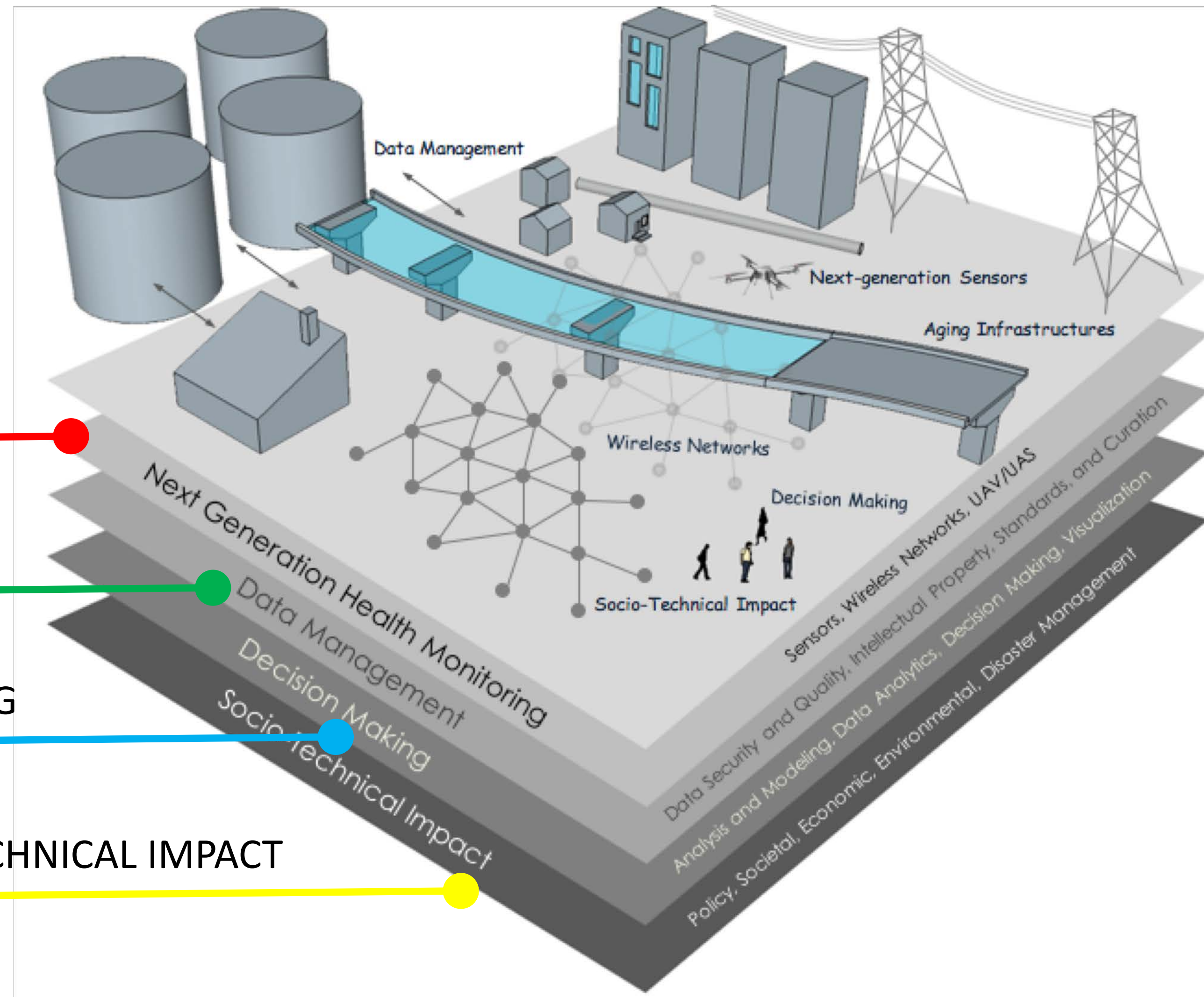# **SM**art big data pipeline for **A**ging **R**ural bridge **T**ransportation **I**nfrastructure

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Focus Areas

NEXT-GEN HEALTH MONITORING

DATA MANAGEMENT
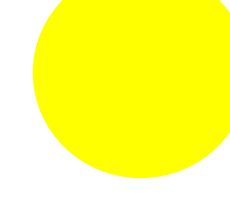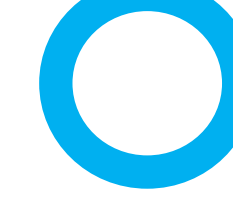
DECISION MAKING

SOCIO-TECHNICAL IMPACT

Approach

For representative auto and rail bridges in Midwest:

- Mine existing and new datasets

- Leverage next-gen sensing, seamless data management and curation

- Facilitate decision making and identify socio-technical impact
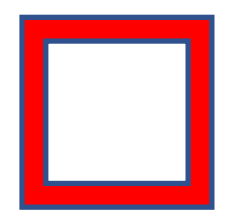
SMARTI

Next-Gen Health Monitoring

*Can **durable, low-cost systems** involving non-contact and contact sensors that integrate Big Data pipelines become essential components for maintaining rural bridge health?*

*What is a **suitable technique** to autonomously maneuver a UAV so that it can collect data from the surface of a 3D bridge structure ensuring certain constraints are satisfied?*


*Can on-site **fusion techniques** be applied to produce and discover new bridge datasets and restore missing data without installing additional sensors?*

Data Management

*How to perform **automatic curation** of bridge health data and what formats would increase **data security and portability** for long-term preservation?*


*How can bridge health data be expressed through **metadata** to encourage discovery and reuse for social science, computational, and engineering research?*
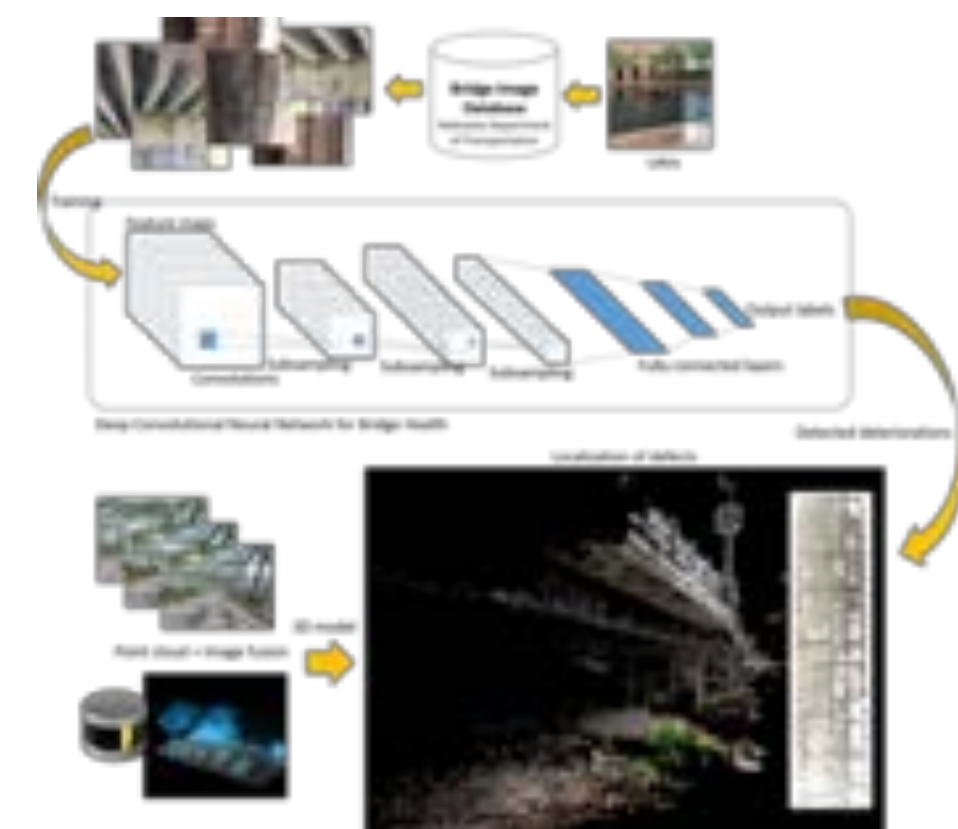
Decision Making

*How to **predict responses** from several locations on the bridge using sparse instrumentation schemes coupled with accurate computational models for damage indices when exact loads (inputs) are unknown?*
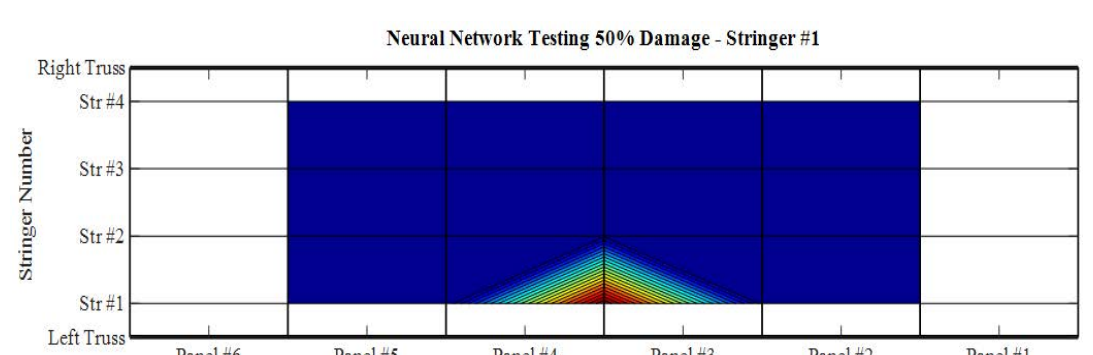
*What **machine/deep learning techniques** help identify factors or factor level combinations indicate deterioration of bridge health in the representative set of bridges?*

*What **data visualization techniques and tools** provide an optimal user experience to extract actions to address bridge health through exploration and interaction?*

Socio-Technical Impact

*What are the **institutional challenges** in the transition to a focus from just building bridge infrastructure to a mindset of continuously monitoring the health of our infrastructures? How does this transition play into building resilient rural communities that can deal with disasters?*

*How **effective are current economic and human loss models** for estimating losses from partial and cascading failures in a "systems of systems" environment?*
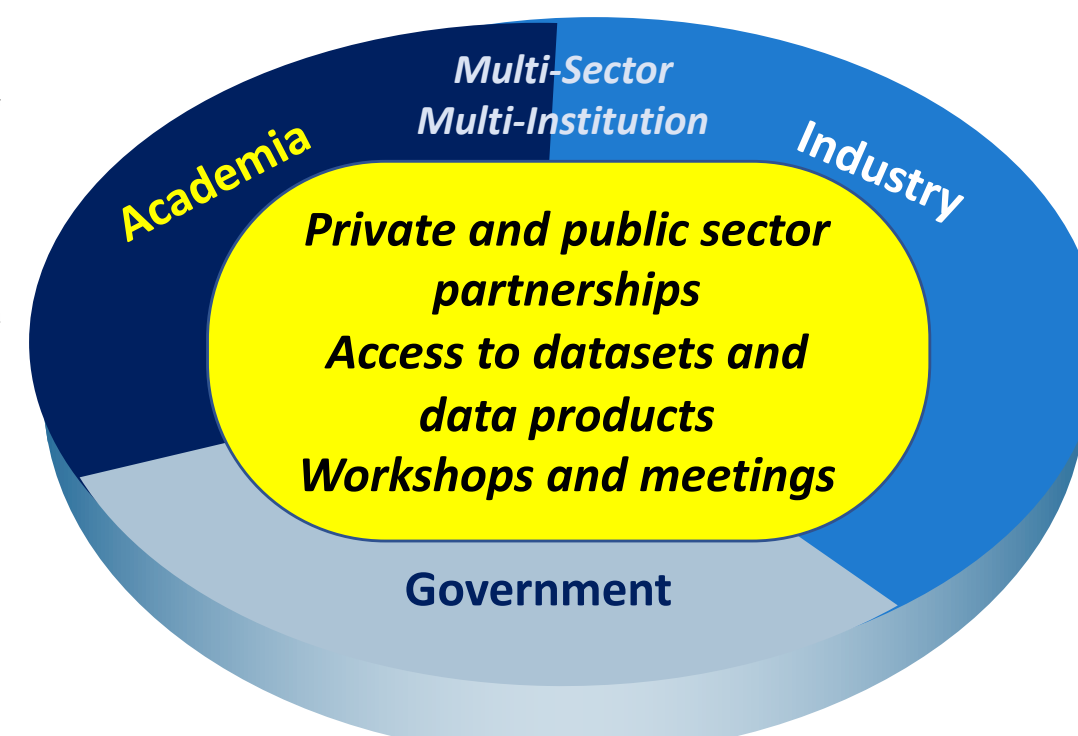
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Academia — Industry
Private and public sector partnerships
Access to datasets and data products
Workshops and meetings
Government

MIDWEST BIG DATA HUB

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