



Informing “Smart” Distributed Resource Management

Dora Nakafuji

Hawaiian Electric Company

Asia Pacific Clean Energy Summit and Expo

August 31, 2010



REIS

RENEWABLE ENERGY &
ISLAND SUSTAINABILITY



Hawaiian Electric Company



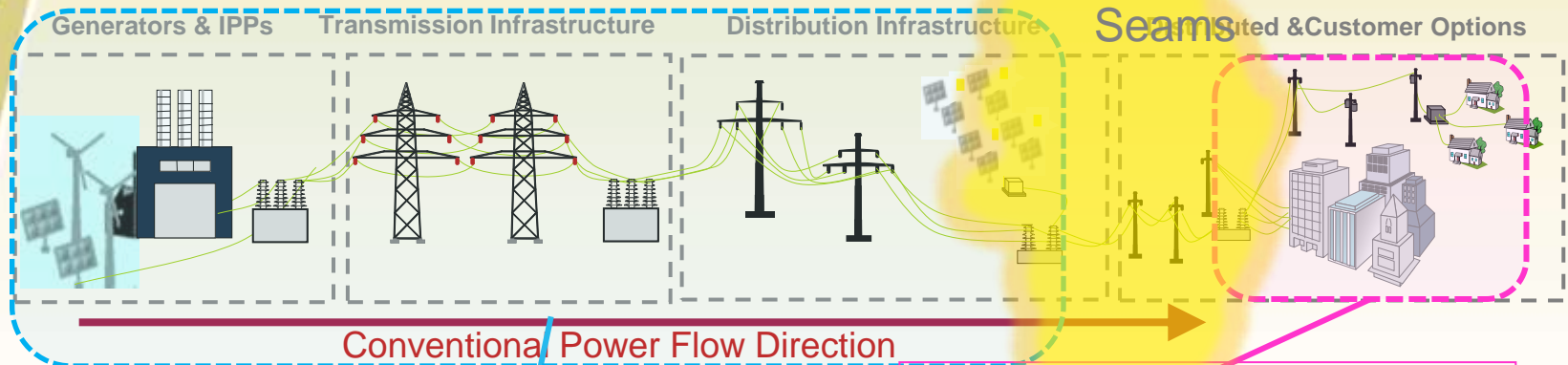
Desired Characteristics of Future Smart Grids



Energy Independence & Security Act 2007, Sec 1304 Smart Grid RD&D Highlights

- Enable **active participation** by consumers
- Accommodate *all* generation and storage options (including vehicles)
- Enable new tools, products, services and markets
- Provide power quality reliability for the digital economy
- **Optimize** asset utilization and operate efficiently
- Enable the **self-healing** grid to anticipate and respond to system disturbances
- Operate resiliently against attack and natural disaster

Paradigm Shift



System Controls



Local Controls

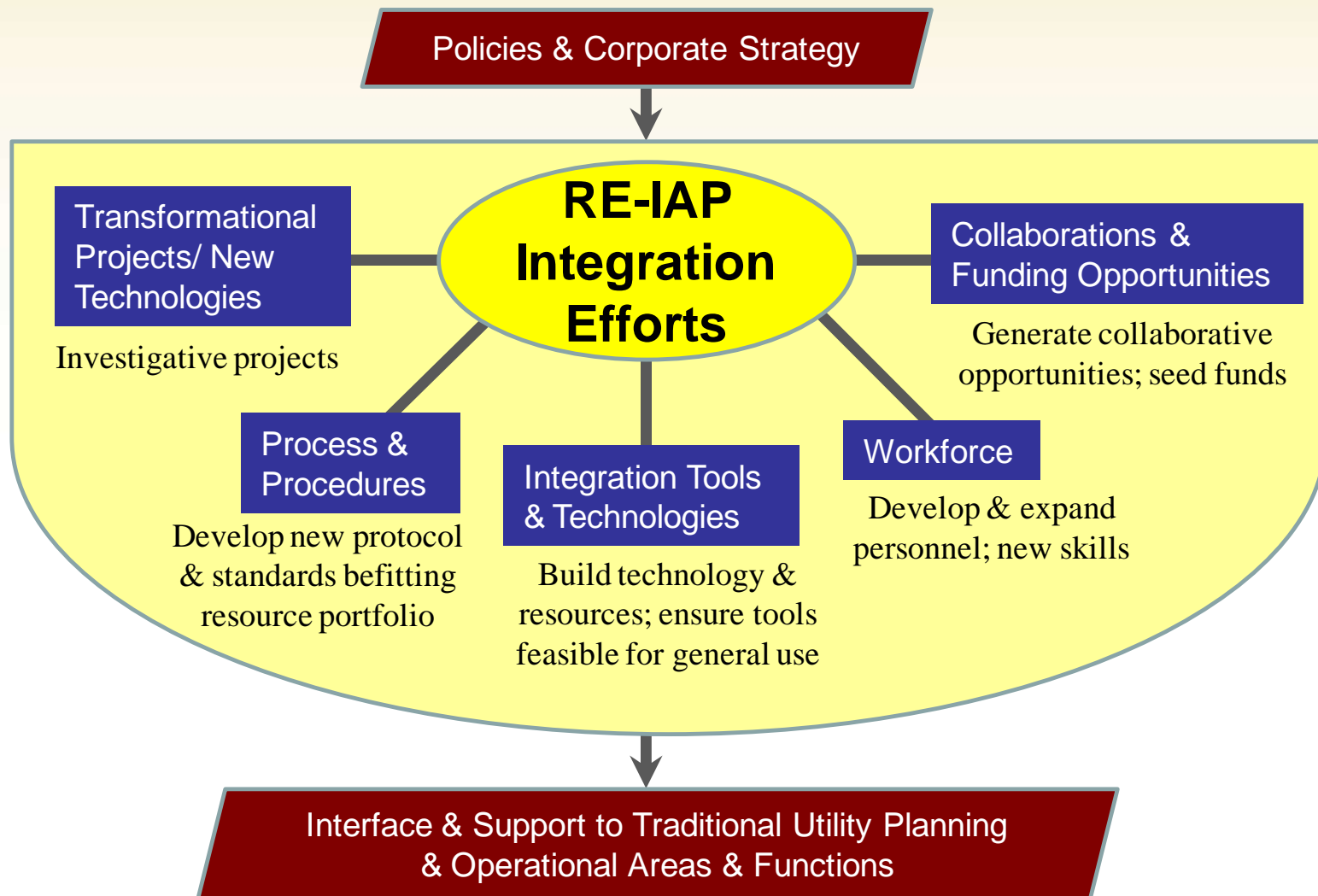
Work needed to bridge the gaps for "Seams" Infrastructure and Coordinated Response & Control Logic

Perspective on Gaps & Roles

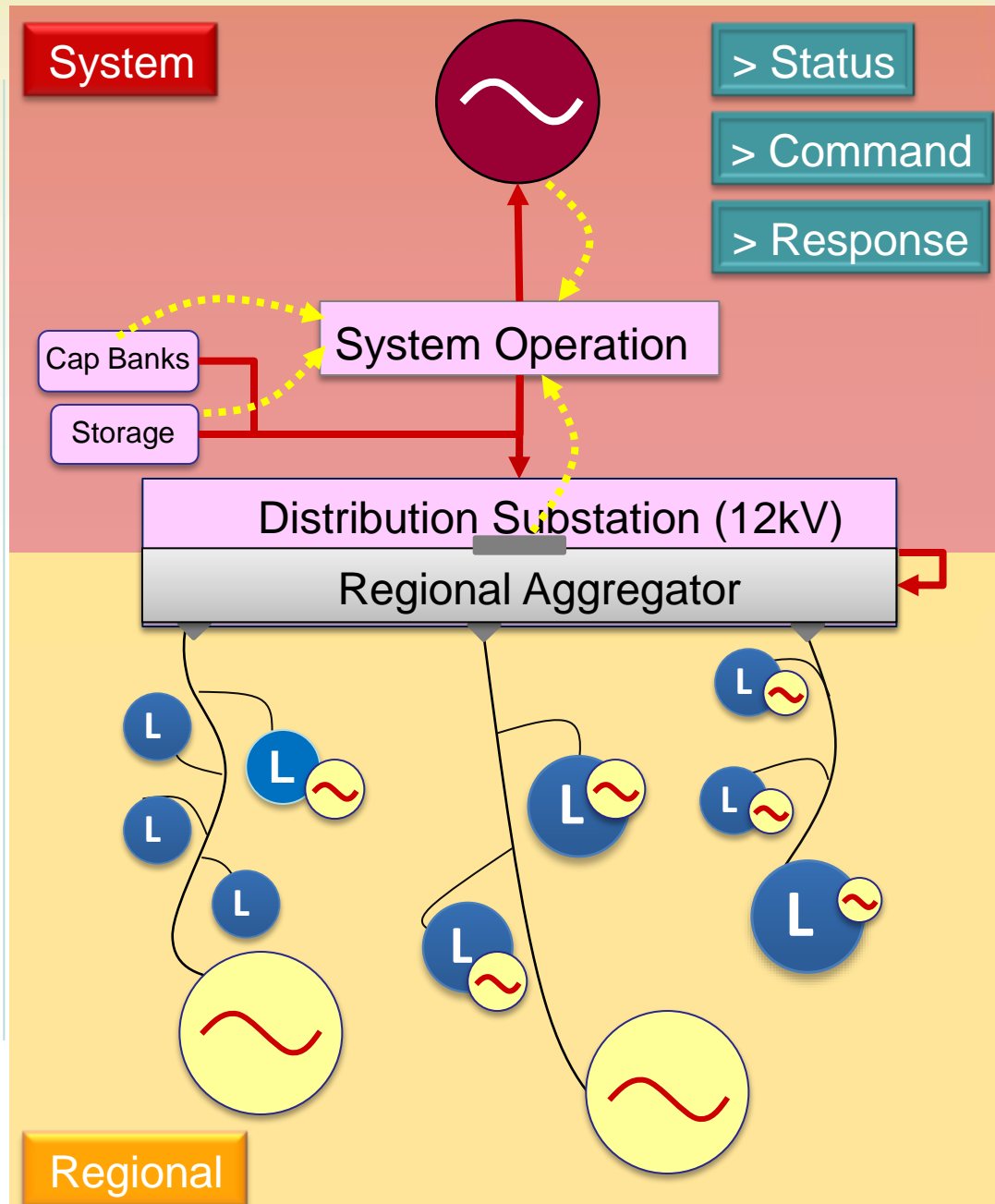
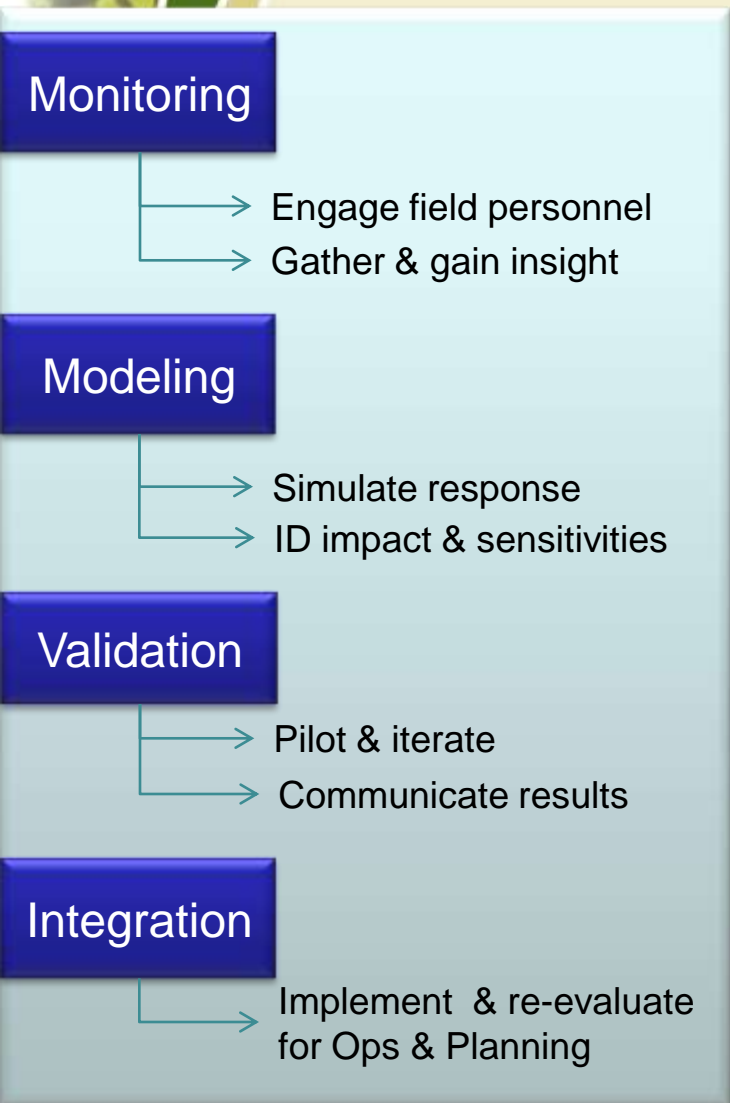
GAPS	ROLES
Engaged community (workforce & beyond)	Federal, State, ALL
Evaluation of “Seams” (data & infrastructure) <ul style="list-style-type: none">▪ Leverage existing capabilities (dual use)▪ Data visualization & assessment to inform interoperable smart designs & control strategies▪ Communication for both control & information (status)▪ Customer usage & renewable resource characteristics▪ Desired degree of reliability and choice/optionality▪ Pilot tangible technologies (AMI,	Utility, Technology Providers & Industry
Coordinated, Responsive, Self-Organizing, State Estimation Control Logic for emerging technologies	Industry & Academia partnership
Informed Smart (I-Smart) customer and programs to encourage smooth transition with sustainable options	Regulatory, Policies, ALL

Seams: Embracing Change

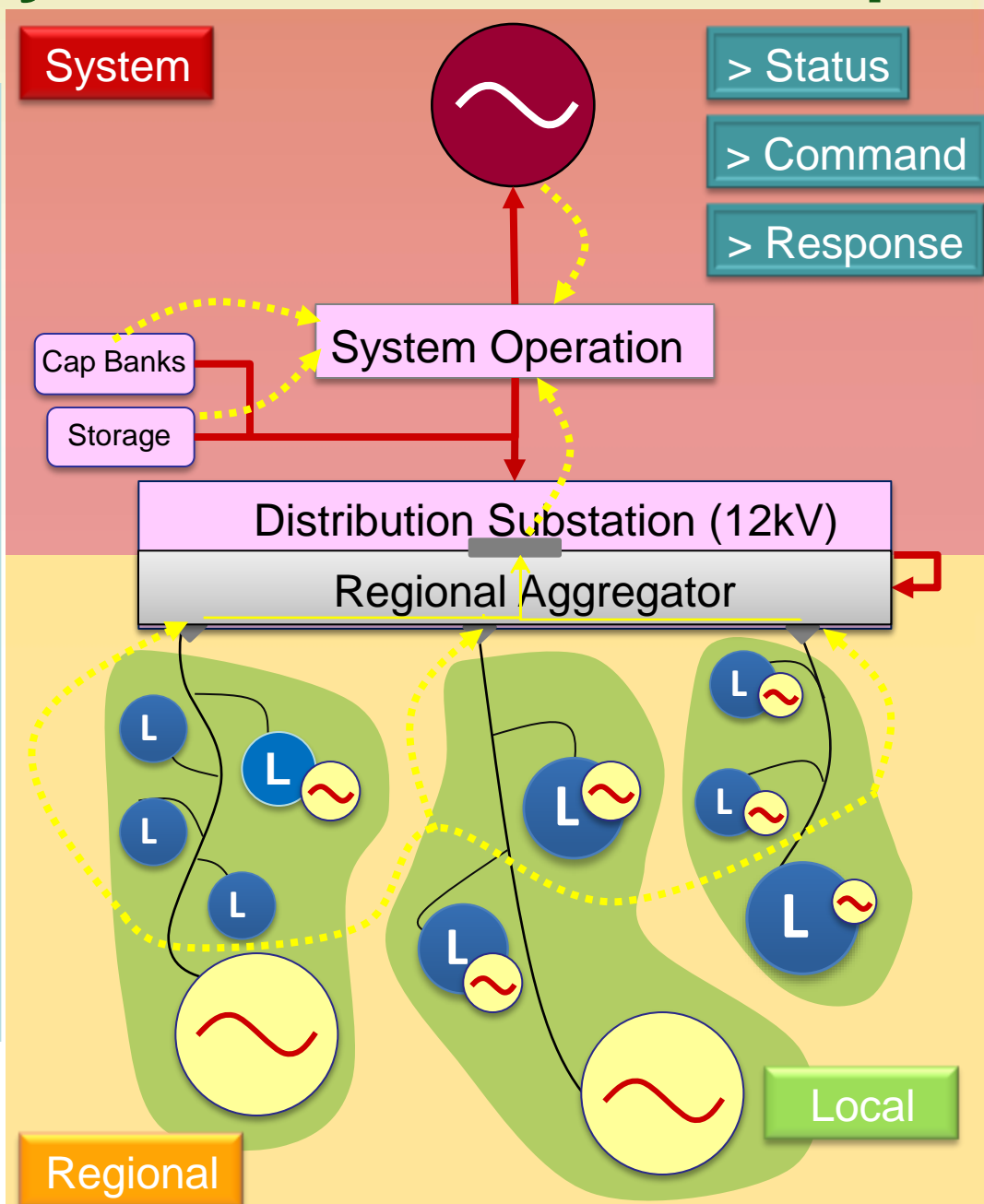
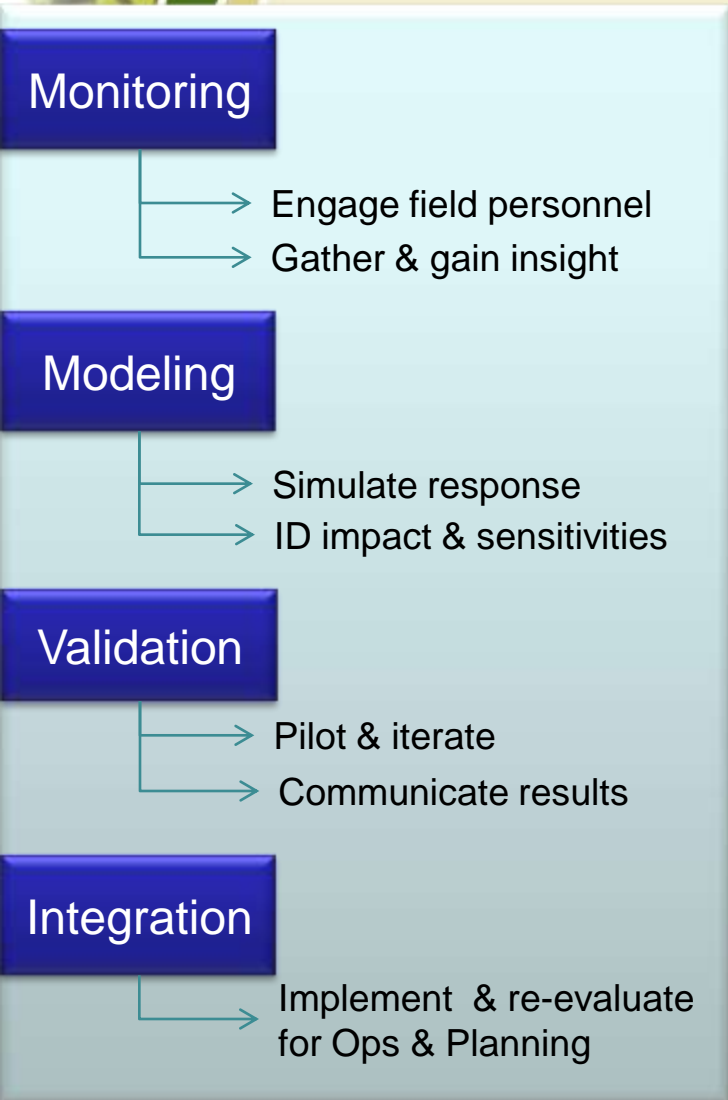
Engaging Workforce & Action Planning



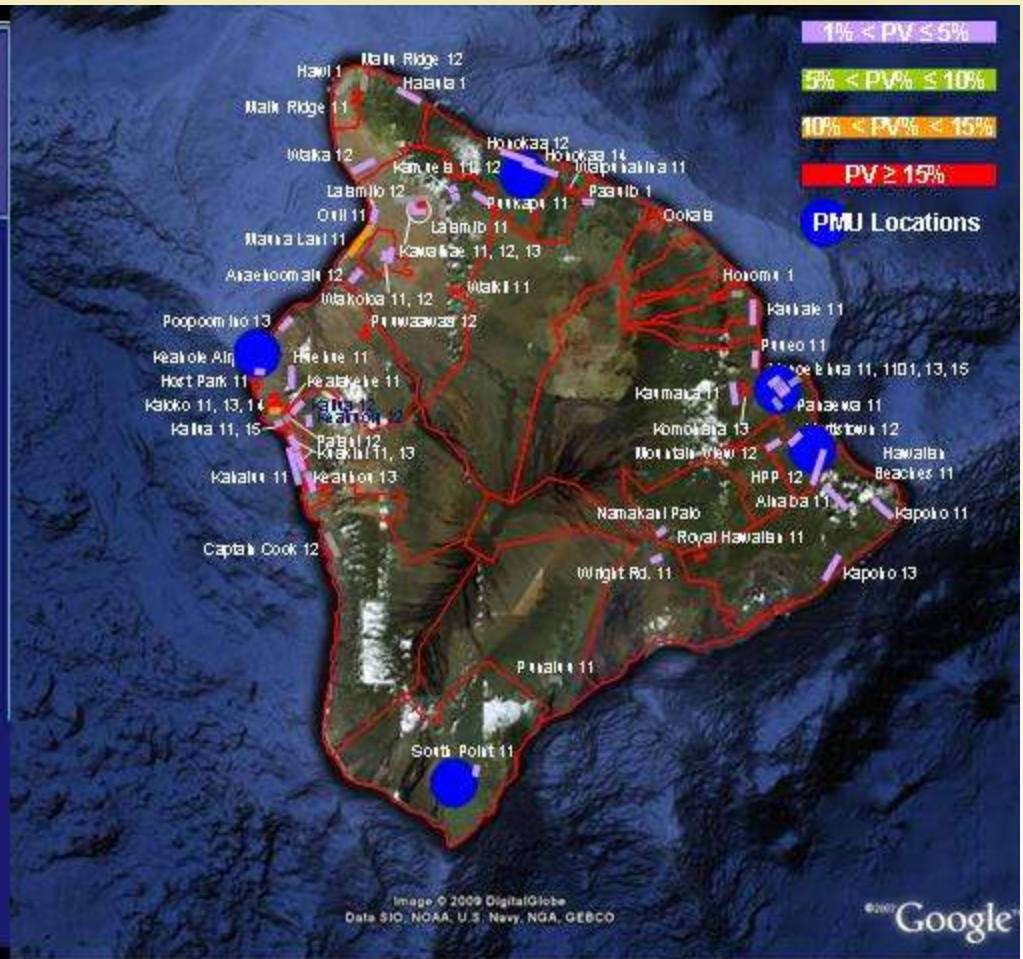
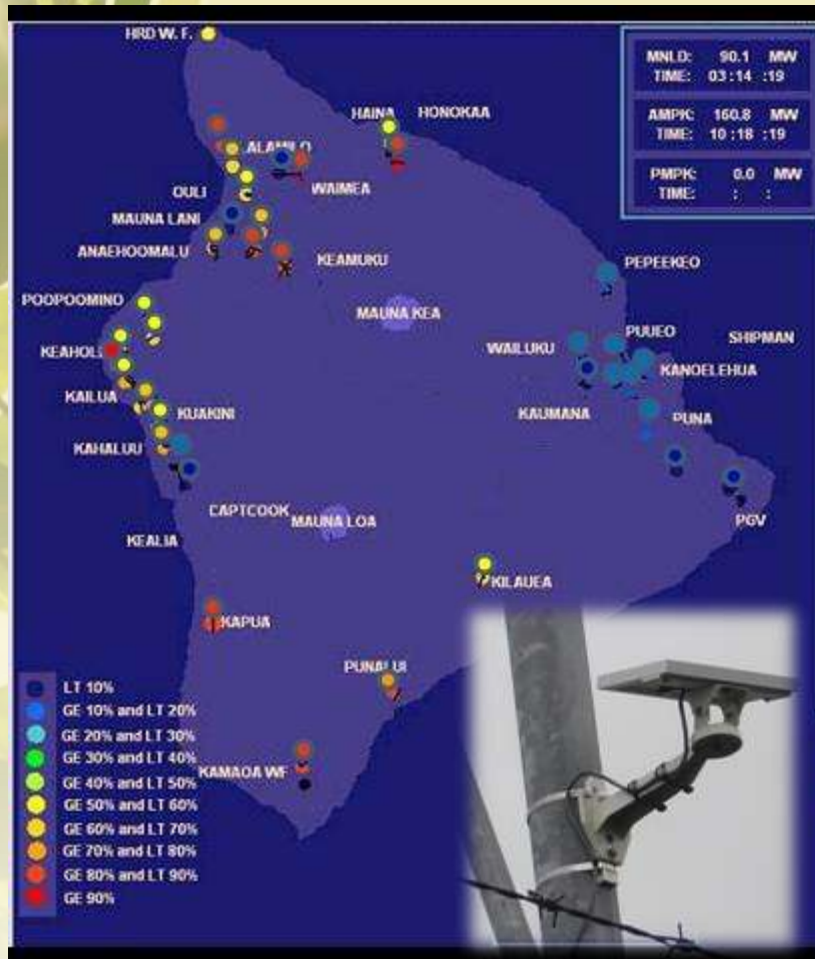
Seams: Utility/Academia Partnerships



Seams: Utility/Academia Partnerships

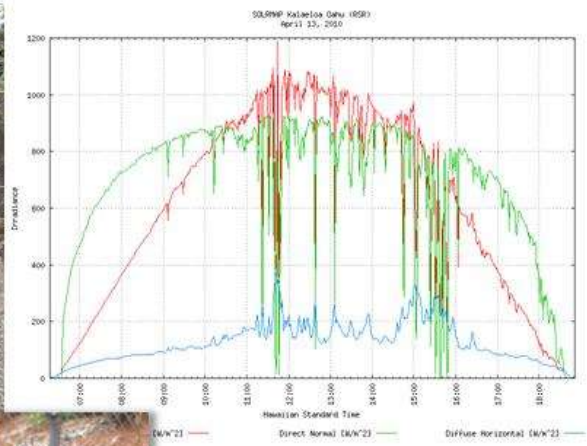


Seams: Predictive Visualization & Data Monitoring for Operations & Planning

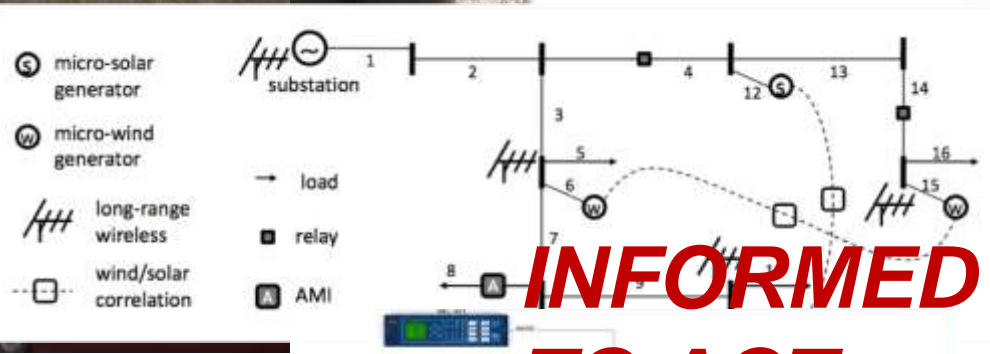


Ability to anticipate production on the system by linking solar resource information with installed capacity around the island

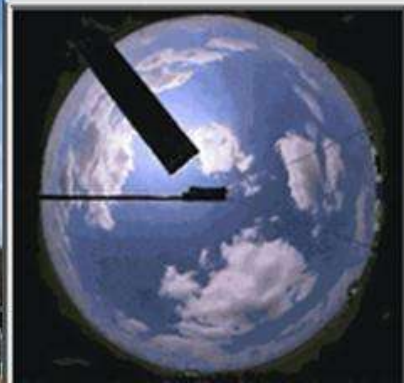
SENSE & MEASURE



ASSESS, MODEL &

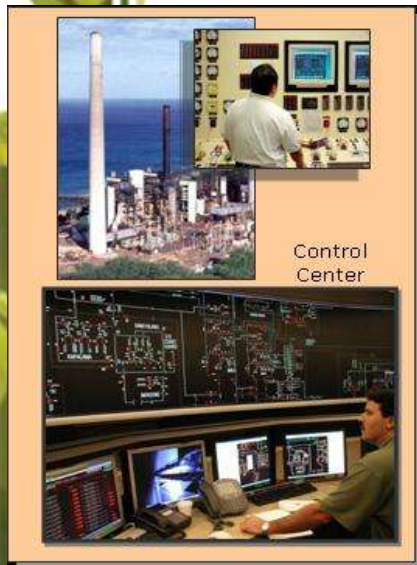
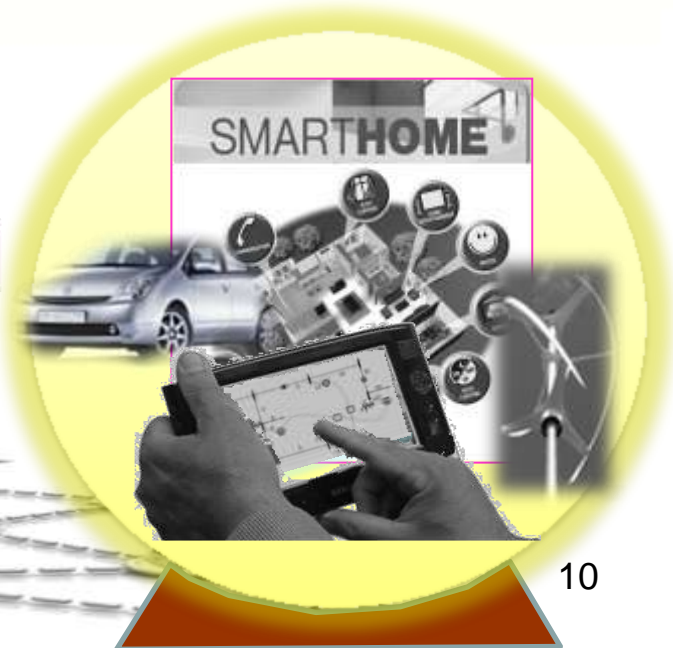


INFORMED TO ACT



Charting a Course for Tomorrow

- Involve the responsible communities
- **Focus on the Seams**
- Optimally simulate and iteratively assimilate
- **Plan for contingencies & unintended consequences**
- Anticipate *MORE CHANGE...*



Control Center

Questions/Comments??

Mahalo

Dora Nakafuji

dora.nakafuji@heco.com

Director of Renewable Energy Planning

