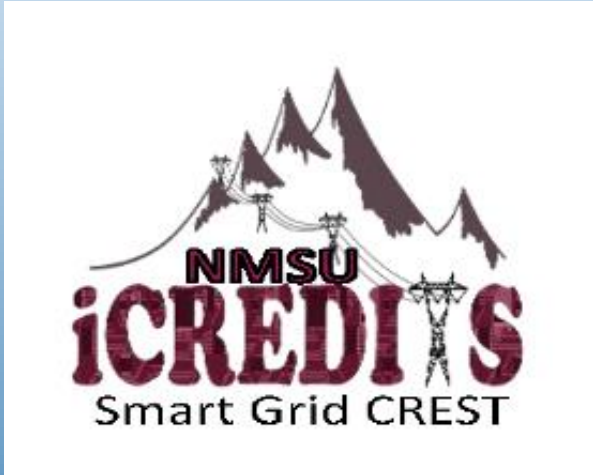




2021 Virtual HBCU-UP/CREST PI-PD Meeting



CREST: Interdisciplinary Center for Research Excellence in Design of Intelligent Technologies for Smartgrids Phase I and Phase II (iCREDITS I and II)

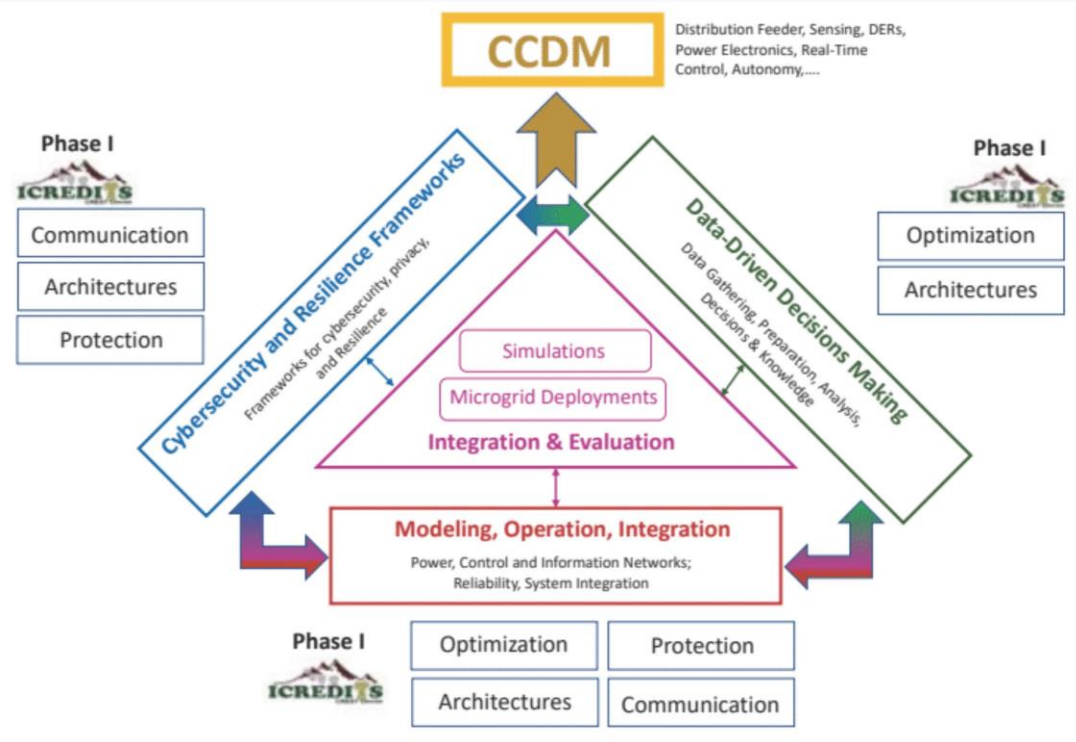
Principal Investigators

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iCREDITS Project Overview



- Establish a national hub of research and education in smartgrids and critical cyberphysical systems (CCS)
- Fosters the transformation of electricity distribution feeders into interconnected customer-centric distribution microgrids (CCDMs)
- Advances CCDMs as an effective model for smartgrids that which enables reuse of distribution infrastructures
- Develops realistic and scalable approaches to the realization of microgrids and networks of agile grids that are secure, reliable, and resilient

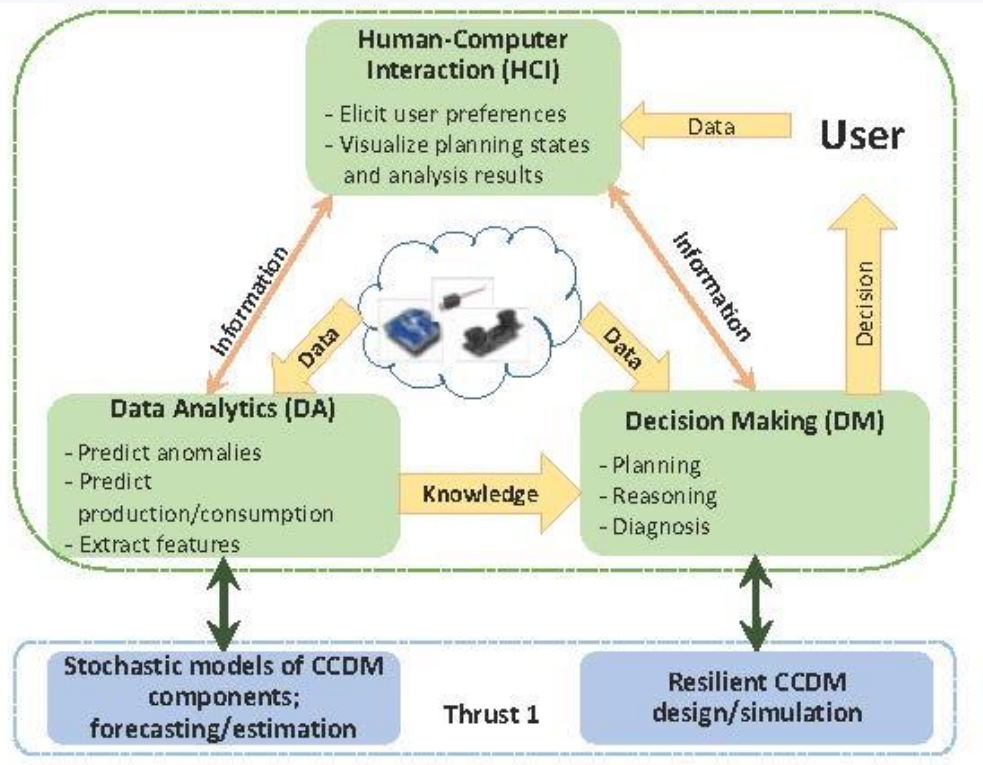
Power Electronics and Low-Level Operation

- CCDMs incorporates technologies (i.e., advanced power electronics for redundancy), integrates multiple resources, and utilizes data-driven agility by consolidating diverse information
- Development of Power Electronic Getaways using conventional voltage-source inverters and novel topologies for agile CCDMs
- Use of an extended stochastic, Model Predictive Control approach to develop methods for operational planning and control of agile CCDMs
- Investigate co-design of control and communication for distributed management and operations

Grid Cybersecurity in CCDMs

- Design a cybersecurity framework for security, provenance, authentication, and privacy based on trust
- Investigate mechanisms to augment the framework with resilience, particularly for failures and post-quantum attacks
- Study hardware-based security and hardware-assistance to support the cybersecurity framework and related tasks
- Explore future-proofing concepts, i.e., zero-knowledge proofs, efficient oblivious transfer-based protocol design and implementation, distributed ledger, and quantum-safe computing

Machine Learning



- Design new algorithms to extract knowledge from data generated by a CCDM, or input by CCDM users
- Develop new approaches to planning and diagnosis in multi-agent systems with focus on CCDMs and engagement of human agents emphasizing distributed reasoning and scalability
- Create methods and interfaces to elicit human needs and preferences and for communicating knowledge learned from the system to end users