Distributed product development
Mobilizing many to create one

A pattern study from the Center for the Edge’s Patterns of Disruption series
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Overview

In the report *Patterns of disruption: Anticipating disruptive strategies in a world of unicorns, black swans, and exponentials*, we explored, from an established incumbent’s point of view, the factors that turn a new technology or new approach into something cataclysmic to the marketplace—and to incumbents’ businesses. In doing so, we identified nine distinct patterns of disruption: recognizable configurations of marketplace conditions and new entrants’ approaches that can pose a disruptive threat to incumbents. Here, we take a deep dive into one of these nine patterns of disruption: **distribute product development.**

**Distributed product development**

**Mobilizing many to create one**

**Def:** Engage a large number of third parties in product design and development to create superior value.

Rapid advances in communication and collaboration technologies make it easier to mobilize a large number of external participants in product design and development. Even relatively small organizations can gain advantages in speed, scale, and flexibility by leveraging the contributions of third parties, shifting sources of strategic advantage from the resources an organization controls to the resources the organization can engage in bringing new offerings to market. The management techniques to harness these dynamics are powerful in their own right, but the real power comes from their ability to spawn a continuing series of innovations for the organization and the broader set of participants.

In the report *Patterns of disruption: Anticipating disruptive strategies in a world of unicorns, black swans, and exponentials*, we explored, from an established incumbent’s point of view, the factors that turn a new technology or new approach into something cataclysmic to the marketplace—and to incumbents’ businesses. In doing so, we identified nine distinct patterns of disruption: recognizable configurations of marketplace conditions and new entrants’ approaches that can pose a disruptive threat to incumbents. Here, we take a deep dive into one of these nine patterns of disruption: **distribute product development.**
Distribute product development
Mobilizing many to create one

Cases
- Wikipedia x Britannica/Encarta
- TripAdvisor x Travel guide books
- PortalPlayer x Digital music players

Conditions
Where is it playing out?

Catalysts
When?

Challenges
Why is it difficult to respond?

Markets that are information-rich, in which customers are largely satisfied with a single product to meet a broad range of needs, vendors infrequently solicit input from third parties, and products require a diverse set of specialized knowledge for development.

Enabling technology
Digital infrastructure providing richer connectivity.

Customer mind-set shift
From passive customer to active participant.

Platform
Scalable learning and aggregation platforms, increasing collaboration.

Renders significant assets obsolete
Existing product manufacturing facilities may need to be written off to take advantage of development opportunities.

Challenges core assumptions
Changes assumptions about what customers want and how third parties are involved in product development.

Arenas

Technology—software
Life sciences

Oil and gas providers
Commodities—food

More vulnerable
More resistant

Graphic: Deloitte University Press | DUPress.com
As information and resources flow more freely and rapidly, product life cycles across many industries have compressed. Even successful products fall by the wayside more quickly as new generations come through the pipeline in response to changing consumer demand and dynamic markets. In more stable times, once we had learned something valuable, we could generate value from that stock of knowledge for a long time.

Today, advances in the tools for coordination and collaboration are making engagement models that involve large numbers of external participants more effective and practicable. Organizations using these new models to involve passionate third parties, such as consumers and suppliers, in product design and development processes, can often learn faster and, as a result, move faster to more effectively address the changing needs of customers, with fewer internal resources. Further, the tacit knowledge that is developed and shared around specific process and product components lays the groundwork for additional innovations and opportunities for everyone involved. This shift in the way products can be created, and the rate at which we can produce, capture, and share information across individuals and institutions has profound implications for how organizations create and capture value.

Distributing product development is an entirely different model from traditional hard-wired development as shown in figure 2. It requires the organization to focus on mobilizing and coordinating rather than managing and planning. In practice, that tends to require a more modular approach, which leverages loosely coupled groups and activities that encourage participation from diverse, specialized third parties.

This approach allows innovation to emerge from a larger, more diverse group of participants, rather than remain in the exclusive domain of select executives and R&D specialists. It is powerful—and threatening—through its leverage: Accessing resources where they are and distributing the problem among them in a decentralized fashion can enable greater speed, flexibility, and scalability without the institutional overhead or capital requirements. By affording external parties latitude over the ultimate design and form of the product,
distributed product development is distinct from traditional outsourcing arrangements, which typically involve only a small set of vendors executing on tightly defined specifications over which they have little or no influence.

Initially, efficiency benefits can be significant; however, they are only a small part of the story. Over time, dynamic specialization leads to increasing returns. Third parties begin to specialize in the activities where they have distinctive capabilities and can make the biggest impact and shed the activities that can be better performed by others. Companies can then become more focused and learn more rapidly in their chosen areas of specialization without the distraction of other activities.

The external participants involved in distributed product development—similar to those building on top of a product platform—can be customers or other businesses within the ecosystem. One key difference between those involved in product platforms and those engaging in distributed product development, however, is that most distributed product development efforts are focused on engaging a wide number of participants to develop a single product whereas product platforms are focused on engaging third parties to create many variants of a core product. In both cases, individual contributions may be motivated through non-financial, intrinsic rewards like burnishing a reputation among peers, or the simple sense of accomplishment associated with contributing to a learning community. These communities generate passion, and intrinsically motivated contributors pursue what they deem most exciting, opening the door for radical innovations affecting a large number of people and technologies. In aggregate, these seemingly small contributions can lead to unprecedented scale and scope.

Technological catalysts, such as smartphones, laptops, and richer connectivity, dramatically expand the power and potential of the crowd by endowing them with increasing access to information and improved capacities for computation and communication. Learning and aggregation platforms minimize the cost
to access information and make it easier to find opportunities to collaborate and contribute. As a result, ownership of intellectual capital is becoming more distributed than ever.  

Whether leveraging the customer or the ecosystem, distributed product development can prove challenging to incumbents accustomed to protecting proprietary stocks of knowledge—the patents, processes, or formulas—that are expected to generate a steady stream of future returns. It challenges both their core assumptions about where innovation happens as well as what’s required to create value. In the “zero-sum” view of the world, intellectual property is closely guarded, and employee productivity is maximized through ever more standardized roles and processes. Unburdened by this legacy mindset, new entrants can more easily take advantage of “pulling” in external participation, handing over partial control and sharing intellectual property to create increasing returns. Once developed, the capabilities for mobilizing and coordinating external participants in product development can become self-reinforcing and help build capabilities throughout the ecosystem to develop offerings that would otherwise not be possible.

This pattern will likely affect markets where customer needs are changing rapidly, products are not modular and have many potential use cases and features, and there is no significant credentialing or regulatory requirements. It will be most threatening in information-rich product environments that rely on limited specialized knowledge and where there are currently few, if any, customer touchpoints during the development process.

“So, there is a huge competitive argument about sustaining the capacity for open-source and consumer-driven innovation, because it’s one of the greatest competitive levers against monopoly.”

—Charles Leadbeater, author  

Distributed product development
Digging deeper

How does distributed product development relate to outsourcing?

Distributed product development processes might resemble more traditional outsourcing relationships, but with a key difference: Outsourcing relationships, whether they involve outsourcing design to a single party or focus on assembling products from many component manufacturers, typically involve tightly structured arrangements with strict specifications requiring lengthy negotiations and detailed contracts. Distributed product development processes create very different kinds of relationships that are much more flexible in nature and often span a larger scope of the company’s operations.

How does open innovation compare to distributed product development?

If you look at most of the widely cited examples of successful open innovation, the model in use poses a question to a group of “solvers” who then provide an answer. You might call this the transactional model of open innovation—while the results can often be significant, the third-party interactions are narrowly defined and short term. Problem posted, solution offered, payment made, transaction completed, all parties move on. This approach has two limitations relative to more robust forms of distributed product development. First, it misses the opportunity to build long-term trust-based relationships among participants. Second, it does not encourage participants to build cumulatively upon the contributions of others.
Encyclopædia Britannica likely did not expect to be displaced soon after earning record revenues in a centuries-old stable business. But as the requisites of success changed, so did the fortunes of both Britannica and its first serious threat, Encarta.

First published in 1768, Encyclopædia Britannica was considered for centuries to be the premiere source of general interest reference knowledge. In its prime, it relied on a team of a few thousand specialized and venerated contributors to establish credibility and maintain its leadership of the reference information market. This premium strategy worked in an era where marginal cost of production was high and access to expertise was expensive and difficult to obtain. But manufacturing and distributing a CD-ROM proved to be more cost efficient than producing a set of books, each with thousands of pages, and Encarta was able to price lower as compared to Britannica ($99 versus upward of $1,200). Despite pulling content from less-respected publishers, Encarta attracted customers with its multimedia content and ability to link between articles. While the 750 MB capacity of the disc limited the amount of content able to be stored, the mass-market seemed content with a large foundation of core knowledge and the more frequent updates of content on Encarta. By 1996, Encarta controlled 44 percent of the $60 million digital encyclopedia market.

Wikipedia’s entrance in 2001 heralded an innovation in reference information that transformed the industry by leveraging an aggregation platform to capture widely distributed intellectual capital from passionate and informed contributors that could scale and update more rapidly than any single institution could on its own. Rather than producing an encyclopedia in-house, Wikipedia provided the world with the means to document its knowledge. It also allowed for emergent design, letting the contributors shape...
content and structure to consumer interest. Where Britannica and Encarta were focused on managing resources, Wikipedia focused on mobilizing them. Jimmy Wales, founder of Wikipedia, likes to note that Wikipedia initially had no employees.\textsuperscript{13} The efforts of a few (or one, in this case) unleashed the efforts of thousands.

Wikipedia quickly gained traction and surpassed Encyclopædia Britannica in number of articles a mere two years after launch. Over the following decade, Wikipedia attracted over 750,000 contributors and contained 4.5 million articles, compared with Britannica’s 4,000 contributors and 120,000 articles.\textsuperscript{14} Surprising perhaps everyone except the iconoclasts, Wikipedia has been able to maintain accuracy comparable to Britannica at much larger scale.\textsuperscript{15} Extensive review protocols, both manual and automated, encourage acceptance of communal standards and promote meritocracy within the volunteer editorial community, and their “neutral point of view” policy inspires confidence in readers.

Allowing third parties to edit introduced a new standard for reference information: broader, more accessible, and faster to update than anything before. Incumbents could not compete; encyclopedia sales, already diminished by the arrival of the CD, fell from more than $150 million in 1990 to $10 million in 2012 (figure 3). Encarta dissolved in 2009 and Encyclopædia Britannica halted print operations in 2012.\textsuperscript{16} In 2009, Wikipedia had 97 percent share of the online encyclopedia market and 184 times the page view volume of Encyclopædia Britannica online.\textsuperscript{17}

\textbf{Figure 3. The two-phase displacement of Encyclopædia Britannica}

![Figure 3](chart.png)

Note: 1996 revenue for Britannica does not include sales of Britannica CD-ROMs; however, based on the rapid decline in the price of Britannica's CD-ROMs (they declined from $1,200 to less than $100 in the span of less than a year), it is clear that Britannica's CD-ROMs were not selling that well. Online subscriptions, which were first offered to households in 1996 at $150 and then $85 are also excluded for lack of data. 2012 household subscriber revenues only account for households that paid for subscriptions; it does not include any incremental revenues that may have been earned indirectly from those households that did not pay annual subscriptions and instead obtained access through distribution partners such as telecom companies and Internet providers.


Graphic: Deloitte University Press | DUPress.com
Short story

Apache

Who would believe that the organization creating the web server technology used to power over half the Internet has no employees and instead relies on just over 2,500 passionate volunteers? Apache HTTP Servers have powered a majority of Internet traffic, currently over 56 percent, since shortly after their release in 1995. The product has been so reliable that it displaced the then market leader, the National Center for Supercomputing Applications (NCSA), within a few short months, and continues to power significantly more traffic than competitive products from Microsoft, Google, and Oracle (figure 4).

Apache HTTP Server protocol is one of the preeminent examples of successful open-source collaboration; the secure, robust technology relies on no professional contributors, instead relying on a core group of developers to mobilize a larger group of developer participants who share the same motivating imperative—that the Internet should have a free, safe, and extensive open-source web server. In the community, competence is currency, and prolific contributors tend to become well-known and respected. While everyone is invited to contribute, governance protocols determine whose contributions will actually be integrated into each new release of the product.

Interestingly, the Apache foundation counts many of its competitors, such as Microsoft and Google, as its sponsors. These competitors continue to find it hard to respond because of Apache’s passion, scope, and momentum.

Figure 4. Apache open-source web server technology displaces leading incumbents in two years

TripAdvisor disrupts the travel guide book market

Travel guide books, popularized globally in the 19th and 20th centuries by publishers like Frommer’s and Lonely Planet, were once the source of information about travel destinations near and far. In a few short years, however, TripAdvisor disrupted these travel guide book publishers by providing an inclusive aggregation platform for travelers to post their own personalized reviews and experiences. By mobilizing the crowd rather than relying on a dedicated group of experts, it was able to achieve unprecedented scale and deliver the most recent information available. This market became particularly vulnerable because, on the one hand, the experience and expertise it needed access to was widely distributed and difficult to locate, and on the other hand, smartphones emerged as a newly available and affordable means of letting customers themselves capture and contribute the information they felt was most helpful and relevant in real time.

Sourcing content from travelers gave TripAdvisor a way to reach unprecedented scale at low cost. That scale, both in breadth and depth, inspired confidence in readers to make informed decisions to find the trip that best fit their needs. Providing content at no cost allowed TripAdvisor to enjoy an audience significantly larger than any travel guide before it. Its large audience propelled its growth, both through network effects and the advertising revenue they brought in.22

While a physical travel guide might be a few hundred pages long and updated seasonally, by 2012 TripAdvisor had accumulated more than 75 million reviews and 11 million pictures on more than 1.6 million businesses in over 110,000 destinations.23 Updates came in constantly, and the most recent information was prominently presented. This was a key success factor in an industry with fragmented demand and a desire for the most recent information.

Figure 5. TripAdvisor grows to be 10x larger than the top travel guides in less than six years


The leading travel guides have suffered since TripAdvisor’s rise and were forced to shift from being a source of authority to one of inspiration, and their sales and valuations have suffered dramatically. From 2006 to 2012 (figure 5), TripAdvisor’s revenues grew seven-fold, from $100 million to $762 million, while travel guide sales decreased by more than a third, falling from $119 million to $77 million.\(^24\) In a market of TripAdvisor and the top five travel guides, TripAdvisor’s share grew from 46 percent in 2006 to 91 percent in 2012.

Ultimately, while successful, TripAdvisor’s use of distributed product development is still limited relative to its potential to foster more sustained, significant trust-based interactions among users, mobilize participants, galvanize engagement, and lead to significant future business opportunities.

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**Short story**

**PortalPlayer**

While the Apple® iPod® digital music player\(^25\) is now synonymous with the MP3 player, the MP3 industry was actually born in 1998 with Saehan Information Systems’s MPMan. The iPod, released three years later in 2001, entered a crowded market, where there were roughly 50 portable MP3 players vying for customers in the United States.\(^26\) Within three years, however, Apple sold almost 42 percent of all digital music players and 82 percent of US retail hard drive-based digital music players.\(^27\) Apple took its product from initial approval to market in just nine months. This feat was largely due to the collaborative creation nets organized by Apple’s semiconductor contractor, PortalPlayer.\(^28\)

PortalPlayer had an extremely challenging task ahead of it: Apple demanded a high-performing device integrating specialized electronics. Microprocessors, digital-to-analog conversion technologies, power management circuits, flash memory, batteries, and hard-disk-drives, among other technologies, would need to work together seamlessly. Recognizing the limitations of its organization, PortalPlayer beckoned a global network of leading technology companies, some of whom were traditionally competitors, to complement it in developing what eventually became the iPod.

The network and system were structured to access the most cost-effective, high-quality talent globally, and the product was designed from the ground up to be modular. Focusing on rapid iteration to improve performance and reduce cost, PortalPlayer leveraged loosely coupled participants for high efficiency and engagement. For efficiency, processes were modularized and interfaces standardized to facilitate independent work and reduce integration complexity. For engagement, PortalPlayer selected the best solution for each component every six months. This rapid development cycle produced two major positive effects; the quick turnaround allowed for a continual stream of customer feedback into the development process. Creation network members would focus their efforts on satisfying customer needs in the hopes of winning the upcoming semiannual release, which fostered a healthy environment of both cooperation and competition. On one level, these third parties competed with one another for their particular technology to be included in the next release. If partners were unsuccessful in a particular round, however, they were incentivized to continue to participate and collaborate because there was uncertainty as to which partners would be helpful in successive rounds.

Even industry powerhouses like Apple can perform at higher levels when they leverage ecosystems of participants, like the one PortalPlayer orchestrated. Incumbents were challenged to replicate PortalPlayer’s approach and found the assets available to them were quickly dated in a rapidly evolving market. While Apple was responsible for many of the distinguishing features of the iPod, PortalPlayer was the driving force behind the innovative technology that contributed to the quick ascendancy of the original iPod to market dominance.\(^29\)
Is my market vulnerable?

**Do I gain my competitive advantage from expertise across fragmented disciplines?**

More complex products or services that require input from different disciplines will likely benefit more from a model that can dynamically pull in the best thinking or capabilities from each discipline rather than rely on captive resources that are static. Simpler products may not gain an advantage from reaching beyond the four walls for expertise.

**Do my offerings have a high degree of modularity?**

Modular products can more easily be distributed out to separate entities to innovate on part of the product and minimize the effort required to integrate all of the product components. However, disruption is more likely in industries where products have not been modular and a new entrant finds a way to modularize and distribute development on a rigid and tightly integrated product. Then, the best talent can be paired with the appropriate module.

**Am I operating in an industry with short or shrinking product life cycles?**

Shortening life cycles are increasingly incompatible with product companies’ internal product development processes. The use of a flexible, collaborative ecosystem where participants can bring to bear leading capabilities on specific aspects of the design may bring products to market faster.

**Do I involve the customer in product development?**

Customers increasingly expect products that fit their specific needs rather than standardized specifications. Markets that have not typically focused on the customer will be vulnerable to models that bring more personalized products to market, especially through methods that accommodate the customer to help shape the product.
Am I prepared to co-create new intellectual property with third parties?

Companies that are focused first on protecting IP will tend to assess third-party participation as too risky or will burden it with formal agreements and processes that prove too cumbersome to move quickly. Markets where IP protection is common will be more vulnerable to a new entrant willing to relinquish control in order to get products to market and into customers’ hands faster.

Are customers using my product to satisfy a diverse set of needs?

Customers are more likely to receive significant value through distributed product development when there are diverse needs. If customer needs are fairly uniform, there is less value to be gained from distributing development to specialized experts. Products with more potential uses may also tend to attract more third parties to work on the product requirements for a specific use.
Endnotes


16. McCarthy, “Encyclopedia Britannica halts print publication after 244 years.”
23. TripAdvisor, “Fact sheet.”
25. Apple and iPod are trademarks of Apple Inc., registered in the United States. and other countries.
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About the research team

This report and the Pattern write-up series would not have been possible without the hard work of our research team—colleagues who tracked down case studies and cheerfully dug for data and more data on the way to proving and debunking countless possible patterns.

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About the Center for the Edge

The Deloitte Center for the Edge conducts original research and develops substantive points of view for new corporate growth. The center, anchored in Silicon Valley with teams in Europe and Australia, helps senior executives make sense of and profit from emerging opportunities on the edge of business and technology. Center leaders believe that what is created on the edge of the competitive landscape—in terms of technology, geography, demographics, markets—inevitably strikes at the very heart of a business. The Center for the Edge's mission is to identify and explore emerging opportunities related to big shifts that are not yet on the senior management agenda, but ought to be. While Center leaders are focused on long-term trends and opportunities, they are equally focused on implications for near-term action, the day-to-day environment of executives.

Below the surface of current events, buried amid the latest headlines and competitive moves, executives are beginning to see the outlines of a new business landscape. Performance pressures are mounting. The old ways of doing things are generating diminishing returns. Companies are having a harder time making money—and increasingly, their very survival is challenged. Executives must learn ways not only to do their jobs differently, but also to do them better. That, in part, requires understanding the broader changes to the operating environment:

- What is really driving intensifying competitive pressures?
- What long-term opportunities are available?
- What needs to be done today to change course?

Decoding the deep structure of this economic shift will allow executives to thrive in the face of intensifying competition and growing economic pressure. The good news is that the actions needed to address short-term economic conditions are also the best long-term measures to take advantage of the opportunities these challenges create.

For more information about the Center’s unique perspective on these challenges, visit www.deloitte.com/centerforedge.
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