



He book

PICHAI

THE
FUTURE OF
GOOGLE

JAGMOHAN S. BHANVER

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INTRODUCTION

Over the past few months, since the appointment of the third chief executive officer (CEO) of IT giant Google on 10 August 2015, both the media and analysts have been speculating about the changes Sundar Pichai will bring about at Google. Needless to say, the kind of expectation that has stemmed from Pichai's appointment is unprecedented, and perhaps surpasses even that of Satya Nadella, who he was chosen to lead the world's fourth-largest company, Microsoft, just a year ago.

Unlike Microsoft and several other large technology companies, Google hasn't made too many mistakes in the past. This is not to say that it has been smooth sailing for Google so far, as they have faced fierce competition from Amazon, Microsoft, Apple and various other companies on different fronts. However, most of Google's recent product stories have been written right, and observers would be hard put to find fault with too many of them. In fact, Pichai's ability to come up with winning products has been something Google's co-founder Larry Page has lauded in the past. Now that the man behind most of those products is actually in the driver's seat, it will be interesting to see in which direction he plans to steer Google. On the flip side, there have been people who have criticized Google for going slow on innovation in recent years. Larry Page's decision to create Alphabet as the holding company and focus on moon shots through the newly formed entity may actually be a move to counter that criticism. It leaves Pichai to focus on making Google better at what it does. A leaner Google will also innovate better.

Sundar Pichai has been at the forefront of most of these developments, and with his promotion a lot of people will be keenly watching the developments at Google's Mountain View headquarters in California, USA. Google, under Sergey Brin, Eric Schmidt and Larry Page, has made huge strides since its beginning in 1998. Will the company lead the world into the next phase of technological innovation? More importantly, will Sundar Pichai be the man to take the company there?

Like Nadella, Sundar Pichai has not been much of a public figure in the past. Very little is known of the man from Chennai who has rapidly risen through the ranks of the tech giant. What goads the man to excel? What does Pichai's appointment portend for Google and, possibly, for the tech industry as a whole?

In endeavouring to glean answers to these questions and several more, I have had the fortune of analysing not just Google but also its latest CEO. By all accounts, it appears that Google is set for a very interesting ride and Sundar Pichai may end up surprising his supporters and detractors alike.

Pichai's appointment as CEO of Google and Larry Page's transition to Alphabet is merely the tip of the iceberg. The actual story of Google's new innings will start unfurling over the following months and will continue for at least a couple of years from now. By all accounts, Google appears to be in safe hands. However, only time will tell whether Google will supersede its biggest rivals or end up losing its current market share to more nimble players. In the interim, this book attempts to give an insight into Sundar Pichai, the man and the professional, and what his recent promotion means for Google and for the future of technology.

PART 1

THE DREAMER

‘The thing that attracted me to Google and to the Internet in general is that it’s a great equalizer. I want Google to strive to do that; not just build technology for certain segments. For me, it matters that we drive technology as an equalizing force, as an enabler for everyone around the world.’

– Sundar Pichai

The inception of an idea

‘Life has no limitations, except the ones you make.’

– Les Brown

The Mobile World Congress (MWC) today is veritably the largest exposition for the mobile industry, where heads of various mobile operators, technology providers, manufacturers and content owners meet to talk about the latest innovations and happenings in the mobile world, and the impact this will have on mobile users all over the globe. The 2015 Mobile World Congress in Barcelona was no exception. In fact, it was the largest gathering in the history of the exhibition. Imagine 94,000 participants from more than 2,000 organizations and 200 countries, all in one place!

What marked this particular event though was not just the significant number of attendees, but also the speech given by a Google representative, introduced by Brad Stone of *Bloomberg BusinessWeek*. Interestingly, Brad Stone, in a June 2014 article in his magazine, had referred to this very person as ‘the most powerful man in mobile’. The man was none other than Sundar Pichai, then senior vice president at Google, and now the CEO of the legendary company.

The thousands of people gathered at the MWC in Barcelona, listening with bated breath to Pichai’s dreams and plans of a ‘mobile Google’, might be forgiven for not knowing that the speaker’s story began in a place called Ashok Nagar in Chennai, where, 30 years ago, a 12-year-old Sundar Pichai held a rotary phone in his young hands for the very first time. It was the first phone his family had ever owned!

It was perhaps right then that the possibilities of what a phone could do flooded Sundar’s mind. While it may be conjecture, one feels compelled to surmise that his love for technology and his unlimited power to make positive changes for people everywhere, may have germinated within him being in that very moment.

The early years

*‘Difficulties are meant to rouse, not discourage.
The human spirit is to grow strong by conflict.’*

– William Ellery Channing

Most people who have succeeded in their lives have had their fair share of challenges. If everyone who won the race had a favoured past, there would be no motivational stories to inspire those who haven’t had fortune shine upon them yet. One thing that separates the true winners from the also-rans is the indomitable spirit to rise above their tribulations and go to war with whatever they have, rather than

sit at home complaining about what they don't.

Sundar Pichai belongs to the tribe of achievers, and Channing's words never rang as true as they appear to do in his case. Born on 12 July 1972, in Madurai, Pichai's childhood was spent in Chennai. While the Pichai family was not impecunious, their coffers were certainly not overflowing with riches either. Sundar's father, Regunatha, was employed as a senior engineer with a British multinational company that made switchgears. Lakshmi, his mother, worked as a stenographer but gave up her job after Sundar and his brother Sreenivasan were born. A traditional, down-to-earth family, the Pichais' focus was on ensuring that the children got the best education possible, which meant that comforts like a television set or a car had to be sacrificed. Their Chennai apartment boasted two rooms and this necessitated that Sundar and his brother sleep in the living room. Travel was restricted to the overcrowded public transport or riding shotgun with his father on their old Lambretta scooter which his younger brother brought up the pillion.

The Pichais' simple lifestyle helped keep the children grounded. Sundar's focus was on his studies though in later years, during high school, cricket became an additional attraction and something he found himself faring rather well in. At this stage, Sundar's life was influenced by two very distinct experiences:

One, Regunatha shared with the boys stories of his workplace and the challenges he faced there. These anecdotes seemed to have a profound impact on Sundar. Even at that age, he appeared to be attracted to anything that had to do with technology, possibly sowing the seeds of innovation in his growing mind.

Secondly, holding the family's first phone in his hands did more than just attract him to technology. It made him think of the unlimited power technology could wield to change the life of the common man. On a different note, it also revealed an extraordinary gift he had not known he had. Sundar Pichai found he had an uncanny ability to remember any number that he had ever dialled!

Competition begins at school

'My father and mother did what a considerable measure of parents did at the time. They sacrificed a considerable measure of their life and utilized a great deal of their extra cash to verify their kids were educated.'

– Sundar Pichai

The first phase of what is now popularly referred to as Pichai's 'self-driven' attitude kicked off at Jawahar Vidyalaya School in Ashok Nagar, Chennai. While Jawahar Vidyalaya is considered among the good schools in Chennai, it is certainly not in the league of top schools across the country. Yet there must have been something in the school's ethos and in young Pichai's inherent nature that would propel him to go for success. It's interesting that the man who was able to grab the attention of Google founders Larry Page and Sergey Brin was quite inconspicuous during his school days. Not too many of the faculty from Jawahar Vidyalaya or the other school he studied at – Vana Vani Matriculation Higher Secondary School – remember Pichai very clearly. R.M. Krishnan, who was the principal of Jawahar Vidyalaya, joked that professors tend to remember either the top students or the naughty ones. Sundar was an intelligent boy, but a quiet one nevertheless.

After completing his 10th grade from Jawahar Vidyalaya, Sundar moved to Vana Vani, which is located inside the IIT Chennai campus and is the breeding ground for a lot of future IIT-ians. Sundar was here for two years and completed his 12th grade under the Tamil Nadu state board curriculum in 1989.

Even as a student, the current CEO of Google set goals for himself. He demonstrated a degree of self-drive that is rare in one so young. Sundar's father has spoken several times about how he never had to tell Sundar to study because Sundar would be doing it on his own without being told. Sundar's friends also talk about his unwavering attention as he would read a book even in the cycle rickshaw on the way to school and back home.

In Chennai, Sundar represents the quintessence of what is known as the 'IIT boy'. And it wasn't any coincidence that he landed up at IIT Kharagpur after passing out of Vana Vani. While most kids his age were playing cricket or were preoccupied with other street games, Sundar would be sitting somewhere reading a book or studying. He was so fiercely competitive that he would fight even for a single mark and not rest until he had got it.

IIT boy

'Some people dream of success...while others wake up and work hard at it.'

– Winston Churchill

In 1946, two educationists, Humayun Kabir and Jogendra Singh, decided it would be easier to facilitate industrial development in India if the country had technical institutions built on the same framework as the famed Massachusetts Institute of Technology (MIT) in the USA. With the help of B.C. Roy, who became the chief minister of Bengal in 1948, they formed a committee headed by Nalini Ranjan Sarkar, which later on came to be known as the Sarkar Committee. Roy persuaded Prime Minister Jawaharlal Nehru about the need for such institutions in the country. Since there were many industries in West Bengal at the time, the first such institute was commenced in West Bengal itself. Thus, was born the first IIT in May 1950 and it was located at Esplanade East, Kolkata. Four months later, the institute moved to a place called Hilji in Midnapore district. This was an interesting choice as Hilji was formerly a detention camp for Indian freedom fighters. Now it was set to be the centre stage for the opening of an institute that would enable India to assert its independence and industrial growth.

Hilji is located beside Kharagpur, which was part of the 200-year-old Hilji kingdom that came to an end in 1886. It was not surprising, therefore, that the Indian Institute of Technology here was named IIT-Kharagpur. The institute commenced its session in August 1951 when it was inaugurated by Maulana Abul Kalam Azad. In September 1956, the Indian Parliament declared IIT-Kharagpur an institute of national importance. Nehru, at the first convocation of the institute, spoke eloquently: 'Here in the place of that Hilji detention camp, stands the fine monument of India, representing India's urges, India's future in the making. This picture seems to me symbolical of the changes that are coming to India'.¹

It was at IIT Kharagpur's sprawling 2,100-acre campus which Sundar Pichai joined in 1989, that he found himself rubbing shoulders with the people who would define technology not just in India but a

over the world. He joined the metallurgical department that has produced other high achievers such as Praveen Chaudhari (director at the Brookhaven National Laboratory, USA and previously head of IBM's research division). Arun Sarin (who was CEO at Vodafone) was another product of IIT Kharagpur's metallurgical division, as was Vinod Gupta, chairman of Everest Group LLC, a US-based venture capital and private equity firm.

Better known as P. Sundarajan during his stint at IIT, Sundar kept a relatively low profile though he was well respected by fellow students as well as professors. The boy from Nehru Hall (Sundar's hostel at Kharagpur) topped his batch from the word 'go'. This continued even during his final year in 1991 when he not only topped metallurgy, but was also given the institute's prestigious silver medal for academic excellence.

While Sundar was enrolled in the metallurgy programme, he was immensely interested in electronics, too. The suppleness of the IIT system encouraged Sundar to balance both his interest and his core curriculum. From his third year onwards, Sundar used IIT's platform to develop his knowledge on the behaviour of electronic materials. So much so that even his B. Tech thesis was on electronic materials.

Prof. Sanat Roy, who was one of Sundar's professors at Kharagpur says, 'He was doing work in the field of electronics at a time when no separate course on electronics existed in our curriculum. His thesis dealt with implanting molecules of other elements in silicon wafers to alter its properties. It was very clear from the beginning that he was enthused about electronics and materials.'²

At IIT, Sundar started showing signs of going beyond the 'bookish' aura he had created around himself during his school days in Chennai. His people skills and communication developed and he was able to forge strong relationships. At Nehru Hall itself, he had a close group of 14 friends whom he keeps in touch with even now. One of these hostel mates, Prashant Tripathy, who is currently director and CFO of Max Life Insurance, says, 'I found him sharp and articulate. When discussions took place within our group, he usually took centre stage. He was very friendly and helpful. Not at all the "nerd guy" that one might assume. We used to watch movies till late night at times. These were times when the Internet wasn't there and most of our time was spent talking to friends. He also used to read a lot.'

Sundar's stint at IIT got him more than a bunch of good friends and the institute's silver medal. This is also the place where he met the woman who would become his wife and life partner.

Romantic at heart

'The very essence of romance is uncertainty.'

– Oscar Wilde

If you thought making it to the post of the CEO at Google may have been tough for Sundar, close friends of Google's head honcho would probably disagree. Apparently, one of the biggest challenges Sundar ever faced was proposing to the woman he loved. In classic style, Sundar fell in love with a girl in the chemical engineering department from the same batch. She was from Kota, Rajasthan while Sundar was from Tamil Nadu. He gave the relationship the same passion he brought to all other things in his life.

The girl who had Sundar Pichai besotted was Anjali Haryana. It was characteristic of Sundar that not even his closest friends knew about his interest in Anjali until after they had graduated from IIT. While Sundar proposed to her during their final year, they were able to marry only a few years later. After IIT, he went to the USA to do his Master of Science (MS) at Stanford. Unable to obtain a student loan, his father had to withdraw funds from the family's savings to pay for Sundar's flight and other miscellaneous expenses. It cost the elder Pichai a year's salary, but it put Sundar on the right track.

Stanford was followed by a stint at a Silicon Valley semiconductor firm, Applied Materials. It was a tough period for Sundar as he was unable to stay in touch with Anjali, sometimes for a period of several months at a stretch. This was a time when telecommunications in India were not too developed and international calling rates were prohibitively expensive.

It was only when Sundar joined Applied Materials that he asked his parents for their permission to marry Anjali. The Pichai family gave their consent and the young couple was finally bound in marriage. Subsequently, Anjali joined Sundar in the US. When Sundar joined McKinsey as a consultant, Anjali decided to follow in his footsteps and did an MS from Stanford, much like Sundar had done earlier. This time, of course, the circumstances were different – the two of them were together.

A man with a mind of his own

'Don't keep forever on the public road, going only where others have gone.'

– Alexander Graham Bell

While outwardly quiet and apparently easy-going, Sundar has a will of steel that surfaces when it is required to. He has time and again demonstrated that he will do what he believes in, and that he believes in what he does.

At IIT, he went against the tide when, despite being enrolled in the metallurgical programme, he did his thesis in electronics at a time when no separate course on the subject existed at the institute. Later, his professors at IIT suggested that he undertake a PhD programme at Stanford, where he had earned a scholarship. Instead, Sundar dropped out of the PhD programme and did an MS in materials science and engineering.

Afterwards, while working for Applied Materials, he yet again decided to do things differently. Much to the initial chagrin of his parents, he quit the job and enrolled for an MBA at the Wharton School of Business. Here, he was named a Siebel Scholar and Palmer Scholar. The Siebel Scholar programme essentially recognizes outstanding students from 27 graduate schools in the US, China, Japan, Italy and France. Apart from Wharton, it includes institutes like the MIT-Sloan Institute of Management, Kellogg School of Management, Stanford Graduate School of Business, Harvard Business School, Carnegie Mellon University, Princeton University and Johns Hopkins University. Every year, a Siebel Scholar is chosen from each of the institutions, based on the dean's recommendations. The winner gets an award of \$35,000. The Palmer Scholar award is given to those students who graduate in the top five per cent of the class. The rank in class is calculated based on the student's cumulative grade point average (GPA) earned during the two-year stint at Wharton.

To an extent, Sundar's decision to do an MS in materials science and engineering from Stanford

contributed greatly to his understanding of the business at Google and his ability to add value to the Google founders' own thought processes. Sundar is skilled at dealing with density, semiconductor molecular mechanics and materials that make good semiconductors – essentially the building blocks of computers. On the other hand, Larry Page and Sergey Brin's outlook and qualifications are better more towards the software side of the business. Pichai's expertise literally blends the software as well as the hardware story, which could be a terrific advantage for Google in the present technological environment.

Gully cricket

'Cricket to us was more than play; it was a worship in the summer sun.'

– Edmund Blunden

There is something about Indians and cricket that is literally inseparable.

Cricket is one thing where even the most diligent student would make a concession and watch a match or at least discuss its intricacies with their friends. Sundar Pichai is not an exception to the rule.

During his earlier years at school, however, he did not show much interest in discussing cricket. Sundar's grandmother Ranganayaki says that while Sundar (she calls him by his nickname, Rajes) did not like wasting time, he and his younger brother Sreenivasan would play cricket in front of the house after school. Later, he was captain of his high school cricket team. At IIT Kharagpur, he was no different from the rest of his group at Nehru Hall, when it came to spending hours at night discussing the sport or dissecting a match they had seen recently.

It is interesting that Sundar's compatriot and another high-achieving Indian in the field of technology, Satya Nadella, CEO of Microsoft, also professes his love for cricket and what the sport has taught him about leadership.

Not an elitist

'Sundar Pichai is a metaphor for a new kind of elitism in the US.'

– Wajahat Qazi

Historically, any major event is followed by a plethora of salubrious and some not-so-wholesome reactions. Pichai's ascension as CEO of Google was not an exception. Among the not-so-favourable coverage was an article by Wajahat Qazi.⁴

While the article was not directly targeted at Pichai, it contained some pointed remarks that involved the new Google CEO and other talented Indians in the US. In the rather befuddled article, Qazi talks about a rising elite in the US (epitomized by Pichai) and how this has been instrumental in large measure in creating the angst faced by the working class white American. In his piece on Firstpost.com, Qazi seemed to imply that immigrants – mostly from India – going to the US had an easier time than homegrown Americans who did not have the same access to mentoring, education and opportunities that the immigrants had. While some may tend to agree with his views, anyone will be

compelled to wonder at the theory Qazi puts forth in the article. For instance, there are very few places today where opportunities for education and mentoring are as high as in the US, and people from developing nations certainly don't enjoy that advantage.

However, Qazi unwittingly does recognize that most of the so-called elites who have moved to the US have earned their stripes purely on merit; and nowhere is this more evident than in the case of Sundar Pichai, whom Qazi refers to as a metaphor for a new kind of elitism in the US! If Qazi had taken a little pain to delve into Pichai's background, he may have found that this is a man who didn't let the disadvantages of his youth decide the future course of his career; that here is a man who had struggled to compete with the best of the best in a nation that perhaps ranks the highest in the world on competitiveness but rather low on the spectrum of opportunities. In 1993, after landing in the US on a scholarship to Stanford, Pichai did not have enough money to buy a backpack for himself. When he heard that it cost \$60, he was shocked. Surely, this cannot be the elitist and privileged man Qazi refers to in his article. The fact that Pichai's father had to dip into his savings to buy Sundar's flight ticket also fails to support the 'elitist' tag Qazi attributes so easily to Sundar and others of his ilk.

On the contrary, Sundar Pichai is a metaphor for a new kind of meritocratic global citizen; the type that ought to evoke pride not just within India but also within the country (the US) that has allowed him to succeed entirely by his accomplishments.

Just before Google

'Our mission is to help our clients make distinctive, lasting, and substantial improvements in their performance and to build a great firm that attracts, develops, excites, and retains exceptional people.'

– McKinsey

McKinsey was founded in 1926 by James McKinsey to apply accounting principles to management. Today, it is one of the most reputed management consulting firms in the world, the Galleon scandal notwithstanding.

Sundar joined McKinsey in 2001 at a time when another well-known Indian – Rajat Gupta – was at the helm of McKinsey's global operations as the first non-American in the role. Pichai worked at the consulting firm for three years before leaving for Google in 2004, a year after Rajat Gupta had been replaced by another McKinsey stalwart, Ian Davis.

It was while at McKinsey that he completed his MBA from the Wharton School of Business. While Applied Materials taught Sundar the intricacies of semiconductors, his stint at McKinsey helped him develop management skills that would later come in handy at Google. However, his engineering and business skills are a small part of what defines him as a leader. Somewhere along the way, Sundar Pichai picked up the kind of acumen that is rare to see even in much older and experienced leaders. Perhaps, the man from Chennai always had those skills within him and merely needed the right ecosystem for it to flourish – an ecosystem called Google!

PART 2

THE RISING STAR

‘A key part of this (restructuring of Google and formation of Alphabet) is Sundar Pichai. Sundar has been saying the things I would have said (and sometimes better!) for quite some time now, and I’ve been tremendously enjoying our work together. He has really stepped up since October of last year, when he took on product and engineering responsibility for our Internet businesses. Sergey and I have been super excited about his progress and dedication to the company.’

– Larry Page

The changing landscape in the technology business

‘In my opinion, all previous advances in the various lines of invention will appear totally insignificant when compared with those which the present century will witness. I almost wish that I might live my life over again to see the wonders which are at the threshold.’

– Charles Holland Duell

Perhaps one of the most popular and misquoted statements of the century is attributed to Charles Duell, who was commissioner at the US Patent and Trademarks office between 1898 and 1901. In an apparent case of Chinese whispers, Duell has been misquoted as saying, ‘Everything that could have been invented has been.’ Ironically, this is not what the erstwhile commissioner said. If anything, his actual statement, made in 1902, (quoted above) reflected his excitement at the changes and discoveries he instinctively knew were on the way. This is borne out by the fact that the number of patents in the United States went up from 435 in 1837 to 25,527 in 1899. Duell knew the world was at the tipping point of discoveries and inventions that would make everything that had happened in the past look like a primary school science project.

The incredible 1990s

Duell’s incredible foresight was borne out over the ensuing years. The nineties, for instance, changed the way most of us looked at technology and its impact on people. In 1993, Microsoft introduced Windows NT that paved the way for MS-DOS and Windows. Apple Inc. came out with a Personal Digital Assistant (PDA), which was part of their Newton project. Both Microsoft and Apple would several years later prove to be two of the most formidable competitors for Google and, by extension, for Sundar Pichai.

In 1994, a man called Jeff Bezos left his job at a top investment firm on Wall Street, DE Shaw, and moved to Seattle to start his own company. Just four years prior to that he had been named the youngest VP at DE Shaw. DE Shaw’s loss was a boon for the world as Bezos went on to found [Amazon.com](https://www.amazon.com). Keen to maximize the opportunity offered by the Web, Bezos named his startup after the Amazon river. Bezos wanted Amazon to be the largest online store, and as exotic and different as the Amazon river. In 1997, Larry Page and Sergey Brin registered [Google.com](https://www.google.com); in the same year Jeff Bezos issued Amazon’s initial public offering (IPO) trading on the NASDAQ at a price of \$18 per share. Today, Amazon is one of the major contenders that Google and Sundar Pichai need to consider when it comes to cloud computing services.

In August 1991, the World Wide Web became available publicly. While the World Wide Web had its foundation in work that Tim Berners-Lee did in the 1980s at CERN, the European organization for nuclear research, it was later extended into a far more comprehensive proposal recommending a World Wide Web of documents connected via hypertext links. In 1990, Berners-Lee was working on a computer built by NeXT, the firm Steve Jobs launched after exiting Apple in the mid-eighties. It was on a NeXT computer that Berners-Lee developed the first Web browser software and called it the World Wide Web. In 1993, CERN declared that it was free for everyone to use and develop. The first graphical web browser to become popular, Mosaic, inspired the first commercial browser, Netscape Navigator. At the same time, Mosaic's technology went on to form the basis of Microsoft's Internet Explorer. Several years later, Sundar Pichai from Google would take it upon himself to unseat the ruling browser and make Chrome the preferred choice for users.

In 1997, Larry and Sergey registered Google.com as a domain. The name they had chosen was inspired by 'googol', a mathematical term for the number represented by the numeral 'one' followed by a hundred zeros. The domain name expressed Larry Page and Sergey Brin's mission to organize an infinite amount of information on the web.

The amazing 2000s

2004 was a seminal year for both Sundar Pichai and the organization he would later head as CEO. Not just that, if anything, the first decade of the new millennium portended even more excitement for the entire technology industry than the previous decade had.

However, the beginning wasn't altogether great. In March 2000, the dotcom bubble climbed to a peak and reached a zenith of 5,132 on the NASDAQ. Shortly thereafter, the speculative bubble eventually burst, wiping out more than \$5 trillion from the value of technology businesses. Hundreds of startups were wiped out and several blue-chip investors lost not just their funds but considerable face, too.

In 2001, Wikipedia was launched. Prior to this, the only online encyclopedia of note was Nupedia, started by Bomis – a web advertising company – and owned by Jimmy Wales, Tim Shell and Michael Davis. The editor-in-chief at Nupedia, Larry Sanger, convinced Wales and a few others at Nupedia to allow a new online encyclopedia (that he later called Wikipedia) to act as a feeder to Nupedia. The difference would be that unlike Nupedia, where the content was reviewed by expert editors, Wikipedia would be mostly self-regulated. Shortly thereafter, Wikipedia overtook Nupedia. Today, its global readership per month exceeds half a billion, making it the world's seventh most popular website as far as visitor traffic to the site is concerned.

Advances in data compression in the 2000s involved encoding information using fewer bits than was done originally. Compression can take the form of either lossy or lossless – the former cuts down on bits by identifying unimportant information and taking it out while the latter reduces bits by removing statistical redundancy. In simple terms, the procedure of reducing the size of a data file is called data compression. When the data is transmitted, this is referred to as source coding which involves encoding at the source of the data prior to it being stored or transmitted. The advancement in data compression tied in with the surge in music downloading and coincided with the increase in sales of portable digital audio players. While this gave birth to a slew of MP3 players, a classic case was

Apple's iPod which surfaced in November 2001. Given its storage capacity and the user-friendly interface, the iPod was an instant success. Apple's fortunes underwent a significant change with the introduction of the iTunes store as millions of customers lined up to download songs. By 2005, online music sales already accounted for six per cent of all music sales in the world. Subsequently, digital music options were integrated into devices like smartphones and the PSP (Play Station Portable) from Sony Corporation. Since then, data compression has defined the way ahead for several digital utilities and services, literally changing the landscape for all the technology players, including the big ones like Apple, Google, Amazon and Microsoft.

In the early 2000s, Flash was used to display web pages and online games. Enhancements in Flash technology enabled the making of video players. Consequently in 2005, the newly started YouTube used Flash Player to display compressed video content on the web. In 2007, YouTube offered videos in HTML5 format that supported Apple's iPhone and iPad but incidentally did not support Flash Player. In October 2006, Google bought YouTube for \$1.65 billion in an all-stock deal amidst rumours that the latter had competed with Yahoo for the acquisition.

On the operating system (OS) front, Microsoft's Windows XP and Microsoft Office 2003 became a sort of industry standard. On the browser side, Microsoft's Internet Explorer ruled the roost even though the free and open source browser Firefox from Mozilla Corporation gave them a run for the money in certain parts of the world. In later years, Sundar Pichai realized that Google risked losing its primary source of revenue from Search if it remained dependent on Microsoft's Internet Explorer. While we cover this in greater detail in the following sections of the book, this realization prompted Pichai and Google to hasten work on their browser. The result was Google Chrome, a freeware web browser that was launched in September 2008. Google's operating system, Chrome OS was launched in July 2009 and in it the applications and user data both reside in the Cloud. It essentially means that within a few seconds of switching on your computer you could be connected to the Internet.

Very importantly, at this time, broadband Internet usage increased all over the world. In 2000, the usage was barely 6 per cent of the overall Internet usage in the US. By 2010, it had surpassed all expectations and jumped up to more than eighty per cent. In fact, broadband Internet was by then viewed as a norm for a high-quality Internet browsing experience. This obviously had implications for any player who wanted to make their presence felt in the Internet-enabled services space. Google whose primary source of revenue came from Internet search, couldn't afford to ignore this trend. Neither could others like Microsoft or Amazon.

The other event that was meaningful during this period was the shift in broadband speeds. In the nineties, dial-up connections were the only way to access the Internet but in the 2000s, broadband became the technology of choice. While this trend commenced in the developed nations, it was rapidly copied by several other countries.

The threshold speed required to meet the broadband criterion is 4 Mbit/s. By 2014, the average connection speed at a global level was 4.6 Mbit/s. While the US clocked an average speed of 11 Mbit/s, places like South Korea and Hong Kong registered 24.6 Mbit/s and 15.7 Mbit/s respectively becoming the top two in the world as far as broadband Internet speeds were concerned. UAE mirrored the global average at 4.6 Mbit/s and Uruguay came up at a surprising 5.6 Mbit/s. What is incredible is the fact that most countries have been experiencing a year on year growth of 25 to 50 per cent. The

ramification of this on Internet-enabled businesses is not too hard to miss. It will also aid Google and Sundar Pichai's goal of making Search and other e-enabled services available to people across the world, irrespective of where they are or which social strata they belong to. Anyone who has a smartphone or a basic Internet-enabled laptop or desktop will be able to access the same information that a billionaire in the developed world or a professor sitting at Harvard would be able to.

In 2003, a phenomenon took place that changed the way people interacted with each other. This was the beginning of social media. Myspace.com, founded by Chris DeWolfe and Tom Anderson, was the largest social networking site in the world till 2008, when Facebook finally overtook it. The launch of Myspace.com was followed by Google coming out with Orkut in January 2004. The service was named after its creator, Orkut Buyukkokten, a Google employee. Orkut caught the world's attention and was immensely popular in USA, Japan, Brazil and India. A month later, Mark Zuckerberg came up with Facebook which took the thunder away from Orkut and took the world by storm. By 2011, Facebook was ahead of eBay and Amazon and ranked lower than only three other American web companies – Google, Microsoft and Apple. It was also the fastest company in the S&P 500 Index to reach a market cap of \$250 billion. Twitter, launched in 2006, became one of the widest used platforms to share information in real time. Founded by Evan Williams, Jack Dorsey, Noah Glass and Biz Stone, the company rapidly moved into the ranks of the top ten most visited websites in the world. Sites like LinkedIn, Pinterest, Tumblr and Flickr are among several others that helped fashion the social networking landscape. Today, the immense pull these websites exhibit has become a key opportunity for advertisers, and an incredible source of ad revenue for these sites. Therefore, it is not surprising that Facebook or Twitter today compete with Google for a share in the large advertising pie. What has also been defined are the kind of applications and strategies that technology companies and even non-technology businesses will need to come up with if they want to take advantage of data thrown up by some of these sites.

Several other developments in the 2000s have had tremendous bearing on Google and its peers. The vastly changed landscape has presented both opportunities and challenges for leading players. No approach is guaranteed to succeed for too long as the rules of the game are evolving quicker than they ever have before. Companies that focus on collaboration and early adoption of new technologies and who are willing to reinvent themselves or re-model themselves either organically or through corporate actions will have a better chance at being successful.

It remains to be seen if Google under Sundar Pichai is able to do this, and who among the many contenders in the technology sector will ease into a clear number one slot, a place that thus far has eluded everyone, including the inhabitants of Googleplex.

Coming home to Google

'By prevailing over all obstacles and distractions, one may unfailingly arrive at his chosen goal or destination.'

– Christopher Columbus

It was 2004. Facebook and Orkut had already been launched when Sundar Pichai left McKinsey and joined Google as one of the countless managers in product management. As Columbus said, years of

hard work and tiding over numerous obstacles and tribulations had eventually got Pichai to the place where he could set his dreams in motion.

Pichai's joining of Google coincided with the company launching a free email service called Gmail on 1 April 2004. He half believed the whole thing was a joke because the date is infamous as April Fools' Day. He was to realize he had been wrong when Gmail quickly overtook other popular email services. While initially Gmail commenced as a beta version, and for some time was used by internal employees of Google, it was made available publicly on an invitation-only basis in April 2004. Three years later, in February 2007, Gmail was opened up to the public at large. It was upgraded from beta status in April 2007. Gmail started off by providing 1 GB of free space to users at a time when peers like Yahoo and Hotmail offered a 2 MB storage capacity. It compelled competitors to offer considerably increased space to customers. Both Hotmail and Yahoo offered their Plus customer space of 2GB and 1 GB respectively. However, by and large most users of these two popular mail services still had to contend with only 100 to 250 MB of free storage. Gmail's entry into the mail services market did more than just push players into offering additional free space; it resulted in Yahoo and Hotmail enhancing their email interfaces as well. (In fact this is one area that is still considered to be a weakness for Gmail.) While there are enough loyalists for the latter, very few would doubt that Gmail can do with serious upgrades to its interface within the user's web browser. Be that as it may, a 2014 study suggested that 60 per cent of mid-sized organizations in the US were Gmail users. Even more significantly, in the same year, Gmail had the distinction of becoming the first app on Google Play Store to touch one billion installations on Android devices!

Interestingly, Gmail probably represents the first launch from Google that really got them in the soup. Up until the launch of Gmail, Larry Page and Sergey Brin had been able to excite almost everyone about all their products, the most notable one of course being Search. Gmail was a different story. Right in the beginning, the Google team knew they had a great product. While the initial users of Gmail were Google employees, a few 100 select users were subsequently given the opportunity to try out the new product. Later, these happy customers were allowed to give away a limited number of accounts to their family members and friends. It was a great way to beta test the product. Also, not making it available en masse to start with created just the right level of anticipation in the world at large.

And it would have been perfect had Google just launched Gmail and not tried to replicate the success of their 'text ad' model in the Search business in the case of Gmail too. Those who have followed Google's success would remember that Google was the only player in the Search business who did not flood their users with meaningless banner ads. Nor did they believe in allowing paying advertisers to get a say in where they would be listed. While Google adopted Overture Inc's model of putting small text ads alongside the search results, they veered away from what they considered Overture's unethical manner of giving prominence to paid businesses. It worked like a charm. Internet experts like Danny Sullivan commended them for their brave and ethical business model and users obviously loved the fact that Google was not cluttered with meaningless ads and that sponsored listings put up by Google were clearly mentioned as 'sponsored'. More importantly, the sponsored listings were linked to what the user was searching for in the first place and that made them truly relevant for the users. This was the beginning of millions in ad revenue coming to Google.

Yet, the savvy and customer-centric Google founders made a gargantuan mistake with Gmail. In a classic case of inside-out thinking, Google decided that what had worked for Search would also work for Mail. They decided to adopt a similar model of placing text ads on the right-hand side of Gmail. In order to benefit users and businesses, Google claimed they would be looking at contextual advertising. Exactly what Google meant by this was announced by Wayne Rosing, Google's Vice President of Engineering, around the time of Gmail's launch. Rosing said in an interview, 'Gmail grew out of experiments that involved our ad targeting. We did some textual analysis and were able to make it work.'⁵

While the announcement did make players like Yahoo and MSN start to sweat, it had a lot of other people including politicians and regular users up in arms. The implication that Google may be peeping inside their private mails to understand the context and then place contextually relevant ads was anathema to a lot of people. Google began to be compared to Big Brother and all of a sudden, the youthful 'do no evil' brand was no longer the innocent player it had been considered for the past few years. Google eventually sorted the mess and moved on, making Gmail one of its biggest successes after Search.

When Sundar Pichai joined Google in 2004, Eric Schmidt was the CEO. Page and Brin had got the immensely capable former CEO and Chairman of Novell to join Google in 2001 when Page decided to step down.

Joining Google as one of the scores of Product Managers, Pichai's initial responsibilities related to Search and consumer products like the Google Toolbar, iGoogle and Desktop Search. For someone with Pichai's ambition and fervour to make changes, this may not have looked like an ideal beginning at least not on the surface. After all, he was one among several product managers, barely touching the echelon of middle management at Google. And the products he had been given to handle were certainly not the kind of stuff you write home about or boast of at alumni meetings.

However, Pichai has been known to weather constraints and convert what others may see as disadvantage into an opportunity. And he did just that with the otherwise innocuous-looking Google Toolbar.

'Tooling' it to the top

*'Don't wait for extraordinary opportunities. Seize common occasions and make them great.
Weak men wait for opportunities; strong men make them.'*

– Orison Swett Marden

Pichai's reasons for joining Google were perhaps no different from that of several other high-potential resources who had joined this amazing organization. What drove him to the legendary company was possibly the desire to change the world through technology that empowers people to do amazing things.

However, before he could begin to do that, he would need to accomplish something entirely different; something that might not have been as important or elevating as changing the world but was certainly critical for Google's survival. And it all started with the Google Toolbar!

The Toolbar was significant as it enabled Google to make its search engine the default option on Internet Explorer and Firefox, the two most popular browsers at the time. Pichai's role in creating Google's Chrome browser, and driving its success even while Microsoft demonstrated the aggression against it, was one of the things that propelled him to the limelight. Eric Schmidt was initially not in favour of a browser. The CEO of Google didn't see any point in replicating a product that was already doing well in the market. However, Pichai saw it differently. He argued that Microsoft might someday replace Google as the default search engine on Internet Explorer with one of their own. The face-off continued for a bit with neither party yielding. Pichai, in what is now known to be his patent style, waited and watched for the right opportunity to convince Schmidt and the others.

At long last, the Chrome project was approved by Schmidt in April 2006. It was none too soon either. Six months later, the team at Google had their most fiendish ghosts come alive. Microsoft had just shaken up their world as they knew it, and the Bill Gates-led company had done it without providing any notice to either Google or to the users. The date was 18 October 2006. Microsoft had, without warning, changed the default search engine on Internet Explorer to Bing.

In order to understand the importance of this move, it will be significant to consider how Google was making its money at that time. Internet Explorer was moving traffic of millions of customers to Google since the latter had been the default engine on Microsoft's browser. This traffic was worth billions of dollars to Google. While Google was also the default search engine on every other browser of note (including Firefox), close to 65 per cent of its users came through Internet Explorer.

Microsoft's move to make Bing the default search engine on Internet Explorer resulted in Google losing close to 300 million customers! This wasn't just a business setback. It was the kind of nightmare you might wake up from to find out that you are no longer in business.

Fortunately for Google, Sundar Pichai had foreseen this. Along with his team, Pichai went into crisis mode. The net result was a dual strategy. Google made use of a feature in Internet Explorer and created a pop-up window rooted in the web page. This gave customers, who were now on Bing, the option of setting their default back to Google. This was helpful and somewhat saved the day for the Search leader. Nearly 60 per cent of the lost customers reverted to using Google.

However, this was not yet enough to allow Google to breathe easy. There were still approximately 100 million customers to win back. This is where the innocuous Google Toolbar came into the picture. The Toolbar affords a search box that always points to Google. This meant that any customer with the Google Toolbar installed would be recaptured and reverted to Google. Also, the latter could check the registry settings, thereby prompting users to change the default, if need be.

While Pichai and his team at Google had won the battle, they knew that the war was just beginning. Microsoft was not an easy competitor and the software firm was entirely capable of coming up with measures in the future that would prevent Google from recovering its lost customers. The next time could be fatal for Google. Pichai and the powers-that-be at Google were in no mood to wait for such a moment to happen in the future.

Pichai swung into action and began signing up OEM bundling deals. Distributors, including the likes of Hewlett Packard (HP) and other large players were spoken to and the result was that Google software bundle was pre-installed on millions of computers. This ensured that when a customer bought a computer, it would have Google Toolbar, Google Desktop and other software already

installed on it. Google would either be set as a default search engine or the user would be prompted to change the existing search engine back to Google the first time they used the browser. Sundar Pichai and team had saved Google from a major potential disaster.

This event did two things. On the personal front, it positioned Pichai as a forward-looking visionary resource, a perception that at once differentiated him from the several other sharp-shooting cerebral product managers at Google. On the other hand, it set the ball rolling in the right direction for the creation of Google's own browser, a product that would later be called Chrome and shake up the world of Internet Explorer and Microsoft.

Chrome shines

'He likes scale, huge scale. I was in the room when Sundar convinced Eric Schmidt that it would be possible to unseat Internet Explorer as the world's most popular browser.'

– Christopher Sacca

It's fair to say that Pichai's current success owes a great deal to his ability to lead difficult projects successfully; among these, in the initial stages, were the Toolbar and Chrome. The former was significant in defending Google's search efforts on users' machines whereas the latter took that one step forward by improving the user's experience of the entire web. At the outset, Sundar Pichai had figured out the key to Google's ongoing success: keep users online and they would keep using Google for Search.

Pichai's vision of having a Google browser came at an interesting time. Google and Microsoft had been battling it out on various fronts ever since Google became a noticeable player on the horizon. The charismatic leader of Microsoft, Bill Gates, has been quoted innumerable times saying that he would drive Google to the ground in the war for innovation and customers. Microsoft has rarely been able to make this reality. Google with its nimble structure and an almost maniacal obsession with innovation more often than not has frustrated Microsoft's efforts. This has not gone down too well with the gigantic software company that in the early 2000s still considered Google to be an upstart that could be put in its place.

It did not help that the Google founders and CEO Eric Schmidt failed to show any public deference to the Redmond-based company. If anything, they faced Microsoft head-on the first opportunity they got. In 2005, Eric Schmidt spoke at the University of Washington's Paul Allen Center for Computer Science and Engineering, a venue donated and named after one of the Microsoft founders. Schmidt was at his best. He was respectful enough not to come across as brash in his views about Microsoft but outspoken enough to get his goal across: he wanted to lure into Google's work force as many talented people as he could. And talent taken away from the University of Washington was talent made unavailable to the nearby headquarters of Microsoft. It was like putting your arm inside the lion's den and attempting to take away its food while it slumbered nearby! Schmidt referred to Google as the best place in the world to work while his comments about Microsoft plainly indicated that the latter was a sleeping monolith whose best days were behind it.

Again, the same year, Google hired a man called Dr Kai-Fu Lee in China. Lee had been Microsoft's key man in China since 1998 and his relationships within China were incomparable. While several

senior managers from Microsoft had already joined Google, Lee's decision to join Google was seen as one of the highest-ranking exits from Microsoft. This did not go down well with Steve Ballmer, CEO of Microsoft, and the battle-lines were drawn much tighter between Google and the older organization.

Later, in 2005, Google dealt another large blow to Microsoft. Google already had a tie-up with America Online (AOL). However, in December 2005, it was able to frustrate bids from rival companies Yahoo and Microsoft, resulting in a \$1 billion deal with AOL that saw Google take up a 10 per cent stake in the company. The strategic partnership with AOL meant that Google could no longer further its search and advertising relationship with it. It was a big blow for Microsoft.

Perhaps, the biggest thorn in Microsoft's side involved its failed bid to acquire Yahoo. In 2000, Microsoft's Ballmer launched a hostile bid to take over Yahoo. The offer price of \$31 for Yahoo shares was significantly higher than the then stock price of \$19. The \$45 billion bid would not only have essentially placed Microsoft as a major contender in the Search business, but the overall combined entity would have been an invincible foe for Google or any other player in the industry. However, the Google troika (Larry Page, Sergey Brin and Eric Schmidt) successfully rallied Jerry Yang (the Yahoo chief). The result was an advertisement pact between the two companies that enabled Google to help Yahoo make more advertisement money through Google's superior technology. Yahoo was able to successfully ward off the hostile bid. Microsoft knew they would have to do something about Google before it became too big to handle.

All of this might still not have been sufficient cause for Microsoft to really target Google's lifeline – its ad business. That owed its basis to something else, an event that happened in 2004.

It started with Google going public in August 2004. Until the company was privately held, its incredible profitability was known only to the Google founders, CEO Eric Schmidt, and a few other trusted people within the company. When it went public, the company had to disclose its immense revenue and profitability data. What had seemed like a modest-sized Search firm till then to the public, and even to its competitors, now suddenly loomed as a gigantic Search organization earning billions of dollars in revenue every year. That most of the money came from ads was not lost on anyone and no one was more acutely aware of Google's cash inflows than Microsoft. The reasoning at Redmond did not need a genius to decipher – cut off the ad revenue to Google and the company would die. And if the same business could be replicated at Microsoft, it would be like killing two birds with one stone. Pichai and others at Google did not fail to see this either. The blatant replacement of Google with Bing on Internet Explorer had put the writing clearly on the wall and it helped Pichai get the green light from Schmidt and others to commence building a browser from the Google stable.

Pichai knew that Microsoft had, to a large extent, been responsible for driving Netscape out of business. Netscape had, in 1995, gone public with a stock price of \$28. The stock price went up by almost 300 per cent within a day of it being traded. When Microsoft came out with Internet Explorer in August 1995, Netscape had more than 80 per cent of the browser market share. Microsoft responded by signing exclusive contracts with ISPs and bundling Internet Explorer with its Windows OS. In 1998, AOL announced a \$4.2 billion acquisition for Netscape. By the time the deal fructified in 1999, it was worth almost \$10 billion.

Pichai knew what Microsoft was capable of. He did not want a similar fate for Google. The first thing was to avoid reliance on Internet Explorer as that allowed Microsoft to replace Google Search

the default on their browser. This underscored the need for Google's own browser. Hence, Chrome was born. The next, equally important thing, was to ensure that Microsoft could not do to Chrome what it had done to Netscape. One of the issues with Netscape was that it was not free for users, especially corporations, whereas Internet Explorer (IE 2.0) from Microsoft was free for all Windows users, even if they were commercial businesses. Google Chrome was consequently offered free to all users.

Chrome was a big hit with users with its few significant advantages over Microsoft's browser. Chrome had more effective memory management. The page navigation was intelligent compared not just to the Internet Explorer but also to other popular browsers of the time. The text layout and rendering was faster, too.

According to StatCounter, in January 2009 Chrome had a market share of 1.38 per cent compared to Internet Explorer's significantly larger 65.41 per cent. Exactly one year later, Chrome had notched it up to 6.04 per cent whereas Internet Explorer's share fell to 55.25 per cent. The real difference, however, came in July 2011 when Chrome considerably reduced the gap between Internet Explorer and itself. At this stage, Chrome was at 22.14 per cent while Internet Explorer was at approximately twice its share at 42.45 per cent. A year later, by July 2012, Chrome (33.81 per cent) comfortably beat Internet Explorer (32.04 per cent).

By February 2015, Chrome was seated atop a comfortable 48.71 per cent while Explorer languished at an unimpressive 18.91 per cent, according to the StatCounter Global desktop stats figures.

Today, Pichai says, one-third of the world's users are on Google Chrome. In the consumer space the share could actually be higher, given that Google has historically been stronger on the consumer end compared to Microsoft's relative strengths on the enterprise side. Also, enterprise users take a while to upgrade and that could be another reason they are still on Internet Explorer. It's noteworthy that emerging markets have shown a higher preference for the faster Chrome. What is most interesting, though, is that there are more Windows users on Chrome than there are Mac users. This is possibly because Chrome initially launched on Windows.

Pichai's push on Chrome came at a time when even senior Googlers like Eric Schmidt felt that the world did not need an extra browser. One wonders if Chrome would have ever been born if the equation between Microsoft and Google hadn't been what it was in the early 2000s and if Google hadn't perceived a threat from the larger organization. Be that as it may, Chrome is currently the predominant player in the browser market. Not only that, Chrome (the browser) is the basis for Chrome OS (the Google operating system); Google looks set to push Chrome OS as an alternative to Microsoft Windows.

Chrome – not just a browser

'Sundar has a talent for creating products that are technically excellent yet easy to use; and he loves a big bet.'

– Larry Page

Following the immense success of Google Chrome, Sundar Pichai was promoted to the post of vice president. This was followed by another promotion to senior vice president a short while later.

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