FreedomCAR and Fuel Partnership

Codes and Standards Tech Team (CSTT)

Overview & Introduction
CSTT Purpose & Operation
C&S Roadmap & Fuel Purity

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FreedomCAR and Fuel Partnership

ChevronTexaco

ConocoPhillips

EXXONMobil

bp

Shell

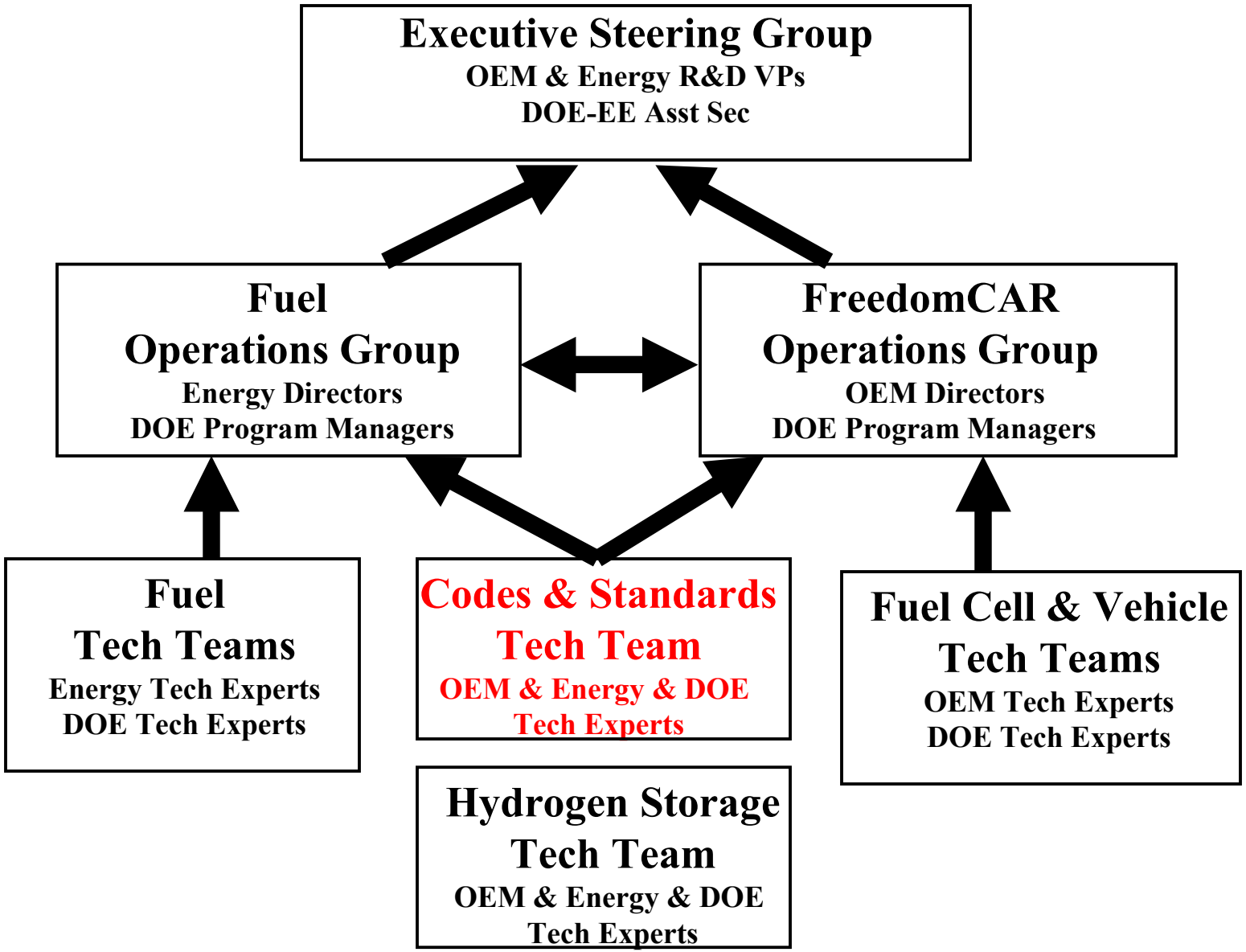
w/ National Labs

GM

DaimlerChrysler

Ford

Organization



C&S Roadmap

Focus on R&D

Solicit Input

Enable CDO/SDO

Enable Practice/Education

Communicate

CSTT Purpose

C&S Roadmap

- Develop a C&S Roadmap with focus on R&D in areas where sufficient data or experience is not currently available
- Enable the responsible development of robust codes & standards based on factual knowledge including statistically-appropriate experiential data
- CSTT C&S Roadmap will help DOE further develop the annual DOE R&D Plan by identifying priorities and timeframes

Coordinate with needs of CDOs & SDOs

- Seek input from experts and other professional organizations (NHA, USFCC, SAE, etc)
- Coordination of federal R&D at universities & national labs
- Coordination with requirements of promulgation & regulatory processes

CSTT Operation

Gaps

- Insufficient existing data
- Incorrect or inappropriate data
- Organized dissemination of information
- Education of stakeholders
- Training for industry and governments

Gap Closing Efforts

- Coordinate comprehensive data collection plan (Roadmap)
- Detail certain specific R&D approaches
- Assess existing information and processes currently underway
- Define both hard and soft R&D approaches
- National website access for CDO/SDO

Work Plan Target Areas

1. Hydrogen Properties
2. Vehicle Applications
3. Hydrogen Infrastructure Applications
4. Interface Applications
5. Testing/Validation
6. Education/Training
7. Communication/Dissemination
8. Coordinate w/ other TTs

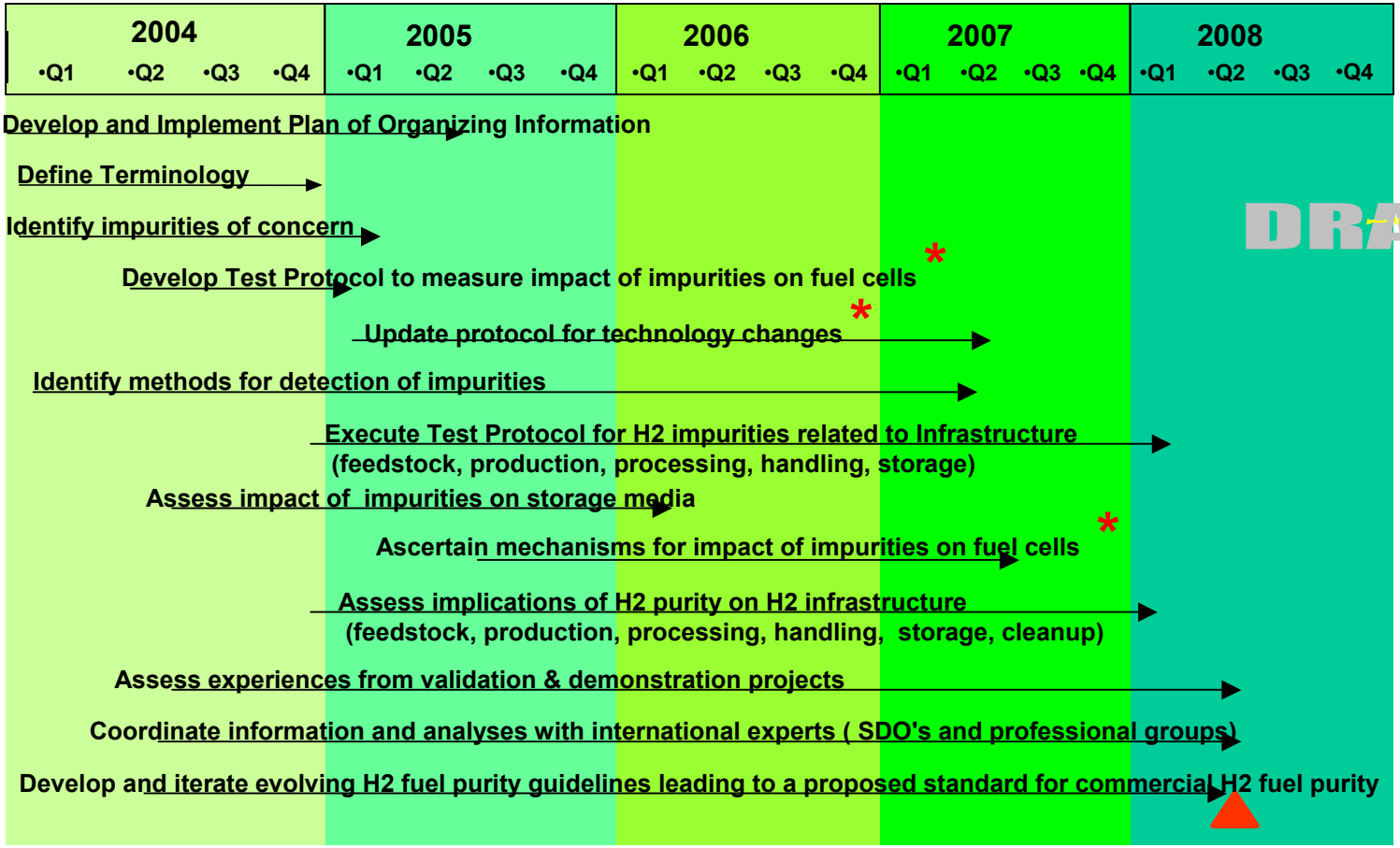
Context for Industry

1. Readiness State
   - Pre-Commercial
   - Commercial
2. Classification
   - Safety : (fire, properties, etc.)
   - Commercial : (purity, pressure, etc.)
   - Systems : (station/vehicle interface, etc.)
3. National and Global Awareness

Hydrogen Fuel Quality: R&D Needs

1. **Resolve data deficits**
   - Impact of impurities & diluents on fuel cells
   - Impact of impurities & diluents on production technology
2. **Assess validation / testing possibilities**
3. **Assess utility and scope of potential interim guidelines (pre-commercial)**
4. **Include continued R&D within C&S Roadmap to evolve guidelines to a commercial application**
5. **Cross cut with FC TT, Production TT, and Delivery TT to establish criteria**
6. **Engage industry, academia, and CDO/SDOs**

Draft Purity Plan



▲ SAE Recommended Practice for hydrogen fuel quality

* USFCC input anticipated

Potential Timeline

2004

- Draft Technical Roadmap
- Identify early participants (nat'l labs, universities)
- Develop design of experiments (test protocol)

2005

- Implement & oversee experimental test protocol (nat'l labs & universities)

2006

- Workshop to evaluate results, select guidelines
- Assess experience from programs

2007

- Disseminate to SDOs with information & analysis

Thank You

from the entire CSTT