

# Innovation Through Design Thinking, User Experience and Agile: Towards Cooperation Framework

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**Резюме.** Настоящата статия разглежда предимствата и недостатъците на методологиите Дизайнерско мислене (Design Thinking), Дизайн на потребителския опит (User Experience design) и Гъвките методологии (Agile methodologies). В нея се дискутира съвместното приложение на тези методологии в практиката като важна предпоставка за тяхната по-голяма креативност, иновации и ползи. Авторите са наясно, че има издадени малко книги и статии, които дават яснота как да се приложи методологията на дизайнерското мислене и потребителския опит в гъвкавия процес (Agile), как да се направи иновация и как те могат да се приложат на практика в проектите. Структурата на изложението е следната: кратко въведение в тези модели; предложения как най-добре да се приложат съвместно принципите на дизайнерското мислене и практиките на гъвките методологии; практически пример с рамката на дизайнерско мислене, предложен от IBM.

Основните предимства на анализираните методологии са, че те не са ограничени само до приложение в софтуерната разработка, а могат да бъдат използвани на практика от всеки тип бизнес и на всяко организационно равнище, за да привлекат повече задоволени клиенти и да ги накарат да останат за дълго.

**Ключови думи:** *Дизайнерско мислене, Дизайн на потребителския опит, Гъвкави методологии, Иновации*

**Abstract.** In the present paper are discussed the advantages and disadvantages of the methodologies of Design Thinking, User Experience design and Agile and it is argued that their collaboration into practice is important as it leads to higher creativity, innovation and profitability. The authors are aware that there are quite a few books and articles written on how to perform Design Thinking, incorporate User Experience into the Agile process, innovate and apply them together into practice of projects. After a short introduction into the models, it is revealed how best to collaboratively implement Design Thinking principles and Agile practices by giving example with the IBM Design Thinking framework.

The main advantages of the analyzed methodologies are that they have not been limited only to software development itself, they can be used by every type of business and can be implemented collaboratively at every possible level at the organization in order to generate more happy customers and manage to turn such happy customer into repeat customers.

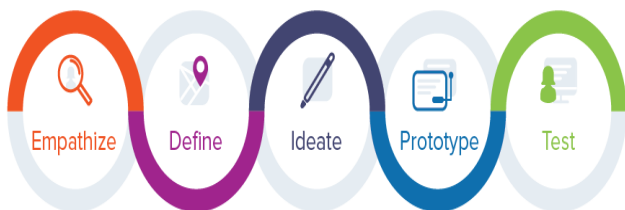
**Keywords:** Design Thinking, User Experience Design, Agile, Innovation

## 1. INTRODUCTION

Design Thinking (DT) is a people-centered model that encourages creativity and innovation to create a product or service that solves a complex problem for the target customer or user. It can help innovate a new product, design a simple solution to a complex problem, or to get the whole team involved in generating design ideas [1].

DT is a more strategic, problem-solving, big-idea process instead, while User Experience (UX) is based on a more tactical work on a digital experience. UX is grounded also in doing empathic research to help define the problems to solve, find ways to innovate, and is used to continue designing, testing, iterating, and building a product or service. The two methodologies are almost the same, although the collaboration aspect of DT is not always done in the UX process in practice. However, collaboration is a very important ingredient on an Agile software project and an effective way to conduct design. Therefore, DT fits well into the Agile model of doing digital design.

There are quite a few books and articles written on how to perform DT and its phases (see Figure 1), how to incorporate UX into the Agile process, how to innovate and how to apply them into practice in a project [1].



**Figure 1. Phases in the Design Thinking Process [1]**

Agile software development leads to improved software delivery process by using short and fast iterations. By simplifying the software engineering practices Agile methodology could guarantee a higher success rate than traditional waterfall model [10]. The Agile Manifesto requires collaboration with customers, but its approach does not guarantee that the software development team will work towards solving the correct problem [11]. Agile methods including Scrum have already tried to follow this approach by incorporating user feedback as part of the requirement process.

In the Agile software development it is important to understand the end user needs, to incorporate the user feedback into the software development process. The user stories should represent the need of the user not only the view of the software development team.

Moreover, IBM DT extends the original DT method providing a new approach to write requirements, organize teams and track project progress including end-user feedback during all the project development phases [12].

The contributions of this paper are as follows: (i) to point out the advantages and disadvantages of the DT, UX design and Agile single methodology and the need for their collaborative integration. (ii) To present shortly the best practices of IBM DT and Autodesk use case as well as to draw a conclusion.

After the short introduction, the structure of the paper is as follows: Section 2 gives a short background on DT and Agile methodologies. Section 3 discusses the possible coupling of DT and Agile, presenting the strength of Agile and the single phases of the DT. Section 4 outlines the best practices and ideas for employing DT on an Agile project, in particular the IBM DT framework and Autodesk use case. Section 5 draws conclusions about how best to implement DT principles and Agile practices as well as what exactly makes UX-focused companies successful.

## 2. BACKGROUND ON DESIGN THINKING AND AGILE METHODOLOGY

Design Thinking is a methodology for innovation that combines creative and analytical approaches and requires collaboration across disciplines.

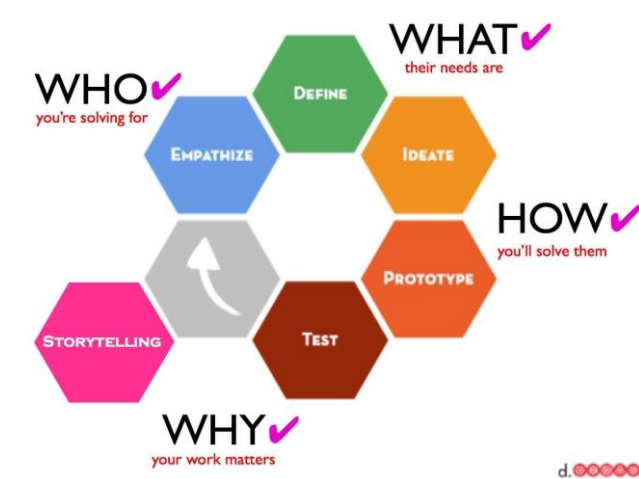
The focus is on creating spectacularly transformative learning experiences and along the way, students develop a process for producing creative solutions to even the most complex challenges they tackle [14].

Empathise, define, ideate, prototype, test

There are five key phases and principles to successful DT [2], as follows:

- Empathize with your audience, customers or target market
- Define their needs, any problem they might have and your understandings
- By challenging assumption one is able to ideate or create ideas for innovative solutions
- Look at a prototype and start creating solutions
- Finally, it is imperative to test these solutions

The principles of DT appear intuitive. What distinguishes this approach from human-centric innovation is how each of the steps has been conceptualised [14].



**Figure 2. The principles of Design Thinking [14]**

*Empathize:* Design Thinking is grounded on a deep understanding of the people you are trying to serve. It requires careful observation of people within their contexts to uncover disconnects between what people say and what they do which is where great insights can often be found. Design thinkers also engage with people in deep and meaningful ways through loosely structured conversations. And of course, they listen and watch.

In many cases, the best solutions are the ones that address the needs of the ‘extreme user.’ During a recent visit to the d.school by participants of the 2016 FIPP/VDZ Innovators’ Tour, Astrid Maier, a journalist and Knight Fellow, described the example of carry-on luggage which was initially designed to meet the unique needs of airline pilots but which today is used by virtually every traveler.

*Define:* After developing a deep understanding of the user, the next step is to define the challenge you are taking on based on what you have learned about your user and about the context. This involves creating a meaningful and actionable problem statement that guides the rest of the process. The problem statement should address who the user is, what specific needs they have and what insights the team had during the empathize stage.

*Ideate:* This is the phase where the magic happens in Design Thinking because the team comes together to generate the broadest range of ideas they can in a judgement-free environment. Successful ideators build on each other’s ideas while setting some parameters to ground the discussion. Situating an ideation session in a creative space that includes inspiring materials can help the process.

At the d.school, multi-colored post-it notes are often a key enabler of this process as they help the team visualize an idea. Other brainstorming techniques include bodystorming, which helps designers discover new and unexpected ideas by physically experiencing a situation; mindmapping; and sketching.

*Prototype:* Once the team has identified one or more solutions to the problem statement, it is time to develop prototypes. This is an iterative exercise where ‘artifacts’ are created and tested in attempt to get closer to a final solution. The key to prototyping is creating something fast and cheaply that users can interact with. It is also critical to identify what’s being tested with each prototype and what design question is being addressed.

The prototyping area at the d.school is stocked with very simple materials – stacks of Post-it note pads, paper clips, staplers, cardstock and only a few power tools.

*Test:* The only reason to create prototypes is to have the opportunity to get feedback that allows you to understand your user better. Testing will yield the best insights if users are able to experience the prototype in a real way with very little upfront explanation. The job for the designer is to observe how the prototype is used or misused, how the user interacts with it and what they say about it.

Outside of the d.school, media organisations have a number of tools at their disposal for rapid prototyping and testing – including A/B testing of content and ad formats, putting video on Youtube, social media posts and ads and many more. This allows for testing a wide range of new ideas fast and eliminating those that don’t deliver results.

#### *Iterate*

The unspoken but implicit next step or intra-step in DT is iteration. This may involve repeating the entire process a number of times before arriving at a solution to the problem statement that the team loves as well as creating and testing multiple prototypes.

The principles of DT provide a rich opportunity for media companies to embed innovation deeply into their cultures. By focusing more on creating innovators rather than innovations, Design Thinking encourages organisations to place their bets on the collective creativity of their people as they navigate the twin challenges of uncertainty and opportunity [14].

These phases are not necessarily sequential instead, they should be used organically without any worry about a specific order in which they should occur, with the solution being the end-goal rather than the way it was achieved.

DT is the most effective way to understand the customer's needs and it involves finding out what and how they do and then thinking out of the box or coming up with crazy ideas that might just be the solution to a unique offering that customers will love.

While DT provides the solution, the next aspect is how to deliver those solutions to the marketplace.

Agile works by focusing on smaller bits of the larger project at a time, delivering value quickly and adapting or changing based on real-time feedback.

Scrum is a derivative of the Agile that follows the same iterative process and is used by Fortune 500 companies world wide. It is an effective, smart and perfect example of how maximum input equals maximum output. The following is a quick overview of how Scrum works:

- Sprint: this is simply a team planning meeting to determine what needs to be done in the coming sprint.
- Daily stand-up: or a daily scrum, is a 15 minute get together or mini-meeting for everyone to touch base.
- Sprint demo: this is a sharing meeting where the team shows what they've achieved in that sprint.
- Sprint retrospective: this is a review of what worked and what didn't, what went well and what needs improvement and actions for the next sprint to be better.

While DT helps us understand what work to do, Scrum gives us the autonomy to decide how to do it. The main similarity is that both DT and Scrum are iterative and the mentality and approach required to successfully undertake both are quite similar. They both require adopters to develop sufficient insight in order to recognize early successes and failures through constant evaluation and adaptation.

The DT team need not view their work as completely independent of the project team or vice versa. DT encourages the cross-functional team to work together and that team could include developers, user experience designers and testers [2].

Like DT, Agile emphasizes collaboration, but it has its own language and methodologies. The Agile manifesto outlines some key principles and then teams typically use methodologies like Scrum, Sprints, Retrospectives to execute.

Agile's iterative approach lets project teams react to changes and challenges better and deliver a finished product in a shorter time frame. However, developing the product faster is good only if it is the right destination to begin with. Organisations are coupling DT and Agile processes aiming at identifying the right solution and then focusing on building a better product. Understanding the problem paves the way for executing more creative and useful solutions through Agile processes, i.e. delivering the true customer satisfaction on which Agile is built [3].

Integrating DT and Agile approaches helps organizations find and build the right customer-focused solution.

Agile uses the DT approach in identification of problems and challenges, and in generation of ideas and innovative solutions. The process includes series of steps and tools that proposes an analysis and discussion of the current situation from a holistic point of view. Once the real problem is identified, the focus turns to the solution, guided by the end user's needs by stimulating "outside of the box" perspectives.

All this is possible through participation of teams who collaborate within an environment that encourages creativity. Agile is qualified to help a company using DT to obtain solutions that apply new models and meet business challenges.

This methodology searches different ways for the innovative solution to the problem, prioritizing collaborative work in multidisciplinary teams [6].

Summing up the benefits of Agile are as follows:

- Faster and cheaper process to generate innovation;
- Focus on customer perception, their needs, desires and behavior;
- Process based on implicit knowledge and experiences with prototypes;
- Innovation as a result of the use of methodologies plus teamwork;
- "Outside the box" perspectives

### **3. COLLABORATION BETWEEN DESIGN THINKING, USER EXPERIENCE AND AGILE**

DT is a strategy for product design that avoids the mistakes of extrapolating future customer requirements based on past data or defining a strategy based on instinct instead of the actual needs. So that, in DT we shift the focus to human behavior.

While DT provides a robust, creative and innovative process it does not necessarily address actual product development limitations and requirements from an organizational perspective.

Thus, theoretically we can iterate through the 5 steps with little involvement from the engineering, product

development and operational units. We might segregate and silo the design – 5 step process and end with a lengthy requirement document that feeds to a linear approach such as waterfall for the actual development. Otherwise, we can view the DT process as a sequential process in itself and superimpose it on the existing development methodology, encumbering the creative innovative process with a procedural methodology. We end up with product iterations that are 9 months long which are detrimental to fast feedback loops.

Agile development is a term which refers to several iterative and incremental development processes that speed up the delivery of the business value. Through a process of continuous planning and feedback it ensures that value is maximized throughout the development process. The most popular include Extreme Programming (XP), Scrum, Scaled Agile, Dynamic Systems Development Method (DSDM), Lean Development, and Feature-Driven Development (FDD). Agile methods are those that follow the Agile Manifesto and Agile principles [15].

While Agile provides a paradigm shift in how products are delivered, it does not necessarily address the challenge of what to deliver. The product backlog, which is a common artifact in many Agile processes, is populated by an invisible process outside the product organization. Practically many Agile transformations do not address new product and strategy initiation at all. It is not uncommon that users use less than 20-30% of the product features. This results in 70-80% of the development effort being a waste.

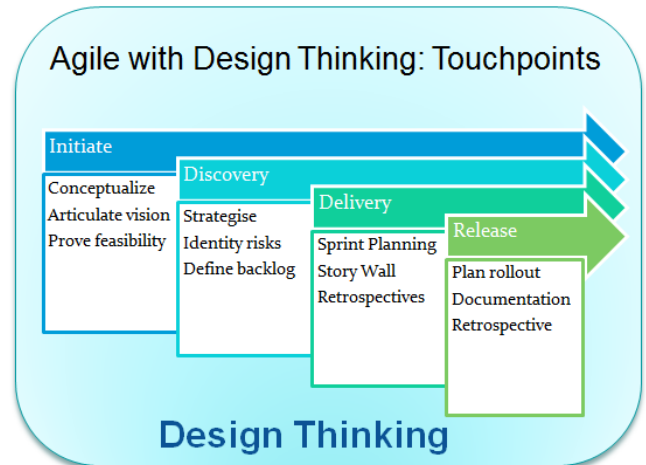
Agile and DT are complementary. DT is particularly well-suited to situations where the problem itself is not clear, focusing strongly on problem definition, problem shaping, and requirements clarification. Likewise, Agile methods embrace uncertainty and are appropriate for projects where the requirements are subject to change [7].

While DT is a solution-centric approach, it also places great emphasis on having a clear understanding of the problem. For Agile projects, the backlog is where the functional requirements of the system under development are captured, and the quality of those requirements is a significant factor determining the success of the project [7].

A pairing of DT with an Agile mindset and method can occur across the lifecycle of a project, from Initiate to Release phase (see Figure 3). Examples of how to elevate the Agile with DT [7] are as follows:

- Ideation to develop the Agile backlog

- Empathy puts the ‘human’ at the centre of the Agile backlog
- Creativity and innovation reinvigorate Agile teams



**Figure 3. Agile with Design Thinking: Touchpoints**

DT is an exploratory approach which relies on identifying end-user needs and discovering solutions to meet those needs. UX designers are generally better appointed when it comes to think from the end-user’s point of view. Their job is to help in the development of solutions which are easy to use. That is why being Agile goes beyond the use of tools and the designers need to understand their importance in the team and should be actively involved in providing design suggestions for the improvement of the software at all stages.

Sometimes a small change in the interaction design can reduce a lot of problems faced by the developers. However such changes in mobile app design for instance are usually accompanied by an increase in the development work. Agile will need such changes being an iterative process where all those changes that help in achieving a business goal are always welcome. That is why Agile is so effective in delivering quick value so that, it allows you to adapt quickly based on feedback and learning. This also means that the work of a UX designer is never over in an Agile project.

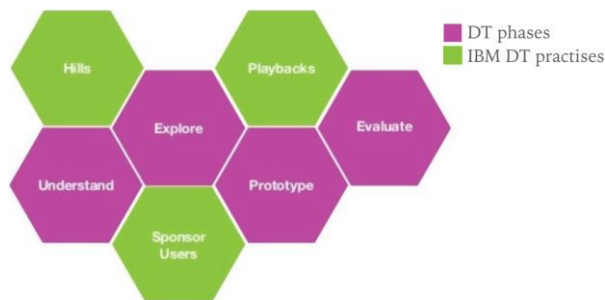
#### **4. BEST PRACTICES AND IDEAS FOR EMPLOYING DESIGN THINKING ON AN AGILE PROJECT**

##### **4.1 IBM Design Thinking Framework**

IBM DT approach is a framework for teaming and action and it helps the teams to deliver outcomes. So that, it is a set of recommended practices that helps one moves beyond feature-centric delivery.

In order to implement the Software Development Framework (SDF) successfully it is necessary to create multidisciplinary teams composed by designers, engineers, product managers and users who work together to drive a vision of the software development [9].

Some limitations of the IBM DT process are related to the project team structure. The process itself could not be applied successfully if the company does not change its approach to solving problems. Implementing IBM DT requires teams to reorganize as well as review their work model and functional roles.



**Figure 4. IBM Design Thinking Compared to Traditional Design Thinking [9]**

IBM Design Thinking SDF goal is to extend DT principles so they can be applied to develop software that captures user needs at the speed and scale required for fast pace incremental software development such as Cloud based software. While it shares some similarities with other DT methods, it has a few modifications, including three practices that are unique to the framework: sponsor users, playbacks and hills [12]. The integration of those practices to DT are shown in Figure 4.

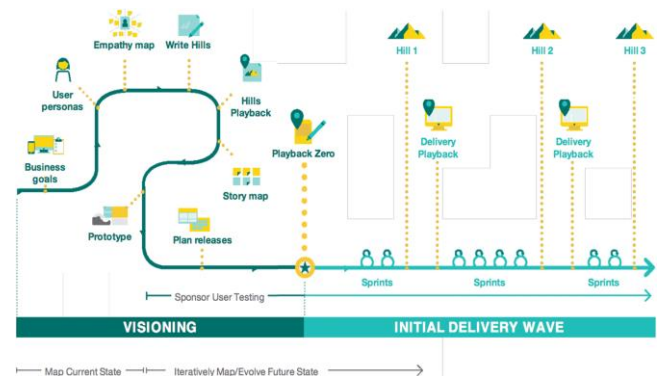
The IBM DT defines three major roles with different set of responsibilities.

- The Product Manager is responsible for understanding the market opportunity and defining the product release. He is responsible for the project kick-off, defining and recruiting sponsor users, and defining the playback strategy.
- The Designer is responsible for the UX and functional design. He is engaged in developing design artifacts, mock ups, user research and design sprint plan.
- The engineering team is responsible for the technical design and implementation of the release. They are in control of project architecture and executable code, prototype and the technical sprint plan.

IBM Design Thinking SDF activities are divided into two main phases. The Visioning phase is responsible to develop software requirements through the use of several DT practices that combines user personas, empathy maps, hills and story maps. The other phase, the Delivery Wave consists of software development Sprints conducted by multidisciplinary teams that includes Sponsors Users, who contribute with constant feedback about the delivered artifacts. Figure 5 illustrates the workflow of a sample IBM DT project [9].

Summing up, the IBM DT principles are as follows [13]:

- Diverse empowered teams
- A focus on user outcomes
- Restless reinvention
- See problems and solutions from a new point of view



**Figure 5. IBM Design Thinking Software Development Framework [9]**

The Loop consists in:

*Understand users' needs and deliver outcomes continuously*

At the heart of IBM DT is a behavioral model for understanding users' needs and envisioning a better future: a continuous loop of observing, reflecting and making [13].

IBM DT incrementally delivers great UX, while Agile incrementally delivers great enabling software. What links them most closely is the continuous cycle of experience maps and playbacks.

DT facilitators initiate and lead DT activities on their team to reach great outcomes for their users. With time and practice anyone can become an effective and credible facilitator. IBM DT is designed as a framework and the team could use bits and pieces of it as it makes sense. As a DT facilitator one should

ensure that conversations and activities are centered on the user.

Each activity helps to understand the user's problems and motivations, explore new concepts, prototype designs and evaluate with stakeholders. These activities serve as tools for establishing the IBM DT framework [13], which are as follows:

#### *Stakeholder Map*

If you're integrating new team members, starting a new project, exploring a new market, or expanding an offering, this activity helps you identify project stakeholders, their expectations, and relationships.

*Empathy Map* - It helps to rapidly put the team in the user's shoes and aligns whether at the beginning of a project or mid-stream when one needs to re-focus on the user.

*Scenario Map (As-is/ To-be)* - As-is Scenario Maps help documented collective understanding of user workflows and are best used as precursors to exploring new ideas. To-be Scenario Maps tell the story of a better experience for the user.

*Big Idea Vignettes* - Once the team has a clear and validated understanding of the user's problems and challenges, this activity is a good way for many people to rapidly brainstorm possible ideas.

*Prioritization Grid* - When many items (such as ideas, Hills, scenarios, or user stories) are being considered, this activity helps the team to evaluate and prioritize them by focusing discussions on importance and feasibility.

#### *Needs Statements*

This is a very effective activity to use with the team when one feels that he is shifting from the actual needs, desires and goals of the user. It helps focusing the work around the user.

*Storyboarding* - is a way to iterate and communicate ideas and scenarios visually by telling user-centric stories.

*Assumptions and Questions* - Any time you feel that your team's work needs a "reality check," use this activity to identify and prioritize what assumptions are being made, what you've been guessing about, and what your team still doesn't know.

*Feedback Grid* - This activity helps to gather and organize any sort of feedback and to unpack questions and ideas either in real time or after-the-fact as an efficient means of determining next steps.

*Experience-based Roadmap* - This activity helps you define a "minimum delightful experience" by scoping big, visionary ideas into more achievable near-term outcomes while still focusing on the user experience.

## **4.2 Discovery-driven enterprise user-experience design: case of Autodesk**

At Autodesk the company's design teams are as global as its customer base. The \$2.5 billion-dollar software giant is powered by 7700 employees across all 7 continents [14].

In the Tel Aviv office, Uri Ashano serves as the senior UX manager for AutoCAD 360, the mobile application of the company's flagship product. The AutoCAD® mobile app is a drawing and drafting tool that lets you view, create, edit, and share AutoCAD drawings on mobile devices—anytime, anywhere.

Uri Ashano and his team of five (two UX designers, two visual designers and one researcher) collaborate closely with the San Francisco HQ to practice user-centered design within an Agile process.

As Uri explains, the company sees itself as a knowledge house, not just a software provider. All designers train and work with the Luma Innovation Institute, which teaches 36 different methods for user-centered design. The design process Uri and team follow each time they get new feature requests, illuminates the power of collaborative design, especially in the discovery stage.

The Tel Aviv team's process begins when they get a request from the larger AutoCAD 360 team for a new feature. In response, the team first opens a new project in Slack to start investigating the problem the feature aims to solve. This initial research consists of interviewing local architect firms, reviewing customer support tickets for ideas, and reviewing online data in MixPanel. The team also consults data from the greater Autodesk's research, mostly around multiplatform use of AutoCAD and the flows related to these products.

The request usually presents itself as a user scenario such as: "An architect needs AutoCAD drawing at his job site. He's bringing along an iPad (or other tablet) and wants to view his drawings, modify and annotate. Afterwards, he wants to share the updates with colleagues."

In summary, Autodesk's Tel Aviv team shows that enterprise design does not need to be bogged down by poor communication and mountains of documentation. Here are the big takeaways:

- Validate feature requests with early qualitative research (reviewing support tickets and user interviews) and quantitative research in analytics tools and surveys.

- Dedicate time up front for discovery and ideation with half- to full-day workshops aimed at defining the rough feature set.
- Treat documentation as a knowledge portal rather than a paper trail by linking out to further details.
- Prioritize prototyping for the most difficult interaction models [14].

## 5. CONCLUSION

DT and Agile both offer great advantages for innovation, creativity and profitability, and they are not limited only to software development itself, but they can be used by every type of business. More importantly, the benefits associated with each one can be significantly increased by combining them to create a process that works seamlessly.

It is important to point out that both DT and Scrum emphasize people over processes, and so in order to succeed, organizations need to ensure that the right people are appointed on each project and that there is a cultural compatibility between the teams and the way DT and Scrum work. By focusing on the principles, the organization can maintain a stable environment in which the culture can prosper. Once the principles are in place it is easier to see the result in practice.

As previously noted, DT requires that we follow a series of steps which might not be sequential. First the team has to go through the process of understanding and well defining the need and then is to ideate and test, where the DT and Scrum can well come together. By combining both, the team could recognize a couple of advantages, as follows:

- The Scrum development teams form part of the design process from the beginning, which enables them to understand in-depth the customer's needs and requirements. This way a connection is built between the two processes, which can improve the product.
- Combining both processes help to eliminate duplication and create products or services which meet the actual user needs.
- The iterative and user oriented software development process connects with the creative, iterative and user oriented DT process and this way is created a collaborative environment at the organization.
- Through the application of a combination of DT and Agile approaches, organizations can reduce risks from the development effort and obtain better return on investment.

A study by the Design Management Institute shows that UX design-driven companies outperformed the S&P 500 by 228% over the last ten years. Regardless of industry, businesses that significantly invested in UX design were able to demonstrate good advantage by focusing on the user experience from the very first step in the product development, by creating a UX design culture. These companies are Apple, Coca-Cola, Ford, IBM, Intuit, Procter & Gamble, Starbucks, Walt Disney and Nike [16].

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