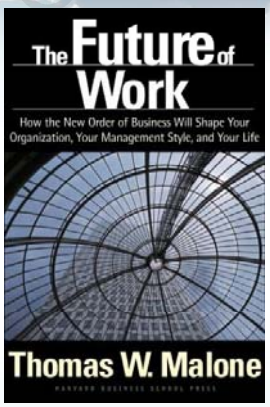
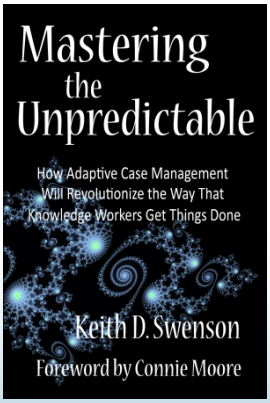
Open Innovation: Opportunities and Collaborations Facilitated By The Cloud

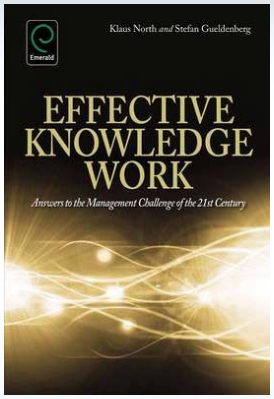
Professor Eric Tsui
Knowledge Management Research Centre
HKPolyU

2011 © Copyrighted. KMRC HKPolyU

Recent books on Knowledge Work







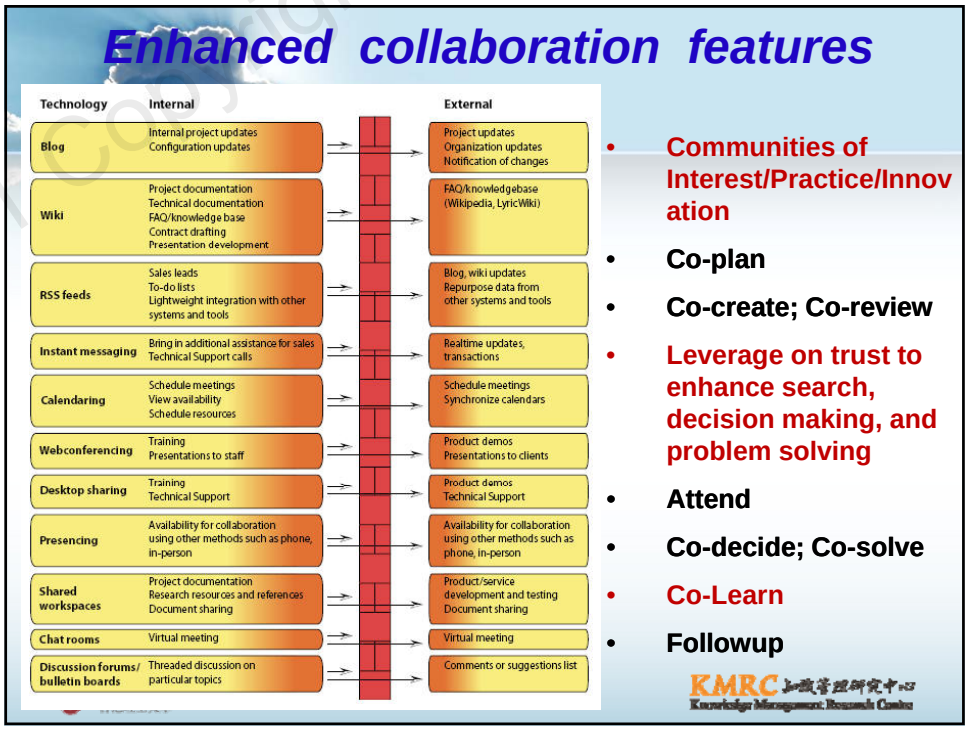
Nature of Knowledge Work

- Increasingly less routine, more analytical and need to be more collaborative
- Highly unstructured, unpredictable, disruptive yet often come with a sense of urgency
- Transitions from a product-dominant to a service-dominant logic
- Requires a different set of metrics for performance measurement
- Not only requires data and information but also knowledge and experience of the individual
- Group/Collaborative task execution, decision making and problem solving
- A huge amount of data and information to deal with
- Often more than one way to solve a problem, collaboration, reflection and a learning environment are crucial

2011 © Copyrighted. KMRC, HKPolyU

Support for performing Knowledge Work

- Automate routine tasks as much as possible
- *Tools to coordinate ad hoc tasks among workers*
- Tools to identify and connect with subject matter champions; codify and share tacit knowledge
- *Tools to discover, aggregate, analyze and visualize document/information/discussion summary, trends, work tasks etc.*
- Leverage on input and preferences from trusted peers
- *Knowledge Repository for keeping core assets*
- Powerful Search mechanisms (proactive, multi-modal, multiple search modes, visualisation,…)
- *Create a Personal and Organizational Learning Environment*
- Personalization (role type, multi-generational workforce, mobile workers, content, tools, networks etc.)



2011 Copyrighted. KMRC, PolyU

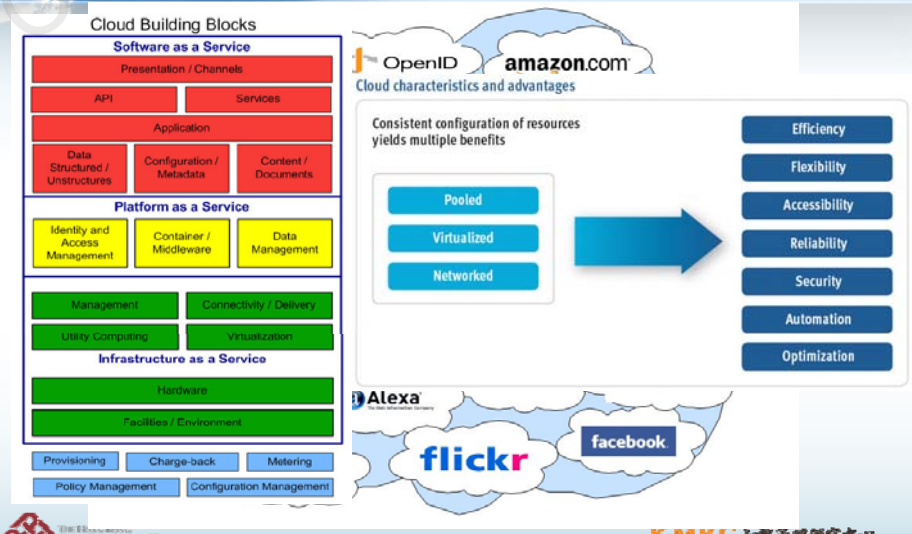
Definition of Cloud Computing

A widely adopted, formal definition comes from the National Institute of Standards and Technology:

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

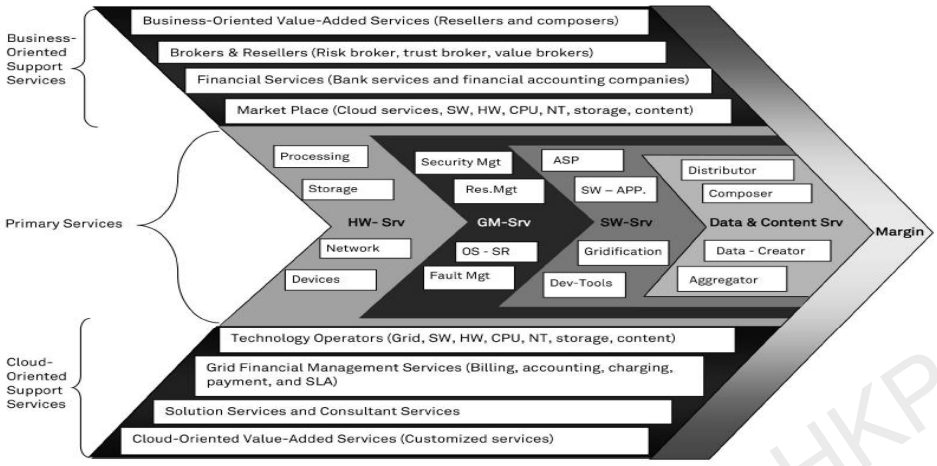
2011©Copyrighted. KMRC, HKPolyU

Cloud building blocks (Oracle) & benefits (EMC)



Cloud Value Chain

(Source: A.B. Mohammed, J. Altmann and J. Hwang (2009); Cloud Computing Value Chains: Understanding businesses & value creation in the chain, Economic Models & Algorithms for Distributed Systems)

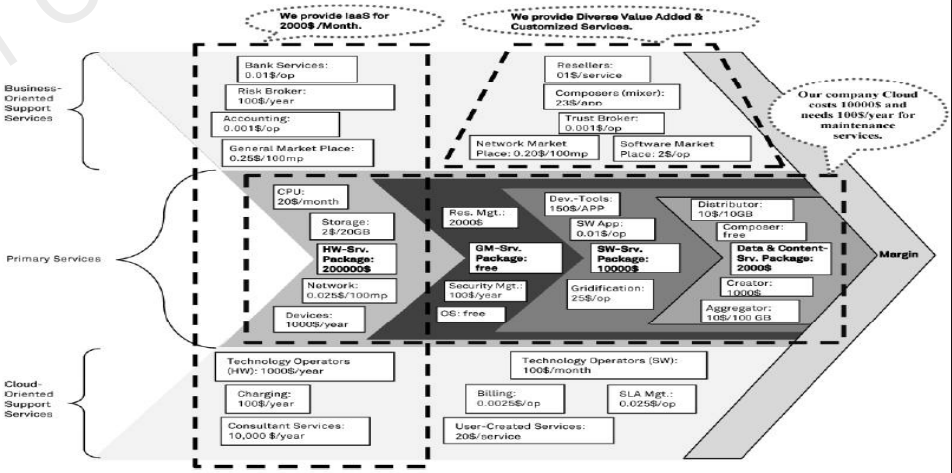


Cloud value chain reference model.

2011 © Copyrighted. KMRC, HKPolyU

Cloud Value Chain (cont.)

(Source: A.B. Mohammed, J. Altmann and J. Hwang (2009); Cloud Computing Value Chains: Understanding businesses & value creation in the chain, Economic Models & Algorithms for Distributed Systems)



Instances of cloud value chains.

Events on Cloud Computing

2011 All rights reserved. KMRC, PolyU

Events on Cloud Computing

Commonly addressed operational & research issues

- Security / Privacy, Data location, compliance, identity management
- Data migration & integration
- Interfacing legacy systems
- Service Level guarantee & legal ambiguity
- Customisation of vendor-specific tools & applications
- Portability of applications across clouds (especially PaaS & SaaS)
- Performance measurement
- Discovery, de-duplication and selection of services & data
- Data Analytics
- Paradigmatic change to OPEX model, work style and workplace
- Cloud exit strategy

2011 © Copyrighted. KMRC, PolyU

Opportunities brought about by the cloud

Aim beyond the primary set of benefits?

Cloud characteristics: OPEX model, Ubiquity, Scalability, Connectivity across platforms, wide range of services, cheap/perpetual storage, accessible by the masses

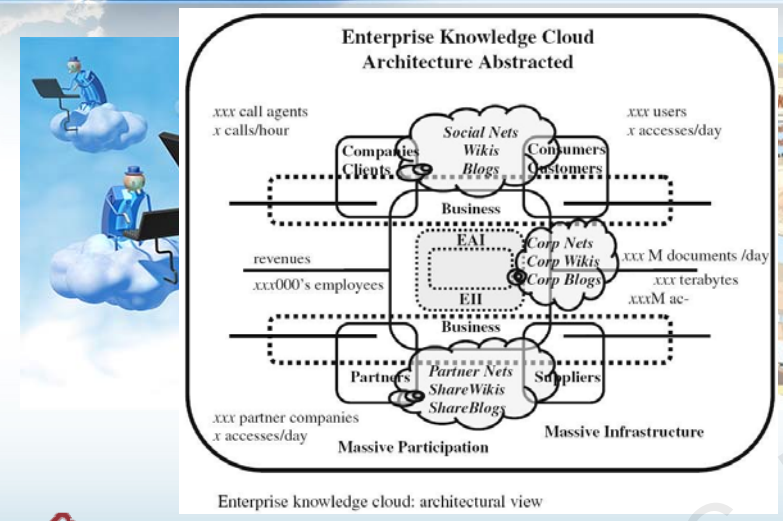
2011©Copyrighted. KMRC, HKPolyU

Immediate & Secondary benefits

- Upgrade management
- Spams and virus threats
- Value-add functions provide by a S-a-a-S &/or P-a-a-S providers
- Integrated data management
- Enterprise Knowledge Cloud

Enterprise Knowledge Cloud

(Source: Delic & Riley, 2010)



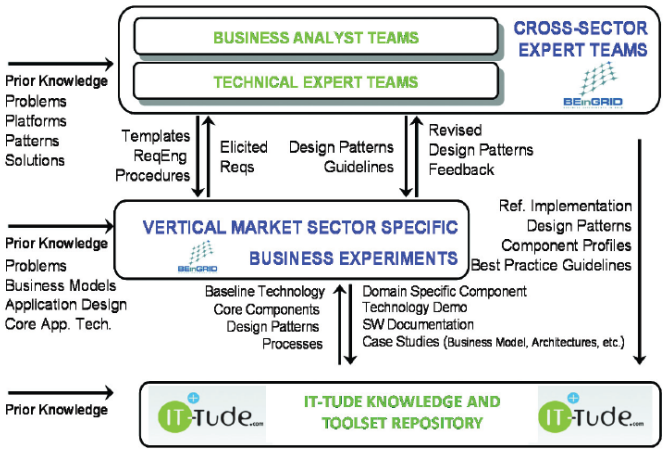
Enterprise knowledge cloud: architectural view

2011 © Copyrighted. KMRC, HKPolyU

Biomedical Knowledge Cloud

(Source: Ken Buetow, National Cancer Institute, USA, 2009.)

IT-Tude project (Source: ERCIM News, October, 2010)



As a consequence, 98 organisations from all across Europe united in what was the FP6's largest Grid project. Grouped into 25 different pilots, each with an end-user, Grid provider and specialist, they focused on the real business problems faced by the end user and built a solution around them. Each was highly autonomous in their solutions: some used GRIA, others Globus, Glite or Unicore. Some were open source, others proprietary. Some were to be delivered as SaaS, others used in-house.

2011 © Copyrighted. KMRC, PolyU

Opportunities brought about by the cloud

Cloud characteristics: OPEX model, Ubiquity, Scalability, Connectivity across platforms, wide range of services, cheap/perpetual storage, accessible by/to the masses

Think Outside The Box
The Cloud is Disruptive

The Cloud as some backend resources

Intelligent Knowledge Cloud with massive data, problem solving skills (processors & human), plus dynamic computational power

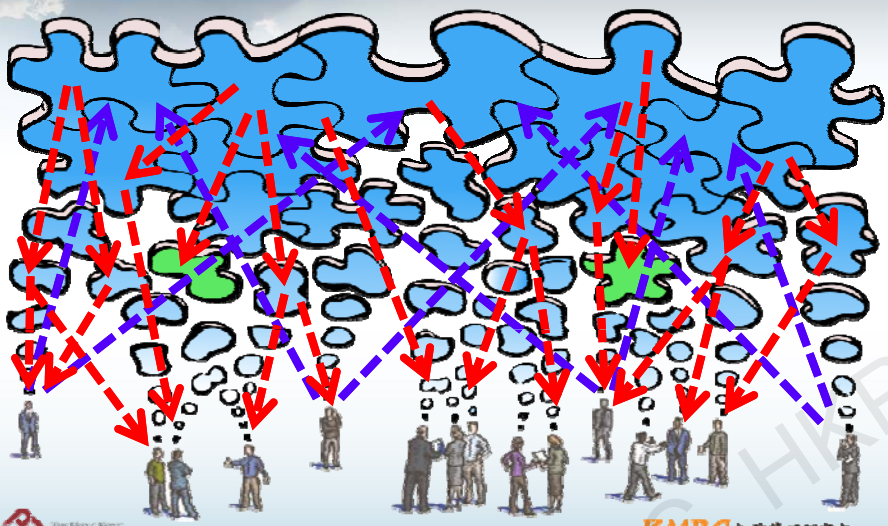
© All rights reserved. KMRC, HKPolyU

Cloud Intelligence

(Sources: Nova Spivack, presenter at The Singularity Summit, 2010 & Tom Koulopoulos, author of The Knowledge Cloud eBook & presenter at ILA 2010)

1. **Collective intelligence**
   - **Crowds -> Groups -> Meta-selves**
2. **Re-factoring**

Cloud Intelligence in action



2011©Copyrighted. KMRC, HKPolyU

Cloud logic defined

The term "cloud logic" refers to logical inference systems that reside at remote servers rather than on client machines. Remote inference systems can distribute logical inference tasks over many cores at remote sites or distribute inference tasks across widely distributed machines and collect the results together to complete a client's query.

(Source: John Fisher, http://www.csupomona.edu/~jrfisher/cs515/cloudlogic.html)

Cloud Intelligence elaborated

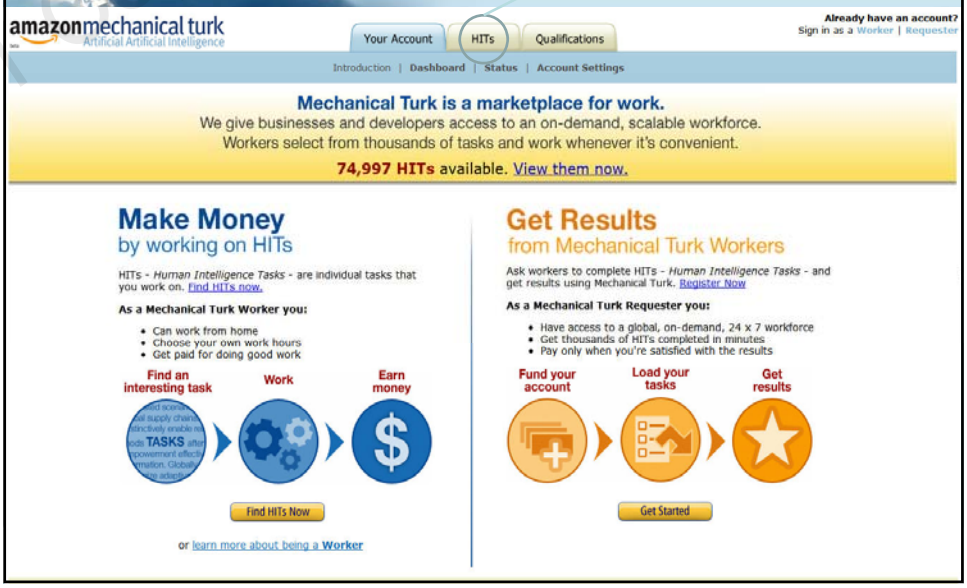
1. Decompose a problem into smaller ones for parallel processing (aka Grid Computing)
2. Discover new knowledge embedded in very large structured and unstructured datasets (aka Big Data)
3. (Re-)Prioritise tasks and resources for high gain areas/applications (at the *algorithmic* and *resource allocation* levels)
4. Intelligent Allocation/Diversion of resources to meet demand
5. Elicit human input based on problem complexity (aka Web 2.0 & "Human-as-a-Service"), individually, group or on a massive scale

Source: www.ibmsystemsmag.com

Polytechnic University 香港理工大学
KMRC 知識管理研究中心 Knowledge Management Research Centre

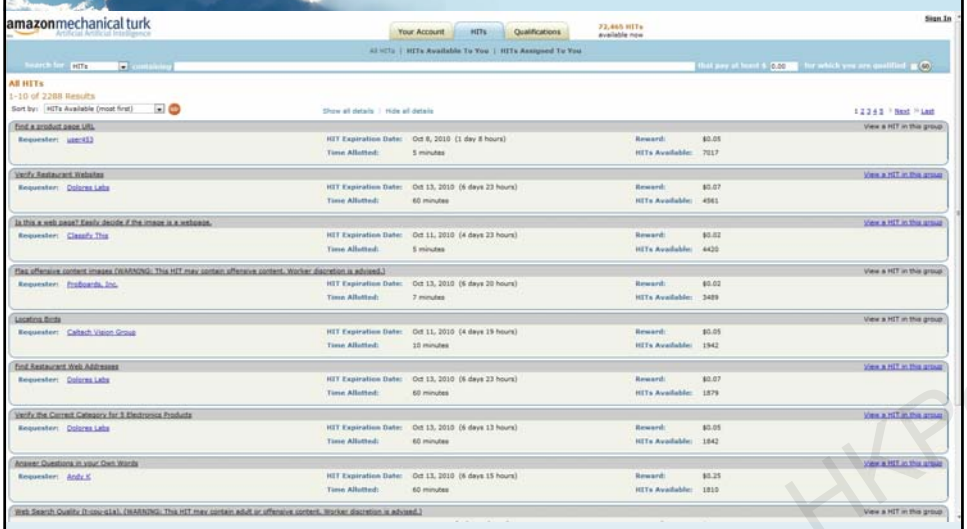
Amazon Mechanical Turk

Human Intelligence Tasks



2011 Copyrighted. KMRC, HK PolyU

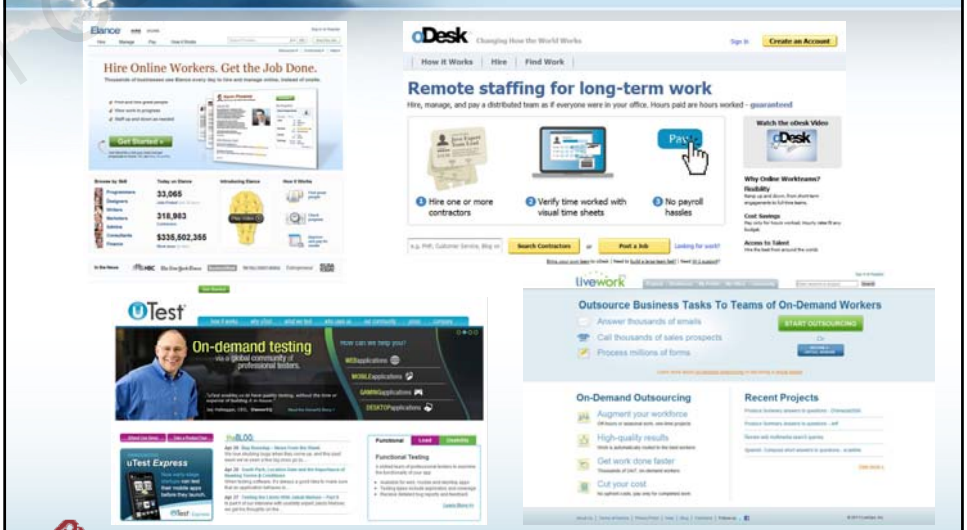
Amazon Mechanical Turk (cont.)



The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

Crowdsourcing in the cloud: Elance, oDesk, uTest & Livework



The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

2011 copyrighted. KMRC, HKPolyU

Knowledge Centres in the Cloud: Kaggle & Quora

The 20 Most Innovative Startups In Tech

Kaggle is a network of 17,000 PhD-level people that help each other solve impossible problems 2/21

Company: Kaggle

Founders: Anthony Goldbloom

Location: San Francisco, CA

Funding: $11 million Series A from Index Ventures, Khosla Ventures, SV Angel, and others

Why it's innovative: NASA, Deloitte, and The University of Michigan have all turned to Kaggle's pool of 17,000 PhD-level scientists to solve complex problems and create winning models.

It uses the collective knowledge of some of the world's smartest people to make vast improvements in the world, from AIDs research to mapping dark matter in outer space.

The 20 Most Innovative Startups In Tech

Quora is a Q&A site that's answered by experts, not idiots 5/21

Company: Quora

Founder: Adam D'Angelo, Charlie Cheever

Location: Palo Alto, CA

Funding: ~ $11 million at $86 million valuation

Why it's innovative: Quora re-imagined Internet search and answers. It created a platform where credible industry experts are happy to respond to the average Joe and share what they've learned.

Quora co-founders Adam D'Angelo (L) and Charlie Cheever (R).

It's the only place on the web where users can get advice from people they admire and respect.

The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

More examples of Knowledge-as-a-Service (KaaS) (Source: Jerry Bishop, 2011)

- www.mob4hire.com
- www.interneteyes.co.uk
- www.clickworker.com
- www.cloudflower.com
- www.microtask.com
- Projects.csail.mit.edu
- www.logodesignguru.com
- www.logomyway.com
- Funsat.eecs.umich.edu
- www.gwap.com
- www.innovationexchange.com
- www.innocentive.com
- www.cloudcrowd.com
- www.1sky.org
- www.sparked.com
- www.samasource.org
- www.crowdvoice.org
- www.kiva.org
- Answers.yahoo.com
- www.quora.com

The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

2011 ©Copyrighted. KMRC, PolyU

Cloud Marketplace: SpotCloud

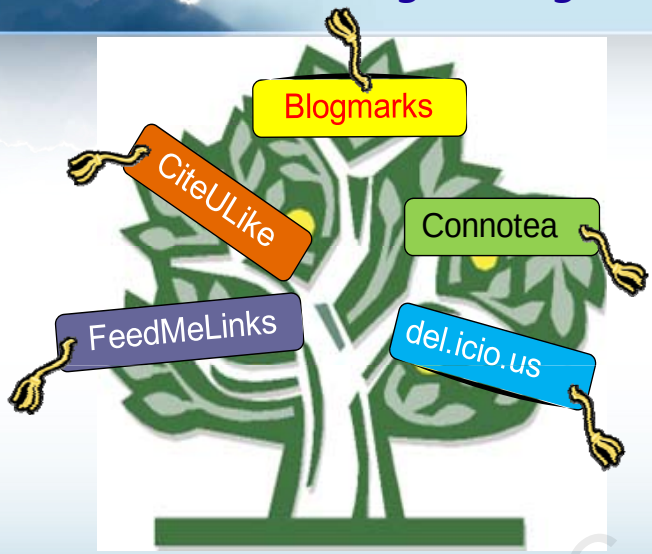
Cloud computing
A market for computing power

2011 © Copyrighted. KMRC, PolyU

Opportunities & impact of CC on

1. Business Process Management
2. Taxonomy building & maintenance
3. E-Discovery on Big Data
4. IT Service Management (ITSM)
5. Personal & Group Learning

Use of Social Bookmarking and Mashups to enhance knowledge navigation

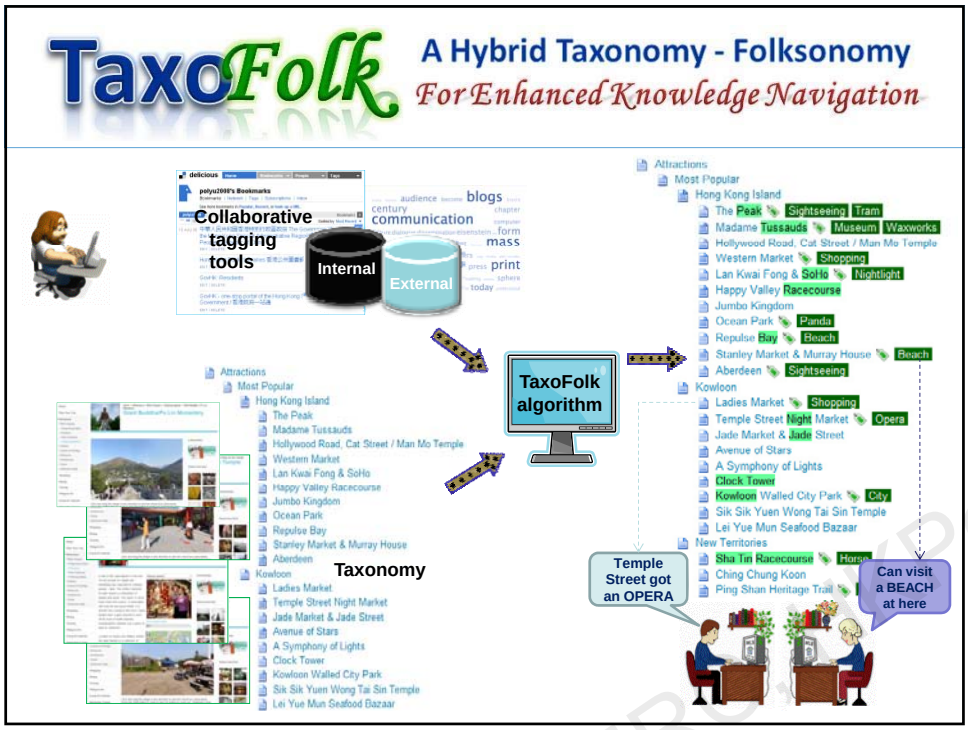


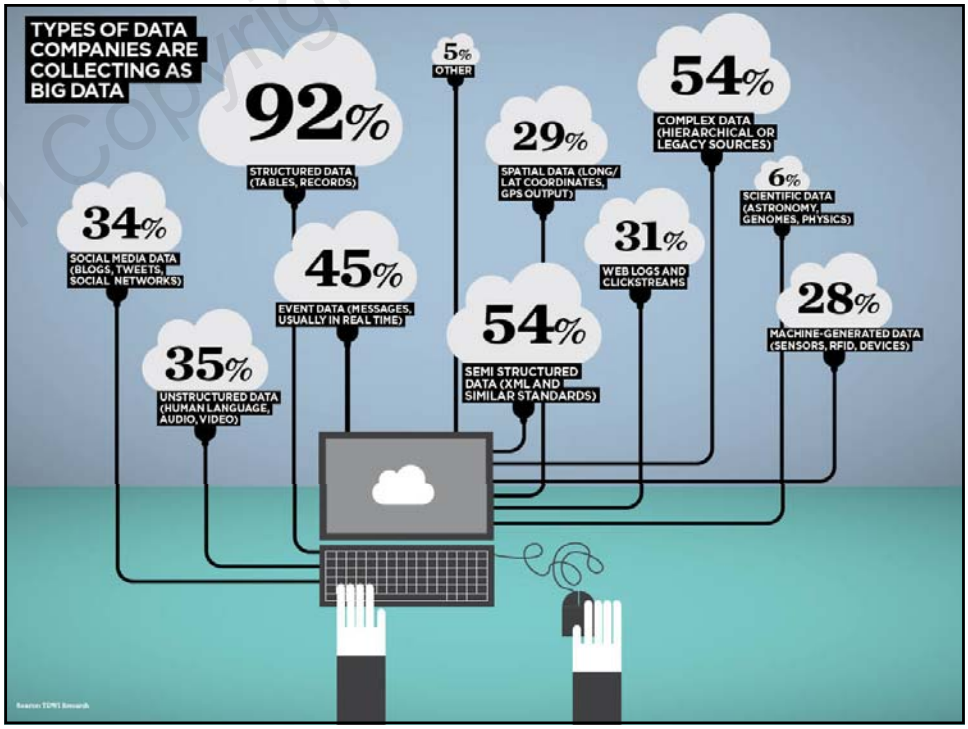
2011 © Copyrighted. KMRC HKPolyU

Taxonomy + Folksonomy

Taxonomy	Folksonomy	Taxonomy Hybrid Models
Central Control	Democratic Creation	Central control with continuous user input
Top-down	Bottom-up	Meet in the middle
Meaning to the author	Meaning to the reader	Cater for the growing community
Tedious process for making changes	Just do it	Suggestions, additions, deletions with governance models
Accurate	Good enough	Community validated and tested
Navigation	Discovery	From navigation to discovery by leveraging mass input
Restrictive	Expansive	Flexible and evolving
Defined Vocabulary	Personal Vocabulary	Community Vocabulary

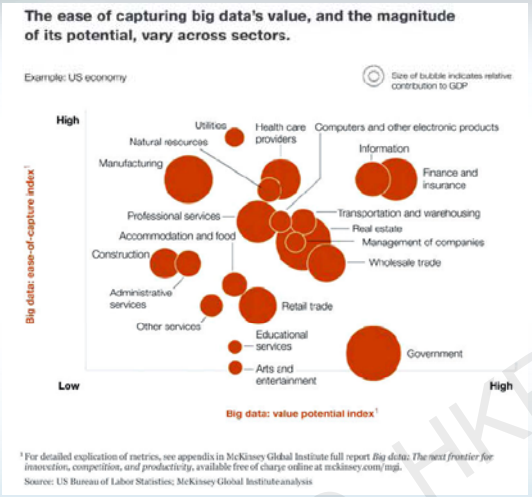
Dow Jones Factiva & Michael Sampson





2011 Copyrighted. KMRC, PolyU

The era of Big Data



The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

Singapore's Smart Traffic Cloud (Source: FutureGov, Dec 2010)

SMART TRAFFIC CLOUD ROAD TESTED

Singapore is trialing a traffic management system that could improve the monitoring of the citystate's roads by using geo-location data captured from drivers' smart phones.

GPS sensors in drivers' smart phones can determine the location, direction of travel and speed of vehicles, and the data, captured in real-time, is hosted on a cloud platform that the Land Transport Authority can use to monitor – and predict – traffic conditions.

"It would be very costly to deploy sensors all over the city. We only have sensors on highways and major roads, so why not make use of GPS sensors in drivers' mobile handsets?" said Dr Lim Hock Beng, Programme Director, Intelligent Systems Centre, Nanyang Technological University, who leads the research team behind the initiative.

The smart traffic cloud platform, a joint effort by LTA, NTU, the Infocomm Development Authority and SingTel, will be available for government and private sector service providers to use the data to develop location-based services.

Singapore has been working in collaboration with the University of Berkley, which is testing the same concept in the San Francisco Bay area.

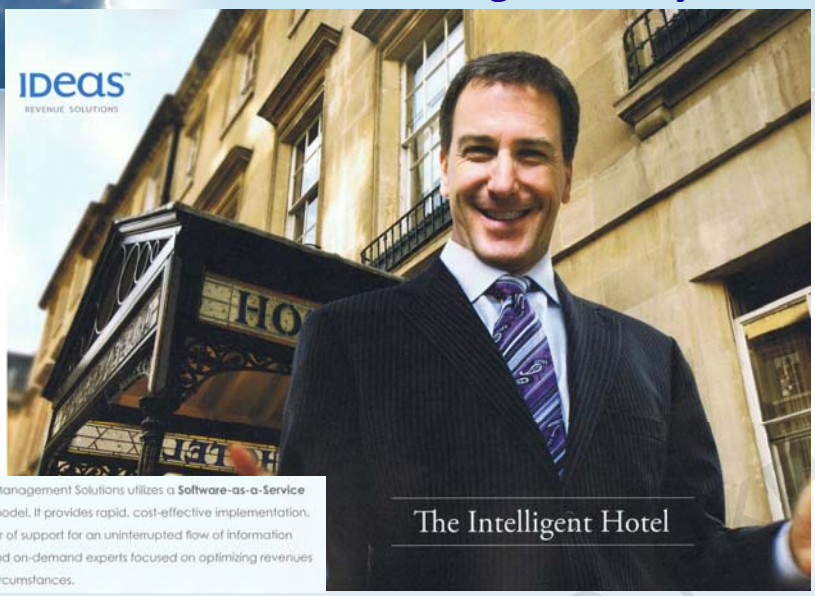
ASIA PACIFIC futureGOV

The Hong Kong Polytechnic University 香港理工大學

KMRC 知識管理研究中心 Knowledge Management Research Centre

2011 © Copyrighted. KMRC, HKPolyU

S-a-a-S: IDEAS Revenue Management System



IDeaS Revenue Management Solutions utilizes a **Software-as-a-Service (SaaS)** business model. It provides rapid, cost-effective implementation, a protective layer of support for an uninterrupted flow of information and decisions, and on-demand experts focused on optimizing revenues in unexpected circumstances.

2011 © Copyrighted. KMRC, PolyU

The Crowd To Cloud Journey

Co-Evolution (MetaWeb)

Co-Creation (e.g Cloud Apps)

Collaboration (e.g. Web 2.0)

Cooperation (e.g Crowdsourcing)

President Hu on China's service innovation

Hu Jintao, President of China, stated at the country's top academic conference in June, 2010, "*The rapid development of Internet, cloud computing, Internet of things, knowledge services and intelligent services offers a powerful tool and a favorable environment for service innovations.*"

Source: CCID Consulting, 23 Dec 2010

2011 Copyrighted. KMRC HKPolyU