

A process for practicing design innovation

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Innovations offered by companies have historically focused on providing better efficiency

In the past, companies transformed their business primarily through pushing their efficiency to extreme limits, often through streamlining their tactical operations and strategic offerings. For example, Google's search engines have become amazingly efficient in searching through large amounts of data using their patented system called PageRank. In seconds, the search engine presents us with results that are immediately meaningful to our search objectives. FedEx and UPS have become extremely efficient in their technology-supported operations, allowing us to get our packages delivered within stringent time limits. Online shopping is permitting us to make our purchases much more quickly and effectively than before. Airline companies are offering efficient self-booking systems like Saber to make our travel planning efficient. New technologies and business modeling are the main drivers for this type of innovation.

An emerging new innovation focus is on better fit with users and increased customer adoption

These types of innovation initiatives are creating a new world of seemingly unlimited consumer choices and almost magically efficient systems. But as more companies catch up to the best practices in these areas of innovation, they find that to stay competitive, they need to switch their innovation focus, paying more attention to creating offerings that fit people's daily lives. Attention is shifting from achieving efficiency to creating desirable user experiences and thereby greater adoption. This means, for instance, that for companies like Nike, the innovation focus is no longer on shoes but on the user experience of running. For Apple, the innovation focus of the iPod is more on the experience of listening to music than on MP3 players.

Companies are increasingly adopting "design innovation" as a winning strategy

It is in this context that design innovation is becoming a powerful basis for companies to compete in global markets. Design thinking helps companies see new opportunities for innovation that are prompted by a deep understanding of people's needs. These innovations start with the primary goal of creating offerings that are desirable for users and meet their needs, creating what is often called "user value." Creating offerings with more user value in turn raises the economic and business value of the offerings.

Apple is a quintessential example of a company that successfully adopted design innovation as a winning strategy. Today, executives in many companies are searching for ways to "be the Apple" of their own category. A survey of the leading innovative companies in the world indeed suggests that most of them are increasingly adopting design innovation as a primary competitive strategy.

Design innovation processes are transforming the innovation practice in companies

The challenge for companies is not only to adopt design methods into their innovation processes, but also to merge these new methods effectively with existing processes of business modeling and technology development (see Figure 1). Companies need to understand effective and compatible design methods, tools, and frameworks, paying particular attention to practicing design innovation collaboratively, reliably, and repeatedly. Innovations conceived by carefully integrating design processes with business and technology have a better chance of achieving high user value and economic value, leading to greater adoption and market leadership.

Four principles for practicing design innovation

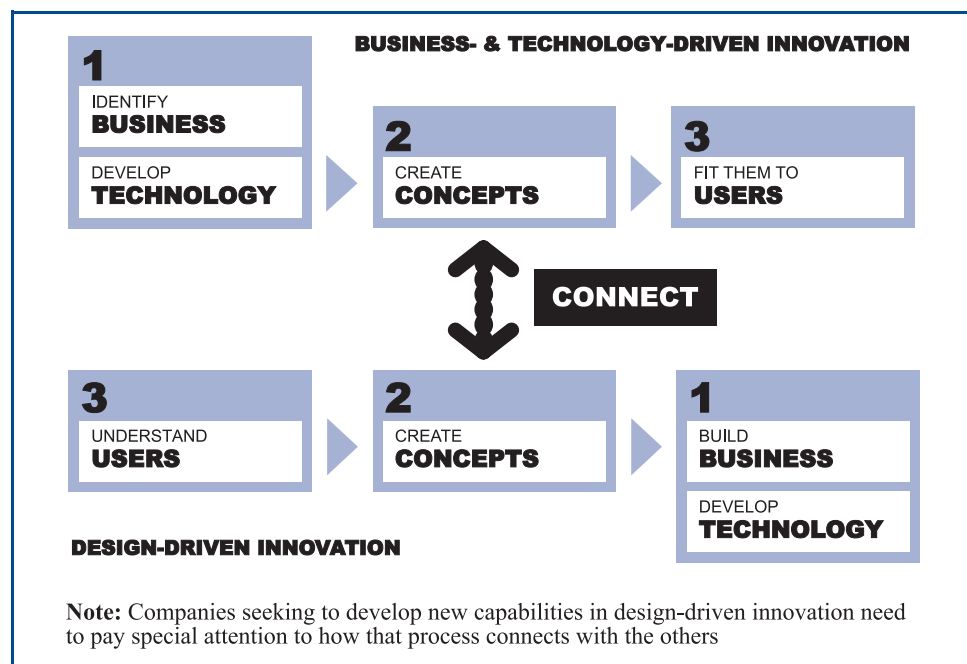
Analyzing some of the most innovative companies in the world as identified by innovation experts, and studying hundreds of successful innovations such companies offer, I have identified the following four key principles that successful innovators need to pay attention to.

Principle 1: build innovations around people's experiences

Innovation process in companies start with an objective of understanding how consumers are using the company's offerings, whether they are products, services, or messages. Product-oriented companies typically try to understand how consumers decide to purchase a product and how they use that product, usually through methods such as surveys, focus groups, interviews, home visits, and usability tests. Researchers seek to answer questions that are primarily about the product. What improvements can be made to the product? Why did people buy this product over another? What additional features will cause them to pay more for the product? In this context, innovations are built around a good understanding of the product itself.

In design innovation, the emphasis is to create innovations that have a good fit with users. The focus shifts from products that people use, to what those people do – their behaviors, activities, needs, and motivations (Kumar and Whitney, 2007). Successful innovations are

Figure 1 Three different models of innovation, driven by technology, business processes and design, and the points at which they intersect



“In design innovation, the emphasis is to create innovations that have a good fit with users. The focus shifts from products that people use, to what those people do.”

built around what we can learn from all these factors of people's overall experience. For example, a company designing an MP3 player would focus on the experience of "listening to music" rather than on the device itself. Or perhaps a food manufacturer's focus would shift from the food product to the larger experience of "eating and drinking". Focusing on experience can lead to surprising opportunities for innovation that are nonetheless firmly grounded in people's daily lives.

To gain a comprehensive understanding of people's experience, it's useful to consider five factors:

1. *Physical*. How do people experience their physical interaction with things?
2. *Cognitive*. How do people associate meanings to things they interact with?
3. *Social*. How do they behave in teams or in social settings?
4. *Cultural*. How do people experience shared norms, habits, and values?
5. *Emotional*. How do people experience their feelings and thoughts?

Principle 2: think of innovations as systems and not just products

An offering, whether it is a product, a service, or media/messages, belongs to an overall system with many interconnected parts. Innovators need to understand how this system works in order to gain a deep understanding of the offering itself.

If we were designing a healthcare-related product such as a blood pressure meter, a prescription drug bottle, or a wheelchair, the primary focus for innovation would traditionally be on product performance. While this can lead to incremental improvements to the product, to get to truly powerful innovations, we need to understand the overall healthcare system of which the product is a part. We need to think of the product's relations to other parts of the system, such as the patient, doctor, hospital, home, pharmacy, product manufacturer, product retailer, insurance company, pharmaceutical company, government, and others. This broad view of the system is likely to provide us with more opportunities for thinking about innovations that we would not have thought of otherwise.

The systems-thinking framework Flows, Attributes, Relations, and Entities (FARE), which I have developed as an extension of the Entity-relationship model (originally developed by Peter Chen in 1976 (Chen, 1976) and later extended by many scholars), helps us think about the larger context of innovation. FARE allows us to think about the entities in the system – for example patient, doctor, and hospital – and the relations among them. We can also describe the attributes that define these entities; for example, the patient's health condition, treatment plan, and other information, similar to what is found in the patient's electronic health record. The FARE framework is also good for thinking about the flows that happen between entities, such as a patient's payments to the insurance company or the information that patients and doctors exchange. Creating a FARE model of the system not only helps us understand system-level implications for the design of the product, but also reveals new opportunities for innovation.

Another useful framework that helps us think about systemic innovations is the "Ten Types of Innovations" model developed at Doblin Inc. (2008). This model helps us move from a

product innovation focus to a systemic combination of multiple innovation types— business models, networks and alliances, enabling processes, core processes, product performance, product system, service, brand, channel, and user experience.

Principle 3: cultivate an innovation culture in organizations

The goal here is to cultivate a mind-set among people in an organization that everyone's actions can add to the overall value of the organization's offerings, and to foster an environment in which all members of the organization are proactively engaged in innovation thinking as part of their daily activities.

Innovation practice is a collaborative activity. People with competency in various fields need to come together to make the process thorough, inclusive, and valuable. Technologists, engineers, designers, ethnographers, managers, strategy planners, marketing experts, financial planners, and others all need to be brought to a common shared mental space for creating innovations to ensure success. Most recently, end users and communities are also brought into the innovation process. The shared space that builds innovations is thus becoming more "open".

Although achieving this level of collaboration is a huge challenge, we can take some small steps that eventually lead to positive changes in the innovation culture of organizations over time. One of these steps is to promote frequent collaborations among people with diverse expertise by bringing them together as team members in the innovation process. Frequent interactive work sessions and brainstorming activities are conducted. This not only helps specific teams build on each other's ideas, but it also fosters a broader innovation culture.

Principle 4: adopt rigorous design processes and structured methods

Innovators in companies need an integrated practice model that synthesizes design, technology, business, and other processes. Integrated planning processes that are easily understood and collaboratively used by innovation teams are likely to increase the success rate of innovations.

"Innovation planning" is not the oxymoron it may seem to be. It is possible to create innovations using well-developed processes for recognizing people's needs and contextual demands, but a high degree of discipline is necessary for these processes to work. Successful innovations emerge from well-informed, purposeful, and disciplined processes and their applications. This requires reliable frameworks, structured methods, and rigorous tools.

Moreover, innovation team members with expertise in different disciplines like research, engineering, business management, branding, finance, and strategy need a shared mental space and shared frameworks around which they can work together. For multidisciplinary teams to effectively and collaboratively practice innovation, these frameworks have to be clear, pragmatic, and jargon-free.

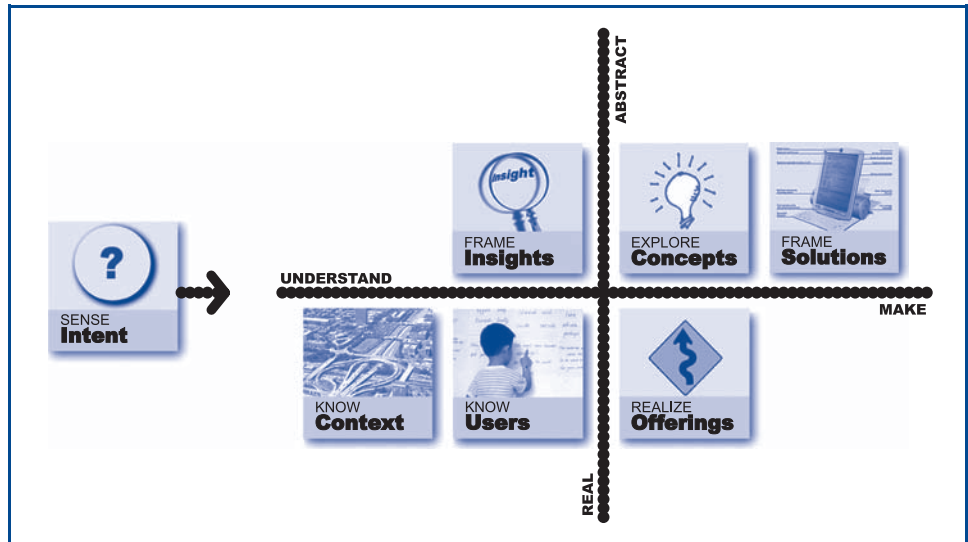
In short, to practice successful innovation, companies need disciplined processes supported by structured methods, frameworks, and tools that can help multidisciplinary teams and multiple specialty areas work together.

A generic design innovation process

By analyzing hundreds of successful academic and professional design projects, I have created a generic framework for the design innovation process (Kumar, 2004). This framework has seven key "modes" that innovators go through sense intent, know users, know context, frame insights, explore concepts, frame solutions, and realize offerings. Figure 2 shows these seven modes as organized along two dimensions; real-abstract and understand-make. The modes' positions on this map depend on the innovator's mindset and activities during the mode.

The rest of this paper focuses on each of these seven prominent modes, their goals, and the significant activities innovators need to perform in each to ensure valuable results from the process. A collection of tools and frameworks organized under each of these seven modes

Figure 2 Innovation process with seven modes



forms the ‘Innovation Toolkit’, as shown in Figure 3. Paying attention to all seven modes and using the right tools is critical for successful innovation practice.








Mode 1: sense intent

Defining the problem and the innovation intent

In this mode, the goal is to establish an initial ‘innovation intent’ based on an intuitive and provisional sense of where new value might lie and how to find it. It often starts with simply a rough goal, a hunch, a gut feeling, or some other form of initial prompt.

Two primary activities take place in this mode. First, framing the problem space through a quick diagnosis of the situation, both inside and outside the organization. Second, actively sensing the relevant changes and trends in the world, in people’s lifestyle, business, technology, culture, and public policy. A few of the tools that support the activities in this mode include:

Figure 3 Innovation toolkit

 SENSE Intent	 KNOW Context	 KNOW Users	 FRAME Insights	 EXPLORE Concepts	 FRAME Solutions	 REALIZE Offerings
<i>Trend matrix</i>	<i>Context map</i>	<i>Video/photo ethnography</i>	<i>User data analysis</i>	<i>Insights to innovations</i>	<i>Concept systemizer</i>	<i>Strategic roadmap</i>
<i>Era diagram</i>	<i>Innovation map</i>	<i>Ethnographic interview</i>	<i>Context data analysis</i>	<i>Concept definition</i>	<i>Scenario plan</i>	<i>Innovation brief</i>
<i>Opportunity map</i>	<i>Value web</i>	<i>Experience map</i>	<i>List sorting</i>	<i>Concept matrix, map</i>	<i>Behavioral prototype</i>	<i>Strategic plan</i>
<i>Innovation intent</i>	<i>Era diagram</i>	<i>POEMS</i>	<i>Experience map</i>	<i>Concept manager</i>	<i>Concept prototype</i>	<i>Tactical plan</i>
	<i>Innovation diagnostics</i>	<i>Five user experiences</i>	<i>System simulation</i>		<i>Prototype evaluation</i>	<i>Business case</i>
	<i>Competitive landscape</i>	<i>User Insights Tool</i>	<i>Analytic frameworks</i>		<i>Business illustration</i>	

- Trend matrix: visualizes emerging trends in lifestyle, business, technology, culture, and policy.
- Era diagram: visualizes the historical evolution of changes and reveals major eras on a timeline.
- Opportunity map: frames the innovation problem-space based on an initial diagnosis of the situation.
- Innovation intent: initially defines the likely users, their needs, potential offerings, and benefits.

Mode 2: know users

Observing users and generating insights

Traditional market research techniques are most useful when a new offering is already defined, but to explore unmet or unspoken needs, we need other research tools. In the know users mode, innovators seek to understand –the people who are current or potential end-users of a new offering, as well as other relevant stakeholders inside and outside the company.

For example, ethnographic observation and interview techniques for studying people in their daily environments, adapted from the social sciences, can spot latent user needs that are hard to discover using typical market research methods. This type of research can lead to innovations people did not even know they wanted.

A key objective in this mode is to extract the most valuable insights from our observations. An “insight” here is defined as an interesting revelation or learning that emerges out of observing people’s actual behavior. It is literally the result of “seeing into” a situation. It is our interpretation of what we see, and is often the result of asking the question “why?” – why do people do certain things in certain specific ways? A clear definition of what constitutes an insight is helpful for creating a shared understanding, especially in a team-based innovation process. The goal is to identify problems users currently encounter in their daily lives, in a way that points to unmet, unspoken needs. Examples of tools in this mode are:

- Video/photo ethnography: captures people’s activities in real contexts and extracts insights.
- Ethnographic interview: conversational interviews with people conducted in their own environment.
- Experience map: visualizes people’s holistic experiences with products, environments, messages, and services.
- POEMS: a framework (people, objects, environments, messages, and services) to help organize user research and conduct analysis.
- Five user experiences: helps us understand the five factors related to people’s experiences – physical, cognitive, social, cultural, and emotional.
- User Insights Tool: a sharable database that organizes sets of observations about specific types of daily activities.

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Mode 3: know context

Understanding context and generating insights

User observation is one rich source of innovation insight, but there are also many other elements in the surrounding context that innovators can learn from. These can include the company making the offerings, its competitor companies and their offerings, available technologies, market composition, comparable innovations in other industries, financial models, regulations affecting the business, and a host of other issues. The goal is to understand the current state-of-the-art of the context as well as how it has changed over time.

To support interdisciplinary teamwork while in this mode, findings and insights are organized under commonly understood categories like business, technology, and design. It can be a challenge to deal with the complexity and abundance of available information. Frameworks for differentially focusing the field of inquiry, data-mining techniques to extract information from large databases, and graphical overview visualizations of large amounts of data, are all helpful. The FARE framework discussed earlier is also a useful tool for understanding context and generating insights. Examples of tools in this mode:

- Context map: visually organizes the context elements such as users, products, services, messages, companies, and creates overviews.
- Innovation map: overviews of innovation occurrences, types, numbers, and uptake, both at company and industry levels.
- Value web: illustrates the value (money, information, materials) exchanged among the context elements.
- Era diagram: visualizes the historical evolution of changes and reveals major eras on a timeline.
- Innovation diagnostics: assesses the innovation capabilities and competencies of relevant organizations.
- Competitive landscape: compares the innovation capabilities and competencies of competing companies.

Mode 4: frame insights

Finding patterns and framing user/context insights

After gathering information about users and contexts, the next step is to bring structure to what has been found. This is where innovators sort, cluster and organize the data gathered in the previous three modes and begin finding important patterns. For example, by analyzing a positioning map of problems faced by users in their daily lives, dense groups of common problems might emerge, pointing to areas of unrealized opportunity or needs. Similarly, analyses of context data might show patterns that point to untapped market opportunities or niches. Finding insights and patterns that repeatedly emerge from multiple analyses of data is at the core of this mode.

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statements that can be used to think of concepts. An example of a design principle is “Innovations should enhance social interaction”. A second option is to turn insights into “criteria”, standards or rules on which ideas can be based; for example, “reduced cost”.

Another powerful way to link insights to concepts is by creating whole new frameworks – sets of assumptions that support a way of viewing the future – that are comprehensively built, from the ground up, out of patterns found in the research. Some examples of tools in this mode:

- User data analysis: helps sort, organize, and analyze the data derived from user research.
- Context data analysis: structures contextual data and shows patterns of relations, flows, historical developments, and value exchanges.
- List sorting: sorting lists based on relations, creating clusters, and showing patterns through visualizations like matrixes, Venn diagrams, maps, nets, trees, or profiles.
- Flow/experience map: shows the flows of information, materials, transactions, and experiences as people interact with context elements.
- System simulation: visualizes context as a system of interconnected parts, simulates its behavior, and analyzes evolving patterns.
- Analytic frameworks: tools that use numerous existing frameworks to organize contextual information and analyze the resulting patterns.
- User journey: analyzes user’s pathways through experiences.

Mode 5: explore concepts

Identifying opportunities and exploring concepts

This mode focuses on structured brainstorming to identify promising opportunities and to explore new concepts, starting from the insights, principles, and criteria framed earlier. To encourage fresh and bold thinking, innovators should build on each other’s ideas while carefully postponing critical evaluation. Further, purposefully exploring concepts that are based on the findings from our research and analysis, ensures that the concepts are defensible and grounded in reality.

Many categories of concepts are typically explored, from products, services, and communications, to environments, brands, and business models. All proposed concepts are documented and linked back to a framed insight, principle, and/or criteria. Even at this early stage of exploration, it can be useful to construct paper or sketchbook prototypes, either to focus team discussions or to get early user or client feedback.

Exploring concepts happens at many levels. There is micro exploration to conceive “point-concepts” that solve specific problems, such as “interacting with a control”; and there is also macro exploration that builds “system-concepts” by integrating point concepts into a whole. Switching back and forth between micro and macro explorations is common while in this mode. Examples here include:

- Insights to innovations: a tool to move from insights, design principles and criteria to concept exploration.
- Concept definition: defines both point and system-level concepts as concise statements, diagrams, sketches, or illustrations.
- Concept matrix, map: explores concepts in a matrix or map with two dimensions.
- Concept manager: an organizational tool to manage the large number of concepts innovation teams produce.

Mode 6: frame solutions

Prototyping concepts and framing solutions

The concept exploration of the previous mode results in a large number of ideas. Evaluating all these concepts and identifying the ones that bring the most value to stakeholders (primarily users and businesses) is essential. They also need to be organized into useful categories and hierarchies. The most valuable point-concepts and system-concepts can then be combined into systems of concepts that work together and reinforce each other's value, such as Apple's system of iPods products, iTunes software, and related accessories like system docks.

The success and adoption of new concepts depends on their fit with users and contexts. To ensure successful fit, innovators need to iteratively prototype and test concepts in real situations early on in the process, before investing too much on implementation. Both unexpected problems and unforeseen opportunities can thus be identified early, when the ideas are still fresh and not yet fully fleshed out, and before big investments are made. As the ideas become more complex, prototypes should remain tightly focused on the key concepts and interactions we want to test. Innovators also need to develop meaningful evaluation criteria for each of the test cycles, based on the original innovation intent and the insights framed earlier.

The most promising concept systems are then framed as overall solutions, and illustrated through stories and scenarios about the possible future, diagrams and prototypes. Descriptions of solutions are turned into depictions to give the team, the users and the client(s) a visceral sense of "what could be." Some tools for doing this include:

- Concept systemizer: synthesizes systems of concepts by combining point-concepts.
- Scenario plan: creates future scenarios and builds stories out of the explored concepts.
- Behavioral prototype: test the nature of user's behaviors around low-fidelity prototypes.
- Concept prototype: used to build models, simulate functions, and evaluate features.
- Prototype evaluation: measures the user value and business value of prototypes.
- Business illustration: depict solutions as stories, illustrated with diagrams and prototypes.

Mode 7: realize offerings

Evaluating solutions and planning implementation

Once potential solutions are framed and prototypes tested, we need to evaluate them to move to implementation. We need to ensure that the solutions are purposefully built around people's experiences and can provide real value. We also need to make sure that these solutions add economic value for the companies producing them.

Once we have a good sense of high-value solutions, we move to implementation plans. For this, design and business innovators need to collaborate deeply to define viable strategic directions. Roadmaps are created to show the speculated progression of solutions in distinct phases. These roadmaps are shared with the stakeholders, showing everyone involved the steps necessary to implement the solution. A business case is prepared for

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prompting further action; with clearly defined and specific initiatives the company will follow to facilitate implementation. Some tools that help here are:

- Strategic roadmap: tracks the strategic evolution of concepts over distinct phases.
- Innovation brief: presents solutions and their key values to internal and external audiences.
- Strategic plan: builds the company's innovation strategies around the explored solutions.
- Tactical plan: details the tactical steps needed to realize offerings.
- Business case: transforms the concepts into a viable business plan.

The seven modes of the design innovation process discussed above are followed by a series of actions for successful execution and implementation of new offerings. Fostering a positive environment for successful innovation adoption is the key here.

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