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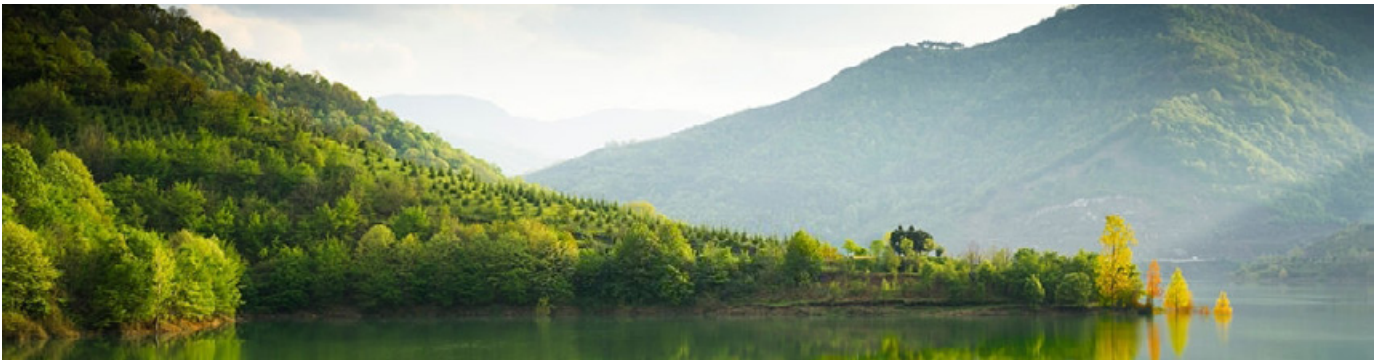
In partnership with

Life Is On

Schneider
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Services in the age of the IoT





Introduction

Climate change is considered a threat by 70% of people worldwide, and the level of concern is on the rise.ⁱ Meanwhile, the coronavirus pandemic has underscored the urgent need to protect the world in which we live. In the face of these threats, the importance of digital solutions, not only to delivering efficiencies, but also to ensuring resiliency, safety, and sustainability has become ever more acute.

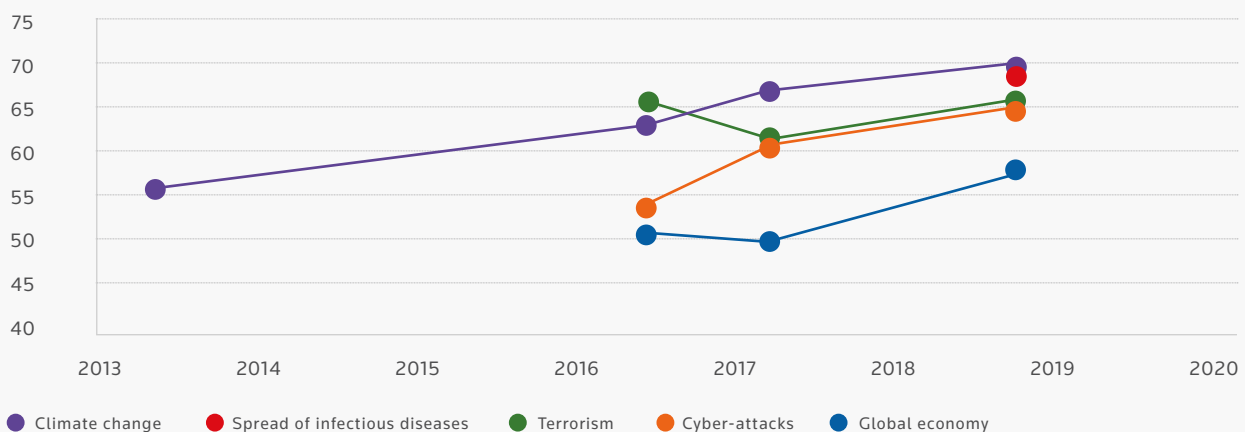
Humanity in the 21st Century has a unique set of technology tools with which to address sustainability challenges. The global threat of climate change will require collective global action. Increasingly, businesses will need to adopt a collaborative approach,

drawing upon expertise from across the value chain to deliver upon their goals.

The Internet of Things (IoT), or the use of sensors and networks to monitor and control physical assets, holds the potential to revolutionize industries and provide agility and eco-efficiency through automation. By 2030, up to 5.4 billion devices are forecast to be connected to the IoT by mobile networks alone.

This paper, developed in association with Schneider Electric, the most sustainable corporation in the world in 2021 according to Corporate Knights, will explore the creation of a services-oriented economy, powered by the IoT, and its potential to improve safety, resilience, efficiency, sustainability, and cybersecurity along the way.

Percentage of the population that considers ... as a threat to their country.



Source: CaixaBank Research, based on data from Pew Research.ⁱⁱ



Services in the IoT age

One of the consequences of global warming is that it has focused attention on the growing impact of economic externalities on human societies. Wasteful energy use has been a key contributing factor to the climate change crisis. Moreover, similar emergencies are appearing in areas as varied as ocean plastics and water availability as a result of economic models that prioritize production and consumption over efficiency and re-use.

Paradoxically, a use-and-throw-away model of consumption is not particularly good for producers, either, because it gives consumers regular opportunities to switch to competing products. Hence, a growing number of manufacturing companies are embracing the concept of 'servitization'—the use of a product as a delivery platform for life-long value-added services.

This model originated in the software world and is now being enabled in physical objects through the IoT. "We are in a world where we thought the resources were infinite," says Philippe Arsonneau, senior vice president of the services line of business at Schneider Electric. "Now we realize that's not true. People are starting to see we can do things with existing stuff much longer."

Switching to a service, rather than product-based model of consumption, means much of the waste associated with product manufacturing can be eliminated. At the same time, manufacturers will benefit from lower overheads and more predictable revenues, while having a greater incentive to repair, re-use, and extend the life of physical assets.

Boosting safety

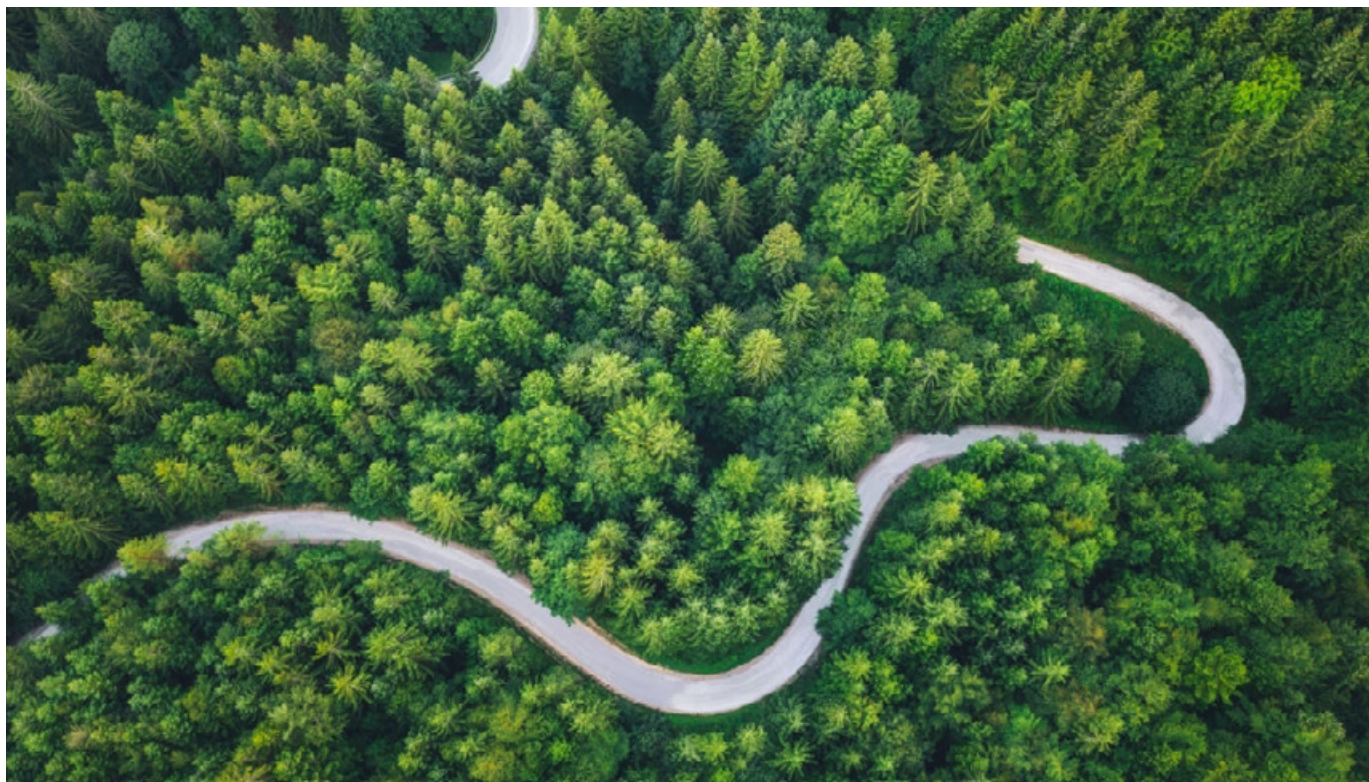
Before considering the IoT's impact on asset efficiencies and lifecycles, it is worth noting that the IoT first and foremost can bring about significant improvements in human safety. Sensors can deliver valuable data on the status of critical infrastructures, forewarning operators of the risk of failures. Such capabilities are of particular importance in high-risk work environments such as oil and gas drilling operations.

That is why oil and gas companies have embraced IoT services as a safety tool. Chevron, for instance, uses the IoT extensively for its Decision Support Center, which oversees complex well drilling. The Center monitors safety conditions relating to "deep water, high pressure, high temperature-type scenarios where the ramifications of things going wrong can be very bad," says Udayan Vyas, senior emerging technology strategist at Chevron.

As the Deepwater Horizon incident demonstrated, oil rig workers may have just minutes to respond to an emergency. If a distant operations center has to sound the alarm, it must get information in near-real time. That's the case at Chevron, thanks to the IoT. "All the variables that we really need to look at, from a process safety perspective, are now coming off the rigs into the center," Vyas says.

"And we're getting that sensor data, from the rig site to the screen in the room, within less than 90 seconds."





Delivering efficiency

One of the most important challenges facing the global economy is how to live more efficiently and relax the burden society imposes on the world's resources. In energy, for example, the International Renewable Energy Agency expects that a quarter of all the carbon-reduction efforts required to reach a net-zero emissions scenario by 2050 will have to come from efficiency measures.

And a key function of the IoT in the delivery of services is that it allows for more precise measurements, creating opportunities to improve efficiency. One example of efficiency gains is a pilot by the US Offshore Operators Committee Oil & Gas Blockchain Consortium (now called Blockchain for Energy), which combined IoT with blockchain to automate water haulage reconciliation at North Dakota Bakken field oil wells.

Previously, the amount of water transported by haulers had to be taken on trust, a system that could lead to errors, fraud and payment disputes. Now, though, water volumes are measured automatically using IoT sensors, and payments are issued automatically via smart contracts on a blockchain.

The pilot is delivering the potential for up to a 35% reallocation of resources versus current business processes for operator and trucking companies, while reducing process workflows from a minimum of 90 days down to one.ⁱⁱⁱ "It prevented unwanted practices and highlighted for you to remember to have more efficiency," says Rebecca Hofmann, Blockchain for Energy's president.

Enhancing resiliency

Along with improved efficiency, the IoT allows asset owners to monitor the condition of assets and carry out just-in-time preventive maintenance instead of suffering major failures. This translates to enhanced asset resilience, allowing assets to work for longer and deliver greater value over their lifetimes.

As an example, the steelmaker ArcelorMittal reduced downtime at its Belval rolling mill in Luxembourg by up to 10% after replacing the facility's aging electrical installation with new medium-voltage equipment plus a Schneider Electric EcoStruxure IoT monitoring system.^{iv} Improved monitoring is easy with IoT technologies since in many cases they ride on the back of existing communications networks.

"Control layers in electrical distribution have been connected since almost a decade ago," says Frederic Godelmel, executive vice president of power systems and

services at Schneider Electric. "All that data was used for local safety and control."

But now, "this connection for control remains, but you can add connectivity for monitoring and supporting operations," he says.

This monitoring capability is helping to avoid failures and extend asset lifetimes. And extending the lifespan of assets also has a highly beneficial impact on carbon footprints, since purchasing new industrial assets not only involves emissions in manufacturing but also right across the supply chain.

This has been the case at Belval, where the modernization of switchgear and transformers helped avoid the emission of 170 equivalent metric tons of CO₂ and prevented the reprocessing of 26 metric tons of materials.



Improving sustainability

Greater efficiency and resilience—making things do more with less, for longer—are key components of sustainability. Enabling sustainable operations is a growing concern for almost all industrial and commercial sectors. One industry that is particularly alive to the need for sustainability is the data center sector. This accounts for 1% of global carbon emissions and is set to see a compound annual growth rate of 21%, by market value, up to 2025.^v

Improving sustainability is important for the data center industry not just because many operators have a strong commitment to environmental, social and governance principles but also because power is one of its biggest operational costs. As a result, data center operators have long tried to reduce the ratio of the total amount of energy used by a facility to the energy delivered to computing equipment, also known as their power usage efficiency (PUE).

An ideal data center would have a PUE of 1, with all the energy it uses going straight into computing tasks. Reaching that level in practice would be impossible, and “15 years ago, data centers were operating at a PUE of 1.6,” says Arno van Gennip, senior director of facility operations at Equinix, the world’s largest digital infrastructure company.

Now, thanks to innovations such as the IoT, “they are down to 1.2, depending on where you are in the world,” he says. “We are able to operate them even better than design theories. The step from 1.6 PUE to 1.2 is enormous.”





Ensuring cybersecurity

One big concern about the IoT is that by connecting devices to networks there could be a much wider range of assets susceptible to cyberattack. The risk of cybercrime relating to critical assets is very real: in May 2021, a ransomware attack forced the closure of the 5,500-mile Colonial Pipeline, which supplies 45% of the gasoline used across the East Coast of the US.^{vi}

However, it is unclear how much the IoT could exacerbate such risks. A worry for many infrastructure and industrial companies is that IoT systems using cloud computing could be susceptible to attack, but in practice such systems can usually also be deployed on premise.

Then there is also the matter of what kind of data a hacker could access through the IoT. At Schneider Electric, for example, cybersecurity is taken very

seriously and on most devices a hacker would only be able to gain access to the data being picked up by a specific sensor—which is hardly a tempting proposition for a hacker.

Plus, “in critical cases, we have a completely separate network to make sure that there will be absolutely no interconnections with the operations,” says Yann Reynaud, senior vice president of global commercial operations for Schneider Electric’s services business.

To stay on top of cyber threats, Schneider Electric has a dedicated cybersecurity group that not only consults on internal product development affairs but also advises customers across a broad range of industries. The team looks at everything “from processes to equipment, to make the operation safe,” Reynaud says.

Outlook and conclusions

Although the deployment of IoT services is still in its infancy, the concept is gaining traction across multiple industries. The chemical giant BASF, for example, implemented an IoT-based Schneider Electric EcoStruxure Asset Advisor for remote visibility into operations when it built a new electrical substation at its Beaumont, Texas plant.

The setup means BASF can now remotely monitor the health of its new substation through a dashboard that provides a global operations index and specific asset status measures.^{vii} And the University of Rochester Medical Center has saved nearly \$1 million through the early discovery of equipment problems after deploying

EcoStruxure Asset Advisor across a power infrastructure that spans 5 million square feet of hospital and research space.^{viii}

This outcome is helping the Medical Center achieve its carbon reduction goals and, just as importantly, has delivered a twentyfold return on investment on the spend on IoT technology. In the face of results such as these, it seems inevitable that the IoT will continue to facilitate the trend towards a world where assets are not subject to defined lifetimes but can continue to provide a valuable service indefinitely.

And it will do this while improving safety, resilience, efficiency, sustainability and cybersecurity.



Resources

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