The notion of **scale**

Where does the electricity come from?
THE PLUG!
FROM A SWITCHBOARD TO AN OUTLET

ARTS LIBRARY

Switch

Transformer

SS SB

to other panels
breaker

PANEL

MOTOR

4 Outlets

At most, one can get 15 Amps out of the 4 collectively!
The UW electrical system
Waterloo-North Hydro
Figure 4-1 Ontario Hydro Major Stations (greater than 100 MW capacity) and 500kV and 230kV Line Routes (mid 1989)

- Existing Major hydraulic GS
- Thermal GS (existing or under construction) F= Fossil, N= Nuclear
- Existing 500 kV and/or 230 kV transformer station
- Existing 230 kV line route
- Existing 500 kV line route
- 500 kV authorized
- Authorized 500 kV and/or 230 kV transformer station
- Interconnections

Ontario Power Grid
Different Scales/Levels of Description

• Each level (i.e. different scale) is a different perspective on the situation
• Each provides new insights
• Failure to think about consequences at different scales leads to problems
  – CFCs are wonderful at the scale of a refrigerator but terrible at the scale of the global atmosphere (ozone hole)
Elements of a system description

- Components
- Structure
- Boundaries
- Environment
- **Scale**
- Type
- Nesting
- Hierarchical description