June 2024

Defense Health Agency Strategic Research Plan: Department of Defense (DoD) Working Dog

Defense Health Agency ®

REVISION HISTORY

Revision	Entered by	Reason	Date

CONTENTS

FIGURES

TABLES

1. OVERVIEW AND ORGANIZATION

The Defense Health Agency (DHA) Research and Engineering (R&E) Directorate leads the discovery of innovative medical solutions responsive to the needs of Combatant Commands, the Military Services, and the Military Health System (MHS). DHA R&E provides oversight and management of a Science and Technology (S&T) annual budget of approximately $500 to $800 million to support research across critical investment areas. The cornerstones of the DHA S&T management approach are as follows:

- Portfolio Managers directly accountable for the health and performance of their research Portfolios
- Alignment of research investments to validated and prioritized joint Capability Requirements
- Identification of the Capabilities needed to work toward fulfilling priority Capability Requirements
- S&T (Budget Activity [BA] 6.1, 6.2, and 6.3) efforts that focus on areas where Defense Health Program (DHP) investments can make the most impact and accelerate delivery of knowledge and materiel products to end users
- Informing multi-year research investment plans that allow adaptation to emerging (or declining) requirements

The DHA Deputy Assistant Director (DAD) for R&E employs Strategic Research Plans (SRPs) to inform and describe how Department of Defense (DoD) medical capabilities will be developed over time. These SRPs will drive investment recommendations for Future Years Defense Program (FYDP) plans and serve as a critical tool for aligning investments with military medical health priorities. SRPs include information that will enable the Portfolio Manager to perform the following activities:

- Develop, on an annual basis, the FYDP plans in alignment with Capability Requirements and anticipate the resources that will be required for the respective Program Objective Memorandum (POM) cycle
- Provide the oversight and concurrence of Year of Execution (YOE) spend plans that Program Managers (PMs) will be responsible for developing as a recommendation to the Portfolio Manager
- Facilitate discussion with leadership and stakeholders regarding the research activities required to address Capability Requirements

SRPs are organized into four levels:

- **Capability Areas** (CAs) reflect the highest structural elements that encompass broad areas of medical research within an SRP
- **Capability Requirements** (CRs) are derived from key source documents [e.g., Joint Capabilities Integration and Development System (JCIDS)] and outline Capabilities (knowledge or materiel) required to meet current or future military medical needs
- **Science and Technology Paths** (STPs) describe the high-level research activities needed to support the transition of Capabilities to product development or other end users

- **Capabilities** describe the S&T knowledge and/or materiel products to be transitioned to product development or end users

Figure 1-0 shows the hierarchical relationship between the components of the SRP, with the associated reference schema.

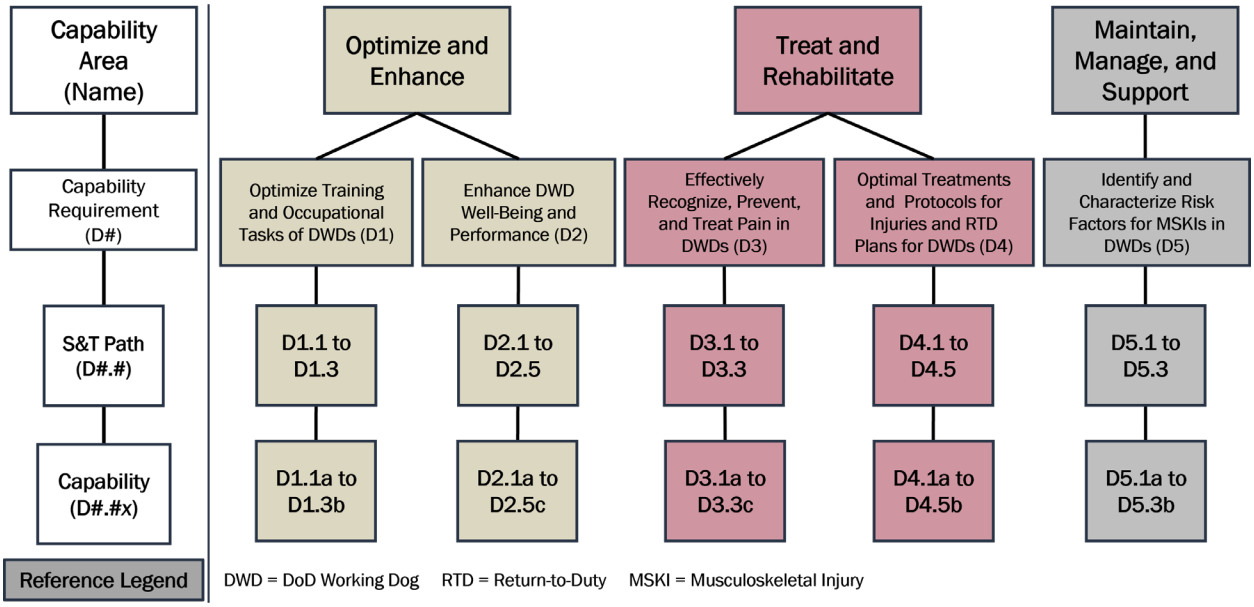

Figure 1-0 SRP Hierarchy

The definition of a DoD Working Dog (DWD) is any canine that meets DoD Component requirements to support operations in the protection of installations, resources, and personnel, to include explosive and illegal narcotic detection abilities, patrol, tracking, or other requirements prescribed by the DoD Component [1]. The scope of this DWD SRP includes CRs related to preparing, procuring, employing, evaluating, maintaining, and managing DWDs to enable the effective execution of the full spectrum of global DWD mission sets. This SRP only outlines the CRs deemed as priorities. These priorities have been identified based on assessment of the current and future medical and operational needs and/or existing research gaps of the military medical community. Inclusion of a CR in the SRP does not guarantee that funding will be aligned to its respective STPs.

The priority DWD CRs in this SRP are organized into the following CAs:

- Optimize and Enhance: Breed, select and procure, prepare, and equip DWDs for optimized operational performance
- Treat and Rehabilitate: Develop treatments, therapies, and rehabilitation strategies for DWDs that optimize return-to-duty status
- Maintain, Manage, and Support: Oversee and provide support to DWDs across entire service life

Priority DWD CRs are listed in Table 1-0, with each CR noted via a D and a number (e.g., D1, D2). These CRs are derived from the Initial Capabilities Document (ICD) for Joint Research Needs

of the Department of Defense (DoD) Working Dog (DWD) Enterprise [1] and subject matter experts (SMEs) in the DWD field. Section 2 describes the STPs leading to defined Capabilities for each CR. The numeric labeling schema is not meant to represent relative priority and is only intended to organize the CRs for ease of use.

Table 1-0 Capability Requirements Included in the DWD SRP

D No.	Capability Requirement Name	Capability Requirement Description
D1	Optimize Training and Occupational Tasks for Health and Performance in DWDs	Identify health, and performance characteristics of DWD breeds to optimize training and occupational tasks.
D2	Enhance DWD Well-Being and Performance	Develop solutions that enhance the well-being and performance of DWDs through detecting, evaluating, predicting, and treating behavioral problems impacted by genetics, occupation, and kenneling.
D3	Effectively Recognize, Prevent, and Treat Pain in DWDs	Develop solutions to effectively recognize, prevent, and treat pain in DWDs, including acute and chronic pain, field analgesia, and sedation/anesthesia and their associated effects.
D4	Optimal Treatments and Protocols for Injuries and Return-to-Duty Plans for DWDs	Identify and characterize optimal treatments, protocols, and devices for DWD occupational hazards and injuries, including return-to-duty plans.
D5	Identify and Characterize Risk Factors for Musculoskeletal Injuries (MSKIs) in DWDs	Identify and characterize occupational risk factors for MSKI and probability of MSKI occurrence based on breed, genetics, or body conformation.

2. CAPABILITY REQUIREMENTS AND ASSOCIATED S&T PATHS

This section outlines the DWD priority CRs, STPs and Capabilities. The Capabilities described are expected to transition to product development or other end users (e.g., members of the clinical or operational community) to aid in fulfillment of the requirement when they reach the appropriate Technology Readiness Levels/Knowledge Readiness Levels (TRL/KRL). Product development will then perform, as appropriate, additional development activities required to mature these Capabilities to the extent to which they can be delivered for full clinical or operational use by the intended end user. Any specific examples listed within the Capability description are intended only as examples and not as main/top priorities of that Capability. Each CR in this section to follow is depicted as a figure in the format shown in Figure 2-0.

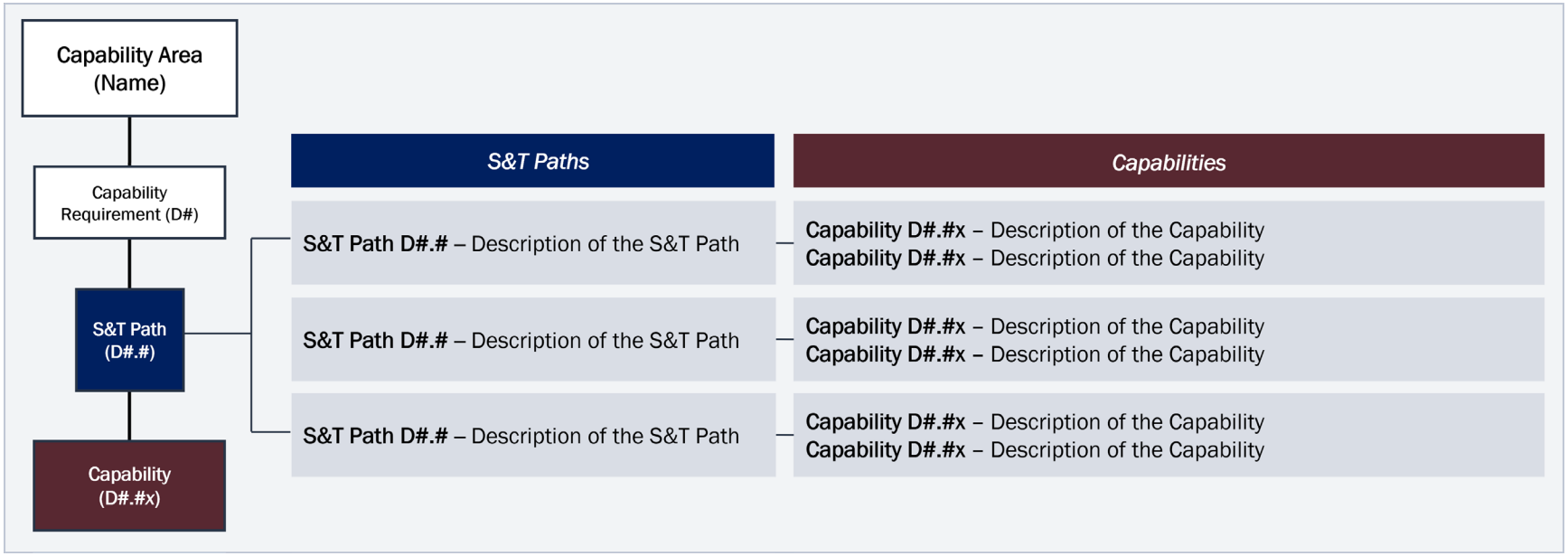

Figure 2-0 Capability Requirement Graphic Example

2.1 Optimize Training and Occupational Tasks for Health and Performance in DWDs (D1)

DWDs must achieve and maintain optimized operational performance to be effective in their role. The identification and characterization of factors and conditions that positively or negatively affect the DWD are required to understand optimal performance (D1.1). Building on this knowledge, the development of evidence-based methods for performance enhancement and optimization are required to develop assessment guidelines and screenings to effectively determine performance limitations (e.g., work/rest cycles, breed characterizations) (D1.2). This knowledge will also be used to develop guidelines, proper training, and care guidelines to maintain the operational performance of the DWD (D1.3) [1].

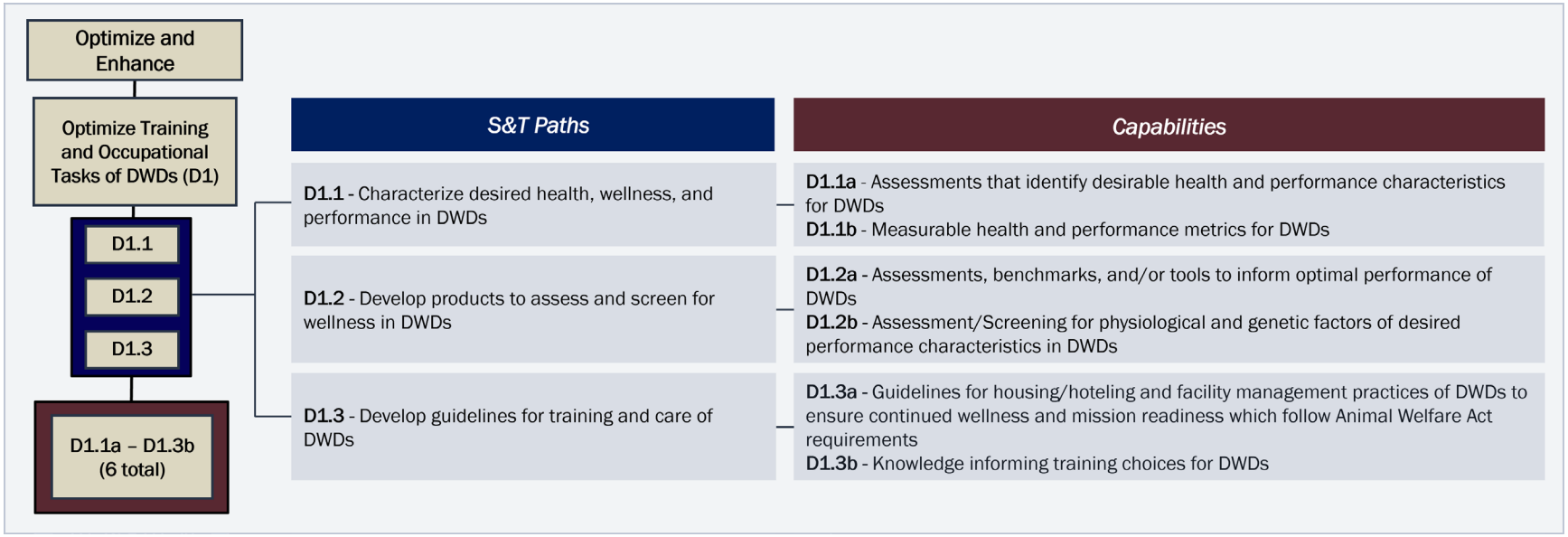

Figure 2-1 Optimize Training and Occupational Tasks of DWDs

2.2 Enhance DWD Well-Being and Performance (D2)

Behavioral health is critical to the DWDs ability to perform their role effectively. Enhancing the well-being of the DWD by the detection, evaluation, prediction, and treatment of behavior problems in the DWD is critical for optimized performance and duty readiness (D2.1, D2.4). Determining the effects of kennel design, management practices, and environmental stimuli/exposures on the DWD's well-being and performance of the DWD (D2.2 – D2.3) are critical in the development of guidelines for the treatment and mitigation of unwanted or abnormal behaviors (D2.5) [1].

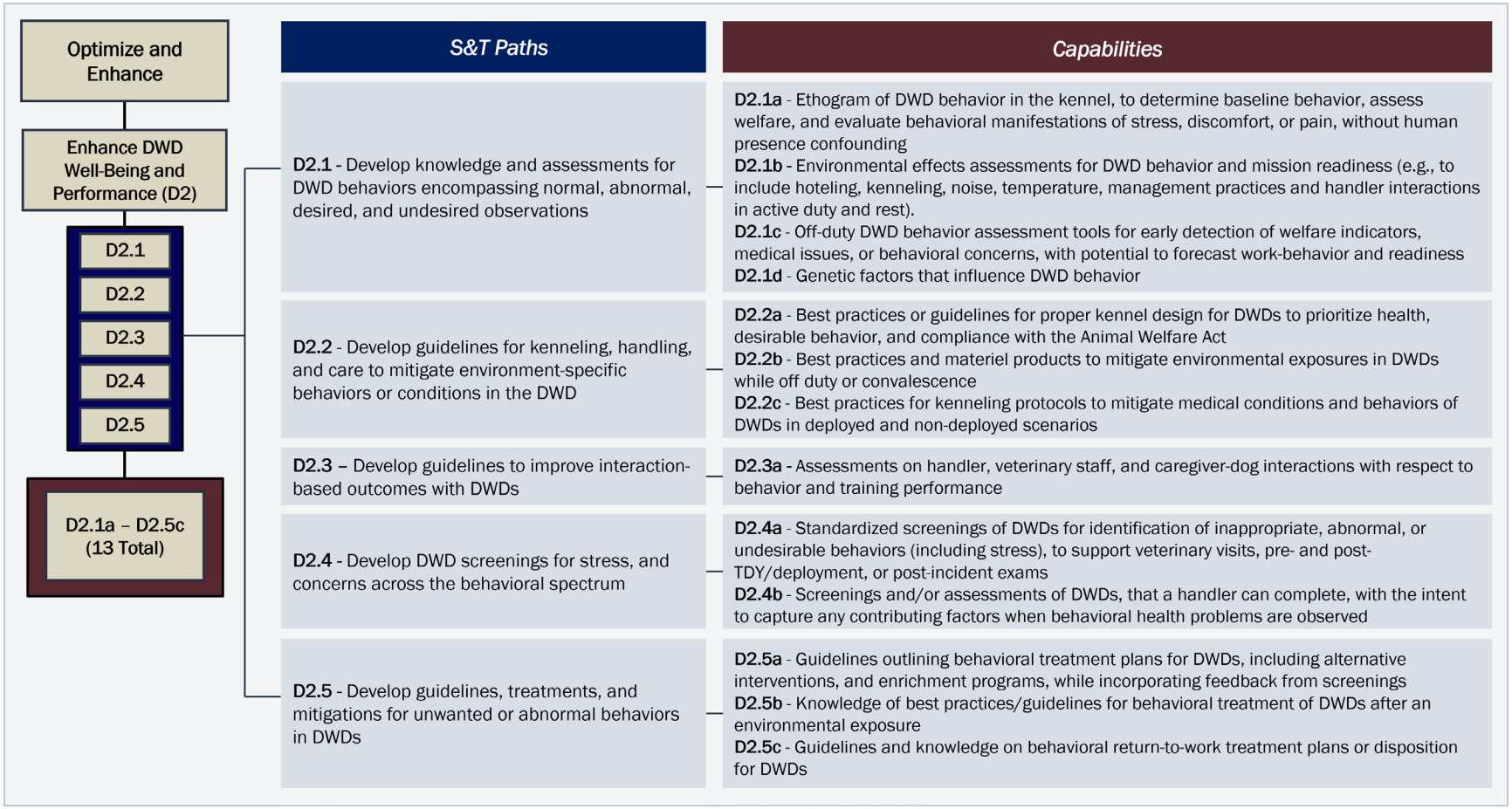

Figure 2-2 Enhance DWD Well-Being and Performance

2.3 Effectively Recognize, Prevent, and Treat Pain in DWDs (D3)

The development of knowledge and/or materiel products to effectively recognize, prevent, and treat pain in DWDs will aid in the readiness of the DWD and handler team. This includes determinations of acute and chronic pain, field analgesia, and sedation/anesthesia and their associated effects on the ability of the DWD to perform their duties and the development of return-to-duty guidelines (D3.1 – D3.3) [1].

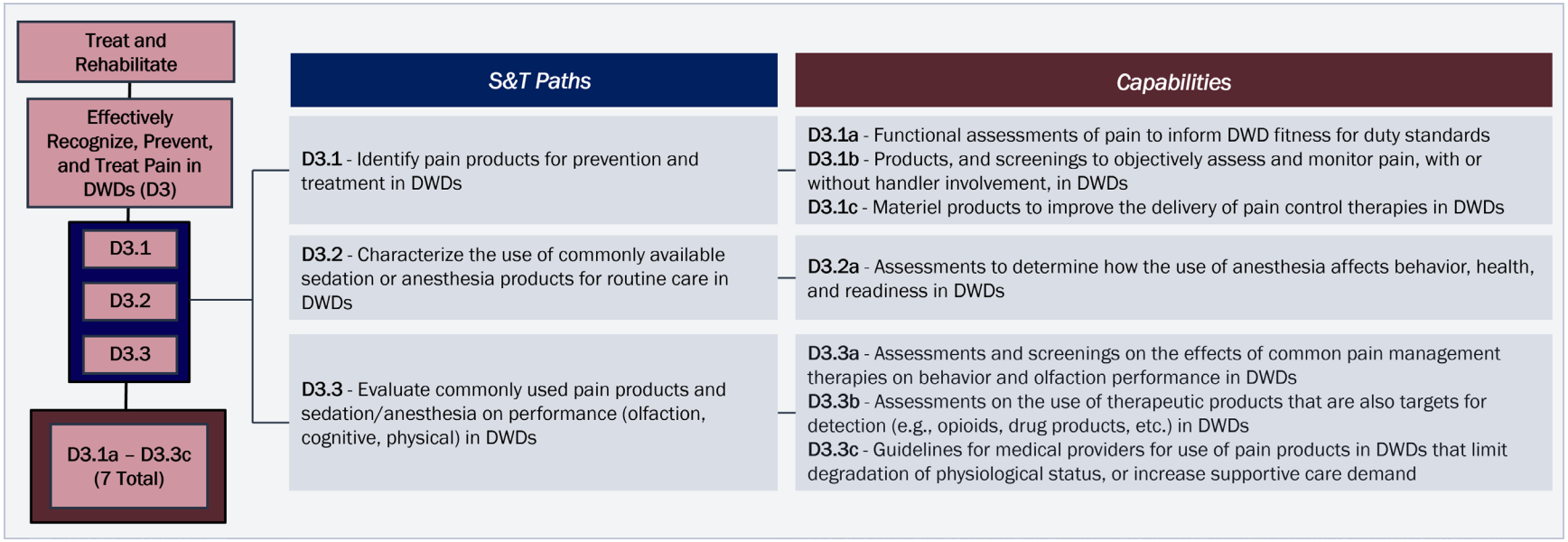

Figure 2-3 Effectively Recognize, Prevent, and Treat Pain in DWDs

2.4 Optimal Treatments and Protocols for Injuries and Return-to-Duty Plans for DWDs (D4)

The identification of optimal treatments, protocols, and devices for use on DWDs is critical in determining return-to-duty timelines following injury resulting from occupational hazards. This includes characterizing the occurrence, mitigation, and treatment of injuries from environmental exposures (D4.1), the development of optimized treatments and protocols for resuscitation, ventilation, and bleeding control following injury, as well as tools and strategies for treatment of blast, burn, and crush injuries (D4.2 – D4.3), the development of assessment tools to identify and treatment guidelines for behavioral issues that develop from their environment or injury (D4.4), and the development of rehabilitation and return-to-duty guidelines for injured DWDs (D4.5) [1].

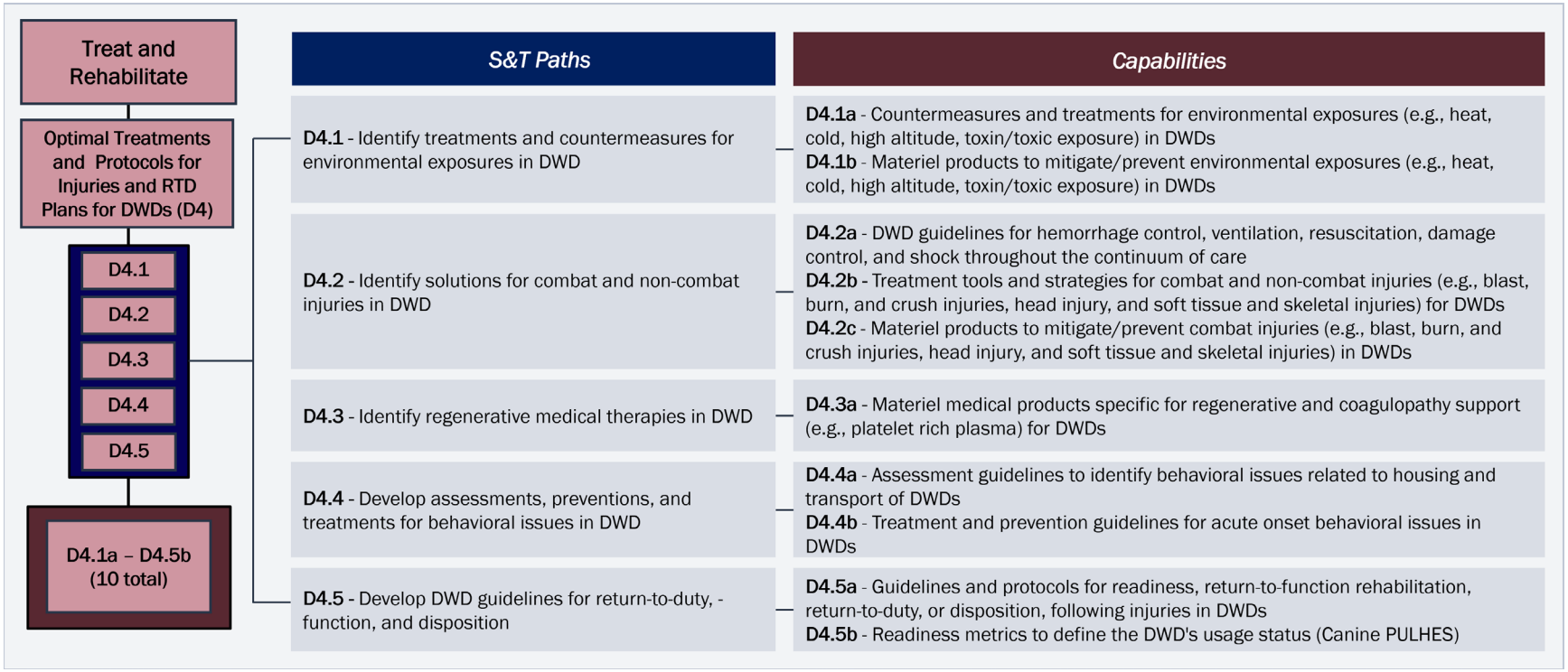

Figure 2-4 Optimal Treatments and Protocols for Injuries and Return-to-Duty Plans for DWDs

2.5 Identify and Characterize Risk Factors for MSKIs in DWDs (D5)

The identification and characterization of occupational risk factors for MSKIs is an important factor for DWD readiness in both prevention and mitigation. This includes knowledge of MSKI risk factors based on job function (D5.1), the probability of MSKI occurrence based on breed, genetics, and/or body conformation (D5.2) with a goal of identifying preventions and treatments for MSKIs (D5.2) to maintain the operational readiness of the DWD [1].

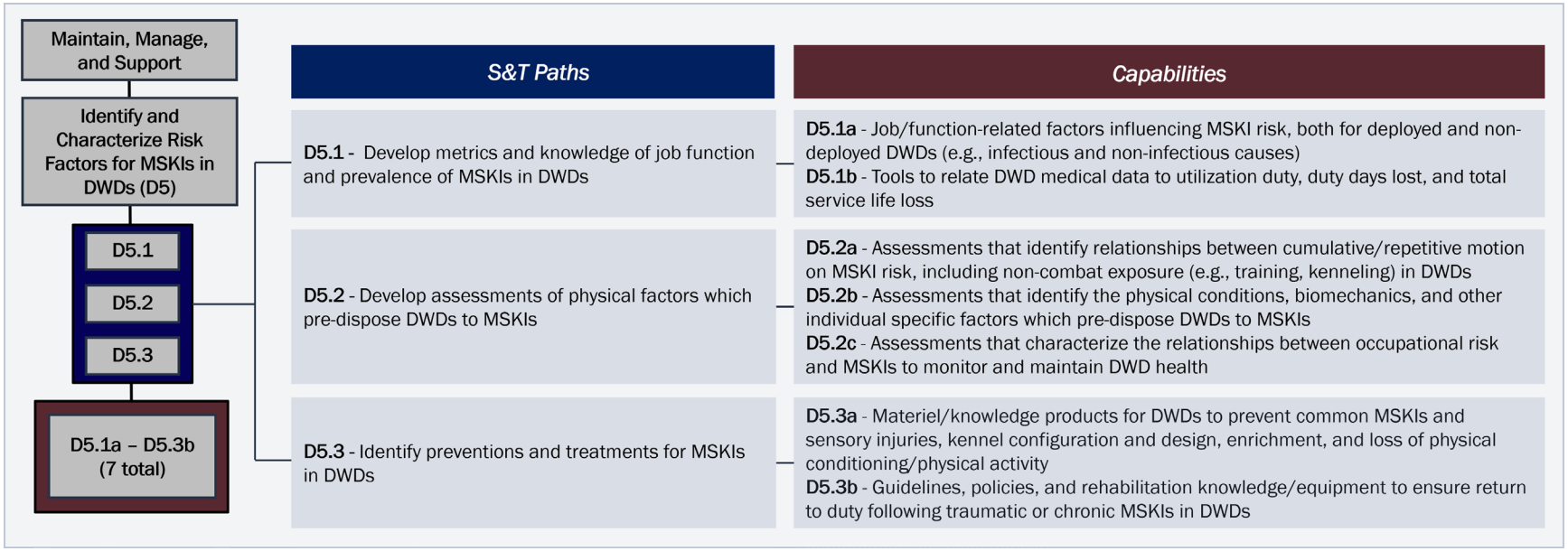

Figure 2-5 Identify and Characterize Risk Factors for MSKIs in DWDs

3. REFERENCES

1. "Initial Capabilities Document (ICD) for Joint Research Needs of the DoD Working Dog Enterprise," Version 0.1, 9 December 2021

2. JHU/APL, "Defense Health Agency Science and Technology Portfolio Management Concept of Operations," Pre-decisional Draft, AOS-L-20-0230, 10 June 2022

3. JHU/APL, "Science and Technology Portfolio Management Process (STMP) Research Roadmapping Methodology," AOS-21-0929, August 2021

4. "Department of Defense (DoD) Working Dogs (WD) Capabilities-Based Assessment (CBA)," 9 December 2021

5. Congressional Research Service, "Defense Primer: RDT&E," *In Focus*, 10 November 2022

6. Institute for Defense Analysis, "Early State Research and Technology at U.S. Federal Government Agencies," April 2017

7. CJCSI 5123.01I, "Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System," 30 October 2021

8. "Joint DOTmLPF-P Change Recommendations (DCR) for Department of Defense (DoD) Working Dog (WD) Enterprise Management," Version 0.1, 9 December 2021

9. C. Wooten, *Nerves and Nerve Injuries*, Chapter 18: Anatomy of the Olfactory Nerves, pp. 273–276, Elsevier Ltd., 2015

APPENDIX A. KEY DEFINITIONS

Terminology	Definitions
6.1	BA for Basic Research increases knowledge and understanding: discovery; hypothesis testing. ~ TRL/KRL 1–2 [5]
6.2	BA for Applied Research is the refinement of concepts into solutions: preclinical studies; drug formulation; device defined in animal model. ~TRL/KRL 2–3 [5]
6.3	BA for Advanced Technology Development is candidate solution development; proof of concept and product safety demonstrated (e.g., Phase 1–2a trials). ~TRL/KRL 3–6 [5]
Product Development	Performs the additional development activities required to mature Capabilities developed in S&T to the extent to which they can be delivered for full clinical or operational use by the intended end user.
Budget Activity	Categories within each appropriation and fund account that identify the purposes, projects, or types of activities financed by the appropriation or fund.
Capability Area	Reflects the highest structural element that encompasses broad areas of medical research within a Portfolio.
Capability-Based Assessment	Provides an analytic basis to identify capability requirements and associated capability gaps prior to development and submission of capability requirements documents for review and validation [4].
Capability Gap	The inability to meet or exceed a CR, resulting in an associated operational risk until closed or mitigated. The gap may be the result of no fielded Capability, lack of proficiency or sufficiency in a fielded Capability solution, or the need to replace a fielded solution to prevent a future gap [6].
Capability Requirement	A Capability that is needed to meet an organization's roles, functions, and missions in current or future operations [7]. In this SRP, the CR is derived from key source documents and outlines Capabilities (knowledge or materiel) required to meet current or future military medical needs.
Capability	The ability to complete a task or execute a course of action under specified conditions and level of performance [6]. In this SRP, Capability refers to the S&T knowledge and/or materiel products to be transitioned to Advanced Development or other end users.
Capability Objective	A clearly defined, decisive, and attainable goal toward realizing the CR. Some of the capability objectives were derived from capability gaps and rephrased for consistency and clarity.
DoD Component	DoD Components associated with DWDs include: Army, Air Force, Marine Corps, Navy, National Security Agency (NSA), National Geospatial Intelligence Agency, SOCOM, National Guard Bureau (NGB), DoD Intelligence Information System, and the Pentagon Force Protection Agency. It also includes agencies outside the DoD which include the Federal Protective Service (medical care) and US Secret Service (missions and medical care).
Evidence-based	The integration of the best available research findings considered the gold standard into clinical practice in the context of patient characteristics, culture, and preferences.

Terminology	Definitions
Exposure	Contact with a hazardous or potentially hazardous chemical, physical, or biological agent. Exposure may be short term, of intermediate duration, or long term. Assessment of individual health risk is dependent on the exposure concentration (how much), the frequency and duration of exposure (how long), and the multiplicity of exposures with other similar exposure agents [8].
Fitness	The ability to accomplish the tasks and duties unique to a particular operation and the ability to tolerate the environmental and operational conditions of the deployed location [4].
Hazard	Any real or potential condition that can cause injury, illness, or death to personnel or damage to or loss of equipment or property, mission degradation, or the environment [4].
Injury	a. A term comprising such conditions as fractures, wounds, sprains, strains, dislocations, concussions, and compressions. b. Conditions resulting from extremes of temperature or prolonged exposure. c. Acute poisonings (except those caused by contaminated food) resulting from exposure to a toxic or poisonous substance. [4]
Materiel Solution	A new item developed or purchased to satisfy one or more CRs [8].
Medical Readiness	Ensuring working dogs are healthy, protected from potential threats, and ready for operations or contingencies.
Military Working Dog (MWD)	a. Any Government-owned dog procured, acquired, or bred to meet working dog requirements of the military departments and DoD agencies, collectively referred to as DoD Components. b. Any canine bred, procured, or acquired to meet DoD Component requirements to support operations in the protection of installations, resources, and personnel, to include explosive and illegal narcotic detection capabilities, patrol, tracking, or other requirements prescribed by the DoD Component [4].
Olfaction	The sensation of smell that results from the detection of odorous substances aerosolized in the environment [9].
Operational Environment	The composite of the conditions, locations, and scenarios whereby military forces are employed to address crises and conflicts that are not limited to a geographic location.
Priority Capability Requirement	A CR that, through analysis by the portfolio, is deemed worthy of funding and pursuit.
Rehabilitate	A set of interventions needed when an individual is experiencing or is likely to experience limitations in everyday functioning as a result of aging or a health condition, including chronic diseases or disorders and injuries or traumas. Examples of function limitations include difficulties with cognition, sight, hearing, communication, movement, behavioral regulation, or physical performance. Rehabilitation enables an individual to return to duty and maintain or return to their daily life activities while maximizing their wellbeing [4].
S&T Path	Describes the high-level research activities needed to support the transition of Capabilities to Advanced Development or other end users.

Terminology	Definitions
Veterinary Services	The DoD veterinary services capability encompasses animal health and welfare and veterinary public health. Veterinary public health focuses on the animal health interface with human health and environmental health and is an essential part of public health. More specifically, veterinary services consist of the practice of veterinary medicine and surgery, including diagnosis and treatment of sick or injured animals; animal health and zoonotic disease surveillance, epidemiology, control, and prevention of zoonosis; food protection; management of health aspects of laboratory animal facilities and diagnostic laboratories; biomedical research; health education and extension; production and control of biological products and medical devices; management of domestic and wild animal populations; protection of drinking water and the environment; and shared management of public health emergencies [4].

APPENDIX B. ACRONYMS

AHP	Analytical Hierarchy Process
BA	Budget Activity
CA	Capability Area
CBA	Capabilities Based Assessment
CBRN	Chemical, Biological, Radiological, and Nuclear
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CPG	Clinical Practice Guideline
C-PTSD	Canine Post-Traumatic Stress Disorder
CR	Capability Requirement
DAD	Deputy Assistant Director
DHA	Defense Health Agency
DoD	Department of Defense
DWD	DoD Working Dogs
FYDP	Future Years Defense Program
ICD	Initial Capabilities Document
IR	Infrared
JCIDS	Joint Capabilities Integration and Development System
JHU/APL	The Johns Hopkins University Applied Physics Laboratory
KRL	Knowledge Readiness Level
MEDCOM	Medical Command
MHS	Military Health System
MSK	Musculoskeletal
MSKI	Musculoskeletal Injury
PM	Program Managers

POM	Program Objective Memorandum
PoP	Period of Performance
PPE	Personal Protective Equipment
PULHES	Physical capacity/stamina (P), upper extremities (U), lower extremities (L), hearing and ears (H), eyes (E), and psychiatric (S)
R&D	Research and Development
R&E	Research and Engineering
RLA	Research Landscape Analysis
RTD	Return-to-Duty
S&T	Science and Technology
SME	Subject Matter Expert
SRP	Strategic Research Plan
STP	Science and Technology Path
TBI	Traumatic Brain Injury
TRL	Technology Readiness Level
UV	Ultraviolet
USAISR	United States Army Institute of Surgical Research
USASOC	United States Army Special Operations
USSOCOM	United States Special Operations Command
WDT	Working Dog Team
WRAIR	Walter Reed Army Institute of Research
YOE	Year of Execution