

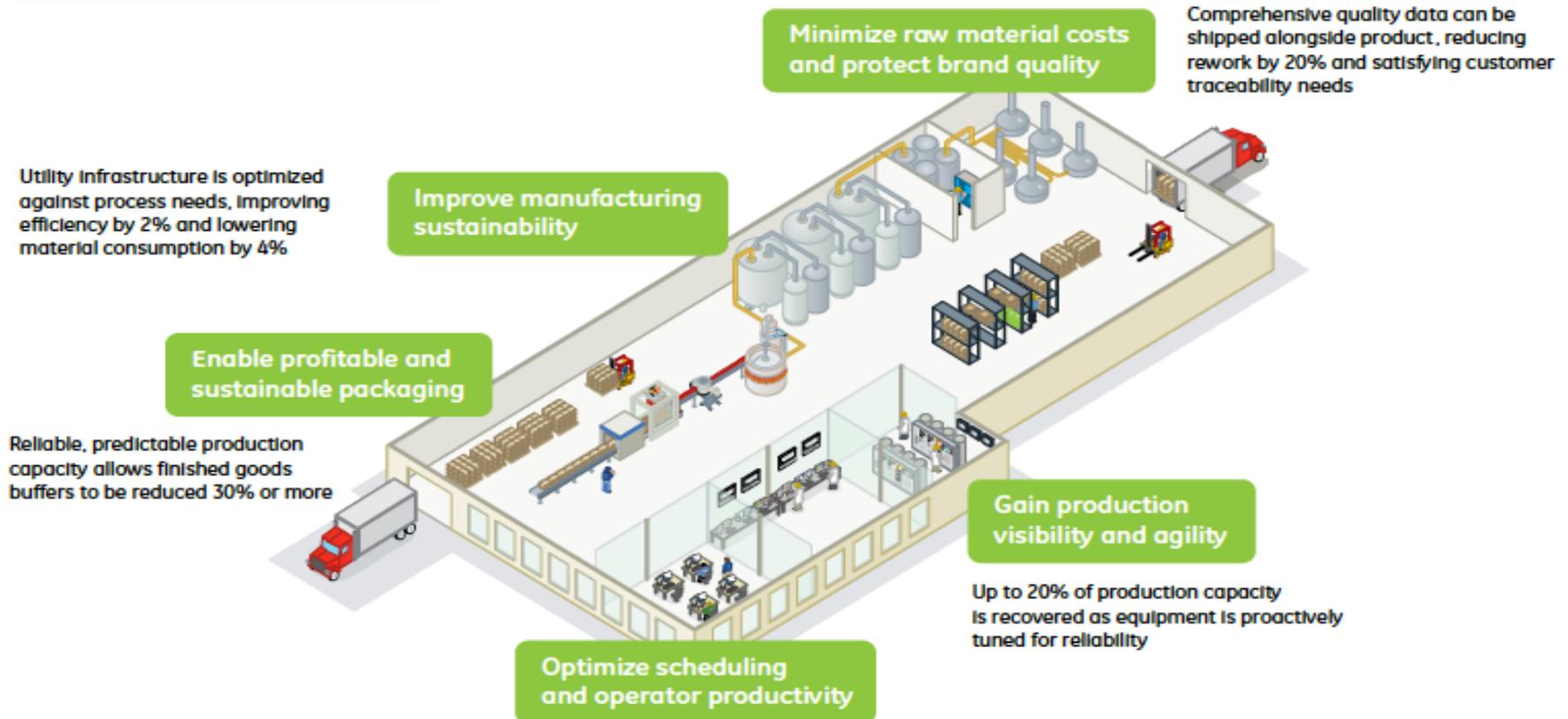
# Focus Group: Big Data Analytics for Smart Manufacturing Systems

Report by  
Sudarsan Rachuri  
sudarsan@nist.gov



# Improving Manufacturing Efficiency through Predictive Analytics

## Typical Process Improvements



- 5% decrease in batch cycle time
- 10% improvement in machine reliability
- 10% reduction in water consumption
- 5% reduction in energy costs



# The new Program

## Smart Manufacturing Systems Design and Analysis

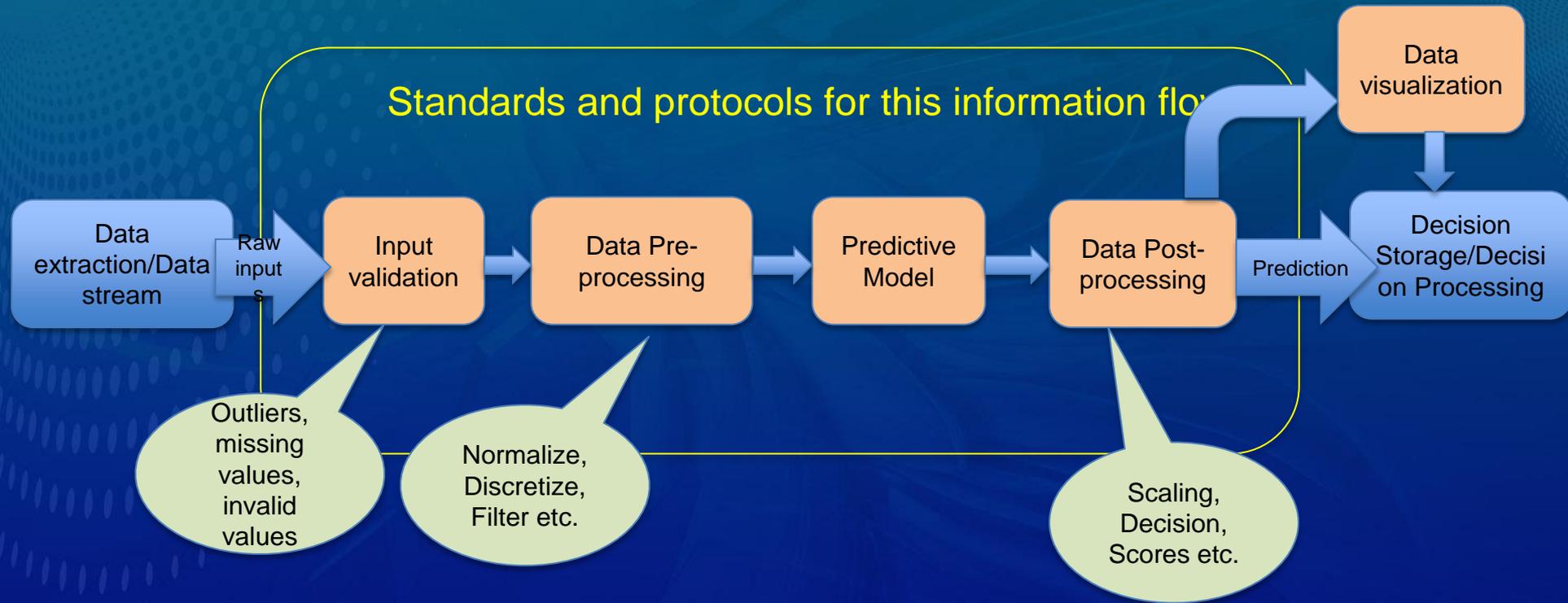
- Objective: The objective is to deliver measurement science, standards and protocols, and tools needed to predict, assess, optimize, and control the performance of smart manufacturing systems.

### Major Projects:

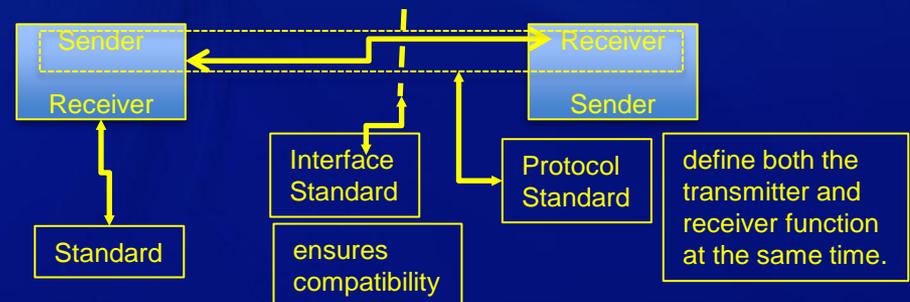
1. Reference architecture and open solution stack to enable and assess the composable SMS
2. Modeling methodology and associated tools to predict, assess, and optimize the operational performance
3. Data analytics and associated methods and tools to enable adaptive system
4. Methods and tools for system performance assurance.



# We need to understand the Predictive Analytics Workflow

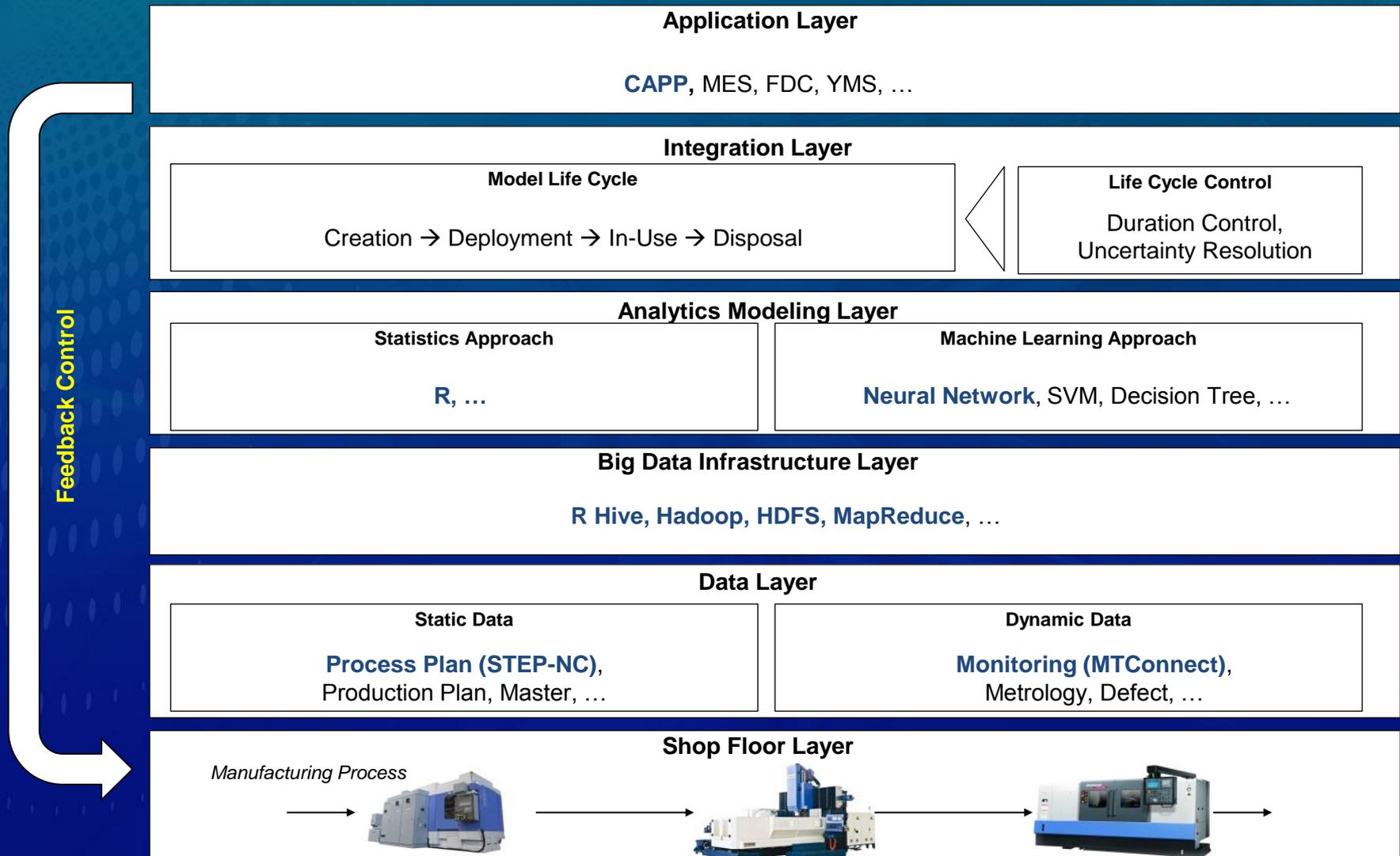


- Standardize the predictive models
  - Model definition
  - Model Composition
  - Model chaining



# Promise of Big Data Analytics Solution!

<Concept Architecture>



# Focus Group Discussion Points

- Data acquisition issues
  - In Health care, Manufacturing (discrete, continuous)
  - Cost of collecting data
  - Availability of data (real world data and data simulator)
  - What are the real implications of volume, velocity, variety, and veracity?
  - Methods of collecting data (manual, automated)
  - Open Data Repository



# Focus Group Discussion Points

- Standards for data acquisition
  - Data attributes (meta data), unstructured (extracted from text,...), structured (standards), data sampling
  - Data access and query
  - Data modeling and data science
  - Safety data, privacy of data (data masking??)
  - Open Data Initiative ??
  - Measurement and metrics for V&V



# Focus Group Discussion Points

## Analytics Modeling

- Problem classification: No need for DA, Good to have DA, must have DA
- Data driven Models, Architecture for Data Analytics (common issues for Manufacturing and Health Care)
- Model Composition, chaining, reuse
- Correlation to Cause-Effect Analysis
- Analytics Workflow – Standards and Protocols
- Moving analytics to the data
- More research needed in understanding feature vector (minimal or optimal)
- Computing and IT infrastructure for DA



# Data Analytics – Past, Present and Future

Data Volume

