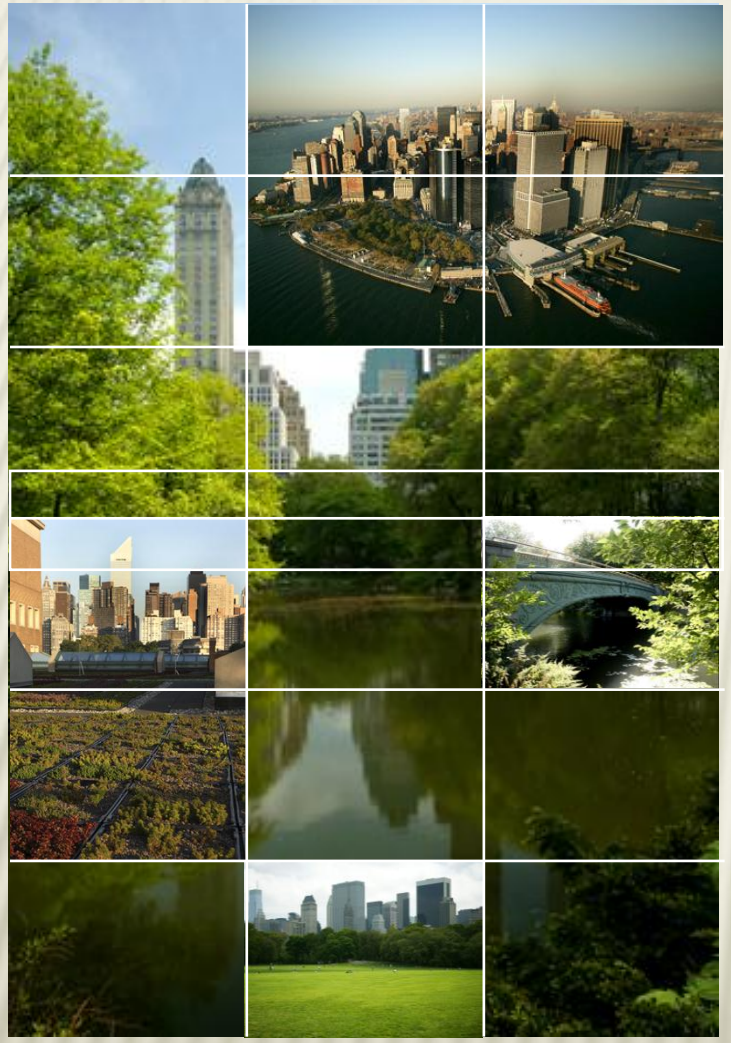
Smart Grid-Strategies for Integrated Urban Infrastructure Management



Arthur Kressner
New York University - Polytechnic Institute

W-SMART 2011 International Workshop

May 11 – 14, 2011 - The Hague

NYU·poly

URBAN UTILITY CENTER

grid connections

CON EDISON'S ELECTRIC SYSTEM IN NEW YORK CITY

- 3.2 million customers, 14-16 million people
- 36,000 miles of overhead lines
- 94,000 miles of underground lines
- 80 local distribution networks

THE SYSTEM

Substations

Transmission	37
Sub-Transmission (Area)	60
Distribution Transformer Vaults	78,700

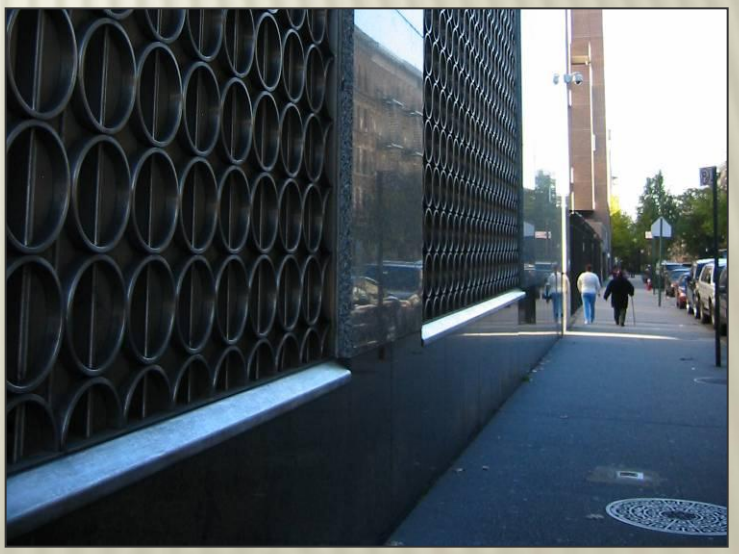
System Voltages

Transmission	345kV, 500kV
Sub-Transmission	138kV, 69kV
Primary Distribution	33kV, 27kV, 13kV, 4kV
Secondary Distribution	120/208V, 460V

Distribution Design Criteria

- N-2 in high density
- N-1 minimum throughout entire system
- Low voltage distributed grid and spot networks

Area Substation



UNDER THE STREETS

Why a Smart Grid

- Existing facilities are aging and change is a challenge- old and new facilities need to capable of change
- Resources are getting more varied, costly and scarce
- The resource is increasingly vital to personal, economic and societal well being
- The systems need to provide a high level of physical and cyber security
- Uncertainty about future technologies and other challenges, require flexible and adaptable strategies

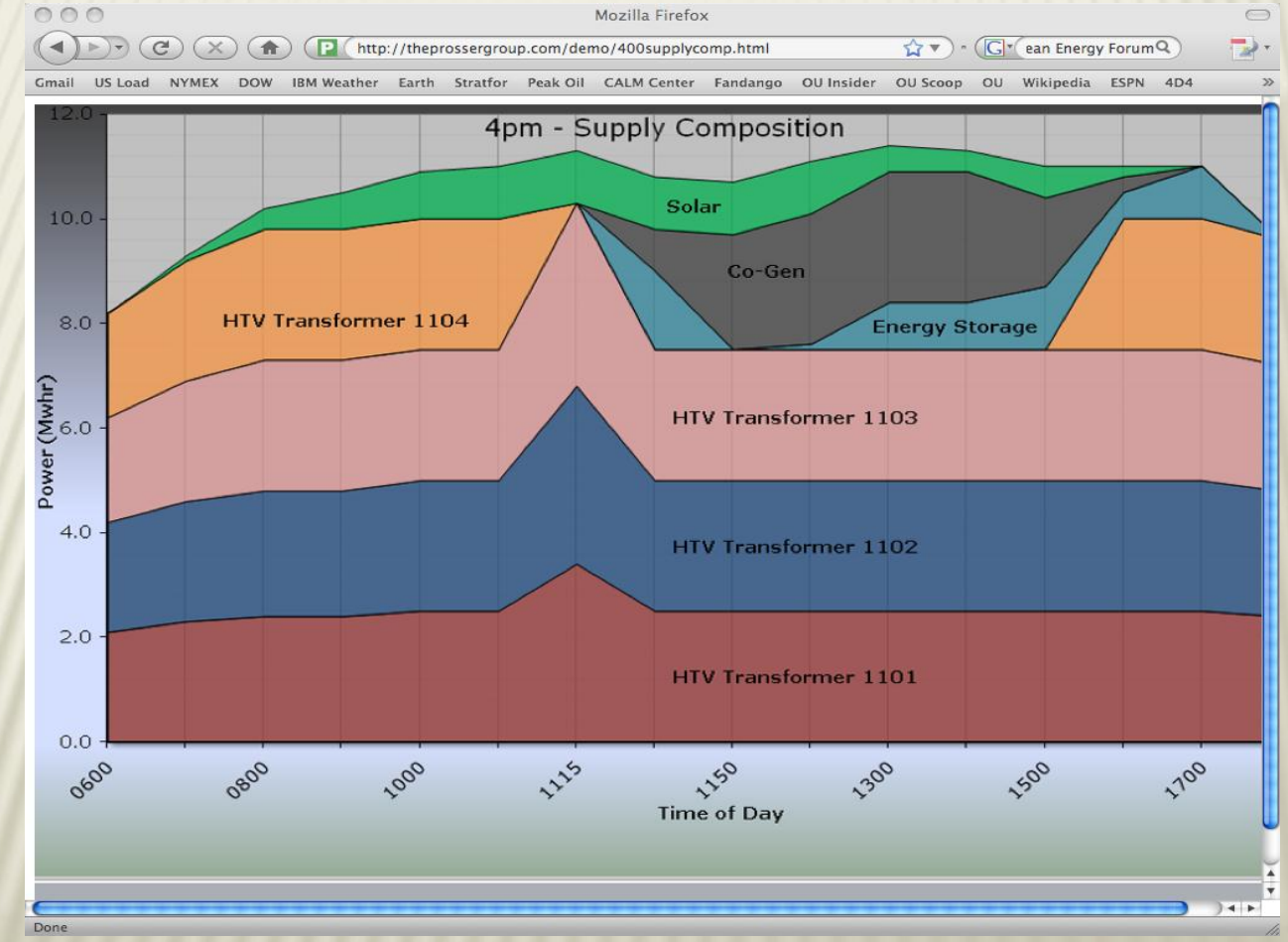
Objectives of a Smart Grid

- Smart Grid needs to make sense economically and provide real economic feasibility
- Implementation over many years, needs to be scalable and compatible with legacy
- Federal and regional policies need to be aligned

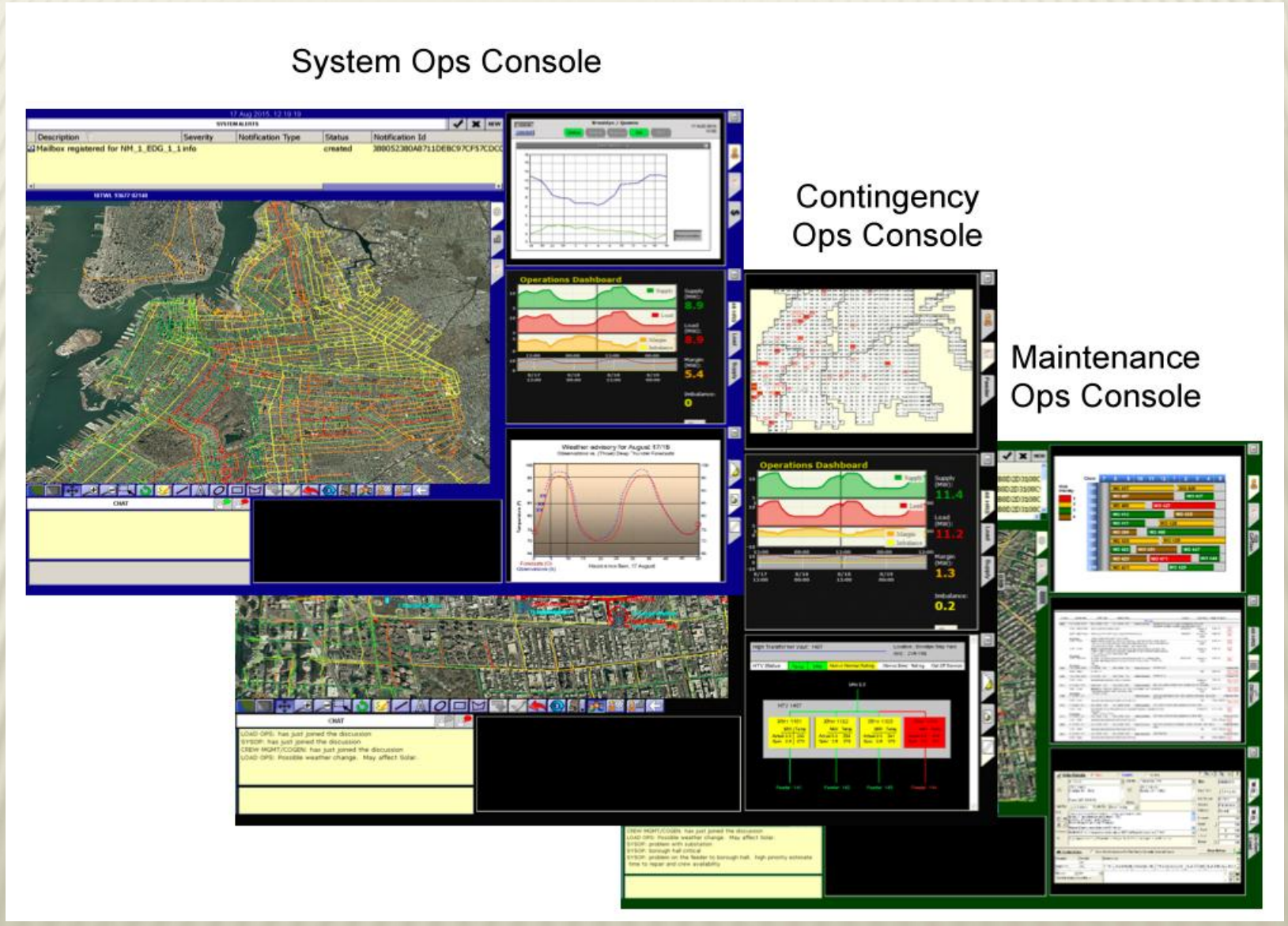
TECHNICAL AND ECONOMIC CHALLENGES NEED TO BE TESTED AND VALIDATED

- Equipment
- Systems and Software

Multi-supply, Multi-use



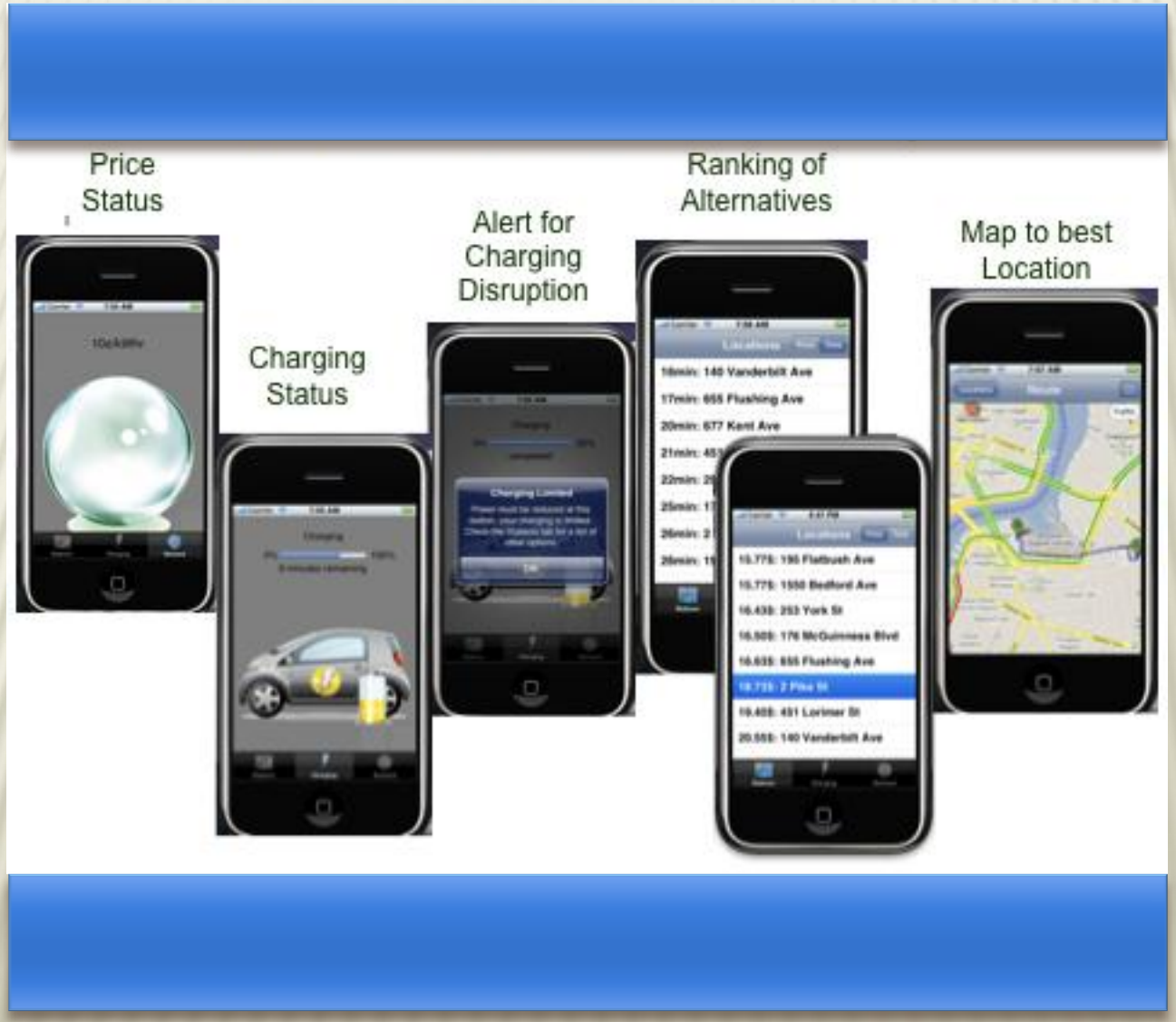
Interdependent



The Smart Grid is Multi-Discipline

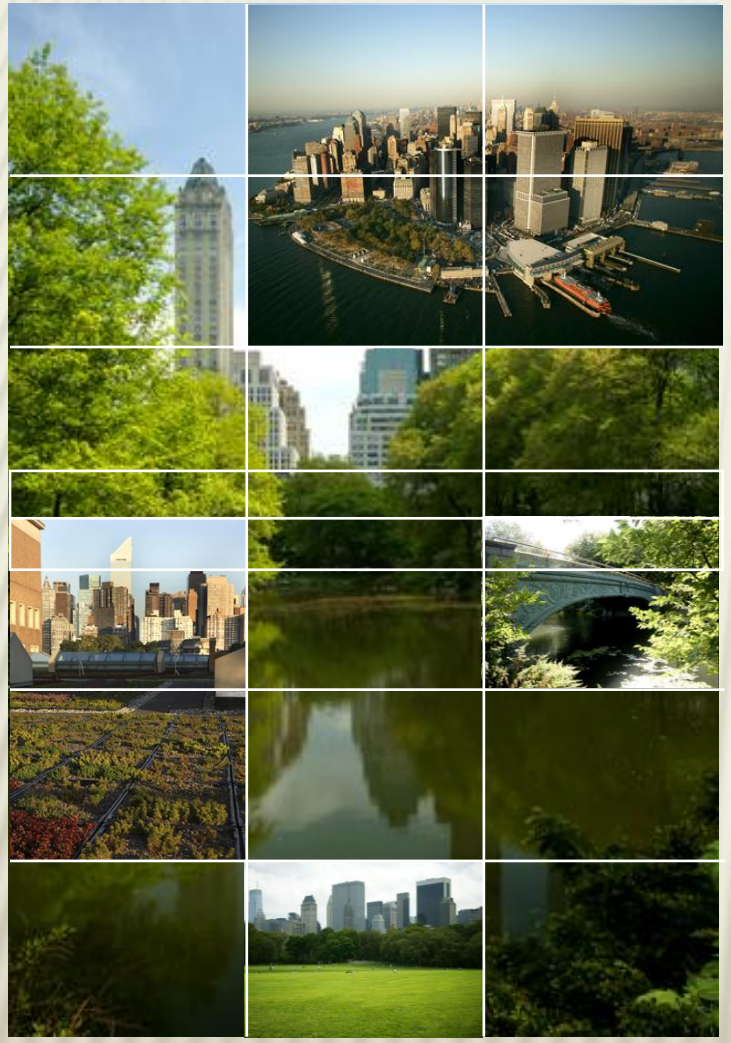
- Many complex systems need to work together with a high degree of reliability and transparency, including with the customer or end-user
  - Electricity
  - Water
  - Transportation
  - Communications
  - Municipalities and Agencies – The Public

Transparency, Access



Technical Requirements of a Smart Grid

- Open standards
- Secure
- Modular
- Scalable
- Shared data
- Adaptive
- Automated



Thank You !

NYU·poly

URBAN UTILITY CENTER

grid connections