

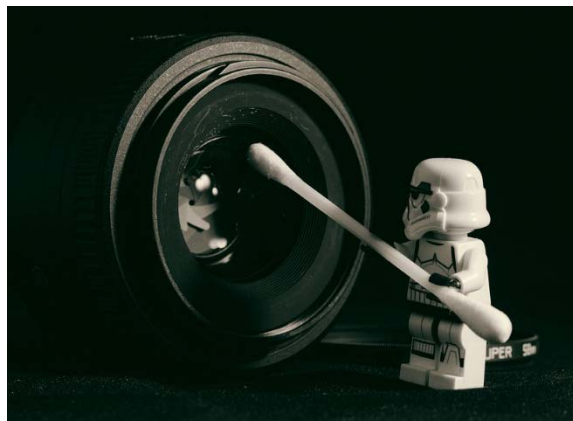


## *Innovation Insight*

No 10/18 October 2018

# The impact of emerging technologies on Commercial Cleaning of Facilities

*Selected recent trends*



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## Selected recent trends

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This report contains a selected number of references to recent trends and news articles published mainly circa September/October 2018, pertaining to the impact of emerging technologies on the commercial cleaning of facilities.

Views in the articles are those of the authors (or as stated in the articles), and are not necessarily supported by DeltaHedron. References are to open source articles, generally excluding peer-reviewed and academic journals.

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# The impact of emerging technologies on Commercial Cleaning of Facilities: Selected recent trends

## Executive Summary

A broad spectrum of emerging technologies continue to impact on facilities management, including commercial cleaning - typically interacting with one another and more mature technologies. The dynamics of technological change present strategic risks to companies in this sector, in that they create new opportunities for those that seize them, but also threats for those that don't. Disruptive technological innovations not only spawn new companies and industries, but also render laggard companies and entire industries obsolete.

A number of emerging technologies have specific application in commercial cleaning. These include robotics and automation, the internet of things and sensors, mobile technologies as well as wearables as well as advances in materials and chemicals.

These emerging technologies enable more efficient, productive and competitive operational practices, often underpinned by new business models. These include, for example, enhanced asset tracking and management, as well as logistics and automated procurement. Analytics, big data and artificial intelligence can be utilised to implement better optimized processes. In addition, a number of other emerging technologies, mainly centred on digitalisation, are bringing great benefits to businesses in general, including their back office operations and marketing. Virtual reality (VR) and augmented reality (AR), for example, have been shown to enhance staff training significantly. It is foreseen that trends in smart buildings, including offices, factories and homes, will also impact on commercial cleaning.

There is no doubt that the adoption of appropriate emerging technologies can provide significant business advantage to companies in the commercial cleaning of facilities sector. Knowing what the future may bring is one thing, however – knowing what to do about it is quite another. Technology intelligence pertaining to emerging technologies and the dynamics of technological change should be utilised as an important element of a broader innovation strategy to maximise the real benefits.

This report contains references to news articles published in the open media, mainly circa September/October 2018. The list is not comprehensive nor exhaustive, but does provide an overview of trends and selected examples of the broad impact of a number of emerging technologies on various disciplines and applications in commercial cleaning of facilities. A number of articles in this report focus on other industries, such as healthcare and the automotive sector. The reason is that there is much we can learn from other industries - the principles are transferable and are applicable to applications in commercial cleaning.

## Quicklinks

**Artificial intelligence (AI) and machine learning**

**Asset tracking/management and biometrics**

**Augmented reality (AR) and virtual reality (VR)**

**Cleaning equipment**

**Cleaning processes and practices**

**Customer experience**

**Cyber security and blockchain**

**Internet of Things (IoT) and sensors**

**Robotics and automation**

**Smart buildings and devices**

**Trends, innovation and emerging technologies**

**Wifi, mobile and telecommunications**

## Artificial Intelligence (AI) and machine learning

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- **VergeSense's artificial intelligence (AI) sensing hardware tackles facility management**

(Source: TechCrunch) [\[Return comment\]](#)

- **The real-world applications of artificial intelligence in marketing**

(Source: Entrepreneur, Oct 2018) [\[Return comment\]](#)

- **Artificial reality, virtual reality (VR) and specialized surgeons are advancing surgery and patient safety**

(Source: Mobihealth News) [\[Return comment\]](#)

- **Automakers extend artificial intelligence use beyond autonomous vehicles into back office**

(Source: Nvidia, 10 Oct 2018) [\[Return comment\]](#)

"For companies developing autonomous vehicles, AI may be taking the wheel, but it's also increasingly being used in the back office. Automakers, suppliers and startups developing self-driving cars are implementing deep learning algorithms to operate vehicles without a human driver."

## Asset tracking /management and biometrics

[\[Back to Quick links\]](#)

- **Start outcomes-based security with asset identification**

(Source: Computer Weekly) [\[Return comment\]](#)

- **Asset-tracking technology gains traction**

(Source: Waste360) [\[Return comment\]](#)

- **Benefits of biometrics**

(Source: Information Security Buzz) [\[Return comment\]](#)

- **Cover your assets: The rise of the super-intelligent supply chain**

(Source: Forbes) [\[Return comment\]](#)

- **RFID and wireless internet of things (IoT) tomorrow 2018**

(Source: The Financial Times) [\[Return comment\]](#)

- **RFID locks: key drivers and analysis for the North American market (2018-2024)**

(Source: Business Wire) [\[Return comment\]](#)

- **Facial recognition tech to verify age for alcohol sales in UK supermarkets**

(Source: ZD Net, 18 Oct 2018) [\[Return comment\]](#)

"This device is unable to play the requested video. UK supermarkets are reportedly going to adopt facial recognition technology at self-checkouts to verify the age of customers buying products. The pilot scheme will be rolled out in checkout areas in which customers serve themselves by the end of the year."

- **Next-generation sensors take to the field**

(Source: TD World) [\[Return comment\]](#)

- **New tool uses your smartphone camera to track your alertness at work**

(Source: Science Daily, 18 Oct 2018) *[Return comment]*

“Our level of alertness rises and falls over the course of a workday, sometimes causing our energy to drop and our minds to wander just as we need to perform important tasks. To help understand these patterns and improve productivity, researchers have developed a tool that tracks alertness by measuring pupil size, captured through a burst of photographs taken every time users unlock their smartphones”

- **First to market: Facial recognition startups**

(Source: Wired) *[Return comment]*

- **Global asset management 2018: The digital metamorphosis**

(Source: Boston Consulting Group) *[Return comment]*

## Augmented reality (AR) and virtual reality (VR)

[\[Back to Quick links\]](#)

- **What augmented reality training is and how to leverage it in your learning and development process**

(Source: eLearning Industry) *[Return comment]*

- **Wayfair launches augmented reality (AR) home design app**

(Source: Retail Dive, 12 Oct 2018) *[Return comment]*

“Wayfair, the online marketer of home furnishings, released an interior design app called Wayfair Spaces that works with augmented reality (AR) headsets developed by Magic Leap One. The app lets shoppers see professionally designed rooms and helps them visualize products in their homes”

- **Soldiers to get advanced virtual training tools next year**

(Source: Military) *[Return comment]*

- **3D printing and virtual reality (VR) tech could cut office construction waste**

(Source: Facilities Management World) *[Return comment]*

- **7 Fields and professions that are beginning to rely on virtual reality (VR)**

(Source: Innovation Excellence) *[Return comment]*

- **Box Measure and Send is a free postage app that uses augmented reality (AR) to measure your parcels for you**

(Source: Android Headlines) *[Return comment]*

- **How to use virtual reality for employee training: 3 Virtual Reality (VR) platforms to check out**

(Source: Tech Republic) *[Return comment]*

- **In 2018, virtual reality (VR) stopped "having potential" and started being real**

(Source: Venture Beat) *[Return comment]*

- **Macy's expanding virtual reality (VR) furniture shopping to 90 stores by January 2019**

(Source: Retail Dive, 12 Oct 2018) *[Return comment]*

“Macy's has launched virtual reality furniture shopping experiences in about 70 of its stores nationwide, with plans to expand the capabilities to 20 more stores by January 2019. The offering is the largest in-store VR rollout in retail history”



## Cleaning equipment

[\[Back to Quick links\]](#)

- **Want a robot vacuum for your workspace?**

(Source: ZD Net, 18 Oct 2018) *[Return comment]*

“This device is unable to play the requested video. New technologies are optimizing modern offices for better collaboration, productivity, energy efficiency, employee health, and, believe it or not, cleanliness.”

- **The latest Roomba vacuum will even empty its own dust bin**

(Source: Mental Floss, Oct 2018) *[Return comment]*

“Since launching in 2002, the Roomba has become the closest thing modern homeowners can get to Rosie the robot maid from The Jetsons. A new feature in the latest model of iRobot’s smart vacuum makes it even smarter—meaning even less work for users.”

- **Stepping on Legos: Soon a thing of the past with this robot that tidies up rooms**

(Source: Uber Gizmo, 18 Oct 2018) *[Return comment]*

“We all know how fast a room can go from tidy to messy, especially if children toys are involved. What if there was a robot smart enough to sort things up, so you never step on a LEGO or come back to a messy room again?”

- **Say goodbye to household cleaning with Samsung's robot vacuum**

(Source: Tech Spot, Oct 2018) *[Return comment]*

“Cleaning your house is now easier than ever before. With the latest visionary robotic technology, the Samsung POWERbot Star Wars Robot Vacuum is the future of household cleaning. Say goodbye to cleaning chores forever with this intelligent robot vacuum that can avoid obstacles and clean corners.”

- **Robot vacuum cleaner: Which one is the best? 2018**

(Source: US Tech Portal, 18 Oct 2018) *[Return comment]*

“Gone are the days when you carry a heavy vacuum cleaner in your hand to clean your house. With the new advent of technology, cleaning your home became easier. The traditional vacuum cleaner is now a robot, and it requires minimum physical effort to clean your house.”

- **Best robot vacuum cleaners 2018: Clean your home automatically**

(Source: Trusted Reviews, Oct 2018) *[Return comment]*

“Vacuuming is not a fun job, so why not hand the hard work off to a robot? With one of our best robot vacuum cleaners, you can clean your home more regularly. With these maintenance cleans, your house will be tidier and a full vacuum will take far less time.”

- **Coral One 2-in-1 vacuum cleaner**

(Source: The Awesomer, Oct 2018) *[Return comment]*

“Vacuum cleaner robots are great, but there are lots of places that they can’t reach. That’s where the Coral One comes in. It looks and works like a vacuum robot, but its core can be detached and used as a Dustbuster-style handheld cleaner as well.”

- **Hands-free robotic floor care machine with built-in sensors**

(Source: Facility Executive) *[Return comment]*

- **London Underground stations are getting vending machines that'll clean your clothes**

(Source: The Verge, Oct 2018) *[Return comment]*

"Need clean clothes but can't fit visiting the launderette into your go-getting London lifestyle? A new startup called Vclean Life is promising to help with its new laundry vending machines, which it's currently trialing in the car parks of select London Underground stations"

- **New cleaning product inspired by 20,000 mile adventure**

(Source: Motorcycle News, Oct 2018) *[Return comment]*

"Elijah Anisovets has launched a novel new product to clean your visor on the move. Kelias Visor Clear combines a microfibre cloth and a spray bottle for cleaning solution which attaches via a powerful magnet to your motorbike's handlebars."

## Cleaning processes and practices

[\[Back to Quick links\]](#)

- **10 tips when water damage hits**

(Source: Facility Executive, Sep 2018) *[Return comment]*

"Water is a powerful element. While critical to meeting basic human needs, water can also be unpredictable, relentless, and destructive. This becomes alarmingly apparent in the face of a natural disaster"

- **12 Things only professional cleaners know**

(Source: Coastal Living, May 2017) *[Return comment]*

- **20 Doable ways to deep clean your home this weekend**

(Source: Apartment Therapy, 19 Oct 2018) *[Return comment]*

- **How advertising for cleaning products is fuelling ecological collapse**

(Source: Independent, Oct 2018) *[Return comment]*

"There are many rational reasons that motivate consumers to spend £50bn annually on household cleaning products. But non-rational mechanisms are nevertheless still at work in the cleaning products market, as in all others."

## Customer experience

[\[Back to Quick links\]](#)

- **Using analytics to increase satisfaction, efficiency, and revenue in customer service**

(Source: McKinsey, Oct 2018) *[Return comment]*

"Payments providers that adopt advanced analytics to develop integrated approaches to customer service are seeing significant improvements. As payments providers around the globe cope with increasing pressure on revenues and margins, customer service is increasingly becoming an important asset for driving top- and bottom-line performance, and improving the customer experience"

- **How 5 retailers succeed in redefining the customer experience**

(Source: Business Insider, Oct 2018) *[Return comment]*

"When it comes to department stores and marketplace retailers, digital truly is the divide. Traditional legacy brands have struggled with e-commerce, while their digital-first counterparts haven't always been able to translate to the physical world."

- **Top technology trends impacting customer experience**

(Source: Gartner) *[Return comment]*

## Cyber security and blockchain

[\[Back to Quick links\]](#)

- **There are a lot of fish in the sea - blockchain could help track them**

(Source: Marketplace, 18 Oct 2018) [\[Return comment\]](#)

“Reporting and collecting data up and down the supply chain could determine whether seafood really is sustainably caught, processed and sold”

- **How To protect healthcare internet of things devices in a zero trust world**

(Source: Forbes, 23 Oct 2018) [\[Return comment\]](#)

“Over 100M healthcare IoT devices are installed worldwide today, growing to 161M by 2020, attaining a Compound Annual Growth Rate (CAGR) of 17.2% in just three years. Healthcare executives say privacy concerns (59%), legacy system integration (55%) and security concerns (54%) are the top three barriers holding back Internet of Things (IoT) adoption in healthcare organizations today according to an Accenture 2017 Internet of Health Things Survey.”

- **IBM’s blockchain patents: From food-tracking and shipping to internet of things and security solutions**

(Source: Coin Telegraph, Oct 2018) [\[Return comment\]](#)

“The adoption of blockchain technology is slowly taking shape across a multitude of industries. At the forefront of the amalgamation of payment systems and logistics is US tech giant International Business Machines Corporation (IBM), which has established itself as a leader in terms of blockchain-based products and offerings.”

## Internet of Things and sensors

[\[Back to Quick links\]](#)

- **What’s the best way to use your internet of things data? [VIDEO]**

(Source: Forbes, 19 Oct 2018) [\[Return comment\]](#)

“What’s the most valuable use of your Internet of Things (IoT) data? The answer could be: fixing things before they break. The biggest benefits for the customers using IoT data is in the maintenance”

- **What is the future of internet of things (IOT)**

(Source: Dataconomy, 3 Oct 2018) [\[Return comment\]](#)

“Why should IoT meet blockchain? Combining these two concepts allows companies and even consumers to directly monetize the “billion times more information” that is generated by the approximately 30 sensors in your car, engine sensors in airplanes measuring 5,000 elements per second, and billions of other sensors in every part of our daily lives measuring things like weather effects, pollutants, location, fuel, temperature, humidity, moisture, sound, vibration, wind resistance, pressure, weight, electricity, and more than 300 other types of elements.”

- **This mini sensor can instantly detect 31,000 colors**

(Source: Interesting Engineering) [\[Return comment\]](#)

- **The rise, fall and return of RFID**

(Source: Retail Dive) [\[Return comment\]](#)

- **These tags turn everyday objects into smart, connected devices**

(Source: UC San Diego News) [\[Return comment\]](#)



- **The 'internet of things': How much is it tracking you?**

(Source: The Internet of Things, 20 Oct 2018) *[Return comment]*

“The ‘internet of things’ is composed of all the devices and appliances that allow a user to turn up the heat, brew a pot of coffee or start the Crock Pot from a smartphone. The convenience is great, but a real-life experiment at Northeastern University is finding there are several potential dangers that a user might not realize.”

- **Temperature sensors — now you see them, now you don't**

(Source: IEEE Spectrum) *[Return comment]*

“You may not know it, but temperature sensors are present throughout many of the daily tasks in our lives. Thinking back on your day today – did you turn on the kettle for a cup of coffee or take the milk out of the refrigerator?”

- **Supply chain management projects to spark jump in internet of things (IoT) investment through 2023**

(Source: DC Velocity) *[Return comment]*

- **Sensor technology: Tracking occupancy for improved space planning**

(Source: Facility Executive, 18 Oct 2018) *[Return comment]*

- **Smart tags add touch controls to ordinary objects**

(Source: IEEE Spectrum) *[Return comment]*

- **Is geofencing the future of targeted marketing?**

(Source: Smart Insights, 22 Oct 2018) *[Return comment]*

“Geofencing has been gaining popularity recently when it comes to local marketing, but what is it and how useful is it really? If you’ve been working in digital marketing, and in local marketing especially, you’re bound to have come across one of the biggest buzzwords in the industry right now – geofencing. “

- **Internet of things takes South Africa by storm**

(Source: IT News Africa, 19 Oct 2018) *[Return comment]*

“Everyone agrees, technology and the internet of things (IoT) has transformed the way we live our lives and co-existing without our gadgets, a screen full of applications, and an internet connection is near impossible these days.”

- **Internet of things shaping new facilities management paradigms**

(Source: IT News Africa) *[Return comment]*

- **Internet of things security solution identifies and mitigates threats in real-time**

(Source: Facility Executive, Oct 2018) *[Return comment]*

- **Industrial revolutions: Using industrial internet of things to create profitable efficiencies**

(Source: Australian Mining, 14 Oct 2018) *[Return comment]*

“The vast potential of IIoT (Industrial internet of things) is finally giving industrial companies the ability to control their business performance in real time and drive operational profitability improvements – safely and sustainably”

- **IoT analytics guide: What to expect from internet of things data**

(Source: Network World, Oct 2018) *[Return comment]*

“The growth of the Internet of Things (IoT) is having a big impact on lots of areas within enterprise IT, and data analytics is one of them. Companies are gathering huge volumes of information from all kinds of connected objects, such as data about how consumers are using certain products, the performance of corporate assets, and the environmental conditions in which systems operate.”

- **How the internet of things is changing your office forever**

(Source: Smart Data Collective) *[Return comment]*

- **How Internet of Things (IoT) data ecosystems will transform B2B competition**

(Source: Boston Consulting Group) *[Return comment]*

- **4 Examples of how internet of things (IoT) makes your business more efficient**

(Source: Small Biz Trends) *[Return comment]*

- **A contactless RFID system based on chipless MIW tags**

(Source: IEEE Xplore) *[Return comment]*

- **Are the police using smart-home internet of things devices to spy on people?**

(Source: Schneier, 22 Oct 2018) *[Return comment]*

“IoT devices are surveillance devices, and manufacturers generally use them to collect data on their customers. Surveillance is still the business model of the Internet, and this data is used against the customers’ interests: either by the device manufacturer or by some third-party the manufacturer sells the data to.”

- **Internet of things connectivity for heavy equipment**

(Source: Construc Tech, Oct 2018) *[Return comment]*

“One of the biggest challenges contractors face is getting the most out of every dollar invested in heavy equipment. Measuring fleet utilization has always been a tricky science, but the more precisely a business can track each machine’s contributions to their bottomline, the better their return on equipment investments will be.”

## Robotics and automation

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- **Advanced computer vision lets robot pick up virtually any object**

(Source: Power Electronics, 17 Oct 2018) *[Return comment]*

“Humans have long been masters of dexterity, a skill that can largely be credited to the help of our eyes. Robots, meanwhile, are still catching up. For decades, robots in controlled environments like assembly lines have been able to pick up the same object over and over again.”

- **Amazon robotics is automating everything**

(Source: The New American, 18 Oct 2018) *[Return comment]*

“When Amazon, the largest Internet retailer in the world, purchased Kiva Systems in 2012, it paid almost a billion dollars for it; and it transformed, and continues to transform, the company. Amazon wanted the technology behind the Kiva robots that were previously being used by The Gap, Walgreens, Staples, Office Depot, Crate & Barrel, and Saks 5<sup>th</sup> Avenue.”

## Smart buildings and devices

[\[Back to Quick links\]](#)

- **For smarter buildings, we need to bridge the IT-facilities divide**

(Source: Techtarget) [\[Return comment\]](#)

- **Google's Home app gets much better design and can now control smart devices remotely**

(Source: The Verge) [\[Return comment\]](#)

- **Smart home and industrial IoT connectivity highlighted**

(Source: Electro Pages, 22 Oct 2018) [\[Return comment\]](#)

"Explore the latest silicon, software and solutions for a smarter, more connected world with Silicon Labs. Discover what's next for the IoT, discuss the latest IoT innovations with wireless experts, and see live demonstrations of Bluetooth, Wi-Fi and Zigbee connectivity for the smart home and industrial IoT"

- **Smart home automation market forecast to grow at 13.6% CAGR to 2026**

(Source: Empowered News) [\[Return comment\]](#)

## Trends, innovation and emerging technologies

[\[Back to Quick links\]](#)

- **'Welcome to what's next': intrigue and anxiety await business tech**

(Source: CIO Dive, 17 Oct 2018) [\[Return comment\]](#)

"CIOs and other technology business executives are tasked with making IT decisions that have a long-term impact on the business. A vast technology ecosystem amplifies indecision, especially when next-generation technologies promise disruption."

- **Voice controlled windows tint on command**

(Source: Construction Enquirer, Oct 2018) [\[Return comment\]](#)

"Building occupiers can now control the dynamic glass tint via simple voice commands to optimise daylight and outdoor views while preventing heat gain and glare."

- **The 5 biggest innovations in facility management technology**

(Source: Facility Executive) [\[Return comment\]](#)

- **Technological changes you will probably notice in the near future**

(Source: The Costa Rica News, 15 Oct 2018) [\[Return comment\]](#)

"What will be the daily life and the industries in the future? An analysis of the firm EY describes how emerging technologies and demographic changes will reinvent the daily lives of human beings"

- **Key technology trends driving facilities management industry**

(Source: Business World) [\[Return comment\]](#)

- **Gartner: Top 10 strategic technology trends for 2019**

(Source: Forbes, 22 Oct 2018) [\[Return comment\]](#)

"Gartner has identified a top ten strategic technology trends for the year ahead. Gartner defines "strategic" as those technologies that will have significant disruptive potential over the next five years"

- **Here are the 10 top tech trends you need to understand right now**

(Source: ZD Net, October 2018) *[Return comment]*

“Tech analyst firm Gartner has compiled a list of the top ten strategic technology trends that organisations need to explore in 2019. According to Garner, these technologies have substantial disruptive potential and are either on the edge of making a big impact, or could reach a tipping point in the next five years”

## **Wifi, mobile and telecommunications**

[\[Back to Quick links\]](#)

- **Three things you need to do if you wanna monetize 5G**

(Source: Disruptive Asia) *[Return comment]*

- **5G is almost a reality - here's what it'll really feel like**

(Source: CNET, 17 Oct 2018) *[Return comment]*

“You couldn’t miss the explosion of purple and magenta amid the sedate stone and marble interior of Grand Central Terminal’s Vanderbilt Hall. T-Mobile was, at least temporarily, making its mark on the New York icon.”

- **The evolution is here, meet 5G**

(Source: IT Proportal) *[Return comment]*

A selection of the emerging technologies continuously monitored by DeltaHedron®

Emerging technologies	Applications	Industries
3D Printing and scanning Artificial Intelligence (AI) and Machine Learning Artificial Reality (AR), Virtual Reality (VR) Automotive Autonomous, flying, hybrid Electric, petrol, diesel, hydrogen, battery Basic sciences Astronomy, biology, chemistry, physics Mathematics, statistics, geology Biotechnology Blockchain Cryptocurrencies Bots Chatbots Robotics and automation Biometrics, voice/facial recognition Computers and computing Quantum computing High Performance Computing Memory storage Data Big data, analytics, business intelligence Cybersecurity, data protection Data science Digital and ICT Mobile, cloud, wireless, wifi Software, SaaS, APIs Broadband, wifi, 5G, VOIP Drones Electronics and photonics Antennas, radar, lidar, LoRA, sonar Energy Batteries, storage, renewables Electric, fossil, oil/gas, nuclear, hydro Hydrogen, solar, wind Imaging Holograms, photography, video Internet of Things (IoT) Industrial, sensors, RFID Materials Building, chemicals, bio, graphene, nano Metals, metallurgy, plastics, self-healing Wearables	Asset management Protection, tracking Anti-poaching Cities and communities Real estate Smart cities Smart factory Smart home, office Customer experience Consumers, UX Digital identity, e-privacy Data protection, GDPR Environment Carbon emissions Climate change, conservation Water, marine, oceans Fraud prevention Anti-counterfeiting Games, toys Geolocation, mapping Navigation, GPS Health Dental Digital health Diseases/medical conditions Health and safety Hospitals, homecare Mental health, psychology Pharma, medicine ICT Data centres Enterprise systems Internet, online, web Phones, tablets, apps Management/governance Search Engine Optimisation Software development Telecommunications Legal, IP and patenting Maintenance Marketing, branding Packaging Workflow X-as-a-Service (XaaS)	Aerospace Agriculture, food, agritech Animals, crops, plants, fisheries Arts and culture Built Environment, construction Constructechs, housing Chemical, biochemical Defence Education Edtech Higher education and schools Corporate learning Energy Engineering Entertainment, music Fashion, textiles Financial, banking, investment e-Payments Fintechs, insurtechs Insurance, actuarial Health, pharma, cosmetics ICT Logistics, procurement Supply chain Manufacturing Maritime, marine, oceans Shipping, ports Media, journalism, publishing Social media Mining and minerals Philanthropy, CSR Professions Accounting, Auditing Engineering, Health, Legal Public sector, digital government Retail Security and policing Service industries Sport, exercise, leisure Telecommunications Tourism, travel, hospitality Transport, infrastructure Air travel and airports Public transport, rail, road

Business impact and cross-cutting themes

Trends and future thinking Digital transformation Disruption Dynamics of technological change Societies and communities Generational impact World of work and employment Freelance, gig economy HR management, recruitment	Risk management Innovation management Business models/platforms Corporate culture Incubators/accelerators Science and techno parks R&D, technology transfer Ventures, startups and entrepreneurship	Leadership and management Change management Decision-making/support Ethics and values National and regional interest Competitiveness Economic impact Fourth Industrial Revolution Innovation systems/policy
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# The impact of emerging technologies on Commercial Cleaning of Facilities: Selected recent trends



DeltaHedron® Ltd is a UK-based consulting firm with a global reach, specialising in the management of technological innovation. Our focus is on supporting our clients to assess and manage the strategic business impact, opportunities, risks and threats presented by emerging technologies and the dynamics of technological change.

*“A company with an engineering soul, an innovation mindset and a business outlook”*



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