For sustained digital advantage, find a huge customer problem and create the processes that will solve it

Robert Chapman Wood

The most successful users of digital technology have followed a difficult but straightforward path to revolutionizing customer experience: Focus for decades on making something important work really well.

Robert Chapman Wood is a Professor of Strategic Management based at School of Management, San José State University, San Jose, California, USA.

Digital technology is being reinvented once again. Progress in artificial intelligence and the analysis of big data is prompting a serious rethinking. But the thinking needs to go deeper than most firms are taking it. Only a few firms can be said to have leveraged digital tech for maximum value. A handful of companies – Amazon, Tesla, Walmart and a few others – have created far more wealth with their digital systems than most. And the latest technologies may offer special opportunities for others to achieve very large returns with approaches like theirs.

A useful way to understand the successes of each of these firms is to see that each found a truly big problem that limited customers greatly and utilized digital technology to solve it through multiple waves over decades. With the many problems customers face today and the ever more powerful technologies available to attack them, the opportunity to do what these firms did and benefit similarly is considerable.

The processes of attack on the problems at Amazon, Tesla, and Walmart were similar. We can understand each in three steps:

1. Identify something big and important that digital technology **should** be able to do for customers but can't yet do really well.
2. Create a system that solves an important part of the problem, with opportunities for upgrades and solutions for other parts of the problem in mind.
3. Use the initial system as a platform for addressing more and more of the problem over the long term, ultimately using technology to solve the whole.

Exhibit 1 summarizes the process. Exhibit 2 summarizes how these three firms plus two others to be considered below went through the steps.

A truly big challenge

Outside the information industry itself, Amazon, Tesla, and Walmart are the three companies that have created most wealth by building digital systems. (See box, "The Biggest Creators of Wealth Through Leveraging of Digital Technology"). So, it's significant that each firm's methods had a great deal in common with the others'.

The Biggest Creators of Wealth Through Leveraging of Digital Technology

The research for this article begins with three companies that have built probably the most wealth-creating digital systems ever: Amazon, Tesla, and Walmart. Today the firms with the highest market capitalization – Microsoft, Apple, NVidia, Alphabet – are technology suppliers. Their management successes no doubt offer lessons, but not everyone can be a top technology supplier. Amazon, Tesla, and Walmart are closer to the heart of the economy. Two are retailers, the other makes a consumer product (cars).

Today Amazon is the fourth- and Tesla the seventh-highest market-cap firms. (Numbers 5 and 6 are Google and Meta – two more tech suppliers). Addressing big problems over the long term –effective ecommerce for Amazon and excellent electric cars for Tesla – has created $1.52 trillion and $798 billion in market cap for these two firms respectively. *[Source: Investors.com, March 1, 2024].*

The Walmart technology story is older. From the time Walmart got its core technology system working in the early 1970s to the end of the 20th Century, it led the retail industry in innovation, transforming what a discount retailer did for its customers. It was then the world's most valuable company. Eventually others copied it with success. The Federal Reserve Bank of Chicago found this learning from Walmart accounted for the largest share of the increase in U.S. productivity in the late 1990s, the most prosperous decade the U.S. economy has experienced since the 1960s.[6] Indeed, Walmart was a model that Amazon carefully emulated when it did for online retail what Walton had done for bricks-and-mortar.

Walton described his understanding of a discount chain that would fully utilize technology as early as 1963 to a deeply impressed 29-year-old Don Soderquist, data processing manager of the Ben Franklin variety store chain. Walton doggedly pursued the vision (and hired Soderquist, who became chief operating officer of Walmart 30 years later). Soderquist reported the 1963 conversation in his own memoir, published in 2005.

Bezos headed a group at the Wall St. hedge fund D.E. Shaw & Co. that sought to launch Internet businesses. One proposal was for something called "the Everything Store." Seeing that creation of the Everything Store would be very difficult and complex, Bezos left to build the business on his own.

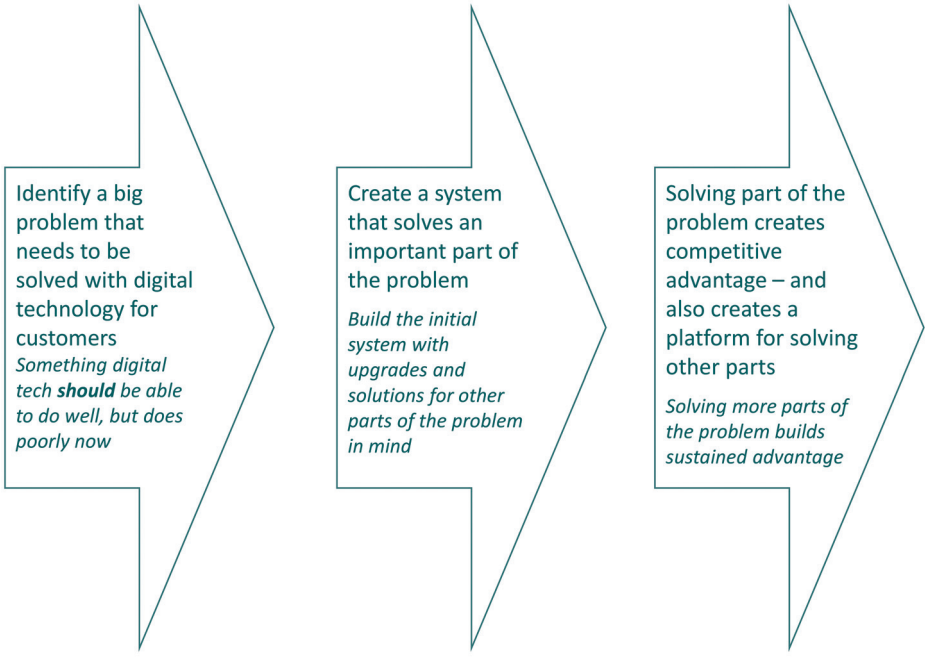
The founders of Tesla saw that the simple lithium-battery-powered electric vehicles being produced in kit form in the early 2000s could be transformed into real cars that would not only save the earth but also be great to drive. They began work in 2004, and by 2006 they had told the New York Times of their plan to start with high-priced product and work down to a more popular-priced product as makers of cell phones and color TVs had done – really solving the problem of electrification of transportation only when they could deliver the popular-priced version. (A blog post from this time describing the strategy is still available at https://www.tesla.com/blog/secret-tesla-motors-master-plan-just-between-you-and-me).[1] Thus, all the leaders committed to solving a problem whose solution was far off and essentially unknown.

This suggests that the digital strategist who wants to achieve enormous returns and sustained advantage should start by doing something very unusual: Find an extremely difficult but important customer problem and commit to solving it, however long it takes.

Solving a big part of the huge problem

Walmart, Amazon, and Tesla each began by bringing to market an impressive solution to a part of their huge problem. Walton's Walmart was initially a tiny firm that ran discount stores in small towns. He quickly learned such towns could be highly profitable and produce more

Exhibit 1 Attaining sustained advantage by solving a big problem digitally



Source: Created by author

sales than others could imagine. The need to manage and control many stores to grow gave Walmart the opportunity to solve a core piece of the challenge of bringing digital technology's benefits to retail. The firm created sophisticated in-store information systems and controls to tie its small stores together in the 1970s.

Bezos produced a simple book-selling site that worked reliably and offered customer reviews of books.

Tesla produced gorgeous roadsters to sell for $100,000 or so with a team of 100 people. "Until today, all electric cars have sucked," Musk said at the announcement event.[2]

The modest cost of achieving these successes suggests that even enormously challenging businesses that will make the world different can be begun with limited investment. The firm that wants to learn from Walmart, Amazon, and Tesla needs to find an initial partial solution to its big problem that will delight many customers. The partial solution needs to be built with later upgrades and solutions to other parts of the larger problem in mind. But that need not add much to the cost.

Use the initial solution system as a platform for further progress

The initial demonstration that the firm can solve a significant part of the larger problem and delight many customers is an important achievement. The firm becomes a leader – perhaps ***the*** leader – in the problem area. A competitive advantage is created that can be built on.

But the initial business has to set the stage for the full solution and that solution must be pursued over many years. If the firm does not build aggressively and successfully on the first success, copycats will destroy the advantage. More innovations must be introduced to

Exhibit 2 How five firms achieved sustained advantage by solving big problems for customers

Company	*Process of Identifying & choosing a big problem*	*Years of creating solution*	*Initial system that solved part of the problem*	*Strengths created in building of initial system*	*Further steps that produced a more complete solution*	*The situation today*
Walmart	Sam Walton saw discount stores could succeed in smaller towns than others realized but that to grow a firm with small-town stores would need good information systems for management and control.	1966–2000	Electronic cash registers connected to sophisticated IBM inventory-control system and logistics enables a small, rural chain to expand; stores and head office get real-time data on their profitability.	Habit of constantly seeking operational improvement through information systems complements Walton's excellent relations with associates to produce long period of strength.	Logistics move goods from incoming trucks to Walmart's without goods going into warehouses; ultimately goods are tracked from moment of manufacture to checkout. At peak, Walmart saves 3 cents per dollar of sales on logistics compared to competitors.	Rivals successfully copied Walmart IT in early 2000s; competitive advantage had lasted four decades.
Amazon	Jeff Bezos, an investment banker, headed a project to identify Internet opportunities. He saw that the most appealing, called "the Everything Store," involved many difficulties	1992–2010	Initially focused on books. More reliable credit card processing and helpful user book reviews differentiated from online rivals.	Clear long-term vision and focus on repeated improvement of customer experience and digital features drive growth.	Amazon really is the Everything Store. Superior logistics defend its competitive advantage. Systems created for selling merchandise form the basis for highly profitable Cloud services division.	Dominant in online retail; a leader in the Cloud.
Tesla	Electric car fans saw strengths of new lithium batteries and cheap electric cars assemblable from kits, able to go zero to 60 mph in 5 seconds. They sought to build real cars embodying the strengths of electric propulsion.	2002–2020	Built a very expensive "roadster" that could be produced profitably with limited features	Roadster experience produced the capabilities needed for design and manufacture of a large, high-end luxury car, the Model S.	By late 2010s, Tesla had been able to leverage experience from its early cars to design and efficient-scale manufacture of sedan and SUV Model 3 and Model X. Tesla became the most profitable automaker.	Still the most profitable automaker. Aggressive competitors and distractions of its CEO represent serious threats.
Varian Medical	At a time when cancer radiation therapy could mostly only delay death, academics proposed more precise approaches that might lead to cures. Varian executives worked with other academics to envision how real precision and cures might be achieved in the long run.	1986–2013	New tools including beam-shaping devices and digital ways of controlling them produced clear improvement documented in peer-reviewed studies. Initial products engineered as platforms for future improvement.	Relations with academics and repeated improvement gave Varian a strategy it could implement for further progress. Key competitors dropped out of market.	Bought a Finnish treatment software firm with unique human body modeling capabilities; spent 10 years leveraging it for world markets. Repeatedly improved displays and patient-positioning so beams precisely hit tumors and avoid healthy tissue.	Latest product improves control and ease of use further and can reduce cost. Opens 3rd World market. Varian still dominant in radiation therapy, merged with Siemens Healthineers, opening global sales channels.

(*continued*)

Exhibit 2

Company	*Process of Identifying & choosing a big problem*	*Years of creating solution*	*Initial system that solved part of the problem*	*Strengths created in building of initial system*	*Further steps that produced a more complete solution*	*The situation today*
Deere	In an industry traditionally focused on selling discrete products, new leadership team decided to build complete automated farming solutions.	2018–	Added artificial intelligence, digital control, and self-driving to tractors and combines. Announced plans for fully automated corn, soybean production by end of 2020s.	Deere vision and leading skills give it a program for further advantage.	*Deere is still in early stage of solving the problem of automated farming that fully utilizes the skills of the modern farmer.*	Deere's position as the leading farm equipment manufacturer has been strengthened, with important software and service subscription revenues added

Source: Created by author

solve more parts of the problem. This can keep the firm solidly ahead of rivals who lack comparably strong platforms.

Walmart's innovations in the 1970s included inventory control that allowed many products to be moved from incoming manufacturers' trucks directly to Walmart trucks leaving for its stores without ever being deposited in the warehouse. Jeff Bezos deliberately copied Walmart's process in the 1990s, but developed a very different collection of innovations to produce real solutions to the problems of making everything easily and enjoyably purchasable online. Tesla created its own array of radical innovations as it learned to deliver superb electric cars for a wide market. In each case, as the firms built on their initial partial problem solution, they were able to create and then radically strengthen long-term competitive advantage.

Building on the original success is likely to put the firm at the center of an ecosystem that includes other firms providing related services. Walmart's digital systems effectively brought suppliers into an ecosystem as its logistical innovations tied supplier operations to the core firm more tightly than traditional discount stores' operations did. Amazon's system created a vast platform ecosystem that allowed millions of suppliers to use Amazon as part of their own business models. Yet Amazon's success, like Walmart's and Tesla's, depended on its willingness to provide much more than basic capabilities of a platform. Each firm built carefully architected systems to provide comprehensive problem solutions, taking over work that traditional firms in their industries left to suppliers. They delivered vast systems for customers and as they created vast wealth.

An established firm achieves long-term success solving a huge problem

An established firm that found a big problem and solved it over a period of decades was the Silicon Valley pioneer Varian Associates. It created today's effective cancer radiation therapy and that produced billions in additional market capitalization.

One of the founding firms of Silicon Valley, Varian got its start making the klystron, a vacuum tube that made highly sensitive radar possible. (Hewlett-Packard founder David Packard was able to return to California from an East Coast job with General Electric because he was hired to work on klystron development. Packard used Varian salary to rent an apartment with a garage, where he and Bill Hewlett founded HP).

Varian became a manufacturer of klystrons and related products. It adapted the klystron to produce high-energy linear accelerators for attacking cancer tumors.

But initially, radiation mostly just shrank tumors rather than destroying them because doses large enough to destroy a tumor would also destroy healthy tissue, potentially killing patients. Varian was unique in radiation therapy in seeking a comprehensive solution to this problem: how to manage radiation with such precision that more powerful beams could actually destroy tumors while healthy tissue stayed healthy.

Varian's initial partial solution included new beam-shaping devices and digital control capabilities. Competitors introduced similar products, but Varian had designed its products as a platform for future advance. Its beam-shaping devices were engineered with thought to improvement, and unlike rivals, it had set up a committee of Varian leaders, medical school professors, and other leading practitioners to imagine what radiation therapy could be like a dozen years in the future. "Our field was populated by a lot of really smart people who were dreaming," notes Tim Guertin, Varian CEO during much of this period. "I made a point of listening to geniuses a lot."

Then, over more than 20 years, it created improvements, increasing precision, speed, and system comprehensiveness.[3] By the time the TrueBeam linear accelerator generation was delivering full performance in 2013, survival rates of patients had improved dramatically[4], and all Varian's competitors of the 1980s had left the business. The medical business' profits had increased 40-fold.

Deere's AI solutions to a huge problem today

For evidence of how today's technology can help companies prosper through similar big-problem solutions, consider Deere & Co., long the market leader in agricultural equipment. Deere is on the way to creating a comprehensive solution to the problem of how to effectively leverage both AI and the skills of the modern farmer to achieve both superior farm yields and excellent environmental stewardship.

Today farming involves much technology but also much routine work that does not greatly leverage the modern farmer's skills. Thus, farmers' talents are under-utilized, yields are not maximized, and negative environmental impacts can be significant. Large farm machines have increased productivity, but they have often eliminated careful human farm work like recognizing exactly which plants are weeds and eradicating them through environmentally sound means.

After John C. May was named Deere's chief executive in 2019, Deere reorganized to build comprehensive solutions. "Everybody in the industry was focused on building the best product, like the best tractor, the best planter, or the best combine," May says. "We made a big shift and said, no, we want to help our customers do the jobs they do better." This means using artificial intelligence and digital control to farm better, evolving toward full farm automation (with growing technology subscription revenues for Deere). New sprayers on Deere machinery have cameras that connect digitally to programs that recognize tiny weeds and tell what will efficiently kill each in the most environmentally friendly way.

Deere introduced its first self-driving tractor in January 2022. It aims to fully automate corn and soybean production by the end of the 2020s and eventually other crops, allowing farms to be managed from the farmhouse by farmers who will have good reason to pay for Deere software as well as hardware.[5] Deere's stock is up 161% over the last five years compared to 81% for the S&P 500.

Can you solve a huge customer problem?

Today's powerful technology can solve many enormous problems if they are recognized and an attack is managed as well as at Amazon and Deere. There are many potential opportunities, and each business needs to take time to consider what large challenge might on one hand offer an opportunity for the firm to establish strong leadership and on the other create enormous value for customers as it is solved. Ask: Where do opportunities exist for

technology to make life significantly better or cheaper in the fields you know? *[See box, "What Kind of Problem Brings Large, Sustained Advantage to the Firm that Solves It?"]*.

What Kind of Problem Brings Large, Sustained Advantage to the Firm that Solves It?

It is notorious that being first does not guarantee sustained advantage. The deaths of firms like CompuServe, Netscape, and Blockbuster Video show that having a good idea does not guarantee long-term success.

Moreover, solving a real customer problem does not guarantee long-term success, either. Early producers of computer printers, home security systems, and Internet-to-the-home are no longer with us.

The problems that spawned enormous successes of Walmart, Amazon, Tesla, and Varian Medical were huge in specific ways. A first step in judging whether a problem and set of ideas to solve it have the potential to represent large opportunity for sustained competitive advantage is to answer three questions:

1. How much value are customers currently missing because no solution to the problem is available?
2. Does the problem involve many different issues that we can address at different times?
3. Can a simple, partial solution be developed that can be a platform for adding solutions to other issues later?

If the answer to Question 1 is "a lot" and the answers to 2 and 3 are "Yes," then big long-term opportunity may be available.

One obvious candidate in the information industries is helping students learn. Systems have sought to improve teaching since the University of Illinois' 1960s Plato systems. Yet it is difficult even today to identify educational computing that has been shown to improve learning beyond what person-to-person teaching accomplishes. Creating learning involves system-construction challenges like those Amazon faced in making online shopping worthwhile: Anticipate customer's/student's needs, deliver relevant content consistently. Since the 1990s, Amazon has said its mission is to be "Earth's most customer-centric company." Educational technology companies have not behaved as "Earth's most student-centric companies." Can a firm identify a part of the problem that it can solve really well, then build on that to solve more and more?

Other examples may be found in the often-mismanaged primary care physician relationship in the U.S. One Medical is attempting to solve the challenge and has made enough progress to be purchased by Amazon. If One Medical and Amazon can complete a reliable primary care system and then solve the associated problems to connect primary care efficiently to solutions for other health care needs, they may reap as much sustained advantage as Amazon's core business has. Other problems that can lead to large long-term competitive advantage can be found in the transition from fossil fuels to more energy efficient, renewables-based systems. Cellulose-based alternatives to cement and plastic, green hydrogen technology, and new energy transmission may each be fields where a basic solution can be created at high but not impossible cost and the opportunity to build the solution out over decades can create enormous businesses.

Getting started today

Attempting to solve a huge problem involves big risks. You can face appalling cost surprises. Tesla, for instance, grossly underestimated the challenges and funding

requirements for assembling battery packs in Thailand, and this delayed the roadster's introduction. And in contracting for the roadster's transmission – where it simply sought to adopt the existing state of the art – it found the newness of its approach caused skeptical suppliers to assign second-rate people to its project. Thus, if you wish to attain sustained advantage by solving a big problem you must be prepared to overcome repeated potentially solution-killing difficulties.

Moreover, you can deliver an approach that is genuinely new and on target, but fail to execute well enough to offer something of genuine value. Some negative One Medical reviews indicate that in some regions it suffers from this problem.

Yet the value-creation potential of attacking and defeating huge problems is truly enormous. In an era when radical technology is readily available, it does not get the attention it deserves. The path of starting with a small, manageable part of the problem is often not appreciated. Building initial solutions as a platform for later, better ones is not adequately considered.

The first, key step is to seek a problem capable of delivering the kind of returns that pioneering a large system can create. That's something every business should work on.

Notes

1. Soderquist's version of the Walton story is in his book *The Wal-Mart Way* (Nashville: Thomas Nelson, 2005, pp. 139-40). More details are in Walton's autobiography *Made in America* (New York: Bantam, 1992). Details on the Tesla team's early commitment to the enormous project of starting with an expensive car and ultimately producing a cheaper one for ordinary drivers are in Ashlee Vance, *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future (New York: Ecco).* The initial vision came as much from co-founders Martin Eberhard and Marc Tarpenning as from Musk. In each case there is considerable evidence that the founders had a good idea how challenging the problem was and how far their initial products would be from ultimate solutions.
2. Tesla ultimately came close to bankruptcy after this successful launch event because Musk insisted on changes including a carbon fiber body and the firm made some manufacturing mistakes just before the world went into the 2008 "Great Recession." But the initial success proved the same point as Walmart and Amazon's initial achievements: A partial solution to a huge problem can come to market with investment not inordinately great.
3. Robert Chapman Wood, "Visionary customers: Source of long-term competitive advantage," *Strategy and Leadership,* 2018 issue 3, pp. 29-36; Robert Chapman Wood and Joel West, "Integrated Management and the Construction of Large Digitally Enabled Systems," paper for Academy of Management Annual Meeting. Boston, 2023.
4. Michael J. Zelefsky and Joseph O. Deasy, "Editorial: Improved Long-Term Outcomes With IMRT: Is It Better Technology or Better Physics?," International Journal of Radiation Oncology*Biology*Physics, Vol. 87 No. 5 (2013).
5. Jack Hough, "Deere Has Gone High Tech Under This CEO," *Barron's,* July 8, 2022. Searched March 12, 2023. See also Jack Hough, "The Boom Time for Farmers Can Last. Who Will Reap the Rewards," *Barron's,* March 3, 2023, searched March 12, 2023.
6. Federal Reserve Bank of Chicago, "The acceleration in the U.S. total factor productivity after 1995: The role of information technology," *Economic Perspectives,* Spring, 2004.

Corresponding author

Robert Chapman Wood can be contacted at: robert.wood@sjsu.edu