



# THE SILVER LINING OF THE CLOUD

## Managing Cloud Computing for a More Equitable Knowledge Society

By Florian Ramseger

We are at the doorstep of a new era. Just like the telegraph in the 19<sup>th</sup> century or the PC in the 1970s, “cloud computing” will revolutionise the way we work. What we are witnessing is a tectonic shift towards a new era of mobile computing, where computing power, software and data are located in the so-called “cloud”, and can be accessed via the internet – at any time and from anywhere in the world.

But this is not just a new era of information technology. This is the coming-of-age of the Post-Capitalist Society that Peter Drucker described in his visionary book by that name, published in 1993.<sup>1</sup> Drucker recognised the world economy was starting to change and predicted that knowledge would completely replace capital as the defining factor of production within a few decades; he predicted that we would be living in what he called a “knowledge society”. Following a brief description of the new technologies that are becoming available to those who use, transform and create information, I will argue in Part II of this essay why cloud computing will galvanise the transition towards this new society.

The impact of this technological revolution on society will not be the same everywhere. Only those who leapfrog to the opportunity frontier will experience the benefits; only those with access to the cloud can participate in the knowledge society.

But, as the saying often attributed to Drucker goes, ‘The best way to predict the future is to create it’. Nothing is decided yet, and management decisions taken at governmental, non-profit and private-sector organisations can still make a difference.<sup>2</sup> Therefore, in the last section of this essay, I will outline the opportunities and challenges that they face when building the infrastructure for our new world.

## PART I – Demystifying Cloud Computing

In the very-near future, your daily computing experience will be as follows. Your computer will be slim, light, yet affordable – a netbook, tablet PC or smart phone. Upon switching the device on, it will automatically connect to the internet. All your applications and documents will be stored online on huge servers – in the so-called “cloud”. This will mean that you can create, view and edit your work, from wherever you are, using whichever device you wish. What’s more, you will be able to collaborate

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<sup>1</sup> Drucker, *The Post-Capitalist Society*.

<sup>2</sup> In this essay, *management* is understood in the wider, Druckerian sense and thus includes the management of all kinds of organizations, not just for-profit businesses.

on projects with your colleagues no matter where they are located. In fact, you will be able to edit the same files simultaneously.

The pieces of this future are falling into place. Netbooks, tablets and smart phones have started to conquer the markets. These devices still run locally installed applications, but software, too, is in the process of changing. Consider for example that Microsoft has recently made parts of its Office suite available as a web-based application. Taking this a step further, Google Chrome OS – a combination of operating system and web browser – is scheduled for release later this year, which means that operating your PC and browsing the internet will soon be one and the same. Data created with these applications can already be stored online, for instance with 3PAR, which, at this time of writing, is the jewel of a bidding war between Dell and HP. According to the Economist, these market leaders ‘are jockeying for a bigger share of the market for “cloud computing”’.<sup>3</sup> Security concerns often mentioned in the media as an obstacle to cloud computing are being addressed, too. People used to store their money under their mattress, before it became commonplace to open a savings account. Similarly, experts predict that eventually a critical mass of people will find storing data externally more secure than on their own computer.<sup>4</sup>

All these developments in information technology will result in more than just cosmetic changes to your computing experience. In an article titled *The End of Corporate Computing?*, Nicholas Carr argued that the impact will be akin to the development of the electric grid in America in the early 20<sup>th</sup> century.<sup>5</sup> Prior to that, firms – at least those who could afford it – would run their own electricity generators at each of their plants. When electricity then became a utility and was available through power sockets, fixed costs of production decreased drastically, making it possible for even the smallest firms to set up shop and thereby giving industrialisation a large boost. According to Carr, cloud computing will generate similar reductions in overhead costs, as firms switch from having their own data centres to renting computing power.

The promise of costs savings, personal mobility and flexibility will propel cloud computing mainstream. And when this happens – just like the electric grid changed the way we work with machines – cloud computing will change the way we work with knowledge.

## **PART II – Cloud Computing in the Knowledge Society**

**K**nowledge has, of course, always played a role in the history of the world economy. As society advanced, people came up with new ideas for new products and for new methods of production. Concurrently, the importance of knowledge increased steadily. According to Drucker, knowledge is now becoming so dominant a force in the world economy that we are moving towards what he calls a knowledge society, where knowledge will eventually replace capital as the defining means of production:

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<sup>3</sup> The Economist, *Cloud computing, or cloud-cuckoo land?*

<sup>4</sup> Focus, *The Top 10 Cloud Computing Trends*

<sup>5</sup> Carr, *MIT Sloan Management Review* 64:3.

‘Increasingly there is less and less return on the traditional resources, labour, land and (money) capital. The only – at least the main – producers of wealth are information and knowledge.’<sup>6</sup>

In my opinion, cloud computing will be a key protagonist in the nascent transition towards this new era. As the primary tool of the knowledge worker, it has the great potential to put in place the three main elements of Drucker’s knowledge society.

First, emerging information technologies have the potential to facilitate the functioning of markets where knowledge workers can exchange the fruits of their labour. In his book *The World is Flat*<sup>7</sup>, Thomas Friedman describes how large IT and outsourcing firms such as Infosys or Wipro have benefitted from the glass-fibre cables that now connect Bangalore to the world economy. Independent knowledge workers, too, flourish in a connected world and can, offer services like computer programming, business plan drafting, or even ghost writing through virtual market places such as eLance.com, a platform similar in function to eBay. I am convinced that the greater connectivity of cloud computing will deepen existing markets and create many new platforms of exchange for knowledge workers to engage in. This will create one of the pillars of the post-capitalist world that Peter Drucker had in mind. After all, Drucker argued that only the market will allow the knowledge worker – who has to specialise in a very narrow field in order to truly master the subject – to contribute efficiently to society.

Second, cloud computing could shift the balance in employer-employee relations. So far, knowledge workers often depend on their employers to provide them with the tools of their craft: their desks, PCs, IT servers, etc. Drucker thought that workers would increasingly take ownership of these tools of production, because they would control their companies either through share options or through commitments from their pension funds. However, I would argue that Drucker’s vision might manifest itself in a more direct way. With cloud computing, workers will no longer need to be deskbound. Instead, by being able to plug into the cloud anytime and anywhere, they will finally be able to own their work tools: a netbook and some server space.

Third, cloud computing will also liberate the workforce by enabling “flatter” hierarchies among workers. Knowledge workers cannot be productive on their own, mobile as they will be. Instead, because they are so specialised, they need to interact with other specialists. Moreover, Drucker postulates that, as opposed to industrial times where hierarchic teams functioned best, knowledge work requires more flexible arrangements, allowing constant interaction and coordination. As simultaneous access to digital files is possible with cloud computing, the tools are now there to realise Drucker’s vision of how knowledge work should be arranged.

All three of these elements imply the declining importance of geography. The knowledge worker can use his tools, collaborate with colleagues and participate in markets from anywhere in the world. It follows that more and more people can be integrated into the global economy – even those from the most remote parts of the world.

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<sup>6</sup> Drucker, *The Post-Capitalist Society*, P.167

<sup>7</sup> Friedman, *The World is Flat: The Globalized World in the Twenty-First Century*.

## PART III – Infrastructure is Key

But the promise of cloud computing is based on one premise: access to the cloud. In turn, this hinges on two things: ownership of a computer and, crucially, a fast internet connection. While the use of computers has mushroomed in the last few decades, there are still billions of people who do not have access to one. Christened the “digital divide”, this difference could aggravate the gap between the haves and the have-nots drastically, as knowledge gains in importance.

On the other hand, our generation’s opportunity to close the digital divide has never been better than before. As computing power shifts to the cloud, end devices become leaner and therefore more affordable. Currently, netbooks are already available for 300 US\$, but the price will drop further, along with the pace of technological progress. The Indian government is, for example, planning to roll out tablet computers to schools and universities, aiming at a price of ‘around \$35 per piece, gradually dropping down to \$20 and ultimately to \$10 a piece’.<sup>8</sup>

Similarly, new ways of pricing software and data storage – renting services out on a per-use basis, rather than charging a lump sum – renders IT more accessible to larger groups of society. As explained in the *The Fortune at the Bottom of the Pyramid* by C.K. Prahalad, the poor often benefit from lower fixed costs.<sup>9</sup> In countries such as India, many people prefer to buy small sachets of washing powder rather than a large box, for example. More and more multinational companies are warming up to alternative consumer preferences and realise that selling many small units can also add up to large sums. Due to the low marginal costs of provision, cloud computing services would lend themselves to such pricing models.

Another strategy that could make cloud computing services widely available to the poor is varying prices across geographic regions and across time. It is already a common practice in the mobile phone sector of many African countries to offer different call charges at different times of the day. This helps to smooth the utilisation of networks, while allowing financially-constrained customers to make cheap phone calls at certain times of the day.<sup>10</sup> There is no reason why it should not be possible to extend this to cloud computing. IT companies must realise the full potential of the emerging markets and employ creative ways of pricing to tap this potential.

Yet, a computer on its own will soon no longer be worth the plastic it is made of. To be useful in the future, connectivity to the internet at high bandwidth is quintessential. Unfortunately, huge differences in connectivity exist at the moment. Consider the following story: on 22 April 2009, the UK government announced that it will deliver broadband internet of at least 2 megabits per second (mbps) to every household in the country by 2012.<sup>11</sup> <sup>12</sup> Just one day later, a Korean minister promised that his country would have 1,000 mbps ‘as standard by 2013’.<sup>13</sup> The Koreans enjoy broadband rates

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<sup>8</sup> Press Information Bureau, Government of India, press release from 22 July 2010.

<sup>9</sup> Prahalad, *The Fortune at the Bottom of the Pyramid*.

<sup>10</sup> The Economist, *The Mother of Invention*, p.8.

<sup>11</sup> Directgov, *Budget '09 and Digital Britain*.

<sup>12</sup> The new government of David Cameron has pushed back the date to 2015 due to financial constraints (Financial Times, *Universal UK Broadband Roll-Out Delayed*).

<sup>13</sup> Financial Times, *Coping with Life in the Broadband Slow Lane*.

that average over 100 mbps already today, as do the Japanese and the Scandinavians, for example. These trailblazers are clearly punching in a different league from the UK.

But it is not only speed that matters. Mobility, too, is important. In a world where your end device can only function properly in the cloud, you will need access to the internet *wherever* you are. Here, too, Asian countries appear to lead by example. Take Singapore for instance, where I travelled to earlier this year. Upon arrival at the airport, I received an automated welcome message on my mobile phone. Expecting the usual alert about roaming charges, I was pleasantly surprised by its content: how to obtain a free password for the network of over 800 WiFi hotspots located throughout the city. What I found even more amazing was that the Singaporean authorities are working towards nation-wide coverage of WiFi – set to be in place by 2015. These examples demonstrate the immense possibilities when a government embraces the advent of technology and puts its full weight behind systemic implementation.

On the other extreme, there remain many countries with poor internet infrastructure. Today, 78% of the world population still do not have access to the web.<sup>14</sup> In Africa, less than 9% of the continent's population can go online, compared with over 60% in Europe. And broadband internet is not even something they can dream about; merely 0.1% of Africans have a fixed broadband connection.

Yet, there is hope. The rapid spread of mobile telephones in developing countries provides room for optimism. In Africa, cell phone subscriptions scaled up quickly and already vastly outnumber subscriptions to fixed lines (in 2006 there were 21.6 subscribers to mobile services per 100 inhabitants, compared to just 3.6 for land lines<sup>15</sup>). Better still, the private sector has come up with innovative ways to set up the necessary infrastructure. Dubbed the “Indian model” in the telecommunications industry, sharing of antenna towers by multiple phone providers has become widespread, not only in India, but also in Africa and elsewhere in the world.<sup>16</sup> These developments are very encouraging, because mobile phone networks have the capacity of substituting for WiFi internet. Thus developing countries could skip cable-connected internet altogether and join the cloud, leveraging on mobile phone networks.

Despite the innovative strategies of firms tapping into the markets of even the poorest countries, governments should not just sit back and relax. Telecommunication networks, like any utility, bring with them the latent risks of natural monopolies – once an incumbent firm has set up the necessary infrastructure, the fixed costs of setting up a rival network can prove prohibitively costly for latecomers to the market. Thus a need for government regulation might arise, to ensure healthy competition in the long-run interests of consumers.

The good news is that policy makers do not have to re-invent the wheel. Both positive and negative examples for how to regulate natural monopolies abound. The botched privatisation of the phone industry in Mexico, for example, resulted in one company (Telmex) commanding a market share of 90% and has left the country with some of the highest telephone charges in the world.<sup>17 18</sup> Instead, the acknowledged best

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<sup>14</sup> International Telecommunication Union, *Free Statistics*.

<sup>15</sup> *Ibid.*

<sup>16</sup> The Economist, *The Mother of Invention*, p. 9.

<sup>17</sup> OECD, *Getting it Right*, p. 31.

practice is to separate the physical network from the service providers that use it. The state should then maintain a strong regulatory grip on the former while fostering competition amongst the latter. The expertise to build and operate the IT infrastructure of the future exists; what we need now is the audacity to translate blueprint into action.

## **CONCLUSION – Continuity and Change**

**P**eter Drucker predicted that improvements in information technologies will result in knowledge being the crucial resource of the 21<sup>st</sup> century. What he could not have known, when he wrote the *Post-Capitalist Society*, is what exactly the IT tools of the knowledge worker will look like. Today, we can see a little farther.

While the innovative nature of the IT industry makes any long-term predictions difficult, it is clear to me that cloud computing will be the next big thing. I have described the impact it will have on how we work in a knowledge society: how it can create information-based markets, how it can facilitate teamwork, and how it can liberate the knowledge worker.

Change and renewal of societies rarely proceed smoothly in history. The rise of cloud computing, too, will be accompanied by a host of challenges, including issues relating to security, reliability and privacy. The most important issue – and the one that I have tried to address in this essay – is that of enabling access to the cloud for as many people as possible. As we have seen, commercial businesses are coming up with innovations to deliver IT to the bottom of the pyramid. They will need to forge on with their efforts to counteract a worsening of the digital divide.

The crucial bit is providing the requisite infrastructure underlying high-speed internet. We will need a drastic change in thinking among those in power. Merely watching the IT landscape evolve will not do. Some Asian countries have shown how ambitious governments can lead the way to offer internet access based on cutting-edge technology. Other countries will need to follow suit, if they do not want to be left behind.

While drastic changes are clearly needed, we would be wise to also retain certain elements of continuity: if the internet evolves into an essential utility, such as water or electricity, we can draw on time-tested regulatory policies to ensure widespread, efficient and consistent availability of this infrastructure.

We now know what the transition to the knowledge economy will be like. We now know the opportunities and the challenges that it presents. What remains is to act on it. If we manage this transition well, we can make ours a better and more equitable world in the new age of knowledge.

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<sup>18</sup> Forbes.com, *Carlos Slim Helu*.

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