

Create Better, More Profitable Products:

THE VALUE OF UX DESIGN



BOSTON  UX

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Introduction

ARE YOU INVESTING IN UX DESIGN?

Here's why you should



Why should you invest in user experience (UX) design? Simply put: to increase revenue by delivering a better product, one that truly works for users.

According to the Interaction Design Foundation, user experience (UX) design is “the process of creating products that provide meaningful and relevant

experiences to users. This involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function.”

Implemented early, UX design helps you create products that people desire while decreasing the costs and inefficiencies related to product development. Whether you're building a consumer product, a medical device, industrial equipment or anything else, investing in UX design helps you build the right product, the right way.

UI accounts for **47-66%** of a project's total code, as well as **40%** of the development effort.

THE RIGHT PRODUCT

UX design involves intensive user research, information architecture design, wireframing, rapid prototyping and user testing. By going through this process, you'll ensure before you build that you're

developing a product people actually want. No more wasted dollars on products that sit on the shelves.

THE RIGHT WAY

Leading product development with UX design offers many benefits, including:

- **The chance to validate your product** idea with real users at a point when making adjustments is not cost-prohibitive.
- **Decreased development inefficiencies.** The user interface accounts for 47-66% of a project's total code, as well as 40% of the development effort. UX design ensures you wring the most value from your development efforts.
- **Accelerated time to market.** According to Strategic Data Consulting, UX investments made early shrink a product's time to market by as much as 50%.
- **Reduced re-work.** The user interface accounts for 80% of a project's unplanned fixes. By defining

usability requirements up front, a central tenet of UX design, you can vastly limit (even avoid) the need for re-work, according to the Massachusetts Innovation & Technology eXchange.

- **Better budgeting.** Rapid prototyping and wireframing lead to 50% more-accurate estimates for build time and cost, according to a report by Warfel, Todd & Zaki.

THE PAYOFF

Every dollar invested in UX brings \$100 in return. How? UX design, implemented early and well, allows you to stay within budget by avoiding feature creep, trim development costs, minimize re-work and reduce product liability risks by increasing product

safety. Other benefits include increased ease of use, greater customer satisfaction, improved patient outcomes (in the case of medical devices) and greater probability of commercial success.

UX design, carried out diligently, is so powerful that **companies that prioritize UX outperform their peers by 43%**, as noted in the Forrester Research Customer Experience Index Ranking. Bottom line: if you're not already championing UX design in your product development efforts, it makes financial sense to do so.

We've created this eBook to help you discover the power of UX design.

Chapter 1

DO YOU NEED A UX STRATEGY?

Short answer — yes



A user experience (UX) strategy insures that you'll spend your design budget wisely. In the absence of a UX strategy you may find that your UX dollars are wasted.

Here's the backstory. UX design is increasingly recognized as the essential part of any software

project that users will interact with. Still, many companies are sensitive to the cost of UX design. That's understandable. It can feel like an added expense, particularly to those coming from an engineering practice where prioritizing users above adding functionality is not the norm.

But investing in UX design makes sense. Businesses that do so enjoy increased ROI and enhanced productivity, and reduced product development risk. And their users benefit from a more enjoyable, frictionless experience.

In the long run, **UX design can pay for itself many times over** — even in situations when the short-term view is that UX is too much of an expense for a specific project to bear. Of course, this payoff doesn't happen magically. If you're willing to invest in UX design you'll get the most value from your investment by applying a cohesive, well-planned UX strategy.

A UX STRATEGY DRIVES DECISION MAKING

UX strategy is a way to find out if a product's user experience is aligned with business objectives. It's a plan for the success of your UX design, one that ultimately leads to product success. It's a way to ensure you don't waste valuable resources on non-essential or low-priority aspects of a project. It's a

guidebook to get you from zero to delivery with a complete, highly usable product finished within an agreed-upon budget and schedule. It's a proven way to minimize product development risk.

Having a UX strategy means that you:

- Understand the stated business goals of the product or service (hence called "product")
- Understand the problem the product will solve
- Develop metrics for success of the product
- Understand constraints of product design and development, such as budget, schedule, and stakeholder and user involvement
- Clarify who is the user
- Set clear, concise goals for the product's UX
- Prioritize the product's desired features, components and design elements taking into consideration development time

- Choose a path and process for completion that is most effective and efficient, considering all desires, requirements and constraints

Having a UX strategy doesn't mean you are locked into a rigid box. You can change any criteria you want at any time. Rather, a UX strategy is 100% about creating clarity and transparency on a project so that the team can make and agree upon realistic choices.

HOW TO DEVELOP A UX STRATEGY

A UX strategy should be established before design or development of a digital product begins. A well-envisioned strategy starts with research and ends with a written, sometimes illustrated, document. Here are the key steps involved:

Examine Business Goals and Requirements

Meet with stakeholders and gather the business requirements and goals of the product. List the stakeholders' desires and requirements, including qualitative and quantitative aspects. Articulate the problem this product solves for users. Develop

UX strategy is **100%** about creating clarity and transparency on a project

metrics so you can measure the product's success. Clarify the constraints on product design and development, such as budget, schedule, involvement of stakeholders and users, and required hardware and software platforms. This sometimes can take multiple meetings if stakeholders are unclear or not in agreement about what they want.

Understand Users

Meet with or research users of the product to understand their needs and requirements. Validate that this product is desired in the marketplace or by the target users.

Investigate what might draw users to the product or what will turn them away.

Assess Technical and Budget Concerns

Consider hardware and software preferences and limitations and how they impact the design and the process of designing. Consider the budget and schedule limitations and weigh the business goals, design requirements and constraints to figure out the best path forward. Resolve conflicts by negotiation, such as dealing with a small budget with oversized design requirements or challenging technical requirements.

ARTICULATE YOUR DESIGN

Sketch out high-level design requirements in the form of a story, storyboard or journey map to ensure

that all parties understand the high-level design requirements. Getting stakeholders to sign off on this high-level design document may make sense to ensure that they take it seriously. Articulate any particular issues that present risk for timely completion or budget overruns of either design or development and propose ways to mitigate that risk. Less is more in design. Strive for ways to **simplify the design while maximizing the value of the product.**

A cohesive, well-planned UX strategy is your blueprint for success and developing one is beneficial to any project that involves users. A small investment in creating a formal UX strategy, which benefits both your users and your business, delivers a huge payoff.

Chapter 2

ATTRACTIVE USER EXPERIENCES

Deliver unexpected payoffs



People love beautiful things. Earthshaking information, right?

What's significant about beauty is that our appreciation extends beyond our conscious behavior. Over a decade ago, usability expert Don Norman made the argument in his book *Emotional*

Design: Why We Love (or Hate) Everyday Things that “attractive things work better.” What he was really saying, with clever word omissions, is that by human perceptions, attractive things appear to work better.

Is this true?

Probably. Imagine you're examining a new product. You likely believe that if the developers paid great attention to detail on its surface appearance (or on the user interface, or UI) — taking time to create something beautiful — they must have paid as much attention to detail on the inside (the structure or code). The logical conclusion: this a high-quality product.

And, you probably have **high confidence that products that look well made and carefully organized will work properly**. It's human nature to arrive at these conclusions.

Norman's investigations found that people's behavior changes were even influenced beyond just positive assumptions about product quality. When people perceive an application or device as attractive they are more open to exploring and experimenting with the interaction, and more tolerant of any issues that may arise.

In essence, Norman suggested that aesthetics matter in the design of man-made artifacts — not

because people love attractive things, but because aesthetics influence both our perceptions of how well products work and how tolerant we are of their shortcomings.

That's a major reason product development teams should spend more time and attention on achieving an attractive UI and an appealing user experience. Making the user experience positive and engaging via elegant UI design increases exponentially the potential that your app or product (or website or touchscreen kiosk etc.) will be a hit.

BEAUTIFUL UXs MAKE FOR MORE SUCCESSFUL PRODUCTS

Attractive user experiences (UX) make people more open to taking the time to figure out how to use a new product, say a touchscreen app or innovative device they haven't seen before. And the inverse is also true: when an application or device is widely regarded as unattractive, people perceive it as

more broken than it really is, and have less patience to get it to work properly.

This is an important message to developers and designers: making the extra effort to enhance the user experience and polish the UI so the product appears most attractive and easy to use will make your product more successful.

WHAT MAKES AN INTERFACE OR UX ATTRACTIVE?

Though the aesthetics of the user experience is complicated and difficult to explain succinctly, here's a shot: beauty, attractiveness, aesthetics — whatever we call it — is not just about the graphic design, the audio design, the animation design, the information architecture or any one aspect of an interface.

It's about the user experience in a holistic sense: how coherent it is; how well suited it is to the content or activity; how appropriate it is for the user group; how easily it fits into the flow of work or play; and

yes, whether it pleases a person by tweaking their senses in a way that they consider positive.

In other words, it's about good design.

Our visual sense dominates our conscious thinking, which leads us to assume that attractiveness is simply a visual attribute. But it's actually multisensory and multidimensional.

Attractiveness in a user experience starts at user stories and ends at the pixel level. A design is neither a group of discrete, disconnected pieces nor just the skin. A design is more like an organism or a puzzle with many interconnected parts.

That's why **the most successful products and interactive experiences feature cohesive designs that maintain the integrity of all of the individual design elements.** A good design — an attractive design — has nothing superfluous; every element is there to serve a purpose.

SO REMEMBER...

When developing a product, spend the time to create an extraordinary user experience, based on the design that your UX team provides. Design is a gestalt. All parts contribute to the whole and the whole is perceived as more than the sum of its parts.

Chapter 3

UX DESIGN FOR IOT

A new frontier



There's one major reason why designing for embedded devices and the Internet of Things (IoT) is challenging: there are few common design aspects shared across devices. No similar operating system platform or interactive modality, for instance.

User experience (UX) design for embedded devices is a vast frontier because there is a very open landscape with only a few settlements that are quickly evolving.

Unlike designing for desktop computers or the web, anything from a growing family of possible technologies can be thrown at you, the designer. A device might feature physical buttons combined with a touchscreen. Or perhaps it has voice interaction. Even voice paired with touch interaction. Components may or may not exist for a particular platform. Performance is a wildcard as processors can vary greatly.

Most importantly, the context of use can vary greatly.

For example, designing a lifesaving medical device for emergency room use is a drastically different use context than designing an in-store retail kiosk for browsing products. In the case of the medical device, speed of use is crucial; the users are trained professionals; and the device likely needs to be portable, heavy duty, highly dependable and accurate.

For the in-store kiosk, the user can be anyone so attracting shoppers to try it out and remain engaged

is a large part of the design. And in this case, it's not just about screen design. Kiosk placement and size can make or break its popularity thereby affecting its value to a retailer.

While embedded design might be the Wild West, desktop and mobile design are more constrained by platforms and have a mature set of best practices.

The use cases for desktop and mobile are better understood so user research and testing typically focus strictly on the app. Many of the options in any possible desktop or mobile design are prescribed or constrained by the platform and hardware. The interaction modality is preset, usually to one primary modality. The screen sizes and resolutions are a limited set of options. The general performance range is defined. And premade components encourage fast, Lego-like app construction.

These limitations allow the designer to limit focus to the content of a specific app or website,

concentrating on information architecture, flow and navigation (within the constraints of the platform components), layout (also within the constraints of the platform components), fonts (often prescribed by the platform), visual concept and colors, and generous user research and testing of the content itself.

CHALLENGES OF DESIGNING EMBEDDED DEVICES

Embedded devices often have little context-of-use information about the physical device and the location or physical way that a user interacts with it. This means the designer has to think about the whole experience, hardware, software, location, size and content. What this suggests about embedded devices is that there is often some inventing going on — new combinations of technology that create a unique user experience.

And, it suggests that designing for embedded devices is more challenging and more time consuming than for desktop or mobile. Embedded devices

have historically leaned toward subpar user experiences. Today, that's no longer acceptable. The IoT is expected to be highly attractive and usable. How will that occur? Experience and specialization.

Experience over time will help designers establish best practices and processes that work for ubiquitous computing. Also, as the IoT expands, designers will increasingly specialize in particular technologies or market verticals thereby limiting the variety of skills any one design team needs.

On the following page are two charts to help you get a better understanding of the scope of embedded design. The first lists the markets that new systems and devices may fall into, while the second lists the range of design factors that can be present in ubiquitous computing.

By Vertical Markets

Healthcare	Medical Devices, Pharma Devices, Life Science Testing and Monitoring
Transportation	Connected Vehicle, In-Vehicle-Infotainment, Fleet Management, Traffic Control
Government	Defense, Security/Public Safety, Elections
Consumer	Connected Home, Wearables, Service Kiosks, Mobile Devices
Industrial	Agricultural Management, Automated Manufacturing, Production Management & Monitoring, Building Automation, Utilities/Energy Management
Retail	Digital Signage, Vending, Sales Kiosks, Payment Systems

By Design Factors

Use Case	Life-saving, Casual, Work, Entertainment, Home, Body
Size	Infrastructure, Device, Wearable
Modality	Pointer, Keypad, Touch/Gesture, Voice, Presence
Technology	Screen, VR, Augmented, Robotics, Invisible
Platform	iOS, Windows, Android, Linux, etc.

THE TAKEAWAY

Designing for the IoT is exciting because of the great number of unknowns that still exist. That means invention is highly valued in the design process to make ubiquitous computing both attractive and usable.

The challenge is to deliver the high-quality user experiences we've come to expect from our handheld and desktop computing devices, while also innovating with new technologies and novel use cases.

Chapter 4

UX DESIGN BEST PRACTICES

Keep your team on track



Using design best practices ensures your user experience (UX) design and development process is focused and efficient. These four best practices — ensuring visibility of the process, following logical steps, taking ownership of work, and communicating effectively — are a must for any successful UX team.

First, a word on collaboration.

Team collaboration is always a challenge, both within a UX team itself and between UX designers, engineers and stakeholders. To be sure, you need effective working practices to achieve good outcomes. Process methodologies such as Agile,

Lean and Extreme offer a generalized structure for collaborative work to occur, which you can then customize to be more specific to the requirements of a user interface (UI)/UX project. How you do that matters. A lot.

When adapting a process methodology for UX design and development, drawing on traditional design practices such as graphic design and industrial design is incredibly valuable. Tried and true design practices can improve the quality of the final outcome. Maybe even rescue a project from failure.

Here are four practices for effective collaboration that Boston UX has applied to UX design and development projects with great success.

1. ENABLE VISIBILITY OF THE PROCESS, DESIGN AND IMPLEMENTATION

Enable a truly “shared vision” of a project by making everything easily visible to everyone on the team. A robust document-sharing system is a

must. Until they are implemented, designs can only be understood by the multiplicity of documents that represent them, such as user stories, lists of requirements, storyboards, visual concepts, wireframes, finished screen mockups and flow diagrams. So be sure to keep your system up to date.

Expend the effort to make the working implementations accessible even to those who do not have access to code repositories, so that the UX team and stakeholders can try out the product early, and can review each stage of progress. **This may involve developing the code in an order that favors the UI, so that the UX can be evaluated and tweaked early in the process.**

A stakeholder’s greatest fear, next to project failure, is that they will not end up with what they bargained for. They must have a window into the project in order to monitor progress, as do all members of the team. By sharing, modifying and agreeing on documents, they act as informal contracts with stakeholders.

2. FOLLOW A LOGICAL SEQUENCE OF STEPS

Designing has a logic to it, progressing from fuzzy ideas, to general concepts, to requirements and guidelines, and finally to specific details. Violating this logic can get you in trouble.

True, it's not always possible to follow this ideal order, and there can be creative and practical benefits to following a non-logical order. For example, exploring a particular part of a project in detail up front or developing an early prototype can inform the overall design problem.

But, too often a non-logical order occurs due to poor planning or miscommunication. Say, a design is created before the UX strategy is agreed upon or details are nailed down before the overall concept is created. That doesn't make sense as it often means work is thrown out and confusion ensues.

By working in a logical order, you can get sign-off from stakeholders at progressive milestones. The

result is that you can build a design from basics to details that you are sure the stakeholders are satisfied with.

And yes, while it's typically best for design to start before implementation, in many cases design and development start at the same time. It can work if they proceed in parallel with design staying ahead of development by an appropriate time frame.

3. EMPOWER OWNERSHIP IN AREAS OF EXPERTISE

Be clear about who is responsible for the quality and completeness of each piece of work, and empower them to — in fact, insist that they — take responsibility for it. Avoid the “throw-it-over-the-wall” problem: the UX team creates a design spec and throws it over the wall to development. Development implements to spec as best they understand it, then throws it over the wall to QA. By the time the product is released, it's quite different than the original design for no good reason except misinterpretations and lack of

communication. No one “owned” the piece they worked on.

Make sure that the appropriate professionals on your team have final sign-off on the parts of the implementation that they are responsible for. Graphic designers need to sign off on the visual quality; information architects need to sign off on the menu text and messaging; UX designers need to sign off on the usability, etc. By doing this, you'll get the maximum benefit from the expertise of your team members.

4. DEVELOP GOOD COMMUNICATION HABITS

It's difficult to collaborate effectively without communicating so make communicating part of your daily routine. Schedule regular daily or weekly meetings and conduct the meetings even if you think there's nothing to talk about. If everyone reports his or her status, it will almost always prompt better

coordination of work. Inevitably, important issues are revealed and have the opportunity to be resolved early.

Make sure everyone attends and everyone reports. This is especially important if the team is not all working in the same location. Nothing fuels misunderstanding like a lack of communication, which can lead to contentiousness and disharmony among team members.

MAKE THE EXTRA EFFORT

These four practices are simple but powerful. Granted there is extra effort in having regular meetings, keeping up-to-date document sharing, making working implementations accessible, and getting appropriate sign-offs. But in the end, you will find that they reduce risk of failures, enhance quality levels of outcomes, and are actually time and money savers.

Chapter 5

UX DESIGNERS CAN SAVE YOUR PRODUCT

Identify usability problems before you hit the market



The software industry is moving at a faster pace every day and the bar for quality has never been higher. Back in 1989 a guy working in his garage could create a best-selling game. Today, that would take as many people working together as to create the average summer blockbuster movie. Why?

Because expectations are so much higher.

Today's savvy consumer will quickly become dissatisfied with poor usability and move onto a competitor's product. So, you need to develop rapidly while maintaining the superior level of quality your customers expect.

HOW DO YOU ACHIEVE THIS? WITH CLEVER, WELL-PLANNED UX DESIGN AND CAREFUL ANALYSIS

One of the many skills that UX designers bring to the table is the ability to perform a heuristic analysis — an inspection to identify usability problems in the user interface (UI) design on an existing piece of software. Conducting this type of analysis, and addressing the resulting recommendations, can essentially save an underperforming project.

ABOUT HEURISTIC ANALYSIS

The practice is very straight forward: review the system against an established set of heuristics and see how it rates. The result is a report detailing issues the designer found and recommendations on how the developers can fix the proverbial low-hanging fruit. Doing so can mean the difference between a smooth launch and happy customers, or many calls to your tech support team.

There are several sets of industry standard heuristics that exist for evaluating software systems, the most common ones coming from Ben Schneiderman and Jakob Nielsen. An effective UX designer knows these inside and out and can quickly apply them to a system that is already in production.

Even simple design mistakes, for instance the ordering of common controls being different between screens, or the misuse of red and green, can have far-reaching, negative consequences once the system gets out in the field. A thorough heuristic analysis can identify these issues early so you can address them prior to release.

While your developers make your application work, with an assist from QA engineers, it takes a proficient and eagle-eyed UX designer to ensure things work well for the user. To ensure your application is free of significant bloopers that can be fixed quickly prior to release, apply the principles of heuristics.

ABOUT BOSTON UX

At Boston UX, we design compelling touchscreen interfaces for high-impact embedded and connected medical, industrial and consumer devices.

Specialists in intuitive interface design for touch- and voice-powered smart devices, our designers have deep knowledge of the engineering and business complexities that impact product development. This allows Boston UX (www.BostonUX.com) to design products that don't just work, but deliver a powerful user experience.

Companies like MilliporeSigma, Intel, Boston Engineering, ZOLL Medical Corporation and Casenet have felt this power firsthand.

Boston UX is part of the Integrated Computer Solutions (ICS) family. Founded in 1987, ICS is a product-driven software company that provides development, project management and related consulting services. Learn more at www.ics.com.

GET IN TOUCH

If you'd like to learn more about Boston UX or want to schedule a meeting to speak with a representative, give us a ring or drop us a note. We'd love to hear from you!



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Jeff heads the Boston UX creative team. With an engineering degree from Worcester Polytechnic Institute (where he's also an adjunct professor), he's an expert at bridging the gap between design and development. What makes his day? Applying human factors principles to UX design. Oh, and 3D-printing a wearable Iron Man suit.

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