Perspectives on Distributed Systems Research
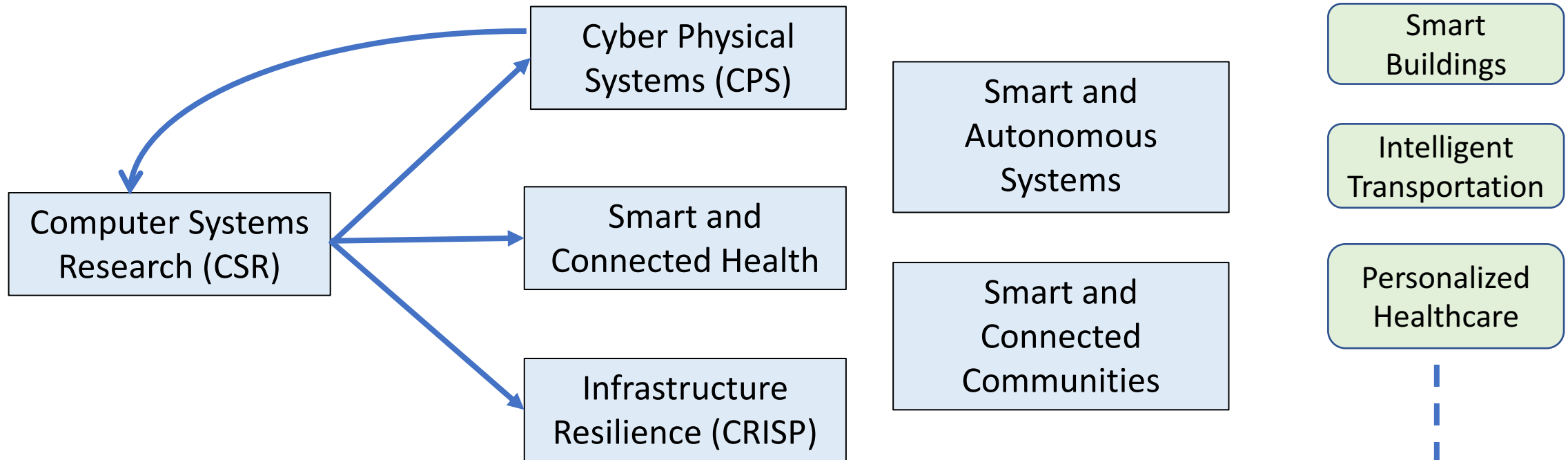
Gurdip Singh

Syracuse University

Systems Research

Computer Systems Research (CSR)

Systems Research
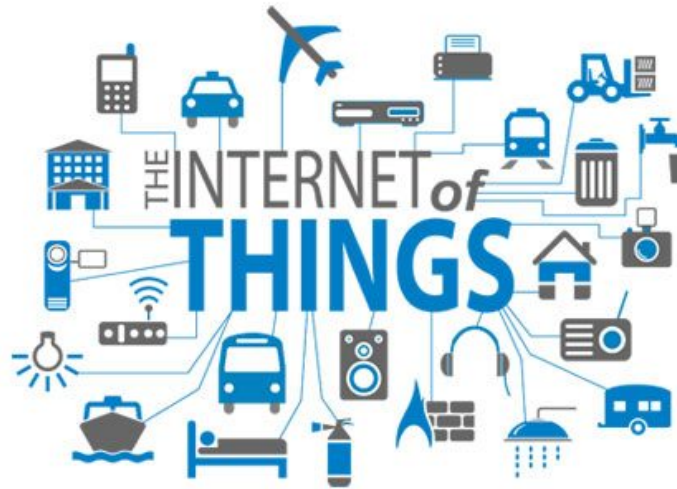
Drivers for Systems Research

- Large scale, Complex and heterogeneous

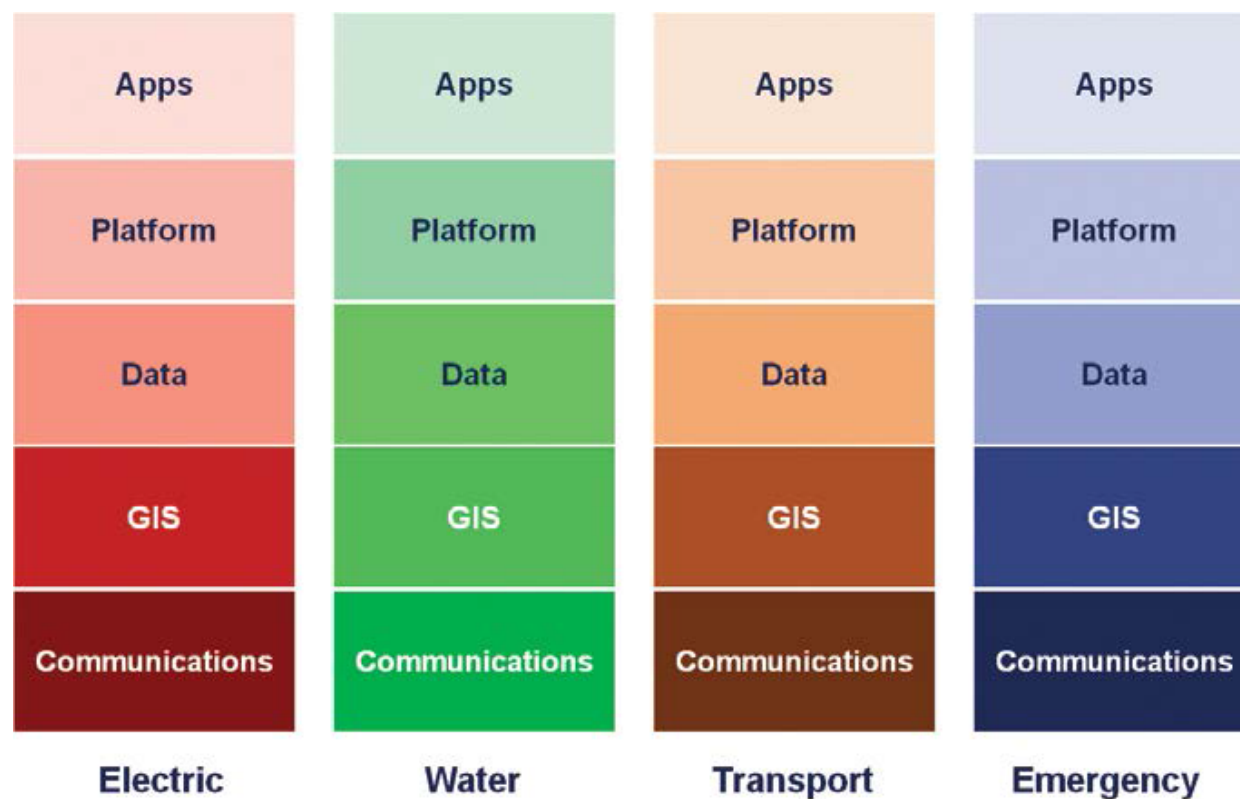# Drivers for Systems Research

- Scalability

Drivers for Systems Research

- Scalability
- Heterogeneity

  - Devices
  - Network technologies
  - Middleware
  - Applications
  - Infrastructures

Drivers for Systems Research

Drivers for Systems Research

- Scalability
- Heterogeneity
- Data

Drivers for Systems Research

- Scalability
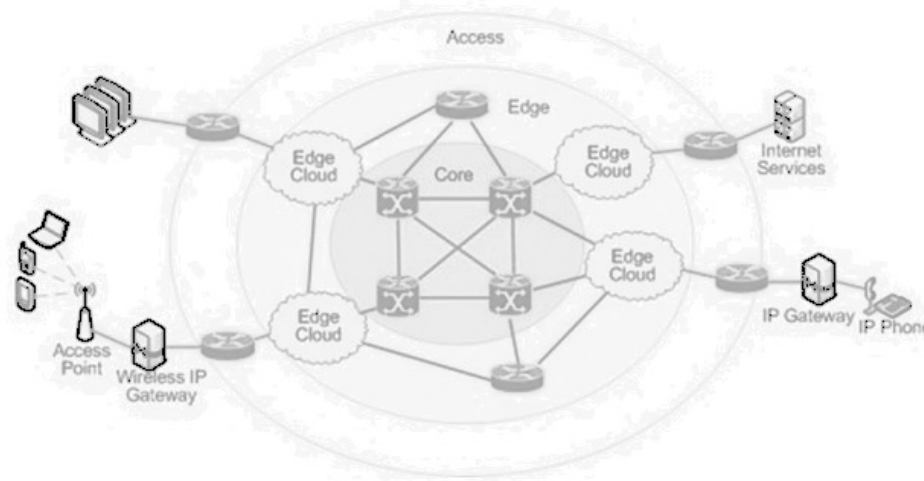- Heterogeneity
- Data
- Anywhere, anytime

Planned Scenarios
- Failures, Disconnected Operations
- Remote Locations
- …

Unplanned Scenarios
- Unknown environments
- Extreme events
- …

Techniques/Approaches

- **Edge Computing**

http://iot.eng.wayne.edu/edge/NSF Edge Workshop Report.pdf

Problems addressed:
- Locality
- Scale
- Real-time Response
- Disconnected operations
- ...

Challenges:
- Decentralized maintenance
- Graceful-degradation
- Sharing infrastructure
- ...

source: http://computerworld.de
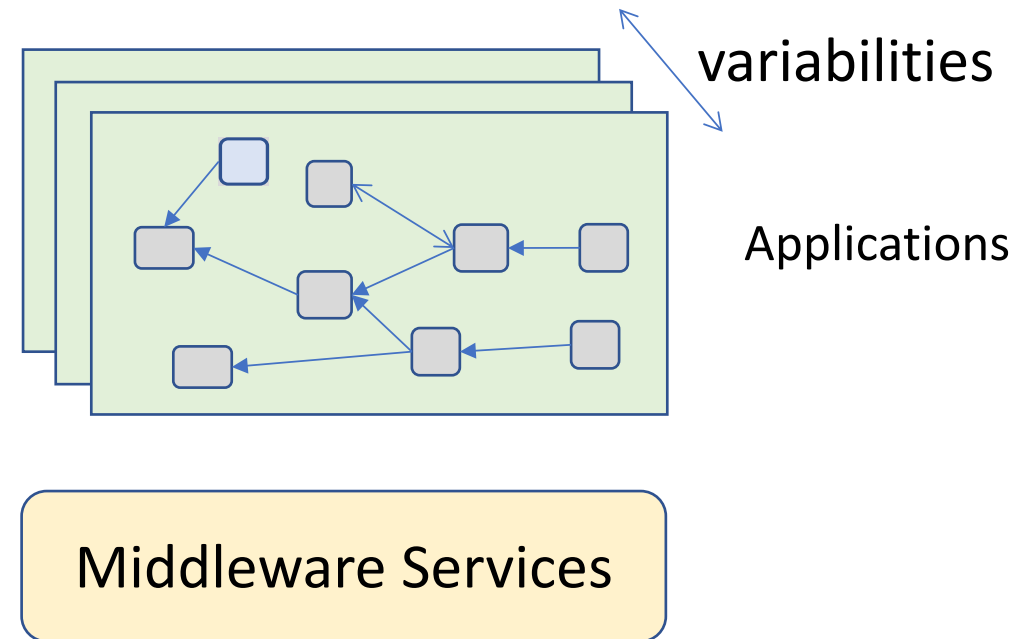
Techniques/Approaches

- Edge Computing
- Exploiting commonalities
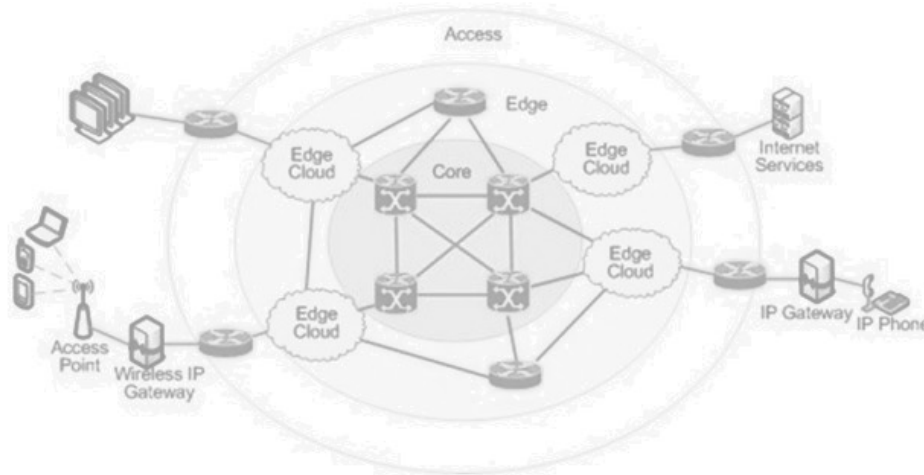
- Device level sharing
- Middleware level sharing
- Application level sharing
  - Static composition
  - Dynamic composition

Techniques/Approaches

- Edge Computing
- Exploiting commonalities
- Exploiting Application Semantics

  ➤ QoS/Mission critical applications
  ➤ Customizable middleware

variabilities

Applications

Middleware Services
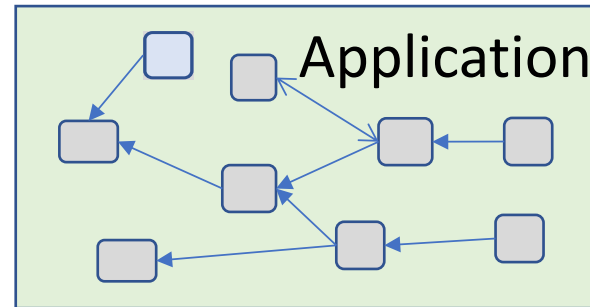
Techniques/Approaches

- Edge Computing
- Exploiting commonalities
- Exploiting Application Semantics
- Computing in context

Karaman 2015

Techniques/Approaches

- Edge Computing
- Exploiting commonalities
- Application Semantics
- Computing in context

Application

Middleware Services

Infrastructure
(context)

Conclusion