Chapter 2: The Process of Interaction Design 🔄

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2.1 Introduction 📸

Key Objectives:

- Reflect on what interaction design involves.
- Explain some of the advantages of involving a range of people as participants in the interaction design process.
- Introduce the four basic activities of interaction design and how they are related in a simple lifecycle model.
- Consider some practical questions about the interaction design process and how it fits into other development lifecycles.

Key Ideas:

- **People-Centered Concerns**: The goal is to design systems that prioritize the needs and experiences of people rather than just technical aspects.
- **Stakeholders and Trade-Offs**: Successful interaction design includes balancing the input from stakeholders, addressing conflicting requirements, and making informed trade-offs.

Key Questions Raised:

- How do we understand the needs of stakeholders?
- How can we balance design trade-offs effectively, such as user freedom versus system guidance?
- How do we generate alternatives, and how do we choose the best one?

2.2 What Is Involved in Interaction Design? 💡🚀

The Double Diamond of Design:

- The **Design Council** of the UK created the **Double Diamond Model**:
  - **Discover** 🔍: Understanding the problem space and talking to those affected.
  - **Define** 📄: Defining the challenge based on insights gained.
  - **Develop** 🔧: Creating and co-designing different responses, drawing on inspirations.
  - **Deliver** 📦: Testing solutions at a small scale, rejecting or evolving based on outcomes.

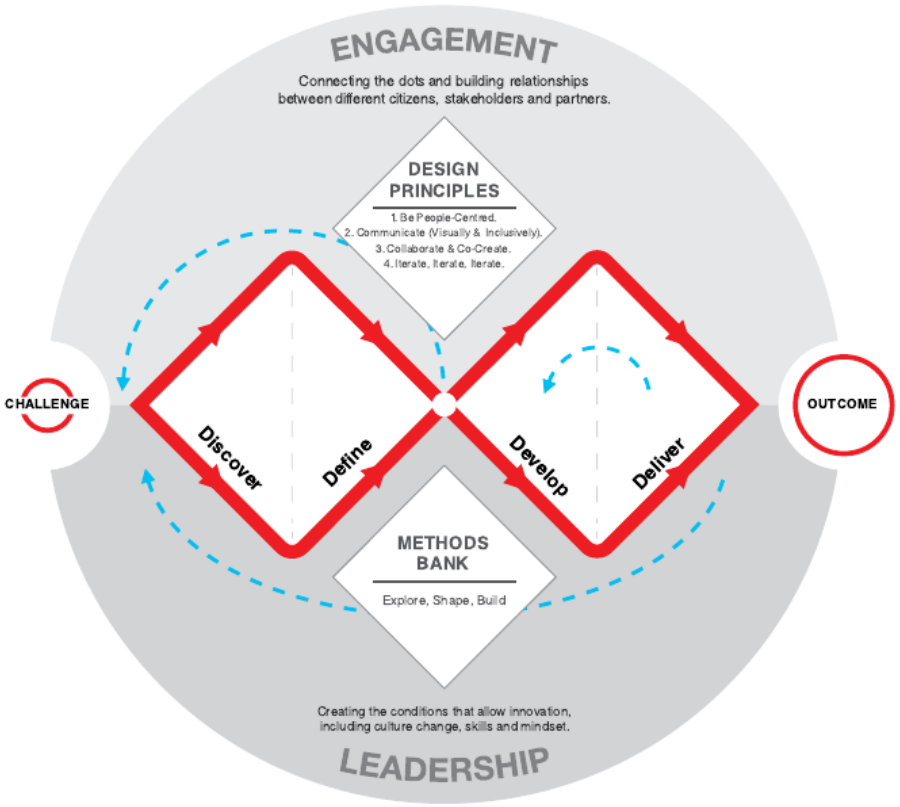
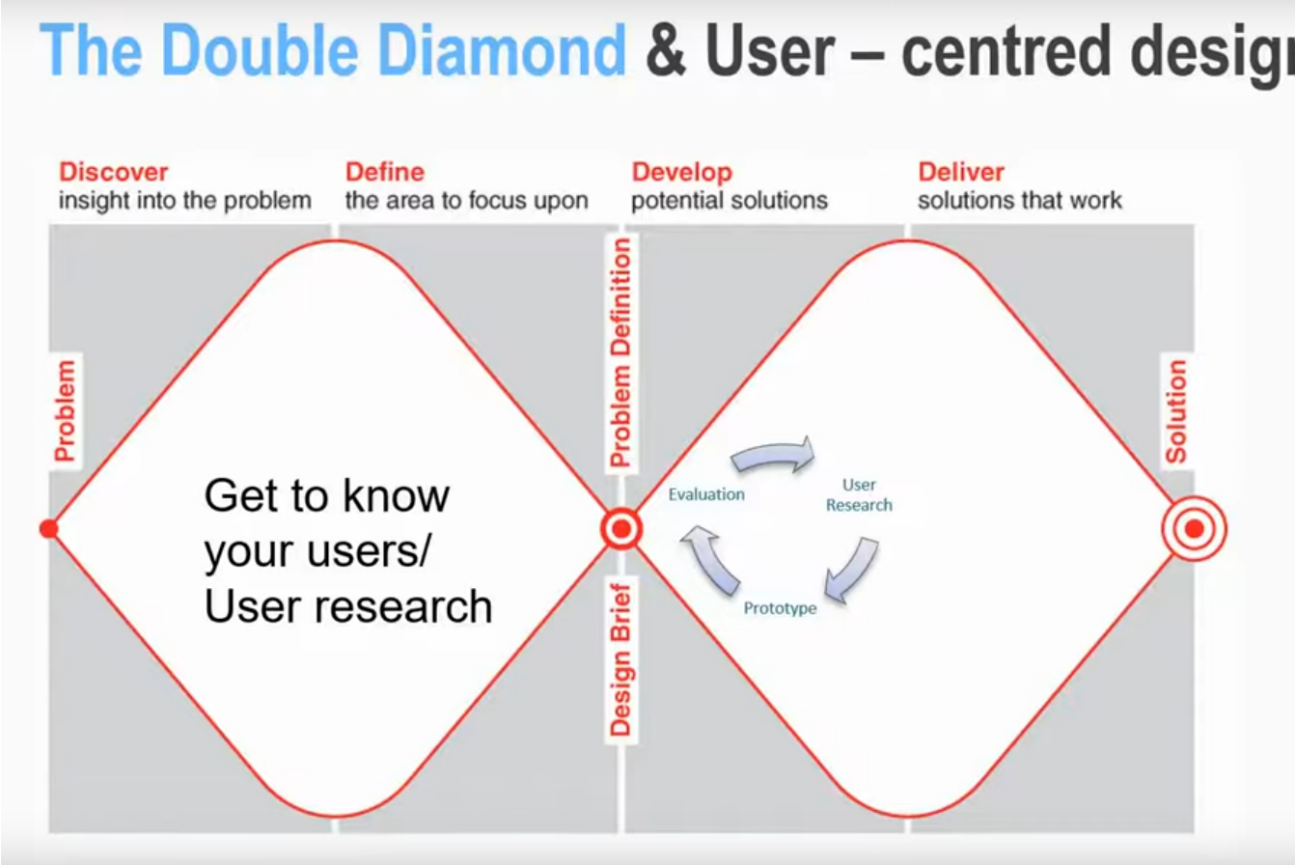


Figure 2.1 The Design Council's framework for innovation with the double diamond of design at its heart



Four Design Principles:

1. **Be People-Centered** 👥
2. **Communicate (Visually & Inclusively)** 🗣️🎨
3. **Collaborate & Co-Create** 🤝✨
4. **Iterate, Iterate, Iterate** 🔁🔁🔁

Key Insights:

- **Non-Linear Process**: The double diamond model shows that interaction design is iterative, where phases are repeated multiple times.
- **People-Centered Design Philosophy**: Engaging different stakeholders enhances the design process, making it more inclusive and representative of real needs.

Quotes & Attributions:

- **Maarten Houben et al. (2020)**: Conducted workshops involving diverse stakeholders for designing an interactive sound cushion, emphasizing user and stakeholder input.
- **Design Council (2019)**: "No idea is ever ‘finished’ in an ever-changing and digital world."

Four Approaches to Interaction Design by Dan Saffer (2010) 📑✨

1. **User-Centered Design (UCD)** 👥🎯
    - **Focus**: The **user knows best**. Designers translate users' needs and goals into a design solution.
    - **Role of User**: Users guide the design.
    - **Citation**: *(Dan Saffer, 2010)*

2. **Activity-Centered Design (ACD)** 🔄⚙️
    - **Focus**: Centered on the **behavior** surrounding tasks. The user's behavior, not their goals, is key.
    - **Role of User**: Users are significant, but behavior is prioritized.
    - **Citation**: *(Dan Saffer, 2010)*
3. **Systems Design** 🌐🛠️
    - **Focus**: A **structured and holistic approach** that emphasizes the **system**—people, computers, objects, and devices.
    - **Role of User**: Users set the system's goals, while the design focuses on how the entire system interacts.
    - **Citation**: *(Dan Saffer, 2010)*
4. **Genius Design** 🎨💡
    - **Focus**: Relies on the **designer's creativity and experience**. Users do not participate in the design but help validate the outcomes.
    - **Term by Jim Leftwich**: Also known as "**Rapid Expert Design**" (Dan Saffer, 2010, pp. 44–45).
    - **Role of User**: Users validate the designer's ideas.
    - **Citation**: *(Dan Saffer, 2010)*

Key Insight:

- Different design problems call for different approaches. Designers often gravitate towards the method that best suits them or the specific problem they are addressing.

2.2.1 Who to Involve in the Design Process 🤝🔄

Key Takeaways:

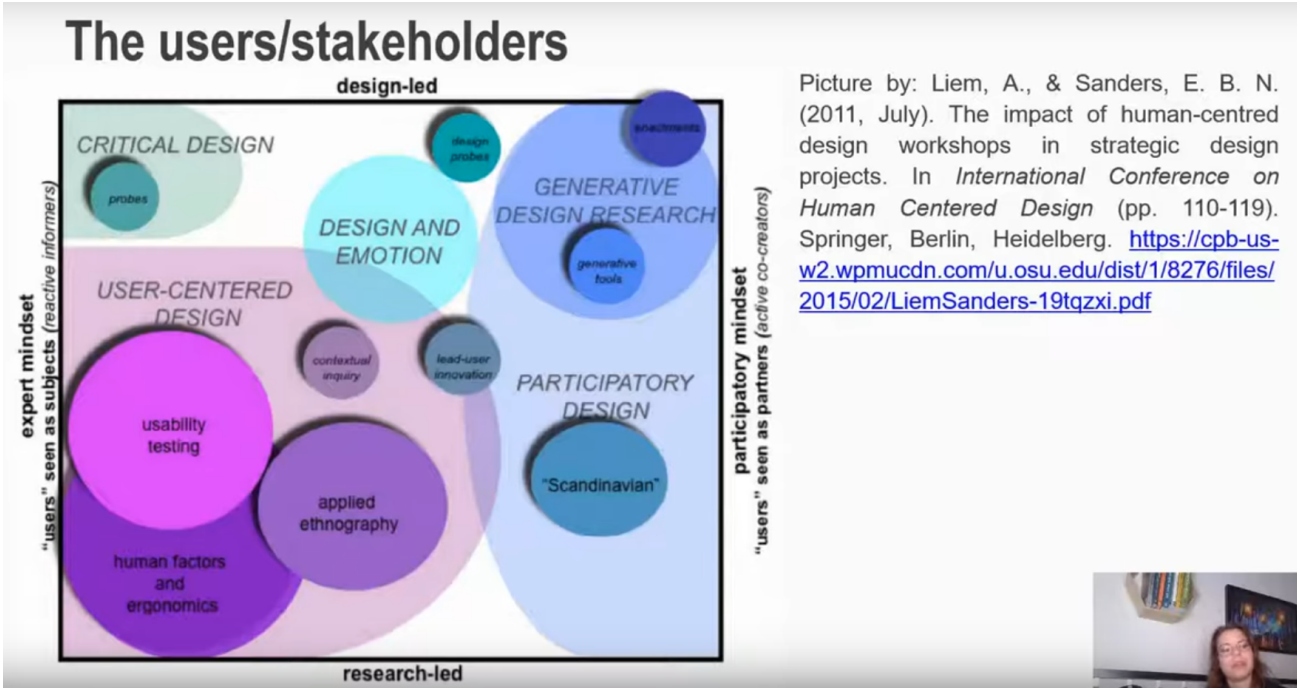
- **Stakeholders Defined**: Stakeholders are individuals or groups that can influence or be influenced by the success or failure of a product. This includes **users, customers, developers, executives, regulators**, and **people affected by the product** (Freeman, 1984).
- **Identifying Stakeholders**: Stakeholder groups are broader than just users; they include everyone from customers who pay for the product to regulators who set rules for it. Questions like **"Who is interested in the project?"** and **"Who is affected by its introduction?"** help identify key stakeholders.
- **Example - Self-driving Delivery Trucks** 🚚🤖:
    - **Primary Stakeholders**: Truck drivers, their families, developers of software and hardware, and the companies that use these trucks. Each group has different stakes, ranging from **job safety** to **successful delivery**.
    - **Indirect Stakeholders**: Government regulators, pedestrians, other vehicle manufacturers, and individuals interested in carbon emissions reduction.
- **Challenges in Engagement**: Not all stakeholders need to be actively involved, but knowing who they are helps in determining the level of involvement. Identifying diverse stakeholders, like in the case of **smartphone users** who fit 382 different user types (Sha Zhao et al., 2016), is more complex than it seems.

- **Practical Difficulties**:
    - Engaging stakeholders can be challenging, especially in large projects. For instance, **Seaborn et al. (2020)** found it difficult to involve residents in an urban food waste project despite trying several strategies, ultimately opting to **observe existing waste habits** as an engagement method.

Summary: Stakeholder analysis is critical in interaction design as it helps determine who has a stake in the product's success. Stakeholders can range from **direct users** to those affected by a product indirectly, and their involvement should be planned carefully. However, engaging these stakeholders can be challenging, especially when trying to reach diverse user types or a wider community.

2.2.2 The Importance of Involving Users 👫💡

- **User Involvement**: Involving users during all stages of product development ensures that the final product is usable and meets user needs effectively.
- **Role of Product Owner**: The product owner helps filter user input, but involving users directly gives a more comprehensive understanding.
- **Expectation Management**: Including users early on helps manage expectations, reducing resistance or rejection by giving them realistic previews of the product.
- **Sense of Ownership**: Early user involvement fosters a sense of ownership, increasing acceptance and support for the product.
- **Optimal Involvement**: User involvement is beneficial, but it needs to be planned carefully regarding when, how, and in what capacity users should contribute.
- **Uli Abelein et al. (2013)**: Found that user involvement generally has a positive effect on user satisfaction and system use, though results vary based on involvement levels.



2.2.3 Degree of User Involvement 🔄👥

- **Various Degrees**: User involvement can vary from full-time engagement throughout the development to

targeted, specific contributions. Involvement can be small-scale (face-to-face) or large-scale (online crowdsourcing).

- **Participation Methods**: Techniques like crowdsourcing and citizen engagement enable many people to contribute to product development, enhancing design quality, satisfaction, and a sense of ownership.
- **Participatory Design**: Users and stakeholders are central participants in the design process rather than passive receivers, often referred to as co-design or co-creative design.
- **Practical Considerations**: The degree of user involvement depends on project circumstances, such as whether the product is for a specific company or the open market.
- **Feedback After Release**: After a product is released, ongoing user feedback can be gathered through customer reviews, data analysis, and error reporting systems, which is valuable for continuous improvement.

2.2.4 What Is a People-Centered Approach? 👥🌍

- **Foundational Principles (Gould & Lewis, 1985)**:

  i. **Early Focus on Users and Tasks**: Understand users by studying their characteristics and observing them during tasks.
  ii. **Empirical Measurement**: Observe and measure user reactions to prototypes and designs.
  iii. **Iterative Design**: Address problems identified during user testing through repeated design, testing, and improvements.

- **Extended People-Centered Principles**:

  - **User Tasks Drive Development**: Technology is secondary to supporting user goals.
  - **Understand Behavior & Context**: Design systems based on how people perform tasks.
  - **Accommodate User Characteristics**: Account for cognitive and physical limitations (e.g., color blindness).
  - **Ongoing User Consultation**: Involve users throughout the entire development process.
  - **Contextual Design Decisions**: Make design choices with users' activities and environments in mind.

- **Additional Design Elements**:

  - **Clear Usability Goals**: Document and agree on specific goals to guide evaluation.
  - **Iteration**: Design evolves through continuous feedback, reflecting the need for repeated refinement.

2.2.5 Four Basic Activities of Interaction Design 🔄✨

1. **Discovering Requirements**: Understand the needs of target users through data gathering and analysis, forming the basis for product requirements.

2. **Designing Alternatives**: Create multiple design ideas, including conceptual (high-level functionality) and concrete (specific details like color and layout) designs to meet identified requirements.

3. **Prototyping**: Build prototypes to represent different aspects of the design for user interaction. Prototypes can be physical, paper-based, or digital to help users experience and evaluate the product.

4. **Evaluating**: Assess usability and user experience through testing, ensuring the product is both functional and meets user expectations. This evaluation helps refine designs and inform future iterations.

These activities are interconnected and iterative, continuously refining the design through feedback.

2.2.6 A Simple Lifecycle Model for Interaction Design

Lifecycle Models:

- **A Simple Lifecycle Model** 🚀:
  - **Discovering Requirements**: Understanding the target users and identifying how the product can be useful.
  - **Designing Alternatives**: Conceptual and concrete design steps to generate multiple alternatives.
  - **Prototyping**: Creating prototypes for usability testing.
  - **Evaluating**: Assessing prototypes to refine the final product.

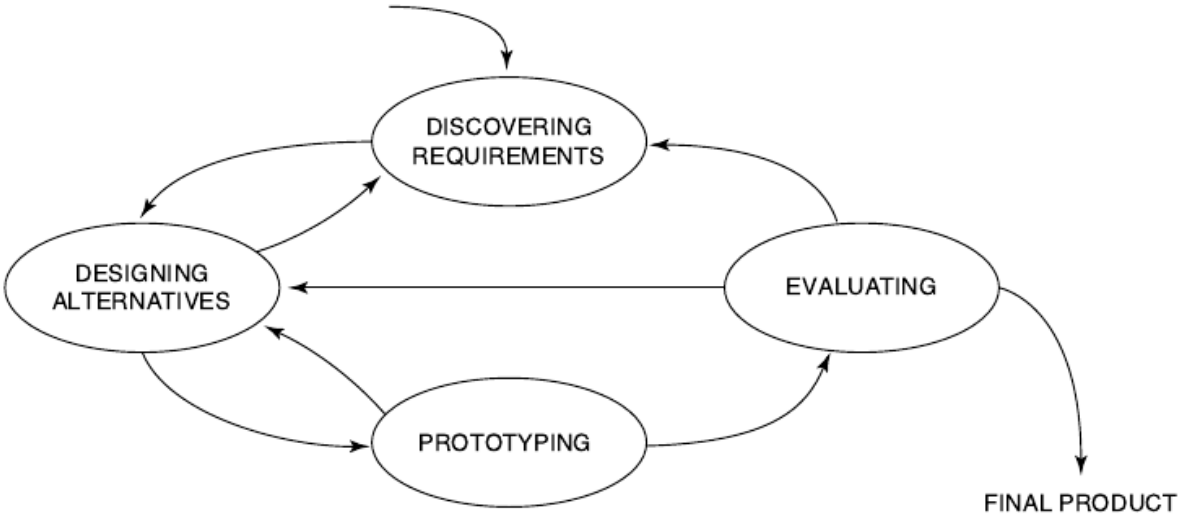


Figure 2.4 A simple interaction design lifecycle model

Design Sprint Phases 🏃‍♂️💨

- **Pre-sprint (Planning)** 📝: Write a brief, choose the challenge, assemble the team, and set up time & space.
- **Phase 1 (Understand)** 🧠: Articulate the problem space with input from experts.
- **Phase 2 (Define)** 🎯: Focus on what you learned to identify the sprint's main goal.
- **Phase 3 (Sketch)** ✏️: Generate ideas and sketch solutions; each team member develops one.
- **Phase 4 (Decide)** ✅: Pick the best idea to move forward.
- **Phase 5 (Prototype)** 🛠️: Build a simple prototype to test your idea.
- **Phase 6 (Validate)** 📊: Gather user feedback and validate (or invalidate) the solution.

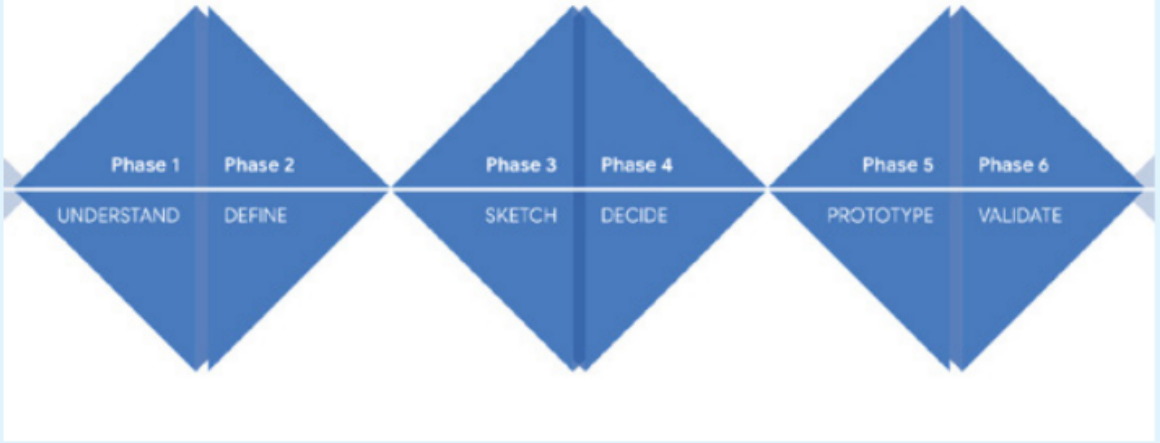


Figure 2.5 The six phases of the design sprint
Source: https://designsprintkit.withgoogle.com/methodology/overview last accessed by 20 May 2022

Research in the Wild (RITW) 🌳🔍

What is RITW?:

- **Developing Tech in Real Life** 🛠️🌍: RITW develops tech solutions by creating and testing them in everyday settings. Researchers experiment with new tech possibilities that can change behaviors.

Developed by **Rogers and Marshall (2017)**:

Key Elements of RITW:

- **Technology** 💻🔌: Use or adapt existing devices like **IoT toolkits** or develop new ones (e.g., a **public display**).
- **Design** 🎨🔄: Design interactive experiences, like **travel planning tools** or an **AR game**.
- **In Situ Study** 🏠🔬: Test tools or prototypes in real-life settings (e.g., someone's home) to see how they are used over time.
- **Theory** 📚💡: Investigate ideas about **behavior**, **settings**, or **phenomena**—either existing or new.

Goal:

- **Challenge Assumptions** 🤔⚡: Observe how people react to and integrate tech in their lives, challenging assumptions about human behavior and informing new HCI theories.

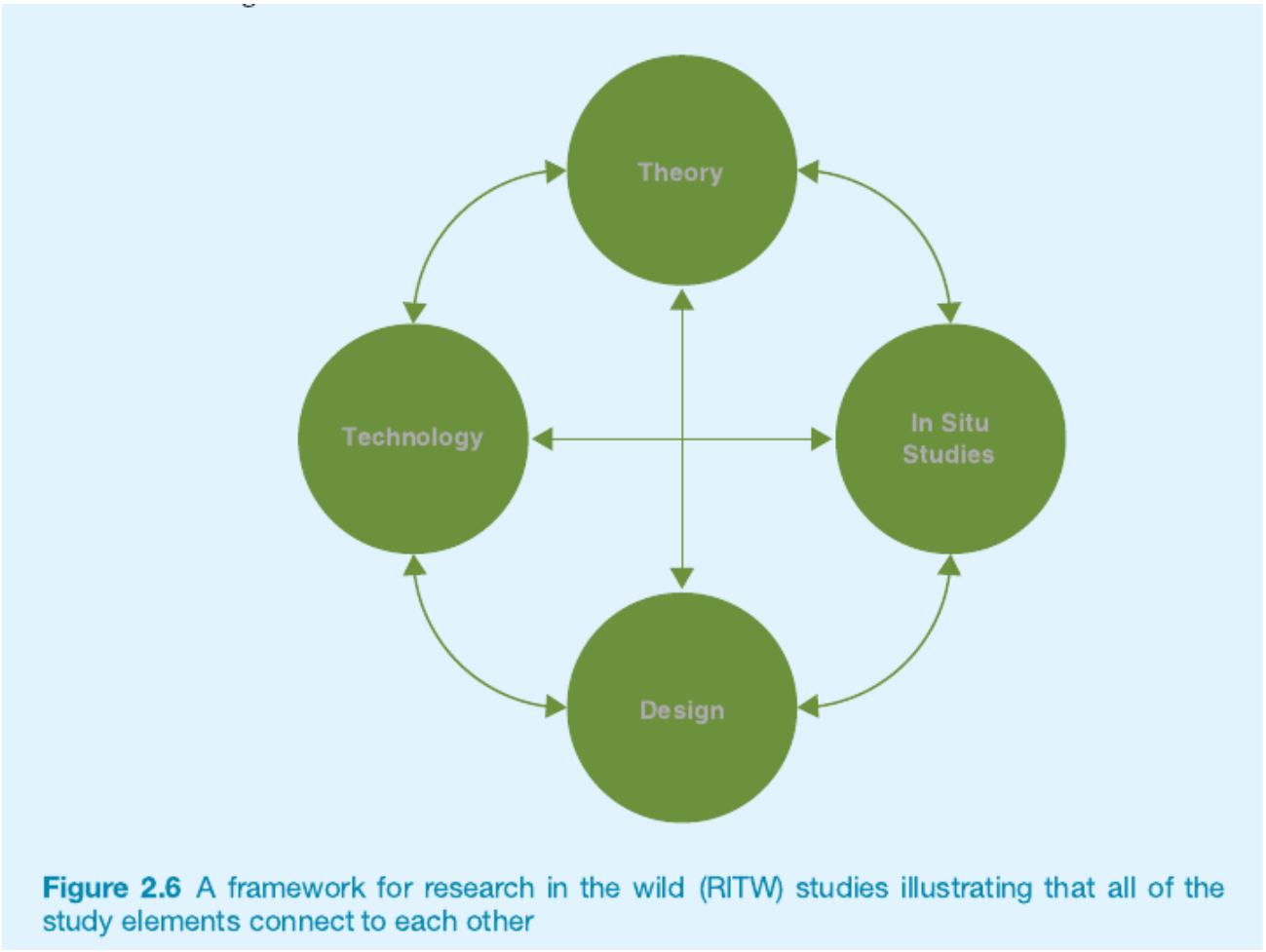


Figure 2.6 A framework for research in the wild (RITW) studies illustrating that all of the study elements connect to each other

2.3 Some Practical Issues 🔍⚙️

2.3.1 How to Find Out What People Need 🤔✨

- **Unspoken Needs**: People often cannot articulate what they need as they might not be aware of possibilities ("un-dreamed-of" needs).
- **Explore the Problem Space**:
  - Investigate users, their context, and activities.
  - Identify areas for improvement rather than asking users directly.
- **Mixed Approach**:
  - Combine exploration, testing ideas, and gathering feedback to decide what to build.
- **User Feedback**:
  - Use **rapid design sprints** and **in-the-wild studies** to gather authentic feedback early on.
  - These methods can provide surprising and valuable insights into real user needs.
- **Focus on Goals**:
  - Prioritize **user goals**, **usability goals**, and **user experience goals** rather than relying solely on user-stated requirements.

- **Real-World Example**:
  - IDEO, a design company, uses community engagement and explores human needs to innovate and create impactful designs.
- **Suzanne and James Robertson (2013)**: Coined the term **"un-dreamed-of needs"**, highlighting that people may not always be aware of their own future needs.

2.3.2 How to Decide What to Design 🎯🛠️

- **Explore the Problem Space**:
  - Understanding the problem space is crucial before jumping into designing solutions.
  - Avoid starting with the physical interface or specific technologies too early.
  - Misunderstanding user needs, context, or missing usability goals can occur when diving into technical design without proper exploration.
- **Importance of User Context**:
  - Understand **current user experiences**, identify why changes are needed, and determine how these changes will improve user experience.
  - Example: Augmented reality navigation systems have evolved from years of research into usability and safety for drivers.
- **Team Effort**:
  - Defining the problem space should be a **collaborative process**.
  - Different team members (e.g., project managers vs. software engineers) will have unique perspectives—considering all perspectives is important to avoid incorrect assumptions.
- **Benefits of Thorough Exploration**:
  - Prevents incorrect assumptions that could lead to an unusable or unwanted design.
  - Encourages more options and possibilities to be considered.
  - Results in a solution that is well-supported by an understanding of both user needs and the business case.
- **Justification of Design Choices**:
  - Designers need to be able to clearly explain and justify their design choices.
  - Articulating the rationale in both **business** and **design terms** is increasingly valued in design fields.

2.3.3 How to Generate Alternative Designs 💡✨

- **Avoid Settling for "Good Enough"**:
  - Relying on an initial solution may prevent discovering better alternatives.
  - Exploring different solutions is essential for good design.
- **Sources of Alternative Ideas**:
  - **Individual Creativity**: Some designers generate inspired designs based on personal creativity.

    - **Cross-Fertilization**: Sharing ideas in multidisciplinary teams or stakeholder workshops helps generate new designs.
    - **Evolution of Products**: Improvements come through observation and cross-domain influences (e.g., from cell phones to smartphones).

- **Techniques for Generating Ideas**:

    - **Creativity Prompts**: Browsing collections of designs or using prompts like **SCAMPER** can inspire fresh ideas.
    - **Creativity Cards**: Various ideation cards exist to prompt new ideas and can be useful for co-design workshops.

- **The Value of Diverse Perspectives**:

    - Different sources of inspiration (competitors' products, existing systems, unrelated domains) can provide valuable insights.
    - Considering different perspectives enriches the design process and can lead to more creative outcomes.

- **Constraints in Alternative Design**:

    - Sometimes constraints limit available alternatives (e.g., adhering to a brand's look and feel).
    - Design decisions often need to balance keeping familiar elements versus exploring new conceptual models.

- **Legal Considerations**:

    - **Copyright and Patent Laws**:
        - Ideas are not copyrighted, but their **expression** is.
        - **Patents** protect the idea itself, e.g., Amazon's one-click purchase.
    - **Creative Commons and Open Source**: Offer more flexible use of designs, supporting collaboration without infringing on copyrights or patents.

- **Dilemma of Copying for Inspiration**:

    - Designers need to understand the legal boundaries of using others' work for inspiration.
    - Creative commons and open-source communities help facilitate legal, collaborative use of designs.
    -

2.3.4 How to Choose Among Alternative Designs 📊💡

- **Design Decisions**:

    - Choices range from interface elements (e.g., physical keyboard vs. touchscreen) to app features (e.g., auto-saving data).
    - These decisions rely on user requirements, technical feasibility, and regulations (e.g., security, privacy).

- **Categories of Decisions**:

    - **Externally Visible Factors**: Features observable by users, like speed, quality, size.
    - **Internal Characteristics**: Technical aspects like materials, friction, etc., which matter only if they

impact external features.

- **Stakeholder Interaction**:
  - Choices between alternatives should involve stakeholder feedback, ensuring the product matches user expectations.
  - Designs need to be in an understandable format for stakeholders, not in technical jargon.
- **Use of Prototypes**:
  - Prototypes are crucial for user evaluation and understanding technical feasibility.
  - They help visualize user experience better than static documentation.
- **A/B Testing**:
  - **A/B Testing** involves deploying two different versions to see which users prefer, often used for websites or apps.
  - Allows for large-scale user evaluations in authentic scenarios.
- **Quality as a Basis**:
  - Views on quality vary between stakeholders (e.g., ease of use vs. feature richness).
  - Formal usability criteria can help make choices clearer.
- **Usability Engineering**:
  - Involves specifying measurable product performance criteria, documented in usability specifications.
  - Useful in applications like health informatics to ensure user experience meets expectations.
- **Dilemma in Defining Quality**:
  - Different stakeholder groups may interpret terms like "realistic" differently.
  - Formalizing usability criteria (e.g., effectiveness, efficiency) helps align expectations and decisions.
- **Considerations for Success**:
  - Balancing constraints and requirements is key; some alternatives might be limited by technology or consistency requirements.
  - Prototyping and evaluation ensure that selected alternatives align with stakeholders' needs and usability standards.

2.3.5 How to integrate interaction design activities with other lifecycle models

- **Integration with Software Development**:
  - Interaction design is influenced by multiple disciplines, including software development, each with its own lifecycle.
  - Challenges exist in integrating design and development, particularly regarding communication during the transition from design to implementation.
- **Agile Software Development**:

    - Interaction design activities are increasingly integrated into agile software methodologies.
    - Popular agile methods include **eXtreme Programming (XP)**, **Scrum**, and **Kanban**.
    - **DSDM (Dynamic Systems Development Method)** is also part of the agile family due to adherence to the agile manifesto.

- **Agile Manifesto**:
    - Emphasizes **individuals and interactions** over processes.
    - Prioritizes **working software** over documentation.
    - Values **customer collaboration** over contract negotiations.
    - Encourages **responding to change** over strictly following a plan.

- **Agile Principles and Interaction Design**:
    - Agile incorporates **tight iterations**, frequent **feedback**, and **collaboration** with customers.
    - For example, in **Scrum**, a working product is delivered at the end of each sprint (1-4 weeks).
    - **XP** advocates for continuous customer involvement, ideally having a customer on-site with the development team.

- **Integration Challenges**:
    - Integrating interaction design into agile is not always straightforward; designer-developer communication often presents challenges.
    - Collaboration, adaptability, and ensuring a balance between flexibility and structure are crucial for successful integration.

- **Practical Considerations**:
    - Agile emphasizes **face-to-face communication**, **streamlined processes**, and focuses on **practice over process**.
    - Many companies integrate agile with interaction design to enhance **user experience** and **business value**, though challenges persist.

Summary

- 🎨 **Different design disciplines** follow different approaches, but they have commonalities that are captured in the **double diamond of design**.
- 🧠 **Understand the Problem Space**: It is important to have a good understanding of the problem space before trying to build anything.
- 🔄 The **interaction design process** consists of four basic activities: **discovering requirements** 🕵️, **designing alternatives** ✏️, **prototyping** 🛠️, and **evaluating** 📊.
- 👥 **People-centered design** rests on three principles: **early focus on users and tasks** ⏱️, **empirical measurement** 📏, and **iterative design** 🔁. These principles are key for interaction design.
- 🤝 **Involving users and stakeholders** assists with **expectation management** 🎯 and **feelings of ownership** 🏠, but careful planning is needed for how and when to involve them.
- 🔍 Looking at **others' designs** and **involving others** in the design process provides useful **inspiration** 💡 and encourages considering **alternative solutions** ✨, which is key to effective design.
- ⚖️ **Usability criteria**, **technical feasibility** ⚙️, and **user feedback** 💬 can all be used to **choose among**

alternatives.

- 🛠️ **Prototyping** is a useful technique for **facilitating user feedback** on designs at all stages.
- 🔄 **Interaction design activities** are becoming better integrated with **lifecycle models** from other related disciplines like **software engineering** 💻.

Glossary for Chapter 2: The Process of Interaction Design

1. Interaction Design

The process of designing interactive products to support the way people communicate and interact in their everyday lives. It involves discovering user requirements, designing solutions, and prototyping and evaluating those solutions.

2. Stakeholders

Individuals or groups who are affected by or have an interest in the development of an interactive product. This may include users, customers, developers, and anyone impacted by the product's introduction.

3. Double Diamond Model

A model for design that includes four phases: Discover, Define, Develop, and Deliver. It emphasizes divergent and convergent thinking for problem-solving.

- **Discover**: Understanding the problem by gathering insights from stakeholders.
- **Define**: Framing the design challenge based on gathered insights.
- **Develop**: Generating and refining design ideas through brainstorming and collaboration.
- **Deliver**: Prototyping and testing different solutions, iterating on feedback.

4. Design Principles

Guidelines that support effective design, including:

- **Be People-Centered**: Focus on the needs and experiences of the people who will use the product.
- **Communicate Visually and Inclusively**: Make designs accessible and easily understood.
- **Collaborate and Co-Create**: Work with stakeholders to generate solutions.
- **Iterate**: Repeatedly refine designs based on user feedback.

5. Prototyping

The creation of a preliminary model of a product to explore and test ideas before finalizing the design. Prototypes can be paper-based or digital and serve as a means for evaluating design choices.

6. User-Centered Design

An approach that emphasizes involving users in every stage of the design process to ensure the product meets their needs and preferences. It includes focusing on user tasks, empirical measurement, and iterative testing.

7. Activity-Centered Design

Focuses on the behavior surrounding specific activities rather than user needs and goals. The design is informed by how people interact with specific tasks.

8. Genius Design

A design approach where the designer relies on their own expertise and intuition rather than extensive user involvement. Users validate the final ideas but are not involved throughout the process.

9. Participatory Design (Co-Design)

A design philosophy that involves users as active participants in the design process, ensuring their needs and feedback directly influence the product.

10. People-Centered Approach

A broader approach that not only focuses on end users but also includes stakeholders and contextual factors that may influence product use. It ensures the product is designed for real-world application.

11. Lifecycle Model

A framework that outlines the stages of developing an interactive product, including discovering requirements, designing alternatives, prototyping, and evaluating.

12. Design Sprint

A time-constrained, iterative process for solving design problems and testing solutions. It consists of six phases: Pre-sprint (planning), Understand, Define, Sketch, Decide, Prototype, and Validate.

13. Research in the Wild (RITW)

A research approach involving the development and testing of new technologies in natural settings, rather than controlled environments, to observe how people use and adapt them in their daily lives.

14. Expectation Management

The process of ensuring stakeholders and users have realistic expectations about what a new product will offer to prevent disappointment and increase acceptance.

15. Ownership

Involving users throughout the design process so that they feel they have contributed to the product, leading to greater acceptance and support of the final solution.

16. Iteration

The practice of refining and improving design through repeated cycles of prototyping, user testing, and feedback analysis.

17. Crowdsourcing in Design

Engaging a large number of people (often online) to contribute ideas or feedback for the design process. This helps to incorporate diverse perspectives.

18. A/B Testing

A method for comparing two versions of a design to determine which one performs better, typically used to refine user interfaces or test specific changes.