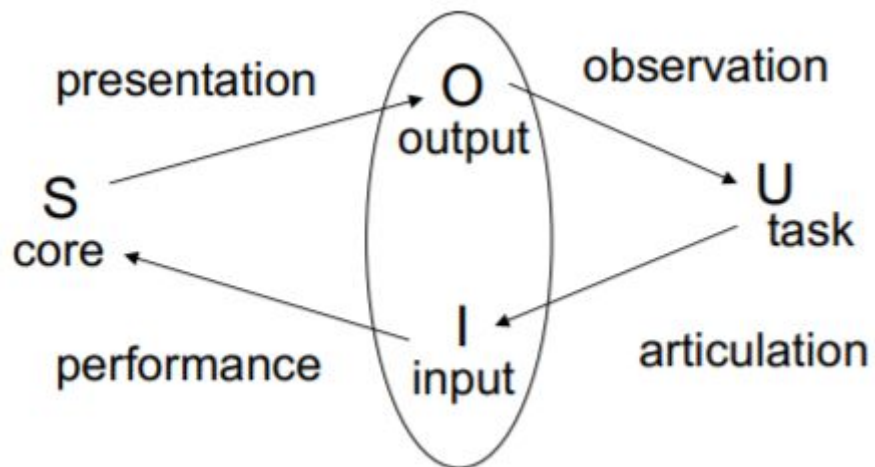


## Interaction

- **Interaction models** - translations between user and system
- **Ergonomics** - physical characteristics of interaction
- **Interaction Styles** - nature of user/system dialogue
- **Context of interaction** - social, organisational, motivational
- **Interaction and experience**
  - User experience has become vital, how a product behaves and is used
  - Can design for the user experience, but can't design the experience itself
- **Interaction frameworks**
  - Interaction is communication between the user and the system
  - Why have a framework? Contextualisation, global perspective
  - Domain - the area of work being studied
    - Tasks are operations to manipulate concepts of the domain
    - Intention is the specific action required to meet the goal
  - **Norman's (1986) Theory of Action**
    - 7 stages of an activity
      - Establish goal
      - Form intention
      - Specify action sequence
      - Execute an action
      - Perceive the system state
      - Interpret the state
      - Evaluate the state w.r.t goals and intentions
    - Criticism
      - Human activity is not that sequential, orderly
      - More likely that stages are skipped, out of order, or repeated
      - It is an approximation & simplification
- **Gulfs**
  - Gaps that exist between user and interface
  - **Gulf of execution**
    - Users formulation of actions isn't allowed by the system
  - **Gulf of evaluation**
    - Users expectation of changed system state isn't the actual presentation of the state
  - Minimal gulfs -> minimal effort
- **Minimal user effort**
  - Norman's model considers low level effort for each action
  - Interfaces should minimise the amount of effort needed to achieve goals
    - **Keystroke level modelling & critical path analysis are used to achieve this**
- **Human error**
  - **Slip** - understand system and goal, correct intention, wrong action
    - Needs better interface
  - **Mistake** - may not even have the right goal
    - Needs better understanding

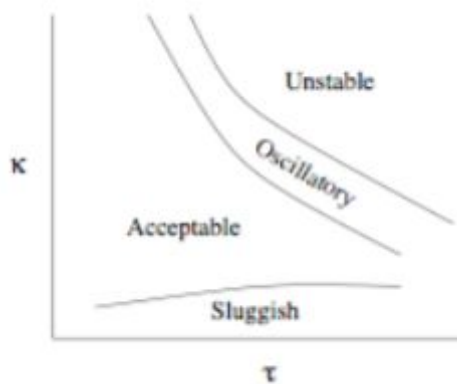
- **Framework**

- **Abowd and Beale: 4 part framework (user, input, system, core)**



- **Ergonomics aka Human Factors**

- Arrangement of controls and displays, surrounding environment, health issues, use of colour
- **Physical interaction:** Consider manually controlled system with gain  $k$  and time delay from user input of  $t$



- High gain and long delay yields systems that are difficult or impossible to control
- **Order of Control**
  - Zero order - mouse
  - First order - car accelerator
  - Second order - steering wheel
  - Third order - submarines, aviation
  - Lower order control is easier
- **Glass interfaces:** shift in industrial interfacing (dials and knobs to screens and keypads)
  - Cheaper, more flexible, multiple representations
  - Not physically located leads to loss in context, more complex interface
- **Indirect Manipulation**

- Using a system to act as an intermediary between user and the real world
  - Indirect interaction gives two levels of feedback - recognition of commands vs final effect on the world
- **Arrangement of controls**
  - **Functional controls** grouped by functional relationships
  - **Sequential controls** reflect order of typical interactions (task sequencing is enforced)
  - **Frequency controls** organised by frequency of use - most frequent, most easily acceptable
- **Constraints of physical design**
  - Ergonomic (can't push buttons that are too small), physical, legal/safety (e.g. out of reach of kids), context and environment, aesthetic, economic.
- **Interaction styles**
  - E.g. CLI, menus, natural language, query dialogue, forms
  - **Linguistic:** CLI, natural language
  - **Key-Modal styles:** function keys, Q&A interaction, menu driven
  - **Direct Manipulation:** GUI, forms
- **CLI**
  - Direct expression to system, good for repetitive tasks, expert users
  - ADV: flexible, power users, initiative, customizable
  - DIS: low visibility, memorization, little error handling
- **Menus**
  - Options displayed on screen, visual (less recall), selected with mouse/buttons, not suitable for complex actions
  - ADV: reduced learning time, less keystrokes, structured, easy error handling
  - DIS: can't support complex, slow for frequent use, consumes screen space
- **Natural Language**
  - Familiar to user, use speech recognition or typed language
  - ADV: natural, novice-friendly, access over telephone, hands free if spoken
  - DIS: requires clarification dialogue, could require more key strokes, unpredictable
- **Query interfaces**
  - Q&A: user led via questions, suitable for novices, used in info systems, limited variation
  - Query interface: systems allow the user to construct a query to underlying db
- **Form Fills**
  - Primarily for data entry or retrieval, simplified data entry, little training, was dominant
- **WIMP interface**
  - Windows Icons Menus Pointers

- Default for majority, doesn't translate to small devices
- **Direct manipulation**
  - Objects of interest visible in interface, incremental action at the interface with rapid feedback
  - Reversibility of all actions, so users are encouraged without penalising
  - All actions are legal actions
  - Removed complex command languages
  - ADV: presents task concepts visually, learnable, memorable, error avoidance, encourages exploration, subjective satisfaction
  - DIS: more difficult to make, blind users
- **Social and organizational context**
  - Interaction is influenced by context
  - Around other people: desire to impress, competition, fear of failure
  - Motivation: fear, allegiance, ambition, self-satisfaction
  - Inadequate systems lead to frustration and loss in motivation