

IDEO and Design Thinking as an Agile Innovation Practice

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Abstract

Agile principles have mostly been aligned with software construction and delivery. While there are examples of organizations applying agile principles and methodologies, like SCRUM, to non-software applications, most of these organizations self-identify themselves as agile, or, specifically indicate what framework, like SCRUM, they apply to their process.

IDEO is a firm that never identifies itself as agile; however, the authors position is that they are agile in their methods, applications, and approach for their process – known as Design Thinking.

This paper provides a background on the core principles of Agile, how IDEO aligns with agile principles, and a brief review of several customers of IDEO: Apple, Microsoft, BBVA Group, and Helix.

1 INTRODUCTION

The focus of this paper is on IDEO's design process, and, while IDEO never specifically identify themselves as Agile, they do follow many agile practices and principles. IDEO has been successful in product innovation and development producing product designs for over 53 companies[9]. Many IDEO customers are well-known brands, such as 3M, Coca-Cola, GE, Microsoft, Apple, Toyota, among others.

This paper provides a background on the core principles of Agile, how IDEO correlates to agile principles, and a brief review of several customers of IDEO: Apple, Microsoft, and Helix.

2 IDEO INTRODUCTION

IDEO is a design firm – and an innovation consultancy – located primarily in Palo Alto, California. Formed initially in 1991 from existing design firms – one run by David Kelley, and the other was **ID Two** (designer of the first laptop)[21]. Office furniture maker Steelcase had a majority interest, of which they started divesting in 2007[23].

Much of how IDEO is run caters to the core principles of agility within an enterprise. They have a flat hierarchy, instill individual autonomy, and provide team orientation through what they call “studios” [23]. While they have studio heads, they act as servant leaders[18] to their project teams within their studios. It is the teams that drive success with designs they do on behalf of their clients.

Teams are made up of multi-disciplined members, with cross functional responsibilities. While the team does elect a project lead, and that is a coveted position within the organization, that role provides a proxy to the product owner for near term decisions and

feedback. That project lead role is generally someone closely aligned with the customer; consequently, the lead may ultimately decide what the product is to become[23].

The studios themselves are mostly self-managed, with strong emphasis on distributed management, and minimal core central enterprise management structure. Studio leads, however, do convene on a regular basis for corporate planning, and other functions, but it is ultimately the studios that drive business and ultimately their destiny[23].

A core aspect of IDEO's design philosophy is gaining empathy of the end user of the product or service that “customer” may desire or require. They do not rely solely on their client's perspective – whom are generally leaders within these large organizations – potentially out-of-touch with their real customers and lack customer empathy.

There are examples where executives from Procter & Gamble, AT&T, Kraft, and others, are forced to endure their real customer's experiences with their products in order to enforce true empathy and understanding of the challenges or problems that their end-users are subject to with their goods and services[21].

Part of their engagement with their clients, is ultimately teaching them to be self-sufficient in driving innovation within their own companies. A major component of their process is conveying the core aspects of what they term Design Thinking[8,22]. David Kelley's book, *Change by Design*, he articulates the need to combine empathy, gain context, allow for creativity and learning through trial and error, and rationalize approaches that fit the problem within the context[8,22].

3 AGILE PRINCIPLES AND GOALS

A significant portion of research in application of agile principles and goals is within the context of Software development. While the Agile software development community is based upon iterative and incremental approaches, the concepts around Agility aren't necessarily tightly coupled to software development.

Agile, simply stated using the Oxford Dictionary is[17]:

Adjective

able to move quickly and easily:

Ruth was as agile as a monkey

able to think and understand quickly:

His vague manner concealed an agile mind

3.1 GOALS OF AGILE PRACTICES[6]

The following goals are provided by the Dynamic Systems Development Method (DSDM) consortium.

3.1.1 Timely delivery

Delivery of the product on time is an important phase in a project. It determines the progress of the project.

3.1.2 Collaborate

Teams which work in right spirit will have better outcome than the individual brilliance.

3.1.3 Quality

The quality of the product delivered during each sprint should be of high quality and it should never be compromised.

3.1.4 Develop iteratively

Agile projects are built iteratively which converges to meet the accurate business solution and invoke confidence in the customer.

3.1.5 Communication

Agile primary focus is to bring about effective communication between team and customers. Quite often poor communication results in delay of the projects.

3.1.6 Control on project

The team needs to be proactive in monitoring the progress of the project making sure that the project progress is in alignment with the plans.

3.2 AGILE MANIFESTO

The Agile Manifesto provides for 12 principles that should be followed[3]. For the purposes of this paper, we generalized these principles, in order to remove the "software development" only applications.

Traditionally agile principles, and methodologies have been applied in software development as noted by principles 1, 3, and 7 from the below table. However, the use of these principles are being successfully applied in other industries and practices, and individually.

Throughout our literature search we found several areas where the agile methodology has been adopted including education, supply chain, manufacturing, sales, healthcare, industrial design, and product development.

We will use the generalized agility attributes below, which the authors have created, in conjunction with the IDEO case studies, their design principles, and contrast it, in order to identify if they are indeed agile.

#	Agile Manifesto[3]	Generalized Agility (authors)
1	Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.	Customer satisfaction and continuous delivery of results
2	Welcome changing requirements, even late in development. Agile	Expect and accept change when it occurs for the customer's need

#	Agile Manifesto[3]	Generalized Agility (authors)
	processes harness change for the customer's competitive advantage.	
3	Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	Delivery frequently, with preference for shorter iterations
4	Business people and developers must work together daily throughout the project.	Collaborate – the delivery and business people work together daily
5	Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	Provided for an unencumbered team of motivated people
6	The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	Communication is direct with team, customers, and stakeholders
7	Working software is the primary measure of progress.	Delivered value through product is the measure of progress
8	Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.	Work at a sustainable pace
9	Continuous attention to technical excellence and good design enhances agility.	Attention to excellence and quality is paramount; good design enhances agility
10	Simplicity--the art of maximizing the amount of work not done--is essential.	Simplicity is essential
11	The best architectures, requirements, and designs emerge from self-organizing teams.	Design, and requirements, come from self-organizing teams
12	At regular intervals, the team reflects on how to become more effective,	Teams adjust at regular intervals based upon feedback from within and

#	Agile Manifesto[3]	Generalized Agility (authors)
	then tunes and adjusts its behavior accordingly.	outside the team

3.3 AGILE INDIVIDUALS

The concept of being Agile can apply to both organizations and individuals. In J.D. Meir’s book, Getting Results the Agile Way[15], he provides a system and approach for application of Agile practices for everyday life. Some of the principles J.D. Meir indicates as key to personal agility are[15]:

- Respond to change
- Incremental delivery / value over time
- Continuous Learning
- Less is more (lean)
- Utilize feedback
- Fix time box – flexible scope
- Cadence and rhythm
- Incremental improvements – delivered value over time

3.4 AGILE PROJECT MANAGEMENT

In addition to individuals, and software development, agile principles can also be applied to generalized project management. Alistair Cockburn published his “Declaration of interdependencies” for modern (agile/adaptive) product and project management in 2005[25]. That declaration states:

- Increase return on investment by — making continuous flow of value our focus.
- Deliver reliable results by — engaging customers in frequent interactions and shared ownership.
- Expect uncertainty and manage for it through — iterations, anticipation and adaptation.
- Unleash creativity and innovation by — recognizing that individuals are the ultimate

source of value, and creating an environment where they can make a difference.

- Boost performance through — group accountability for results and shared responsibility for team effectiveness.
- Improve effectiveness and reliability through — situationally specific strategies, processes and practices.

In addition to this declaration, there are the 12-steps (or recommendations) for DOI[25]:

1. Focus on the value that is being created and watch the flow of increase in value.
2. Make the unit of value in the flow small, in some ideal world a single unit, what the manufacturing people call continuous flow.
3. Engage the customers in frequent interaction.
4. Strive to get shared ownership.
5. Recognize that individuals are the ultimate source of value.
6. Create an environment where they can make a difference.
7. Build / design / work incrementally (our industry now calls these time periods iterations and I can't do anything about that)
8. Anticipate what you can, meaning use the information you have, silly!
9. Use feedback close-in and across levels, reflect after each iteration, and adapt to what you discover.
10. Use situationally specific strategies (or whatever [sp] you call them) and follow-up actions.
11. Give the group single accountability for results (meaning that there is no value in passing blame; everyone is in it together).
12. Help everyone to feel shared responsibility for team effectiveness

3.5 AGILE SOFTWARE DEVELOPMENT BACKGROUND[4]

Development of software projects was transformed with the adoption of agile methodologies. Agile methodologies are based on iterative and incremental development of the project which adds value based solutions to the clients in contrast to traditional waterfall model where project is been implemented in a serial development life cycle with fixed start and end dates and a short term goal. It brings about continuous improvement and involves customers. Non-software projects share many similarities related to the software projects like multiyear development with changing requirements. Software projects were benefitted by the adoption of agile methods hence its process can be applied to non-software projects.

Traditionally non-software projects rely on increasing team sizes and increment development life cycle in order to meet the growing requirements. Larger the team more communications and interactions are needed and with serial development of the project rework of the earlier cycle, costs and deadlines are often an issue[4]. Agile processes can be adopted to address the scalability and bring changes in the management level.

The following are several examples from of adoption of Agile in non-software setting[4].

3.5.1 John Hopkins CubeSat

CubeSat program was introduced in universities to build satellites which are of standard mass and size. John Hopkins University Applied Physics Laboratory adopted agile practices to develop their CubeSat. They built the CubeSat for 3% of the cost and in 14 months of a typical satellite. University divided the development process in to two levels with leads from Electrical, Mechanical, Avionics and Payloads reporting to one manager. Since the team was

co-located it brought in nonlinear process of development[4].

John Hopkins CubeSat case study is an example of how co-location of resources helps in knowledge sharing and transformations which enabled in design flexibility. Incremental tests were conducted at the component level which helped in identifying the issues at the early stages and rectifying them and also increased the pace of the life cycle. The project managers were also allowed to make changes as long as the cost and budget of the project were in scope[4].

3.5.2 PoochPals

PoochPals is a corporation that provides various products for pets. They buy these products from various vendors and redistribute it to businesses related to the pets. Introducing a new warehouse is a part of supply chain growth for PoochPals[14].

Introducing a new warehouse involves following tasks[14]:

- Selecting vendors and products
- Validating product information
- Designing the supply chain for every vendor
- Contract negotiations

Following the traditional method involves defining tasks and scheduling them for each of the above process with all the vendors. Every vendor’s willingness to cooperate is different which implies that vendor has more control over the scheduled plan. Sometimes vendor will make it through the process with reduced product selection or may even not make it. Invariably in the end the project is slowed down[14].

With the adoption of scrum PoochPals defined the new business end goal of setting up a new warehouse by the desired date with product volume moving through it[14].

Through sprints the progress and feedbacks were assessed to adjust to the changing requirements. The work was divided in to work streams as follows[14]:

- Product validation – gather and validate product information
- Supply Chain – set up supply chain network for vendor
- Contract – contract negotiation
- Fulfillment – Enable replenishment of the process

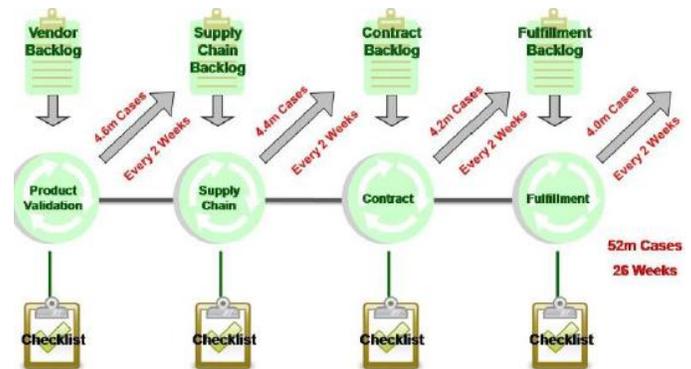


Figure 1 - PoochPals Iteration and flow

Teams members were assigned to streams based upon their expertise. Checklist identifies the tasks which must be completed before the downstream can begin their work. Supply chain team also provides it’s prerequisites to the product validation team’s checklist. If the work listed in the checklist is completed for a particular vendor then the volume for that vendor was counted as “Done” for that particular sprint. The Product backlog is the list of vendors who were ready to enter the stream[14].

By the following agile practices, PoochPals changed the way vendors were selected and pulled through the process, planning was done continuously and impact of decisions on business goal was visible[14].

4 IDEO AND AGILE

One of the questions that came up with regards to IDEO and Agile is – are they agile at all? Reviewing their existing case studies, web site, their Design Thinking toolkits, videos on YouTube – nowhere do we see or hear the word Agile mentioned.

Some would argue that ALL product innovation and design is agile. That discussion and research is not a part of this paper. However, there are examples of product design that are not agile. Commercial aircraft design at Airbus follows a waterfall approach with key phases of “Feasibility”, “Concept”, “Design”, “Definition”, and “Development”[7]. Recent research in the area of Agile product innovation suggests that success for firms may be circumstantial (environmental, employees, economics, markets) and unintentional, but not proven to be agile principal based[20].

4.1 IDEO PROCESS AND AGILITY

Much of the following material is taken from their IDEO Toolkit for educators and organizations. These toolkits are available for non-commercial uses from their website.

IDEO doesn’t product any products of their own (other than their IDEO Toolkit); they work with other companies helping them with the following generic needs[1,10]:

- Innovate
- Build Businesses
- Develop Capabilities
- Grow

In order to achieve that for their customers, they utilized their Design Thinking[8] process. Which, as the authors hope to demonstrate, is an agile approach for Product Design and Innovation.

4.1.1 Design Thinking

At the heart of IDEO’s success, is their design process Design Thinking. From their website[1]:

Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success. —Tim Brown, president and CEO

The following are key principles identified by IDEO in their materials. Within their Toolkit documentation, as you deconstruct each of these areas, you can begin to identify agile principles within. The authors align each of these characteristics of IDEO’s process with the generalized principles of the Agile Manifesto.

4.1.1.1 Human Centered

This is the focus on the user stories, scenarios of the end-user, and stakeholders of the overall project. The personas that become the main focus of the value proposition are identified here. During their process they use interviews that obtain empathetic viewpoints, and become core to the project.

This aligns with the following: 1, 4, 5, and 6.

4.1.1.2 Collaborative

Working with multi-disciplinary teams, and their customer, the Design Thinking approach follows the agile principle of Customer Collaboration. Additionally team size is expressly identified in their process. Similar to SCRUM (which is an agile framework), the target team size is no more than 8 members (current SCRUM is 7 +/- 2) [SCRUM-DOCS].

This aligns with the following: 4, 5, 6, 11, and 12.

4.1.1.3 Optimistic

Motivation of a team is an important part of agile orientation. Providing a design challenge that may seem unachievable at first to an

ordinary team could be an initial sign of failure. However, IDEO fosters team dynamics and motivation by allowing them the autonomy, environment, and feedback loops that is needed to be creative.

This aligns with the following: 2, 5, and 12.

4.1.1.4 *Experimental*

Teams work iteratively over several periods, providing demonstration and obtaining feedback over the project lifetime. Within these iterations teams apply creativity towards possible solutions, some might be considered outlandish, but in many instances, an approach that is bizarre might trigger other creative thoughts. This is the learning process for the team, which is a key aspect of agility.

This aligns with the following: 2, 5, 11, and 12

4.1.2 *Other*

Other agile principles are contained within their documentation. Concepts and principles not specifically identified in bullets, are present that align well with agile.

For example, from the IDEO Toolkits:

- Finite timeframes – this aligns with fixed time box[10]
- Cycles – creating a cadence and rhythm (deep dives – are time boxed)[10]
- Incremental – not Revolutionary ideas[10] – the simple, incremental ones that can be evolutionary
- Value chain integration – prefer to execute and ensure value chain analysis is done[10]

In addition to their marketing materials on their website, they also publish toolkits for public consumption and an Educators toolkit, for use in the classroom. Both are published under the Creative Commons Attribution license, for non-commercial purposes, for public consumption and use.

4.2 IDEO TOOLKIT

The IDEO Toolkit provided the following best practices, which align with agile principles as stated in the agile manifesto. Specifically around team structure, the environment needs, and concepts of regular intervals and time box of incremental delivery.

4.2.1 Best Practices for Innovation[10]

4.2.1.1 *Multi-Disciplinary Teams*

The challenges you face are very complex and are likely to have been explored by predecessors. You will have a higher likelihood of success at solving such complex, difficult, and already-examined problems by intentionally assembling the right team of people. This team will work best if it consists of a core group of 3-8 individuals, one of whom is the facilitator. By mixing different disciplinary and educational backgrounds, you will have a better chance of coming up with unexpected solutions when these people approach problems from different points of view.

4.2.1.2 *Dedicated Spaces*

Having a separate project space allows the team to be constantly inspired by imagery from the field, immersed in their post-it notes, and able to track the progress of the project. If possible, find a dedicated space for your design team to focus on the challenge.

4.2.2 *Finite Timeframes*

Many people notice that they work best with deadlines and concrete timelines. Likewise, an innovation project with a beginning, middle, and end is more likely to keep the team motivated and focused on moving forward

4.3 IDEO TOOLKIT FOR EDUCATORS

The toolkit for Educators provides methods and approaches for innovation in the classroom, with Design Thinking at the heart of the process. Within that guide, many principles for

agile are also present. In addition, some key aspects of agile delivery approaches are also demonstrated.

Teams are coached on gaining empathy with their customer base. Teams capture stories about their customers. Stories are then presented, for the team in a common area or environment upon information radiators[5].

Below is an example from the IDEO Toolkit of an information radiator:

Refine your Plan

A solid plan will help you make decisions along the way. You began with a plan for the project, connect with your team around goals and deadline to make sure everyone is aligned. Make agreements so everyone on the team can organize their time effectively.

Sketch a calendar

Sketch out a large paper calendar that everyone can see. Write down tasks, meetings and finish dates on Post-it Notes, then affix them to the paper calendar to allow for mobility.

Form agreements

As a team, define which times you can best collaborate. Put these dates on everyone's calendars.

Create a visual reminder

Keep your paper calendar in a space visible for everyone to see, or create a shared online document with access for all team members.



Figure 2 - IDEO Information Radiator

4.3.1 User scenarios and stories

Core to IDEO's process is obtaining stories, scenarios, challenges faced by the stakeholders, backed by research and first hand experiences.

4.3.2 Environment

The common room, quality environment or space – again, a key principle of agile teams is

present within the IDEO process. This along with a focus on some of the other key principles if IDEO process align nicely with agile principles:

- Common Room / Environment / Space
- Continuous Feedback
- Frequent Meetings
- Prototyping to gain feedback, course correction, validation
- Evolution and acceptance of change

5 IDEO EXAMPLES

The following examples of projects where IDEO applied their agile innovation techniques towards commercial needs. In these examples, much of the effort was about significant change that provided an inflection point within that corporation or an industry[21]. Apple for example, was able to parlay the idea of a cheap mouse into a significant change in how computer users would interact with computers[21].

5.1 APPLE COMPUTER

The founder of IDEO had a close relationship with Steve Jobs, the co-founder of Apple – Steve Jobs introduced David Kelley to David's wife[21].

5.1.1 Design Goal

Existing mice (Xerox PARC and others) were expensive and fragile; the Apple mouse had to be reliable, but less than 10% of the cost or earlier versions[11].

5.1.2 Agility

This case study of IDEO's Apple mouse reveals how user needs, behavior and feedback may lead to narrowing of the design space[16].

5.1.3 Design Approach

When IDEO designed a mouse for Apple in 1980, the key requirement was to make the

mouse more reliable and which would cost less than the earlier version of it. IDEO design team used two slotted wheels as encoders. LEDs and phototransistors read the rotating wheels and the ball was held in its place by the third roller. The team redefined other parts of the mouse button to the rubber coating of the ball. The mouse designed was both mechanical and economical. This basic design is used in most of the mice built to date. IDEO's human computer interaction factors brought in changes by movement of the mouse ball from under the palm and clicks of the button. This resulted in precision control and better performance[11].

Apple mouse case study was example of how designs emerge and they are defined up front. The overall design of the mouse has evolved since its base model and has also taken the advantage of the technologies over the period of time. Design models need to be just good enough. They don't have to be perfect and complete. It is important to think through how to build something by designing it, before they are built[2].

Quality control was followed to ensure that the product meets the customer requirements. The steel ball in the mouse had been replaced by the rubber ball. This implies that moving testing upfront would improve quality of the product[19].



Figure 3 - Apple Mouse - IDEO Website

5.2 MICROSOFT MOUSE[12]

Microsoft, not to be outdone by Apple, also employed IDEO in development of one of their first hardware devices – a mouse.

5.2.1 Design Goal

The primary goal of the design for ergonomics. Prior to this design, mice for computers were boxy, very mechanical devices. Through simple modifications, such as moving the ball forward in the device allowed better control for the user.

5.2.2 Agility

The IDEO design team went through several iterations of prototypes, ultimately centering on what was known as the “Dove Bar” design. From this design they obtain the final design, adding things like a glossy finish for durability and ease of cleaning.

In addition, they worked with fabrication teams in modification of the manufacturing methods. The manufacturing organizations would be considered “customers” of the design, and stakeholders.



Figure 4 - Microsoft Ergonomic Mouse - IDEO Website

5.3 ATM MACHINE FOR BBVA (BANCO BILBAO VIZCAYA ARGENTARIA)

BBVA Group is a financial services company with 47 million customers[13]. In 2009 they employed IDEO to help design a new ATM experience.

5.3.1 Design Goal

The goal was for BBVA to obtain a competitive advantage with the design of their ATM. Clearly, few of us could imagine banking without this convenience. BBVA intended to create a better experience, based upon customer needs and focus on user experience during that development process[13].

IDEO and BBVA are constrained by banking regulations and ATM industry standards. ATMs are primarily designed by hardware manufacturers which have a base catalog of offerings[13].

5.3.2 Agility

In a multi-function team made up of IDEO and BBVA team members, they undertook an approach that leveraged[13]:

- Cross-discipline team
- Customer interviews
- Experiences from non-ATM applications – gas pumps, supermarkets, train ticket kiosks
- Provided iterative prototype delivery
- Work with manufacturers (customers of the design) to ensure original design maintained through delivery



Figure 5 - BBVA ATM - IDEO Website

5.4 WAYNE HELIX

5.4.1 Design Goal

While design designing the dispenser its manufacturing process was also considered so that it could be manufactured anywhere in the world. This highlights the efficiency and scalability of the design thinking. Each component’s material and manufacturing process was carefully chosen to bring about efficient functionality and quality of the component[24].

Wayne Helix fuel dispensers are methodically designed and technologically advanced dispensers. They are the end products of worldwide research and design of IDEO.

5.4.2 Agility

To be effective in Agile cross-functional teams should work together. The progress of the project is built upon feedback from customers and communications among everyone in the team. With proper design bottlenecks can be avoided earlier than later in the project. User Experience can also help in acceptance testing and determine the success of the project [17].

The IDEO team spoke and gathered knowledge about the dispensers from customers and station owners from different countries. The fueling process and user experience are reflected in Helix dispensers[24].

- Customer feedbacks were transformed in to the design of the dispenser[24]
- User Interface – Different models of Helix dispensers were built on same type of user interface.
- Enhanced displays – Angled price displays allows the users to see clearly both in day and night.
- Payment Security – The transaction security at the dispenser was increased.

- Helix dispenser's accurate metering and durable material provides high quality end product with attractive design.

5.5 FORD MOTORS

IDEO has had a long standing relationship with Ford Motor Company. In an interview with Ed Pleet, Director, Europe, Asia Pacific, and Africa Connected Services at Ford Motor Company, he indicated the following:

1. The working process with IDEO is designed to be iterative
2. Each iteration had a review
3. Each iteration was 8 – 12 weeks
4. Feature owners, acted as product owners
5. Use of User Stories and Scenarios for the innovation team
6. Constant feedback between team and feature owner
7. Team adjusted as needed

The transition to the IDEO agile approach for Ford was not simple nor easy. Ed Pleet indicated "It is critical that you allow the teams enough lead way to accomplish their goal while providing protection to them from any internal concerns."

Ed Pleet summed up the IDEO team with "IDEO reacts well to change as they are very flexible in their development process."

6 CONCLUSIONS

While IDEO never explicitly states they are agile in their process, or practices, IDEO does exhibit many of the core agile principles identified. The reasoning as to why IDEO never states agility is part of their practice is not known. It could be several reasons, of which at this point we are only guessing. Such as marketing – they don't want to blend themselves with the rest of the crowd that is stating agility as the next best thing (yet they are agile). They might not even

know it – or, they know it and they just don't care as they've developed a process that works.

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