The findings and conclusions in this presentation have not been formally disseminated by NIOSH and should not be construed to represent any agency determination or policy.

Interoperability Workshop

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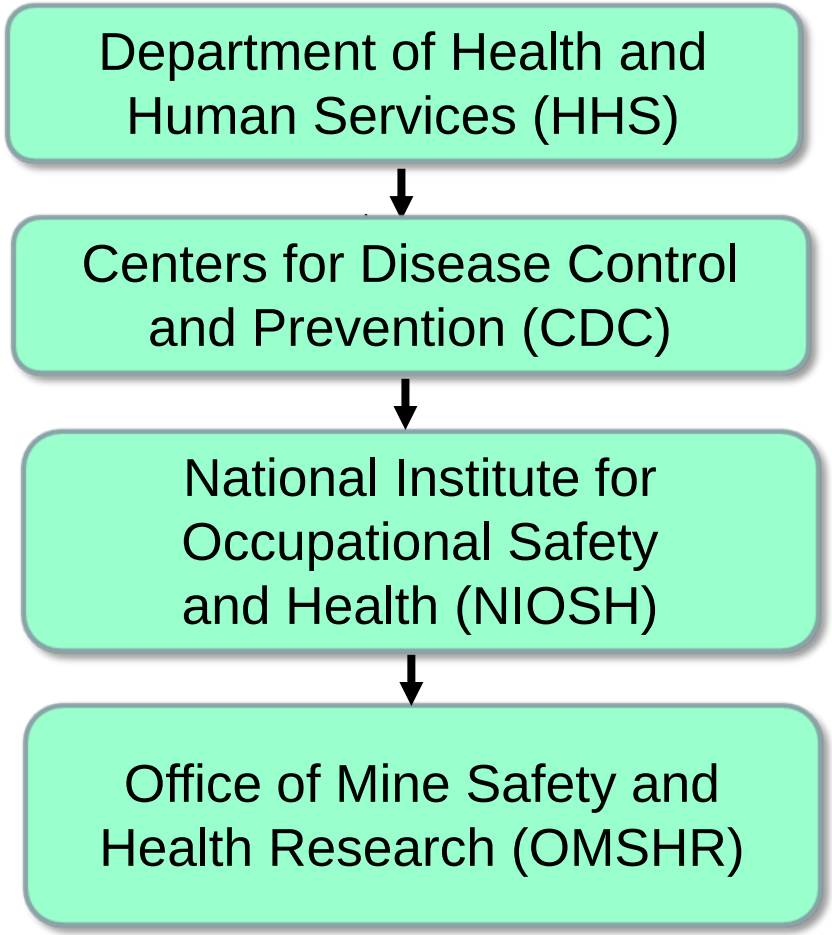
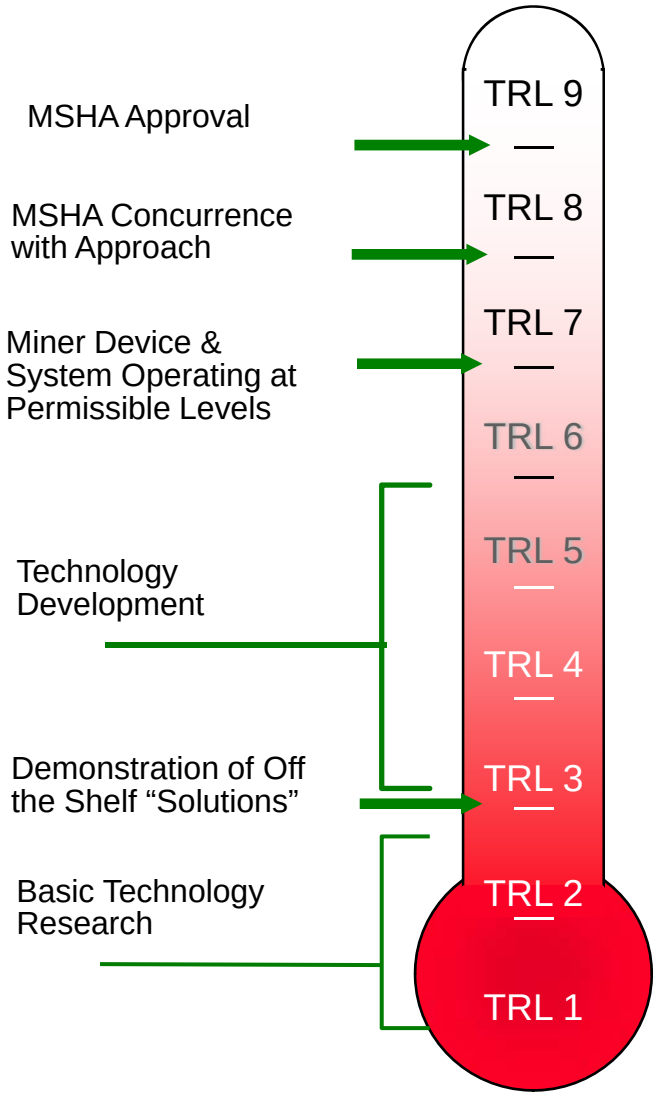

Department of Health and Human Services (HHS)
Centers for Disease Control and Prevention (CDC)
National Institute for Occupational Safety and Health (NIOSH)
Office of Mine Safety and Health Research (OMSHR)

OMSHR Role

- MINER Act – implement communications and tracking
- Emergency Supplemental Appropriations Bill (develop technology)
- CT (communications and tracking) workshops
- CT tutorial
- Internal research
- BAA process (limited funds) & specific competitive solicitations
  - Generally fund demonstration of new or enabling technology

Measuring Technology Maturity

Technology Readiness Levels



Actual system "mine proven" through successful full scale pilot operations

Actual system completed and "mine qualified" through test and demonstration

System prototype demonstration in a operational environment

System/subsystem model or prototype demonstration in a relevant environment

Component and/or breadboard validation in relevant environment

Component and/or breadboard validation in laboratory environment

Analytical and experimental critical function and/or characteristic proof-of-concept

Technology concept and/or application formulated

Basic principles observed and reported

The Communications Trend

- Manufacturers or distributors of communications technology
- Since passage of MINER Act (2006)
  - Tremendous advancement in communications technology
  - Numerous systems commercially available
  - MSHA approved list
    - 73 systems, peripherals, components

- Communications companies forming partnerships
- Distributors handling & combining multiple technologies
- Mine owner/operators combining systems

Goal = Survivable Communications

- The principal challenge for post accident operation is survivability
- Survivability has as much to do with the design and installation as it does the technology
  - Mine specific design approach
- Survivability is most practically achieved through alternate communications paths
  - No practical way to harden primary communications infrastructure to survive any conceivable event
  - Ideally – have primary & secondary system
  - Ideally - link primary to secondary system

The Issue

For daily use

Primary communications

- leaky feeder
- node based
- fiber or wired

Multiple channels
High data rates

For emergency use

Secondary communications

- medium frequency (MF)
- through-the-earth (TTE)

Single channel
Low data rates

Technology Integration Approaches

- Identify, modify, agree to use, existing standard(s)
  - Physical interface
  - Protocol
- Create new standard(s)
- Primary and Secondary manufacturers collaborate
  - Open architecture
  - Cooperative integration
- Industry assimilation
  - Form combined product, proprietary interface

How might OMSHR or NIST help?

- Introduce several primary/secondary system configurations

- Feel free to interrupt / participate
  - Identify issues
  - Gaps in technology
  - Ask questions

- Ultimately: Path forward