

Decontamination Strategy and Technology Selection Tool (DeconST)

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US EPA

Technology & Transition Workshop Brief
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**Homeland
Security**

Science and Technology



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Decontamination Strategy and Technology Selection Tool



Technology Description:

This project is the design of a decontamination tradeoff analysis tool designed to help decision-makers understand the relative appropriateness, efficacy, waste production and cost requirements of the various decontamination methods. The objective is to optimize use of resources and minimize cost.

Technology Readiness Level at Start/Completion:

Start (TRL-4/5); Completion (TRL-6)

Transition:

- 1) Leverage IBRD decision support tool development by adding building materials, efficacy, and cost data to the system;
- 2) Modify software for integration into EPA's decision support structure;
- 3) Combine decon waste estimation tool output with decon tradeoff tool;
- 4) Incorporate corrections based on end-user evaluation.

Operational Evaluation:

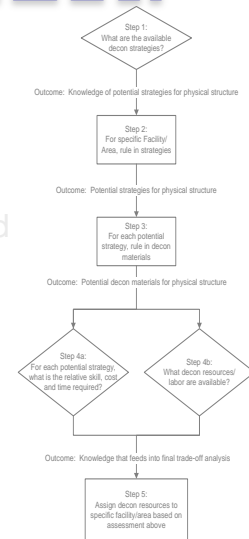
EPA special teams will exercise and evaluate tool and provide feed-back. Participation in WARRP exercises.

Transition Agency: project will be conducted in collaboration with EPA HSRC; Transition to US EPA (National Decontamination Team/Office of Emergency Management).

Project Overview:

A systems approach is conducive to bio-restoration for several reasons:

- the large scope of the problem, which encompasses multiple types of facilities and areas;
- the large number of potential decontamination strategies and materials that could potentially solve the problem;
- and the wide range of considerations that factor into strategy and material selection.



Project Plan

Schedule with milestones:

- Task 1: Amend & enhance design of & data for existing tool (Month 4)*
- Task 2: Software development for enhanced decon decision support tool (Month 6)*
- Task 3: Operational Assessment & correction cycle (Month 9)*
- Task 4: Deliver integrated tool (Month 12)*

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C/B/R: B



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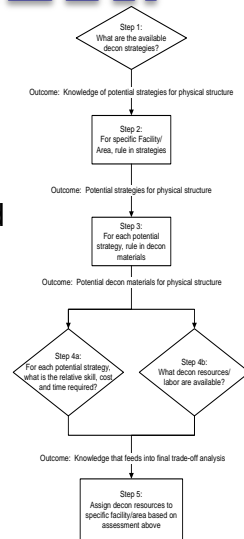
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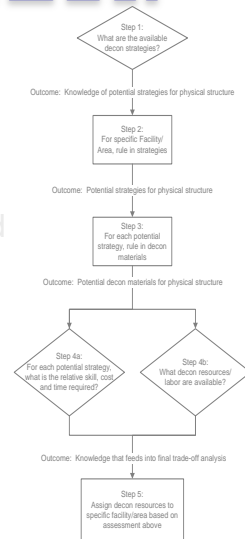
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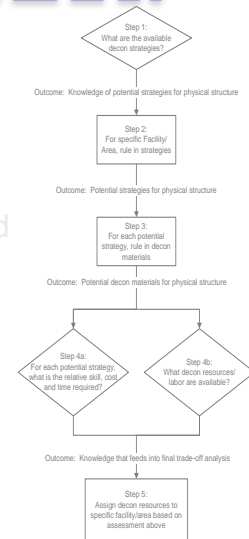
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Technology Developments: Motivation

The WARRP System Study (January 2012), identified

**Lack of methods for trade-off analyses
of various recovery strategies**

...as a high priority gap

- the gap strongly impacts recovery efficiency
- multiple stakeholders indicated the gap is high priority
- no gap solution currently exists

The DeconST addresses this gap.



Technology Developments: Tool Development and Impact

- Tool Functionality:
 - Analyze the situation specific benefits and drawbacks of decontamination options
 - Assist in the development of systems-oriented cost-benefits analysis
- Tool Foundations:
 - Decon Selection Tool developed under the IBRD program
 - EPA's IWMPRT waste tool
 - Research conducted by the USEPA, DHS, DTRA, the National Laboratories
 - effectiveness and cost information on many decontamination options

The impact will be an increase in cost efficiency.



Transition Planning

- Transition Foundations
 - Already written into the *Draft USEPA Guidance on Remediation Following a Bioterrorist Event*
 - Will be incorporated as part of the *USEPA Operational Bio Guide* for the EPA responders
 - Will be transitioned to EPA for maintenance and any necessary further development
- Transition Partner(s)
 - US EPA, Office of Research and Development
 - Shawn Ryan, Ph.D., US EPA NHSRC, DCMD
 - US EPA, Office of Emergency Management
 - Erica Canzler, US EPA OEM

SNL and EPA are collaborators on the design process for the Decontamination Selection Tool (DeconST)



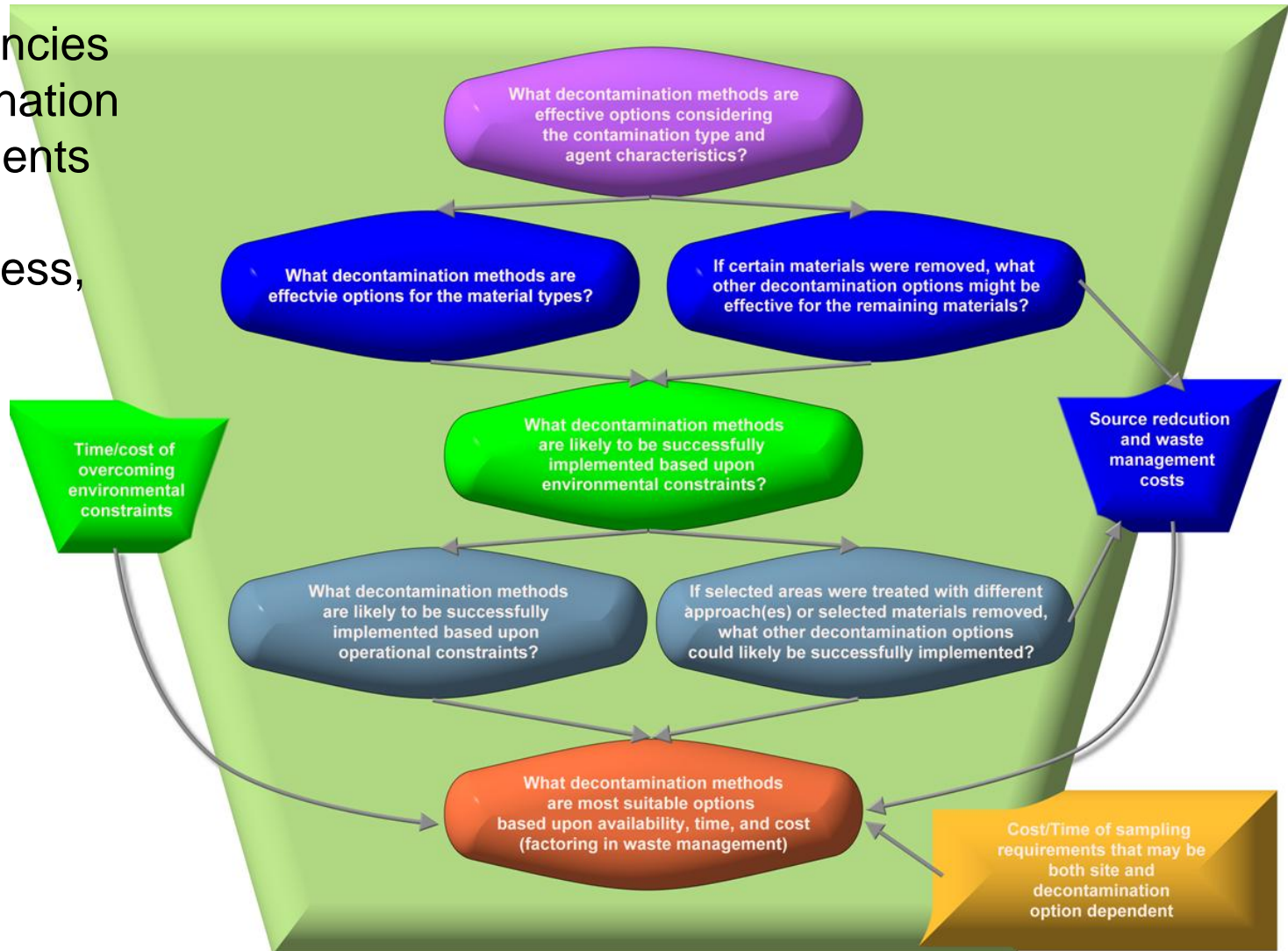
Project & Transition Timeline

Task	Schedule (Month)								
	1	2	3	4	5	6	7	8	9
1.0 Collect & correlate desirable components list	█	█	█	█	█	█	█	█	█
1.1 Determine desirable results page (output) content & format	█								
1.2 Determine tool input page content and format	█								
1.3 Prioritize options for decision framework		█							
2.0 Update databases – collect, correlate and build tables	█	█	█	█	█	█	█	█	█
2.1 Upgrade decon efficacy data table		█	█	█					
2.2 Design/build waste production per technology data tables		█	█	█					
2.3 Collect, correlate and tabulate cost estimate information		█	█	█					
2.4 Update materials compatibility data table		█	█	█					
3.0 Software development for Decon ST	█	█	█	█	█	█	█	█	█
3.1 Design modifications to tool logic and algorithm		█	█	█	█	█			
3.2 Design modifications to user interface		█	█	█	█	█			
3.3 Implement changes into tool			█	█	█	█	█	█	
4.0 Operational Assessment	█	█	█	█	█	█	█	█	█
4.1 Develop operational assessment plan						█	█		
4.2 Conduct operational assessment								█	
4.3 Prepare final report & user manual								█	█
5.0 Technology Transition	█	█	█	█	█	█	█	█	█
5.1 Prepare and sign GUN with transition partner	█								
5.2 Deliver final version of software to USEPA									█
5.3 Deliver final report and User Manual									█



Decontamination Method Down-Selection Process Relationship

Interdependencies of decontamination process elements that go into a decision process, from EPA's perspective



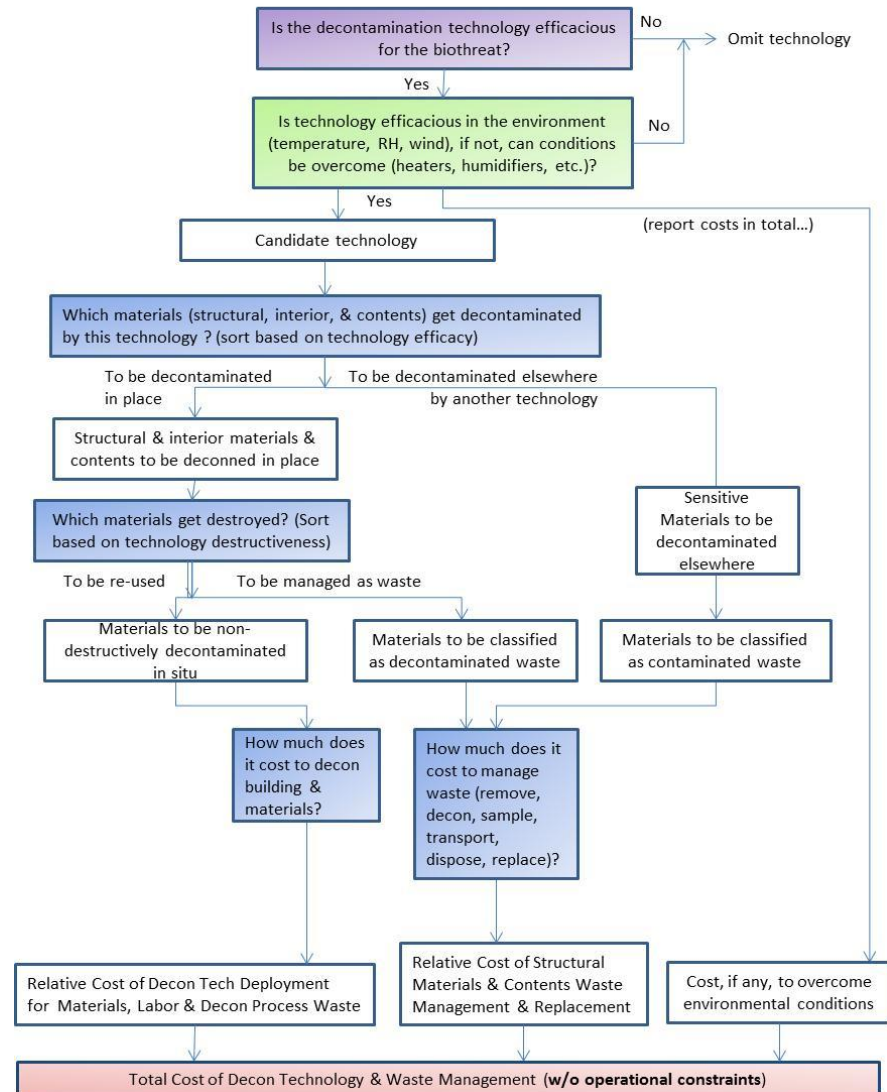


For tool development the interdependencies are represented in a form that can select and sort information

Decision-tree

- The dependencies are placed into a logical order and questions are asked of the operator to identify and sort conditions that will influence the cost of decontamination
- The database requirements are identified by the structural material and content dispensation

DeconST: Decontamination technology assessment process – each decon technology will be evaluated by this process





Data Requirements & Outputs for DeconST

➤ Working together with our transition partners/collaborators we have identified the desired outputs for the tool and defined the required data to build the database

Data Requirements & Outputs for DeconST

(The template for data collection will be built from data requirements identified below)

Requirements (green highlighted boxes)	Outputs (white & red boxes)
Biothreat Agent Data <ul style="list-style-type: none"> Decontamination technology efficacy against various biothreat agents (only needed when tool is expanded beyond anthrax spores) 	Biothreat Agent Output <ul style="list-style-type: none"> Report whether the decontamination technology is efficacious against the particular biothreat agent (needed when tool is expanded beyond anthrax spores)
Environmental Conditions Data <ul style="list-style-type: none"> Decontamination technology performance data and processes/equipment/\$ required to make decontamination technology efficacious under various weather conditions 	Environmental Conditions Output <ul style="list-style-type: none"> Processes/equipment/\$ needed to make the decontamination technology efficacious under the conditions particular to this event (heaters, humidifiers, etc.)
Materials Compatibility Data <ul style="list-style-type: none"> Decontamination technology efficacy and destructiveness on various materials and contents (corrosiveness, decontamination sinks, etc.) 	Materials Compatibility Output <ul style="list-style-type: none"> Report which materials (and their quantities) stay for decontamination and which must be removed as waste (either contaminated or decontaminated)
Decontamination Technology Cost Data (cost per volume or per weight) <ul style="list-style-type: none"> Fixed \$ Size-based \$ Monitoring \$ Decontamination Verification \$ Process waste \$ <ul style="list-style-type: none"> Removal \$ Sampling \$ Transport \$ Disposal \$ 	Total Relative Cost of Decontamination Technology Deployment (for materials and contents remaining in the building) <ul style="list-style-type: none"> Materials Labor Decontamination Process Waste
Waste Management Cost Data (per volume or per weight) <ul style="list-style-type: none"> Removal \$ Decontamination \$ Sampling \$ Transportation \$ Disposal \$ Replacement \$ 	Total Relative Cost of Waste Management & Replacement (for materials and contents removed as waste)
Not Included: <ul style="list-style-type: none"> Operational costs including availability, downtime and logistics 	Total Relative Cost <ul style="list-style-type: none"> Decon technology deployment + waste management + environmental factors



Design Elements of the DeconST

- This project combines the following:
 - Phase-1 DeconST tool (developed for IBRD)
 - Efficacy sorting and selection mechanism, and user-interface
 - IWMPRT/EPA
 - Foundation for building materials types & volumes and for waste production
 - BOTE Project
 - Cost analysis information



Proof of Concept / Demonstration

- We will conduct an operational assessment to demonstrate a Technology Readiness Level (TRL) of 6 (system/subsystem model or prototype demonstration in a relevant environment).
 - We will conduct a table-top exercise/demonstration with EPA special teams (TWGs) and stakeholders.
 - The exercise/demonstration will be used to assess operational parameters such as ease of use, training requirements, utility of generated data, etc.
 - The deliverable for this activity is the tool. A half-day table-top exercise will provide an opportunity for operational assessment by members of the USEPA National Decontamination Team (NDT).



Transition Partner Comments

- Transition Partner Viewpoint
 - Transition Plan & Projected Outcome
 - “The decontamination selection tool & documentation will be transitioned to the EPA National Decontamination Team through both a briefing and a controlled exercise that will demonstrate the product's utility.”
 - “EPA end users have reviewed this product and are guiding it's development.”
 - “A key aspect is the open coding and development of the tool to be able to be readily updated by the end-user community to ensure it can be kept relevant.”
 - “The logic for the tool is following the thought process used by the BOTE exercise TWG and other experiences.”



Transition Partner Comments, Continued

--Issues/Concerns

- “The scope used to develop this product did not include an exhaustive gathering and evaluation of the needed input data, in particular the costs associated with the different decontamination technologies. In many cases total cost will be the driving factor in decontamination selection.”
- “Coding the logic, with appropriate flexibility for future expansion, with some currently abstract information (e.g., impact of decontamination method selection on sampling requirements).”
- “Consistent translation of data and appropriate documentation
- Need to maintain flexibility in structure to allow expansion to non-anthrax bio, chem and rad scenarios in future.”