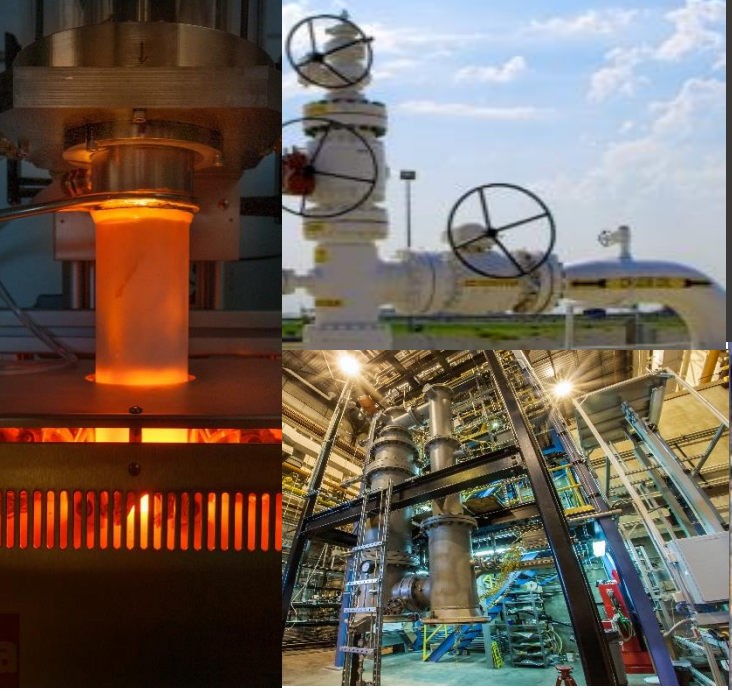




U.S. DEPARTMENT OF ENERGY

Office of Fossil Energy Applications for HPC

HPC 4 Manufacturing Industry Engagement Day

March 2-3, 2017

Dr. Darren Mollot

Associate Deputy Assistant Secretary

Office of Clean Coal and Carbon Management

New Subsurface Signals

Office of Fossil Energy

Develop high resolution imaging technologies to characterize fractures, reactions, processes, and fluid flow to guide subsurface operations

New Sensing Approaches

- High-performance sensors for broad scale deployment
- Development of monitoring systems that assess long-term performance of remediation systems and behavior of residual contamination

Integration of Multi-Scale, Multi-Type Data

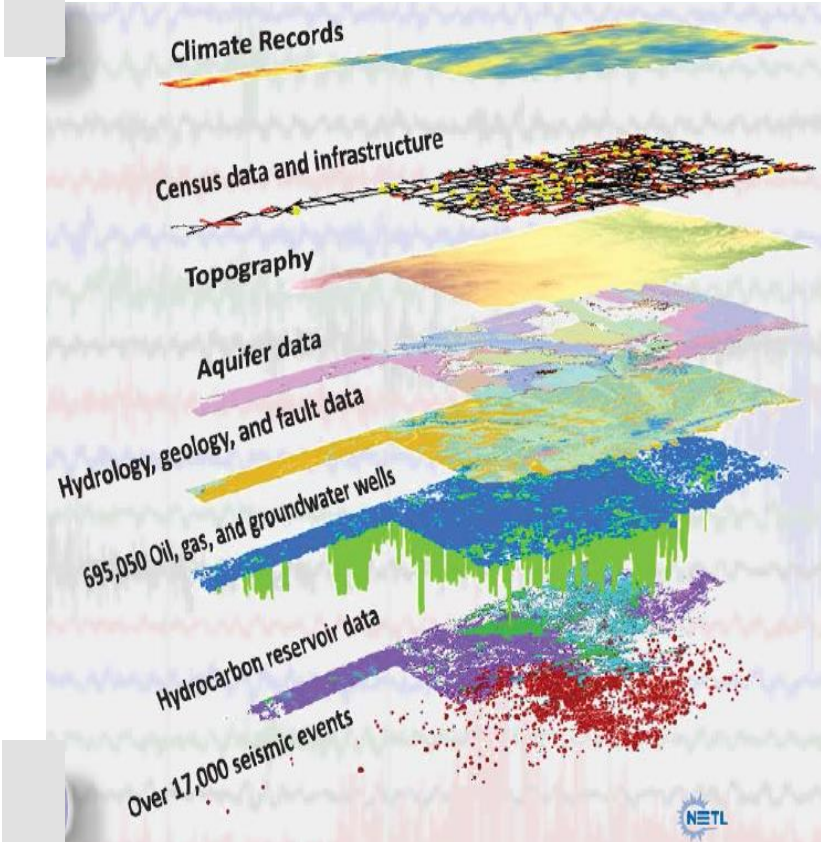
- Multi-sensor data integration and analytics (including visualization using "big data") focusing on faults and fractures

Diagnostic Signatures and Critical Thresholds

- Novel approaches to subsurface attenuation and scattering
- Diagnostic signatures and critical thresholds
- Development of tools and techniques to define key processes and features underpinning inherent uncertainties of environmental cleanup

Adaptive Control Processes

- Development of predictive models that depict natural subsurface dynamics, contaminant behavior, and remedial performance
- Expand scope of existing field observatories and establish new field observatories for testing and deployment of new sensing technologies

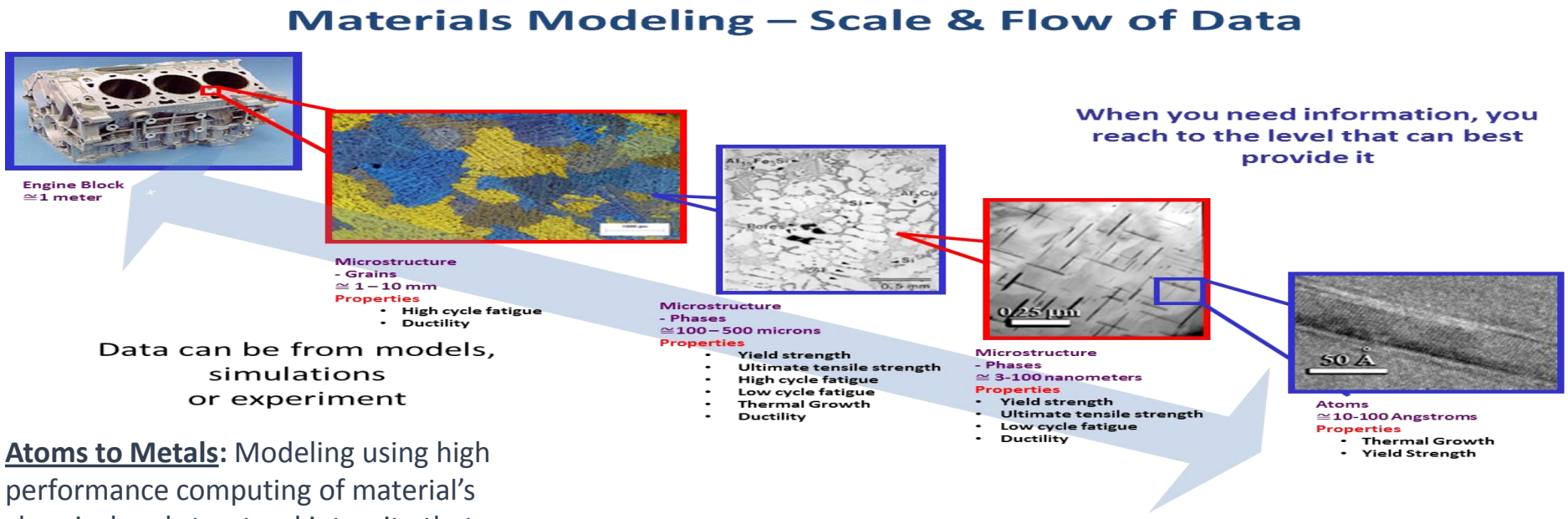


1. *Schematics of data meta-analysis visualizing big data summation using key geologic and risk variables. Credit: K. Rose NETL SubTER Sapling Tech Talk Jan. 1, 2016.*

FE: Materials Under Extreme Environments

Office of Fossil Energy

In FY 2017, new computational techniques will continue to be developed to design materials that are needed for advanced combustion and gasification systems. This computational work decreases the time and cost to develop the new materials and is projected to lead to classes of improved high performance materials:



Atoms to Metals: Modeling using high performance computing of material's chemical and structural integrity that will consider the impacts of multi-material interfaces on overall component performance.

Informatics and Accessible and reliable Data: Will be developed to analyze the large volume of data generated testing of materials to incorporate that learning to improve the predictive capability of simulations developed as well as to reduce uncertainty.

***Code Certification of High Temperature Materials*:** Develop methods to understand the effects of process and production an increasing throughput of predictively scale-up of materials (kg to tons) from proof-of-concept small-scale to full scale development processes.