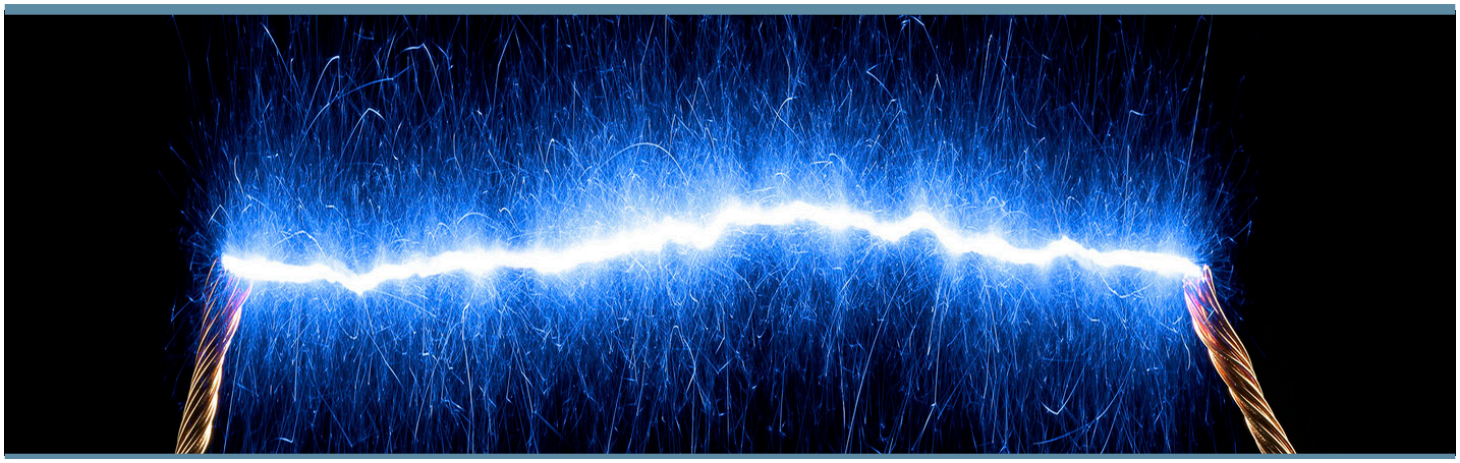


Executive Insights

Volume XVIII, Issue 29

Why Disruptive Technologies Matter

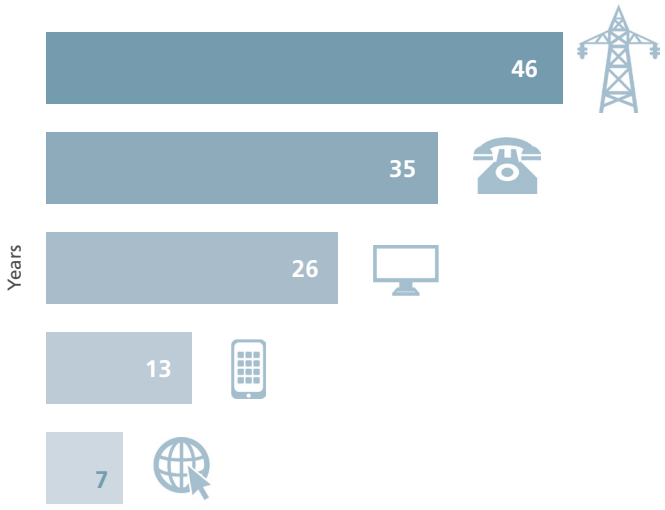
It is almost two decades since business professor Clayton M. Christensen defined disruptive technologies[1]. Since then, the term has been much overused but the fundamental concept of an innovation that offers something new and goes on to transform a business sector still stands. Indeed, technological change in the 21st century is accelerating and the digital revolution is ushering in a wide variety of innovations that have the potential to fundamentally disrupt industrial businesses.

Industrial businesses cannot afford to ignore disruptive technologies. As more come on stream, the effects will extend beyond traditional areas of operational efficiency and effectiveness, impacting business models and industry structures.

Recent examples include 3D printing, artificial intelligence, cloud computing, robotics, drones, biometrics, data analytics and the internet of things. As 3D printing, for example, advances and proliferates, the ease with which complex components can be printed is likely to reduce labor and distribution costs, improving efficiency and minimizing waste. Such changes could have broader implications for the industry, such as allowing smaller companies to enter manufacturing sectors that were previously the domain of larger businesses, while the ability to print items locally could have a significant impact on logistics.

Some of these changes are in the future and some are happening now. The U.S. hearing aid industry, for example, has largely migrated to 3D printing in less than two years[2]. Businesses that fail to plan for the future are likely to suffer, but there will be opportunities for those who develop successful strategies for harnessing disruptive technologies (see case studies on minimills and ARM).

Figure 1
Years required for 25% of U.S. population to adopt new technology



Source: Singularity.com

[1]Christensen, C. M. (1997) The Innovator's Dilemma, Harvard Business Review Press
[2]https://hbr.org/2015/05/the-3-d-printing-revolution

Disruptive Technologies: Part 1 was written by **Tom Diplock** and **Jeremy Wheatland**, Partners in L.E.K. Consulting's Industrials practice, and **Rebecca Kelly**, a Manager. Tom, Jeremy and Rebecca are based in London.

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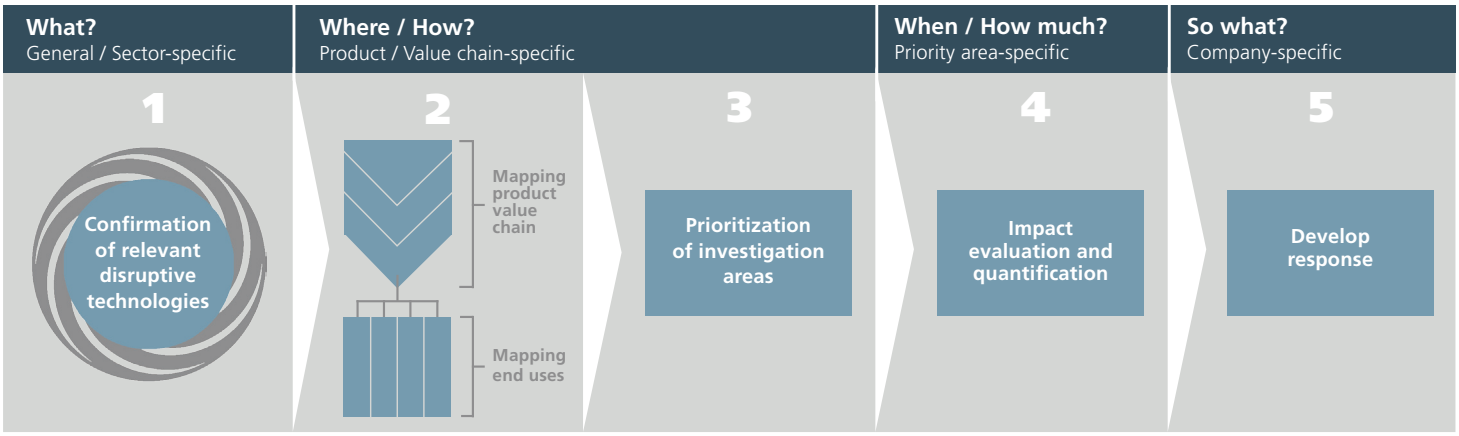
Figure 2
L.E.K. disruptive technology evaluation process



Source: L.E.K. analysis

Understanding the impact on your business

A top priority for all businesses must be to evaluate the likely impact of disruptive technologies. Given the large number of potential innovations and their broad application, this can be a daunting task and one that can take considerable time and thought.

To guide clients through the evaluation process and help them develop a realistic view of the way their business will be affected, L.E.K. has developed a framework for assessing potential challenges and opportunities (see Figure 2). The framework combines our expertise with the client's knowledge and industry-specific data to collaboratively assess how disruptive technologies are likely to affect the client's business. L.E.K.'s framework provides a clear approach to identify the relevant disruptive technologies, prioritize the areas of the value chain and end markets to investigate and then assess the impact of disruptive technologies on those prioritized areas. This, in turn, allows us to work with our clients to develop a response specific to the company concerned.

The first step is to confirm the relevant technologies impacting a company, which can include both sector-specific and broader cross-sector technologies spanning the entire value chain. The energy sector offers an example of the broad effects created by disruptive technologies. Energy companies are facing innovation in generation technologies such as clean coal, nuclear fusion, renewable energy and hydrogen fuel cells, as well as in storage technology and end-markets such as transportation (consider, for example, plug-in electric, hybrid electric and autonomous vehicles). The disruptive potential of these innovations is significant, and companies in the energy sector also face the effects of broader disruptive technologies that are not sector-specific, such as data analytics, advanced materials and robotics.

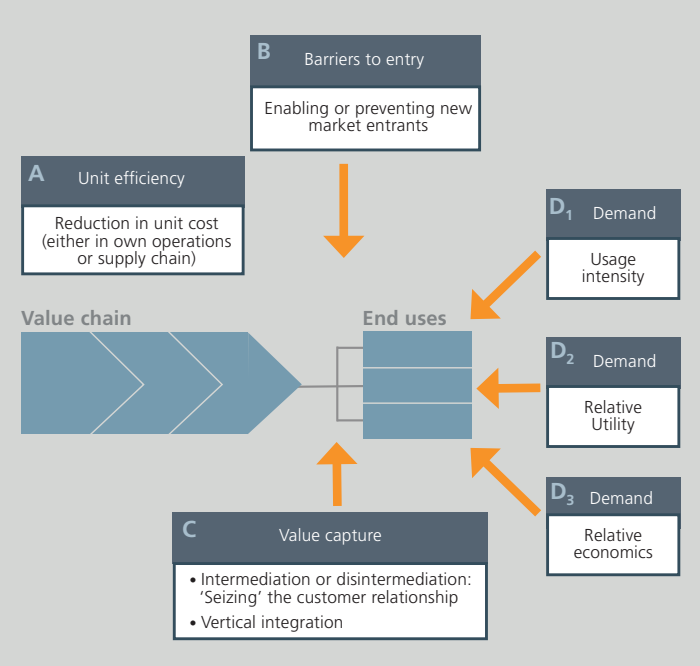
The combined impact of all these innovations has the potential to transform all businesses in the energy sector, both in terms of practical operations and longer-term economics.

Typically, companies start by identifying cost and efficiency saving opportunities, but to understand the full breadth and depth of potential implications, it is necessary to consider all four areas of potential impact (see Figure 3):

Case study 1
How minimills disrupted the steel market

Though the term 'disruptive technologies' is relatively new, the competitive effect of such innovations is much older. Until the 1970s most of the world's steel was made by large, integrated steel companies, which served all types of customers from users of high-end sheet steel to low-end 'rebar' steel for reinforcing cement. However, other manufacturers began to use minimill technology to enter the steel market, melting scrap metal in electric furnaces to produce steel more cheaply than the integrated companies. At first, minimills could only sell to the rebar market, and the integrated steel mills let rebar customers go in order to concentrate on the more profitable high-quality steel. But as their technology advanced, minimills were able to progress to producing higher quality steel, encroaching further on the market served by integrated steel mills. A number of integrated steel mills went bankrupt as their customer base was reduced to the high-end, low volume segments.

Figure 3
Areas of commercial impact from disruptive technology



Source: L.E.K. analysis

A. Improving efficiency — technologies can significantly disrupt value chain economics by increasing unit efficiency and reducing unit cost. This impact can affect either a client's own operations or create broader efficiencies in the supply chain.

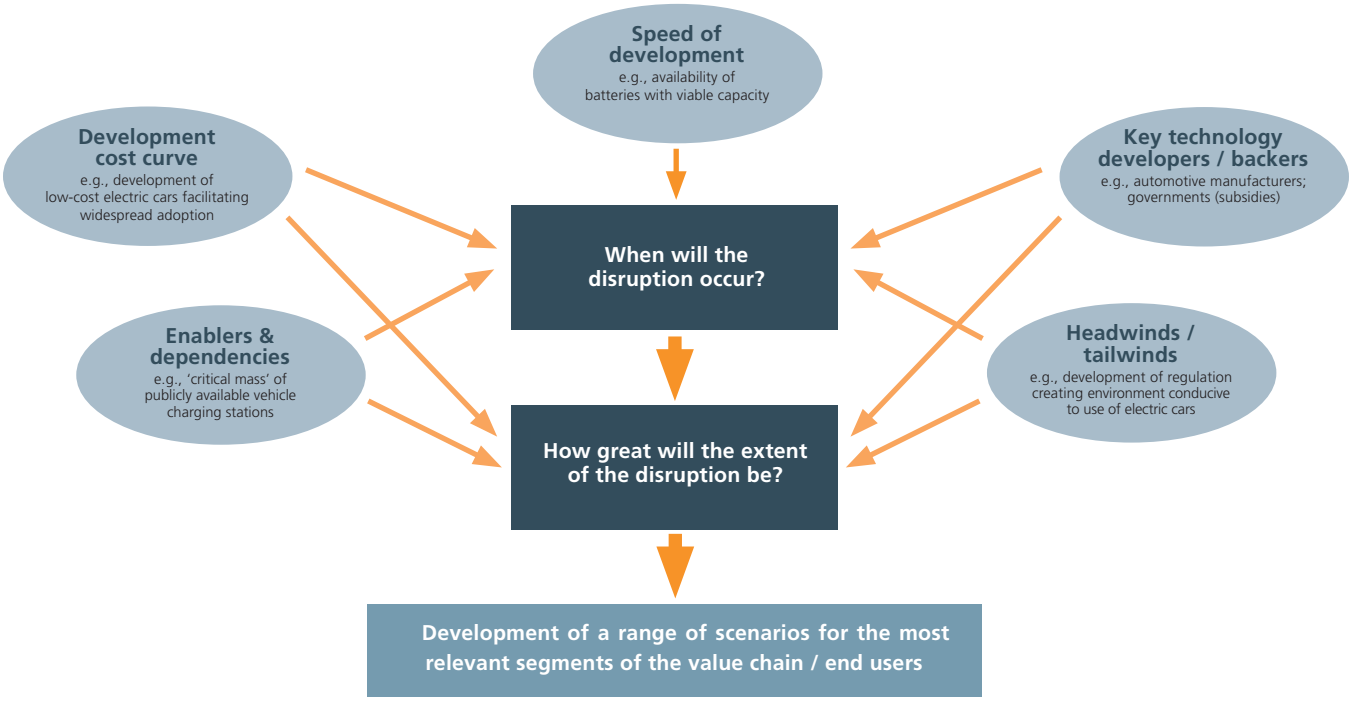
B. Altering barriers to entry — some innovations can reduce or increase the barriers to entering a given market, enabling or preventing market entrants and disrupting competitive dynamics.

C. Capturing additional value — many disruptive technologies change the nature of the customer interface by creating, removing, or merging stages in the value chain. Such changes can enable different value-chain participants to seize the customer relationship and capture value.

D. Creating or destroying demand — demand can be disrupted by changing usage of the end product, or by impacting the relative utility or economics between competing solutions.

Once an initial assessment of industry-specific disruptive technologies has been developed, it is possible to identify the potential timing and scale of the impact on the business. This assessment involves taking account of many inter-related issues – see Figure 4 for a worked example involving electric vehicles.

Figure 4
The impact of disruptive technology on electric vehicles



Source: L.E.K. analysis

Time for action

The past few decades have seen a dramatic growth in technological innovations, and there is evidence that society is adopting each new technology more quickly than the last.

While the breadth and speed of these developments can be overwhelming, there are rewards for businesses that make the most of the opportunities on offer. However, success depends on acting early. L.E.K. works with clients to produce pragmatic strategies to respond to disruptive technologies, transforming them from a threat to competitive position into a positive force for change.

In this *Executive Insights*, we have outlined the importance of using a robust framework to identify and assess the impact of disruptive technologies. Developing the appropriate strategic response is a considerable challenge, and one we will cover in subsequent *Executive Insights.*

Case Study 2

ARM's intellectual property strategy for semiconductors

Semiconductors have been a key element of much of the computer and digital revolution in past few decades. The semiconductor industry is capital intensive with the operation and maintenance of wafer fabrication, assembly and testing facilities. ARM identified that the true value-add was in the design and related intellectual property of semiconductor chips. Instead of marketing and producing chips, ARM sold a library of core IP with additional add-ons, taking a licence fee on each chip produced. This IP strategy allowed ARM to become more agile and exploit the rapid growth in demand for devices that needed lower power consumption such as mobile phones and tablets. Today, ARM's IP is in nearly every mobile device produced, and the group's success is demonstrated by a nearly 12-times outperformance of Nasdaq's PHLX Semiconductor Sector Index (SOX).

About the Authors

Tom Diplock is a Partner in L.E.K. Consulting's London office. His primary focus is in industrial sectors including defence, manufacturing, energy, and industrial equipment and services across the U.K., European and global markets. He advises clients on a range of critical issues including strategy development, commercial and financial diagnostics, and performance improvement, and has significant experience in both buy and sell side commercial due diligence.

Jeremy Wheatland is a Partner in L.E.K. Consulting's London office. Jeremy joined L.E.K. in 1995 and has extensive experience in providing strategy advice and transaction support in a broad cross-section of industries. Jeremy has worked with clients in a number of areas, including market entry and product/ service strategies development, business plan development, commercial due diligence, value based management, portfolio optimization and valuation.

About L.E.K. Consulting

L.E.K. Consulting is a global management consulting firm that uses deep industry expertise and rigorous analysis to help business leaders achieve practical results with real impact. We are uncompromising in our approach to helping clients consistently make better decisions, deliver improved business performance and create greater shareholder returns. The firm advises and supports global companies that are leaders in their industries — including the largest private and public sector organizations, private equity firms and emerging entrepreneurial businesses. Founded more than 30 years ago, L.E.K. employs more than 1,200 professionals across the Americas, Asia-Pacific and Europe. For more information, go to www.lek.com.

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