Week 2-1
Interface and Interaction

SFWRENG 4HC3/6HC3 Human Computer Interfaces

** Slides adapted from previous instructors of COMPSCI/SFWRENG 4HC3/6HC3*

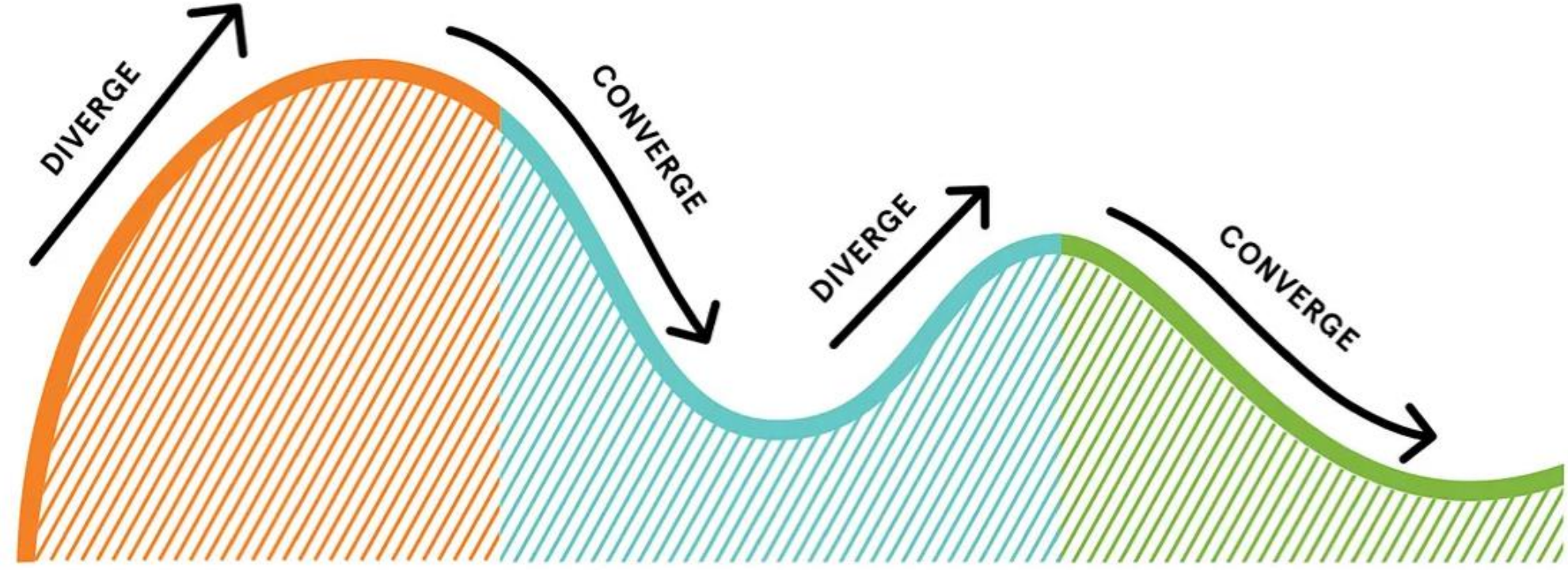
McMaster University

Applying HCD to Design Project

Design Project M2
Requirement Elicitations

Design Project M3
Task Analysis and Low-Fidelity Prototypes

Design Project M4
High-Fidelity Prototype & Project Report



McMaster University

Quick Items

- Design project milestone #1 instruction
- Project working time during tutorial (checklist)

A recap on HCI and HCD

- What is HCI?
- Human-centered Design
  - “an approach that **puts human needs, capabilities, and behavior first**, then designs to accommodate those needs, capabilities, and ways of behaving”
- Human-centered Design Process

But what is Design?

Processes, methods

Creative endeavor

Outputs are things

Process of creating or shaping tools or artifacts for direct human use.

People-centered concerns

Design vs. Engineering

Design

- Envision **new possibilities, new outcomes**
- Determine what **outcome should result** among **infinite possibilities**
- Reliance on **process** over formulae
- **Humans** are central actors "in the loop"

Engineering

- Make a mostly-known outcome **possible**
- Construct **a sturdy bridge** based on **specifications**
- Concerned with **what can be done**
- Reliance on well-established formulae
- Humans **may or may not** be directly "in the loop"

Design vs. Art

Design
concerns the creation of something **useful and usable**

Art
does not bother with this restriction

slido

Please download and install the Slido app on all computers you use

Can you think of the difference between requirement engineering and human-centered desgin?

ⓘ Start presenting to display the poll results on this slide.

HCD vs. Requirement Engineering

HCD

- User interaction and experience (human centered)
- Prioritize usability and user experience
- Results in **interface and interaction design, guideline**s

Requirement Engineering

- Define what the system should do
- More systematic, focus on capturing and managing all necessary requirements for the system
- Results in **requirement specifications** and **documentation that guide development process**

Week 2 Goals

- **Monday**
  - **Interface and Interaction**
- Wednesday
  - Usability and UX
- Friday
  - Design Principles: Part 1

Week 2 Goals

- **Monday**
  - **Interface and Interaction**
    - **Interface, Interaction, and Experience**
    - **The Interactive Cycle, and Stage of Actions**
    - **Gulf of Execution and Evaluation**
- Wednesday
- Friday

Quick Poll #1

Is this an interface or an interaction?

slido

Please download and install the Slido app on all computers you use

Is this an interface or an interaction?

ⓘ Start presenting to display the poll results on this slide.

Quick Poll #2

Is this an interface or an interaction?

slido

Please download and install the Slido app on all computers you use

Is this an interface or an interaction?

ⓘ Start presenting to display the poll results on this slide.

Quick Poll #3

Is this an interface or an interaction?

slido

Please download and install the Slido app on all computers you use

Is this an interface or an interaction?

ⓘ Start presenting to display the poll results on this slide.

Interface, Interaction, Experience

An **interface** refers to what is presented to the user

- Could be a visual, physical, or auditory presentation
- Includes **what** you can manipulate

Interface, Interaction, Experience

An interaction is the **dialogue** between the computer and the user

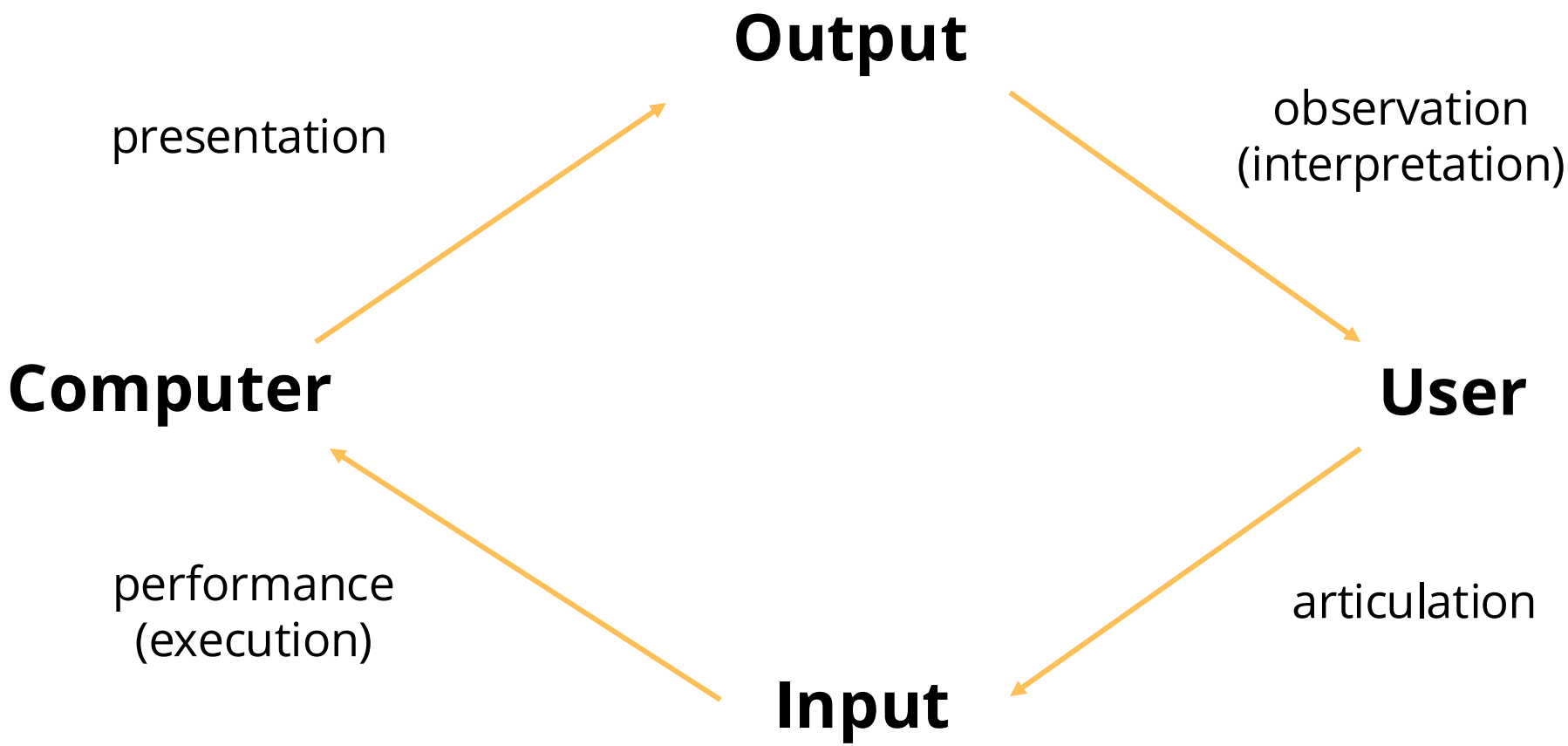
- The actions the user **must** invoke to perform a task and the corresponding responses
- The **dialogue is ongoing**

Interface, Interaction, Experience

Experience refers to the **overall perception and feelings** a user has while interacting with a system.

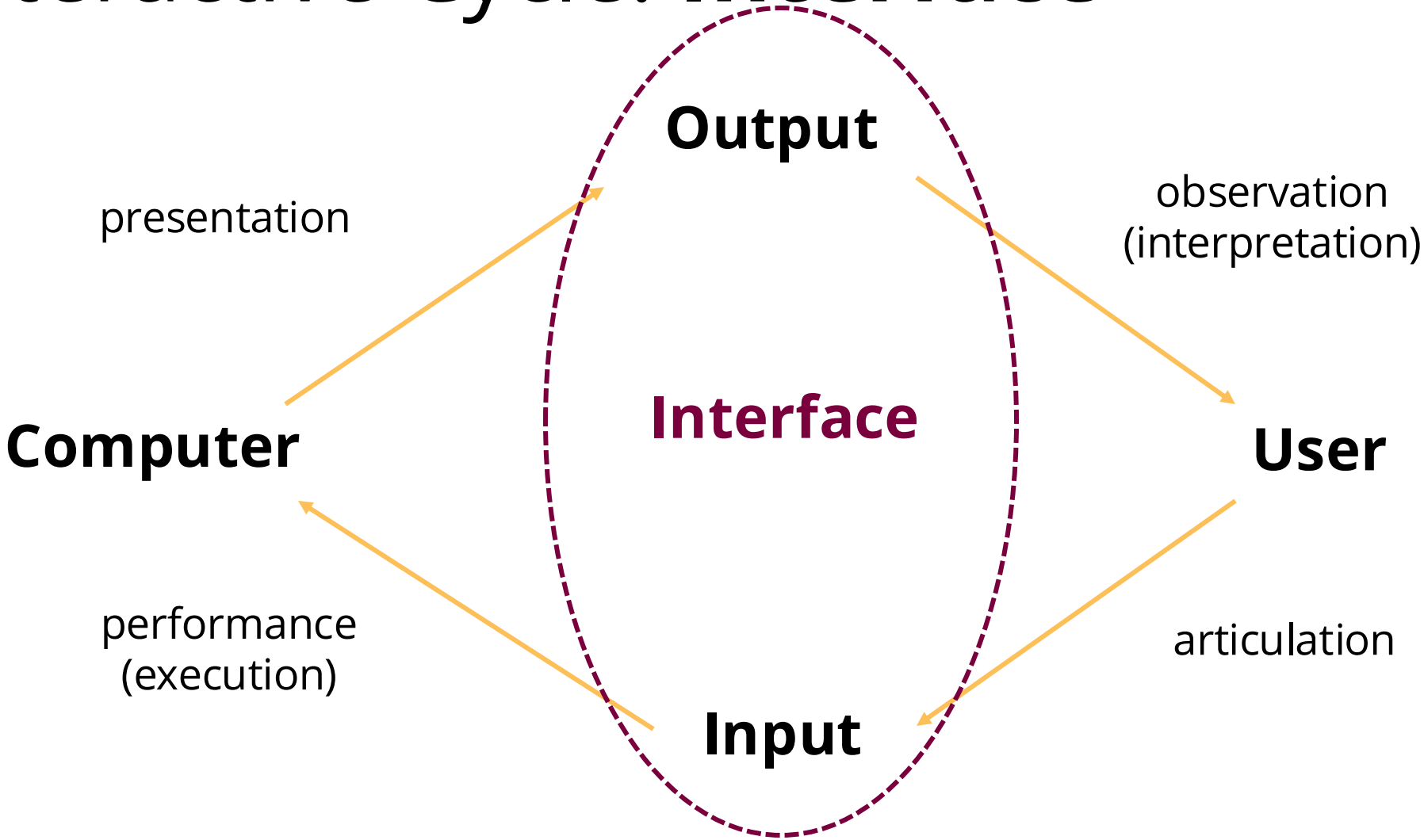
It can cover **many aspects** of the interaction.

Interactive Cycle



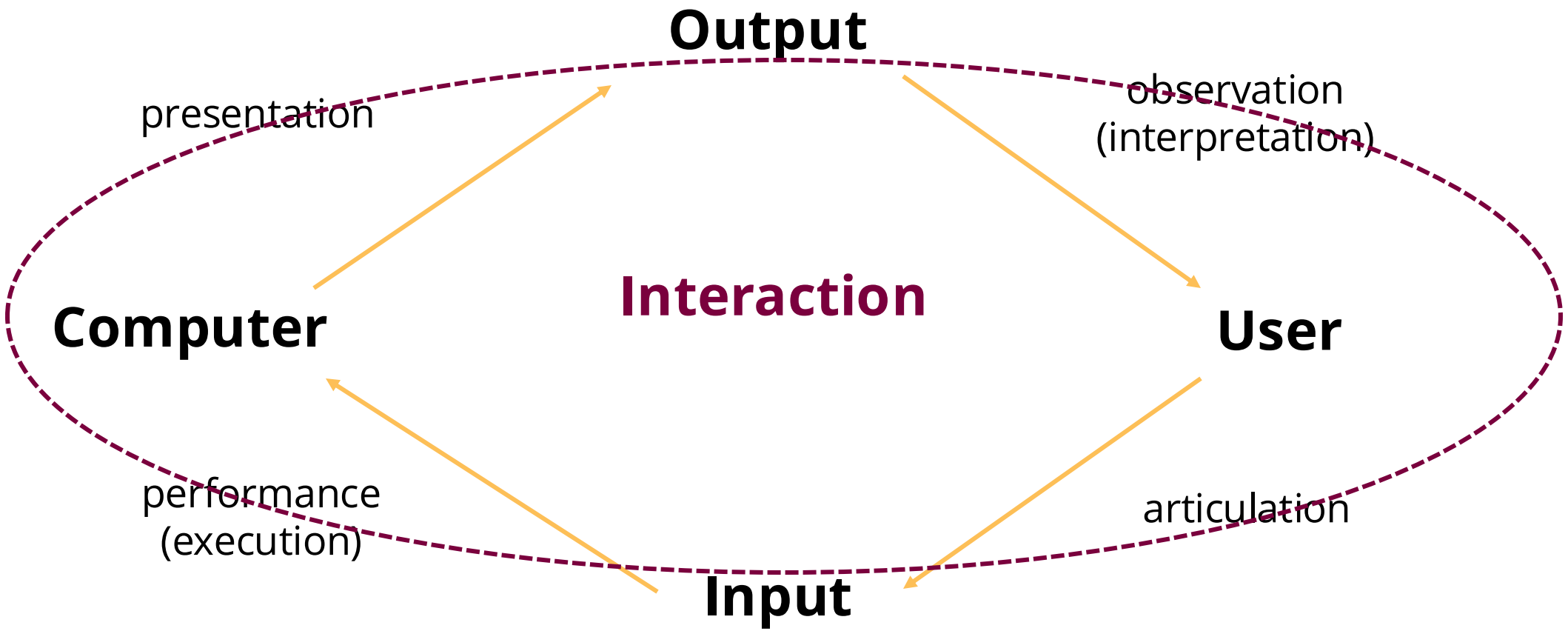
Reproduced from Dix, Finlay, Abowd, & Beale (2004)

Interactive Cycle: **Interface**



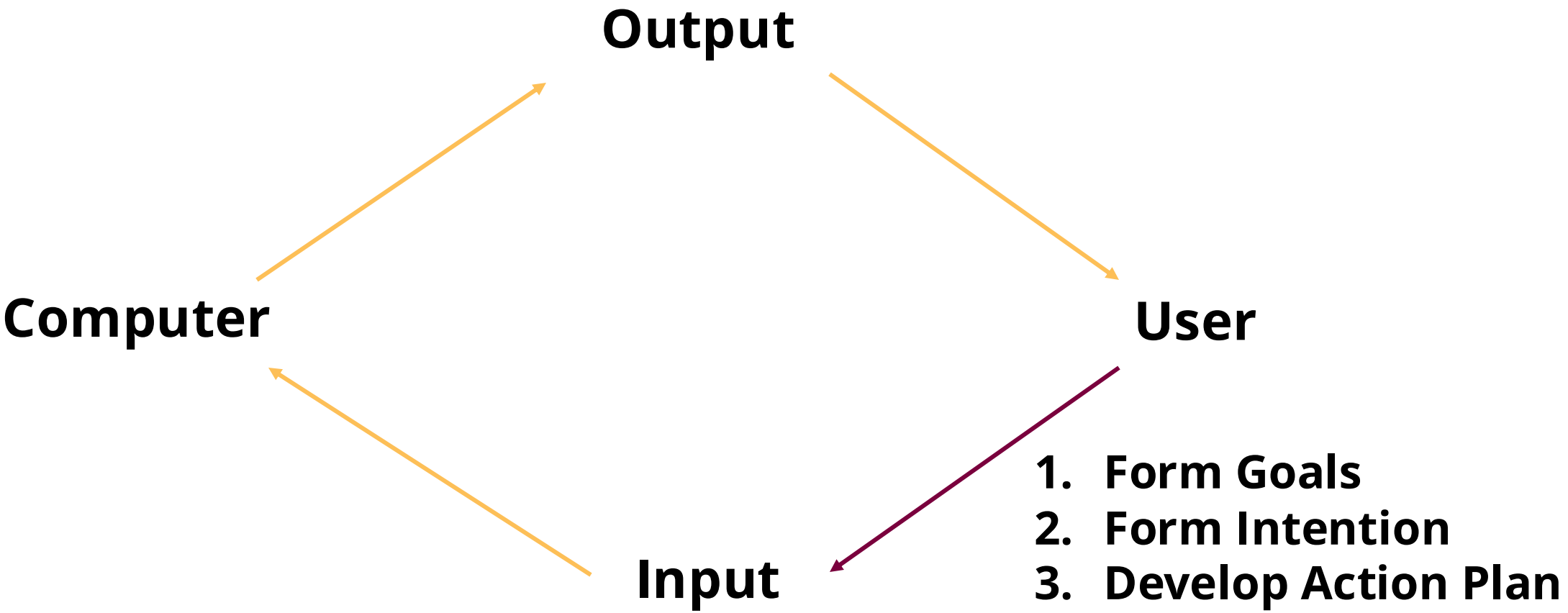
Reproduced from Dix, Finlay, Abowd, & Beale (2004)

Interactive Cycle: **Interaction**

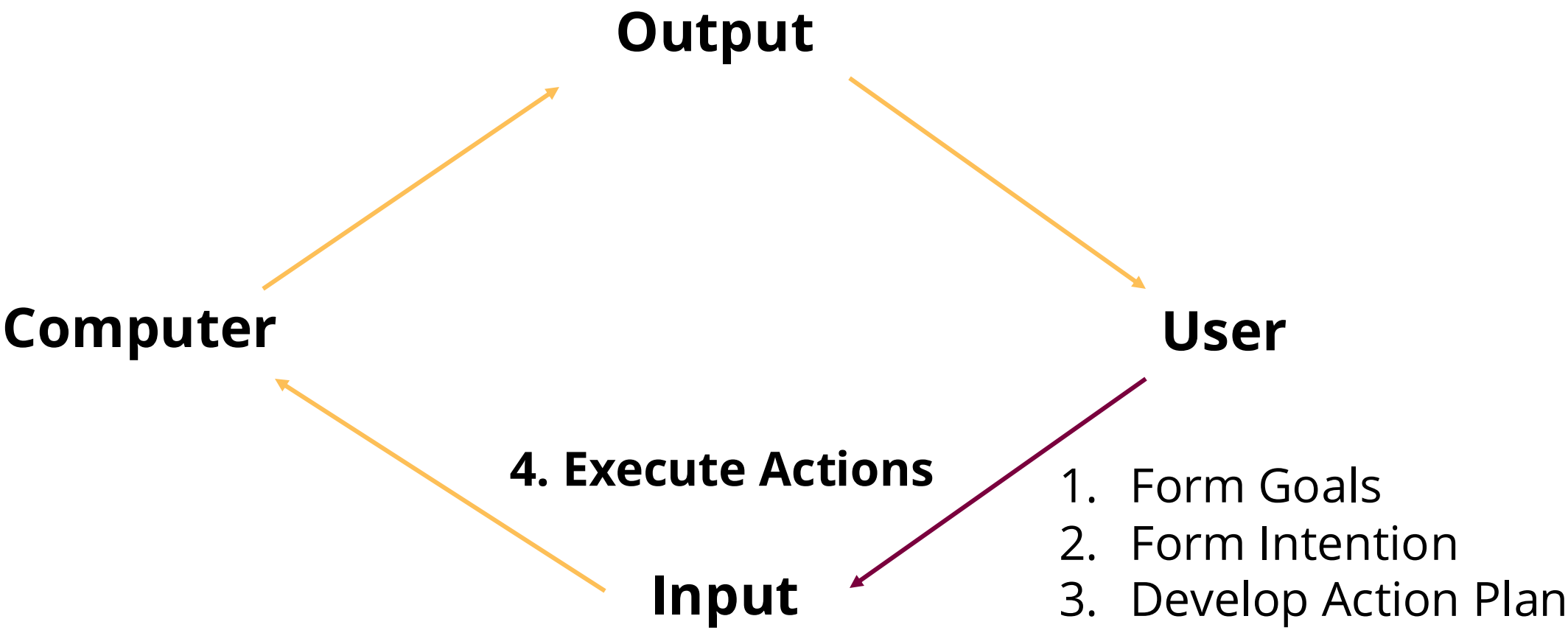


Reproduced from Dix, Finlay, Abowd, & Beale (2004)

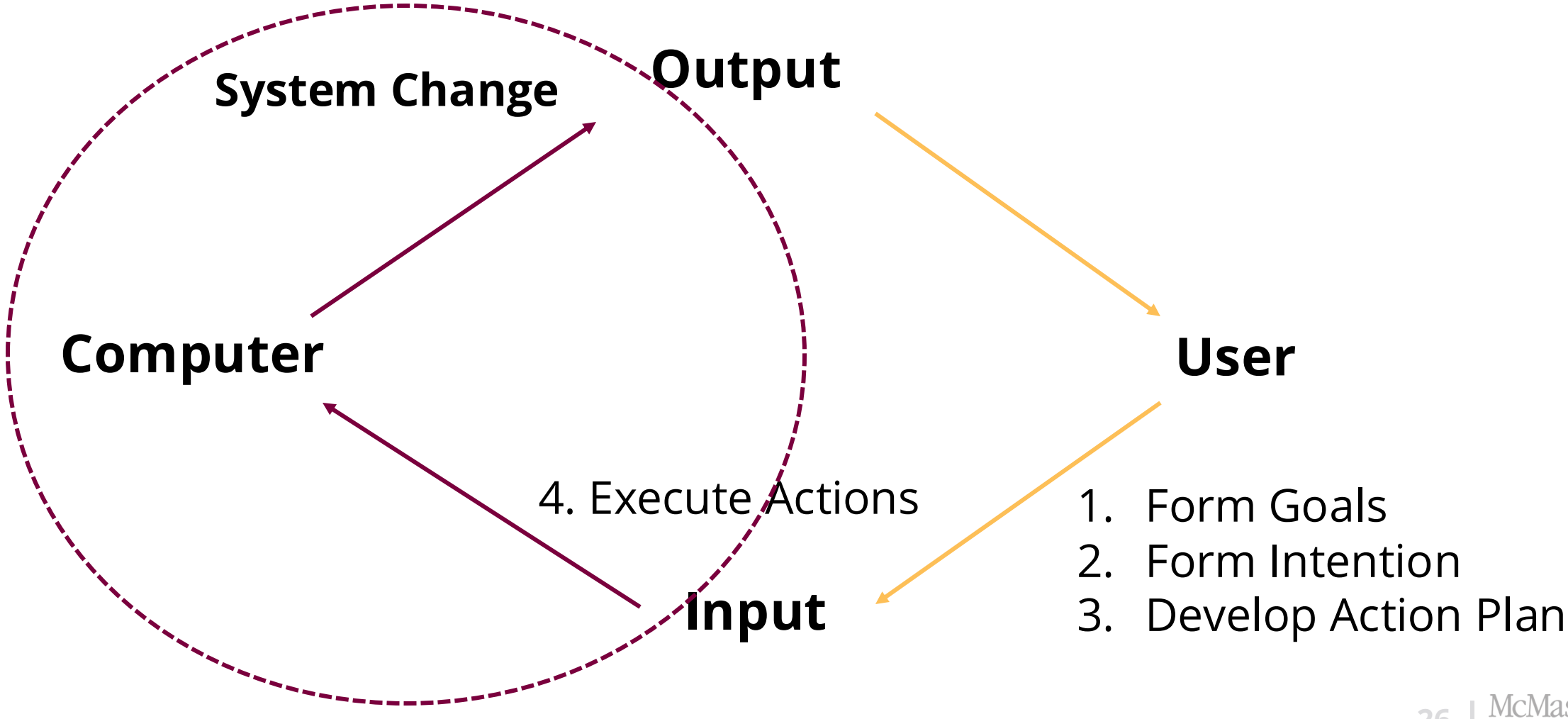
Interactive Cycle: **Stages of Action**



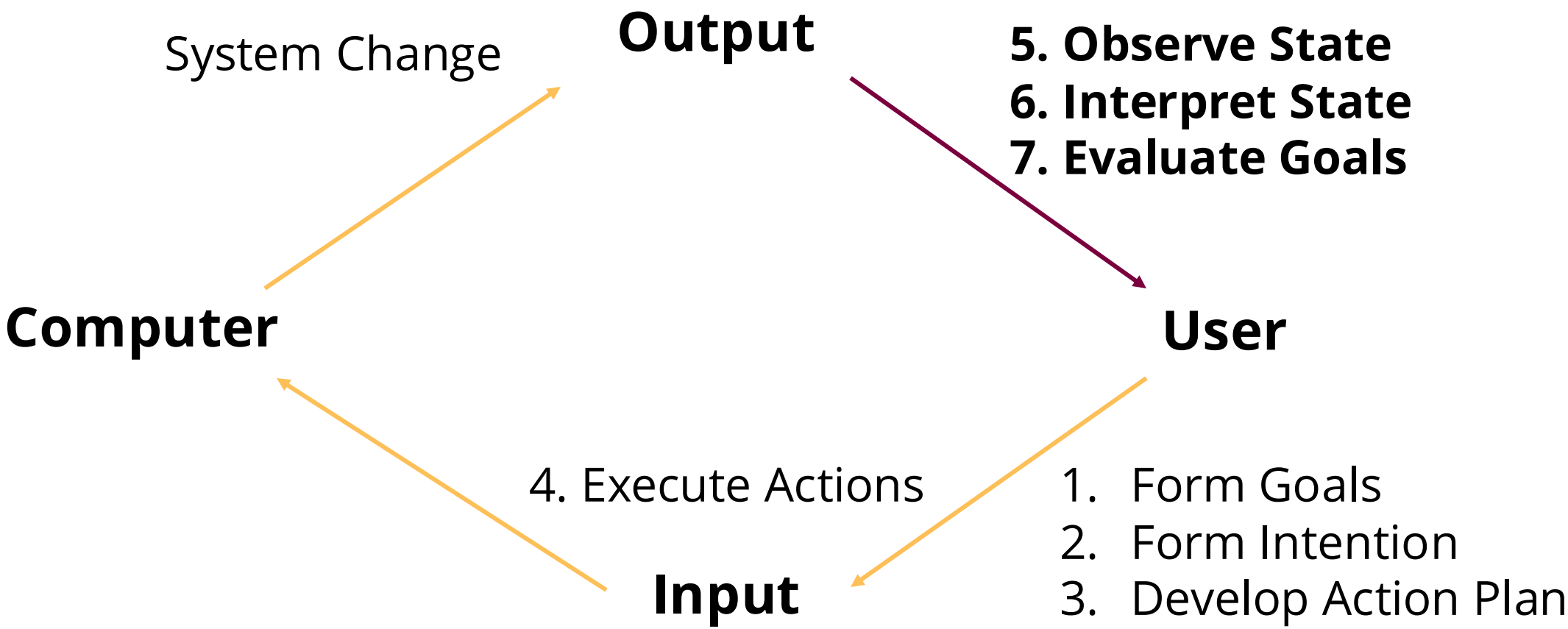
Interactive Cycle: **Stages of Action**



Interactive Cycle: **Stages of Action**

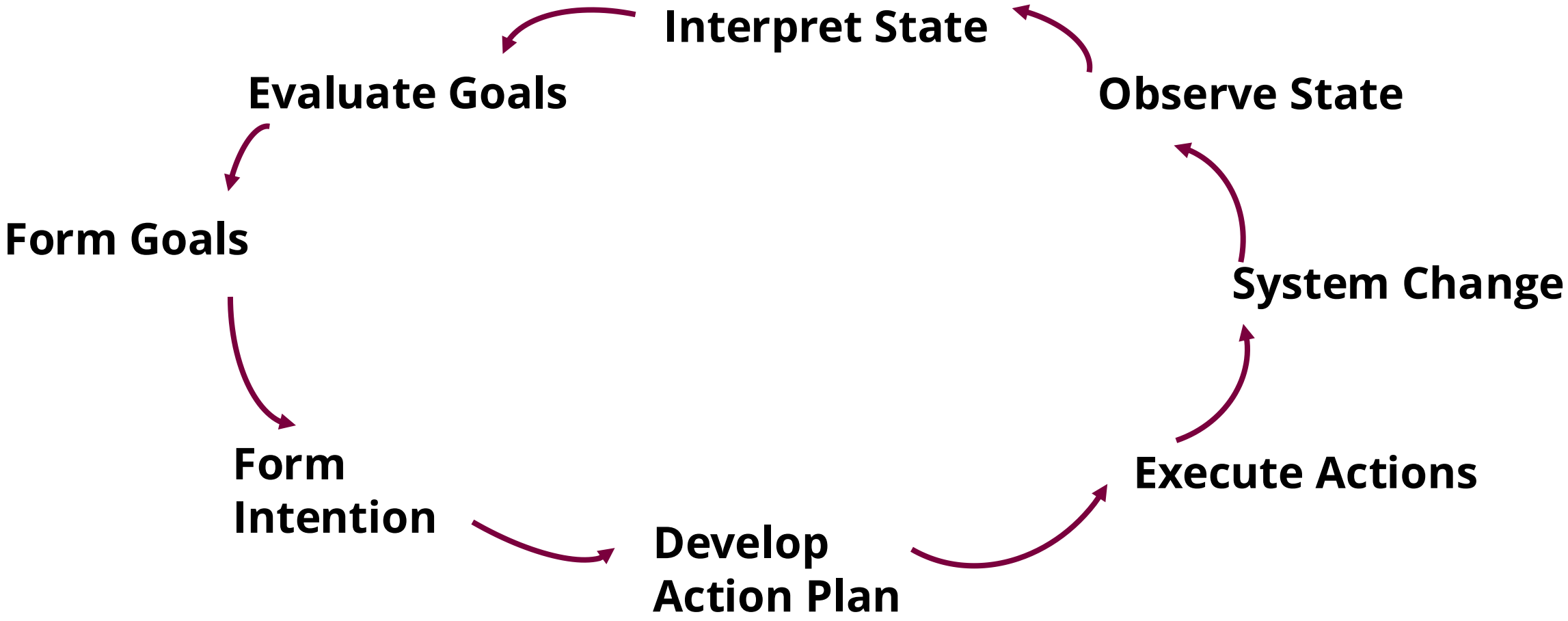


Interactive Cycle: **Stages of Action**

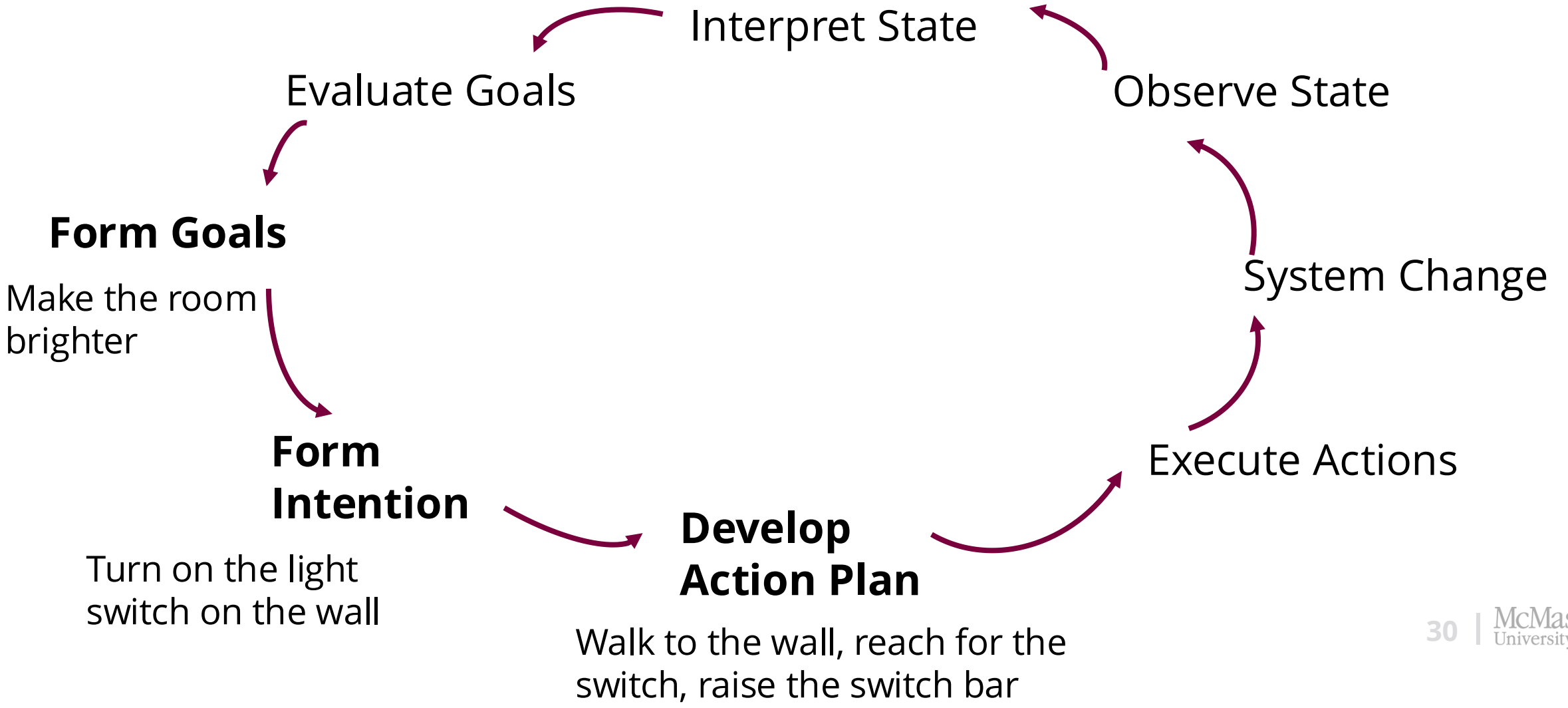


Example: **Make the Room Brighter**

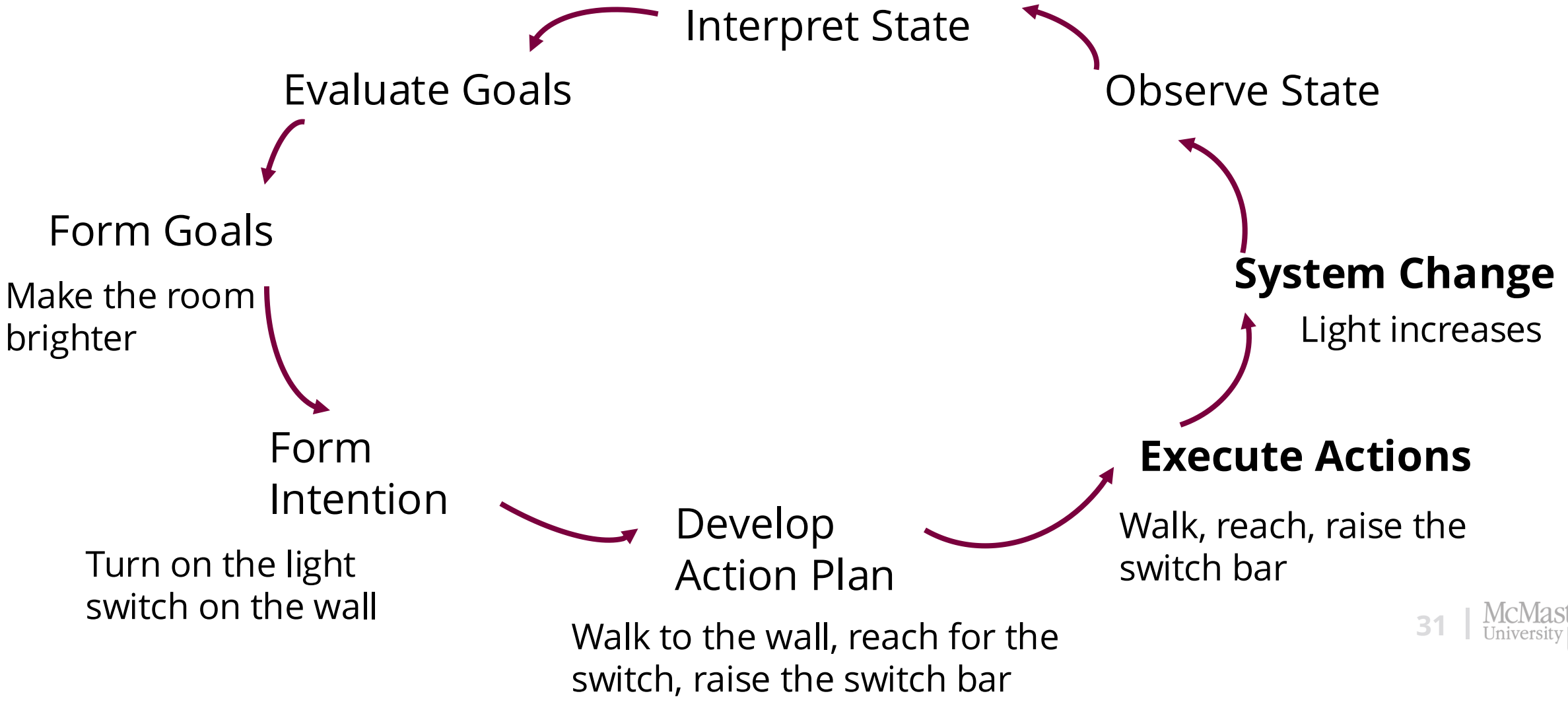
Example: **Make the Room Brighter**



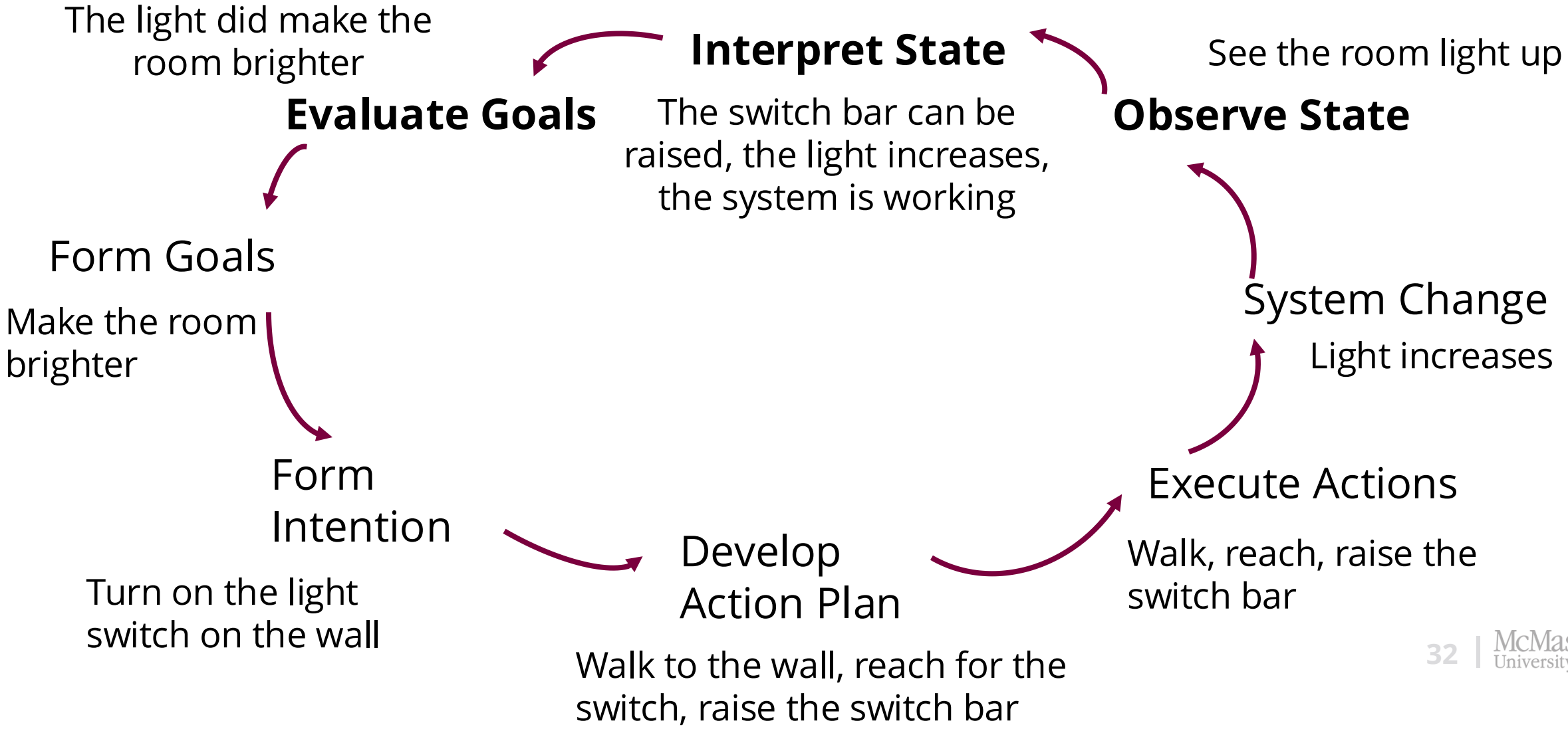
Example: **Make the Room Brighter**



Example: **Make the Room Brighter**



Example: **Make the Room Brighter**



Stages of Actions: **Problems**

Example: **Make the Room Brighter**

Interpret State

Observe State

System Change

Execute Actions

Develop Action Plan

Walk to the wall, reach for the switch, change the switch

Form Intention

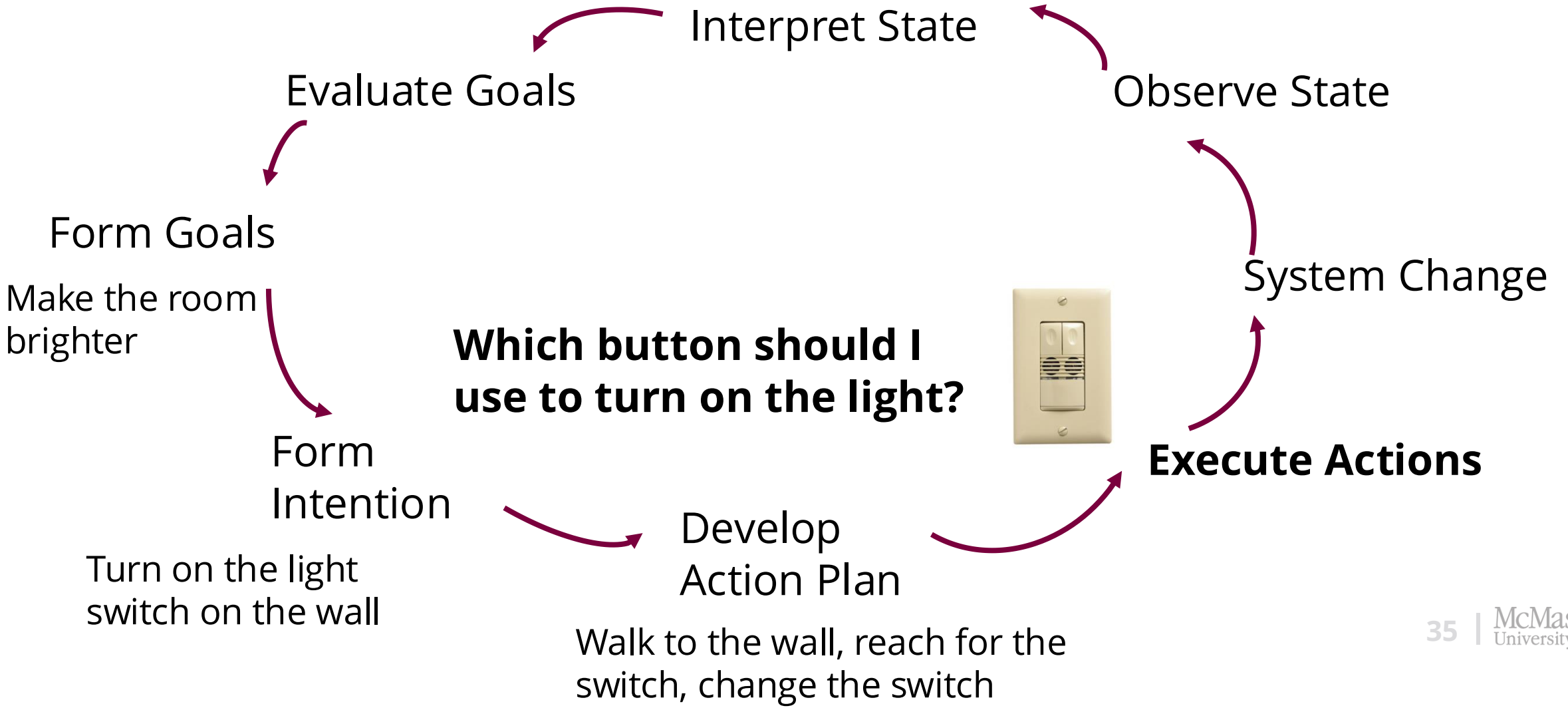
Turn on the light switch on the wall

Form Goals

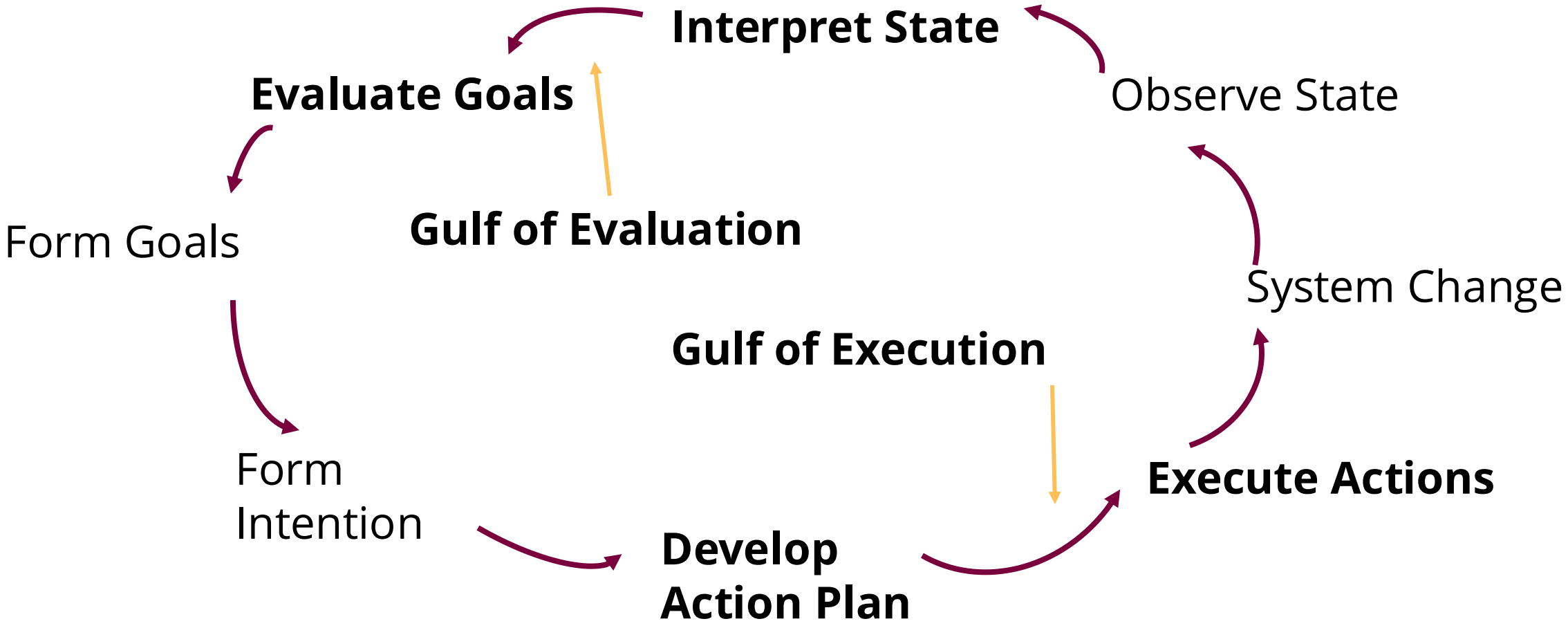
Make the room brighter

Evaluate Goals

Example: **Make the Room Brighter**



Gulf of Execution & Evaluation



Idea formulated by Don Norman

Week 1 Goals

- ~~Tuesday~~
- ~~Thursday~~
- **Friday**
  - **Interface and Interaction**
    - ~~**Interface, Interaction, and Experience**~~
    - ~~**The Interactive Cycle, and Stage of Actions**~~
    - **Gulf of Execution and Evaluation**

McMaster University

Lost in translation?

Both the person and system need to **translate**…

- From person's intention to system input language (PERSON)
- From input language to internal task (SYSTEM)
- From internal task output to output channel (SYSTEM)
- From output channel to person's interpretation of output (PERSON)

Lost in translation?

Gulf of Execution

Both the person and system need to translate…

- **From person's intention to system input language (PERSON)**
- From input language to internal task (SYSTEM)
- From internal task output to output channel (SYSTEM)
- **From output channel to person's interpretation of output (PERSON)**

Gulf of Evaluation

Lost in translation?

Both the person and system need to translate…

- From person's intention to system input language **(PERSON)**
- From input language to internal task **(SYSTEM)**
- From internal task output to output channel **(SYSTEM)**
- From output channel to person's interpretation of output **(PERSON)**

Gulf of Execution

The manner in which the user must translate their plans into input the system can understand is not always natural or intuitive

A gulf of execution arises when the **user has difficulties providing instructions that are executable** by the system

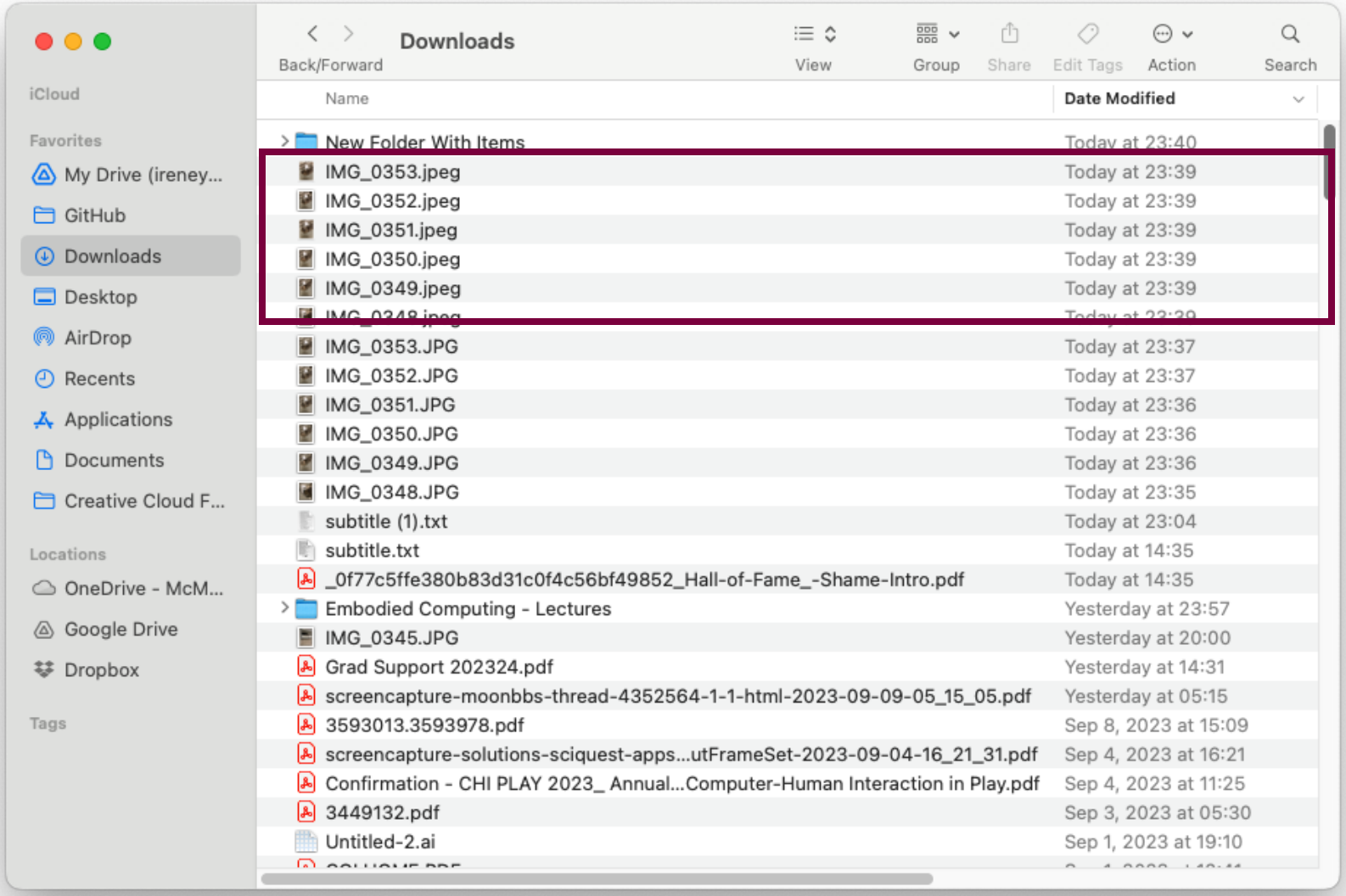
Example: The Light Switch from the Practice

Gulf of Evaluation

A Gulf of Evaluation arises when the **user has trouble interpreting system output** in light of their goals

Reflects the amount of effort the user has to exert to determine how well their expectations and intentions have been met

Gulf of Evaluation: Example



Just downloaded some picture files

Gulf of Evaluation: continued

"The **gulf is small** when the system **provides information** about its state in a form that is easy to **get**, is easy to **interpret**, and **matches** the way the person thinks of the system"

Don Norman, Design of Everyday Things

Interface's Impacts

I/O Channels (interface) affect what **can and cannot** be expressed

- Sometimes interaction language is far from how the user would naturally do a task (i.e., the domain language)
- Requires extra effort on behalf of user to translate back and forth

Goal with Design

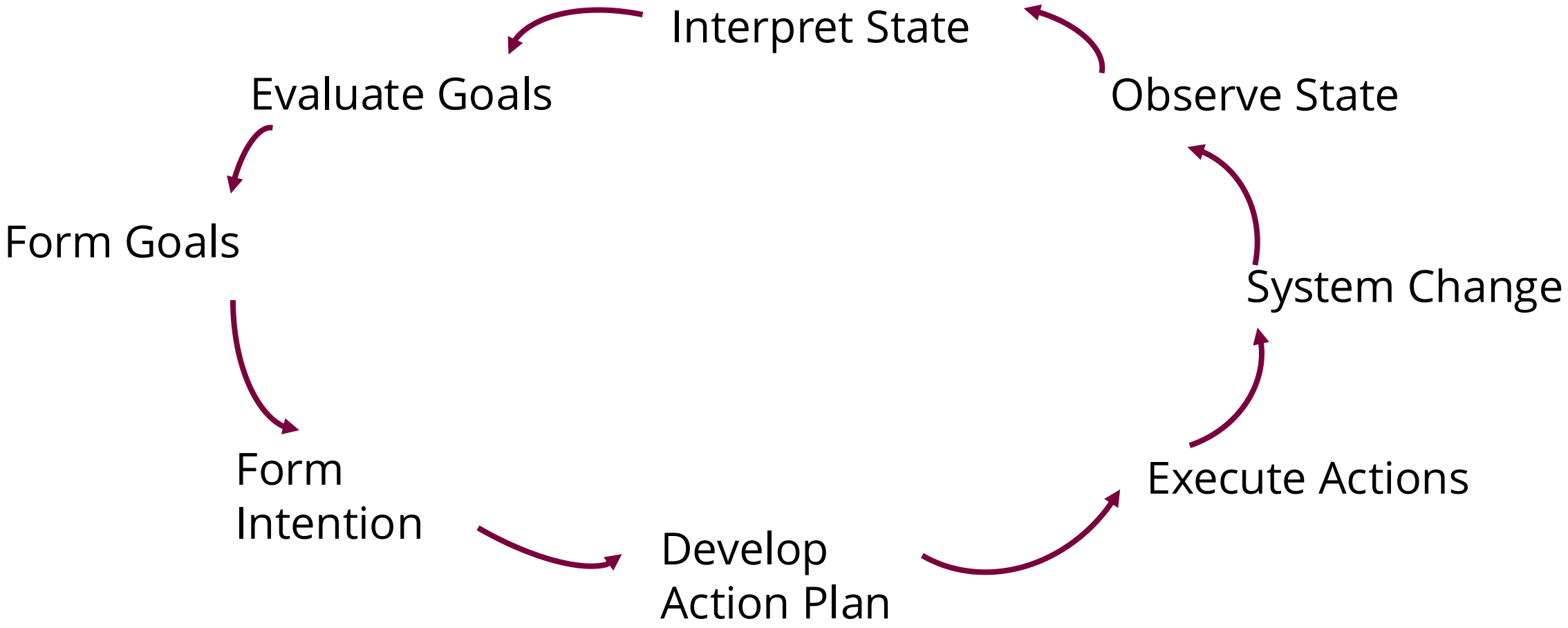
Minimize these gulfs by making **input easy** to understand and use, and **output clear and easy** to interpret

The more “translating” the user has to do, the more **difficult** it is for the user to accomplish their task

- Slower
- More errors

Sometimes interaction language is far from how the user would naturally do a task (i.e., the domain language) (e.g., 3D modelling vs. clay modelling)

Stages of Action as Design Guide



Quick Practice
Computer Desktop Design

Practice: **Computer Desktop Design**

Assume a MacOS user who has never used Windows before, and wants to clean up their Desktop in Windows

1. Use Stages of Action to analyze the user's interaction with the system
2. With the stages of action, think about how does the current design of the desktop interface minimize the gulfs?

Week 2 Goals

- ~~Monday~~
  - ~~Interface and Interaction~~
- **Wednesday**
  - **Usability and UX**
- Friday
  - Design Principles: Part 1