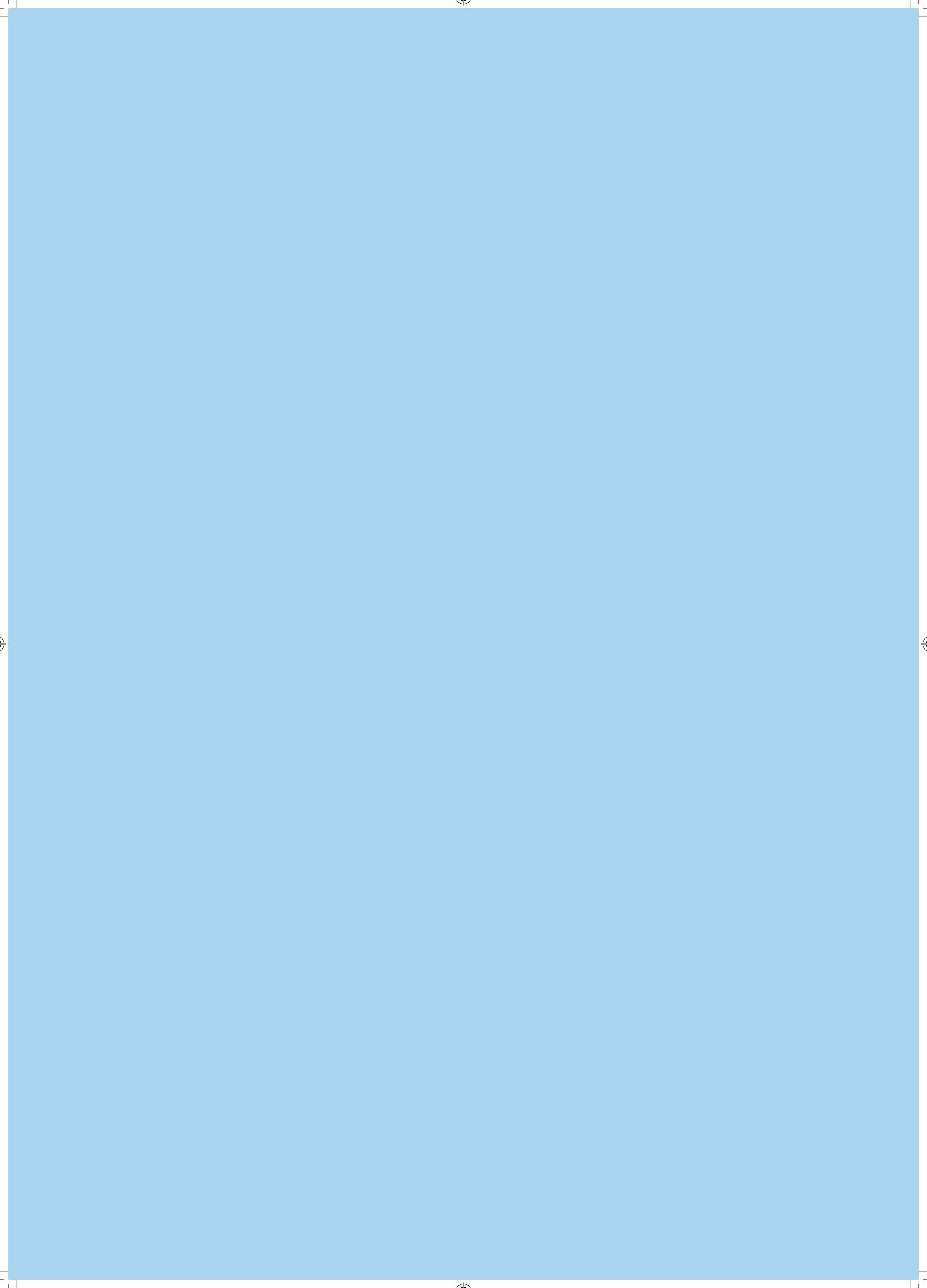


Smartphones on the beach

A vision on the office workspace of 2012





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Foreword

The world around us is forever in motion. New technologies grow and overtake, then they are themselves overtaken. Our ability to adapt as users of technology is forever being put to the test. Virtualization, the rise of online social networking, new forms of collaboration and architecture have all become part and parcel of our lives.

What are the consequences of these changes for tomorrow's office, for tomorrow's workspace? Which developments can we determine in terms of software, of new device paradigms, in terms of modes of communication? Which technologies are here to stay (for a while, at least)? And, most importantly: what role will users and organizations play in this arena of change?

Bas van Leur, together with a team of trend watching Capgemini consultants, has tried in this white paper to answer some of the questions posed above. The result pays due respect to the movement towards open standards and open source that has evidently gripped the market. For a deeper exploration of that trend, though, the reader is encouraged to try Open Times, a Capgemini white paper written by a team of experts in 'open' matters. That paper too is available through the Capgemini website: www.capgemini.com.

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1 Introduction

Smartphones on the beach. Much in the same way as the revolutionary **One Laptop per Child** project offered a vision of new models of production for information technology, Capgemini in this paper expresses its views on the role that this technology plays and will play: in the workplace, on a day-to-day basis.

What will be the office workhorses of 2012? Will it be laptops... even smartphones? The venerable desktop computer is dwindling fast, but what can we say about the myriad of new devices that charge into the market every month? And what software will operate this workhorse? Will it be Microsoft Office 2012, running on Windows 2012? Finally, why do we envision our 2012 coworker as working from the beach, of all places?

The changes noted in this paper are fundamental and their effects become ever more significant. Capgemini has been tracking events in technology for many years. In this paper, the edge technologies of tomorrow find their use in the workplace of the near future. The effects developments have on that workplace vary wildly: some are direct and profound while many will be hardly noticeable to the average employee.

Context

There is currently an ongoing debate in both the private and the public market about information technology

and its role in the office. This debate is known under various names and incarnations. In Capgemini's point of view the workplace of tomorrow will be profoundly affected by the advent of open source, open standards and collaboration. It is no secret that Capgemini wishes to contribute to this debate, as befits a leader in systems integration.

2 Developments in technology

2.1 The You Experience

You, the person reading this paper, were proclaimed Time Magazine's Person of the Year 2006 – just as everybody else was, of course. The message: that the era of lowbrow, wide-access multimedia communications has arrived where your role is no longer just to listen and think. In this era every consumer of media has become a potential producer of media. Conventional mass media is all about sending bulk messages to masses; now these masses have been given the means to talk back. And talk back they do: witness the explosion of blogs, communities and apps we call the Web 2.0.

Customizability

The employee of 2012 will be better equipped to work through the Web than his predecessor. In 2012, eighty percent of the workforce will have no knowledge of what it was like working without computers. The digitally illiterate generation will have all but retired. The digitally savvy coworker will demand less of the corporate help desk, but he¹ demands ever more in terms of customizability for his workspace. Technology will have to meet those demands. Applications as well as hardware, in terms of form as well as function: user customizability is key.

Prosumers in the office

Members of the workforce in 2012 will know better what's available in terms of technology. As individuals in their spare time, they are prosumers: involved with what they buy. So too, in the office: tomorrow's coworker is a

knowledge worker who knows what his workspace ought to be capable of doing for him. CIOs and CTOs must devise coherent, transparent technology policies in their organisations, especially where security is concerned. The digitally emancipated coworker is prone to ordering those devices that they want to use, and installing on these devices exactly those apps that they want to work with. That leaves the CIO/CTO to worry about security, integrity and interoperability, but such issues pale in the face of finally having a workforce that knows its way around a computer.

An important discovery for producers of both soft and hardware is that what coworkers will ask for in the office largely depends on what they already use at home. Producers realise that b2c market share is in this manner linked to b2b market share: several global producers readily admit that precisely this link is the reason they're still involved in consumer products at all.

2.2 Co-creation and Interaction

Once, the consumers' way of showing their preference was through their wallets, in the same way as the citizen's only way of showing preference was through their voting ballot. That time has been and gone. Joe Average today has a wide range of instruments at his disposal for direct, two-way communications with those who provide him with products and services. What used to be mere transactions – goods and services move silently from producer to consumer – now become interactions, because the buying party

can and will provide feedback on their purchase. The positive result of this development is that producers and service providers have access to incredibly detailed, unsolicited feedback. Instead of having to phone your target group after hours, often disturbing them at the dinner table, customers have gone online and they are telling us all exactly what they think about what they buy. Producers and service providers – overcoming their initial dismay at all the frank criticism with regard to their products – have jumped on the bandwagon. They now ask their audience directly what it'd like to see, and then they build it. Co-creation is key.

The same happens in the workspace. The conventional model, in which management communicates one-way and top down, has been compromised by email and the intranet. Hierarchical and geographical borders are voided by these instant and often colloquial forms of communication. Organisations can engage in ambitious offshoring operations while the internal demand side hardly even notices, save for hiccups regarding language or cultural differences. Co-creation happens across borders and even continents. The side effect of all this online access is that the internet has become paradise for the anonymous heckler. Anyone and everyone can get online and denounce their boss, manager, company or product in any way they please. Corporate communications will need to develop answers to this trend; international government needs to develop adequate legislation for it.

¹ For any use of the words he, him or his in this paper should just as easily be read she, her or hers. The employees of 2012 will enjoy even greater gender equality than today's employees do, we expect.

Wikinomics

Working through wikis is the epitome of online collaboration. The online workplace is increasingly becoming a platform for working together. Online applications make the exchange of ideas and peer review for documents ever easier, until today even the exchange of the document itself is no longer needed. Microsoft Word first featured a track changes button in 1997, allowing for easy peer review. This has however always remained a serial process. With the launch of Google Apps, it became possible for multiple editors to work on a single document at the same time: the file itself is stored online on a server. The decision who is, and who isn't allowed to edit is at the discretion of the administrator.

The ultimate form of this free collaboration is the wiki; there's a document online somewhere, and all can join in perfecting it. Wikipedia is the most famous public example of this collaborative mode but a multitude of groups and communities, both professional as well as amateur, with memberships both more and less restricted, have followed suit. The document you are now reading was largely drafted on Capgemini's own corporate wiki.

2.3 On-the-fly Processes

The modular makeup of Service Oriented Architecture (SOA) allows for faster reconfiguring of organisations, if and when external demands change. While every department once required its own copying facility, its own graphic designers and its own archive, SOA is based on the premise

that merging smaller services into one larger organisation-wide service provider creates flexibility for the organization involved. No longer does management have to hire a new graphic designer every time a new sales line comes operational. Today these merged services have in many cases grown into customer oriented and smoothly run shared service centers that service many departments and even multiple corporations in parallel. Formalising transactions between the supply and the demand side forces both sides to maximise cost efficiency, which benefits the organisation as a whole. A side effect of this trend is, not unimportantly, that departments will often become so agile that issue-driven units arise. These are pseudo-departments that exist solely to tackle one single issue, reappearing and disappearing as issue owners see fit. This fluidity in organisations has become something for policy makers to take into account.

The Mash-up Organization

When self-supporting service centers find themselves sourced out of the mother corporation and turned into profit & loss-responsible entities in their own right, they often look each other up and begin using each others' facilities. Again, online technologies allow a new type of business model to emerge. Facilities, functionalities and inventories intertwine; the boundaries of the original service center become fluid. We call this new type of business organization a mash-up organization - mash-up being the word artists use for the new artistic products they make out of existing works. A DJ mashes samples to make a new beat; a

photo artist mashes up a collage to make a statement.

Already, large corporations surround themselves with large numbers of service providers, often companies that have a host of corporations, corporations which compete with each other directly, as customer. Because of the competition drive the customer seeks to use these standardised services in unprecedented ways. Open standards thus cause services to proliferate in ways that the original service provider never imagined, or even intended. We call these innovative blends of services mash-up services and so far Google's move to publish its Google Maps API has been the most prolific source of mash-up services around. Google may never have known beforehand that its API would one day be used to track plane movements around the globe. Nor would it have cared. This freedom to adopt and adapt technology is another signal trend within organizations.

2.4 Information-as-a-Service

From the supply side of technology comes another fundamental shift: away from the software as a cash cow, to software as a commodity. These software suites are offered for free, as-is, with professional support or additional services driving the business model. Software-as-a-Service, SaaS or simply 'on-demand', these have been business model buzzwords for this decade. Its byproduct is mobile offices powered entirely by online software applications. Google Apps, Microsoft Office Live, Netsuite Salesforce and SAP are just a handful of major software brands that have gone SaaS.

As the next step in this development we have seen SaaS maturing into fully-fledged software suites tailor-made to the sector they are targeted at, an evolution Capgemini calls **Sector-as-a-Service**.

Storage-as-a-service

Parallel to the process that sees corporate apps supplied completely over the internet (SaaS), we're seeing the process that governs the files themselves move away from the desktop or laptop storage devices too. Hard disks have grown to be capable of storing hundreds of gigabytes, but the capacity sits unused because data is stored on centrally serviced blade servers, or even outside the company altogether with dedicated storage partners. Now Amazon, Microsoft and Google, among others, have taken Storage-as-a-Service to the consumer market, and as such, it is probably here to stay. Storage too has become a commodity, rendering the mobile office ever more mobile.

Lumping **software-as-a-service** together with **storage-as-a-service**, Capgemini coins **information-as-a-service**. Their impact on the office workspace is compounded by several other developments, described below.

Always on

The availability of information-as-a-service means users are getting used to having access to their information 24 hours a day, 7 days a week. The hardware devices they use play into this standard by having always on capability. Office environments geared to information-as-a-service aren't just

always on, they're always online. If not always on, then start-up times have to keep to an absolute minimum to keep the wily coworker satisfied. Google's Android OS raised eyebrows by no longer including software for PC synchronization - the idea is that the phone synchronizes not with any PC but directly with the server, via the internet.

The 'instant-on' computing concept

With information-as-a-service in play, the desktop, laptop or smartphone increasingly becomes an empty shell, suitable only for attaching a keyboard and a mouse to: a terminal into the internet, requiring very little else in terms of functionality. The Operating System responds to this trend by introducing the splashtop: an operating system that takes next to no time to start up, and powers up only those apps that the user will need for his session. A good example is the Asus EEE-PC (Easy to Learn, Easy to Work, Easy to Play) equipped with just a linux kernel and several online tools. If all the apps and data that a user needs are accessible online, then the only app that the device needs is the browser. This brings boot times to a minimum, hence 'instant on'.

2.5 Invisible Infrastructure

In all, the technology that powers the office workspace is becoming increasingly unobtrusive and implicit. Gone is the bulky desktop, gone is the modem, gone is the floppy disk. Screens are getting flatter - or even beamed onto an office wall altogether. Software is provided online - gone are stacks of CDs.

Increasingly unobtrusive as well, is maintenance. System operators carry out updates at the server side, out of sight, increasingly unnoticed. Yes, there is a help desk, reachable by phone or email or intranet chat, but in general, our coworker has no notion of maintenance taking place.

Saving data, analyzing it, exchanging and processing is all done via the permanently present connection. The processes that power the office disappear to the naked eye: *invisible infrastructure*.

Mobile

Increasing congestion on the highways and rising oil and gas prices place pressure on the working population. Technology must provide ever easier ways of working mobile. The current generation of users is used to having access to information at all times, and will not feel so great a need to visit the office. Already technology is looked to for the solution, but in many cases, its enabling capacity is only partially made available. Wireless networks don't yet provide citywide or even global coverage but much can be expected from for example WiMAX and HSDPA. The expectation is that in 2012, such coverage will be regarded as a given by an educated workforce. Information will then of course no longer need to travel with our coworker. It can - USB-sticks aren't necessary going to leave us - but what is the point of carrying one around if wherever you go, there is access to cloud storage-as-a-service?

This last observation has profound consequences for the nature of information in terms of device interoperability, even device independence. Data, documents: all these will need to submit to a reality of device independence and application independence. This sounds easier than it is, but the demand is non-negotiable. Screens used to be a hampering issue in terms of how small devices were allowed to become, but the industry is finding ways around that, such as the polymer screen and miniaturized beaming. Soon documents will quite possibly be as easily read, on a device the size of a smartphone, as they are on a laptop or desktop computer. Document standards must adapt. Smartphones and devices must embrace open document standards in order to accommodate: governments are setting the example by decree; the market seems to be doing the same as developments progress. More about open standards in paragraph 2.6.

Security in the mobile office

All this freedom entails a formidable challenge in the area of security. The conventional model for security focused on building a solid perimeter: a line drawn around the organization: what's inside stays in, what's outside is the enemy. The firewall, the smartcard, the WPA-encryption: these are examples of perimeter thinking. One is forced to ask: how thick need these walls be to guarantee our security? And what does the mobile coworker think of all this paranoia?

In answering the questions above,

security experts are exploring deperimeterization. This is the idea that information must be safe, no matter where it is: inside, or outside any perimeters. The idea is not to secure access to the information, but to secure the information itself.

Encryption of storage methods, intelligent user authorization, Information Leak Prevention² and Data Classification Tools³: these are examples of deperimeterization. In discussion about these matters Capgemini uses the term Jericho style security.

2.6 Open Standards and Service Orientation

.DOC, .XLS, .PDF, OOXML...ODF!

The move from analogue typewritten documents to digitalized files was an enormous feat for the office of the eighties and nineties. The format revolution rages on today. Invisible innovations rule the administrative departments of government and commercial life, making things ever easier for the citizen and the consumer. Amidst the changes the challenge remains to maintain functionality between subsequent filing and storage systems. Organizations need open, universally applicable document standards to tackle the challenge, and the market is moving towards these at great speed.

The Dutch Government

The government of The Netherlands has a history of lawmaking and policy decisions towards open document standards, primarily with cost efficiency and quality of service as its main policy drivers. As of April 2008 for example, Dutch national government

has committed itself to accepting the Open Document Format (ODF) in its civilian communications, with other levels of government to follow suit. This decision is part of the resolution 'Netherlands in Open Connection'.

Microsoft, longstanding market leader in document software, today seems to have acknowledged the power of the movement towards open standards, as it decided in June 2008 to fully accommodate for ODF in its MS Office suite.

The 'open' trend

Underpinning most any of the aforementioned trends and developments is a profound shift in attitude towards the closed business models of the past decades. The following chapter will delve a little deeper into the political dimension to this shift. But the development of open standards and business models is a far from purely ideologically driven one. Today, open standards often simply mean easier business. The mobile office exists almost solely on the principle that information flows smoothly and safely from one end of business to the other: vertically as well as horizontally. No one can safely predict the end of the proprietary model (the conventional, closed model based on limited licenses and intellectual property rights beholden to a single party) by 2012. However, the movement behind the open model has gained such momentum these years that it is by now hard to see the end of it.

² Products in the organizational network that ensure intelligent security by way of taxonomy.

³ Another document taxonomy.

3 The 'open' trend

3.1 The Open Trend: comes in four flavours

We will order the 'open' trend in four categories. These may overlap, and they supersede each other somewhat, but for the sake of explaining the power of the open argument, they will do nicely.

Open Standards

For policy makers in government and commercial life, this category is probably what matters most. It is the movement to open up interface protocols and storage protocols. The Open Document Format (ODF) is probably its greatest achievement yet. It is also the category of open developments where change will happen most rapidly, also because this is where vested commercial interests have the least to fear from change. For government, this is where citizens are served best by the open trend.

Open Source Software

This category entails mostly software (Operating Systems, applications) that allow any third party to obtain, open and tinker with the source files, the building blocks of the product. Currently the most well known is the Google Maps API, but the list includes quite a few operating systems (Linux and its many offspring), many thousands of applications (OpenOffice, Joomla) and several environments (OpenSocial, Android). Contrary to the Open Standards category, where change happens fastest, the Open Source arena is where change happens most furiously and every step of the way is hotly protested. The champions of protest here are established players that built their strength on

proprietary models, and that often fear the open movement because they stand to lose what has approached in many cases a monopoly. Yet the consumer, prosumer and CIO have seen the price benefits that open source has to offer, and the developer has embraced the edge that open community development has to bring. These are the drivers of change in this arena.

Open Methods

These are methods followed by professionals (analysts, designers, engineers) that allow any likeminded professional, internal or external to their company, to contribute. Of course, this is again quite a change for the highly competitive fields where these professionals operate. Capgemini supports this revolutionary way of working together by participating in the OPEN Group and by asking input for its methods (TOGAF, IAF, SEMBA and others) from the professional field. The coworker in this paper however is not likely to notice much of the changes taking place. Still open methods do support other categories of the open trend; open methods serve the CIO in an important way because they make for more transparent pricing and the end user is of course the chief beneficiary of any architecture and infrastructure implemented through open methodology.

Open Content

This discussion involves intellectual property in general, and supersedes the other categories somewhat. Most visible in the arena of the arts, it really does involve all other forms of knowledge and intellectual production. Projects such as Wikipedia and the

greater Creative Commons license that governs that reservoir of knowledge are its most well-known achievements. It is also the most ideologically driven arena, based on the assumption that knowledge must be free to achieve its full potential.

3.2 Push- and pull-factors in the 'open' arenas

Vendor Lock-in

We will briefly discuss some of the main reasons why the open model is currently so attractive to a host of parties. The most important push factor is probably **vendor lock-in**, a notorious feature of the conventional proprietary model.

Vendor lock-in occurs when an organization, in its daily reality of procurement decision making, is faced with no choice but to stick with its current vendor. The cost of moving to a different platform, suite or application often outweighs the possible benefits of such a change. Or, in a somewhat similar calculation, the core operations of an organization have grown so attached to working with a certain product, that making a change would disrupt output severely, however temporary.

The conventional coworker in his office for a long time hardly experienced vendor lock-in as a hindrance. Users often enjoy working with what they know, especially in a time when office technology was for many people a tricky competence to master. This is beginning to change however, because coworkers are ever more digitally savvy and they are finding that vendor lock-in keeps them from acquiring

those new technologies that they do wish for. Also, the hassle of yet another upgrade has become somewhat of a strain on a workforce that has just grown used to what they're using right now.

Collaboration

The chief benefit in the open business model is precisely in its openness. The fact, that any party that wishes to contribute to a product can do so, means that a tremendous potential for improvement has been unleashed in terms of adaptive and innovative force. This is also one of the reasons why the technological upscaling of products made by way of an open source development model happens so quickly. Finally, open standards ensure that the effects of vendor lock-in stay limited to a large extent, even if they cannot be excluded altogether: if documents can move freely from application to application, it will be less of a problem that the company that uses these documents cannot.

Pricing

The open model has a major benefit in terms of pricing. Essentially, once the source code of a product is published, the basic product in itself ceases to drive revenue. It becomes a commodity, the brand company uses it to gain market share, and generates revenue through added services such as support and plugins or, in the case of Google and a host of other technology brands, advertising. For the buyer, the benefits are self-evident.

The rise of the open source business model has been for many years a cause to which only a handful of idealist insiders subscribed. These were often regarded as well-meaning but

hopelessly naïve by the public at large. In many cases, back then a convincing business case was the one thing lacking from the open source argument. Having come up and grown with that business case, the debate about open business models and open source software has rapidly evolved away from the IT department water-cooler and squarely into the boardroom as well as the parliament.

4 Conclusions

This document has painted with a broad brush the currents presently playing out in technology, and how these currents are soon to affect the offices of coworkers everywhere. How are we to arrive at that smartphone, working from wherever we want to work (which was evidently, in the case of the authors, from under a palm tree on the beach)? The trends we have described have been the following:

- User-centered orientation (customizability)
- Application interoperability
- Mobility, and the concomitant security paradigm
- Increasing online collaboration
- Increasing invisibility of the technology that powers the office
- Fluid forms of organization
- Device interoperability
- Increasing market share for online services
- Decreasing dependency on providers and producers due to open business models and standards.

We have argued that technology in the office is changing rapidly from being a disabler into becoming an enabler. The amount of things you can do with technology is starting to get the upper hand over the things you cannot do. We have also argued that a number of major choices remain that currently still generate much heated debate throughout the commercial and the public economic ecosystem. The fact that much of this

debate seems inclined to favor the 'open' model is something Capgemini as a systems integrator encourages.

Today's CIO/CTO would do well to play into these developments. Of course, transformations of this magnitude and scope are rarely of the 'Big Bang' type: there is always legacy⁴ to take into account. Moreover, a CIO/CTO is not a lone actor on the organizational stage. He needs to take his user population into account: the coworker we have discussed throughout much of this paper. That population is in most cases not amused with all too much change in all too short a time. But with a well-drafted procurement policy that takes into account not only financial drivers but also interoperability, integrality and continuity, an incremental approach to a fundamental transformation is very well possible.

⁴ Technology that is in itself obsolete, but that is maintained within the organization for whatever reason, and that must be taken into account when considering transformations.



About Capgemini

Capgemini, one of the world's foremost providers of consulting, technology and outsourcing services, enables its clients to transform and perform through technologies. Capgemini provides its clients with insights and capabilities that boost their freedom to achieve superior results through a unique way of working - the Collaborative Business Experience™ -

and through a global delivery model called Rightshore®, which aims to offer the right resources in the right location at competitive cost. Present in 36 countries, Capgemini reported 2007 global revenues of EUR 8.7 billion and employs over 86,000 people worldwide.

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