FUJITSU

White paper
The Future of Workplaces

In order to persist in tomorrow's competitive environment, businesses need a motivated and productive workforce who can react flexibly and fast on ever changing demands. The turntable for all activities of the workforce is their workplace. But how will the workplace look like in the future? An exciting question, to which there is more than just one answer.

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Introduction: The business world is changing

For ages, people had to accept barriers and restrictions imposed by the physical world. Long distances and geographical borders between members of a team, who had to collaborate, often proved as an obstacle which protracted projects enormously or even had them failed. The digital world removes these barriers, thus providing innumerous new opportunities for everyone. Especially for businesses, the world changes dramatically. Laborious and time-consuming tasks which were feasible with highest efforts only, or which were sometimes perceived as almost impossible, can be executed in the twinkling of an eye.

As time and speed are more important than ever before to be competitive, organizations set their strong focus on the productivity of their workforce. Being able to do your job anywhere and anytime is a key prerequisite for success and leads to an increased significance of mobility.

At the same time, the number of smartphones in the market is exploding. Already today, more smartphones are sold per year than desktops or notebooks.

This trend is for sure strongly influenced by the digital natives, increasingly entering working life. Having grown up in a digital world, they procure devices with latest technology on a private basis, but they leave no stone unturned to use their own devices and even non-corporate applications for business purposes, on and off their employers' premises, beyond the control of the corporate IT.

In this context, social media deserve mentioning too, as they are more and more seen by the digital natives as tools with a positive impact on the business.

All these trends go along with flexible working models which make it anyway difficult to see a clear boundary between work and life.

But is there a chance to get around these trends? The war for talents makes at least a partial acceptance of these trends indispensible.

Completely independent from these trends, the shortage of energy and the rethinking in terms of energy policy makes people and enterprises more conscious of the environment.

This means that tremendous changes will influence the business world within this decade. For the IT as the heart of the business, these changes represent new challenges and pose a number of questions. In the following, we are going to look into the question, what the impact will be on the end users' workplaces and the IT organization which has to look after them.

Your workplace – As it used to be

Before disclosing how the workplace of the future will look like, we are going to regard the workplace as it used to be. And frankly spoken: even today, there are many enterprises where exactly this situation prevails.

Everything is tied to the end user's working device, the type and size of which is a one-time decision with an effect for several years. The operating system and the applications are installed locally, and the user personality is also statically present on the device. In principle, it's all about the device. If your device is not available and functioning, you won't be able to use your applications and access your data. In other words: Without your device you won't be able to work.

Doubtlessly, this rigid dependence of the user from his device is in conflict with the flexibility you need to be competitive in the market.

In addition, the tight coupling of all components, such as hardware, operating system, applications and user personality, makes these components and their lifecycles dependent from each other. Any change in one of these components will impact its adjacent components, too. Correspondingly, with this monolithic approach, the IT department is faced with lots of unique configurations, causing huge efforts in terms of lifecycle management. Many support calls are the result of many incidents being a daily occurrence. The complexity of the monolithic approach leads to long recovery times after failure, and thus expands the period of time in which the affected end users are limited in their productivity.

As a backup by all end users on a regular basis is not ensured, there is always the risk of data loss. Further security risks result from the multitude of vulnerabilities which can potentially cause unauthorized manipulation or destruction of data, as well as data theft. All these risks conflict drastically with regulatory compliance.

It goes without saying that the high management complexity limits the speed and flexibility of reaction, when the business requires changes driven from internally or externally. And finally, for all reasons mentioned, operational costs and end user costs, and thus of course also the total costs of workplaces are high, and often not all transparent.

Virtualization of the workplace

How to get around all these limitations regarding flexibility and speed, and how to manage IT workplaces in a more cost-effective way? The answer is fairly simple. You just have to break the tight coupling of the components, thus making hardware, operating system, applications and user personality, as well as their lifecycles independent from each other. This is exactly what virtualization stands for.

Due to their independency from each other, you expand the lifetime of the components. Complexity is tremendously reduced, because instead of managing lots of unique and monolithic workplace configurations, you will be able to manage single instances of components. This does not only simplify management, it increases flexibility and speed when you have to react, improves service quality and finally reduces costs.
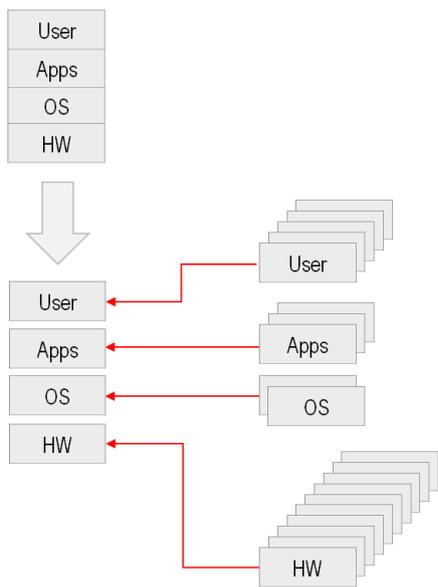

The separation of the components (also denoted as the component model of IT workplaces) even makes a dynamic workplace assembly and delivery on demand very easy, no matter whether workplaces have to be deployed for new users, or workplaces have to be recovered after failure.

While today the virtualization of the workplace is often seen as an alternative architecture, the component model is expected to be the only architecture deployed in the future.

Moving from the front-end to the back-end

Due to the separation of the workplace components from each other, virtualization enables you to move applications, user personality, data or even entire workplaces from the user's device into the data center. As the front-end device is then used for the access only, thin hardware, such as thin clients or ultra-thin clients with the respective access software or just a web browser are absolutely sufficient. As an alternative, zero clients without any of the typical ingredients of a device will be used. By moving things into the back-end, we basically turn the workplace into a workspace, which is accessible anywhere and from any device, no matter whether it is a stationary device, a notebook, a tablet PC system, a smartphone or anything else.
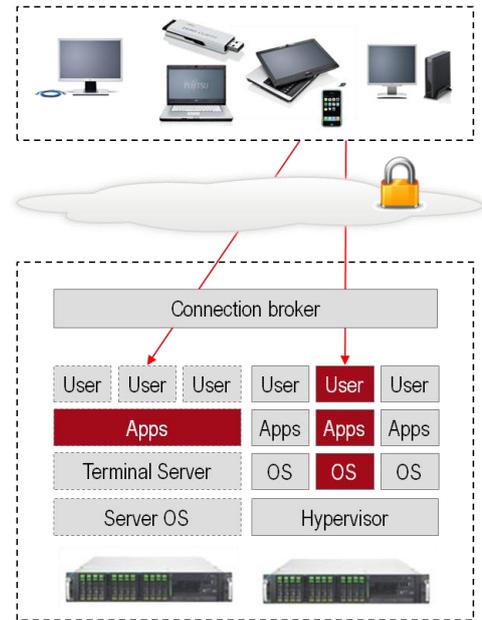
Moving things from the front-end to the back-end simplifies management. Software can easily be deployed and updated, and patches become effective without touching numerous end user devices. Hardware and software upgrades are achieved without disrupting the end user. Onsite visits for the purpose of end user support are a thing of the past. The level of application and workspace availability is significantly increased; even disaster recovery concepts known from the server world can be applied to end user workspaces.

As new software or growing computing needs do not require PC upgrades any more, the lifetime of the client hardware is considerably extended. Thin and zero clients have no moving parts, and they operate without failure for at least twice as long as normal PCs. If such an access device once breaks down, it can simply be replaced by a new one. Furthermore, their usage holds enormous energy cost savings, although you need the additional infrastructure in the data center. And, you won't hear any noise when using a thin or zero client.

The fact that all data is hosted centrally eliminates the risk of data theft. Data backup no longer depends on the end user, thus minimizing the risk of data loss and improving security. This does not only help you fully meet compliance demands, it even makes your compliance audit-proof.

Furthermore, central infrastructures for end user workspaces hold a great potential of cost savings, especially operational costs and end user costs are considerably reduced.

Nevertheless, it should not be ignored, that a central workplace infrastructure needs to be managed, too. But who will look after the management in the future? Can the IT organization afford doing it, or do they have other priorities? Is it reasonable for them to do it from a cost perspective, or is it an expensive luxury?

Make or buy?

Considering the various evolution phases of IT infrastructures, after consolidation and standardization, virtualization paved the way for moving things from the user's device into the data center. In contrast to the traditional lifecycle management with the device and its availability being in the focus, workplace services are either simplified by being moved into the data center, or they can be dropped completely, as for instance the deployment of devices. Security services will be needed in a totally different shape. Powerful tools for orchestration, which are frequently an integral part of virtualization solutions, help accelerate and automate the remaining service tasks.

However, in many cases, businesses will recognize that subject matter experts are rare and costly, which is reflected in the war for talents they have to fight one day at a time. Consequently, their primary goal will be to use the experts they have got on their own payroll for strategic projects and business-relevant tasks rather than daily routine tasks and commodity-related things. Basic tasks, such as lifecycle management for IT workplaces, can in general be covered much more efficiently by service providers who deliver highly industrialized managed services, and can achieve scale effects, which a single organization can usually never achieve. Based on a service level agreement, the typical charging model is a monthly price per seat, which provides full cost transparency.
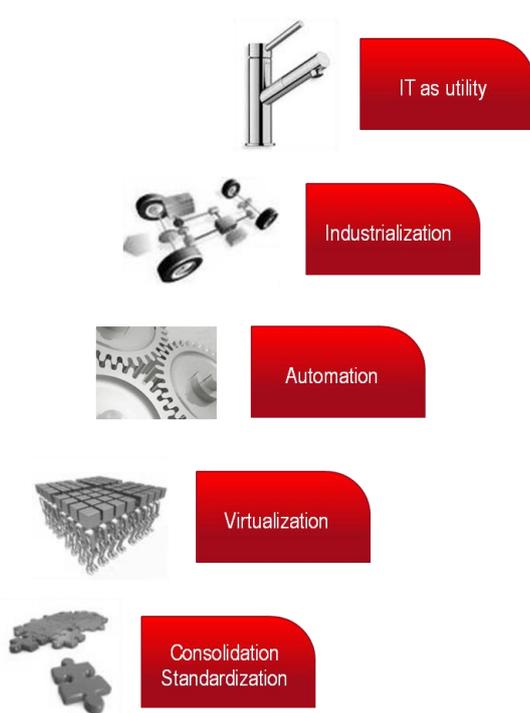
While with managed services the customer keeps full control over his workplace infrastructure, the trend is going more and more towards consuming IT workplace services as a utility, like water from the tap or electricity from the socket. This is exactly what cloud computing stands for.

Cloud computing relieves business pain

Based on virtualization as its enabler, cloud computing is the technology, and at the same time the model for highly standardized delivery of applications, data storage or entire workspaces as a service.

A "pay-as-you-use" model is the basis for billing, shifting capital to operational expenditure, and reducing costs in total. You just pay for what is needed now, rather than funding for future growth in advance. And what might be very important too, it allows you to turn off resources not needed any longer. The high flexibility in up-scaling and down-scaling enables you to start up new initiatives fast and without any risk. You may always expect latest technology and highest service quality, without investing in infrastructure and skills.

With cloud computing, the customer has the choice between a dedicated and a shared approach. With the dedicated approach, also known as the private cloud, the cloud infrastructure is dedicated to an organization, and cloud services are provided to various divisions of this organization.

The shared approach comprises the trusted cloud and the public cloud. In a public cloud, the infrastructure can be shared, even anonymously, with anyone. In contrast, with a trusted cloud, the cloud infrastructure is selectively shared among a number of customers, who are well-known by the cloud provider. Likewise, trusted cloud customers know where their data are, and they are familiar with the security policies and mechanisms their cloud provider has in place.

Using any of the shared approaches, high economies of scale can be achieved, which in turn will make cloud computing very attractive from a price perspective.

Of course, a hybrid cloud, which is a mix of various cloud approaches, for instance hosting entire workspaces in a private cloud and getting certain rarely needed applications from a trusted cloud, is also imaginable.

All said, cloud computing will relieve much of the pain businesses and their IT departments are currently faced with.

Ubiquitous high-speed connectivity makes cloud computing reality

With cloud computing as a preferred option for service delivery, networks will become more important than ever before. As an integral part of the "workplace system" they have to be always on, in order to enable anywhere and anytime computing.

Excellent user experience is the basic prerequisite for the acceptance. From a network perspective, this will be achieved by exploding bandwidths resulting from technologies, such as WiFi and mobile broadband, but also by 4G services, such as WiMax and LTE (Long-Term Evolution), with which all existing 3G technologies can harmonize.


Economical flat rates will make networking affordable for everyone. And the fact, that LTE is a global phenomenon, will even simplify roaming.

Due to the broad coverage, the availability and the bandwidths of the networks in many countries, offline work will become an exception in the future. In those rare cases where you cannot avoid working offline, local hypervisor-based virtual environments on your device, being fully encrypted and isolated from anything else, will support you. And when your device is lost or stolen, IT has the ability to remotely erase data stored on the end point device, thus minimizing security risks.

The workspace is dynamic

Moving workplace components into the data center or even into whatever type of cloud transforms the workplace into a workspace. From an end user perspective the workspace can be seen as a personal cloud which represents a set of online services and personal devices. It so happened that there is the same acronym for both, the Personal Computer and the Personal Cloud, meaning that the PC acronym will keep its right to exist in the future, too.
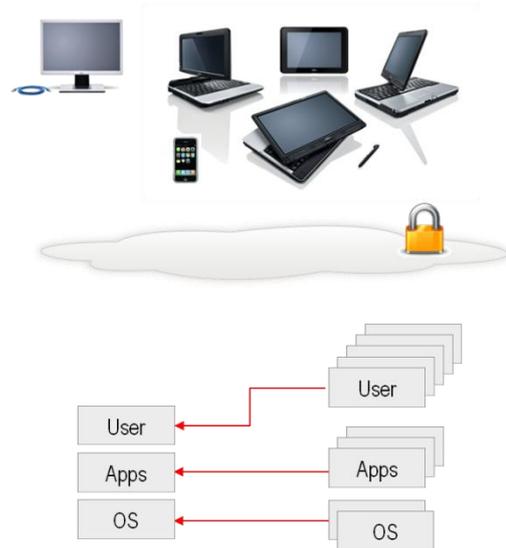
However, quite in contrast to a personal computer, the personal cloud is nothing static. By self-service, the workspace of a user is dynamically created at logon and ceases to exist after logoff. Context-aware filters will control permissions and access rights depending on the user's current location, the time of access and the access device. Correspondingly the dynamic presentation of the workspace content will be controlled, according to corporate security policies.

Devices will not matter for IT

After all discussions about virtualization, centralization, cloud computing and dynamic workspaces, the question remains what the device requirement from an IT perspective will be in the future.

Especially with this question a fundamental change will be noted. Doubtlessly the era of device-based locked down clients will be over. Central virtualization concepts and cloud services enable users to interact with applications across multiple devices.

As far as devices and operating systems platforms are concerned, an ever increasing proliferation will be observed. Mobile devices will absolutely dominate, new device types will emerge with the focus on design and ease of use.

More and more users will use more than one device; they will go for diverse devices for specific use cases, which might reflect their individual lifestyle and self-expression at least up to a certain level. At average, we see 2-3 devices per user, e.g. a smartphone that you pack wherever you go for information consumption, a tablet for working while being on the move, and a device with a full keyboard for highly productive working and generating information in the office, at home or somewhere else.

Managing all this proliferation of devices and platforms would take enormous efforts. But the company's interest in end user devices will strongly decrease in the future. It might at the most be the purchase department that keeps being interested in them up to a certain degree. For most businesses and their IT departments, devices will not matter anymore. The CIO focus will be on managing services instead of devices, having smart processes in place for productivity improvements, the governance of applications, data, IT services and providers, and on making sure that the access of the end users to their own data center or the one of their provider is controlled appropriately. In other words: the IT department is quite clearly subject to a change from just looking after a stable infrastructure to driving the business.

But who will select, buy and manage the end user devices, if the IT department is no more interested in them? Actually there is only one party left, and this is the end user.

Device selection by end users

One of the main reasons, why device selection is moving from the IT organization to the end user is that every year more digital natives are entering working life. They have grown up in a digital world, and they are used to having always latest technology for their personal life and desire the same technology at work instead of maybe a cheap boring plastic device.

Therefore they try everything to use their devices for business purposes, too. And often it makes no difference for them, if they are allowed doing so or if they are not. Anyhow most of them will find a way to do what they intend to do.

However, it is not only the digital natives driving this; it is in general about people who need IT – and this applies to all generations.

On the other hand, it must be stated that the borders between work and life blur more and more. Knowledge and information work can happen anywhere. Why should you be in the office, if you can do your job more efficiently at home? You won't waste your time by being on the move. You won't be hit by traffic jams, being able to start working without any delay. As a result, you will be more relaxed and therefore more productive and probably even longer productive for your business. Understanding that salaries should be paid for performance and results rather than presence for a certain amount of hours will lead to a mind change in organizations to support flexible working models and even encourage their employees to make use of such opportunities.

In a world without clear boundaries between work and life, end users are often busy with a mix of business- and person-related tasks, what makes a separation of devices for private and business purposes unacceptable for them.

Moreover, they are convinced that in addition to the device it can make a lot of sense to use some applications for both, life and work. For example, social media, such as Facebook, MySpace, Twitter, LinkedIn or YouTube, which certainly originate from the private environment can be used to collect more information about customers, or for communication, because this is sometimes the faster way compared to the traditional e-mail.

In this way, consumer technology – devices operating system platforms and even applications – migrates into the enterprise. Consumer technology has overtaken business technology as the driver of innovation. That's why people speak of consumerization of IT.

In a first step, corporate IT is usually wondering how to react. Should they embrace the end user's desire? Should they contain or even block it? Or should they just ignore what is going on? They often come to the conclusion, no matter how they react, they won't stop consumerization. Therefore many of them follow the motto: If you can't beat them, join them!

At the same time, more and more organizations recognize that empowering their employees to use diverse productivity tools according to their personal needs and preferences will make them resourceful, will improve work processes and workforce productivity and drive innovation. They start understanding that end user experience and satisfaction is not only increased by a range of technologies, but particularly by giving people the choice to use the technologies they want to use. Therefore they are removing the constraints which hold this back.

BYOD (Bring Your Own Device)

The new term which emerged over the last years, describing long-lasting attempts and initiatives to replace corporate devices by employee-owned devices is BYOD (Bring Your Own Device). There are lots of synonyms out there, as for instance BYOC (Bring Your Own Computer; some people go even a step further and talk about Bring Your Own Cloud), BYOPC (Bring Your Own PC), BYO-3 (Bring Your Own 3 Devices), or just BYO (Bring Your Own) and many more. But basically all these terms express just the same: employees bring their own asset with them into the enterprise or use it for work, wherever they might be working. And of course, they can use the same device concurrently for business and private purposes.

Initially, when this trend came up, IT managers saw above all two challenges: security and manageability. Here are only some of the typical questions posed:

- How to protect corporate data from corruption, misuse or theft?
- How to enforce security policies without compromising ease of use?
- How to meet compliance demands?
- How to install and use applications, if the appropriate operating system version is not installed on the end user's device?
- Who takes care of hardware, software, data and support?
- How to support the proliferation of devices and configurations?
- What if a device fails?
- How to keep control?

Due to these concerns, BYOD has been often seen as complex, dangerous and expensive. And by the way, the end users had similar concerns as well, how to protect their private sphere and activities from their employer.

However, the reality looks different and IT managers may be more relaxed when regarding it. Having the end user workspace in a private or trusted cloud, you will use your private device only for the access to the cloud, while corporate data will usually not be stored on the device. This minimizes security risks and management efforts for the device. With smart solutions, such as the Portable Zero Client from Fujitsu, a portable USB stick, which enables an absolutely secure access to your personal cloud, just by being attached to the employee-owned device, you can combine security with ease of use.

BYOD - What's in it for whom?

After having discussed the meaning of BYOD and all the aspects that should be considered before being introduced, we are turning towards the questions what is in it for whom.

Let us start with the end users. BYOD gives them the ability to use exactly the devices that fit their needs and work style, and use them for working from any location. The fact that they can use a single device for both work and life reduces complexity for them, improves user experience and increases satisfaction.

The main benefit for the business is the increased attractiveness for recruiting and retention. For being successful in the tough war for talents, BYOD will be a must. Moreover, reducing hardware assets can implicate cost reductions. As work can be done anywhere, i.e. even remotely, office real estate costs can be reduced, too. From companies that have already introduced BYOD, we know that their staff is doing more work on weekends and after hours, which leads to a higher overall productivity. And finally, as users evidently better care about devices they own, fewer devices get lost or damaged.

And what is the benefit for the IT department? IT staff is relieved from the lifecycle management for non-strategic assets. They don't get complaints about the age and the poor performance of devices, because all this is within the end user's responsibility. The reduced management effort comes along with cost reduction, and they can focus on strategic projects that bring the company hopefully ahead.

All said, BYOD can be seen as a win-win situation for all, for the end user, the IT department and the business.

Aspects to be considered when introducing BYOD

Nevertheless, when introducing BYOD, some important aspects should be considered. In the first place, a **strategy** and well-defined **policies** are recommendable, showing whether BYOD is just allowed, if employees are encouraged to go for it, or if BYOD is even subsidized. It should also be clear, whether employee-owned devices are the only option, or if the company-owned device option is maintained. Maybe you even want to make a difference between different user groups. And you should address how to deal with new employees in their probation period.

To be able to run corporate applications at a sufficient performance, minimum configurations and other **technical prerequisites** should be defined. If necessary, you should also specify, that **using applications from the corporate virtual environment** is mandatory for business purposes, even if from a functional point of view, applications of the private environment could lead to the same result.

Even if the employee-owned device is, from a business perspective, only used to access corporate data, **security policies** are necessary, defining for instance which anti-malware to use on the device, if the malware scan should be executed automatically in certain time intervals, or if it needs to be initiated manually by the end user.

An important topic in this context is the **license implications**. Is the parallel use of a software product for private and business purposes allowed? May corporate licenses be used on a private asset? Do you need volume licenses instead of enterprise licenses? What is then more favorite, a central procurement by the organization or a self-procurement by the employee? These are questions to which there is no general answer, because this will always depend on the individual software and the respective vendor.

Support guidelines should sort out who is in charge of the support for what, the device and maybe the software, such as security software running directly on the device. Is it the IT department, is it a service provider nominated by the business, or is it up to the employee to close a support contract with any 3rd party. And there should not be any doubt about who has to procure a spare device, if one is needed.

Depending on your country, there might be **tax implications**, such as depreciation, income-related expenses or monetary benefits that you should get familiar with.

If you want to encourage your employees to go for BYOD or if it is even the one and only option, your employees certainly expect a **stipend program**, either as a one-time allowance or per month. In this case, do not forget to decide on a prorated payback from employees quitting your company.

The most difficult part is the **legal aspects**. To demonstrate the broad scope of what needs to be considered and correspondingly agreed, we are going to show some of the questions that sometimes require intensive discussion:

- Who is liable in case of damage or theft?
- In which situation can the employee claim for compensation?
- Which adjustment can be expected?
- Will it be an individual lump-sum,
  or will the value of damage or loss be exactly evaluated?
- What if culpable negligence by the end user can be proved?
- Is there a difference, if the device is stolen or damaged
  at home, in the company, or during a business trip?

In the event of corporate data being stored locally on the user's device, for whatever reason, be it because a local virtual environment is needed for offline working, the company should be able to claim for the return of corporate data, when the employee is going on his annual leave, when he is sick, or when his work contract is terminated. Likewise, there should be an agreement regarding the temporary surrender of the device for copying or deleting corporate data by the organization. But be aware that you always have to ensure the privacy of the user's private data.

And you should think about the certainly rare situation that corporate data are on the user's device, and the user has forgotten his password.

Another issue to be clarified is the usage of private applications in the corporate network. Do you allow, do you limit or even forbid it? Allowing it can cause an increased network traffic which in turn could cause extra investments. And besides, you would quasi act as an internet service provider for your employees, what would oblige you to keep all connection data for a certain period of time.

Hence, BYOD should come along with clear rules and policies covering all these various aspects. But what if employees do not stick to the rules? Think also about this:

- Will you stop the payment for the employee?
- Will you claim for compensation?
- Will you terminate the working contract?

Defining the answers beforehand can help avoid hearings at the labor court.

Putting all policies together involves various parts of the business: the IT organization, Human Resources, the Legal department and finance. And some policies require the agreement by the workers council, too. Having all policies in place, communication to the employees is essential. Your staff has to be aware of all the options and restrictions, responsibilities, duties and consequences.

Company-owned devices and private use

There will be IT managers who understand the advantage of dual-duty devices for work and life, but their organization wants to keep on owning the devices, giving them exclusive control over the devices, no matter which private data are locally stored. Due to better control, it is easier for the organization to ensure protection from attacks, espionage and malware, and to enforce security policies.

Company-owned devices which may be used privately are certainly an alternative and viable way, if the basic conditions are fulfilled. Meeting the requirements of the end users is certainly most important. In essence, you should offer them a broad selection of innovative IT-supported devices which enables them not only to run the latest versions of the software they need for the business, but of course also their private applications.

Although, when choosing this path, there is more safety and clarity regarding labor laws, the ownership structure and the authority to give directives to the employees, it is also recommendable to define policies, which clearly define whether private applications may be used while being in the office. As soon as they use the internet privately through the corporate network, you are again faced with potentially higher network traffic and the internet service provider issue, which was discussed in conjunction with BYOD.

But compared with BYOD, at the end of the day, there is much less policy work to be done.

And if the basic conditions suit, company-owned devices which may officially be used for private purposes will also contribute to making your organization more attractive and competitive in the war for talents.

End users look for innovation

As previously mentioned, end users select devices and the majority of them are always eager on latest technologies and looking for innovation. But what can they expect in the coming years?

There will be various new form factors. Besides ultra-slim and ultra-light screens, ultra-small thin clients and various portable form factors in general, wearable devices in wrist-watch size will emerge, including all the functions which are available in today's PCs or smartphones.

Major innovation is also seen with regard to interaction and user interface. While the mouse / keyboard paradigm and handwriting recognition rely on an abstracted interaction with content, touch screens enable direct physical manipulation of content in a two-dimensional space. Cameras with facial recognition for social networking and security purposes, voice sensors (with integrated translation on demand), and motion sensors permit an even wider range of physical interaction with devices, with a user's body and voice becoming the controller. By means of context-aware sensors, it will be much easier to provide location-based services.

The new interaction options which are embraced by the term "human interface computing" are enablers for Augmented Reality, which will increasingly become a feature that enhances devices in the future. Augmented Reality enables information being automatically made available at the location and the time of its relevance.

As fast access and immediate availability of the device will be self-evident for end users, flash memory and keyless entry options using RFID chips and motion sensors will be largely employed.

Another strong trend is devices with less cables or even cable-less devices. Technologies contributing to this trend are energy induction on demand, SUPA (Smart Universal Power Antenna) and Power over Ethernet.

Having a closer look at display technologies, the future will bring glasses-free 3D displays, displays which are resizable from the size of a wrist watch to the size of a tablet, thin flexible touch-screens without fingerprint, tactile gel displays and flexible screens with virtual papers.

Web-centric operating systems

Windows desktop operating systems will certainly not die short-term, but it is a matter of fact that more and more applications are web-based, be it business applications or private applications. For instance, new computer games which are launched nowadays are often offered in the web only. At the same time, organizations make even legacy applications read for the web.

As due to this trend, the browser becomes the center of the user activity, web-centric operating systems on end user devices gain attraction. These are degraded to browser functionality and have an exclusive focus on using web applications. They are ideal for netbooks being equipped with a flash only.

The benefits for the end user:
* A fast start of the device within seconds
* Ease of use (because the user interface is limited to the browser)
* Highest security

Will the workplace of the future be green?

Nowadays for the individual, the environment is of highest significance, as it is the place where people want to enjoy their lives. Moreover, the shortage of energy after turning off nuclear power plants leads to a general rethinking in terms of energy policy. These aspects together make people and enterprises more conscious of the environment.

How does this relate to IT workplaces? The answer is fairly simple: IT workplaces consume energy, and energy consumption in turn causes CO_2 emission, if power is generated from fossil fuels. IT in total causes more than 2% of global CO_2 emissions, which is about the same magnitude as the entire civil air traffic. And over a third of this portion is due to workplace systems.

But how can we reduce the energy consumption and CO_2 emission of workplaces? Due to the technical progress in the last couple of years, energy consumption of devices in operation has considerably decreased. Technologies, such as solid state disks which are going to replace hard disks, will support the trend to less power requirements even more.

The primary challenge today and in the future will be to minimize the energy waste while the devices are waiting for user interaction. As individual device components, such as CPU, RAM or other consume less energy when being in a low utilization state, the solution is an intelligent power management, which changes the device's operational mode to a low activity state when useful. As a result, Fujitsu, for instance, once invented and patented the first 0-Watt PC with zero energy consumption in off-mode (ACPI S5).

Another contribution to reduced energy consumption is minimizing the conversion loss of the power supply unit, maximizing its energy efficiency.

But energy efficiency related to IT workplaces is not just about the devices. It is the overall infrastructure which counts. Using virtual client computing infrastructures for the dynamic workspaces of the end users in your own data center, where resources are only allocated to a workspace as long as it exists (meaning as long as the user is logged in), will have a great impact on energy efficiency, in particular, if energy-saving thin endpoint devices or even zero clients are used for the access.

The same is true with cloud computing. Especially when using the shared approach of a trusted cloud for application or workspace delivery, energy efficiency can be optimized.

Further efficiency aspects in the data center facility will have an additional positive impact. These are above all new technologies for uninterruptible power supplies and cooling. But the control of cooling depending on load and the distribution of load is also worth mentioning. To increase energy efficiency when data center load is temporarily decreasing, it is useful to move all active virtual environments to a subset of the physical servers, which in turn enables you to turn all the unloaded physical servers including the respective cooling off.

How can the energy efficiency of IT products be demonstrated and proved? There is first of all "Energy Star", an energy rating and labeling scheme for a wide range of products, defined by the Environmental Protection Agency (EPA) of the United States. It includes schemes for IT in general and workplace systems in particular. To reflect the state of technology, Energy Star is frequently redefined.

Energy Star has been adopted as a European scheme for IT by the European Union. Other labels, like the Blue Angel, contain Energy Star certification as a mandatory requirement.

In its new Energy Efficiency Directive announced in June 2011, the European Commission is proposing that all IT procurement of public bodies in all EU-27 countries must be restricted to Energy Star compliant equipment. In its effort to satisfy the targets of the 20-20-20 initiative (reduction in greenhouse gas emissions of at least 20%, 20% of energy consumption to come from renewable resources, improving energy efficiency by 20%), the European Commission intends to make the public sector a role-model for responsible purchasing.

Ecological footprint

Besides energy efficiency, you contribute to protect our environment by reducing hazardous materials in the production of IT equipment, by the efficient use of resources and by using recyclable material, which at the end of a product's lifecycle helps reduce waste.

It is true that workplace systems have become very green during the past five years. However, energy efficiency, alternative energy concepts, such as solar, fuel cell (supplying electricity from hydrogen) and energy harvesting from electromagnetic waves, as well as environmental optimization of IT products will certainly accompany the new developments in the coming years, making the workplace of the future even greener as it used to be in the past.

How Fujitsu can help

Transforming the workplace as it is today into a dynamic workspace considering all accompanying current and future trends which add value is for sure an exciting journey for the customer. However, such a journey can be extremely long, costly and full of risks and traps.

Fujitsu's approach is to accompany the customer on this journey, optimize the duration by avoiding all the potential traps, overcome the many hurdles you are faced with while being on the move, thus reducing risks and costs.

Usually the journey starts with a Workplace Assessment, in which we analyze the current IT workplace environment, and identify cost savings and performance improvements. Based on the results, we define jointly with our customers the workplace strategy, which optimally meets business requirements.

No matter how the customer's workplace strategy will look like, no matter which virtualization technologies are ideally suited for the customer's specific objectives, Fujitsu will provide a virtual client computing solution from a single source for the dynamic workspaces of your end users.

Close partnerships with all prominent market leaders, such as Citrix, Microsoft and VMware enable us to use best in class virtualization software and additional technologies to optimize the overall solution. Fujitsu provides the respective licenses, the subscription advantage and the support.

Fujitsu's infrastructure products for the data center, such as Fujitsu PRIMERGY servers and Fujitsu ETERNUS storage systems, represent an excellent basis for this purpose. These products, as well as the access devices used in this context are certified for all market-leading virtualization products, and have proven success in innumerable virtualization projects.

Through all our activities, no matter whether in our labs or in real-life projects, we have gained experience as to what is required to successfully introduce virtual client computing solutions. This broad knowledge of optimizing solutions for specific customer requirements is reflected in our services, comprising consulting, the design and the implementation of the new infrastructure, the integration and the migration from the current into the new world. Likewise, Fujitsu provides maintenance and support, end-to-end for the entire infrastructure solution, helping avoid the typical finger-pointing when ingredients originate from different vendors.

If you want to make your legacy applications accessible via the web, Fujitsu can take over the legacy modernization on demand, making the applications web-ready.

Not every customer has budget available to invest in virtual client computing upfront, despite wanting to take advantage from the benefits it provides. Fujitsu Financial Services, the IT leasing and financing arm of our business, has a multitude of solutions that can help overcome initial capital expenditure blocking points. By shifting fixed costs into variable costs, we allow our customers to maximize their operating budgets. This increases their flexibility, and allows them to maneuver within their budgets.
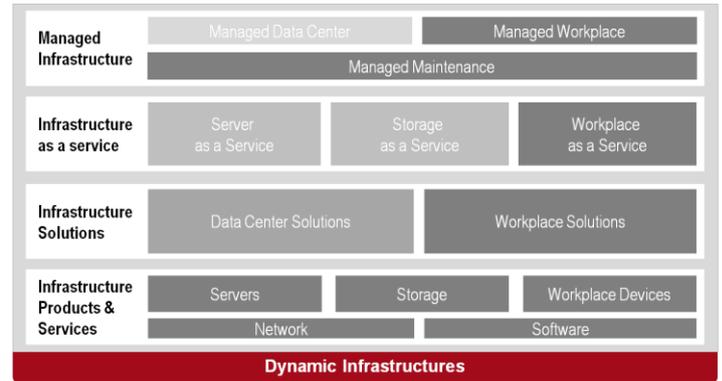
If IT organizations want to concentrate rather on their core business and strategic projects than daily routine tasks, Fujitsu will operate the customer's workplace infrastructure, based on standardized and optimized processes. Customers take advantage from scale effects, the simple opportunity to alleviate shortages in resources and skills, flexible customer-specific and business-related service levels, and cost reductions. The "price-per-seat" charging model eliminates investment risks and ensures highest cost transparency. At the same time, customers keep their IT infrastructure fully under control.

Especially for smartphones, no matter whether corporate- or employee owned, Fujitsu Managed Mobile is worth mentioning, which is a complete service for managing and supporting Smartphones, applications and their users. As well as encrypted and backed up Push mail, calendar and contacts, the service includes remote device management, multi-platform support and enforced security policies. It is designed to increase personal productivity, collaboration and overall efficiency, whilst minimizing security risks.

Alternatively, Fujitsu as a global cloud provider will deliver applications and highly standardized IT workplaces as a service from the cloud, with a standardized service level agreement, as easily as electricity from the socket or water from the tap. A "pay-as-you-use" model is the basis for billing, minimizing capital expenditure.

Having once more a closer look at the devices for the end users, Fujitsu is in an extraordinary position, that already today its portfolio includes all relevant device types. For the access to central virtual computing infrastructures, Fujitsu FUTRO thin clients, as well as the differentiating Fujitsu Zero Clients and Portable Zero Clients which do not require any management at all, are the products of choice. Instead, the mobile user will of course go for Fujitsu LIFEBOOK notebooks, Fujitsu STYLISTIC slate PCs and smartphones. And if for certain use cases desktops or powerful workstations are needed, Fujitsu can also help out with its Fujitsu ESPRIMO PCs and Fujitsu CELSIUS workstations. It is true that this numeration represents a snapshot of today, but it goes without saying that Fujitsu, well-known for a long track record of innovations, will adopt future trends, if the value for the customer is evident.

Fujitsu is not just known for innovation, it is also known for being green and contributing a lot to the environment. All its products, no matter if end user devices, servers or storage systems, have featured highest energy efficiency and their materials are optimized for the environment, much more than the environment certifications demand for. Examples are the previously mentioned 0-Watt PCs and the 0-Watt AC adapter which were both invented by Fujitsu, as well as the Fujitsu FUTRO thin clients and the Fujitsu Zero Clients with energy savings of up to 70% compared to a standard PC. Fujitsu is already today one step ahead with a complete green workplace systems lineup offering features like 94% energy efficient power supplies or low power soft off (0.07W in off mode). In the future, Fujitsu will continue to make IT more efficient, lower in cost and – most importantly – even more sustainable to protect the environment. That is why Fujitsu has introduced the Green Policy 21, a resolute statement on sustainable improvement of your corporate energy footprint. From the factory floor to the finished product – Fujitsu cares about the environment. As a pioneer in Green IT, Fujitsu is heavily working on further innovations making the IT world even greener as it is today.

Fujitsu's workplace systems are excellently suited for business and private purposes, i.e. for work and private life. If you think about BYOD, frame agreements between your organization and Fujitsu let your employees benefit from our leading edge workplace systems technologies at attractive conditions. With or without such frame agreements, ordering by your employees happens through an easy-to-use online portal. To add value for your employees, the devices offered will be bundled with accessories, software, and services.

In a nutshell: Fujitsu is a one-stop shop that provides everything you need on your journey transforming the workplace into a dynamic workspace from a single source. This helps reduce complexity, project time and risk. And Fujitsu's Dynamic Infrastructure model gives the customer all the flexibility he needs to select the most appropriate sourcing option or even a mix of them.

Summary: Workplace of the future

So let us summarize how the workplace of the future will look like. There will definitely not be one single answer, because details will always depend on the individual business and its needs. However, strong trends are visible.

The workplace component model will certainly dominate with virtualization asserting itself on each layer, enabling a smooth transition from a workplace as it used to be to a dynamic workspace in a private or trusted or public cloud, which gives users the freedom of choice with regard to devices.

More and more organizations will go for BYOD allowing their employees to bring their own device or even more than one device and use these devices concurrently for private and business purposes.

Especially with the devices, changes are expected at a wide extent. The types of the devices and the styles of interaction will proliferate. And probably none of the currently existing devices are good enough for what we foresee. But they will be greener than ever before.

As we hardly think about which mechanisms need to be in place to get electricity from the socket or water from the tap today, in the future users won't care where their corporate workplaces or their dynamic workspaces come from. It will be just the user experience that matters.

The journey into this new world need not remain a dream or vision. You will be there earlier than expected. Just choose Fujitsu as your companion into an exciting future.