PLANETARY DEFENSE
MITIGATION GATEWAY

Ishan Shams, GRA, George Mason Univ.
Myra Bambacus, PM, NASA/NNSA NEO Mitigation Project
Dr. Phil Yang, Director of STC
Other Team Members

From NASA/NNSA joint NEO Mitigation Team

- Bernie Seery, USRA
- Kevin C. Greenaugh, DOE/NNSA
- Cathy Plesko, DOE/LANL
- Megan B. Syal, DOE/LLNL

Collaborating Team Members

- Dr. Gerbs Bauer, UMCP
- Dr. Jesse Dotson, NASA ARC
The NASA Planetary Defense Coordination Office (PDCO) directs critical studies. NASA Goddard and the National Nuclear Security Administration (NNSA) established a collaboration to investigate the short time response options to potentially hazardous objects (PHOS). The objectives of these study efforts motivated us to design this PD Mitigation Gateway

- **Challenge**: data dispersed throughout different organizations and research results produced by many different PD experts throughout the community

- **Purpose**: To build a one-stop shop for PD domain specific data, information, and knowledge by the NEO mitigation team for the community
  - One-stop gateway for pertinent PD related contents
  - PD knowledge base
  - Smart discovery and authoritative ranking to PD related resources
  - 5D Visualization tool for mitigation (x, y, z, t, and uncertainty)

- **Impact**
  - Advance discovery, innovation and education
  - Maximize the linkage to multiple data sources
  - Collaborate, share and integrate the different capabilities
  - Engage PD community to analyze and study risks from potentially hazardous objects
PD Mitigation Gateway Architecture

Knowledge Base

- Text Mining
  - Metadata
  - NLP
  - Linkage

- Database
- Distributed File System
- Domain Ontology
- Authoritative Data

Domain Crawler

Internet
Upload

Glossary
Visual Analytics

Reasoning Engine
Ranking, Recommendation, Semantic Search

PD Processing Workbench

Smart Search
Document Management
The NASA Planetary Defense Coordination Office (PDCO) was established in 2016 to study the mitigation of potential Near-Earth Object (NEO) impacts to our home planet. NASA Goddard and the National Nuclear Security Administration (NNSA) established a collaboration to study the short time response options to potentially hazardous objects (PHOs). The objectives of these study efforts motivated us to design this architectural framework (gateway) to provide unique capabilities to the Planetary Defense community including:

- **Smart Search**: A one-stop shop for planetary defense mitigation-related data, information, and knowledge based on a PD knowledge base, information mining and reasoning.
- **File Depot**: A document archiving and understanding system for managing the results produced by the PD science community.
- **Glossary**: An evolving PD knowledge base accumulated from existing literature using natural language processing, machine learning and deep learning.
- **Visual Analytics**: A visual analytics tool that helps interactively analyze the PD mitigation process.
Future Enhancements

1. Collaborative connections to more community data sources, such as small bodies, comets, Horizon, PDS, etc.
2. More dynamic mitigation scenario visualizations
3. Web crawler and search performance improvements
4. PD knowledge base and reasoning engine
5. Continue domain experts testing, evaluating, and helping to improve the system
6. Community computing resources infrastructure
7. Engineering the gateway as an operational service
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Thank You!