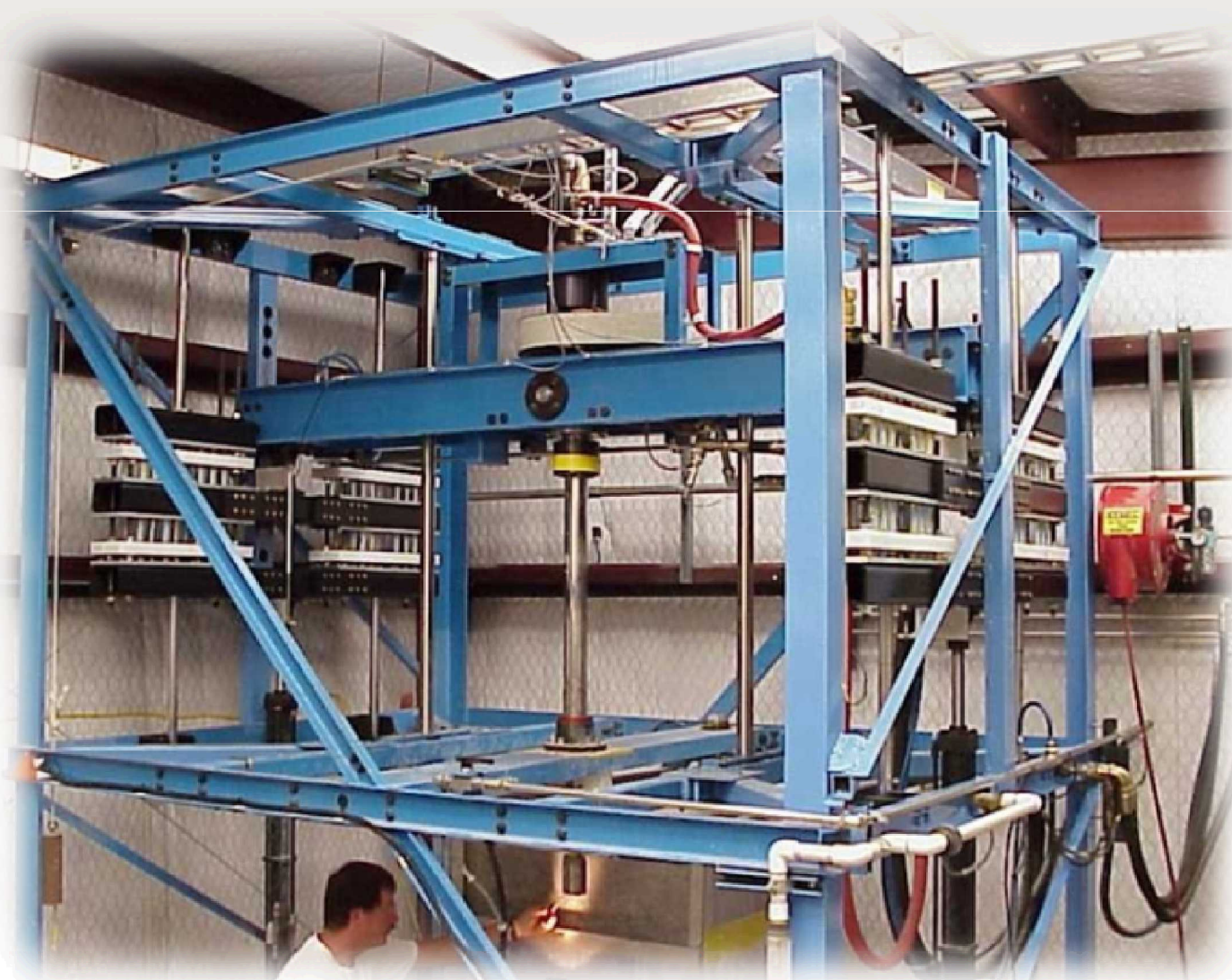


Active Suppression of Drilling System Vibrations For Deep Drilling

Laboratory Directed Research and Development

Problem

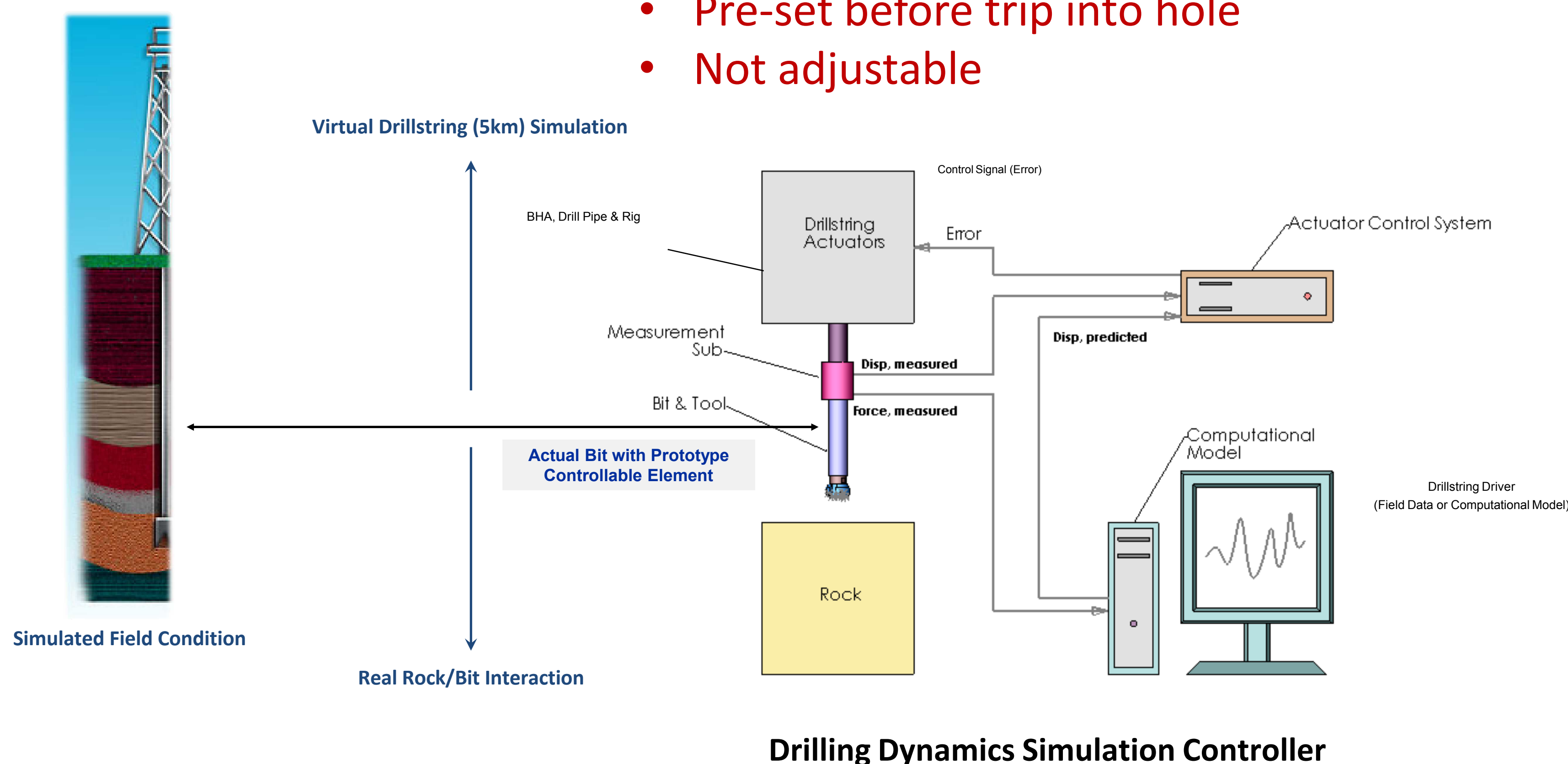
- A high-reliability drilling system is needed for construction of a deep borehole disposal system to depths of 5 km in continental crystalline basement rock
- Drilling dynamic dysfunctions are nemesis of drilling industry
- Vibrations of the drill string are of vital concern in deep holes as they increase the technical risks and final costs of well construction
 - trouble (non-productive time)
 - damaged components
 - reduced ROP (rate of penetration)
 - decreased bit and tool life



Drilling Dynamics Simulator

Solution Basis

- Suppress vibration by controlling dynamic properties of individual elements within drill string
 - Develop controllable, variable-rate spring elements
 - Selectively activated
 - Shift system resonance relative to excitation forces
- Autonomous
 - Internal sensing
 - Self-controlled
- Conventional approach
 - Fixed-rate spring elements
 - Pre-set before trip into hole
 - Not adjustable



Project Plan

- Computational Modeling, Candidate Technology Selection & Proof of Concept Demonstration
- Critical Function Evaluation & Prototype Development
- Drilling Applicability Demonstration

Exceptional Service in the National Interest