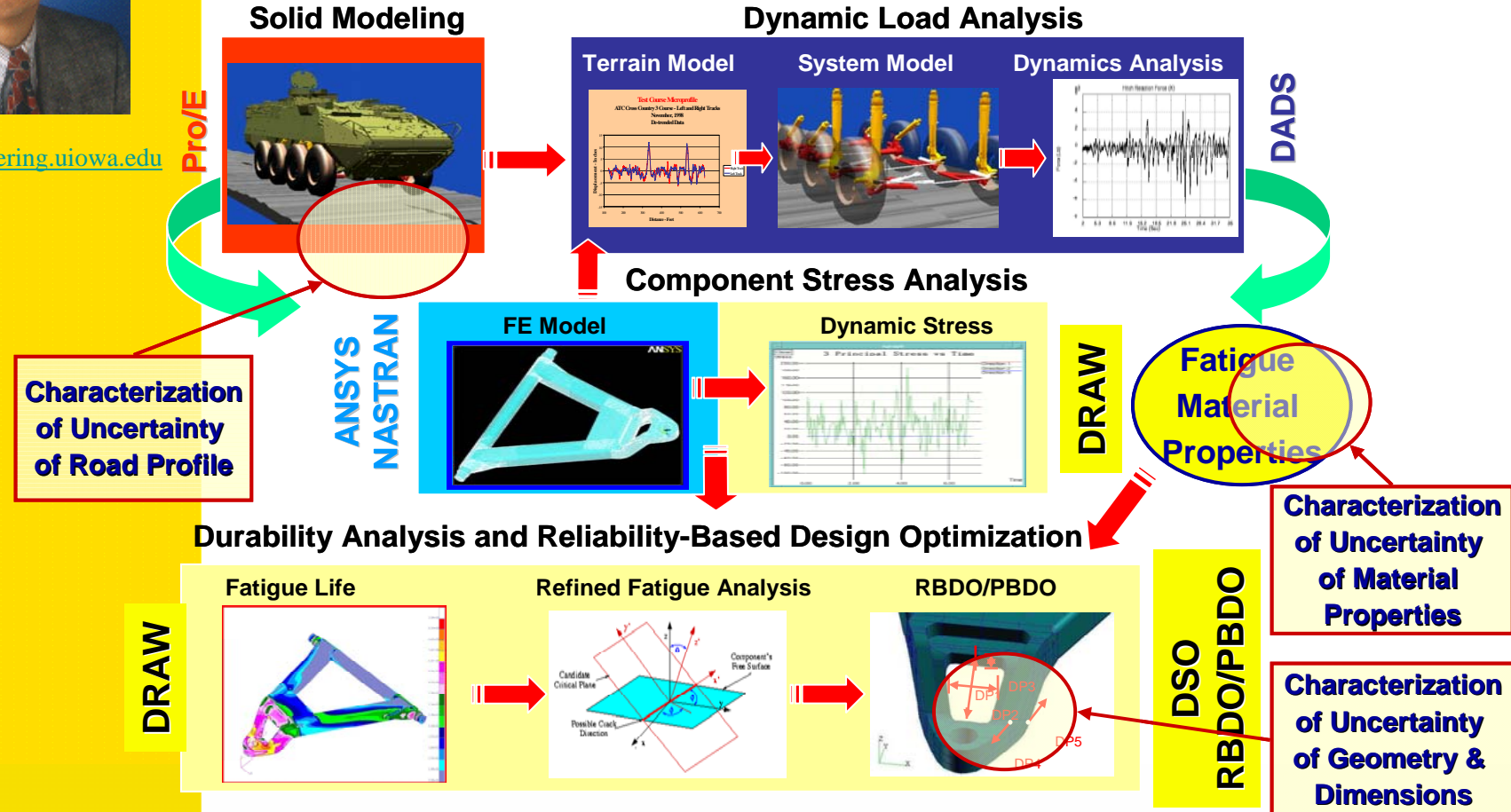


ARMY VEHICLE DURABILITY OPTIMIZATION & RELIABILITY



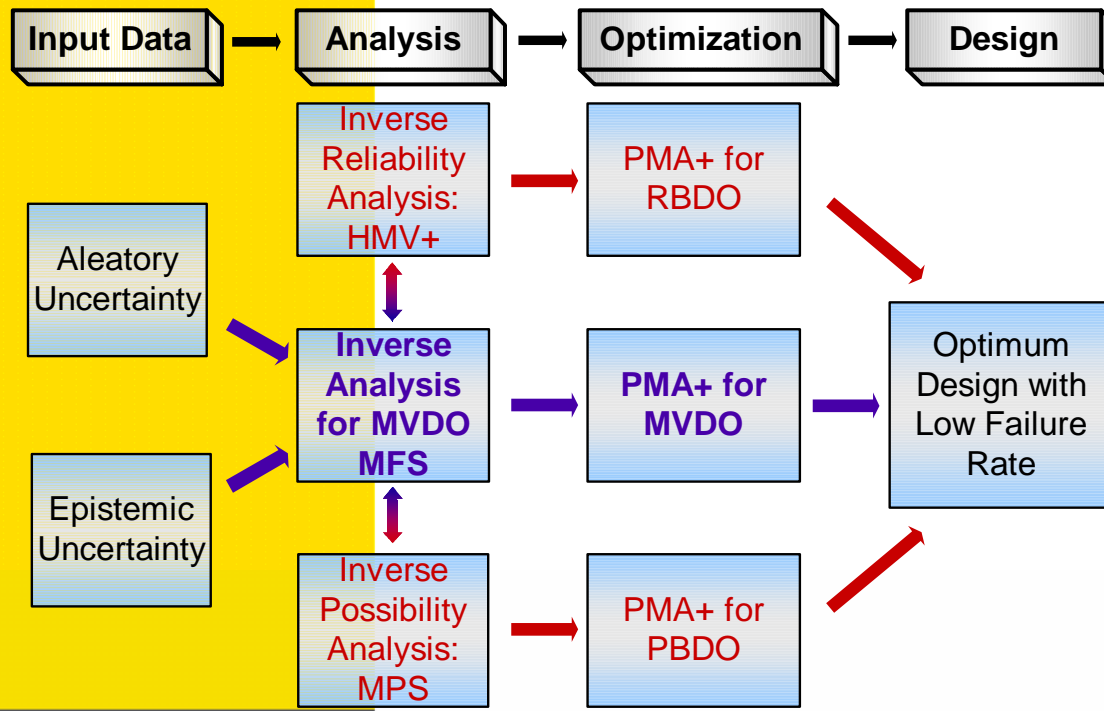
kkchoi@engineering.uiowa.edu



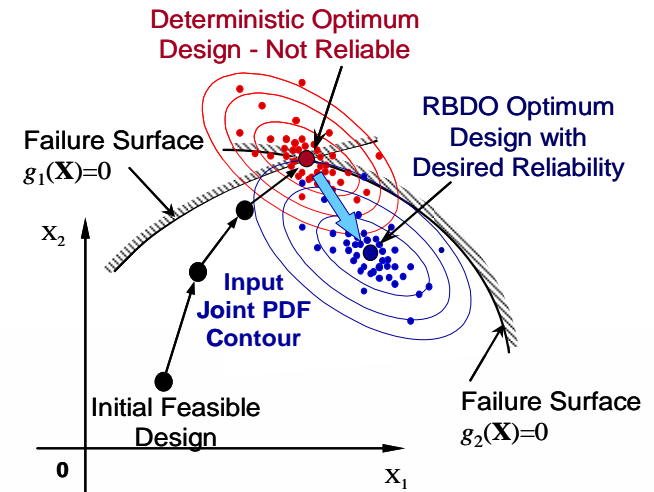
- ✓ How to Optimize the Vehicle Design to Minimize/Reduce the Weight?
- ✓ Under These Uncertainties, How to Achieve Component Level Reliability?
- ✓ Under These Uncertainties, How to Achieve System Level Reliability?

DESIGN OPTIMIZATION UNDER UNCERTAINTY

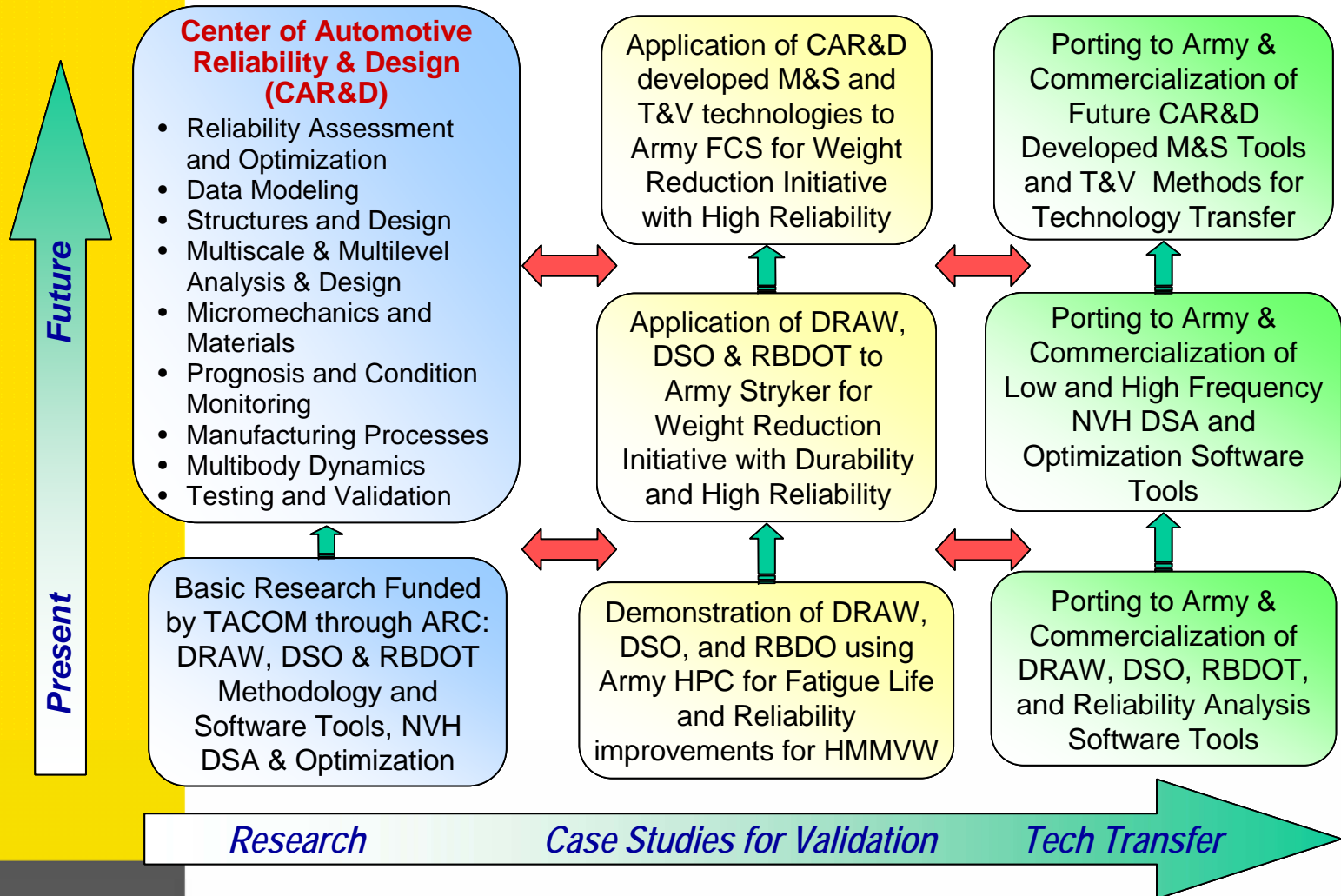
- Reliability-Based Design Optimization (RBDO)
- Possibility-Based Design Optimization (PBDO)
- Mixed Variable Design Optimization (MVDO)
- Robust Design Optimization (RDO)



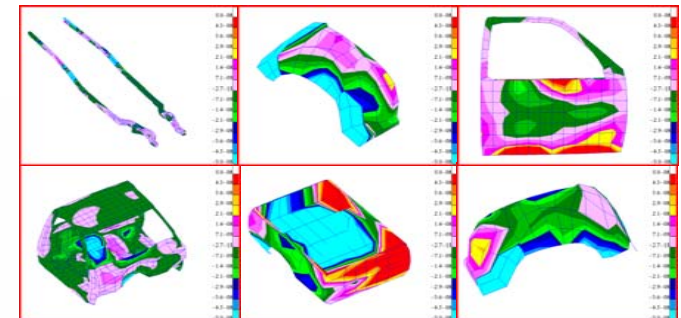
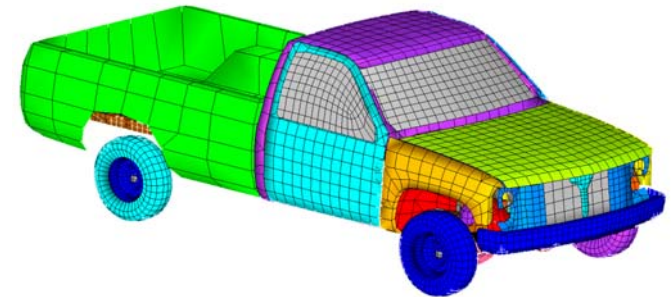
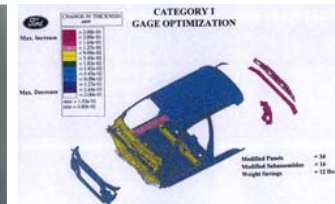
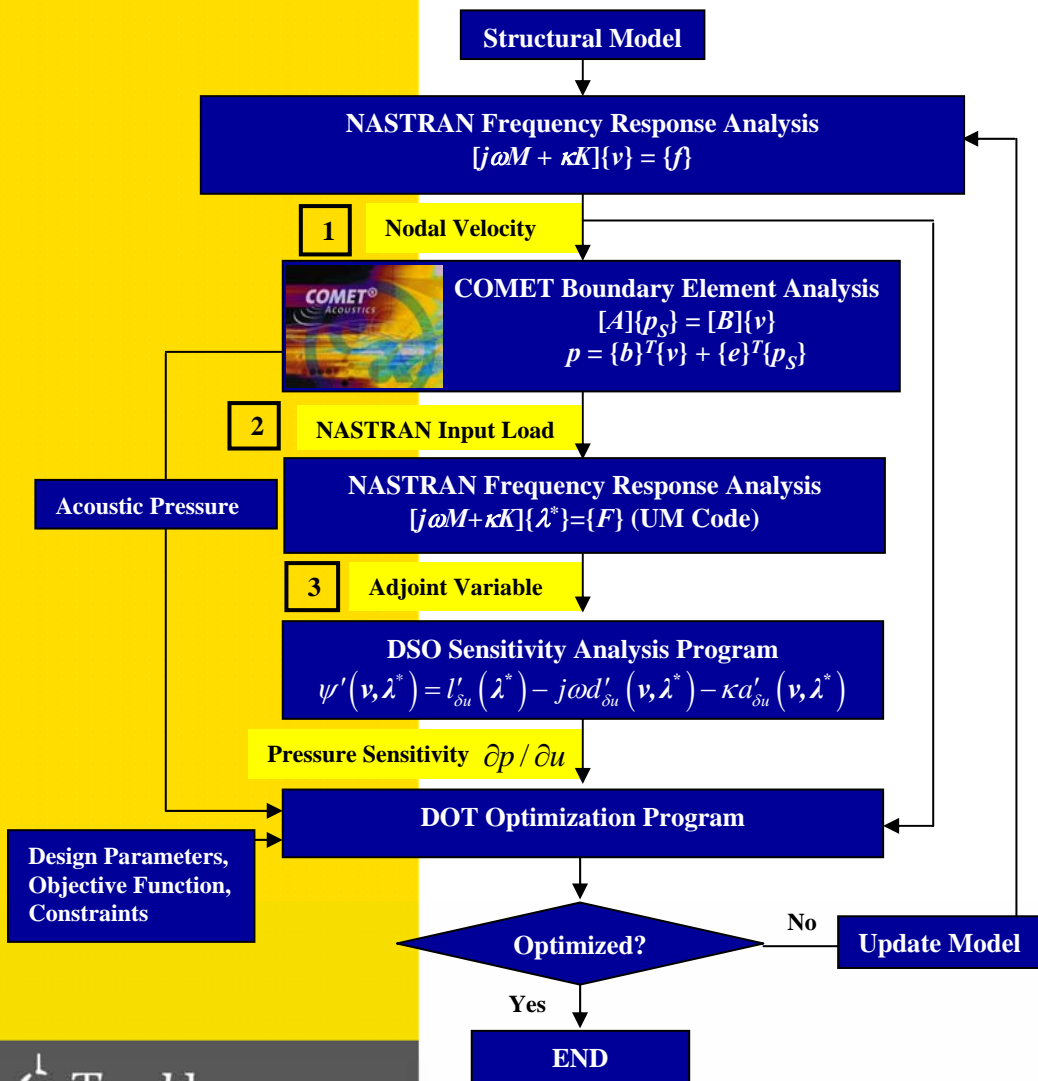
- ✓ **Uncertainties of System Input**
- ✓ **Probability of System Failure**
- ✓ **Optimum Design for 6-Sigma**



PLAN OF RELIABILITY RESEARCH, APPLICATION, AND TECHNOLOGY TRANSFER IN CAR&D



NOISE, VIBRATION, & HARSHNESS DESIGN OPTIMIZATION (FEA-BEA & EFEA-EBEA)

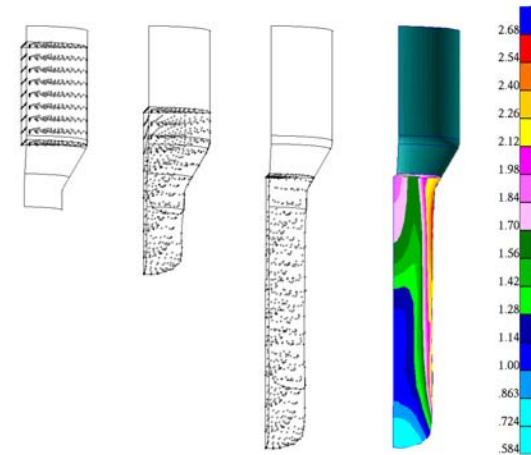


STAMPING & METAL FORMING PROCESS DESIGN USING MESHFREE METHOD

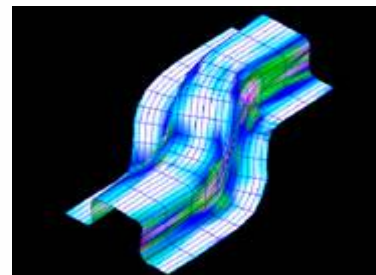
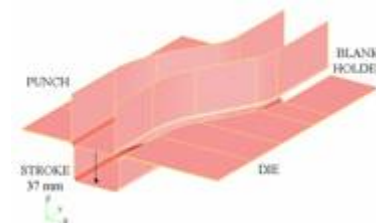
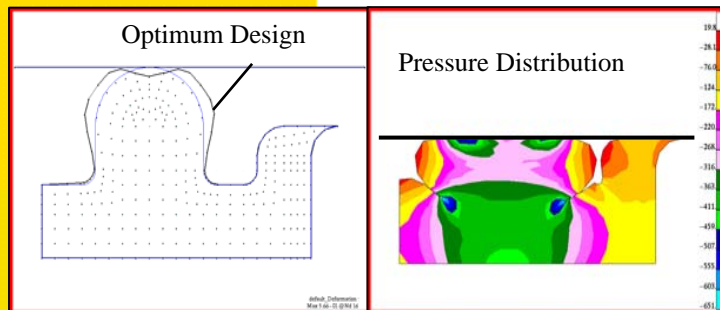
Development of Design Sensitivity Analysis (DSA) and Optimization Capability of

- A Seamless Integration of CAD-Simulation-Design
- Large Shape Changing Problems without Remodeling
- Finite Deformation Elastoplasticity for Manufacturing Process Design
- Frictional Contact Problems for Die Shape Design Optimization
- Nonlinear Shell DSA for Sheet Metal Stamping Process Design

Extrusion Design



Gasket Design



FEA Took 58 Iterations* with 7 Remodelings

Meshfree Took 17 Iterations w/o Any Remodeling

Stamping Design