

# The “Connectivity Law”

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I am happy to report that the state of Building Connectivity in the broadest sense of the word is strong, if still somewhat confusing.

We now have strong initiatives at all necessary technical levels to connect devices with each other, to connect devices with systems that, in turn, connect with other systems and with enterprise applications. We have dialog between the differing standards groups, and IT players are starting to look seriously at buildings.

If you look at these initiatives throughout the past few years, you see a common thread: connectivity. Whether it is between devices in a field bus, between systems using data definitions and profiles, between software systems using XML and Web Services, or the use of TCP/IP and the Internet, communication is the name of the game, and connectivity is the result.

## **What is Connectivity?**

The dictionary defines connectivity as “the quality or condition of being connected”.

Having a sensor on the wall is one thing, having the sensor connected to a controller is something different, and having that sensor connected through the controller to other controllers, complex systems and enterprise applications is something completely different.

At its core, connectivity is often taken as a technical term, and fundamentally, it is, but the effect of connectivity, of being connected, is very far-reaching. You only get this only if you take the broadest view of connectivity and accept that the true value of connecting things with each other is when you are able to connect everything with each other. Not just some things, not most things, but **everything**.

If you do not accept that everything must be connected with each other, then you are accepting the notion of disconnected islands of information. Corporate networks were just that, but then the Internet (Inter-Networking) came along and connected corporate networks with each other. After that, the Internet connected people, then homes, and cars and soon every little thing in existence, including that pack of Corn Flakes on your breakfast table, through RFID.

While at one level this is a technical achievement (and a wonderful one at that), it is also a very significant change for the “things” that are connected: people, homes, cars, corn flakes pack, etc. We now live in a very connected world, and it still amazes me how I managed to survive as a teenager without the Internet, how inconvenient it was!

## **Building Connectivity**

Until recently, most of the focus of standards in the buildings space is about connectivity of devices and systems with each other, within the building’s scope.

The driving force in 1989 that started the creation of BACnet was that proprietary systems forced many building owners to use a certain vendor, often to the detriment of the building owner. Open systems is now here. Phew! We have two significant standards in

LonWorks and BACnet, some say this is not as good as having one, but maybe it's better as it will keep them competing to be the best, to the benefit of building owners.

However, neither BACnet nor LonWorks in and of itself achieves the level of connectivity that we now take for granted in the Internet generation. A LonWorks or BACnet building or campus may well remove the proprietary stranglehold, but unless connected to everything else (literally), they are still islands of information, locked and trapped from being useful. At least until information in these systems are presented on IP, which is now gradually being implemented.

### **Nevertheless, it is confusing!**

To a degree, this is true and inevitable at this stage of the development. Years ago, many proponents of open systems (me included) proposed a single standard that would go from the lowest levels to the highest levels of the building system architecture.

While IP as a protocol is now broadly used as the base connectivity standard, IP itself does not solve all of the requirements for the Internet. The Internet that we use today is in fact a combination of many different connectivity standards, meshed together to deliver the applications we use on a daily basis. The products hide much of that complexity to become the true plug-and-play set of applications that we now take for granted.

Building systems is still going through that evolution, although it does look rather complex at this time.

We are doing nothing but going through the normal cycle of technology adoption; the products and tools that are now being developed will make much of the complexity go away and allow buildings and IT professionals to reap the true benefits of connectivity.

### **The Value of Connectivity**

We have to remember that this is a business for all of us, and in business, we have to always think about the creation of value. So how do we measure the value of connectivity? To do this we have to appreciate that connectivity in itself is not necessarily valuable, what is valuable is the information.

If a sensor is connected to a fan, I propose that its value could be said as being 1. If connected to 2 fans, surely its value is 2. If it is connected to a device, that is connected to and influences 20 things (fans, lights, etc.), then its value could be said to be 20. So every use of particular piece of information could simplistically have an incremental value of 1.

The value of connectivity is the amount that the value of information can be increased by connecting it with other uses of that information. There are thus three things here, the source of the information, the connectivity, and the uses or users of the information.

This presupposes that each source of information has some finite and discrete shape; this is especially true with devices such as sensors, as well as state and calculated information, historical data, and identity, etc. But it also applies to other information such as a document, an Email address, the IP address of a device, a password, the serial number of a printer, the location coordinates of something, images from a camera, a database record and many more.

The "uses" that the piece of information is connected to can also be many things. From actuators, fans, valves, door locks, etc., to calculation logic, a report, an alarm, a computer display or dashboard (physical or on-screen). In addition, a PDA, a work order, an invoice or any other information input to a system or application.

So, my Connectivity Law states: **The value of a piece of information is proportional to the number of uses that piece information is connected to.**

This law focuses the value on what connectivity is enabling, an increase in the value of information.

This goes well with Metcalf's law that states the value of a network is the square of the number of nodes on the network. The Connectivity Law though focuses on the value of the node, not the network. While the value of the Internet is huge by Metcalf's calculations (1 billion squared, based on 1 billion computers), if a web site is only viewed by (connected to) 1,000 people, then the rest of the billions have no tangible value, other than a potential value brought about by the network.

### **We Need to Talk!**

For this to evolve, all of the stakeholders concerned with building systems connectivity need to talk with each other, resolve issues of incompatibilities, understand owners needs, appreciate the values that are being brought in from both the buildings side as well as the IT side of the problem. People need to connect first with each other, in order for devices and systems to connect.

The objective, if we could get back to basics we covered above, is to make all devices and information be connectable to other devices, systems and information, subject of course to security protocols and safeguards. Accepting that there exist some disconnected islands of building information is simply not acceptable.

### **Call to Action**

From the very first BuilConn in 2003, the event's vision has been to connect people with each other so that devices and systems can be better connected. The name BuilConn is no accident, it's about Building Connectivity ("building" both as a verb and a noun). BuilConn is the only venue focused on this very important subject, not about the disciplines of HVAC, security, lighting, IT or any of the other systems found in buildings, but about connecting them with each other, and extracting their true value.

The supporters of BuilConn are evolving to be a veritable list of connectivity-centric companies and organizations: LONMARK, BACnet, oBIX, OASIS, OPC, ZigBee and CABA to name a few, and commercial support from Cisco, Tridium, Gridlogix, Lantronix, Cimetrics and many others. It's also not an accident that BuilConn is co-located with events that also focus on connectivity, M2M in generic devices and GridWise Expo for the smart Grid.

The challenge at BuilConn this year is to establish the value of building information systems. We have the technology, we have the infrastructure, we have the attention of the buildings and IT industries, we have the demand from corporations who own buildings, and now we have a way to measure the value of connectivity.

It is time to turn this into new business opportunities.