# User-Centered Design: UCD Practices in Organizations

Andrea Peer, Iowa State University

# Agenda

- Introductions

- Defining UCD

- Models for UCD

- Cost justifying UCD

- Reporting UCD findings

- Usability vs User experience

- UX lab overview

# Introductions

- Your name & location

- Where do you work

- Your experience with

  - User-Centered Design

  - User experience

  - Usability

# Introductions

- Andrea Peer

- 3rd year P.h.D. student, ISU HCI / MIS

- Experience

  - 4 years in Air Force doing UCD, UX, & usability (kinda)

  - 4 years in industry

  - 3 years of study & consulting gigs

# Defining UCD

- Norman

- International Organization for Standardization (ISO)

- Usability Professional Association (UPA)

- ACM Special Interest Group Computer Human Interaction (SIGCHI)

- Usability.gov

# UCD According to Norman

- "The Psychology of Everyday Things" (Norman, 1988)

- Design based on the needs of users

  - Simplify structure of tasks

  - Making things visible

  - Capturing conceptual maps

  - Affordances

*Norman (1988)*

# UCD History

- Jobs in industry

  - Human Factors Specialist

  - Usability Engineers

  - User Experience Specialist

  - User-Centered Design Specialist

  - Human-Centered Design Specialist

# UCD According to ISO

- TC 159/SC 4 - Ergonomics of human-system interaction

  - ISO 9241-230 (ISO TR 16982) - Usability methods supporting human-centered design

  - ISO 13407 - Guidance on software accessibility

*Nigel Bevan (2009)*

# UCD According to ISO

- TC 159/SC 4 - Ergonomics of human-system interaction

  - ISO TR 18529 - Human-centered lifecycle process descriptions

  - ISO 18152 - Specification for the process assessment of human-system issues

*Nigel Bevan (2009)*

# UCD According to ISO

- ISO 13407 & ISO TR 18529

- Human-Centered Design Principles

  - Active **involvement of users** and a clear understanding of user and **task requirements**

  - An appropriate allocation of function between users and technology

*Nigel Bevan (2009)*

# UCD According to UPA

- "User-Centered Design (UCD) is an approach to design that grounds the process in information about the people who will use the product. UCD processes focus on users through the planning, design and development of a product." (UPA, 2010)

*UPA (2010)*

# UCD According to SIGCHI

- Graphic design basics

- Alternative system development process

- Task analysis

- Design specifications

- Design analysis

- Industrial design basics

- Empirical analysis of design

*SIGCHI (1996)*

# UCD According to Usability.gov

- "User-centered design (UCD) is an approach for employing usability It is a structured product development methodology that involves users throughout all stages of Web site development, in order to create a Web site that meets users' needs. This approach considers an organization's business objectives and user's needs, limitations, and preferences."

*Usability.gov (yr?)*

# UCD According to Andrea

Process for systems development & evaluation

Data-Driven

Contextual

Grounded in measured & observed user behavior

Focus on users

and their tasks

Performance and satisfaction focus

throughout the SDLC

Measured ROI

# UCD According to Andrea

- A philosophy - We believe...

  - The users know <u>what they want.</u> They just don't have the skills, knowledge, or abilities to communication what they want.

- A set of practices

  - Theoretically can be plugged into any software development process

# UCD According to You

- How would you define UCD?

# Models for UCD

- UCD Process models

- Variables to consider with UCD

# Models for UCD

- Usability.gov

- Usability Professional Association (UPA)

- Usability Planner Tool

- Usability Body of Knowledge (Usability BOK)
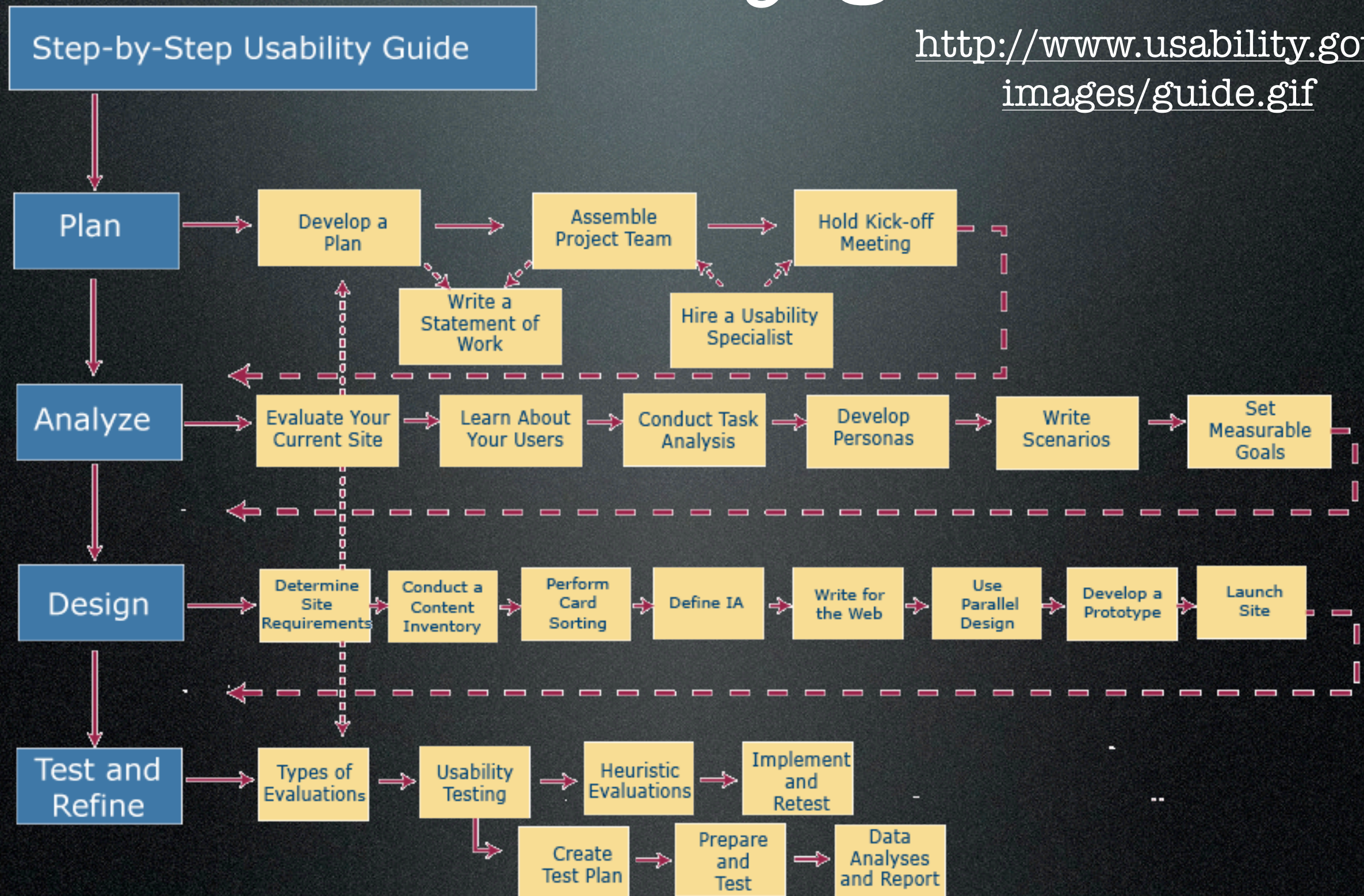
# UCD Process Models
# Usability.gov

| Stages | Considerations |
| --- | --- |
| 1. Planning your site<br>2. Collecting Data from Users (Analyze)<br>3. Developing prototypes (Design)<br>4. Writing content<br>5. Conducting usability testing with users | • Business objectives as they relate to the website<br>• Users - tasks & goals<br>• Information needs of users<br>• User expectations and experience<br>• Hardware and software used by users |

# UCD Process Model
# Usability.gov

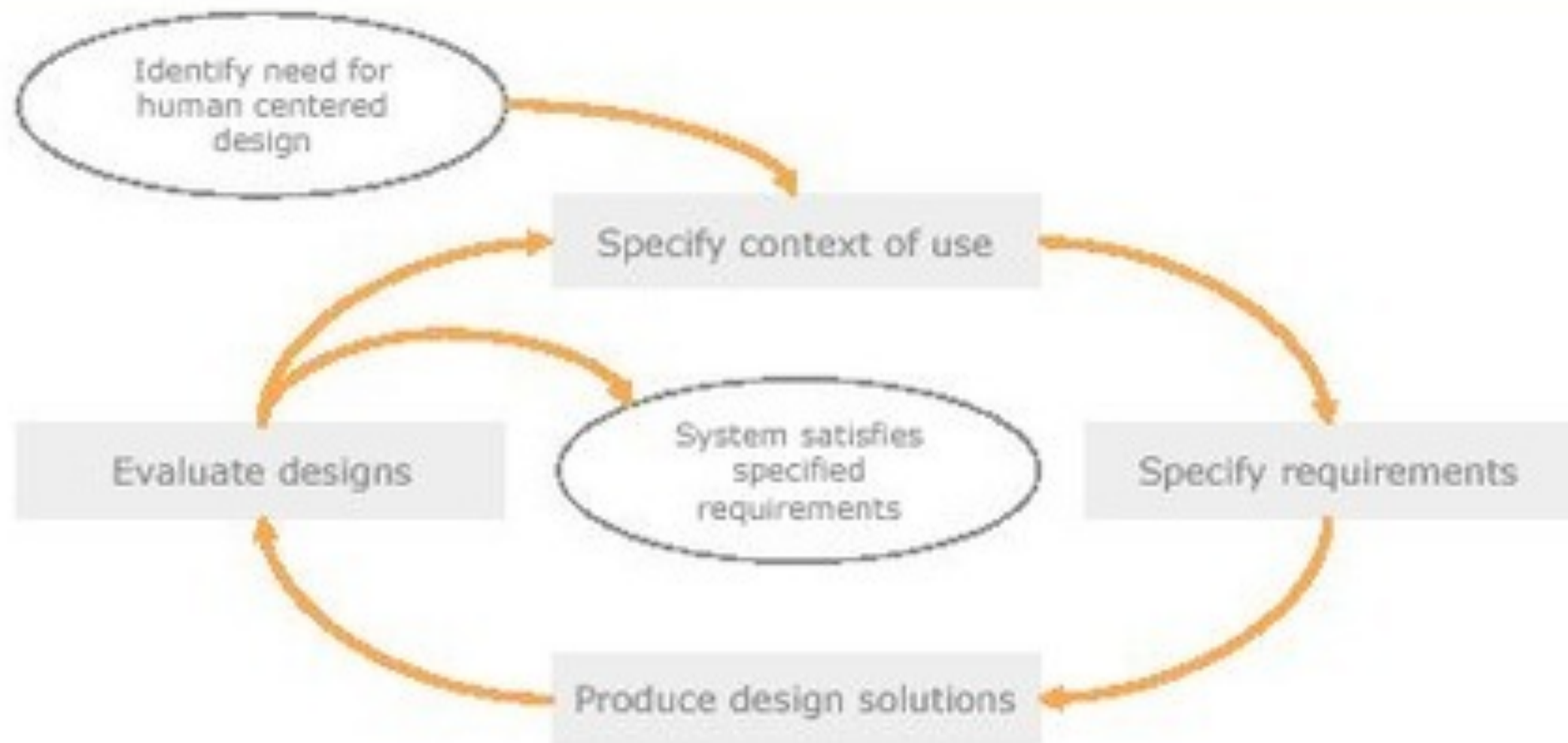**Step-by-Step Usability Guide**

## Plan

- Develop a Plan
- Assemble Project Team
- Hold Kick-off Meeting
- Write a Statement of Work
- Hire a Usability Specialist

## Analyze

- Evaluate Your Current Site
- Learn About Your Users
- Conduct Task Analysis
- Develop Personas
- Write Scenarios
- Set Measurable Goals

## Design

- Determine Site Requirements
- Conduct a Content Inventory
- Perform Card Sorting
- Define IA
- Write for the Web
- Use Parallel Design
- Develop a Prototype
- Launch Site

## Test and Refine

- Types of Evaluations
- Usability Testing
- Heuristic Evaluations
- Implement and Retest
- Create Test Plan
- Prepare and Test
- Data Analyses and Report

# UCD Process Models UPA

| Stages | Considerations |
|--------|----------------|
| 1. Analysis<br>2. Design<br>3. Implementation<br>4. Deployment | • Specify the context of use - user intended use and context<br><br>• Specify requirements - business requiremens, user goals<br><br>• Create design solutions<br><br>• Evaluate designs - usability testing |

# UCD Process Models
# UPA



Identify need for human centered design → Specify context of use → Specify requirements → Produce design solutions → Evaluate designs → Specify context of use

System satisfies specified requirements

# UCD Process Models
# Usability BOK

| Stages | Considerations |
|--------|----------------|
| 1. Analysis and requirements<br>2. Design<br>3. Evaluation (Test & Measure)<br>4. Implementation<br>5. Management (Planning & Feasibility) | • Users<br>• Tasks<br>• Environment<br>• Comparatives<br>• Project background<br>• Business goals<br>• Constraints |

# UCD Process Models
# Usability BOK
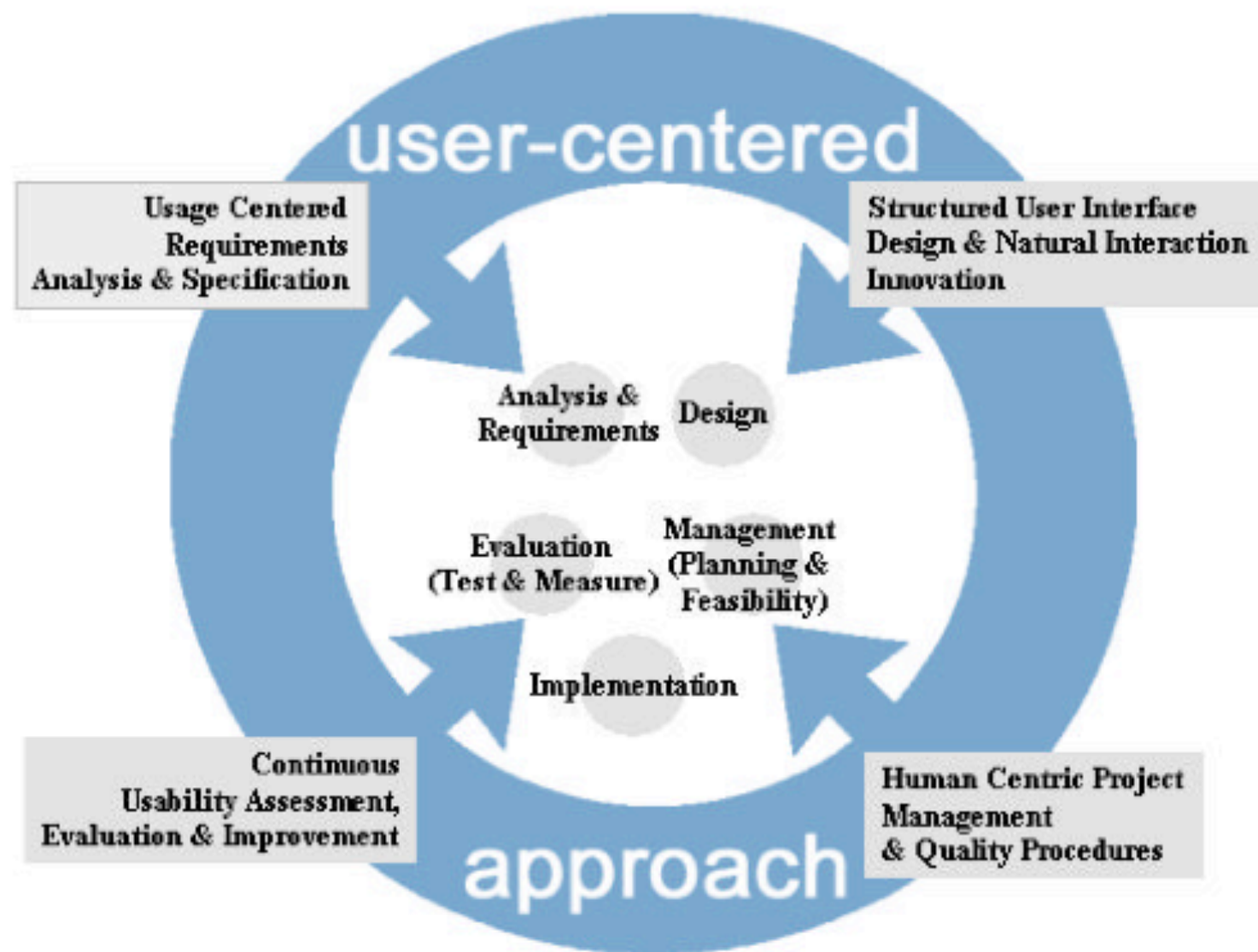


Figure 1: UCD principles and IST project activities

*Bevan (2002)*

# UCD Process Models
# Usability Planner

| Stages | Considerations |
|---|---|
| 1. Concept<br>2. Planning<br>3. Understanding Needs<br>4. Requirements<br>5. Analyze Requirements<br>6. Design / Development | • Cost-benefits<br>• Risks<br>• Constraints<br>  • Project<br>  • User<br>  • Task<br>  • Product<br>  • Context of use<br>  • Human / Resource |

# UCD Process Models
# Usability Planner

- http://www.usabilityplanner.org/ #home

# UCD Process Models
# Andrea

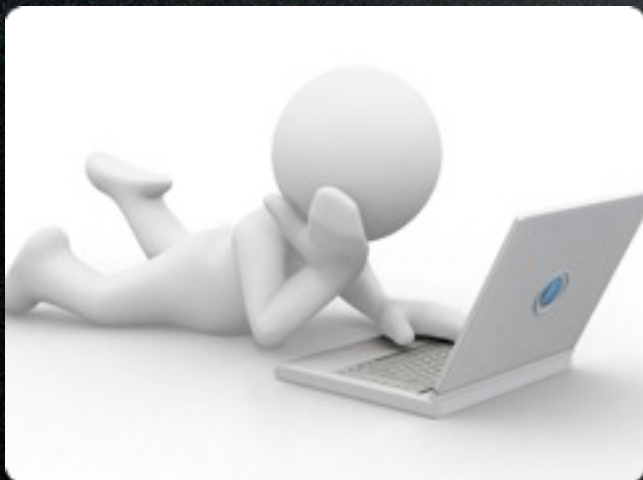| Stages | Considerations |
|--------|----------------|
| 1. Explore the problem space<br>2. Profiles, Personas, Scenarios<br>3. Task analysis<br>4. Design & Prototyping<br>5. Development<br>6. Deployment & Evaluation | • Business factors<br>• Process factors<br>• UCD factors<br>• Product factors |

UCD Activities

# Exploring the Problem Space

- System concept/idea

- Market research

- Data log analysis

- Wants & needs analysis

- Organization climate assessment

# Profiles, Personas, Scenarios

- Creating the database of users

- Capturing key data on users

- Personas - Grouping users into meaningful groups

- Contextualize

# Task Anarch Analysis

- Identifying user triggers

- Understanding desired endpoints & success criteria

- Recognizing critical paths

- Contextual inquiries

- Ethnographic research

# Design & Prototyping

- Testing design alternatives

- Information architecture analysis

- Low fidelity to high fidelity prototyping

- Functional testing

- Integrated workflow testing

# Development

- Persona campaign

- Unit testing based on personas and scenarios

- Developer and UCD team collaboration
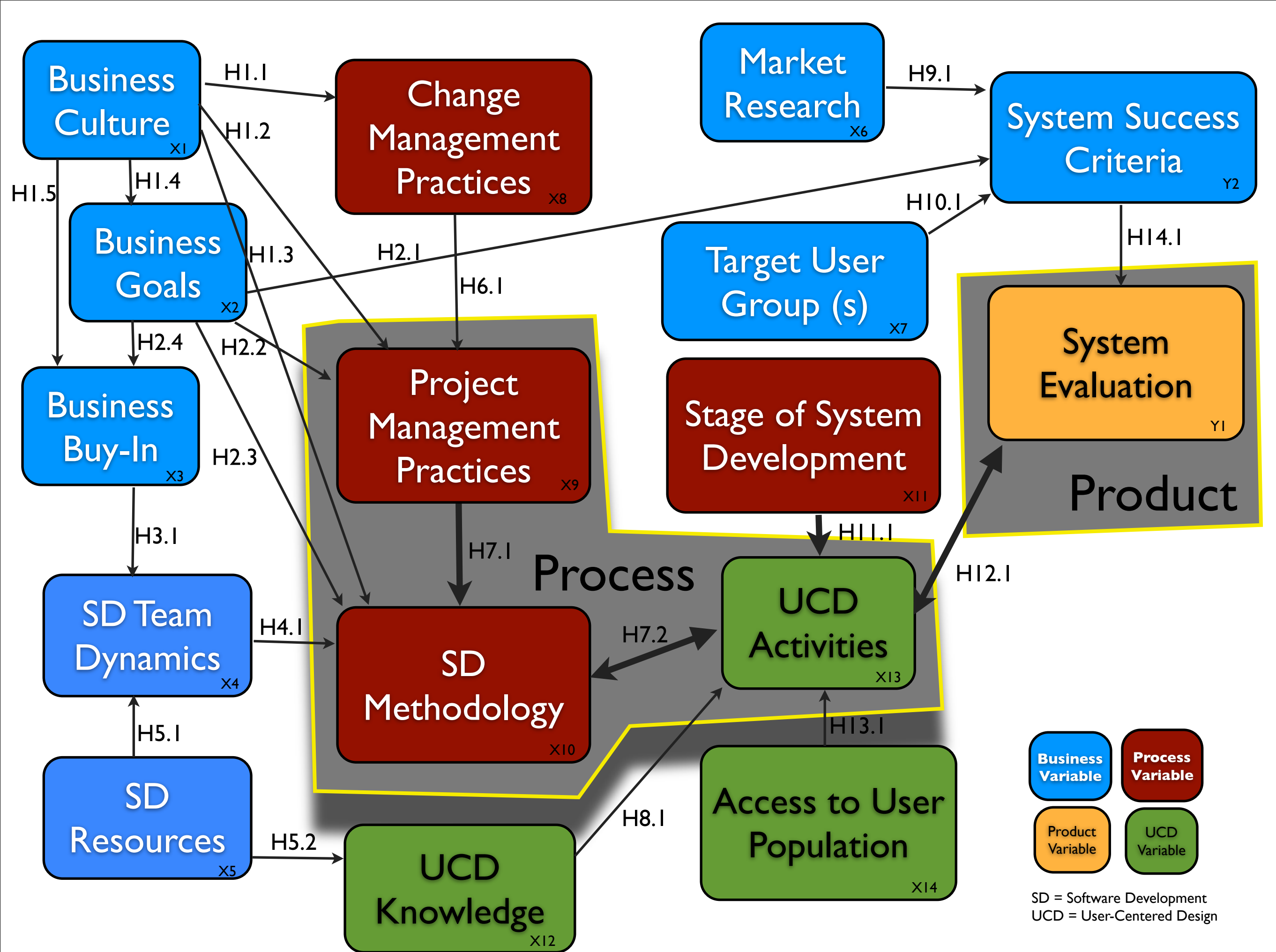
- Field tests of personas
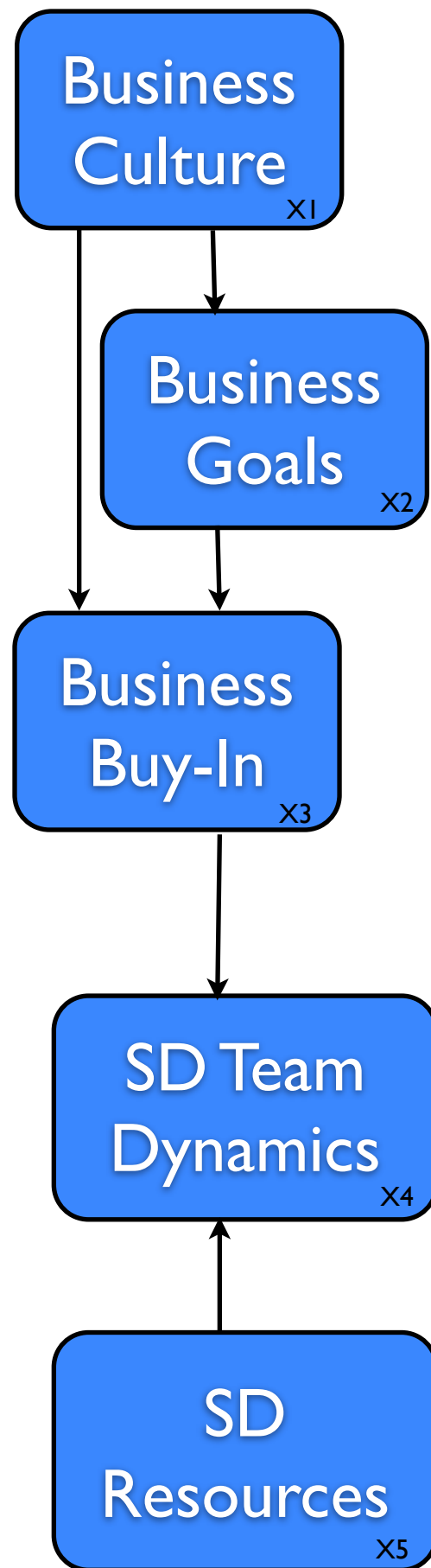
# Deployment & Evaluation

- Usability testing

- Data log analysis

- User feedback
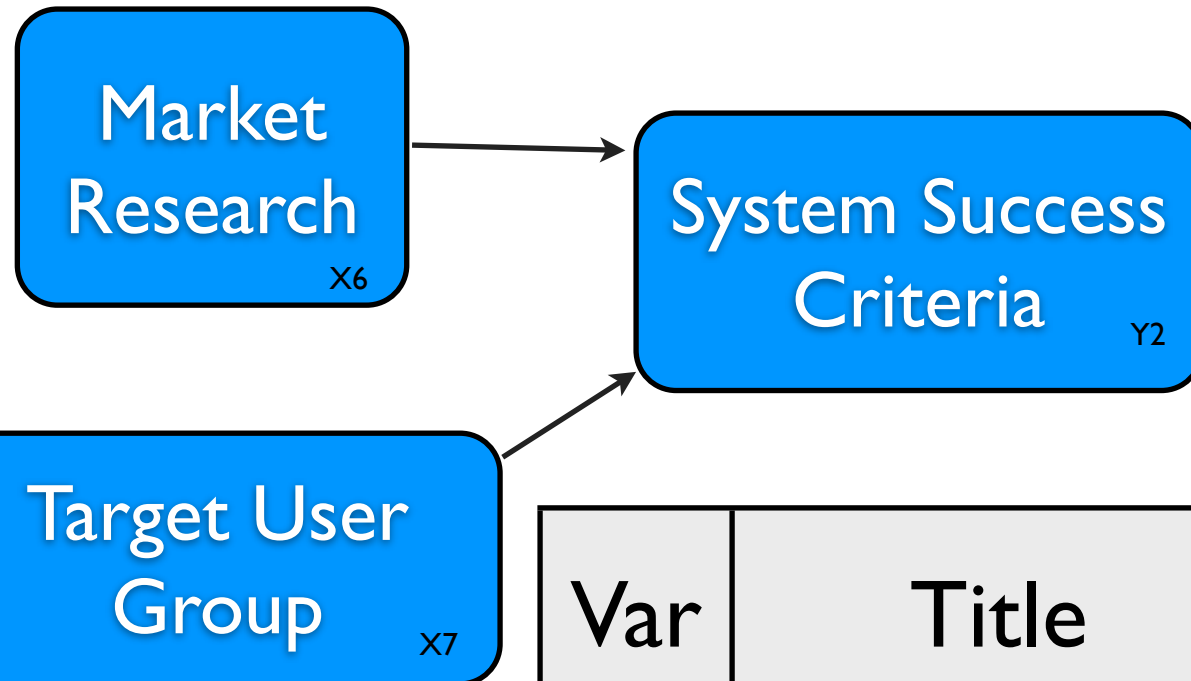
- Task analysis

- Measure ROI

# Business Factors

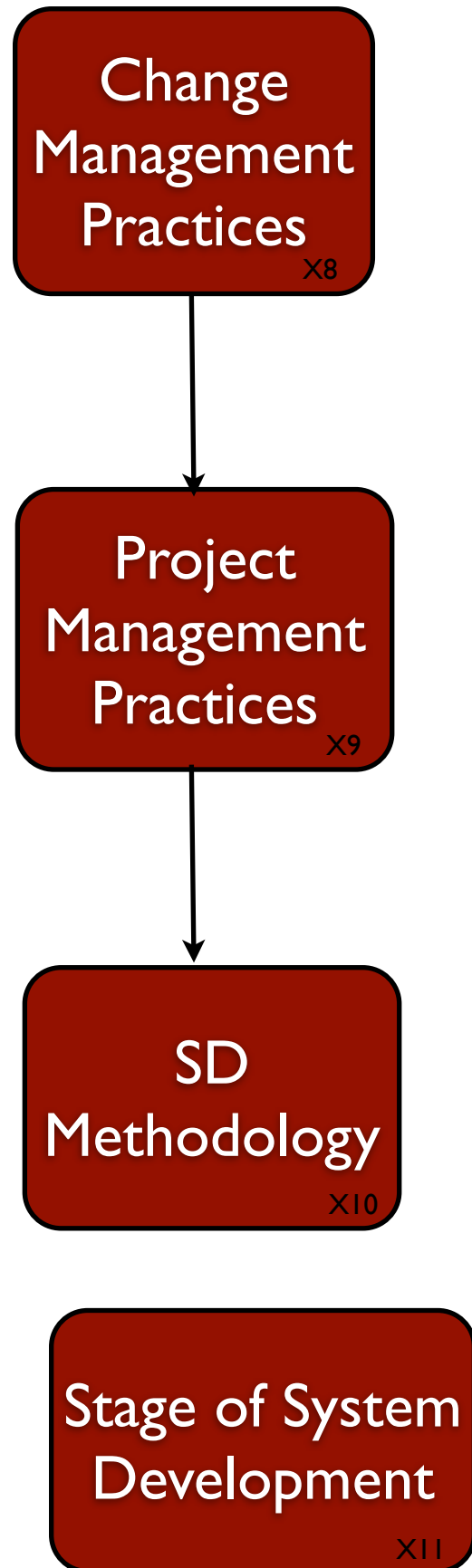| Var | Title | Definition |
|-----|-------|------------|
| X1 | Business Culture (BC) | An organization's absorptive capacity to implement UCD practices. Organization's user centeredness. |
| X2 | Business Goals (BG) | High level business strategic vision and market penetration strategy. |
| X3 | Business Buy-In (BB) | Commitment and support from organization leadership. |
| X4 | SD Team Dynamics (TD) | Maturity of team on team dynamics continuum. User-centeredness of team. |
| X5 | SD Resources (R) | Resources dedicated to software development to include money, people, and materials. |

**Business Culture** X1

↓

**Business Goals** X2

↓

**Business Buy-In** X3

↓

**SD Team Dynamics** X4

↑

**SD Resources** X5

# Business Factors

Market
Research
X6

System Success
Criteria
Y2

Target User
Group
X7

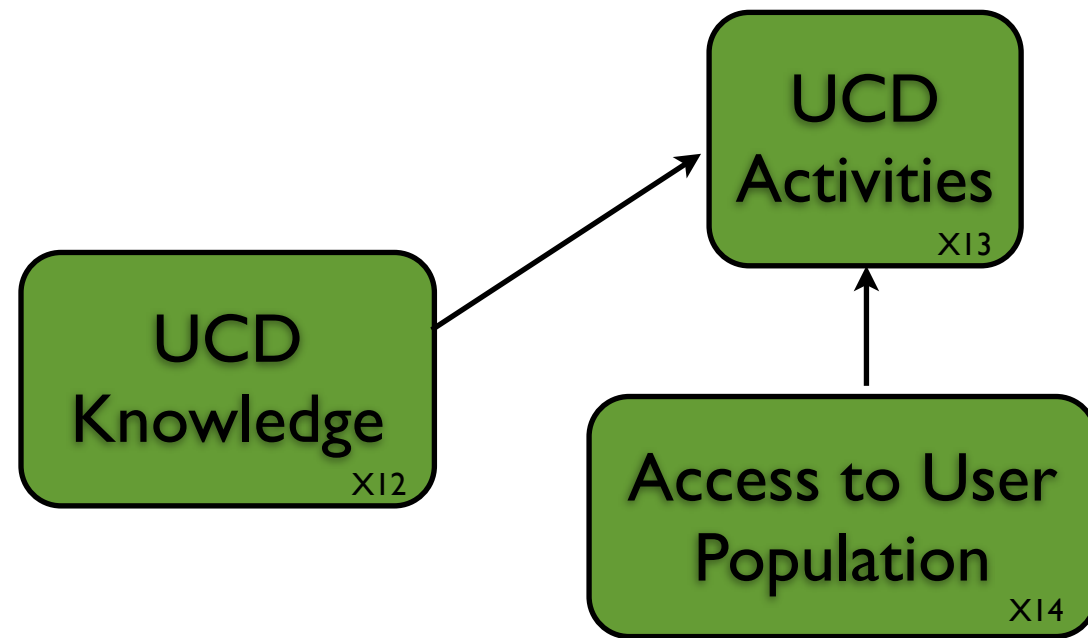| Var | Title | Definition |
|-----|-------|------------|
| X6 | Market Research (MR) | Identified market opportunities and strategies to penetrate the target population of users. |
| X7 | Target User Group (UG) | The identified target population of users based on market research and business strategy. A prioritized list of stakeholders and end-users. |
| Y2 | System Success Criteria (SS) | Measurable return on investment goals for the product, business and brand. Desired process improvement measures. |

# Process Factors

**Change Management Practices** X8

↓

**Project Management Practices** X9

↓

**SD Methodology** X10

**Stage of System Development** X11

| Var | Title | Definition |
|-----|-------|------------|
| X8 | Change Management Practices (CM) | Measures both the macro (culture) and micro (process) levels of an organizations ability to change. |
| X9 | Project Management Practices (PM) | Identifies the current project management practices according to PMP standards. |
| X10 | SD Methodology (M) | The type of software development methodology the company uses for the given product. |
| X11 | Stage of System Development (S) | The maturity of the product as well as the stage of development (concept to maintaining). |

# UCD Factors



| Var | Title | Definition |
|-----|-------|------------|
| X12 | UCD Knowledge (K) | Organizational knowledge and previous experience with UCD activities. |
| X13 | UCD Activities (A) | Current UCD activities being used throughout the system development process. |
| X14 | Access to User Population (UP) | An organizations ability to physically or remotely bring users into the development process. |

# Product Factors

System
Evaluation
Y1

| Var | Title | Definition |
|-----|-------|------------|
| Y1 | System Evaluation (SE) | User experience evaluation matched to user experience goals. System performance. |

# You Decide

- Take a look at the models and comment on

  - What do you agree with?

  - What do you disagree with?

# Cost Justifying UCD

- ROI of UCD

- Cost-benefits of UCD

- Measuring UCD

- Linking UCD to ROI

# Cost Justifying UCD

- HFI Animation

  - The ROI of User Experience with Dr. Susan Weinschenk

  - http://www.youtube.com/watch?v=O94kYyzqvTc&feature=related

# Cost Justifying UCD

- Calculating cost-benefits

  - Development

  - Sales

  - Use

  - Support

Beven (2005)

http://www.usabilitynet.org/trump/
methods/integration/costbenefits.htm

# Cost Justifying UCD

## The cost of NOT using UCD

- Rule of thumb: "Once a system is in development, correcting a problem costs 10 times as much as fixing the same problem in design. If the system has been released, it costs 100 times as much relative to fixing in design" (Gilb, 1988; IBM, 2001).

- "It is common for usability efforts to result in a hundred percent or more increase in traffic or sales" (Nielsen, 1999a)

*Bias (2005)*

# Cost Justifying UCD

## The cost of NOT using UCD

- "80% of software life cycle costs occur during the maintenance phase and were associated with 'unmet or unforeseen' user requirements and other usability problems" (Nielsen, 1993).

*Bias (2005)*

# Cost Justifying UCD

## Misalignment

- "The average user interface has 40 flaws (this is a low estimate for web sites). Correcting the easiest 20 of these yields an average improvement in usability of 50%. The big win, however, occurs when usability is factored in from the beginning. This can yield efficiency improvement of over 700%" (Landauer, 1995).

*Bias (2005)*

# Cost Justifying UCD

## Balance

- "You can increase your sales on your site as much as 225% by providing sufficient product information to you customers as the right time" (User Interface Engineering, 2001).

*Bias (2005)*

# Cost Justifying UCD

- Resources

  - "Cost-Justifying Usability" by Bias

  - Bevan (2005) Case Study

    - http://www.usabilitynet.org/papers/Cost_benefits_evidence.pdf

# Cost Justifying UCD Andrea Guidelines

- Business goals

- Brand goals

- User experience goals

- Important differentiators

- Value propositions

- Who, Where, What, When, Why

*Courage & Baxter (2005)*

# Cost Justifying UCD
# You Decide

- Do you have challenges in cost justifying?

- What measures are important in your context?

# Reporting UCD Findings

- Story time

# Reporting UCD Findings

- Usability.gov - short form and long form

- http://www.stcsig.org/usability/resources/toolkit/toolkit.html

- http://www.useit.com/alertbox/20050425.html

# Usability vs UX

- UX and UI - Chicken and the Egg

  - http://www.youtube.com/watch?v=2wZUTe7Ow1Y&feature=related

# ISU HCI UX Lab

- Resources

- Progress

- Questions?