# Horizon Scanning Series

# The Internet of Things

*What Could the IoT mean for Supply Chains in Australia?*

*This input paper was prepared by Kim Hassall*

# What Could the IoT mean for Supply Chains in Australia?

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## 1. Introduction

The Supply Chain is a very significant part of every industry and is significant in a nation's total economy. This can vary between 5% for the United Kingdom, to 20% for China and Finland, 9.5% for the US and 14.6% for Australia, (Raptour Institute for Department of Industry Innovation and Regional Development (DIIRD),2007). Any efficiencies achieved in the Supply Chain, can deliver savings of a few percent to a nation's GDP, which is usually worth billions of dollars.

## 2. Australia's beginnings in e-Freight and e-Marketplaces

The move to internet based applications, for freight and supply chains began in Australia with two experiments in 1999: These were Tasmanian Business Online (TBO), which was a closed e-marketplace with a transport capability, and Australia Wide Loading (AWL) which was Australia first e-freight marketplace. These experiments are described in Hassall 2001, for the OECD and in Hassall and Welsh 2014. By 2014 Australia has some fourteen e-freight marketplaces. Most have not survived. The UC Logistics owner driver e-market is one that has survived. ([www.uclogistics.com.au](www.uclogistics.com.au))

Also, in 1999, the National Office of the Information Economy (NOIE) produced "Trucks Online, a Scoping Study" which brought several insights into the road freight industry as to what efficiencies might be attained through the use of internet applications. In 2001 the OECD ran a 40 nation e-Transport and Logistics summit in Paris. Australia was invited to co-chair this event which predicted a healthy future for internet based e-freight applications. In 2005 DIIRD, in Victoria, undertook an ICT transport benchmarking study and observed that the transport and logistics industry was a laggard in relation to both ICT and internet based technologies. Even when Victoria's first freight strategy "Freight Futures" (DoT 2008) was released it was reiterated that a bigger focus be made on the adoption of ICT in the sector.

## 3. The emergence of Software as a Service for the logistics and Supply Chain Industry and Cloud Computing

Software as a Service (SaaS) which allowed for internet based software became a serious option post 2000 but had slow take-up within the industry. However, the Singapore Portnet application was cited as an excellent example of SaaS being used very successfully, (Welsh 2008, for NTC). Although SaaS offered many user benefits such as automatic maintenance and security upgrades, the freight industries still saw data security as a concern.

From 2010 onwards, with the arrival of cloud based technology, many user applications could be now delivered as default SaaS programs which dragged a lagging freight industry into a new technological age. However, as at 2020 the industry still has a long way to go to understand how a multi IoT applications environment can be efficiently exploited.

## 4. Improving the 'Last Mile' operations

For two decades the international Institute for City Logistics, Kyoto based, (www.citylogistics.org) with significant Australian and international representation, has been researching and suggesting very significant improvements to the urban freight problem and the especially the last mile conundrum. Such ideas as:

- consolidation centres and their placement
- Internet bookings for kerbside delivery,
- using vehicle routing applications
- planning afterhours delivery
- defining environmental freight zone restrictions, and
- using distributed internet freight applications to minimize urban transport trips.

Many of the freight and planning applications could all be could based and many could work as a subset of an IoT suite of applications

## 5. Government and Regulation in the Supply Chain and the IoT

### 5.1 Import/Export

It is often considered that the whole supply chain operates continuously, both domestically and internationally, achieving some productivity improvements each year, whilst minimizing day to day hinderances. Well, the domestic and international supply chains both operate within regulatory frameworks. These frameworks span quarantine and specific commodity declarations, import and export restrictions and import duties. In many cases International export agents, freight forwarders and brokers are very much needed. From the older paper based environments these, especially export supply chains, can be facilitated through enhanced and expanded online, cloud based systems that have evolved from the Electronic Data Interchange (EDI) systems that leapt into use by the mid 1990s, a decade after the arrival of the internet in Australia. Now importers/exporters, and their freight forwarders, will often deal 'online' through the specific applications of their agents, or brokers, as import/export customers themselves may not hold these required applications for streamlining the document exchange processes with regulators and freight lines. However, internet applications in this area have certainly evolved from the initial days when EDI was first proposed to facilitate document based exchanges.

### 5.2 Domestic Regulations and the Supply Chains

Operations in the whole of the domestic freight and warehousing industries are again regulated by operational laws. These span such factors as: speed, mass limits, truck dimensions, driving hours, load restraints etc. Aviation, maritime and rail operators have, in many cases, even more and tighter regulations than road operations. With

the massive growth in e-commerce the humble warehouse has had to take notice of storage regulations for both limited volumes and large consignments of incompatible products, as well as regulations for the clean-up and disposal of certain commodities after spills and breakage accidents.

Freight operations are all constrained by laws and regulation and although this is a fact, that is taken for granted, the regulation for each modal operation needs to be easily internet accessible. In Australia most government agencies have developed comprehensive departmental and agency online regulation repositories for modal operations. How does this apply to the IoT? Many operational cloud-based software programs can be configured to certain values, but in setting operational parameters users need to be aware of the legal constraints against which parameters cannot be exceeded, for example, truck driving hours or load size.

At this time there is not much interaction between regulatory directories and operational internet-based supply chain applications. This role is always fulfilled by the knowledge of the program user or the user of a specific freight app. However, this could be an area that may emerge linking selected supply chain apps to the legal repositories housing to regulatory constraints on modal freight operations.

## 6. Case Study – "Fresh Insights" Retail Supply Chain

The IoT linking multiple program to program applications, often referred to a Machine to Machine (M2M), are only just evolving, however, such an example where sensor applications' data feeds decisions along supply chain and other internal corporate programs are reflected in the Woolworth 'fresh insights' project. Woolworths are continuously obtaining sensor information from the farms, measuring moisture content and temperature, hours of on-road refrigeration and the time estimates of the farm product despatches into the fresh-produce distribution centres. These trips are monitored and arrival into the Distribution Centres are known. "We're doing some very cool things with IoT in the stores themselves "where you can scan over the food product with your phone and actually see the entire journey that piece of fruit or meat took throughout its life," the GM of IT Service Operations and infrastructure reported recently. Woolworths has already introduced smart refrigeration, smart lighting and smart thermostats, as well as other hardware into its store network. As an exceptionally large user of electricity, Woolworths had turned to the 'internet of things' to reduce its power costs along with its state-of-the-art monitoring of its fresh produce.

## 7. Conclusion: IoT In A Perfect Supply Chain World

The internet at this time hosts innumerable freight and supply chain applications. Usually these are stand alone. A user of these applications usually physically reformats data to feed into the next program, although some mapping tools can input data to other programs. If specific programs could be interfaced with outputs from program 1 being fed to program 2, and this output being fed to program 3 etc this could be a giant step in efficiency. Such linked applications exist often within enclosed large company inhouse systems. However, for several programs that are web based and proprietary this may need licencing agreements, but in a perfect world this is possible. This is what the philosophy of IoT actually is.

In a perfect world Is there a role for governments in having 'public domain' software available in the cloud, especially where the Supply Chain can achieve its biggest returns? Very basic vehicle optimization software can save an average of 20% of urban kilometres, (Raptour 2006, Section 3), and even basic inventory management systems for medium warehousing operations can be a very valuable tool preventing stockouts. Should governments facilitate small 'free, public domain' cloud based applications like these? Moving up the scale to massive Port Management Systems. on which dozens of applications hang with outputs feeding hundreds of players on the Port supply chain, should governments have a role in implementing such systems in the public domain? This is an example where a large port community, through IoT, could achieve very large efficiencies. Relieving port congestion through open access port software applications, which could also be connected to a free, cloud-based truck queueing and scheduling system, could deliver significant 'Smart City' congestion busting benefits. The IoT could be a game changer in these areas.

There are many freight and supply chain areas that still have to be addressed by researchers and industry. Firstly, finding the optimal number of vehicle configurations in an urban delivery and pickup fleet is a relatively untouched area. Secondly, designing the optimal delivery network as opposed to optimizing an existing delivery network also has significant potential efficiency gains. Such tools when they get developed will add two large layers of productivity for improving an urban distribution task. These new elements in an IoT e-freight program suite, could dampen the growth in urban freight kilometres in any large city.

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**Glossary:**

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| AWL | Australia Wide Loading |
| DIIRD | Department of Innovation, Industry and Regional Development |
| DoT | Department of Transport |
| EDI | Electronic Data Interchange |
| ELM | Electronic Logistic Marketplace |
| ICT | Information and Communications Technology |
| IoT | Internet of Things |
| M2M | Machine to Machine |
| NOIE | National Office of the Information Economy |
| NTC | National Transport Commission |
| OECD | Organization for Economic Co-operation and Development |
| SaaS | Software as a Service |
| TBO | Tasmanian Business Online |