ACTIVITY THEORY AND HUMAN-COMPUTER INTERACTION

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History

The need for Activity Theory

The Problem with HCI

- Traditional HCI is based on the application of *information processing cognitive psychology*, which is limited

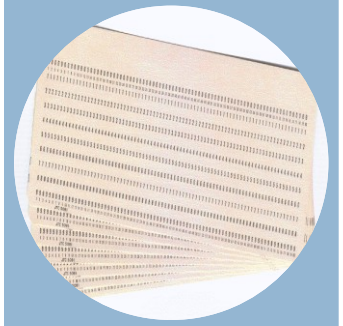
- There exists a **startling gap** between research results and practical design
  - Many good designers have been oblivious to research
  - Research work isn't affecting practice

The Push for Change

- Criticism of information processing psychology grew in the 1980s
  - Recognized a need for consideration of users and their actual work tasks
- By early 1990s, HCI researchers were realizing:
  - Human *actors* are more than just cognitive processors
  - Studies of individual acts are not practical on their own
  - Laboratory experiments < actual work practices
  - Actual use of systems was a long-term process
  - Emphasis on design was growing
  - Contextuality is important
  - A constructive relation between users and systems existed

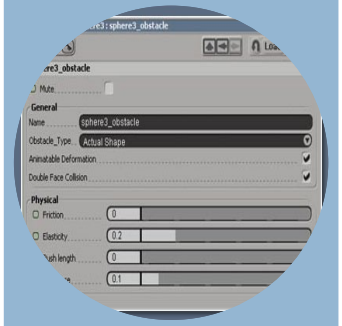
The Interface at Several Levels

Hardware



Programming Task

Terminal



Interaction Dialogue

Work Setting

Where Activity Theory comes from

- Classical German philosophy
  - Emphasized developmental/historical ideas
  - Promoted active/constructive role of humans
- Marx and Engels
  - Elaborated the concept of activity
- Soviet psychology (Vygotsky, Luria, Leont'ev) in the 1920s
- Paralleled in Dewey's pragmatism and G.H. Mead's symbolic interactionism

Activity Theory & Use

What is it already??

What is Activity Theory?

- A clarifying tool, not a predictive theory
- Offers perspectives on human activity and concepts for describing that activity
- Activity Theory is a philosophical framework for studying human practices as development processes

Critical Features

- Activities are defined as basic units of analysis
  - Individual actions + meaningful context = Activity
- Activities are not static
  - Each activity has a history of its own
  - Activities are under continuous change/development
- Activities always contain various mediating *artifacts*
  - There is an asymmetry between people and these artifacts
- Notion of consciousness as something directly related to the conditions current in a person's situation
  - Unifies consciousness and activity

Structure of an Activity

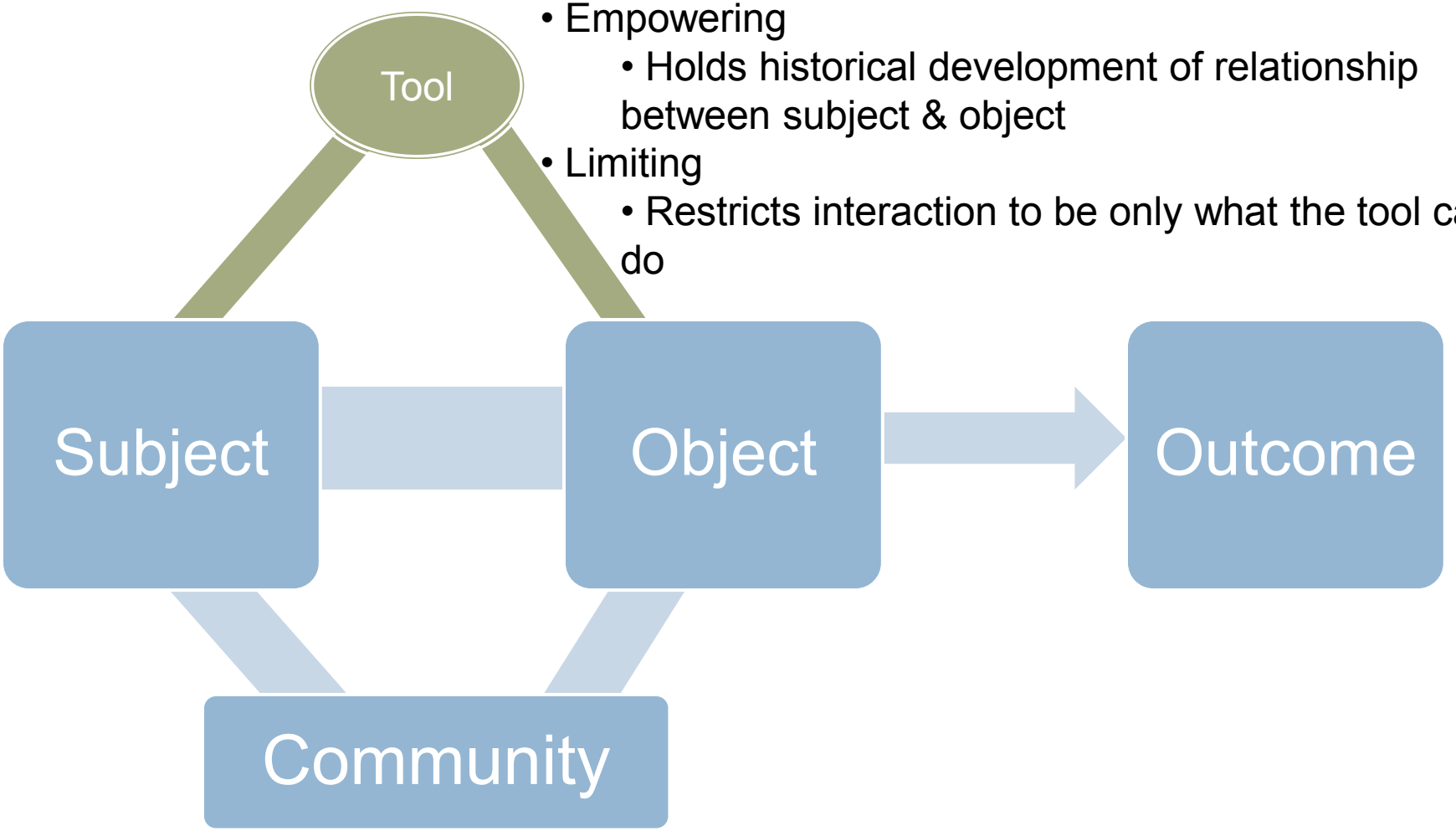
Object

- The act of hunting
- Software application work-in-progress
- Financial status of a software company

Outcome

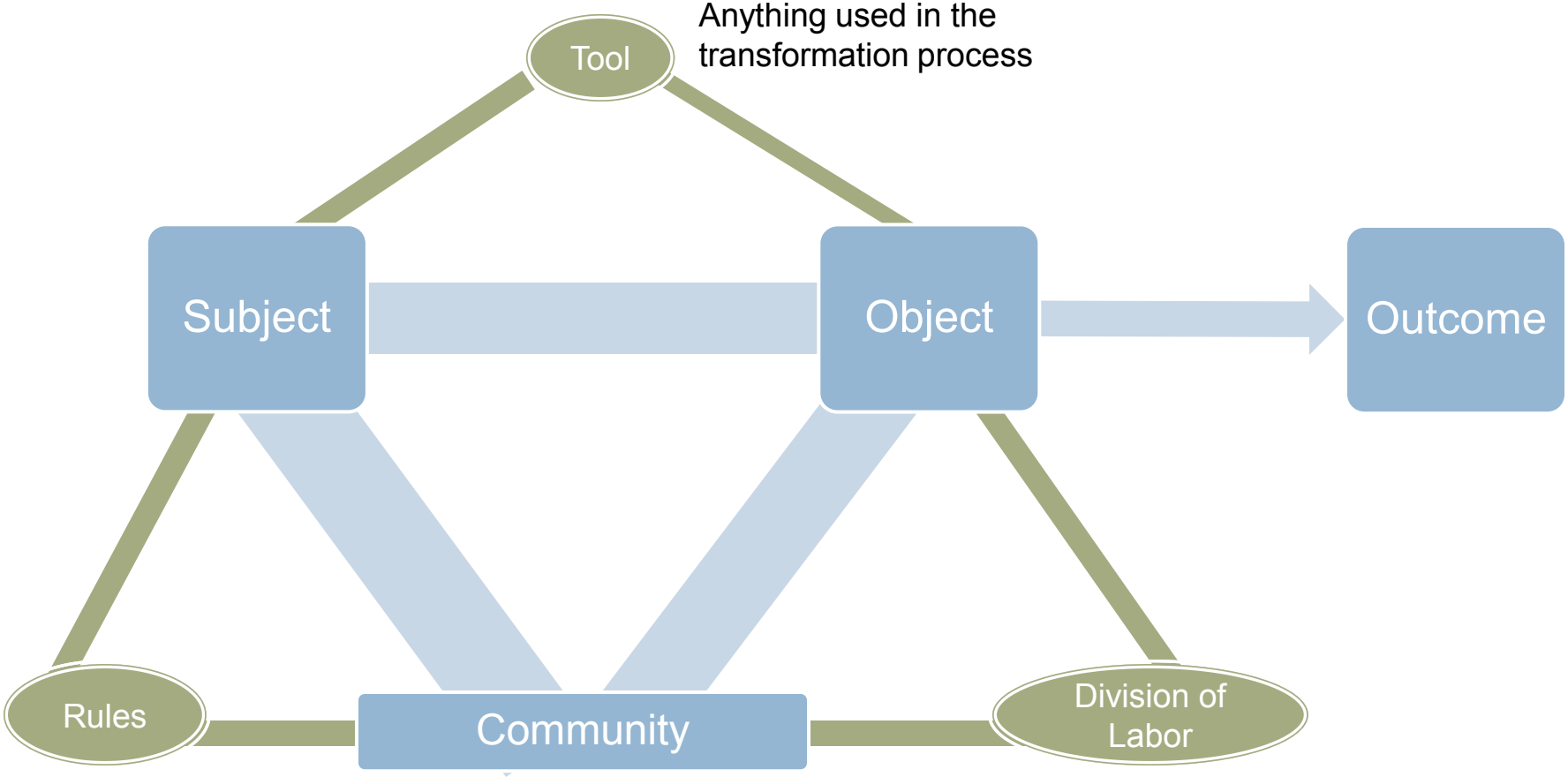
- Meat or a trophy
- Deployed software application
- An improved financial position for a software company

Structure of an Activity

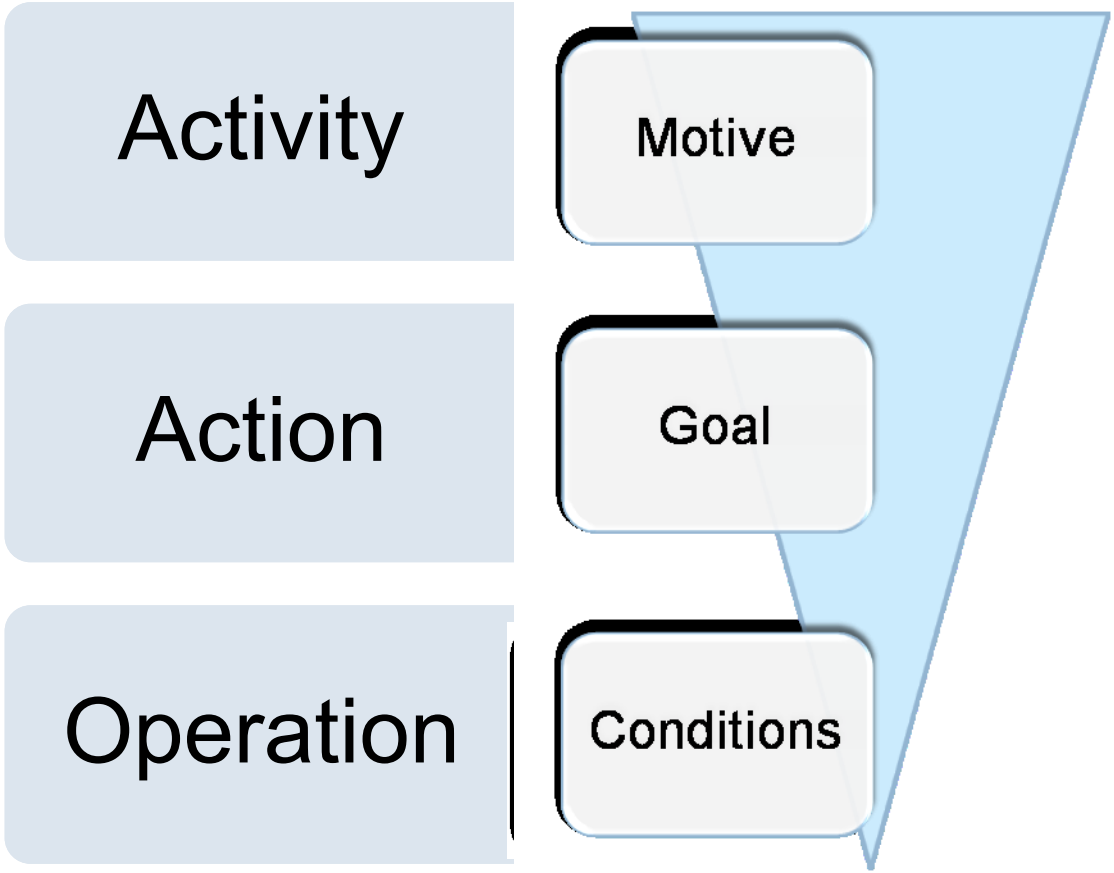


- Empowering
  - Holds historical development of relationship between subject & object
- Limiting
  - Restricts interaction to be only what the tool can do

Structure of an Activity



Levels of an Activity



Action-Operation Dynamic

- Before actions are performed, they are planned in the consciousness with a model (*orientation*)
- Conscious **actions → operations** over time (orientation phase disappears)
  - New action is created with broader scope, incorporating new operation
  - Ex: Learning to drive manual

Activities are Dynamic

- Activities have both internal and external sides
  - Subject transforms object and vice versa
  - Subject assimilates the experience of humanity
- Activities are not isolated
  - Influence from other activities and environment
  - *Contradiction* is what happens when external activities / internal components are at odds

Role of Information Technology

- In principle, IT can automate all **operations**
- IT can also support **actions**
  - IT can serve as a tool
  - IT can aid sense-making (*informate*), providing a new perspective of the object of work
  - IT can drive communicative actions between participants
- IT can be the principal enabler for **activities**
  - May make an activity feasible
  - May allow an object that wouldn't have been accessible

Operation-level support	Action-level support	Activity-level support
Tool, instrument		
Automating routines	Supporting transformative and manipulative actions Making tools and procedures visible and comprehensible	Enabling the automation of a new routine or construction of a new tool
Object		
Providing data about an object	Making an object manipulable	Enabling something to become a common object
Actor		
Triggering predetermined responses	Supporting sense-making actions within an activity	Supporting learning and reflection with respect to the whole object and activity
Rules		
Embedding and imposing a certain set of rules	Making the set of rules visible and comprehensible	Enabling the negotiation of new rules
Community		
Creating an implicit community by linking work tasks of several people together	Supporting communicative actions Making the network of actors visible	Enabling the formation of a new community
Division of labor		
Embedding and imposing a certain division of labor	Making the work organization visible and comprehensible	Enabling the reorganization of the division of labor

Figure 2.5
A classification of potential ways of supporting activities by information technology.

Contribution of Activity Theory

- With Activity Theory, we can better address…
  - Issues belonging to different levels within an integrated framework
  - Interaction in a social context
  - The dynamic features of human practices