# Highly Interactive, "Lively" Interfaces

# Many things happening at once...

- 3D, VR
- Distributed UIs (ubicomp, CSCW)
- Animated Interfaces

# Example 1 of Animated UI: Cartoon-style Animation

- Replace sudden changes with smooth ones (Chang and Ungar, Hudson and Stasko)

- Increase
  - understandability
  - liveness/liveliness of UI
  - pleasure

# Animation Effects: Solidity

- Motion blur
- Arrivals and departures

# Animation Effects: Exaggeration

- Anticipation

# Animation Effects: Reinforcement

- Slow-in Slow-out
- Arcs
- Follow through

# Why Cartoon-style Animation?

- Theatrical communication (clarity)
- Engagement

# UIs are not Cartoons

- Active vs. passive

# Pervasive Animation: The Morphic UI

- UI for the Self programming language
- Focus on *directness* and *liveness*

# Example 2 of Animated UI: Fluid Documents

- *In-place* embedding supporting material in a document
- Salience and space
- Negotiation

# Issues when building such UIs

- Multiple "agents"

# Issues when building such UIs

- Animation

# Cognitive Co-Processor Model

# Implementation

- Integrated with I/O model
- Time-based
- Smoothness
- Interruptible
- Synchronization possible

# Integration: Work Queues

- Central queue where all work is registered
  - objects with "step" functions
  - remove from queue when done

# Integration: FSM

- Use FSM to model state of animation
  - Each step triggers a transition (often back to the same state)

# Time-based

- Machine and load independent

# Smoothness

- Time-based helps
- Smooth out motion: blur
- Speed up rate: degredation

# Interruptible

- User must be in control

# Synchronization

- Multiple animations can relate in complex ways

# Example Integration: Artkit

- Transition functions
  - Methods:
    - start_transition, transition_step, end_transition
  - Object
  - Time interval
  - Trajectory: Curve, Pacing Function

# Time Intervals

- Relative to other transitions