C. Negin - Panel Session 2: TMI-2
Some Needed Remote Capability Functions

1. Information & Data
   - In Place
     - Characterize
       - Photos
       - Video
       - Gamma
       - Neutron
       - Toughness
       - Britteness
       - Composition
       - Temperature
       - pH (?)
       - Salinity (?)
   - Samples Retrieval
     - Retrieval
       - Boring
       - Chipping
       - Grinding
       - Robotic grabbing
       - Clamshells
       - Loading into shielded containers

2. In Place Force Operations
   - Size Reduce
     - Materials
       - Corium rocks
       - Crust
       - Once melted mass
       - Steel & Zircalloy
       - Operations
         - Cutting
         - Crushing
         - Shearing
         - Boring
         - Coring
   - Positioning
     - Tools
       - Saws
       - Drills
       - Chisels
       - Borers
       - Millers
       - Plasma Arc

3. Movement Operations
   - Retrieve
     - Materials
       - Corium
       - Metal pieces
       - Particles
     - Operations
       - Grabbing
       - Lifting
       - Vacuuming
   - Load & Remove
     - Fill Containers
       - Buckets
       - Baskets
       - Canisters
     - Canister Operations
       - Inserting
       - Rack position
       - Lid placement
       - Dewatering
       - Lifting out
Development and Application Cycle

Design: for each function & task
- Environmental conditions
- Space restrictions
- Pathways
- Motive power
- End tools
- End tool power
- Instruments
- Vision
- Sonar (?)

Fabrication
- Materials
- Parts
- Assemble
- Quality Control
- Testing during fabrication

Preparation
- Testing
- Design and build mockups
- Maybe modify
- Training

Observations and Recommendations
- Each development cycle can take weeks or months, depending on complexity and what components are already available with need for development
- Insights for what is needed is best known by those at the site who are using the equipment (they will be gaining experience as the cleanup proceeds)
- It is recommended that an on-site organizational be established as the key interface between designers and suppliers
- This organization should be staffed with operators, engineers, and technicians (mechanical, I&C, etc.)