smoke. The smoke also enters the cockpit, which needs to be investigated.

As a complementary element, the National Center of Expertise for Unmanned Aerial Systems (UAS) is currently being built up at WTD 61. It is intended to act as a coordinator for the DIH, in support of R&T, as the Bundeswehr center for UAS technologies with a focus on overall systems, and as the central point of contact for technical support in all matters concerning UAS technologies with relevance for the Bundeswehr.

Current important topics include the regeneration of micro drones intended for immediate range reconnaissance and extensive activities supporting the introduction of the urgent Navy UAS (VorMUAS/ Sea Falcon), where the focus chiefly is on the support of the flight campaigns at the moment.

Helicopters are another area in which WTD 61 is working on a wide spectrum of tasks. In terms of the CH-53 weapon system, the double load hook locking device for the Special Operations Forces Command (KSK) and flight tests with the BambiBucket fire extinguisher container are currently the top priorities.

The successful UH Tiger firing campaign with 70-millimeter rockets in Putlos was an outstanding achievement of the "WTD 61 squad". In addition, the hot reloading procedure was qualified.

Cooperating closely with the Naval aviation forces, WTD 61 managed to carry out tests of MEDEVAC equipment on the

MK41 Sea King despite the fact that the technical center does not have its own instrumented Navy test helicopters. This successful cooperation was then expanded in the framework of the qualification/certification of lifesaving equipment and winch equipment on the NH90 NGEN weapon system in Nordholz. These activities are complemented by the NGEN Step 2 qualification flights on the premises of the AHD company in Donauwörth (Airbus Helicopters Donauwörth).

WTD 61 also played a major role in supporting and accompanying customer acceptance procedures for the A321 and A350 aircraft in Seville. These aircraft are part of what is called the "White Fleet", the Special Air Mission Wing of the Federal Ministry of Defense. In addition, the Large Aircraft Infrared Countermeasures (LAIRCM) system was tested on the A321 aircraft.

In order to ensure the operational capabilities of the A400M aircraft, the container delivery system (CDS) intended for cargo dropping was tested at WTD 61. Further air drop tests are planned for 2021.

In the area of engine testing, WTD 61 is equipped with a combined test stand for jet engines, which allows the agency to test RB199 and EJ200 comprehensively. Infrared measurements were performed on the jet and the jet blast of EJ200 in order to establish the jet engine's signature.

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) works in all areas



Photo: WTD 61

The Tiger combat helicopter after lock-on tests with the Stinger CFTs. The aim of the investigation was to assess the influence the 70 mm rockets have on the FIM92 Stinger weapon system. The heat target for the Stinger CFTs, mounted on a pole, can be seen in the background.



Photo: WTD 61

An A400M aircraft as it drops cargo with the Container Delivery System

Photo: WTD 71



A WTD 71 trial vessel towing the entire measuring chain – noise and magnetic field generators – to the Aschau ranging facility

of maritime defense technology and research. It comprises a total of nine sites with measurement and test facilities throughout Schleswig-Holstein and currently employs a staff of 700. In addition to its special infrastructure, the agency also operates the research ship PLANET and other trial vessels to execute research and technology (R&T) projects as well as tests and final acceptance trials for the Navy.

In this article, out of the broad spectrum of WTD 71's tasks, we will take a closer look, firstly, at an ongoing R&T project carried out in collaboration with European partners aimed at improving mine sweeping technologies and, secondly, at the current requirements in the area of network technology.

On-Board Communications Networks

The Type 125 frigate is equipped for network-based communication using the established civilian Ethernet and IP technologies complemented with the required security technology and underwent intensive trials conducted by WTD 71.

To ensure secure communication, technical parameters must be fine-tuned. While analog transmission technology is quite forgiving regarding implementation errors, setting just one bit wrong can render digital communication useless.

The requirements for the communications integration of military vessels comprise high transmission security and the volume of data to be transmitted at the often rather low transmission rates of the available communication channels as well as long transmission delays (latency) and disrupted transmission paths.

The necessity to adapt core parameters to the standard procedures of the IP universe is exemplified by the transmission via a satellite communication system (SATCOM). With a maximum window size of 64 kB and a latency of 0.4 s of a geostationary SATCOM system, a maximum data rate of 1.25 Mbit/s can be achieved with the widely used TCP, although the SATCOM channel provides a significantly higher data rate.

This simple example shows that the technical standard parameters of civilian internet applications cannot simply be adopted without modification, but need to be optimized through operational concepts in order to efficiently link naval vessels with shore installations.

Examples:

- data compression of the data streams to be transmitted, preferably at the source, if possible
- shortening the IP header
- quality of service rules
- encryption with very low overhead
- optimization of TCP services

The Type 125 frigates continue to require optimization in these areas after commissioning. In order to be able to conduct measurements independently of the actual operation of the unit, a Test Entry Point, analogous to the Fleet Entry Point, is being established at WTD 71 in Schwedeneck in cooperation with the Naval Support Command. It will be equipped with extensive measurement equipment for network analysis. Units afloat will be able to link up for final acceptance trials and in-depth analyses of IP connections.

Modern Minesweeping Technologies

Minesweeping is conducted in environments where minehunting is not able to achieve the degree of clearance required due to a high number of false contacts (such as in fields of stones) or silting. In such scenarios, influence minesweeping systems are employed, which simulate vessel signatures (acoustic, magnetic, electric and pressure field) in order to actuate the sensors of influence mines (bottom and moored mines). Besides trialing the signature generators, WTD 71 is tasked with signature ranging including propagation modelling.

The "Modular Lightweight Minesweeping" (MLM) project is part of the EDA's unmanned marine systems research program. The project's objective is the development of a light minesweeping system that can be easily towed by small unmanned boats (unmanned surface vehicles – USV). Besides WTD 71, phase II of the EDA MLM project is carried out with the participation of the Norwegian Defense Research Establishment (FFI), industry partner Patria from Finland (noise generation for different frequency ranges) and the CTM company from Poland (magnetic and electric signature generation).

As sensitive mine data, such as target algorithms of real mines, cannot be shared, a generic mine model has been developed and tested in the simulation. Thus, every nation involved received a test tool that can be used to quantify the actuation probability of the simulation mine sweeping systems.

In August 2020, the noise and signature generators were ranged at WTD 71's Aschau ranging facility. The site is perfectly suited for simulating the operating conditions of influence mines in shallow waters. In the trials, the acoustic, magnetic and electric signatures of the sweeping systems were ranged during runs and when stationary. In a further step, the shock resistance of the signature generators will be tested in the underwater test facility at WTD 71's site in Elpersbüttel.

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

The Bundeswehr Technical Center for Information Technology and Electronics (WTD 81) in Greding, located south of Nuremberg, is the center of excellence for information technology and electronics in the field of Bundeswehr equipment. The agency, which operates within the remit of the Federal Office of Bundeswehr

Equipment, Information Technology and In-Service Support (BAAINBw), draws on its expertise to contribute significantly to securing the functionality of weapon systems and equipment in all phases of the CPM.

Its core tasks include project monitoring and support, the performance of specialized technical tasks and the control of research and technology projects. Further core tasks include project management in the fields of navigation equipment, common measuring and testing equipment and the test, evaluation and reference facility of the Evaluation Center for IT Security in the Bundeswehr (Prüfzentrum für IT-Sicherheit in der Bundeswehr), which is also part of WTD 81.

- navigation,
- semiconductor materials and technologies.

In order to accomplish its tasks, WTD 81 has laboratories operated by highly qualified staff and equipped with state-of-the-art, high-end infrastructure and technology.

The facilities include one of the largest fully shielded test centers for the study of electro-magnetic compatibility (EMC) and electro-magnetic effects in Europe. In the EMC test center, military systems and electronic components are tested for compliance with standard-based threshold values. The weapon systems being tested must neither be influenced by external electromagnetic fields nor in-



Aerial view of WTD 81

WTD 81 is highly competent 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 technology (radar, optronics including associated signal processing),
- electromagnetic compatibility (EMC), lightning protection and electrical safety,
- electronic Warfare,
- the interoperability of command and control information (C2I) systems as well as combat direction systems (CDS),
- the integration of IT into platforms,
- technical reviews of overall systems and the interaction of individual systems in a systems of systems, based on mission-specific scenarios,
- radar and identification technology,
- intelligent weapon systems, homing technology, fire control technology,

fluence internal or external systems in an inadmissible manner.

The agency conducts hardware-in-the-loop-simulations of optical and optronic components in the target simulation dome in order to evaluate fire control and weapon stabilization systems as well as seekers heads of guided missiles. The dome has a diameter of 45 me-

Photo: WTD 81



Target simulation dome

ters and is equipped with 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 area. Two high-performance simulators simulate the movement of the test objects. In order to facilitate networked experiments, the target simulator can be connected to other national and international simulation facilities via standardized interfaces and protocols.

Furthermore, the modern Center for Interoperability, Network Centric Warfare and Simulation (ZINS) facilitates multi-project networked experiments aimed at studying interoperability and measuring performance in a system of systems in all phases of the CPM. An extra-large media wall, an audio system, laboratory buildings and multi-purpose rooms as well as a high-performance data network with a multitude of connection capabilities have been set up for this purpose. The flexibility required to set up a great variety of test configurations is the defining characteristic of this facility. Two projects from the wide range of ongoing activities will be briefly presented below:



EMC test in the large measurement chamber

Photo: WTD 81

Future test capabilities for Data Link 22

Tactical data links (TDLs) guarantee the exchange of mission-relevant and C2-related information via formatted reports exchanged between a defined circle of participants in near real time and in a largely automated manner. The exchange of messages is encrypted.

The tactical data link "Link 22" consists of different components that form a functional chain. Two essential components are the radio set and the upstream modem, which is also referred to as signal processing controller (SPC).

Test objective

For the integration in a weapon system such as a ship, the objective was to verify whether the radio set produced by a particular manufacturer works with the signal processing controller (modem) of another manufacturer, as required. Several well-known manufacturers of radio equipment and modems participated.

The test was conducted under the leadership of the NILE Programme Management Office (NILE PMO). The agency conducted the test in accordance with

Photo: WTD 81



Laboratory test at WTD 81, 1st quarter of 2020, digital front-end receiver

and documented in an unclassified test report for NILE PMO.

Outlook on future test capabilities

The ship-shore-ship buffer (SSSB) is a real time data link system which uses UHF

The Cloud 22 software emulates the system components for cryptographic equipment, controller signal processing and radio sets. It is used to connect the Link 22 components to be tested (CDS with data link processor) via IP networks. Therefore, the test components can be located quite far apart, even in different countries.

High level testing of radar warning equipment under near-operational conditions in a complex threat scenario

The threat to all airborne weapon systems posed by different radar systems has increased significantly in the past years. Data gathered and specific reconnaissance strategies applied during sorties flown in the context of the politically mandated operations illustrated this. Findings on new radar modes as well as new radar systems and targeted interference signals were gathered.

These findings suggest the development of adequate radar warning receivers (RWR) as an obvious reaction to secure the survivability of friendly aircraft crews. The RWR included in current operating patterns have a limited capability of delivering warnings against threats to the flight deck in time.

These receivers have a relatively low sensitivity due to their age and they are technically ill-suited to detecting complex modern radar signals. In order to guarantee operational readiness in case of radar threats and complex electromagnetic spectra, renewing the RWR is the sensible alternative.

Possible successor products by different RWR suppliers have been tested repeatedly in laboratory tests at the Electronic

Photo: WTD 81



TDL laboratory control station

a complex test specification, which was drawn up by WTD 81 and ratified by NILE PMO.

Two Link 22 participants exchanged tactical and technical messages and processed them. All messages and their transmission were recorded for further analyses.

Test evaluation

All recordings which had a time stamp and which allowed conclusions about the duration of a frame were classified. A reception quality percentage was calculated from the recordings. This meant that conclusions about the time frame were no longer possible, so that a lower security classification of the test results was possible and they could be communicated. The resulting quality of reception was summarized in a compatibility matrix

and HF radio systems and supports data exchange between naval forces, air forces and associated air defense units.

The SSSB functions include:

- data transmission and forwarding to a multitude of national and international NATO data links,
- creation of a common real-time operational picture including information on airborne, sea-based and submarine units that is received by tactical data links.

When the Federal Republic of Germany joins the Ship-Shore-Ship-Buffer (SSSB) Board, a section of the NATO Communications and Information Agency, the Bundeswehr is given access to the software products required for system testing.

Cloud 22 is an important product for testing Link 22 systems including the Link 22 network management functions.

Warfare branch of WTD 81. This contributed to the Bundeswehr's ability to assess and evaluate the development in this field, and particularly that of BAAINBw. In order to avoid depending on non-European manufacturers, BAAINBw initiated the evaluation of individual system components of a new RWR technology in the context of awarding contracts for national R&T studies several years ago. This mainly involved testing different signal algorithms for reliability when classifying



Photo: WTD 81

Ground test at WTD 81, turntable with digital hardware

detected signals and their simultaneous capacity to prevent multiple displays or false alarms in the cockpit caused by an emitter.

The studies, which comprised the optimization and iteration of the algorithms, then led to the investigation of a suitable setup in the context of flight trials with WTD 81 participation.

Findings from the flight trials and the objectives for a digital RWR structure were harmonized. As a result, the first ground tests of the algorithms on WTD 81's turntable with the potential hardware produced by a German company could be carried out in 2019.

The practical experience gained during these tests was used to conduct extensive testing on the optimized digital radar warning technology at the newly equipped laboratory at WTD 81 in the first quarter of 2020. In the two-week test period, this type of fully digital radar warning system was tested for compliance with its technical specifications and also thoroughly tested in near-operation-



Photo: WTD 81

TDL laboratory

al scenarios. WTD 81's laboratory equipment allowed test staff to "fly" the radar warning system through different threat scenarios in a realistic manner. A variety of radar signals generated by a radar simulator was transmitted to the test item via its antennae. Additionally, the civilian electromagnetic environment (such as communication signals) was emitting in order to create a realistic situation.

The project was continued in the 2nd quarter of 2020. With the participation and support of WTD 61 in Manching, the airborne weapon system CH-53 was equipped with a digital radar warning receiver so that comprehensive flight trials could be conducted above WTD 81 in June 2020. The receiver proved its capa-

bilities against various systems such as the mobile radar simulator ICEFISH, the naval radar FURUNO, the Russian fire control system SA-8 and the radar systems Skyguard and Flycatcher.

The test setup was designed to simulate the new digital technology at the same time as the permanently installed radar warning receiver. Initial quick-look evaluations have confirmed the favorable impression of the RWR gained during the laboratory tests.

According to the current assessment, the data gathered is suitable for use as a benchmark for the new radar warning technology concerning the assessment and evaluation competence described above.



Photo: WTD 81

Flight trials at WTD 81, 2nd quarter of 2020, CH-53 with digital radar warning receiver

Detailed evaluation will take some time. Judging by the current degree of maturity, an excellent product in this important segment can be expected. This will have created a major prerequisite for taking national technologies into account when replacing the warning receivers reaching the end of their useful lives on several platforms. It will also help to ensure protecting the lives of our crews and the integrity of our aircraft under the current conditions (VJTF or collective defense).

nate Friedrich Krupp, it was referred to as "Kruppscher Schießplatz" (which roughly translates as "Krupp's range"), and army and navy guns were tested there. After an interim period, during which it was used by the occupying powers and the civilian population, the Bundeswehr took over the area and the existing lease agreements in 1957.

WTD 91 is the Bundeswehr's center of excellence for weapons and ammunition, the protection of mobile platforms and reconnaissance. It is either responsi-

Answering these questions is part of the day-to-day business of WTD 91's experts'. Ammunition is initially disassembled to component level and undergoes physical/chemical testing. Subsequently, it is tested in extreme situations. The resulting findings can for instance be relevant for storage. Sometimes, the manufacturer has to make improvements. In extreme cases, the ammunition can be entirely rejected. That is because the consequences of an accidental chain reaction of explosions in an ammunition depot or in operations would be disastrous.

Technical functions and mechanical stability in extreme situations are also tested. If the Bundeswehr intends to field a new weapon system, WTD 91 will test it in a great number of scenarios the new weapon might encounter.

A Bundeswehr weapon must function reliably in hot or cold environments and after spending an extended period of time in saltwater. Apart from that, the system must not fail even in very fine-grained desert sand.

Apart from technical tests, WTD 91 also focuses on specific requirements of the weapons carrier regarding ergonomics, emissions and handling. Which ammunition penetrates which version of our body armor? Which of our helmets is too tight, slips or restricts the wearer's field of view? Which parts of German tanks are still vulnerable and how can this be changed?

Test items such as helmets, shoes or body armor are fired at, and they are tested under realistic conditions on the obstacle course. Vehicle underbodies are subjected to mine blasts, tank seats are tested for the effects of shock in whirling rigs. These tests are increasingly supported by simulations in order to reduce the number of time-consuming real blast tests and firing tests.

Apart from these extensive tests, WTD 91 also assesses the behavior of defense materiel in a real operational environment, such as an enemy attack on vehicles or dismounted troops. WTD 91 heads the team of experts responsible for the technical analysis of mine and explosive ordnance incidents as well as improvised explosive or incendiary devices in operations (ETAV) on behalf of the Federal Ministry of Defense. Situations that occurred in past operations are analyzed in detail with the help of experts from the civilian and military organizational areas of the Bundeswehr in order to further improve Bundeswehr materiel and equipment.

WTD 91 currently employs a staff of about 800, among them about 250 scientists, engineers and technicians.



Photo: WTD 91

Panzerhaubitze 2000 bei der Schussabgabe

Bundeswehr Technical Center for Weapons and Ammunition (WTD 91)

Every member of the Bundeswehr who has ever handled and fired a service weapon relied on WTD 91's work when doing so. However, not many people are aware that the Bundeswehr Technical Center for Weapons and Ammunition even exists, let alone of its tasks. Nevertheless, the agency plays a global leading role as a competence center for weapons and ammunition, among other things in the field of testing. More than 250 experts from different fields of expertise thoroughly test potential Bundeswehr materiel. No ammunition, no gun and no tank is fielded if it does not fulfill WTD 91's exacting requirements.

WTD 91 is located in Meppen, a town in the state of Lower Saxony which is close to the German border with the Netherlands. The center's entire area covers 19,200 hectares. It is 31 kilometers long and up to 7 km wide. Weapon systems with a range of up to 28 kilometers can be tested here. The area was first used as a firing range in 1877. Owned by industrial mag-

ble or acts as adviser in all phases of the development, procurement and use of defense materiel and research and technology activities. Other equipment tested includes rockets, guided missiles, drones and optical and acoustic devices, the latter of which are used for target recognition and target acquisition, for instance. This applies to Bundeswehr materiel but also foreign defense materiel. The focus of testing Bundeswehr materiel is on finding and eliminating weaknesses. It is the objective of all tests to further improve the German soldiers' equipment in order to guarantee the greatest possible protection also under extremely hard conditions. Personal safety starts with the storage and handling of weapons and ammunition. There are many questions the soldiers don't need to give any thought to because WTD 91 has already done so. Ammunition is a case in point: How sensitive is the ammunition to external influences such as changes in temperature, long transportation routes or inadvertent dropping? Do I need special transport equipment? How long can a bomb be kept in storage? And what happens in case a rocket accidentally explodes?

Experts from the fields of

- ballistics,
- acoustics,
- optronics,
- chemistry,
- physics,
- laser technology,
- mechanical engineering,
- electrical engineering and electronics,
- computer science and information technology,
- aerospace,
- geodesy

and many other fields work hand in hand. As one of the biggest employers in the Emsland region, WTD 91 trains up to 30 young persons a year in six different training occupations. Another highly valued, though rather inconspicuous, branch is behind the entire testing operations at the agency at WTD 91:

The department of meteorology and geodesy Apart from carrying out topographic surveys, surface weather measurement at firing sites and target areas as well as wind component measurements at several points along projectile trajectories, this department also assists the German Meteorological Service (DWD). The recorded data is the prerequisite for testing.

Apart from its highly qualified personnel, WTD 91 has an extensive range of equipment and measuring technology. Large-caliber warheads can be accelerated to twice the speed of sound on an 830-meter-long rocket sled track before they hit their target in a controlled manner. Any climatic scenario can be simulated for testing weapons, ammunition and technical equipment at WTD 91's environmental simulation center. The trajectories of rockets and projectiles can be precisely measured with high-resolution radar technology. Firing trials and even blast tests are carried out on ship hulls at the underwater demolition site.

On top of that, WTD 91 conducts research in the field of the military use of virtual, mixed and augmented reality. A building is currently being converted for the purpose of investigating to which extent infantry scenarios such as fighting in built-up areas can be safely trained in a virtual environment. Unlike traditional situational training, the three-dimensional presentation via the virtual reality goggles makes the events seem more real, and biological-psychological factors such as stress and fear can be observed and influenced. A further example of what WTD 91 is currently working on is the testing of the 127 mm VULCANO round in cooperation with the Italian armed forces. The ammunition is to be used on the class F



Photo: WTD 91

Firing trials with the Puma AIFV at WTD 91

125 frigates from the end of 2020. In order to be able to exactly predict effects and explosion behavior later, the round is analyzed by experts from different fields, ranging from chemical and physical tests of the explosives to actual firing trials. For subsequent assessment, the tests are conducted with high-precision sensors and high-speed cameras which precisely capture the ammunition's behavior. They are used for documentation purposes and facilitate conclusions about the behavior of the round in the different stages of its trajectory.

Further prominent examples of systems that were tested at WTD 91 before being fielded include the Leopard 1 and Leopard 2 main battle tanks and PzH 2000.

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

As a military research facility, WIS is concerned with the protection of Bundeswehr service members against the effects of nuclear, biological and chemical weapons of mass destruction. Other primary tasks include fire protection technology, protection against strong electromagnetic fields and drinking 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 soldiers against CBRN threats by providing optimum equipment is pivotal in view of worldwide military deployments of the Bundeswehr. Particularly in times of the Corona pandemic, WIS can draw on its strengths in the area of protective technologies. Within its scope of activities, it makes valuable contributions to Bundeswehr equipment.

Testing of Respiratory Masks

The main way of human-to-human transmission of infectious diseases like COVID-19 is by aerosols carrying the pathogen. They are released as fine droplets when coughing or speaking, but also when breathing normally. Class FFP-2 face masks provide medical staff with a high degree of protection against the SARS-CoV-2 virus. The vast and rapid increase of the infection numbers led to a shortage of FFP masks for medical personnel, also in the Bundeswehr. Not only production and delivery, but also efficiency testing of FFP masks required considerable capacities in civilian test centers. That is why the "Individual and Collective Protection" branch could employ its capabilities and assess FFP masks which were procured in great numbers but sometimes were of unknown quality.

Based on decades of experience in the development, testing and qualification of personal CBRN respiratory masks, WIS features the high level of expertise and the extensive equipment necessary for the validated assessment of this vital piece of equipment. The test methods used are recognized by the German accreditation body (Deutsche Akkreditierungsstelle – DAkkS. WIS carried

out qualification testing of more than 750 FFP masks (sample testing), which enabled the Bundeswehr to provide its medical service with a great number of efficient FFP2 masks in a very short time after the COVID-19 outbreak.

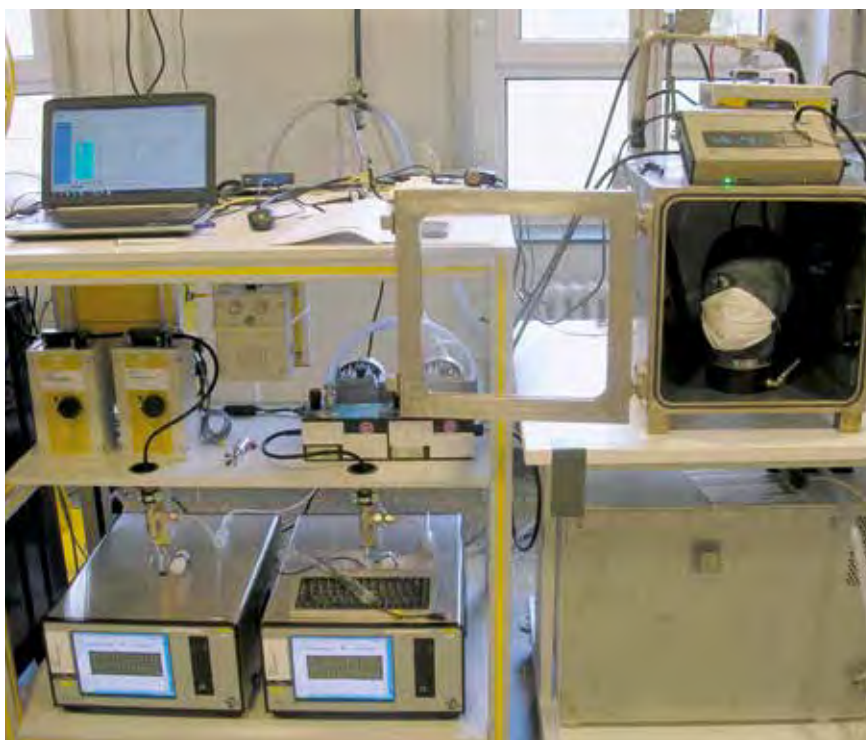
PCR Test Equipment for Combat Support Ship "Berlin"

For the identification of biological agents, WIS's "B-Detection" branch continuously tests commercially available PCR test equipment (PCR – polymerase chain reaction) as well as equipment about to be commercialized. This equipment is then assessed with a view to its usability in field conditions, in accordance with an accredited method. In April 2020, the first COVID-19 test capability was established on the CSS Berlin with PCR equipment that had passed inspection. Building on the operational experience of recent months, the technical and scientific development of PCR analysis was continued. The aim was to prolong the service life (shelf life of 5 months) and to improve the handling of test reagents (reducing the number of work steps from 12 to 1). In the framework of ensuring operational readiness of PCR equipment under the technical and scientific supervision of WIS since the year 2000, this equipment is currently undergoing a third regeneration cycle. As a complementary measure, the focus is directed to so-called "point-of-care" detection systems, which only permit a single test for a pathogen, but which are quick and safe, as their use is possible without a great many manual work steps or additional laboratory equipment.

New Fire Extinguishing Equipment

Beside the special duties due to the COVID-19 pandemic, WIS continues its specialist core tasks in the armaments sector. Beside its fire protection research and testing duties, the "Fire Protection Technology" branch bears project responsibility for about 50 material planning objects in this sector. Primarily, these include portable fire extinguishers and foam agents. As an example, a new generation of 50-kg powder fire extinguishers is being readied for introduction into service. These fire extinguishers ensure fire protection during refueling processes for aircraft and are therefore indispensable for smooth flight operations. It is also inconceivable to operate a camp in a mission country without sufficient fire extinguishers and other fire protection equipment. Beyond that, the "Fire Protection Technology" branch ensures the availability of portable fire extinguishers

Photo: WIS



Laboratory set-up for the testing of face masks

for use on and in vehicles as part of its project responsibility.

Researching – Testing – Advising

WIS, with its wide spectrum of tasks, contributes substantially to providing the Bundeswehr with optimum equipment by consistently focusing on science-based services. Starting with basic research, WIS helps to shape the state of the art in its field, contributes its expertise to the armaments process and provides reliable results also for very current issues.

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 occupational safety and health as well as environmental protection. It provides the technological and scientific foundation required to ensure the safety and reliability of defense materiel. Thus, it 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. It is closely connected to all major organizational elements of the Bundeswehr, the research community, the defense industry and partners both within Europe and beyond.

The 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 2020, the organizational structure of WIWeB was adjusted to be better prepared for current and future tasks. Having assumed responsibility for the technology field "Soldier System" last year, and a new branch of the same name was created within the organization.

Departmental research in WIWeB was reoriented. The new technology field

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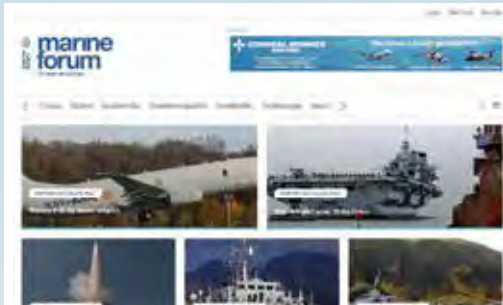
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Beethovenallee 21 · 53173 Bonn, Germany · Phone +49 (0)228 / 3500870

info@mittler-report.de · **www.mittler-report.de**

"Soldier System" evaluates clothing and personal equipment of soldiers as part of overall systems, coordinating closely with the user and the project directorate at BAAINBw. This research includes new soldier support systems such as unmanned aircraft vehicle (UAV), unmanned ground vehicle (UGV), exoskeletons and many other technologies (smart textiles, bio-monitoring, augmented reality, among other things) which are developing at high speed due to the digitalization of society, and which promise con-

tremendous success and the basis for a productive exchange within the Bundeswehr, with other EDA and NATO partners, and with industry.

The quality of research at WIWeB is also evident in the final academic papers presented by its staff. All in all, four doctorates were successfully completed at the WIWeB, and two post-doctoral researchers will remain at WIWeB for the longer term.

Two WIWeB researchers were awarded prizes this year; the Adhesion Award for

deswehr Research Institute for Protective Technologies and CBRN Protection (WIS) in Munster and at WIWeB. Numerous questions about material compatibility regarding the disinfection of aircraft after patient transport were resolved.

Especially at the beginning of the pandemic, there was a shortage of disinfectants. WIWeB produced disinfectant for its own use and for others. Clothing technicians verified available patterns for temporary face masks, and provided both material and sewing machines, so that - thanks to very many helpers - urgently required but unavailable temporary face masks could be produced in a matter of days.

The consistent application of personal, organizational and technical protective measures permitted limiting necessary restrictions of laboratory operations.

The Naval Arsenal

What's Ahead for the Kiel Garrison?

Since the stationing decisions made in 2011, the Naval Arsenal (MARs) for the most part has been centered in Wilhelmshaven. This has 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 currently beginning. 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 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 were shifted within the organizational structure to be integrated into the remaining arsenal organization, and to this day they continue to repair certain classes of vessels in Kiel.

Photo: WIWeB/Sebastian Scheuermann



Experimental set-up to examine chemical hydrogen storage.

siderable improvements. An innovations laboratory, to be set up by WIWeB, is to ensure future continuity, speedier development and more rapid implementation of innovations in this important area of soldiers' equipment, of course drawing on national expertise.

Work on research into energy sources fit for the future has begun. In the next few years, this work is to be further developed to become a research focus by taking up promising civilian concepts and investigating and evaluating them with a view to military requirements. The aim is to demonstrate options for use and storage, as well as decentralized production of energy sources usable for military purposes for mobile applications. The findings are to contribute to the implementation of the energy transition within the Bundeswehr.

WIWeB continues to be the Bundeswehr's center of expertise for 3D printing. The international symposium organized by WIWeB in January 2020 was a

research in structural bonding, the other was the SAMPE Award for Innovation for a paper on the improvement of carbon fiber composites against laser weapons. This year, too, the number of inventions that WIWeB patented was considerably higher than average.

The Corona pandemic is and will remain dominant in the practical work of WIWeB. Due to its interdisciplinary orientation, WIWeB received many different requests for support.

The 3D Printing Center supported various institutions inside and outside the Bundeswehr. Particularly in cooperation with the Bundeswehr Medical Service, targeted solutions could be found and tested. As a result, face shields could be made available in a very short time. Notably, a special variant was developed for the dental service. It includes appropriate attachment possibilities for lamps and additional splash protection. Beyond this, recently procured protective suits were tested for suitability at short notice, both at the Bun-



Photo: Naval Arsenal

Aerial photo of the Naval Arsenal premises in Kiel-Ellerbek

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

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

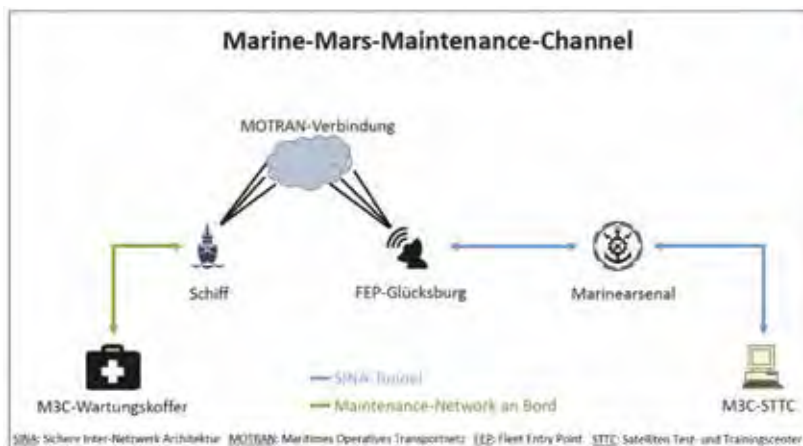
- As of mid-2019, the necessary posts in Kiel are available and will now be filled by the Federal Office of Bundeswehr Personnel Management in cooperation with the competent agencies.

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.
- The Marine-MARS-Maintenance-Channel (M³C) is a tried and tested tool used by the Naval Arsenal for remote maintenance (remote support and remote access up to classification level VS-Geheim (Secret)) via the Navy information domain during immediate repair activities on vessels.

Relating to the **Class 212 submarine common design (U212 CD) cooperation project**, the Naval Arsenal is further building up repair staff, creating 30 posts in Kiel. At the moment, the Naval Arsenal is preparing a common maintenance concept together with its Norwegian partners.

The existing **infrastructure** will need to be prepared to accommodate upcoming tasks. For this purpose, the Naval Arsenal has cooperated with the Bundeswehr Technical Center 71 (WTD 71) as the gar-

**Marine-MARS-Maintenance-Channel and M³C maintenance kit**

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 the **Class K130 corvettes (supplementary pro-**

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

ison's current main user to initiate a utilization concept.

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". This is why on September 1, 2020 training operations resumed at the **training workshop in Kiel** to augment the training workshop in Wilhelmshaven.

Graphic/Photo: Naval Arsenal

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. The agency 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 the following project offices and to liaison offices at US Army and Air Force facilities (cf. Fig. 1):

- Rolling Airframe Missile 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
- 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.

The DtVStRü USA/CAN 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. It 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

This year, the exchange programs with defense engineers and scientists and administrative personnel were faced with great challenges due to the COVID-19

pandemic. Even if the program for the group initially scheduled for August had to be postponed, applicants were again welcomed already in January 2021.

Multifunctional Information Distribution System (MIDS)

In December 2019, the 6-year development phase for the Multifunctional Information Distribution System – Low Volume Terminal as part of Block Upgrade 2 (MIDS LVT - BU2) was concluded successfully. The qualification and the successful definition of the final configuration permits the integration into flying and non-flying platforms.

Due to new capability and security requirements all Link 16 platforms must be modernized in the years to come. With a significant capability growth, Block Upgrade 2 makes MIDS LVT mature for the use in the decades to come. This growth includes modernized encryption procedures, a higher data rate and dynamic frequency management.

After the completion of the development phase, the MIDS program is now focusing on stabilizing BU2 production at the participating manufacturers' as well as on supporting the partner nations when it comes to the integration of new capabilities into their platforms. All the required contracts were concluded by the MIDS IPO in San Diego.

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 shipboard systems for the additional K130 corvettes are provided and the integration of RAM shipboard systems on the future MKS180 multirole combat ships of the German Navy is prepared.

Government Quality Assurance

Apart from regular spare parts procurement for all technical Bundeswehr systems, the procurement of the new corvettes continues to determine the daily business of Government Quality Assurance personnel. Both the IMCS (Integrated Monitoring and Control System), an automated ship system, and the RAM close-in defense system are procured in North America.



Locations of the German Liaison Office for Defense Materiel, USA/Canada and its branch offices

European Security & Defence Maritime Security & Defence



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