JPM IP and the Future of Respiratory Protection: Operational and Technical Perspectives

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Program Overview

The Joint Project Manager for Individual Protection (JPM-IP) is Responsible for the Development, Procurement, Fielding, and Overall Life Cycle Management of all CBRN Individual Protective Equipment Programs and Reports to the Joint Program Executive Officer for Chemical & Biological Defense (JPEO-CBD).

Future Respiratory Protection Initiative

Our objective is to explore leading edge technologies that have the potential to advance respiratory and ocular protection into new frontiers of capability and performance

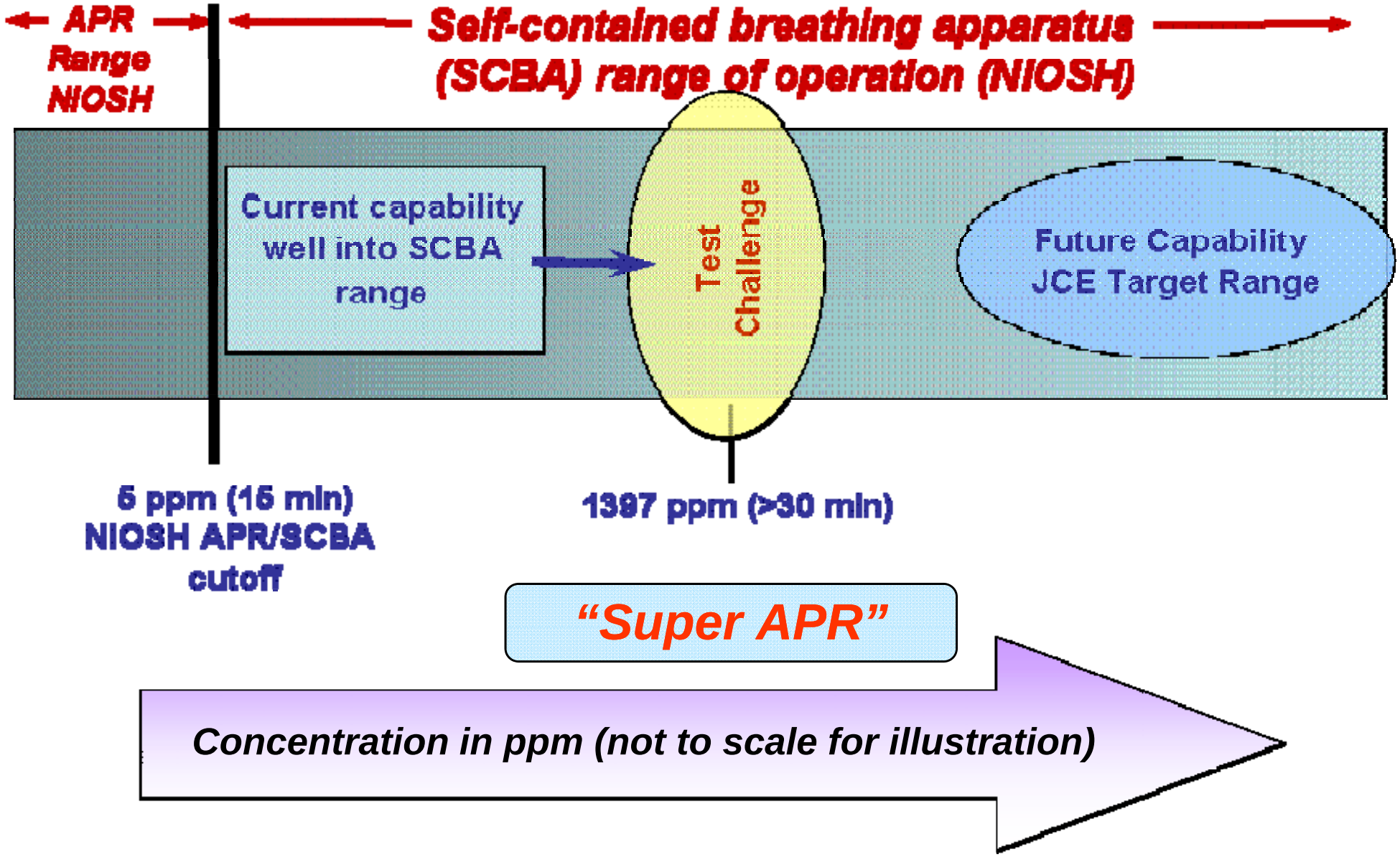
Operational Need You Already Know: Lighten the Load

- **Personal**
  - Breathing resistance
  - Temperature and sweat control
  - Psychological/Cognitive
  - Field of view, visual acuity—fogging and lens distortion reduction
  - Weight/volume
- **Logistics**
- **Cost**

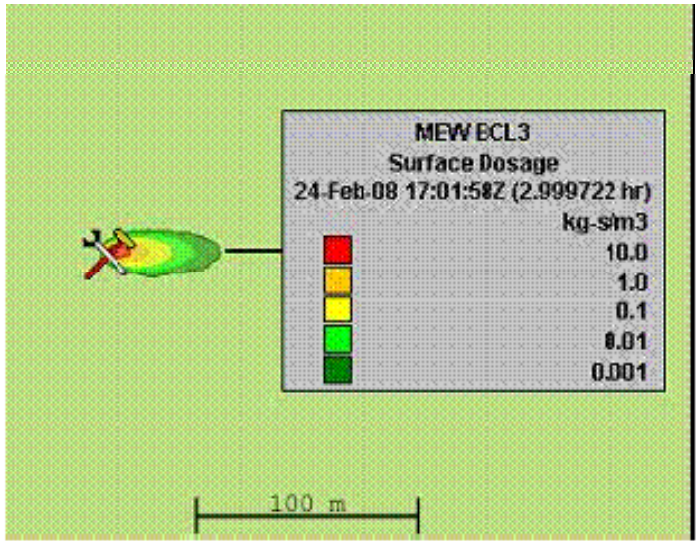
Operational Need You Already Know: Deliver Enhanced Performance

- Advanced broad spectrum capability against TIC threats
- Advanced performance under broad spectrum of conditions
  - –Variable breathing rates
  - –Variable temperature and humidity
  - –Variable battlefield contaminant concentration
- Advanced integration— SaaS Concept
  - –Platform, subsystem, system
    - •Body armor
    - •Helmet
    - •Sighting systems
    - •Cockpit, vehicle control
    - •Life support systems
- Advanced system integrity assessment
  - –Service Life Indicator

What's New: Approaches to Development of TIC Protection—Capability in Context

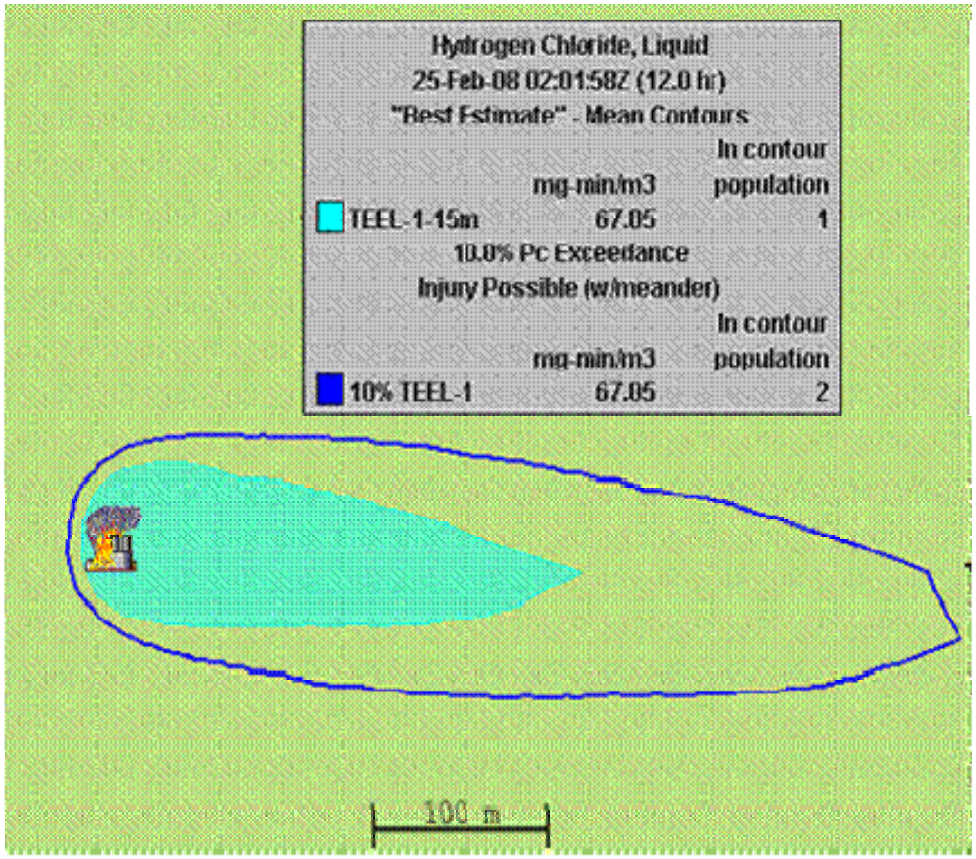


What's New: Understanding behavior of industrial chemicals in the operational environment



Inputs:

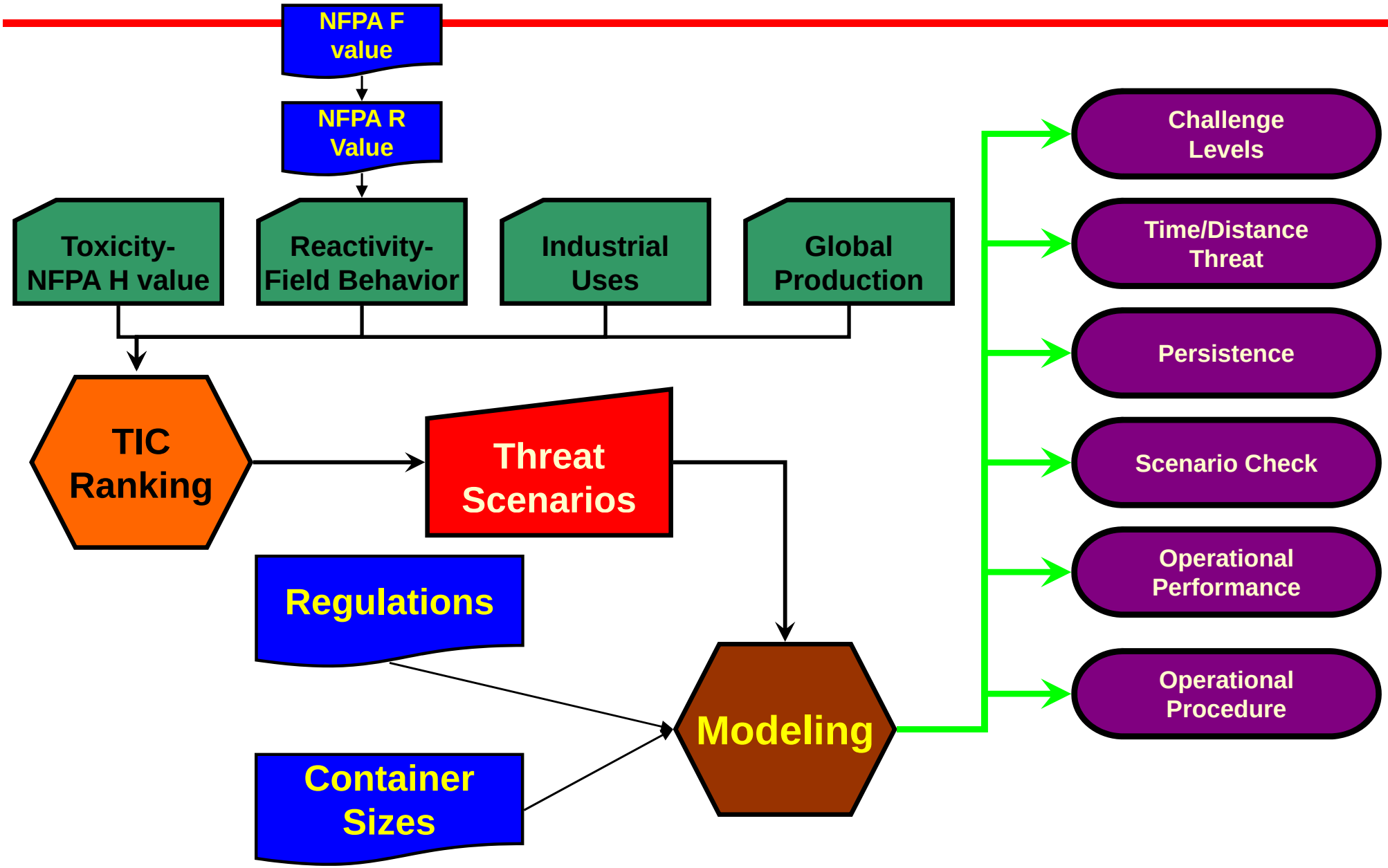
(1) Chemical Reactivity
(2) Decay rate fed into model
(3) Container Regulations



Outputs:

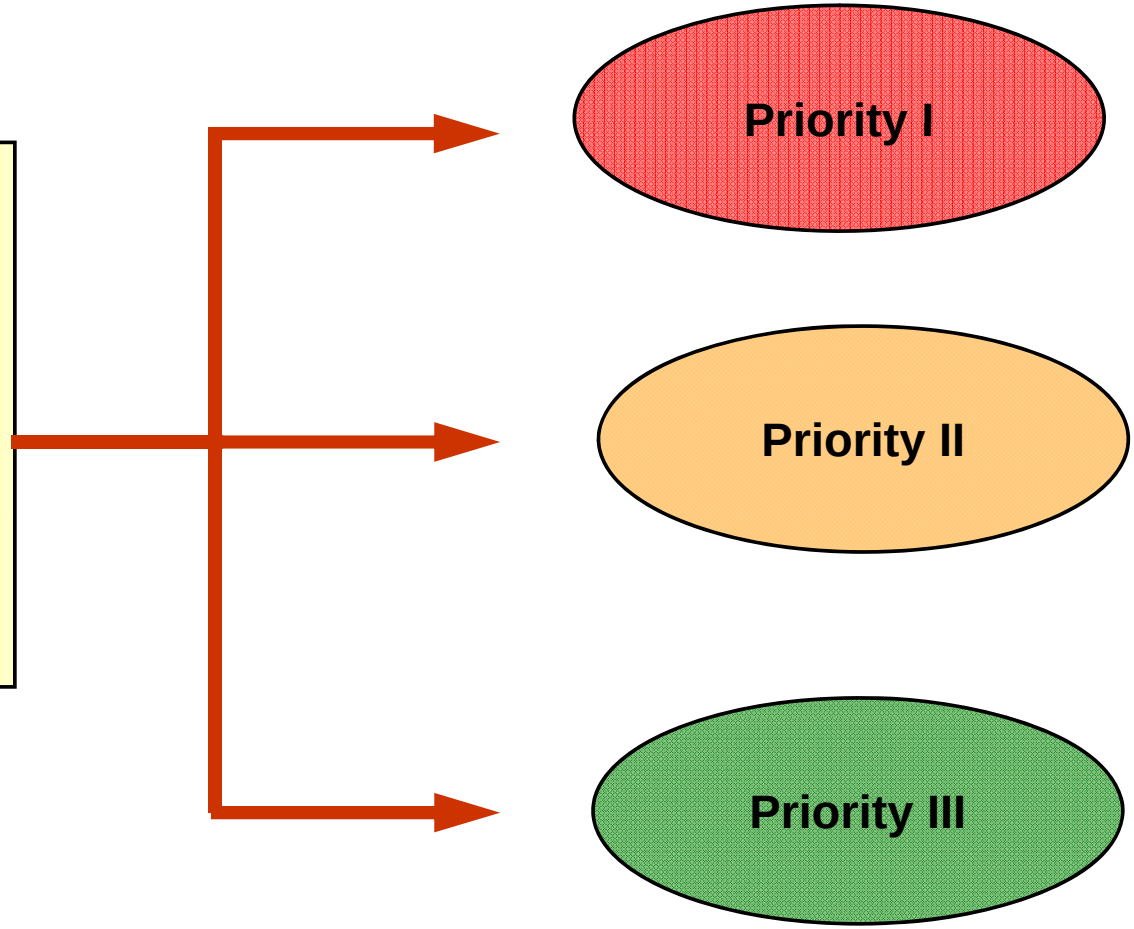
(1) Major By-product: Hydrogen Chloride
(2) Release Modeled as such

What's New: Approaches to Development of TIC Protection—JSGPM Prioritization Approach



What's New: Synthesis of 3 Tier Hierarchy of Capability

Process results employed to generate 3 tiers of required and desired capability

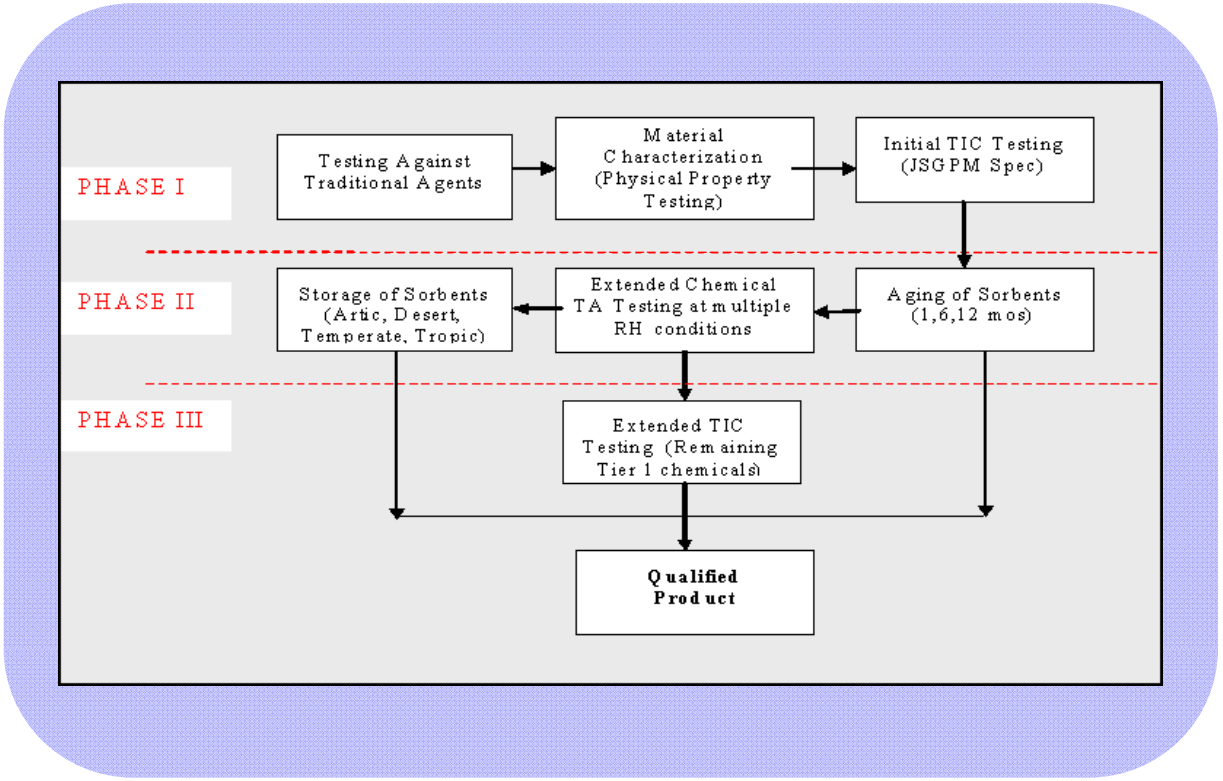


What's New: Preliminary Ranking

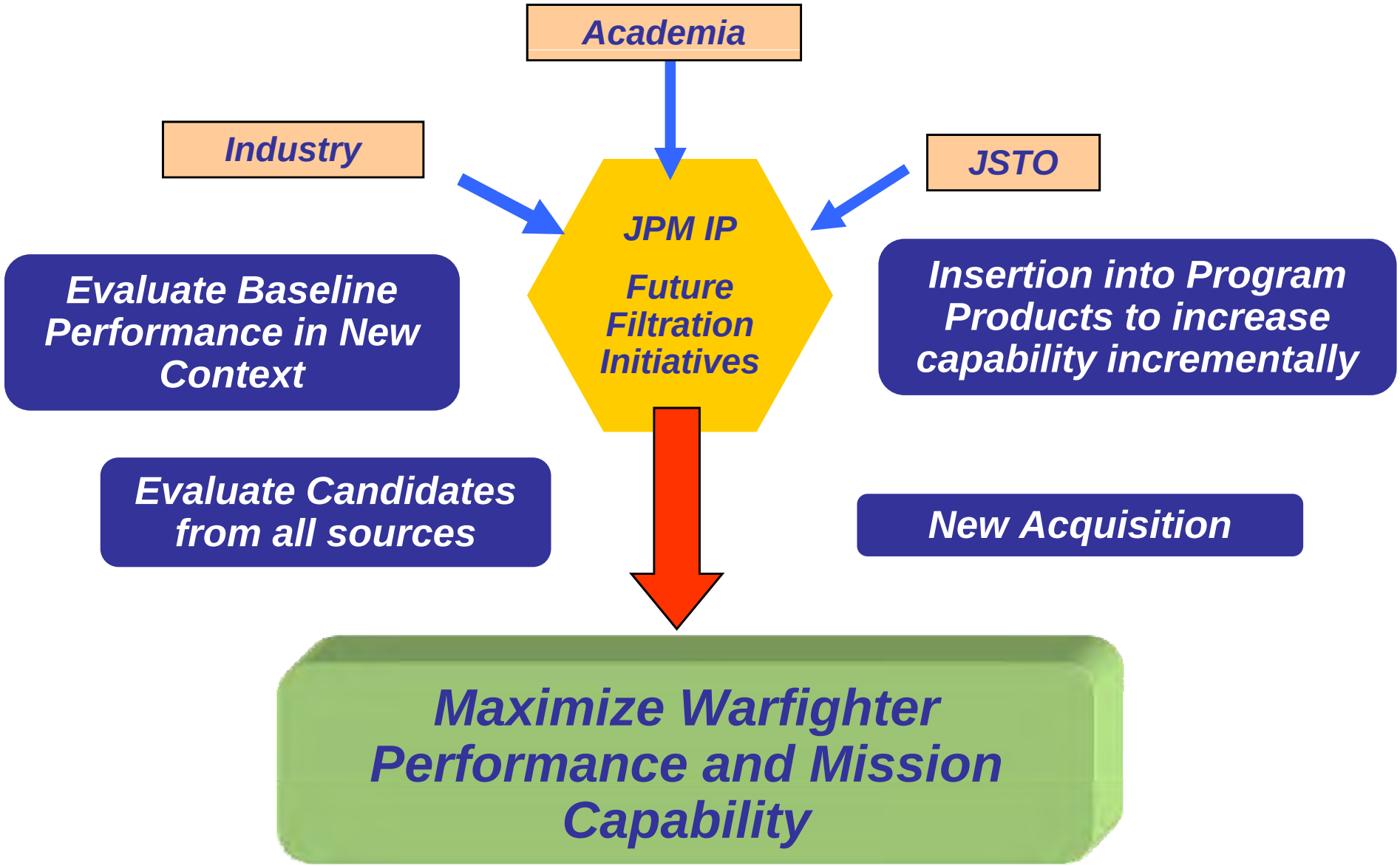
Chemical	Production Rating	Usage Rating	NFPA Toxicity Rating	NFPA Flammability Rating	NFPA Reactivity Rating	Reactivity Score	Overall Score	Ranking
Ammonia	4	4	3	1	0	0.5	10.50	
Chlorine	3	4	3	0	0	0	10.00	
Hydrogen Fluoride	2	4	4	0	1	0.5	9.50	
Sulfuric Acid	3	4	3	0	2	1	9.00	
Hydrogen Chloride	3	3	3	0	1	0.5	8.50	
Nitric Acid	3	1	4	0	1	0.5	7.50	
Acrylonitrile*	4	1	4	3	2	2.5	6.50	
The above are the Tier 1 Chemicals								
Sulfur Dioxide	2	1	3	0	0	0	6.00	
Sulfur Trioxide	3	1	3	0	2	1	6.00	
Hydrogen Sulfide	3	1	4	4	0	2	6.00	
Nitrogen Dioxide	1	2	3	0	0	0	6.00	
Allyl alcohol*	4	0	4	3	1	2	6.00	
Acrolein*	4	0	4	3	3	3	5.00	
Formaldehyde	2	2	3	4	0	2	5.00	
Hydrogen Cyanide	3	1	4	4	2	3	5.00	
Boron Trifluoride	1	0	4	0	1	0.5	4.50	
Phosgene	1	0	4	0	1	0.5	4.50	
Methyl isocyanate*	4	2	1	3	2	2.5	4.50	
Hydrogen Bromide	1	0	3	0	0	0	4.00	
Phospshorus Trichloride	1	0	4	0	2	1	4.00	
The above are the Tier 2 Chemicals								
Tungsten Hexafluoride	0	0	4	0	1	0.5	3.50	
Methyl mercaptan*	2	0	4	4	1	2.5	3.50	
Hydrazine*	3	0	4	4	3	3.5	3.50	
Boron Trichloride	1	0	3	0	2	1	3.00	
Carbon Disulfide	2	0	3	4	0	2	3.00	
Fluorine	1	0	4	0	4	2	3.00	
Toluene disocyanate*	1	0	3	1	2	1.5	2.50	
Phosphine*	1	0	4	4	2	3	2.00	
Ethylene Oxide	2	0	3	4	3	3.5	1.50	
Arsine	0	0	4	4	2	3	1.00	
Diborane	0	0	4	4	3	3.5	0.50	
The Above are the Tier 3 Chemicals								
* Indicates Objective Chemicals								

What's New: Short Term Technical Strategy

- Pursue promising candidates responding to RFI
- Candidate assessment via FASQ and new material qualification protocols
- Fast Track—contenders move into later phases of assessment quickly

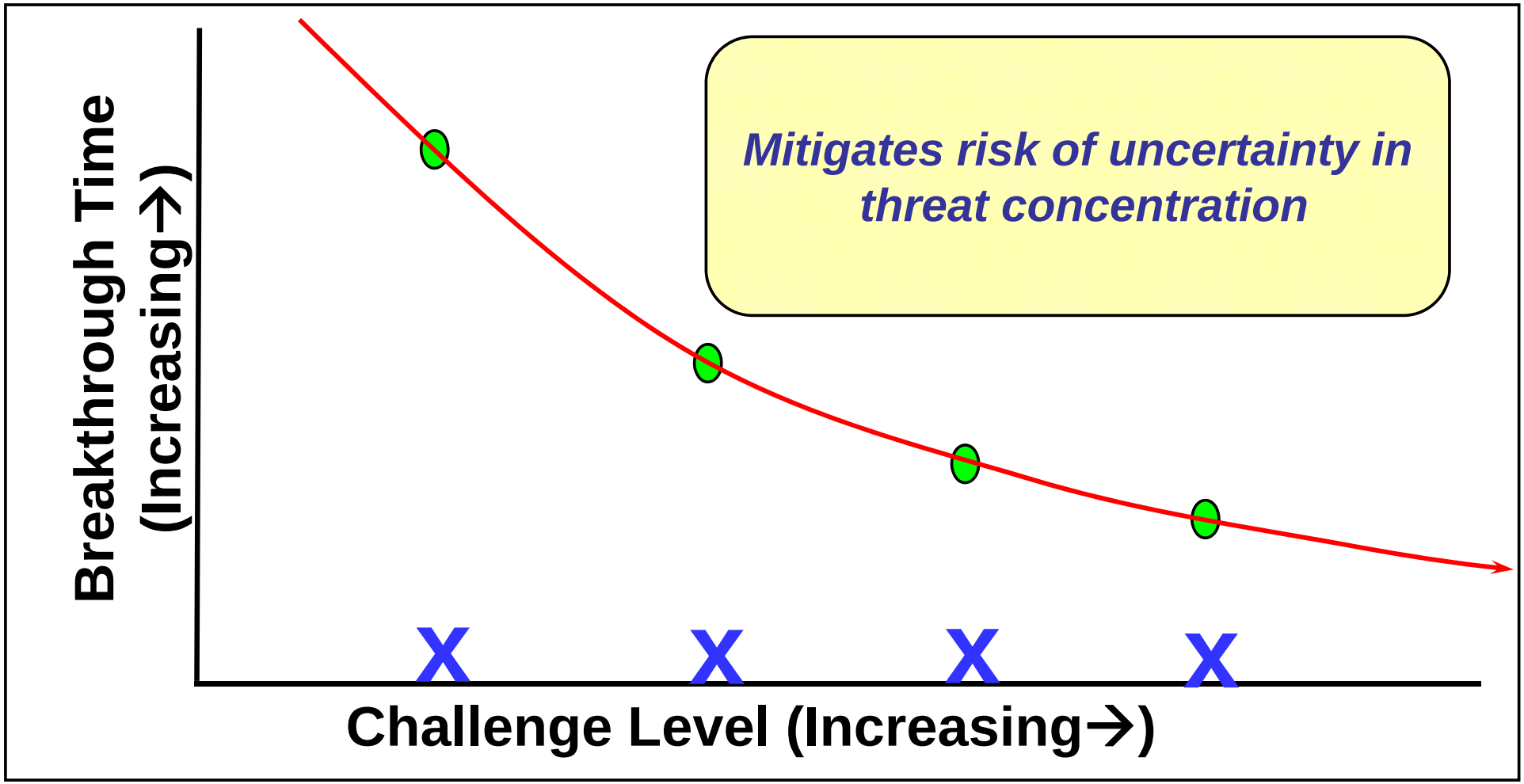


What's New: Long Term Technical Strategy



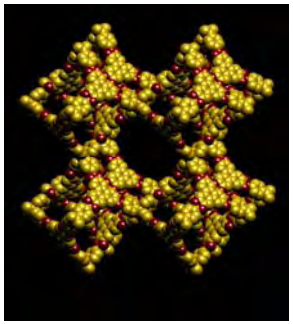
What's New: Approaches to Development of TIC Protection—How We Test

- Test range of concentrations
  - Performance curve generated vs. single data point
  - Extrapolation of performance for any vignette

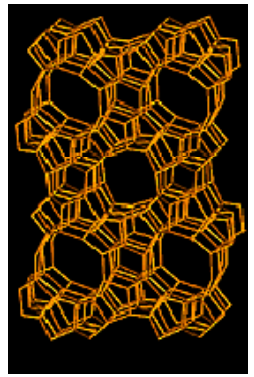


What are we looking for?

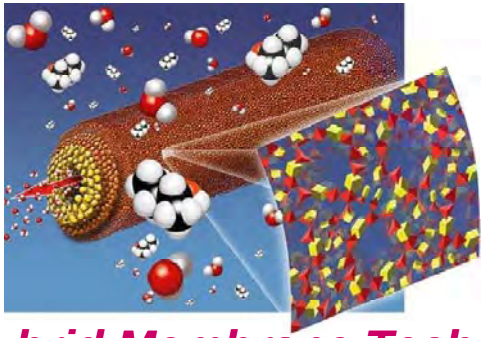
- *Innovative materials*
- *"Frontier ideas"*
  - *Filtration*
  - *Life support gas storage/generation*
- *Range of Technical Maturity*



"Reticular" Chemistry

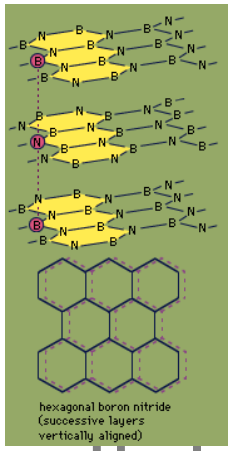


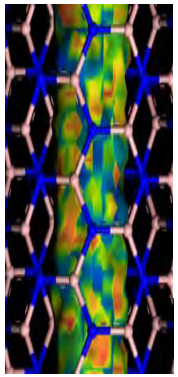
Zeolites



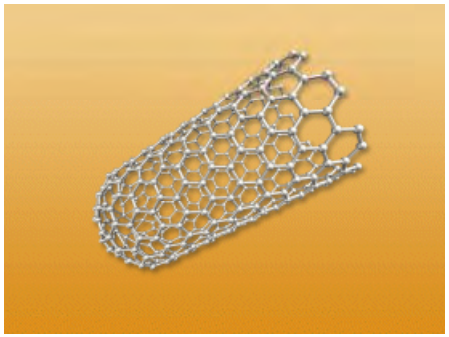
Hybrid Membrane Technology

BN Molecular Architecture





Carbon Nanostructures

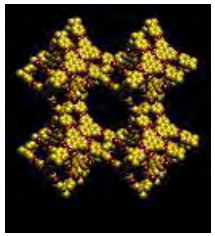


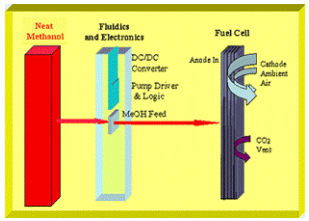
What are we looking for?

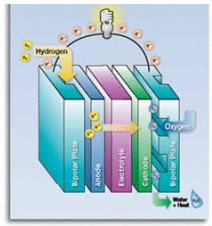
Creative propagation

Apply technology created for other purposes as a solution to a new problem:

Example: Fuel cell technologies







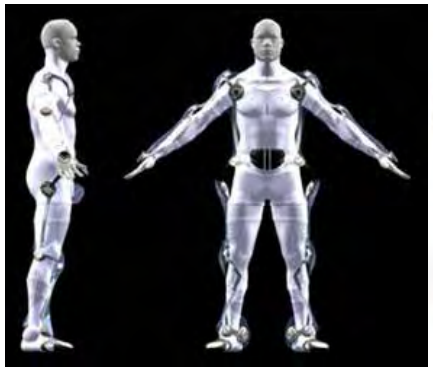
Gas storage media

Filtration media

Future ?

What are we looking for?

Integrated CBR/head trauma protection?



Tandem power/respiratory gas generation?

Tell us what's

possible

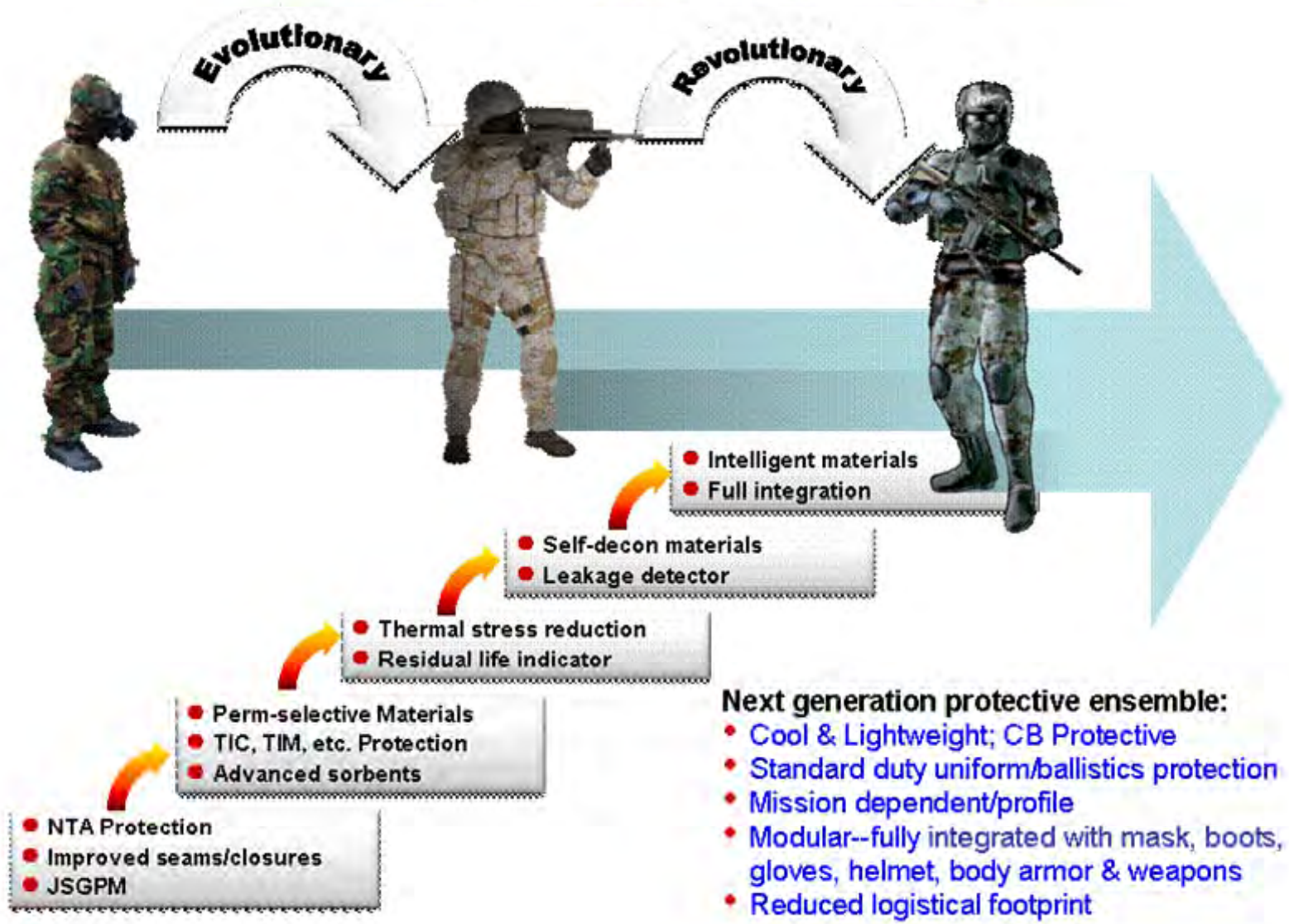
probable

practical

Lighter, faster Level A?

Advances in APR/SCBA hybrids?

JPM IP Ensemble Acquisition Strategy



Next generation protective ensemble:

- Cool & Lightweight; CB Protective
- Standard duty uniform/ballistics protection
- Mission dependent/profile
- Modular--fully integrated with mask, boots, gloves, helmet, body armor & weapons
- Reduced logistical footprint

JPM IP Ensemble Acquisition Schedule

JOINT CHEMICAL ENSEMBLE

TIMELINE FY08 09 10 11 12 FY15 →

Lightweight Chemical Biological Protective Garment

Aircrew Ensemble

Joint Chemical Ensemble

Continued Integration Efforts with IAE/MACH Uniform Developers

"Revolutionary *change* achieved through Evolutionary *gains*!"

Unclassified

Upcoming Business Opportunities

PROGRAM	EVENT DESCRIPTION	YEAR
Future Filtration Initiative	RFI Release July 2008	FY08
Lightweight Chemical-Biological Protective Garment	Industry Day Sept 2008	FY08
Joint Chemical Ensemble	Industry Day 3rd Qtr-FY10 for Potential Aviation Ensemble Improvements	FY10
Joint Chemical Ensemble	Next Generation Protective Ensemble RFI Release 3rd Qtr-FY12	FY12

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