How can Systems Integrators deliver business IoT at scale?

By Charles Paumelle and Tim Panagos

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Executive Summary

After years of promises, the Internet of Things (IoT) has matured into a powerful bundle of technologies that can have a transformational effect on business operations across the entire economy. But a mix of cultural, economic and technological challenges have prevented Systems Integrators (SIs) from playing their traditional role as accelerants of technology adoption. This can be solved by viewing IoT more holistically as a SaaS model rather than a series of sensors, connectivity, and networking point solutions.

Successful SIs need to be able to:

- Engage customers in a clear ROI conversation with clear cost structures and value propositions bolstered by hard numbers
- Scale a project with a blend of specialist and commodity resources to make it deliverable
- De-risk a project so that it can be delivered on-time, in-scope by following best-practices for delivery
- Build follow-on value both for the client and the SI organization itself based on the initial project by selling additional consulting and support services

A "Sensing-as-a Service" model makes these things possible, with early adopters reporting the value of this comprehensive approach. Sensing-as-a-Service improves cost forecasting, eliminates the need for specialists and refocuses away from the technology and toward repeatable functions the SI community understands intimately. The technological advances in IoT capabilities and its maturing as a client-ready solution set has paved the way for entire new SI revenue streams.

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Introduction: IoT's long and winding road

Promises that the Internet of Things (IoT) would digitally transform every industry have been talked about for many years now. From "Industry 4.0" to "Smart Metering", "Smart Cities" or "Smart Buildings", analysts have been projecting a world where billions of connected devices in the 2020s would make the world a smarter, more efficient and sustainable place. While some of this is taking place, Systems Integrators (SIs) have not played their typical role driving adoption of this new technology in the way they led the charge for Enterprise Resource Planning (ERP) in the 90s or cloud computing in recent years. Given IoT's measurable growth and maturing capabilities, why have none of the world's major SI firms built comprehensive IoT practices to deliver repeatable models and capabilities to their corporate clients? This whitepaper describes some of the reasons why and proposes some avenues to unlock the growth opportunity.

The Internet of Things is a broad term which in fact bundles together a vast array of technologies, protocols and methods of acquiring data from the physical world. The "standard" internet requires a combination of end-user devices, such as computers or smartphones, infrastructure such as servers, networks, and services such as telecommunications and applications to be useful. Likewise, the IoT needs a combination of sensors, networks and applications integrated to business processes to produce real-life business returns fuelling the demand from large clients, and it all needs to work seamlessly and securely to be accepted in the workplace.

Fig 1: Skills required to create Enterprise IoT solutions

Fragmentation of expertise is a key reason here: expertise in radio propagation is critical for a wirelessly connected IoT sensor to operate properly and deliver long battery-life. Equally critical is the expertise in network performance and encryption to ensure secure transmission of the data. Adherence to data privacy regulations requires expertise in data management compliance. IoT data is useless if it is not properly integrated into a client's system or easy to visualise or ingest by Machine Learning. A multitude of skill sets, each with their own challenges, must be assembled to create a coherent and solid IoT solution and no single company, let alone a single engineer, can be expert at all these things. As a result, most IoT companies are selling only components when customers would like to buy finished products. It's like expecting your accountant to assemble a computer from motherboard and a handful of chips and start hacking together C# rather than simply downloading Excel to their Surface. End-users want hardware and software that work out of the box, not fragmented components they have to knit together.

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Connectivity wars are another reason why SIs and end-users are often confused about IoT. Telecom operators and network equipment providers enjoyed decades of rapid growth based on historical oligopolies and our ever-increasing appetite for voice and data services. Not surprisingly, the lion's share of media and trade coverage about IoT has focused on Telecoms. For the most past, that coverage has been about "which connectivity standard to use" rather than "what IoT really does." Mobile communication standards are dominated by large carriers who enjoy a unique position in their market by selling access to controlled airwaves they bought or leased from the governments. The powerful GSMA (Global System for Mobile Communications Association) brings together most mobile network operators and spends a considerable amount of marketing money promoting a future of the Internet of Things based on controlled mobile radio spectrum, using acronyms such as LTE-M and NB-IoT. Some competing approaches using free-to-air radio spectrum (typically called the "ISM bands" for Industrial, Scientific and Medical) also claim to have the perfect solution for IoT, whether they're using open or proprietary low-power protocols (e.g. LoRaWAN vs. Sigfox), building on existing standards (Bluetooth or Wi-Fi) or future promises (e.g. 5G, Li-Fi). The reality is that whilst a common communication protocol and infrastructure is critical (for instance, no Internet without TCP/IP), connectivity is a tiny part of the value chain of IoT, representing 5-10% at best and rapidly diminishing. Choosing which communication protocol should always be a function of the right one to serve the business case and never the starting point of any IoT project. Microshare chose LoRaWAN® as the most open IoT standard with a large choice of sensors available globally.

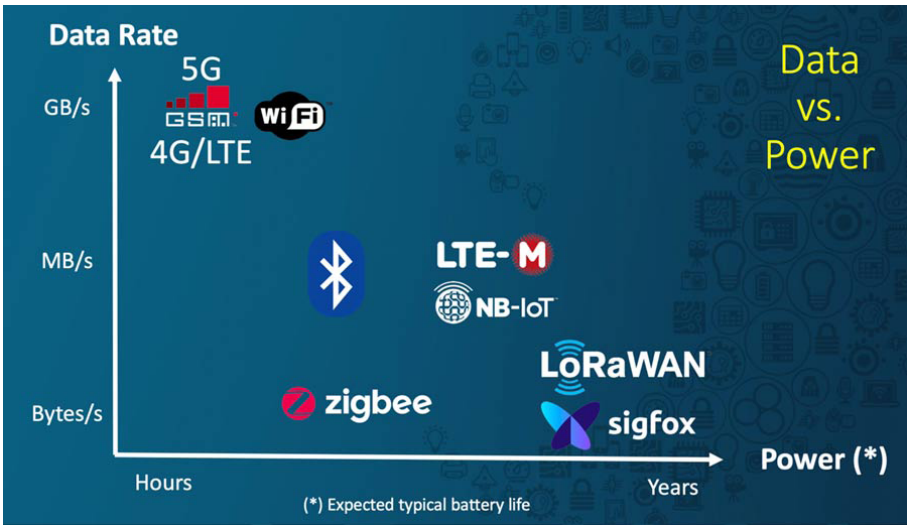

Fig 2: Example of a comparison to choose the right connectivity for the right job.

A surplus of varied, specialized hardware offerings has also slowed IoT adoption. Smartphone mass adoption was driven by a plethora of apps offered by companies great and small to serve all kinds of business and consumer needs. What made it possible for all of these to flourish was a common set of hardware capabilities, such as touchscreen, wireless connectivity, cloud storage and cameras, as well as support from the manufacturers such as security, marketplaces with curation and SDK frameworks to develop on the platforms. Fierce competition and the effects of Moore's Law ensured hardware devices got better and cheaper year by year. If IoT is to enjoy the success of smartphones, it also needs a good set of universal and affordable hardware components on which many companies can build apps dedicated to business segments, small or big, with enough abstraction from the hardware and connectivity layers for any developer to make it easy to learn.

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Global SIs focus on software & services, not hardware: Process outsourcing, software customization & professional services have been the cornerstones of global SI success over the last three decades. Hardware development and rollout have taken a back seat. IBM, for all intents and purposes the inventor of the Personal Computer, famously offloaded its PC division to Lenovo to focus on professional services. Large global SIs such as Accenture, Cap Gemini, Cognizant or Wipro are all broadly organized around the same three pillars of outsourcing, technology delivery and management consulting. Technology delivery which would be a natural candidate for IoT development has been primarily about customising and supporting deployments of commercially available off-the-shelf (COTS) software, such as SAP, Oracle or Salesforce, rather than sourcing, configuring, connecting and integrating customised electronics. Object-oriented languages, cloud systems and API integration are their forte. Programming micro-controllers in C/C++ or decoding base64 payloads on the other hand is miles away from their focus. Global SIs have a wealth of resources to deliver at scale software development, integration, change management and project delivery skills, but are lacking in confidence in hardware development, deployment and support.

Fixing the problem: Why SIs are critical

"Proof of concept" has been the unfortunate approach for too many corporates trying to figure out if and how IoT could improve their business. Someone in the business has a good idea to automatically measure or monitor something. They either start tinkering internally or run a hackathon with a bunch of Arduino boards pushing some data to a cloud server and proving that "IoT technically works," something everyone in the industry already knows. Anyone can get behind an "innovation hack" which costs less than the monthly photocopier paper budget. But established organizations are not going bet millions of dollars on scaling that IoT idea unless they can solve how to get a significant return from the investment. "Proof of value" is the real issue organizations need to solve for, not the concept of connecting real-life objects with electronics to the cloud to capture data, which is not a "concept" but a well-established reality since the 1980.[i] SIs are used to doing Return on Investment modelling to prove the value of their outsourcing or offshoring deals and can bring these models to IoT.

[i] The little-known story of the first IoT device
https://www.ibm.com/blogs/industries/little-known-story-first-iot-device/

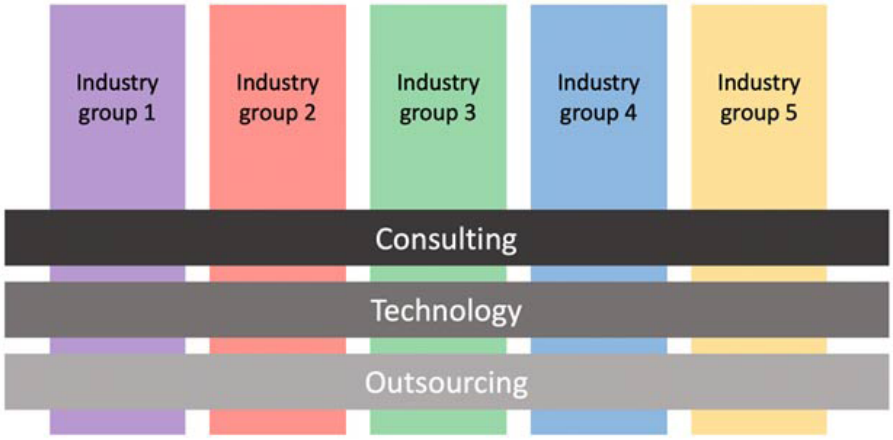

Fig 2: Example of a comparison to choose the right connectivity for the right job.

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SIs have deep vertical expertise: In addition to the typical horizontal organization around their outsourcing, technology and consulting capabilities, all large global SIs have vertically aligned industry groups. Each group represent thousands of professionals with a deep vertical knowledge of anything from Healthcare to Retail to fast-moving Consumer Goods or Manufacturing. That knowledge represents the required basis on which to establish the respective value from IoT solutions for that specific industry. The exact same IoT solution will have completely different business drivers for different industries. As an example, we found at Microshare that our washroom Predictive Cleaning solution had different value to different constituents. Facilities Managers serving Corporate Real Estate clients saw it as a tool to boost productivity; Airport operators perceived it a way to measure and increase Net Promoter Scores; Healthcare administrators saw its potential to reduce infection risks. Pitching the wrong benefit to the wrong audience is a sure way to miss opportunities. System Integrators with their intimate knowledge of industry drivers are the best placed to help identify the right value for each industry and in turn drive scale adoption of IoT.

Solution	Vertical	Primary Value driver
Washroom Predictive Cleaning	Corporate Real Estate	Productivity gains
	Airports	Net Promoter Score
	Healthcare	Infection reduction

Fig 4: Different primary metrics for ROI for the same solution in different industries.

Embracing Global Trends

The need to understand fully the dynamics of what happens inside corporate or other facilities has always offered operational efficiencies. In recent years, that rationale has been bolstered by the sustainability movement and the growing need for corporations to have data to address their ESG (Environmental | Social | Governance) ratings. Now, with the new realities and likely regulatory demands imposed by COVID-19, IoT's relevance has exploded, ensuring that SIs will get a hearing from people who dismissed these capabilities previously as a "nice to have." As the Economist Intelligence Unit noted in a report in June 2020, "COVID-19 has necessitated unprecedented changes in the way almost all companies operate... The Internet of Things (IoT) has been a key factor behind enabling these changes. The way countries have employed IoT during this crisis highlights the broader transformational potential of this technology for the post-pandemic economy." [i]

Project Management, Testing and Change Management are some of the additional skills for large-scale IoT adoption and success. Once the concept is established and the business value validated, IoT projects need to be treated just like any other large transformation. That means thinking holistically in a coherent manner about such things as:

- How to engage stakeholders from employees to customers to third party service providers to plan, prepare and deliver new devices or data
- How to embed the changes brought by innovation into everyday processes
- How to capture and act upon ideas for continuous improvement

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Many organizations lack the in-house resources to manage these challenges and therefore turn to contracting System Integrators for help. IoT becomes for these SIs an opportunity to re-deploy existing resources and grow their IoT business with little need for re-training. Several System Integrators that Microshare partners with are building very successful IoT practices without the need to really understand how the sensors or the networks work.

Data Integration and Analytics

A common error made by many IoT professionals is to think their job is done once sensors have been installed, are connected over the network and produce data being displayed in a dashboard. Dashboards are a really useful tool for people new to IoT to visualize and appropriate for themselves sensor-generated data when they first experience it. However, within weeks or months, the novelty wears off and people don't want to log into yet another system to look at their sensor data. Integrating sensor data into operational systems and, wherever possible, automating the data-driven decisions derived from that information is the key to embedding IoT durably into the new ways of working with minimal re-training from the end-users. As their job description implies, System Integrators are the specialists in getting systems to talk to one another and allowing data from one area to inform another. Whether you call it middleware, API management or simply data integration, building and maintaining the bridges of data flow are a core focus and capability for SIs and a natural role for them to play in the IoT value chain. Creating additional value from that sensor information, whether from enriching it with more context from various sources or making decisions and actions through rules and process automation is another area of expertise for SIs which gives them a natural advantage in scaling IoT. Finally, Artificial Intelligence and Machine Learning will only deliver their promises if they are fed with a lot of data. IoT is a critical source of information to feed the AI/ML models with streaming machine-generated data about the physical world with both more regularity and less subjectivity than human-generated data, to build the digital twins of tomorrow. Data science is a key growth opportunity for SIs for which IoT simply cannot be ignored.

Sensing-as-a-Service: How SIs unlock the potential for IoT at scale

Cloud services have been a great source of growth for all SIs who now have practices around PaaS such as Amazon Web Services or Microsoft Azure, as well as some of the popular cloud-native enterprise applications such as Salesforce, NetSuite or Workday. The success of these "as-a-Service" approaches is that they provide "a set of services aimed at developers that helps them develop and test apps without having to worry about the underlying infrastructure".[ii]

What if IoT could be consumed and enhanced by SIs just as easily as these other cloud services? IoT Sensing-as-a-Service is the key to enabling these companies to continue growing their industry-aligned services and leverage all their existing competencies and resources without the need to invest in learning and experimenting in electronics, radio propagation or network management.

At Microshare, we've had extensive experience of both the IoT and the large SI worlds, and we've spent years building abstraction services and business solutions to bridge these two worlds at scale. We are demonstrating that IoT Sensing-as-a-Service is allowing both our IoT ecosystem partners (e.g., sensor manufacturers, network providers) to tap into new markets and our SI partners to build the confidence to add IoT to their portfolio of solutions. SIs can focus on delivery of the services they are best at, such as project or change management, custom integration or user interfaces, with the confidence that the whole solution will work as it should.

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Lower complexity of implementation is achieved by focusing on the outcome desired from the solution, rather than the individual components which together make it work. Our SI partners get access to a standardized technology offering which has been end-to-end tested, both from a technical feasibility as well as a market-readiness point of view. All of the solutions are turnkey and work out of the box. Using the LoRaWAN® standard means additional sensors and solutions can be rapidly added into an existing Microshare sensing client environment leveraging the same infrastructure. We can also deploy the solutions on a choice of public or private LoRaWAN® networks based on geography and requirements. The result is that our partners are able to connect to our data feeds in minutes, without having to attend training classes or sit through long tutorials. They can invest their time in harnessing and enhancing the data for their clients' specific needs rather than figure out how to get a sensor deployed or connected or how to decode a HEX data uplink.

Demand aggregation allows Microshare to offer IoT Sensing-as-a-Service with a disruptive pricing model which in turn allow SI partners opportunities to create additional value and margin at scale. We have brought to market a set of turnkey IoT solutions which are both generic enough to be sold in volumes, and attractive to many industries, ranging from corporate real estate or manufacturing to healthcare or education. Microshare has thus found the "set of services" for IoT which allow our fulfilment organization to place significant orders on our supply chain. This drives the economies of scale we can turn into affordable volume subscription models for our customers and SI partners. As an example, our Occupancy-as-a-Service solution has been deployed by Microshare partners for such use cases as Corporate office desks utilization, washroom usage reporting, pest monitoring and access control recording. All these diverse use cases total up to millions of the exact same Sensing-as-a-Service solution. Leveraging the same hardware, connectivity and data management accessed via a normalised API gives our partners a common platform to build industry-specific value propositions with a learning curve and integration efforts of just a couple of hours.

Focus on one's strengths

There is absolutely no doubt that IoT is complex and needs to bring together many different kinds of expertise. But as we established, that is no different to the regular Internet. Internet pioneers needed to know everything from installing and running web server software to managing DNS entries to coding HTML which made them very scarce. Setting up a website can now be done in a few minutes on a cloud server with a Content Management System such as WordPress which abstracts all the underlying complexity of server, operating systems and databases. This allows website owners to focus on what is really important: great content and services. Turnkey IoT Sensing-as-a-Service is about bringing that same level of abstraction to the Internet of Things and allow System Integrators to stop worrying about how the underlying sensing infrastructure works, and instead build on their own strengths of industry knowledge, project and change management and data science to build great IoT-driven solutions.

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References

(*) The little-known story of the first IoT device
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(**) PaaS Primer: What is platform as a service and why does it matter?
https://www.networkworld.com/article/2163430/paas-primer--what-is-platform-as-a-service-and-why-does-it-matter-.html

[i] Economist Intelligence Unit, EIU Update (email), June 4, 2020
https://www.eiu.com/n/content/the-eiu-update/

[ii] PaaS Primer: What is platform as a service and why does it matter?
https://www.networkworld.com/article/2163430/paas-primer--what-is-platform-as-a-service-and-why-does-it-matter-.html

About the authors

Charles Paumelle is a Co-Founder and Chief Product Officer of Microshare, a Philadelphia-based Sensing-as-a-Service company. He is well versed in both Enterprise IoT implementation and large global Systems Integrators. Charles previously served as Accenture's Practice Lead for Business Process Management across Europe, Africa and Latin America. This followed the sale of his previous business, Knowledge Rules, to Accenture in 2010. In addition, Charles also served from 2017 to 2020 as the Marketing Chair for the LoRa Alliance, a global non-profit organisation promoting the open LoRaWAN low-power networking protocol for IoT connectivity, working with the entire ecosystem spanning the whole IoT value chain, from silicon, network providers, telecom operators to data management platforms. Charles holds a Master's in Business from Audencia (Nantes, FR) and Trinity College (Dublin, IE).

Tim Panagos is Microshare's Chief Technology Officer and Co-Founder and a recognized thought leader on data sharing and privacy issues. Tim has 20 years of experience in enterprise software, most recently as Chief Architect of Accenture's global Business Process Management (BPM) practice leading architecture innovation. Prior to that, Tim was CTO at Knowledge Rules, a global consulting start-up and held multiple engineering leadership roles at Pegasystems (PEGA). Tim holds a Masters in the Management of Technology from MIT and studied Computer Science at the University of New Hampshire.