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IT Workforce Enablement – How Cloud Computing Changes the Competence Mix of the IT Workforce

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***Abstract*—**Cloud computing has provided the impetus for change in the demand, sourcing, and consumption of IT-enabled services. The technology developed from an emerging trend towards a 'must-have'. Many organizations harnessed on the quick-wins of cloud computing within the last five years but nowadays reach a plateau when it comes to sustainable savings and performance. This study aims to investigate what is needed from an organizational perspective to make cloud computing a sustainable success. The study was carried out in Germany among senior IT professionals, both in management and delivery positions. Our research shows that IT executives must be prepared to realign their IT workforce to sustain the advantage of cloud computing for today and the near future. While new roles will undoubtedly emerge, roles alone cannot ensure the success of cloud deployments. What is needed is a change in the IT workforce's business behaviour, or put more simply, the ways in which the IT personnel works. It gives clear guidance on which dimensions of an employees' working behaviour need to be adapted. The practical implications are drawn from a series of semi-structured interviews, resulting in a high-level workforce enablement plan. Lastly, it elaborates on tools and gives clear guidance on which pitfalls might arise along the proposed workforce enablement process.

***Keywords*—**Cloud Computing, Organization Design, Organizational Change, Workforce Enablement.

I. Introduction

IT has been over five years since cloud computing has arrived in the market and successfully been started to be deployed in companies. This is long enough that it is safe to say it is no longer an 'emerging trend'. Pilot projects have proven how the consumption of cloud services provides businesses a distinct competitive edge. Cloud computing has changed the entire rules of the game [1]. Lines between business and technology blur [2], [3]. IT becomes a commodity that business can tap into anytime anywhere – without necessary help from an internal IT organization as described by Nicolas Carr in his evergreen bestseller 'IT doesn't matter' [4]. Additionally, more and more business departments see themselves as the new owner of the IT agenda. Marketing owns the digital strategy, group strategy owns the information strategy and finance determines the landscape of analytic tools – only to mention three players within organization. [5]

In conjunction with these trends go the macroeconomic trends that shape a world where everyone connects with everyone [6]. This leads to a complex environment in which business constantly demands IT to be the simplifier that connects all dots and makes relationships transparent instantly, if wanted [7]. All these requirements can be summarized in the need of IT's anticipation of behavioural patterns that have changed in the way consumers interact in their daily life with technology [8]–[10]. This phenomena is even strengthened by the changing role of IT organizations; transferring from a 'service supporter', delivering IT services, towards a 'service provisioner', steering external providers that deliver IT services[11].

Unfortunately, many companies fail to anticipate those changing behavioural patterns, especially in the space of cloud computing. That missing anticipation either results in a missing realization of the technology's full potential or makes them fall flat after harvesting the quick-wins. The reason behind is that IT departments do the operational type of work (deploy and manage) of the new technologies very well but the responsible executives often fail to enable their organization's workforce appropriately for adoption of the changing behavioural patterns.

That being said, this paper sheds light on the situation many companies are facing that has successfully deployed cloud computing services but cannot tap into the full potential of the technology. It argues based on qualitative research results that sustainable cloud computing deployments are driven by a coherent workforce enablement.

II. Shortfalls after Cloud Computing Deployments

A cloud vendor with a top-notch sales pitch can get a lot of attention from business and IT executives. It is no secret that several adjustments are required along a transition towards a cloud service consumption. Nevertheless, some of these adjustments are well-known, others are very seldom present. Executives tend to focus on 'hard adjustments' like security risks, economical effects, legal aspects, and technological topics such as computing capacity, flexibility and scalability [12]. But this is not the entire scope that executives need to focus on. A successful cloud service consumption has to be facilitated by 'soft adjustments' [13]. To make it specific, many companies neglect to analyse how the internal IT organization must be adjusted to ensure that the expected outcomes are sustainable. Our study shows that missing workforce enablement is the number one reason why corporations fail to achieve the prospected bottom line effect, even after several years of cloud service consumption.

The central question is 'how the IT organization needs to be enabled in order to ensure that the consumption of cloud services is a sustainable success'. New technologies come

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along with new requirements for employees. While a pure technological transformation might be feasible more rapidly, a successful people and culture transformation imposes more difficulties. People have got to change the way they think and behave. This is especially true when the IT organization moves from a pure IT operator to an IT broker – meaning that the main tasks of the IT organization change from delivery orientated towards controlling and steering of the delivery [11]. This transformation places a need for change on the overall IT organization and its workforce.

Our study has shown us that there are generally three organizational shortfalls while consuming cloud services. Often these shortfalls stand in the way while implementing a successful cloud service consumption; regardless whether the transition is to Software as a Service (SaaS), Infrastructure as a Services (IaaS) or Platform as a Service (PaaS).

Shortfall 1: Business Lack of IT Savvy and Vice Versa Results in Poor Decision Making

More and more direct interaction between 3rd party cloud service provider and the business takes place. Internal IT organizations need to be business savvy to be a viable alternative to those 3rd party providers. The IT personal needs to understand the industry trends that benefit the most to the business without getting too much into details. 'IT personnel must learn to interact with users to identify information needs without mentioning the latest technical enhancement.' [14] A lack of that up-to-date information on the IT site becomes more and more visible aligned with less buy-in for internal technology constraints on the business site [15]. A good balance of industry competences on the IT side and less silo thinking on the business side helps to avoid poor decisions making.

Shortfall 2: Unclear Responsibilities Result in Decreased Business User Satisfaction

Unclear task responsibilities are generally considered an overarching challenge especially within the outsourcing business. External cloud computing consumption intensifies the challenge as services are mostly consumed from a range of different vendors (complexity is mostly driven by SaaS solutions). Existing research shows that clear responsibilities between the IT organization, business departments and the 3rd party cloud vendor need to be clearly defined [16]. Good communication competencies are key to proactively clarify unclear responsibilities and therefore drive ultimate business user satisfaction.

Shortfall 3: Missing Skill Enhancements Neutralize Cost Savings

Five years from now there was no clear understanding that skillsets need to change when moving towards cloud service consumption. Today this has been accepted by most IT and business executives. Nevertheless, our study shows that the right enablement plans are missing that help the IT workforce to gain the required skills. It is of most importance that clear enablement plans are implemented which secure the forecasted cost savings and increased revenue streams that the business expects from the cloud service consumptions.

Many cloud computing deployments fail to deliver sustainable success when the three shortfalls are not mitigated properly. The problem is further compounded when the people expected to manage the cloud services on a daily basis are poorly informed about their new responsibilities.

III. Background to the Study

This is an exploratory study which used a semi-structured interview questionnaire to explore IT professionals' recommendations on the organizational implications of cloud computing. Cloud computing was selected as it is the most established technology trend in comparison to other trends like analytics, social media or mobile computing [17]. The research study was divided into *two sections*.

The *first section* identified which element of an organizational role (obligations, beliefs, norms and [working] behaviour [18]) is considered the predominant one in case of the changes that come with cloud computing. The *second section* focused on which functions in a generic IT organization face the strongest change in regards to the identified element.

Literature review and literature integration were used to structure the two sections. These were then used to run the semi-structured interviews with the group of selected senior IT professionals. The semi-structured interview approach was chosen as it is well suited for the exploration of the perceptions and opinions of respondents regarding complex and sometimes sensitive issues and enables probing for more information and clarification of answers along the interviews [19]. It furthermore allows understanding the reasoning behind the answers and how personal experiences are integrated into those answers. Another benefit is that explicit working situations of each of the experts have been recorded and used to describe practical implications for practitioners.

The *second section* drew on a generic IT organization framework to get a holistic view on all organizational areas that a generic IT organization provides to its customers. Each interviewee was asked to distribute 100% along the identified role dimension for each function before cloud computing was introduced to the market and after its introduction. It was purposely left to the interviewee what s/he considers to be before and after the introduction of cloud computing to avoid being biased by specific timeframes or guidelines. All results were then evaluated and the standard deviation was calculated for each function before and after the introduction of cloud computing, to neutralize research defects. The strongest five standard deviations were selected as the major functions that face a need for change. Each function was then evaluated based on the comments along the semi-structured interviews.

IV. Findings of Section 1

In scenarios such as those presented in paragraph II, the implementation of new roles is frequently offered as a solution. These roles usually come with a detailed description of accompanying responsibilities, so IT executives will often

attempt to save time and money by assigning them to workers with similar descriptions that already exist within the company [20].

Decision makers may believe that detailed role descriptions automatically lead to skill enhancements within the workforce. Because this is seldom the case, simple reassignment can be as ineffective as applying a bandage to a wound in need of surgical staples. Redistribution of duties is no guarantee that they will be given to individuals with the skills required to carry them out, and does not ensure that everyone has an equal ability to complete every task. Additionally, only 53% of workers worldwide report that their company takes the time to record and catalogue all of their skills [21] which leads to a practical problem that executives simply don't know to whom to assign the new roles.

While role descriptions are a frame that determines the obligations, beliefs, norms and [working] behaviour [18], the findings of our study show that 'working behaviour' is the key element that shapes success in the area of cloud service consumption. Working behaviour has a significant impact when a business makes a transition towards cloud service consumption in order to realize its strategic aims. The interviews showed that employees have to have a different mix of behavioural competencies to handle working situations that differ from the once they are used to. The practitioners support the fact that it is of high importance that employees use the right mix of behavioural competencies to deal with the changing type of work. Behaviour has been defined in different ways. Some authors state that behaviour is the way someone interacts in a given situation [22] others highlight different aspects of behaviour e.g. task related behaviour [23]. This paper defines behaviour as the way someone acts either proactively, or in response to a particular situation or stimulus.

Looking at the different definitions of behaviour, three competencies have been selected as the basis for any behaviour apart from an individual's attitude and the culture with which a person grew up. When these competencies have the right impact on someone's behaviour they significantly increase the probability of a sustainable use of any cloud service deployment, as employees can better deal with the changing requirements.

Industry competence– How deep is an employee's knowledge within the industry, and how well is an employee informed about new trends or innovations? Furthermore, how well is he connected within the industry?

Methodological competence – What are the technical and procedural capabilities that help employees to manage their responsibilities? How much do they engage in capability development?

Communication competence – How do employees communicate and act within the ecosystem? How do they articulate their needs and achievements?

V. Findings of Section 2

18 organizational areas have been selected from a standard IT organization model. Of these, five have been identified during our study as the ones with the strongest need for change when introducing cloud service deployments. These findings are the result of the second section of the study. The study results indicate a general trend away from methodical competence toward greater industry competence and communication competence. Fig. 1 explains how the research results are illustrated. Table I illustrates the five functions and summarizes the expert's recommendation of how these organizational areas should be re-aligned in order to become drivers of sustainable success within an effective IT organization.

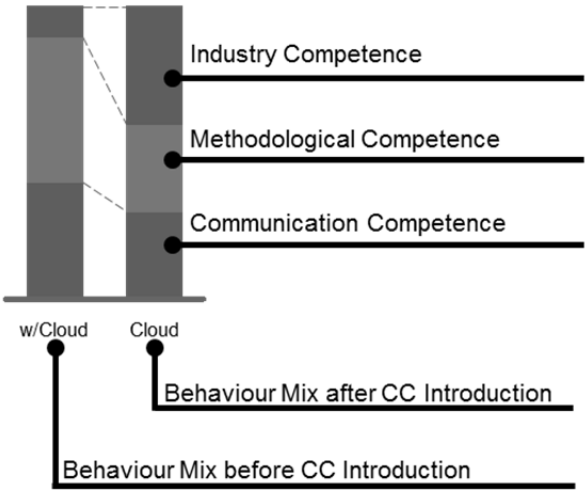


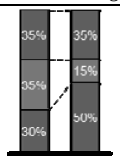
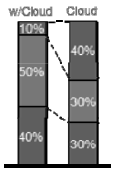
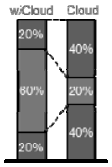
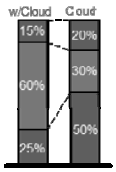
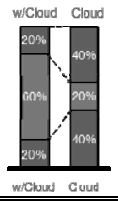
Fig. 1 Research Result Legend

VI. Discussion

It executives may not anticipate having to elicit changes in employee behaviour for the simple reason that they may be unsure of how to do so. Social norms cause the most people to feel that attempting to change another person's behaviour may be considered unethical. However, when the workplace is concerned, this should not be a cause for concern as it does not suggest the attempt to elicit mental change within an individual. What it does involve is changing the ways in which someone applies their particular competencies and knowledge so these can be used most effectively. A comprehensive workforce enablement plan can help organizations to put behavioural changes in perspective and help to determine the most effective way to implement them.

While many executives might consider training as the primary tool to be used by an employer to adjust workplace actions in accordance with new requirements, the interviews have shown that training alone does little to help adjust targeted behaviours. For this reason, it is recommended to use coaching as the primary tool in the workforce enablement process. Effective coaching should manifest itself in two basic ways: as (external) "coaching" and (internal) "work-shadowing." It can furthermore be helpful to employ the services of an organizational change manager to facilitate a smooth and organized enablement.

TABLE I
ORGANIZATIONAL NEED FOR CHANGE

Organizational Area	Purpose	Need for Change	Reasoning
Business Relationship	Identify and harness IT demand from business stakeholders		▪ High business consulting demand shifts focus toward communication capabilities ▪ Industry competence and communication competence become the pure focus competencies
Architecture and Information Management	▪ Develop architectural direction for IT's technology portfolio ▪ Define target state blueprints for business applications and technology architecture		▪ Industry competence becomes a major driver of business process innovation ▪ Methodological and communication competence help to convey innovation messages to the business and within the IT organization
Service Integration	Integrate all services and measure performance against underlying contracts		▪ Communication competence drives relationship building between the IT organization and cloud providers ▪ Industry competence is highly relevant to understanding the "big picture" when it comes to new trends and their impact on the infrastructure & application landscape as well as on business processes
IT Finance Management	Ensure business users are billed for services provided to them according to agreed terms and conditions		▪ Methodological competence becomes less important as the work moves away from a deep analytical focus towards strong interactions with different stakeholders in which communication is key ▪ Industry competence requirements increase as the understanding of cloud-related invoicing mechanisms becomes more relevant
Security & Risk Management	▪ Define a formal set of processes by which the organization can identify security concerns or gaps ▪ Develop remedial actions to ensure the security of operations		▪ Industry competence becomes key as the organizational area security and risk moves from rather technical competencies to industry know-how ▪ Due to required market understanding, strong communication competence to network within the industry are critical

External coaching involves the use of trainers who are hired from outside the organization to analyse an employee's current behaviours, and then pair them with behaviours that will be required of the individual in the future. Any gaps between the two can be used to develop personalized coaching plans. These plans should be shared with trainees in order to help facilitate development of the behaviours they will need to adopt in order to fulfil their changing responsibilities.

To put the information obtained to use, it can be helpful to pair an employee with a mentor from which they can gain additional skills and gain a broader perspective about the organization as a whole. Adopting a teach-the-teacher approach is another way in which individuals can solidify their own expertise while obtaining additional skills [24]. Instructing others provides experience in areas including presentation and facilitation which can prove useful in future endeavours.

Work-shadowing is a method generally used with employees who are used to working with external providers, and who have been trained in industry specific concepts [24]. This approach allows individuals to observe jobs first-hand in order to learn new skills and obtain a broader understanding of the organization as a whole. These employees may later be used as role models for future employees to observe and learn new behaviours from. Placing high-performing workers in leadership roles can also be an effective way to shape behaviour by rewarding performance [20].

Taking all of the above mentioned tools in place, leads towards a four-step workforce enablement plan. These four steps allow for a streamlined behaviour adjustments to provide the basis for sustainable success of any cloud computing deployment.

1) Understand required behaviours – What is necessary for the organization to perform properly?
2) Conduct behaviour gap analysis – What gaps exist in required behaviours?
3) Develop individual coaching plans –What coaching approach is necessary for behavioural change?
4) Execute individual coaching plans – What needs to be done in which order?

VII. PITFALLS

Even the best workforce enablement plan does not completely prevent "value leakage". Value leakage refers to certain aspects that minimize the overall value along the enablement process. Table II provides details about respective sources of leakage and the recommended preventative actions. It is broken down to each of the four steps introduced in the

former paragraph.

It is very much recommended by every practitioner to control those aspects along the workforce enablement process to allow for an early warning and respective mitigation strategies.

TABLE II
VALUE LEAKAGES AND PREVENTION ACTIVITIES

Step	Sources of Leakage	Prevention
1. Understand required behaviour	▪ Insufficient understanding of target cloud computing strategy ▪ Poorly-defined responsibilities	▪ Clear scoping of future cloud services ▪ Understand cloud computing vendor's responsibilities
2. Conduct behaviour gap analysis	▪ Inexplicit baseline ▪ Missing change management	▪ Supervisory-led baseline data collection ▪ Proactive communication
3. Develop individual coaching plans	▪ Generic (rather than individualized) training content ▪ Budget constraints	▪ Ensure individual involvement ▪ Develop plans first (define budget later)
4. Execute individual coaching plans	▪ No handover from planning to execution stage ▪ Lack of ownership	▪ Establish transition roles between planning and execution ▪ Clear role assignments

VIII. CONCLUSION

This paper has presented the latest thinking about workforce enablement strategies in times where cloud computing consumptions have been moved from an emerging trend to an unavoidable opportunity. The findings based on the study give information on how to build a sustainable cloud service consumption into an IT organization. It provides clear advices and insights of how an IT organization can sustainably achieve cloud-computing outcomes such as cost reduction, elasticity/scalability, speed to market and increased agility by making the right organizational adjustments.

It therefore prevents executives from consuming cloud computing services too fast without deliberate consideration of all required adjustments. Instead of simply aiming at 'quick-wins' with a lack of sustainable effects the recommendations ensure that IT organizations are aware that having an effective workforce enablement plan is a key necessity to ensure a sustainable success. Still, it is advisable to pay close attention to value leakages that detract from successful workforce enablement plans.

The key message is that the behaviour of the existing IT workforce need to be adjusted to meet the new challenges. Furthermore, it needs to be elaborated that adjusting people's behaviour is the most important aspect when introducing new roles. When looking at the necessary behaviour in the cloud computing environment, the paper has highlighted a strong shift away from methodical capabilities towards greater industry knowledge and communication capabilities. It is recommended to introduce the required behaviour changes not through sole training but a consistent coaching approach with a mix of external coaching and internal work-shadowing plans, which is embedded in an overall workforce enablement plan.

Keeping in mind that the adoption of cloud computing is not about a pure technological adoption, but a successful people and culture transformation, it is recommended to be prepared for adopting the entire organization towards the 'new normal'[3] – a world where cloud computing consumption is the normal way to deploy IT services.

IX. LIMITATIONS

The limitation of the paper is that it has asked a small range of experienced organization design practitioners. Future research should cast a wider net of experts, considering not only perceptions of one group but also other IT and business executives. To allow for a statistically proven approach this should be a representative sample of a larger executive population. Additionally, it is recommended to increase the scope of research in both directions – more than just cloud computing but rather all digital trends and not only roles but all aspects of an organization. This can be done through the use of one of the standardized organization design framework [25]–[28].

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