

AI Guide for UX Designers

Enabling UX Designers to enter AI field

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ABSTRACT

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Purpose

This thesis action research brings the voices of User experience (UX) and Artificial Intelligence (AI) experts from the field of UX and various industries to provide recommendations and an action plan for the development of UX along with new skills that are needed to adapt to this change to continue innovating and create experiences. The purpose of this thesis is to enable UX designers to enter AI field thereby leading to lower the barrier of entry into the AI field for UX Designers to ultimately lead to the increment of UX Designers in the AI field.

Design/methodology/approach

The thesis is based on a literature review and utilizing qualitative research methods which include semi structured subject matter expert interviews and a survey with sample size of 30 – 40.

Findings

This research identifies a list of skills, challenges, and opportunity areas for UX Designers to enter into the AI field.

Originality/value

The value of this paper based on the recommendations and action plan for the development of UX along with new skills that are needed to adapt to this change to continue innovating and create experiences.

Keywords

User Experience (UX), Artificial Intelligence (AI), UX Designers, Futures Thinking, Design Management, and Strategy development.

CHAPTER 1. INTRODUCTION

1.1. INTRODUCTION

Machine learning (ML), a type of AI, plays an increasingly important role in improving the overall user's experience. From mundane spam filters to personalized news feeds to conversational agents like Alexa to the promise of self-driving cars, several products and services now improve user experience (UX) with algorithms that learn from an underlying data source. This growing reliance on ML and AI imply that UX designers have become quite skilled at envisioning new products and services that leverage ML's capabilities. However, recent research indicates that many UX designers are unprepared to understand and effectively leverage AI capabilities (Dove, Halskov, Forlizzi, & Zimmerman, 2017). Therefore, it is up to the UX designers to address this barrier into the AI field.

1.2 PROBLEM STATEMENT

The main research question of this research paper is: How might we equip UX designers with the skills needed to apply UX in the field of AI? Yet in this ever-changing world filled with technology and its developments, which are advanced almost every day, how are we adapting to those changes is a bigger question.

In every industry, there are various types of inputs and outputs of data. The data collected is often complex data, and analyzing it is overwhelming for many people as well as for businesses to find solutions on time. With more and more aspects of lives and work generating vast amounts of data, it is all but inevitable that artificial intelligence (AI) can and will contextualize the data to extract meaningful insights so that companies can make better decisions and improve their bottom line,

offerings, and ultimately people's lives (Kujala & Väänänen-Vainio-Mattila, 2009). Uncovering these complex data by sense-making leads to opportunities and aids in solving complex problems as well. As both UX and AI deal with problem solving, and UX Designers focus on addressing user needs through empathic understanding, it is imperative to have more UX designers enter the field of AI (Judge, 2019).

This thesis topic focuses on understanding the Artificial Intelligence field as an emerging driver of change and the involvement of UX designers in the field. For this study, the role and value of UX designers in the AI field is to be studied.

1.3 OPPORTUNITY STATEMENT

There is an opportunity to lower the barrier of entry for UX Designers to the AI field in order to enable UX designers to communicate, understand and thrive in this growing field of Artificial Intelligence by applying the User Experience approach effectively. The barriers of entry for UX designers are

1. The lack of initiative to be a part of technologists like data scientists, engineers, and developers.
2. The lack of understanding of the opportunity available for UX designers in the field of AI.
3. The ability to keep up with change from the impact of emerging drivers of change.
4. The lack of importance for User Experience in the AI field.
5. The lack of advocacy for user needs through empathy.

1.4 RESEARCH QUESTIONS

1.4.1 UMBRELLA RESEARCH QUESTION

How might we equip UX designers with the skills needed to apply UX in the field of AI?

1.4.2 SUB-QUESTIONS

RQ 1.1 What is the value of Artificial Intelligence?

- What is Artificial Intelligence and its various types?
- What are the challenges of Artificial Intelligence (AI)?
- What are the strengths/ capabilities of AI?

RQ 1.2 What is the value of User experience in AI?

- How might we describe User experience (UX)?
- What is the history of UXD?
- Who are UX designers? What characteristics signify a UX designer?
- What is the value that UX brings?
- What are the skills currently needed to be considered a UX designer?
- Are there changes in skills required because of AI? If yes, what are the skills needed?
- What are the limitations for UX designers in the AI field?

RQ 1.3 Where does User Experience currently lie in the AI field?

- Why should UX designer consider entering the AI field?

1.5 STRUCTURE OF THE THESIS

Chapter one provides an overview of the motivations and intentions behind the area of study, as well as an introduction of the scope of research. Chapter two reviews the existing literature in the fields of User Experience, its Designers and Artificial Intelligence as well as highlights the connections and gaps between the topics. Chapter three describes the research methodology, approach, and tools for gathering and analyzing data in the primary research stage. Chapter four explains the findings and insights obtained from the primary research and data analysis process, as well as the identified opportunities for the development of a concept. Chapter five discusses the design development along with the testing phase of the design process. Lastly, in Chapter six the conclusions of the study and opportunities for further improvement of this study are presented.

CHAPTER 2. LITERATURE REVIEW

2.1 OVERVIEW

This study proposes to develop a plan of action/framework that assists UX designers to build the knowledge, update necessary skills, and understanding of AI to enter the field and implement UX. Hence , the literature review begins by giving an overview on the future of work. It discusses the impact on jobs due to growing adoption of Artificial Intelligence in industries and changes in skills needed to keep up with the change. After which the literature provides an overview of Artificial Intelligence, its types, the value of AI, challenges of AI, and the scope of the technology. Then it discusses the User Experience space, the history of UX, the definition of UX and who is a UX Designer/professional, the code of conduct, principles of UX and characteristics of UX Designers. The literature then goes into the third area which is on UX Designer skills - the type of work UX Designer does, traits, qualities, must-haves, traits not have. The literature also examines the relationship between UX and AI, the Value of UX approach in businesses, and value for UX designers to be in the AI field. This chapter concludes with an analysis of the gaps found in the literature that will guide the primary research of this study.

2.2 THE FUTURE OF WORK

The industrial revolution has changed the conception of work due to the realization of faster and cheaper manufacturing options due to the automation of repeatable tasks in which machines can specialize. It has led to a new notion of a "job" which is a collection of tasks, not necessarily related

to each other, rather than an integrated set of actions that delivered a complete product or outcome (Greenwood, P. E., Lewis, H., & Guszczka, J. 2017).

Now, the cognitive revolution of which artificial intelligence is one of the biggest drivers of change (Schwab, K. 2018) brings a similar situation to redefine work to create collaborations between human-machine which shifts the understanding of work from task completion to solving problems, management of relationships. According to the World Economic Forum 2018, the division of labor between people and machines is expected to continue to shift toward machines for repetitive and routine tasks which could potentially disrupt 32 percent of today's jobs, according to the Organization for Economic Cooperation and Development (OCED) 2018. On the contrary, there is evidence that AI technology could be used to increase the efforts of the workforce rather than replace them. In the 2018 report, the World Economic Forum projected that nearly 1 million jobs might be lost, while another 1.75 million will be gained.

The jobs of the future are expected to be more machine-powered and data-driven than in the past, but they will also likely require human skills in areas such as problem-solving, communication, listening interpretation, and design. As machines take over repeatable tasks and the work for people to do becomes less routine, roles could be redefined in ways that marry technology with human skills along with advanced expertise in interpretation and service. Increase in the use of techniques such as design thinking can help organizations define future roles that incorporate the new types of capabilities, skills, activities, and also practices needed to get the work done efficiently (Greenwood, P. E., Lewis, H., & Guszczka, J. 2017). Workers of the future will spend more time on activities that

machines are less capable of, such as managing people, applying expertise, communicating and collaborating with others. Machines exceed human performance in taking over activities that are predictable physical activities, collection, and processing of data. Therefore, the skills and capabilities required will also shift toward more social and emotional skills, and more advanced cognitive capabilities, such as logical reasoning and creativity (Manyika.J et al, 2017).

By 2022, no less than 54% of all employees will require significant re- and upskilling. Of these, about 35% are expected to require additional training of up to six months, 9% will require reskilling lasting six to twelve months, while 10% will require additional skills training of more than a year. Skills continuing to grow in prominence by 2022 include analytical thinking and innovation as well as active learning and learning strategies. The sharply increasing importance of skills such as technology design and programming highlights the growing demand for various forms of technology competency identified by employers surveyed by the World Economic Forum, 2018. Additionally, a report on future of work by McKinsey 2017 states that from the total displaced jobs 75 million to 375 million will need to switch occupational categories and learn and train new skills and applications of skills under their new automation adoption scenarios. The changes in professional growth or decline imply that a large number of people will need to shift occupational categories and learn new skills over the years ahead (Schwab.K, 2018).

2.3 ARTIFICIAL INTELLIGENCE

2.2.1 DEFINITION OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence is a study of agents that give out responses to specific tasks based on their

surroundings and events. Every agent serves a purpose of functionality which plans percept arrangement into responses (Russell & Norvig, 2016, p. viii). Barr & Feigenbaum, 1981) also state that Artificial Intelligence (AI) is the part of computer science concerned with designing intelligent computer systems, systems that exhibit characteristics we associate with intelligence in human behavior like understanding language, learning, reasoning, solving problems, and so on.

The following table 1 is a representation of numerous ways to represent the functions as reactive agents. The definitions on top are concerned with thought processes and reasoning, whereas the ones on the bottom address behavior. The explanations on the left measure success regarding fidelity to human performance, whereas the ones on the right measure against an ideal performance measure, called rationality (Russell, S. J., & Norvig, P, 2016, ch1, 2).

	SUCCESS REGARDING FIDELITY TO HUMAN PERFORMANCE	RIGHT MEASURE AGAINST AN IDEAL PERFORMANCE
PROCESSES & REASONING	<p style="text-align: center;"><u>Thinking Humanly</u></p> <p>A new effort in which computers are capable enough to think with their minds literally (Haugeland, 1985).</p> <p>Automation of activities that involve human-level thinking which aids in making a decision, making sense, learning, problem-solving, etc. (Bellman, 1978).</p>	<p style="text-align: center;"><u>Thinking Rationally</u></p> <p>“The study of mental faculties through the use of computational models” (Charniak and McDermott, 1985).</p> <p>Computations or algorithms that extend the functions to enable perception, reason, and action (Winston, 1992).</p>

	<u>Acting Humanly</u>	<u>Acting Rationally</u>
BEHAVIOR	<p>Art of developing machines to carry out tasks which need intelligence when executed by human beings (Kurzweil, 1990).</p> <p>A study that develops computers to do jobs that human beings are better at. (Rich and Knight, 1991).</p>	<p>“Computational Intelligence is the study of the design of intelligent agents” (Poole et al., 1998).</p> <p>“AI is concerned with intelligent behavior in artifacts.” (Nilsson, 1998).</p>

Table 1: Definitions of Artificial Intelligence
 (Source: Artificial Intelligence - A Modern Approach, Third Edition, Chapter 1, pg 2)

2.2.2 TYPES OF ARTIFICIAL INTELLIGENCE

AI has its roots in several older disciplines such as Philosophy, Logic, Computation, Cognitive Science/Psychology, Biology/Neuroscience, and Evolution.

Major subfields of AI include Machine Learning, Neural Networks, Evolutionary Computation, Vision, Robotics, Expert Systems, Speech Processing, Natural Language Processing, and Planning.

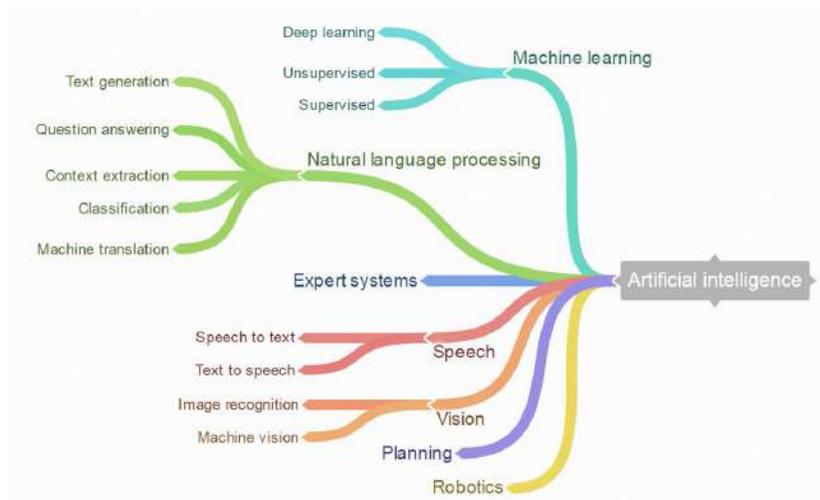


Image 1: Types of AI (Visual from Twitter post by Francesco Marconi
<https://twitter.com/fpmarconi/status/794208040207740928>)

A few primary standard techniques used across many of the sub-fields include Knowledge Representation and Rule Systems.

Knowledge representation - It involves artificial intelligence and the presentation of specific types of knowledge. IT professionals and others monitor and evaluate an artificial intelligence system to get a better idea of its simulation of human knowledge, or its role in presenting the data (Techopedia, 2017).

Rule-based system - A set of "if-then" statements that utilize a set of assertions to which rules are applied for the assertions are created. In software development, rule-based systems can be used to create software that will provide an answer to a problem in place of a human expert. These types of systems may also be called an expert system.

There are four core types of artificial intelligence: reactive machines, limited memory, the theory of mind and self-awareness (Hintze, 2018).

1. REACTIVE MACHINES

The most basic types of AI systems are purely reactive and can neither form memories nor use past experiences to inform current decisions. An example of this type of machine is Deep Blue, IBM's chess-playing computer, which beat international chess player Garry Kasparov in the late 1990s. Deep Blue can identify the pieces on a chess board and know how each move. It can make predictions about next moves for itself as well as its opponent. Based on those predictions it can choose the most optimal move from all the possibilities. However, Deep Blue does not have any memory of past happenings. All it does is look at the pieces on the chess board as it stands at the moment and chooses from possible next moves.

This type of intelligence involves the computer perceiving the world directly and acting on what it sees. It does not rely on an internal concept of the world. In a seminal paper, AI researcher Brooks' (1991) argued that we should only build machines with the level of Deep Blue. Brooks' main reason was that people are not very good at programming perfect simulated worlds for computers to use of what is called a "representation" of the world.

The modern intelligent machines either have no such concept of the world or have a minimal and specialized one for its particular duties. Deep Blue's developers found a way to narrow its view, to stop pursuing some potential future moves based on how it rated their outcome. Without this ability, Deep Blue would have needed to be an even more powerful computer to actually beat Kasparov.

Similarly, Google's AlphaGo, which has beaten top human Go experts, cannot evaluate all potential future moves either. Its analysis method is more sophisticated than Deep Blue's, using a neural network to evaluate game developments. These methods do improve the ability of AI systems to play specific games better, but they cannot be easily changed or applied to other situations. These computerized imaginations have no concept of the wider world – meaning that they only function for specific assigned tasks and are easily fooled (Caudill, 1989). These machines will behave precisely the same way every time they encounter the same situation. This can be very good for ensuring that an AI system is trustworthy. These are the most straightforward AI systems and will never feel things like being bored, interested or sad.

2. LIMITED MEMORY

Limited memory is the type II class that contains machines which can look into the past. For example, self-driving cars do some of this already. They observe other cars' speed and direction. It requires identifying specific objects and monitoring them over time.

These observations are added to the self-driving car's preprogrammed representations of the world, which also include lane markings, traffic lights and other important elements, like curves in the road, etc., when the car decides when to change lanes to avoid cutting off another driver or being hit by a nearby vehicle. But these simple pieces of information about the past are transient. It does not save as part of the car's library of experience, the way human drivers compile experience over the years behind the wheel.

3. THEORY OF MIND

This is the type that creates a great divide between the present machines and the machines in the future and the types of representations machines need to form.

Machines in the next, more advanced, class not only form representations about the world but also about other agents or entities in the world. In psychology, this is called "theory of mind" (Premack & Woodruff, 1978) – the understanding that people, creatures and objects in the world create the thoughts and emotions that affect their behavior. This is crucial to how we humans form societies because they allow us to have social interactions. Without understanding each other's motives and intentions, and without taking into account what somebody else knows either about an individual or

the environment, working together is at best challenging and impossible (Hintze, 2016). If AI systems are indeed ever to walk among us, they will have to be able to understand that each of us has thoughts and feelings and expectations for how we want to be treated and will need to adjust different behaviors accordingly.

4. SELF-AWARENESS

This last type of AI development is one that can develop its representations. AI researchers will need to build consciousness in machines apart from understanding it. This is an extension of the "theory of mind." Conscious beings possess an awareness of themselves and their surroundings, know about their internal states, and can predict and understand the feelings of others (Premack, & Woodruff, 1978). For example, one assumes someone honking behind us in traffic is angry or impatient or has an emergency because it is relatable. Without a theory of mind, we could not deduce those sorts of inferences (Hintze, 2016).

While this type of AI is far from being created, the efforts should focus on understanding memory, learning, and ability to take decisions from experiences. Developing knowledge and understanding of this area is a vital step for human beings to understand intelligence in itself as the goals of evolving AI are more than classifying things or the information in front of them (Brooks, 1991).

2.2.3 VALUE OF ARTIFICIAL INTELLIGENCE

The real value of AI lies at an organization's ability to harness the capabilities of AI.

AI is currently used to solve a variety of problems across various industries and challenges. The most significant potential for AI is to create value in use cases by utilizing established analytical

techniques like regression and classification techniques. The use of neural network techniques could provide more exceptional performance to generate additional relevant insights and applications (Chui et al., 2018).

Due to diverse industries and sectors, the types of use cases also vary because of the broad applicability of AI. These variations have resulted from the importance of different drivers of value within each sector/ industry. It is also affected by the availability of data and the applicability of various techniques and algorithmic solutions (Chui et al., 2018).

ECONOMIC VALUE OF AI

The deep learning (type of AI) techniques such as feedforward neural networks, recurrent neural networks, and convolutional neural networks—account for about 40 percent of the annual value potentially created by all analytics techniques. These three techniques together can enable the creation of between \$3.5 trillion and \$5.8 trillion in value annually. Within industries, that is the equivalent of 1 to 9 percent of 2016 revenue (McKinsey, 2018). Due to the growth of this industry and that many businesses are investing heavily into this technology and it will only continue to grow.

2.2.4 CHALLENGES OF AI

AI holds a lot of varying types of technical limitations which include the need for a large volume and variety of data that is trained and labeled. Societal concerns and regulations, like privacy and use of personal data, can also constrain AI to use in industries like banking, insurance, health care,

pharmaceutical, and medical products, as well as in the public and social sectors if these issues are not adequately addressed (McKinsey, April 2018).

2.4 USER EXPERIENCE

2.3.1 History of User Experience (UX)

Since the 5th century, UX experience principles were being used to create ergonomic workspaces in Greek Civilizations. One of the earliest examples of this can be seen in how the Ancient Greeks' organized their operation rooms; a surgeon was to be in a well-lit area, sitting or standing based on his comfort preferences, and his tools were laid out to be within easy reach of him without obstructing any of his work (Hippocrates, 460 - 370 bc). The concept of UX can also be found beginning in 1430s Italy. In order to design feast-friendly kitchens, it was important that ease of use, comfort, safety, the efficiency of the space were considered in order to have an inviting appeal (Gelb, 2001).

The next phase of User Experience development came in the 1900s from Frederick Winslow Taylor, who piloted a new means of workplace efficiency. "Taylorism" was born out of the extensive research he conducted on worker-tool interactions. He concluded that workers should be organized in a systematic workflow to increase tool efficiency. While he is valued for spotlighting the worker-tool relationship, Taylor faced criticism for reducing workers to "cogs in a machine" (Stevens, E. 2018).

In the 1940s, Toyota changed the way worker-experience design was considered. This time around, production was human-centered, valuing workers' inputs. Although assembly lines were used, a worker could stop it at any time if they had any suggestions to change or improve the process. In a sense, the workers themselves were involved in a kind of usability testing (Stevens, E. 2018).

Workplace efficiency is not the only type of UX that was considered. In 1955, Henry Dreyfus, designer of the Hoover vacuum cleaner, tabletop telephone, and Royal typewriter, focused on consumer-product interactions. He believed that as long as a product made people feel safer, happier, more comfortable, or more efficient, they would be more willing to buy it. However, he warned, if consumers viewed their product experience as a "point of friction" the design has been a failure (Dreyfuss, 1955).

In 1966, Walt Disney too valued UX in crafting an immersive Disney World experience. In his feature for UX Magazine, he explains that he not only wanted his engineers to think about the color, form, shapes, and textures that their guests saw, but to also what it felt like to be in their shoes. He imagined a world in which the latest technology was used to improve people's lives - which is very reminiscent of UX design philosophy today (Stevens, E. 2018). In fact, in the 1970s, it was Xerox's research team that focused on how computer design could aid human use. One of its lead members, Bob Taylor, was both a trained engineer and psychologist. Using his knowledge, his team crafted the two foundational bases of human-computer interaction: the mouse, and the graphical user interface (GUI).

In 1995, "User Experience Architect" became the first job title to officially recognized to incorporate UX design. Apple hired Don Norman to craft its new human-centered product line. Norman, chastising aesthetics-focused design, pushed that it was essential to focus on usability and functionality first. Eventually, within a decade, Apple released what was known as one of the best user-experience products than any of its market competitors, the iPhone (Tariq, 2015; Buley, 2013).

Historically beginning as a novice effort to improve workers' experiences, UX design has now manifested into a crucial component of market research and product development (Stevens, E. 2018).

2.3.2 DEFINITION OF USER EXPERIENCE

User Experience is linked with several meanings (Forlizzi & Battarbee, 2004), ranging from traditional usability to beauty, hedonic, effective, or experiential aspects of technology use. Alben 1996 attempted to define UX by identifying beauty as aesthetics being an essential quality aspect of technology (HASSENZAHN, M., & TRACTINSKY, N. 2006). The elements of beauty are not limited to being instrumental and useful as important due to its value (Postrel 2002), that also shows that beauty fulfills a human need (Maslow 1954). However, Gaver and Marti, 2000, argue that there needs to be important in needs for surprise, diversion or intimacy which needs to be considered by technology and all of these ideas distribute widely into Human-Computer Interaction (Mandic, Kerne. 2005). Hassenzahl 2003, states that the future of HCI is to deal with pragmatic facets with interactive products along with the hedonic facets like the stimulation of personal growth, identification, and evocation (HASSENZAHN, M., & TRACTINSKY, N. 2006). On the other hand, Don Norman 1993 quoted, "I invented the term (User Experience Design) because I thought human

interface and usability were too narrow. I wanted to cover all aspects of the person's experience with the system including industrial design, graphics, the interface, the physical interaction, and the manual. Since then the term has spread widely, so much so that it is starting to lose its meaning... user experience, human-centered design, usability; all those things, even affordances. They sort of entered the vocabulary and no longer have any special meaning. People use them often without having any idea why, what the word means, its origin, history, or what it is about."

"Engineers make things. We make people love them." Karl Fast – 2009, IA Summit. "We" refers to UX specialists who work under UX.

UX design and strategy form the big tent in which all the UX specialists work. From The Definition of User Experience by Jakob Nielsen and Don Norman:

"User experience" encompasses all aspects of the end user's interaction with the company, its services, and its products.

There are three levels for user experience:

1. There is a requirement to meet the exact needs of consumers/customers.
2. Then it gives importance to making it simple and elegant which ultimately provide a sense of joy to own or use.
3. To achieve real user experience, it should be a seamless merging of the services of multiple disciplines, including engineering, marketing, graphics, industrial design, and interface design.

When one works with user experience, it is crucial to have a good understanding of what those areas are so that one knows what tools are available to use (Don Norman, Nielsen Norman Group, August 1998).

There is an international standard that is the basis for many UX/UCD methodologies. This standard (ISO 13407: Human-centered design process) defines a general procedure for including human-centered (user-centered) activities throughout a development life-cycle but does not specify exact methods.

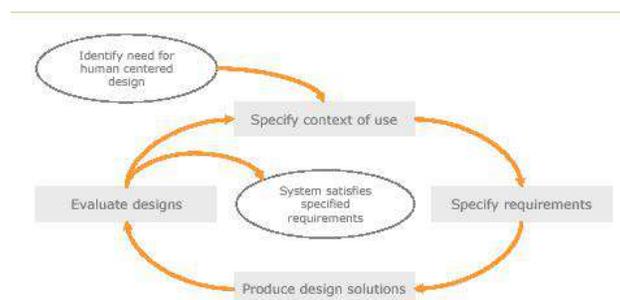


Figure 1: Diagram of a UCD process from the ISO 13407 standard

In this model, once the need to use a human-centered design process is identified, four activities form the primary work:

1. Specify the context for use -

Who will use the product, what they will use it for, where they will use it and how they will use it.

2. Specify goals/requirements -

Identifying business and user goals to be met through the product/service to be successful.

3. Creation of solution -

This section could be done in stages, from an initial concept to a completed offering.

4. Evaluate design -

This is ideally done through usability testing with actual users. Once the requirements have been met, the product can be released for the market.

2.3.3 Who is a UX or UX professional

The User Experience Professionals Association (UXPA) defines a User Experience (UX) professional broadly as one who researches, designs, and evaluates the user experience of products and services.

Some specialize in conducting usability tests or other user research while others practice UX as part of other responsibilities in designing products, services, software applications or web sites.

The training and professional background of UX professionals is equally broad. Many have qualifications in closely related fields like human-computer interaction (HCI), information design or psychology. Others have used their backgrounds in computer science, project management, journalism, fine arts, library science, or business as part of their journey towards being a UX professional.



Figure 2: The vectors of User Experience and Usability, <https://www.uxmatters.com/mt/archives/2010/12/essential-and-desirable-skills-for-a-ux-designer.php>

2.3.4 Code of Conduct for UX professionals

Ethical Principles (UXPA Code of Professional Conduct, 2016):

1. Act in the best interest of everyone.
2. Be honest with everyone.
3. Not harm and if possible provide benefits.
4. Act with integrity.
5. Avoid conflicts of interest.
6. Respect privacy, confidentiality, and anonymity.
7. Provide all resultant data.

2.3.5 Some tenets of UX

In many ways, UX is a calling, not just a job, because it aims to do good in the world by making tools and technologies usable by everyone. UX has philosophies and essential principles to live by, and it

also has ethical rules, legal and moral constraints. Here are some of the practitioner guidelines that are often referred to:

1. Understanding the context is essential.
2. Empathizing with others to know what they know.
3. The purpose of UX work is to improve the system and the interface.
4. Solutions need to be tested with users who will use them.
5. Understanding and efficiently utilizing affordances, design patterns and practices to ensure a solution is easy to grasp and use.
6. To be respectful, inclusive and helpful.
7. To always document the work, one does.
8. To be persuasive and practice evidence-based design/solutions.
9. Be aware of unintended consequences and perverse incentives (Farrell, S., & Nielsen, J., 2013).

2.3.6 UX professionals tend to be

1. People come to UX work from every area of study, with all kinds of backgrounds.
2. UX professionals seem to have innate characteristics that draw them to the field and help them excel, such as curiosity, perceptiveness, empathy, and the joy of learning new things.
3. Learned skills play a significant role too, such as becoming an effective communicator, a careful design critic, and a problem solver.

Fields of User Experience Design



Figure 3: Fields of User Experience Design, by Elizabeth Bacon, founder of DHeath Studio / Find Wellness

2.5 USER EXPERIENCE DESIGNER SKILLS

A study was conducted by the Nielsen Norman group in 2013 with 963 people from interaction designers, information architects, user researchers, and managers who took their 26- question survey (Farrell& Nielsen, 2013). Below are the sections which discuss the findings relevant to this thesis study.

2.4.1 What kind of work UX professionals do

- About 94% have worked on websites and web apps, 67% on mobile apps, 60% on enterprise applications, and 54% on desktop applications.
- Nearly 40% also improve content and documentation of various kinds of purposes.
- Another 24% reported working on services and processes.
- A majority perform at least 16 UX activities of which the top 10 are:
 1. Present solutions and concepts.
 2. Persuade other members and teams.
 3. Analyze tasks or activities.

4. Build prototypes or wireframes.
 5. Collaborate with subject matter experts.
 6. Gather requirements.
 7. Specify interaction design.
 8. Conduct in-person usability studies.
 9. Make storyboards, user journeys, flow diagrams.
 10. Perform reviews or heuristic evaluations.
- A minimum of 20% mentioned doing both UX and software programming (beyond HTML / CSS).
 - Most respondents have jobs in the computer, financial, and healthcare industries; education, marketing, and government. Some 16.5% said they work as consultants.

2.4.2 Skills needed to do a good job

- UX professionals or UX Designers need business skills along with design and interpersonal skills.
- The ability to persuade others to cooperate in fixing problems is called out as a critical skill area.
- HTML / CSS skills are essential. Half of the respondents in the study by Nielsen and Norman already know how to make web pages, and the rest want to learn.
- UX Designers might want to pick up useful complementary skills to be more competitive in the business world, such as project management and data analysis. Public speaking and

group facilitation are on both the most-used and most-wished-for skills lists, so they seem very desirable for those entering the field.

- About a third of respondents said they wish they did have programming skills. Another 47% said they do not want or need to code.

2.4.3 Traits of a UX Designer

- Have a want to design a better solution for problems.
- Love for good design.
- To organize things, problems, and pieces of information.
- The tendency to make things efficient and streamline is well rewarded in the UX field.
- Work to make things better for everyone.
- Detail oriented.

2.4.4 Qualities of a UX Designer

- Knowledge of several things and constantly keeps learning.
- Problem Solvers.
- Genuinely care about people and want to make a difference in the world.
- Simplifies problems and solutions.
- Finds thinking is interesting.

2.4.5 UX candidates must have

- Empathy – feel users' frustration and understands their points of view.
- Soft skills –communication, writing.

- Technical vocabulary – speak engineers’ language (data and precision).
- Understanding how systems work (basics) and how people work with systems (specifics).
- Persuasion for the rightful decisions and solutions.
- Tenacity, patience and curious.
- Observational skills.

2.4.6 Traits to not have

- Lack of interest in technical topics.
- Perfectionism.
- Procrastination.
- Disinterest in ongoing self-education.
- Lack of self-awareness and self-control.
- Attachment to plans, solutions rather than the ability to adapt. (Farrell, S., & Nielsen, J., 2013).

2.4.7 Value of UX approach in businesses

The methods used in User Experience and design thinking foster innovation and enhance the efficiency of business goals and user needs (SAP UX Community, 2015). Applying a UX approach leads to increase in monetary gains by optimizing productivity, effectiveness, efficiency and user satisfaction. Additionally, UX brings a few non-monetary benefits -

1. Increase in User Satisfaction - A focus on the real needs of users means solutions meet their requirements, lowering the barriers to use the new solution, as well as leading to higher satisfaction and loyalty.
2. Increase Customer Loyalty - Consumer solutions with a great user experience lead to a higher rate of product or service recommendations, ultimately improving the brand experience, sales, and growth.
3. Increase in Solution Adoption - Users will automatically adopt a solution that fulfills their real needs and requirements.
4. Strengthen Relationships - Close collaboration between stakeholders pushes the demand and manages expectations. This improves the perception regarding the value and innovation capabilities of businesses and leads to more influence in business strategy decisions.

2.6 UX DESIGNERS NEED TO CONSIDER AI FIELD

<u>UX</u>	<u>AI</u>
User satisfaction	Improves customer experience
Customer Loyalty	
Build stronger relationships	
Solution Adoption	Grows revenue
	Increase efficiency by reducing time
	Provides a competitive advantage
	Reduce operational costs

Table 2: The types of benefits that UX and AI share

The table above represents the benefits shared by both UX and AI. Therein lies a connection from the benefit of AI being able to improve customer experience and to UX that benefits user satisfaction levels to increase customer loyalty which also leads to building trust and relationship with the businesses. Since AI helps save money by taking over the repetitive tasks, it ultimately leads to an increase in revenues as well, and UX leads to quicker solution adoption which also leads to an increase in revenue for businesses.

Artificial intelligence (AI) collects data and information to make sense and anticipate human behavior. User Experience reads human behavior to anticipate the next move by people or users. With that, AI has the power to shape the future of UX, offering new insights and context to the experience's businesses create for consumers or users. The predictive analytics approach in both AI and UX bring forth a synchronization that helps benefit consumers and businesses. "UX is still the center" - Sandy Marsico, the founder, and CEO of Sandstorm Design, a brand experience agency states. The predictive analytics approach aids in determining and anticipating the user needs and AI assists in insights generation; however, it does not provide a more significant understanding of the insights (Dcomisso, 2019).

Artificial Intelligence provides businesses the information and data to help solve problems, but it still requires UX designers to identify the problems and use cases at the beginning. UX Designers understand the context of the insights generated by AI and figure out the impact of insights on UX

Design. Also, UX designers are capable of the empathetic approach toward users (Polonski, V., 2018).

Artificial Intelligence and User Experience aim to understand users and provide solutions based on understanding the needs, and this makes AI a technology that is ready to impact experiences that businesses provide for consumers or users. User Experience provides the human aspect to what AI provides by applying concepts from one to another. Aside from their abilities to interpret behavior together, AI and UX offer possibilities that have not been explored (Anderson, B., 2018). Hence AI field has a need for the increase in number of UX Designers to apply UX effectively.

2.7 FUTURE OF USER EXPERIENCE

Every major milestone in the evolution of UX has involved an interaction between technology and human beings. As technology and the Internet continue to weave themselves into human beings' lives, UX would continue to evolve with it (Huggins, 2018). UX has been a buzzword since 2005, and customer intelligence agency Walker (2013) predicts that experience will overtake price and product as the key brand differentiator by 2020. This brings to light the need for specialized skills in multidisciplinary practice, including user research, graphic design, customer advocacy, software development, and more. The Internet is no longer confined to laptops, smartphones, wearables, and even implantable as they are in a state of constant communication. This presents opportunities for user experience professionals to design interactions that transcend form factors with the ultimate purpose of improving people's lives and solving problems (Tariq, 2015).

2.8 FINDINGS

In summary, the literature mentions that the meaning of work is continually changing and so are the needs of the skills, and so in the context of User Experience there is value for UX designers in the field of AI, yet it is currently difficult for many unprepared UX Designers to understand and effectively leverage AI capabilities. The research does not explore the concept of lowering this barrier for entry to the AI field to enable more UX Designers to be a part of this growing field.

Another factor that is not taken into consideration in the literature when describing the challenges of AI for UX Designers is that literature is minimal. The literature presents various skills and characteristics of UX Designer and the relationship between UX Designer and the AI field. However, the literature does not address the opportunity areas, challenges, skills needed to enter the AI field.

CHAPTER 3: METHODOLOGY

3.1 RESEARCH APPROACH

The following pages outline the research activities conducted, timeline, methodological choice, methodological limitations and research ethics used to gain insight and validation into the thesis topic.

As mentioned in the literature review, the overall value of User Experience in Artificial Intelligence highlights that it ensures UX Designers advocate for the users. However, it also stated but did not explore how the UX Designers can make themselves relevant within this space by understanding limitations, challenges, opportunities to contribute to and value for UX Designers to enter into AI.

Thus, an inductive approach was selected to collect primary data with a qualitative methodological choice of semi-structured subject matter expert-interviews and a survey to answer and confirm the following research questions:

RQ AI. What is Artificial Intelligence and its various types?

- How has it been developing?
- What are the challenges of Artificial Intelligence (AI)?
- What are the strengths/ capabilities of AI?
- What are the principles of the formation of AI?

RQ UX. What is the value of User experience in AI?

- How might we describe User experience design (UXD)?

- Who are UX Designers? What characteristics signify a UX Designer?
- What is the value that UX brings?
- What are the UX methods and approach/process?
- What are the skills currently needed to be considered a UX designer?
- Are there changes in skills required because of AI? If yes, what are the skills needed?
- What are the limitations for UX designers in the AI field?

3.2 METHODOLOGICAL CHOICE

The primary data was collected using a qualitative research approach by conducting semi-structured expert interviews and a survey. This allowed for data collected to foster different viewpoints, suggestions, opinions, experiences, and attitudes of industry professionals at various levels in the organization of UX and AI about the intersection of UX and AI. The methodological choice gave a deeper understanding of the importance of the UX Designers in the AI field that is lacking at the moment as the field of AI is still entirely new and developing. It also provided an understanding of various challenges along with opportunities UX designers face in order to enter this field of AI. This qualitative approach allowed experts to share and express themselves and provided emotional cues when talking about these challenges and opportunities.

3.3 PRIMARY DATA COLLECTION

The cross-sectional study was conducted to gather information from UX Designers and leaders of similar fields and Artificial Intelligence at a single point in time. Sixteen members of the related fields

of UX and AI participated in the semi-structured subject matter expert interviews conducted via video calls and in-person.

The subject-matter expert interviews were guided by open-ended questions to allow interviewees to expand on topics of AI - scope, challenges, positives/strengths, evolution and types of AI also on topics of UX & people involved - scope, challenges, positives/strengths, methods, skills, thinking, characteristics and finally the intersection of UX in AI. After this round of interviews, a survey was shared across various groups of people in both university and professional levels to validate and understand the interest of UX Designers in AI and their challenges to enter into AI field.

3.3.1 Sampling strategy

The sample for the subject-matter expert interviews is divided into two categories; one set of participants holding formal training in educational level about AI and the other set of participants holding no formal training in AI before the workplace. This set of participants were selected based on the gap from literature which does not distinguish approaches of applying learned skills to enter the AI field, experience and methods.

Over thirty-five experts were invited via email to participate in the study, of which only sixteen were able to collaborate. The following table shows the information about participant's locations, roles, organization size, and years of experience.

	Experience in AI field	Participants Roles	Organization Size	Country	Company type
U1	10 years	Lead UX Researcher	Large	US	Transportation
U2	15 years	Design Principle	Large	Germany	Cloud computing Cognitive computing
U3	4 years	UX Researcher & Conversational Designer	Large	US	Computer software
U4	9 years	UX Lead (IA)	Large	US	Conglomerate
U5	4 years	UX Manager	Large	US	Construction Software
U6	15 years +	Experience Design Consultant & Founder. Global director of HMI & Interaction, Experiences & Ergonomics	Medium	US	Automotive
U7	3 years	Chatbot designer	Small	US	Enterprise Chatbots
U8	3 years	Chatbot Advocate	Small	Brazil	Telecommunications
U9	5 years	Product Design Lead & Researcher, Computer Vision & UX Researcher	Large	US	Cloud computing Cognitive computing
U10	3 years	Chatbot designer	Small	UK	Financial
U11	10 years +	Linguist, Specialist in Forensic Linguistics, Artificial Intelligence and Chatbot Designer	Small	US	Language Investigation and Technology
U12	8 - 9 years	UX Professor	Large	US	Conglomerate
U13	2 years	Conversational Designer	Large	US	Domain Registrar, Web hosting, SSL certificates, small businesses
U14	3 years	Author, Int'l Keynote Speaker, Founder/CEO	Small	US	Non-profit for ethics
U15	8 - 9 years	Lead Visual Designer	Small	Canada	Web and mobile application development services
U16	9 - 10 years	UX Professor	Large	US	Conglomerate

Table 3: Participants involved in the primary research

3.3.2 Interview design

Most of the primary data were collected using one - to - one semi-structured expert interviews via video or face to face. These interviews were audio recorded with the permission of the participants for further analysis of this study. Eleven open-ended questions were used to guide the interview around the meaning of Artificial Intelligence (AI) & User Experience (UX), challenges, scope, values, characteristics, and capabilities along with methods and skills. It also captures their experiences and perspectives on getting involved in the AI field. At the end of the expert interviews, participants were asked to mention sources for the researcher to learn about AI with content that is in understandable language and areas that need more focus and scope for UX Designers. The questions allowed participants to expand on the areas and follow up questions were asked as per each participant's response.

3.3.3 Survey design

Due to the availability and time of participants, a short survey was designed to be shared with various User Experience groups and people. The survey was divided into six areas:

1. A few demographics (location, age groups, education, occupation).
2. Interest and Experience in knowing about AI and Design.
3. AI taught in an educational setting, self, and organizational setting.
4. Challenges for UX Designers while considering for AI & its types and overcoming them.
5. To list sources used frequently to learn about AI and design.
6. Values of UX to bring into AI.

3.4 METHODOLOGICAL LIMITATIONS

A number of factors limited the study. Firstly, a few organizations follow regulations to not reveal information about certain things about AI and practices. Only a small sample is used for research, which hardly represents what most professionals are doing and their approaches. Additionally, experts from various areas who are currently in the AI field were interviewed, which possibly ignored different experiences from UX Designers in other industries about AI. Moreover, due to geographical location of the researcher and organizations being at different locations, the research did not allow for field observations to be carried out and instead, the information is taken from the expert interviews and survey which might have left out some details and attitudes that could have been picked up while observing a direct interaction.

Another aspect to consider was getting in contact with participants in the UX and AI fields, which was one of the biggest challenges in the research process. The intention behind the sampling strategy was to get in touch with experts in AI field solely with no UX or design background and then with participants in UX & AI field together. Often due to hectic schedules a few participants had no time to devote and hence has led to interviewing participants who are in integration of UX & AI field.

3.5 RESEARCH ETHICS

The qualitative research of this study is conducted under an ethical strategy in order to protect and respect the participants. Interviewees were provided a consent form (Appendix D) before the interview that described the objective of the interview, the different methods that will be used by the researcher, such as recording and transcribing, and the duration of the interview. It also included the

objective of the call to inform participants about the intent of the interview and allow them to decide to agree or disagree to participate individually. They were also given the option to choose to be disclosed or anonymized in the research study.

Similarly, the information of the consent form was adapted on the information section of the online Google forms survey in order to allow participants to understand the purpose and assure them of the option to withdraw the application even after submitting it.

In order to protect the identity and the relationship, the names of all participants were removed from any published document, and the recordings and transcriptions were not shared or used by anyone other than the researchers of the study and will be deleted after the study is completed. All data was stored on the researcher's personal computer and deleted after the completion of the thesis.

CHAPTER 4: ANALYSIS AND FINDINGS

Completion of primary research using subject matter expert interviews led to the collection of qualitative data. The information collected was analyzed with an inductive approach which allowed for various patterns, connections, and disconnections from the data. The information was then analyzed by categorizing the information into first level codes as UX, UX Designers, AI, UX & AI to identify challenges, opportunities, skills, and expectations which were similar and varied across the categories of codes.

The analysis led to several findings that relate to the UX Designers challenges in Artificial Intelligence space along with skills needed to be a UX Designer. It also encompasses expectations of UX Designers to enter into the AI field, and the value UX can bring into this field of AI technology products/services to contribute to experiences that address and advocate for user needs.

4.1 ANALYSIS OF PRIMARY RESEARCH

The use of semi-structured subject-matter expert interviews was conducted as a method to collect primary research data for this thesis study. It required the taking of notes and audio recordings for most interviews. The recordings were then transcribed using online software and reviewed thoroughly by the researcher of this study to ensure everything was translated accurately.

The subject matter expert interviews along with survey responses were analyzed with an inductive method by beginning with open code. Open and inductive coding is described by Smith, Thorpe, and Jackson (2015) as an analysis method where there are no preconceived definitional codes but

where the structure originates from the data, and the categories emerge from the participants' answers. The method involves assigning labels to portions of text to capture the essence of the data (Seale, 2017).

The researcher scanned and coded the data while listening to the recording to capture the meaning and emotion behind the text to assign a proper code. There were no prior codes for the analysis and the research questions served as a guide to assign codes and focus on the purpose of the study. The main objectives of the analysis for the data were to identify, understand and connect the challenges, expectations, and skills needed to be at the intersection of UX and AI for UX Designers.

After all the subject matter expert interviews and survey responses were coded, the highlighted portions were categorized into four major groups: User Experience Field/Industry, User Experience Designers, User Experience, and AI and Design Principles. This helped in identifying patterns and fill the gaps in the literature that do not specify the problems and expectations for UX Designers in the Artificial Intelligence field and the change/ future scope for UX due to AI Design.

The next phase of analysis involved identifying specific categories under each major group (UX, AI, UX & AI, Design Principles). Analysis included identifying and comparing expected skills applicable for AI and current practice of skills along with changes needed in UX approach concerning AI. It also led to identifying opportunities for UX Designers willing to enter into this space, methods valuable to apply in AI and finally understanding of AI capabilities, its challenges, the scope for UX and design in

this AI space. The data was sorted in an Excel sheet to highlight the process that helps draw out various patterns and connections along with the process of the approach during analysis.

This then led to analyzing and highlighting the problem scope that directly ties to the research question and opportunities for concept development.

4.2 FINDINGS

After the analysis of data points from the subject matter expert interviews (conducted with 17 participants) and the survey responses from industry professionals and university level students in UX or related fields, the data findings are structured in the following major categories:

1. User Experience (UX)
2. Artificial Intelligence (AI)
3. User Experience and Artificial Intelligence synthesis (UX & AI)
4. Design Principles

To present the findings below is a tabular format in three sections: Codes, Sub-codes, and insights. Here the code represents a category, sub-codes represents a sub-category and insights represent the findings take away. These categories were created based on the questions asked using a semi-structured discussion guide. It followed a three sectioned process to ask questions in UX, AI and both fields together. The design principles were arrived at due to questions that were asked to understand UX goals and process changes in the AI field. The semi-structured approach led to a

discussion on design principles remain a constant regardless of any area that is adapting to changes as the design principles are the foundation.

4.2.1 Major category - User Experience (UX)

There are various sections under this major category which range from a list of UX methods and how they would help by utilizing in the AI field. A few UX Designer challenges which are sub-categorized into Designing for AI, communication challenges, technology challenges to be considered by UX Designers, approach with work based on prior training and practices of application and finally challenges that came from education & training itself that lack in teaching UX Designers about technology, its types, and limitations.

USER EXPERIENCE CODES	SUB-CODES	INSIGHTS
UX Methods for AI field	Workshops, Role Playing, Usability testing, AB Testing, QA testing, Heat mapping, Data analytics.	To understand user behavior and help see issues beforehand, anticipate and test user needs to create a better AI product/service. U3 C2, C1, U2, U15.
	Conversation Mapping, Journey Mapping, Survey Research, Secondary Research, Conversation Creation/ Dialogue Creation.	This tool helps design Chatbots. U3 C2
	AB testing or User testing for Reinforcement Learning	Used to make multiple variants in different tests that can be tested all in different environments and go ahead with the best one. U15
UX Designer Challenges	Design for AI	It is still unknown for many UX Designers on how to design for AI which is a bigger question to address. U3 C1

		The challenge for UX Designers is to humanize the whole approach in the AI field. U4
		UX Designers don't consider Ethics in their work as much as it should be done. U3 C1
	Communication	Challenge for UX Designers is that when people talk about AI, a lot of the conversation along AI is very technology driven. u4
		UX Designers feel insecure due to lack of transfer of knowledge. U9
	Technology	To understand the limitations of AI. U1
		Too many designers forget about the work that affects people or users the most. U15
		Do not make use of a tool that exists. U15
	Approach to Work	UX designers have a single trained approach which is to deliver delightful experiences which sometimes might not be suitable for businesses. Recognition of that is essential for designers. U8
		UX Designers lack the initiatives to collaborate, ability to foster relationships with the more technical members of the team. U9
	Education/training	A lot of UX Designers are not taught the basics of data and AI. U5
		To understand the differences between various technologies and their capabilities to design with educated guesses on the levels of feasibility. U5
UX Challenges	UX Challenges in AI	Building for trust. U4
		Personality design for AI. U10, U3 C2.
		Lack of system thinking approach. U14
	UX Challenges in general.	Bridging brick and mortar experience with E-commerce. U3 C1
		Research is an afterthought and used to just fill in holes at later stages in the design process. U6
UX Designer Opportunities	Purpose of design	Trust & sense of rightfulness, reliability & Personality that is personable. U3C2, U8
		Conversations U8, U3 C2

		Scalability U5
	Teach	Design Thinking with AI upon learning about it. U9
	Learn	Networking with the larger community and really open up to technical & other development roles. U9
		Exploration of trained skills which can be applied across different disciplines & industries. U10
		Understanding of data and data organization. U7
UX Field opportunities	Use of Technology	Generative Adversarial Network. U15
	Areas to apply UX approach	To choose the right problem, or the right product to make all the right needs. U2
		Software space to foster accessible & Inclusive design thinking approach & collaboration. U4, U2
Areas to explore	Human-machine dialog box. U6	
	Chatbot personality design & process along with solidifying design principles & measure effectiveness. U3 C2	
User Experience	Understanding	Needs, goals, purpose, behaviors, user-centered design, empathetic understanding of person and ecosystem in which they exist.
	Thinking	Ecosystem, Systems leveled with humans.
	Methodology	Design thinking, Empathetic thinking.
	Creating	holistic experiences, solve problems.
		Understanding User Experience is about practicing three core areas . 1. Understanding user-centered design 2, Using some methodology of empathetic design, such as design thinking. 3. Having that larger empathetic understanding of the person and ecosystem in which they exist, is really what captures the concept of being a user experience designer. U4

<p>UX Designers characteristics</p>	<ul style="list-style-type: none"> - Able to ask intelligent & right questions - Practice critical thinking - Understand, apply empathy, advocate & convince user needs and problems - Able to simplify interfaces - Able to communicate & design complex ideas - Identify fundamental design principles and apply it in the AI field. - Identify themselves about aspects of design that differentiate from everyone else. <p>U1, U1, U3 C1, U6, U3 C2, U7</p>	
<p>UX Designer goals for AI</p>	<p style="text-align: center;">Demystify AI</p> <hr/> <p style="text-align: center;">Clarity & satisfaction to users about AI</p> <hr/> <p style="text-align: center;">Identify ways to alleviate pains</p> <hr/> <p style="text-align: center;">Ethical & moral design for AI</p>	

Table 4: Findings of User Experience Field

This section answers the following research sub-questions: How might we describe User experience (UX)? Who are UX designers? What characteristics signify a UX designer? What are the skills currently needed to be considered a UX designer? What are the limitations for UX designers in the AI field? Looking at the methods, challenges, opportunities, characteristics, and goals for User

Experience and UX Designers helps to understand the scope for UX designers to explore as the emerging technologies like AI take over industries, especially with challenges to demystify AI and help users understand the technology use better by designing for trust with empathy. It also helps to understand who the UX designer is as there exists a varied manifestation of the roles; therefore, it is important to understand the characteristics of UX designer as one who understands, applies empathy, and advocates for and addresses user needs and problems. It is also important to understand the AI field to explore its challenges and opportunities.

4.2.2 Major Category - Artificial Intelligence

There are sections under this major category of Artificial Intelligence which begin with a few types of Psychology & Human behavior which then moves into types of intelligence in humans. After which findings related to AI definitions, evolution and various AI challenges are listed. It also reveals findings on types of AI, capabilities of AI currently and it is positive and finally on AI Ethics as well. All of these have their subcategories / sub-codes and insights.

Artificial Intelligence CODES	SUBCODES	INSIGHTS
General Psychology, Human behavior in UX and AI field	Cognitive sciences and UX - connection.	Cognitive sciences feed into UX due to aspects of working memory, decision making and reasoning of the human mind. U3 C2
	Effect of fundamental elements	Removing or replacing the most fundamental elements in ecosystems leads to disruption in a negative way. U14
	Metapsychology & AI	Understand metapsychology, the psychology of our collective conscious and how it fits into AI. U14
	Example of Collective	Google really has become our collective conscious. U14

	Conscious	
	Different disciplines in psychology	There are many different disciplines in psychology like applied experimental psychology which is to apply the things you learn from experimental setting to actual design. U16
Types and meanings of Intelligence in Humans	Fluid Intelligence	Fluid Intelligence - involves reasoning without any prior knowledge. U3 C2
	Hyper-specialization	Post-industrial revolution - people are now hyper-specialized and have reached epiphany & cannot begin to think in systems. U14
	Language studies	Language studies are more cognitive and are related to human cognition and intelligence. U11
	Socialization process to communicate	Humans ability to communicate comes from birth with a socialization process to acquire language ability to communicate and this AI is leveraging our innate ability to communicate with human modality among humans. U16
	Human beings	Human beings operate with a type of understanding, because of the nuances we built through years of experience on body language, speaking in pronunciation, enunciation through all these really small cues that we use to pick up on. U4
AI Augmented/ Artificial Intelligence definitions	Anthropomorphism	Any kind of intelligent devices that is related to the human-like characteristics which are anthropomorphism. Such as social robots, voice recognition speaker, etc. U16
	Augmented Intelligence	Augmented Intelligence is known to find ways to increase capabilities to make a decision with better information and insights. U2
	AI	AI means having smarter machines that can do things that humans can do but don't have to. U9
	Beginning of AI	AI started with the idea of obtaining human intelligence artificially but that has not happened until 5-7 years ago with Deep neural networks. U16

	AI decisions	"AI is a system that contains knowledge about something and is able to give a response by making decisions toward particular goals. U1
AI Evolution/Growth	Emergence of AI	During the sixties and seventies, one of the 12 disciplines of computer science emerged as artificial intelligence. U16
	Goal of AI	The goal of AI is trying to copy what humans do. U11
	AI changes	AI been around for a long time, a lot of different sort of manifestations. U9
	Chatbots	Since 2015 chatbots started to boom. U3 C2
	Automation	30 years or so ago IT was in the process of Automation, to take people out of the context and have machines do everything whereas cognitive sciences were trying to solving memory related problems. U11
	Deep neural networks	Only about 5-7 years ago with Deep neural networks came in. U11
	Development of AI	The evolution of AI has been very logical but is exponential instead of linear. U14
AI challenges in terms of the technology itself	Defining AI	Challenge in how to define AI, its types and the unknown, the definitions are always changing. U4, U14, U5
	AI is mostly Logical	AI is built to be logical, but the thing is not everything in life is logical. U14, U4, U3 C1
	Only can do repetitive tasks	Cannot do non-routine, empathy & creative. U14
	Single jobs/tasks & limited data access	Due to lack of access U2, U15
	No clear problem and solution	Problems & solutions are not generic for multiple people. U5
	AI is biased	AI machines will always be biased to a certain level as we as humans are biased and it is difficult to eliminate that while teaching it. U2

	Fewer contributions	Contributions are with a smaller set, variety, and people
	Expensive to build AI	Lack of awareness of the costs. U2 U15
	Constant training	
	Hard to make changes	When changes are made it impacts the entire model of AI & is complex to deal with. U13
	Duration to develop AI	Difficult to tell how long it takes to develop.
	Measurement of impact of AI	Cannot measure the impact of AI because something can amplify human beings or augment as creatives, the effect of that is not known which is the "Unknown". U8
	Personality for AI products/services	Difficult in understanding and designing a personality for AI.
	Accessible by developers	Leads to giving the power of AI only to few which does not make for good market product adoption. U9
	Engineering systems perspective	
	Role of checks and balances	Within organizations, the checks and balances are not taking place as the field is very new. U14
Types of AI	Deep Learning	A type of machine learning and upon learning about a topic once taught it learns all about it on its own. U1
	Speech and Text recognition	Speech & text recognition where it learns the language and then recognizes words. U1
	Neural Networks/Connections	set of algorithms, modeled loosely after the human brain, used to recognize patterns. U15
	Platform	A platform is a program that is connected to the cloud. U11
	Predictive analysis	Finds correlations, extrapolating them, putting on a type of trajectory and predicts things based on that format and since it gives out statistical accuracy it is not thinking and is not AI. U4

	Types of AI	Neural Networks, Gradient Descent, Generative Adversarial Network, Multiple Neural Networks, Open AI, Better Language Models, Speech & Text recognition, Deep learning, Platform, Predictive analysis, Machine Learning, Vision Recognition. U15
AI currently does/can do	Very specialist & do single tasks	AI systems are very specialist and do single tasks alone. U2, U4
	Does repeatability	Computers do repeatability not volatility. U2, U15
	Unsupervised model make decisions on own	The unsupervised models make a decision on their own. U15
	NLP allows to include synonyms in chatbots	Chatbots with Neuro-linguistic programming/NLP are better as it allows for users to include synonyms, more vocabulary, and responses that match. U11
	Answers based on parameters set	AI gives answers based on parameters that are set and not based on actual knowledge as humans do. There's a certain philosophical layer of this type of ontological mapping to assign this type of meaning. u4 "The knowledge of the cloud is very important, or the brain of the cloud, how the cloud thinks is very important in order for a chatbot to be accurate." U11
AI Advantages/ positives	Opportunity to get creative	"Computing allows to be creative and bring endless possibilities on what it can be used for. U2"
	Make lives easier	Lives and the world are much better with the technology and tools that have been created. U14
	Mass commercialization	Mass commercialization is important, a signal that people can really use fluidly with AI products/systems with a relatively cheap price. U16
	Data Collection	"The power of AI today is that organizations are combining and putting cognitive thinking and data analysis, and even IoT, just to track data." U8

	Ethics importance	Due to AI, there is a lot of discussions on ethics, representations, diversity, and inclusion which is good as it helps to reflect on things better. U2
	Opportunity to stand out	Usually, AI projects have high visibility within the organization. U13
		AI is in a very formative nature and it leaves a mark for many entering this space to leave a mark and innovate. u3 c2
	Gives time to do Thinking	AI really helps in taking on manual stuff so humans then can focus on critical thinking aspects of UX. U3 C2, U1, U15, U2
AI Ethics	Impact of Data collection	Data collection is the modern tax on society and people should fight for no taxation without representation. U14
	Applied Ethics	Having Applied ethics as coursework is essential. U14
	AI Researchers and ethics	AI researchers tackle the foundation of AI, modeling of deep neural networks, etc. U16

Table 5: Findings of Artificial Intelligence Field

This section answers the following research sub-questions: What is the value of Artificial Intelligence? What are the challenges of Artificial Intelligence (AI)? What are the strengths/ capabilities of the AI? Artificial Intelligence is an increasingly growing technology that several businesses are investing in. It is disrupting several areas of work within organizations, business offerings, and even consumers’ lifestyles and hence it is essential for UX designers to clearly understand the technology change, its scope, opportunities, and challenges to ultimately make use of it in the best way possible after having followed the field of AI.

4.2.3 Major Category - User Experience and Artificial Intelligence synthesis (UX & AI)

The categories found in this major category discusses areas of its sub-sections/sub-codes which begin from listing the necessary UX skills in AI field that is broken down into three sub-codes/ sub-categories. It then presents findings from role of UX Designers in AI, the future of UX with AI, challenges for UX Designers due to the approach of developers, data scientists, and engineers.

UX & AI CODES	SUB-CODES	INSIGHTS
UX Skills in AI Field	Understand	Ability to define each term and break it down to understand the true meaning. U4
		The systems side of things related to AI. It is not needed to learn to code but to understand the connections. U3 C1
		Technical feasibility in order to balance user needs and actionable design. Having basic programming knowledge definitely helps UX Designers understand AI. U7, U5
		Limitations and constraints and design around it. U5, U13
		The language of AI data scientists, impacts on workflow depending on each company, understanding limitations to fully suggest use cases. U15, U5
		Psychology well apart from building wireframes & site maps.U3 C2
	Soft Skills	Leadership, communication, persuasiveness, teamwork/collaboration, problem resolution, tools like software, arts, quick to learn, observe. U15, U8, U2
Hard Skills	Writing, aptitude in design, research, a study of ethics & data, produce concept prototype, user testing, knowledge of AI, basics of coding, quality in execution level, HCI, UX training, the language of AI data scientists U3 C2, U1, U16, U7, U15	
	UX Designers should be able to organize information, thinking and chaos to bring order and clarity. U4	
Role of UX Designers in AI	Increase in presence	Need the presence of designers & creatives in AI work
UX Designers to drive conversations with data scientists, analytics, engineers, Information Architects.		

	Researchers should do	Researchers to uncover user needs, guide design purpose and create meaning
	Information Architects should do	Information Architects create an ontology of relationships and build a frame of reference
	Think & ensure	UX Designers ensure that AI products and services are usable by stakeholders
		All occupations need to be aware and think about how AI will influence as a whole.
		Apply the understanding of service design, HCI and technology
Future of User Experience is	Collaboration	Increase in collaboration between developers, data scientists, engineers to understand user needs. U2
		Leaders in organizations to understand the value of UX and its processes. U3 C1
		Increase in roles & value of Qualitative researchers, UX writers, Content strategists, conversational designers, AI Designers, Hybrid UX Designers + Product Managers. U3 C2, U3 C1, U15, U10
	Systems of systems	UX will be blurred lines between Service design, customer experience, design, and UX. U3 C2, U1
	Thinking Time	AI ultimately gives time to designers to do more critical thinking work rather than aesthetics work. U15
		Deal with thinking outside of the screens, the analog faces. U3 U1, U16
Challenges for UX Designer due to impacts from Developers, Data scientists, and Engineers approach.	Developers Mindset & approach, Challenges from developers	Is not from a user's point of view but their training and logic alone. U2
		Engineers, developers, and scientists are trying to make machines that think about things like humans do without understanding humans. U14, U11
		Are unable to communicate with others. U13
		Collaboration at a distance. U15
		UX Designers are not required until the developers figure out the technology side of things like obtaining clean data, putting in data, algorithm training. U5

	<p>AI can be faster than the human allocation which is the challenge. U8</p> <p>There is a disconnect in the thinking that developers have and that of UX Designer as they advocate for user needs. U2</p>
UX Designers fears & challenges	<p>Do not take the ownership & initiative to be in the community of data scientists and developers. U9</p> <p>Lack of communication and understanding language of AI especially with teams being at a distance. U15</p> <p>AI is accessible by developers alone, but that leads to giving the power of AI only to few which does not make for right market product adoption. U9</p> <p>In most places programming is given more importance and value over UX, design, writing - only used to set the tone of things and not beyond that. U7</p>
Education & training challenges	<p>Our world is built for industrial work, we are built to be factory workers, and that is how the education system is created. U14</p> <p>Re-thinking - how do we read, retool education and skilled labor force. U14</p> <p>The challenge is trying to simplify and logically define a much larger puzzle & trying to logically define the most innate human behaviors in the world and across the world without its knowledge. U14</p> <p>Engineers are raised and educated to believe & apply that almost everything can be logically reasoned out which does not work for human beings. U14, U11</p> <p>Software is eating the world fast, and the problem is that people are not getting educated as fast. U8</p>

Table 6: Findings of synthesized Artificial Intelligence and User Experience Field

This section answers the following research sub-questions: What is the value of User experience in AI? What are the skills currently needed to be considered a UX designer? Are there changes in skills required because of AI? If yes, what are the skills needed? What are the limitations for UX designers

in the AI field? Where does User Experience currently lie in the AI field? Why should UX designers consider before entering the AI field? This category covers detailed aspects of the synthesis of AI and UX for UX designers. This section contributes to gaps found in literature section with the specifics of where the future of UX designer lies as AI is causing disruptive change. To keep up with change, UX designers need to adapt to it and evolve with it to impact users' lives, especially by addressing areas like understanding the language of AI to make it more accessible to users. The change also leads to a future of UX designers to do more thinking work, deal with increase in collaboration and also to be a part of service, customer and user experience design together.

4.2.4 Major Category - Design & Diversity Principles

Below presents findings of key design principles that every design field need to incorporate and practice along with the ideal diversity principles too. The major findings also included that the core design principles for any design discipline would not change and the application of these principles remain as constant guiding principles. These principles are followed by industry professionals and expect UX designers to apply as well across various levels of organizations.

DESIGN & DIVERSITY PRINCIPLES CODES	INSIGHTS
Design Principles	Design in a way to engage with user's psychology. U13
	Design principles should be taken abstractly and be explored. U3 C1
	Users should not have to adapt to design but instead the other way around. U3 C1

	<p>Few guiding principles that structure Design in UX:</p> <ul style="list-style-type: none"> - Not to make something because of capability alone. - Make it simple. - Make it to the service of humans. - Make it useful, desirable and unique. - Make it accessible & inclusive design. <p>U6, U4</p>
<p>Ideal Diversity Meaning for AI field</p>	<p>People who can critically analyze this from all different walks of life, thought patterns, cultures, values apart from skin color, race. U14</p>

Table 7: Findings of core design principle being practiced.

4.3 CONCLUSIONS

Overall, primary research data filled the major gaps in the literature review and answered research questions as well. One question that arose from the literature review concerns with the challenges for UX Designer in the AI field specifically was unclear. The research shows that in most situations the involvement of designers and creatives in the development of AI is limited. Various factors have an impact on that, some of which are that UX Designers do not understand the technical language of developers, data scientists, and engineers. These findings lead to two conclusions: 1. There needs to be an education of AI and design in universities, workplaces, and networking places to build a common language and 2. UX Designers need to be able to network with developers, data scientists and engineers confidently to understand their thinking, technical language and limitations of AI to be able to foster shared learning and effectively apply UX to AI field.

Another gap found in the literature was that it did not specify various opportunity areas for UX Designers to be able to enter and specialize. It also did not specify how UX Designers can enter into this space. After the analysis of the research, it can be determined that organization type and its capabilities influence the types of challenges and opportunities. There also is a genuine interest

from UX Designers of various levels about AI field but they are unsure on how to approach, learn and train themselves about it, which ultimately also leads to the lack of involvement of UX Designers in the AI field to advocate for user needs and develop use cases. Most interviewees agree that the perspective of a UX Designer needs to increase as the rate of development of the AI field is growing exponentially. To ensure all types of thinking and perspectives are involved and included in this development of AI products and services, UX Designers need to take the initiation to learn about AI and its language to effectively be a part of the industry to drive for user needs ultimately. They stated that at the moment they notice very few UX Designers attending meetings related to AI in their workplaces and wished they had more involved and attend them. They also mentioned that they sense a barrier for UX Designers to enter the AI field as UX Designers find this emerging technology field a little daunting and lack the understanding on how quickly it is growing and how much the businesses are adopting this technology.

Another gap found in the literature was that it did not specify the methods and skills for UX Designers to apply in the AI field to better prepare UX Designers incoming to the AI field. From the primary research, UX Designers should develop quick prototyping and testing skills as the development of AI is often expensive and time-consuming and so it is ideal for testing, fixing and testing several times in early stages of the process.

In conclusion, there is a need for UX Designers to

1. Be a part of the AI community to apply the UX approach.

2. To learn about the language of data scientists, developers, and engineers to uncover AI and deliver a universal language that is understandable to users.
3. Contribute to valuable and actionable use cases that benefit users as well as businesses.
4. Develop and practice research, design and testing skills at a much quicker rate to uncover errors early in the process.
5. To make a mark for themselves in this emerging technology field as leaders as well.

However, for these needs to be addressed by UX Designers the initial step is for UX Designers to acknowledge this field and develop their skills and knowledge to enter and contribute to the AI field confidently.

CHAPTER 5: CONCEPT DEVELOPMENT

Based on the literature review and research findings, it was determined to explore the creation of a guide for UX Designers and like-minded individuals which primarily focuses on three areas:

1. Shared information about Artificial Intelligence and User Experience.
2. After understanding the number of opportunities open for UX Designers to contribute ultimately shows the value of being in the field of AI for UX Designers.
3. After having the initial understanding of the AI field, it aids in developing an action plan to work toward the goals.

Even though there are various blogs written by people that focus on multiple aspects individually, there lies an opportunity in bringing it together to the UX community from research that has been validated from experts in various industries of AI for UX Designers to lead the way for the application of UX to AI field. The guide consists of the following structure of Absorption, Understanding, Plan, and Action.

The proposed guide is created based on design criteria that were derived from analysis of primary research to ensure it addresses the thesis question and the importance for UX Designers to network and thrive in a community that fosters the transfer of knowledge between UX and Technologists.

The guide does not aim to change the UX Designers' methodology and approach but rather to educate them on current scope and limitations of AI that UX Designers can contribute to along with

overcoming the primary challenge of uncovering a common language, terminology, and understanding between UX Designers and Technologists.

The proposed guide is designed to empower UX Designers and lower the barrier of entry in order to increase UX Designers in the AI field by understanding, finding a common language thereby advocating and addressing for users' needs. The guide shares the research findings under the first two sections, 1. Absorb and 2. Understand, to help UX Designers understand the fundamental knowledge about AI and then take charge to educate themselves with the ultimate goal to lead the UX way in AI.

5.1 DESIGN CRITERIA

Based on the findings from the qualitative analysis, four criteria to create a guide for UX Designers to develop skills and knowledge that ultimately helps UX Designers become a part of the AI field in order to apply UX conclusively, to keep up with the changes of work and update skills were established:

1. The solution must enable UX Designers to obtain fundamental knowledge and thorough understanding of AI opportunities.
2. It should enable UX Designers take part in the AI field.
3. It should be accessible to reach UX Designers across the globe.
4. It should be focused on communicating the broad spectrum of possibilities for User Experience design in the AI field.

5.2 A GUIDE AND PLANNER - UX DESIGNERS GUIDE AND PLANNER TO AI FIELD

All learning begins with experiences (Dewey, 1938; Jarvis, 1987; Kolb, 1984). Experiential learning is defined as a process of sensemaking along with active engagement between two worlds, the inner and outer of the person and environment (Beard, Wilson. 2006). Kolb also defines experiential learning as the creation of knowledge is through the transformation of experiences (Kolb, 1984). All of these theorists' state that experiential learning is essential to the learning process.

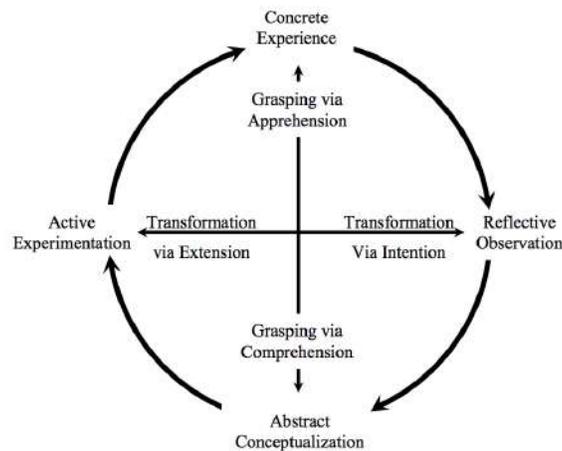


Figure 4: The Model of the Experiential Learning Cycle (Kolb, 1984)

Kolb defines learning as a way to create knowledge. Through citing work of Dewey, Lewin, and Piaget, Kolb put forward a cyclical model for experiential learning that consists of four stages (figure 4). In his model, there are two supportive sections - grasping information and the transformation of the information. Kolb also stated that the process of learning could begin at any stage in the 4 four stages (figure 4). For this discussion, "Concrete Experience" serves as a first step. In this stage, the learner understands information through the use of sense like seeing, hearing, smelling, feeling, and tasting as well. The next stage is "Reflective Observation," where the learner reflects on the experience. In this stage, all the information obtained is modified through intentions. Kolb describes

intention as a process of cognition where the learner makes sense of the experience to internalize the information. During "Abstract Conceptualization" stage, learner understands information by the formation of rules, hypotheses about the experience being studied. This stage also is cognitive and can take place without physical experiences or situations. The last step is "Active Experimentation," and this section takes place when the learner put the rules and generalizations, or hypotheses formed from previous states into action. Kolb states that in this stage, the information is passed on through extension by direct interaction with the experience (Kolb, 1984).

However, this framework does not allow a learner to begin with a particular focus. In the context of the "UX designers, guide and planner to the AI field," a focus of the study is required because the meaning of AI varies across different industries and has broad applications. For this purpose, the framework proposed by Robert, 2006, which is adapted from Kolb's framework is utilized to address this gap.

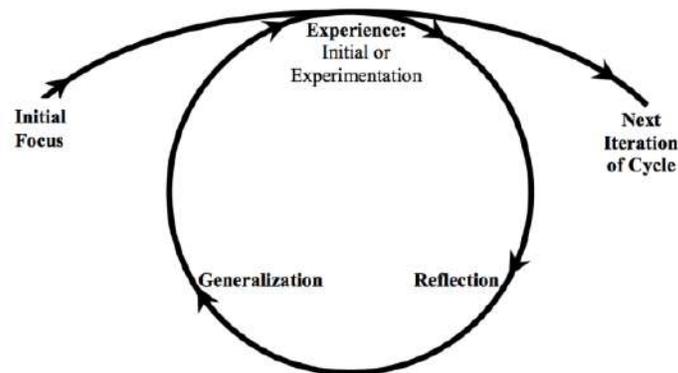


Figure 5: The model of the experiential learning process (Roberts, 2006)

The framework of " the experiential learning process " begins with an initial focus of the learner along with an initial experience (figure 5). Then moves into reflections of learner's observations from experiences after which it leads them to formulate generalizations. In generalization formations phase, the learners make various interpretations of the newly learned knowledge and figure out how it fits with previous knowledge and information. Following experimentation, learners further reflect and refine the generalizations, thus leading to further experimentation. The experiential learning process is on-going in a looping pattern (Roberts, 2006). Roberts 2006 framework works great for the general learning process, but it does not direct the use of the process to different fields which require specific details needed for individual field needs.

Since this thesis is specific to the field of AI and UX designers and given the lack of specificity from Roberts 2006 framework, the proposed framework "UX designers guide and planner to the AI field" address the gap by making the learning process that is specific to UX, AI field, and UX designers. This framework helps the targeted users (UX designers at an entry-level to AI) to have a learning process that consists of the details and information needed to understand and enter the AI field and develop an action plan to keep up with the change that AI is causing positively.

The "UX designers guide and planner to the AI field" follows a similar iterative and spiral framework that delineates the findings of the primary research in this thesis into four core sections:

1. Absorb
2. Understand
3. Plan

4. Action



Figure 6: The framework of "UX designers guide and planner to AI field"

There are four distinct sections for this framework to help UX Designers build the skills and thinking needed to enter into the AI field. Each section has its purpose, and the framework is a structured approach for UX Designers to enter the AI space and apply User Experience for the AI industry. The content in the first and second sections (absorb and understand, respectively) is presented from the findings that are analyzed from experts in the industry.

5.2.1 ABSORB

The first section of the framework represents the fundamental understanding of AI and UX. Before jumping into the field of AI and gaining an understanding of where opportunities lie for UX Designers, this section begins by absorbing the broader spectrum of Artificial Intelligence and User Experience to gain that initial knowledge as shown in The Experiential Learning Process (Roberts, 2006). There are various terms and definitions shared in this section on AI and UX which gives the readers an

initial understanding to research further which helps absorb the information further. The absorb section is intended to expose UX designers to basic level understanding of AI and UX which covers information such as definitions and evolution of AI and UX.

5.2.2 UNDERSTAND

The second section of the framework represents the understanding of UX in the AI field. It covers a range of subsections from the challenges of each field (UX and AI) to sharing the current opportunities for UX Designers. The findings presented in this section then drive thought process and understanding for readers to think about developing an action plan to work toward their goal of entering into the field of AI to apply UX after having the initial understanding of scope, challenges to help figure out reader's goals in the intersection of UX and AI. The second section – Understand represents the sections of reflection and generalization from the Experiential Learning Process (Roberts, 2006). This section helps UX designers develop further understanding of UX and AI field through the process of reflecting on information gained from first phased and then after having understood this section's findings they are able to form generalizations about the various aspects of UX and AI.

5.2.3 PLAN

The third section of the framework represents the development of an action plan to ensure a continuous learning plan to ultimately make way into the AI field with knowledge and skills needed. This section follows a five-step process by using identifying, planning, prioritization tools to ultimately help the readers tackle the right goals to enter the AI field and apply UX. "Plan" looks at

how the learned knowledge and experience through formed generalizations can be applied (Roberts, 2006) and therefore helps UX designers to develop a plan to work toward. The tools to use in this section are most effective for planning as they have been created for

The tools in this section are:

1. List goals: This section helps list down all the intended goals UX designer would like to achieve.

There also exists a pre-determined goals list that can help guide UX designers with goal setting.

2. S.W.OT analysis: This category utilizes SWOT analysis method to analyze one's strengths and identify opportunities for growth in terms of the interest in entering the AI field for the set goal.

3. Identify all the Tasks to-do: After having goals set, it is important to break it further down to list the tasks that need to be achieved to accomplish the goals.

4. Prioritizing tasks to-do: Now that a list of things-to-do is created, prioritizing them using the Eisenhower matrix helps to identify which ones to tackle first and set timelines to achieve them.

5. Develop an Action Plan: For each of the Eisenhower matrix quadrant tasks developing an action plan by answering questions that cover the what, when, how, and where (if applicable) to successfully work toward the goals.

These tools continue to be relevant and effective due to a number of reasons. Some of which include the flexibility and adaptability of the tools to any type of situation and also that this planner is created from the perspective of AI goals.

5.2.4 ACTION

The final section of the framework represents the actual application of the developed plan to ensure progress and continual learning as stated from the experimentation section in the Experiential

Learning Process framework that it is a continuous learning spiral that grows with each cycle (Roberts, 2016). It is essential to develop a timeline to keep in check of goals to achieve and make changes as one goes along the process. Iterations are critical in the process to promote continuous growth and work toward the set goals to enter the AI field.

5.3 REQUIREMENTS TO USE THE GUIDE

This guide is created for readers who have an understanding of User Experience and its applications before reading this guide. It is ideal for readers who are looking to make industry switch or enter the AI field in their career or as their interest to work on projects. It is meant to provide the very first and fundamental knowledge about AI and applications for UX Designers.

5.4 TESTING

The concept was put to the test through a process of verification and validation with four various types of people to evaluate if the proposed “UX Designers guide and planner to AI field” fulfills the needs and expectations of UX Designers who are at an entry level to the AI field, and meets the needs.

5.4.1 The verification process and conclusions for initial concept:

The verification step was to check during the concept development cycle if the solution meets the design criteria. Thus, a one on one call for an hour and a half was set up with an expert in the transportation industry of UX and AI. The objective of the call was to obtain feedback on strengths, weaknesses, and opportunities for improvements for the areas of the framework.

The verification process took place for the initial concept which was about a guide that educated UX Designers on the use of ethical tools in everyday practices – the concerned feedback was on the issues of educating UX Designers about AI field as a whole before educating them about ethics and its use. Overall feedback provided was that the initial concept did not provide the ideal solution to this thesis problem and opportunity area.

5.4.2 Validation of final concept

The validation phase is the process after the completion of concept development to ensure the concept's purpose and intention of use. This section is conducted with four various types of UX Designers, two of which are experts in the field of User Experience and Artificial Intelligence. One of the four is a UX student who is coming to the industry with bachelor's degree in UX with no prior understanding of the AI field, and another is a graduating bachelor's student in UX with prior knowledge of the AI field.

These validators were selected for the following reasons -

Participants	Level of knowledge on AI	Level of knowledge on UX	Who is the actual user/reader of this guide?	Who are the experts in this list?
EV1	High	High	-	Yes
EV2	High	High	-	Yes
MV3	Moderate	High	-	-
BV4	None	High	Fits actual user/reader criteria	-

Table 8 :Validator's selection chart

Because implementation of the entire framework requires months for it to be completed, it is decided to obtain validation from experts in the industry as well as from UX Designers who have no prior knowledge about AI to obtain feedback from both types.

The validators were provided with a brief explanation and aims of the guide and the purpose of this guide + planner. The members had two to three days to go over the guide. After their review, a video call or in-person meeting took place to conduct a feedback session with each validator individually using a semi-structured guide. Each of the feedback and validation sessions lasted for 1 hour - 1.5 hours and the first fifteen minutes were used to go over some prior information on the background of the study and to highlight the goal or purpose of the call/meeting.

At the end of the meetings/ discussions, the validators were asked about any additional comments or suggestions to inform researcher.

5.2.3 Validation Conclusions

After analyzing and comparing the feedback from experts and actual users, several conclusions are made. The conclusions are divided into two categories - from experts, from users.

From Experts:

After analyzing the feedback and findings from the validation session, it shows that guide and planner is a solid foundational start for inexperienced UX designers looking to engage in the AI field from a humanistic point of view. They also find that the Plan and Action phases help UX designers

begin to guide one's course of action and work toward their goals. It was also highlighted that the value of the guide and planners lies in the demonstration of the needed skills and knowledge to confidently move forward to be further equipped for the tasks of AI.

There was further feedback provided on the implementation of this guide and planner as this is considered to be the first type of tool to guide UX designers to AI is to find this as a "living document or a guide" which should be continually enhanced by the researcher and other professionals over time. It was also mentioned to take this to various types of organizations and see how this guide and planner can be adapted to their needs, even with educational institutions. The feedback also included that it was useful to encourage the users of the guide and planner to be self-reflective of their strengths and weaknesses that ultimately promotes self-improvement and growth. The self-realization, humility, and constant personal improvement are primary ingredients for success. Finally, the actual value of this guide and planner was that it pushes to lower the barrier for UX designers to enter AI field, thereby ultimately leading to having more UX designers in the AI field.

From Users:

Upon analysis of the feedback, the users state that they have a clearer understanding of AI and encourages them to read further to develop their knowledge. It also provides the current knowledge of AI and the space of UX designers in the field of AI. Highlights that the "Absorb" and "Understand" section are more valuable compared to "Plan" and "Action." The users find it useful to do self-searches after having their curiosity developed in this area upon reading various sections. However,

it would be beneficial to see the results of the entire framework being utilized to thoroughly understand the benefits and drawbacks of this guide and planner, which leaves scope for further study.

CHAPTER 6. CONCLUSIONS

The purpose of this thesis was to lower the barrier of entry for UX designers to enter the AI field to apply UX principles and to adapt to the changes in the future of work. The literature review revealed that UX designers have difficulty in understanding the AI field and therefore, are unprepared to leverage AI capabilities to UX effectively. There is an increase in the adoption of Artificial Intelligence by businesses, which causes much disruption in jobs across various industries. It highlights the impacts of cognitive revolution with Artificial Intelligence being the biggest driver of change in organizations and therefore to redefine work to create collaborations between human-machine to shift and adapt to a new understanding of work to being about solving problems and collaboration.

Even though the literature reveals UX designers being unprepared for the AI, it did not specify the reasons why there lies a lack of preparedness to enter the AI field and contribute to it effectively. Similarly, it does not specify the specific UX, and AI synthesized challenges and opportunities for UX designers to take advantage of to enter the field of AI. These served as a fundamental premise for primary research of the study.

Sixteen subject matter experts were interviewed from United States, United Kingdom, Canada, Brazil, and Germany all of who work at diverse sizes of organizations and with different years of experience to analyze their roles, skills, challenge, collaboration, and application of UX to AI field. Additionally, a survey was shared with various UX professionals to understand their interest in the field of AI and preparedness, along with their understanding of the challenges UX designers have for the AI field.

After analyzing the information, it was found that UX designers have the interest to be a part of the AI field but are not sure how to approach and learn about the field and prepare accordingly. A few commonly mentioned sources they try and learn about AI is through medium blog posts, Google AI, and twitter updates. The experts in the field mentioned the lack of initiative from UX designers to network and thrive in the community of technologists like data scientists, engineers, and developers.

The challenges were categorized into three major categories of UX Designer, Artificial Intelligence, and User Experience field. Significant findings of challenges for UX designers is the difficulty in understanding AI technology, and its connectedness, lack of communication and networking, misunderstanding of terminology in AI field with technologists and UX designers and finally designing for AI itself is a challenge due to lack of clarity. The findings for AI are that it is challenging to define AI as it varies for each organization and its use, only capable of repetitive tasks, will always be biased to an extent, difficult to customize and make changes to the technology, unable to measure the impact of AI and is mostly accessible by technologists. The findings from the UX field also faces various challenges of which are to build trust for AI, lack of systems thinking perspective and approach, and the application of research methods being an afterthought in several industries.

The primary research findings also discuss the necessary skills for UX designers to develop and practice to enter and adapt to changes from AI. The critical skills are to break down and understand true meanings, connections of systems in AI, the balance of user and business needs, ability to design with constraints and limitations of AI, understanding of the language of AI, a keen understanding of psychology along with soft skills like problem resolution, teamwork,

persuasiveness. It is ideal to even have writing skills, the study of ethics and data, user testing, basics of coding, organizes information to bring order and clarity.

The findings also point to a core design principle that remains as a guiding force for the future of UX and its application which are -

- Make things with definitive and robust reason.
- Make it simple.
- Make it to the service of humans.
- Make it useful, desirable, and unique.
- Make it accessible & inclusive design.

Final findings suggest the UX designers need guidance and an approach to develop and update their skills to enter the field of AI as several industries adopt it across various levels. Since change is inevitable from the use of AI, it is up to UX designers to keep updating their skills and develop continual learning processes to keep up with changes in the AI field and apply UX effectively.

Based on the findings, a "UX Designers Guide and Planner to AI" was developed to promote the learning using a guided framework to allow current and future UX designers to have a guide that provides essential information of the synthesis AI and UX and to then develop a plan with each individual's goals to enter the field of AI. The framework consists of four major sections – Absorb, Understand, Plan, and Action. It has been adapted from the experiential learning process framework by T. Grady Roberts, 2006.

The complete framework was verified with subject experts and users that currently practice UX in the field of AI and users of the guide who does not have any specific knowledge about AI.

After carrying out the validation sessions, it was confirmed that the guide and planner allow for UX designers to develop an initial level of understanding about AI and UX to develop their goals then and work toward entering the field of AI by updating skills and developing the knowledge. It was also found that UX designers need to have a few initial goals set to understand the development of goals in the planning section.

This study is relevant to the field of Design Management as it highlights the importance of managing change in order to continually innovate and identifies opportunities for using design management approach to enable UX designers to thrive in the AI community.

6.2 FUTURE DIRECTIONS

Due to time constraints of the study, it was not possible to see the results of applying the complete framework. However, the guide and planner has been shared with a few UX designers to continue applying the planning and action sections of the framework and analysis of the final results of the framework will be carried out to identify areas of improvement.

There is also an opportunity to explore the use of this guide and planner to help industry professionals in organizations to train their employees about the AI field. Most importantly, it is necessary to conduct future research to analyze the changes in skills and methodologies as the

industry of AI grows, since the study revealed an increase in adoption of AI and displacement and retraining of skills and tools.

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APPENDIX A – CONSENT FORM

SCAD *Informed Consent Form*

I voluntarily agree to participate in a conversation/interview/inquiry performed by Neha Tadepalli, an M.F.A candidate in Design Management at the Savannah College of Art and Design for her thesis research. I understand that this conversation/interview/inquiry is being conducted by Neha Tadepalli in order to identify the following opportunities for design:

- To identify and propose the direction of User Experience (UX) skill set changes that could potentially occur to the User Experience (UX) industry and its employees from the use of Artificial Intelligence (AI).

I understand that it may include:

1. Recorded audio
2. 30–90 minute conversation/interview/inquiry duration
3. Additional questionnaire(s) - if needed

I grant permission for the conversation/interview/inquiry to be recorded and transcribed, and to be used only by Neha Tadepalli for analysis of interview data and her thesis. I grant permission for this data to be used in an educational setting/ purposes only.

Any identifiable information in regard to my name and/or company name will be (mark your option)

- Anonymized**
 Disclosed

to those not directly involved in this study.

Participant's printed Name

Participant's signature

Date

Informed Consent Form

APPENDIX B – CONCEPT

Below are all the pages for the design concept – UX Designers guide and planner to AI field.



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www.nehatadepalli.com

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Terminology references

- UX Designers - all professionals in the User Experience field.
- UX - referred to as User Experience.
- AI - referred to as Artificial Intelligence.

Introduction

To all who are reading this right now,
You are here for a purpose to know about AI due to its relevance
and due to AI being a hugely disruptive technology across various
industries.

I embarked on the journey of understanding about AI and how
it would fit into UX. These are both worlds I want to be a part of
and build my career in, and hence I chose to begin my journey by
selecting this area of study for my M.F.A. Design Management thesis at
Savannah College of Art and Design.

Like several UX Designers wondering about AI and curious to learn
about it, I began my journey.

I have spoken to over 15 experts in the industry of User Experience
and Artificial Intelligence across different countries all with different
purposes and stories, but one common challenge for all UX Designers
is how to design for AI? How to take a step to enter this space? Where
can one get started to enter this field? What are the opportunities that
exist for UX? These are the challenges for over 60% of UX Designers

after having surveyed and spoken to participants across the United States. My study heavily focused on the United States as I have access to that demographic.

If you are reading this and are wondering about these questions then reading further ahead would be of great value as this report discusses my findings with a framework that involves absorption of what AI and UX are, then moving into understanding the various challenges, opportunities, skills and methods for UX, UX Designers and AI. Finally, to plan and get into action phases that is essentially a planner for UX Designers looking to break into this field after having understood the value and opportunities that lie for UX Designers. It ends on a note with Action step where it then becomes a cyclical process that involves continual learning and application.

The terminology around AI is often complex to understand for anyone other than technologists. This guide and planner is to help take the first step toward an individual's career change as the field of AI is not very accessible by everyone at the moment.

**How might we equip
UX designers with the
skills needed to apply
UX in the field of AI?**

About the guide

There are four distinct sections for this framework to help UX Designers build the skills and thinking needed to enter into the AI field know as "Absorption," "Understanding," "Plan," "Action." It is an iterative process.

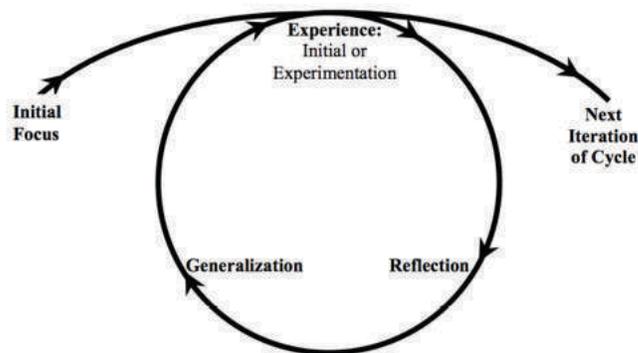


Framework: UX designers guide and planner to AI field

Each section has its purpose, and this framework is a structured approach for UX Designers to enter AI space and drive User Experience for the AI Industry.

About framework

In the context of the "UX designers, guide and planner to the AI field," a focus of the study is required because the meaning of AI varies across different industries and has broad applications. For this purpose, the framework proposed by Robert, 2006, which is adapted from Kolb's framework is utilized.



The model of the experiential learning process (Roberts, 2006)

The framework of "the experiential learning process" begins with an initial focus of the learner along with an initial experience (above figure). Then moves into reflections of learner's observations from experiences after which it leads them to formulate generalizations. In generalization formations phase, the learners make various interpretations of the newly learned knowledge and figure out how it fits with previous knowledge and information. Following experimentation, learners further reflect and refine the generalizations, thus leading to further experimentation. The experiential learning process is on-going in a looping pattern (Roberts, 2006). Roberts 2006 framework is great for the process of general learning but does not consist of the break down details needed for specific fields and industries like in this thesis study it is for UX designers to enter into the AI field.

How to use this guide?

The "UX designers guide and planner to the AI field" follows a similar iterative and spiral framework (Robers 2006) that delineates the findings of the research into four core sections:



Framework: UX designers guide and planner to AI field

1. Absorption

- At the beginning of this process using the framework, we are in the section of figuring out where to start with the AI field.
- Before jumping into the field of AI and gaining an understanding of where do opportunities lie for UX Designers, we first begin by absorbing the broader spectrum of Artificial Intelligence and User Experience.
- There are various terms and definitions shared in this section, which provides a guide to research further, which helps absorb the information even more.

2. Understanding

- In this second section, we understand the intersection of UX and AI.
- It covers various sections from the challenges of each industry to share the opportunities by industry experts.

- The findings in this section then drive thought process and understanding for us to think about developing an action plan to work toward the goal of entering into the field of AI and UX with the knowledge of the scope and challenges to help figure out goals in the synthesis of UX and AI.

3. Plan

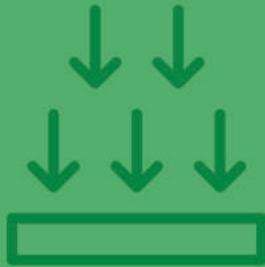
After having understood, this section takes us into developing a plan to achieve the set goals. It provides a list of goals to begin. It follows a five-step process by using various identifying, planning, prioritization tools to ultimately help you tackle the right goals to enter the intersection of UX and AI. The tools are:

1. List goals: This section helps list down all the intended goals UX designer would like to achieve. There also exists a pre-determined goals list that can help guide UX designers with goal setting.
2. S.W.O.T analysis: This category utilizes SWOT analysis method to analyze one's strengths and identify opportunities for growth in terms of the interest in entering the AI field for the set goal.
3. Identify all the Tasks to-do: After having goals set, it is important to break the goals further down to a list of tasks that you need to achieve.
4. Prioritizing tasks to do: Now that a list of thing is created, prioritizing them using the Eisenhower matrix helps to identify which ones to tackle first and set timelines to achieve them.
5. Develop an Action Plan: For each of the Eisenhower matrix quadrant tasks developing an action plan by answering questions that cover the what, when, how, and where (if applicable) to successfully work toward the goals.

All these offer us a way to re-frame our initial goal and actionable opportunities. It also helps us think of an initial intent about where we should be moving.

4. Action

It is essential to develop a timeline to keep in check of goals to achieve. Iteration is critical in the process to promote continuous growth.



1. Absorption

The cycle begins with the absorption of what these (AI & UX) areas are. It gives you the first step into AI and UX hence absorption. It also shares AI types, evolution, UX Designer characteristics, and future of UX.

1. Artificial Intelligence (AI)
2. User Experience (UX)

Artificial Intelligence (AI)

■ DEFINITION

Artificial Intelligence is a system that contains knowledge about something and gives a response by making decisions toward particular goals.

■ RELATED DEFINITIONS & TERMS

Anthropomorphism

Any intelligent devices that are related to the human-like characteristics which are anthropomorphism. A few examples are social robots, voice recognition speaker.

Augmented Intelligence

Augmented Intelligence is known to find ways to increase capabilities to decide with better information and insights.

AI means

AI means having smarter machines that can do things that humans can do but do not have to.

The idea of AI at the beginning

AI started with the purpose of obtaining human Intelligence artificially, but that had not happened 5-7 years ago with Deep neural networks (a type of Machine Learning, AI).

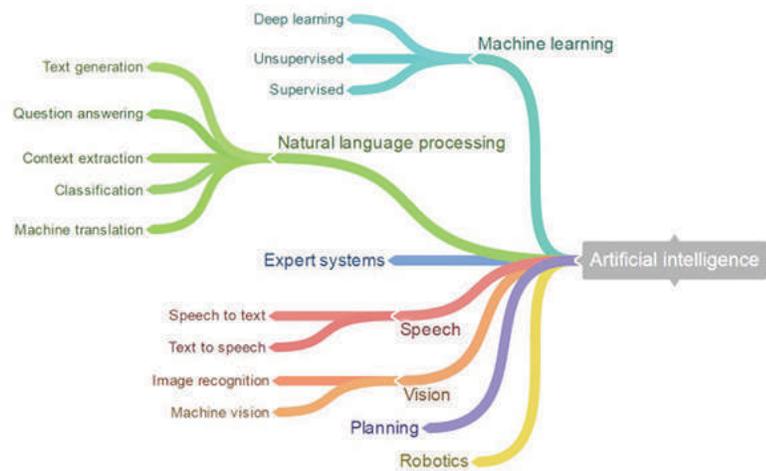
Sources to read further

- <http://www.canada.ai/>
- <https://futureoflife.org/ai-news/>
- <https://ai.google/about/>

■ ARTIFICIAL INTELLIGENCE FIELD

There are eight main branches of AI -

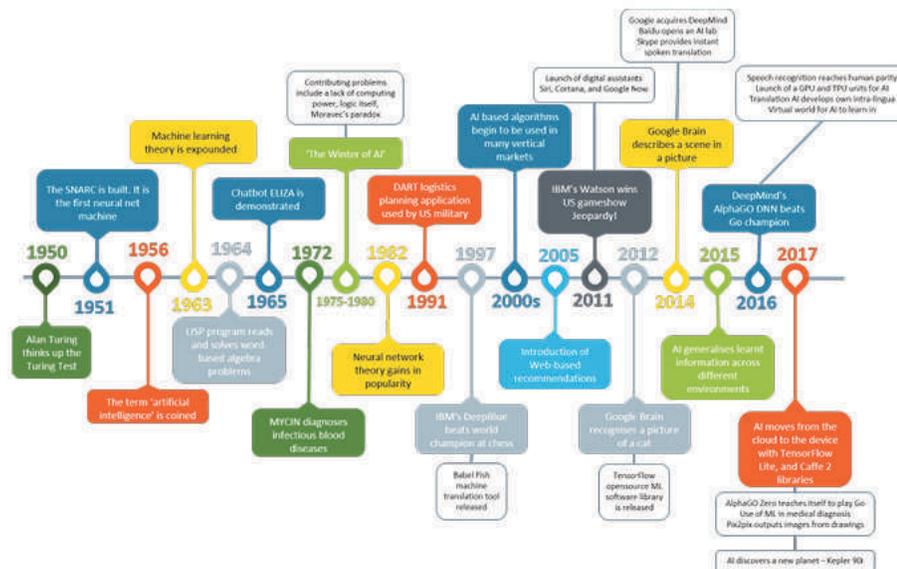
1. Machine Learning
2. Natural Language Processing
3. Speech
4. Vision
5. Expert Systems
6. Planning
7. Robotics
8. Robotics



Visual from Twitter post by Francesco Marconi
<https://twitter.com/fpmarconi/status/794208040207740928>

ARTIFICIAL INTELLIGENCE EVOLUTION

- During the sixties and seventies, one of the 12 disciplines of computer science emerged as artificial intelligence.
- The goal of AI is trying to copy what humans do.
- AI has been around for a long time having a lot of different manifestations.
- Chat-bots are continuing to boom since 2015.
- Thirty years ago, IT (Information Technology) was in the process of automation, to take people out of context and have machines do everything & cognitive sciences were trying to solving memory related problems.
- Deep neural networks came in 5-7 years ago.
- The evolution of AI has been very logical but is exponential instead of linear.



Ide, H. (2018, May 18). What causes AI boom and bust: A personal view of Artificial Intelligence history. Retrieved from <https://www.innovationobservatory.com/node/243>

User Experience (UX)

■ DEFINITION

Understanding User Experience is about practicing three core areas:

1. Understanding user-centered design.
2. Use a methodology of empathetic design, such as design thinking.
3. Having the larger empathetic understanding of the person and ecosystem in which they exist.

RELATED DEFINITIONS & TERMS

■ Understanding

Needs, goals, purpose, behaviors, user-centered design, empathetic understanding of person and ecosystem in which they exist.

Thinking

Ecosystem and systems leveled with humans.

Methodology

Design thinking, empathetic thinking.

Creating

Holistic experiences, solve problems.

■ CHARACTERISTICS OF UX DESIGNERS

- Able to ask intelligent & right questions
- Practice critical thinking
- Understand, advocate & convince user needs and problems
- Able to simplify interfaces
- Able to communicate & design complex ideas
- Identify the fundamental design principle and apply it in the AI field
- Identify aspects of design that differentiate from everyone else.

■ FUTURE OF USER EXPERIENCE

Collaboration

Increase in collaboration between developers, data scientists, engineers to understand user needs and technology changes.

Leaders in organizations understand the value of UX.

Increase in roles & value of qualitative researchers, UX writers, Content Strategists, Conversational Designers, AI Designers, Hybrid UX Designers + Product Managers.

Systems of systems

UX will be blurred between Service Design, Customer Experience Design, and UX.

Thinking time

AI ultimately gives time to designers to do more critical thinking work rather than aesthetics work.

Deal with thinking outside of the screens, the analog faces.



2. Understand

This section focuses on understanding AI technology, UX Designers, and UX. It begins by sharing the scope of AI for UX and then moves into challenges of all three areas. Then, this section states specific UX Designers skills, methods, and opportunities that exist for UX and its people.

1. Scope of AI for UX
2. AI Challenges
3. AI Technology Strengths
4. UX Challenges
5. UX Designers Challenges
6. UX Designers Skills in AI field
7. UX Methods in AI field
8. UX & UX Designers Opportunities - Value of UX and UX Designers for AI.

Scope of AI for UX

■ UX AND UX DESIGNERS IN AI

Increase in presence

Need the presence of Designers & Creatives in AI work for advocacy of users. UX Designers need to drive conversations with data scientists, analysts, engineers, and information architects. The other side of UX and AI is UX building the AI, not just data models and information architecture, but the empathy that is needed for systems to respond in an empathetic and delightful way.

Researchers do

Uncover user needs to connect needs with the user, guide design purpose, and create meaning, which is a goal or direction for the work to be done post-research.

Information architects do

Create an ontology of relationships and build a frame of reference.

Solve design problems quickly

Artificial intelligence algorithms help make it easier by taking advantage of AI to learn user behaviors, UX teams can quickly solve design problems to create AI models based on user preferences that provide solutions and develop personalized products/services.

As businesses and users become more inclined to greater customization, it's vital for UX Designers to become data-savvy, and dive headfirst into scrutinizing the endless possibilities in engaging with any system.

AI Technology Challenges

■ CHALLENGES

Defining AI

Challenge in how to define AI, its types, and the unknown, the definitions are always changing.

AI is Logical

AI is built to be logical, but the thing is not everything in life is logical.

Does repetitive tasks

AI cannot do non-routine, empathy, and creative.

Does single jobs/tasks well due to limited data access.

No clear problem and solution

Problem and solutions are not generic for multiple people.

Will be biased

AI machines will be biased to a certain level as human beings are biased, and it is difficult to eliminate that while teaching it.

Contributions

The contributions are made with a smaller set, less variety, and fewer people.

Difficult to make changes and predict the time

When changes are needed to be made, it impacts the entire model of AI and is complex to deal with as it almost restarts the whole cycle.

Difficult to tell how long it takes to develop as it would depend on tasks, content needed to teach it, and capabilities.

Personality of AI

It is still a challenge to figure out a personality for AI.

Hard to measure the impact of AI

Cannot measure the impact of AI because something that aims amplify human beings or augment as creatives, the effect of that is not known, which is the "Unknown."

Mostly accessible by developers

- Leads to giving the power of AI only to few, which does not make for the right market product adoption.
 - Engineering systems perspective.
 - Within organizations, the checks and balances are not taking place as the field is very new.
-

AI Technology Strengths

■ POSITIVES

Opportunity to get creative

Computing allows us to be creative and brings endless possibilities for its use.

Make lives easier

Lives and the world are much better with the technology and tools that have been created.

Mass commercialization

Mass commercialization is essential, a signal that people can use fluidly with AI products/systems with a relatively low price.

Data Collection

The power of AI today is that organizations are combining and putting cognitive thinking and data analysis, and even IoT, to track data.

Ethics importance

Due to AI, there are several discussions on ethics, representations, diversity, and inclusion, which is good as it helps to reflect on things better.

Opportunity to stand out

Usually, AI projects have high visibility within the organization.

AI is in a very formative nature, and it leaves a mark for many entering this space to leave a mark and innovate.

Gives time to do Thinking

AI helps in taking on manual stuff so humans then can focus on critical thinking aspects of UX.

UX Challenges

■ CHALLENGES

Challenges from developers approach

- Their approach is not from a users point of view but based their training and logic alone.
- Engineers, developers, and scientists are trying to make machines that think about things like humans do without understanding humans.
- Are unable to communicate with others.
- Collaboration is at a distance with the AI field.
- UX is not required until the developers figure out the technology side of things like obtaining clean data, putting in data, algorithm training.
- AI can be faster than human allocation, which is the challenge.
- There is a disconnect in the thinking that developers have and that of UX as it advocates for user needs.

UX Designers ownership levels

- UX Designers do not take the ownership & initiative to be in the community of data scientists and developers.

Collaboration at a distance

- Lack of communication and understanding the language of AI, especially with teams being at a distance.

Accessibility and Importance

- AI is accessible by developers alone, but that leads to giving the power of AI only to few, which does not make for right market product adoption.
- In most places, programming is given more importance and value

over UX, design, writing - only used to set the tone of things and not beyond that.

Education & training challenges

- Our world is built for industrial work, we are made to be factory workers, and that is how the education system is created.
 - Re-thinking - how do we read, retool education and skilled labor force.
 - The challenge is trying to simplify and logically define a much larger puzzle & trying to logically identify the most innate human behaviors around the globe without its knowledge.
 - Engineers are raised and educated to believe & apply that almost everything can be logically reasoned out, which does not work for humans beings.
 - Software is eating the world fast, and the problem is that people are not getting educated as quickly.
-

UX Designers Challenges

■ CHALLENGES FOR UX DESIGNER

Design for AI

- It is still unknown for many UX Designers on how to design for AI, which is a bigger question to address.
- The challenge for UX Designers is to humanize the whole approach in the AI field.
- UX Designers do not consider Ethics in their work as much as it should be.

Communication

- Challenge for UX Designers is that when people talk about AI, a lot of the conversation along AI is very technology driven.
- UX Designers find it slightly complicated due to lack of transfer of knowledge.

Technology

- To understand the limitations of AI.
- Too many UX Designers forget about the work that affects people/users the most.
- Do not make use of tools that exist.

Process/Approach with Work

- UX designers have a single trained approach, which is to deliver delightful experiences, which sometimes might not be suitable for businesses. Recognition of that is essential for UX Designers.
- UX Designers lack the initiatives to collaborate, the ability to foster relationships with the more technical members of the team.

Education/training

- A lot of UX Designers are not taught the basics of data and AI.
- To understand the differences between various technologies and their capabilities to design with educated guesses on the levels of feasibility.

UX Designers Skills in AI field

■ SKILLS NEEDED

Understanding of

- Ability to define each term and break it down to understand the true meaning.
- To understand the systems side of things related to AI. It is not needed to learn to code but rather to understand the connections.
- Technical feasibility to balance user needs and actionable design although having basic programming knowledge helps understand AI.
- Understand of limitations and constraints and then to design around it.
- The language of AI data scientists, impacts on work-flow depending on each company, understanding limitations to accurately suggest use cases.
- To understand psychology and apply it apart from building wire-frames & site maps.

Soft Skills

- Leadership, communication, persuasiveness, team-oriented/player, collaborator, problem resolution, tools like software, arts, quick to learn, observe.

Hard Skills

- Writing, aptitude in design, research, the study of ethics & data, produce concept prototype, user testing, knowledge of AI, basics of coding, quality in execution level, HCI, UX training, the language of AI data scientists.
- UX Designers should be able to organize information, thinking, and chaos to bring order and clarity.

UX Methods

■ METHODS TO USE

- Workshops
- Role Playing
- Usability testing
- AB Testing
- QA Testing
- Heat Mapping
- Data Analytics

These help to understand user behavior and foresee issues, anticipate and test user needs to create a better AI product/service.

They are used to make multiple variants in tests that can be used in different environments and go ahead with the best one.

- Conversation Mapping
- Journey Mapping
- Survey Research
- Secondary Research
- Dialogue Creation

These tool helps to design Chat-bots as well.

UX & UX Designers Opportunities

■ USER EXPERIENCE OPPORTUNITIES

Use of Technology

- Exploration of use cases and use of Generated Adversarial Network.

Areas to induce UX approach

- To choose the right problem, or the right product to address all the right needs.
- To foster an open and inclusive design thinking approach along with collaboration in the Software and technology industries.

Areas to explore

- The Human-machine dialog box.
- Chat-bot personality design & process.
- Solidify design principles.
- To measure effectiveness.

■ UX DESIGNER OPPORTUNITIES

Design for

- Trust and a sense of rightfulness.
- Reliability and personality that is personable.
- Conversations.
- Scalability.

Teach and educate about

- Design Thinking with AI upon learning about it.
- Addressing user needs and its value to the businesses growth.
- Communication with technologists to then pass it on to users.

Learn about

- Networking with the broader community and open up to the technical and other development roles.
 - Exploration of trained skills to then apply across different disciplines and industries.
 - Understanding of data and data organization.
 - Able to comprehend the connection of systems and to utilize a system thinking approach.
-



3. Plan

This section focuses on creating a plan after having understood the challenges, opportunities that exist in the AI field for UX Designers. It utilizes the application of various goal setting and planning tools to help you identify the right goals to work toward to enter AI field.

-
1. Identifying goals
 2. S.W.O.T Analysis
 3. Identify Tasks to do for the goals
 4. Prioritizing tasks to-do
 5. Develop Action Plan

1. Identifying goals

■ LIST OF DETERMINED GOALS FOR UX DESIGNERS

These goals are provided to help you either pick the goals that apply to your interests in AI field or to help guide you through creating your own goals by looking at the examples below.

- To drive conversations with data scientists, analysts, engineers, and information architects.
- To learn to take advantage of AI that helps understand user behaviors.
- To become data-savvy.
- To increase the presence of UX Designers in the AI field.
- To figure out a personality for AI
- To give the power of AI to everyone by making it understandable and accessible.
- To identify use cases using AI.
- To communicate with others by understanding developers terminology.
- To bridge the gap between the between developer goals and UX Designer goals.
- To thrive in the community of data scientists and developers.
- To change the perception of User Experience in organizations with AI and UX teams.
- To humanize the approach in the AI field in terms of building products/ services.

- To practice AI ethics in User Experience.
- To increase the transfer of knowledge between teams.
- To understand the limitations of AI.
- To make use of the AI tools that exist.
- To learn, break down the meaning, and teach the basics of data and AI.
- To understand the differences between various technologies and their capabilities to design.
- To understand the system's connection with AI technology.
- To develop basic programming knowledge that helps understand AI.
- To learn and apply psychology to AI.
- To determine the methods best-suited for the AI field.
- To explore the use of Generated Adversarial Network.
- To work toward fostering inclusive design thinking approach.
- To explore and develop a human-machine dialog box
- To figure out the chat-bot personality and design process for AI.
- To solidify design principles for AI.
- To design for scalability.
- To explore the application of skills possessed across various industries or products/services.
- To understand data and data organization.
- To utilize systems thinking approach toward AI Design.

2. S.W.O.T Analysis

- **SWOT ANALYSIS FOR SELF AWARENESS**

This tool helps to understand strengths better, manage weaknesses, identify opportunities for growth, and figure out potential threats that could keep you from moving forward for the selected goal from previous step.

Strengths	Weaknesses
Opportunities	Threats

How to use SWOT analysis?

TIPS

- Think about your strengths and weaknesses concerning you and the people around you.
- Importantly, look at your strengths, and ask yourself whether these open up any opportunities – and look at your weaknesses, and ask yourself whether you could open up opportunities by eliminating those weaknesses.

■ STRENGTHS (don't be modest)

Questions to help answer the sections efficiently.

- What advantages do you have that others don't have (for example, skills, knowledge on topics, certifications, education, or connections)?
- What do you do better than anyone else that can be applied to AI?
- What do other people see as your strengths?
- Which of your achievements are you most proud?
- What values or ethics do you have that your peers often lack?

■ WEAKNESSES (be honest)

Questions to help answer the sections efficiently.

- Where are your education, training, knowledge on topics and skills that leave room for improvement?
- What are your negative work habits and work traits?
- What tasks do you usually avoid because you don't feel confident doing them related to AI?
- What will the people around you see as your weaknesses?
- Do you have personal traits/thoughts that hold you back in your field?

■ OPPORTUNITIES

Questions to help answer the sections efficiently.

- What type of AI can help you in your career shift? Or can you get help from others or people via the Internet, networking?
- Is your industry growing? If so, how can you take advantage of the growth?
- Do you have a network of strategic contacts to help you, or offer good advice?
- Are any companies or people failing to do something important? If so, can you take advantage of their mistakes?
- Is there a need in your industry that no one is filling?
- Do your users complain about something to you? If so, could you create an opportunity by offering a solution?

■ THREATS

Questions to help answer the sections efficiently.

- What obstacles do you currently face in your career?
- Who/what is your competition?
- Will new technology or certifications demand to slow your progress?
- How is your job or industry changing in ways that could affect your advancement?
- Could any of your weaknesses lead to threats?
- What are some barriers that could stop you from working on your opportunities?

3. Tasks To-Do

- **TO-DO TASKS FOR GOAL ACHIEVEMENT**

Upon identifying the goals and understanding strengths, it is time to list anything and everything related to the goal that needs to be done to achieve it.

Task List	Estimate date
<input type="checkbox"/>	

Task List	Estimate date
<input type="checkbox"/>	

4. Prioritize Tasks to-do

■ EISENHOWER MATRIX

It is then vital to identify which ones from the list to tackle first based on levels of urgency and importance.

Urgent & Important	Not urgent & Important
Do.	Schedule.
Urgent & Not important	Not urgent & Not important
Delegate.	Ignore.

5. The Action Plan

This section of the planner converts the goal into an actionable process. It has three essential parts.

■ 1. PLAN TOWARDS IMPLEMENTATION

What?

When?

How?

Where?

■ **2. RESOURCES TO USE**

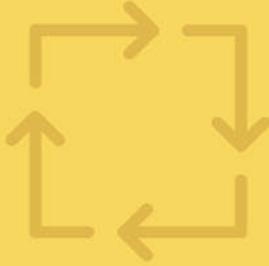
List all resources types needed to implement the tasks. It could be things like a book, specific websites, contacts, etc.

Resources
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

■ **3. POTENTIAL BARRIERS TO EXPERIENCE**

This step to anticipate and identify your behavior, approach, and situations to then have an alternative plan to achieve the goals.

Potential barriers
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>



4. Action

Now it is your turn to make the step to take action over the plan.

It is essential to develop a timeline to keep in check of goals to achieve. Iteration is critical in the process to promote continuous growth.

This section provides a few ways to approach keeping track of tasks and goals. It usually is like any project we work on using excels, reminders, project trackers, etc. It also discusses the impact of change due to increasing adoption of AI by various industries. Keeping up with change and constant reskilling and retooling is essential to adapt to the changes.

Tools to use for progress tracking

To evaluate a few simple ways are by keeping track of what is being achieved on a day to day basis and weekly reviews with yourself.

A few tools are:

1. Using Excel sheets to type all your dates, times dedicated, goals, and tasks to mark whether or not it has been achieved by the delegated time.
2. Printing calendars and marking things with a marker.
3. Project tracker applications like Asana, Trello, Wrike, Basecamp, Evernote, etc.
4. Even assigning reminders on your smart devices could help in evaluating your progress.

Although this is a step that is very personal and varied for each person whichever approach is chosen, it is crucial to ensure to mark things for yourself as this is a reflective moment for yourself to continue working toward your goals.

To Keep up with change

The fourth industrial revolution of which artificial intelligence is one of the biggest drivers of change (Schwab, K. 2018) brings a situation to redefine work to create collaborations between human-machine which shifts the understanding of work from task completion to solving problems, management of relationships.

According to the World Economic Forum 2018, the division of labor between people and machines is expected to continue to shift toward machines for repetitive and routine tasks which could potentially disrupt 32 percent of today's jobs, according to the Organization for Economic Cooperation and Development (OCED) 2018. On the contrary, there is evidence that AI technology could be used to increase the efforts of the workforce rather than replace them. In the 2018 report, the World Economic Forum projected that nearly 1 million jobs might be lost, while another 1.75 million will be gained.

The jobs of the future are expected to be more machine-powered and data-driven than in the past, but they will also likely require human skills in areas such as problem-solving, communication, listening interpretation, and design. As machines take over repeatable tasks and the work for people to do becomes less routine, roles could be redefined in ways that marry technology with human skills along with

advanced expertise in interpretation and service. Increase in the use of techniques such as design thinking can help organizations define future roles that incorporate the new types of capabilities, skills, activities, and also practices needed to get the work done efficiently (Greenwood, P. E., Lewis, H., & Guszczka, J. 2017). Workers of the future will spend more time on activities that machines are less capable of, such as managing people, applying expertise, communicating, and collaborating with others. Machines exceed human performance in taking over activities that are predictable physical activities, collection, and processing of data. Therefore, the skills and capabilities required will also shift toward more social and emotional skills, and more advanced cognitive abilities, such as logical reasoning and creativity (Manyika, J et al. 2017).

By 2022, no less than 54% of all employees will require significant re- and upskilling. Of these, about 35% are expected to require additional training of up to six months, 9% will require reskilling lasting six to twelve months, while 10% will require additional skills training of more than a year. Skills continuing to grow in prominence by 2022 include analytical thinking and innovation as well as active learning and learning strategies. The sharply increasing importance of skills such as technology design and programming highlights the growing demand for various forms of technology competency identified by employers surveyed by the

World Economic Forum, 2018. Additionally, a report on future of work by McKinsey 2017 states that from the total displaced jobs 75 million to 375 million will need to switch occupational categories and learn and train new skills and applications of skills under their new automation adoption scenarios. The changes in professional growth or decline imply that a large number of people will need to shift occupational categories and learn new skills over the years ahead (Schwab.K, 2018).

To keep up with the change and reskilling Artificial Intelligence brings to the industries, it is vital for UX designers to adapt to these changes by taking action to continual learning, update skills and apply them to the AI field as it is the biggest driver of change.

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APPENDIX C – SEMI STRUCTURED INTERVIEW GUIDE

Discussion Guide for Interviews Round 1

Who to ask: Experts in the field of UX + AI, UX, and AI.

How many: 12-16 Semi-structured Expert Interview type.

Opening

1. **(Establish Rapport)** My name is Neha Tadepalli and I am pursuing my M.F.A in Design Management at SCAD.
 2. **(Purpose)** I would like to ask you some questions about your background, some experiences you have had, and some of your interests in order to learn more about you. After which I would ask you a few questions on the topic of the use of AI and field of UX as my thesis focuses on understanding the potential skill-set changes that could come from the use of AI in the world of UX.
 3. **(Motivation)** The information you provide helps me direct my thesis to a potential solution.
 4. **(Timeline)** The interview should take about 60 - 90 minutes.
-

Introductions – 5-6 minutes

- Introduce (Participant and myself)
- Introduce the Thesis: Problem/ hypothesis and Research question.
- Tell them why you're interviewing people like them.

Keep in mind: Let the participant know what to expect during the interview and give them a chance to ask questions. Most people won't have been interviewed before so take the time to put them at ease, make eye contact and smile.

- **Opening question (Transition to begin questions)**
- As a (Fill their role here _____), what are your responsibilities at the current organization you are working for?
- **User Experience: (20 minutes)**
 - How would you define User Experience maybe with context?
 - What does User Experience Industry consist/comprise of?
 - What are the types of roles in User Experience Industry?
 - *How would you describe/define UX employees in this industry/organization?*
 - What would you say are the current required skill-set needed to be in the field of UX?

- How would you say it has changed over the last 10-15 years? (*question for interviewees in industry space for more than 10 years*).
- Where do you see the future of User experience heading toward?
- **Artificial Intelligence: (20 minutes)**
 - How would you define or describe AI and deep learning?
 - How is it (AI) currently being used at your organization?
 - From your experience of seeing AI evolve, Could you describe to me the journey you have seen with the development of AI? Can you provide a few examples and how it has been implemented at the workplace?
 - How does your organization help employees cope with change? Like for example from the use and implementation of AI in the workplace?
 - What would you say are the types of change on the employees from the implementation of AI in the workplace? And how do organizations consider these implications?
 - Where has AI been implemented at the workplace in UX and how does it work? (advantages and disadvantages).
- **Changes: (10 minutes)**
 - What would you say are the various levels/types of change that come with the usage of AI, currently as well as anticipated, if any?
 - How would you describe the change in UX Industry (example?)

Closing :

- Well, it has been a pleasure speaking with you. Thank you very much for taking out the time to speak with me regarding this. I appreciate your help and involvement.
- Is there anything else you think would be helpful for me to know that would help guide my thesis?

- Would it be alright to email or schedule to call you for another round if I have any further questions? Again, Thank you very much for participating.

Tell the participant that the interview is over, give them a chance to ask any questions or suggestions. Thank them for their time and explain what happens next. Leave Researcher contact details with them in case they have questions later.
