

# **THE EQUITABLE DISTRIBUTION OF DECENTRALIZATION BENEFITS**

**Sarosh Talukdar**

**Carnegie Mellon University**

**Panel on Grand Challenges**

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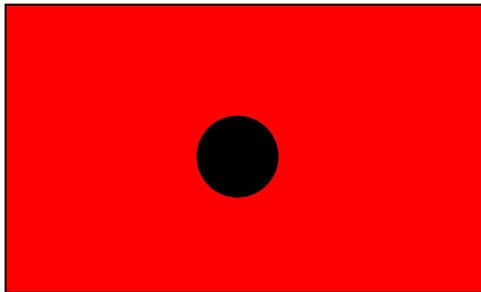
**New York, Jan. 2002**

# What is restructuring?

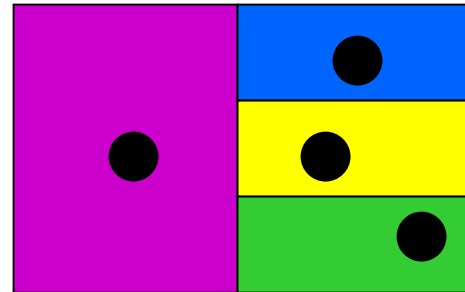
**Restructuring = decentralization**

**= increasing the number of decision-makers  
(agents, each with partial information  
and partial control)**

**= distributed decision-making**



**Centralized**



**Decentralized**

# Relative advantages of decentralization

## Advantages

- More efficient data collection
- Reduction in decision-making complexity
- More robust decision-making

## Dangers

- Poorer decision-quality
- Inequitable distribution of benefits
- Introduction of new failure modes

# Four challenges for the architects of restructuring (Obvious but difficult things)

1. **Set good long-term goals (what baggage, acquired in the past, must be carried forward?)**
2. **Set good short-term goals (optimal short-term targets)**
3. **Test new schemes thoroughly before adopting them**
4. **Allow for equal opportunity (rather than favoring sellers over customers)**

# 1. Long-term goals (what burdens should be eliminated? what weaknesses can be reduced?)

**Make the targets explicit and rational (rather than traditional). Use horizons consistent with the time constants involved.** (There must be a long-term vision in order to do rational, short-term planning. Of course, long-term targets will be uncertain and subject to frequent revision. But they must be explicit to be useful.)

- **Besides decentralization, what else?**
- **Does the AC transmission system really need to be expanded?**
- **Should it be dismantled?**

## 2. Short-Term Goals (Optimal Targets)

**What are the best results that can be obtained from decentralization?**

**A real, decentralized scheme can never do better than an ideal, centralized scheme (complete information, optimal solution)**

**ideal centralized scheme → upper bounds on benefits**

### **3. Testing and Verification**

**Good technologies for testing economic artifacts remain to be developed**

- economic artifacts are not as well designed as they could be**
- the likelihood of flaws and failures is high**

**We need reliable and efficient testing and verification procedures for all stages of the design of markets and other economic artifacts**

## 4. Equal Opportunity

1. **Power systems are quasi-repetitive**
2. **Learning is an effective way of obtaining benefits in quasi-repetitive systems**
3. **Agents that are allowed to learn new behaviors have a great advantage over the other agents**

**(For sellers, learning is almost as advantageous as collusion. Until customers are given wider choices, and the opportunity to learn how to make these choices, sellers will enjoy a large advantage.)**

## **Example: very simple evolutionary learning**

**How a seller determines its offer for the current period:**

- 1. Find offers from similar periods from the past**
- 2. Pick the offer that produced the greatest profit**
- 3. Make a slight, random modification**
- 4. Submit modified offer**

# Clearing prices for 10 sellers and 3 types of periods:

