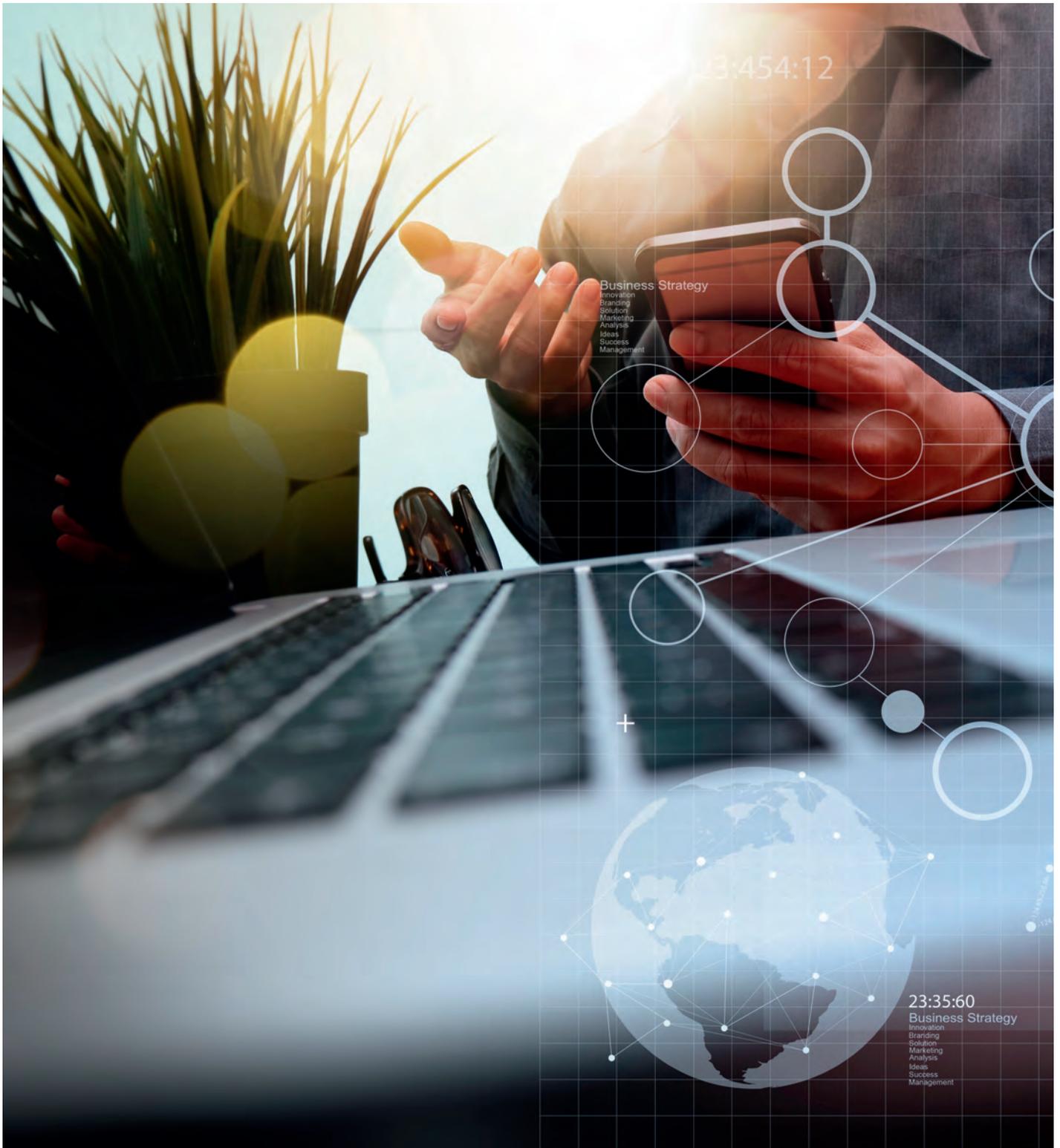


# the cloud report



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## New Work

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# EDITORIAL



## New Work

The working world is changing. It becomes usual to fly to meetings or to have teams who are working together, sitting on different continents. The communication changes, the way of doing things and the approaches of getting tasks done. And of course, the requirements towards employees are different as well. Who is not able to adapt the new situation for his or her own, will be soon to inflexible, to slow and overstrained.

Cloud computing and cloud native approaches have a great stake on this development. Within cloud computing new processes are feasible and new working surroundings are possible. We all know this could be a chance, but it must be taken by all participants.

Fortunately, nobody has to face these challenges alone. There are trainers and coaches who support teams, companies and individuals in not drowning in new things, learning processes, establishing new cooperation models at their pace and growing personally. In this issue we focus on these new approaches to being prepared for the future in the world of work. We talk about New Work, about agility, about design and hybrid thinking, and about training that supports everything.

We're also happy to be a media partner for SUSECON 2019 in Nashville! We wish all participants a great event with great presentations, sessions, information, exhibitors, sponsors ... !

HAVE A GOOD TIME AT THE SUSECON!

Best wishes,  
Friederike  
Editor in Chief



the cloud report  
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the cloud report  
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# The new way of life

## New Work, the future of work and the new culture of the people

The world of work has been experiencing fundamental and structural change for some years now. New Work is the epitome of this transformation. But the triggers for this development are manifold. Globalization and demographic change, digitization and connectivity are among the causes for the change in the world of work. The question of how we deal with the New Work megatrend is becoming increasingly urgent.

### A glance at the beginning of New Work

New Work is a collective term used to describe various, mostly alternative working models and forms. At the same time, however, the term also marks developments such as the transition to a knowledge society. The common denominator is the New Work concept of Frithjof Bergmann who developed the theoretical concept of the new work in the mid-seventies.

- › 1/3 gainful employment
- › 1/3 high-tech self-providing and smart consumption
- › 1/3 work you really, really want (vocation)

New Work is not really new, but in our rapidly changing society (VUCA, Laloux<sup>1</sup>, globalization, digitization, fig. 1) it has gained more dimensions and significance. Terms like Work 4.0 or similar keywords are used to summarize everything we imagine under the “Future of Work” as New Work.

### The end of the “old working world”

The various contexts in which the New Work term is currently used let the concept appear rather blurred. Today

New Work serves as a buzzword for often precise, but also very different organizational and working models. For example, the term is used in connection with flexible forms of work such as job sharing or agile working methods like Scrum. It describes manifold approaches such as gender empathy or job rotation concepts. However, the New Work label also refers to participatory organizational models, such as holacracy. Digitized forms of collaboration, for example via wikis or social media applications, are also referred to as New Work. Despite this broad spectrum of management and HR concepts, most approaches have one thing in common: they represent a development away from rigid working models towards the flexible value-added processes of the working world 4.0.

### Working world 4.0: new environment, new work

Undoubtedly there are many reasons for this development. It is obvious, however, that digital technology has played and continues to play a major role in the emergence and spread of alternative forms of work. Digitalization has also contributed to the transformation of economic structures: the Internet has created a globally networked market in which innovations in particular have a major impact.



Figure 1: Planning for success in the new VUCA business world

Many companies have now responded to the challenge of having to deal with the possibility of so-called disruptive technologies: to increase their innovative strength they are introducing flexible working models and methods or use methods of agile project work – originate from software development – which often have similar goals, too.

### **Changing values - from the industrial society to a knowledge society**

As a megatrend the digital transformation also plays a role in the transition from an industrial society to a knowledge society. One feature of today's society is that knowledge has become a central resource. Although other goods such as capital and raw materials are of course still very important, knowledge is increasingly becoming a determining factor for success – for individuals as well as for companies.

The economy has been developing in the direction of knowledge economy. Many activities today not only require knowledge of specialists, but also the ability to exchange ideas and learn continuously. On one hand, the half-life of specialistic knowledge is comparatively short today. On the other hand, many tasks are so complex that the experience of individuals is no longer sufficient to cope

with them. A vivid example is the video game industry: in the 1990s it was still possible to program a commercially successful computer game on one's own. Today, that's unlikely: today's video games are so complex that hundreds of people with very different skills are working on them. They all have to exchange ideas with each other constantly – often using new work methods like Scrum.

### **Dying Jobs and Technology Progress**

Perhaps in the not too distant future there will also be a very fundamental question: Suppose, in the progression of automation, machines and intelligent computer programs take over a large part of the tasks to be performed - how do we work then?

The German digital expert Thomas R. Köhler predicts: "The digital transformation will lead to massive changes in the world of work. Some jobs are already at risk until 2020."

According to Köhler, from 2019 the following jobs will disappear faster than previously assumed: Personal managers, warehouse workers, employees in fast food chains, lawyers, construction workers and seafarers are particularly affected. The jobs would be successively filled with computers or artificial intelligence, which would not only

be much cheaper “workers”, but also more efficient.

Many are still awaiting the digital job showdown eagerly, although we are already in the middle of it. For almost 20 years, robots have been used in production at the truck assembly plant of Mercedes Benz Trucks in Würth: driverless transport vehicles in deserted halls; computer-controlled robots weld and paint and have increasingly taken over the jobs of the workers in recent years. A welding robot replaces three to four employees and does an excellent job: precise, continuous and almost error-free.

This does not only apply to the automotive industry. Bitkom President Achim Berg points out that 90 percent of the jobs in German communications technology have already been lost in the last 15 years. The same applies to other professions. The daily newspaper is also a phase-out model, online banking and self-service terminals have become a normal part of everyday life. Comparable erosion at the edges also occurs among lawyers. Simple facts have long since been offered automatically, and legal portals are already often replacing the way to a lawyer. All these developments have long since become reality and have already left their mark on many professions.

“But the real change is still to come,” says Köhler. We are currently experiencing a new wave of automation. The question of what prospects are waiting us on the labour markets in the years to come is more topical than ever – how will they develop?²

### **More and more global – more and more mobile – more and more digital**

New technologies – industry 4.0, autonomous vehicles and developments in the field of artificial intelligence – and flexible kinds of work are being performed when and where the market demands it, globally and often around the clock. More and more people in the “old working world” are being asked what they want to do in the future.

## **WE COME TO NEW WORK BY ANSWERING THE QUESTION: WHAT DO YOU REALLY, REALLY WANT TO DO?**

FRITHJOF BERGMANN

Bergmann states a simple and provocative thesis: New Work does not simply emerge when companies equip their employees with new technologies. It takes more than that. “New Work is the result of a long, accompanying process,” continues Bergmann, “which begins with the question of what we really want to do. People should bring their own

personality into the work. For many, however, this challenge is first and foremost an excessive demand.” That’s why Bergmann founded the Center for New Work at the end of the 1970s – basically the first consulting firm for New Work. Advice and support are the keys to entering the New Work age.

While many other scientists warn against the consequences of automation and digitization, Frithjof Bergmann welcomes the new technologies. But he also believes that automation and digitization have bad consequences which he finds very regrettable and painful. “Murderous poverty – for me the worst in the world – must of course be combated, and people must defend themselves against it”. In his opinion, this poverty will even intensify and deepen.

In Bergmann’s imagination, however, automation must not be generalized and seen as a danger, but above all that it serves people and frees them from the work they experience as a beginning illness.<sup>3</sup>

### **So how do we get from old work to New Work (Fig 2)?**

How the working world of the future will look like is, of course, uncertain. How can we make the productive transition from the old working world to New Work? Innovative solutions are needed today in ever shorter intervals in order to survive in dynamic markets. The answer to this challenge cannot be a homogeneous working day where all employees are physically present in a department from 9 to 5 o’clock.

In addition to automation and division of labour, strict hierarchies are typical for the old working world. This characteristic of the old working world has prevailed in companies for more than 200 years since the beginning of industrialization. It is pleasing to note that many approaches and instruments for the preparation of New Work are tried out and used in a variety of ways, especially in the area of personnel development. This development is certainly also stimulated by the worldwide shortage of skilled workers. The sensible and ethic use of new technologies is another important starting point and connecting piece.

### **To live New Work in the 21st century means for the entrepreneurial everyday life:**

- › Self-determination and not only wage labour: Reduction of strict hierarchies and creation of temporal and spatial free spaces. People of different professions and backgrounds must be able to meet and exchange ideas so that new ideas and solutions can emerge.
- › Cross functional or mixed teams: Since New Work is based on a completely new organization of work, tasks are no longer primarily carried out in departments, but divided into projects. In order to achieve the best possible result, those with the best skills are organized into



“What if we don’t change at all ...  
and something magical just happens?”

## **FUTURE IS THE TIME WHEN YOU REGRET NOT HAVING DONE WHAT YOU CAN DO TODAY.**

FROM THE USA

teams for each project. Teams and whole organizations can be understood as heterogeneous and dynamic networks. Since the beginning of the 2000s there has been a lot of scientific discussion about this.<sup>4</sup>

- ▶ **Networked infrastructure:** New work needs new infrastructure at different levels. This applies not only to the architecture of buildings, but also to the technical infrastructure and organization. Without connectivity there is no network and New Work remains just a utopia.
- ▶ **Employee retention:** The insight that satisfied employees who identify with their work are more motivated, productive and creative also changes the working structures. New Work’s goal is to retain employees and balance work, social environment and personal interests. This creates a performance-enhancing yet familiar atmosphere.
- ▶ **Cooperation and co-creation between humankind and technology:** Our age is characterized by increasing complexity, rapid technological development, doubling of

world knowledge within only 72 weeks, the processing, storage and evaluation of data volumes ranging from Zettabyte to Brontobyte as well as the upcoming revolution of AR, VR, and AI. The existing fears of job loss (machine / software replaces man) and gloomy future scenarios must be considered around a new mindset of cooperation models of man and technology. If technological development is regarded as co-creation, the following advantages result: Cooperation between humans and software increases productivity and effectiveness,

### **info box**

#### **The values of New Work**

The central values of the New Work concept are independence, freedom and participation in the community. New Work should offer new ways of freeing up creativity and personal development and thus contribute something really essential and important to the labour market. In this way, genuine „freedom of action“ is made possible.

There are many ideas and assumptions about how this could work. Brave people simply try it out in their companies.

processes can be designed more efficiently (standardizable = digitizable), real-time visualization, AR and AI create highly effective learning and development opportunities, new target groups can be opened up even more easily worldwide, new needs arise through the processing of complexity and permanent strain. In many areas, people remain (still) superior in the foreseeable future, e.g. in creative, social and reflexive abilities.

- Corporate responsibility: If the thoughts are consistently pursued, the education system must also be taken into consideration. In today's education system many central skills that will be essential in the age of New Work have not yet been taught. Companies can exert greater influence on this through targeted cooperation with educational institutions - from kindergartens to universities - and politicians.

To ensure all this, we need courageous experiments, new ideas and a lot of innovative power. Or in short: New Work.

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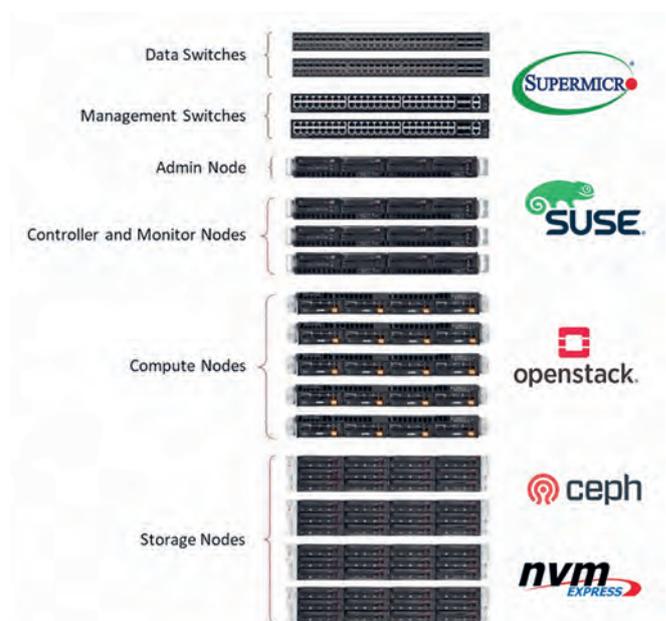
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# How to approach Cloud properly

The idea of relying onto Lift & Shift-approaches when considering the move into cloud environments is simple. And it is plain wrong and (financially) risky. And it will most likely be a disappointment in regard to scaling, availability and performance. Instead, one must think completely different of Cloud to actually gain an advantage. Let me explain and let me show you the pillars required for a successful cloud experience.

### Lift & Shift into a cloud environment

Cloud is often understood as a way of thinking of an infrastructure: automated, operated by a cloud provider, easy to set up. While this is true and while it could definitely be the right decision to move to public or private cloud providers, it gives the wrong impression: if you move into a cloud environment only by executing Lift & Shift-approaches, you might perhaps save some money on the infrastructural side and perhaps some time on the provisioning side – but you simply exchange one datacenter operator (yourself or your current one) by another, very generic, one (Microsoft, Amazon, Google, Digital Ocean, etc., figure 1).

In fact, quite often you do not even save money, since the overwhelming number of offerings and the reduced amount of customization can cause lacks of transparency and might even lead to higher operational costs, as the cloud environments are typically operated on an infra-

structural level only, leaving management and operations in your hands.

If you only execute a Lift & Shift-approach, your software and middleware will not substantially benefit from what cloud actually has to offer: automated scaling, fail-over-functionalities, zero-downtime deployments, and so on. You might mimic these functionalities by bringing in more infrastructure – but at which costs?

Or you would use proprietary offerings from these cloud providers. Which will tie you to them and trap you inside their ecosystem. This kind of vendor lock-in is to be considered a major risk for any enterprise and project and should therefore be avoided.

So, there must be a better way.

### #1: CloudNative. By Design.

To actually and substantially save money and utilize the advantages of cloud environments, one must change the way, software and middleware are set up and integrated with each other. That means: only software being designed for cloud environments is running in such environments – i.e. microservice-based solutions or solutions that understood and utilize the volatile nature of cloud environments (figure 2).



Fig. 1: Logos of Hyperscalers

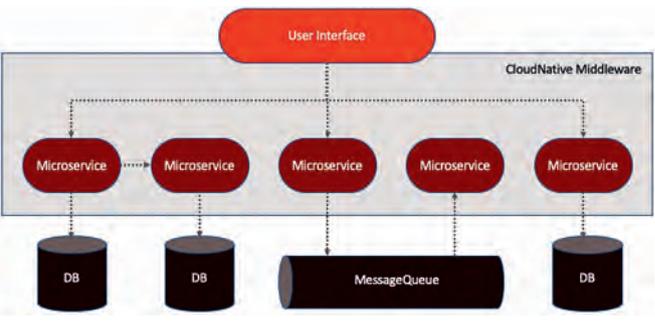


Fig. 2: CloudNative Architecture

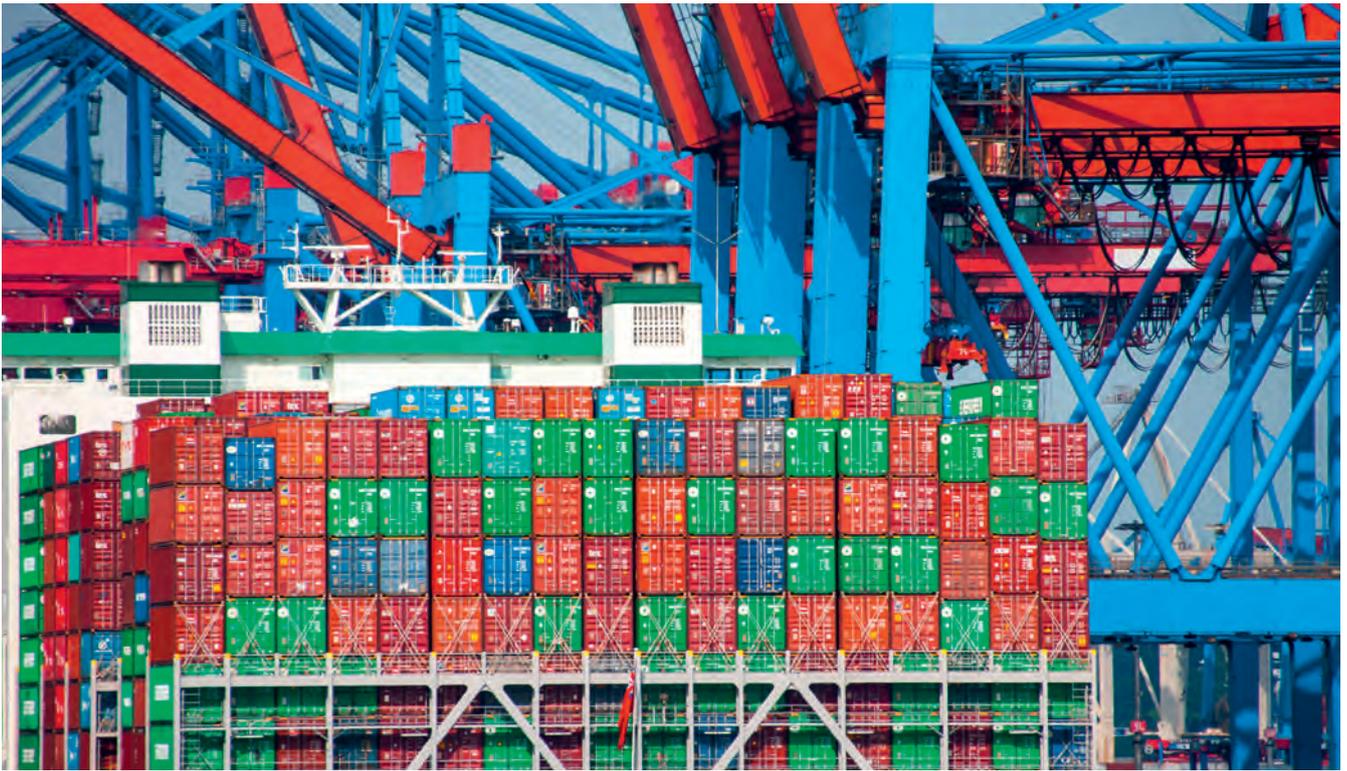


Fig. 3: Containers (copyright: by Thorben Wengert)

Such solutions provide fail-over capabilities, autoscaling functionalities, etc. They will try to avoid single-point-of-failure scenarios and vendor lock-ins and embrace stateless approaches. They will usually be set up as containers run by cloud-native middleware instead of being installed by hand and run inside VMs (figure 3).

A cloud-native middleware will try to integrate deeply into the software it runs (let's better call them "workloads" from now), it will monitor the workload's health and state automatically. But: it will never be invasive, it will simply utilize interfaces and data being made available by the workloads. The typical cloud-native middleware in 2019 is Kubernetes and solutions built around it, such as RedHat OpenShift or SUSE CAAS (figure 4).

They allow for running containerized workloads, for integrating into authorization backends and into already existing infrastructure – and they are completely Open-Source (at least Kubernetes and SUSE CAAS are, OpenShift brings in a lot of proprietary aspects). There are vendors providing commercial support for these solutions, such as SUSE or RedHat or third-parties such as my company, Cloudibility.

This software stack runs on top of VMs or OpenStack infrastructures, ensuring dynamic provisioning of infrastructures and abstraction from the underlying environment (figure 5). When planned properly, your software and your

middleware could literally run anywhere in public or private clouds, without utilizing proprietary functionalities.

And despite one could technically run old, not cloud-native software stacks on top of this kind of middleware, it would not solve the problem of running a software not being designed for cloud environments in such an environment.

So, software and middleware need to be cloud-native to utilize all technical advantages of cloud environments without being trapped in vendor lock-in scenarios or being confronted with unfulfilled hopes and expectations.

## #2: CloudNative. By Approach.

Setting up cloud-native infrastructures and deploying cloud-native applications will solve all problems and challenges, right? Unfortunately, no. In fact, having infrastructure and software in place which allow to scale, will most likely scale your expenses and costs as well.

Why is that?

As a matter of fact, cloud-native infrastructure and cloud-native software is way more complex than their traditional counterparts. Additionally, ops teams will not only have to monitor and run some virtual machines, instead



Fig. 4: Logos of CloudNative Middleware products and projects



Fig. 5: Logos of IaaS-Vendors and -Middleware products



Fig. 6: Logos of DevOps-Infrastructure products

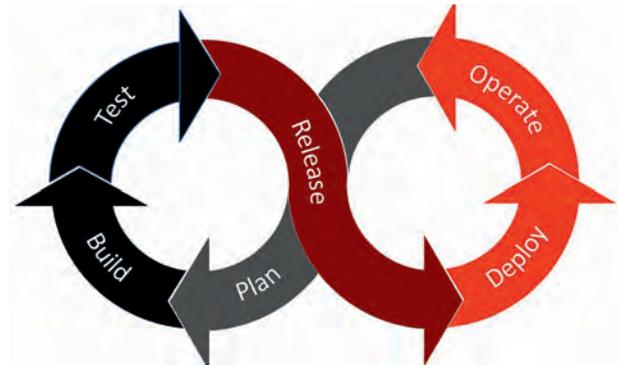


Fig. 7: Agile and iterative DevOps-approach

there will be hundreds or even thousands of services to be monitored and executed upon. Also, cloud-native middleware will move workloads around the underlying infrastructure, making error analysis and resolving incredibly complex, especially when considering the volatile nature of containers which are understood as units of work, to be thrown away and discarded when not needed or when being faulty.

To handle a way more complex infrastructure and a way more unpredictable execution model, different approaches are required: automation and agile DevOps teams.

### Automation and Versioning

Automation and Versioning are essential to run a cloud environment properly. The classical approach of manual interactions with infrastructure needs to be replaced by a scripted, versioned one. If something is not working properly, environment and / or software is reverted back to the previously working version without manual intervention or SSHing to containers or VMs.

- » Every kind of infrastructure is versioned and rolled out automatically.
- » Every build of a software is versioned and tested automatically.
- » Every deployment of a software is versioned and rolled out automatically.

- » Every configurational change is versioned and rolled out automatically.

This allows faster iterations, better controlled environments and an implicit documentation of everything. It is executed up to the point, where SSH keys are created automatically inside the environment, deployed onto machines and infrastructures and are never known to any Ops team member (figure 6).

### Agile Teams, DevOps and Iteration

To handle the complexities of cloud environments and the software running inside them, a joint development and operations team needs to be established, acting way more agile than in the past by incorporating Scrum and Kanban principles in their working model. This DevOps team forms the core, but to establish a truly cross-functional approach, other stakeholders such as business units and departments as well as legal and governance, need to be involved as well on a regular basis. Openness and transparency are fundamental, strong communication and collaboration skills are required.

Such a team will foresee a lot of problems. It will iterate and produce results. It will share knowledge between team members, thus allowing to have a smooth transition from development to operations. It will also involve external vendors as required and will execute in a self-organized

way. The team will define and coordinate SLAs with stakeholders. It will be responsible for its own quality assurance and it will prevent from vendor lock-ins.

If set up properly and executed consequently, such a team will lower operational costs and efforts required to run and operate workloads in a cloud environment, since it will develop matching processes and automate everything (figure 7).

### #3: CloudNative. By mindset.

Going one step beyond establishing agile DevOps teams and enforcing automation and versioning, a common mindset needs to be established across all technical and non-technical units and stakeholders.

That mindset implies a different interaction with and understanding of cloud environments, as well as agile and knowledge-driven processes, completely automated operations and DevOps pipelines and an ever-improving ability to setup, deploy and operate environments and software running within them.

Such a mindset needs to be learned, it needs to be executed upon and it needs to be lived – way beyond the borders of “we do it since we are forced to”. It should be at the heart of every team working with and in cloud environments, as well as every stakeholder being involved. It should prevent from being scared of complexities and costs, it should allow to act and to iterate.

Ultimately, a cloud-native mindset is to be lived from top to bottom inside an organization. It should not be a grassroots movement alone, it needs to have support from management and C-level executives. IT and Cloud need

to be considered to be one of the building blocks of what a company is doing. Without IT and modern cloud solutions, the race to success and the race to survival are lost even at the very beginning – with cloud environments and cloud-native approaches, it is way more a question of being fast and efficient instead of being slow and inflexible. And that question is answered by knowledge, approach and mindset (figure 8).

### #4: New Work

How to learn and execute the described levels of cloud-nativeness? How to ensure technology, design, approaches and mindset are understood, executed upon and lived inside a company or an enterprise?

New Work approaches can be an answer, since they allow for a better and more modern way of working and interacting with each other. Members of small, cross-functional teams interact with each other without hierarchies, based only on merits, experience and knowledge.

These approaches change the way teams execute, even if they already work in an agile fashion. New Work implies more democracy without falling into anarchy. It needs to be learned, trained and lived properly – and when implemented successfully, it will bring a team, a department, a company onto a new level of performance and efficiency (figure 9).

### #5: Knowledge Management

As cloud-nativeness and New Work approaches are strongly tied to knowledge gaining, training and collection of experience, it is necessary to manage them properly. This is where knowledge management comes into play, since it provides a path for structured learning and structured knowledge transfers. Without it, knowledge and learning are driven by coincidence. With knowledge management in place, knowledge is considered a strategical asset, a deliberately positioned aspect of a path towards CloudExcellence.

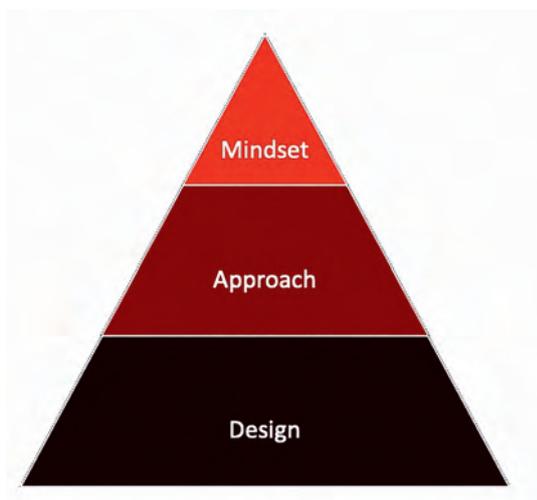


Fig. 8: Pillars of CloudNativeness



Fig. 9: New Work

### The sum of things: CloudExcellence

All discussed components are required for reaching a state of CloudExcellence, as it covers technical and processual expertise, agile and iterative approaches as described above and implies a continuous improvement process and knowledge transfers between team members. If one aspect is missing, excellence and return of investment will not be reached.

In short, CloudExcellence is the sum of cloud-native approaches, New Work aspects and knowledge transfers and management. It is independent of a specific cloud environment, it is independent of a specific middleware, it is independent of the kind of workload run – instead and

most importantly: CloudExcellence is a mindset (figure 10). So, the way to approach clouds properly, is to bring all the discussed pillars together: cloud-native design, cloud-native approaches, cloud-native mindset, New Work approaches and knowledge management, ultimately leading to CloudExcellence.



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CLOUDIBILITY



Fig. 10: What does CloudExcellence mean?

# Design Thinking

## Interview with Torben Lohmüller

Dark Horse from Berlin are an innovation agency and offer workshops on New Work in their academy. Dark Horse was founded in 2009 by 30 graduates of the D-School at the Hasso-Plattner-Institute in Potsdam. Based on the experience of how important collaboration and working at eye level is, especially in interdisciplinary teams, they have taken new paths in collaboration from the very beginning. The experiences of the first years can be read in their book „Thank God it’s Monday“, published in 2014. Dark Horse Innovation enables organizations to utilize the market potentials of the digital age. “We create user-centered products and services and transform structures, processes and minds to empower our clients to be more innovative.” Torben Lohmüller has only been a team member at Dark Horse for a relatively short time, but he is convinced of their approaches and is committed to teaching in the workshops offered. He talked to me about the changes in the world of work and New Work.

**Dark Horse wrote about Generation Y in the first book (Thank God It’s Monday) – how did the generation develop in your opinion?**

Generation Y was a strong driving force to re-think the ways we work, and maybe to make it a bit more humane. In the meantime, many of them have become parents and have to reconcile family and work, which changes the working models once again.

Dark Horse has also changed in this respect. There are new needs among the young parents, and we support all colleagues during their parental leave. A flexible commitment to work was already in place. Inspired by the principle of monks and pilgrims, who together form a com-

munity of solidarity, and where some make their contribution in the monastery while others go on wanderings and bring new experiences, it was also possible in the past to work elsewhere for some time. So, some colleagues have worked on their theses, founded start-ups or worked in other companies and then came back after some time with these experiences. We discuss and plan together who is going to work how much and when. We call this Commitment Day. The individual plans for the next year are brought together there: how do I want to work, how much, where, how much vacation do I want to take?

But at Dark Horse, the workspaces are also important for the working collaboratively. Also, while working with our customers, we ask ourselves over and over again how rooms can be designed in a user-oriented way so that they support the respective needs and working modes of the people. Space is needed both for concentrated tunnel work and for exchange and collaborative thinking!

**How is remote work designed and how does it affect the question of space?**

I think collaboration still requires presence. Face-to-face communication make important contributions to the quality of work.

**What are the skills for the next 5 years? What do you need as an employee?**

I think we will still require both methodical and personal skills: on the methodological side, this means, for example in design thinking, user and customer centricity, iterative work, i.e. no long planning and production cycles, but regular feedback on the question whether what we are



doing right now is relevant for our users at all. To fail early isn't bad at all, but rather an opportunity to learn and steer things in a different direction. In my opinion, this is an important common feature of agile methods such as Design Thinking, Scrum or Kanban. On the personal skills side, in addition to a certain degree of humbleness in the face of the complexities we often have to deal with today, a high degree of uncertainty tolerance and the ability to organize oneself and as a team is required. New challenges also arise for managers. Their role now often consists of supporting self-organization, removing organizational obstacles and providing framing and orientation.

These changes in work tend to be perceived as liberating by the younger generation, but threatening to those who have been doing the same job for a long time and need a lot of security and stability. But here, too, we should be cautious not to overgeneralize. There are simply different needs in terms of working methods.

And, in addition to the customers, the employees are also the users whose needs have to be taken into account and included. However, there are still areas in which routine line work makes sense. Agility is not the answer to all questions, just as user centricity in the arts can perhaps bring about good pop, but no works that challenge our habits of perception and thinking.

**AMONG OTHER THINGS, IT IS ABOUT BEING ABLE TO ACT INNOVATIVELY IN RAPIDLY CHANGING SITUATIONS.**

#### **What does Design Thinking mean for New Work?**

Among other things, it is about being able to act innovatively in rapidly changing situations. Organizations are under pressure: environmental conditions are changing, markets and technical developments have become more complex and the old Tayloristic approaches to labor organization can no longer cope with these complexities. If we orient ourselves more strongly to the needs of our users and are prepared to repeatedly review our constructions of reality „out there“, we can shape the future in a solution-oriented and constructive way.

#### **What does New Work mean for companies?**

An important point is that people in organizations want different working conditions to which companies must adapt. If employees want to work more freely, they need a high degree of

## IT IS A **WIDE-SPREAD MISUNDERSTANDING** THAT NEW WORK SIMPLY DOES AWAY WITH ALL HIERARCHIES.

self-organization. Self-management is an important competence here. If decisions are no longer made by the boss alone, responsibilities must be shared. This requires frameworks that must either be set or worked out by the employees themselves. It is a wide-spread misunderstanding that new work simply does away with all hierarchies. Decisions may no longer be pushed through one-dimensionally from top to bottom, but there are still rules and processes that have to be followed and which are precisely the precondition for the freedom in other areas.

With this approach, organizational models change. But such change processes must also be iterative. We have to find out what works. A procedure with prototypes can be helpful here. That way you can learn together what works.

**One of your latest books is called Digital Innovation Playbook. In it, you further develop your Design Thinking thoughts. In which direction is that going?**

Design Thinking focuses on the development of a product in an iterative process, starting with the understanding of user needs. Hypotheses are developed and questioned again and again in prototypes, further developed until they are finally found to be good. In the field of Digital Innovation, Design Thinking therefore fits very well with other agile approaches such as Scrum or lean business models.

Another exciting development I am currently observing comes from the field of Circular Economy. With our old linear ways of production we are still transforming raw materials into products that become waste after a short period of use. This makes no sense not only ecologically, but also economically. Circular Design can help us to design products and processes intelligently in such a way that the value of the raw materials is not destroyed by their use, but is preserved, e.g. by using different materials in products in such a way that they can then be recycled separately.

The interview was conducted by Friederike Zelke

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# Digitalization, Disruption and New Work

## Stop looking for the “silver bullet” to solve all your problems, because there isn’t one

In order to become more resilient to a rapidly-changing world and market pressures, companies often seek one simple “silver bullet” solution to their problems. But this simple solution doesn’t exist. This article explains the value-driven Hybrid Thinking approach. Hybrid Thinking proposes a radical new way to drive change, and focuses on empowering people in companies to turn challenges into opportunities

The business of the future needs Hybrid Thinkers: interdisciplinary, self-organized, collaborative, creative and courageous people, who can combine different tools and fields of expertise.

Noun: silver bullet (Fig. 1):

1. A bullet made of silver, supposedly the only weapon that could kill a werewolf.
2. A simple and seemingly magical solution to a complicated problem.

I’ve heard the question so many times before: “How can we become an agile company?” People ask me because in their eyes, I am an expert. But then they don’t really want to hear my answer because what I say seems too complicated. Or rather, I can’t give a single straightforward answer.

So, I’ll say it now: there is no single straightforward answer to the question of “how to be prepared for the future”.

And the era of relying solely on expert knowledge to answer all our problems will soon be over.

Companies often expect a clear “cause-and-effect” logic, because this neatly translates into “problem-and-solution”. This is why businesses buy in the services of classic

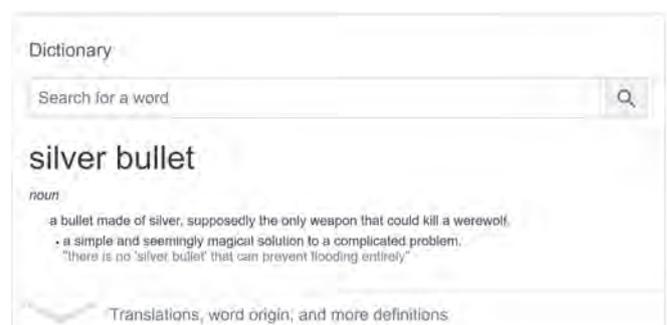


Figure 1: Dictionary definition of “silver bullet”



Figure 2: Hybrid Thinking: the four steps

management consultancy firms or other experts. This approach is an outdated legacy of the enlightenment, and of an education system founded during the industrial revolution. For 200 years, we have been conditioned through an education model which makes us excellent at analysing, breaking down the world into simple models, separating academic disciplines and then encouraging ever greater specialisation in any chosen field of study.

All the while this model has produced graduates who are more and more specialised, and at the same time more unprepared for the complex reality of work. Now we are at a crossroads in human evolution: never before have we had opportunities so great, but never before have we been facing a world so complex, and which is evolving at such a high speed.

Take your pick: digitalisation, disruption, machine learning, big data, exponential technologies, internet of things, innovation, agile, scrum, design thinking. You've probably come across most of these terms. You may even be concerned about how your company needs to change, how it can implement new technologies and processes to avoid being disrupted. Perhaps you've already made some efforts to adapt by introducing new software, building an innovation lab, or retraining some of your workforce in scrum or design thinking. These are good and valuable first steps.

But nobody is talking about the elephant in the room: having a Kanban board is not proof that your company will survive the next economic recession, and having occasional design thinking workshops in your new innovation lab does not make your workforce future-ready. Being ready for change is an attitude, not an artefact.

### What we know, is that we don't know

That attitude, or mindset, is the most important thing you can learn yourself and teach your workforce.

It has two important characteristics: firstly, it is about being comfortable with accepting the realisation that there are no single straightforward answers. In the face of increasing complexity, companies are witnessing their mechanisms of control and prediction fail them. And they are reaching out to a new generation of mechanisms: scrum, design thinking, service design, big data, lean, to provide them with answers.

But here's the crux: none of these innovative approaches is enough on its own. There is no "silver bullet". The important thing is to understand these new methods and how they work, and then be able to adapt them to your own challenges, context and company culture. So, the second important characteristic of this mindset is to understand the limitations of each method and have the courage to reject, adapt, or combine them for your own situation. Only through this you can become the kind of "expert" that is ready for an unpredictable future.

### Tomorrow's experts are Hybrid Thinkers

This is where Hybrid Thinking comes into play. Hybrid Thinking is based on the belief that we need to radically change the way we think and work in order to become the best we can be, and step up to the monumental challenges facing this generation and the next.

# ONE COMMON PITFALL OF THE DISCUSSION ON DIGITALIZATION IS THAT IT IS TOO FIXATED ON TECHNOLOGY AND FORGETS THE MOST IMPORTANT COMPONENT OF CHANGE: PEOPLE

As a mindset, it promotes “the conscious blending of different fields of thought to discover and develop opportunities that were previously unseen by the status quo.”<sup>1</sup> This builds on the principle of interdisciplinary teams, as championed in design thinking. Hybrid Thinking goes one step further. It creates interdisciplinary people: individuals capable of straddling the borders between different areas, taking learnings and tools from each, and putting them into action to solve challenges in a new way.

Hybrid Thinking is not just about finding new business opportunities: it is about thinking, working and creating things with a sense of purpose so as to drive change on a systemic level.

Concretely, it can be broken down into four steps (Fig. 2):

## 1. Get Inspired

Too often we spend our days stuck in the details of our jobs. Meetings, emails, deadlines leave us little time to think, explore, leave our daily lives and look at the bigger picture, the world outside our window.

Questions such as “how do we use deep, qualitative customer research methods to improve our products?” or “how might augmented reality affect our services?” are often outsourced to external agencies, because businesses lack guidance on how to apply new learnings. And bigger questions can’t be outsourced, such as “how can we do what we do in a radically different way, and contribute to building a better future?”

It is not enough to simply find new sources of inspiration. There has to be an alignment with your values and vision for tomorrow’s world, otherwise it is simply “innovation for innovation’s sake”.

The first step of the Hybrid Thinking approach is to bring you into contact with experts and professionals who are doing things in a bold new way. We champion the importance of hands-on experiences to learn about new meth-

ods and technologies. We believe in giving you the time to ask deeper questions and then guiding you into putting your learnings back into the context of your own business.

## 2. Develop your skills

Change starts nowhere else but in the individual. One common pitfall of the discussion on digitalization is that it is too fixated on technology and forgets the most important component of change: people.

Technology is worthless if nobody knows how to (or wants to) use it. Likewise, your company won’t become agile if your workforce perceives change as a threat to their jobs, rather than an opportunity for professional development.

We believe in the intrinsic adaptability, creativity and potential of the human brain. We believe that everyone can grow into a Hybrid Thinker if given the right guidance and space to do so. That’s why this step focuses firstly on self-reflection and secondly on how to transform this greater self-awareness into concrete changes to your professional life.

## 3. Collaborate

The vast majority of your time is spent with colleagues, and a significant amount of your energy is spent on communication. Take a moment to think about how much effort and work goes to waste in your company because your colleagues are not equipped to collaborate effectively. Also, consider how much information gets lost through poor communication.

Collaboration tools and skills are not a “nice-to-have” but the foundation of a successful business. Our experience proves time and again that a team of colleagues equipped with these tools and skills is able to work more efficiently and effectively, and can achieve more.

Once you’ve engaged in constructive self-reflection in the second step, this third step focuses on how you improve your work with others around you: as a manager, as a team-member or as an employee at any level.

## 4. Implement

Step one inspires you to take your business in radical new directions. Step two guides you through a personal self-reflection journey to improve your skills, and step three gives you a solid foundation for working together more effectively with your colleagues.

Now you are ready to consider how to bring these new business ideas to life and launch them. This final step shows you how to use the concrete tools, frameworks and processes developed in the fast-paced world of start-ups.

From agile marketing tools, to prototyping solutions, to customer testing, these frameworks and methods are tried-and-tested by companies at the forefront of innovation. You'll learn how they work and use and adapt them to your own business, in order to achieve long-lasting impact.

## The future is now

Hybrid Thinking is a radical new approach. You can no longer always base best practices on what has been done for decades in your industry, and you will not find a single, miracle, "silver bullet" innovation tool as a replacement.

As a Hybrid Thinker you know that there is no single straightforward answer, because the world is changing exponentially. You know that you don't know. But you also have the skills to experiment, to learn and to adapt. You have the confidence to combine different tools, transfer learnings and fuse different disciplines together.

And finally, you have the values and the vision to step up to the challenges we face and play a key role in creating a better future.

The time of experts is over, only you can be the "silver bullet" that the world needs.

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Morganne Graves, Co-Founder, Hybrid Thinking Academy

Morganne Graves is a partner and innovation consultant at phi360, and co-founder of the Hybrid Thinking Academy. After graduating from the University of Oxford with a degree in philosophy and literature, she completed a one-year course in Design Thinking at the Hasso-Plattner-Institut School of Design Thinking in Berlin.

She has worked on long-term transformation projects with the BNP Paribas and the Deutsche Bahn. She maintains strong connections with the innovation scene in Oxford, appears on the curriculum of the Saïd Business School MBA course (in partnership with the Skoll Centre for Social Entrepreneurship) and works regularly with the Oxford Foundry.

At twenty-six, she passionately believes that nobody is too young or old to change the way they think, work and create to have a positive impact on the world and shape a better future.



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# Training result: Gone with the wind?

What is the desired result of training? At least we expect attendees to learn something new they use in their job. As a consequence, the new knowledge must be transferred. This “occurs whenever the effects of prior learning” ... in the learning area ... “influence the performance of the later activity” ... in the practical area. (Holding 1965/1991) But there often seem to be invisible hurdles on that track: less than 10 % of training is transferred into practice. This article identifies solution approaches for your training.

## The 10/90 rule

Corporates spend billions of Euros training their employees every year. Some think the more expensive the training, the more significant the effect. And others feel if training at all, then it should be as cheap as possible because it does not effect anything anyway.

Maybe they already know that less than 10 % of their expenditures result in transfer to the job. Or to put it another way: 90 % is flying out of the window – money as well as learnings. For any company training transfer matters a lot. And for every attendee training is essential but transfer plays a more significant role. It is the key to change. One single person. A team. A department. A whole organisation.

It is essential to understand that training does not lead to better individual performance automatically. Looking at peoples’ mindset, you find that in our consumer society, we are used to buy suitable solutions when problems arise. We prefer simple answers. But it is not like a frozen pizza,

you buy and some minutes later your hunger vanishes – like magic.

Learning and transfer are a complex process that lasts a whole life. That is guided, let us say, the first 23 years in School and University. But it stops more or less suddenly when people start working for the rest of their lives until they are 68 or older, which means that they have to manage on their own for 45 years.

## Case studies

The problem of training transfer is discussed in science for over 50 years – but in practice not much changes since then. Why is that? Let us take a closer look at two situations as examples. Dolores and Felix work in different companies, and they attend the same training. We start with the story of Dolores – in Latin dolor means pain. It is followed by Felix – which in Latin means the happy one. You will see why I choose these names.

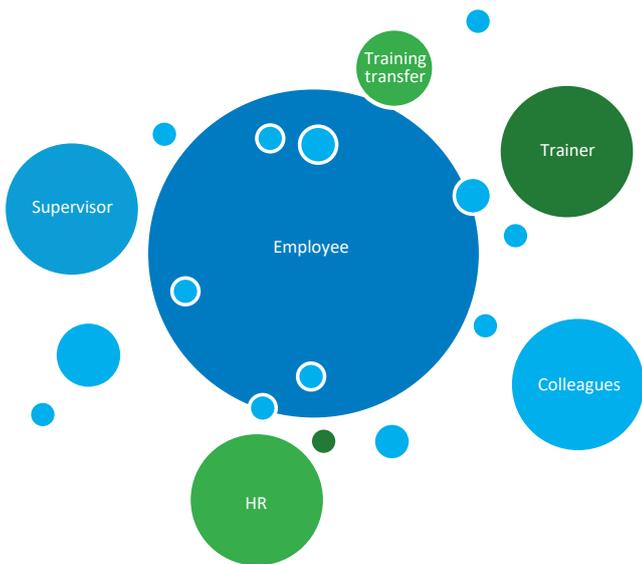


Figure 1: Weak connections of all participants reduces the training transfer (Case Study 1).



Figure 2: Meaningful involvement of all participants significantly improves the training transfer (Case Study 2).

### Case study 1: Dolores.

#### Before training

Dolores' boss has to spend his budget for further training; otherwise, it will be shortened next year. Dolores picks a training topic by herself and explains to her boss why it makes sense. Her boss accepts because he thinks that Dolores is mature and responsible enough to make the right choice. Dolores is allowed to attend the seminar. Before the seminar starts, she receives an email from the trainer with a link to an online survey. She forgets to fill out the survey.

#### Training days

At the beginning of the training, the trainer asks every attendee about their expectation and individual needs to find out if something changed since the survey. Dolores keeps silent.

During the two days, she is happy to escape everyday working routine. At best she has fun, and in the worst case, she is bored but has not to go to work. Let's assume, she had a pretty good time and learned something new she would like to try out at work. In the happy sheet, the trainer receives almost maximum points so that he can be booked for another training.

#### Back to work

As she returns to her job motivated the next day, her boss whispers at her that, due to the training, a lot of work has

been left behind and she promises to make up for the lost work as fast as possible. Colleagues ask her about her training experience during a coffee break. But first, they tell her their own experiences about training. To their minds, it is useless because of several reasons. Mainly it disturbs the daily routine and brings a lot of work afterwards. Dolores does not want to insult anybody and agrees. She tells them that the training was ok and, yes, she certainly has taken some helpful suggestions with her, which she will try out sometime in the next months. But honestly, she would have preferred to go to work, because it is not fair to let the other colleagues do her job. Everybody agrees. Her motivation is at zero and nothing will change.

#### Dolores' learnings

It seems paradoxical: against her better judgment, she is not able to use what she learned. Because she does not use it, she forgets everything within a few days despite one thing: her negative feeling about training.

#### The read thread in Dolores story

The story that is told about training in this corporate – over and over is: you have to provide training to your staff because they want it, but

- › training is exhausting
- › Training is useless
- › Training is stealing time you better use to work

## Case study 2: Felix.

### Before training

Felix' supervisor invites him for a meeting. Felix gets an agenda for the transfer talk beforehand so that he can prepare himself. If he has any questions at that time, he can contact his superior at any time.

Does that feel unusual to you? Then read on, it is worth. If you have already experienced such situations, read on as well and keep the chance to pick something new.

At the meeting, they talk about Felix' competences. They compare his and his supervisor' perspective. They agree upon developing specific skills Felix exact needs for his job to help the corporate reaching their goals. Felix recognises as well as his supervisor the particular needs and likes to optimize his skills. As he is actively involved in the process, he will stay active further on. They write down the concrete targets which Felix shall reach by attending the training in about two months, how Felix will be supported even after the seminar, and how Felix will help his colleagues.

Felix finds three proper pieces of training he discusses shortly with his supervisor, and they pick out the most fitting. They arrange at this early stage a meeting directly after the training day and three weeks later. Felix also arranges already now a meeting with the colleagues for a Knowledge Transfer. Felix also schedules the time to write down the most important things he learned in the wiki of the corporation so that everybody can read up, e. g. if he/she misses the Knowledge Transfer.

Felix colleagues help each other because they are treated the same way from their supervisor and therefore everyone knows about the importance of training and support after the training. Even if they do not attend training themselves, they can learn something. They know about the importance to be open-minded to impulse of change. They know that they are – and not the trainer is – responsible for what they learn and for the implementation in daily working practice themselves. Before the seminar starts, Felix receives an online survey from the trainer. He answers, among other things, questions about his expectations and specific needs for the training.

### Training day

At the beginning of the seminar, the trainer asks every attendee about the things he already asked in the survey to find out if something changed. Felix ads a topic he would like to know more about. During the seminar, the trainer responds strongly to individual needs, and therefore he can answer Felix specific needs. Let us presume, he had – like Dolores, who is sitting in the same training room – a pretty good time and learned something new he will transfer to his daily working routine. In the happy sheet, the trainer receives an honest and nuanced evaluation from Felix. This feedback helps the trainer to optimize his trainings.

### Back to work

Returning from the seminar, Felix reviews the attended training with his superior. They discuss if the goals changed since the last meeting. Then Felix presents what he learned, what he found useful and how he is going to use all this in his daily working routine. His superior asks him what he needs as support for implementation.

After one week latest, he presents in their weekly Team Knowledge Transfer his learnings to his colleagues and offers a Q&A to ensure that everyone has the chance to get things right.

He meets his superior again three weeks after the training to see how everything works out and if they have to re-adjust something. Felix admits that unfortunately, the daily business keeps him from implementing the things he had set out to do. His supervisor tells him that this is entirely normal sticking into old habits and that it is always a significant challenge to change even little things.

He gives him the advice to take it easy and to start with one small thing and to stay positive regarding the changes. He also suggests Felix take one-to-one coaching, that will help to improve his mindset. Thus he will get a deeper understanding of his mental restrictions and learn how to deal with them.

Right now the corporate is extending a sustainable training transfer. They organise internal learning tandems. And they look for trainers who can provide individual or group training right after the training: in person, by telephone or via the web, e.g. in a messenger group where all the attendees of the training can communicate and help each other.

### Felix' learnings

He knows that learning and transfer is something that takes time. Felix is highly motivated because he is transferring what he learned into his practise. And if it does not work out the way expected, he always is supported by his superior.

### The red thread in Felix story

The second story is entirely different from the first. This corporate believes that most employees need continuous support and encouragement for

- 】 change
- 】 higher capacity for learning
- 】 transferring training into practice
- 】 change
- 】 motivate themselves over a longer time

## What we can learn

In the end personal development like in Dolores case is not entirely pointless, because something sticks to her – hopefully. But it is too little measured by the expense of the used resources. Everything is built on wrong believes, on unspoken hopes and assumptions. Nobody verifies anything. They just let things happen.

From a systemic point of view the mechanism is a straightforward one: Every time a story about training starts, it ends up at the same spot like a self-fulfilling prophecy. In a corporate, it is an unwritten law, and the expectable result is seen as the truth. Even without proof, because every time the story repeats itself. The positive as well as the negative outputs confirm the validity of the assumption. This keeps the system stable.

And if Dolores would like to change something, she would have to influence the whole system. It would become unstable. In case you want to change something, this would be the desired effect. But the system itself will not let that happen. You have to manage this process.

If it is like that, how can you change the assumption in the story to get satisfied employees and – more important – better results? Rewrite the story like Felix' corporate. His system, respectively his corporate has gone through a managed change that now allows another perspective with a completely different mindset.

In the end it is that simple: If you are not willing to learn something you have no training transfer. In the worst case, training even harms your work. What you look for is a positive transfer to influence your performance positively. Otherwise, training results are gone with the wind.

## Two areas where changes can happen

There are two areas you have look at to change things. The learning area is the place where the training is held. The functional area is the workplace. Below you will receive a short analysis and suggestions to solve the critical points.

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## Learning area – solutions at a glance

positive	critical	solution
Protected area		Use the protected area for discovering and testing yourself
	Learning content often is too general and not specific enough	Look in advance at what you need to change and focus on small things
	Missing or weak relation to the individual practice of the single participants	Give the trainer the chance to anticipate and built a strong relation between learning and practice
	Attendees tend to have fun and to get out of daily working routine	Having fun is essential for learning – learn how to use that knowingly for yourself
	Participants often are in a passive role	Being active and open-minded is vital for learning – learn how to use that consciously for yourself
	Attendees expect something magic to happen	Be aware that learning is a long road to walk – take a coaching to unleash your potential.
	Seminars as mass-market business	Use standard training for basic information and customized training for deep dives and higher knowledge transfer

## Functional area

positive	critical	solution
	Unprotected space	Create protected working spaces
	Colleagues tend to make fun of participants	Make sure everyone recognizes the benefits of training
	Uncertainty among superiors about benefits	Do not let things just happen. Figure out what matters and start tracking actively.
	Missing target agreements and lack of communication	Write down committed targets and keep everybody informed
	Absent perception of success	Figure out changes and make them visible
	Lack of preparation on the part of the superior	Use the advantage of real change through personal development and training



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# Digital Business

## The blessing after the curse: a corporate culture of self-learning

Digital technology enables qualification anytime and anywhere. When employees decide for themselves where and when they want to learn, they are more motivated and take targeted action. But for this to happen, companies must create the conditions - and encourage and demand stamina.

Further training primarily serves to convey content. What is often neglected here is the transfer of the theory taught into everyday working life: a loss of knowledge occurs and in the end neither the employee has been able to derive an essential added value for his work from the training, nor the employer notices a long-term increase in productivity. The classic offline seminar can be as good as that, but there may also be a short-term increase in motivation. But does this have the necessary substance that all participants want?

To ensure that knowledge is not only passed on through frontal teaching, but can also be flexible and up-to-date, companies are increasingly opting for digital learning methods: Since the turn of the millennium, the eLearning industry has grown by over 900%! The benefits of digital learning are well known. Nevertheless, many companies are sceptical about the new technologies and do not see any significant improvement in the performance of their employees, despite online seminars. What is missing is one thing above all else: awareness of the actual training objective.

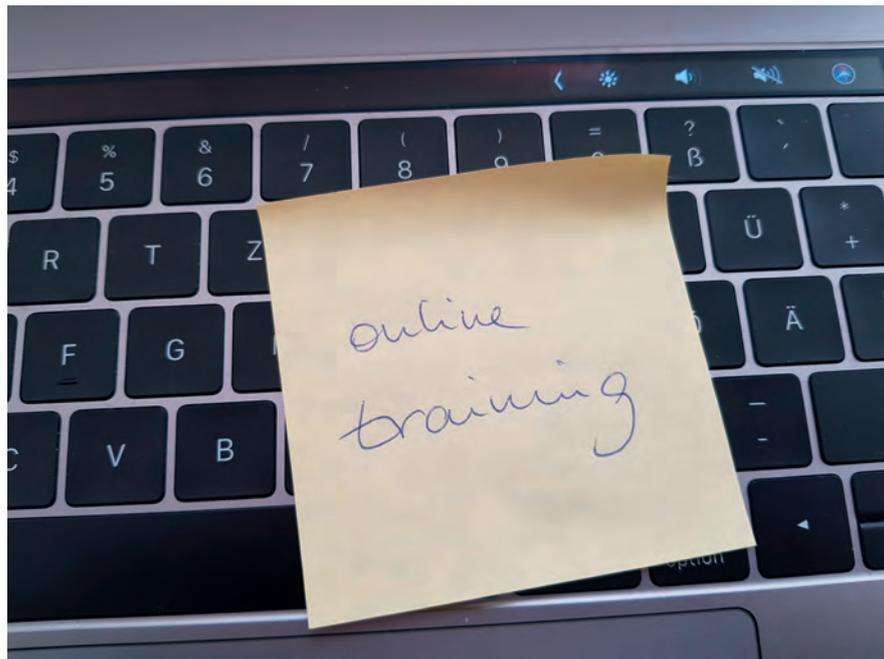
Companies often succumb to the assumption that employees devote themselves to continuing education in an independent and disciplined manner. This is a fallacy, because employees are not prepared for the first step: to rec-

ognise which skills they lack. In order to be able to select a meaningful further training and to bring in the learned actively into the enterprise, it needs completely concrete basic conditions. Self-learning opportunities must be created and it must be ensured that these are accepted and, above all, sustained by the employees.

### Self-Learning within a company

Self-learning requires a corporate culture that builds on and promotes personal responsibility, but at the same time also demands it from its employees. Clear competence and requirement profiles are helpful here. These help the HR department to quickly identify the skills and competencies that make sense for a particular position. The provision of teaching content should be a clearly thought-out process and not a randomly compiled library. No further training for an end in itself, but possibilities of further development with substance and goals.

A learning library with high-quality learning content and learning formats represents an equally important basis for the successful implementation of self-learning. As a learning format, online training fulfils many requirements. Today, not only Virtual & Augmented Reality and Gamification are available as sophisticated and creative methods of



knowledge transfer. But not every online training is equally ideal. What do companies need to consider when selecting suitable online learning formats?

Training close to day-to-day business facilitates the development of a learning culture. In order to avoid the loss of knowledge between learned theory and everyday job life, both components must not be dissociated, but must be regarded as combined. In order to prepare specialists for the evaluation and handling of data and programming languages, knowledge should be taught in an application-oriented manner and using practical examples. It is central to impart „skills“ to the participants. This is achieved with interactive training offers in which the methods and tools taught are practically guided.

However, there is also the question of the limits of a corporate culture in which training and work should flow smoothly into one another. If, for example, frustration arises among employees because they need more time for their main tasks or because they reach their limits during training. This can lead to a demotivation of the employee if no repertoire of strategies for self-directed learning has been taught, e.g. resource management, sequencing of learning steps and, of course, implementation in the workflow.

After all, online training is not just providing a platform with videos that convey theory. There are tutorials on You-

Tube and many video courses on US platforms like Udemy or Coursera. These offers do not require direct and individual support. However, this is essential for the continuing motivation and the will to continue the training in the long run. Nothing is worse than participants who have to do without support completely in the first steps. It must not happen that employees are left alone with the learning environment on their laptops. Just as important as the content of the training itself is the support provided by comprehensive, diverse support and a predefined learning structure in order to create a successful learning experience.

A learning structure represents a binding red thread through further training, which makes it much more likely that objectives will be achieved. What can such a learning structure look like? Employees or even entire departments can be combined in „batches“ and carry out further training at a common start and end time. During this time, the contents of the further training are gradually activated, but holiday periods are also firmly scheduled. This has the advantage that the employees can exchange information and help each other. In-service learning in a group creates a sense of community over a longer period of time and is less isolated than an individual online course. Communication about a team’s progress, procedures and goals is an in-

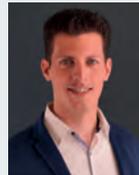
tegral part of everyday professional life and should also be transferred to learning in a binding structure. These are the best prerequisites for building a learning community that has a positive effect on learning success.

It is not a self-runner to instruct your employees to become conscientious self-learners. It is clear that posture changes do not happen overnight. Nevertheless, it is the company's duty to exemplify self-learning as an integral part of the operational process and to encourage it again and again. Especially in the course of the ever-increasing complexity of data streams and ever-newer technologies, employees must train and expand their data skills. AirBnB, for example, has set up its own university, which has included the collection, evaluation and visualization of data in its continuing education curriculum as the most important areas in addition to learning programming languages. In the first half year after its foundation in 2016/2017<sup>2</sup>, more than 500 employees had already taken part in the courses. In Germany, StackFuel is the first training provider in the field of data technologies to specialise in companies and adapt its online training courses directly to the needs of companies. At IBM, they speak of a learning journey in which the employee chooses what he wants to learn and when. Whether the whole course or only selected units, flexible and efficient.

How does self-learning, the Learning Journey, look like in your company?

#### Sources

- 1. <https://www.shiftelearning.com/blog/bid/301248/15-facts-and-stats-that-reveal-the-power-of-elearning>
- 2. <https://medium.com/airbnb-engineering/how-airbnb-democratizes-data-science-with-data-university-3eccc71e073a>



Leo Marose, CEO at StackFuel

Leo Marose is CEO at StackFuel and is responsible for Sales, Marketing and Business Development. During his time as a performance marketing consultant, he realized companies' immense need for data experts and founded StackFuel with Stefan Berntheisel (CTO), Germany's first provider of in-service online training in the field of data

analytics and data science. StackFuel prepares corporations, medium-sized companies and start-ups for effective, data-driven work.

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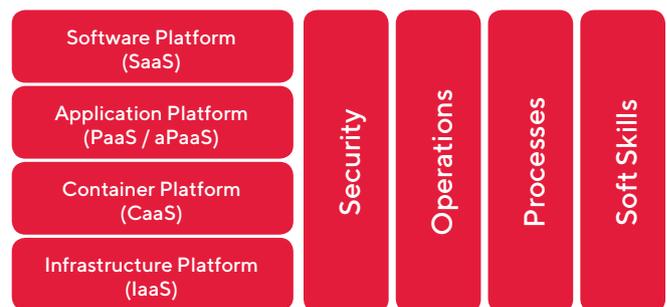


### Training and Coaching – Creating excellence in yourself and in others

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A well-thought-out communication structure also helps to ensure that information and ideas reach the entire company freely and efficiently. Coaching becomes increasingly an integral part of the communications architecture. Coaching has also become indispensable in the



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# Agility in the Cloud

## Interview with Felix Evert



Cloud computing creates great possibilities which need to be used wisely. Agility is one way to use them well. I spoke with Felix Evert, Head of Enterprise and agile Consulting at the Cloudibility, about the opportunities an organization can realize taking the agile journey.

### What is agility?

One would think that in my position, I am able to pull a conclusive definition from the hat. Very often we see contributions or speakers who champion a very specific understanding of agility which, by virtue of definition, is presented to be the (only) true understanding of agility. I appreciate the willingness to take a stance. However, I am not certain that any such exclusive attempts to definition are able to

accommodate for the great variety of approaches that could reasonably be called agility.

Instead, let us take the perspective of organizations. Why would an organization be interested in transforming into a state of agility? Out of the many, often intertwined reasons, I can see four entry points, voiced as expectations: accelerating business processes, exhibiting greater adaptability to change business contexts, shifting focus to the customer's needs, and a less authoritarian mindset.

### What is the benefit of seeing agility as expectation?

This diagnostic lever reminds us what really matters. It's not our superior knowledge about Scrum for that matter; it is about the client's ambition

to transform into a more sustainable, forward-thinking organization. We are looking at vastly different organizations, and people working in these organizations have very individual aspirations and limitations. For me, it is important to understand which direction the business is heading and where the starting point of the journey to agility is. It is all about expectations.

### Could you elaborate on the mentioned four agile expectations?

Accelerating business processes come in many different flavours: the ability to act quickly, effectively and in a more result-oriented manner, the ability to make critical decisions faster or to produce results in shorter periods of time or – also something easier

## Agility has become the cipher for a new understanding of organizing business and work.

said than done - establish innovations in a shorter period of time.

Adaptability could be understood as mastering the need for change in a flexible and creative manner, could mean taking a more embracing stance towards change in general. Obviously, adaptability doesn't mean that companies have to adapt to every external change like a chameleon. Adaptability realizes very differently things based on the company's history - which for German mittelstand usually is a history of success - and the broader market dynamics. In those contexts adaptability very often starts with having systematic discourse about what impulses are worth the need for change and which aren't.

Shifting focus to the client's needs may mean the expectation of being able to react precisely and quickly to customer needs in the form of creating value for the customer. Most readers will find this statement obvious to the point of banality. But I have doubt. Do we really know the customer well? Do we really understand what creates value for the customer? Again, it could be tempting to regard agility as a toolset that helps increase an output called 'customer value'. For me, that is not enough. Shifting focus starts with a sincere and candid interest in that specific entity which businesses consider customers, and it goes as far as envisioning the customer's need before she/he herself/himself understands it.

An agile mindset often entails the expectation of more appreciative interaction among colleagues, with everyone communication at eye level, the willingness to give up hierarchical and bureaucratic structures and, in return, to create spaces of trust. Agile mindset also means wanting and enduring transparency in decision-making. You name it. It is probably the most overloaded expectation of all. Who wholeheartedly enjoys the prospect of having one's mind changed? At the same time, we're talking about some very complex concepts like openness or transparency that can have very different meaning for different people. Agility is nothing you can readily implement, it means to put great expectations on an organization like starting a journey that never ends.

### **Doesn't all this increase the pressure on individual employees?**

It sure does which is exactly the reason I am suggesting the expectation perspective. Business are looking for new ways to handle business challenges. But if we associate agility too easily with specific tools or too exclusive definitions, we further increase the pressure to fit in. It will feel no different to traditional management practice. Agility has become the cipher for a new understanding of organizing business and work; an understanding that is no longer build on assembly line thinking. However, this change needs to be established respectfully and adequately.

### **Which brings us to the central question. Why is agility important at all?**

We can all agree that our world of the early 21st century is rapidly changing. Social and economic globalization, digitization, climate change and transformative technology continuously disrupt or complicate our understanding. I find it reasonable that those development create uncertainty, lack of reliability. But it also creates business challenges. Present-days hyper-competitiveness is a direct result of the said mega trends. All this creates so much complexity and ambiguity to deal with: What can we rely on? What will be valid tomorrow? I believe the expectation, that agility can enable organizations and people within organization to better master those complexity and uncertainty to be true. However, we shouldn't be tempted to conquer complexity with undercomplex solutions. Again, agility, according to my understanding, is an inherently open process.

### **What is the role of cloud computing in this context?**

Cloud computing is one of those transformative technologies that contribute to the ever changing world. Cloud computing is what I call enabling technology as it has the potential to enable completely new business processes. Cloud is a speed driver that is often perceived as a threat, but is also the basis for agility. The challenge is to make the potential available and then also use it through changed processes, mindsets, knowledge that then generate agility. Agility for Cloudibility is the combination of technology and the organization that provides the mindset, the people and the knowledge to harness the potential of the cloud.

The interview was conducted by Friederike Zelke

 CLOUDIBILITY

# Three Days Container Festival in the Port of Hamburg

## ContainerDays 2019 in Hamburg

From 24 to 26 June 2019, the fourth edition of ContainerDays will take place on the premises of the Hafenumuseum Hamburg. For this year the organizer Loodse expects up to a thousand container enthusiasts from all over the world.

To kick off on 24 June, there will be a workshop day on which participants will be able to learn how to use container technologies in a very practical way. The actual conference will then take place on 25 and 26 June. With speakers such as Craig McLuckie, co-founder of the Kubernetes project, Ihor Dvoretzkyi, Developer Advocate of the Cloud Native Computing Foundation, and many more, ContainerDays will once again bring internationally leading experts to the stage this year. And of course the certain festival character with foodtrucks and chillout lounges, which makes up ContainerDays, should not be missing. So the trip to Hamburg is definitely worth it.

A little fun fact at the end: the former free port area where the conference takes place was once the largest and most modern transshipment facility in the city. However, in the 1960s, containers started to appear and both, the shed and the harbour basin, became too small for the new container ships. In shipping, too, containers were a revolutionary technology that brought about many exciting changes.

More information about the programme and tickets can be found at [www.containerdays.io](http://www.containerdays.io).



# KubeCon + CloudNativeCon Shanghai

## A female-friendly tech-conference in a thriving city

Usually, when attending a tech-conference, the picture of the audience is dominated by male attendants. The same is true for keynote speakers and speakers in general. However, there are women in the tech-world, and I found some of them.

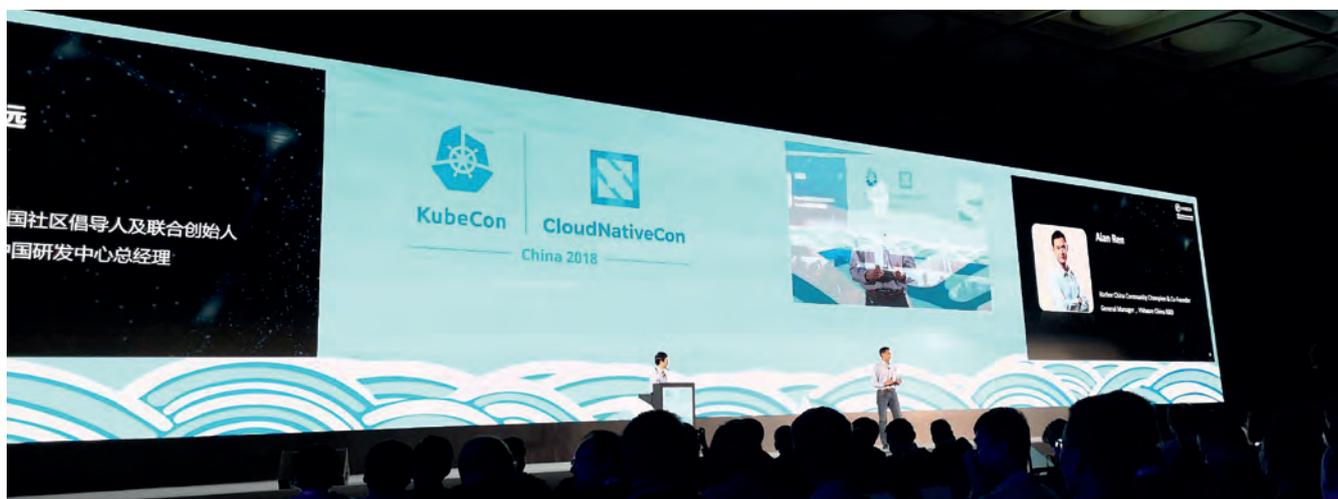
The very first KubeCon + CloudNativeCon in Shanghai, China, was also my very first KubeCon. Shanghai was a location well chosen: 23 Million people in the greater area make it one of the largest cities in the world and a leading economic region in China. And also in the educational sector,

the city is flourishing. In 2013, for example, Shanghai Tech University was founded. It aims to become a national and international first-class research university in the technical fields. Thus, Shanghai was the perfect host for a tech-conference on a thriving topic as Kubernetes.

The first KubeCon + CloudNativeCon in Shanghai attracted 2,500 people to attend the conference – an enormous number. The event was sold out. Great too, that there were many women in the audience and a special women's lunch was held to talk and

network by traditional Chinese food. But also on the speakers lists, the organizers of KubeCon tried to get more women involved, and succeeded: There were 14 % female speakers on the stages during the three days of presentations.

One of them, Janet Kuo, co-chair of the conference, opened the KubeCon with a marvellous speech and the overall top quote: "Kubernetes is boring. But boring is good. It means, that a lot of people are using it, because it works". She told the audience, that Kubernetes became very important





in China also and that 58 % of companies are already running on it.

There were talks about a KubeGene Project, where Kubernetes is speeding up an out of the box gene sequencing process, sessions and discussions on Kubernetes AI with data scientists, engineers and architects from the leading industrial companies and a lot of other great keynotes, presentations, deep dives etc. on various projects on and around Kubernetes.

Cloudibility got hold of Dan Kohn, Executive Director of the Cloud Native Computing Foundation (CNFC) and Janet Kuo, Co-Chair, and asked them for some statements to KubeCon China:

*Cloudibility: How was the conference for CNFC and you personally?*

*DK: I am thrilled, it was a great conference. It was a big challenging process to host it in China, but it went all very well in the end. I am optimistic that the market is growing here. For western companies it was also an important step to come here to Shanghai, especially if they want to operate in China. It was important to CNCF to have a mix with Chinese and Western talks to get China's companies involved to.*

*The conference went so well, that we decided to move it to another conference center next time, so that we can host up to 3.000 participants then.*

*JK: One of the main differences is, that the main audience here was from Asia. We had more intro sessions due to the fact, that the audience in China is more new to KubeCon than in other countries we held the conference before. The audience in general differs: It is more conservative and the language use had to use less slang, for example.*

*Overall, I was surprised by the adoptions and different usage of Kubernetes in the Chinese markets. There is a lot going on here!*

*Cloudibility: How and where will the conference and Kubernetes in general be in 10 years? How will the community change?*

*DK: All technologies have a lifecycle and reach a plateau after a certain time. At some day, we might go down again, but at the moment, the community and Kubernetes is growing very fast. I hope, that there is some growth left and a long decline ahead, when we reach the plateau.*

*JK: There will evolve a greater open source involvement from Chinese users, I think. A lot of enterprises and traditional companies are adopting Kubernetes right now. There will emerge more different approaches, more e-learning and new technologies, too.*

After attending KubeCon in Shanghai I am even more certain: Conferences are a good way for personal and working development also: Growing in studying the new technologies, gaining knowledge and increasing the personal knowledge will help attendees to develop new learning opportunities for their companies as well as for themselves.

Thus, Cloudibility is happy to be part of the next KubeCon + CloudNativeCon Europe 2019 in Barcelona, May 20-23 also. So: Meet us there, we are looking forward to it!

Julia Hahn

 CLOUDIBILITY

# What about Ceph?

## Interview with Kim-Norman Sahm

Kim-Norman Sahm is Head of Cloud Technology and Chief Evangelist at Cloudibility and an expert on OpenStack, Ceph and Kubernetes. As a typical Ops-Guy he is in Storage at home and has already implemented several Ceph projects. Storage options and capacities have always played a major role in the IT environment, but with the move into the cloud these options are changing a lot, how they are changing and how Ceph can be integrated, we got to the bottom of this interview.

**Why is storage important? What is special about storage in the cloud? What has changed?**

Storage has always been a topic, in the legacy world there were the requirements to store all the information that arises. All apps were dependent on having persistent storage available. In general, storage and compute resources were handled very generously. Even for the smallest applications, too large servers were often pur-

chased, 90 % of which normally remained unused. Systems were inflexible and divided into monolithic storage blocks. There were few storage vendors and the offerings were often very expensive.

Over time, it evolved towards using resources more efficiently, both compute and storage. Virtualization was seen as the solution to use compute resources more efficiently. The storage sector has changed to SDS solutions (software defined storage), which offer a multitude of advantages: cost efficiency, flexibility, elasticity, ... Software solutions break down the hard limits of classic storage solutions and make distributed systems possible, georedundancy and, for example with Ceph, avoid vendor lock-in, the storage system is no longer dependent on one manufacturer. In the cloud storage has become a service and customers only want to pay for what they actually use. This also has advantages for the provider, who can use storage flexible and efficient.



Kim-Norman Sahm

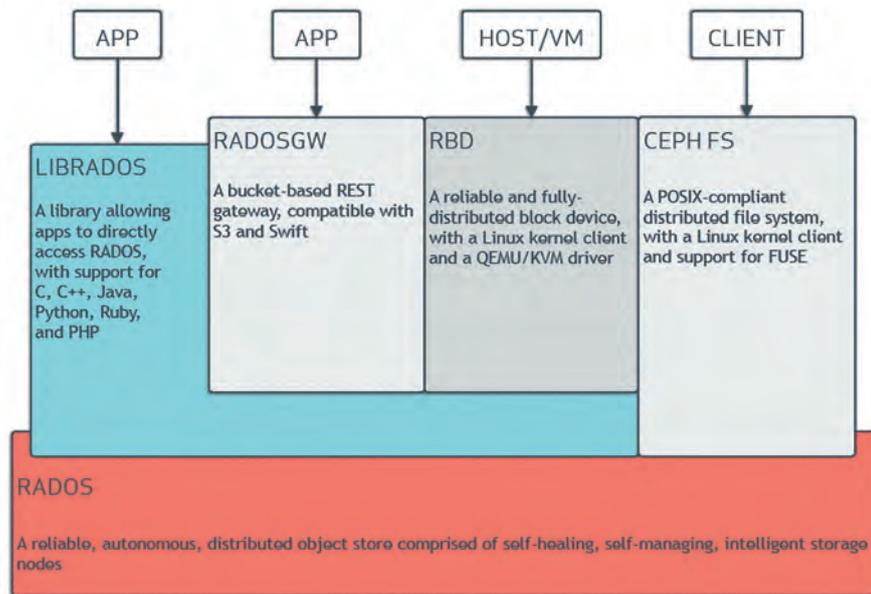


Figure 1: Ceph overview

In the case of Cloud Native applications the mentality has also changed to the effect that only what needs to be stored is stored, not everything. The majority of microservices, for example, are stateless, no more data is stored. So the storage is also used efficiently in this respect.

### How did Ceph get involved here?

Ceph is a software defined storage solution, developed from Sage Weil's doctoral thesis. Ceph was able to successfully assert itself in the till then still sparsely populated software defined storage market. The Open Source solution offers a highly available storage backend that runs on any X86 server hardware. In simple terms, Ceph groups all physical disks together in a cluster and makes them available as a logical, high-availability storage pool, which provides a total capacity of the sum of all disks. This can then be divided into several logical pools that are made available to the applications.

A big advantage of Ceph is that it can provide block, object and file storage from a backend. You don't have to buy separate storage solutions for each type of storage (figure 1).

### How does Ceph work?

When the Ceph project was started, the offer was limited to block and object storage. Compared to other storage solutions that connect the client to the storage system via gateway or proxy nodes, Ceph introduced a „no single point of failure“ right from the start. The Ceph archi-

ture initially consisted of Ceph Monitor (Mon) and Ceph OSD (Object Storage Daemon).

Mons provide the cluster logic, there must be at least 3, maximum 11 monitors in the cluster, the number of which must always be odd because of quorum. The task of the Mons is to monitor the cluster state and ensure the highly available distribution of the objects. The Mons hold the CRUSH map, a kind of map of the objects, for this purpose. The actual user data is stored on the OSD nodes. An OSD always represents exactly one physical hard disk. When a client wants to access the block storage data, it first contacts one of the monitor nodes and requests the CRUSH map. Using this map and the CRUSH calculation algorithm, the client is able to independently calculate which OSDs contain the data it needs, and then directly contacts the appropriate OSD nodes (figure 2).

If data is written, the system behaves in the same way. To ensure high availability objects

**A big advantage of Ceph is that it provides block, object, and file storage from one Backend.**

from the Ceph cluster are replicated three times (Ceph default value). One object is written, but then exists three times in the cluster. The replication level can be adjusted, but there is a balancing act between high availability and cost efficiency. The special feature here is that the write process is not confirmed to the client until all replicas have been written. This, however, represents a difficulty when setting up geoclusters, because the packet runtimes can lead to problems. Therefore, there are no Ceph geoclusters. The Ceph project is currently working on asynchronous write operations, among other things, in order to make this possible.

A big step forward was made for the Ceph project when the OpenStack community became aware of Ceph and this is an excellent backend for OpenStack Cinder (Block-Storage) as well as a replacement for OpenStack Swift (Object-Storage). This development helped Ceph to a higher market share, as Ceph is still considered the standard storage backend for OpenStack. To complete the trinity of storage, Ceph introduced CephFS, a network-based file system, the client module of which has been version 2.6 in the Linux kernel.

**With its large scalability enables Ceph starting with a small setup.**

### Why is Ceph used? What is it important for?

Due to its versatility, Ceph is suitable for many companies. With its high scalability, Ceph allows you to start with a small setup and grow it as your request/use grows. Whether as a pure object store for backups and other applications, as a backend for private cloud solutions based on OpenStack or KVM or as an NFS replacement for Linux clients, Ceph can be used flexibly. Due to the good integration in Kubernetes, Ceph can also be used in the container world.

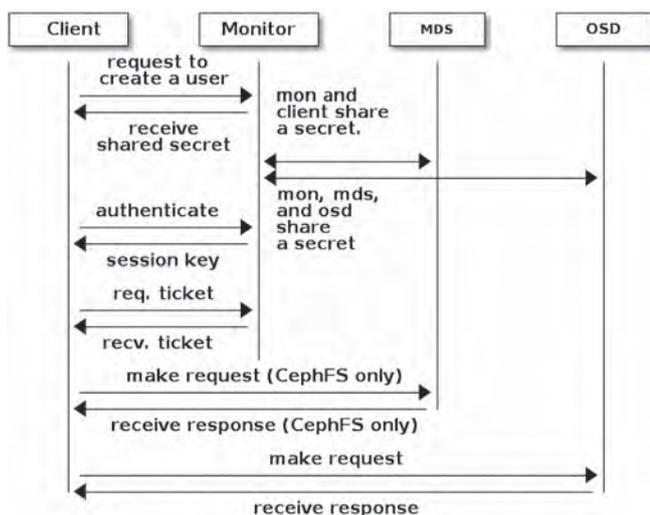
In most management rounds, the main argument for introducing Ceph is the price advantage over commercial closed source enterprise storage solutions. Cheap server hardware and community software enable a start with low capex costs. Those who have sleepless nights when using open source software with community support have the opportunity to purchase commercial support via Linux distributors.

The Subscriptions model is thereby very differentiated and should be thoroughly examined in advance. In general, as versatile as Ceph is, the greater is the challenge in day-to-day operations. The Ops team has to be fit.

### Sources

- 1 <http://docs.ceph.com/docs/master/architecture/>

Figure 2: Ceph flow



The interview was conducted by Friederike Zelke.

**{c}** CLOUDIBILITY



## Manager, Sales - DACH

BERLIN

As a HubSpot Manager for Sales, you will execute our world-class sales methodology, forecast your sales numbers, achieve your new/net quota each month, and uncover strategies to coach and develop your team and grow the business.

### What are the responsibilities of a Manager?

In this role, you will need to:

- Lead and manage a sales team to meet monthly goals: activity metrics, forecasted opportunities and revenue targets
- Build confidence & trust with direct reports as well as provide developmental feedback for continuous improvement
- Coach team members to develop their professional sales and other skills
- Collaborate well with other sales managers, directors & executives to aid the growth of the business
- Supervise & conduct training on skills improvement, inbound sales, product & marketing topics
- Strong sales skills & ability to teach sourcing and sales strategies to new team members
- Maintain headcount via recruiting, selecting and training new Inbound Growth Specialists
- Maintain professional and technical knowledge of inbound marketing & sales and the HubSpot platform
- Understand your country market(s) and build and execute plans to grow them
- Demonstrate HubSpot core values and leadership traits
- Understand leadership training styles and apply to interactions with direct reports

### What are the role requirements?

- **Professional fluency in German and English**
- Experience leading a consultative sales process
- Superior coaching skills - ability to observe, evaluate & use various techniques to improve results
- Detail oriented and the ability to manage multiple objectives
- Good prospecting skills - demonstrate effectiveness on first part of the HubSpot sales methodology (Research & Connect, Explore & Strategize, Demo & Close Call)
- Strong analytic skills to identify trends and gaps in activities and results in order to drive changes in team behaviours and build growth plans
- Ability to work across management team to drive business results
- Strong individual & team motivation skills
- Personal responsibility to hit monthly team goal & positive attitude

**To apply:** Please submit an application online via our [jobs board](#) or contact the recruiter, [Ian Craig](#)

# We are testing clouds

Cloud computing offerings are changing rapidly. Even the offerings of the individual providers are regularly being further developed. This makes it almost impossible to keep track of things. We, Cloudibility, would like to remedy this situation and gradually examine the offers and evaluate them from an objective point of view. Our technicians have developed tests for this purpose. We test general information on onboarding, availability, SLAs, data centers, compute, storage, network, limitations, scaling, technologies, but also more internal information such as backup, security, image service, patch management, monitoring, CI/CD, as a Service offerings and, of course, the cost factor.

This results in rankings and tables help customers to inform themselves independently and to find the right provider for themselves. But not only readers of the Report receive comprehensive,

independent data, providers can also find out about their market, see where they stand and where their strengths lie in comparison. They can also identify their possible weaknesses and potentials, see possible pent-up demand or discover approaches for further specialization and improvement. And of course, they present themselves to interested readers and potential customers.

Currently we have tested the providers AWS, Azure, Google Cloud, IBM Cloud and the Open Telekom Cloud. On the following pages you will find the evaluations sorted by individual topics. You will find the complete evaluations here. We will gradually add more clouds, so that in the next issues only exemplary test evaluations will be shown, you will find the detailed tables online.

› [the-report.cloud](https://the-report.cloud)

If you have any suggestions for supplementing the questions, please write to us at: [presse@cloudibility.io](mailto:presse@cloudibility.io).

Note: Three virtual machines of different sizes are used in the evaluations:

#### Small means:

- › OS Ubuntu 16.04
- › 2vCPUs
- › 8GB RAM
- › min. 50GB HDD
- › Location: Germany, if not Western Europe, if not Europe

#### Medium means:

- › OS Ubuntu 16.04
- › 4vCPUs
- › 16GB RAM
- › min. 50GB HDD
- › Location: Germany, if not Western Europe, if not Europe

#### Large means:

- › OS Ubuntu 16.04
- › 8vCPUs
- › 32GB RAM
- › min. 50GB HDD
- › Location: Germany, if not Western Europe, if not Europe

# And the winners are ...

As with every edition, our team looked into many different aspects of several cloud providers. We analyzed their pros and cons, discussed our experiences, and decided for the winner in several categories. Interestingly, we found out that none of the vendors we tested would not be recommendable - each one has specific strengths and (of course) potential for improvements. We were especially impressed by the performance of smaller and / or

not so-well-known cloud vendors, such as Open Telekom Cloud: Often they offer comparable performance and sometimes even more options than their bigger competitors, combined with more personal support and very reasonable pricing. That being said, let's look into the winners. And don't forget to check out our detailed comparison tables on the next pages for more details!

Category	Winner	Reason
<b>Backup, Recovery and Availability</b>	<b>Azure</b>	Azure is the winner in this case due to having more "strategies" for backups, e.g., full, differential, incremental, available.
<b>Compute</b>	<b>OTC</b>	Compute performance wise OTC is the winner, though looking at other factors such as costs and startup times Google Cloud Platform is a good choice, too.
<b>Databases (DBaaS)</b>	<b>AWS</b>	AWS through their pure variability in big data and databases is the winner here. Ranging from their in house Amazon DynamoDB to Amazon Kinesis, common relational databases such as MySQL and PostgreSQL, but also including non-relational databases Redis and Memcached, has such a vast amount to choose from, to get the perfect one for the project/application.
<b>IaaS, PaaS and SaaS - Patch Management</b>	<b>Google Cloud Platform</b>	Google Cloud Platform is the winner here, because they offer OSES for the most common use cases, such as Debian and Red Hat but also specialized ones like container optimized OS from Google and Red Hat Enterprise Linux for SAP applications.
<b>Network</b>	<b>Azure and Google Cloud Platform</b>	If you need high bandwidth in the same and different availability zone, go for Google Cloud Platform. When needing especially high bandwidth between different regions, go for Azure.
<b>Security</b>	<b>Azure</b>	Azure is knowingly running penetration tests against their cloud platform to ensure safety for users. Though the other cloud providers are also providing the "standard" set of features, such as Intrusion Detection and Prevention System. Only OTC is missing features in that regard.
<b>Storage</b>	<b>AWS for object, IBM Cloud for block and file</b>	Looking for fast block and filesystem storage? IBM Cloud has you covered with measured write speeds up to around 240 Megabyte per second. Price wise OTC is the winner, though together with Google Cloud Platform they are a good amount slower than their competition. Fast object storage? AWS is the "king" of S3 in regard to capabilities and price as they "invented" the protocol. In aspect to maximum object size AWS and Google Cloud Platform are on the same level.

You can see, each one of our vendors has his strengths. From our perspective there is no right or wrong considering cloud vendors nowadays, there is only a matter of needs and their fulfillment by a vendor. The best thing is: Nowadays, multi-cloud-approaches can be implemented as easy as never before, allowing for a the-right-tool-

for-the-job-approach and preventing from vendor lock-ins.

And these are good news for 2019!

The tests were ranked by Alexander Trost.



## Backup, Recovery and Availability

Questions	AWS	Azure	
Are managed backups offered (Provider is responsible to take backups)	yes	yes	
Which types of backups are supported for VMs?	<ul style="list-style-type: none"> <li>- Snapshots</li> <li>- Incremental Backups</li> </ul>	<ul style="list-style-type: none"> <li>- Full Backups</li> <li>- Differential Backups</li> <li>- Incremental Backups</li> <li>- Snapshots</li> </ul>	
Where will the backup be stored?	<ul style="list-style-type: none"> <li>- Amazon S3</li> <li>- Amazon Glacier</li> <li>- Different datacenter</li> <li>- Storage-Cluster</li> </ul>	<ul style="list-style-type: none"> <li>- Recovery Services Vault</li> <li>- Different Datacenter</li> </ul>	
Can backups be scheduled?	yes	yes	
Usage costs per month - 500 GB Backup Storage - Western Europe	€ 22.13 / \$ 25.00	€ 10.12 / \$ 12.00	
IaaS - Start backup job with the backup feature of the cloud. Restore the backup and test if VM can be restored. Also try to restore into a new VM.	no	yes	
Is it possible to restore data from a previous date or is it only possible to restore the latest version?	yes	yes	

## Compute

Questions	AWS	Azure	
Small VM: OS Ubuntu 16.04; 2vCPUs; 8GB RAM; min. 50GB HDD; Location: Germany, if unavailable: Western Europe, if unavailable: Europe	yes	yes	
Medium VM: OS Ubuntu 16.04; 4vCPUs; 16GB RAM; min. 50GB HDD; Location: Germany, if unavailable: Western Europe, if unavailable: Europe	yes	yes	
Large VM: OS Ubuntu 16.04; 8vCPUs; 32GB RAM; min. 50GB HDD; Location: Germany, if unavailable: Western Europe, if unavailable: Europe	yes	yes	
GPU support for the VM?	yes	yes	
AutoScaling for VM?	yes	yes	
Availability Zones (i.e Availability set) possible	yes	yes	
Startup-time (till time of availability) - Small - Medium - Large	50 sec 53 sec 53 sec	109 sec 135 sec 163 sec	
Count of steps until VM is created	7 steps	4 Steps	
RAM throughput (sysbench, Block size 1k) - Read - Write	813.77 MB/sec 778.55 MB/sec	4200.20 MB/sec 3249.21 MB/sec	
CPU speed (geekbench) - Small Single Core - Small Multi Core - Medium Single Core - Medium Multi Core - Large Single Core - Large Multi Core	3368 6410 3368 11732 3478 21712	3254 3787 3045 6475 3518 13226	
VM accessible via Console	no	no	

	Google Cloud Platform	IBM Cloud	OTC
	no	yes	yes
	- Snapshots - Incremental Backups	- Snapshot - Full Backups - Incremental Backups	- Snapshot - Full Backups - Incremental Backups
	- Google Cloud Storage - Storage Cluster	- Evault - r1 cdp	Different datacenters
	yes	yes	yes
	€ 4.46 / \$ 5.00	€ 0.88 / \$ 1.00	€ 5.00 / \$ 5.63
	no	yes	yes
	yes	yes	yes

	Google Cloud Platform	IBM Cloud	OTC
	yes	yes	yes
	45 sec 49 sec 52 sec	125 sec 160 sec 340 sec	76 sec 90 sec 97 sec
	2 Steps	4 Steps	3 Steps
	4316.74 MB/sec 3506.16 MB/sec	606.40 MB/sec 583.99 MB/sec	4569.01 MB/sec 3684.60 MB/sec
	2865 3803 2959 7205 2942 13296	2590 4952 2616 8659 2567 15316	3198 5934 3308 11329 3310 20846
	yes	yes	yes

Total cost of VM per month (732hrs) - Small - Medium - Large	€ 61.10 / \$ 69.12 € 118.71 / \$ 134.29 € 239.17 / \$ 270.56	€ 75.29 / \$ 99.28 € 150.58 / \$ 198.56 € 301.16 / \$ 350.40	
Supported disk formats / images	- OVA - VMDK - RAW - VHD/VHDX	- VHD - VMDK - VHDX - QCOW2 - RAW	
Are there any limitations per VM?	Amount CPUs: 128 RAM size: 1952 GB Disk size: 2048 GB	Amount CPUs: 128 RAM size: 3892 GB Disk size: 4096 GB Amount Disk: 64	
Can bare-metal servers be deployed via the cloud?	yes	no	
Which hypervisor is used?	- KVM - Xen	- Hyper-V	

## Databases (DBaaS)

Questions	AWS	Azure	
Which DB engines are offered?	<p>Relational DB</p> <ul style="list-style-type: none"> <li>- MySQL</li> <li>- PostgreSQL</li> <li>- MariaDB</li> <li>- Oracle</li> <li>- Microsoft SQL Server</li> <li>- Amazon Aurora</li> </ul> <p>Non-Relational DB</p> <ul style="list-style-type: none"> <li>- Amazon DynamoDB</li> <li>- Amazon ElastiCache</li> <li>- Amazon Neptune</li> <li>- Redis</li> <li>- MemCached</li> </ul> <p>Data Warehouse / Big Data</p> <ul style="list-style-type: none"> <li>- Amazon Redshift</li> <li>- Amazon Athena</li> <li>- Amazon EMR (Hadoop, Spark, HBase, Presto, etc.)</li> <li>- Amazon Kinesis</li> <li>- Amazon Elasticsearch Service</li> <li>- Amazon Quicksight</li> </ul>	<p>Relational DB</p> <ul style="list-style-type: none"> <li>- Azure SQL Database</li> <li>- Azure Database for MySQL</li> <li>- Azure Database for PostgreSQL</li> <li>- Azure Database for Maria DB</li> <li>- Microsoft SQL Server</li> </ul> <p>Non-Relational DB</p> <ul style="list-style-type: none"> <li>- Azure Cosmos DB</li> <li>- Azure Table Storage</li> <li>- Redis</li> </ul> <p>Data Warehouse / Big Data</p> <ul style="list-style-type: none"> <li>- SQL Data Warehouse</li> <li>- HDInsight (Hadoop, Spark, Hive, LLAP, Kafka, Storm, R.)</li> <li>- Azure Databricks (Spark)</li> <li>- Azure Data Factory</li> <li>- Azure Stream Analytics</li> </ul>	
Performance of MySQL (MySQL Sysbench, table-size (row data): 1000000, Threads: 16) - Read - Write - Read / Write	<p>Transactions: 62413 (1039.99 / sec)</p> <p>Transactions: 117698 (1959.19 / sec)</p> <p>Transactions: 42882 (714.51 / sec)</p>	<p>Transactions: 19584 (326.05 / sec)</p> <p>Transactions: 4810 (79.97 / sec)</p> <p>Transactions: 4095 (68.05 / sec)</p>	
Provisioning time for a MySQL instance	226 sec	146 sec	
Performance of PostgreSQL	<p>Transactions: 1102709 (18376.33 / sec)</p> <p>Transactions: 532612 (8875.75 / sec)</p> <p>Transactions: 39611 (659.96 / sec)</p>	<p>Transactions: 196708 (3275.69 / sec)</p> <p>Transactions: 46935 (781.81 / sec)</p> <p>Transactions: 6317 (104.97 / sec)</p>	
Provisioning time for a PostgreSQL instance	253 sec	266 sec	

€ 54.72 / \$ 62.55 € 109.43 / \$ 125.09 € 218.86 / \$ 250.19	€ 78.77 / \$ 88.37 € 141.19 / \$ 158.39 € 301.21 / \$ 337.91	€ 72.45 / \$ 83.86 € 150.28 / \$ 168.60 € 292.42 / \$ 328.20
- VMDK - VDH - RAW	- VMDK - AKI - ARI - AMI - QCOW2 - RAW	- VMDK - QCOW2 - RAW - VHD - VHDX
Amount CPUs: 160 RAM size: 3844 GB Disk size: 64 TB Amount Disk: 128	Amount CPUs: 64 RAM size: 512 GB Disk size: 12 TB	Amount CPUs: 60 RAM size: 940 GB
no	yes	yes
- KVM	- PowerVM - VMware ESX Server - Xen - KVM - z/VM	- XEN - KVM

Google Cloud Platform	IBM Cloud	OTC Cloud
Relational DB - PostgreSQL - MySQL - Google Cloud Spanner  Non-Relational DB - Google Cloud Datastore - Google Cloud BigTable  Data Warehouse / Big Data - Google Cloud BigQuery - Google Cloud Dataflow - Google Cloud Dataproc (Hadoop / Spark) - Google Cloud Datalab - Google Cloud Dataprep	Relational DB - Db2 on Cloud - PostgreSQL - MySQL  Non-Relational DB - Cloudant - MongoDB - ScyllaDB - Redis - JanusGraph - etcd - Elasticsearch  Data Warehouse / Big Data - Db2 Warehouse on Cloud	Relational DB - PostgreSQL - MySQL - Microsoft SQL Server  Non-Relational DB - MongoDB - Redis
Transactions: 43284 (721.17 / sec) Transactions: 89311 (1488.26 / sec) Transactions: 28474 (474.35 / sec)	Transactions: 4705 (78.33 / sec) Transactions: 11806 (196.52 / sec) Transactions: 3691 (61.27 / sec)	Transactions: 62342 (1039.03 / sec) Transactions: 73487 (1224.78 / sec) Transactions: 31378 (522.96 / sec)
182 sec	132 sec	392 sec
Transactions: 1044874 (17412.16 / sec) Transactions: 485496 (8089.14 / sec) Transactions: 31484 (524.37 / sec)	Transactions: 65058 (1084.03 / sec) Transactions: 63624 (1060.11 / sec) Transactions: 2961 (49.14 / sec)	Transactions: 307458 (5124.3 / sec) Transactions: 21502 (358.36 / sec) Transactions: 7786 (129.76 / sec)
151 sec	180 sec	467 sec

Supported DB Versions	<ul style="list-style-type: none"> <li>- MySQL 8.0,5.7, 5.6, 5.5</li> <li>- MariaDB 10.3,10.2,10.1,10.0</li> <li>- Microsoft SQL Server 2017 RTM, 2016 SP1, 2014 SP2, 2012 SP4, 2008 R2 SP3</li> <li>- Oracle 12c (12.1.0.2, 12.1.0.1), Oracle 11g (11.2.0.4, 11.2.0.3, 11.2.0.2)</li> <li>- PostgreSQL 11 Beta 1,10.6,10.5, 10.4, 10.3, 10.1, 9.6.x, 9.5.x, 9.4.x, 9.3.x,9.2.x</li> <li>- Amazon Aurora - compatible with MySQL 5.6.10a</li> </ul>	<ul style="list-style-type: none"> <li>- MySQL 5.7, 5.6</li> <li>- MariaDB 10.2</li> <li>- Azure SQL Database: Microsoft SQL Server 2017</li> <li>- Microsoft SQL Server 2017, 2016 SP1, 2014 SP2, 2012 SP4, 2008 R2 SP3</li> <li>- PostgreSQL 10.3, 9.6.x, 9.5.x</li> <li>- Azure Cosmos DB</li> </ul>	
Troubleshooting as a Service			
- Rollback	yes	yes	
- Support	yes	yes	
Total price for the database per month	€ 98.21 / \$ 110.18	€ 139.84 / \$ 165.82	
- MySQL			
- 2 vCores			
- 100 GB Storage			
- Frankfurt / Western Europe			
- 100% active per month			
- No dedicated backup			
Total price for the database per month	€ 104.03 / \$ 116.71	€ 139.84 / \$ 165.82	
- PostgreSQL			
- 2 vCores			
- 100 GB Storage			
- Frankfurt / Western Europe			
- 100% active per month			
- No dedicated backup			
Limitations:			
How many simultaneous requests to the DB?	MySQL: - max Connections: 2540	MySQL: - max Connections: 10000	
How much RAM?			
How many users?	PostgreSQL: - max Connections: 5696	PostgreSQL: - max Connections: 1900	
How does backup/restore work?	Backups: - Automatic Backups. Restore: - Point-in-time restore	Backups: - Automatic Backups. Restore: - Point-in-time restore - Geo-restore	

## IaaS / PaaS / SaaS Patch Management

Questions	AWS	Azure	
Does the cloud provide a managed patch service?	no	yes (Azure Automation)	
Which operating systems are supported?	Linux: <ul style="list-style-type: none"> <li>- Red Hat Enterprise Linux (RHEL) 7.0 - 7.4, 6.5 - 6.9</li> <li>- SUSE Linux Enterprise Server (SLES) 12</li> <li>- Amazon Linux 2015.03 - 2018.03, 2012.03 - 2017.03</li> <li>- CentOS 7.1, 6.5 and later</li> <li>- Raspbian Jessie</li> <li>- Raspbian Stretch</li> <li>- Ubuntu Server 18.04, 16.04, 14.04</li> </ul> Windows: <ul style="list-style-type: none"> <li>- Windows Server 2008</li> <li>- Windows Server 2012</li> <li>- Windows Server 2016 including R2 Versions</li> </ul>	Linux: <ul style="list-style-type: none"> <li>- CentOS 6 (x86/x64), 7 (x64)</li> <li>- Red Hat Enterprise 6 (x86/x64) and 7 (x64)</li> <li>- SUSE Linux Enterprise Server 11 (x86/x64), 12 (x64)</li> <li>- Ubuntu 14.04, 16.04 (x86/x64)</li> </ul> Windows: <ul style="list-style-type: none"> <li>- Windows Server 2008</li> <li>- Windows Server 2008 R2 RTM</li> <li>- Windows Server 2008 R2 SP1 and later</li> </ul>	
Is the operating system from the deployed VM at a current patch level?	yes	yes	
What is the current available patch level in our sample VM?	0.04	0.04	
- Ubuntu 16.04 LTS with latest patches applied			

<ul style="list-style-type: none"> <li>- MySQL 5.7, 5.6</li> <li>- PostgreSQL 9.6.x</li> </ul>	<ul style="list-style-type: none"> <li>Db2-ge</li> <li>PostgreSQL 9.6.10, 9.6.9, 9.5.14, 9.5.13, 9.4.19, 9.4.18</li> <li>MySQL 5.7.22</li> <li>Cloudant-h7</li> <li>MongoDB 3.4.10, 3.2.18, 3.2.11, 3.2.10</li> <li>ScyllaDB 2.0.3</li> <li>Redis 4.0.10, 3.2.12</li> <li>JanusGraph 0.1.1 beta</li> <li>etcd 3.3.3, 3.2.18</li> <li>Elasticsearch 6.2.2, 5.6.9</li> <li>Db2 Warehouse-ef</li> </ul>	<ul style="list-style-type: none"> <li>PostgreSQL 9.6.5, 9.6.3, 9.5.5</li> <li>MySQL 5.7.20, 5.7.17, 5.6.35, 5.6.34, 5.6.33, 5.6.30</li> <li>Microsoft SQL Server 2014 SP2 SE</li> </ul>
<ul style="list-style-type: none"> <li>yes</li> <li>yes</li> </ul>	<ul style="list-style-type: none"> <li>yes</li> <li>yes</li> </ul>	<ul style="list-style-type: none"> <li>yes</li> <li>yes</li> </ul>
€ 121.43 / \$ 138.75	n/a	€ 298.40 / \$ 335.04
€ 124.21 / \$ 141.81	€ 103.04 / \$ 136.00	€ 312.80 / \$ 350.85
<ul style="list-style-type: none"> <li>MySQL:</li> <li>- max Connections: 4000</li> <li>PostgreSQL:</li> <li>- max Connections: 1000</li> </ul>	<ul style="list-style-type: none"> <li>MySQL:</li> <li>- max Connections: 151</li> <li>PostgreSQL:</li> <li>- max Connections: 1000</li> </ul>	<ul style="list-style-type: none"> <li>MySQL:</li> <li>- max Connections: 151</li> <li>PostgreSQL:</li> <li>- max Connections: unlimited</li> </ul>
<ul style="list-style-type: none"> <li>Backups:</li> <li>- Automatic Backups.</li> <li>Restore:</li> <li>- On-demand</li> </ul>	<ul style="list-style-type: none"> <li>Backups:</li> <li>- Automatic Backups.</li> <li>Restore:</li> <li>- On-demand</li> </ul>	<ul style="list-style-type: none"> <li>Backups:</li> <li>- Automatic Backups.</li> <li>Restore:</li> <li>- Point-in-time restore</li> </ul>

Google Cloud Platform	IBM Cloud	OTC
yes (Google App Engine)	yes (IBM BigFix Patch Management)	no
<ul style="list-style-type: none"> <li>Linux:</li> <li>- Centos 7</li> <li>- Container-Optimized OS from Google cos-stable</li> <li>- Coreos-stable</li> <li>- Debian-9</li> <li>- Red Hat Enterprise Linux (RHEL)-7</li> <li>- RHEL for SAP, rhel-7-sap-apps, rhel-7-sap-hana</li> <li>- SUSE Enterprise Linux Server (SLES)-12</li> <li>- SLES-12-sp3-sap</li> <li>- Ubuntu-18.04, 16.04</li> <li>Windows:</li> <li>- Windows Server</li> <li>- Windows-1803-core</li> <li>- Windows-1803-core-for-containers</li> </ul>	<ul style="list-style-type: none"> <li>Linux:</li> <li>- CentOS-Minimal 7.X, 6.X</li> <li>- CentOS-LAMP 7.X.6.X</li> <li>- Debian Minimal Stable 9.X, 8.X</li> <li>- Debian LAMP Stable 8.X</li> <li>- Red Hat Minimal 7.x, 6.x</li> <li>- Red Hat LAMP 7.x, 6.x</li> <li>- Ubuntu Minimal 18.04, 16.04, 14.04</li> <li>- Ubuntu LAMP 18.04, 16.04, 14.04</li> <li>Windows:</li> <li>- Standard 2016</li> <li>- Standard 2012</li> <li>- R2 Standard 2012</li> </ul>	<ul style="list-style-type: none"> <li>Linux:</li> <li>- openSUSE 42.x</li> <li>- CentOS 6.x, 7.x</li> <li>- Debian 8.x 9.x</li> <li>- Fedora 24, 25, 26, 27</li> <li>- EulerOS 2.x</li> <li>- Ubuntu 14.04, 16.04</li> <li>- SUSE Enterprise Linux 11, 12</li> <li>- Oracle Linux 6.8, 7.2</li> <li>- Red Enterprise Linux 6.8, 7.3</li> <li>Windows:</li> <li>- Windows 2008</li> <li>- Windows 2012</li> <li>- Windows Server 2016</li> </ul>
yes	yes	yes
0.04	0.04	0.04

## Network

Questions	AWS	Azure	
Is network monitoring available?	yes	yes	
Is a Content Delivery Network (CDN) available?	yes	yes	
Sample Measurements 1) Same AZ 2) Different AZ 3) Different Region	Iperf Result: 1) TCP: Bandwidth Sender: 953 Mbits/sec Receiver: 952 Mbits/sec UDP: Bandwidth: 1.05 Gbit/sec 2) TCP: Bandwidth Sender: 896 Mbits/sec Receiver: 895 Mbits/sec UDP: Bandwidth: 1.35 Gbit/sec 3) TCP: Bandwidth Sender: 125 Mbits/sec Receiver: 123 Mbits/sec UDP: Bandwidth: 1.94 Gbit/sec	Iperf Result: 1) TCP: Bandwidth Sender: 893 Mbits/sec Receiver: 891 Mbits/sec UDP: Bandwidth: 852 Mbit/sec 2) TCP: Bandwidth Sender: 1.15 Gbit/sec Receiver: 1.14 Gbit/sec UDP: Bandwidth: 827 Mbit/sec 3) TCP: Bandwidth Sender: 902 Mbits/sec Receiver: 902 Mbits/sec UDP: Bandwidth: 944 Mbit/sec	
Public IPs – Public IPs for VMs? – Available kinds of public IPs for VMs – Public IPs for Load Balancers? – Available kinds of public IPs for Load Balancers	yes floating / static yes static	yes floating / static yes static	
Is a dedicated network connection from data-center to public cloud possible?	yes (AWS Direct Connect)	yes (Azure Express Route)	
Network Security features (Network Traffic analysis, Network Security Groups)	– AWS Web Application Firewall – Network security groups – Network Traffic analysis	– Azure Firewall – Azure Front Door – Azure Network Watcher – Azure Security Center – Azure DDoS protection – Network access control – Network layer control – Network security rules (NSGs)	
VPN as a Service	yes	yes	
Traffic costs per GB	€ 0.13 / \$ 0.15	€ 0.009 / \$ 0.01	

## Security

Questions	AWS	Azure	
Integration to a SIEM possible? (Security Information and Event Management)	yes	yes	
Security Groups	yes	yes	
Disk Encryption	yes	yes	
Network Traffic Analyse	yes	yes	
Protection against Denial of Service Attacks	yes	yes	
Firewall – Does the cloud provider provide additional integrated security features i.e. a Next Generation Firewall?	yes	yes	
Does the cloud provider keep an eye on current threats and take action?	yes	yes	

	Google Cloud Platform	IBM Cloud	OTC
	yes	yes	yes
	yes	yes	yes
	Iperf Result: 1) TCP: Bandwidth Sender: 1.91 Gbit/sec Receiver: 1.90 Gbit/sec UDP: Bandwidth: 3.80 Mbit/sec 2) TCP: Bandwidth Sender: 1.88 Gbit/sec Receiver: 1.88 Gbit/sec UDP: Bandwidth: 3.79 Gbit/sec 3) TCP: Bandwidth Sender: 367 Mbits/sec Receiver: 365 Mbits/sec UDP: Bandwidth: 3.80 Gbit/sec	Iperf Result: 1) TCP: Bandwidth Sender: 102 Mbits/sec Receiver: 99.9 Mbits/sec UDP: Bandwidth: 99 Mbit/sec 2) TCP: Bandwidth Sender: 102 Mbits/sec Receiver: 99.9 Mbits/sec UDP: Bandwidth: 98.9 Mbits/sec 3) TCP: Bandwidth Sender: 102 Mbits/sec Receiver: 100 Mbits/sec UDP: Bandwidth: 98.8 Mbit/sec	Iperf Result: 1) TCP: Bandwidth Sender: 85.8 Mbits/sec Receiver: 84.8 Mbits/sec UDP: Bandwidth: 4.41 Gbit/sec 2) TCP: Bandwidth Sender: 106 Mbits/sec Receiver: 105 Mbits/sec UDP: Bandwidth: 3.87 Gbits/sec 3) n/a
	yes floating / static yes static	yes floating/static yes static	yes static yes static
	yes (Google Cloud Interconnect)	yes	yes
	<ul style="list-style-type: none"> <li>- Firewall</li> <li>- Network security groups</li> <li>- Network Traffic analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Network Security Groups</li> <li>- Firewalls (Multi VLAN, Single VLAN and Web App)</li> <li>- DDOS mitigation</li> </ul>	<ul style="list-style-type: none"> <li>- Network Security Groups</li> <li>- Firewalls (Multi VLAN, Single VLAN and Web App)</li> </ul>
	yes	yes	yes
	€ 0.073 / \$ 0.082	€ 0.078 / \$ 0.087	€ 0.06 / \$ 0.067

	Google Cloud Platform	IBM Cloud	OTC
	yes	yes	yes

Does the cloud provider support additional integrated security features for cloud resources using 3rd party tools:			
IDS (Intrusion Detection System)	yes	yes	
IPS (Intrusion Prevention System)	yes	yes	
ATP (Advanced Threat Protection)	yes	yes	
Does the provider carry out regular penetration tests against the platform?	no	yes	

## Storage

Questions	AWS	Azure	
Which kinds of storage are available? - Object / Blob Storage - File Storage - Block Storage	yes (S3 / Glacier) yes (EFS) yes (EBS)	yes (Azure Blob Storage) yes (Azure Disk Storage) yes (Azure Files)	
Block - Different tier-classes? SATA, SSD, SAS	yes	yes	
Which objects storage-engines are offered?	Amazon S3	Azure Blob Storage	
File - Accessing file storage via (cluster) file system.	- EFS	- GlusterFS - BeeGFS - Luster	
Storage capacity limits	Overall size: Unlimited 5 TB per S3 object	Overall size: 500 TB per Storage Account 200 Storage Accounts per Subscriptions	
Duration of provisioning?	18 sec	47 sec	
Throughput IOPS (only Block- and File-Storage)	- Random read: bw = 24.52 MB/s, iops = 3065 - Random write: bw = 128.83 MB/s, iops = 2013 - Random Read and write: - read : bw = 44.20 MB/s, iops = 2762 - write: bw = 5.03 MB/s, iops = 314 - Sequential read: bw = 24.55 MB/s, iops = 3068 - Sequential write: bw = 99.07 MB/s, iops = 3095	- Random read: bw = 46.33 MB/s, iops = 5791 - Random write: bw = 32.00 MB/s, iops = 4500 - Random read and write: - read: bw = 105.19 MB/s, iops = 6574; - write: bw = 11.99 MB/s, iops = 749 ; - Sequential read: bw = 34.24 MB/s, iops = 4279 - Sequential write: bw = 16.80 MB/s, iops = 524	
Costs per month - total price for 50 GB Disk which is mounted to the VM	€ 5.34 / \$ 5.99	€ 7.65 / \$ 8.58	

	yes yes yes	yes yes yes	no no no
	no	no	no

	Google Cloud Platform	IBM Cloud	OTC
	yes (Google Cloud Storage) yes (Google Drive / Persistent Disk) yes (Google Persistent Disk)	yes (IBM Cloud Object Storage) yes (IBM Cloud file storage) yes (IBM Cloud block storage)	yes (Object Storage Service) yes (Scalable File Service) yes (Elastic Volume Service)
	yes	yes	yes
	Buckets (like S3)	- S3 - Swift	- S3 - Swift
	- Google Cloud Storage FUSE - Beta: Google Cloud Filestore	- NFS	- NFS
	Overall size: Unlimited 5 TB per individual object	Overall size: Unlimited 25 GB per month of object storage(Unlimited for standard plan)	50 TB object storage
		25 sec	23 sec
	- Random read: bw = 13.00 MB/s, iops = 1624 - Random write: bw = 32.75 MB/s, iops = 511 - Random read and write: - read: bw = 25.12 MB/s, iops = 1570 - write: bw = 2.86 MB/s, iops = 178 - Sequential read: bw = 13.00 MB/s, iops = 1624 - Sequential write: bw = 28.07 MB/s, iops = 877	- Random Read: bw = 92.88 MB/s, iops = 11610 - Random Write: bw = 24.30 MB/s, iops = 3796 - Random Read and write: - read: bw = 78.24 MB/s, iops = 4889 - write: bw = 8.91 MB/s, iops = 557 Sequential Read: bw = 79.44 MB/s, iops = 9929 Sequential Write: bw = 85.32 MB/s, iops = 2666	- Random Read: bw = 8.24 MB/s, iops = 1005 - Random Write: bw = 66.10 MB/s, iops = 1009 - Random Read and write: - read: bw = 14.80 MB/s, iops = 903 - write: bw = 1.65 MB/s, iops = 102 Sequential Read: bw = 10.60 MB/s, iops = 1322 Sequential Write: bw = 59.60 MB/s, iops = 1818
	€ 1.14 / \$ 1.28	€ 8.82 / \$ 9.89	€ 2.30 / \$ 2.58

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