Digital Business Ecosystems

21st Century Business Models for Smart Connected Products

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IoT Digital Business Ecosystems

by CBPN Admin - Tuesday, March 03, 2015

http://cloudbestpractices.net/guides/iot-digital-ecosystems/

21st Century Business Models for Smart Connected Products

‘Digital Business Ecosystems’ has emerged as the cutting edge concept to describe the future of business models. This TIM white paper describes how they are based on futuristic ‘technospecies’ concepts.

Enterprise IoT

Although the concept was coined in 2002 the advent of the Internet of Things has provided a fresh and accelerating context.

Michael Porter has defined the Internet of Things as being so significant as to warrant being defined as a third generation of how technology is defined to achieve his seminal business best practice Competitive Advantage.

He describes how the IoT will enable ‘Product Systems’ that dramatically enhance how market advantage can be achieved.

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IoT Smart Products - The Third Era of Competitive Advantage

by neilmcevoy - Sunday, March 08, 2015

http://cloudbestpractices.net/blog/iot-michael-porter/

Michael Porter, author of the most highly regarded of all business strategy theories, Competitive Advantage, describes how there are now three distinct eras of how technology can be defined to impact upon the ability to achieve this advantage.

Michael makes two very important points. The first point is that there has previously been two eras and now there is a third – the first being when corporations started to use IT for automation purposes, described in this 1985 article, followed then by when all of this IT became interconnected via the Internet, described in this 2001 article. Then in this 2014 article Smart Connected Products he describes a third era, the Internet of Things.

The second point he makes is that he defines this third era because now, unlike before, technology is now an integral part of products. Previously technology was only used to automate their surrounding operations like sales and distribution. Now, through embedded sensors, processors, software and connectivity, technology is becoming part of products directly, and from this new opportunities for competitive advantage emerge, with Michael describing the scope of just how large this opportunity is:

“The third wave of IT-driven transformation thus has the potential to be the biggest yet, triggering even more innovation, productivity gains, and economic growth than the previous two.”

He goes on to describe how the use of embedded technology enables maturing product
capabilities of monitoring, control, optimization and autonomy, functions that are core to the value creation of the product. He gives an example of healthcare where monitoring blood glucose levels is central to the value of new IoT wearable devices. Another is how insurance companies fit cars with telematics devices and tailor insurance premiums based on knowing exactly how you drive.

**IoT Product Systems – Harnessing Big Data Cloud Computing**

Michael goes on to describe that not only can products be described in increasing maturity terms by becoming smarter, through being Internet connected, but also that they can participate in ‘Product Systems’, referring to a collaborating supply chain of companies.

He provides an example of Joy Global who shifted from optimizing the performance of individual pieces of mining equipment to the entire fleet deployed in the mine, or farming equipment that is part of a larger ecosystem of a farm automation industry, one that also interconnects not only farm machinery but also irrigation systems, information feeds for crop prices, weather and soil nutrients and so forth. Others would include the grouping of suppliers involved in delivering smart homes, smart buildings or smart cities.

He also makes the critical point that these innovations require skills rarely found in manufacturing organizations, and therefore we can start to identify the enabling role Cloud services will play, offering the capabilities via On Demand services that organizations can rent without requiring the in-house skills. **ZDNet provides an introduction** to what these impacts and new capabilities will be.

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**IoT Product Cloud services**

Michael outlines a ‘Product Cloud’ specification, the combination of big data analytics and other key features that will enable these IoT Product Systems:
“This includes modified hardware, software applications, and an operating system embedded in the product itself; network communications to support connectivity; and a product cloud (software running on the manufacturer’s or a third-party server) containing the product-data database, a platform for building software applications, a rules engine and analytics platform, and smart product applications that are not embedded in the product. Cutting across all the layers is an identity and security structure, a gateway for accessing external data, and tools that connect the data from smart, connected products to other business systems (for example, ERP and CRM systems).

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Digital Ecosystems and the IoT

by CBPN Admin - Monday, March 09, 2015

http://cloudbestpractices.net/listing/digital-ecosystems-and-the-iot/

In this article Smart Connected Products business guru Michael Porter describes the idea of ‘Product Systems’, how products will evolve from the simple item itself through to a networked community of partners and other information systems.

From the academic world we can identify a similar concept, what’s described as ‘Digital Ecosystems’. Introduced in this white paper from the Canadian National Research Council, the authors explain how Digital Ecosystems mirror natural effects like swarm intelligence to operate in a self-organizing manner, and how the core principles can be mapped to but not bound by technical architecture like client-server or peer to peer intelligent agents.

The document then explains how the ecosystems are enabled through semantics, common language and shared understandings that enable communication, and that Digital Ecosystems can therefore repeat this effect through the technologies of the semantic web, such as unique resource identifiers, RDF, ontologies and meta-data, describing an example of an expert-finder scenario.

Other papers then explore more specifically how these principles might be technically implemented. This paper from the University of Surrey makes a key connection to the RESTful approach to web service integration that has come to dominate Internet systems in recent years, and similarly this one does so for Identity-specific XML standards like SAML.
IoT and Machine Learning

by CBPN Admin - Wednesday, March 04, 2015

http://cloudbestpractices.net/listing/iot-machine-learning-ajitjaokar/

Ajit Jaokar provides an introduction to the relationship between AI and the IoT in this presentation: IoT and Machine Learning

He sets the scene with a background on the volumes of explosive growth of mobile devices and big data, and then explains how machine learning may be applied to it in scenarios for consumer, enterprise and public sector, such as product management through to assembly lines and autonomous helicopters.

He describes key functionality like ‘sensor fusion’, where feeds from multiple sensors are combined and processed to improve their effectiveness, ‘deep learning’, techniques pioneered by the likes of Google-acquired DeepMind technologies, and ‘real-time stream processing’, such as processing vehicle GPS data.

[slideshare id=37392087&doc=iotandmachinelearningciufajitjaokar-140727002417-phpapp02]
The Cloud Name System - Addressing architecture for the Internet of Things

by neilmcevoy - Saturday, September 13, 2014

http://cloudbestpractices.net/blog/cloud-name-system-addressing-architecture-internet-things/

A key development for the Internet of Things will be the evolution and emergence of the ‘Cloud Name System’, a directory system for Cloud applications in the same way DNS (Domain Name System) works for the web and email.

Lori Vittie wrote a while back about the need for an ‘SNS’ – a Service Name System, a DNS type directory approach but for Cloud Services so that they can be entirely loosely coupled from their IT infrastructure.

Tim Berners-Lee, the inventor of the web, himself described a scenario of ‘Socially Aware Cloud Storage’ that applies this same ideal of abstraction to our personal data across all the social networks we use. This refers to a distributed (Cloud) storage service that is used to store personal user data for social networks, rather than the social sites holding it themselves.

The standard I am more familiar with is the OASIS XDI protocol, where they have coined the term Cloud Names and Cloud Numbers. This is a re-naming (!) of the term i-names and i-numbers, the naming system that XDI enables.

In short XDI enables unique and permanent identifiers (eg. =neil.mcevoy) for entities including but not limited to people, in the same way that web site URLs and email addresses do for web sites and communications, but where they are persistent while these can change, and where they will enable a universal data sharing network in the same way universal web content and email messaging are achieved.

The inventors of the standards describe it here, via their implementation called the Respect Network.

This type of architecture will be needed for the vast universe of RFID tags and other devices and nano-technologies predicted to become the ‘Internet of Things’.
The Cloud as Linked Dataweb

This is driven by the ongoing evolution of the Cloud not just as an environment for running virtualized apps, but also as a broader singular environment for the data they store and process, better connecting it as part of this integrated world.

This is particularly important given our fears of the privacy of this data. Certain features of XDI explain key important points about this system, most notably ‘Link Contracts’ – These are the actual mechanisms of linking data, because they define the nature of how it is linked, and so builds into this the critical privacy protection factors, such as respecting your wishes for who can and can’t access and use your data.

Sir Tim also describes this trend within a context of ‘Linked Data’, where the data is joined up like in a database but at the web level through the same linking mechanism that joins content to form the world wide web. Therefore the fundamental shift is that rather than storing data centrally, in a database, and accessing it via a distributed content tool (the web), you would simply distribute data the same way.

This concept of a “Dataweb” is also the same vision behind XDI, explained in this white paper (21 page PDF). It was written in 2004, ten years ago, showing how visionary this developments are and how they are now maturing, making for a very exciting future for technology innovators and entrepreneurs.

An evolution of this nature will have as profound an impact on our approach to software and business systems a magnitude larger again than the first impact of the first wave of the Internet.

In particular it will be extremely powerful for problem-solving, given how many IT problems can be traced to a lack of data interoperability between different systems. The CNS would solve this problem for everyone at a global level, in the same way the Internet solved universal email and content sharing for every one.

For example it’s a notorious issue in Healthcare, and scenarios where it could be applied are aptly described for example through the standards work for EHealth Ontario, where have a
system for implementing ‘Object Identifiers’, these same unique identifier principles.

There are also other protocols setting out to tackle the same need – For example Named Data Networking, even further down the path of maturity, so these are no longer conceptual ideas, they are now in the early stages of traction, always the best time for smart investors and entrepreneurs to get involved....
IoT Microservices - Realizing the vision of the X Internet

by neilmcevoy - Thursday, March 05, 2015

http://cloudbestpractices.net/blog/iot-microservices/

An explosive combination of technology trends will be where ‘microservices’ and the IoT Internet of Things intersect, a concept we can describe by comparing it with a previous theme, the ‘X Internet’.

The X Internet – Harnessing distributed microservices for big data applications

How to build the enterprise part of IoT solutions is fairly well understood now, with a maturing set of components, such as messaging protocols like MQTT or XMPP, implemented by software systems like Mosquito, and then Big Data software platforms for storing this data and performing the analytics, such as the examples given of Hadoop, Storm, and Couchbase.

With IoT scenarios of course the scope of the challenge is broadened and defined by the fact that the source of these data feeds will be a myriad of new ‘occasionally connected’ devices, presenting associated challenges.

With this in mind there are also approaches that don’t store all the data in one big database. As Phil Windley describes about Fuse, a IoT technology platform intended for the ‘Connected Car’ scenario, and how it employs a ‘microservices architecture’, using ‘Picos’ that store the data for each individual user. This is more of a ‘Personal Cloud’ data approach, a distributed computing big data design if you will.

The apps can be hosted in the Cloud and Phil is developing a Docker-based install highlighting this connection again.

Other technologies targeting this same scenario include Canadian poster child Blackberry’s spin off QNX, who have an ‘embedded’ operating system for device scenarios such as in-car entertainment.
There are also other development tools ideally suited to the microservices approach, created long before the concept, such as Rebol, an application development language and toolset from Carl Sassenrath, inventor of the Amiga operating system.

It was also originated with this new age in mind, enabling developers to create ‘Reblets’ – Small distributed apps that can run across many different devices and are ‘network-centric’, hence ideal for IoT.

Or as Carl described ideal for what the similar buzz term at the time was, the ‘X Internet’. As Forrester write here they actually predicted another vision of a similar concept and term to the IoT, the ‘X Internet’. Others working around the same idea included Motorola, this white paper actually making for a good Internet of Things primer: The X Internet: Connecting the physical world with the Cyber world.

The X Internet stood for ‘Executable Internet’, or ‘Extended Internet’, referring to the evolution from not just distributed content, the web, but also distributed applications, what we now think of as the Internet of Things.

Carl said “As a result, REBOL is optimal for X Internet distributed applications. It provides more effective solutions to modern network distributed applications. When compared to traditional languages, REBOL offers greater expressive power with less code. Most applications are typically measured in 10’s of KB, not 10’s of MB. And, when it comes to software development and support costs, smaller is better”.

This sounds like a sound philosophy for IoT application development in general, given the myriad of challenging device scenarios that code will need to operate in, and so one thing seems certain, the general microservices approach is likely to be hugely important to the trend and consequently explosively popular.
Cloud Best Practices

Global best practice standards for adopting Cloud Computing

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