Interview with Tom Macallister, Co-Founder & Director of Caburn Solutions Ltd.

IoT Helping Smart Offices in Need of Protection from the Pandemic

By *Japan SPOTLIGHT*

Smart offices and buildings have a growing need to protect themselves from the increase in infections today. Administering ventilation or social distance among the employees in office spaces would be vital to maintaining safety from infections. The Internet of Things (IoT) must play a key role in this.

Caburn Solutions is a UK company working in this field. *Japan SPOTLIGHT* interviewed Tom Macallister, its co-founder and director.

(Interviewed on April 8, 2021)

Introduction

JS: Could you please briefly introduce yourself and your company?

Macallister: My name is Tom Macallister, and I am the co-founder and director of Caburn Solutions, a specialized IoT solution and communications provider, basically developing IoT solutions for a number of sectors, in terms of property and personal safety. We are based in the northwest of England; we have our own development capability, and we provide our own IoT solutions while our parent company also provides mobile communications for IoT companies and providers of IoT technologies.

JS: In the United Kingdom and all over the world, there is an increasing number of smart offices and smart buildings that need IoT. Your company must have high potential for growth.

Macallister: That is correct, and this is a market that will continue to grow in terms of smart cities and smart buildings. That will be driven by a number of factors around things like energy efficiency, around environmental monitoring and management within buildings. The potential has grown significantly during the current pandemic. A lot of companies want to utilize space better and improve working environments for staff.

Pandemic Has Changed the IoT Business

JS: Do you think that a good environment is the

Tom Macallister

greatest need for promoting smart offices? Before the pandemic at least?

Macallister: To be honest, before the pandemic I am not sure how much commitment there was. There was a certain amount of recognition from companies that a good environment could promote safe working for staff, but also improve productivity. I am not sure that the business case for it was as clearly defined as the case has now become due to the pandemic situation, due to which employee safety has come to the fore.

JS: Which sector in particular will need smart offices and buildings the most?

Macallister: It's an interesting question. An area that we are focusing on at the moment in terms of smart buildings is around CO_2 levels within buildings. We are focusing on this for a very good reason: what has been recognized by the scientific advisory group for the UK government is that Covid-19 likes high CO_2 environments with high levels of humidity. So in terms of smart buildings, monitoring CO_2 and levels of humidity and temperature become critical because the risk of high levels brings the risk of far field aerosol transmission of Covid-19 in multi-occupancy buildings.

These levels of CO_2 depend upon the purpose and level of occupancy of the building. Buildings with high levels of occupancy where the level of CO_2 is above 1,500 parts per million, that is deemed too high. In terms of a smart building, if you measure it and highlight a problem in terms of air quality, then you can use smart technology to initiate a smart ventilation system to reduce the level

of CO_2 and then you can switch that system off once the CO_2 has reached an appropriate level. This has an impact on energy efficiency, rather than keeping the ventilation system running for 24 hours a day. The acceptable levels differ depending on the function of the building. In a normal office environment, it would be above 1,500 but there are other building environments where that level should be kept much lower. In places like gymnasiums, concert halls, places where people are singing, shouting and talking in a crowded environment – then the level needs to be set low. The smart element of it is that if you measure and identify that there is a problem, then the ability of smart tech is to improve the situation by switching on ventilation, air conditioning systems within the office or gym environment that will lower the risk to the people using the building. Covid-19 has pretty much highlighted that.

JS: Would you say that Covid-19 is the main driver of promoting smart office and smart buildings with the use of IoT?

Macallister: I think Covid-19 is one driver; the other is the green agenda and energy efficiency in terms of monitoring building temperatures to ensure that the temperatures are kept at an acceptable level to the people occupying the building. Other places that I know of that are quite prevalent in terms of IoT include managing retail environments, especially those where food storage and preservation is involved, because you can switch fridges and freezers off using smart technology and then switch it back on to actually reduce the energy usage over a period of time.

JS: For these kinds of smart buildings that are not yet prevalent in Japan, engineers would presumably need to be knowledgeable about both IT but also other machines too.

Macallister: I think there is an interesting thing about IoT, whether it be for smart buildings or other technology. There is a lot of focus around IoT "providing" data that allows efficiencies, whether it is energy or environments that people work in. There is another challenge, which is that a lot of focus is on the use of IoT, but not a lot of focus on how you remotely manage thousands and thousands of potential gateways and all the sensors that are connected that provide the data. How do you manage all those devices and ensure that they are functionally and operationally collecting data? Caburn Solutions is a company with a lot of people who have worked in machine-to-machine communications, and before that, payphones. We were responsible for managing hundreds of thousands of payphones remotely, using technology, and I think that is the same challenge that the IoT industry will face in future: how do you manage hundreds of thousands, potentially millions of devices? What kind of platform will be necessary? We have focused on device management because we see that as one of the key areas of expertise, and collecting sensor data.

We can collect the data and provide it to our partners, because we can't know everything about every industry and every sector, so sometimes we develop the platform and the analysis of the data. In other situations, we are quite happy to provide a flow of data to companies that have much more expertise in terms of the platforms they use to manage people's energy, environment and workflow. Sometimes it is better to know what you are good at and when to do what you are good at to focus your business, but also to allow others and to actually work in partnership. I think that the case in the IoT industry is that partnerships will continue to form because not everybody can develop an IoT solution for every sector.

JS: Data seems to be very important in this business so engineers would need to be knowledgeable about data and not just information technology. Is that the case?

Macallister: Our background is using data to manage large populations of remote devices, and knowing what data you need to know to manage a lot of remote devices efficiently. That goes into two areas – the actual gateways and sensors that make up an IoT system, but another key element of IoT is communications. Because we have all worked in the telecommunications industry for a large number of years, we know the challenges of communications. The world is moving towards a number of different technologies; predominantly I would say IoT is driven by mobile communications technologies such as 3G, 4G and 5G but there is also a whole range of short-wave radio services that are being put in around towns and cities, such as LoRaWAN where they have nodes where an area of a city can be wirelessly connected to reduce the number of gateways where you can use LoRaWAN to control street lighting and so on. The question for the future would be how many of those technologies will survive – the problem is that you use standardization and there is not a standardized communication method.

Js: In terms of technology, you are using a lot of sensors, so engineers also need to be experts on sensors.

Macallister: There are a number of short-wave radio capabilities that sensors have, and I suppose that the predominant technologies in that space are Z-wave, which is a short-wave radio capability that sensors have. We are at the moment using Zigbee which is another short-wave radio system particularly used in industrial environments, and also Bluetooth. We use Bluetooth for connectivity of certain sensors around temperature and also medical devices. We use Zigbee for a range of other sensors. All of our sensors and a lot of sensors these days are battery powered, and the batteries will eventually run out, so you need to be able to monitor the battery level within the sensor. You also need to know that the sensor is connected to the gateway, and raise it as a problem if it isn't. You have also got to know what the format of the data is from the sensor, and we get sensors from a wide range of suppliers, both in the Far East and Europe. What we have tried to do is not restrict ourselves to a particular sector in terms of sensors. So we don't just use temperature sensors and focus on temperature control, we actually have a range of sensors/medical devices which do remote medical readings for telemedicine, and we also do a wide range of environmental sensors. We will basically provide IoT solutions to customer problems and if we need a specific IoT sensor to solve that problem and there is one available, we can connect it to our service.

Partnerships for Success in IoT Business

Js: You mentioned that partnerships would be key.

Macallister: I think that is the nature of IoT. We are very much an innovative start-up business; it is impossible for us to have the reach to develop growth without partnerships with other large companies. We have a number of partnerships with large blue-chip companies in Europe that use our gateways and devices and sensors to populate their management systems.

JS: It sounds like partnerships would be very important, but they could also present a challenge for your business.

Macallister: I think that the challenge with partnerships is finding partners that share your vision and your goal for where you want the technology to go. The other element is that especially with large enterprise partners or corporate partners, for a small business you end up tied to their timescales and their development cycle which may not necessarily suit a small fast-moving company. Large enterprises do like to work with small companies, for the very reason that we can move quickly to develop solutions, but the moment we get caught in their enterprise bureaucracy then it tends to slow everything down. I know a lot of large enterprises desperately want to work with small businesses, but the problem is that you end up with a very big dog wagging a very small tail.

JS: Are most of your partners domestic or overseas?

Macallister: We have partners in the UK but also in Europe. Caburn Group has partnerships in the Far East and a company in the United States, so we have routes into other markets. It is a case of focusing on the UK primarily because we know the market very well. Somewhere like Japan is a very interesting market because there is a will for innovation and people accept technology quicker than a lot of other places, and that is probably something that happens in the Far East particularly. If you look at the current situation with track and trace for Covid-19, a lot of countries in the Far East adopted track and trace and the technologies it uses to manage the situation a lot quicker than the UK, so I always look at the Far East as a place where technology is adopted quicker.

One of the areas for IoT in Japan has to be the fact that you have a very elderly population, you have a high average life span and a lot of healthy, elderly people who will at some stage need to be monitored and managed at home, so I am sure there are already systems and services in place. But if you put an IoT gateway into somebody's house, you then can open up a whole range of monitoring of that person's daily living activities, and using AI technology you can begin to work out patterns on behavior and raise any abnormalities in people's movements and nutrition and so on. There is quite a lot of work going in the UK around integrating health and social care with IoT, which again has been driven by the Covid-19 situation where monitoring people's levels of oxygen in their blood and their body temperature have come far up the agenda. It is easy with an IoT gateway to collect that data and provide it either to friends and relatives or to clinical specialists.

JS: Hospitals and other healthcare facilities must be big clients for you?

Macallister: Yes, we currently have projects with the health service in the UK. Those are at the pilot stage at the moment, so we are basically testing the technology. Japan and other Asian countries would also be a big market, although the language conversion of the technology and platforms could present a challenge.

Recruiting Good Engineers

Js: In order to be well qualified for this business, you would need to recruit a lot of good engineers. Has that been difficult?

Macallister: Not so far – our organization has a lot of good engineers who have come out of a company in the Northwest of England where they all worked together, so in terms of software development and product we were able to recruit the right people. The challenge for us as a company is the development of younger engineers, but there are very good schemes in the UK, again driven by government economic policy during the Covid-19 crisis to actually promote companies taking on apprentices to train them. The challenge always is that having to train somebody reduces existing experienced engineers efficiency in developing what you want them to do because part of their time has to be spent training younger engineers. That is a challenge that has to be met, but in terms of recruiting engineers with the right skills, we haven't had a problem.

Entrepreneurship in UK in the Pandemic

JS: How about entrepreneurship in your country? Is it flourishing under the pandemic?

Macallister: Having been an entrepreneur for five years, the path never runs straight because you go down one path and then realize that it is not the path that is going to achieve your aims and your goals, so you end up taking a slightly different path. It's all about flexibility, as you might start going down a path in one sector and then finding out that it is not a sector where you are making any significant headway in, so you change and look at other sectors. Most entrepreneurs have probably changed in some shape or form during the pandemic, in that they have adapted to it and recognized the opportunity. People who are maybe developing IoT technology for one purpose have maybe seen the opportunity for potential in the health area and so have adapted the technology for health purposes because that is where the opportunity is, and they have done that

very quickly; that is the advantage of owning your own business and being able to redirect resources quickly onto another project. I think that is something that I have seen a lot of – entrepreneurial organizations that have taken technology that they have developed and quickly adapted it, or management of the pandemic. Whether it is systems for booking patients into vaccines, or monitoring people at home, whether it is improving the social inclusion of people using technology – that is really where entrepreneurs in the UK have adapted very quickly to the pandemic.

Future Business Plans

JS: Could you tell me about any future business plans for your company?

Macallister: Our future plan is to keep growing the business and to expand the number of partnerships that we currently have. There are a number of radio technologies that we are interested in adapting our service for – things like 5G, NB-IoT – and there are a number of technologies coming along where we see ourselves becoming much broader on the communications side. From my personal perspective, our first challenge is to build partnerships and grow those, and grow relationships, especially those requiring them to provide data to their customers and clients. So we see next year as being a highly focused year in terms of partnerships.

JS: Do you have any plans to expand the business overseas?

Macallister: I have seen lots of companies over-extend themselves without consolidating their position in their home market. So if they expand overseas, they find out that it is not as easy to manage cross-country teams, so there is a challenge there. It comes back to partnerships – places like Japan, Malaysia, other places – we would be looking for partnerships there that could take the technology and the data and use it in their own markets. The data is not language-specific; data is data and whatever system you put it into is a system that requires a local capability. **JS**