Insights: Design as a Process

By

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Design plays a fundamental role in the success of many of the world's leading companies. Different designers manage the process of design in different ways. The way of mapping the design process, and detail on the key activities in each of the process's four stages is as follows. The design process across several companies is taking into account how such a process will differ depending on the companies' product or service offer, size, shape and location, legacy of design use, and its supply-chains and production systems.

The 'double diamond' design process model

The double diamond diagram was developed through in-house research at the Design Council in 2005 as a simple graphical way of describing the design process

Divided into four distinct phases, **Discover, Define, Develop, and Deliver,** it maps the divergent and convergent stages of the design process, showing the different modes of thinking that designers use.

Discover

The first quarter of the double diamond model marks the start of the project. This begins with an initial idea or inspiration, often sourced from a **discovery phase** in which user needs are identified. These include:

- ✓ Market research
- ✓ User research
- ✓ Managing information
- ✓ Design research groups.

Discover

The start of a project is marked by an initial idea or inspiration, often sourced from the Discover phase.

The objective of the Discover stage is to act as a 'phase of divergent thought', where the designers and other project team members keep their perspectives wide to allow for a broad range of ideas and influences. In this stage of the design process, the company is asking a question, posing a hypothesis or identifying a problem by analyzing market data, trends, and other information sources.

It is worth noting, however, that in practice an element of discovery takes place throughout the design process, aimed at taking into account new information, user needs, competitive contexts, or challenges that arise as the project progresses.

Initial influences and inspiration

Companies begin the design process when they want to develop a new product or service, or refine an existing one. The initial influence or inspiration for this can be triggered in a variety of ways. It may involve noticing social or environmental trends, the launch of a competitor product or service, or tapping into the ideas of staff or networks.

Wherever the initial idea comes from, the design process in general and the Discover stage in particular provides a framework within which to process the initial ideas or inspiration. The Discover stage helps to identify the problem, opportunity or user need that should be addressed, and introduces the space within which design can provide a solution – the playing field for design. It is important that the design process used in the company allows ideas to be captured and developed in this way, and fosters this type of creative environment among designers and other staff.

Information sources

We have seen that the initial influence or inspiration for a project could come from key individuals – such as the design leader in the company. It can also come from the need to regularly update or change a product or service. However, the design process most commonly begins with teams finding their initial inspiration in information about user behavior. Indeed, the most formalized sources of inspiration and information are the outcomes and interpretation of market research and data, observation, primary research or ideas that have been generated in formal or informal settings by members of the team.

This often takes the form of three key sources of information:

- ✓ Use of market research
- ✓ Generating user research (such as ethnography and observation)
- ✓ The involvement of a bespoke design research group

While their focus and settings differ, the design teams in all the companies we visited share a user-driven mentality, which is apparent in the up-front phase of enquiry and gathering of initial research into the behaviors, needs and perceptions of users. Multi-disciplinary teams digest this information during the design process, including researchers, designers, product manager, engineers, research and development experts and developers.

All this research and knowledge-gathering activity creates an enormous amount of information. Managing that information is another key challenge that many of the companies in the research are addressing in creative ways.

Limitations of research

While most companies use the research methodologies described above, it was generally acknowledged that such methodologies were not without their limitations. Some designers express concerns about whether consumer feedback could 'take you to the next level' when it comes to product and service development

The outcome of the Discover stage of the design process is a project brief for a design project, and signifies the practical start of the design process.

Market research

One source of information that can lead to the development of new products and services is market and research data. This can mean the outputs from companies' own internal marketing, consumer insight or research teams, who commission and manage regular information and data from key target customer groups.

It involves tracking perceptions and attitudes related to the company, its products and services, brand perceptions and customer satisfaction, and are likely to include competitor analysis, and gathering feedback on the commissioning company's performance and reception in contrast to that of their competitors.

Through the analysis of such data by designers and other members of a project team, gaps in the market and areas for improvement and innovation are identified.

Future trends

While timely and regular market and research data can help to identify user needs and future trends, there is equally a need to anticipate future user or consumer needs. In order to address the requirement for information of this type, specific future-focused or trends analysis is often used.

Particular topics of interest here revolve around:

- ✓ Consumer behavior and preferences in relation to the product or service offered by the company
- ✓ New modes of communication
- ✓ New service needs that may emerge based on social, economic, or environmental changes

The breadth of focus here opens up the possibility of a wide range of impacts on companies' products and services – from complete product innovation (in response to issues such as global warming or technological changes), to styling preferences such as colors, finishes, materials and textiles.

User research

The emphasis on user needs and experiences in the companies means that user research features heavily in the design process.

User research is used to identify:

- ✓ How users are accessing current products and services
- ✓ Areas for improvements or innovation
- ✓ Opportunities for new products and services that will address a user need

Many user research methods find their roots in traditional market research methodologies, particularly when it comes to the gathering of data on customer satisfaction and trends.

A significant proportion of user research is conducted through qualitative research with consumers, ranging from focus groups and depth interviews with target audience groups, to more focus and detailed ethnographic and observation based techniques.

Stimulus materials such as cartoon strips to portray service propositions, storyboarding, scenario-building, multimedia, prototypes and other tools (such as eye-tracking technology for testing user interaction with software packages) are used to illustrate present and future user scenarios involving the use of their products and services. Using images and illustrations to bring the use of complex products and services to life is a useful way of communicating during user research.

Designer involvement in user research

A key activity we noticed across all of the Discover methods and processes was involving designers as far as possible in conducting, analyzing, and understanding research.

Designers to take part in user research allowed them to gain faster, deeper insights and better product ideas. This approach ranges from general multi-disciplinary design practices (which keep designers, user researchers and product or service developers working closely throughout the design process), to methods made available for designers to view user research) in practice, either remotely or in person.

The benefits of involving the designers closely in user research are broadly that:

- ✓ Designers bring particular creative skills or idea generation to the analysis of research-based information, and these skills help to identify problems and solutions emerging from the data
- ✓ Having designers involved directly with other teams in the analysis of data and research involves multi-disciplinary working and thus gives other teams an insight into the skills that designers bring to the process
- ✓ This kind of collaboration helps to clarify project objectives at an early stage.

Managing and planning information

As well as gathering these types of information during the Discover stage of the design process, design teams also face a key challenge in the way in which this information is used by, and shared with, the design function and with a wider project team.

The design processes managed this challenge in two key ways:

Planning with information - Using the design process to plan the flow of information through the development phase and manage the interaction with designers and other teams throughout

Designer involvement in user research - Ensuring that designers are contributing to and taking part in research with users themselves.

Planning with information

Reflecting the findings of market data, research and future trends - and making appropriate design changes where necessary - presents a considerable challenge when planning the development of a new product or service.

Most companies deal with this issue by setting strategic targets, deciding their objectives at least one year in advance and drawing up new product and service development plans accordingly. This is supported by having a formalized design process, which acts as a roadmap from the point of receiving information on users.

Design research groups

One criticism leveled at trends research is that future trends are sometimes researched in isolation of design thinking, with design thinking applied only after a trend has been identified. In order to bring design thinking closer to new business areas, product opportunities and user needs, several businesses have set up design research units whose main purpose is to generate new ideas alongside design thinking.

Define

The second quarter of the double diamond model represents the definition stage, in which interpretation and alignment of these needs to business objectives is achieved. Key activities during the Define stage are:

- ✓ Project development
- ✓ Project management
- ✓ Project sign-off.

The Define stage should be thought of as a filter where the review, selection and discarding of ideas takes place. This is where findings from the Discover stage are analyzed, defined, and refined as problems, and ideas for solutions are pitched and prototyped.

During the initial Discover stage of the design process, the design team and its partners must keep a broad perspective and open mind in order to identify a problem - a user need or an opportunity that needs to be addressed and channeled into a design-led product or service development process.

At the Define stage, a combination of the ideas or directions identified during the Discover stage are analyzed and synthesized into a brief with actionable tasks related to new and existing product or service development.

The Define stage ends with a clear definition of the problem(s) and a plan for how to address this through a design-led product or service. In practice, the Define stage ends in a project go-ahead through corporate level sign-off.

Key activities during the Define stage are:

- ✓ The generation of initial ideas and project development
- ✓ Ongoing project management
- ✓ Corporate objectives agreed and project sign-off.

At most, of the companies the Define stage would end with final sign-off of the concept and approval of work to begin on design and development. In some companies, much of the actual

designing has effectively been frozen until the match between the concept and the overall corporate objectives that it will be aligned to and measured against have been agreed.

Here, strategic dialogue takes place up front, and potential bottlenecks, opportunities, and no-go areas are defined ahead of the concept approval. In this way, the development of the design project gets as far as possible without affecting negatively on finance, time, and resources.

It is worth mentioning at this stage that the companies place particular emphasis on the Discover and Define stages of the design process, which no doubt contributes to the overall success of their design and design processes.

Project development

Having defined the problem in the Discover stage, the Define stage covers the initial development of project ideas and components needed to solve the problem at hand.

Here, it becomes important for the whole team working on the project, and not least the designers, to have an awareness of a number of factors that influence the possible solutions to the problem.

Firstly, designers must understand the context within which the project is being undertaken. The Discover stage establishes that a problem or opportunity exists, and that a product or service development or iteration is necessary as a result.

During the Define stage a designer must engage with and understand the wider context in which this problem or opportunity sits, both within and beyond the company. This might include considering the company's own financial situation and the extent to which it is able to invest in a project, the recent launch of a competitive product with similar features, or social and economic contexts, which require a certain approach or sensitivity, such as an awareness of sustainability issues.

The role of design in the innovation process is valued, but is subject to the careful development of a robust business case before a project commences, and must – in many cases – also be compliant with regulations. Once a large monetary commitment has been made, there is little tolerance of failure, requiring the need for the in-house design team to innovate in-line with very strict business guidelines.

Secondly, the designer must equally keep in mind what is feasible within the company's technological or production capabilities. A clear understanding of details such as materials, logistics, time-to-market, and other influencers is a key part of understanding the wider corporate ability to develop a design solution.

This enquiry is not as detailed during the Define stage as during the Develop stage, but rather serves as a filter that allows designers to identify which idea has legs and should be pursued and developed.

Communication with other experts and departments internally is important at this stage. In most cases, the design process oversees clear lines of communication between designers and other area experts, such as engineers, developers, materials experts, Research & Development teams, and product or service managers who are able to input the right information that will guide the designers' initial ideas.

The design team runs regular milestone meetings where designers and manufacturers meet to make sure that they have the same interpretation of the design and that production is feasible.

Thirdly, initial ideas generation must consider the corporate brand. The design process involves constantly checking to ensure that ideas generated are in line with the corporate brand vision, mission, values, and guidelines.

In summary, the project development and initial ideas generation phase of the Define stage reviews the context for the product or service development, the realism of what can be done, and the corporate brand. Considering these considerations, designers work through the project development and initial idea generation stage to define a project, which will address the initial problem, identified.

Designers work in a variety of ways to do this, to refine the scope of the project, and to home in on which solutions can have impact, which product or service has scope or potential, which product or service would push the business and design in the right direction. Some of the methods used include reviewing further research, role-playing, paper prototyping, day-in-the-life scenarios, sketching, reviewing ideas, considering colours, styles and trends, project team scrums, selections, and brainstorms, among others.

Project management

As design projects move from their initial discovery phase into the more structured process of definition, so the companies began to use a variety of more formal project management tools.
Formal tools serve two main purposes during project definition. They help design teams to ensure that they have considered and captured every essential aspect of the design problem – to avoid unpleasant surprises later – and they help in the communication of the design specifications to other parts of the organization, so they can make go/no go decisions or sensible choices about the resources required to support the development of the design.

While some project management approaches attempt to define the project specifications in as much detail as possible before design development begins, others adopt a fundamentally different philosophy. Some companies, particularly in the software sector, consider changes in project definition to be an inevitable part of the design process. Their management systems try to make the implementation of those changes as quick, cheap and painless as possible. . AGILE is one of these systems, and is one of a family of approaches to software development. A number of key principles underlie the AGILE methodology:

- ✓ Customer satisfaction by rapid, continuous delivery of useful software
- ✓ Working software is delivered frequently (weeks rather than months)
- ✓ Working software is the principal measure of progress
- ✓ Even late changes in requirements are welcome
- ✓ Project progress through close, daily, cooperation between business people and developers
- ✓ Face-to-face conversation is the best form of communication
- ✓ Projects are built around motivated individuals, who should be trusted
- ✓ The development process should pay continuous attention to technical excellence and good design
- ✓ Simplicity
- ✓ Projects are delivered by self-organizing teams

- ✓ Regular adaptation to changing circumstances.

In the AGILE system, designers, user researchers, developers and commercial staff work closely together on a given project. Team members may work separately on their particular parts of a project, but they come together frequently to take projects forward, and adapt quickly to changes and new information where possible. This type of project management, helps designers to identify where and when their input is most valuable, and to communicate that input frequently to other members of the team.

Corporate sign-off

At most, of the companies the end of the Define phase is a pivotal point in the design process. It is at this stage that projects are either killed off, or given the budget and approvals to move on to production.

In order to make this go/no-go decision sensibly, companies must have a detailed understanding of the likely market for the new design, together with a good idea of the cost and complexity of producing it.

The ability to present a well argued business case alongside a proposed design approach was a key attribute for almost every design team

Companies however, in how far they allowed or required a design to progress before making the go/no go decisions. Many companies have formal processes to manage the corporate sign-off process and to ensure that project teams and designers deliver comprehensive and consistent information to those responsible for sign-off. Some companies use less formal processes to make the go-ahead decision for design projects. It is for the final decision about the viability of a project to be made by the CEO.

Develop

The third quarter marks a period of development where design-led solutions are developed, iterated, and tested within the company.

At the Develop stage the project has been taken through a formal sign-off, which has given the corporate and financial backing to the development of one or more concepts that have addressed the initial problem.

Key activities and objectives during the Develop stage are:

- ✓ Multi-disciplinary working and dependencies with other departments
- ✓ Visual management
- ✓ Development methods
- ✓ Testing

During the Develop stage, the design team, either together with key internal partners (such as engineers, developers, programmers, and marketing teams) or via external design agencies, refine one or more concepts that will address the problems or issues identified during the Discover and Define stages.

Design development methods used here include creative techniques and methods such as brainstorming, visualization, prototyping, testing and scenarios. The methods and working processes are in many cases similar to those during the Define stage, but are this time focused on bringing the agreed product or service to fruition.

At the end of the Develop stage, the design process will have brought the product development team to a stage where the product or service is ready for delivery to production.

Multi-disciplinary working

Multi-disciplinary teams are a key feature of the design processes observed in the companies. In addition, multi-disciplinary teams are a feature strongly in the Develop stage, where input and advice from other areas of expertise are essential to finalizing the product or service at this stage.

Key to this is the way in which the design process aims to break down walls and silos internally, for example between design and manufacturing. The benefits of doing this include speeding up problem solving during the project, as potential issues and bottlenecks are identified early on, and potential delays are addressed.

During this entire process, a multi-disciplinary team including product and brand managers from brand and marketing backgrounds, designers from Design, and Product Development groups (representing the product category being developed) manages the design process. In doing so, designers are consulting with R&D experts, the advanced materials group, and other key stakeholders.

Visual management techniques

During the Develop stage of the design process, project management is carried out in much the same way as during the Define stage.

However, it is worth noting that many of the tools for project management take on a visual nature at this point in the process.

Visual management techniques allow internal stakeholders to track progress on the design project and see different phases and iterations of sketches, prototypes, and other design work on the product or service concept. Team plans together how to reach the next stage, by aligning objectives, tasks and deliverables. Such visual management techniques are equally a key communications tool for the rest of the team, and are used to track project deliverables, developments, timings, and internal or external dependencies.

Development methods

Whatever a company is designing, the principle of the Development phase is to prototype and iterate the concept to get it as close to an end product or service as possible. Lessons from each round of development are fed back in through formal and informal communications within the project team and with its stakeholders.

In order to reduce costs and development time, companies are increasingly turning to **virtual prototyping methods** during the early phases of design development. Such methods can range from **sketches and renderings to detailed 3D computer models of potential designs.** Physical models made using **rapid prototyping equipment or traditional model-making skills supplement visual representations.**

At the product-based companies, the Develop stage included close involvement with colleagues in **R&D, materials and engineering departments, and with external suppliers and manufacturers.** These detailed insights into materials and engineering requirements help to reduce the number of physical prototypes required and ensure that fewer problems are discovered during testing.

Company also uses **Failure Mode and Effects Analysis (FMEA)** to evaluate potential failures in a design before they take place. The use of **FMEA and other analysis methods** helps design process in whittling down the number of concepts, which are put forward for approval, and can usefully help to manage and reduce the cost of prototyping, engineering, and tooling.

Very often, insights from development rounds produce changes in **product specifications**. As development is often the lengthiest part of the design process, external factors can change too, with shifts in the market or competitor activities requiring late changes in **requirements** to be met.

In most product-based companies, actual manufacturing was outsourced. Liaison with manufacturing partners is often a lengthy process as design and engineering teams ensure that their requirements match the **processes** available at their manufacturing partners.

There are of course some differences in the **development methods** used when products are less tangible. The development of software products or graphical executions of campaign materials, for example, also involve continuous iterations and the sourcing and use of new information. In software development particularly, new products can to be **prototyped** in situation as the designers, developers and user researchers work out ideas and test them themselves and with external users to iterate a solution.

A good example of such in situation prototyping and evaluation is Microsoft's design philosophy that designers should 'eat their own dog food' - encouraging them to work with their own products as they are in development.

Testing

The testing of concepts and prototypes form a major part of the Develop stage.

Some companies use particular principles to guide their testing of products. The basic methodology consists of a number of steps that are aimed at checking that the design is consistent with user needs and corporate strategy, checking product capabilities, requirements and the ability to meet these, and optimizing the design to combine these two.

In fact, the **Six Sigma process** overall can be said to include a lot of what happens in general during the Develop stage, not just the testing phase.

Essentially the methods of testing used rely heavily on traditional market research methodologies, and in most cases, testing is carried out with consumers through in situation observation, focus groups and other techniques. Generally, the concept is well developed and near final before being tested with users. Organizations carry out simulated and **real-life testing** of its products with consumers in relevant market and audience groups.

Microsoft's designers and developers engaged in the principle of 'eat your own dog food', turning the project team (including designers, researchers, developers and programmers) into users and requiring them to use the beta product and report back on issues or amendments needed.

Deliver

The Deliver stage of the double diamond design process is where the final concept is taken through final testing, signed-off, produced, and launched.

It will result in a product or service that successfully addresses the problem identified during the Discover stage. It will also include processes for feeding back lessons from the full design process to Inform future projects, including methods, ways of working and relevant information.

Key activities and objectives during the Deliver stage are:

- ✓ Final testing, approval and launch
- ✓ Targets, evaluation, and feedback loops.

Final testing, approval and launch

This final stage of the process is designed to identify any final constraints or problems before manufacture and is when the product or service is checked against standards and regulations, and undergoes damage testing and compatibility testing.

Final Testing involves practices such as First Article Inspection and snagging. First Article Inspection is an assessment of the first item off the production line to ensure that it is fully functional. This will happen in parallel with production, as there will be many components being produced and assessed in parallel at any one time. Alongside this, snagging involves picking up any small adaptations necessary in relation to the products,

Launching the product or service

At this point in the design process, the product or service is launched, and the process now includes liaison with appropriate internal teams in areas such as marketing, communications, packaging, and brand.

The importance of internal communication and the acceptance of designs is acknowledged during the production phase too. Shop floor representatives are involved in final product reviews and part of the design process is the production of photographic instructions to help store managers install and arrange new items correctly once delivered. These directions are distributed in the form of a

document, which describes every element of each season's offering, with full instructions on installation and display to ensure a consistent brand experience in every store worldwide.

Targets, evaluation and feedback

Most of the companies are required to report on the success of the launched product or service. The common aim in doing this is to prove the impact of good design on the success of the product or service. Being able to prove that design contributed to business success helps to gain buy-in for design and maintains the team's credibility and perceived value to the organization.

Measuring the impact of the product or service is done by collecting data from a number of sources. For example, companies use their internal consumer insight, research, or marketing functions to carry out customer satisfaction tracking surveys and link changes in satisfaction to the introduction of products or services.

The introduction of a new product or service can be linked to other business performance metrics, such as sales and market share. A significant measure of success, which is widely attributed to the design team.

Companies will also encourage customer feedback through in situation channels – Equally, data on the sales of spare parts or logged in-service failures are tracked and may indicate where design has successfully overcome problems in a product or need to be developed in more detail.

Finally, where companies see design as an extension of the brand, design is valued as part of the overall company brand value. Design is assumed strong contributor to the overall brand value of the company. Companies take their responsibilities in reporting on the success of a design project very seriously, and many point out that they are required to do so.

One page summary of performance of their products against a number of hard metrics, which is circulated widely internally to demonstrate the level of success achieved. In-Use evaluation of designs is quite extensive.

Feedback loops

The information and metrics that are gathered are, of course, not always quantitative business metrics. Feedback related to problems with a product or service, or suggestions for improvements, flow back into the organization via other channels, and can be used to spin off into new projects or improvements.

Ideas that have emerged during the design process or in post-launch feedback may be put to one side but developed later, and will then go through the design process again on its own.

However, some of these prototypes have been known to be 'unfrozen' and brought into production at a later stage.

Equally, lessons from the entire design process are usefully documented and logged in the various methods banks and case study libraries used by the companies.