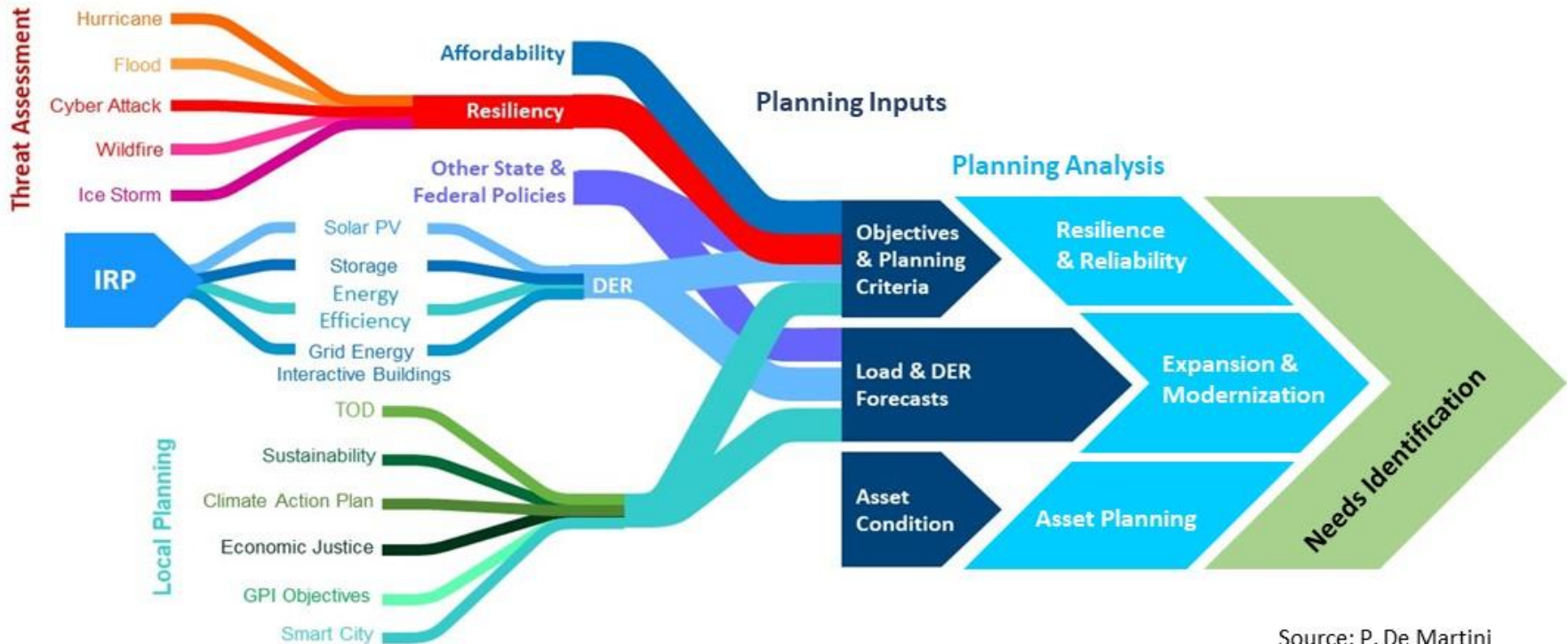# Planning for Operational Coordination

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Comprehensive System Planning

**System Planning Increasingly Interdependent Upon Bulk Power Use of DER and Local Sustainability & Resilience Plans**

Source: P. De Martini

Operational Coordination Architecture Model (OCAM)

1. Identify Objectives & Constraints

2. Identify Services & Operational Mechanisms

3. Develop Coordination Structures & Reconcile Coordination Conflicts

4. Document Existing/Emerging Industry Structure

5. Develop Transition Plan

1. Identify Objectives & Constraints

► Identify state & federal objectives, policy and regulations driving industry structural changes

► Identify scale and timing factors

► Identify any institutional and practical constraints

Source: P. De Martini
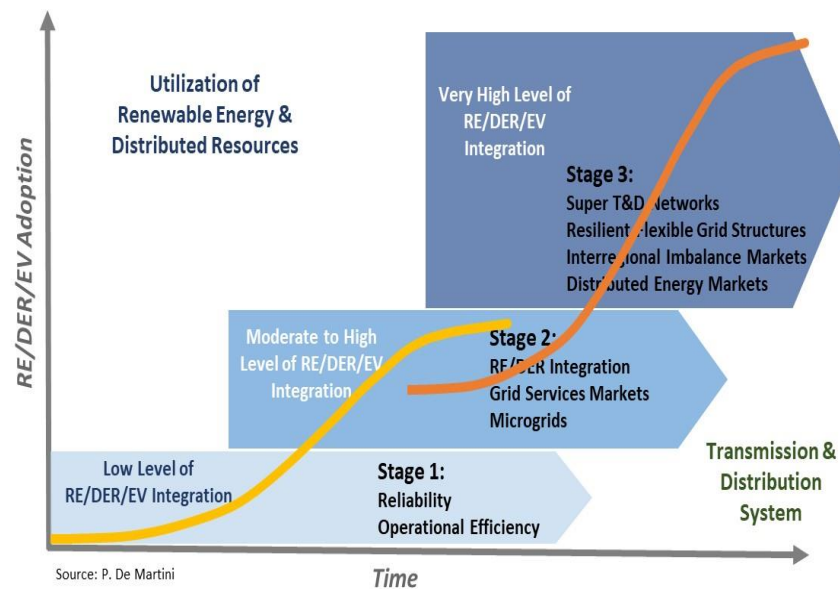
2. Identify Services & Operating Mechanisms

- "Value stacking" will involve various bundles of services for specific applications at different tiers in the system

- These combinations that require deeper examination in relation to the interrelationship of operating mechanisms and related actors and operational interchanges.

- This is an essential perquisite to assessing structural changes.

	Bulk System	Bulk <-> Dist	Dist System	Edge <-> Dist	Edge<->Edge	Edge (BTM)
Services						
Energy Supply						
Energy Transport						
Energy Storage						
Managed Energy Consumption						
Frequency Regulation						
Voltage/Reactive Power Regulation						
Energy Reserves						
Resilience						

Value Stack Bundle Examples

Virtual Power Plant

- Edge:
  – Autonomous energy supply

- Edge to Distribution
  – Dispatched load reduction services
  – Autonomous voltage/Var services

- Bulk Power
  – Dispatched energy supply
  – Dispatched capacity service
  – Dispatched frequency service

Community Microgrid

- Edge:
  - Autonomous energy supply

- Edge to Edge:
  - Dispatched energy supply
  - Voltage regulation
  - Resilience service

- Edge to Distribution:
  - Dispatched Capacity services

- Bulk Power:
  - Dispatched Energy Supply

Operating Mechanisms Inform Coordination Structures

► Real time operating mechanisms for each service at and between each tier (bulk power, distribution, edge) should be identified

► Various Operating Mechanisms to initiate response
  - Price based mechanisms (e.g., real-time market price, dynamic rate, etc.)
  - Direct control mechanisms (e.g., AGC, traditional demand response, etc.)
  - Autonomous mechanisms (e.g., droop control, advanced inverter functions – volt/watt, microgrid islanding, etc.)
 - Independent operation (e.g., BTM solar PV output)

3. Develop Coordination Structures & Resolve Operational Conflicts

► Develop coordination structures for each discrete service associated with each operating mechanism

► Identify actors, information and timing requirements

► Evaluate the resulting "stack" of structures to resolve any conflicts


Energy Supply Service
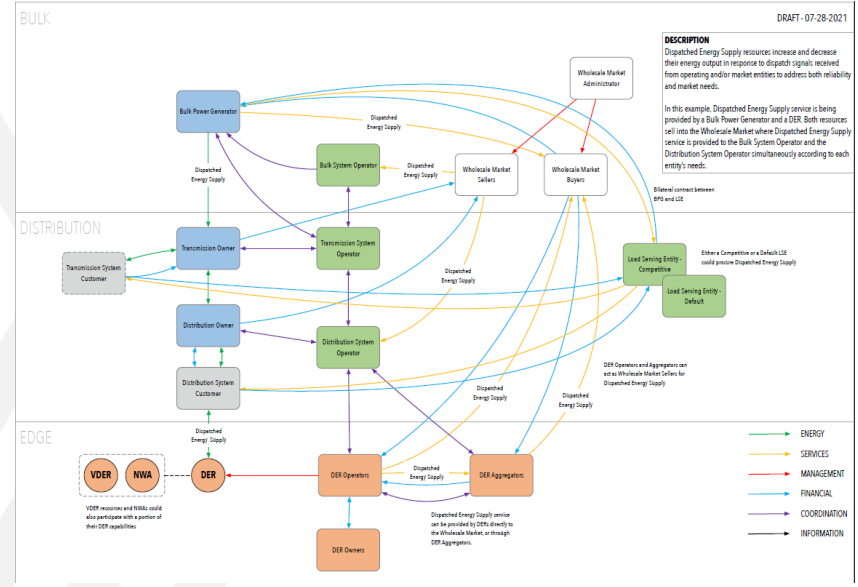
Distribution Balancing Service
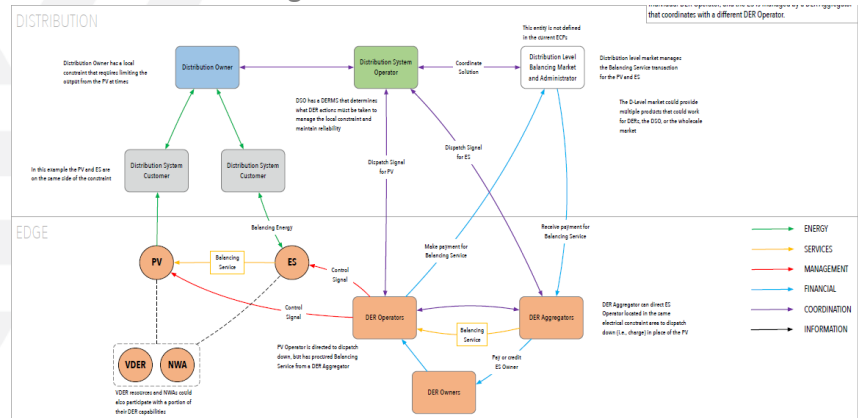
Source: Concentric Energy Advisors

4. Document Existing/Emerging Structure

- ► Important to identify the current or emerging industry structure
- ► Structural diagram identifies the interrelationship of each of the principal entities as well as the roles and responsibilities
- ► Example shown includes power flow, operational control, market transactions and information/data exchange layers
- ► Additional layers can include regulatory and market oversight

All Layers

Source: ICF-De Martini

Legend
— Power flow
— Operational control
— Market transaction
— Information/data exchange

Considerations
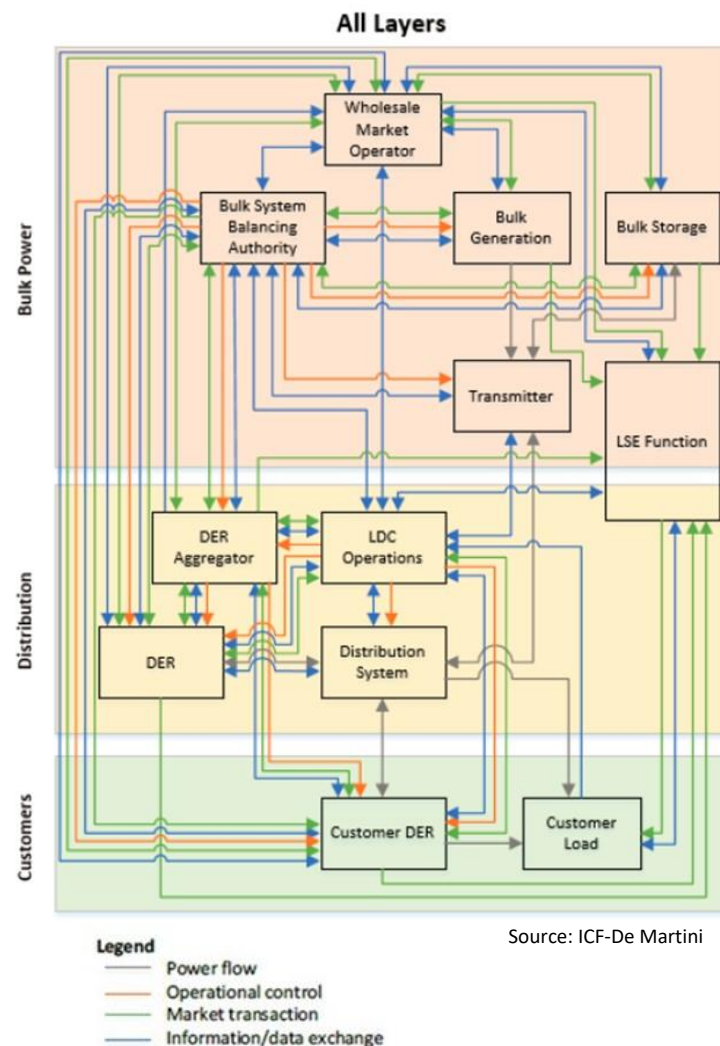
Utilization of distributed energy resources across the power system requires coordinated policy, regulation and planning

- ► What are the DER services anticipated over the next 10+ years at each tier of the power system?

- ► What operating mechanisms are appropriate given the operational requirements (e.g., timing) for each service?

- ► What operational coordination conflicts arise when "stacking" services from the same resource or aggregated resources (e.g., pricing vs direct control vs autonomous vs independent)?

- ► What level of regulatory coordination & oversight is needed to ensure safe, effective operation across edge to bulk power system?

Thank you

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