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# Understanding and Serving Users

Class 3

The User-Centered Design Process II

Methods and Pitfalls

# Design diaries

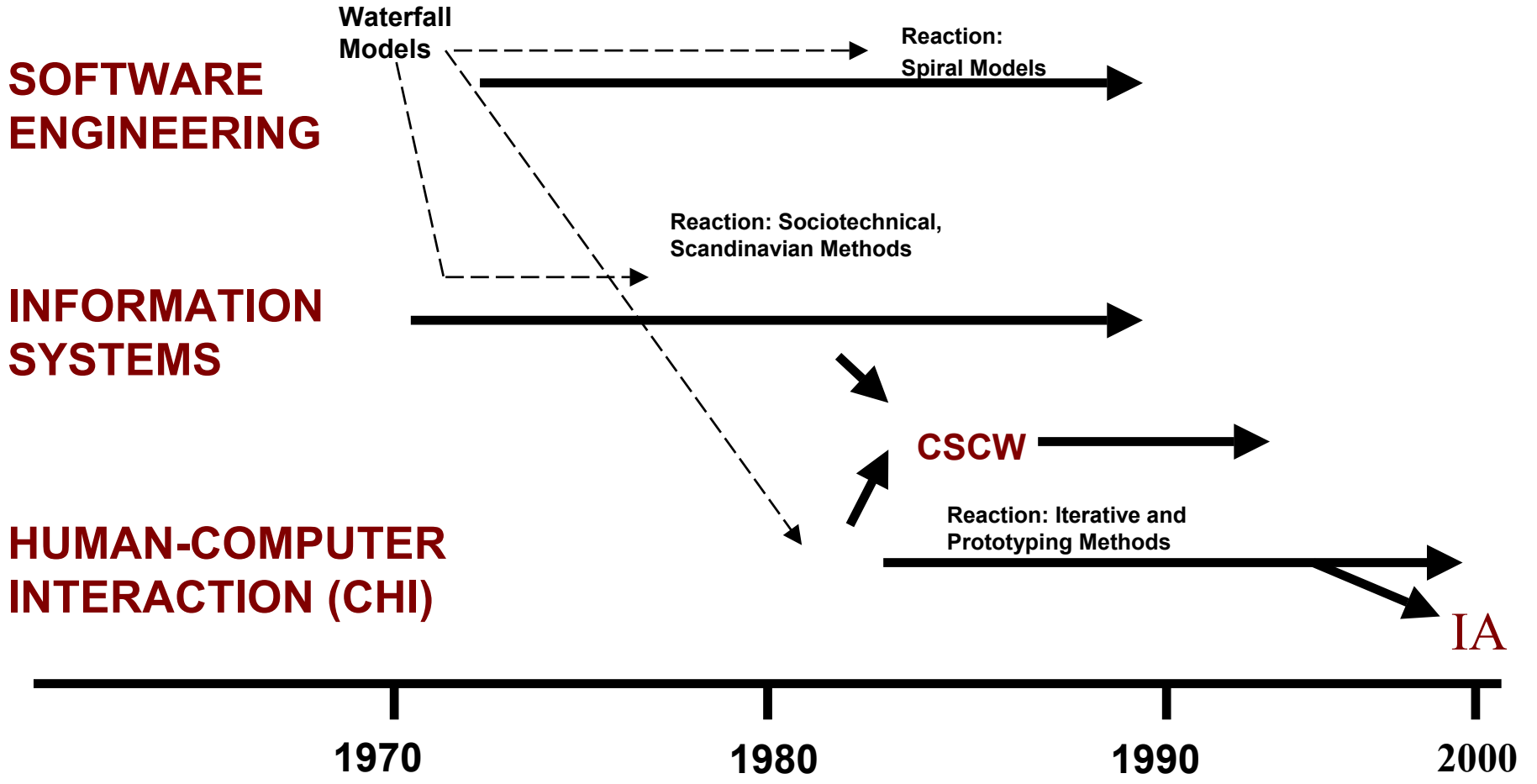
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- <http://php.indiana.edu/%7Eetzazelen/542/>
- <http://www.burningchrome.com/~cdent/slis/I542/designdiaries.htm>

# Mainstream origins?

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- “Since the 1980s there has been a shift towards a ‘person-centred’ approach rather than a ‘system-centred’ approach. This has been accompanied by a shift from quantitative methods to qualitative methods” Wilson, p51.
- Note- Wilson does not elaborate or explain these ‘shifts’ and is talking of a narrow range of tasks



# System Development Lifecycle

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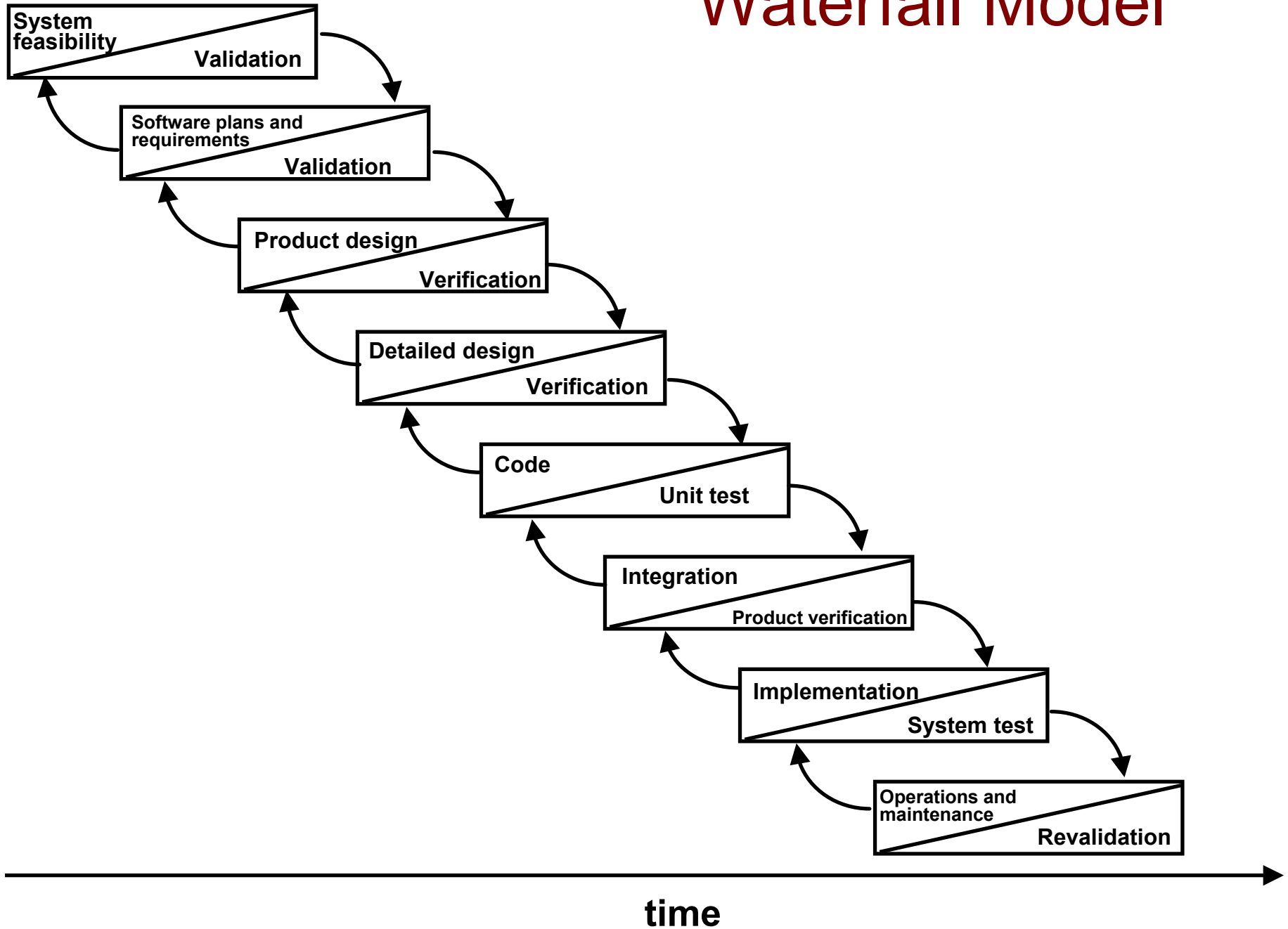
- Multiple models
- Multiple stages
  - running from conception to maintenance
- Common form
- Common aim

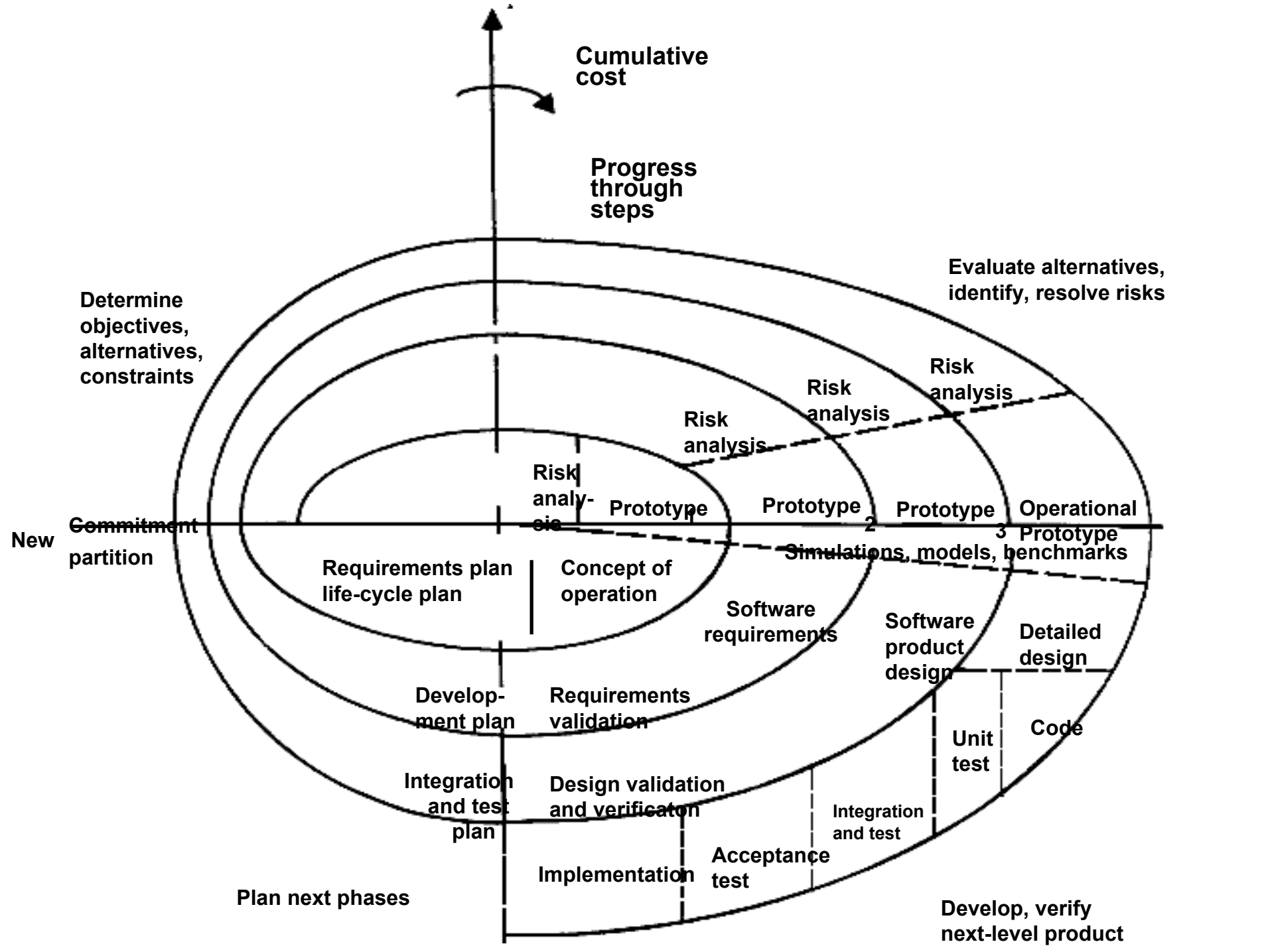
# Generic model of the process:

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- Requirements
- Design
- Implementation
- Testing
- Maintenance

# Waterfall Model





# Design Process Efforts

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## Pre-maintenance

- Requirements/Design 40%
- Implementation 20%
- Testing 40%

Long-lives system maintenance costs can exceed all other costs by 4:1

(Sommerville, 1995)

# User Centered Design

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- What is it?
- Where did it come from?
- How do you do it?
- Problems!

# What is UCSD?

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An approach to design based on social and cognitive analyses of human activities

In practice UCSD is more philosophy than method but other methods are considered too management oriented

# Related terms

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- Design for usability
  - User performance with system is our primary concern
- Participatory design
  - Engaging user in the process
  - Users have co-ownership of development process
- Human-centered design
  - Holistic approach to complementing human skills

# Human-Centered Systems (HCS)

(Kling and Star, see readings)

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- The question of what is and is not HCS can be divided into 4:
  - What do we mean by human?
  - What is a system?
  - What are the goals of a human-centered system?
  - What are the processes associated with HCS?

# Human=User?

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- Does the term 'user' deprive us of understanding subtle aspects of the quality of use?
  - Obsession with Task analysis?
  - See task models in Tuominen, Wilson et al
- Does the concept of 'user' objectify humans as 'monologic subjects' (see Tuominen, 1997 in readings)

# What is a HCS?

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- Complementary to human skills
- Recognizes the structure of social relationships
- “HCS should be cognizant of the possibility (of outcomes) via analysis of systems’ use in some very realistic contexts” (see Kling and Star in readings)

# Note

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- Many authors here are strong on philosophy and criticisms of existing methods but short on details of how their alternative works
- UCSD comes across as a 'call to arms' for improving the process but does it help a designer?

# IBM on UCSD

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- User-Centered Design is a **method** for designing ease of use into the total user experience with products. It enables organizations to consistently develop **engaging products** that are easy to buy, easy to set up, easy to learn, easy to use, and easy to upgrade. It calls for a **multidisciplinary team** to design **everything the user sees and touches** and to gather **user input and feedback** during **each stage** of the development process.
- It's like 'good hygiene'

# The IBM User-Centered Design Principles

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- **Set business goals.** Determining the target market, intended users, and primary competition is central to all design and user participation.
- **Understand users.** A commitment to understand and involve the intended user is essential to the design process. If you want a user to understand your product, you must first understand the user.
- **Assess competitiveness.** Superior design requires ongoing awareness of the competition and its customers. Once you understand your users' tasks, you must test those same tasks against competitive alternatives and compare their results with yours.
- **Design the total user experience.** Everything a user sees and touches is designed together by a multidisciplinary team. This includes the way a product is advertised, ordered, bought, packaged, maintained, installed, administered, documented, upgraded and supported.
- **Evaluate designs.** User feedback is gathered early and often, using prototypes of widely ranging fidelity, and this feedback drives product design and development.
- **Manage by continual user observation.** Throughout the life of the product, continue to monitor and listen to your users, and let their feedback inform your responses to market changes and competitive activity.

# Quote:

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- “For each principle, the goal is to involve users -- to ask the right people the right questions. Putting yourself in their shoes is a sure way to put your product at the front of the pack.”

# Product?

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- Remember, information technology can be a:
  - Product
  - Person
  - Process

# Typical methods (IBM)

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- **Market Definition:** ask members of proposed target audiences to rate their levels of interest in a new product or product enhancement; ask target users to list and prioritize their needs and identify current solutions they use and prefer
- **Task Analysis.** ask users to list and prioritize tasks; observe users accomplishing their tasks
- **Competitive Evaluation:** ask users to complete the same tasks using different products and assess their overall satisfaction with each one; ask them to list the strengths and weaknesses of products in order of importance
- **Design and Walk-through:** ask users to evaluate "lo-fi" prototypes such as simple sketches
- **Evaluation and Validation:** observe users accomplishing important tasks with a working prototype
- **Benchmark Assessment:** ask users to complete the same tasks using different products and assess their overall satisfaction with each one; ask them to list the strengths and weaknesses of products in order of importance

# Ask yourself:

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- To what extent is the IBM approach generalizable to all design processes, not just software?

# Key elements of UCSD

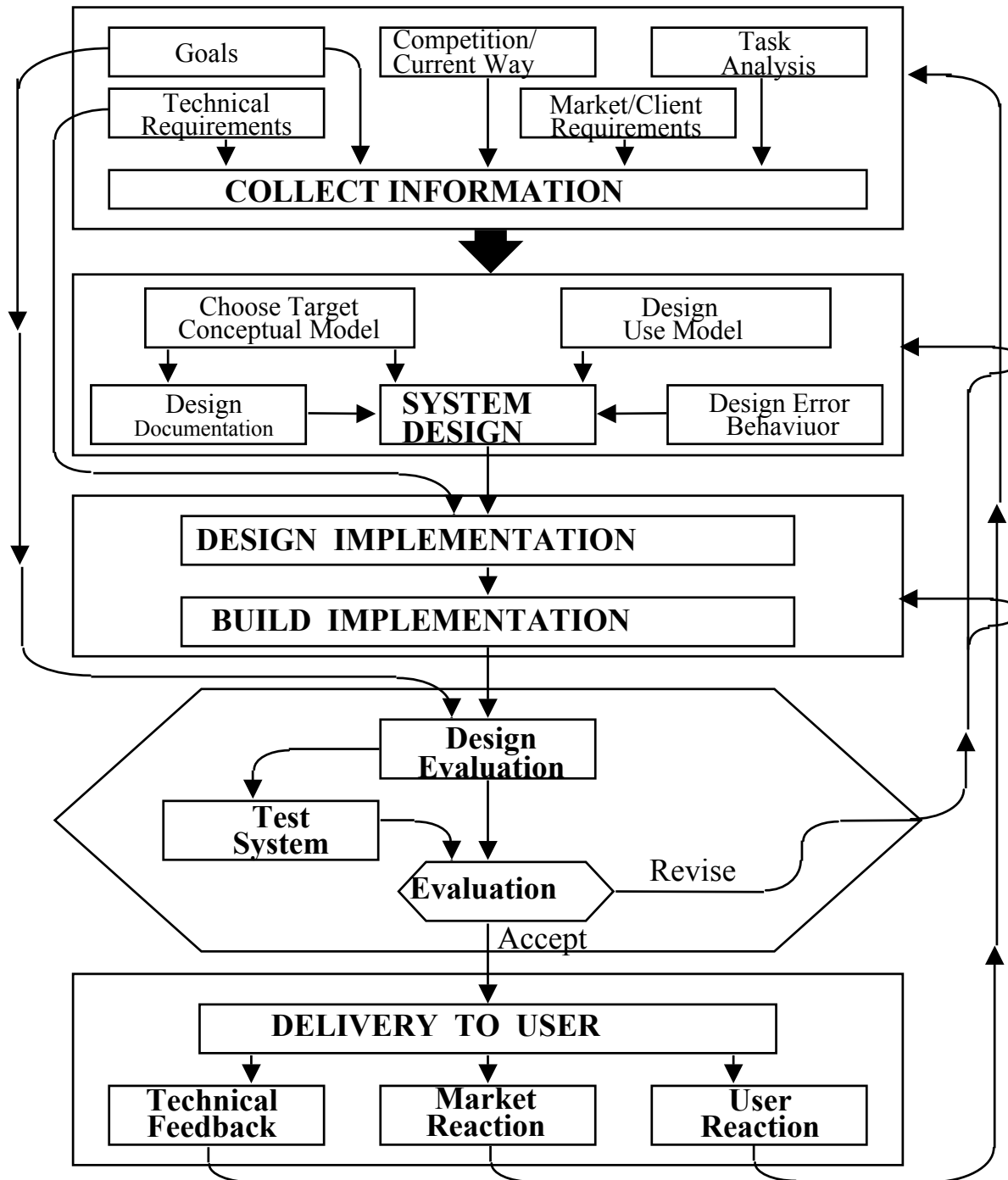
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- Emphasis is on truly meeting users' requirements through their active involvement in the process
- Technology is assumed to be a tool designed to support human tasks / augment human capabilities
- Technology must be tested for usability
- Acceptability is determined by key stakeholders
- People and technology form socio-technical systems whose behavior is not completely predictable

# What's new?

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- Design-test iterations
  - as opposed to phased-stage testing
- Early and continuous focus on users
  - what do users require?
  - how do users work?
  - How are we changing the way they work?
- Operationalise usability for testing
- Testing as often as needed



# Gould's 4 Principles (1997)

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- Early & Continual focus on users
  - observation, interview, participation
  - understand cognitive, behavioral issues
- Early & Continual focus on user testing
  - test everything all the time
- Iterative design
  - repeat
- Integrated design
  - all work geared to one goal - a usable design

# UCSD Activities: 1

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- Stakeholder identification
  - All people who are affected by the tool
- Scenario identification
  - Description of people's likely interactions
- Establish means of participation
  - Focus groups
  - Design team membership

Acceptability is more than interface deep!

# UCSD Activities: 2

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- User analysis
  - Determine users' characteristics
    - Expertise
    - Training
    - Computer Experience
    - Motivation
    - Expectations
    - Capabilities
- This analysis feeds the usability definition

# UCSD Activities: 3

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- Task Analysis
  - Identifying the human and tool resources necessary for acceptable performance

The more we know of users' tasks, the better we can support them through good design

# UCSD Activities: 4

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- Setting usability criteria
  - establishing the effectiveness, efficiency and satisfaction levels that are desired
  - Establishes context for design
- Prototyping
  - often useful for establishing requirements

# UCSD Activities: 5

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- Usability evaluation
  - To establish criteria
  - To meet criteria

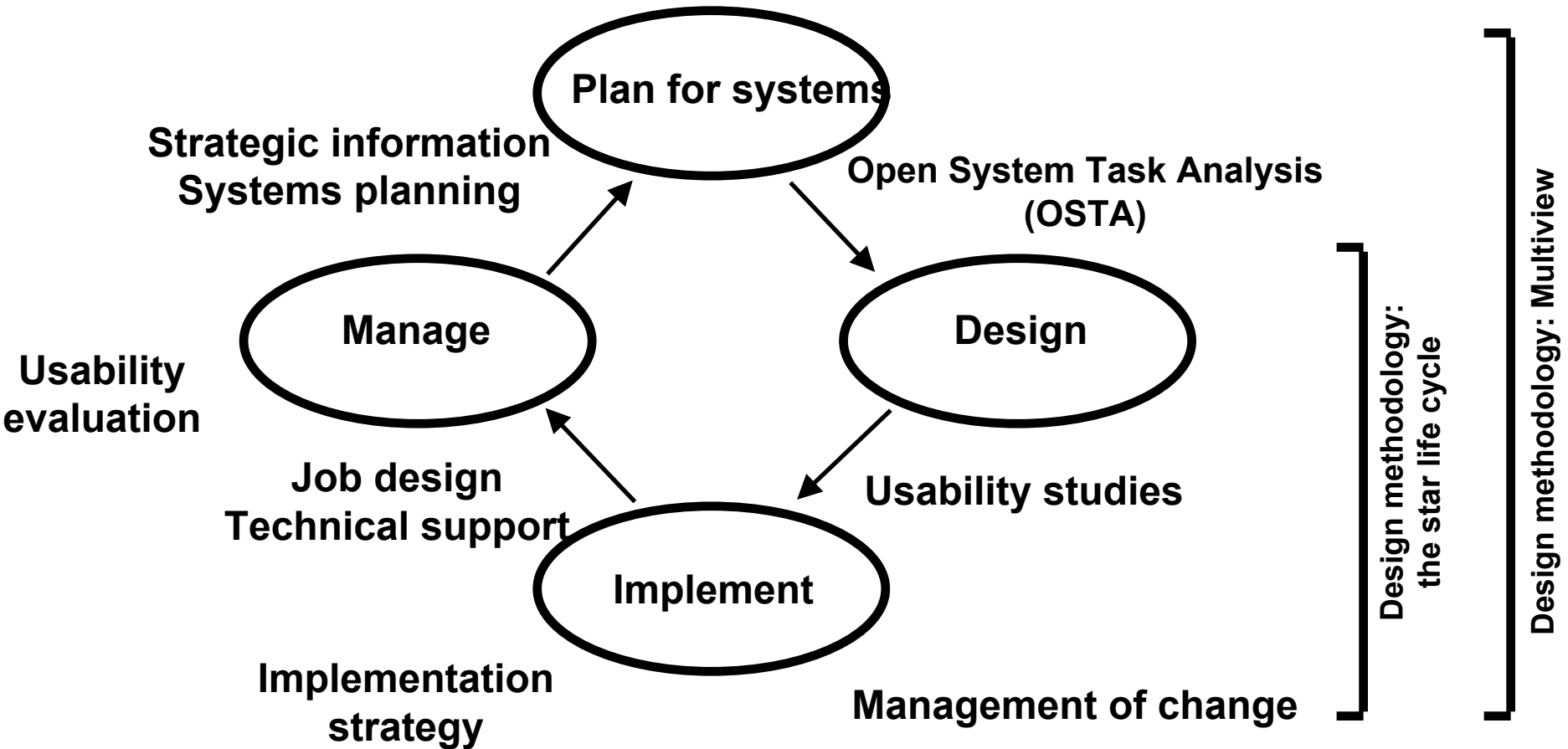
Usability is checked repeatedly with whatever methods are appropriate to the design stage

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<b>Traditional</b>	<b>UCSD</b>
Requirements	Stakeholder id User analysis Task analysis Set usability criteria
Design	Prototype and test Re-design Re-visit criteria
Implement	As before
Test	Usability tests
Maintenance	Field studies Early analyses for future stakeholder and user data

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# Soft Systems Methodology (SSM)



# Common shortfalls

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- Assume common sense works!
- Use designers as test subjects
- Avoid task analysis
- Rationalize test findings
- Take test results as a personal attack
- Seek to convince participants to see your way
- What of implementation?

# METHOD

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- Design is a process
- Method serves to guide process
  - think USER
  - think TASK
  - think ENVIRONMENT
  - think USABILITY
  - think TEST

# HOW?

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- Scenarios
  - discussions, paper prototypes, surveys
- Reality check and contextual inquiry
  - present conclusions to participants
- Establish agreed criteria for the design
  - usability definition may vary
- Prototype and Test
  - Don't guess, demonstrate.

# Scenarios

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- A scenario is a story about an interaction a user experiences with an information resource which conveys explicit information about what a user does in a specific context, how s/he experiences the interaction, what the goals are and what actions are taken.
- Scenarios have plots, sequences, events etc.

# Elements of scenarios

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- Settings (e.g., office, car, library etc.)
- Actors (e.g., accountant, patron, trainee etc.)
- Task goals (e.g., compare budget data, locate a file)
- Plans (e.g., locating file will answer question about X)
- Evaluation (e.g., Search engine output is not helping)
- Actions (e.g., inputting data)
- Events (e.g., feedback from other person, from interface)

# Why use scenarios?

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- Help manage trade-offs in design by articulating what happens without saying *how* it happens
- Are flexible and safe for exploring options
- Keep design space open and avoid premature commitment
- Can be presented in a form that everyone understands
- They are vivid, and encourage ‘what-if?’ discussions
- See Rosson and Carroll (2001) in suggested readings

# How to use scenarios

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- Use them to analyze requirements
- To envision new designs or features
- To guide prototyping
- To organize evaluation tests

# Reality check and contextual inquiry

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- Involve users whenever and wherever possible
  - Check your scenarios against real use examples
  - Observe users in action on existing tasks
  - Interview, brainstorm, evaluate current design
- Determine the role of users in the process
  - Test subjects?
  - Collaborators?
  - Participants?
  - Co-designers?
- Master/Apprentice model is useful, where user is the master, you are the apprentice

# Contextual Inquiry

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- A form of immersive interviewing where the user or client is the expert, you must learn to see their world following 4 basic principles:
  - Context
  - Partnership
  - Interpretation
  - Focus

# Principle of Context

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- Go into the client's workplace and see work unfold
  - Ongoing experience of user's work
  - Concrete data, not general abstractions
- Ask for specific examples, follow the process in detail, (see examples in Beyer reading)

# Principle of Partnership

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- You and the user are collaborating to build shared understanding.
- Alternate between watching and probing
- Process encourages user to re-view their own activities and practices
- Avoid interviewer-interviewee or novice-expert relationship

# Principle of Interpretation

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- Interpretation is the chain of reasoning that turns a fact you have uncovered into action for design.
- The only way to validate your interpretations is to share them with users and allow them to be corrected
  - Clearly related to the principle of relationship
- Be open to subtleties of users reactions

# Principle of Focus

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- Focus defines the point of view of the interviewer while in context
- Check the shift over time from your initial impressions to your more informed observations and recommendations
- Admit ignorance, ask for details, try not to shape responses with nods etc.
- Assume everything a user does is for a reason

# Establish agreed criteria

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- What does 'usable' mean to each stakeholder?
  - Effectiveness?
  - Efficiency?
  - Satisfaction?
  - Lack of complaints?
  - More users?
- Aim to agree a target for the design with all stakeholders

# Prototyping and testing

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- UCSD assumes continuous evaluation
  - Early scenarios
  - Sketches and diagrams, paper prototypes
  - Early interface mock-ups
  - Working versions
  - Full information system

# Types of testing

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- **Formative**
  - Tests carried out to guide re-design, to check what is working and not working for the users, often on prototypes of the intended information system
- **Summative**
  - Tests which serve as verification or certification that agreed targets have been met

# Form of testing in USCD

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- User-based
  - Test the design on target users
  - Users perform tasks and their performance/attitudes are assessed
- Expert inspection-based
  - Design is evaluated by design experts (not users)
  - Evaluators use guidelines or heuristics to judge the interaction
- Model(or theory)-based
  - Formal model of user behavior is applied to design
  - Often based on estimates of time to completion (GOMS)

# Problems and pitfalls in UCSD

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- User involvement disturbs the process
  - Time consuming
  - Skill-intensive
- Users (sometimes) cannot clearly articulate their work or needs
- Calling for involvement does not guarantee its form
- Users can be overwhelmed by technical details

# Eason (2001) in readings

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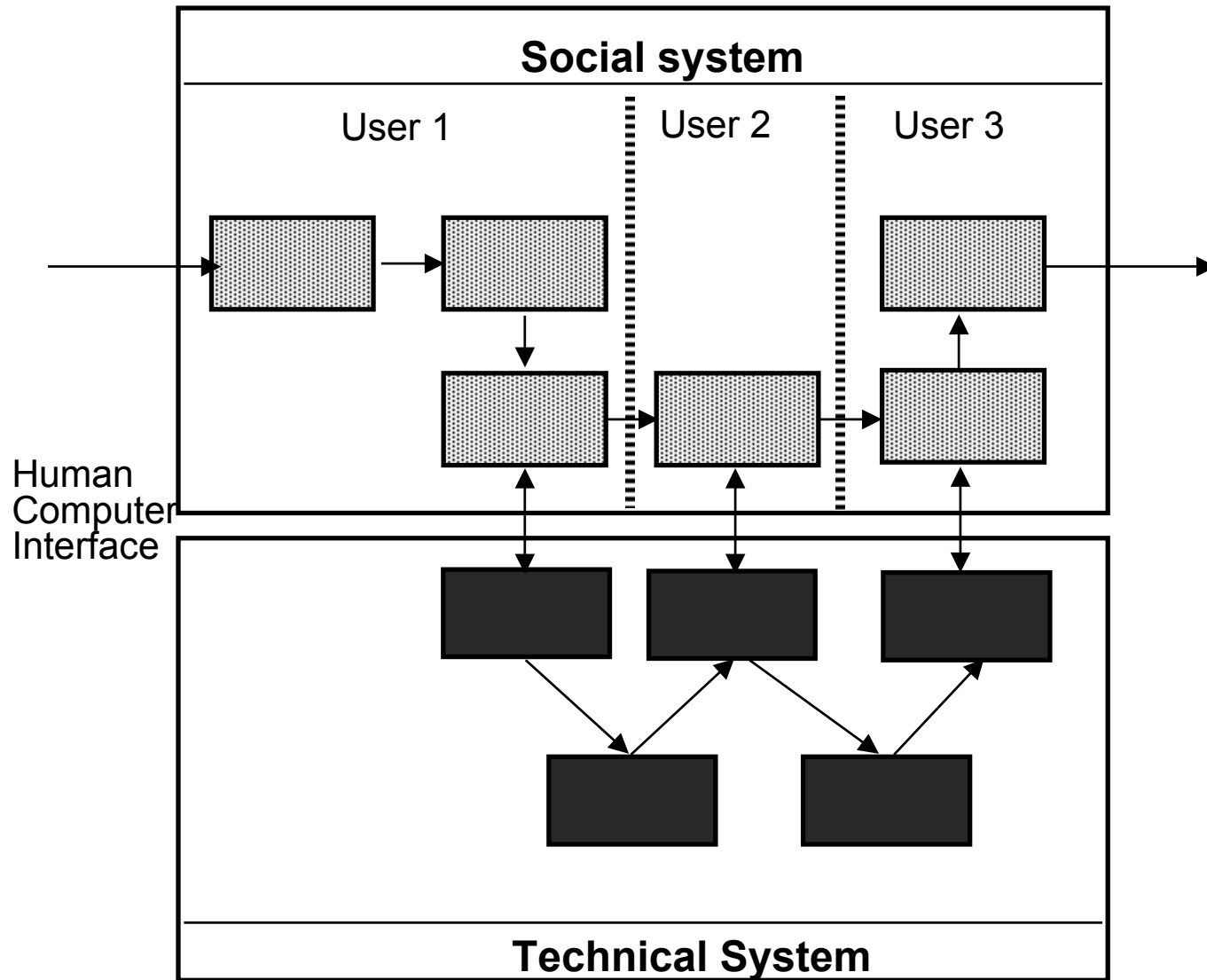
- The design goal is still too focused on technical systems not on the broader organizational agenda
- Yet organizational and social changes among people are inevitable consequences of a change in a technology.

# Specific problems

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- Testing for usability is based on individuals and tells us little about the organizational impact of the system
- Organizational outcomes are not well addressed until too late in the development process and do not fit neatly into scenarios

# Organizational Information Interaction



# And more:

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- UCSD has evolved independently of Management of Change practices, and tend to occur sequentially
  - Design and implementation need to be both addressed
- True design should occur over longer periods and lead to modifications based on use
  - Minimal critical specification

# Eason, p.328.

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- “Despite the progress of user-centered design approaches, it is the user issues most closely associated with the operation of technology that have been assimilated into everyday practice. The wider issues of organizational design remain outside the normal systems development agenda. This has serious implications for the next wave of technology applications”

# Two goals for UCSD remain:

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- Help organizations plan socio-technical rather than technical systems
- Help stakeholders to recognize there are alternative organizational solutions and to make more informed choices about their own practices

# Identifying problems in UCSD - a survey of practice

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- See Heinbokel et al (1996) in your readings

# Method

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- Surveyed 29 commercial development projects on the pros and cons of USCD.
- Interviewed:
  - Team leaders
  - The users' representatives
  - Developers
- Average participation rate was 70% of team, 200 people in total

# Procedure

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- Two measurement periods, spread 6-12 months apart
  - Teams interviewed and surveyed (part 1)
  - Teams surveyed again on what happened (part 2)

# Major Measures

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- User orientation:
  - the developers' attitudes towards designing for the user and thinking about the user throughout the process [cognitive-emotional response of designer]
- User participation:
  - The level of involvement of users in the development process e.g., a user is a member of the team [organizational implementation of the design approach]

# Other measures

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- Project size
- Current lifecycle phase
- Length of time on team
- Work stressors
- Quality of team interactions

# Results

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- User representatives usually involved for requirements and testing but rarely for implementation
- User representatives stayed on a project (on average) longer than other team members
- All teams showed high user orientation scores

# Problems

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- Projects with high user participation showed lower overall success by time period 2
  - “this indicates that negative features of user participation do not become apparent immediately....”
- User orientation correlated highly with stressors and negatively with team effectiveness, and negatively with overall success (period 2)

# Surprise!

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- “The results suggest a clear pattern: user participation and user orientation were negatively related to features of process and product quality. User participation was related to low overall success, few innovations, little flexibility. Low team effectiveness....User orientation was related to high stressors, low quality of team interactions low overall success and low team effectiveness”

# What are we to conclude?

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- The developers were imagining it?
- Projects with problems turn to users for help?
- Projects with problems blame the users?
- USCD leads to more objective assessment of problems?
- User participation is a bad thing?

# At least this:

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- “Our results imply that naïve statements suggesting that user-centeredness is all positive, need to be modified”

# For next week

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- Develop a model of the user-centered process that synthesizes the readings to date
- Try out a contextual inquiry based interview with a user to see how the process feels