

# *Cloud-Based Personal Knowledge Management as a service (PKMaaS)*

Eric Tsui  
Department of Industrial and  
Systems Engineering  
The Hong Kong Polytechnic  
University  
[eric.tsui@polyu.edu.hk](mailto:eric.tsui@polyu.edu.hk)

Rickey K.F. Cheong  
UBS AG.  
[Rcheong852@gmail.com](mailto:Rcheong852@gmail.com)

Farzad Sabetzadeh  
Department of Industrial and  
Systems engineering  
The Hong Kong Polytechnic  
University  
[farzad.sabetzadeh@polyu.edu.hk](mailto:farzad.sabetzadeh@polyu.edu.hk)

## Abstract

This study tries to give a different perspective of the cloud application through a personal knowledge management perspective and its structure in the cloud computing environment. In recent years, there has been a great hype about cloud computing and different books and literature reviews have classified different types of cloud with various definitions and criteria focusing on mainly three different layers of services being infrastructure, platform and software. Instead, this paper provides a meta-observation over an integrated cloud ecosystem through the knowledge window through which a deeper insight into how the cloud, as an ecosystem, provides services that are not feasible in many conventional knowledge management approaches. Adopting a top-down approach, this study tries to illustrate the implications of the cloud at the personal levels from a knowledge-oriented perspective.

**Keywords :** Cloud, PKM, Collaboration

## 1. Introduction

In the last 5 years, cloud computing has emerged from, among others, outsourcing and managed services, to become an increasingly popular and viable business concept in the IT and other industries. Cloud Computing is not a new computational paradigm; in fact, quite the contrary, cloud computing represents new business models for sourcing, composing, and delivering IT and business services with flexibility and scalability. Up till now, much of the focus of the cloud, as represented by the business literature and a handful of academic publications, is on the provision of infrastructure (aka Infrastructure-as-a-Service), software platforms (aka Platform-as-a-Service), and software applications (aka Software-as-a-Service), together with the commonly perceived issues and hurdles for organizations that contemplate of switching to the cloud. Such issues and challenges include, but not limited to, multi-vendor management, decision for private, public or hybrid clouds, standards, security, data migration, data privacy and regulatory

compliance, and cloud exit strategies. While there are obvious and compelling needs for these issues and challenges to be resolved before there is a massive uptake of the cloud worldwide, the much anticipated value-add brought about by the cloud especially in terms of harboring and harnessing knowledge, fostering extensive and ad hoc collaborations, and leveraging on various tools for individual and group learning purposes have been under-explored [4]. The idea of the Cloud-Based Personal Knowledge Management (CBPKM) is kind of Knowledge-as-a-Service (KaaS) model offering a good reason for individuals to subscribe the cloud computing service. This paper provides an insight about this new service layer in the cloud environment and how the cloud can support personal and group knowledge management by collaborative tackling of information overload.

## 2. CLOUD COMPUTING AND THE SERVICE MODEL

Cloud Computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services [1]. Current research and prevailing discussions on the cloud focus principally at the operational level but indeed there is much to gain in exploring how, for example, knowledge cloud can add value to the DIKW(Data-Information-Knowledge-Wisdom) hierarchy. These aspects in the cloud superiority manifest in new found knowledge, new ways of fostering collaborations and new learning paradigms.

### 2.1 Characteristics of Cloud Computing

Malcolm [11] defined 5 characteristics of cloud computing as below:

1. Dynamic computing infrastructure

2. IT service-centric approach
3. Self-service based usage model
4. Minimally or self-managed platform
5. Consumption-based billing

From Malcolm's [11] viewpoints, the service model for cloud computing requires standardized, scalable, and secure physical infrastructure which leveraged on the virtualization technology. This dynamic computing infrastructure is a critical factor to offer effective support to the elastic nature of service provisioning and de-provisioning and while maintaining high level of reliability and security. Besides, the usage model also provide compelling business values to the cloud users e.g. savings on capital equipment, reduced support cost, and significantly increased business agility.

Apart from Malcolm, others authors also mentioned the same benefits for the cloud users, e.g. Armbrust et al [1] mentioned that cloud computing is eliminating the up-front commitment by cloud users and pay for use of computing resource on a short-term basis as needed; Hofmann and Woods [7] mentioned that cloud computing removes the infrastructures and capital expense as a barrier to entry and allows startups to scale up cheaply and rapidly; Ryan and Leoffler [14] argued that the basic point of cloud computing is to avoid acquiring and maintaining computer equipment and software, increasing the ease-of-use and flexibility of the benefit offered by the technology.

### 3. PERSONAL KNOWLEDGE MANAGEMENT

The idea of the cloud based personal knowledge management platform is leveraging the benefits of cloud computing to interconnect individuals together to better manage and share their knowledge. It is not a single application but a collection of tools running in the cloud.

#### 3.1 What is personal knowledge management?

Several scholars have articulated what is personal knowledge management e.g. Frand and Hixon [5], Avery et al. [1], Higgison [6], Jefferson [10], Volkel and Abecker [15], Martin [12] and Harold Jarcho [8]. The followings are the extracts of the related literature by different scholars which provides insight of the definition and nature of personal knowledge management.

(1) Frand and Hixon [5]  
Personal Knowledge Management is a system designed by individuals for their own personal use [5]

and *"it is a conceptual framework to organise and integrate information that we, as individuals, feel is important so that it becomes part of our personal knowledge base. It provides a strategy for transforming what might be random pieces of information into something that can be systematically applied and that expands our personal knowledge."*

(2) Avery et al. [1]  
Avery et al.[1] argued that *"PKM assumes that individuals have developed a self-awareness of their limits and abilities, i.e. what they know and what they can do. This personal self-awareness is an understanding of how much they know, how to access the things they know, strategies for acquiring new knowledge and strategies for accessing new information as needed. In the vast amount of information available and many means for acquiring new information, individuals have each mapped out their own areas of expertise and their own methods for additional learning."*

(3) Higgison [6]  
Higgison [6] defined personal knowledge management as *"managing and supporting personal knowledge and information so that it is accessible, meaningful and valuable to the individual; maintaining networks, contacts and communities; making life easier and more enjoyable, and exploiting personal capital"*

(4) Jefferson [10]  
Jefferson [10] argued that *"PKM is focused on bottom up approach, with an individual perspective to KM. The goal is to allow individuals to choose what information to collect, how to structure it, and who to share it with. Individuals need to be able to manage their own information so that is meaningful, accessible when it needed, can be easily exploited. PKM allows workers to organise both digital and paper content in such a way to allow them to make sense of the deluge they are continually exposed to."*

(5) Volkel and Abecker [15]  
Volkel and Abecker [15] termed *"Personal Knowledge Management to denote the process of the individuals to manage knowledge"* and *"PKM deals with embrained, embodied and encoded knowledge i.e. mostly with personal, self-authored artefacts."*

(6) Jerome Martin [12]  
Martin (2008) argued that *"PKM is knowing what knowledge we have and how we can organise it, mobilise it and use it to accomplish our goal, and how we can continue to create knowledge."*

(7) Harold Jarche [8]

Jarche [8] mentioned that “PKM is an individual, disciplined process by which we make sense of information, observations and ideas. In the past it may have been keeping a journal, writing letters or having conversations. These are still valid, but with digital media we can add context by categorising, commenting or even remixing it. We can also store digital media for easy retrieval”

Irrespective of how personal knowledge management is defined by different scholars, Cheong and Tsui [3] argued that the key purpose of personal knowledge management is to provide a framework for individuals to manage new information, integrate it and enrich each individual knowledge database in an effective manner; doing this successfully will empower each individual to easily apply their own personal knowledge to deal with new and old problems, to learn from new experience and to create new knowledge; and it is a continuous and interactive process which is not independent of other knowledge management.

A PKM model is developed by Cheong & Tsui [3] based on the literature review and also the results of a global survey about the roles and values of the PKM. There are four core components in this model, namely Personal Information Management (PIM), Personal Knowledge Internalisation (PKI), Personal Wisdom Creation (PCW) and Inter-Personal Knowledge Transferring (IKT). The interaction action of the components is illustrated in Fig. 1 and Fig. 2 which illustrate the required skill/competence, the layer of the DIKW transformation, the inherent knowledge conversion and the involved KM process.

PKM 2.0 Components	Personal Information Management (PIM)			Personal Knowledge Internalisation (PKI)			Personal Wisdom Creation (PWC)			Inter-Personal Knowledge Transferring (IKT)		
	Skill / Competence	Retrieving	Evaluating	Organising	Analysis	Learning / Self Development	Reflection	Problem Solving	Creativity	Mental Agility	Securing	Presenting & Communication
DIKW Transformation Layer	Data			Information			Knowledge			Information / Knowledge		
	↔			↔			↔			↔		
Knowledge Conversion	Information			Knowledge			Wisdom			Information / Knowledge		
	Explicit			Explicit			Tacit			Explicit / Tacit		
KM Process	↔			→			↔			↔		
	Explicit Capture / Locate			Tacit Create			Tacit/Explicit Apply			Explicit / Tacit Transfer / Share		

Figure 1 : PKM model – Integrated view

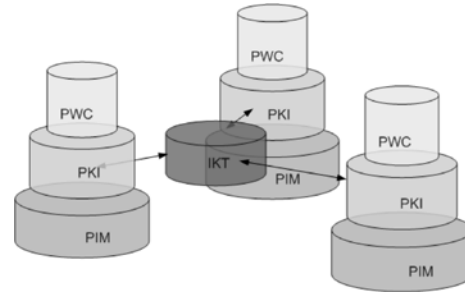


Figure 2 : PKM model

#### 4. CLOUD BASED PERSONAL KNOWLEDGE MANAGEMENT (CBPKM) PLATFORM

PKM requires an environment to facilitate Personal Information Management, Personal Knowledge Internalization, Personal Wisdom Creation and Inter-personal Knowledge Transferring, such environment is known as personal learning environment (PLE). The PLE should be accessible at anytime and anywhere, and independent of the client platform or devices i.e. no matter the user is using mobile phone or Mac or Window desktop...etc. The nature of cloud computing is just perfectly fit for this requirement, all information is processed at cloud not at client end and user can access the service anytime and anywhere when there is a connection to the internet no matter via the mobile network or internet access.

The following features of CBPKM can be viewed as Knowledge-as-a-Service (KaaS) which form a PLE by leveraging the cloud computing benefits e.g. usage model, scalability, sustainability...etc.

##### 4.1 Knowledge-as-a-Service (KaaS)

The idea of the CBPKM tools is to enable the cloud users to better manage the PIM, PKI and IKT of the PKM model described in this paper. The PWC is not included in the CBPKM toolset, as personal wisdom creation is the result of the PIM, PKI and IKT, and also it requires users' effort in real life situation, which is hardly replaced by software tools.

The features of the CBPKM should allow mobility and portability, i.e. the cloud user can access at anytime and anywhere. Besides, the platform should allow cloud users to better manage their personal knowledge, e.g. information retrieving, evaluating and organising. CBPKM should be able to facilitate information analysis, cloud users to learn and develop their knowledge, and reflection of their knowledge.

One of the sample applications in the CBPKM platform is a search engine which provides cloud users to search and retrieve necessary information anytime and anywhere, provided an Internet connection is available no matter it is via the mobile or fixed Internet network.

The challenge for the KaaS provider is that the features of search engine become more sophisticated. More intelligent is required and not just search the textual contexts or locate the relevant portion in an audio and video clip. KaaS should be able to advise the information about the relevancy and the trustworthiness of the searched information, which will enable the users to evaluate if the information is useful and meet their search purpose or not. It should also be able to provide e.g. expert opinions about the searched information, and the cloud user should be able to access the expert for further consultation when necessary as a paid service. KaaS in this case should line up the cloud experts together in different knowledge domains and the revenue would potentially come from the subscription of both the cloud users and cloud experts.

For the information or knowledge organizing, KaaS can provide a cloud-based knowledge repository. It is not just a storage space for the cloud users to keep the information. It should enable the cloud user to internalize their personal knowledge. As such it should be an indexed knowledge repository system to handle both structured and unstructured information, allow pattern matching for lesson-learned, and able to build a narrative repository. This knowledge repository can be a private repository for the cloud users or a public repository available to all subscribers. The scalability of cloud computing does help the service provider to handle e.g. the storage requirement for individual users as the private repository should allow portability which may impact to the service provider to change the storage demand at any time.

In short, CBPKM is a platform of knowledge as a service (KaaS), it is not merely providing an application,

## Conclusion

Due to scalability and ubiquity of the cloud, traditional enterprise applications can now be used by far more users than they were originally anticipated and additional resources can be allocated to support (authorized) computational intensive applications whenever the need arises. These two characteristics have offered new ways of working for knowledge workers operating with cloud-based enterprise applications. These new ways of working often do not just manifest in the change in work style or processes but new found and valuable knowledge can be generated and in some cases fused with enterprise applications thereby realizing the concept of embedding knowledge into business processes.

This paper highlighted a conceptual service of Cloud Computing for Personal Knowledge Management and future research is required. The idea of CBPKM is a Knowledge-as-a-Service platform (KaaS) which is beyond the SaaS. The features of CBPKM described in this paper are just to stimulate the service providers in designing their future KaaS platform which will require in-depth research in the aspects of both technical and commercial.

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