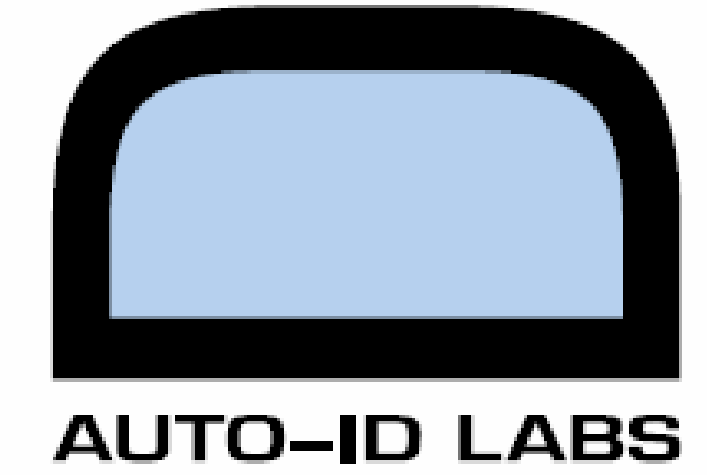




# EPC Network User Interface Design and Information Visualization



## Background

### Motivation for Research

- Human-Computer Interfaces satisfying the needs and requirements of the end-user
- User Interface definition drives lower layers
  - Data storage process
  - Data access process
  - Collection of events
- Lack of attention to the user interface (UI) design can lead to loss of man-hours, ideas and data interpretation

### Role of the User

Representation of a relationship between a kind of user and a system, characterized by those users' needs, interests, expectations, behaviors and responsibilities

### User Capabilities

- Simplification through symbols, icons and color
- Limitation on the number of components and elements per visual screen
- Hierarchy of Data: Number of levels drilled down
- Interaction of the user with interface
  - Similar to familiar systems

### User Classification

- Goals: business, operation of part, technical working
- Skills/experience in Domain: Novice, Intermediate, Expert
  - Young vs. old
  - Skilled vs. unskilled
- Experience with system
- Needs

### User Metrics

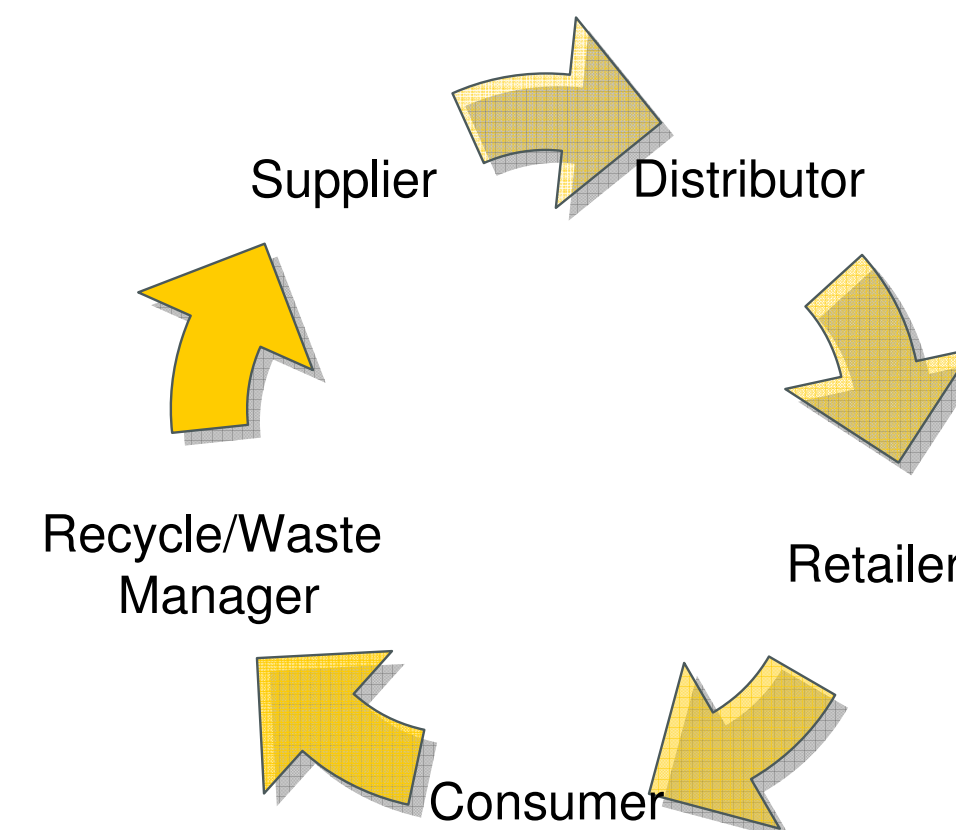
- Retention of system-related skills (over time)
- Time to learn
- Time to complete task
- Amount of assistance
- Number of touch-points (eg. Clicks)
- Number of widgets on the screen
- User satisfaction

By Chaitra Chandrasekhar,  
Stephen Miles, and  
David Brock, MIT Auto-ID Laboratory

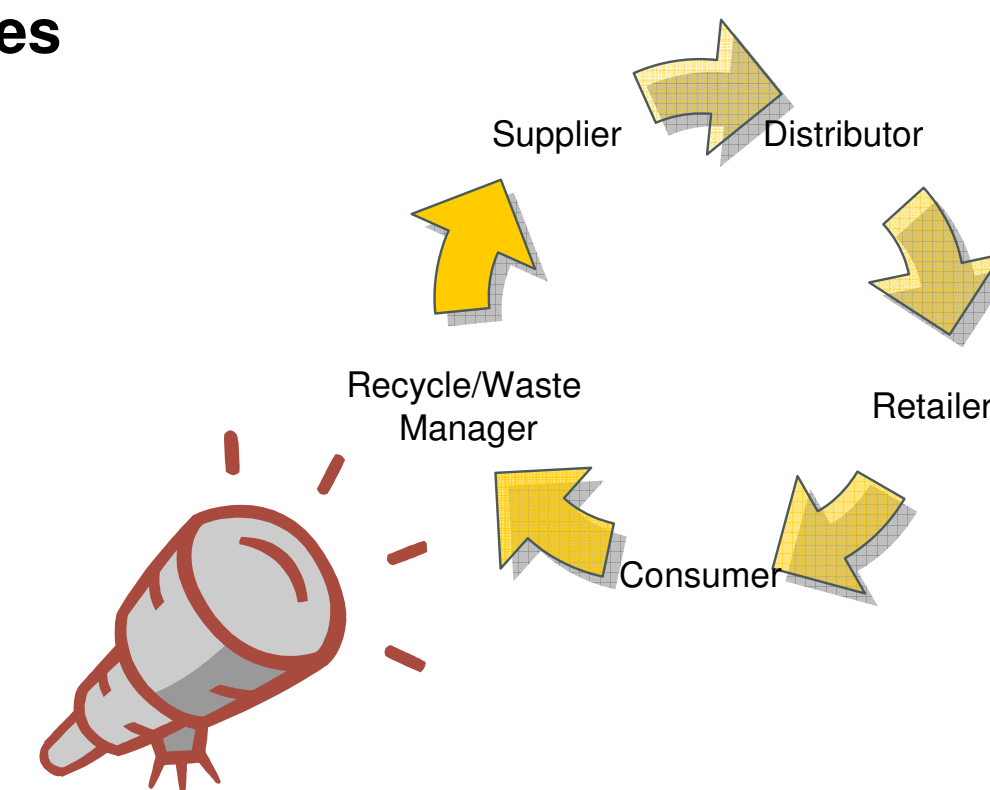
## User Interface

### EPC Network Ecosystem

#### Immediate Players



#### Third Parties



Customs

Taxing Authorities (IRS)

Environmental Protection Agencies

National Security Agencies

Third Party Logistics (3PL) Providers

### User Interface Design

#### Rules

- Support: Support not hinder user's work
- Context: Suitable for environment of use
- Access: Be usable w/out instruction to domain expert new to the system
- Efficacy: Not impede use by system expert
- Progression: Facilitate novice -> expert

#### Principles

- Metaphor: Use behavior from familiar systems
- Feature exposure: See clearly what features are available without overwhelming
- Coherence: Internal and external consistency
- State visualization:
- Shortcuts: Concrete and abstract ways – useful for expert user
- Focus: Animated vs. static
- Help: Goal-oriented, descriptive, procedural, navigational

### User Cognition and Perception

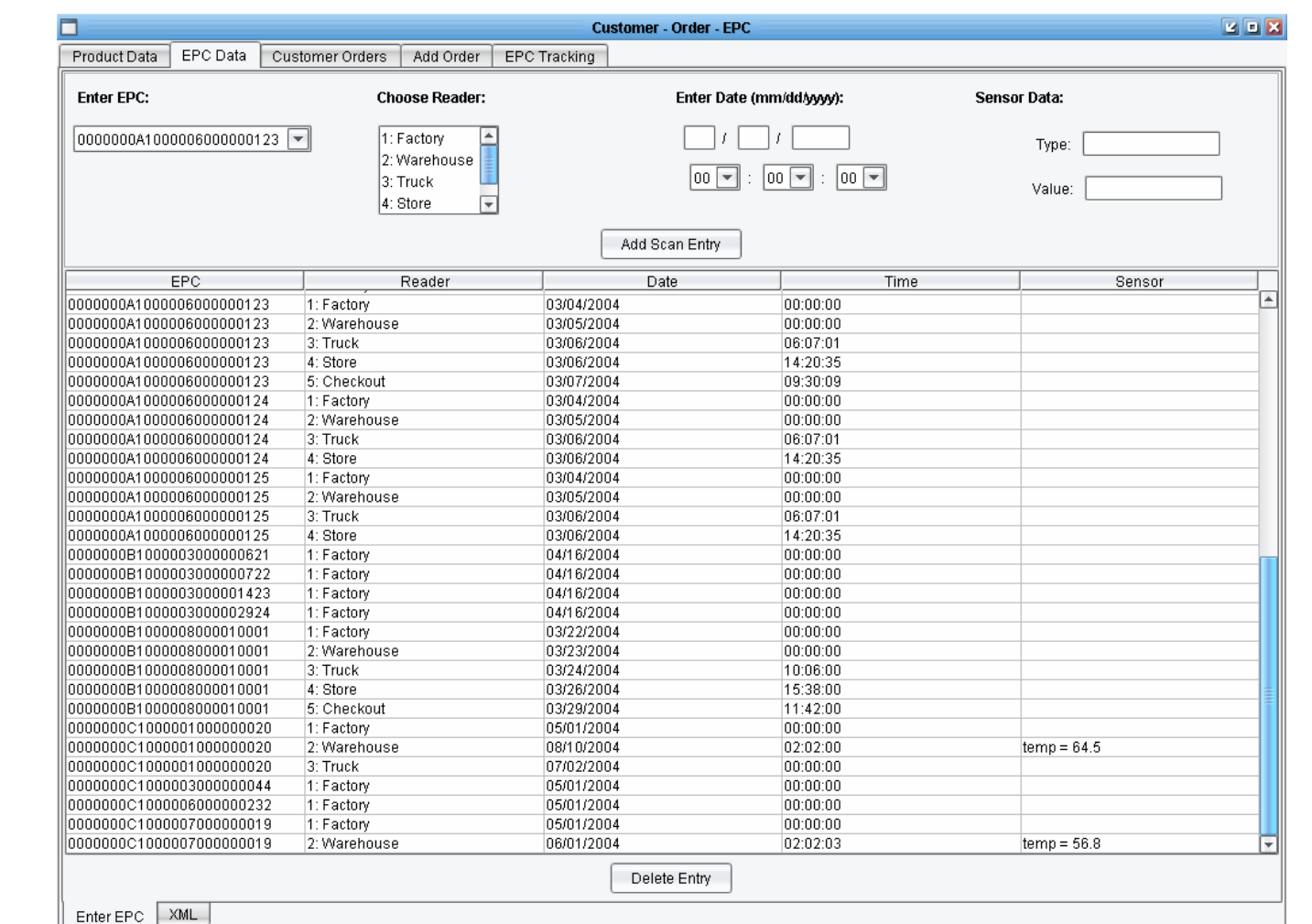
- Visualization -> Perceptualization
- Short-term vs. Long-term memory
  - Short-term: 7 (+/- 1 or 2 items)
  - Long-term: interference between similar functions/programs/representations
- Anchoring: Preference to work with familiar representations
  - Decision analysis: Decisions based on initial value than exploration of entire range of alternatives

### Graphics

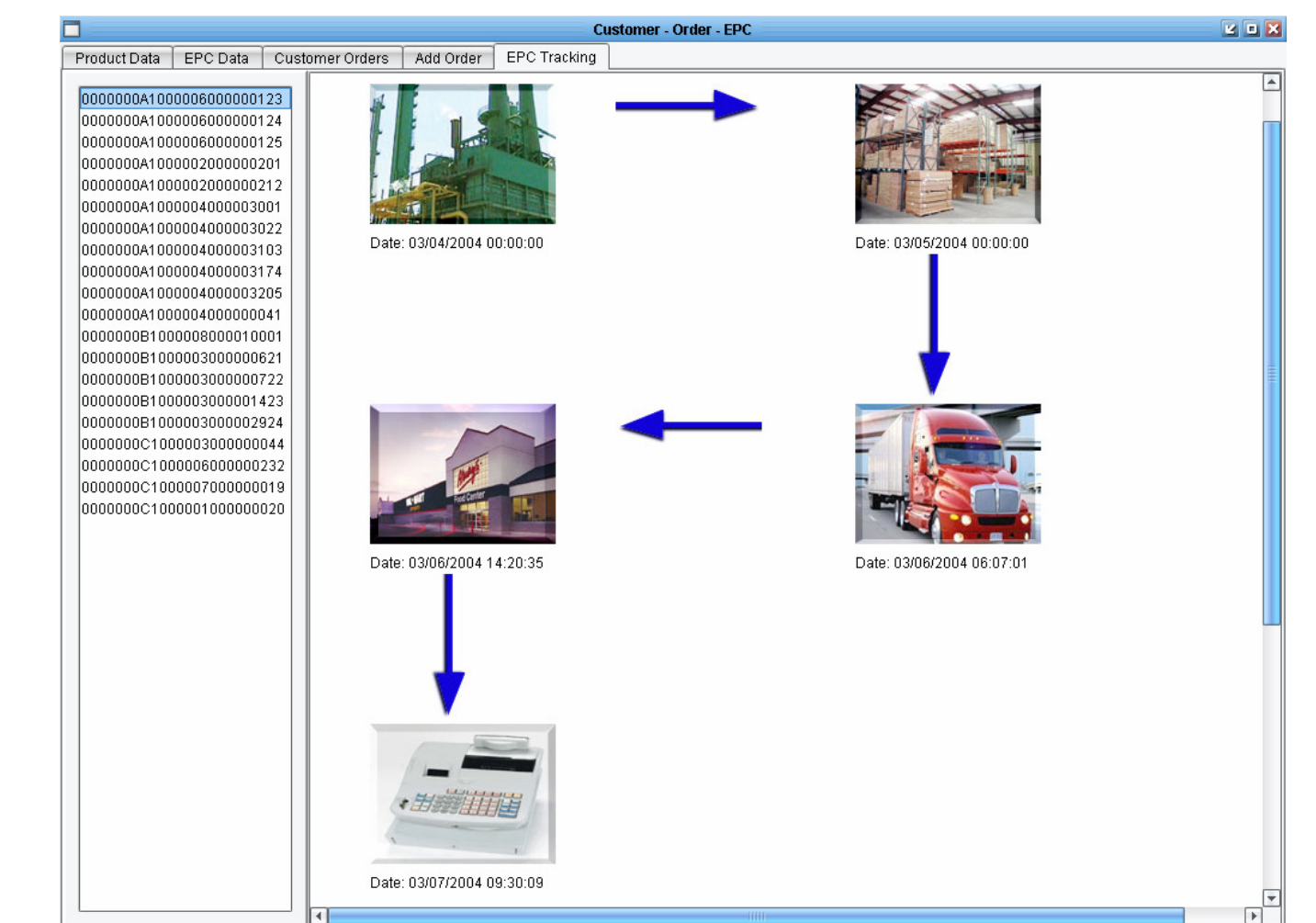
- Text - Linear representation
- Tables - representation: 2D+
- Charts - 2D representation
- Volumetric visualization: 3D
- Color is generally superior to shape to search for a given item - limited colors < 7 to be in line with 7 (+- 2) short term memory limit

## Implementation

### Role-based Flexible Table Interface



### Graphical Iconic Interface



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