THE SUBSURFACE CONTAMINANT FOCUS AREA (SCFA) PLANS STRATEGIC OBJECTIVES THROUGH ROADMAPS

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ABSTRACT

The Subsurface Contaminant Focus Area (SCFA) has historically worked with individual Department of Energy (DOE) sites to identify needs and develop technologies to solve those with the most immediate and high payoff. This approach has led to successful deployments and strong technical assistance. The current DOE site technical needs collection method yielded over 300 needs in fiscal year (FY) 2001 and requires a means to help focus development. With a desire to improve program support, SCFA has defined specific strategic objectives and wishes to perform specific development to accomplish these objectives. The SCFA has developed this improved approach for technical and strategic management by identifying and describing the site needs using a smaller number of technical targets, which individually work to solve many of the site needs. The targets have elements of near-term and long-term thrusts that can be used to balance the investments for science and applied R&D.

SCFA is also developing "mini roadmaps" for each technical target to outline specific performance requirements, where improvements are needed, when the improvements are needed, and the significance to the DOE programs. The technical targets were evaluated for complexity and potential benefits to prioritize the order that they would be roadmapped. Four technical targets were identified as the first candidates for roadmapping and will be completed in the January – March 2002 time. The technical community within SCFA will develop the potential targeted improvements and the end-users will help describe the potential impact of these improvements to their programs. The end product from these "mini roadmaps" will include the target's technical objectives with a definition of the performance objectives and potential impacts.

This paper will summarize the progress to date in roadmapping the SCFA technical targets selected to be completed first. The first four roadmaps will be used to test how the mini-roadmapping process can strengthen the strategic planning and portfolio management within the SCFA. The paper will focus on the identification and discussion of the mini-roadmapping process adaptations required to roadmap program objectives within a focus area where broad and crosscutting development is needed and customers are unique and spread out. The timely lessons learned and insights will be valuable to other programs desiring to roadmap large amounts of workscope but unsure how to successfully complete it.

BACKGROUND

The SCFA develops the technologies needed for the DOE's Environmental Restoration (ER) Program. Development activities have focused to date on "needs statements" provided by the individual DOE sites. The needs are used to seek technology development proposals and typically, those that address the needs best are funded. The current system has perpetuated to a large number of needs for SCFA, 339 in FY-01, across the DOE system. With limited funding available within SCFA, development has focused in those areas where SCFA believed was the most productive across the DOE complex. In an effort to improve the focus of the development activities, SCFA has performed a strategic planning effort where the technical and end-user communities were brought together to define more focused problem areas needing development called "Technical Targets".

The Technical Targets are twelve areas of focus within the ER Program that are the large technological problems across the various DOE sites. Teams made up of both technologists and end-users defined the technical objectives for each of the Technical Targets. The technical objectives were defined in such a way that they reflected real site problems that would be solved if the technical objectives were met. Although the Technical Targets were a great step forward in determining what should be developed, it was believed that some of the targets were complex enough that further detailing would be beneficial. The Technical Target Team prioritized the targets by identifying those targets that were reasonably complex and could have a large impact.

The roadmapping process chosen is a scaled down version of the typical roadmap discussed in DOE's draft guidance document. The scaled down version is referred to as a "mini-roadmap" and differs from a typical roadmap in that it is only developed partially through the technical response phase III of the draft guidance. This means that the product can be used for strategic decisions, but will not contain the detailed development path needed to deliver the technology desired. It will still contain the problem description, the sites that have it, what performance improvements are needed, when they're needed, what technical advances are needed, and what types of research and development could be used to deliver the technology. Because these mini-roadmaps will not detail out a development pathway, the managing of the system delivery to solve the site problem will have to be done some other way. Because it is important to get some detail on as many technical targets as possible and funding is limited, creating mini-roadmapping was selected as the desired path forward. A limited roadmapping effort is being performed on four of the Technical Targets. Figure 1 shows the twelve targets highlighting the four targets that are the initial focus of the mini-roadmapping. As part of developing the technical targets, each target team provided technical and end-user participants who are knowledgeable and interested in further defining each technical target and its objectives. The four selected mini-roadmaps are scheduled to complete by March of 2002.

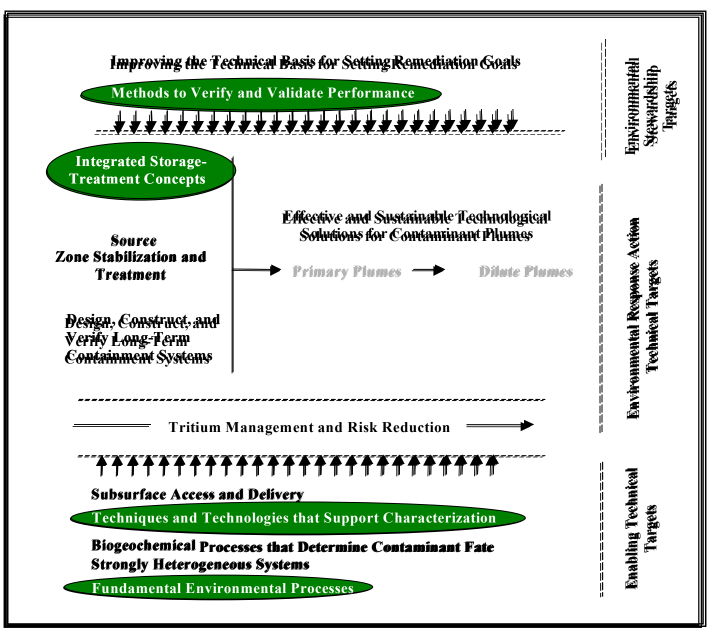

Fig. 1. Current Technical Targets

APPROACH

The approach defined follows the draft guidance (1) for technology roadmapping given by DOE's Office of Science and Technology (OST). Since the mini-roadmapping process is a less detailed version of the roadmaps discussed in the guidance, some steps were simplified to accomplish the mini-roadmap in the time and budget available.

Step I, Problem Definition

As part of the technical target meetings, team members from SCFA and end-users defined technical objectives with the intent to be the same as the major problem areas across the DOE complex. The elements of the problem statement are detailed in the first step. The elements include the functional performance improvement desired by specific DOE sites and when the technology would be needed. The when needed question defines the desired insertion date for a technology. There are two types of technology insertions, those that are improvements and those that are gaps. An improvement technology has a positive impact on the cleanup or monitoring program in terms of cost savings, dose reduction, etc but a cleanup program could proceed without the technology. A technology gap insertion defines the need of a cleanup program to have a specific technology before the work can be accomplished. The improvement and gap insertion points will be displayed together for each target with the associated performance data and opportunities for synergistic development will be identified. Figure 2 displays a conceptual picture of a timeline for a technical target and one of its overall technical objectives. Each triangle represents a potential insertion point that a specific site has. The information associated with each triangle is the performance improvement or gap technology desired and the impact if delivered to the ER project. These desired technologies for gaps and performance improvements will be further investigated in Step 2 where the technology needs are defined in terms of potential performance improvements over specific time intervals.

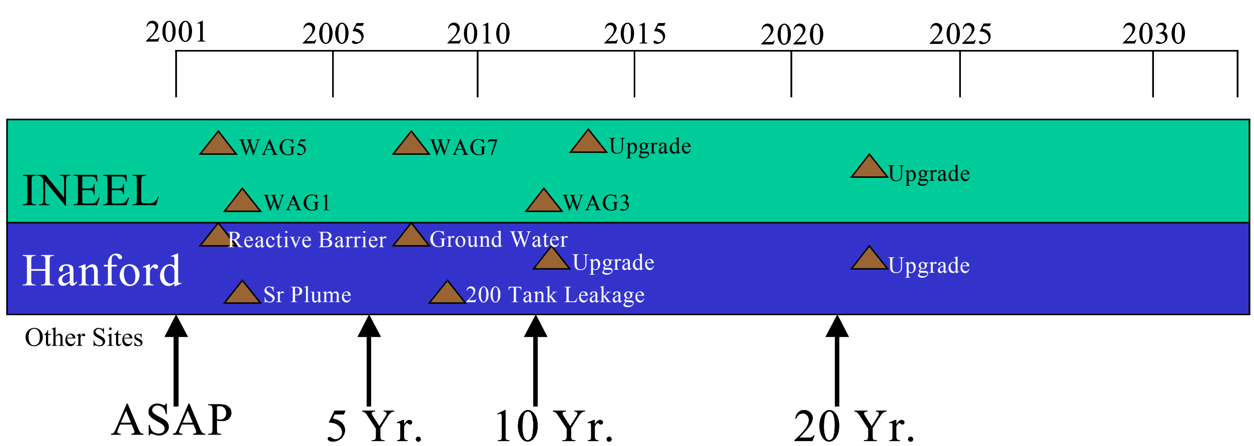

Fig. 2, Timing of Verification & Validation Systems Insertions

Step II, Technology Needs Definition

The potential technology insertion points that are identified from Step 1 are evaluated to identify what and when improvements would best fit the majority of the site's needs. Step 2 will focus on the identification of the system and technology components needed to solve the problem in question. Often, multiple functions must be performed to fully solve the problem. Additionally, if the improvement is going to have a full impact, each of the integrated components will need to be further developed to a level of performance that would support the system improvement desired. To define these system technology needs, an assessment of the system performance across all the components is completed. This assessment first describes the stretch or long-term goals of the system and its components.

Once the vision is initially defined for the overall system performance, a current state of technology is assessed for each component in terms of capability to meet the performance ultimately needed. The overall improvement will consider one or more intermediate steps dependent on the size of the change in performance sought and the time when the performance is needed. Figure 3 is used to communicate what technologies need improvement at each insertion phase. Green bars are used where the component technology performance is adequate for the intermediate system performance insertion point. Existing technologies turn to yellow bars where an existing technology can meet the needed improvement with additional development. The red bars are reserved for those components where a new technology is needed to meet the performance desired.

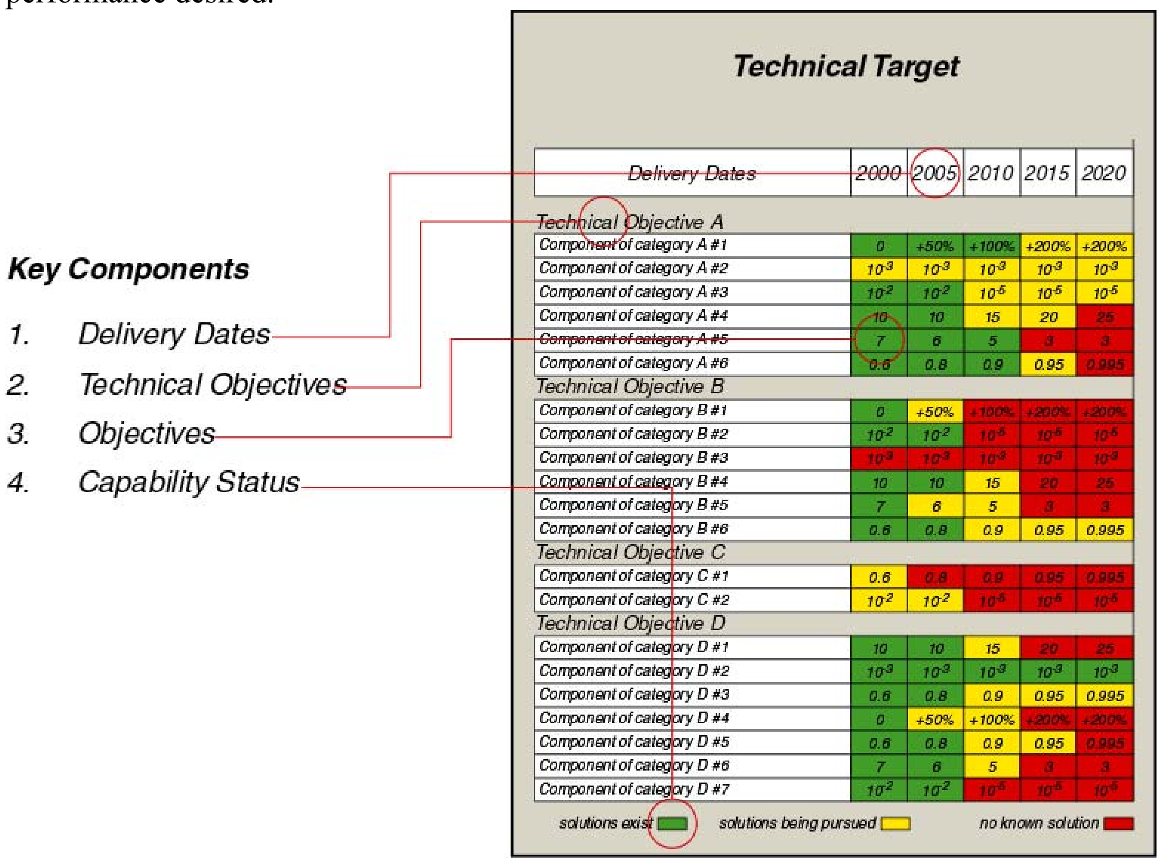

Fig. 3. Assessment of Capability with Desired Performance

With this graphic, the SCFA can look across each of the time increments and see where the weak links are and where the greatest focus must be to advance the system. This graphic is also the input to Step 3 where a technology development plan is initialized. Where there are red technology areas, it may be desired to invest in multiple potential technologies to improve the probability of finding a viable candidate. Development towards implementation or deployment would follow a down-selection from technology candidates.

Step III, Technology Development Plans

The technology development plan will be defined to the level where the type of research and development is identified for each component and time phase. The roadmap defines the steps to mature the various components of the system at the right time to make the next insertion most successful. The blocks of research, development, and deployment will be estimated in time and cost based on the phase of technology development required. A simplified logic diagram will be constructed where objectives and type of development will be defined from conception to implementation. Basic Science and Environmental Management Science Program (EMSP) will be considered for use in scientific research necessary to create viable technologies to advance technology systems. Applied development and deployments may be used to prepare components and systems for implementation at the various sites. Figure 4 displays a potential development plan and is a continuation of Figure 3. As shown in Figure 3, Objective D, Component 2 is green throughout the entire performance improvement thus, in Figure 4, there are no specific development tasks associated with improving it. In the case of Component 1, there is a problem with meeting the performance goals with the current technology so in parallel to improving the current technology to meet the yellow performance goal of 2010, two new technologies are being investigated to potentially fill the red performance goals needed by 2015. However, the improvement for 2010 is only expected to take a couple of years thus it is not started until more of the other system components get caught up.

These conceptual development schedules will provide SCFA three important tools for managing their future program. First, the order of development and performance expectations will be defined over time. This should limit the need to develop technologies on all fronts at the same time but instead, put some orderliness to the development. Second, the improvements sought by the development will be to advance the performance of a specific function as it relates to an integrated system. If the current technology is already adequate, advances will be held back until the rest of the integrated system components catch up. Third, by lining up the development activities across the time phases, SCFA can strategize their near-term, mid-term, and long-term portfolio options.

One iteration of the needs versus the development schedule is planned in this mini-roadmap process. The logic and required development to reach the desired performance by the desired date will be reviewed for disconnects. The amount of time to create the integrated product is checked against the amount of time it is estimated to take to deliver and adjustments will be made to either the performance increments or the delivery time.

Follow-On Activities – After Mini Roadmapping Four Technical Targets

Follow on activities will include an evaluation of the four mini-roadmaps for effectiveness in managing the SCFA portfolio. Adjustments to the mini-roadmapping process will be made prior to proceeding with additional technical targets. It may be necessary to further detail specific technology development plans of one or more of these four technical target roadmaps to increase the probability of success in delivering increased performance to the ER Program on schedule. Recommendations of improved process and more detailed roadmaps will be made following **these four mini-roadmaps.**

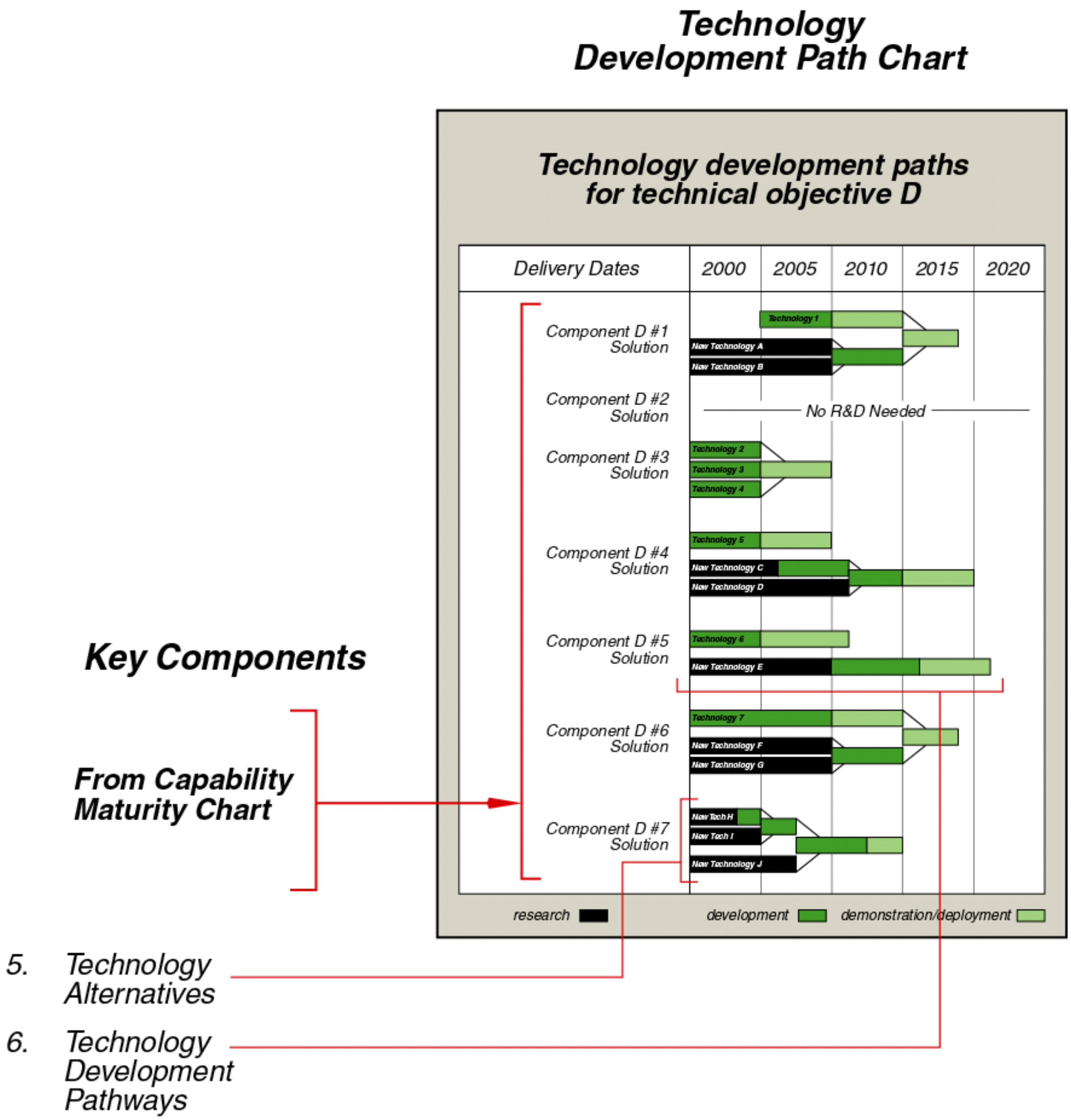

Fig. 4. Technology Development Plan for a Conceptual Technical Target Objective

CONCLUSIONS

The mini-roadmapping process will further mature four of the technical targets from the current state of generally defined research objectives to a level that can begin to be useful in strategic planning within SCFA. These four roadmaps will be used to learn how to approach the technical targets strategically and make them useful in the technology proposal calls and prioritization of funding. The lessons learned will be folded into the mini-roadmap process for the other technical targets that will follow. Additionally, further definition of the technology development plans may be desirable if the complexity is too great or the confidence of delivery is too low.

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