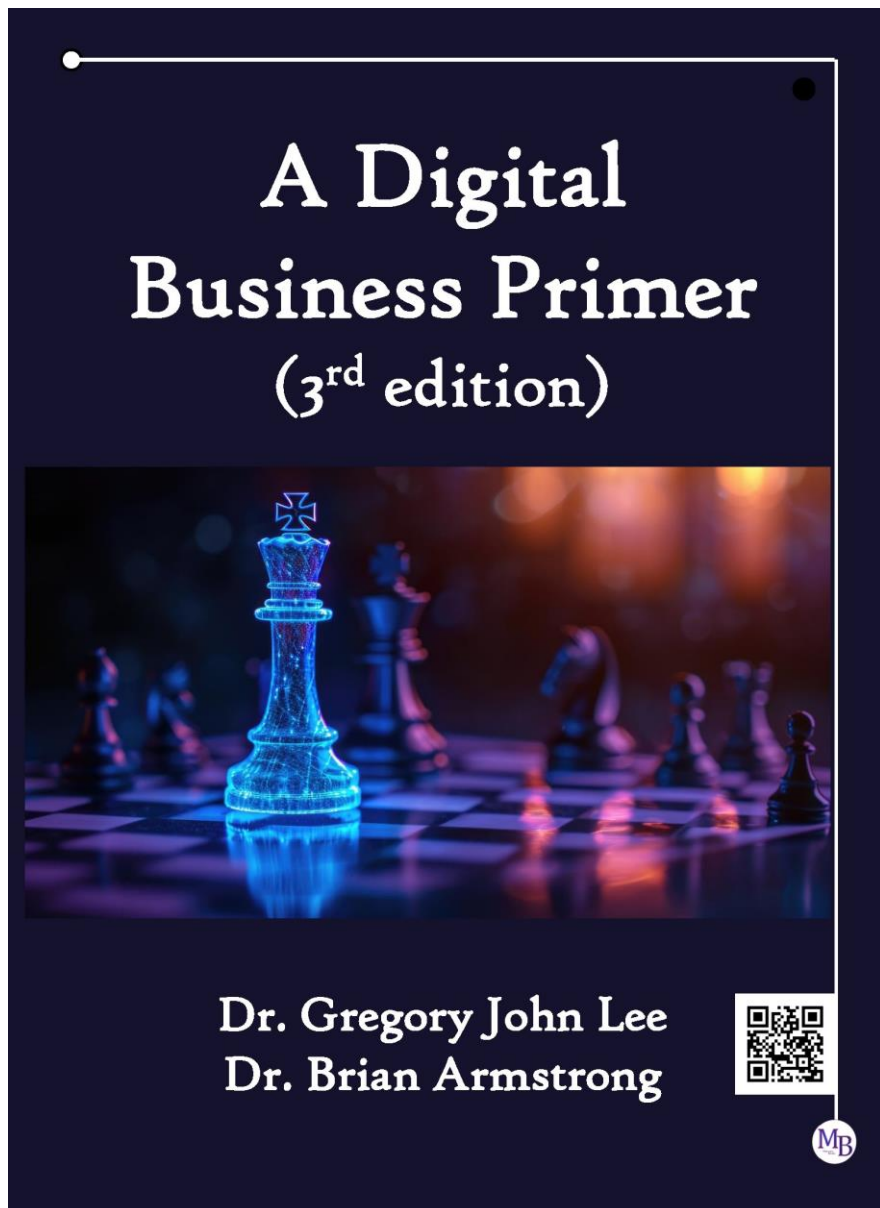


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The Crucial Triad

From:



THE CRUCIAL TRIAD: THREE INGREDIENTS OF DISRUPTION

In our books, we argue that three major forces dictate the impact of technological disruptions. It can be argued that the unprecedented impact of the digital revolution arises from the convergence of these three macro-forces. Figure 1 summarizes these forces; they are a) the technology, b) the market demand for the disruption (notably, the forces attracting your target market to accept and adopt the disruption), and c) ways of doing business, for which we will employ the notion of the business model. We term these the 'crucial triad'.

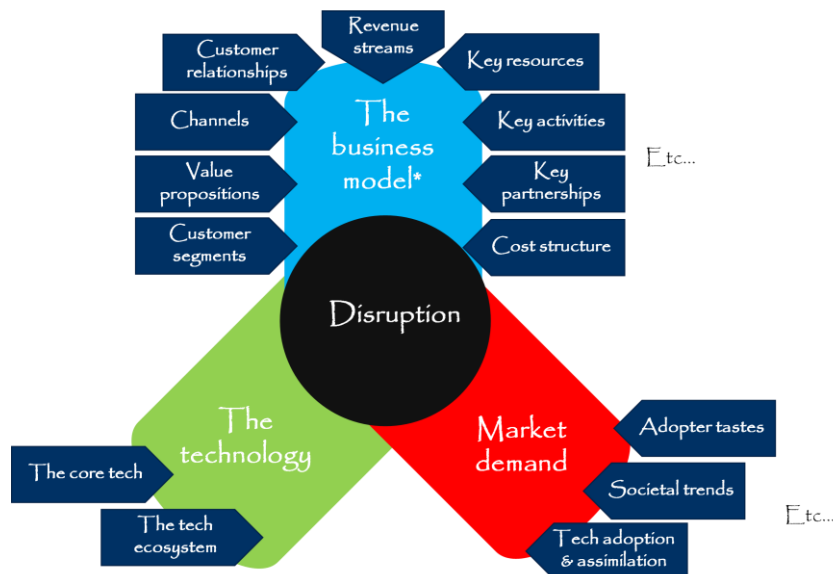


Figure 1: *The crucial triad - major forces that underpin successful digital disruption*

Note: The business model tags here are based on the Business Model Canvas (e.g., Osterwalder *et al.*, 2005)

In order to achieve a technological disruption, there are two important things to note regarding these three forces:

- All three of these forces must be sufficiently 'in play', in other words, accounted for. Failure to adequately account for one of these forces, for instance, if you do not have an adequate business model, will disable the potential for disruption even if the other forces are strongly accounted for.
- However, it is not enough to account for all three. To truly disrupt, *at least one of these three forces must be a source of genuine disruption, and it does not always have to involve innovative or groundbreaking technologies.* Sometimes the source of a disruption can be more about changes in markets or society or about an innovative business model: the technology may support and carry such disruptions, but in such cases the technology may not be particularly innovative or new. We give examples below.

The below sections discuss each of the three forces underlying disruption.

The Technological Leg of the Crucial Triad

As seen in Figure 1, the technology underpinning the potential disruption is, of course, critical. The technology should be mature and sufficiently developed to work. Many 4IR technologies that we consider cutting-edge and disruptive are, in fact, decades old. Despite decades of development, these technologies have only recently begun to be ‘good enough’ to bring to market and begin to make a real impact.

However, the core technology is not the only technological factor. All technologies embed themselves in a broader technological *ecosystem*, such as networks the technology must work within, other technologies it must link to, and so forth. The technology must work well with and within this ecosystem, and if the ecosystem itself is not well developed then there is a chance that the broader project may fail.

The below illustration gives some examples of how the technological roots are critical to technological disruption, both internally and with regard to ecosystems.

Illustration: The early days of smart fridges and centralized patient records

One of the first big consumer drives of the Internet of Things was smart internet-connected refrigerators, which were touted as the ‘next big thing’ at electronics conventions and in appliance media from about year 2000 (Cook, 2016). Appliance manufacturers have promised a wide variety of connected functionality, such as fridges being able to monitor food, reorder stock from retailers, auto-pay for online delivery, allow the owner to monitor contents remotely, and so forth. This trend has never taken off (Cook, 2016). Part of the reason for this is that the technology was initially not good enough. Firstly, the internal features such as the sensors or computing were not always very good, with some public failures visible at large exhibition demonstrations (e.g. AFP, 2018). However, the ecosystem was also problematic. Internet connectivity was highly problematic during the first big push (2000-2007). Retailers did not have online ordering systems even remotely capable of connecting to such devices and to process orders, with systems such as Amazon Fresh only recently beginning to break such ground. Simply put, the idea was technologically premature. Whether it will disrupt in the years to come partly depends on whether we have overcome some of these technological issues.

Another example is early attempts to digitalize patient records in hospitals. These attempts, using pre-smartphone handheld devices, suffered a variety of technological problems, including battery power, rudimentary and inflexible interface applications with regard to data entry, and connectivity, with WiFi in hospitals being poor. As we will see next, however, user attitudes were perhaps the biggest inhibitor.

It is true that technology can be the core source of disruption, if it is innovative and groundbreaking as well as meeting core market needs. In our books we talk about the Google AI & augmented reality microscope which embeds AI in a microscope to enable the detection of cancers, and indicates the presence of a cancerous cell to the pathologist in real time by putting an augmented reality ring around the suspected cancer. We would argue that technological innovation is the predominant source of the potential disruption.

However, as noted in Figure 1, technological disruption is certainly not only rooted in the technology itself, and, in fact, it may act more as a supporting platform for disruptions that are

more rooted in transformations within the target market or the business model. Below, we discuss the second major force.

The Market Demand Leg of the Crucial Triad

The second major force that must be harnessed for tech-driven change to take root is market demand, acceptance and adoption. In short, even great technology cannot thrive unless users accept it and, therefore, a market is created. More powerfully, it is the resonance between changing consumer demands and the ability of new technologically-enabled offerings to satiate that demand that creates actual disruption. Conversely, a plethora of technological initiatives have failed because they did not resonate with users or consumers. Conversely, a plethora of technological initiatives have failed because they could not inspire users or consumers. In some cases, earlier technological innovations trigger changes in societal norms and wants, which in turn create conditions in which later technological innovations can flourish. We see a positive feedback loop between technological change, which stimulates market and societal change, which in turn creates demand conditions for further technological change.

We note that “market” demand may also refer to internal organizational projects, such as process improvements using RPA. In such cases, the “market” is the target management, employees and so on. Their demand, acceptance and adoption are equally as important as when the innovation is targeted at customers.

To continue the example of smart fridges from the previous illustration, this technology did not fail to take off merely because of the technological challenges. Consumers also did not respond with enthusiasm to the technology, not only because of the design issues but in addition because they did not feel that they *wanted* smart fridges. Also continuing from Illustration, centralized and digitalized patient records have not failed in the past only because of technology. On the contrary, cultures among both nurses and doctors have been an issue. In one such experiment in South Africa, nurses failed to adopt digital recording mechanisms for patients partly for the reason that they felt it did not accord with their training and culture (Whittaker et al, 2011). In addition, doctors are often resistant to such initiatives as they fear it breaches the long-standing tradition of doctor-patient confidentiality.

It is worth noting that some technological revolutions succeed because they are built into an already-accepting context, for example, where smart innovators create technology that taps into a rising social trend. This is where societal change creates a positive feedback loop with technological change. The plethora of social media applications – Twitter, Instagram, Snapchat, TikTok, and many more, have risen to prominence in an era where people are hungry for digital social interaction, which was in turn stimulated by early social media applications like Facebook (see the illustration below). Likewise, the phenomenon of COVID-19 led to a widespread adoption of collaboration and online meeting platforms.

Alternatively, it is possible, albeit probably much harder, for organizations to stimulate a social trend and create markets, for instance through clever advertising, product placement, or media attention. You could perhaps argue that the cult of personality that has grown around Elon Musk has had a lot to do with building a societal taste for electric cars, and that Tesla has survived and grown off the back of his trend-creating abilities.

In some cases, as discussed earlier, the societal trends are the truly disruptive force among the crucial triad in creating a digital revolution, although the other two factors must still be addressed for such a disruption to occur. Illustration gives an example where transformations in

the target market were the true source of disruption, supported certainly by technology and business models.

Illustration: Target market transformation at the fore in the social media revolution

To illustrate the power of user trends and market creation, consider social media. Social media is (mostly) hardly impressive technology; yet this is one of the most influential digital revolutions of the past two decades. At their heart, social media sites are just webpages or even simpler technologies. Twitter, for instance, is remarkably simple, until recently involving just text: it is basically public SMS! Facebook does have some impressive technology, such as its Deepface facial recognition algorithm and its cloud storage, but it, too, is mostly quite simple technology, essentially involving linked webpages. However, the real revolution inherent in social media is that at some stage in human history multiple generations decided together to share their lives and thoughts online. Social media companies may have piggybacked on this zeitgeist, or, perhaps to some extent, helped create it; but it is the social trends and market creation that really led this revolution. Note, however, that technology and business model elements are still absolutely required to have a successful social media product.

The Business Model Leg of the Crucial Triad

The final crucial element to consider is the business model, that is, the way we do business and the ways in which we create and distribute value. Figure 1 expresses the elements of a typical business model through popular Business Model Canvas of Osterwalder *et al.* (2005), which the next subsection unpacks.

A. The Business Model Canvas: One Way to Describe a Business Model

Osterwalder et al. (2005) developed the popular Business Model Canvas business as a way to describe the business model of an enterprise or endeavor. This tool suggests that there are nine elements to a business model, each of which is described by several key questions or considerations. The Business Model Canvas is unpacked in Table 1 below.

Table 1: Elements of the Business Model Canvas

Source: Based on Osterwalder et al. (2005)

Business Model Theme	Focal Areas	Business Model Canvas Key Questions
Customer value proposition	Customer segments	<ul style="list-style-type: none"> • For whom are we creating value? • Who are our most important customers? • What are the customer archetypes?
	Value propositions	<ul style="list-style-type: none"> • What value do we deliver to our customers? • Which one of our customers' problems are we helping to solve? • What bundles of products are we offering to each segment? • Which customer needs are we satisfying? • What is the minimum viable product?

Business Model Theme	Focal Areas	Business Model Canvas Key Questions
How to deliver it – resources & organization	Customer relationships	<ul style="list-style-type: none"> • How do we get, keep & grow customers? • Which customer relationships have we established? • How are they integrated into the rest of our business model? • How costly are they?
	Channels	<ul style="list-style-type: none"> • Through which channels do our customer segments want to be reached? • How do other firms reach them now? • Which ones work best? • Which ones are the most cost-efficient? • How are we integrating them with customer routines?
	Key activities	<ul style="list-style-type: none"> • What key activities do our customer value propositions require? • What key activities do our channels require of us? • What key activities do our customers require of us? • What key activities do our revenue streams require?
	Key resources	<ul style="list-style-type: none"> • What key resources do our customer value propositions require? • What key resources do our distribution channels require of us? • What key resources do our customers require of us? • What key resources do our revenue streams require of us?
	Key partners	<ul style="list-style-type: none"> • Who are our key partners? • Who are our key suppliers? • Which key resources do we acquire from our partners? • Which key activities do our partners perform?
Profitable value capture	Revenue streams	<ul style="list-style-type: none"> • For what value are our customers willing to pay? • For what do they currently pay? • What is the revenue model? • What are the pricing tactics?
	Cost structures	<ul style="list-style-type: none"> • What are the most significant costs inherent to our business model? • Which key resources are the most expensive? • Which key activities are the most expensive?

The business model canvas is shown graphically in Figure 2. This model has become widely used and is a key part of the lean startup methodology (Blank, 2013).

Key Partners	Key Activities	Value propositions	Customer Relationships	Customer Segments
<ul style="list-style-type: none"> Who are our key partners? Who are our key suppliers? Which key resources do we acquire from our partners? Which key activities do our partners perform? 	<ul style="list-style-type: none"> What key activities do our CVPs require? What key activities do our channels require of us? What key activities do our customers require of us? What key activities do our revenue streams require? 	<ul style="list-style-type: none"> What value do we deliver to our customers? Which one of our customers' problems are we helping to solve? What bundles of products are we offering to each segment? Which customer needs are we satisfying? What is the minimum viable product? 	<ul style="list-style-type: none"> How do we get, keep, and grow customers? Which customer relationships have we established? How are they integrated into the rest of our business model? How costly are they? 	<ul style="list-style-type: none"> For whom are we creating value? Who are our most important customers? What are the customer archetypes?
	Key Resources		Channels	
	<ul style="list-style-type: none"> What key resources do our CVPs require? What key resources do our distribution channels require? What key resources do our customers require of us? What key resources do our revenue streams require? 		<ul style="list-style-type: none"> Through which channels do our customer segments want to be reached? How do other firms reach them now? Which ones work best? Which ones are the most cost-efficient? How are we integrating them with customer routines? 	
Cost Structures		Revenue Streams		
<ul style="list-style-type: none"> What are the most significant costs inherent to our business model? Which key resources are the most expensive? Which key activities are the most expensive? 		<ul style="list-style-type: none"> For what value are our customers willing to pay? For what do they currently pay? What is the revenue model? What are the pricing tactics? 		

Figure 2: The Business Model Canvas

Source: Osterwalder et al. (2005)

The Illustration below gives an example of a business model canvas for Nespresso.

Illustration: The Nespresso business model canvas

Nespresso's targeted customer segments were medium to affluent households in major cities, initially in Switzerland, and ultimately now in 700 major cities globally.

The value proposition is comprised of two products: firstly the Nespresso machine, and secondly the pods that go with it.

The distribution strategy is at the heart of their business model. Nespresso sell the machines through general retail outlets serving household appliances and furniture. This means they earn a one-time transactional sales revenue from selling the machines. Most of that money goes to the key partners – the machine manufacturers – with whom they work closely together. But this is not their primary revenue and profit focus. For the Nespresso pods, on the other hand, they have a totally different distribution strategy: they only sell the pods through their own channels. They started out with mail-order and call-center; then they built nespresso.com; and today in the bigger cities of the world one also finds Nespresso stores. This is noteworthy because it meant that they had to build up distribution channels as a key resource in their business model, because the Nespresso pods are the first product that a Nestle-owned company sells directly to households through its own channels.

So why do they use different distribution channels for the machines and the pods? For the machines they use general household retail stores because these offer the broadest reach possible, in order to get the machines into as many households as possible. Then, once a household has a machine in the house, they are actually ‘locked in,’ because they can only use Nespresso pods¹. This creates significant switching costs which prevent households from going to another machine manufacturer. Nespresso have defended this vigorously through the patents that they have in the key resources.

Once a household has a machine and is hence “locked”, they have to buy pods from Nespresso-owned channels, which means Nespresso earn recurring revenues from repetitive pod sales. In doing so Nespresso moved the entire industry from being a primarily transactional business to an annuity business with recurring revenues. Importantly, for the pods, these recurring revenues are through direct sales channels, and have much higher margins – reportedly five to six times more than for traditional ground coffee sales.

The left-hand side of the business model canvas describes what Nespresso have to do well to be able deliver on the right-hand side of the business model canvas. Firstly, they need coffee, so they work together with coffee growers globally to try to source some of the best coffee available. The coffee goes into the pods, which they manufacture themselves. Therefore, production of the pods is an important key activity, and the associated production facilities are a key resource. Nespresso produce about 12 billion pods every year, which is one of their main costs.

Another important activity – and key resource, and main cost – is marketing and branding (which is high even in the context of the high marketing and branding costs typical to consumer goods).

A final activity and resource that is noteworthy is because Nespresso sell directly to households – a decision made on the right-hand side of the canvas – they had to establish a business-to-consumer distribution logistics capability, which we find on the left-hand side of the canvas.

This describes the critical activities and resources that are important for the success of Nespresso on one piece of paper.

Interestingly, when Nespresso started out, they had a totally different business model, around exactly the same product, and they almost went bankrupt. It was only after a number of iterations of the business model that Nespresso were able to find the business model described above, and that led to a multi-billion dollar business. So the difference was not the product alone: the difference was all the different elements of the business model working in unison with the business model canvas that led to the success of Nespresso.

¹ Nespresso’s patents started expiring in 2011 and now one can buy compatible pods from a wide range of vendors in many supermarkets, but the momentum of the original business model continues to help Nespresso retain market leadership

B. The Business Model as a Part of the Crucial Triad

In order to achieve disruption, somebody, or some organizations, must figure out how to build business models around the new disruption that will work. Innovative business models find ways to harness the incredible potential that digitization and digitalization offers. As we discuss further in Vol II of our digital business book series¹, financing and business models in the 4IR era often deviate from traditional models. If the business model is not there – for

¹ Digital Business Vol II: Strategy in a Digital Age

example, the technology and markets have matured but nobody can figure out how to make it profitable or affordable – then, of course, this will cause the initiative to falter.

As we have noted previously, a key component of 4IR business models often vests in their ability to achieve a convergence of different elements, enabled by technology, which generates a new way of creating, capturing, and disseminating value. One example of this is personalized medication based on digital mapping of peoples' genomes. This technology has the ability to radically improve certain pharmaceutical treatments, however, the industry continues to await a pharmaceutical firm that has figured out the mass business model for it (e.g., Kapoor & Klueter, 2015 & 2017). Continuing the social media discussion discussed earlier, the big social media services are all free to use because they have figured out alternative business models to charging fees, a key consideration in their virality (which in itself has become a business priority in many digital business models). Crowdsourcing, platform business models, sharing economy, asset externalization, and others are all facets of new digital business models which are transforming industries and being used to realize the transformative potential of technological change.

The illustration below discusses how the business model has been at the fore of the crucial triad for sharing economy firms.

Illustration: Business model at the fore with sharing economy giants

The sharing economy is exemplified by companies such as accommodation facilitator Airbnb and ride sharing companies such as Uber and Lyft. Again, these companies are generally not boasting very complex 4IR technology – mostly, they use websites and merchant services. They certainly rode a societal trend favoring app-driven access over ownership. In addition, however, the business models involved are arguably the real innovation. Neither Airbnb nor Uber own the accommodation or cars to which they sell access. The idea of on-selling other people's assets for short-term access is at the heart of the new business model, that has quickly attacked traditional hotelier and taxi firms. Once again, note that the technology and social / market trend legs nonetheless remain critical as complements to the business models.

Conclusion to the Crucial Triad

This appendix has established the three forces required to start and sustain a digital revolution. As noted above, attempts to disrupt with technology must sufficiently address all three. However, it is also important to heed the point that the source of the innovative disruption itself need not always be ground-breaking technology, instead, innovators may disrupt by tapping into revolutions within target markets or business model revolutions, using technology as a supporting and enabling factor.

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