

# **Practicum: Imagining/planning an energy climate service for your country**

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# Meteorology Needs for Power Production

- Atmospheric variability impacts:
  - Siting
  - Maintenance
    - Long-term viability of wind turbines – gearboxes failures
    - Extreme events – hurricanes
- Operations
  - Economic value of next day wind energy
  - Ability to integrate wind into the grid – **Forecasts**
  - **Building Load Analysis**





# So How do we Pull this Information Together?

- **Key to recognize the needs of the Stakeholder (Utilities and ISOs)**
- **Use best of information**
  - Data
    - Historic
    - Real-time
  - Dynamical/Physics Models
  - Computational Intelligence
- **Blend in optimal ways**
- **Deliver to stakeholder in time for decision**
- **Actionable Output**

# **Mental Modeling**

**with apologies to social science colleagues including Jeff Lazo**

- **Define a picture of how someone sees a process**
- **Often in terms of a flow chart**
- **May be very individual**
- **When individual is an expert, becomes part of an expert elicitation**
- **Will see differences in how experts from different fields see flow**
- **Useful for determining value chain**
- **Method for initializing dialog**

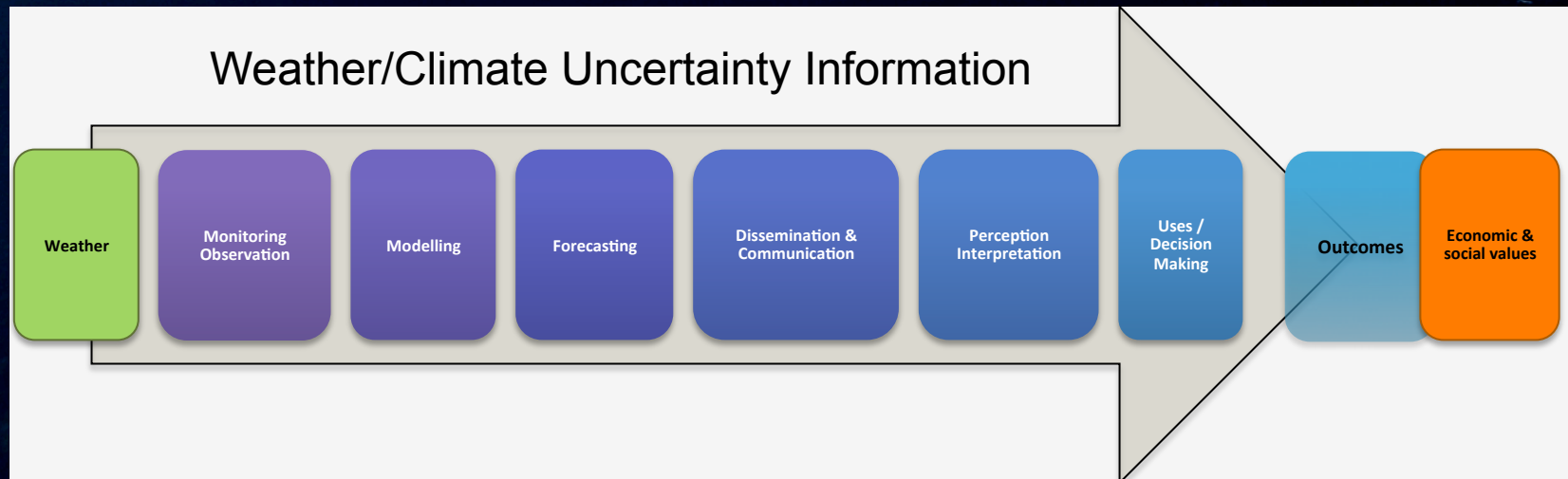


# Mental Modeling

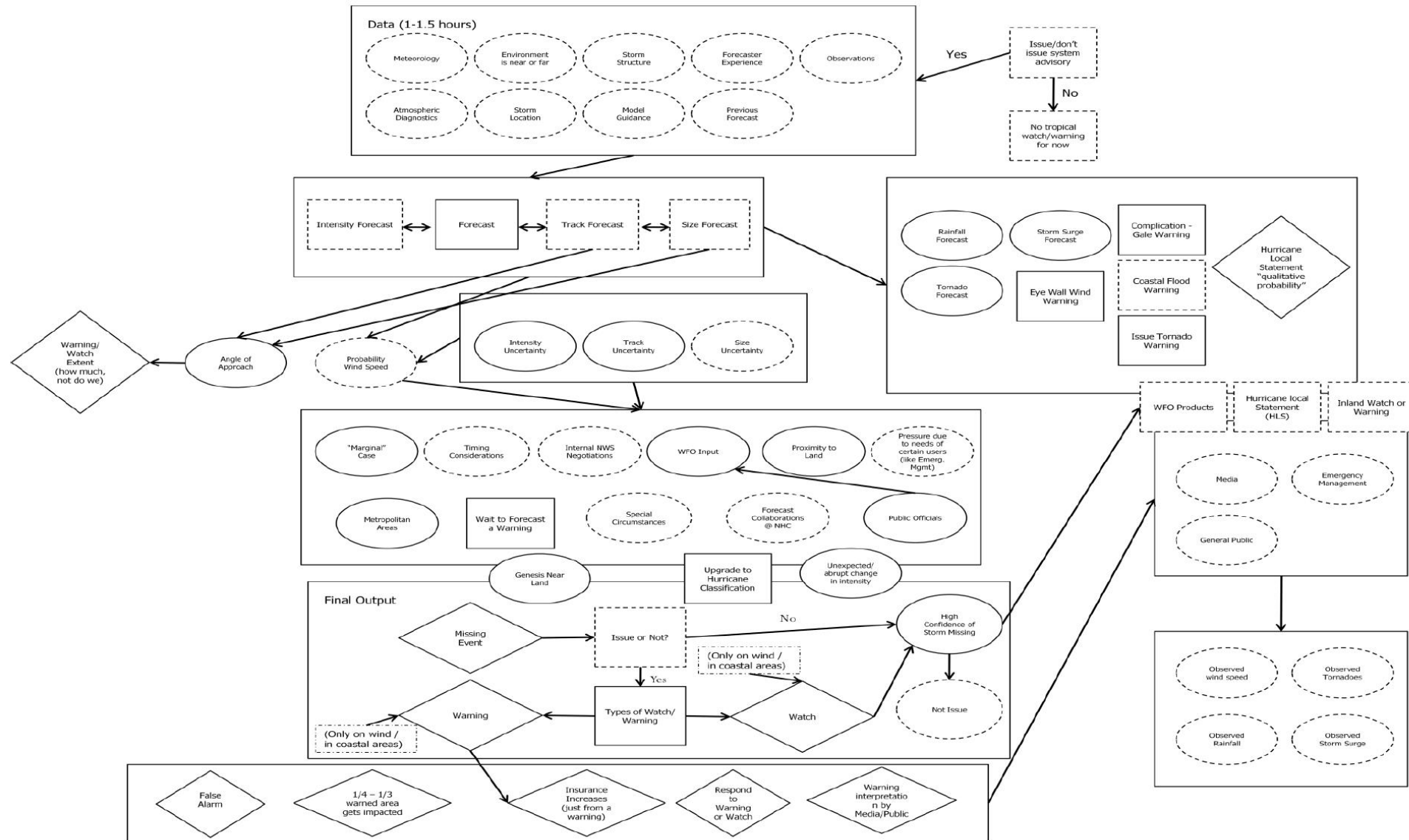
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Use here as communication tool where we explore:

- How we each see the information chain?
- How we perceive how information is
  - Generated?
  - Used?
- How to improve the models and delivery for the energy uses?



# Influence Diagrams / Mental Models





# Example Use: What is the value of solar power forecasting?

Jeff Lazo, March 12, 2013

From kick-off meet of NCAR-led, DOE-funded Project



## Breakout Process:

- General concept of value chain
- Who are the decision makers?
- Forecast Improvement
- Is the information actionable

# Group Exercise

## Conceptual Mental Modeling Exercise

### Build a Value Chain of What is Necessary in a System to Meet User Needs

Break-out groups discussing Implementation Planning – Conceptual Model of Climate Service

Planning the system to match the application end goal

#### Objective:

- Build a qualitative model of the weather-energy climate service
- Enhance discussion and understanding across all students
- At the end of the day, explain how this effort to deploy a climate service will create value

#### Procedure:

1. 5-8 minutes – each person to “draw” their own value chain
2. 10 minutes – share your thoughts with the rest of your group
3. 30 minutes – build a group climate service diagram
4. 10 minutes – summarize to share with larger group

## Value Chain

#### General Concept of Value Chain:

- What values / decisions / outcomes do you think are important to end-users / decision makers?
- How does weather and climate impact that?
- How does weather and climate information relate to that?
- What type of modeling systems would be beneficial?
- Is the output of the system actionable?
- How would changes in / improvements in such systems change end-user outcomes?

#### Who will use this information?

- Who are the decision makers?
- What are their needs, resources, constraints?
- How do different “agents” in the value chain add value to information?

#### So what is needed in a system?

- Measurements
- Models
- Engineered systems
- Communication

#### Group Report Outs:

- Summary system of climate service
- Where is there agreement, disagreement, ... ?
- What are there gaps, misunderstandings, confusion, ... ?
- What are the issues to discuss across the broader group?

Note that this portion will help the instructors plan the rest of the lectures and discussions.