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Research and Development
CIVIL WORKS RESEARCH, DEVELOPMENT, AND TECHNOLOGY PROCESS

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1. Purpose. This Circular provides the process for managing Civil Works Research, Development, and Technology (CW RD&T) according to the UTIS. It describes the basic CW RD&T structure, process, and its phases, the process schedule, and execution responsibilities, as well as how the generation of CW RD&T needs and requirements will align with the annual Civil Works (CW) budget process. This Circular also provides a process for transitioning new and approved technologies across the enterprise.

2. Applicability. This Circular applies to all Headquarters U.S. Army Corps of Engineers (HQUSACE) elements, laboratories, centers, major subordinate commands, and district commands having CW responsibilities. It encompasses all RD&T work conducted with CW appropriations provided for RD&T, and CW activities purposefully planned and aligned with such RD&T work to support innovation. RD&T activities are innovative activities conducted to discover and develop new products, methods, and technologies or technologically improve existing activities in support of USACE CW Missions.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References.

- a. Engineer Regulation (ER) 5-1-11, U.S. Army Corps of Engineers Business Process.
- b. ER 25-1-8, U.S. Army Corps of Engineers Communities of Practice
- c. ER 70-1-5, Corps of Engineers Research and Development Program
- d. USACE 2020, USACE Technology Innovation Strategy
- e. OPORD 1 USAERDC, 1998; official directive by the USACE Commander establishing the Engineer Research and Development Center.

5. Records Management (Recordkeeping) Requirements. Records management requirements for all record numbers, associated forms and reports required by this regulation are included in the Army's Records Retention Schedule - Army. Detailed information for all record numbers, forms, and reports associated with this regulation are located in the Army's Records Retention Schedule - Army at <https://www.arims.army.mil/arims/default.aspx>.

6. Strategy. The purpose of the CW RD&T process is to support the U.S. Army Corps of Engineers' (USACE) ability to deliver its Civil Works (CW) missions. CW RD&T activities support strategic, short-term and operational needs for all CW program areas.

CW RD&T focuses on high priority scientific, engineering, and technological problems for which optimal solutions have not yet been identified, based on requirements identified within the CW program and the strategic vision of both CW and scientific leadership. Outcomes from CW RD&T benefit CW practitioners with the focus on better equipping the field with advanced capabilities and addressing the most pressing unmet needs across the enterprise. The Director of Civil Works and the Director of Research and Development work in partnership to maintain a robust, rigorous, and transparent CW RD&T process. The CW RD&T process supports all phases of project life cycle, from planning, through engineering, construction, operations and maintenance, and deauthorization. CW RD&T products may be developed in conjunction with or with advisement from external organizations including other Federal agencies, academia, and the private sector.

a. The UTIS provides a framework to Discover, Develop, Deliver, Sustain and Connect innovative practices and technologies within the USACE enterprise, as illustrated in Figure 1. Application of these concepts to CW is essential to implement emerging innovative products, methods and knowledge to revolutionize the USACE in Delivering the Program. The CW RD&T process advances science and technology within USACE to improve CW mission delivery by implementing the entire UTIS framework throughout all CW activities. In the context of the CW RD&T process, R&D covers Discover, Develop, and some Deliver phase, while Technology covers Deliver, Sustain, and Connect phases.

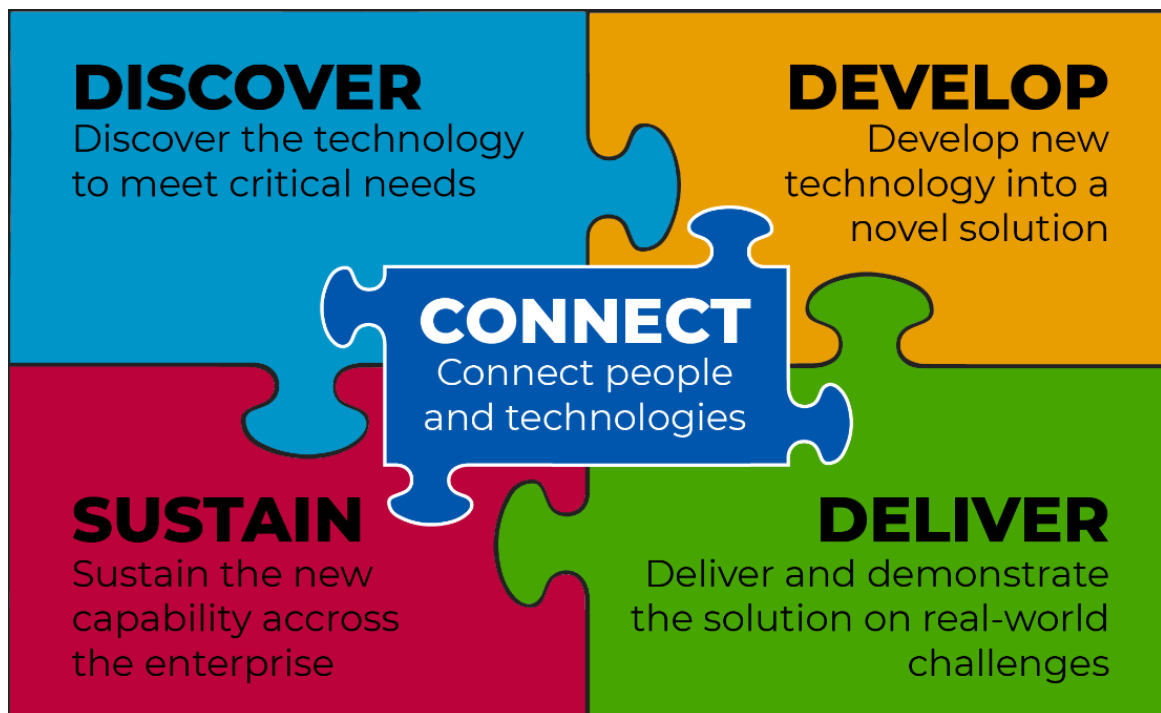


Figure 1. Depiction of the USACE Technology Innovation Strategy (UTIS) elements, including Discover, Develop, Deliver, Sustain, and Connect.

b. Planning, Programming, Budgeting, and Execution. For over 50 years, the Army, along with other DoD and Government agencies, has effectively utilized a formal process to define RD&T tactical and strategic requirements and deliver the solutions. The process is known as the Planning, Programming, Budgeting, and Execution (PPBE) process. The PPBE framework streamlines the strategy and budget processes for CW RD&T as well, and is envisioned as follows:

(2) Planning: During Planning, CW leadership works with technologists and internal (e.g. Districts, Communities of Practice (CoPs), RD&T leaders) and external (e.g. academia and formal advisory boards) sources to strategically vision possible futures and anticipate a broad spectrum of current and future challenges and needs (process detailed in Section 7, 'Roles and Responsibilities', below). These needs must then be matched with existing and emerging science and technologies which can offer solutions and determine enterprise RD&T strategic requirements for new capabilities in development of a CW RD&T Strategic Plan which is updated each year. A guiding principle for Planning is to keep the end in mind for transforming state-of-the-art to state-of-the-practice and delivery to the field.

(3) Programming, Budgeting and Execution: During Programming, the research is planned and technology transition mechanisms are created, which define the stakeholders, business case, benefits, tasks, and resource requirements in order to identify solutions already available or develop new capabilities. Programming provides all the information necessary to request funding during both RD&T Budgeting, as well as CW Budgeting to support transition of advancements into common practice and operations, as well as to support successful planning for Execution of the RD&T development and implementation. This process occurs annually to ensure CW has a robust RD&T strategy and each budget request aligns with that strategy and results in successful delivery of new capabilities. Associated timelines are illustrated in Figures 3 and 4.

(4) Scope: This process applies to specific RD&T funds, and to the non-RD&T CW funds that are aligned to support RD&T or transition RD&T outcomes to support other activities in the CW program. CW has the responsibility to implement new capabilities into practice and support timely identification of emerging needs. Therefore, purposeful technology transition planning is essential to leverage the outcomes of CW RD&T, and assist CW practitioners with implementation. Successful technology transition requires field engagement in defining the unmet needs; field demonstrations; defining the applicability for the new technology or method within the USACE portfolio; updating enterprise guidance; strategic asset portfolio management decision-making; and field implementation activities. Research and Development (R&D) is only one component of this process. The Deliver, Sustain, and Connect portions of the UTIS framework require

resources beyond the research-focused sectors of USACE. The PPBE process and CW RD&T transition process requires participation of the entire CW enterprise. Planning, Engineering and Construction, and Operations all have roles and responsibilities to implement the UTIS within CW along with the RD&T community. This document describes how to align RD&T delivery with the broader CW program development and execution.

(5) Implementation: Implementing the PPBE and CW RD&T transition processes will result in CW RD&T focused on the most impactful solutions to the toughest and most critical CW challenges. Combined, they lay out an innovation roadmap for CW, showing activities needed for relevant phases of the UTIS, when resources will be needed from various components of CW and R&D, who has execution responsibility of the various phases and activities, and provide robust and transparent justifications for budgeted activities.

(6) Business Line Management: The CW RD&T program is structured and managed primarily with three USACE Business Lines of Navigation, Flood and Coastal Risk Management, and Aquatic Ecosystem Restoration (broadly known as 'Environment'). Additional Business Lines within the USACE mission include: Hydropower (closely associated with Navigation), Emergency Management and Water Supply (closely associated with Flood and Coastal Risk Management), Regulatory Recreation and Environmental Stewardship (closely associated with Environment). Cross-cutting RD&T activities may work through any of the Business Lines separately or in collaboration, as appropriate, to identify needs, formulate the RD&T work efforts, and align with other relevant CW activities.

7. Management and Execution of Process. The CW RD&T process activities are coordinated by the USACE Directorate of Research and Development (RD) to optimize effectiveness and efficiency of the process and to ensure resulting innovative tools and technology are available for USACE practice. Additional details are provided in the remainder of the document, including management, execution, single year schedules, and multi-year cycles.

8. Roles and Responsibilities. The overall CW RD&T process is led by senior leaders in Headquarters Civil Works and R&D who comprise the CW R&D Steering Committee (see paragraph 8-a-1) and have the ultimate decision authority for strategy and investment. This strategy and investment is informed by business line managers, functional deputies, and subject matter experts (e.g., HQ, CoP leads, Laboratories, Centers, and Field personnel) who recommend RD&T work efforts, and identify and recommend needs and methods of technology implementation into field use. Subject matter experts from industry, academia, and related government agencies, as well as

independent technical advisory boards may also serve in advisory roles for the CW RD&T process.

a. Governance Process – Headquarters Roles. The CW RD&T process of meetings, collaboration, and decision making is coordinated by RD and oversight is provided by the CW R&D Steering Committee. The CW RD&T process encompasses the determination of requirements, Budgeting and Programming, technical execution, review, and implementation, and thus involves representation from both the CW and R&D Directorates and other elements across the USACE enterprise. This process also includes the integration of decision briefings to the CW senior leaders responsible for oversight of the RD&T Investigations funding (Planning & Policy (PPD) Chief), RD&T Construction funding (Engineering & Construction (E&C) Chief), and RD&T Operations and Maintenance funding (Operations and Regulatory Chief); along with other RD&T budget items, prior to the final RD&T decision brief to the CW R&D Steering Committee for approval. The following description outlines the necessary roles and responsibilities of those representatives who are required to participate in this process.

(1) Civil Works Research and Development Steering Committee (CWRDSC):

(a) Co-Chairs: Director of Civil Works, Director of Research and Development, Deputy Commanding General (DCG) for Civil and Emergency Operations.

(b) Membership: Chief of Engineering and Construction, Chief of Planning and Policy, Chief of Operations and Regulatory, Chief of Program Integration, Director of Contingency Operations, Deputy Director of Research and Development, Engineer Research and Development Center (ERDC) Civil Works Research and Development Area Director, The Director of the Institute for Water Resources (IWR), one Major Subordinate Command (MSC) commander selected by the DCG-CEO to serve up to three years, one MSC SES selected by the Director of Civil Works to serve up to three years.

(c) Role: The CWRDSC is the highest-level decision-making body in the CW RD&T process. The CWRDSC meets up to four times annually to make three primary enterprise RD&T decisions: Approval of the CW RD&T Strategic Plan, Approval of the annual RD&T budget requests for the Chief's budget request, and Approval of the final RD&T Execution plans. These meetings are held in a timely fashion to enable the PPBE process, as well as be integrated in the annual CW budget development process. Details on topics and scheduling of these meetings is discussed in Section 10 RD&T Planning, Programming, Budget, and Execution Single Cycle Calendar process. Meetings are anticipated to be held in September BY-3 (to approve the strategic plan) and the Spring BY-2 timeframe (to approve the proposed budget request). The CWRDSC may hold additional meetings and Timeline.

(2) RD&T Advisory Group:

(a) Co-Chairs: RD CW Lead and CW Member appointed by Director of Civil Works (DCW).

(b) Membership: Deputy Director of IWR, Deputy Chief of Planning, Deputy Chief of Engineering and Construction, Chief of CW Engineering, Deputy Chief of Operations and Regulatory, Deputy Chief of Contingency Operations, Deputy of Program Integration, HQUSACE Chief of Navigation, HQUSACE Flood Risk Management Business Line Manager, HQUSACE Aquatic Ecosystem Restoration Business Line Manager, Principal CW Technical Directors for Navigation, Environmental, and Flood Risk Management, and up to three Senior Scientists or Senior Scientific Technical Managers.

(c) Additional Participation: Additional external RD&T advisors can include up to five external participants to serve for an annual rotation from outside of USACE who should be based selected on their knowledge of science and technology strategy. These external participants will advise on current and emerging technology, technology application for the Water Resources Mission, and technology implementation into field use; and will attend portions of RD&T Advisory Group Meetings as deemed necessary by the membership or may be consulted as part of a separate engagement outside of the RD&T Advisory Group. External advisors will not be involved in the RD&T decision making process and will not be asked to prepare or review advisory documents. These external participants will be proposed by RD and approved by the CWRDSC.

(d) Role: The RD&T Advisory Group is a senior level advisory body with external engagement from industry, academia, and other government agencies. The RD&T Advisory Group works for the CWRDSC to prepare strategy, budget, and execution recommendations for approval and enactment. The RD&T Advisory Group meets up to four times annually to perform these duties. A minimum of two meetings are expected to be held as follows: in July for strategic plan development and program evaluation; and in January for evaluation of Programming (budget) and Technology Transition Planning. The RD&T Advisory Group develops, maintains, and makes recommendations to update the CW RD&T Strategic Plan each year which is subsequently approved by the CWRDSC. The RD&T Advisory Group receives prioritized needs from Business Line Managers (BLMs), recommendations from external advisory boards through RD, and opportunities for new technologies from the Technical Directors. The RD&T Advisory Group provides input to and reviews the annual RD&T budget requests. Finally, the RD&T Advisory Group provides input to and reviews the final RD&T Execution plan annually.

(3) Directorate of Research and Development (RD):

(a) RD is the Proponent in the advancement of science and technology within USACE and develops and maintains the UTIS. RD focuses on three main mission areas: Strategy, Policy and Advice. RD develops the R&D strategies for both Civil Works and Military Programs, creates policies to facilitate Science and Technology (S&T) innovations across the enterprise and advises the Chief of Engineers on S&T matters, enabling USACE corporate success. RD is also the USACE proponent for knowledge management strategy and policy.

(b) RD provides the oversight for the RD&T process to ensure each step of the PPBE process is executed consistently and with high quality, including RD&T Advisory Group meetings, CWRDSC meetings, budget preparation, execution, and corporate communications. RD also provides oversight for the Technology Transition Process, ensuring each plan is executed with adequate leadership and resources, helping to overcome any impediments to technology implementation.

(c) RD is responsible for gathering strategic recommendations from external advisory boards to the USACE as relevant to CW, as well as non-governmental, interagency, and international organizations for use in crafting the CW RD&T Strategic Plan by the RD&T Advisory Group and coordinating cross-agency CW RD&T.

(d) RD is responsible for tracking and communicating RD&T metrics to the CWRDSC and external stakeholders, such as Assistant Secretary of the Army (ASA), Office of Management and Budget (OMB), and Congress. Metrics include budget and enacted funding, delivered R&D products, new technology transitioned to field use, and benefits of RD&T. RD is also responsible for publishing the CW RD&T Strategy in a publicly accessible media.

(4) Business Line Manager (BLM): The HQUSACE BLMs for Flood Risk Management and Environmental (Aquatic Ecosystem Restoration) and the Chief of Navigation (included herein as “BLM”) are members of the CW RD&T Advisory Group:

(a) Each BLM is responsible for representing the innovation vision, identifying any strategic requirements, and summarizing Statements of Need (SoNs) priorities in their business lines. The BLM will consider recommended priorities submitted by the Research Area Review Groups (RARGs), and add priority to SoNs that apply to multiple business lines (cross-cutting) and collaborate with other BLMs to fund cross-cutting SoNs.

(b) With assistance from the corresponding ERDC Principal Technical Director, each BLM, prior to the CW RD&T Strategy meeting, will assemble a RARG to gather SoNs, detailing needs and opportunities, from the relevant USACE Districts, Divisions, HQUSACE, CoPs, Centers of Expertise, and other USACE operational elements. Each BLM will leverage these SoNs to develop and maintain an innovation strategy for their

business line, which will be discussed during the annual CW RD&T Strategy meeting by the BLM CW RD&T Advisory Group members.

(c) The BLM determines the RARG membership and the requirements for gathering and evaluating the SoNs. The BLM is responsible for communicating their reasoning behind the final RD&T strategy for their business line (which SoNs were recommended and which ones were not and why). The BLMs and their RARGs will also aid in binning SoNs according to those that are strategic and support their strategic vision, those that are already being addressed, and those that are short-term and require near-term RD&T.

(d) BLMs are responsible for leading and executing portions of the UTIS involving field activities which transition technology into practice, as documented in the CW RD&T Technology Transition (CWRD TT) Plan (see paragraph 12) for each project, such as demonstrations and widespread implementation, through Programming, resource allocation, and enterprise communications.

(5) Communities of Practice (CoPs): CW technical CoPs have a critical role in the CW RD&T process:

(a) Description: CW CoPs will participate in the development of field R&D needs, both short-term and strategic, to address technological challenges in their area of responsibility, and provide priority of needs for their CoPs to BLMs and ERDC TDs. CoPs will also monitor progress of funded R&D projects and technology products, providing CoP perspectives to the ERDC TD, and will recommend technology transfer activities to bring R&D products and new technology into field practice.

(b) Role: CoP leads or their CoP designees will participate in the RARGs (see 8-b-3) with SoNs that are within the CoP area of responsibility. CoP leads will also make members aware of the process to submit SoNs, and will encourage SoNs for needed R&D. CoP leads should incorporate briefings from R&D practitioners in CoP meetings for any R&D or new technology of interest to the CoP.

(6) Proponent: The Proponent is a CW technical Community of Practice (CoP) Lead, business line subject matter expert (SME), or designee, whose role is to provide review from user perspective of specific RD&T activities, and operational guidance for RD&T products. A designee should, but is not required, to be from the Division, District, Field Operating Activity, or corresponding CoP that originated an SoN or strategic need driving the proposed RD&T activities:

(a) Description: A Proponent is to assist in advancing specific RD&T capabilities into practice, and will interface between groups to promote technology development and transition from multiple related work units within a Strategic Target (see paragraph 9)

into field practice. The Proponent reviews Project Management Plans (PMPs) developed by the Research and Development Area (RDA) Team (see paragraph 8-b-1) for alignment with the SoN or strategic need, monitors RDA IPRs and reviews final R&D product(s) for sufficiency to meet field needs. The Proponent provides review and direction for the CWRD TT Plans within the Strategic Target, and ensures the Plans are developed and executed according to the CWRD TT Process described. The Proponent interfaces with identified field or HQ CW senior experts to ensure field resources such as demonstration sites and expert review of field guidance are available. The Proponent also reviews any technology transition activity or guidance document and provides recommendations for next steps leading to full implementation in field practice. Status is communicated to RD, and the Proponent will be identified as part of the Pre-Programming activity for review and approval / comment by the CWRDSC before formal budget requests are developed.

(b) Role: The lead for getting specific capabilities implemented into practice enterprise-wide. Potential proponents are nominated in the CW Technology Transition Plans by CoP Leads and selected and assigned by the CW R&D Advisory Group.

b. Governance Process – Research Offices, Field Offices, Outside Organizations.

(1) ERDC Civil Works RDA Team:

(a) Leadership: Civil Works RDA Director, as assigned by the Director of ERDC.

(b) Membership: ERDC Civil Works Senior Leadership Team as assigned by the ERDC CW RDA Director, CW RD&T Program Managers, RD CW RD&T Program Officer, and ERDC CW Programs Officer.

(c) Role: The CW RDA Team is responsible for the Programming and management of the CW Funded RD&T Programs (as defined in the glossary) regardless of which USACE operational unit executes the work, according to the CW RD&T Strategic Plan and this policy. This team is responsible for gathering input on needs and opportunities from researchers, scientists, and engineers from within ERDC, IWR, and partners, including other federal agencies and academia, in addition to SoNs from the field and RARGs. These will be reviewed for consideration within the RD&T Strategic Plan. Further, the CW RDA Team is responsible for the Pre-Programming and Programming phases of the RD&T PPBE process and coordinates with IWR and the BLMs to complete the full effort as detailed in Sections 9b and 9d below. The team will ensure each RD&T Program is executed in alignment with USACE business processes. Each work unit within the Programs will have a well-developed PMP and be aligned with the associated CWRD TT Plans. Further, the CW RDA Team communicates project status, financial execution, and technical results with appropriate stakeholders within the

Business Lines, Districts, Divisions, Communities of Practice, RM, Programs, RD&T Advisory Group, as necessary.

(d) Liaison to HQ: A RD member will serve on the CW RDA Team as a liaison to HQ.

(2) ERDC Principal CW Technical Directors:

(a) Membership: ERDC Technical Directors (TDs) for the primary CW areas of Navigation (including Hydropower), Flood Risk Management (including Emergency Management and Water Supply), and Environmental areas (including Aquatic Ecosystem Restoration, Recreation, Environmental Stewardship and Regulatory).

(b) Role: In addition to any responsibilities as part of the RDA team and the RD&T Advisory Group, TDs have the responsibility to support their corresponding BLMs throughout their RARG process. TDs also must ensure that CoP leads are included in corresponding RARGs, are informed of SoNs and funded work efforts, have input in needs and priorities, and have input in RD&T products and technology transfer. TDs will help coordinate the RARGs, compile RARG recommendations for SoN priority, and note SoNs that apply to multiple business lines.

(3) Research Area Review Group (RARG):

(a) Leadership: Each BLM assembles and leads their own RARG, setting expectations and processes according to this document.

(b) Membership: Each RARG is a specific group of advisors designated by the applicable BLM. Members include Leads of CW Technical Communities of Practice, or their designees, for relevant SoNs. Members can also include Directors of centers of expertise, relevant leaders in the business line (MSC BLMs, Chiefs of Operation, Chiefs of Engineering, MSC representatives, etc.) or others as deemed appropriate by the BLM.

(c) Roles: The role of the RARG is to advise the BLM in development of an RD&T strategy for the particular business line. The RARG members are responsible for submitting SONs from their relevant communities within USACE. SONs may come from Districts, Divisions, Centers of Expertise, or HQUSACE, and ERDC or IWR in conjunction with a non-ERDC/IWR proponent. The RARG members prioritize the SONs corresponding to their expertise and present those to the BLM. According to the direction of the BLM, the RARG members may be asked to comment or evaluate SONs

from other RARG members to assist the BLM in determining the final recommendations for the CW RD&T Advisory Group strategy meeting. RARGs also will identify cross-cutting SoNs and recommend the business line in which to manage and fund appropriate work efforts.

(4) USACE Federal Advisory Committee Act (FACA) Groups and External National/International Organizations:

(a) Members: FACAs such as the *Coastal Engineering Research Board* and *Environmental Advisory Board*, and other External Organizations.

(b) Role: The USACE Federal Advisory Committees annually provide strategic recommendations in an advisory role for the CW RD&T Advisory Group. These groups use their expertise and vision for their respective fields to advise USACE on emerging technologies and their applications to critical problems within USACE CW. RD will execute a formal process to receive suggestions for strategic needs from outside of USACE.

9. Defining RD&T Needs.

a. RD&T Strategic Focus Areas (SFAs). SFAs are long-range priorities that are identified and adopted by USACE leadership as priorities for innovation and solutions to big problems impacting USACE CW Mission delivery and together make up the CW RD&T Strategic Plan. These SFAs are identified as major science and technology areas requiring attention and investment. Strategic Targets are interrelated work packages that develop one or more capabilities to address the needs identified within each SFA. Each of these work packages may have multiple work units to combine necessary expertise to develop the required capability.

b. SFA Development. The CW RD&T Advisory Group develops Strategic Targets and SFAs based on recommendations and ideas from several sources including: USACE CW Senior Leadership, the field via the RARG and SON process, researchers and scientists through targeted solicitation of ideas administered through the technical director offices and/or equivalent, and external organizations and/or established advisory boards (i.e. Coastal Engineering Research Board). Additionally, technologists, both internal to USACE and external by invitation, provide insights and vision regarding emerging technologies.

c. SFA Development Process. The CW RD&T Advisory Group meeting will review current SFAs and Strategic Targets annually and provide an updated vision for SFAs and recommended Strategic Targets, considering progress and outcomes from ongoing RD&T activities. The updated Strategic Plan and recommendations developed by the

RD&T Advisory Group will be formalized by RD and submitted to the CWRDSC for final approval before Pre-Programming activities begin each year. An overview of the programmatic hierarchy and responsible participants is provided in Figure 2.

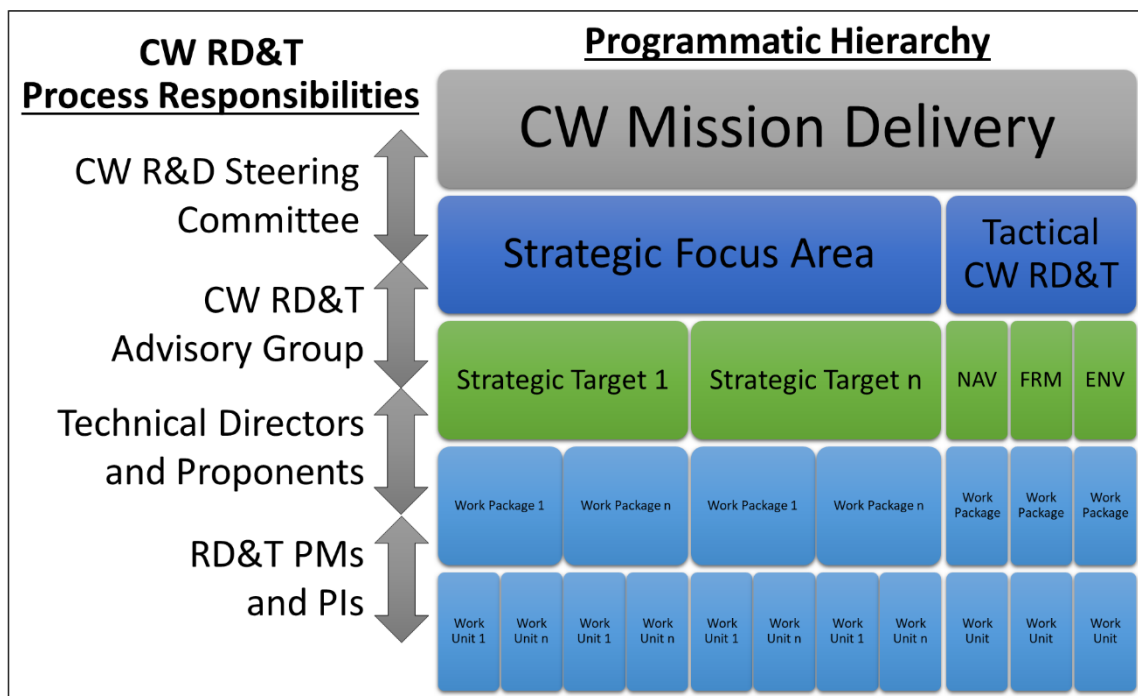


Figure 2: Programmatic Hierarchy and Alignment with Responsible Groups / Participants for Execution of the CW RD&T Process.

d. Strategic RD&T Requirements. Strategic RD&T is intended to develop long-term (approximately 5+ year) capabilities, and needs are derived from SoNs or other research or advisory sources. Strategic needs identified in SONs are considered along with future visioning to develop the Strategic Plan which informs SFAs and their strategic targets for Programming and Budgeting activities.

e. Short-term and Operational RD&T Requirements. SONs or other sources may inevitably identify immediate and important needs which do not rise to the level of a USACE-wide strategic priority but may instead be a short-term need to meet a requirement (~1-3 years). These ideas should be considered in existing research programs as a method to continue to provide RD&T solutions directly to the USACE field (see the righthand path of Figure 3). Operational needs are those required on regional / project scales, and will be considered for execution in perpetual short-term and operational support CW RD&T programs. SoNs that are redundant with ongoing or prior CW RD&T activities, or activities funded by other line/remaining items will not be considered and the submitters of such SoNs will be connected with the appropriate subject matter experts and knowledge management products by the appropriate TD or line/remaining items proponent.

f. Sources of CW RD&T Requirements. CW RD&T requirements may include the following sources:

(1) USACE Senior Leaders: RD will solicit and collect recommendations on new and existing strategic recommendations from USACE Senior Leaders. These results will be presented at the RD&T Advisory Group meeting.

(2) USACE Field Users: Recommended priorities for each business line will be developed by the BLM or their designee based on submitted SONs using input obtained via the RARGs. The BLMs or their designee will determine the criteria on which the SONs will be prioritized and the RARGs will provide input on which SONs should be prioritized as strategic priorities and which should be identified as high-priority short-term needs. The BLM or their designee will present their final list of recommended strategic priorities at the RD&T Advisory Group meeting. RD and CWRDA Team will support and help facilitate this process.

(3) Strategic Technology Advisors: The RD will solicit and collect recommendations on new and existing strategic recommendations from external advisory boards. The RD should prioritize these recommendations based on applicability to USACE mission and needs and present the results at the RD&T Advisory Group meeting.

(4) Researchers and technologists: Technical directors and equivalents will solicit and assemble strategic opportunities and needs from researchers and technologists who typically carry out research. This solicitation will focus on emerging technologies, new science, and cutting-edge issues. Technical Directors and equivalents will prioritize researcher and technologist opportunities and needs and present top priority ideas at the RD&T Advisory Group meeting.

(5) Strategic vs. Short-term CW RD&T Investment Prioritization: The CWRDSC will provide guidance on the proportion of CW RD&T investment that should be allocated towards short-term and long-term strategic CW RD&T activities. This guidance will inform Programming and Budgeting activities of the CW RD&T process.

10. RD&T Cycle of Planning, Programming, Budgeting, Execution. The CW RD&T PPBE process consists of strategic Planning, Pre-Programming to support CW program integration, Budgeting, and Full Programming / technology transition planning; culminating in Execution of CW RD&T. This process is described below and graphically in Figure 3. The CW RD&T process described herein is a significant transformation from prior processes in published CW R&D Engineering Circulars.

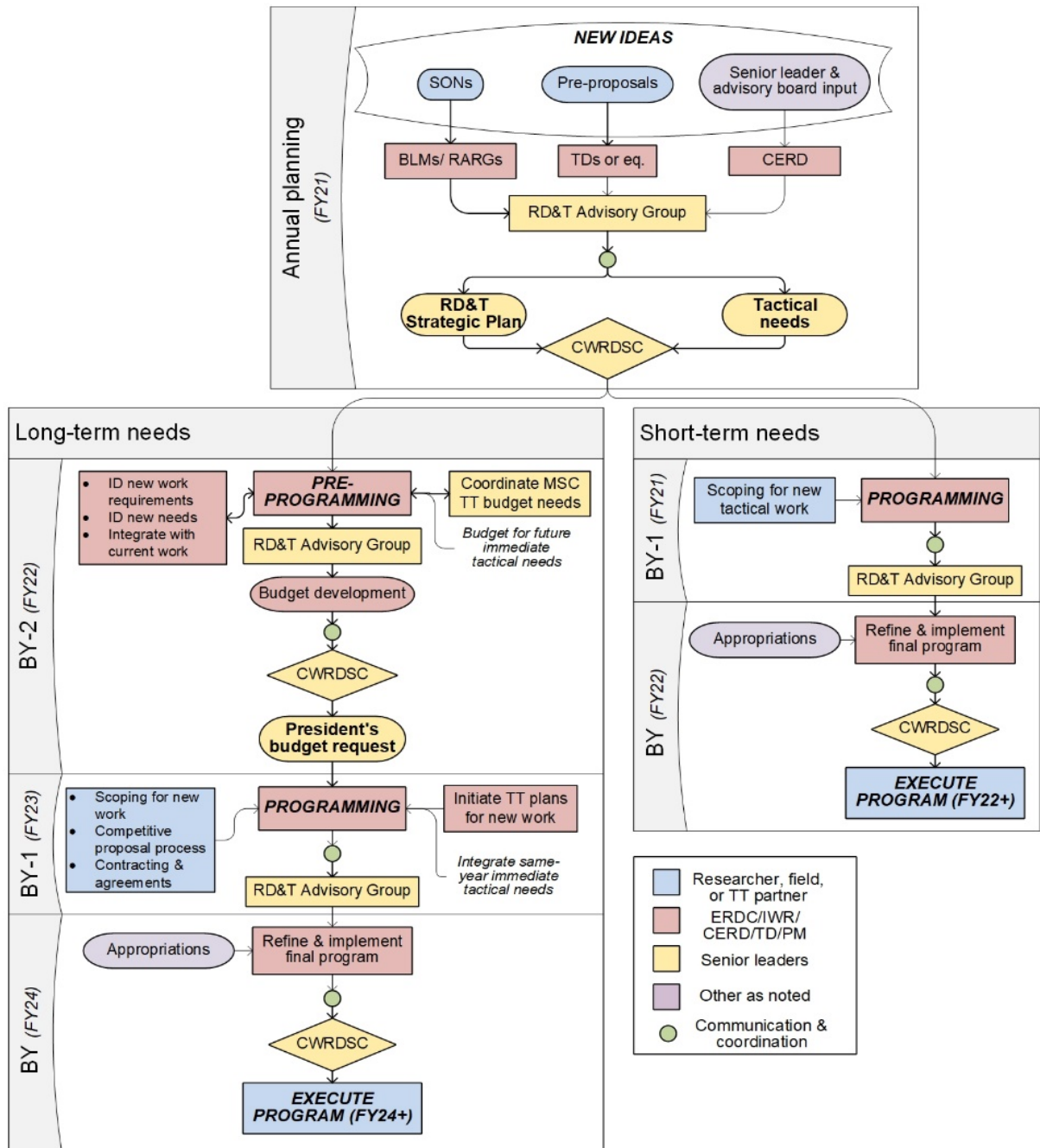


Figure 3: 4-year cycle of R&D Program depicting the phases of Planning, Pre-Programming, Budget, and Execution as related to the solicitation, consideration, and incorporation of research priorities. This figure assumed that FY2024 is the target Budget Year (BY). This figure is for Strategic RD&T needs; Short-term RD&T needs coming out from the RD&T Advisory Group meeting and go the Programming to start in the following fiscal year.

a. Planning.

(1) The Planning phase results in a CW RD&T Strategic Plan comprised of a list of strategic RD&T requirements (SFAs and Strategic Targets) to improve USACE CW Mission delivery for each appropriation.

(2) Statements of Need (SONs), pre-proposals, and recommendations are gathered from: the USACE field (Districts, Divisions, CXs) by the BLMs or their designee and their RARGs; the USACE Scientists and Engineers by the ERDC Technical Directors and the IWR Director; external advisory boards by RD. RD also solicits any updated direction from CW Senior Leaders and the CWRDSC on guidance for prioritization of short-term vs. strategic CW RD&T.

(3) The CW RD&T Advisory Group meets annually to develop and update the CW RD&T Strategic Plan for recommendation to the CWRDSC for approval. This meeting consists of reviewing inputs, priorities, and opportunities from multiple sources and ongoing RD&T activities and discussing each member's perspective of USACE CW gaps and emerging technologies.

(4) The CW RD&T Advisory Group may invite up to 5 external participants each year from academia, industry, or other government agencies to share their viewpoints on innovations. Invitees will have been identified by the group as strategic visionaries in the area of RD&T, innovation for water resources infrastructure, or emerging technologies.

(5) Technologist group members or invitees to the RD&T Advisory Group meeting can also suggest strategic RD&T needs for consideration.

(6) The CW RD&T Advisory Group approves guidelines for conducting evaluation of potential strategic objectives (relevant metrics, rating criteria, number of strategic targets, etc.) as proposed by RD.

(7) Strategic Focus Areas describe the capability gap or requirement which RD&T activities can be programmed and budgeted to meet the objective. Strategic Focus Areas should be significant and comprise multiple simultaneous applications, technologies, problems, products, and activities to meet the strategic requirement. These long-range Strategic Focus Areas provide the vision and strategic requirements aligned with a future vision for the CW mission. Strategic Focus Areas also provide the top-level vision under which programs are built in a series of Strategic Targets (major capability requirements), work packages, and work units.

(8) Along with Strategic Focus Areas developed for strategic CW RD&T, general requirements for short-term CW RD&T to provide near-term support to CW will also be developed solely for the purpose of Programming and Budgeting. These short-term CW RD&T programs will be driven by near-term requirements received throughout all phases of the CW RD&T PPBE process.

(9) RD documents the strategy meeting, all ideas considered, rating criteria, relevant comments, decisions, final recommended strategy, and reasoning. RD prepares the final documentation of the CW RD&T Strategic Plan for CWRDSC approval and then publishes the strategy. Strategic Focus Areas are updated to be publicly facing from USACE to broadcast long-term RD&T drivers for USACE and its potential partners.

(10) The CW RD&T Strategic Plan will describe the vision for Strategic Focus Areas in the CW RD&T program, along with suggested Strategic Targets required to develop capabilities described in the vision of each Strategic Focus Area. These activities will be the subject of CW workplan integration through Pre-Programming activities for outyear budget submissions. Short-term SONs and needs for consideration in the upcoming Fiscal Year's tactical and operational support RD&T programs will also be identified. These programs are perpetual in nature and are integrated into the CW budget based on evolving requirements in the CW program areas of navigation, flood risk management, and environment.

b. Pre-Programming:

(1) Pre-Programming begins after the annual approval of the CW RD&T Strategic Plan and ends with a formal Presidential Budget request for RD&T activities as part of the USACE CW Program Integration Division's Programming and Budgeting activities. This activity includes funding within the specific CW Funded RD&T Programs and within other functional area funded programs (such as Navigation, Planning, Construction, etc.). This CW RD&T workplan will include both strategic activities supporting Strategic Focus Areas, as well as general requirements for short-term CW RD&T.

(2) The BLMs are responsible for understanding the proposed and enacted budget process as it relates to the potential for Execution of Pre-Programming for non-RD&T specific CW funded programs, such as Operating Project activities, guidance updates, demonstrations, etc. for preparation of those respective budget requests.

(3) The CW RD&T RDA Team is responsible for Pre-Programming for CW funded RD&T programs. This will include specific Pre-Programming activities to address strategic CW RD&T requirements as stated in the Strategic Plan, its Strategic Focus

Areas, and recommended Strategic Targets. Along with Pre-Programming of strategic CW RD&T, Pre-Programming of short-term and operational support CW RD&T will result in work plans to support near term needs identified in short-term SONS.

(4) Pre-Programming will focus on developing capability roadmaps, value propositions and impact metrics, and budgetary requirements for Execution of CW RD&T. These activities will be accomplished with guidance from the CW Program Integration Division and its annual Engineer Circular on the CW budget process, found in the CW Direct Program Development Policy Guidance.

c. Budgeting.

(1) The RD&T budget is incorporated into the USACE CW budget request, according to those required processes, practices, and schedules. The request is made for funding the CW Funded RD&T Programs and other RD&T activities for a single year of the Pre-Programmed Strategic Target CW RD&T requirements and estimated short-term needs based on backlog of unfunded SONS.

(2) The budget must include funding to support the CW RD&T requirements and the administration of the CW RD&T process.

(3) Budget package development for RD&T activities is the responsibility of the ERDC Programs Office. Budget packages for Technology Transition activities also are within RD&T activities, but can also originate from across the USACE enterprise, including all CW functional program areas.

(4) Budgeting activities will be executed with guidance from the CW Direct Program Development Policy Guidance in concert with the CW Program Integration Division.

d. Full Programming.

(1) After the President's Budget request is submitted, prior to an appropriation of funding, the BLMs and CW RDA Team finalize Execution plans for the upcoming Strategic RD&T activities.

(2) Full Programming consists of detailing specific work units, projects, scopes, PMPs, budgets, schedules for all Strategic CW RD&T activities as well as all stakeholder, R&D, and non-R&D PDT members and a Project Team Lead (e.g. Project Manager or Principal Investigator) for each work unit or activity. Technology Transition plans and partners are also identified.

(3) Short-term CW RD&T is inherently different in process than RD&T activities aligned with Strategic Focus Areas. The stakeholders / submitters of pertinent short-term SONs will serve as proponents for the research activity and transition partners for the purpose of CWRTT plan development.

(4) Activities associated with new Strategic Targets may also align with specific Operating Projects or CW Funded RD&T Programs and are coordinated with the appropriate Program Managers.

(5) Prior to the appropriation, the final Execution plan is updated to reflect the final expected budget and presented by the BLMs and ERDC TDs to the RD&T Advisory Group for input. The RD&T Advisory Group recommends a final Execution plan to the CWRDSC for approval. RD facilitates this approval process.

(6) The CW RDA Team will monitor progress in Energy and Water Development appropriations during Full Programming and will adjust scopes and final PMP developed based on guidance on upcoming appropriations.

(7) The Full Programming stage for each Strategic Target-level R&D effort will include the development of a CW RD&T Technology Transition (CWRD TT) Plan at the Strategic Target level which includes at least the following:

(a) A designated Proponent (paragraph 8-a-6) who will ensure the CWRD TT Plan is developed and delivered for the intended capability outcome.

(b) Value proposition of the proposed technology or solution to a problem. This value proposition may be quantitative or qualitative, but it must be presented in terms which allow USACE senior leadership to evaluate the potential value delivered compared to other CW investment alternatives.

(c) Major efforts required to meet the strategic requirement(s), identifying major milestones, demonstrations, and products necessary to implement the technologies into practice, including responsible parties for each effort.

(d) Approximate timeline to meet the strategic requirement(s), deliver the requirements, and implement the technologies.

(e) Approximate cost of the full CWRD TT Plan, broken out by year and activity.

(8) The CW RDA Team may leverage calls for proposals, competitions, or other solicited ideas within the RD&T program and other programs during the development of the CWRD TT Plans.

(9) The CW RDA Team is responsible for updating the program plans for ongoing CW Funded RD&T Programs in preparation for the next budget request.

e. Execution. Oversight of Execution will include the following:

(1) In-Progress Review (IPRs): IPR meetings for each strategic and short-term CW RD&T program occur at least once per FY as defined in the approved schedule of the work plan, including both short-term and strategic efforts. These meetings are open to researchers and practitioners with an interest in research outcomes.

(2) TDs will brief their portfolio to the CW RD Advisory Group annually.

(3) Routine updating of PMPs and Technology Transition Plans is necessary as the research progresses to reflect the evolution of knowledge, progress, and changes in the value proposition, milestones, schedule, budget, or responsible parties.

(4) Additional upward reporting and communication requirements may be determined (e.g., demos, guidance updates, training, etc.) by the CW RD&T Advisory Group and the CWRDSC.

11. RD&T Planning, Programming, Budget, and Execution Single Cycle Calendar and Timeline According to Budget Year (BY).

a. September BY-4 - December BY-3. In preparation for the RD&T Advisory Group Meeting, strategic requirements will be solicited through three channels: RD will collect requirements from external advisory board(s), Technical Director-level staff will collect requirements from researchers, and BLMs through their RARG process will collect strategic and short-term needs from field practitioners (including CoP input and SoN submittal). TDs will assist BLMs in collecting their requirements.

b. March BY-3. End of window to receive input for BY-3 decision cycle and upcoming R&D Advisory Group Meeting.

c. May-June BY-3. RD, BLMs, and TDs organize input received during October-January, refined input is provided to RD. RD provides pre-brief of input to RD&T Advisory Group in advance of meeting.

d. July BY-3. RD&T Advisory Group Meeting reviews input and develops or updates the CW RD&T Strategic Plan, detailing priorities for SFAs and Strategic

Targets. At this meeting the RD&T Advisory Group also reviews ongoing Execution. After this meeting these strategic priorities are then provided by RD to the CWRDSC.

e. August-September BY-3. The CWRDSC meets to approve/revise the CW RD&T Strategic Plan for Programming and Budgeting for BY CW RD&T program along with near-term short-term and operational support needs to be executed in BY-2 ongoing CW RD&T programs.

f. September BY-3 – January BY-2. Civil Works RDA Team and BLMs work on Pre-Programming activities and initial BY budget development for CWRDSC approval.

g. October BY-2. Short-term CW RD&T continues Execution in ongoing programs.

h. February BY-2. RD works with CW Functional Deputies to schedule an RD&T decision briefing to the three CW Champions responsible for oversight of the RD&T funding by appropriations - Investigations R&D Program (DCW), RD&T Construction funding (E&C or Ops and Reg Chief), and RD&T Operations and Maintenance funding (Ops and Reg Chief). Any other accounts funding RD&T will be briefed to the corresponding Champion. Completion of high-level program and prioritized BY budget requirements, CWRDSC meeting to approve/revise RD&T budget request (as early as February but no later than May).

i. March – April BY-2. Work packages entered into CWIFD and, where relevant, ranked by MSC.

j. April-June BY-2. Budget developed at HQUSACE.

k. May BY-2. Final Programming begins.

l. June BY-2. Chief's recommendation finalized.

m. July BY-2. Chief's recommendation given to ASA(CW).

n. September BY-2. Army budget submitted to OMB.

o. First Quarter BY-1. During this time the Civil Works RDA Team will refine Programming based on received appropriations guidance, and finalize technology transition plans under guidance of associated technology Proponent.

p. December BY-1. Justification sheets due to the Program Integration Division (PID).

q. Second Quarter of BY-1. Final Programming plan is released to researchers to begin detailed Execution planning.

r. February BY-1. President's Budget published.

s. October BY. Funds are provided to begin strategic CW RD&T Execution activities lasting 1-3 years, or to continue with ongoing CWRD TT Plans.

t. CWRDSC. Meetings are anticipated to be held in September (to approve the Strategic Plan and the Execution plan) and June (to approve the proposed RD&T budget), after having pre-briefed the Chief, PPD: Chief, E&C; and Chief, O&M. The CWRDSC may hold additional meetings and make additional decisions as deemed appropriate by the Co-Chairs and Membership in order to carry out the primary duties. The annual cycle for significant RD&T Planning and Execution activities is shown in Figure 4.

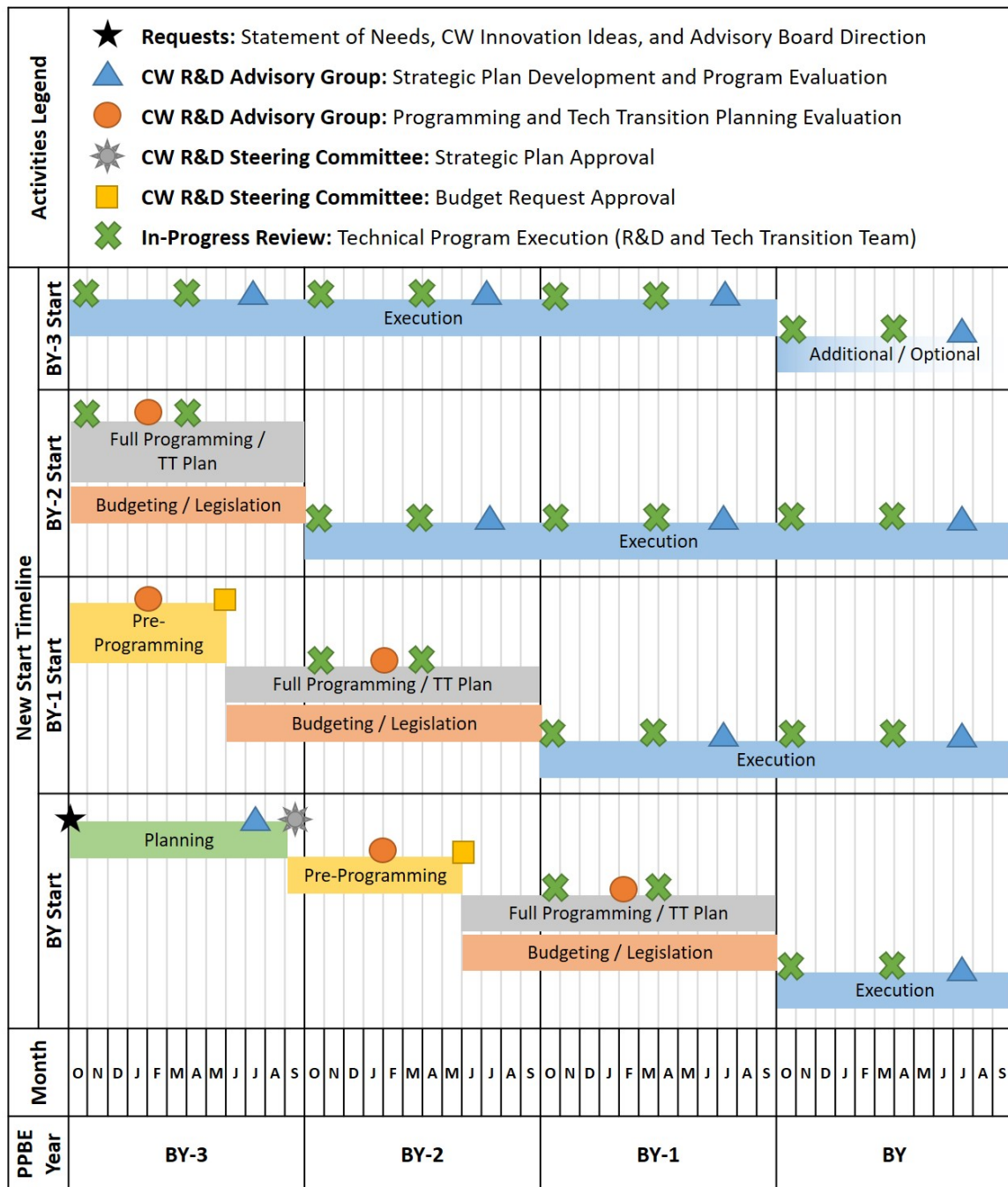


Figure 4: 4-year cycle of R&D Program depicting key meetings during the phases of Planning, Pre-Programming, Budgeting, and Execution.

12. Technology Transition. A technology is successfully transitioned when it is implemented into practice. As an innovative organization, USACE CW must implement a CWRDTP process and track success of RD&T outcomes, improved technology, and new ideas across the enterprise. This process must implement concepts which are outlined in the UTIS and will be documented in CWRDTP Plans, as discussed below.

Each CW RD&T Strategic Target will be developed and implemented according to a CWRD TT Plan.

a. Market Research, Business Case, Implementation Plan. The CWRD TT Plan is composed of (1) market research, (2) business case, and (3) implementation plan. Market research should include potential approaches to address the CW need, including new and ongoing research, ongoing programs and studies, industry technology, and academic partnering. The business case should describe potential return on investment to include added value (e.g., life safety, risk reduction, time savings) and cost savings. The implementation plan includes required resources (people, funding, data, demos, guidance, training, etc.) and major decision-points required over the full lifecycle to develop, deliver, and sustain the technology, and specifies the parties responsible for each required activity. The CWRD TT plan is to be regularly updated as new information is gained through its implementation.

b. The CWRD SC will oversee establishment and implementation of a Strategic CWRD TT process which must, at a minimum, include the following steps and associated decision-points, which coincide with the UTIS framework:

(1) Discover: Discover begins during the Planning phase and continues until Execution. CW identifies strategic RD&T requirements through the Planning phase of the annual RD&T budget process in the form of CW RD&T Strategic Targets. Once prioritized and resourced, a cross-enterprise Product Delivery Team (PDT) and Proponent are identified and begin documentation of the CWRD TT Plan.

(2) Develop: The technology, process, and/or tool is researched and developed into a product (tool, technique, knowledge, software, etc.) to meet the intended CW requirement by the RD&T PDT. The market research is used to develop a project management plan which can be composed of any combination of acquisition of industry technology and R&D. The project management plan is approved and overseen by the appropriate principal Technical Director and/or BLM. Updates are ~~communicated to~~ reviewed by the Proponent and communicated to the cross-enterprise PDT as requested. The technology will be developed such that it can be demonstrated to meet the requirement.

(3) Deliver: Based on the risk-informed business case, HQUSACE defines whether to implement the technology enterprise-wide or for particular subsets of the USACE portfolio (e.g., high-risk) or phase in USACE business process (e.g., operations); and provides guidance as to the extent, resources, and timeline for implementation. In conjunction with a subset of appropriate USACE projects, local or regional study applications, and/or business processes, the technology is demonstrated to an extent

necessary to validate safety, reliability, robustness, efficiency, and efficacy for enterprise implementation. Relevant guidance documents and training are developed.

(4) Sustain: Guidance documents and training are updated, as needed, to sustain the design, procurement, implementation, and upgrade of the technology.

(5) Connect: Support required communications planning and knowledge management to ensure enterprise workforce connectivity to the outcomes of CW RD&T.

c. Every technology being considered for enterprise implementation must have an assigned Proponent nominated by RD who must be approved by the CWRDSC and is responsible for creating and implementing a CWRDTT Plan (see template included in Appendix). The Proponent will track and ensure successful implementation of the technology, oversee development and updating of a business case, and seek to resolve issues that may arise. The Proponent will regularly communicate status of the CWRDTT Plan with the CWRDSC.

13. Implementation. This guidance is effective immediately. Districts, divisions, and field offices should inform CECW-CP of any problems with the implementation of this guidance.

FOR THE COMMANDER:



DAVID W. PITTMAN, PE, PhD
Director, Research & Development



ALVIN B. LEE
Director of Civil Works

Glossary:

RD&T Strategic Plan = Identification of strategic gaps in USACE technology/ practice/ capabilities which may or may not be adopted as priorities for targeted investments. The Strategic Plan is an output from the RD&T Advisory Group meeting and is comprised of Strategic Focus Areas.

Strategic Focus Areas = Priorities as identified by USACE leadership to innovate and solve big problems impacting USACE mission delivery. These Focus Areas have been identified as needing attention and investment, time scales may vary.

Strategic Targets = Inter-related capabilities which work together to address the needs identified within the Strategic Focus Area.

Statements of Needs (SoN) = Requirements submitted by MSCs, CXs, CoPs, field users, etc. to their Business Line Manager.

CWRD TT Plan Proponent = The responsible party nominated by RD and approved by the CWRDSC and is responsible for creating, implementing, and briefing a CWRD TT Plan.

CW Funded RD&T programs = Named programs currently funded through the Remaining Items process and managed by ERDC. These programs include but are not limited to: Aquatic Nuisance Control Research Program; Aquatic Plant Control Research Program; Coastal and Ocean Data System; Coastal Field Data Collection; Coastal Inlet Research Program; Dredging Operations and Environmental Research; Dredging Operations Technical Support; Ecosystem Management & Restoration; Flood and Coastal Systems; Monitoring of Completed Navigation Projects; Navigation Systems Research; Regional Sediment Management; Water Operations Technical Support.

USACE Technology Innovation Strategy (UTIS): A multi-faceted framework with five key tenets – Discover, Develop, Deliver, Sustain and Connect designed to foster innovative technology development and implementation within USACE.