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Publisher and Managing Editor: Stephen Barnard (sb)

Editor-in-Chief: Jürgen Hensel (jh)

Editorial Staff: Rolf Clement (rc, Political Affairs), Waldemar Geiger (wg, Infantry, Industry), Wolfgang Gelpke (wge), Gerhard Heimig (gwh, News, Land Forces), Rolf Hilmes (rh, Army Technology), Hans-Uwe Mergener (hum, Naval Forces)

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AnKo MedienDesign GmbH, Germany

Production:

Lehmann Offsetdruck und Verlag GmbH
22848 Norderstedt, Germany

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 Director: Peter Tamm

Editorial Director: Lars Hoffmann (lah)

Authorised Signatories: Waldemar Geiger, Lars Hoffmann

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

The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support – or BAAINBw for short – is a higher federal authority within the sphere of the Ministry of Defense. BAAINBw has its official seat in Koblenz, Germany. The area of responsibility of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) comprises six Bundeswehr Technical Centers and two Bundeswehr Research Institutes, the Naval Arsenal and the German Liaison Office for Defense Materiel, U.S.A./Canada.

Partner of the Armed Forces

BAAINBw, which was established in October 2012, 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.

At BAAINBw, service personnel with operational experience are working alongside civilian employees with armaments expertise in order to integrate aspects and experience gained from operations and in-service use even more efficiently into the processes of developing and procuring military equipment. Such cooperation contributes to providing the Bundeswehr personnel with a common understanding of their day-to-day work and the common mission.

BAAINBw and its subordinate agencies assist the Armed Forces as reliable partners.

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 materiel. Although in some cases commercially available equipment may be used, it is often necessary to initiate a specific advancement or new development 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

Photo: mavibo media



The BAAINBw is located in Koblenz.

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 bases its procurement and in-service management on three main pillars:

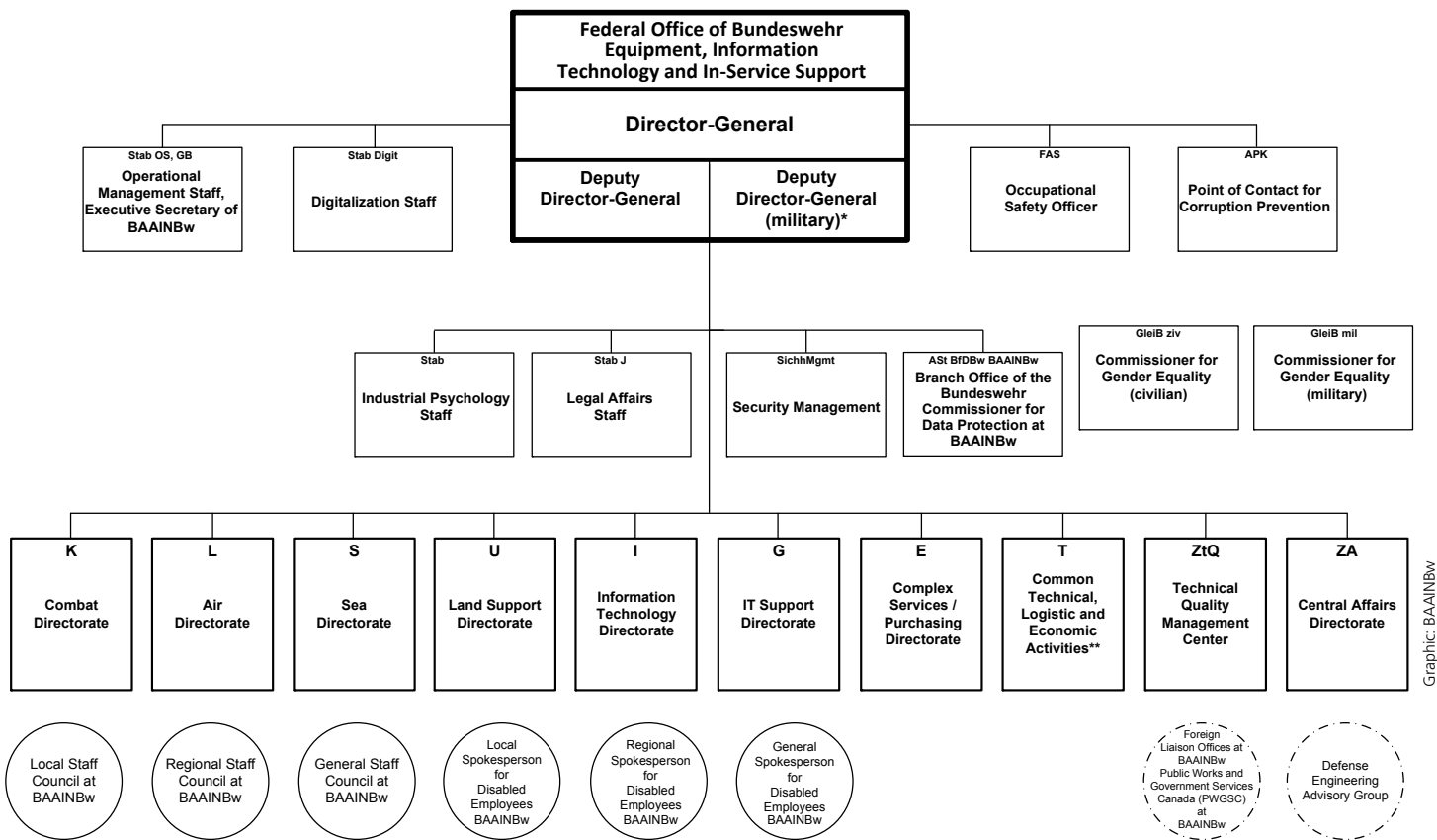
- providing materiel solutions and services in accordance with the Customer Product Management (CPM) procedure,
- satisfying Bundeswehr non-project needs by Bundeswehr Purchasing and
- procuring and using complex services.

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 materiel responsibility for operational viability. Thus, these comprehensive tasks, starting with the analysis phase and covering the entire in-service management of the materiel of all military organizational areas until its disposal, are covered by one agency.

Reversal of Trends

The trend reversals in the areas of materiel, personnel and financing initiated in 2016 resulted in various organizational changes within BAAINBw which were aimed at strengthening the office's operational effectiveness. This process has not yet been concluded and will still be a focal point in the future development of the office.



* also fulfils the function of Commissioner for Military Personnel Affairs and Commissioner for Reserve Affairs, directly supported by Chief of Branch ZA3.2

** At the same time Defense Materiel Disposal Officer at BAAINBw

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

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BAAINBw – Rauental premises

In-Service Support Agenda

The current implementation of In-Service Support Agenda measures aims at increasing the operational readiness of the Bundeswehr and at focusing on tackling, in the area of in-service support, 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

In September 2019, the then Federal Minister of Defense, Ms. Annegret

Kramp-Karrenbauer, approved the implementation of measures to optimize procurement and in-service support with the aim of providing soldiers with the required equipment in a faster, easier and more precise way 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 has reviewed and initiated 58 measures focusing on the following:

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

During the ongoing implementation process, new findings are taken into account as are the concerns of personnel and interest group representatives and equal

opportunities officers, who accompany and participate in this process.

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

- Creation of the role of In-Service Support Manager on the Deputy Director level in the project-managing directorates Combat, Air, Land Support, Sea and Information Technology in order to increase the awareness for 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 for their cost-benefit ratio even more strictly (80% solutions that are quickly available and/or available on the market will be preferred). Requirements controlling will also be integrated into 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 improvement of the procurement and in-service organization and contribute to rendering work at the interfaces to industry more efficient. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



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

Operational Management Staff

The Operational Management Staff comprises four 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 the central task management at BAAINBw and of the coordination of all tasks related to parliamentary/cabinet affairs. OS1 is also the control office for German Audit Office affairs and serves as POC for all internal auditing affairs.

The contributions to 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 contents 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.) needed by the BAAINBw Executive Group to prepare for its participation in Defense and Budget Committee meetings. The division also performs a coordinating function for part 1 of the bi-annual armaments report to parliament. In addition, OS1 coordinates all audit matters of the German Supreme Audit Institution (Bundesrechnungshof) that fall 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

Division OS2 coordinates the cooperation with the FMOD planning organization, particularly with the Bundeswehr Office for Defense Planning, develops situation analyses as decision-making aids, and maintains the portfolio management regarding the activities and performance of BAAINBw in the sectors of projects, products and services.

In accordance with the central performance process called "Executing Integrated Planning", the Bundeswehr Office for Defense Planning draws up the capability situation of the Bundeswehr to identify ca-

pability gaps on this basis. 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 assessment competence of BAAINBw. This will include coordination of the activities of the respective BAAINBw representatives in the Analysis Phase Part I of the CPM process. Division OS2 thus supports the Bundeswehr Office for Defense Planning right from the beginning of the procurement process in determining the key data of a project across the entire period of its existence (from creation to service use) and in integrating these data into 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. For this purpose, the division analyzes information on projects, products and services from all directorates and compiles them into situation pictures. 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.

Further, OS2 has the function of a central element within BAAINBw for portfolio management at the level of projects, products and services. This also includes the Project Steering Group established together with the Bundeswehr Office for Defense Planning. This group is intended to generally ensure maximum transparency and a smooth progress of the projects in all phases above the level of the individual projects on a common information basis. This task package is complemented by specific and focused project monitoring activities as far as the contributions to NRF 2022-2024 are concerned in order to ensure a consistent synchronization of the

procedural steps regarding planning, operations, satisfaction of demands and budgeting so as to be able to meet the VJTF's procurement needs in due time. OS2-VJTF advises the BAAINBw Executive Group on all VJTF-relevant matters and maintains the situation picture regarding the current material-related implementation status of projects and products relevant to VJTF. OS2-VJTF has a seat and a vote in all capability development bodies for VJTF, making a significant contribution as a mediator, coordinator, catalyst, early warning system and "temperature sensor" in a key position. Working in close cooperation with the BAAINBw project directors, OS2-VJTF is continuously monitoring the respective status of all projects and products relevant to VJTF, subjecting them to an economic and technical "reality check", introducing them to the VJTF capability development bodies in a proactive and prompt manner, providing recommendations for action.

Division OS3

OS3 is responsible for the areas of strategic controlling, risk management (RM)/project controlling (PC) as well as agency controlling, in addition to management. Further, OS3 is responsible for other special tasks.

Strategic controlling includes the preparation of interagency agreements on target objectives as well as the conception and implementation of target and parameter systems. It supports the BAAINBw Executive Group's management process, which is geared towards medium-term and long-term objectives. In addition, budget and contract controlling is being established at BAAINBw in cooperation with OS3 in order to identify contract backlogs and their causes.

Further fields covered by OS3 are the review and evaluation of CPM documents prior to their signature by the BAAINBw Executive Group, the support of projects and the provision of advice in the area of RM as well as the further development of RM, in addition to the RM course and the contribution to training courses.

OS3 performs a coordinating function regarding risk reporting with the Category A and B preparatory committees at

the state secretary level as well as with the Armaments Board at the level of the Federal Ministry of Defense. This function includes the compilation and preparation of project-specific contributions and drafts for the respective boards. In addition, OS3 is also involved in the preparation of the semi-annual armaments report to parliament, which is drafted by the division in close cooperation with the Project Controlling and Risk Management Group of the Ministry. As for the preparatory committees at the state secretary level, OS3

Division OS4

Division OS4 is the central point of contact regarding Customer Product Management (CPM) and project management at BAAINBw. The division develops procedural regulations for the implementation of the CPM requirements at BAAINBw and, as part of the CPM decision-making element, takes final decisions on project-specific deviations from the CPM procedure. Regarding the output process called "Provision of Material Solutions in accordance with CPM",

with the Federal Ministry of Defense Press and Information Office.

The management and coordination of press, public relations and media work for BAAINBw as well as for the ten agencies subordinate to it are core tasks of the AIN Press and Information Center. It is the first point of contact for the entire major organizational element regarding questions by the public, media representatives and citizens. Furthermore, the Center is responsible for the involvement of BAAINBw and its agencies in trade fairs and events

enhancing the public image as well as for the production of multimedia information material.

Within the broad spectrum of tasks, press releases and information on events, press kits or the preparation of ministerial trips, reports and interviews belong to the main tasks within the scope of the direct cooperation with journalists and media representatives. Answering citizens' inquiries and coordinating the cooperation with defense-related publishing houses, too, are central tasks of the AIN organizational element, just like the organization of the participation in public relations events of the Bundeswehr. For major events such as the "Bundeswehr Day" as well as for regional events, trade fairs or exhibitions, the AIN Press

and Information Center organizes the involvement of BAAINBw or the agencies of the major organizational element.

In addition, the AIN Press and Information Center is responsible for the "equipment" section on the Bundeswehr internet site, makes contributions to all social media channels of the Bundeswehr and manages its own Twitter account as part of active information work.

By maintaining a comprehensive own intranet presence of BAAINBw and by supporting and implementing a variety of measures, the AIN Press and Information Center takes its responsibility for internal communication and its further development seriously. ■



Customer Product Management

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



Center of Expertise for Project Management

- Fundamentals
- Advice
- Training
- BAAINBw knowledge management

Tasks of the Center of Expertise for Project Management

performs the organization and conduct of meetings of these preparatory committees for Category C projects on the level of the BAAINBw Executive Group, including OnePager and reports. In the course of the advancing digitalization, OS3 is involved in the implementation and introduction of the CPM IT support with regard to the technical aspects of RM, the reporting system and PC. With agency controlling and management, OS3 assumes another task area in order to jointly optimize the processes of the agencies through the preparation of detailed concepts, the conduct of management boards and a targeted development of capabilities.

With special topics such as the Bundeswehr Purchasing clearing process, the special task of the state secretary regarding cluster tools or the Bundeswehr Purchasing Implementation Group (AGU EinkaufBw) as well as with its role in the reorganization of the procurement of medical materiel, OS3 assumes a key position.

OS4 is responsible for modeling this process and for developing it further.

In its role as the Center of Expertise for Project Management, OS4 defines the project management standard at BAAINBw and provides standardized tools. The Center of Expertise for Project Management provides advice to the project team members on the use of these tools and supports the projects through comprehensive knowledge management. OS4 develops the initial and advanced training in the area of project management further on a continuous basis. Part of the training is carried out by this division itself.

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. It cooperates directly

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Graphic: BAAINBw

Digitalization Staff

In the past, BAAINBw had different areas of responsibility when it came to the complex topic of digitalization. The nucleus of the Digitalization Staff was established on 1 November 2020 with the aim of merging these areas.

The main tasks of the staff include the development of uniform guidelines as well as the implementation of a central control and coordination mechanism for all digitalization activities of the major organizational element for equipment, information technology and in-service support (AIN). At the same time, the Digitalization Staff is the central point of contact for all matters of digitalization and it plays an important role in the central monitoring and control of the implementation of cluster strategies and the digitalization platform. In addition, all software introduction and support groups of the AIN major organizational element were brought together.

The staff consists of three divisions and an administrative office.

Division D1

Division D1 of the Digitalization Staff is responsible for the project-related technical supervision of IT system architecture in the AIN major organizational element and for the process-related, organizational and content-related design of cross-project and cross-program components of the realization of clusters in the cyber/IT sub-portfolio.

In cluster programs, common IT services are developed by means of top-down control and provided for reuse.

To this end, considerable effort is currently required in the implementation of the new processes (HP ITM (IT management), LP CIT (cyber/IT)), the newly assigned responsibilities, and the comprehensive requirements (e.g. data strategy, architectural requirements, etc.).

Division D1, which focuses on architecture, can only be successful in close cooperation with IT service portfolio management and IT service design (BAAINBw I1.6), mission-related IT (BAAINBw I1.4), the other divisions of the Digitalization Staff and, above all, those responsible for ongoing projects or projects in development. For this purpose, Division D1 uses a special tool suite that provides improved controllability of the Bundeswehr IT system across all organizational levels.

The aim is to offer all participants the

means to develop solutions and thus to ensure the necessary standardization of the content of the data and information model and to relieve projects of overarching tasks.

Division D2

Division D2 consists of three branches that are assigned to the areas of "information security" (D2.1), "Data Governance Office" (D2.2 DGO) and "IT coordination and verification" (D2.3). The Chief of Division D2 is also the Chief Information Security Officer (CISO) Armaments..

Branch D2.1

Branch D2.1 supports the Chief Information Security Officer (CISO) Armaments and also comprises the roles of Information Security Officer (ISB) of the AIN major organizational element and ISB of BAAINBw. In addition to ensuring information security of the IT systems used and operated in its own major organizational element, the AIN major organizational element is also responsible for the preventive information security of IT systems procured for users, i.e. primarily the major military organizational elements.

Branch D2.2 DGO (Data Governance Office)

Branch D2.2 DGO advises and supports the project departments in BAAINBw and subordinate agencies in matters relating to master data maintenance. The established Master Data Management working group is responsible for the internal and external communication with regard to master data problems and for finding solutions, especially in the case of logistic issues. In addition, practice-oriented advanced training in the form of master data maintenance dialogs is conducted for project management and equipment specialists to assure and improve the quality of master data in SASPF (standard application software product families). In future, the tasks of the DGO AIN and (some) tasks of the Bundeswehr virtual DGO (including those of the deputy of the Bundeswehr virtual DGO) will also be carried out in this branch.

Branch D2.3

Branch D2.3 is the IT coordination center of the AIN major organizational element. It advises agencies of the major organizational element in Germany and abroad on the provision of IT equipment and

services, approves IT concepts of IT managers, reviews and approves requests for material allocated to the major organizational element, and approves IT requirements. Branch D2.3 is also responsible for IT verification.

Division D3

Division D3 of the Digitalization Staff pools all software introduction and support groups concerning the digitalization of administrative transactions in the AIN major organizational element.

Branch D3.1

As the SASPF introduction and support group for AIN, the task of Branch D3.1 is to coordinate and accompany all necessary measures in the context of the introduction and use of Standard Application Software Product Families (SASPF – in particular SAP) in the AIN major organizational element. In addition, SASPF ENO AIN is the authorized representative of the AIN in-service organization (BV NuOrg AIN) and represents the interests of the AIN major organizational element in the Bundeswehr-wide bodies of the Customer Center of Expertise (CCoE).

The currently planned SASPF rollout, which is the most important rollout for the AIN major organizational element, includes implementation components of sub-project 1 in the IT-U CPM SASPF project and replaces the legacy procedures EMIR (management of the entire investment title) and VOCON 1 (project controlling of CPM armaments projects including risk management).

Branch D3.2

As the introduction and support group for the electronic administration, Branch D3.2 is in charge of coordinating, initiating and overseeing all measures concerning the introduction and support of IT projects on the electronic administration, related processes and IT services in the AIN major organizational element.

Current projects are "Groupware Bw" and the "Document Management System of the Bundeswehr" (DokMBw). ■

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<https://www.bundeswehr.de/en/organization/equipment/downloads>



Introducing the Industrial Psychology Staff

Never has the workplace been subject to faster change than nowadays: Digitalization, structural changes, demographic changes and the current pandemic situation repeatedly pose new challenges.

Working models are ever changing, the boundaries between work and private life are becoming more and more blurred, learning requirements are increasing, and flexibility is taken for granted.

Work can become a burden due to factors such as demography, psychological stress, inadequate leadership styles, requirements on mobility or a lack of work-life-balance; this also applies to employees of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). And all these aspects mentioned above have an influence on well-being and health. Psychological disorders and costs associated with them are on the rise. Leadership styles have a significant influence on the extent and quality of psychosocial stress, strains and resources. It is therefore the responsibility of executive personnel to pay attention to their staff as part of their duty of care. The medium- and long-term efficiency of organizations can only be main-

tained on the basis of the physical and mental wellbeing of its individuals. If individuals are absent from work due to health issues, this does not only result in a deficit of working hours, but also in an increase of costs. Additionally, stressed employees are proven to make more mistakes and often to be less productive. On top of everything else, they are more prone to other diseases.

With the establishment of the Industrial Psychology Staff as part of the AIN organizational area, BAAINBw reacts to the social change and creates a central point of contact for executive personnel at all levels of command and for all employees regarding topics and questions of psychological relevance.

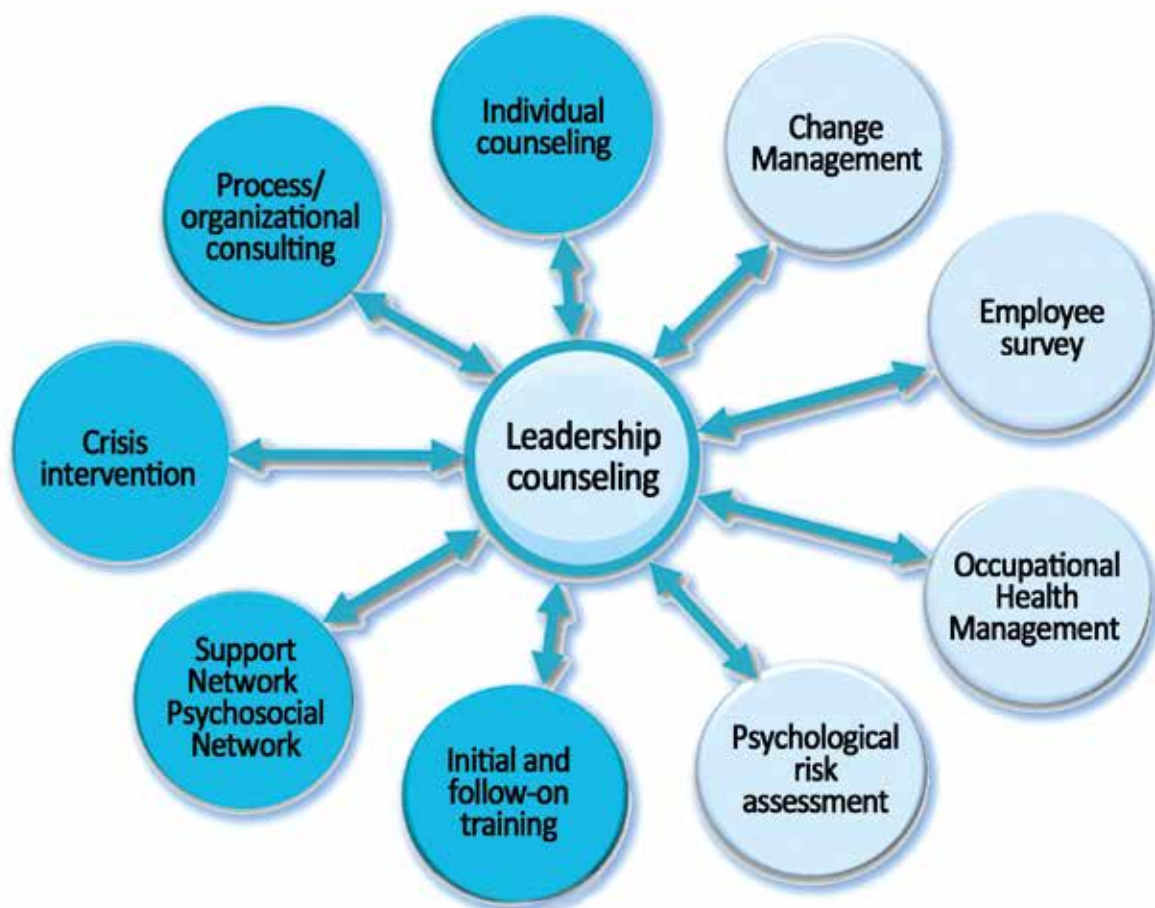
Industrial psychology as an organizational element was initially established in the line organization and has been directly assigned to the BAAINBw executive group as a staff unit since March 2020. The Industrial Psychology Staff consists of a team of psychologists supported by civilian and military personnel trained in the field of psychology. The establishment of the Industrial Psychology Staff offers unique services to civilian and military personnel. The unique feature

of this offer is that it is not only aimed at military personnel – like military psychology – but is available to all employees. Additionally, former employees, reserve duty personnel as well as family members and surviving dependents also have access to the services offered by the Industrial Psychology Staff.

Working Methods and Service Offers

The Occupational Safety and Health Act establishes the employer's obligation to take care of the health of its employees.

Basically, human health can be divided into the categories "physical health" and "mental health". There have been – and still are – programs regarding the physical health of employees, for example in the field of occupational safety or occupational health management (Betriebliches Gesundheitsmanagement, BGM), while there have been no comprehensive programs or comprehensive support regarding the mental health of employees. The Industrial Psychology Staff has been established in order to offer services in this context for all BAAINBw and AIN organizational area employees.



Among other tasks, the services include individual counseling, leadership counseling and psychological crisis intervention as well as advice on all topics and issues of psychological relevance.

To this end, the Industrial Psychology Staff offers assistance in the event of strains and burdens at work and in private life by conducting personal talks with the aim to relieve stress and offer advice. The assistance offered by the Staff includes, among other things

- Prevention of stress and support in stress management,
- Development of resources for improving resilience,
- Advice on burnout / boreout syndrome,
- Advice on mobbing and bossing,
- Advice on (stress-related) mental and psychosomatic as well as physical disorders,
- Addiction counseling,
- Counseling in acute life crises (e.g. in case of family problems),
- Establishment of contact within the Psychosocial Network (PSN) and with external psychotherapists.

Additionally, (prospective) executive personnel are offered advice tailored to their individual needs. Coaching on

their personal development is also part of the services offered by the Industrial Psychology Staff.

This includes advising and supporting superiors at all levels of command in a solution-oriented and proactive manner on all topics and issues of psychological relevance.

In detail, this may include support in the following areas:

- in decision-making,
- in the development of their leadership capability,
- in the resolution of conflicts in their team,
- in the implementation of team-building measures,
- in their personal development.

In addition, the Industrial Psychology Staff is expected to offer expert advice. In this context, it provides psychological expertise regarding – among other things – employee surveys, in-company training and follow-on training, change management processes, risk assessments regarding psychological stress, and occupational health management (BGM).

In summary, the Industrial Psychology Staff offers the following services, among others:

- Performing
 - Leadership counseling / coaching,
 - Individual counseling,
 - Process and organizational consulting,
 - Psychological crisis intervention,
 - Participating in
 - Psychosocial Network (PSN),
 - In-house training support,
 - Change management,
 - Employee surveys,
 - Risk assessment of psychological stress,
 - Supporting the Occupational Health Management (BGM),
 - Establishing the Support Network ("Netzwerk der Hilfe") in BAAINBw.
- It should be noted that consultations with psychologists and their contents are strictly confidential. As with physicians, the contents of the consultations are subject to legal confidentiality in accordance with Section 203 of the German Criminal Code (Strafgesetzbuch). This is an important aspect because these conversations must be regarded as a safe space in order to establish a trusting atmosphere and develop targeted solution strategies. Those seeking advice can be sure that their concerns will be treated with the utmost confidentiality. ■

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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 (acquisition of external advisory and support services as well as legal services).

B ranch 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 review and contract counseling for the individual contract branches of the Office's directorates 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 area of Intellectual Property Rights (IPR). In this context, the Branch provides advice in particular on issues relating to licensing rights. Regulations on rights of use, in particular with regard to technical documentation, software or industrial property rights, in BAAINBw contracts are specified by J3. Furthermore, it is responsible for conducting the proceedings before the competent intellectual property authorities with regard to the notification of federal industrial property rights. The Branch's responsibilities include, in addition to the protection of federal technical know-how, the evaluation of third-party industrial property rights in cases where such rights influence the awarding process. Moreover, J3 is responsible for principles regarding the preparation of statements of work.

Branch J4 deals with the procurement of external advisory and support services as well as legal services (so-called BURA services). In addition, as a contract management authority, the Branch supervises all existing BURA contracts (contract administration, invoice processing) and coordinates necessary measures, for instance if performance prob-

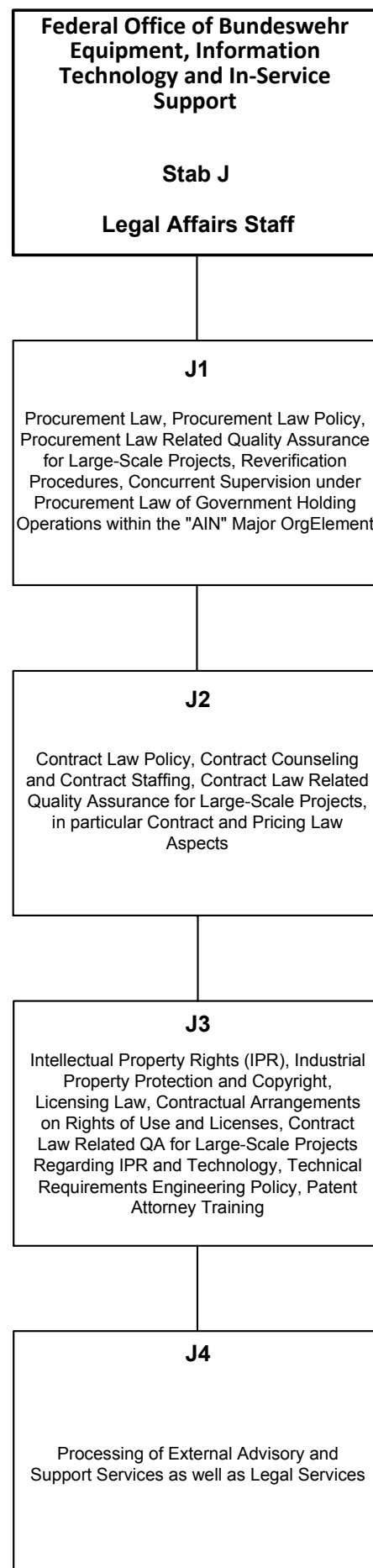
lems occur after contract conclusion. J4 is also responsible for reviewing requests under framework agreements of other ministries in the field of information and communication technology.

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 (gross) ("major projects").

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

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

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



Combat Directorate (K)

The main task of the BAAINBw Combat Directorate (K) is the armaments and in-service support management for the following weapon systems and the associated components. Directorate K is responsible for main battle tanks and armored transport vehicles as well as various armament, air defense and artillery system projects. The Combat Directorate's task spectrum also comprises infantry and engineer systems.

Four project divisions comprise the expertise of BAAINBw in the following areas:

- ground-based air defense systems (K3),
- air-/ship-borne armaments systems, anti-armor systems (K4),
- armored combat and transport systems (K5) as well as
- artillery, infantry and engineer systems (K6),
- fuzes and joint fire support (two additional branches in Division K1).

The Economic and Technical Affairs (K1) and Economic and Legal Affairs (K2) Divisions support these four project divisions in performing their comprehensive tasks in the fields of project and in-service support management as well as research and technology. The Economic and Technical Affairs Division (K1) with its four branches supports the Directorate in all technical-economic and in-service-related matters that affect more than one project.

Branch K1.1 is the central armament, in-service use and logistics element for the Combat Directorate. This comprises all common 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 comprises, for example, the practical training of candidates for the technical administrative service career, practical training required within programs of technical studies as well as support of practical papers and bachelor's theses.

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 sys-



Photo: Bundeswehr

Plans are in place for a new fire control vehicle based on the FUCHS (FOX) APC.

tems" 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 main components of these technological studies are:

- threat analyses,
- assessment of weapon effectiveness,
- risk areas of deployment,
- vulnerability models,
- innovative protection technologies,
- vehicle and systems electronics,
- missile architectures,
- counter-UAS,
- hypersonic missiles,
- laser effectors,
- air defense and
- simulation.

Branch K1.3 as national safety board is responsible for the fielding of new fuzes/fuzing systems in the Bundeswehr and, in this context, is responsible for the safety assessment and qualification of new or modified systems and their components (explosive devices

etc.). Furthermore, Branch K1.3 implements procurement projects in the field of fuzes and performs the strategic planning, tasking and assessment of related R&T studies. In addition, Branch K1.3 is responsible for preparing and updating the interactive electronic technical documentation (IETD) for weapon systems and equipment supervised and managed by the Combat Directorate. Moreover, Branch K1.3 is the central support element of the Combat Directorate regarding maintenance of master data in SASPF and the introduction of SASPF in the K Directorate (local introduction organization – EFO) and IT (including support of project-specific IT within the Combat Directorate – K-DV). 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 typical elements of indirect

Photo: Bundeswehr



The PATRIOT air defense system

fire, the "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. They manage contracts for the individual projects within the Directorate's area of responsibility. This includes contracts on the in-service phase of defense materiel. Furthermore, the contract branches support the projects by concluding national and international agreements.

K2.1 also focuses on repair, technical logistic support (TLS) and research and technology (R&T). It supports the Bundeswehr

Technical Centers WTD 52 and WTD 91 in contractual matters and serves as the legal department for the MGCS (Main Ground Combat System) project.

Branch K2.2 predominantly supports the projects of Division K5. Branch K2.3 supports those of Division K3 (K3.1 and K3.2) and Division K4 as well as Branch K6.1. K2.4 works on the TLVS project in Division K3 (K3.3) and on small arms and ammunition for the Branches K6.2 and K6.3. Branch K2.5 is specialized in matters of pricing regulations for public contracts and in charge of negotiating prices with contractors.

With effect from 1 June 2021, Division K3 „Ground-Based Air Defense/Territorial Missile Defense“ was newly established. It consists of the former Division PMO2 and two branches of Division K4 (K4.4 and K4.5).

In June 2021, Branch K4.4 was transferred into Branch K3.1 „Surface-To-Air Long

Range – PATRIOT; Surface-to-Air Missile Operations Center“. It is responsible for the management of the PATRIOT surface-to-air long range weapon system; the surface-to-air missile operations center (SAMOC); Polygone; the surface-to-air missile simulation facilities; and the satellite-based missile detection (SBMD) project. The regeneration of the PATRIOT air defense missile system is continued. The existing missile defense capabilities will remain in place until they are replaced by a successor system.

The surface-to-air missile operational center SAMOC provides the capability to connect, command and control national ground-based air defense forces, flying and seagoing units as well as platforms of allies and partners for multinational cooperation. A joint situation picture is created to provide a real-time presentation of the findings obtained. The main task of the respective in-service support management is to maintain or restore operational maturity, taking into account economic efficiency and the effects on life cycle costs.

Branch K3.2 is responsible for the short-range surface-to-air weapon system MANTIS NBS C-RAM and the light air defense system based on the STINGER guided missile. MANTIS is a stationary short-range air defense gun system primarily used for the protection of camps. Apart from typical air defense targets such as aircraft and helicopters, it is also used to engage so-called RAM targets (rockets, artillery and mortar). In order to be able to also engage small drones (Class 1 UAS), a special C-UAS weapon system was procured for the MINUSMA mission.

In addition to working on these projects in their in-service phase, K3.2 is also dealing with four major armaments projects. The first one is the LVS NNbS air defense system for short range and very short range protection, which is intended to replace the light air defense system and the Mantis weapon system in the long term. Develop-

Photo: Rheinmetall



KODIAK (Pionierpanzer 3) armored engineer vehicle

ment activities for this project are scheduled to start next year, and the system is planned to be made available to the user, the German Air Force, from 2027 on. In addition, the protection of Bundeswehr facilities in Germany and of forces in standby commitments is being dealt with in the area of activity „C-UAS Class 1“. The fourth major armaments project involves the development of a weapon laser. Next year, a demonstrator on a frigate is to be comprehensively tested for this purpose.

Branch K3.3 carries out project work for the projects „Tactical Air Defense System (TLVS)“ and „Medium Extended Air Defense System (MEADS)“. In the TLVS project, the ongoing award procedure will proceed under the constraints of the current budget law. The winding-up process for the tri-national MEADS project is currently underway. In this context, tri-national agreements and NATO requirements must be taken into account, especially in the field of the permanent protection of the information generated in MEADS.

In addition, Branch K3.3 will manage the projects „National Air Security Center for Territorial Missile Defense“, „Integrated Battle Management System (IBMS)“, and „Satellite Based Missile Detection (SBMD)“ in the future. These projects are currently in different project phases.

Specialist knowledge is pooled in Branch K3.4 for the following areas:

- commonly used equipment (e.g. vehicles, containers, power supply systems and installation kits),
- communication & information security as well as
- weapon system and ammunition safety for air defense projects

These areas implement individual aspects of major projects, such as PATRIOT and the air defense system for protection in the short range and very short range (NNbS), for the branches in charge of air defense project management in such a way that they are available to the projects in time. In addition, the Branch works on the IRIS-T SLM and SLS system components for the NNbS project.

Division K4 focuses on sea and air-based guided missiles as well as on antitank defense.

Apart from antitank systems, Branch K4.1 deals with air-launched guided ammunition that engages targets on the ground, i.e. air-to-ground guided missiles as well as guided and unguided bombs.

Regarding the first area, the main activities are the MELLs antitank guided missile and the hand-held antitank weapons, including the light-weight weapons „Wirkmittel 90 mm“ and „Wirkmittel 1800+“ (Enforcer). The essential tasks in the field of air-to-



Photo: KMW

LEOPARD 2 A7A1 with active protection system



Photo: IABG

Full demonstrator of the Airmobile Weapon Carrier

ground guided missiles are the „SEAD capability maintenance“ for the Tornado, i.e. the introduction of AGM-88E AARGM, an improved version of the HARM missile, and the BRIMSTONE short-range guided missile for the Eurofighter Typhoon. In addition, the 70mm rocket for the TIGER combat helicopter in the practice and operational versions has been procured again. Current projects in the field of airdropped ammunition are the procurement of the GBU-54 (Guided Bomb Unit) and new bomb bodies for the GBU-48 in the variants Mk-83 TIP and Mk-83 IM.

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 air-to-air missiles. This currently applies to the projects Meteor, IRIS-T, AMRAAM, Sidewinder and the air-to-air weapons for the successor to the TORNADO weapon system.

Division K5 „Armored Combat and Transport Systems“ consists of six branches.

Branch K5.1, „Main Battle Tank, Family Vehicles and Main Guns“ is divided into the LEOPARD 1-based vehicles project teams (DACHS armored engineer vehicle, BIBER armored bridge laying vehicle, armored recovery vehicle 2) on the one hand and the Leopard 2 project team on the other hand.

In addition to the permanent tasks of maintaining the operational maturity of the fielded fleets, the following major projects are currently being worked on:

- introduction of 44 armored engineer vehicles model 3, KODIAK, as successor to the DACHS armored engineer vehicle,
- modernization of 104 LEOPARD 2 main battle tanks to the LEOPARD 2 A7V variant,



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

ESD: What are the main tasks that you and the K Directorate will have to accomplish next year as a matter of priority?

Schmidt: Our focus will certainly be on all measures necessary to equip the Very High Readiness Joint Task Force (VJTF) in 2023, the year in which Germany assumes the leading role. At the same time, our extended focus is on intermediate objective No. 2 (2027) of the

Bundeswehr capability profile. In addition, there are a number of other high-level projects that I will be happy to discuss. As always, the primary objective is to successfully complete all projects within the prescribed and usually tight schedule. Due to the outstanding commitment of the staff of Directorate K, I am confident that we will achieve this objective.

ESD: In your opinion, how will the results of studies and decisions made on the subject of “in-service-use” affect the work of Directorate K?

Schmidt: A decision on the future responsibility for in-service support management and in-service support control has not yet been made. Currently, a range of solutions is being considered for the four operational domains – land/air/sea/cyber – with regard to the establishment of systems for the domain-based coordination of competencies and responsibilities to be established in the field of in-service support management. There is still a considerable need for studies in this area.

ESD: According to the Bundeswehr Concept, land forces must have an appropriately high level of protection. Are there any new considerations or requirements or is there a new status in this context?

Schmidt: Current considerations regarding an increased level of protection relate to the studies of active protection systems, since the necessary protection of a vehicle only by means of passive armor (armored steel plates) would increase the weight. A solution must be found to raise the level of protection and to reduce the vehicle weight at the same time.

The objective of R&T (research and technology) studies on modular active protection systems is to enable several different systems to use a common system architecture in order to reduce integration effort and weight. Furthermore, this is intended to enable a modular, adaptable protection configuration so that an appropriate protection system can be adapted to the vehicle, depending on the threat situation.

There are simulation-based studies on the reduction of the actual effectiveness of KE (kinetic energy) threats. In addition, firing trials are conducted with various countermeasures to enable KE defense or weaken a KE projectile.

ESD: What is the current status of the required materiel for the VJTF (Land) 2023 regarding projects in your area of responsibility? Will there be relevant deficits?

Schmidt: For the VJTF 23, the focus of my directorate is on 122 products of the land domain in addition to the basic equipment of a brigade. 29 of these products have been closely monitored, since what is feasible on the timeline in their case differs from what is possible on a monetary basis. Some things will not be available in time.

ESD: What is the status of the projects for short range and very short range protection?

Schmidt: This summer, the air defense system project for short range and very short range protection (LVS NNbS) received a financial commitment for the development of an initial capability. The contract is planned to be concluded in the fourth quarter of next year. The introduction of the first four highly mobile squadrons could then start at the end of 2026 and be completed by 2029.

We consider the short range and very short range air defense to also include protection against UAS Class 1. The acceptance of five systems is currently being carried out, which are to be used, among other things, for the protection of field facilities. They are planned to be ready for use by the beginning of next year. The systems have different sensors

in different spectral ranges (IR, visual range and radar). The weapon used with the system is the HP47+ jamming rifle, which has already been introduced into service in the Bundeswehr. For the existing C-UAS capability gap, proposals for solutions still have to be developed. We are working hard on them.

ESD: Are there any new challenges in the territorial missile defense program, and how should TLVS continue?

Schmidt: As part of the establishment of the new/old Division K3 (territorial air defense), Branch K3.3 will continue the TLVS project in the form of standstill maintenance. As part of territorial missile defense, K3.3 will take over the project “National Air Security Center for Territorial Missile Defense”, phase 1, upon completion of the analysis phase part 1. In accordance with the CPM procedure, proposals for solutions must be developed.

ESD: What is your view of the situation in the Joint Fire Support project, and what progress has been made in the introduction of precision ammunition for artillery and mortars?

Schmidt: The Joint Fire Support system network (JFS network) is characterized by a large number of sensors and weapons (and ammunition), which in turn are linked by a large number of coordination elements used for controlling and prioritizing the employment of weapons. These projects are distributed among the directorates I, U, S, L and K of BAA-INBw. As already shown, the JFS network consists of many systems that are deployed on the battlefield during operations. Therefore, the exchange of information between these systems has always been of particular importance. The “ADLER III” command and weapons control system used in the JFS network is currently being rolled out in its latest version. This provides the JFS network with a modern and highly efficient command and control asset for weapon employment.

The Bundeswehr intends to procure VULCANO precision ammunition. It will be fired by the PzH2000 self-propelled howitzer as 155 mm ammunition and will be used for the gun system of the class 125 frigates in the 127mm variant. A large part of the required qualification measures has already been completed, so that we will have another, very precise and effective weapon available in the JFS network.

ESD: How do you rate the chances for the second batch of PUMA IFVs? Are there any alternatives?

Schmidt: The status achieved with the VJTF 2023 mechanized infantry system and the retrofitting of the first lot, which was commissioned on this basis, form a solid foundation for the commissioning of a second lot. This decision will be made in the next legislative period. We are preparing for this.

If the German Army sticks to the capability requirements for a capability platform for the mechanized infantry, I do not see an alternative to the heavy PUMA/mechanized infantry system at the moment. If a more light-weight system is preferred, a wheeled variant based on the BOXER would also be conceivable. Division K is implementing both capability requirements.

ESD: What progress and special challenges are there with regard to the MGCS at BAAINBw?

Schmidt: The MGCS project is currently in the technology demonstrator phase. At the same time, a joint Franco-German concept of an MGCS system architecture is being identified in a study.

The next step is to examine the individual technologies developed in an overall system and to ensure the transition to the realization phase. Challenges in this context: Definition of contractor structures for further R&T activities and assignment of the overall system demonstrator phase to a prime contractor against the background of a very complex strategic interest situation in Germany and France, the tight budget situation and challenging timelines up to the target of a planned series launch in 2035.

The interview was conducted by Michael Horst.

- integration of the active protection system into 17 LEOPARD 2 MBTs, which will then be assigned the variant designation 2 A7 A1. These projects also include the modernization of the LEOPARD 2 tank driver training vehicle fleet and the associated training equipment.

Branch K5.2 deals with the PUMA and MARDER armored infantry fighting vehicles (AIFV). The PUMA AIFV and the “enhanced future infantryman system” equipment, which is also part of the “mechanized infantry system”, have reached a decisive milestone on the way to full operational maturity through the successful implementation of the design status, which has been significantly improved with regard to VJTF 2023. On the basis of the contract concluded in mid-2021 for the retrofitting of the PUMA AIFV, the progress achieved will be gradually implemented in the first lot of PUMA AIFVs. At the same time, the operational readiness of the PUMA AIFV has been significantly improved over the past two years.

As part of the extension of the MARDER AIFV's service life to 2030, comprehensive measures were initiated to remove obsolescences, which will be implemented in the form of various conversion measures by 2024. In addition, a digital command and



Photo: Bundeswehr/Jonas Weber

There are plans for the procurement of a second batch of LEGUAN assault bridges.

control system will be installed in selected vehicles in order to ensure the operational capability for VJTF 2023 in a comprehensive manner.

Branch K5.3 “Heavy Weapon Carriers/Armored Transport Vehicles” deals with the BOXER multi-role armored vehicle and the FUCHS armored transport vehicle 1.

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 operating in Mali. Furthermore, the Branch works on the development of measures to extend the service life of the WIESEL 1 fleet, the construction of a system and function

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Photo: Bundeswehr/Jane Schmidt



Firings of PANZERHAUBITZE 2000 SP howitzers

Photo: Bundeswehr/Johannes Heyn



After 50 years of the MARDER AIFV in service, extensive measures have been initiated to extend its service life until 2030.

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 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. The main focus of the work is the fast-floating bridge 2, which is to replace the M3 amphibious rig and the folding girder bridge, the procurement of the second lot of the LEGUAN assault bridge as well as the successor system for the folding trackway.

Branch K5.6 deals with the outstanding topic of the successor to the conventional main battle tank in the future form of a multi-platform system that also integrates unmanned elements. This Main Ground Combat System (MGCS) project, which is currently being conducted bilaterally with France and is expected to

open up for cooperation with other nations, is intended to replace the LEOPARD 2 and LECLERC main battle tanks from 2035 on. For this purpose, the Branch is set up as a combined project team (CPT), which has also included French staff since September 2020.

The range of tasks of Division K6 includes small, medium and large caliber guns of the Bundeswehr, including their corresponding ammunition, as well as explosive ordnance 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 employment system and 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 via the NATO Support and Procurement Agency (NSPA). With a comprehensive package for maintaining and expanding its capabilities, PzH 2000 is being prepared for

in-service use in the next twenty years. At the same time, work on the future systems of short/medium/long range indirect fire is underway.

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

Branch K6.3 deals, among other things, with the projects

- heavy machine gun
- programmable 40 mm airburst ammunition for the grenade machine gun,
- programmable 30 mm airburst ammunition (PUMA AIFV),
- 30 mm ammunition with reduced range for training purposes,
- remote-controlled weapon stations as well as the
- 12.7 mm, 27 mm, 76 mm and 127 mm naval gunnery systems.

Improvised explosive devices (IED) have increasingly become a threat to soldiers in many of the countries where Bundeswehr forces are deployed. 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 the task of Branch K6.5.

Relevant ammunition will, by means of regeneration, always be adapted to the state of the art and the operational requirements and will be fielded upon completion of the risk reduction phase.

Currently, preparations are underway for the fielding of guided artillery ammunition in the Army and Navy. In the field of naval ammunition this will be ensured by the 127 mm VULCANO ammunition for joint fire support by the F125 frigate from sea to land. In addition, the unguided 127 mm standard ammunition is currently being qualified.

For the Army capability of point target engagement within a range of up to 70 km, the VULCANO 155 mm GPS/SAL (semi active laser) is planned to be used from the Panzerhaubitze 2000 self-propelled howitzer. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Air Directorate (L)

The Air Directorate of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) manages aircraft systems of the Bundeswehr. Its project divisions L3, L4, L5, L6, L7, L8 and – as of May 2021 the new project division L9 – are responsible for implementing projects in accordance with the Customer Product Management (CPM) process and for supervising the in-service support management of fielded products until they are phased out. Directorate L also exercises functional supervision of the Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (Bundeswehr Technical Center 61 (WTD 61)). The project portfolio of Division L includes combat aircraft as well as

- transport and special aircraft,
- all helicopter systems,
- unmanned aircraft,
- tactical drones,
- rescue and protection systems for crews and
- simulators and training equipment.

Division L also manages the increasingly important capability area of space, reconnaissance and electronic warfare, for which a separate project division – L9 – has been set up.

Almost all large-scale projects are implemented through multinational (predominantly European) partnerships and management agencies.

Directorate L assumes materiel responsibility for operational viability throughout the entire life cycle of airborne weapon systems assigned to it. Prior to the implementation phase, this viability is ensured 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),
- support in the field of planning during Analysis Phase I and
- the preparation of proposed solutions during Analysis Phase II;
- and during the implementation and in-service support phases through
- acquisition life cycle management,
- the management of all in-service support activities for maintaining the operational viability of all manned and unmanned aircraft and space-based reconnaissance systems fielded in the Bundeswehr,
- the supervision of systems engineering and the integration of subsystems, including armament,



Graphic: Boeing

P-A8 POSEIDON Maritime Patrol Aircraft (MPA)

- life cycle management including obsolescence management and
- risk management.

This also includes highly prioritized procurements in the context of fast-track initiatives for operations.

Divisions L1 "Economic and Technical Affairs, Policy/Fundamentals of A/C, Aeronautical and Non-Essential Equipment" and L2 "Economic and Legal Affairs" as well as the Directorate Staff and Directorate Controlling support the project divisions.

Since 2020, project and in-service support management has also been assisted by the Airworthiness Staff and the In-Service Support Manager at the level of deputy director.

Current and Future Challenges

Increasing the materiel readiness of aircraft and ensuring their positive development will remain high priorities of the Air Directorate. This year, contracts were concluded for a large number of new projects. Striking a balance between the (required) capabilities of the Bundeswehr, the requirements of users, legal regulations, technically feasible solutions, and available budgetary funds continues to be a challenging task. Several crucial capabilities are still ensured by "legacy aircraft", which must now be replaced for technical and economic reasons.

The following examples of our project development activities in the year 2021 illustrate the "traditional" major aircraft types and the task portfolio of Directorate L.

Procurement of the P-8A POSEIDON Maritime Patrol Aircraft (MPA)

A capability gap in the field of long-range maritime reconnaissance and anti-submarine warfare was imminent owing to the end of service life of the P-3C Orion system in 2025 and the expected entry into service of the successor system MAWS (Maritime Airborne Warfare System) in 2035 at the earliest. For the German Navy, the capability to conduct airborne surveillance and reconnaissance at sea and under water and anti-submarine warfare in particular are of special importance. Maritime patrol aircraft (MPA) make an important contribution to search and rescue (SAR) operations.

The P-8A Poseidon, which is manufactured by Boeing, is a twin-engine aircraft based on the Boeing 737-800 civilian medium-range aircraft and has all the capabilities of the P-3C Orion aircraft. It is used by the United States as well as by Australia, India, South Korea, New Zealand, Norway and the United Kingdom. To ensure the capabilities that have been provided by the P-3C Orion, the German Government decided to procure five Boeing P-8A Poseidons as part of two foreign military sales (FMS) contracts concluded with the US Navy. As in the past, Germany will seek to cooperate with other nations using the P-8A Poseidon as far as possible and practicable.

Airbus H145 LUH SAR

In the initiated generational change for the Bundeswehr land SAR service, the Airbus H145 LUH SAR is a worthy successor

A Further Insight



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

ESD: What were the most important developments regarding equipment for the German Air Force in 2021?

Herzog: Not only were we able to build up capabilities by delivering further contractually agreed aircraft, such as the A400M and the NH90, but we above all reached important milestones for the German Air Force and its equipment.

For example, we were able to obtain parliamentary approval for the EURODRONE program, which is also called EU MALE RPAS, and the PE-GASUS project (editor's note: Global 6000 business jets are the carrier platform). Another significant milestone was reached when BAAINBw assumed project responsibility for the C-130J aircraft. The first German aircraft are expected to be delivered to the German-French air transport squadron at the Évreux airbase in the coming months. Given increasing European armaments cooperation, our focus was also on further deliveries of the Multi Role Tanker Transport (MRTT) aircraft (based on the A330) to the NATO Support and Procurement Agency (NSPA). These developments are crucial steps for the equipment of the German Air Force and will ensure significant capability growth in the coming years.

ESD: What, for you, are the priority tasks of Directorate L in 2022?

Herzog: The year 2022 will be marked by further progress in key projects such as the heavy transport helicopter, the replacement of the TORNADO weapon system, the EURODRONE program, and the Direct Infrared Counter Measures (DIRCM) system for the German C-130J.

ESD: The availability of airborne weapon systems continues to improve. What are the remaining challenges?

Herzog: In the introduction phase of airborne systems, maintenance must be carried out by companies whose capacities are already largely being used for production and conversion. Another challenge is that in addition to production activities a repair pool of high-quality components must be established in order to minimize repair turnaround times.

In many programs, we have been able to implement a performance-based logistics approach, which has contributed to an increased availability of spare and exchange parts and thus to an increased availability of airborne systems.

We expect further positive effects for the EUROFIGHTER and the NH90 in the course of 2022.

ESD: Will a contract be concluded for the heavy transport helicopter in 2022?

Herzog: It is our objective to continuously provide the required capabilities that are currently ensured by the CH-53 beyond 2030, its scheduled end of in-service life.

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

Herzog: The capability growth of the EUROFIGHTER can be roughly divided into short-term, medium-term and long-term measures.

With the short-term measures, we ensure the timely provision of the required capabilities for upcoming Alliance commitments such as VJTF 2023. We are focusing, first and foremost, on upgrading the Link 16/Multifunctional Information Distribution System (MIDS), the IFF mode 5, the self-protection capability, and the mechanical scanning radar system.

As part of the next quadrinational development program, i.e. the Phased Enhancement Package which Germany will join as of 2022, we will also build up the capabilities of the METEOR missile and the air-to-ground role and lay the foundations for participating in civilian air traffic.

In the medium and long term, we will be able to significantly enhance capabilities by installing an AESA (editor's note: active electronically scanned array) radar as of 2024. The radar systems will also be installed in the jets under Project Quadriga, which are intended to replace the Tranche 1 aircraft.

To ensure the EUROFIGHTER's effectiveness in future scenarios with modern threats until its scheduled end of in-service life in 2055 and to guarantee a sustainable platform, our long-term plans under the Long-Term Evolution Program include modernizing the avionics and IT architecture as well as building up communication capabilities.

ESD: What is the situation with regard to the EURODRONE?

Herzog: After the negotiation phase between 2019 and 2020, OCCAR (editor's note: Organisation Conjointe de Coopération en matière d'Armement), which is the responsible defense agency for the EURODRONE project, provided the partner nations with a finalized draft contract concluded with the main contractor Airbus Defence & Space GmbH. In April 2021, Germany gave the green light for the four-nations contract on development, procurement and industrial support during the first five years of the in-service phase. The contract is still to be approved by the partner nations France, Italy and Spain. Only with their consent can the international arms procurement agency OCCAR conclude the contract with the main contractor on behalf of the four nations.

Supplementary contracts cannot be concluded before the multinational main contract is signed.

It is worth mentioning in this context that the EURODRONE project is funded by the European Defense Industrial Development Program (and thus by the European Defense Fund) with €100 million from the EU budget. The contribution agreement, which is necessary to receive funding, was signed by OCCAR and the European Commission on 20 November 2020.

ESD: What progress do you expect for the FCAS in 2022?

Herzog: I expect that the concept study will be completed and that the research and technology development phase will be started in 2022. During this phase, the technology required for the Future Combat Air System (FCAS) will be further developed. This will be followed by the demonstrator phase in 2024, during which demonstrators will be developed and constructed.

In 2022, we will also initiate the national research and technology component in order to complement the trinational activities performed in these two phases.

The interview was conducted by Ulrich Renn.

to the long-serving Bell UH-1D ("Huey"). The LUH SAR is for the most part identical to the civilian version of the H145 helicopter. It is equipped with only a few military items such as a command radio and a military GPS.

At the end of 2018, a contract was concluded between BAABw and Airbus Helicopters Deutschland GmbH (AHD) concerning the procurement of seven helicopters and their maintenance, repair and provision for flight operations. In a second contract amendment, this number was increased to eight aircraft at the end of 2020. Logistic services will be provided based on a subcontract with AHD and Motorflug for a period of nine years as of delivery of the first helicopter.

Between December 2019 and March 2021, a total of eight LUH SAR were delivered to the Bundeswehr, seven of which are available to Transport Helicopter Regiment 30 for SAR services and the training of SAR crews. The eighth aircraft is used at WTD 61 to support test operations. Its design is largely identical to that of the rest of the fleet and can thus be flexibly exchanged.



Photo: Airbus Helicopters Deutschland

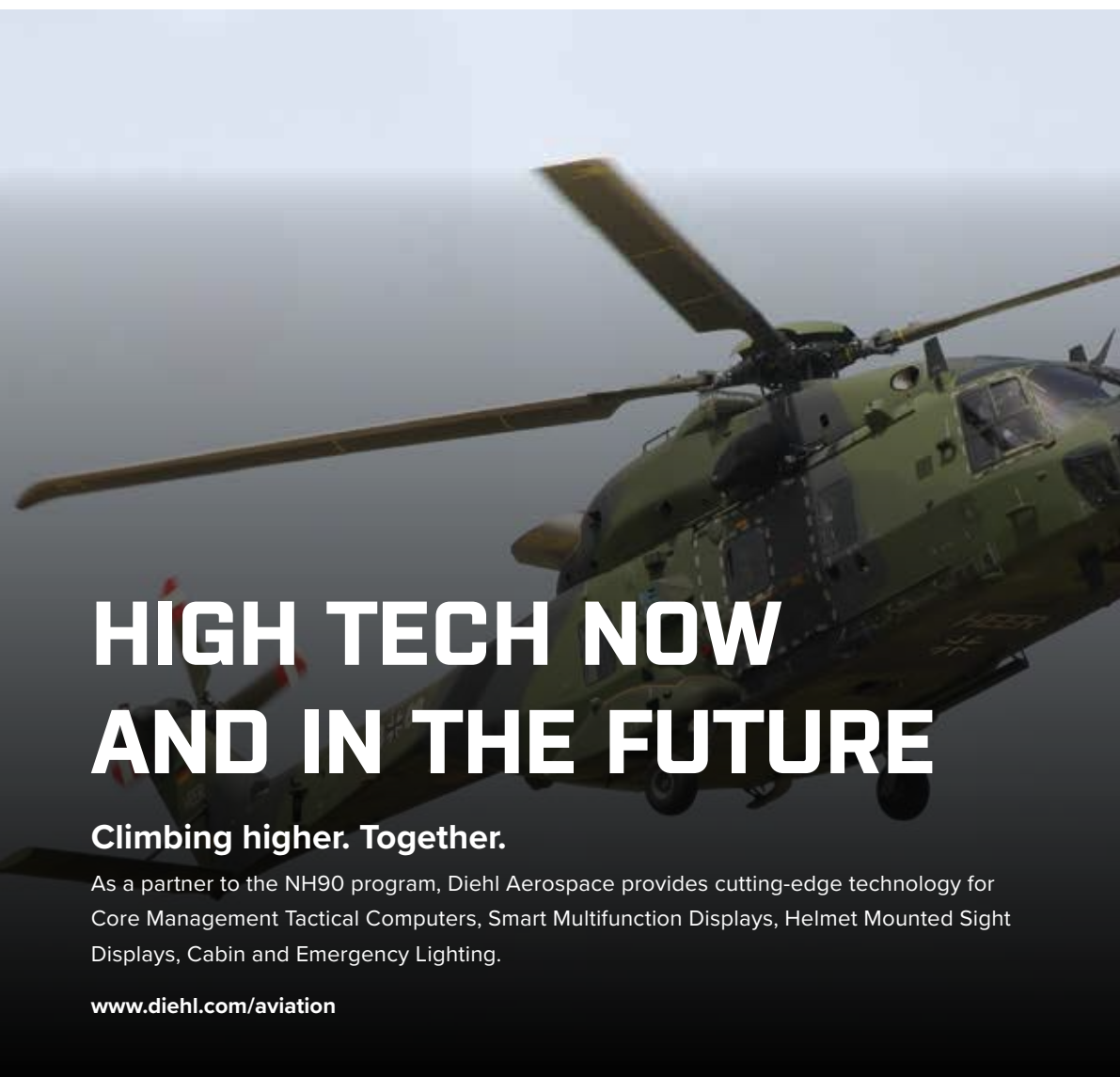
H146 light search and rescue support helicopter

The operational suitability test, which started immediately after delivery of the first LUH SAR, was finished in March 2021. Further milestones were reached when the LUH SAR fleet was delivered to the SAR commands in Niederstetten in June 2020, Nörvenich in December 2020, and Holzdorf in April 2021. The transition to the new model has thus been completed, and land SAR tasks will be performed much sooner than planned.

PEGASUS (L5.1)

Since the Breguet Atlantic SIGINT reconnaissance aircraft (BR 1150 ATL SIGINT) was decommissioned on 30 June 2010, airborne SIGINT systems are no longer available to the Bundeswehr. The future PEGASUS aircraft for airborne wide-area

SIGINT surveillance and reconnaissance (SLWÜA) has capabilities to contribute to the operational picture in areas of interest. PEGASUS provides intelligence on target objects through reconnaissance on electronic activities of forces and assets and on detection and guidance systems. The PEGASUS aircraft will be able to fulfill all key reconnaissance requirements and is therefore a crucial and extremely flexible reconnaissance resource that will also help to fulfill Germany's Alliance commitments. The reconnaissance system consists of three aircraft, which are modified for this purpose, and the SIGINT system. Bombardier Global 6000 business aircraft are used as a carrier platform. The SIGINT system developed by Hensoldt consists of an air-based SIGINT system, which is integrated



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Photo: Bundeswehr

Four NH90 tactical troop helicopters in flight

into the carrier platform, a SIGINT ground-based system, and a training and a reference system.

The implementation contract for the PEGASUS system was signed by Hensoldt, which is the main contractor, and BAABw on 29 June 2021. Since three Global 6000 aircraft had been reserved in 2020, the first aircraft was delivered to the contractors for modification only two months after the contract was signed.

The 15-Year History of the NH90 in the Bundeswehr

The first NH90 (NATO helicopter 90) transport helicopter was delivered to the Bundeswehr on 2 November 2006. The

Bundeswehr therefore looked back on 15 years of use in 2021. More than twenty years have passed since the first flight of an NH90 prototype in June 2000.

Today the international NH90 fleet comprises more than 400 aircraft that were delivered in more than 20 different variants of the basic NH90 TTH (Tactical Transport Helicopter) and NH90 NFH (NATO Frigate Helicopter) versions to 13 user nations. Around the world, 14 customer nations have ordered a total of 597 helicopters.

Of these, the Bundeswehr is using 82 aircraft in the NH90 TTH basic version as a light transport helicopter for the Army (LTH Army) and for search and rescue operations (LTH SAR).



Graphic: HENSOLDT

The PEGASUS weapon system

A total of 18 NH90 NTH (Naval Transport Helicopter) SEA LIONS were ordered in 2015 to replace the SEA KING Mk41. The SEA LION is primarily used for emergency SAR operations in the air and at sea, for missions of the Navy special operations forces, and as a helicopter on board Bundeswehr combat support ships.

On 31 August 2020, the Bundeswehr concluded a contract on the procurement of 31 additional NH90 Navy helicopters – the latest member of the NH90 family – as Multirole Frigate Helicopters to replace the SEA LYNX Mk 88A Navy on-board helicopter (a detailed article on this topic was published in ES&T 7/2021). These helicopters will be delivered in 2025. With a designated service life of 30 years, the NH90 will continue to be a crucial element of the Bundeswehr helicopter fleet in the foreseeable future.

A multirole helicopter, the NH90 has a modular design that allows it to fulfill various tasks in the armed forces of user nations. The operational spectrum ranges from basic transport missions to coordinated anti-submarine warfare. The helicopters can be adapted to the specific requirements of planned operations at short notice. The wide variety of operational tasks that can be fulfilled is reflected by the many different versions of the NH90 and the large number of conversion kits. The NH90 can thus be converted from a simple “packhorse” to a flying ambulance with intensive care equipment or to a reconnaissance helicopter with a high-resolution electro-optical sensor system.

Not only has the NH90 been in use for 15 years, but it has also been further developed for 15 years. On the basis of lessons learned from repair and maintenance activities and on operations, the NH90 now covers a wider range of mission capabilities and functions. Through continuous improvement and innovation, the demands of logistic support and day-to-day use can be met more efficiently.

Adapting the NH90 fleet to changing threat scenarios and tasks and keeping pace with technological developments will continue to be the greatest challenges for the NH90 project in future. ■

Download of the BAABw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Sea Directorate (S)

The Sea Directorate is responsible for matters related to the realisation and in-service use of Navy ships and boats, Navy-specific shore-based systems, communication systems and training installations, and other Navy-specific equipment. It supports the units from the first stages of realisation until their disposal.

The Sea Directorate consists of a total of eight divisions, each with a different focus of activities, as well as the Directorate Staff and Directorate Controlling. Within this organisation, five project groups support the German units afloat:

- S3: Frigates and Corvettes
- S4: Mine Countermeasures, Subsurface Weapon Systems and Subsurface Sensor Systems
- S5: Support Vessels, Surface Sensors, Auxiliary Ships and Support Systems
- S7: Submarines
- S8: Type 126 Frigates

Apart from the project groups, the Sea Directorate also has three specialist groups that support the projects:

- S1: Economic and Technical Affairs
- S2: Economic and Legal Affairs
- S6: Naval Command and Control Systems

In addition to its specialist tasks, the group S6 is also in charge of the project management of shore-based systems and training installations, and is responsible for checking the IT security, operational reliability and functional reliability of software and hardware in the command and weapon control systems.

To meet the increasing challenges related to in-service use, the Sea Directorate has established the position of a deputy director and in-service support manager.

The current status of selected projects of the Sea Directorate is presented on the following pages:

Replacement of the Obsolescent Long-Range Sensor and Enhancement of the Air Defence Capability of Type 124 Frigates

With its three Type 124 frigates, the German Navy operates ships specifically designed for force and joint air defence. The main sensor for the development of a long-range air picture is the SMART-L¹ air surveillance radar system, which is affected by considerable obsolescence.

The primary objective of this project is to maintain an air surveillance capability. Additionally, the frigates are to be enabled to contribute to NATO Ballistic Missile Defence (BMD) in the fields of early warning and cueing in a manner that appropriately reflects



Photo: Bundeswehr/Gergs

Frigate F 224 SACHSEN-ANHALT sailing in the Firth of Flensburg on 31 October 2020

Germany's leading role in cluster Air and Missile Defence (AMD).

According to current plans, the integration of the first new long-range radar into the test, reference and training system is scheduled for 2023. In 2024, the frigate HESSEN will be the first ship to be equipped with the new long-range radar in the course of her scheduled maintenance phase.

The contract for project stage 1, i.e. the procurement and integration of the new long-range sensor, was signed by the Hensoldt company on 23 August 2021.

Type 125 Frigate Project

The four new Type 125 frigates (F125) have been designed for multinational joint military operations of low or medium intensity and long duration. The third of the class, the frigate SACHSEN-ANHALT, was accepted from industry in March 2021. On 17 June 2021, she was commissioned at 4 Frigate Squadron, like all Type 125 frigates before and after her. The fourth and final ship of the class, RHEINLAND-PFALZ, is scheduled to be delivered to the Bundeswehr by the end of 2021 once she has passed her final acceptance trials.

Type 126 Frigate

On 19 June 2020, at the end of a Europe-wide competitive bidding process,

the project of the Type 126 frigate (formerly known as MKS 180 multirole combat ship), reached the most important realisation milestone until then, namely the conclusion of the building contract with Damen Schelde Naval Shipbuilding B.V.

Initially, four units will be procured, with the option being to procure another two to cover the conceptual demand of a total of six units. The frigates will be capable of three-dimensional naval warfare in the entire intensity spectrum of operations around the globe. Delivery of the first of class is planned for 2028, with the other units scheduled to be delivered by 2032.

As a modular maritime capability platform, the Type 126 frigate will have basic capabilities that will particularly meet the requirements of permanent operational commitments. These capabilities include above all the ability to exercise command and control in a maritime formation, a self-defence capability and, additionally, an antisurface and anti-air warfare capability.

The Type 126 frigate will provide capabilities focussed on wide-area antisubmarine warfare for the protection of task forces and sea areas. Moreover, the options for a missionised equipment suite will also allow it to meet the requirements of other than the above operations and missions. In order to further tailor the ship to the respective operation, it is possible to take two shipborne helicopters and one unmanned aerial

¹ Signaal Multibeam Acquisition Radar for Targeting, L-Band



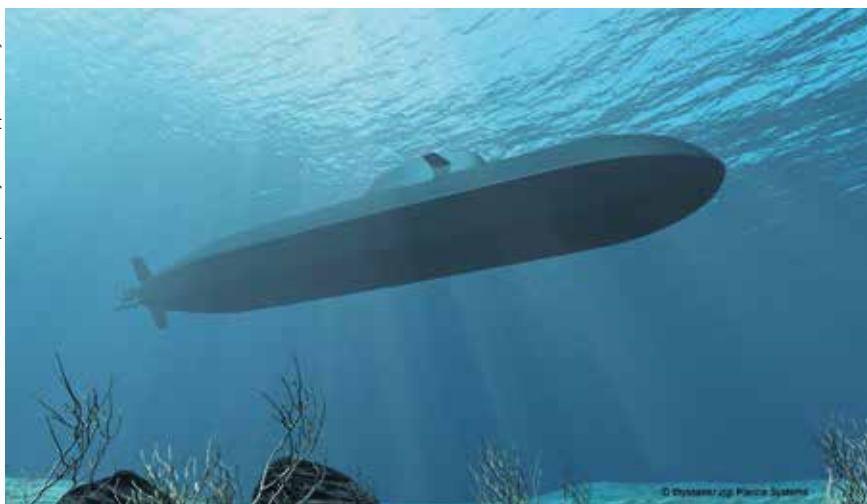
Artist impression of a Type 126 frigate



Type K130 corvette LUDWIGSHAFEN AM RHEIN



Intelligence Collector



Draft of Type 212CD submarine

system (UAS) aboard and embark special forces, a fleet surgical team or signals intelligence personnel.

Supplementary Procurement of Type K130 Corvettes

The first five Type K130 corvettes procured constituted extremely advanced and highly

complex state-of-the-art weapon systems. The proven basic design of the K130 will be maintained for the procurement of the vessels no. 6 to 10.

On 13 July 2021 already, the keel laying of vessel no. 9 was performed in an official ceremony in Wolgast.

Vessels no. 6 to 10 are planned to enter service from 2023 onwards.

Type 212CD Submarine after Kick-off

After long preparation, the Type 212CD (Common Design) submarine project was approved by parliament on 23 June 2021. Immediately thereafter, on 8 July 2021, the trilateral contract between the Norwegian Defence Material Agency (NDMA), the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) and the contractor thyssenkrupp Marine Systems (tkMS) was signed by the procurement organisations and the main contractor at Kiel and Bergen simultaneously. The objective of the project is to deliver six submarines to the two users (two to Germany and four to Norway) beginning in 2029.

This project is not an isolated one as the contract for the procurement of the Naval Strike Missile (NSM) antiship guided missile also signed on 8 July is equally object of the German-Norwegian armaments cooperation in accordance with the Memorandum of Understanding (MoU) on Naval Defence Materiel Cooperation.

The creation of synergies and the establishment of interoperability between the German and the Norwegian Navies will be the core tasks of this strategic cooperation, which will comprise far more than the mere common development and procurement of submarines of identical design.

The trilateral project kick-off meeting took place at Kiel on 7 September 2021.

With the exception of a few nation-specific technical details, six identical submarines will be procured within the scope of the Type 212CD project. A common in-service support management will be established, which will include crew and logistic personnel training.

Already in 2018, it was agreed in the Program Arrangement for Submarine Cooperation to establish a Joint Building Program Office (JBPO) immediately after the signing of the contract. The JBPO will be registered at Kiel and serve as the sole and central point of contact for design, construction and acceptance issues. In the

Kiel joint team, approximately one third of the personnel employed directly on site will be Norwegian.

Similarly, a Lifetime Management Program Office (LMPO) will be established at Haakonsvern, Norway, before the beginning of the critical design review of the project. Approximately one third of its staff will be German personnel.

The two offices will be headed alternately by Germany and Norway. In addition, the Program Arrangement for Submarine Co-operation provides for the installation of a liaison office at Haakonsvern as this is where the commonly procured submarines are intended to be repaired in a new shipyard in the future.

Type 123 Frigate – Remaining in Service until 2035

Comprehensive obsolescence elimination measures will be taken to ensure that the capability of the Type 123 platforms is maintained, that they remain available in an operationally ready and robust condition without any interruption until the delivery of the Type 126 frigates (see above) and that the four BRANDENBURG class units remain operational until 2035.



Photo: German Navy Press and Information Centre

Type 123 frigate MECKLENBURG-VORPOMMERN at sea



Graphic: MTG Marinetechnik GmbH

Design draft for the new German Navy oilers

In a comprehensive system-overlapping measure, the orders for the tactical radar systems are intended to be pooled and placed parallel to the conclusion of a Performance Based Logistics contract that is to ensure an efficient obsolescence management and, not least,

increased availability of the systems in use. Maintenance of the self-defence and long-range antisurface warfare capabilities as well as, in particular, the capability deficits in the field of sub-surface picture compilation will also be considered.



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

ESD: In 2020 everyone was talking about naval surface shipbuilding being declared a key technology. What were the effects?

RADM Czerwinski: Classifying naval shipbuilding as key technology has emphasised its significance for both German security and industrial policy from a strategic point of view

and has made it clear to everyone that naval shipbuilding will remain an indispensable component of Germany's national security provisions.

This will have an impact on all of Germany's maritime defence capabilities. Enabling key technologies in maritime research and technology will have to be identified and specifically developed into innovative and robust product solutions. For this purpose, we set up a "Technology Control for the Sea Dimension" section in the Sea Directorate that works in close collaboration with the Navy. In terms of the maritime industrial basis, national supply security was emphasized as an essential security interest of Germany. Based on the exception provided for by Article 346 of the Treaty on the Functioning of the European Union, it is now possible to award contracts in this domain to domestic companies only; however, each single case has to be justified conclusively.

ESD: Contrary to all statements in the past, the cooperation between Navy, industry and BAaINBw is still a target of criticism. What can be done to change that?

RADM Czerwinski: In our present procurement projects, we are following various approaches that we have deduced as lessons learned from former projects.

One of these approaches was, for example, the award procedure for the new Type 126 frigate (formerly MKS 180), which was carried out as a Europe-wide competition. At the end of three rounds of negotiations, in which the requirements for the future frigate were fleshed out step by step, the tenderers presented their Best and Final Offer. Due to this course of action, the competitive pressure was high and finally led to a construction contract that is particularly high in quality and offers both contracting parties great clarity about the result to be delivered or expected. Apart from project and risk management specifications to the contractor, an active obsolescence management as well as a warranty policy for certain properties that determine the capabilities of the future frigate were also agreed upon.

In the field of maintenance, we analysed the underlying process intensively last year and derived potential for optimisation. One result of this analysis is the revision of the relevant maintenance regulation. In this context, we will strengthen the role of the project managers and improve collaboration by ensuring their presence on site among other things. Another important component will be the new conditions of contract. Our plan is to arrange class-specific multi-partner framework contracts with the industry. These contracts primarily serve the purpose of creating a predictable and more reliable basis

for the maintenance of seagoing units for all parties, that is industry, Navy, and Naval Arsenal as customer, and thus for operational availability.

ESD: Cyber is one of the deep concerns of our time. How do you approach this in the field of naval armament?

RADM Czerwinski: The Sea Directorate has just recently taken organisational measures to further sharpen the focus on the subject of cyber in terms of information security. The development of project-related information security concepts will in the future be supported by a separate IT security cell with additional professional expertise within the directorate. In my opinion, it is only a matter of time until there will be a hacker attack on one of our vessels. We have to continue to prepare thoroughly for this scenario and close all known security gaps consistently.

ESD: How well do you think Navy and naval armament are prepared when it comes to modern technologies – artificial intelligence, autonomous weapon systems, just to mention some keywords?

RADM Czerwinski: In the Sea Directorate, we keep track of research and technology developments in these areas very carefully in the Technology Control for the Sea Dimension section and work very closely with the Navy to react to upcoming developments in the best possible way. Apart from the armaments industry, cutting-edge defence research plays a central role in this process.

For future capability platforms of the Navy, a special focus in the R&T task area Sea lies on AI-based (maritime) assistance and command and control systems. Against the backdrop of increasing system complexity, high operational dynamics and the ongoing flood of information, this is indispensable.

I think it is unlikely that we will rely on completely autonomous systems in the future that act, and above all decide, self-sufficiently.

In addition to developments in the area of artificial intelligence, efficient energy and propulsion systems as a preliminary stage to alternative power supply and propulsion concepts in a post fossil world as well as systemic survivability and vulnerability of future capability platforms will be our focus topics. In addition to the classical "kinetic" threat scenarios, the latter relates especially to the threats from cyberspace mentioned before.

ESD: What do you think are the chances and possibilities of a consolidation of the shipyards?

RADM Czerwinski: From our point of view as a public purchaser, consolidating competitors in the private sector is always a double-edged sword.

On the one hand, a consolidation leads to a strong industrial partner that can count on a broad basis of specialists and react flexibly to unprecedented developments in the course of a project.

On the other hand, competition decreases when the number of contenders does and in the worst possible case negotiations have to be conducted with a monopolist. The general structures in German industry are completely different from those in France, for example.

The interview was conducted by Hans-Uwe Mergener.

NGFrig concept study

Replenishment of Seagoing Units

After more than 40 years of operation, the German Navy oilers RHÖN and SPESSART will reach the end of their service lives in 2023.

The new oilers can travel at a maximum speed of 18 knots and have an off-load capacity of 11,000 m³ of diesel fuel and of at least 500 m³ of aviation fuel. The capability profile is supplemented by a helicopter landing pad and the ability to stow and autonomously handle up to ten containers.

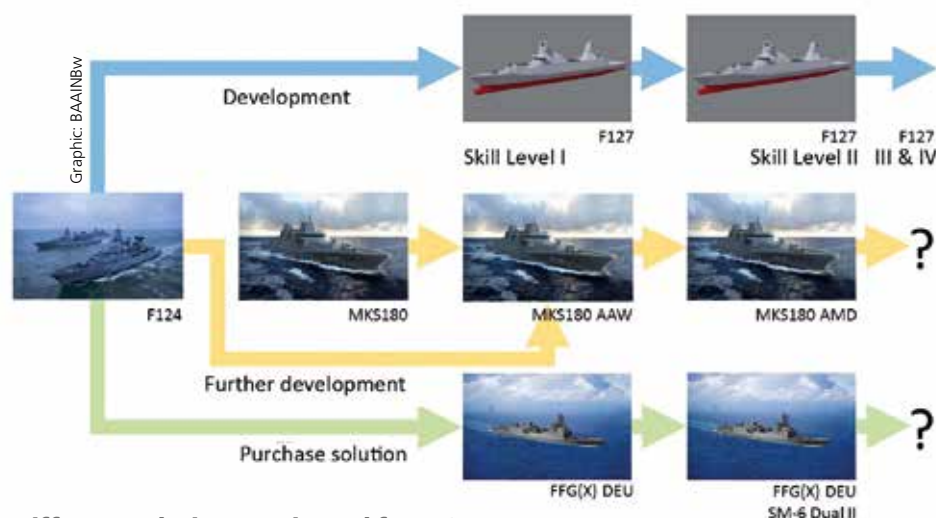
The contract for the procurement of the vessels was concluded on 7 July 2021. The ships will be designed and built at the Neptun shipyard in Rostock, which belongs to the Meyer shipyard. Provided that the first unit will be delivered from 2024 on, the capability of replenishing seagoing German Navy units will be seamlessly maintained.

Type 424 Intelligence Collector

On 23 June 2021, a contract for the procurement of three Type 424 intelligence collectors and a reconnaissance training and reference system was concluded between the BAAlNBw and Lürssen Werft GmbH & Co. KG. This procurement is intended to help achieve the objective of maintaining a sea-based signals intelligence capability without any interruption. The highly complex project is characterised by the special demands placed on the surface and subsurface reconnaissance components to be used in worldwide operations as well as by specific military requirements such as self-protection, command and control capabilities, and the need for extremely low-noise propulsion systems.

Outlook

In addition to the above projects, the Sea Directorate is concerned with many other large-scale and small-scale projects and product modifications that it is currently working on in very close cooperation with and with major support provided by the Bundeswehr Technical Centre 71, the Naval Arsenal, the Navy and other organisational elements. These projects range from launching cranes and boats for special operations forces to electronic warfare systems and further Navy-specific systems and equipment (electrooptics,



Different solutions envisaged for F127

radar, navigation). In the following, three selected examples are presented to provide a glimpse at the order book of the Sea Directorate.

Combined MCM Capability Platform

The demand for maintaining mine countermeasures (MCM) and minelaying capabilities was documented when the phase document "Capability Gap and Functional Requirement for a Combined MCM Capability Platform" was approved in January 2021. This also marked the completion of part 1 of the analysis phase conducted under the responsibility of the Bundeswehr Office for Defence Planning. The project responsibility for part 2 of the analysis phase has now been transferred to the BAAlNBw.

The integrated project team was established immediately. Under the lead of the project team in the BAAlNBw Sea Directorate, the course is currently being set for the preparation of solution proposals. The objective is to achieve a smooth transition from the capability-enabling platforms currently in service to the new capability platforms, which are scheduled to be delivered by the end of this decade.

A strictly modular approach will be taken to enable the vessels to prevail in the scenarios expected.

Next Generation Frigate – Air Defence (NGFrig-AD), Type 127 Frigate

The project outline draft "Next Generation Frigate" was approved by the FMOD Di-

rectorate-General for Planning in February 2020. The dedicated project team led by the Bundeswehr Office for Defence Planning was established at the end of the third quarter 2020 and is currently developing the associated operational and employment scenarios. As result of part 1 of the analysis phase, it must submit the "Capability Gap and Functional Requirement" including the derived prioritised requirements catalogue by April 2022.

In part 2 of the analysis phase, which will take from 2023 to 2025, the different solution proposals allowing a selection decision to be taken are intended to be developed by the end of 2025.

New Branch for Combat Craft

The project group S4 has established the new branch S4.4 "Combat Craft" in the summer of 2020. Once it has adopted its target structure in early 2022, the new branch is supposed to pool the responsibilities for combat craft and rigid-hulled inflatable boats (RHIBs) during all CPM (Customer Product Management) phases.

Its first project currently is the procurement of nine rigid-hulled inflatable boats of medium range as replacements for the RHIB H1010. In addition, the branch will assume responsibility for the "multirole combat craft" project at the end of 2021.

Download of the BAAlNBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



SCORPIUS – A Quantum Leap in Electronic Warfare Capabilities and Performance

As technology advances incessantly, so too do the deadly threats appearing on the multi-dimensional electronic battlefield. The challenges to forces on the ground, at sea, and in the air are daunting. Examples include the latest cruise missiles, powerful imaging radars deployed from aircraft, and long-range air surveillance and defence radars. The list is virtually endless, and to make matters worse; some of these systems are finding their way into the hands of dangerous, rogue nations and non-state actors.

The stakes are high – the loss of highly trained personnel and costly, difficult to replace platforms and equipment may result in failure or even defeat – so it is imperative that forces be equipped with the tools needed to survive and successfully complete their objectives. To this end, Israel Aerospace Industries' (IAI) subsidiary ELTA Systems Ltd. has leveraged its decades rich technological heritage as the country's radar and electronic warfare house, and its culture of innovation, to field the SCORPIUS family of cutting-edge Electronic Warfare (EW) systems. Offering unmatched protection

on land, at sea, and in the air, the SCORPIUS family redefines the state of the art in EW and electronic attack system performance.

AESA and GaN – Game Changing Technologies

The SCORPIUS product range is based on ELTA's Active Electronic Scanning Array (AESA) technology. AESA, built with a staring array of wide-band solid state transceivers, provides a dramatic increase both in receiver sensitivity and in Effective Radiated Power (ERP) – far exceeding legacy EW solutions. Furthermore, AESA technology allows narrow multi-beam operation for reception and transmission, enabling the system to detect and target multiple threats simultaneously, across the entire field of regard.

The SCORPIUS family also incorporates the latest Gallium Nitrate (GaN) technology, which provides much higher power density and efficiency than previous generation Gallium Arsenide (GaAs) transistors, maximising power and reducing energy consumption.

Leveraging AESA's exceptional sensitivity, the SCORPIUS family is able to detect and track advanced threats such as low probability-of-intercept (LPI) radars and long-range targets. Furthermore, with its superior ERP, SCORPIUS disrupts and degrades enemy radars with unparalleled effect. SCORPIUS effectively protects assets against modern airborne, shipborne and land-based threats, including fire-control radars, search radars, active missile seekers, and imaging radars.

Meet the Family

The SCORPIUS family comprises the land-based SCORPIUS-G EW System and SCORPIUS-T Threat Emulator for EW training; the naval EW System, SCORPIUS-N; and two airborne systems – SCORPIUS SP for self-protection, and SCORPIUS EJ for escort jamming.

SCORPIUS-G (ELL-8256SB) is a powerful ground-based system designed for long-distance RF Electronic Countermeasures (ECM). Mounted on a rotating pedestal and deployable from a single rugged all-terrain vehicle, SCORPIUS-G performs

Photo: IAI



accurate, multi-beam, multi-technique electronic attack against advanced fire control radars, search radars, AEW sensors and SAR over a wide geographic sector. Capable of simultaneously jamming numerous emitters over its entire frequency range, SCORPIUS-G protects ground forces from both airborne threats as well as ground-based threats within its line of sight. In addition, the system provides high performance Electronic Support Measures (ESM), continuously intercepting and tracking hostile electronic emissions, and building a detailed Electronic Order of Battle (EOB). Mounted on a small truck or service vehicle, SCORPIUS-T (ELL-8257SB) is a multi-threat EW emulator designed to provide a realistic signal-dense, multi-threat training environment for aircrews and EW operators, and to support system testing and evaluation. SCORPIUS-T's capabilities are unprecedented, with diverse training scenarios to challenge fourth- and fifth generation fighter aircraft. With its multi-beam capability based on the SCORPIUS ESA technology, the system can simultaneously engage multiple trainee aircraft with an array of threat patterns, emulating the threat's full operational sequence: from search, acquisition and track, to launch.

SCORPIUS-N (ELL-8256SB) is ELTA's powerful shipborne EW suite combining advanced Electronic Countermeasures (ECM) and Electronic Support Measures (ESM) capabilities. It comprises four conformal antenna array panels, each housing transceiver arrays that cover a wide frequency range, a control unit for processing and managing operations, and an operator console that includes maintenance and training functions. SCORPIUS-N provides naval forces with the tools needed to contend with current and future threats. Highly developed multi-beam, multi-technique power management capabilities enable SCORPIUS-N to efficiently jam multiple emitters, including all types of radars and RF missile seekers. The system detects and then tracks, engages and jams multiple threats over a wide geographic sector to create a protective hemisphere around naval forces. It will disrupt the operation of long-range, stealthy anti-ship missiles before they close range and lock on to the vessel. Moreover, the system will effectively attack the newest generation low probability-of-intercept radar systems used to provide weapons with target data. Finally, SCORPIUS-N is fully compatible with leading hard-kill

systems. In fact, its advanced capabilities significantly reduce the burden on hard-kill systems, preserving their capabilities for further engagement.

Scorpius technology allows for exceptionally high EW performance in a small form factor – advantages that enabled the development of the SCORPIUS-EJ (ELL-8251SB) and SCORPIUS-SP (ELL-8222SB) systems. Designed for deployment from fighter and transport aircraft, these systems deliver unprecedented capabilities relative to their respective size and weight class thanks to AESA and GaN technologies.

ELTA offers an extensive portfolio of high-performance and field-proven payloads and a wide range of platforms; from strategic ISR satellites, multi-mission sensors for aircraft and UAVs, to tactical drones and ground systems. System solutions cover integrated EW (ESM/ECM), radar, EO/IR, IMINT, Launch Detection Systems (LDS), SAR/GMTI, SIGINT, and cyber. This ability to deliver game changing solutions such as the SCORPIUS EW family, at the strategic and tactical levels to customers worldwide, is a key factor in ELTA's ability to maintain its position as a trailblazer in advanced defence electronics.

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Land Support Directorate (U)

The Land Support Directorate (Directorate U) of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) has a wide spectrum of tasks. It is responsible for:

- the management of complex projects,
- system technology and integration,
- research and technology,
- technical and economic aspects of in-service support management and
- the procurement of defense materiel.

The range of items and products for which Directorate U has material responsibility is immense: individual equipment for special forces, physical security technology, military camps, military pharmacies, medical treatment facilities and medical equipment, CBRN protection, military wheeled vehicles, special vehicles/equipment, EW (electronic warfare), reconnaissance (including space reconnaissance), air traffic control, robotics and training/simulation.

The following projects illustrate the breadth of the Directorate's task spectrum.

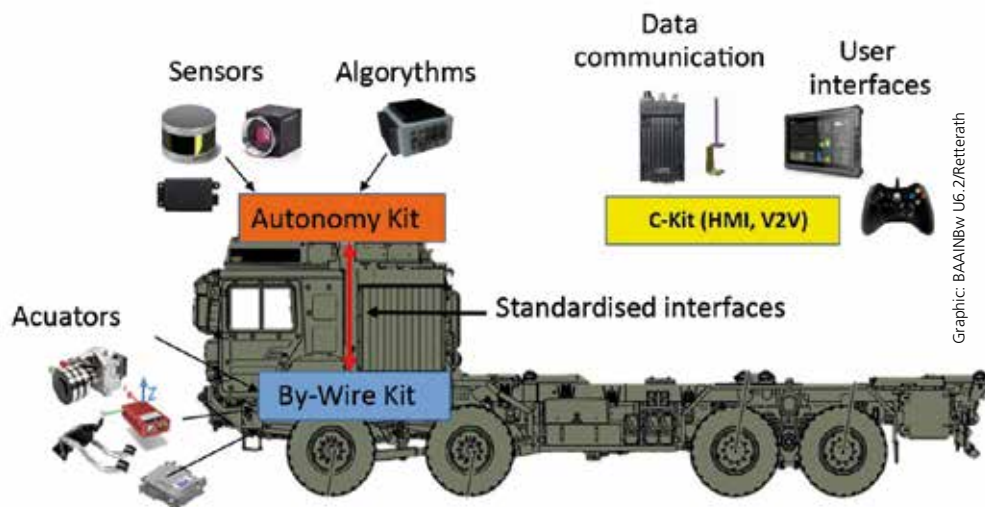
R&T Study InterRoC – Interoperable Robotic Convoy

In the medium term, the Bundeswehr intends to make road transport processes more efficient by means of semi-automated vehicles. For this purpose, medium-term planning since 2020 has included the "establishment of a basic capability for (semi-) autonomous/unmanned driving for land vehicles" by 2027.



Photo: BAAINBw U6.2/Retterath

A modified unprotected transport vehicle equipped with the American A-kit during initial tests at WTD 41 in Trier. The components of the A-kit can be distinguished from the basic vehicle by their sand-colored paint.



Graphic: BAAINBw U6.2/Retterath

Modular architecture for unmanned systems

In order to examine the current state of the art, the R&T study InterRoC (Interoperable Robotic Convoy) was launched by BAAINBw U6.2 at the end of 2019.

Objectives and procedure

The InterRoC project will lay the foundations for the development of a prototype of a semi-automated convoy (electronic tow bar in the military environment) by 2027. The project will study how an unmanned convoy made up of different Bundeswehr trucks (and later trucks from different nations) can be technically implemented. The idea is to have a military convoy with a single manned command vehicle at the front, followed by one or more unmanned trucks. In this way, basic decisions such as the choice of route or stopping for blockades can be made by a human operator who, due to his/her position in the first vehicle, has the best overview of the situation.

In addition to the expansion of two unprotected transport vehicles by by-wire kits (B-kits), an interoperability profile (IOP) is used to communicate with the B-kit and thus ultimately with the vehicle. Sensors and intelligence are realized by means of an autonomy kit (A-kit). The A-kit communicates with the B-kit via the IOP. The A-kit consists of sensors and computers with the following tasks: localization of the vehicle (globally and relative to the command vehicle), perception and interpretation of the environment, path planning, as well as lateral and longitudinal control of the vehicle. With the help of the two kits, the truck is able to move independently on the basis of the driving detail and its sensor data. The use of the IOP will facilitate the replacement of the A-kit and

the use of A-kits in different systems. In addition to the A- and B-kits, communication kits (C-kits) ensure interaction with the operator and data exchange with other vehicles.

An A-kit from the American manufacturer Robotic Research, which has already been tested in the United States, was installed and tested in German vehicles. These A-kits are borrowed from the US as part of R&T cooperation and the conclusion of a project arrangement between Germany and the United States for this project. The decision to use these American A-kits was based on the advanced development and successful testing of them by the United States as well as on the close cooperation between BAAINBw and the CCDC Ground Vehicle Systems Center (GVSC; formerly TARDEC) of the U.S. Army.

Current status of the R&T study

In cooperation with BAAINBw U4.3, Branch U6.2 received two of the unprotected transport vehicles for this study. These vehicles are based on the new MAN HX2 series of RMMV (Rheinmetall MAN Military Vehicles GmbH) and are ideal for drive-by-wire capability due to the fully automated transmission and the electric acceleration control (e-gas). The modification of the vehicles included electronic control for primary functions (gas, brake, steering, gearshift) as well as secondary functions (e.g. lights, horn, turn signal). Care was taken to ensure that a driver can still operate the vehicle manually without any restrictions.

The user interface is the software the U.S. Army uses with its A-kits. The WMI (warfighter machine interface) in the command vehicle allows the user to assemble the convoy, set intervals (time or distance) between

Multifunctional infrared lamp for military vehicles

Tactical lamps for military ground vehicles must meet modern tactical demands in operational conditions. Switching between the different operating modes should be simple, performed with a flick of the wrist, and the equipment must be reliable. With the transition from conventional to modern LED lighting, the opportunity arose to develop compact lamps in which all necessary functions are integrated in one lamp housing with low power demand.



Infrared headlight (left) and infrared rear light with brake light functionality (right) mounted for demonstration purposes on the rear of a combat vehicle using magnetic mounting feet.

Since modern lamps that fully exploit these technical possibilities were not available on the market, Rainer Diederich, CEO of Diederich Engineering Systems (DES), drew up a set of requirements and developed a infrared front light and a infrared rear light with brake light functionality. Combining design support from a university as well as optronics specialists, two compact lamps with a weight of less than 400 grams each were developed.

Infrared headlight 3-in-1

The multifunctional headlight combines a visible light and near-infrared (NIR) channel with two operating modes in a 70 mm diameter housing. In visible light mode, the LEDs have eight preset brightness settings, allowing the user to brighten or dim the lights as required. When switching to infrared light (IR), it is possible to choose between dipped and high-beam headlight modes, and the IR light intensity is also user-adjustable. The active illumination provided by the lamps in NIR mode allow a driver using night vision goggles to see the road ahead with reduced risk of detection by hostile forces. In the design, DES has taken care to ensure that light can only exit in the intended direction, with light blocked in all other directions, particularly upwards. The lamp consumes a maximum of 14 watts at 24 volts, and thanks to the LEDs' efficient light output, the housing does not heat up.

Infrared rear light with brake light function

At only six centimetres in diameter and five centimetres in depth, the infrared rear light with brake light functionality can operate in both the visible and NIR bands, and the brightness is also user-adjustable.

Additional functions

The lighting system is designed for permanent mounting on a vehicle. This requires mounting holes, which is not a problem with new vehicles. However, for simple retrofit solutions, DES has developed a magnetic mounting foot that allows mounting and dismounting in one easy step. The magnetic base has already proven its reliability in the field.

The removable light can be set to emit a coded NIR signal, which if set pointing upwards enables the rapid location and identification of the vehicle by friendly assets, which is particularly useful for emergency situations. Additionally, turn signal functionality can also be integrated into the lighting system.

DES is also developing a portable lamp which uses the infrared front light, and replaces the vehicle power supply with a

battery pack. This solution is intended to provide soldiers on foot with a mobile NIR light to improve mobility and local situational awareness during night conditions.

Approval

The infrared front and rear lights have been provisionally approved by the German Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr) in accordance with defence equipment standard VG 96945 since April 2021 and June 2022 respectively. According to Diederich, this is the only approved infrared lighting in Germany, although all information on this standard is also available to competitors following joint work in the VG Standards Committee.

Production

Production of the lights has already started. DES has delivered the first vehicles equipped with their new, more powerful infrared lamps. Orders for several thousand infrared lights have already been received and are slated for delivery in the next two years. Since the lights will become standard for new vehicles according to VG standards and all vehicles are to be retrofitted with them over the long term, DES has secured external production capacities to produce the lights in greater quantities.

About Diederich Engineering Systems (DES)

DES distributes Polaris light off-road vehicles in Germany, Austria and Switzerland and retrofits such vehicles according to military requirements, particularly for special forces.



Rainer Diederich GmbH

DES Defense

Werner-von-Siemens-Straße 1

D-51674 Wiehl-Bomig

Telefon: +49 (0)22619151-01

Fax: +49 (0)22619151-02

Mobil: +49 (0)151-21210527

E-Mail: L.diederich@des-defense.net

E-Mail: R.diederich@des-defense.net

the vehicles, and monitor the automated vehicles (e.g. warnings, fuel levels, and the view from the front camera).

Initial Tests with InterRoC Vehicles

In July 2021, BAAINBw U6.2 and WTD 41 conducted their first test drives with modified vehicles and A-kits at test sites in Koblenz and Trier. The semi-automated convoy featured a command vehicle and an automated following vehicle and was successfully tested with different distances between the vehicles and at different speeds (for safety reasons only up to 45 km/h). The tests confirmed basic technical feasibility with a high potential for applications on different surfaces and under different weather conditions. During the tests, the command vehicle was flexibly changed and the teleoperation mode was checked from both vehicles.

During convoy runs, distances between the two vehicles were observed, tracking stability was maintained, and the systems worked very reliably. Even when direct visual contact was interrupted, the automated convoy did not encounter problems. The experiments showed that the transfer of A-kits to new vehicles could be successfully realized through standardization and close cooperation between international actors.

Conclusion

With InterRoC and the US A-kit, we have quickly laid a good, solid and state-of-the-art foundation for the operation of the semi-automated convoy by 2027. On the way to an operational product, alternative A-kits will be integrated and tested which use other sensors and also offer additional functions.

Mobile Accommodation for Armed Forces on Operations – Series Production Approved

After the Budget Committee of the German Bundestag had approved procurement in March 2021, BAAINBw concluded a framework contract on 8 April 2021 on the delivery of up to 19,000 modular tent systems over a period of seven years.

The contract was awarded by way of competitive bidding. In addition to price, consideration was given to technical quality criteria such as high tear strength, minimum weight, small dimensions, and protection from wind. Kärcher Futuretech GmbH submitted the best tender. Immediately after the conclusion of a contract with Kärcher, the conceptual development of the overall system and the coordination of the individual components began. In this process, commercially available products were adapted to the requirements of the Bundeswehr.

The tent system is intended for four soldiers and is made of light-proof fabric. It consists of several modules that can be adapted to the requirements of exercises and operations across the entire capability spectrum of the Bundeswehr. It can serve as accommodation for short to medium stays.

The 1-person tents (core accommodation module) have waterproof floors and can be extended by a zipper system to include a central 4-person tent with a table, stools and field beds (supplementary accommodation module). The 4-person tent serves as a weather-protected area from which the sleeping tents can be accessed.

The cooking equipment (core catering module) can be used to warm up operational rations on a modern multi-fuel stove and, in cold weather, to fill thermos flasks with hot drinks.

A dry toilet with a privacy screen (core hygiene/sanitary module) will replace the cat-hole latrine. The system also includes a waste collection module so that waste can be separated in accordance with applicable laws.

All parts should be as light and compact as possible but still be robust. A complete system with all subelements is contained in six packages with a total weight of 57 kilograms. The 1-person tent alone weighs only about three kilograms and can be easily transported in a backpack. Prior to an operation, the tent system can be assembled according to specific requirements, and on site it can be unloaded and moved by one person.

The rapid availability of the material is an essential factor in this project. For this reason, the tents were tested prior to their introduction. The new systems offer the same rain protection as high-quality trekking tents. In a wind-tunnel test, the 1-person tent withstood a wind speed of 110 km/h without damage. If necessary during operations in extreme climates, Bundeswehr cooling and heating units can also be connected to the central tent element.

After the contract was signed in March 2021, prototypes were presented in August 2021 and approved for series production.

In the summer of 2022, the manufacturer will deliver 2,500 tent systems for 10,000 soldiers earmarked for VJTF (Very High Readiness Joint Task Force) 2023. The tents will thus be available for these units during the preparation phase for VJTF 2023. During this standby commitment, the practical suitability of the material will be demonstrated and any product optimization requirements will be examined.

The project is thus on schedule. Further units will later be equipped with the new tents on the basis of priorities set by the services.



Photo: Rheinmetall/Kölling

Cab of the unprotected transport vehicle after modification with the brake and steering actuator. A driver can drive the vehicle manually without any disadvantages.

GAO Role 1+ Field Hospital

The operation in Mali is currently regarded as the most dangerous Bundeswehr mission. A combination of different conflicts has been causing violent clashes in Mali for almost ten years. Twelve soldiers were injured in an attack in late June 2021.

Since the beginning of the mission, the Bundeswehr has been participating in MINUSMA (United Nations Multidimensional Integrated Stabilization Mission in Mali). It is a "robust UN mandate". This means that, in the event of attacks on civilians, the mandated forces may use force to defend civilians and themselves. As a result, more comprehensive medical care was required for the steadily increasing number of soldiers employed there.

The Federal Republic of Germany agreed to provide, under German responsibility, a ROLE 1 treatment facility with integrated emergency surgical and extended laboratory components as part of the force contingent at Camp Castor in Gao (Mali). This configuration is referred to as ROLE 1(+). In January 2021, planning was extended to include a dental treatment unit.



Photo: Kärcher Futuretech GmbH

The robust 1-person tent offers enough space for a field bed and additional storage space



Photo: Kärcher Futuretech GmbH

Prior to deployment, the required modules are assembled. Everything can be set up quickly on site.

At present, these capabilities are accommodated in mobile accommodation facilities consisting of tents and containers. Such solutions are generally intended to be used for a period of approximately one year. Since the mission has already exceeded this period and will continue, a permanent building is being built to accommodate these medical capabilities.

BAAINBw was tasked with providing medical equipment for the building. The Bundeswehr Medical Service Headquarters (BwMedSHQ) stipulated the individual items of equipment required for the planned medical departments on the basis of available mission-relevant medical equipment. The Federal Office of Bundeswehr Infrastructure, Environmental Protection and Services (BAIUDBw) was tasked with establishing the protected permanent medical facility in Mali. Construction began in April 2021. The requirement that the overall project is to be completed within 24 months poses a major challenge for the timely provision of the altogether more than 500 different items of medical equipment.

The facility will open in July 2022. By the fourth quarter of 2021, a main contractor is therefore to be commissioned with the delivery and integration of all medical equipment as well as any necessary training. Furthermore, the main contractor must carry out all maintenance and repair activities after the activation of the medical facility. A competitive tendering action was initiated and a bidder qualification process was conducted with an invitation to tender.

The required equipment will be used to ensure the provision of medical support for the German MINUSMA contingent by a national facility in a fixed and protected infrastructure in a sustainable manner. This facility will help protect personnel and sensitive medical equipment against desert conditions (over 50 °C in the shade, omnipresent dust, regular sandstorms).

In order to save lives and prevent further complications, medical care begins as close as possible to the point of injury and is continued by appropriate follow-on care. This is achieved by the medical evacuation chain, which takes into account the particularities of each theater of operations. Casualties are

immediately transported to the most suitable medical facility. The necessary medical evacuation organization is an integral part of the medical evacuation chain and thus of emergency medical care.

This ROLE 1 facility provides initial emergency and medical care. For this purpose, it also has mobile medical elements that are used for medical evacuation in accordance with German standards of emergency and disaster medicine (golden hour). The “golden hour” is the period immediately after a traumatic injury when there is the highest probability that immediate medical and surgical treatment will prevent death.

The treatment facility provides further emergency surgical care as well as intensive medical monitoring and care if required. In order to properly fulfill the task of providing initial emergency medical care, the ROLE 1(+) treatment facility must have medical materiel for the following areas of medical support:

Triage and emergency medical care are conducted first and are followed, if required, by emergency surgical care. Temporary inpatient care is then provided, including isolation and intensive care with intensive medical monitoring. For this purpose, the Role 1(+) facility is equipped with both manual field ventilators and mechanical long-term ventilation equipment.

For diagnostic purposes, the Role 1(+) facility is equipped with comprehensive and powerful medical technology for imaging procedures, from ultrasonic devices to mobile X-ray equipment, and has a clinical and chemical laboratory for the diagnosis of physiological and biochemical processes in the human body. There is also a telemedical link to Germany, which allows diagnoses and findings to be shared with facilities and experts at home.

General medical and organic medical care are provided, and laboratory equipment required for the testing of food and drinking water is available. This includes UV/VIS photometers, a voltammetric measuring station for analyzing heavy metals, and gas chromatographs with mass selective detectors. The veterinary laboratory is also used for microbiological tests of food and drinking water.

The equipment also includes the portable dental functional unit mentioned above, which has patient chairs, lighting, radiological diagnostic equipment, and stools for dentists and assisting personnel. Finally, there is a storage capacity, including cold storage, for required pharmaceuticals and medical products. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Photo: Kärcher Futuretech GmbH

Cooking equipment



One-on-One with Jan Gesau, Acting Director of BAAINBw and Head of the Land Support Directorate

ESD: What are your priorities as the “new” director, and what are the main tasks that you and Directorate U will have to accomplish next year?

Gesau: The main focus of my work will be to fulfill the tasks of the Land Support Directorate (Directorate U). This means not only supporting our soldiers with the best possible equipment for their mission but also – and this is the bigger picture – contributing to

the peace, freedom and prosperity of our country. Our tasks are subject to a variety of complex and sometimes adverse conditions that must be mastered in order to fulfill the mission. This is the art and the challenge of our work. Certain prerequisites must be met if we are to achieve this. Firstly, we have to structure and organize ourselves in an increasingly complex working environment and we must be prepared to continuously analyze our effectiveness and efficiency. Only with clear structures, processes and responsibilities can we master daily challenges. Secondly, we need a culture of constructive cooperation in which we strive together for the best possible solutions, always keeping our goals in mind. And there is also no doubt that we need qualified and experienced civilian and military personnel, whom we already have. In my experience, capability is ultimately the key to success. We must work together to achieve the best possible compromise while always keeping an eye on the objective. I would like to help ensure this in Directorate U.

ESD: What is the current status of the required materiel for VJTF (Land) 2023 regarding projects in your area of responsibility? Will there be relevant deficits?

Gesau: Like all projects, VJTF-relevant projects are subject to the constraints I have already mentioned. VJTF projects are a top priority in BAAINBw, and Directorate U is doing everything it can to push them forward. However, not all VJTF-relevant projects can be brought to a successful conclusion in good time for a variety of reasons, including standardized processes and procedures, deadlines, budget constraints, industrial capabilities, and dependencies on other projects. Nevertheless, it is clear to me – and I experience this every day – that those involved are doing their utmost to ensure that as much of the relevant equipment as possible can be delivered on time.

ESD: What are the current plans and intentions for the regeneration of armored command and utility vehicles and the expansion of the fleet of armored transport vehicles?

Gesau: As a rule, plans and intentions concerning equipment and its regeneration are the responsibility of the Directorate-General for Planning in the Federal Ministry of Defense and thus of the Bundeswehr Office for Defense Planning.

Nevertheless, the first category 1 ENOK armored command and utility vehicles, which have been used since 2010, will reach their scheduled end of in-service life in 2026. Short- to medium-term regeneration is not planned.

When it comes to category 2 armored command and utility vehicles, the Eagle IV and Eagle V vehicle platforms are in use in the Bundeswehr. A service life extension of the Eagle IV vehicle platform has already been initiated. A decision has yet to be made. Depending on the measure taken, this vehicle platform could be used for another 10 to 15 years. In addition, the Bundeswehr intends to procure another 50 Eagle V vehicles in the near future.

When it comes to category 3 armored command and utility vehicles, the Bundeswehr uses vehicles of the DURO/YAK family, which have a large usable space and a system-compatible protective design, as well vehicles of the DINGO family, which have a large number of variants, offer a high level of protection, and are extremely mobile. Work is currently being done on extending the service life of various DINGO and YAK vehicles, including the integration of new equipment. Further requirements will be met by a follow-on project that has already been initiated.

Framework contracts have been concluded for the procurement of several thousand 15-ton armored transport vehicles and 15-ton palletized load systems. These contracts allow flexible procurement from industry, depending on industrial capacities and the availability of budget funds. Approximately 450 vehicles have been ordered and will be delivered between 2022 and 2025. For the new generation of 5-ton armored transport vehicles, we intend to conclude an appropriate framework contract for the purchase of more than 3,000 vehicles from 2025.

ESD: Are there any plans – in your area of responsibility – regarding alternative drives or the reduction of energy consumption in wheeled vehicles?

Gesau: There are no relevant guidelines for military vehicles so far. We are, however, closely watching and evaluating technical approaches in the civilian sector such as electromobility for passenger cars and hydrogen technology for heavy vehicles. Hydrogen technology in particular is not yet sufficiently manageable and mature. It is thus not yet ready for use in military vehicles. The Bundeswehr places high demands on its material, which must function reliably even under extreme conditions.

This includes the use of vehicles outside of well-developed traffic infrastructure. Especially during the recent flooding in Germany, the robust diesel vehicles of the Bundeswehr (with a wading depth of 1 meter and more) worked reliably. It would not have been possible to use the electric cars of today in such missions.

Before technology can be introduced into the Bundeswehr, it must be mature and reliable.

ESD: How is Directorate U integrated into the BAIUDBw project “German Armed Forces – Contractor Augmentation Program II – Stationary Accommodation”?

Gesau: With regard to the stationary accommodation of deployed forces, a distinction is made between operational infrastructure with the threat level “significant” (in this case commercial material is used, and setup and operation are usually carried out by civilian service providers) and camp accommodation with the threat level “high”. The latter is a procurement responsibility of BAAINBw, and the armed forces themselves are responsible for setting up and operating the materiel. Directorate U was integrated into the BAIUDBw project “German Armed Forces – Contractor Augmentation Program” outside its original area of technical responsibility in the “Accommodation of Deployed Forces Project Group” and provided BAIUDBw with technical advice within the scope of its expertise.

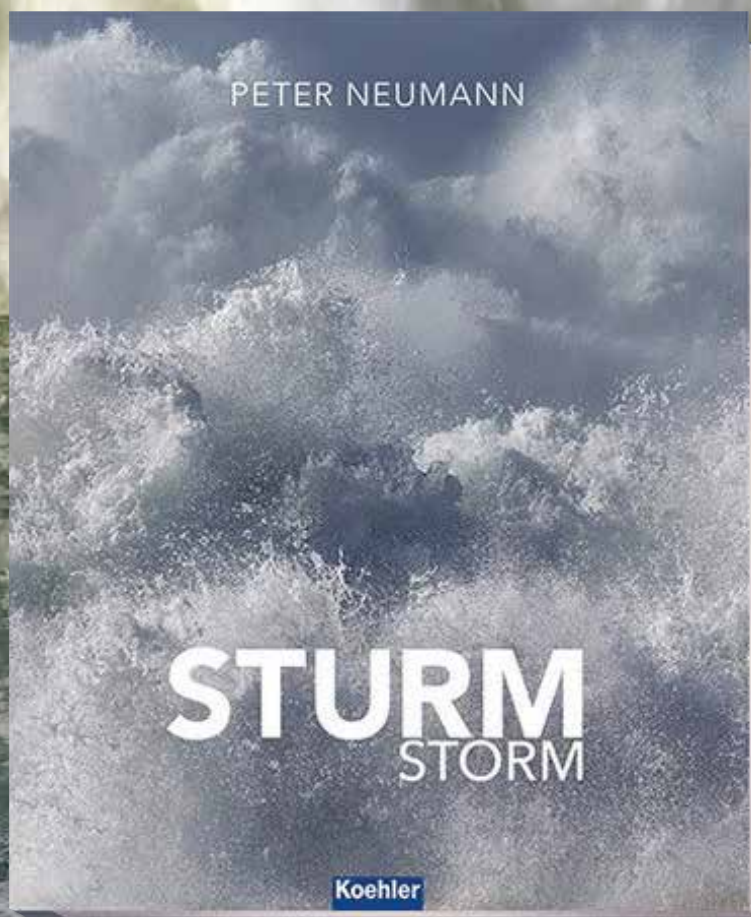
ESD: Are there any further considerations regarding improvements to the soldier system?

Gesau: The current state-of-the-art system, which we call IdZ-ES (future infantryman - extended system) VJTF 2023, has been used since mid-2021. Another generation of soldier systems is planned for 2025. In this connection, a study is being prepared for improving optical and optronic equipment, energy supplies, clothing, protection and load-carrying gear. Parallel to project work on soldier systems in my directorate, project-independent basic research is being carried out at the WIWeB’s Soldier System Innovation Laboratory.

The interview was conducted by Michael Horst.

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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 responsibility for customer management tasks within the HERKULES follow-on project. It is also managing around 100 IT projects in the analysis and realization phase and approximately 150 projects in the in-service phase relating to the areas of C2-relevant IT, IT platforms, and collaboration.

This article describes the progress made in the HaFIS and D-LBO programs (harmonization of the command and control information systems and digitalization of land-based operations, respectively). This year, however, the focus will be on the subject of collaboration. Thanks to Groupware, many thousands of users will benefit from the modernization of their workplaces in the coming months.

HaFIS Becomes GMN (German Mission Network)

In 2012, the HaFIS program was launched in order to harmonize the existing command and control information systems according to uniform standards. Initially, the focus was on stationary system components; over the years, deployable systems were added. Meanwhile, HaFIS comprises a total of 17 individual projects. Following the directive issued by the Federal Ministry of Defense in July 2017, the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) established a program organization for this purpose.

The aims were and still are today:

- The central control of the HaFIS projects,
- a clear allocation of tasks, competences and responsibilities, and
- the creation of short escalation and report channels.

Overall, the aim is to achieve the best possible result for the forces.

Meanwhile, nine years have passed, and we may say: mission accomplished. Now that a joint and harmonized IT platform has been established on the basis of a future-oriented service architecture and equipped with stationary and deployable data processing centers accordingly, the Bundeswehr is finally provided with the capability of conducting missions and operations at the national and international level. In addition to the established program organization, the commitment and dedication of all participants of the different organizational areas, from the provider through the operational organization up to the users, considerably contributed to this success. Meanwhile, HaFIS consists of many individual measures.

Photo: JSEC/Bastian Supple



International staff operating with the HaFIS system

Mastering them all in their complexity is imperative.

On 1 January 2022, the program was renamed to German Mission Network (GMN), which was another step towards making it fit for the future. The aim of GMN is to establish an information and communications network, ranging from stationary elements in Germany to deployable facilities connected to mobile and seaborne elements in potential theaters of operation, and to operate it sustainably. Compliance with the Federated Mission Networking (FMN) standard ensures that information exchange with partner nations is possible on a continuous basis. This is to take account of the special demands on Germany regarding national and Alliance defense and of its role as a framework nation for possible

commitments in multinational missions within the framework of NATO, the EU or the United Nations.

HaFIS Successfully Participates in the Major Exercise Steadfast Defender

The structure of JSEC (Joint Support and Enabling Command), a NATO headquarters, has already been described in the last December issue of this magazine. The IT support required for this purpose is provided by Directorate I through the HaFIS program. The progress made so far is described in the following.

After the IT equipment for JSEC had been installed and taken into operation for the first time, many small steps were taken to implement the software, followed by the



Photo: Bundeswehr

Helicopter in the common situation picture of D-LBO during a flight test in Munster.

major step of federating the system with NATO. This major step, too, was subdivided into many sometimes complicated sub-steps, taking account of the latest information security requirements. Thus, the JSEC IT system was the first system of this size within NATO to be federated up to

the application level in collaboration with NATO, in this case here with the Supreme Headquarters Allied Europe (SHAPE). Thanks to the excellent cooperation of all parties involved, Directorate I has been able to provide the system ready to use and in time for NATO's certification exer-

cise Steadfast Defender. In this context, the IT system proved highly successful. Particularly noteworthy are the local administrators who were able to prove their skills during the exercise and thus made a significant contribution to it becoming a success.

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

ESD: What will be the main focus of work in your directorate in the coming year?

Hauschild: To give you two examples, Directorate I will contribute to the preparations for VJTF 2023 and the certification exercise Steadfast Cobalt. This particularly affects HaFIS and GMN (harmonization of command and control information systems and German Mission Network, respectively) as well as various projects from within all areas of the I Directorate.

After first parts of the Bundeswehr Groupware project have recently been rolled out in the course of the broad-scale mass rollout of Cisco Jabber and

WebEx, we expect that some 60.000 users within the Bundeswehr will receive the products Outlook and SharePoint next year.

EESD: BAAINBw has meanwhile launched several invitations for bids for products where the Army will be the main user: military radio sets, command and control radio and the removal of obsolescence effects in SEM transmitter-receiver modules. What are the timelines for implementation?

Hauschild: The projects you are referring to are in context with the D-LBO program, the digitalization of land-based operations. The integration project for the first force package will create the blueprint for the subsequent rollout of D-LBO across the entire land forces. For this purpose, various service modules have to be implemented and different services like radio sets have to be procured and integrated into the platforms intended for the respective force packages. In view of the required lead times for the award procedures as well as the extensive effort required for type and series integration into the vehicles and platforms to be equipped, the delivery from 2023 on demands the initiation of all procurement procedures already in 2021. As things stand, this will be possible in the vast majority of cases. Here, the projects for the new UHF military radio set ("soldier radio") and the new family of SDR V/UHF force-level radio sets (command and control radio) are of paramount importance.

The road to be taken this decade has been planned, all necessary fundamental decisions have been made, the necessary procurement procedures have been initiated, and fallback positions and options for action have been created - all taking account of the introduction of the cross-sectional Battle Management System (BMS) for VJTF(L) 2023. Therefore, my conclusion is: "That field is well tilled".

ESD: Your directorate is also responsible for developing cyber innovation management further. Which topics are of particular importance to you?

Hauschild: The responsibility for cyber development and innovation management does not rest with BAAINBw, but rather with the central requesting agency. For most IT systems, the driving force behind this is the Cyber and Information Domain Service Headquarters (CyberInfoDS HQ).

Operational architectures, innovation management and, above all, the further development of the cyber/information space with regard to the strategic future are topics in the responsibility of the organizational area of the CyberInfoDS HQ.

ESD: There is still a need for optimization as far as the Air Force's command and control capability and the integration of its various platforms are concerned. What is the role of your directorate in this context?

Hauschild: Within the scope of its role and responsibility as a supplier for the Air Force, Directorate I continues to procure the best possible IT systems and services. In this context, the Air Force must specify its demand and document it accordingly. If not already taken into account, Directorate I will ensure interoperability with the other dimensions, services and organizational areas as well as with NATO partners. The use of architectures and a consistent service design serve as a means of choice for this purpose. This way, we ensure a smooth integration of all systems and services even in the long term.

The interview was conducted by Lars Hoffmann.

During the exercise, the project team of Directorate I was able to learn a lot about this first "live" HaFIS system with NATO connection. The findings will be implemented by the team not only here and now but also in other HaFIS systems, for a simple reason: *After the exercise is before the exercise.*

The Battle Management System for the NATO Spearhead Becomes the Blueprint for D-LBO

In cooperation with BWI and the Bundeswehr Software Competence Center, BAAINBw has completed essential parts of the service development for the Battle Management System for the Very High Readiness Joint Task Force (Land) 2023 (VJTF (L) 2023). It is not only the technical solution currently under review that was developed within this scope, but also the necessary support of the operational organization that was designed and implemented at the same time. Also, the required personnel was trained. After various tests and minor early rollouts, the findings required for the introduction could be gained in cooperation with the troops and incorporated into the solution. Thus, the equipment of the VJTF forces can be ensured to a large extent even before the standby phase. The introduction of the Battle Management System will significantly improve the command and control capability of land-based operations. It supports military leaders in assessing the situation, making decisions, planning and issuing orders.

The identified solution now serves as a blueprint for D-LBO. In this context, it is particularly important to modernize the radio equipment currently in use to be able to fully exploit the performance capabilities of the implemented command and control software.

D-LBO – Ready for Takeoff

In the program for the digitalization of land-based operations (D-LBO), the R&T study Close Air Integration for Mobile Army Networks (CAIMAN) demonstrated that helicopters can be integrated into the information and communications network of D-LBO. The H145M helicopter, which is also used for special forces in the Bundeswehr, was integrated into a common situation picture with the forces operating on the ground.

The broad range of radio technologies, including LTE, military V/UHF radio and satellite radio, and the use of the Bat-

tle Management System allowed a deep functional integration of the air and ground components.

The communications technology in the helicopter can be used as a node in the network, which can significantly improve the network connections. This proved the feasibility of a technological progress that is essential for D-LBO.

In a series of flight tests, the increase in the operational value was demonstrated at the Munster training area: By avoiding lengthy verbal communication between units on the ground and in the air, the digital transfer of tactical information such as target coordinates has created the basis for a significant acceleration of the mission chain in the engagement network.

The Cross-Sectional SINA Project (Secure Inter-Network Architecture)

In many projects, crypto boxes as well as terminals with crypto modules from the SINA product family by secunet are used. These products have the necessary approvals of the Federal Office for Information Security (BSI) to implement network security in accordance with requirements

and regulations and in cooperation with central management elements. So far, SINA components have been procured for more than 50 different projects.

At present, BAAINBw and the German Cyber and Information Domain Service Headquarters have prepared a proposal for a cross-sectional SINABw project on behalf of the Federal Ministry of Defense in order to efficiently combine these activities.

With the establishment of the cross-sectional SINABw project, it is possible to create a central interface both internally within the Bundeswehr to pool and prioritize capability requirements for secure data transmission at an early stage and externally to be able to coordinate demands and delivery plans with the manufacturer secunet in a targeted fashion. The main advantages are

- the pooling of specialist competence,
- the prioritization along the current capability situation, and
- a single-source provisioning process.

In order to be able to establish such a project in a future-proof manner and to maintain a holistic SINA situation picture in the Bundeswehr, the SINA services already provided by the BWI today within

the scope of the HERKULES follow-on project were taken into account, in addition to the close coordination between the decision-makers for such a CPM project in the Bundeswehr.

The Bundeswehr Groupware Project – an Idea Takes Shape

The idea is to support complex working relationships more efficiently through the use of IT and to have modern workplaces that are independent of location. These goals pose new challenges to existing Bundeswehr workplaces every day.

The Bundeswehr takes account of these requirements via various projects like the Bundeswehr Document Management System (DokMBw), the Central Regulation Management (ZRMS) or Groupware. Based on the objective of harmonizing and consolidating existing applications and further adapting them to international standards, the above-mentioned projects serve to bring about a gradual product change from IBM to the Microsoft world and to consolidate the range of Cisco products in use. The adaptation of the product range to ongoing projects in the non-Herkules-relevant area of the Bundeswehr provides the



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SINA products enable the Bundeswehr to implement network security in accordance with the requirements. This photo shows a crypto box as well as a secure workplace computer.

user with a more uniform user experience at the workplace during routine duty as well as on operations and in exercises.

Groupware is not New

Groupware Bw stands for a common technical platform that combines software applications for digital cooperation. The challenge is to offer these tools to 190.000 Bundeswehr users without communication disruptions and to achieve a further optimization in the fields of knowledge and information management for the user. The selected technology is always only a means to an end serving to master the organizational complexity of this project even under the conditions as they exist in the CORONA situation during ongoing routine duty. Since July 2021, Directorate I has been piloting first applications from the area of telephony/video (Cisco Jabber/Webex) in cooperation with more than 2000 Bundeswehr users in order to be prepared for the upcoming mass business during the rollout. The mass rollout of Jabber/Webex for 190.000 users will take place from October 2021 on. With the introduction of the Jabber application, the project fills the existing gap in soft phone telephony (telephony via the computer), which is of

particular interest for mobile working. The participation in video conferences via Cisco Jabber, the call-up to ad-hoc meetings without having to change the application beforehand, and the availability of a voice mail box for every Bundeswehr user are additional benefits.

On 25 October 2021, the second stage of the piloting phase for the Microsoft Outlook/Exchange applications and SharePoint will start. In addition to the technical challenges, this also marks the beginning of the test phase and, if necessary, the adaptation of organizational procedures. Questions such as "What courses of action used in the current mail system do we have to give up?" up to "How do we keep an overview during the piloting phase?" must be answered. This is accompanied by discussions on the future of the mail system as a carrier of information in the agency as well as within the entire communications network used so far.

In the next two years, the Groupware Bw platform will incorporate the functionalities of existing specialist applications of the Bundeswehr and will form the technical basis for the DokMBw project in its second implementation phase (increase to 190.000 users).

In order to provide a more tangible experience, a demonstrator platform is currently

being created at the example of a model agency with experts from the organizational areas. The aim is to integrate existing expertise, exchange arguments and to pave the way for a future release management. According to the motto "How can we make things work?", all participants (integrated project team/introduction organizations, piloting personnel) are therefore requested to explore the possibilities and limits of the upcoming platform and to test more than 170 scenarios submitted by the users from everyday work life in an imaginative way.

Away from Paperwork

The next few months will be challenging. In the context of the rollout planning and in view of the next phase in which two systems exist in parallel due to a step-by-step rollout in the Bundeswehr agencies from December 2021 on, the technical and organizational capacities of these agencies are of paramount importance. The Groupware Bw project is introduced in the context of a "live" system of central services provided as part of Herkules and its established services. Here, further conceptual work is required in order to make the transition and the associated decrease in the use of existing solutions as smooth as possible.

At the same time, the task book is well filled with upcoming training courses for those who perform roles in the system, that is to say application managers and application assistants. Not least, comprehensive guidelines and manuals as well as measures of change management round off the support and the capabilities already within the scope of the pilot and rollout phases.

Directorate I – We Take Digitalization of the Bundeswehr Further

The insight into the activities of Directorate I at the examples given above shows how this directorate is pushing digitalization in the Bundeswehr forward in cooperation with operators and users in many different ways. In the field of collaboration, many Bundeswehr users will be reached through the upcoming rollouts and benefit from a substantial modernization of their workplaces. ■

Download of the BAABNBw Directorates' organizational charts at:

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IT Support Directorate (G)

SASPF Permission Risk Management

In the era of digitalization, business processes and workflows are to become more efficient through modern and timely IT support. As early as the late 1990s, the majority of command and administrative procedures in all organizational elements and task areas of the Bundeswehr became unthinkable without IT support.

A Look Back

In the past, most of the software and hardware used up until now was developed and employed on a project-related basis. As a result, there were countless "isolated applications" within the Bundeswehr, most of which were not linked to each other or communicated exclusively via complex interfaces developed by the Bundeswehr. The resulting data and functional redundancies led to inconsistent and unreliable information. Interoperability between the organizational elements and task areas as well as the technical and command and control information systems were largely absent, as was the capability to engage in dialogue with partners in the Alliance, during UN operations and when cooperating with the industry.

To facilitate the urgently needed modernization and standardization of the Bundeswehr IT landscape in support of administrative and logistic processes, it was determined to use the standard application software product families (SASPF) across project boundaries based on the standard software by SAP and the implementation was planned accordingly.

The introduction of SASPF focused on a Bundeswehr-wide, holistic approach to process-oriented integration of Bundeswehr processes across functional areas. This was to be achieved by providing continuous support, using an enterprise resource planning system (ERP system) based on SAP products. By representing administrative and logistic Bundeswehr business processes in an integrated SAP system and making extensive use of business management processes, SASPF contributes significantly to the optimization of Bundeswehr processes.

Today, SASPF, as part of the Bundeswehr IT landscape, provides users with consistent and reliable logistic and administrative IT support on a uniform platform. Apart from a few specific exceptions, existing "isolated applications" were integrated and thus replaced and a uniform database was established.

The Need for User Management

In order to ensure the SASPF users' access to the required applications and information, a highly developed user management is required. SASPF user management includes in particular:

- the clear identification of each user;
- the granting of access authorizations to systems and applications; and
- the administration of user accounts.

At the same time, this ensures the protection of data against unauthorized access. Nevertheless, due to the complexity of the applications, mere user management is not sufficiently capable of precisely defining the associated extensive authorizations for each use case and for each individual user. In order to further reduce associated security gaps, the Bundeswehr, like all major companies, relies on a multi-level information security network in accordance with the "Governance, Risk and Compliance" (GRC) approach.

Structure of the Information Security Network

IT governance describes the process of responsibly controlling, regulating and monitoring of information technology within enterprises. Thus, it supports the corporate management with regard to the assessment of costs, benefits, opportunities and risks of IT use.

In IT compliance, the focus is on the rule-compliant behavior during IT use for the protection against damage caused by external and internal perpetrators. This includes compliance with all legal, contractual and internal requirements.

Within the SASPF information security network, particular information security systems are grouped into three lines of defense. The first two lines of defense are used for prevention and are already in use prior to the assignment of permissions. Auditing as the third line of defense detects the exploitation of the few remaining risks. Establishing these

lines of defense ensures that risks are reduced to a minimum.

Operational management is responsible for the first line of defense. This is where the above-mentioned user management is located. User management ensures that the scope of authorization of employees is exclusively restricted to the respective necessary activities by using authorization concepts and a two-stage approval procedure.

In the second line of defense a permission risk management is employed, checking the desired scope of authorization of employees for possible permission risks prior to actual assignment. The permission risks are identified, assessed and their handling is determined by the permission risk owners concerned.

Independent third parties (incl. information security officers, internal auditors) form the third line of defense with their auditing measures. They analyze IT systems for vulnerabilities and detect the exploitation of the few remaining risks by continuously monitoring compliance with all requirements.

In general, the Bundeswehr relies on synergies between information security systems and human capital to minimize risks. Without the functional requirements set by the respective permission risk owners in the main processes, the use of appropriate software is inconceivable and ineffective. In addition, experienced experts are required for successful permission risk management in all three defense lines.

Bundeswehr SASPF Permission Risk Management

With its "Governance, Risk and Compliance" software suite, SAP provides various applications for managing the two levels of IT governance and IT compliance. In addition to specialized applications for business operation management, for the automation of cross-border logistics as well as threat monitoring, data control and data pro-

A Further Insight



**One-on-One with Frank Walter,
Director BAAINBw and Head of the IT Support Directorate**

ESD: Networking and extending IT systems may result in security risks. What tools do you use to ensure IT security in your area of responsibility?

Walter: A central program such as the Standard Application Software Product Families (SASPF) has a variety of interfaces and depends on the exchange of information. To protect this information, the program is equipped with an information security management system in accordance with "BSI Grundschrift" (Basic Protection) and the Bundeswehr service regulations. The existing SASPF information security concept describes both the specific requirements and the measures required to maintain information security.

The corresponding implementation at application level will be carried out by Directorate G at BAAINBw and in data processing centers operated by BWI GmbH, a 100 percent in-house company of the German federal government. An established area model with protective measures at gateways depending on the protection requirements ensures efficient protection. This is supplemented by additional security components as part of the monitoring by BWI GmbH under the HERKULES main contract. This creates a holistic IT security protection for the SASPF program.

ESD: What about the interoperability of your systems with those of NATO and other federal authorities?

Walter: Interoperability with NATO is already well established, especially in the procurement business process. Orders from the NATO agencies NETMA and NSPA as well as from the USA via the Foreign Military Sales procurement channel are almost fully integrated. The consistent consideration of NATO Software Logistics Functional Area Services (LOGFAS) as a complementary product in SASPF is intended to ensure interoperability with NATO logistics in the future. The functional requirements needed for this are still being developed.

Considering the networking between SASPF and other federal authorities, this has already been achieved to a large extent today. With respect to the Federal Finance Administration, the reporting of electronic tax characteristics as well as the payment of emoluments are among the networked services of our systems. For example, data on the commitment, payment and acceptance of budget funds are exchanged via a bi-directional interface with the federal budget, cash management and accounting system in the remit of the Federal Ministry of Finance. The customs accounting of procurement procedures and the payment of invoices via the Federal Ministry of Finance are fully digitized.

Public procurement procedures are conducted from SASPF via the central tendering platform of the Federal Government or the European tendering platform Tenders Electronic Daily (TED). Corresponding statistics on the tendering/contracting proce-

dures are provided digitally from SASPF to the Federal Statistical Office. Furthermore, SASPF is connected to the Federal Government's virtual market place ("Kaufhaus des Bundes") so that corresponding framework contracts concluded across different ministries can also be used for procurement within the Bundeswehr.

But there are interfaces with different federal authorities in various other areas. In the field of recruitment, for example, job advertisements are transmitted from SASPF to both the Federal Employment Agency and the Federal Office of Administration, and these advertisements are additionally published on their platforms.

ESD: What is the state of play regarding the migration to the HANA database and the "retrofit SASPF" project?

Walter: The "retrofit SASPF" project essentially comprises the two following components: migration to the HANA⁴ database and establishing SAP S/4HANA readiness.

The migration to the HANA database is a preparatory step for the transition to S/4HANA. The advantages of the HANA database can already be exploited with the currently used software. Therefore, in the last one and a half years, all S/4HANA-relevant system tracks of the overall SASPF system have been migrated to the HANA database. This included not only the migration to a new database, but also the use of new hardware with a modified operating system. With this measure a first important step towards the transition to S/4HANA was completed.

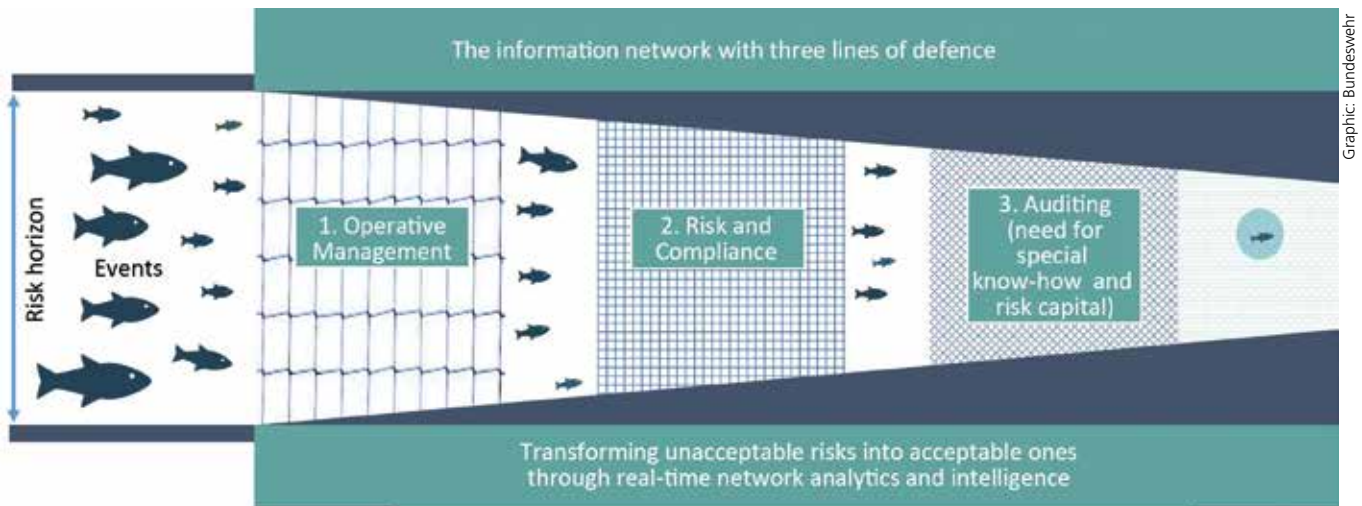
The concept of S/4HANA readiness, the second part of the "retrofit SASPF" project, entails the planning, preparation and implementation of all measures that are absolutely necessary for a transition to S/4HANA. In practice, the measures include the processing/editing of identified simplification items, the custom code checks including the implementation of necessary adaptations as well as the validation of S/4HANA readiness. The analyses required in this context have been completed and the processing/editing of simplification items and the custom codes have been started.

ESD: Qualified personnel are scarce, especially in the field of IT. Does this affect your work?

Walter: In addition to a few non-technical posts, the posts of Directorate G mainly belong to the technical and scientific service. To perform SASPF tasks, staff with a degree in electrical engineering or (business) computing are predominantly required. The scarce availability of appropriately qualified IT personnel is reflected in the large number of vacant posts. This results in a considerable workload and the need to prioritize the tasks to be performed. Despite all efforts to improve the personnel situation, delays in the implementation of SASPF projects cannot be prevented at present.

The interview was conducted by Lars Hoffmann.

⁴ HANA: High Performance Analytic Appliance



tection management, the SAP GRC Access Control (SAP GRC AC) component also includes applications for identity and access control.

Since 2018, the SASPF permission risk management including the applications "Access Risk Analysis" (ARA) and "Emergency Access Management" (EAM) from the SAP GRC AC software suite has been the successful second line of defence.

SAP GRC AC ARA is used for the development and documentation of per-

missions and for conducting permission risk analyzes in the SASPF system of the Bundeswehr.

A permission risk is understood to mean that access to objects, or combinations of objects, that require an authorization check potentially has a negative impact on the basic values of IT security (confidentiality, integrity and availability). The term "object" does not exclusively denote a permission object, but is used as a collective term for an action or a structural-organizational authorization.

Permission risks arise either from one object (object risk) or from the combination of several objects (combination risk).

In this context, an action consists in linking an initial call event with the required authorization characteristics to perform a processing step in the system. If several actions are performed to carry out a work process, this constitutes a combination of actions. In SAP terminology, an action is, for example, the call of a transaction or a report.

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Development of Permission Risk Potentials

The starting point for a risk-bearing access right usually is the call of an action, although at a more detailed level the authorization check takes place technically via the permission objects and fields assigned to the action. In-house developments are equally potentially risky and must therefore be treated in the same way as standard actions with regard to permission risks.

In addition to the already described risky actions, there are also authorizations that allow for more sophisticated access to data in structures such as organizational structures or personnel master data (so-called structural authorizations). The structural authorization check is used in combination with the general authorization check. Structural authorizations are also subject to the requirement of minimizing risk by taking adequate measures.

Another permission risk potential arises if there is a separation-of-duties conflict for certain authorizations, i.e. if several authorizations are considered to be risky due to their combination. This occurs when authorizations allow users to independently carry out a work process that is actually intended for processing by different users. The number of potential permission risks is already reduced at the organizational level by an appropriate separation of functions (SoD – Segregation of Duties).

Prerequisites for Use

An indispensable prerequisite for the productive use of permission risk management is the existence of a permission risk definition basis in the form of functional requirements. It contains the coordinated and relevant permission risks that, due to regulations and statutory principles, are the subject of Bundeswehr permission risk management. Ideally, preventive measures and auditing measures are based on a uniform set of permission risk rules.

The SAP GRC AC ARA application is equipped with a predefined set of permission risk rules that cover the majority of common permission risks in enterprises. In addition, the Bundeswehr makes use of a large number of actions developed in-house (e.g. transactions and reports) that are not included in the predefined set of permission rules. These in-house developments were therefore checked for object and com-

bination risks and added or supplemented to the predefined set of permission risk rules.

The permission risk owners of the currently existing eleven main processes (controlling, health care, individual training, infrastructure/environmental protection, organization, personnel, planning, accounting, armaments/logistics and IT management) are responsible for identifying, assessing and describing permission risks in their own area of responsibility.

It is necessary that a permission risk is clearly assigned to a permission risk owner and that the handling has been determined in accordance with the assigned permission risk level. Only on the basis of these functional requirements is it possible for the application to treat permission risks identified by it in accordance with the requirements.

Handling of Permission Risks

Since SASPF permission risk management operates directly in the request process, the actual assignment of the desired permissions is retained by the system until possible permission risks have been handled appropriately and documented duly. The use of permissions with existing permission risks is thus excluded.

The handling of permission risks includes, in the first instance, the decision as to whether the permission risk should be borne. If this decision is negative, the permissions will not be assigned to the users and the request will be rejected. In case of a positive decision, however, the permission risk must be minimized by appropriate handling. At present, there are several options available to the permission risk owners in those cases. In addition to the conventional tool of instruction, increased functional supervision is the means of choice. In the near future, the current options are to be purposefully extended in order to optimize both security and usability.

As a rule, particularly critical permission risks cannot be assigned via the normal request process. The assignment is prevented by the system. Only the SAP GRC AC EAM application, which is employed in the permission risk management for emergency access, can be used for the appropriate permissions.

The rather inaccurate term "emergency access" stems from the translation of the application name – Emergency

Access Management (EAM) – and in the case of the Bundeswehr it stands for the use of critical permissions in the field of 2nd-level support. The EAM application allows the temporary use of critical permissions in a monitored environment. It manages the respective permissions and their assignment to a few selected users. The assignment will be made exclusively for the temporary completion of required tasks for which the existing scope of authorization is insufficient.

After the use of these special permissions, a detailed report on their use is automatically prepared and handed over to an independent expert for review. The possibility of misuse of permissions is considerably complicated by the use of critical permissions within the EAM application and the supervision that takes place shortly after the use.

This approach has two advantages: The usually far-reaching scope of authorization of support personnel can be reduced to the permissions required to handle day-to-day business. In addition, the use of higher-level authorizations is subject to continuous supervision.

A Look into the Future

In summary, the functions of the SAP GRC AC ARA and EAM applications constitute an indispensable part of information security within the Bundeswehr SASPF system.

Moreover, the Bundeswehr is undergoing constant change. Short-term adaptations to new structures, task areas and information requirements place high demands on information technology, its security and the personnel responsible for it. The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) is responding to these challenges with a large number of new and dynamically managed projects.

The planned introduction of a uniform identity management system into SASPF, which will combine user and permission risk management and further contribute to the improvement of information security, should be particularly emphasized at this point. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



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 Purchasing, the satisfaction of demand via complex services and, to some extent, the procurement of material solutions in compliance with Customer Product Management (CPM) principles.

These tasks are performed 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.

Divisions E1 and E2 – Part of Bundeswehr Purchasing

In all areas of the Bundeswehr, Bundeswehr Purchasing comprises strategic tasks as well as the operational procurement of both commercially available and Bundeswehr-specific material goods and services for operation and use in the area of responsibility of the Federal Ministry of Defense (FMoD), not just in Germany but also on operations and during missions and exercises. These tasks are performed by around 1,000 procurement agencies in the area of responsibility of the FMoD. 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 that are met via interdepartmental procurement (e.g. "Kaufhaus des Bundes", the Federal Government's virtual marketplace). The number of supply items to be procured alone amounts to roughly 2 million. The items purchased range from small parts to Bundeswehr-specific material for complex weapon systems.

By implementing Bundeswehr Purchasing, a strategic level of procurement has been added to the mostly operational level of the procuring agencies. The intention is to ensure an optimized and comprehensive purchasing process.

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 established, 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 comprise products (goods, services and rights) that are procured on the same or similar markets. By introducing the strategic purchasing process, sustainable progress could already be achieved owing to optimized requirements planning in coordination with the users. The main focus is on concluding 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. Meeting demand with direct deliveries has changed processes and procedures in the areas of procurement and logistics.



Bundeswehr Purchasing logo

Bundeswehr Purchasing is managed through a dynamic purchasing plan that is annually approved and geared towards the purchasing strategy. In addition, the purchasing managers and the purchasing director are supported by a system of targets and indicators. Any obstacles and difficulties that arise can thus be identified, analyzed and eliminated through targeted measures at an early stage.

Procurement in the Bundeswehr is subject to permanent review. In the context of reviewing and optimizing the procurement and in-service organization of the Bundeswehr, measures have been adopted and are currently being implemented in different projects by integrated project teams (IPT). The task of evaluating and implementing these measures for Bundeswehr Purchasing was performed in IPT 5 under the ministerial responsibility of FMoD A II 5. In particular, this will optimize structures in Bundeswehr Purchasing and strengthen operational procurement. As a result of the directed measures, required supplies will be pro-



Photos: Bundeswehr

BwFuhrparkService GmbH is part of the three proprietary companies of the Federal Government under the responsibility of the FMoD.

A Further Insight



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

does this affect your work and have the associated expectations been met?

Knappe: The framework agreements concluded in Division E2 have resulted in substantial and lasting improvements in the procurement of operational spare parts. At the same time, projects and technical specialists also benefited considerably from the reduction of release processes. This win-win situation fully benefits the security of supply in the Bundeswehr. Weapon system-related framework agreements create greater predictability for project managers when it comes to delivery times and budget management.

Interdepartmental indefinite-quantity contracts in the context of direct delivery – with decentralized ordering authorities using the centrally concluded framework agreements – have not only led to lower prices as expected but have also eased the pressure on the logistic system and on depot organization in particular. At the same time, cost responsibility, with ordering authorities paying from their own budgets, increases the cost awareness of consumers. Individual calls for services are made in the SAP system using process optimization. In addition, standardization and sustainability aspects are implemented.

Both approaches – framework agreements for the central management of spare parts and framework agreements for direct delivery – remain in focus and will be further pursued.

ESD: In 2021, some parts of the private sector, such as construction and the automotive industry, are faced with supply shortages due to fragile logistics chains or planning errors. Does this also affect your business?

Knappe: Delays in delivery occurred only to a very small extent and we cannot say with any certainty whether they are the cause of fragile logistics chains or planning errors. The pandemic or developments on the commodity markets were cited as the causes of individual delays.

ESD: Since 2020, the new Branch E2.5 has focused on procurement according to weapon systems and not according to product groups. What has been your experience with this type of procurement?

Knappe: This question implies that the division of the old Branch E2.3 into the new Branch E2.3 and Branch E2.5 on 1 April 2020 resulted in changes in how cases are processed, but this is not the case.

We were able to divide the old Branch E2.3 quickly and easily for the very reason that its subject areas had already carried out weapon system-related procurement. The procurement model thus remains unchanged, which means that a before-and-after comparison cannot be made.

However, it must generally be assumed that weapon system-related procurement, where order requests are consolidated into a single contract award procedure, frees up personnel capacities compared with the practice of awarding contracts in different subject areas and thus in separate award procedures.

We cannot say whether invitations to tender for larger packages of consolidated order requests lead to better offer conditions in this area in particular. It is not likely, however, since the weapon systems managed by E2.5 are mainly supplied by monopolists.

ESD: Strategic market analysis plays an important role in the procurement departments of civilian enterprises. How important is this topic for you?

Knappe: The defining feature of the Bundeswehr Purchasing system is the institutionalization of a strategic mode of operation with a centralized and overarching management process. An essential element of the Bundeswehr Purchasing system is the establishment of material segments (soon-to-be purchasing segments), which are autonomously managed as strategic business units. This material segment management includes in particular the conduct of targeted searches for pooled required supplies and equipment on the procurement markets by developing and implementing procurement strategies for each material segment.

Strategic tasks include market research, market analysis and market surveys. The results may be incorporated into the procurement strategy to be defined.

In contrast to civilian enterprises, this process is subject to restrictions as care must be taken to ensure legality by complying with the relevant legal provisions (in particular procurement law) and interdepartmental guidelines.

The defense market is very different from the civilian market. The results of market analysis and the resulting approaches cannot be implemented in the same way. Key factors in this context are transparency, competition and equal treatment or non-discrimination including prohibition on restrictions.

The public customer is also subject to other principles such as that of long-term economic efficiency. This principle aims not only to make short-term purchases as inexpensive as possible from the current budgetary point of view, but also to ensure long-term economic purchasing by maintaining a broad range of products and services and, if possible, small-scale supply structures, which is called regulatory policy.

The interview was conducted by Lars Hoffmann.

vided faster and the burden of administrative tasks will be eased for those who request supplies. This will immediately improve the operational readiness of the armed forces.

Actual improvements of the procurement processes result from, for example, a reorganization of the material segments, improvements in the preliminary processes and adaptations of SASPF processes to automate the satisfaction of the demand for commercial material (electronic catalogs, electronic procurement files, electronic market places).

A policy and support component will be established to purposefully support procurement management at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). By applying the established information and communication concept for Bundeswehr Purchasing, information on improvements in Bundeswehr Purchasing and procurement can quickly be communicated to all parties involved. Thanks to the central provision of information, those involved in Bundeswehr Purchasing will quickly receive the guidance they need.

Division E1 consists of three branches. They perform 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 registration and framework agreement database,
- order information, contract statistics and managing creditor-related data,
- investment reviews (foreign direct investment),
- commercial information and register information,
- Bundeswehr reporting office for European statistics of complex central armaments projects and the regulation on public procurement statistics.

Branch E1.3:

- reviewing and managing demand requests, technical coordination,

- SASPF coordination,
- drawing and design office, managing drawings,
- collection of company proposals and preliminary taking into stock of items.

Division E2 consists of five branches and carries 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 industry standard.

It is divided according to different material segments, which facilitates 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 headed by a material segment manager who has directive authority across the boundaries of the major organizational elements. Support in terms of purchasing process

cyber/IT, thus reflecting the project areas in its organization.

Supplier Management in Bundeswehr Purchasing

Branch E2.1 is also in charge of supplier management in the Bundeswehr Purchasing process, an area which has been in an ongoing phase of build-up and expansion since 2018. Reminder procedures are a key element that was established in October 2019 for the operative Bundeswehr purchasing tasks performed in Division E2. The element monitors compliance with contractually agreed delivery dates. Supplier management provides support to the operational branches E2.2 to E2.5. The service component has proven its worth recently, for example in the procurement of urgently needed medical material during the COVID-19 pandemic in cooperation with Branch E2.4.



The service contract with BwBekleidungsmanagement GmbH was extended by three years until 2023 in September 2020.

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.

In order to achieve the objectives set for improving the materiel readiness of the Bundeswehr, BAAINBw will focus even more on its core competencies in the procurement and in-service process and hand over the procurement of commercial material without any weapon system relevance to BAIUDBw. Accordingly, Bundeswehr Purchasing at BAAINBw will no longer be based on ecl@ss but on the purchasing segments of air, land, sea and

Supplier management also lends support in cases of faulty deliveries and with improving the process flows of incoming and outgoing goods in fixed logistics facilities, including the Bundeswehr material warehouses. In future, supplier management will also support the strategic and operational levels of the Bundeswehr Purchasing process in monitoring the market.

Based on supplier management in Division E2 and positive experience, a supplier management system for the entire BAAINBw will be developed, which in further development stages will eventually be established across the entire area of responsibility of the FMoD. In this context, a policy component will be established to cover not only supplier management but also new topics such as contract management. The aim is to establish a central point of contact for requesters and buyers and to pool policy and support tasks in order to facilitate cooperation.

Strategic tasks for material segments that are not weapon system-specific nor relevant to policy are pooled in Branch E2.4. This includes the material segment of medicine and medical technology as well as closely related material segments such as laboratory equipment and technology. Both Branch E2.1 and Branch E2.4 have the authority to conclude strategic contracts.

In addition to the strategic tasks above, 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 the full spectrum of individually issued expendable medical supplies, including drugs, vaccines, blood products, personal protective equipment, etc. and is thus also concerned with operational tasks.

Operational Procurement

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 tasks:

- implementing any procurement strategies and standards that 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 required by the armed forces in connection with weapon systems and equipment during the in-service use phase. Branch E2.5 was established in 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. Expertise on specific weapon systems can thus be pooled in one branch and cooperation with the corresponding project teams is facilitated. This approach will be continued and extended to the other operational branches, so that they reflect the new purchasing segments (air, land, sea and cyber/IT) as much as possible.



A HIL GmbH workshop

Operational procurement will continue to be developed further through continuous optimization of the Bundeswehr Purchasing process, for example by concluding additional 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.

They are a form of satisfying requirements which can occur in all Bundeswehr task areas and processes whenever a demand cannot or should not 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 Division is structured as follows:

Division E3 consists of five branches; for organizational reasons, their numbering/designation begins with E3.2.

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 (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 individ-

ual 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;
- demand-oriented warehousing within the context of the storage of individually issued expendable items and non-expendable items (EVG/NVG) 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 aforementioned pro-

jects. Projects for complex services are systematically developed 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, Army Maintenance Logistics, demand-oriented warehousing and the Clothing Management projects. The price negotiators of Branch E3.5 also support all branches of Division E3 in matters of pricing law. In particular, they accompany the contract negotiations not just of Branch E3.6 but also of Branch T1.1 until a contract is concluded. On behalf of Branch T1.1, prices are negotiated for recycling and/or disposal contracts, for study contracts as well as for contracts concerning the operation of government quality assurance offices. Branch E3.5 has also assumed responsibility for price negotiations on behalf of the branches in Division E2. Extensive service contracts and/or framework contracts 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 continuously adapted through contract amendments. Large-scale amendments in the relevant projects with a contract value of more than 25 million euros require the involvement of the Budget Committee of the German Parliament (Bundestag).

Branch E3.6 is responsible for processing contracts and dealing with issues related to contract award law for the projects 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, their area of activities also extends to processing cases of impaired contract performance, such as 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 accommodation and meals. Lastly, Branch E3.6 is entrusted with handling aspects related to procurement law and contract law in connection with 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 basic training of motor vehicle drivers (class D).

As a result, project management as well as legal and economic expertise related to complex services are concentrated in one division, which creates potential for optimization.

The current developments in the Army Maintenance Logistics (HIL) project described below serve to illustrate the broad spectrum of activities.

Army Maintenance Logistics (HIL)

The successful “HIL” model was further developed and expanded when a performance contract for the HIL follow-on solution was signed on 13 July 2017 for an unlimited period of time. With the launch of the HIL follow-on solution on 1 January 2018, HIL GmbH was established as an essential service provider and thus continues to be an integral part of the Bundeswehr Logistics System.

Nevertheless, HIL GmbH remains an essential element for the operational capability of the armed forces in view of increasing security requirements.

Due to a fourfold increase in their equipment range, HIL is currently faced with one of the greatest challenges in its history. Against this background, the migration of land systems managed by HIL into the maintenance responsibility of HIL is a huge task for all parties involved in this process. Furthermore, the adoption of the target structure announced by the Federal Minister also represents a change. On the basis of military requirements, extensive infrastructure measures and investments are planned as part of a controlled development process. In addition, HIL GmbH successfully and competently supports the Bundeswehr in numerous exercises at home and abroad. HIL GmbH is a strong, innovative and future-oriented partner of the Bundeswehr and ensures that current and future maintenance and logistics tasks for mission-critical equipment are performed without interruption. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



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 (R&T) 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. other major organizational elements, agencies, ministries, partner nations and international organizations),

- Licensing authority (e.g. transportation licenses), expert assessment activities (e.g. accident investigations, price audits).

Bringing together and concentrating common specialist tasks, Directorate T plays an essential role in the sequence of BAAINBw

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 are 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 portfolio of the Division T1 is complemented by tasks relating to modeling and simulation (M&S), concept development and experimentation (CD&E), geoinformation (GeoInfo) affairs, tasks relating to foreign defense materiel, national and international standardization, and technical specifications (TL).

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. 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 assis-

tance 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 (NATO¹, EDA² and OCCAR³). 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 OCCAR and EDA and for Bundeswehr-wide liaison activities. In addition, it is responsible for preparing technical specifications (TL) and for managing and coordinating Bundeswehr standardization activities as well as NATO standardization work in the AIN organizational area.

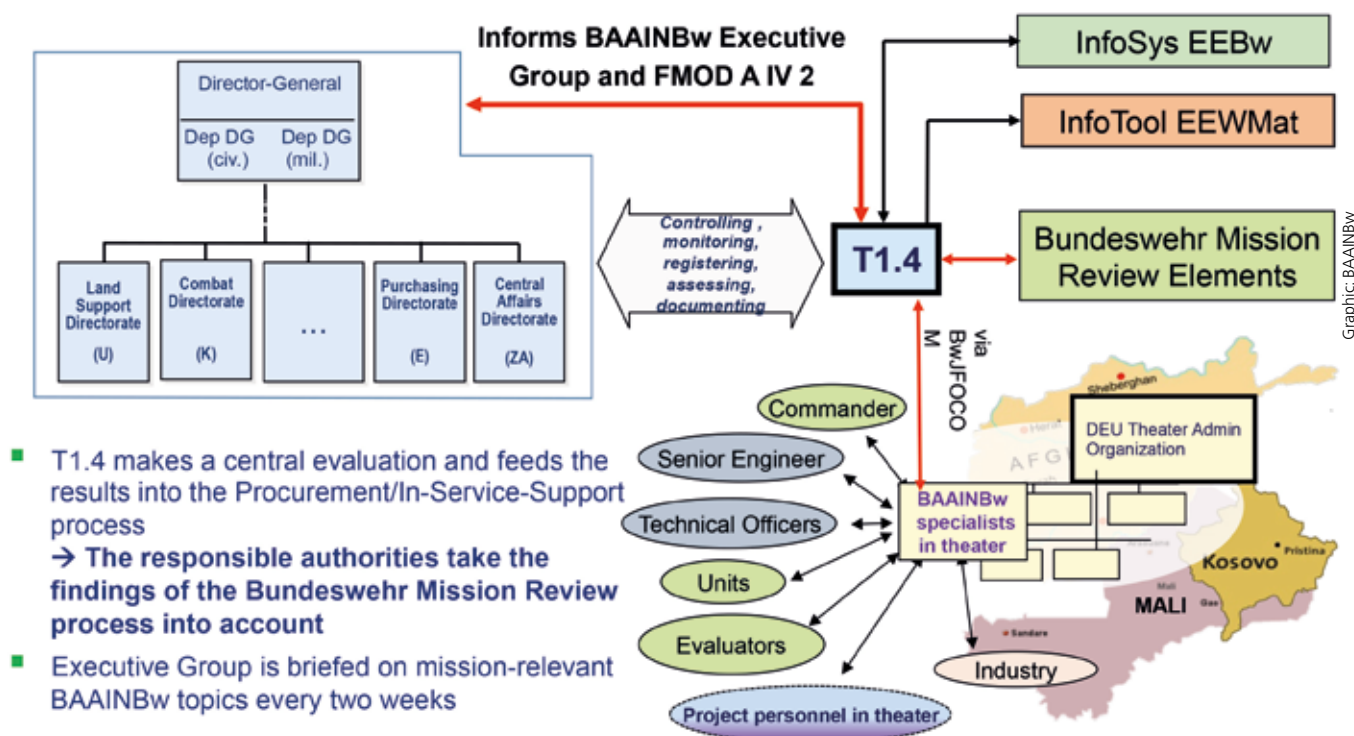
Branch T1.4 performs coordinating and controlling responsibilities in different mission-related subject areas. It coordinates the procurement of mission-essential and urgently needed items and manages mission review tasks. Thus, lessons learned can directly be used for further development of materiel 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 R&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 coordinates the evaluation of foreign defense materiel. The findings thus gained provide a valuable basis for the analysis of capability gaps and the technical adaptation of systems fielded in the Bundeswehr in line with existing threats.

Branch T1.6 is responsible for modeling and simulation (M&S), concept development and experimentation (CD&E) and GeoInfo advice for projects conducted at BAAINBw.



- T1.4 makes a central evaluation and feeds the results into the Procurement/In-Service-Support process
→ The responsible authorities take the findings of the Bundeswehr Mission Review process into account
- Executive Group is briefed on mission-relevant BAAINBw topics every two weeks

The role of T1.4 in the mission review process

The M&S controlling authority coordinates existing and newly established Bundeswehr M&S standards both nationally and internationally (NATO, EDA). This authority also conducts 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.

The CD&E controlling authority is the Single Point of Contact (SPOC) for CD&E at BAAINBw and is currently conducting a study on 3D printing aboard a seagoing unit as a CD&E project. In addition, the topics "Propaganda Awareness" and "Human Performance Enhancement" are currently being dealt with.

The BAAINBw GeoInfo element advises the project teams at BAAINBw, is the point of contact for the provision and request of GeoInfo data and products in the AIN organizational area and coordinates the provision of GeoInfo simulation data in order to optimize the supply of all Bundeswehr systems with quality-assured simulation data as a "coordination center SimDBw", which is still being set up.

Division T2

The project managers are responsible for the procurement of defense materiel, the ob-

servance of regulations and standards concerning occupational safety, environmental protection, ergonomic design of workplaces and weapon system/ammunition safety. 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. When determining and establishing suitable requirements for a weapon system, the project management is advised and supported by the experts for "product-specific protection activities" of Division T2.

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 the progress and 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 German utilization company VEBEG⁴ – 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,



Examples of safety and environmental protection requirements for a weapon system

⁴ VEBEG GmbH, a government-owned trust company responsible for the utilization of discarded property of the Federal Republic of Germany and other public purchasers; its original name meaning "company for the utilization of goods formerly owned by occupying powers".

A Further Insight



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

working group "Implementation of the Procurement Organization" and is about to be finalized. My directorate has also made a large number of contributions to this. However, I would like to ask you to understand that communication on this subject is reserved for the Federal Ministry of Defense.

ESD: In your opinion, how should the Bundeswehr logistics system be further developed?

Baeumler: In my opinion, the Bundeswehr logistics system works very well under the given framework conditions, even in view of new national and international challenges. BAAINBw is also part of the integrated logistics system.

It is important to continue to consistently pursue the course that has been taken. This includes intensifying the early consideration of logistic aspects in new armaments projects. This means: Already during the analysis phase, it must be clear which logistic strategy is to be pursued in a project. This is all the more true when alternative approaches are followed in addition to traditional approaches, such as performance-based logistics solutions. It is important that these solutions fit into the Bundeswehr logistics system in an appropriate way so that the established processes remain applicable.

Nevertheless, the existing system and the underlying processes can be further developed and optimized. One approach to this is the introduction of a supply management system along the supply chains of the Bundeswehr. The aim is to link all actors along the so-called Basic Defense Supply Chain – that is from the manufacturer through purchase, basic and operational logistics to the consumer – more closely. Any problems in the supply of spare parts will thus become transparent more quickly and can therefore be solved better and faster.

The use of current technology such as 3D printing can, for example, help to eliminate bottlenecks in the supply of individual spare parts during operations – a worthwhile approach that is the subject of current studies in which my directorate is intensively involved.

ESD: What are the key lessons learned from the mission review last year?

Baeumler: BAAINBw uses the mission review process in order to incorporate findings on product monitoring into the equipment and in-service use process. Products and services can thus be adapted to changing operational conditions, and as a result the soldiers can be provided with equipment which is tailored to their needs.

As part of the Bundeswehr mission review, BAAINBw took the lead in the processing of 20 so-called "observations" gained from lessons learned reports of the operational contingents. The obser-

vations are evaluated in the responsible project or specialist areas and, if required, incorporated into the products and services; this is referred to as "lessons learned".

BAAINBw specialist personnel in the German MINUSMA contingent communicates findings from the use of defense materiel under climatically challenging conditions directly to the project managers, thus making it possible to respond quickly to operational challenges – which constitutes a noticeable improvement not only of materiel readiness.

ESD: How is the organic capacity for analysis and evaluation (e.g. importance of new technologies) ensured in Directorate T?

Baeumler: Branch T1.5 coordinates all activities in the area of research and technology at BAAINBw and its agencies. At this branch, a situation picture is kept up-to-date at a central point, which ensures quick access to decentralized detailed information on ongoing study activities and thus also a competent capacity for analysis and evaluation.

In addition, there is a long-standing cooperation with the Fraunhofer Institute for Technological Trend Analysis (INT), which monitors technological developments on behalf of the Bundeswehr and provides these observations in the form of a defense technology forecast.

The sum of the findings is directly submitted by my directorate to the functional supervisory authority at the FMOD and forms one of the essential foundations for strategic and operational decisions on the annual R&T program.

ESD: What "enable and enhancement programs" are currently being implemented or planned, and what objectives are being pursued by them?

Baeumler: There are various programs of the FMOD and other ministries to support selected partner countries. The aim of the programs is to help the partner countries to help themselves in ensuring stability and security. On this basis, they will improve the preservation of good local living conditions and promote the development of economic relations.

In addition to the "Enable & Enhance Initiative of the Federal Government", these programs include the "Equipment Aid Program of the Federal Government" and Bundeswehr materiel transfers to other countries.

This requires the existence of certain sustainable basic state structures. The "Enable & Enhance Initiative of the Federal Government" alone currently includes about 70 projects. It would go beyond the scope of this article, however, to list them all. The competent ministries will decide on the eligibility for support and the specific projects. The new Federal Government will therefore decide in due course which programs will be newly initiated or continued in the future. BAAINBw makes a significant contribution to implementing these programs by providing expertise and the corresponding contracts.

The interview was conducted by Michael Horst.

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.

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: Material 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).

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

- technical advice on the conduct of cost estimates in all project phases and the execution of parametric cost estimates,
- technical advice and support in the conduct of economic efficiency evaluations and IT efficiency considerations for armaments projects,
- assessment of alternative forms of satisfying demand and
- review and staffing of phase documents.

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 almost 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 and 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 Bundeswehr across organizations, thus providing the ba-

sis 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 agencies, the Federal Office of Bundeswehr Infrastructure, Environmental Protection and Services (BAIUDbw), 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 and the development of principles for the preparation/management of the project-related logistic concept as part of the In-Service Use Agenda, the re-structuring of the fixed logistics facilities (oIE 2019+), the preparation and continuous revision of the Type 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. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Technical Quality Management Center (ZtQ)

The financial volume of materiel and services which, on a daily basis, are checked for contract conformity, released for delivery or referred back by the Technical Quality Management Center in the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw, Directorate ZtQ) amounts to tens of millions of euros. In addition to providing the Bundeswehr with appropriate equipment, the focus is also on the sustainable and economical use of taxpayers' money. At the same time, the ZtQ Directorate bears the overall responsibility for technical quality aspects of the materiel, the quality of which can determine the safety of soldiers. Accordingly, ZtQ supports high-risk projects in terms of technical quality assurance from the beginning of their conceptual design, through realization (procurement), in-service use and maintenance, to disposal.

The commercial aspect of these activities is governed by the framework conditions contractually agreed between the customer and the contractor. Government quality assurance activities accompanying the production process are also included in ZtQ's remit, be it by the implementation of the General Terms of Contract for the Provision of Supplies and Services (VOL/B) or the Allied Quality Assurance Publications (AQAP; NATO quality assurance publication with a normative character).

The quality management system of Directorate ZtQ, which is based on DIN EN ISO 9001:2015 (Quality management systems – Requirements), defines the procedures for government quality assurance within BAAINBw.

The challenge of an increasing complexity of purchased goods and services needs to be met also in the field of quality assurance, and a purely process-oriented

optimization is not sufficient. In addition, a continuous evolution of methods in government quality assurance is of crucial importance. Continuing the digitalization process and using the opportunities it offers remains a significant aspect in this endeavor, which may require a new mindset and goes well beyond IT support for traditional administrative practice. Tools for checking suppliers, for random and incident-based testing of products and requirements, as well as a uniform database available throughout the country are aspects that are relevant in the context. The aim is to take robust, preventive and predictive measures to ensure quality.

One Directorate. 23 Regional Offices. 60 Locations.

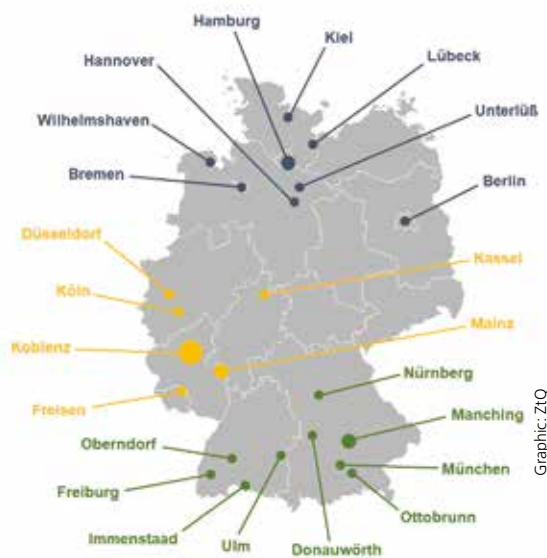
With its complementary quality assurance activities – based on the contractors' and the suppliers' proof of qualification (certif-

icates) as well as their quality management activities (such as documented tests and inspections) – the ZtQ Directorate increases the public customer's confidence in full conformity of products with contractual and economic requirements. This confidence justifies the subsequent acceptance of the finished product as a legal act.

There are approximately 450 employees in the decentralized ZtQ regional offices, working all over Germany directly at the premises of contractors of the Bundeswehr or its partners. From 60 branch offices, they provide direct support to project managers and thus, indirect support to our armed forces in tracking and demonstrating contractual progress step by step and in support of production. They independently process maintenance contracts with industry, particularly concerning the implementation of open-end maintenance contracts with factory repair.

Government quality assurance in the Bundeswehr





Graphic: ZtQ

The regional offices of Directorate ZtQ

Directorate ZtQ – Certified in Accordance with ISO 9001:2015

ZtQ is the first directorate of a higher authority in the area of responsibility of the Federal Ministry of Defense (FMOD) to implement and maintain a quality management system (QMS) certified by an independent third party in accordance with ISO 9001:2015. This QMS integrates all BAABW ZtQ activities and provides an effective and efficient basis to further develop internal priorities, job descriptions and methods. On both the government's and industry's side, there is a trend toward holistic management systems that integrate and make transparent all major organizational and/or business interdependencies, such as resource, IT, financial, occupational safety and sustainability management. The fact that ZtQ is able to set standards with its QMS is also reflected by the results of the successful QMS recertification from March 2021. In a Covid-19 framework, the ZtQ quality management system, with its detailed processes, workflows and guidance, has proved to be a valuable tool for both new and existing staff members, facilitating targeted and efficient cooperation under contact restrictions.

IT support – Driving Force and Opportunity

The way forward in quality management is, not least, characterized by the consequences of comprehensive digitalization. The first building blocks of digital administrative work with regard to audit-proof electronic documentation, workflow-based case management, cross-organizational cooperation and procedural support of technical procedures have already been implemented. They form the basis for the integration into a network of previously isolated IT solutions and for mutual access to data

which had previously been independent of one another. This, in turn, will create new perspectives on relevant issues and thus contribute to the control of quality-related key performance indicators (KPI).

Due to their clearly definable tasks and roles within the scope of any procurement and throughout the life of defense materiel, many activities of the ZtQ Directorate are ideally suited for IT support. Thus, government quality assurance procedures are reflected in the "QM module" of the enterprise resource planning (ERP) system employed by the Bundeswehr. In order to continuously increase convergence toward a coordinated overall system, the individual functionalities are rolled out in a differentiated manner, according to different task areas.

Participation in National and International Bodies

As a member of a number of national bodies and associations, the ZtQ Directorate maintains a dialog with partners from industry and science to further develop methods and procedures in the field of quality management. In addition, the continuous exchange with German industry associations, such as BDSV (a member of the Aerospace and Defence Industries Association of Europe), serves to improve standardized contractual agreements for quality assurance in Bundeswehr contracts with the German defense industry and foster their mutual acceptance. Small and medium-sized enterprises (SMEs), in particular, benefit as Bundeswehr contractors from the better understanding of these contractual arrangements achieved through this committee work.

Equally important for ZtQ is the active and formative participation in relevant NATO bodies in which NATO partners, friendly nations and OCCAR (Organization Conjointe de Coopération en Matière d'Armement) exchange experience and information and develop common strategies for government quality assurance. As a result of this exchange, these bodies regularly review and update the relevant NATO AQAP for mutual support in accordance with STANAG 4107.

The integration of government quality assurance (BAABW ZtQ), which enjoys a high reputation among the NATO partners, is therefore a regular prerequisite and, thus, an enabler for German industry contracts from friendly nations.

So, it is not surprising that the quality inspectors from the ZtQ regional offices use more than 10 percent of their working hours for contracts between our NATO partners and German companies, or for bilateral agreements on government quality assurance.



Photo: Bundeswehr

Quality inspection of gun barrels by means of video endoscopy

Audits: Benefits and Opportunities

Government quality assurance provided by the ZtQ Directorate is not only intended to ensure and demonstrate the contractual conformity of the products and services delivered to the Bundeswehr or its partners. Rather, in modern quality management many priorities of effort shift toward continuous support of contractor development in order to establish long-term confidence in the supplies and services rendered by industry as a strategic partner of the Bundeswehr. Against this background, it is important to expand the contractor-related audit activities of ZtQ. In this context, the contractor's quality management system and individual quality assurance measures are considered in a holistic way. It should be noted that with the consistent expansion of an IT-based quality management, audit management is also becoming increasingly digitalized and geared toward the future.

Conclusions

Directorate ZtQ supports the preparation of Bundeswehr contracts, checks production and maintenance services of industry for contractual conformity and, where appropriate, provides the impetus for the further development of industry's own quality management systems. The Directorate, acting as a strategic partner of industry, thus contributes significantly to the reliability and functional safety of materiel and makes an essential contribution to the materiel readiness of the Bundeswehr as well as to the protection of the life and limb of our soldiers.

In addition, it ensures the economical use of taxpayers' money in accordance with the principles of economic efficiency pursuant to Section 7 of the Federal Budget Code. ■

Download of the BAABW Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



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 of ZA directs, coordinates and controls matters that affect all divisions.

Division ZA1

Division ZA1 consists of the Branches ZA1.1 to ZA1.4.

Branch ZA1.1 is responsible for organizational structures and procedures of BAAINBw and its agencies. In addition, ZA1.1 handles tasks relating to supervision, military complaints and requests according to the German 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 agencies 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 German 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 the development and procurement of defense materiel. Besides funds management, ZA2.2 handles budget item management for non-specific investment-related budget chapters/items. In addition, central tasks of financial requirements analysis are part of its responsibility. 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 for operator solutions are planned and managed in this Branch.

Besides contract accounting for BAAINBw contracts, the tasks of Branch ZA2.5 include 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 exercises functional supervision over the processing of grants by subordinate agencies of BAAINBw and is charged with processing fundamental issues regarding public grant law.

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, 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 the deputy officer in charge of reservist matters within the AIN major organizational element. The assistant chief of the Leadership Development and Civic Education section 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 coordinating 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.

Besides disciplinary affairs, the tasks of Branch ZA3.5 include 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 with co reviewing the consequences of legislative changes concerning allowances. 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 "IT Service BAAINBw", ZA4.2 "Infrastructure Affairs of the AIN Organization, BAAINBw Activities in Representation of the User", ZA4.3 "Internal Services" and ZA4.4 "SASPF Management of Major Process Rü (Armaments)".

Branch ZA4.1 is responsible for the BAAINBw 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 BAAINBw personnel are managed in this Branch and made available either as standard equipment/application via the Bundeswehr-owned IT company BWI or as special application. Individual areas of activity are, among others,

- the provision of mobile IT and dedicated servers for special applications,
- teleworking places,
- the programming of databases, and
- the introduction of a modern document management and groupware system into BAAINBw.

Similar to the services, the Equipment, Information Technology and In-Service Support (AIN) organization is responsible for determining and specifying its own infrastructural requirements. This task has been given to Branch ZA4.2 and 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 and BWI GmbH). The Activities in Representation of the User area coordinates all matters concerning the sites, facilities and accommodation of 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".

Branch ZA4.4 is responsible for the "Management of Major Process Rü (Armaments)". The Armaments major process element is responsible for shaping and optimizing the core processes for satisfying the Bundeswehr's materiel requirements. Specific processes for

- the procurement (purchasing) of products and services (SAP MM-PUR and "AI Awarding Manager"),
- the support of Bundeswehr project management (SAP PS/PPM),
- Bundeswehr quality management (SAP QM), and
- the distribution and sales of products and services (SAP SD)

are thus shaped and coordinated with the other major processes (for example Logistics and Accounting) for all organizations. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



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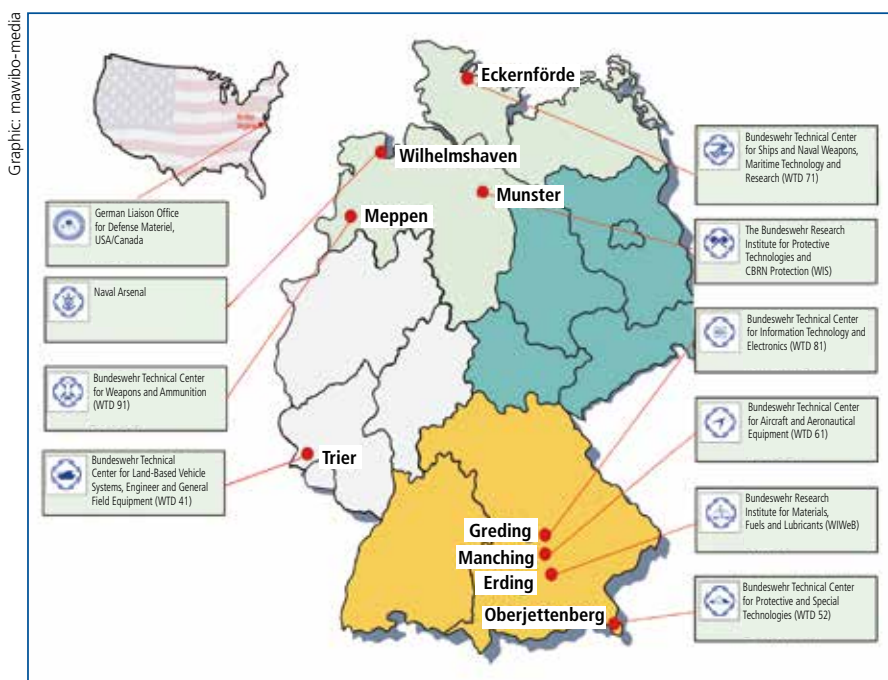
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The BAAINBw Agencies

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 branch offices in Koblenz focus on analyzing engineering and general field equipment, in particular 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 467 (as of 9/2021), the agency is a reliable partner for customers both in

Germany and abroad. In addition to the above-mentioned core activities, WTD 41 is increasingly involved in recruitment and training. It thus makes a significant and valuable contribution to maintaining Bundeswehr defense technology expertise in its areas of responsibility, now and in the future.

WTD 41's tasks involve examining future energy supply systems in military camps within the scope of an R&T project.

The tightened regulations of the Federal Climate Change Act mandate that Germany be climate neutral by 2045. For the Bundeswehr and its personnel, this means changing their way of thinking so that the required contribution of the Ministry of Defense toward climate neutrality can be made. The worldwide commitment as well as the national and collective defense responsibility of the Bundeswehr and the associated accommodation of the armed forces in the theater of operations involve considerable logistic effort for energy supply. It is the Bundeswehr's intended goal to take full advantage of innovative technologies and renewable energies while at the same time reducing

the consumption of fossil energy sources and the ecological footprint. These measures will result in better efficiency and less emissions of climate-damaging gases.

Currently, the energy supply of field camps is still based on the use of conventional power generators that are operated by using fossil energy sources. In addition to providing electrical energy for direct use, these systems also cover the energy required for heating, cooling and hot water preparation. This project is intended to examine the use of renewable energies and of the waste heat produced by power generators, e.g. for heating and cooling. Moreover, technologies for the efficient conversion and storage of thermal energy for the purpose of saving fossil energy and for the associated emission reduction are being researched.

Other project activities include the integration of hybrid, battery and fuel cells or range-extended electric vehicles into the energy network of the WTD 41 Energy Camp. With the help of modeling and simulation, the civilian "vehicle-to-grid" concept (dual-use) for future intelligent energy networks of the Bundeswehr is examined.

The objective of the F&T project is to take full advantage of innovative technologies and renewable energies while at the same time reducing the consumption of fossil energy sources.

To this end, demonstrators of the R&T project will be set up and interconnected at the WTD 41 Energy Camp. In future, these demonstrators are to be positioned as a Green Energy Innovation Hub for universities, institutions of higher education and industry so that the military personnel are able to use or apply innovations more quickly. This hub serves the purpose of adapting to the pace of innovation. The project's results are to be produced in inter-professional cooperation and contribute directly to reducing consumption of fossil energy sources at military camps.

With regard to renewable energy sources and storage systems, the research conducted within the scope of the WTD 41 Green Energy Innovation Hub is intended to confer a tactical and climate-neutral advantage on the Bundeswehr during operations.

Military camps are generally considered to be complex, interrelated and environmentally sound systems of infrastructure, set-up and operation. Intelligent metering and energy management based on use profiles and forecasts are required for coordinating

energy generation, storage and consumption in order to ensure energy supply.

Intelligent integration of individual systems with central control of energy flows under various requirements profiles and environmental conditions, including the required algorithms, is essential.

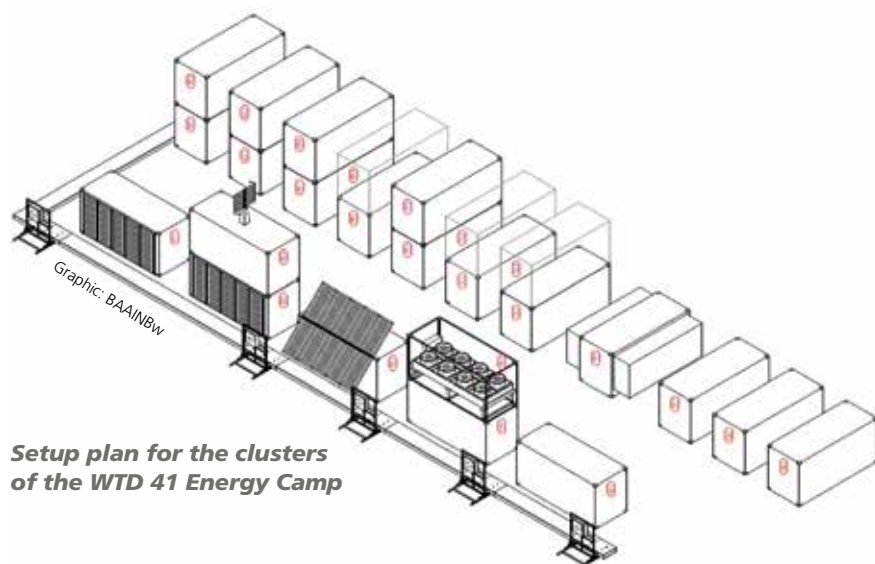
The individual clusters of the Energy Camp are currently under construction and will be connected afterwards. These works are scheduled to be completed by the end of 2022, followed by the camp's commissioning.

Together with the generic system demonstrator "WTD 41 Energy Camp", technical expertise is developed in all relevant technological aspects of power generation, conversion, storage, use and electromobility. The high degrees of freedom of the

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.



Setup plan for the clusters of the WTD 41 Energy Camp

generic system demonstrator for electrical/thermal power distribution are a prerequisite for the verification of distributed (virtual) systems.

In summary, it is of the essence to focus on the camp as an overall system when considering energy generation, conversion, storage, distribution and secure provision at the camp. Therefore, the R&T project is geared towards the intelligent control of all energy flows under various environmental conditions/requirements profiles, the algorithms required for this purpose and their verification in the generic system demonstrator. The WTD 41 Energy Camp will be set up on a long-term basis under the name "Green Energy Innovation Hub" at the Bundeswehr Technical Center for Land-Based Vehicle Systems, Engineer and General Field Equipment (WTD 41) as a technical reference, test and integration environment. It will play an important role in all aspects of verification, integration, obsolescence, regeneration and future viability.

WTD 52's responsibilities also include special technology areas, for instance, aerodynamic load tests on pilot equipment, nuclear blast protection as well as underwater firing and detonation tests. The infrastructure specific to the Oberjettenberg site is geared to its tasks and makes best use of its location in the Bavarian Alps. This is why the agency 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 are 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 compliance demonstration activities. The mountain site is linked with the facilities in the valley by our own aerial cableway, which covers an elevation difference of 1,100 m.

The mountain-valley axis of the WTD 52 site – a multifunctional tool for research in the field of sensor technology

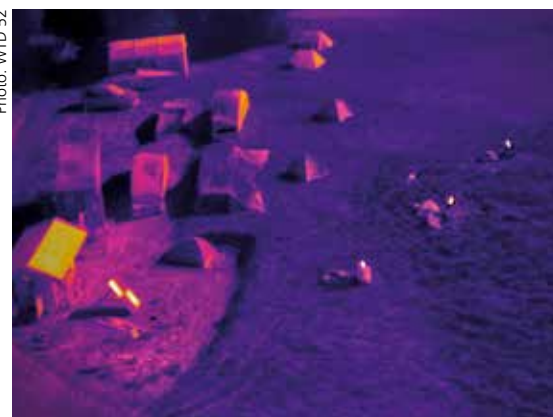
The mountain-valley axis of the WTD 52 site has proven to be an efficient location for both experimental studies concerning target detection sensors and efficiency analyses of camouflage and deception measures. The site's geographical characteristics were taken advantage of in August 2021 within the scope of a study on behalf of BAAINBw which aimed at establishing basic procedures for image-based target detection in the visual and infrared wavelength range. Extensive measurement equipment located on the Feuerhörndl measuring platform at WTD 52's mountain facilities made it possible to collect target data from larger distances. For this purpose, the measurement equipment simulated reconnaissance sensors generally used in drones or reconnaissance systems of helicopters or combat aircraft.

Other sensors were set up in a measuring pod of the agency's cableway which had been specifically adapted to simulate the sensor systems of possible target seekers approaching a target area. Both experimental sensor setups recorded static and dynamic target formations on the valley premises of WTD 52 from different angles. At a later stage, both data sets will be used for developing advanced homing and target hand-off algorithms for future weapon systems.

Examination of pressure-release devices from the mission in Mali

The analysis of incidents with improvised explosive devices (IEDs) in Mali led to new findings regarding the design of pressure-release devices and their use in improvised explosive devices. Based on these findings, WTD 52 was tasked with examining the physical detection of such release devices.

Photo: WTD 52



LWIR photograph of the target area on the valley premises of WTD 52 taken by a drone during a measurement campaign

Test specimens with properties corresponding to the original pressure-release devices from Mali could be reproduced here at WTD 52. The specimens were then buried in the testing areas of the land mine and IED detection facility and the open-area test sites together with connecting wires to create a scenario comparable to the mission country. The wires connect the pressure-release device with a battery and the initiator of the explosive charge. If a vehicle drives over the release device, pressure will be exerted on it, and the explosive charge will detonate.

The German Route Clearance System and hand-held sensors were used in the examination process. The detection vehicle is an essential part of the Route Clearance System. It is equipped with a dual sensor system consisting of a ground penetration radar and a metal detector. The Wiesel tracked vehicle, which can be controlled remotely from the Fuchs armored transport vehicle, is used as a platform. The Route Clearance System ensures reliable, standoff detectability of the pressure-release device.

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

Based in Manching, the Bundeswehr Technical Center for Aircraft and Aeronautical Equipment (WTD 61) is a Bundeswehr technical center of excellence which plays a vital role in ensuring that only safe and operational aerial vehicles are used in the Bundeswehr.

The aircraft and aeronautical equipment developed by industry on behalf of the Bundeswehr are tested and evaluated by WTD 61 in ground and flight tests by

means of complex flight test projects. This includes the qualification and technical assessment of all newly developed Bundeswehr airborne systems as well as modifications to the aircraft systems currently in use. The data obtained are evaluated in terms of performance and characteristics as well as the suitability for

facilities, measuring and test equipment and dedicated flight restriction areas. The complex test topics are specifically military and mission-relevant issues. These include, for example, the integration of airborne weapons, further development of software, airdrop technology for personnel and cargo, air refueling,

Photo: Bundeswehr/Evi Hufnagel



A400M during the operational suitability test for AAD jumps from the A400M aircraft using the T-10 parachute over the WTD 61 Feilenmoos test area

participation in general air traffic (aircraft airworthiness). The personnel is specially trained and qualified for this purpose.

In order to ensure the necessary independence from manufacturers and enable the Bundeswehr to decide and advise autonomously when it comes to the procurement of aircraft, WTD 61 operates its own test airfield. It has a fleet of representative, mission-relevant aircraft equipped as instrumented test aircraft, the required test

testing of new sensor and communication technology, night vision capability and, of course, unmanned aircraft systems.

A Selection of Recently Completed and Ongoing Activities

Even though the TORNADO weapon system has been in service for a long time, numerous further developments are taking place – both in terms of software and weapons. In 2021, the ASSTA 4.1 upgrade tests were completed (Avionics System Software TORNADO in Ada). The ASSTA 4.2 version is currently undergoing flight tests. In the field of armament, the compliance demonstration of the Laser Guided Sidewinder system (LAGS) was completed. Currently, AARGM (Advanced Anti Radar guided missile) is being qualified as a successor of HARM (High-Speed Anti Radar Missile). In the course of “maintaining the TORNADO test capability”, the flight test instrumentation (FTI) of the first WTD TORNADO test aircraft was also completely converted and the first ground test was successfully concluded using the new FTI system.

The testing and integration of the Recce Lite reconnaissance system for Eurofighter will be continued. Eurofighter and TORNADO aircraft were qualified for air refueling with the A400M aircraft during flight tests. Both for Eurofighter

Photo: WTD 52



The detection-related part of the German Route Clearance System consisting of the detection vehicle (left) and the operator team vehicle (right)



Flare ejection as part of the MiniX campaign, the smaller component of the XAVER campaign at the WTD 61 Feilenmoos test site

and TORNADO jet engines, WTD 61 has a combined test stand which can be used to comprehensively test the RB199 (Rolls Barnoldswick) and EJ200 (Eurojet) engines. This test stand is currently used for the implementation of endurance tests for the qualification of a national modification of the EJ2000 engine in the rehear range with extended power settings. WTD 61 also deals with a broad range of tasks with regard to helicopters. The CH-53 weapon system was subjected to various



TIGER HOT rearming: Loading with rotors running on the WTD 61 Feilenmoos test site

tests. For example, the Bambi MAX BBX-HL7600 fire extinguisher bucket was evaluated as an external and internal load. Moreover, modified and new helicopter cargo nets were evaluated. In addition, new avionics software is currently being tested on the CH-53 GA (German Advanced), and recovery concepts for other Bundeswehr helicopters are also undergoing tests. In terms of CH-53 obsolescence elimination, WTD 61 provides test pilots in support of the comprehensive demonstration flights at Airbus Helicopters.

In the context of data link testing, the WTD 61 Tiger Support Helicopter Team successfully participated in the "TIMBER EXPRESS 2021" exercise in Schleswig, testing the VMF (Variable Message Format) short-term solution and Link 16 via the OSS (operations support system). In addition, important data for the validation of the jettison envelope of weapons carried on the hardpoints of the support helicopter were established in trials, and improved laser goggles for aircrews were tested. In another flight test, the qualification of the hot rearming pro-

cedure for the self-protection system was successfully completed.

With the NH90 and CH-53 helicopters and the new A330 MRTT (Multi Role Transport Tanker) aircraft, a campaign for the self-protection of airborne weapon systems against infrared guided missiles was implemented in Manching as part of a more comprehensive national effectiveness study. In further tests conducted with NH90, various rescue assets such as anti-rotation devices and recovery stretchers were tested using a winch. Moreover, various versions of rappelling ropes for Bundeswehr special operations forces were examined for use with the NH90 aircraft.

The operational capabilities of the A400M transport aircraft will be expanded and demonstrated step by step. This includes the testing of the Container Delivery System (CDS) for cargo dropping. Meanwhile, series airdrops of cargo have been conducted. For the operational deployment of the A400M aircraft in the Air Force, WTD 61 conducted the operational suitability test of the T-10 parachute in cooperation with TTVG A400M (the Tactics, Technology and Doctrine Development Division) of 62 Air Transport Wing and with Army parachutists. WTD 61 is of course also involved in all projects in the field of unmanned aerial systems by conducting a wide variety of tests. The UAS (Unmanned Aerial Systems) National Center of Excellence at WTD 61 will be further expanded for this purpose, as will the cooperation with the Drone Innovation Hub (DIH) as an important link of the Bundeswehr to drone-related start-up companies.

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

Based in Eckernförde, the Bundeswehr Technical Centre for Ships and Naval Weapons, Maritime Technology and Research (WTD 71) works in all areas of maritime



Defence against IR-guided missiles

Photo: Bundeswehr/Pia Galler

Photo: Bundeswehr/Josef Rauchacker

Photo: Bundeswehr/Pia Galler

defence 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 Technical Centre also operates the research ship PLANET and other trials vessels to execute research and technology (R&T) projects as well as tests and final acceptance trials for the Navy. From WTD 71's wide range of tasks, this article focuses on the current activities the agency has conducted as part of the international *Centre for Ship Signature Management* and on the activities undertaken during the type test of a new radar sensor for the new Type K130 corvettes.

International cooperation in ship signature management

For the *Centre for Ship Signature Management* (CSSM), the COSIMAR (Continuous Operational Signature Monitoring, Awareness and Recommendation) project was carried out at WTD 71. The objective of the COSIMAR project was to develop a demonstrator for an operational signature management system.

To this end, a series of developments has been brought to completion. Examples include the elaboration of a human-machine interface and the development of a modular software architecture in which the different modules for signature identification and prediction as well as the hazard assessment for the various signatures can be implemented. These activities were undertaken together with the navies of Canada, Germany, the Netherlands and Norway. Regarding infrared ship signature management, the focus is on the inshore threat from missiles with infrared seeker heads as well as on electro-optical sensor systems for reconnaissance and target tracking. For a timely assessment of the threat situation and an effective use of countermeasures, it is necessary to quickly inform the crew about their own ship's signature and detectability, as well as alternative courses of action and their consequences. For this reason, an onboard real time concept demonstrator is being developed for the infrared (IR) spectral range, which can be used to quickly identify the current ship signature during operations. In addition, the demonstrator is to be capable of predicting the ship's signature. This prediction will be based on changes in the ship's condition, its course, environmental effects and the threat, and will also take into account the effect of signature-reducing measures. To date, WTD 71, in collaboration with the Fraunhofer Institute of Optronics, System Technologies and Image Exploitation

Photo: WTD 71



General-purpose vessel HELMSAND with the radar sensor TRS-4D installed aft

(IOSB), has carried out studies on infrared signature management and the development of the IR concept demonstrator.

Type testing the TRS-4D radar system for K130, 2nd batches

For the new Type K130 corvettes, vessels no. 6 to 10, the Bundeswehr has adopted a different approach from previous build programmes for new ships. Even though the new vessels to be procured are the second batch of an existing ship type, i.e. repeat ships, obsolescences especially in the area of the sensor outfit have necessitated modifications.

In accordance with FMOD provisions, the sensor outfit will be procured via separate agreements and furnished to the K130 consortium (ARGE K130). The steps taken to this end included the derivation of requirements for the radar sensor from the requirements of the K130 overall system (vessels no. 1 to 5) and the use of these requirements in a competitive bidding procedure conducted to select the new sensor. As a result, the contract was awarded to the Hensoldt company for their TRS-4D system.

The radar system is to be type tested to prove that the new radar provides all the capabilities of the former system as required to meet the furnishing obligation towards ARGE K130. This task has been entrusted to WTD 71.

As WTD 71 has its own fleet of auxiliary vessels that can be used for trials, the radar system, along with a container and a mast system, was installed on the general-purpose vessel Helmsand. Thus, the type test could be performed regardless of the build progress and the availability of a corvette. The system was tested under real seaway conditions during a three-week at-sea phase in the Baltic Sea. In addition, various sea and air targets were deployed to cover

a broad target spectrum. The aim was to determine the system's capability against fast and slow, big and small targets as well as to test interfaces or to analyze the responses to jammers.

Data relevant to the individual test cases were recorded and need to be evaluated in a next step to understand the radar system's behaviour. To this end, the requirements for the radar system applied in the competitive bidding procedure will be used for comparison. That way, it will be possible to guarantee that the new radar system, subject to it meeting all requirements, can fully replace the former system and that there will be no capability gap. This process is to be completed by the end of 2021.

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. With its staff and facilities, the agency, which operates within the remit of the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), contributes significantly to securing the functionality of weapon systems and equipment in all phases of the Customer Product Management (CPM) procedure.

The agency's core tasks include project monitoring and support, the performance of specialized technical tasks and the control of research and technology projects. Further core tasks involve 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 the agency. WTD 81 is highly competent in the following areas:

- information collection and reconnaissance technology (imagery reconnaissance and signals intelligence),
- information processing, information transfer and information security in weapon systems, command and control systems and support systems,
- electromagnetic compatibility (EMC), lightning protection and electrical safety,
- electronic warfare,
- robotics,



Photo: WTD 81

EMC tests in the large measurement chamber

In the EMC test center, the military systems' and electronic components' compliance with standards-based threshold values is assessed. This means that during



Photo: WTD 81

Aerial view of the WTD 81 site

- interoperability of command and control information (C2I) systems as well as combat direction systems (CDS),
- integration of IT into platforms,
- technical examinations of overall systems and the interaction of individual systems in a system of systems, in each case based on mission-specific scenarios,
- sensor technology (radar and laser sensors, electronic support measures (ESM)) and identification technology,
- intelligent weapon systems, homing and guidance technology, fire control technology,
- modeling and simulation (M&S),
- navigation,
- semiconductor materials and technologies.

With highly qualified personnel, modern, high-end facilities and a unique infrastructure, the agency is best equipped to accomplish its tasks. The technical means are state of the art.

The EMC Test Center

The agency's facilities include one of the largest fully shielded test centers for the study of electromagnetic compatibility (EMC) and electromagnetic effects in Europe.

the test, weapon systems must neither be influenced by any external electromagnetic fields nor must they themselves influence internal or external systems in an inadmissible manner.

Target simulation dome

WTD 81's target simulation dome is a unique facility – even on a global level. In the target simulation dome, the agency conducts hardware-in-the-loop simulations of optical and optronic components and systems in order to evaluate fire control and gun stabilization systems as well as seeker heads of guided missiles. The dome is 45 meters in diameter and is



Photo: WTD 81

The control room of the target simulation dome

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 create the impression of moving test objects.

In order to facilitate networked experiments, the target simulator dome can be connected to other national and international simulation facilities via standardized interfaces and protocols.

Center for Network Centric Warfare

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.

Testing of the light weapon system "Wirkmittel 1800+" ("Enforcer")

WTD 81 was tasked by the competent technical branch of BAAINBw with analyzing and evaluating the guided missile-specific elements of the 1800+ light weapon system. The project is coordinated in close cooperation between the branches "Intelligent Weapon Systems", "Electromagnetic Compatibility and Electromagnetic Effects" and the Center for Multispectral Target Simulation.

Due to the pandemic, the preliminary contractor trials scheduled on an international test site had to be cancelled. However, the guided missile-specific elements could be tested in WTD 81's target simulation dome under appropriate Covid-19 preventative measures, giving a boost to the development process. The main task of the target simulation dome involved the provision of a hardware-in-the-loop (HIL) simulation environment for the optronic components of the guided missile in order to study its tracking behavior in the visible spectrum.

A whole string of simulated shots fired provided the developers with the means to study and optimize algorithms, which proved successful in the preliminary firing tests in Baumholder in September 2021. All four shots hit their target.

Subsequent to those simulations, the agency conducted EMC measurements. Various tests established the fact that the guided mis-

sile electronics can be influenced and even shut down by the radiation applied. Corresponding data were provided to the contractor in order to further improve the system. Supplementary test runs are scheduled for 2022.

In 2022, additional EMC tests and simulations concerning the next configuration baseline of the 1800+ light weapon system are scheduled in the target simulation dome. After that, there will be firing tests at the Bundeswehr Technical Center for Weapons and Ammunition (WTD 91) in Meppen as well as functional firing tests carried out with operational guided missiles at the Overberg test range in South Africa. WTD 81 staff will participate in these firing tests to compare data from the real-scale tests to the simulations and, by doing so, lay the foundation for optimizing the simulation environment for future studies.

Photo: WTD 81



Test setup for the 1800+ light weapon system in the target simulation dome

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

The Virtual Combat Training Facility – New Team Training Possibilities

What are the opportunities and possibilities virtual reality offers for joint team training? The study “VirTuOS” on the virtual training of urban operations as a multi-user scenario deals with this question and finds answers.

Virtual reality (VR) is a currently available technology for a particularly realistic representation of and intuitive interaction with computer-generated synthetic simulation environments. It achieves a high degree of user presence in the synthetic environment so that specific situations are perceived as real. These technologies are expected to enable the military personnel

to accomplish a high level of training and performance. It is a general understanding that soldiers must be optimally prepared by means of modern and ergonomically designed training methods and technologies in order to perform successfully in operations. Today's training concepts range from the classical way of imparting knowledge through books to practical instruction and training. By using VR technologies, the training concepts can be optimized in a more realistic, action-oriented manner that is easier to access and often more cost-effective. This applies to both course-based individual training at the training facilities and pre-deployment training in the military units.

Study Objectives

WTD 91 is conducting the R&T study “VirTuOS - Virtuelles Training urbaner Operationen als Multi-User-Szenario” (virtual training of urban operations as a multi-user scenario) in cooperation with the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). In this study, the virtual combat training facility served as a demonstrator to analyze a training program using the example of fighting in built-up areas. At the beginning of the study, the focus was on the technical realization and the operational capability of the demonstrator. In addition, scientifically sound studies on the feasibility of movements in the VR environment with up to four users (soldiers) and the interaction with the VR environment and other users were conducted and ergonomics analyzed. From the very start, it was of particular importance in the studies to assess the

added value of instruction and training in a VR environment compared to conventional training methods.

Technical Realization

The virtual combat training facility is an area that allows tracking/motion recording of the human body in a freely accessible area of 100 m² where four soldiers can move simultaneously. Active tracking markers are attached with straps to each soldier's hands and feet so that they can be captured individually by the 40 infrared cameras attached to the cross-bar. In addition, markers with IR LEDs attached to the commercial off-the-shelf VR goggles measure the position of his/her head in the room. The soldier carries a backpack PC to which the VR goggles (also called head-mounted display (HMD)) and other items are connected. To increase his/her sense of presence, the soldier wears a haptic vest which signals an enemy hit by triggering a vibration. Furthermore, a replica of the G36 assault rifle is used. The rifle is a modified soft air weapon which is equipped with a gas recoil system. The weight of this licensed replica matches the weight of the original rifle. The weapon allows for precise firing in the virtual space. The soldiers communicate via the sound system integrated in the HMDs. The instructors are part of the military team's radio circuit to be able to give direct instructions. Apart from the modified weapon, the VR equipment consists of commercial off-the-shelf products from the gaming sector.

Start of a VR Mission

As soon as the soldier has put on the VR equipment, nothing more is necessary

Photo: WTD 91



Tracking area of the virtual combat training facility



Source: WTD 91

Soldiers training in a VR environment

than to calibrate the system in order to adapt the display of the digital avatar in the virtual environment to the real body proportions. For this purpose, the soldier assumes a T-pose for three seconds. Once all soldiers involved in the training have been calibrated, the mission can start. The instructor pre-configures and starts each mission on the operating console via a touch-sensitive surface (in short: touch surface). The military team is located on a virtual roof in a typical street of a city in the Middle East. Then, people appear at different distances who are portrayed either as neutral people or potential attackers. The team splits up in accordance with the training doctrine, and each soldier takes over a fixed observation sector. The instructor, who is not involved in the mission, can observe the active soldiers in both the real and the virtual environment by monitoring the displays attached to the outside of the cross-bar system. The display shows information about each individual soldier, such as the number of shots fired and the number of enemies and neutral persons hit. The game engine employed (Unreal), which is also frequently used in the commercial sector, provides a very realistic graphical representation in combination with high-quality content.

Conducting Tests with Human Testers

Within the scope of this study, WTD 91 conducted tests with 32 soldiers from specialized and special forces acting as human testers to determine, among other things, the usability and weaknesses of the system. At the time of the tests with the soldiers, the virtual combat training facility was more like a generic demonstrator of the technology and therefore not yet a complete training simulator for a specific training purpose. Such an approach allows for targeted and

risk-minimized research, because it only makes sense to continue the study after the system's fundamental suitability for use has been determined. The test was divided into four different examination phases:

- individual perception in VR
- perception of the weapon in VR
- virtual operational scenario and communication
- stress on the soldier and robustness of the system

An electronic questionnaire was prepared to enable an evaluation. It includes standardized questionnaires and system-specific questions as well as a section for personal impressions. In addition, a mobile measuring system was used to determine the physical burden on the soldier. An open discussion about the applicability of the system in future training segments completed the study.

Apart from the tests with the soldiers, a VR workshop was conducted together



Photo: WTD 91

Reality and VR

with the Army Concepts and Capabilities Development Center with the objective to develop VR-based contents for future successful training.

Results of the Tests with the Virtual Combat Training Facility

The tests with the soldiers yielded a large number of reliable results. The assessment of the tests comes to the following conclusions:

- VR-supported training achieved a high user acceptance throughout the tests.
- There were hardly any signs of simulator sickness.
- The synthetic representation in the VR environment is perceived to be very realistic.
- The soldiers' sense of presence is very high.



Photo: WTD 91

Soldier during human test campaign

- The options of evaluation by means of VR technology offer considerable added value.
- The current system must be ruggedized for use in trainings.
- It will be necessary to configure the system according to the needs of specific organizational units.

In conclusion, it can be said that the basic usability of VR technology provides considerable added value for team training.

The Development Is Forging Ahead

Based on the findings, the virtual combat training facility is currently being further developed. The software development focusses on the inclusion of possibilities of evaluation in the form of an after-action review, on the variable representation of

neutral and hostile persons with different patterns of behavior and on a higher variation in the selection of training scenarios. It is also necessary to adapt and/or extend the hardware since non-verbal communication within the military team is of great importance. VR gloves which allow for the individual tracking of every finger are to help overcome this current limitation. After the adaptation of the system there will be further tests with human testers to measure the increased added value.

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.

In the operational areas of WIS, application-oriented issues are researched by highly qualified personnel and examined using scientifically sound methods, while technical expertise is constantly advanced and extended. The current tasks in the armaments process are characterized by interdisciplinary approaches and interlinked task performance.

Deployable Laboratory Infrastructure for the Detection of Biological Warfare Agents and Hazardous Substances in the Field

The safe and rapid detection of biological warfare agents and hazardous substances in the field places particular demands on the procedures and deployable facilities needed for this purpose, since the handling of these biological agents is subject to strict legal regulations. For the first time, minimum technical standards are laid down for the design of a legally compliant deployable infrastructure for the handling of biological agents. In addition, the right to use the technical solutions for the Bundeswehr was secured by patents. This was an essential prerequisite for the implementation of future projects concerning field-compatible (laboratory) infrastructure for the

handling of pathogens of risk group 3 and higher (e.g. "CBRN analytical laboratory, deployable" and "Medical CBRN Protection Task Force") on a civilian statutory and normative basis. In addition, the lessons learned are used in projects for the adaptation and advancement of medical supplies (such as patient isolation stretchers).

Modernization of the Nuclear Protection Test Facilities

Because of the developments in global security policy of the last few years and not least because of the termination of the INF Treaty, non-strategic nuclear weapons, in particular, are becoming increasingly important once again. Against this background, WIS is gradually expanding its capabilities within the scope of the integrated compliance demonstration of nuclear hardness.

A modern, high-performance impulse generator for the outdoor NEMP simulator has recently been made available for the examination of nuclear electromagnetic pulses (NEMP). The impulse generator was specifically designed for use at WIS and successfully put into operation. It will be used for reliable examinations of battle tank and helicopter-sized weapon systems.

The effects of ionizing initial radiation on electronics in case of a nuclear detonation, especially on semiconductor components, are examined at WIS in various experimental radiation environments. A modern facility is now available for neutron flux tests which can be used without radioactive tritium gas and is based on

deuterium-deuterium fusion reaction. It was only in recent years that neutron generators based on this physical principle have achieved the required radiation intensity. In addition, radioactive cobalt-60 sources (Co-60) are regenerated for the required dose tests in the gamma irradiation system due to the limited half-life. Thus, an efficient radiation system continues to be available.

A New Reverse Osmosis Test Stand

In the deployable water purification units of the Bundeswehr, so-called reverse osmosis modules are used in the cleaning process to treat raw water and obtain drinking water. WIS assesses the performance of reverse osmosis (RO) in the treatment of raw water of different qualities. Here, the focus lies on the separation performance of the RO membrane modules against relevant pollutants under various framework conditions. Treatment is particularly challenging when the raw water is contaminated with chemical warfare agents.

With the new reverse osmosis test stand, commercially available RO membrane modules can be operated with contaminated test water samples at WIS to test their effectiveness against toxic substances in water under various conditions. The process-related operating parameters of the fielded water purification units can be set at the test stand. The tests have shown new potentials for assessing the performance of Bundeswehr facilities under near-operational conditions and for developing improvement measures on this basis.

Fotos: WIS/Anette Otto, WIS/Bildkraftwerk/Bernd Lammel



Comprehensive CBRN protection: Safety tests of protective clothing for soldiers – a thermoman dummy wearing protective clothing, and protective clothing in the aerosol chamber

Researching – Testing – Advising

WIS, with its wide spectrum of tasks, contributes substantially to providing the Bundeswehr with the best possible equipment by consistently focusing on science-based services. In addition, WIS is involved in a cross-departmental and international effort to deal with the pressing issues in the field of protective technologies and to help shape solutions.

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.
- Fuels and lubricants ensure mobility and are subject to certain changes due to the current energy transition.
- 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 2021, the management of WIWeB changed, while the orientation and fo-

cus on research and in-service support were maintained. Furthermore, the scientific advisory council of WIWeB was newly appointed in March and had its first meeting in June in order to obtain information on the current and planned research work at WIWeB and to provide stimuli for the future orientation of defense technology research.

The branch "Soldier System" continues its research work. This branch was newly established in 2020 and considers the clothing and equipment of soldiers in the context of overall systems and with close involvement of the users and the project directorates within BAAINBw (Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support). The plans for a suitable laboratory environment and a digitalized outdoor area where these technologies can be researched and tested were further specified in the "Soldier System Innovation Laboratory" concept, and appropriate steps were taken to implement them.

In the field of 3D printing, WIWeB continues to be the center of competence and the central point of contact for the entire Bundeswehr. Executing R&T studies and in-house research work as well as providing support by printing parts are still among the central tasks. In early 2021, a field test within the scope of the CD&E project "3D-DruckBw" (Bundeswehr 3D printing) was conducted at WIWeB. The focus of the test was on powder-based printing methods for plastic and metal using 3D printers that were fitted into containers and operated by troop personnel. The objective of the CD&E project is to create a Bundeswehr-wide basis for the additive production of critical spare parts during deployments.

As the project authority for fuels and lu-

bricants, WIWeB has long been responsible for the selection and quality control of the fuels used in the Bundeswehr during routine duty, deployments and exercises. The established focus group on research on the future energy supply of mobile military systems coordinates the activities of the Bundeswehr and its cooperation partners. A corresponding interagency conference was held for the first time at WIWeB in 2021. An important milestone in this context is the construction and commissioning of a container-based pyrolysis system which can be used to thermally split plastics and generate liquid energy sources. Such a system can be used to analyze and optimize the process on a pilot plant scale.

This technology has the potential to become a building block in a future decentralized energy supply system of the Bundeswehr which can be used to make energy-related use of valuable residual plastics.

In the field of clothing technology as well, WIWeB is the competent authority of the Bundeswehr. It not only establishes specifications and tests combat clothing and personal equipment prior to their introduction or in case of problems, but also examines how the highly functional equipment can best support the soldiers and be comfortable and sustainable at the same time. In 2021, a market survey investigated elastic tissue which can be equipped with the required flame resistance and vector protection and offers increased wearing comfort. To improve sustainability, fabrics containing recycled fibers are studied and laminates in functional clothing are examined to achieve the longest possible service life.

The modernization of the combat suit system 90, which started in 2021, combines



The 3D Printing Center of the Bundeswehr at WIWeB supports the Bundeswehr with parts produced by additive manufacturing. As part of the "3D-Druck Bw" (Bundeswehr 3D printing) CD&E project, container-based solutions for plastic and metal printing were tested in a field test.

Graphic: WIWeB

fabrics with advanced finishes with digital-ly optimized cutting patterns. The measuring campaign, which began at the end of 2021 in the form of a 3D body scanning of up to 2.500 Bundeswehr members (selected representing their branches of service, age group and gender), is intended to further improve, among other things, the cut design and fit so that the Bundeswehr can continue to provide its soldiers with the best possible combat clothing.

The Naval Arsenal

Future Developments Regarding the Kiel Place of Duty

Since the stationing decision was taken in 2011, the Naval Arsenal has focused on the Wilhelmshaven garrison with 954 billets. Besides maintenance management, this focus also concerns capabilities and capacities needed for productive maintenance services performed by an arsenal installation. As directed, the Kiel arsenal installation was organisationally disbanded in late 2015.

The Naval Arsenal's mission, namely to ensure the maintenance of the German Navy's ships and boats, remained unchanged.

Consequently, the Naval Arsenal aligned its extensive infrastructure refurbishment in Wilhelmshaven with the framework conditions set by the stationing decision. This refurbishment process is currently beginning. In general, reserves for potential build-up are not provided for in public infrastructure projects.

After the organisational disbandment of the Kiel Arsenal installation, only parts of the maintenance management as well as special repair capabilities and capacities for submarines and MCM vessels remained in Kiel-Ellerbek due to the special infrastructure available only there (e.g. the periscope workshop). The affected specialist staff have been included in the organisational structure of the remaining

arsenal installation and are repairing the boat classes in question to the present day.

In the years to come, the reversal of the trend in Bundeswehr materiel and personnel strengths will lead to a personnel and materiel buildup of the German Navy. The Naval Arsenal is going to grow as well and has currently approximately 1,200 billets. However, the required growth of the infrastructure cannot be fully implemented in Wilhelmshaven, because the already planned, modernised infrastructure for future ship classes (for example the Type 126 frigate (F126)) needs to be kept available in the North Sea area. Therefore, the use of the available infrastructure in Kiel, also with regard to the bases of Flotilla 1 in the Baltic Sea area, is a logical decision. What is going to happen in Kiel? The Naval Arsenal is actively preparing for the repair of the **Type K130 corvettes**, supplementary procurement. This includes a wide range of personnel, materiel and infrastructure measures:

- In an on-the-job training, the new personnel in the Wilhelmshaven workshops will be familiarised with the technical matters. In a next step, they will then complete the maintenance training courses bought from the manufacturers as part of the construction contract.

- The infrastructure required at the premises in Kiel-Ellerbeck has been identified. For this reason, the future armament workshop will be reactivated in its original place. In cooperation with the Kiel Bundeswehr Service Centre and the Kiel Centre of Expertise for Construction Management, all necessary measures will be implemented to ensure the future use of this infrastructure.
- The equipment for the workshops in Kiel will be procured either under the construction contract or, supplementing it by way of decentralized procurement, by the Naval Arsenal as so-called basic equipment. In this regard, planning has been revved up, too.
- The use of the Marine-MARs Maintenance Channel (M³C) as a proven Naval Arsenal tool for remote maintenance (distance support and remote access up to security classification SECRET) for immediate repair of the ships/boats via the Navy's information environment. ■

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>

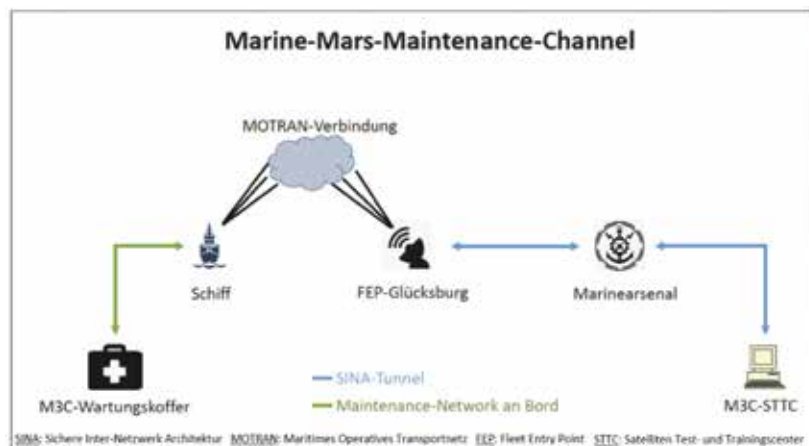


Photo: Naval Arsenal



Air photograph of the Naval Arsenal's Kiel-Ellerbek site

Grafik/Photo: Naval Arsenal



Marine-MARs Maintenance Channel with M³C maintenance box



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 based in the U.S. 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.

Currently, the Liaison Office has 50 posts, comprising

- 28 posts for engineers or scientists,
- 11 posts for non-technical administrative officials,
- 6 posts for officers, and
- 5 posts for local personnel.
- More than half of the posts are assigned to the following project offices and to the liaison offices at U.S. Army and U.S. Air Force facilities (see Fig. 1):
- Rolling Airframe Missile Project Office (RAMPO) in Arlington/VA,

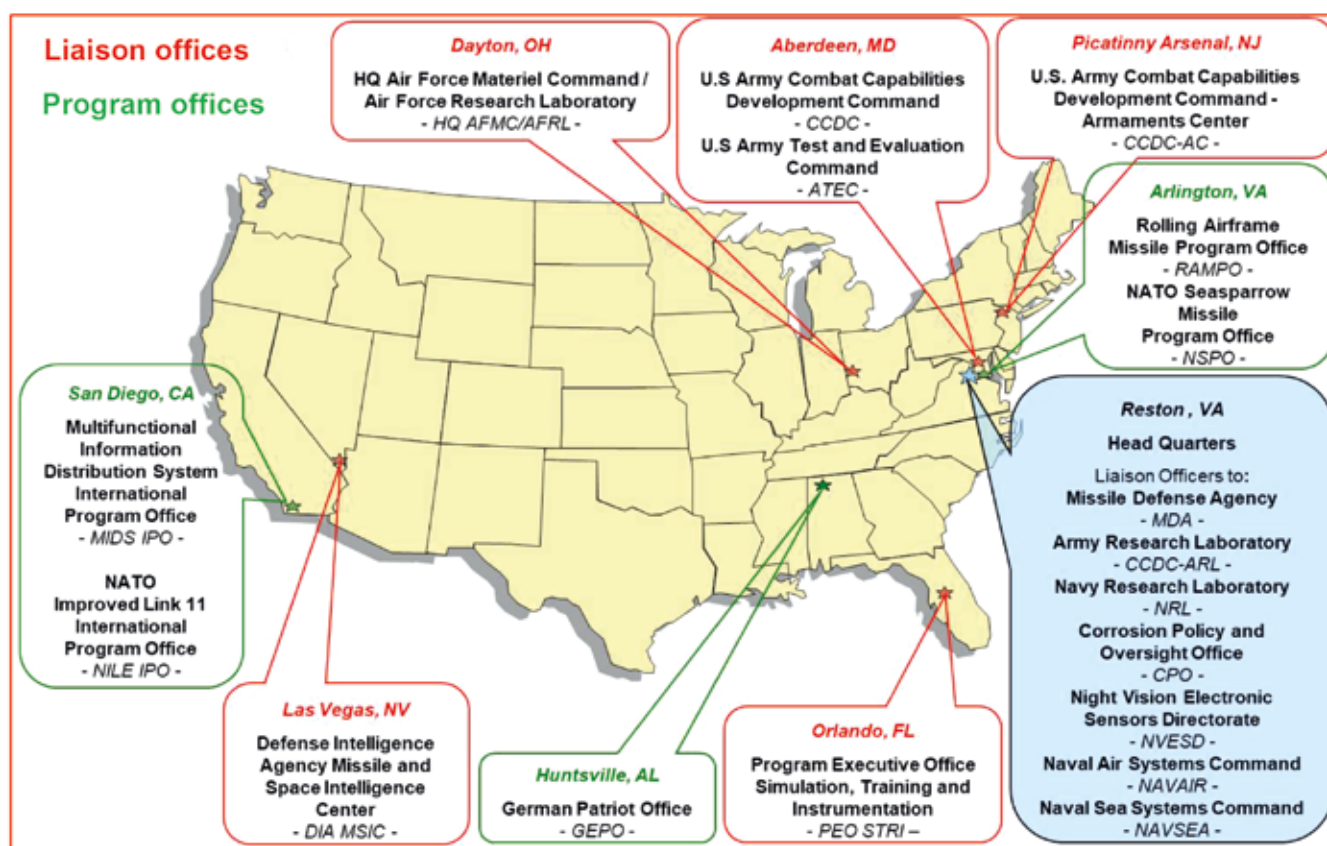


Photo: Bundeswehr/Nattkemper

The German Liaison Office for Defense Materiel, USA/Canada in Reston, Virginia, USA

- 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.
- For these personnel of the major organizational element of equipment, information

technology and in-service support employed in different program offices on the North American continent, the Liaison Office is the home organization in terms of general administrative affairs, but in technical terms the German positions on the projects are determined solely by the responsible project managers in Germany. In this regard, the Liaison Office does not have an independent role or decision-making authority.



Locations of the Liaison Office USA/CAN and its branch offices

The aim of its work is to strengthen national military and industrial capabilities and to promote the development of joint standards and interoperable solutions for mission-oriented equipment of the armed forces.

The Liaison Office 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 up to the use of defense goods procured there. It contributes to maintaining and developing the capabilities of the national defense industry.

Other focuses of its work are the procurement and repair of U.S. and Canadian defense goods for the Bundeswehr, the management of personnel exchange programs for 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, and the representation of German interests in international FMS (Foreign Military Sales) working groups.

Furthermore, the Liaison Office assumes Government Quality Assurance tasks for products ordered in the USA and Canada. To this end, it cooperates closely with U.S. and Canadian government quality assurance authorities.

Current Activities

Personnel exchange programs

The COVID-19 pandemic continued to pose major challenges to the ESEP and APEP exchange programs this year. Nevertheless, in January and August 2021,



Photo: Bundeswehr

Firing of a Rolling Airframe Missile (RAM) from the German frigate HAMBURG

participants of the exchange programs were welcomed again in the USA. The ESEP program with Canada had to be suspended again in 2021 due to the pandemic.

Multifunctional Information Distribution System (MIDS)

MIDS is a tactical radio system for air navigation and distribution of situational information (data link). It was originally developed for the U.S. Armed Forces, now it is generally used by NATO forces and indispensable for coordination in combat when participating in joint operations. It is continuously being improved.

Since the development was completed, three production lines have been established for the Multifunctional Information Distribution System – Low Volume Terminal of Block Upgrade 2 (MIDS LVT – BU2), and initial measures to stabilize production have been implemented. The first BU2 systems are already operational.

The MIDS program continues to focus on production stabilization, platform integration and further development of the BU2 terminal on the basis of the lessons learned during integration. The MIDS IPO uses its own technical expertise and concludes all necessary contracts with industry.

Rolling Airframe Missile (RAM)

RAM is a missile system for short-range protection of seagoing units.

The bilateral RAM program management in the German-American RAMPO covers all aspects of the development, procurement and in-service use of the RAM weapon system.

The RAM Block 2 missile is currently being further developed in order to adapt to new threats. Activities for the series

procurement of the latest generation are being prepared.

In addition, shipboard systems for the second lot of the class K130 corvettes and the class F126 frigates are being procured. What is more, missile re-certification activities are currently being performed or 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.

Research & Technology

In the field of research on unmanned land systems, there is currently a very active exchange between the USA and Germany. Within the scope of the "InterROC" (Interoperable Robotic Convoy) Project Arrangement (PA), the U.S. Army and BAAINBw are very successful in conducting research on self-driving trucks. The Liaison Office made a major contribution to the realization of this PA. Furthermore, it played a central role in the agreement concerning the research on automated small robots and in the procurement of American walking robots for the Bundeswehr.

Download of the BAAINBw Directorates' organizational charts at:

<https://www.bundeswehr.de/en/organization/equipment/downloads>



Photo: Bundeswehr/Falk Barwald

A technician during a check of a TORNADO combat aircraft



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