IMP Social: The Influence of Social Media and Internet of Things on Collaboration in Global Business Networks

Abstract

In the 21st century, the IMP interaction model (Hakansson 1982) transforms into an IMP Social framework (Sood & Pattinson 2012). Social media is prevalent and "social everything" (Keys & Malnight 2013) makes possible novel, innovative and complex supply chain scenarios (Sood 2011), service innovations (Lusch 2011), R&D networks and new approaches for solving sub-atomic (search for Higgs-Boson particle) to intergalactic challenges (search for extra-terrestrial life). The Internet of things or "thingternet" (Valery 2013) combines with social media driving the development of machine-to-machine interactions, new networks, and networks of networks (Quill 2012; Berryman, Johnson and Abbott 2005) providing opportunities for crowdsourcing (Olson 2011) ideas and developing open innovation (Chesbrough 2005) partnerships.

Application of the IMP Social Framework to these network environments offers insights into the emerging technologies, platforms, networks, ideas, innovation and B2B interactions reshaping global business networks. This paper discusses and analyses five vignettes focusing on aspects of business-to-business services, social media applications and thingternet using the IMP Social Framework as a lens to crystallise thinking around emerging technology components (e.g. 3D printing) and supply chain convergence with social media and supply chain networks.

Keywords: social media, supply chain, convergence, crowdsourcing, 3D printing

Competitive Paper

Social Media Powering Innovative B2B Services and "Networks of Networks"

In the second decade of the 21st century, the IMP interaction model (Hakansson 1982) transforms into the IMP Social framework (Sood & Pattinson 2012). Social media is pervasive with "social everything" (Keys & Malnight 2012) making possible novel, innovative and sophisticated supply chain scenarios (Sood 2011).

Keys & Malnight position "social everything" as follows:

> **Social everything: New generations and their digital world stepping forward**
> Social technologies are now a central part of everyday life and work. The social generations are reshaping companies from the inside, helping them to build broader, more agile networks to create and deliver value to customers. Mobility and connectedness will be at the heart of the future business environment: communications and marketing are moving from a focus on one-to-one relationships, to many-to-many. (Keys & Malnight 2012)

Social everything is establishing as the "Internet of Things". In 2013 over 1 billion uniquely identifiable "things" (Valery 2013) connect to the Internet. However, the older internet addressing protocols, unique internet addresses (under ipv4) were effectively exhausted by 2011. New Internet addressing standards (ipv6) couple with increasing high-speed bandwidth (4G mobile and multi-gigabit optical/wireless Internet Service Provision), and low-cost cloud-based data storage enable online connections of literally anything from plants (Koucbachi 2013) to 3D printers (Shapeways 2013) integrating with low power credit card size computers (Raspberry Pi 2013). Current estimates point towards over 27 billion unique objects by 2020 (Valery 2013).

This Internet of Things or the "thingternet" (Valery 2013) is an essential element for creation of social media driven online service (Vargo and Lusch 2004; Lusch 2011) capabilities transforming supply chain, generating service innovations, and a variety of collaborative businesses, institutional, citizen and crowdsourced R&D, location, presence and marketing activities. These social media driven online B2B service capabilities and activities constitute a social layered model (Figure 1).

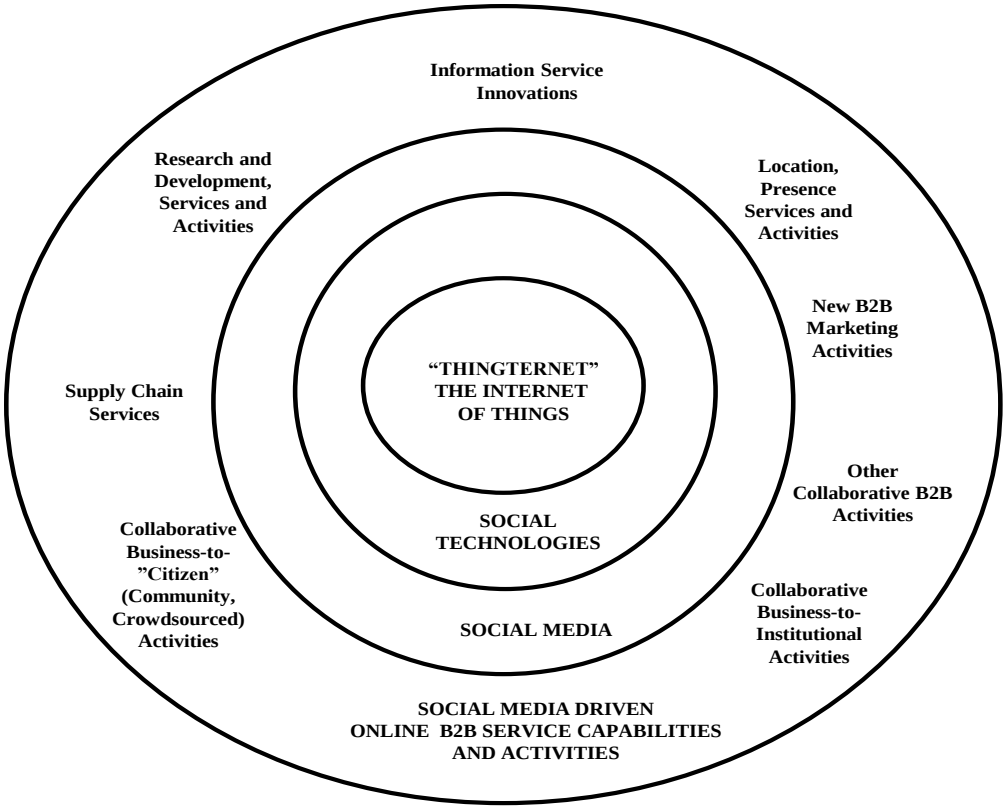

Figure 1: Social Layered Model for Social Media Driven Online B2B Service Capabilities and Activities ("Thingternet" adapted from Varley 2013)

Online service capabilities built on "thingternet" allow freight carriers using Twitter to bid on freight loads in real time (Conway Multimodal 2013). Furthermore, the supply chain software vendors embed social media capabilities into supply chain solutions (Manhattan Associates 2013).

The social technologies underpinning social media make possible new and creative service innovations (Gatwick Express 2013) with a service dominant perspective (Vargo & Lusch 2004; Lusch 2011) including the convergence of online social networks with supply chains creating utility value (ibid) and sustainability (Sood 2011).

Social media driven online B2B service capabilities and activities (Figure 1) focus networks not just on the aspects of actors, actions and resources but also views networks as "objects" with "composite networks, or "networks of networks", in which a finite number of networked objects are then themselves connected together into a network" (Berryman, Johnson & Abbot 2005). Furthermore, the use of social media shifts attention from linear supply chains and networks to "networks of networks" (or composite networks; Berryman, Johnson and Abbot 2005).

> Like their single-network counterparts, networks of networks show up everywhere. By waking up in the morning, going to work and using your brain, you are connecting networks. Same when you introduce a family member to a friend or send a message on Facebook that you also broadcast via Twitter. In fact, anytime you access the Internet,

> which is supported by the power grid, which gets its instructions via communications networks, you are relying on interdependent systems (Quill 2012).

In 2013, businesses witness both social and emerging technologies as "missiles of disruption" (Wessel and Christensen 2012). However, taking an IMP Social framework perspective the picture is not so much one of revolutionary technological services built atop social or emerging technologies but an elaboration of a 30 year old IMP model (Sood and Pattinson 2012). For example, the advent of a 3D printing online service (Shapeway 2013) represents an increasing spectrum of social exchange, co-operation and adaptations (Sood and Pattinson 2012). The opportunity for the 175 year old Procter and Gamble is crowdsourcing ideas and developing open innovation partnerships (Chesbrough 2005; Procter and Gamble 2013) through a co-creation channel fostering adaptation and greater social exchange.

What are the types of IMP interactions IMP Social (ibid) foreshadows as hitherto unforseen technologies encroach upon and reshape business global networks? Are we able to continue to utilise the IMP approach and IMP Social framework against this incessant onslaught of social, emerging technologies and generational change? Do we require further expansion of our thinking with respect to the different types of customer interactions as the physical supply chain diminishes in the wake of the final assembly in a world of digital fabrication (Gershenfeld 2013)?

Five Vignettes: B2B Services Driven By Social Media

This research paper builds on the exploration of scenarios embracing emerging technologies, social media and supply chain convergence. Five key use cases and scenarios (vignettes; Hakansson 1982) further inform the robustness of the newly establishing IMP Social framework (Sood & Pattinson 2012) and help discern critical aspects of newly emergent network of network structures. The five vignettes are Shapeway; Conway Mulimodal; Proctor and Gamble; Google Earth Enterprise; and the CERN Large Hadron Collider. Each vignette study applies the Social IMP framework (Sood and Pattinson 2012,121). These case studies require consideration of M2M (machine-to-machine) networks as well as participant firms, intermediaries and user community networks.

Shapeway

Shapeways.com with headquarters in New York is the largest 3D printing marketplace and community (300,000 members). The company grew out of a Philips Electronics incubator. From B2B perspective Shapeways users include designers and a marketplace of over 3,000 shops. This company provides an alternative to buying expensive 3D printers instead provisioning online the largest online 3D printing manufacturing facility in the world (30 to 50 industrial 3D printers). The service model allows users to generate objects in ceramics, plastic or stainless steel. The printers are capable of producing 100 products daily or 3-5 M million products annually (Shapeways 2013). The Shapeways' network of printers represents a distributed manufacturing capability.

A unique B2B relationship is the SoundCloud and Shapeways partnership resulting in the co-creation of an iPhone case with a sculpture generated from the sound selection made by the user (Kosner 2013). Users actually upload 3D files (see table 1) representing the digital description of the object to the Shapeways online service to produce the goods at the printer location of choice.

Table 1: IMP Social Elements for Shapeway 3D Printing Network

IMP Social Element	Comments on Shapeway
Product/service exchange	3D models in Alumide, plastic, stainless steel, sterling silver, sandstone and ceramics. 10-15 days for plastic or steel and ceramic models or goods
Information exchange	3D file formats (STL, Collada, OBJ, X3D, VRML2) representing the digital description of the object
Financial exchange	Price per cubic cm and handling fees
Social exchange	Shapeways community and monthly live chat
Cooperation	netfabb software provides output to co-ordinate production of goods
Adaptations	Shapeways community Personalisation

Conway Multimodal

Conway Multimodal is an example of a transportation company leveraging social media technology for supply chain management by using Twitter broadcasting capability to relay freight loads to the carriers following on Twitter. Twitter in effect connects the networks of carriers with the loads available. Conway Multimodal is part of Conway, a $5.6 billion Michigan based freight transportation and logistics company with 500 locations across North America and in 20 countries. The subsidiary is a non-asset-based transportation provider with over 15,000 3rd party carrier relationships with around 100 employees (Conway Multimodal, 2013).

Table 2: IMP Social Elements for Conway Multimodal Twitter Network

IMP Social Element	Comments on Conway Multimodal
Product/service exchange	Freight load
Information exchange	@ConwayTweetLoad uses Twitter to match carrier with freight needs every 15 minutes. Available freight loads are sent to Twitter and mobiles (https://twitter.com/ConwayTweetLoad). Additional load information is available via the Twitter link transmitted.
Financial exchange	Contracts are handled through the traditional process
Social exchange	Employment trends, tips and jobs (https://twitter.com/True2BlueJobs)
Cooperation	Twitter provides the opportunity for carriers to match with freight
Adaptations	Twitter messages represent information regarding the freight not the actual transaction

Proctor and Gamble (P&G Open Innovation Strategy)

Proctor and Gamble (Proctor & Gamble 2013) Open Innovation Strategy implementation Connect + Develop links external innovators and companies with P & G. The online portal facilitates partnerships sharing R&D, consumer knowledge and marketing know-how. Over 2,000 successful agreements are in effect (Proctor & Gamble 2013).

Table 3: IMP Social Elements for Proctor and Gamble Innovation Network

IMP Social Element	Comments on Proctor and Gamble
Product/service exchange	Intellectual property e.g. patent
Information exchange	http://www.pgconnectdevelop.com/ Links P&G business with innovation ideas via submission process and innovation portal
Financial exchange	Determined by type of partnership e.g. academic, joint venture, trademark and licensing
Social exchange	Online idea submission process
Cooperation	P&G Global distribution, experts, sales, consumer understanding and manufacturing
Adaptations	P&G Co-Creation Channel for crowdsourcing and evaluating ideas

Google Earth Enterprise

Google Earth Enterprise is a variant of the popular Google Earth and intended for organizations that have vast amounts of geospatial data. Unlike Google Earth organisations have the ability to create a private Google Earth or Google maps layers. The actual maps and Google Earth is held within the organisation and employs security controls.

Table 4: IMP Social Elements for Google Earth Enterprise

IMP Social Element	Comments on Google Earth Enterprise
Product/service exchange	Google Earth and Google Maps
Information exchange	Visualizing global website traffic at www.dell.com
Financial exchange	License model from Google allows use of images & data for marketing
Social exchange	Ability to share maps
Cooperation	Provides access to Google Earth
Adaptations	Employees use Google Earth with own geospatial data to generate a 3D globe for fly through simulations or 2D maps Google Earth available via mobile for field staff

CERN Large Hadron Collider (LHC)

Of all the vignettes the CERN Large Hadron Collider (LHC) is the most intriguing. LHC is largest and most powerful particle accelerator on Earth. This instrumentation comprises a 27-kilometre ring of superconducting magnets. The four particle detectors ATLAS, CMS, ALICE and LHCb represent the points at which the particles are made to collide. Traditionally, the particle detectors provide teams of physicists and support staff with a vast amount of data to sift through and search for the new fundamental particles.

Citizen science (amateur scientists) and the advent of Test4Theory (CERN 2013) allows the distribution of the intensive computational task of finding new particles to citizen's home computers using BOINC (University of California 2013). This software previously allows the donation of computing power in the home to big science projects including SETI@home (Search for Extraterrestrial Intelligence) and Climateprediction.net (world's largest climate forecasting

experiment) and Rosetta@home (protein folding). Using citizens to help is an adaptation wholly dependent on the investment of effort or free computing cycles by the individual citizens from the comfort of their homes. This contrasts with the cooperation between countries, universities and CERN taking place onsite at CERN.

Table 5: IMP Social Elements for CERN Large Hadron Collider (LHC)

IMP Social Element	Comments on CERN Large Hadron Collider
Product/service exchange	Knowledge
Information exchange	2012 data set
Financial exchange	Hunt for new fundamental principles of nature and phenomena including the search for Higgs
Social exchange	LHC@home 2.0 is a volunteer computing platform to support the endeavours of physicists working on the LHC. The platform and downloadable software allows running simulations of particle collisions on home computers helping physicists conduct simulations.
Cooperation	ATLAS - 3000 scientists from 174 institutes in 38 countries CMS - 4300 particle physicists, engineers, technicians, students and support staff from 179 universities and institutes in 41 countries
Adaptations	CERN developed BoincVM is an integrated cloud computing platform harnessing volunteer computing resources on Windows, Apple or Linux computers. Test4Theory is the first of volunteer projects.

Findings and Discussion

The IMP Social (Sood & Pattinson 2012) framework helps envisage the future state of business networks in a global environment of emerging social technologies and diminishing supply chains using 3D printing. Further to a review of five vignettes capturing a diverse group of network businesses, the influence of social technologies in global networks is enhancing not dissipating the spectrum of customer interactions even in the presence of Machine-to-Machine intercommunication and social media. This is a testament to the recognition by the early pioneers of IMP (Hakansson et al) the importance of B2B marketing as a distinct practice transcending technological innovations.

This view is reinforced as seen from the studies of Shapeways, CERN and P&G. These specific vignettes point towards a shift away from many (users) to one (networked intermediary e.g. Shapeways, CERN or P&G portal) to composite networks (Berryman, Johnson and Abbot 2005). For P&G, the digital platform for crowdsourcing enhances communications between potential partners and a variety of stakeholders including P&G sales, product managers and R&D teams. CERN not only connects researchers together but home computer users comprising amateur scientists connecting to the Internet further reinforcing the rise of networks of networks or composite networks (ibid) in a world increasingly embedding social networks into business practice while embracing technologies many still dream about including 3D printing.

Exploration and Analysis of Social and Emerging Technologies within Business Networks

IMP Social (Sood & Pattinson 2012) enables an effective analysis and decision-making of supply chain scenarios embodying hitherto unseen and emerging technologies encroaching upon and reshaping business global networks. IMP Social (ibid) provides an IMP framework to systematically understand supply chain innovation stemming from the embodiment of social and emerging technologies within business networks.

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