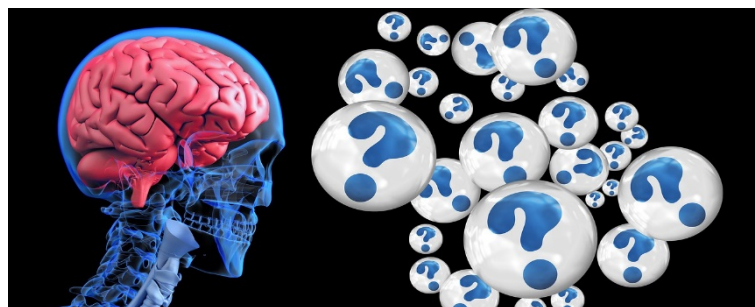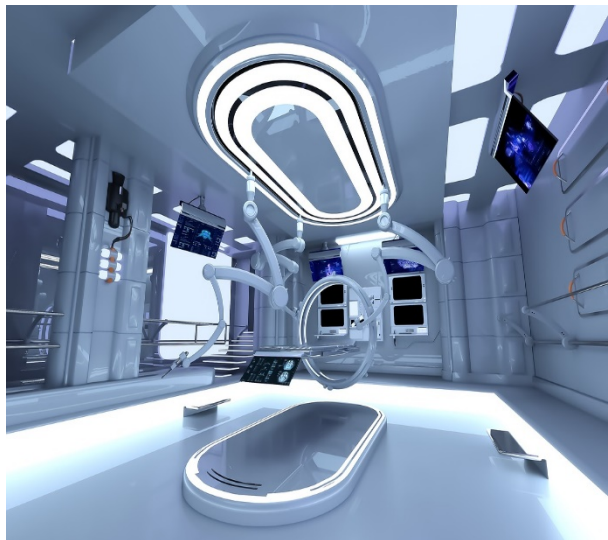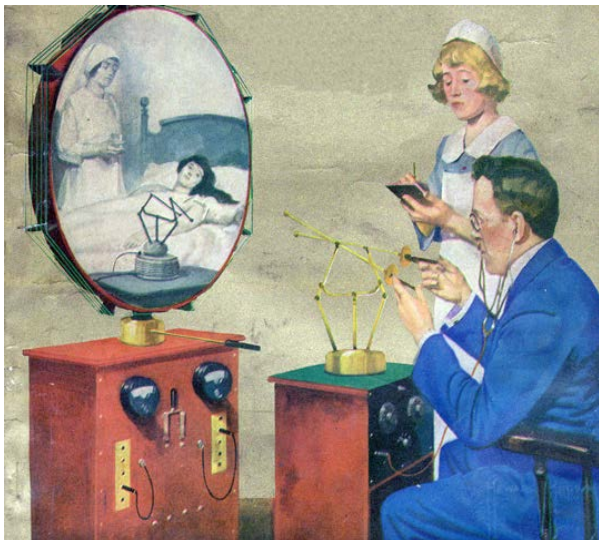*Innovation Insight*

No 9/18   October 2018

The impact of emerging technologies on Healthcare

Selected recent trends

The impact of emerging technologies on Healthcare: Selected recent trends

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

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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Photo images frontpage: Telemedicine Predicted in 1925 - A doctor's diagnosis by radio on the cover of the February 1925 issue of *Science and Invention* magazine; Pixabay

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Executive Summary

A broad spectrum of emerging technologies continue to impact on healthcare and the healthcare industry, including 3D printing of organs and devices, artificial intelligence and machine learning, analytics and big data, virtual and augmented reality, blockchain, robotics, the internet of things and drones as well as advances in biotechnology and materials - typically interacting with one another and more mature technologies. Mobile technologies, wearables and the cloud are enabling and creating exciting and viable opportunities in remote and telehealth, homecare, clinical trials as well as medical devices, procedures and diagnostics. Innovations driven by these dynamics of technological change have a strategic impact on the health and care of patients as well as the healthcare industry, profession and national health systems.

All aspects of healthcare are affected, including primary, secondary and tertiary care; the span of clinical disciplines, nursing, therapy, treatment regimes, biotechnology, pharmaceuticals and funding as well as research to combat diseases. In order to ensure that the benefits are captured now and in the future, it is essential that current and future healthcare practioners and the institutions that educate and train them embrace and adopt the emerging technologies. It is important to understand not only how emerging technologies can improve and enhance current ways of working, but also the new opportunities, new solutions and new capabilities that are being opened – that is the essence of "disruptive innovation".

This report contains references to news articles published in the open media circa September/October 2018. The list is not comprehensive nor exhaustivd, 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 healthcare.

[Please also refer to *Developments in Emerging Digital Health Technologies*, DeltaHedron Innovation Insight, No 1.2/17, April 2017 (**www.deltahedron.co.uk/publications/**)]

Quicklinks

3D printing

Artificial intelligence and machine learning

Biotechnology and biology

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Treatments, surgery and diseases

UK and NHS

Virtual Reality (VR) and Augmented Reality (AR)

3D Printing　　　　　　　　　　　　　　　　[Back to Quick links]

- **Novel 3D bioprinting tech could create artificial blood vessels and organ tissue**

  (Source: 3Ders, 23 Oct 2018) *[Return comment]*

  "CU Boulder engineers have developed a 3D printing technique that can recreate the complex geometry of blood vessels, and could one day be used to produce artificial arteries and organ tissue. THe 3D printing method allows for localized control of an object's firmness."

- **3D printed mini-brains grown in test tubes used to study degenerative disease**

  (Source: ZD Net, 19 Oct 2018) *[Return comment]*

  [Video] "Researchers from Tufts University have developed test-tube brains through 3D printing and stem cells in order to tackle a range of degenerative diseases."

- **Swedish startup is 3D printing human organs**

  (Source: World Economic Forum) *[Return comment]*

- **Using 3D printing to reduce the amount of sugar in cookies…without making them inedible**

  (Source: 3DPrint, Oct 2018) *[Return comment]*

  "Cookies aren't very healthy because of all the sugar they contain. But, partially because obesity rates have been increasing, there is a tendency towards reducing sugar in oods like cookies, or replacing it with something else altogether, perhaps with artificial sweeteners such as sucrose"

- **This 3D-printed prosthetic hand combines speed and strength with simplicity**

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

  "Prosthetic limbs have developed from the heavy, solid hands and legs of the past, however it's still difficult to incorporate a range of motion into them without complex or bulky machinery. New research at Cornell University uses a cleverly designed 3D-printed mechanism to achieve speed and strength with simple construction at reduced cost"

- **Innovation or not – 3D printed body parts**

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

- **Olympus unveils 3D/FlexDex laparoscopic surgical solution**

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

  "The 3D/FlexDex laparoscopic surgical solution can be used in multiple procedures, including general surgery and gynecological specialties. Through an exclusive US distribution agreement, the company is leveraging Endoeye Flex 3D laparoscopic imaging technology with the wristed needle-driver of FlexDex to optimize the capabilities of minimal access surgery and provide the cost-effective robotic solution"

- **3D bioprinting of living structures with built-in chemical sensors**

  (Source: 3ders) *[Return comment]*

- **Real-time rheology system used in 3D printing and bioprinting**

  (Source: 3DPrint, 19 Oct 2018) *[Return comment]*

- **The future of medicine and dentistry in 3D printing featured at upcoming additive manufacturing strategies conference in Boston in January 2019**

  (Source: 3DPrint) *[Return comment]*

Analytics and big data   [Back to Quick links]

• **How blockchain-enabled analytics can be used for insights in healthcare**

(Source: Analytics India Magazine, 6 Oct 2018) *[Return comment]*

• **How Data Science Contribute to Better Health Care**

(Source: Hello Doktor) *[Return comment]*

• **Tissue analytics introduces 3D wound imaging feature for smartphones**

(Source: Cpmpelo, 9 Oct 2018) *[Return comment]*

"Tissue Analytics, a developer of artificial intelligence-powered software solutions for several therapy areas, has launched a 3D wound imaging feature for smartphones"

• **Health information: When it's right, when it's wrong and what it all means**

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

"Where do you get your health and wellness information? If we asked that question a few decades ago, you may have answered with the name of your primary care physician. But things have changed."

• **Text-based survey offers accurate, real-time health info during Ebola outbreak**

(Source: Mobihealth News) *[Return comment]*

• **If your medical information becomes a moneymaker, could you get a cut?**

(Source: WNPR, 15 Oct 2018) *[Return comment]*

"Hospitals and health plans are increasingly using the huge amount of medical data they collect for research. It's a business worth billions of dollars, and sometimes those discoveries can be the foundation of new profit-making products and companies"

• **How should an algorithm generate recommendations for patient care?**

(Source: Stanford, 3 Oct 2018) *[Return comment]*

"Say you're a doctor. You'd like guidance on how to treat a particular patient, and you have the opportunity to query a group of physicians about what they'd do next. Who do you include in that group?"

Artificial Intelligence (AI) and machine learning   [Back to Quick links]

• **Artificial intelligence can't replace doctors, but it can make them better.**

(Source: MIT Technology Review, 23 Oct 2018) *[Return comment]*

"Several years ago Vinod Khosla, the Silicon Valley investor, wrote a provocative article titled "Do We Need Doctors or Algorithms?" Khosla argued that doctors were no match for artificial intelligence."

• **How is artificial intelligence impacting the healthcare industry?**

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

"These healthcare machines can form a likely diagnosis and even suggest the appropriate course of action that should be taken"

• **Artificial intelligence's potential to diagnose and treat mental illness**

(Source: Harvard Business Review, 22 Oct 2018) *[Return comment]*

"The United States faces a mental health epidemic. Nearly one in five American adults suffers from a form of mental illness. Suicide rates are at an all-time high, 115 people die daily from opioid abuse, and one in eight Americans over 12 years' old take an antidepressant every day."

- **Artificial intelligence and blockchain: An easy pill to swallow**

  (Source: Healthcare IT, 3 Oct 2018) *[Return comment]*

  "Artificial intelligence, extended reality and blockchain are some of the most talked about emerging digital technologies. While not typically associated with the healthcare industry, these technologies are having a big impact on the supply chain of pharmaceutical products"

- **3 Ways artificial intelligence is changing healthcare**

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

  "The current US healthcare picture is pretty bleak: more than 12 million serious diagnostic errors each year, a third of the $3.6 trillion spent attributed to waste, reduction in life expectancy for what will be three years in a row (which is unprecedented), and peak levels of physician burnout, depression, and suicide."

- **Putting biopsies under artificial intelligence microscope: Pathology startup fuels shift away from physical slides**

  (Source: Nvidia, 4 Oct 2018) *[Return comment]*

  "Hundreds of millions of tissue biopsies are performed worldwide each year — most of which are diagnosed as non-cancerous. But for the few days or weeks it takes a lab to provide a result, uncertainty weighs on patients."

- **Impact of artificial intelligence and machine learning on the healthcare industry**

  (Source: Design Beep) *[Return comment]*

  "The healthcare industry has undergone major changes in last two decade and that has been proved beneficial in decreasing the mortality rate. Apart from the reduction in the mortality rate, the lives of people have also improved for good"

- **Artificial intelligence is proving fibromyalgia is a real disease**

  (Source: Quartz) *[Return comment]*

- **Artificial intelligence could provide moment-by-moment nursing for a hospital's sickest patients**

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

- **How close is your death? New algorithm can tell patients how long they have to live**

  (Source: Ottawa Citizen, 12 Oct 2018) *[Return comment]*

  "Ottawa researchers are taking a page from Netflix and Google to help patients, their families and their doctors have informed conversations about death. Researchers at Ottawa's new National Centre for Individualized Health have developed an algorithm that predicts how many months, or years, patients near the ends of their lives have to live"

- **Artificial intelligence helps diagnose depression three months earlier than health services by analysing Facebook posts**

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

  "An artificial intelligence (AI) programme trained to scour Facebook posts for 'linguistic red flags' which could be a sign of depression identified the condition up to three months earlier than health services"

- **Artificial intelligence integration into workflows minimizes tools to ease doctor burden**

  (Source: Mobihealth News, 18 Oct 2018) *[Return comment]*

  "How artificial intelligence benefits workflows, with its direct impact to be a seamless integration for physicians and the patient experience."

- **How deep learning can help doctors navigate the contours of radiation therapy**

  (Source: Nvidia, 19 Sep 2018) *[Return comment]*

  "Doctors use the contouring process to determine high-precision radiation therapy treatments. Once the size and shape of tumors are identified in medical images, contouring helps them design target volumes for radiation therapy"

- **Healthcare artificial intelligence market report forecast 2023**

  (Source: My News Desk) *[Return comment]*

- **How artificial intelligence and blockchain technologies are enhancing patient care?**

  (Source: eHealth) *[Return comment]*

  "Artificial intelligence (AI) and blockchain have become important buzzwords in different sectors i.e finance and technology. However, there is no reason to believe that these cutting-edge technologies will not eventually make its way into healthcare"

- **Is emotional support part of artificial intelligence's future in healthcare?**

  (Source: Mobihealth News, 18 Oct 2018) *[Return comment]*

  Artificial intelligence is used across the healthcare field, from reading images to automating work flows. Researchers are also considering to use the technology to move beyond the analytical tasks and move into providing a more human touch"

- **Learning to use data better**

  (Source: CACM, 16 Oct 2018) *[Return comment]*

  "The use of artificial intelligence to process medical sensor data is enabling earlier detection and more effective therapies for cancer, the mitigation of epileptic seizers with implants, and the hope of using similar implants for Parkinson's disease and other neurological maladies, as well as lowering the costs of hospitalization overall"

- **Artificial intelligence could predict cognitive decline leading to Alzheimer's disease in the next five years: Algorithms may help doctors stream people onto prevention path sooner**

  (Source: Science Daily) *[Return comment]*

- **Why doctors are reluctant to use artificial intelligence**

  (Source: Business Insider) *[Return comment]*

- **MedAware uses artificial intelligence to detect potential medication errors**

  (Source: Medgadget, 9 Oct 2018) *[Return comment]*

  "Medical errors are the third-leading cause of death in the US and they are probably the most common and preventable. MedAware, an Israeli company, is using the power of artificial intelligence to detect potential errors before they happen"

- **The present and future use of artificial intelligence in healthcare**

  (Source: Techtarget, 20 Oct 2018) *[Return comment]*

  "Cheaper, better and more convenient care – the use of artificial intelligence in healthcare could fundamentally change the way people are diagnosed and treated. Advances in artificial intelligence technologies such as machine learning are making clinicians' work easier"

• **Philips announces global start-up collaboration program focused on application of artificial intelligence in healthcare**

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

"Royal Philips has launched its first global start-up collaboration program focused on the application of artificial intelligence in healthcare. The program involves Philips' innovation hubs in Cambridge in the US, Eindhoven of Netherlands, Bangalore of India and Shanghai of China"

Biotech and biology   [Back to Quick links]

• **Prenatal gene editing success lays path for treating congenital diseases in the womb**

(Source: New Atlas) *[Return comment]*

• **The biotech innovation that will transform society has arrived**

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

• **Synthetic biology gets a new molecular programming language called CRN**

(Source: Interesting Engineering) *[Return comment]*

• **Genomatica raises $90 million for synthetic biology materials manufacturing**

(Source: UK Business Insider) *[Return comment]*

• **Scientists in China breed mice from two females**

(Source: CNN) *[Return comment]*

• **Researchers gain clearest ever image of Ebola virus protein**

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

"Researchers at the Okinawa Institute of Science and Technology Graduate University (OIST) have for the first time imaged the structure of a central component of the Ebola virus at near-atomic resolution"

• **Japan set to approve controversial gene editing of human embryos**

(Source: Interesting Engineering) *[Return comment]*

• **DNA data storage developments demonstrate serious potential**

(Source: Search Storage, 20 Oct 2018) *[Return comment]*

"Within the past decade, university and corporate researchers have turned their attention to deoxyribonucleic acid as a possible way to store data. DNA data storage offers density and durability that far exceeds any of today's storage media – be it tape, flash or optical drives."

• **Can we teach heart cells to grow up?**

(Source: Science Daily) *[Return comment]*

• **A breakthrough in gene editing sees researchers cure blood disorder**

(Source: Trend in Tech) *[Return comment]*

"Researchers are turning their attention to deoxyribonucleic acid as a possible way to store data. DNA data storage offers density and durability that far exceeds any of today's storage media, be it tape, flash or optical drives."

• **Height, bone density, and more can be predicted using new DNA analysis algorithm**

(Source: New Atlas) *[Return comment]*

• How accurate are online DNA tests?

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

"The age of consumer genomics, you can now send a vial of your spit in the mail and pay to see how your unique genetic code relates to all manner of human activity—from sports to certain diets to skin cream to a preference for fine wines, even to dating"

Clinical trials and tests [Back to Quick links]

• We've been doing drug trials wrong. This is how to fix it

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

"We've been doing drug trials wrong. This is how to fix it By the age of 65, at least half of us will suffer from two or more long-term diseases."

• New blood test could spare cancer patients from needless chemotherapy after surgery

(Source: The Conversation, 16 Oct 2018) *[Return comment]*

"Many cancer patients could soon be spared the unnecessary side effects of chemotherapy after having surgery to remove their tumour. A blood test being trialled at more than 40 hospitals across Australia and New Zealand aims to detect whether there are any cancer cells remaining in the body after surgery, which could lead to the cancer returning"

• New Israeli-US startup harnesses artificial intelligence to help cancer patients find the right clinical trials

(Source: No Camels, 10 Oct 2018) *[Return comment]*

"Cancer patients often face long and difficult battles against the disease. Starting the process of finding appropriate treatment can be a trying, difficult experience as patients navigate traditional chemotherapy, radiation, and surgery treatments, as well as thousands of clinical trials for experimental cancer drugs, and alternative treatment offerings"

Cosmetic, aesthic and plastic surgery and dermatology [Back to Quick links]

• New approach to breast reconstruction may reduce pain and weakness for some

(Source: New York Times) *[Return comment]*

• Tell me your tales of body contouring procedures

(Source: Ask) *[Return comment]*

• The cosmetic institute: four corners reveals dark side of cosmetic surgery

(Source: News) *[Return comment]*

• Mentor CPX4 smooth tissue expander for easier implantation post mastectomy

(Source: Medgadget) *[Return comment]*

• From halal beauty to medical aesthetics: 5 trends shaping beauty in asia

(Source: CB Insights) *[Return comment]*

• Trends in aesthetic services market 2023 by investment feasibility, sales, production and growth rate by region wise

(Source: The Chronicle India) *[Return comment]*

• Beyond skin deep: understanding disparities in dermatology services

(Source: Science Daily) *[Return comment]*

• How to shop for a cosmetic surgery procedure

(Source: Philly) *[Return comment]*

- **4 Plastic surgery trends for 2018**

    (Source: Allure) *[Return comment]*

- **4th Global experts meeting on plastic and aesthetic surgery**

    (Source: Issue Wire) *[Return comment]*

- **A brief comparative history analysis: plastic surgery and gene editing**

    (Source: Sagepub) *[Return comment]*

- **Calf implants and pec implants: A field guide to fitness-related plastic surgery**

    (Source: GQ) *[Return comment]*

- **Analysis of plastic surgeons' social media use and perceptions**

    (Source: Academic) *[Return comment]*

- **Cosmetic surgery industry market research reports**

    (Source: Report Linker, October 2018) *[Return comment]*

- **Beauty matching is the new plastic surgery trend rising among couples**

    (Source: Glamour Magazine) *[Return comment]*

- **Correcting your figure: The top 3 benefits of plastic surgery**

    (Source: Estilo-tendances) *[Return comment]*

- **Cosmetic surgery vs plastic surgery different goals and difference in training**

    (Source: Business World) *[Return comment]*

- **Generation-Z opinion: Plastic surgery has became mainstream**

    (Source: Daily Examiner) *[Return comment]*

- **Growing trends in plastic surgery in 2018**

    (Source: MD Source) *[Return comment]*

- **Japanese wanting to look as beautiful as South Koreans flood Korean plastic surgery clinics**

    (Source: Business Times) *[Return comment]*

- **More men are getting plastic surgery — and they're not who you think**

    (Source: Vox) *[Return comment]*

- **Plastic Surgery Market 2018 by Applications, recent developments, competitive landscape and key players**

    (Source: Empowered News, 20 Oct 2018) *[Return comment]*

- **Plastic surgery procedures that will be trending in 2018**

    (Source: Coveteur) *[Return comment]*

- **Plastic surgery trends 2018: cosmetic surgery trends and shifts in 2018**

    (Source: Plastic Surgeons) *[Return comment]*

- **The reality of plastic surgery**

    (Source: Today) *[Return comment]*

- **Top plastic surgery trends you should explore**

    (Source: Bit Rebels) *[Return comment]*

• **Dallas plastic surgery trends from Lemmon Avenue Plastic Surgery and Laser Center and Park Cities Cosmetic Surgery**

(Source: Dallas Observer) *[Return comment]*

• **Why do people in Nigeria get plastic surgery**

(Source: Pulse) *[Return comment]*

• **Why the plastic surgery community is speaking out about a new breast implants study**

(Source: Yahoo) *[Return comment]*

• **CRISPR Therapeutics, Vertex get FDA green light for sickle cell test**

(Source: Xconomy) *[Return comment]*

• **YouTube is source of misinformation on plastic surgery**

(Source: Health Minute) *[Return comment]*

• **A shocking 400,000 animals used in controversial botox testing**

(Source: My News Desk) *[Return comment]*

• **Botox For Men**

(Source: Ask Men) *[Return comment]*

• **Breast implants market 2018-2025 global key brand insights**

(Source: Empowered News) *[Return comment]*

Cyber security and blockchain [Back to Quick links]

• **Can the health care industry protect itself from cyberattacks?**

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

"The health care industry is racing to adopt cutting-edge technology to provide patients with the best treatment possible at the lowest possible cost. But the rise in health care innovation has yielded unintended consequences: a sharp uptick in the number of cyberattacks that exploit the medical data of unsuspecting patients"

• **How blockchain will herald a new era of security for your business operations**

(Source: TechRadar) *[Return comment]*

• **Healthcare and cyber risk**

(Source: GC Capital Ideas) *[Return comment]*

• **Healthcare blockchain efficiency model**

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

• **Health systems, startups come together to create national standard for security assessments**

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

"Health systems, startups, and other stakeholders are banding together to create a series of standardized frameworks for innovators, starting with a standardized security assessment for business associate agreements."

- **FDA, DHS reunite to address cybersecurity vulnerabilities in healthcare devices**

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

  "The Food and Drug Administration (FDA) and Department of Homeland Security (DHS) have partnered to resolve cybersecurity issues in medical systems to maintain patient safety. The FDA's Center for Devices and Radiological Health and the DHS' Office of Cybersecurity and Communications will coordinate with each other and initiate discussions with medical device manufacturers and researchers about cyber vulnerabilities and threats to health care technologies"

- **The importance of cybersecurity in the healthcare sector**

  (Source: Healthworks Collective, 13 Oct 2018) *[Return comment]*

  "Cybersecurity particularly important for those in the healthcare sector. There are several reasons why businesses in this arena can't afford to put off cybersecurity measures and why tomorrow may be too late to do what you should have already done today"

- **CISOs, CIOs not confident in their medical device security strategy**

  (Source: Healthcare Informatics, 9 Oct 2018) *[Return comment]*

  "According to a survey of CIOs and CISOs, healthcare organizations have an average of 10,000 connected medical devices. The healthcare industry continues to be subjected to cyber security attacks, which are continuously evolving and becoming increasingly sophisticated"

Education and training   [Back to Quick links]

- **Course teaches medical trainees how to provide care in developing countries**

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

  "A starved supply closet and a lack of basic necessities such as electricity or running water pose significant health risks to patients at medical clinics in poverty-stricken parts of the world, sometimes even more so than illness or disease."

- **Medical startup scrubs operating room data to train better surgeons**

  (Source: Nvidia, 16 Oct 2018) *[Return comment]*

Dentistry   [Back to Quick links]

- **Cosmetic dentistry in 2018: What's new and what to expect**

  (Source: Healthworks Collective) *[Return comment]*

- **Disruptive technology in dentistry**

  (Source: Journal of mHealth, 18 Oct 2018) *[Return comment]*

Digital disruption and technology trends   [Back to Quick links]

- **The global promise of digital health**

  (Source: Project-syndicate, 10 Oct 2018) *[Return comment]*

  "New digital technologies are expanding the capabilities of health-care providers in ways that scarcely could have been imagined just a few years ago. By harnessing these new methods to the fullest, the world can put itself well within reach of achieving the United Nations' Sustainable Development Goals for public health"

- **Looking across international borders for digital health tools**

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

    "Panelists at the Connected Health Conference in Boston spoke about the importance of digital health alliances and learning from countries sometimes ignored in the space"

- **The Top Digital Health Companies in One Ultimate Database**

    (Source: Medical Futurist) *[Return comment]*

- **What digital health companies need to succeed**

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

    "Digital health promises to revolutionize health care by changing the focus from sick care to prevention, optimizing disease treatment, empowering individuals to access and utilize their own health information, and improving existing health care practices across the board.

- **AMA issues 'playbook' for physicians to implement digital health**

    (Source: Health Data Management, 18 Oct 2018)

- **Communicating value, connectivity helps digital health tools succeed**

    (Source: Mobihealth News, 12 Oct 2018) *[Return comment]*

    "The challenges of new technology adoption loom impact every industry, and healthcare is by no means an exception. Between its risk-adverse culture, worn out workforce and heavy value placed on establishing human connections, it is little surprise that many technologies which could potentially isolate patients or introduce unnecessary tasks are met with some resistance"

- **HIPAA and data sharing: Rethinking both for the digital age**

    (Source: Healthcare IT News, 10 Oct 2018) *[Return comment]*

    "As HIPAA was written when most providers still used paper charts, the framework today has significcant of room for improvement"

- **Delivering the benefits of digital health**

    (Source: Journal of mHealth, 12 Oct 2018) *[Return comment]*

    "Without the necessary background and experience, it can be difficult to understand how simple it can be to use powerful digital tools to boost your clinic's performance as a business. Whether you need to update your business processes or you want to learn how to analyse and act upon all the data you have gathered, you often only really need a gentle nudge in the right direction"

- **Digital health technologies and the vexing questions they raise**

    (Source: IoT World Today) *[Return comment]*

Healthcare systems, records and insurance   [Back to Quick links]

- **Ways to improve electronic health record safety**

    (Source: Pewtrusts, 28 Aug 2018) *[Return comment]*

    "Electronic health records have transformed modern medicine, giving doctors and nurses better data to guide care, supporting enhanced patient safety through new automated tools, and creating more efficient processes by connecting different health systems."

- **The 5 industries driving the US economy**

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

    "The US economy is finally recovering from the 2008 Great Recession. Jobs are being created by the millions, wage growth is picking up and foreign exports accounted for only 11.9% of the nation's GDP in 2016"

• **Attacking healthcare admin costs: How 20 startups are saving time and money for healthcare providers**

(Source: CB Insights, 18 Oct 2018) *[Return comment]*

"Investors have bet almost $2.5B that healthcare companies can effectively reduce waste, lower costs, and improve patient outcomes. Hospitals, for example, have a lot of room for savings — roughly 25% of American hospitals' budgets go towards administrative expenses, compared to around 12% in Canada and Scotland"

• **Latest in health: Better medical records, better patient care**

(Source: WRVO, 21 Oct 2018) *[Return comment]*

"What's in the way of achieving the best possible patient outcomes? It's a question health practitioners ask themselves daily. In some cases, it's reporting and paperwork, in others accessibility."

• **The wellness economy: the buzzy trend reshaping everything from personal care to real estate**

(Source: CB Insights) *[Return comment]*

• **How health insurance contributes to our failing system**

(Source: KevinMD, 11 Oct 2018) *[Return comment]*

• **The quickly and quietly growing world of voice-assisted health and wellness**

(Source: Pymnts, 3 Oct 2018) *[Return comment]*

"For most people, absently swiping through an Instagram feed, or flipping a light switch, or going to a doctor's office don't register as important events. However, for people with mobility issues, visual impairments or a host of medical concerns, those activities aren't always simple, and can actually form huge quality of life roadblocks"

• **The single market for healthcare in Europe: Learnings for the US**

(Source: Health Populi, 15 Oct 2018) *[Return comment]*

• **Primary-care companies cut costs through preventive models**

(Source: Modern Healthcare, 20 Oct 2018) *[Return comment]*

• **National Academy of Medicine argues barriers to interoperability are organizational, not technical**

(Source: Healthcare Dive, 15 Oct 2018) *[Return comment]*

"A new report from the National Academy of Medicine charges that barriers to progress in healthcare interoperability are not technical, but "in the failure of organizational demand and purchasing requirements." Players across the industry must commit to interoperability as a primary priority, identify goals, collaborate with stakeholders to align contracting specifications, specify clear functional interoperability stipulations in current and future proposals and purchases and assess the progress of measures and improvement of health outcomes"

• **Successful secure messaging trials solve final problems heralding fax-free future for healthcare**

(Source: Healthcare IT, 10 Oct 2018) **[Return comment]**

"Australian healthcare is poised for the wide-scale replacement of the fax machine with secure messaging systems for patient information sharing, according to the Australian Digital Health Agency, with the final problems solved in successful proof of concept trials"

• **EHRs are killing medical innovation**

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

• **Health tech firm plans to consolidate medical records on blockchain**

(Source: Newsbytes) *[Return comment]*

"Individuals, doctors, and insurance companies may soon be able to access and track their and their patients' medical histories in an app via a single, consolidated, and secure blockchain technology-based system."

• **How digital health can stimulate economic development**

(Source: Health Populi, 8 Oct 2018) *[Return comment]*

• **Electronic Health Records: Evolution of the Indian healthcare sector**

(Source: eHealth) *[Return comment]*

"In 2015, the Ministry of Health and Family Welfare in India, published a note that instituted a National eHealth Authority (NeHA). This was done in order to regulate the increasing usage of electronic records in healthcare, and for the maintenance of digital health information and e-Health records across the country."

• **Digital Health: How can smarter tech heal the healthcare system?**

(Source: Schneider Electric, 16 Oct 2018) *[Return comment]*

"Life expectancy increased by five years between 2000 and 2015, the fastest increase since the 1960s, according to the World Health Organization. Furthermore, the number of people over 60 is expected to double by 2050"

• **How Penn Medicine is redesigning its EHR for a new era of care**

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

• **How to create healthcare models for underserved populations**

(Source: Medcity News, 8 Oct 2018) *[Return comment]*

• **Patients' transformation into consumers upends the payer model**

(Source: Mobihealth News, 11 Oct 2018) *[Return comment]*

"As consumers become more involved in their healthcare, payers and providers alike are being forced to think about the industry differently. But this could give new insurers the opportunity to start looking at the consumer space"

Hospitals, clinics, ambulances and drones   [Back to Quick links]

• **EIR Healthcare has created first modular hospital room in world**

(Source: UK Business Insider) *[Return comment]*

• **A new hospitalist model for managing high-cost, high-need patients**

(Source: Harvard Business Review) *[Return comment]*

• **Hospital procedure harms patients**

(Source: Botany) *[Return comment]*

• **King's College London and NVIDIA build gold standard for artificial intelligence infrastructure in the clinic**

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

"King's College London, a leader in medical research, is Europe's first clinical partner to adopt NVIDIA DGX-2 and the NVIDIA Clara platform. KCL is deploying NVIDIA AI solutions to rethink the practice of radiology and pathology in a quest to better serve 8 million patients in the U.K.'s National Health Service"

• **Hospital construction company discusses the importance of ambulatory care centers**

(Source: PR Newswire, 19 Oct 2018) *[Return comment]*

"As part of their commitment to providing industry-leading medical real estate services, Simone Healthcare Development, discusses the importance of ambulatory care centers"

• **Hospital says $2M robot enhances surgery and saves money**

(Source: Times Union, 18 Oct 2018) *[Return comment]*

"A Delaware hospital says its new $2.1 million robot has performed more than 50 surgeries since it was introduced. The Beebe Medical Center's Lewes Center for Robotic Surgery opened this summer"

• **Hospitals are roadblocks to patient HER data requests, despite HIPAA**

(Source: Healthcare IT News, 8 Oct 2018) *[Return comment]*

"Patients are facing many hurdles when they request to receive their records from hospitals. What if the challenge to overcome with data sharing was the policies common among hospitals? A new study published in JAMA Network Open found just that. Conducted by Yale University School of Medicine, the study evaluated medical records processing at 83 top-ranked U.S. hospitals in 29 states and researchers found serious 'discrepancies' in the information given to patients during medical release processes"

• **What innovation looks like at a large academic medical center**

(Source: Healthcare IT News, 26 Sep 2018) *[Return comment]*

"Ochsner Health's chief clinical transformation officer gives us a look behind the curtain, showing how the system makes innovation fundamental to its mission"

• **What innovation looks like at a medium-sized hospital**

(Source: Healthcare IT News, 27 Sep 2018) *[Return comment]*

"Mobile, Alabama-based Springhill Medical Center keeps a focus on physician and patient engagement as it works to drive process improvements and stay competitive"

• **Top 3 high-tech hospitals and concepts**

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

• **Top American hospitals make it unduly confusing for patients to access medical records**

(Source: News Medical) *[Return comment]*

• **Intellimed releases IntelliMarket™, a big data healthcare analytics solution - advanced analytics of claims data solves critical pain points for hospital systems**

(Source: Business Insider) *[Return comment]*

• **How the architecture of hospitals affects health outcomes**

(Source: Harvard Business Review, 15 Oct 2018) *[Return comment]*

"A key determinant of everything that matters when it comes to health interventions — the experience, cost, and results — has been hiding in plain sight. It is the buildings and spaces in which patients are treated"

• **How hospitals are using the cloud for medical image storage**

(Source: Techtarget) *[Return comment]*

• **How clinical communication tools help improve one ER's 'left without being seen' rate**

(Source: Healthcare IT News, 2 Oct 2018) *[Return comment]*

"Hardin Memorial Hospital, in Elizabethtown, Kentucky, had a clinical communication system in the emergency department that just wasn't cutting it for caregivers. It needed a better way for emergency clinicians and others to communicate in the frenzy of the emergency room and with colleagues elsewhere in the hospital"

• **Hospitals roll out artificial intelligence systems to keep patients from dying of sepsis**

(Source: IEEE Spectrum, 19 Oct 2018) *[Return comment]*

"In hospitals, doctors and nurses keep vigilant watch over patients' vital signs and blood tests to catch the first symptoms of sepsis. In this life-threatening condition, the body responds to an infection with widespread inflammation that can lead to organ failure"

• **Ambulance staff contact details shared online in data breach**

(Source: BBC) *[Return comment]*

Innovation, trends and research   [Back to Quick links]

• **Researchers may have found the key to engineering electronic brains**

(Source: Interesting Engineering, 21 Oct 2018) *[Return comment]*

"University of Groningen physicists have been developing memristors: memory carrying resistors which mimic how brain neurons work"

• **Monitoring electromagnetic signals in the brain with MRI: Technique could be used to detect light or electrical fields in living tissue**

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

"MIT engineers have devised a new technique to detect either electrical activity or optical signals in the brain, using a minimally invasive technique based on magnetic resonance imaging (MRI)"

• **Brain wave device enhances memory function**

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

"The entrainment of theta brain waves with a commercially available device not only enhances theta wave activity, but also boosts memory performance"

• **A futurist predicts what healthcare will look like in the late 2020s**

(Source: Healthcare IT News, 22 Oct 2018) *[Return comment]*

"Picture diagnostic booths with large screen 8K resolution, telemedicine tools, sensors tracking just about everything, and more"

• **New approaches boost access to innovative clinical research**

(Source: Buffalo) *[Return comment]*

• **Why 2018 is the year of voice tech in healthcare**

(Source: Healthcare IT News, 17 Oct 2018) *[Return comment]*

What IT shops and clinicians should expect in 2019: plenty of tech failures

• **7 of the best and latest technologies to improve your health and fitness**

(Source: Interesting Engineering, 21 Oct 2018) *[Return comment]*

"From apps to smart hardware – A list of the best technology to help you achieve your health and fitness goals"

- **10 examples of personalization in healthcare**

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

  "The quickest way to ruin a customer experience in healthcare is to treat everyone the same. Patients don't want to feel like just another number. They crave personalized service that helps them find the right solutions."

- **Thanks to spinal stimulation, paralyzed man walks the length of a football field**

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

- **Top five technological innovations in medicine**

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

- **Ground-breaking collaboration creates world-first smart home for people with intellectual disabilities**

  (Source: Healthcare IT, 9 Oct 2018) *[Return comment]*

  "In a first of its kind collaboration, a collection of digital health companies and one of Australia's largest healthcare providers are combining resources and building a trailblazing high-tech house for people with intellectual disabilities. Under construction in Melbourne, the smart home will trial the use of wearables, mobile device apps, voice assistants, sensors, artificial intelligence and more fit-for-purpose innovations for five residents with cognitive issues and secondary conditions such as epilepsy, cerebral palsy and blindness"

- **These 10 market trends turned wellness into a $4.2 trillion global industry**

  (Source: Fast Company) *[Return comment]*

- **When will health services hook up to the tech revolution?**

  (Source: Cloud Irish Times, 18 Oct 2018) *[Return comment]*

  "Technology can profoundly transform the healthcare sector, but trust is still a big issue Have you ever had an MRI? Small enclosed spaces, having to keep still, and donning headphones to block out the banging"

- **9 Massive benefits of tech adoption in the healthcare industry**

  (Source: Noobpreneur, 11 Oct 2018) *[Return comment]*

- **Medical trends of 2019 you should know about**

  (Source: Bit Rebels, 18 Oct 2018) *[Return comment]*

  "2019 will be a landmark year for healthcare technology advancement"

- **How healthcare technology will change in 2019?**

  (Source: Newz New, 9 Oct 2018) *[Return comment]*

- **Expanding healthcare through ultrasound technology**

  (Source: This Day Live, 18 Oct 2018) *[Return comment]*

  "With the introduction of Lumify – a mobile application based ultrasound technology – into the Nigerian healthcare industry by Philips Healthcare Africa, it appears better days are here for the health sector."

- **Get ready for these 4 medtech shifts**

  (Source: MDDI Online, 8 Oct 2018) *[Return comment]*

  "Healthcare has historically focused on treating the chronically ill and diseased populations, but things are changing, and it is a "global shift"

Internet of Things (IoT) and sensors [Back to Quick links]

- **Smart sensor makes it easier for women to manage their birth control pills**

  (Source: Techxplore) *[Return comment]*

- **Despite ethical concerns with artificial intelligence, internet of things is on rise in healthtech**

  (Source: E27, 15 Oct 2018) *[Return comment]*

  "Everyone is now aware that artificial intelligence (AI) and the internet-of-things (IoT) are spawning new businesses. They have their touch-points in almost every industry. AI demands more than just buying and installing a particular piece of software."

- **How Internet of Things (IoT) sensors will transform the healthcare industry**

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

- **This new paper-based wearable sensor could save patients lives**

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

  "Researchers at Purdue University have managed to create wearable sensor 'smart sticker' that can be used to monitor heart patients' health from the comfort of their own homes. These new 'smart stickers' are primarily made from cellulose which means they are very cheap to make and biocompatible and breathable for the wearer."

- **Microscopic implantable sensors measure dopamine in brain**

  (Source: Medgadget) *[Return comment]*

- **Internet of Things (IoT) in Healthcare Market Estimated at $477.9 billion by 2025**

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

  "Internet of Things (IoT) in Healthcare Market: Market Size and Forecast, 2017 – 2025"

Mental health, neuro, psychology and psychiatry [Back to Quick links]

- **Machine learning may help identify ideal dementia treatments**

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

  "Machine learning may someday allow physicians to prescribe the best treatment for dementia, according to a study. Researchers devised and applied a new algorithm that can spot different patterns of progression in patients with a range of dementias in MRI scans, including Alzheimer's disease."

- **Top 25 mental health apps for 2018: An alternative to therapy?**

  (Source: Psycom) *[Return comment]*

- **Nerve stimulation treatment for depression offers new hope**

  (Source: Science Focus) *[Return comment]*

- **Students' mental health is a priority**

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

- **Scientists have connected the brains of 3 people, enabling them to share thoughts**

  (Source: Science Alert) *[Return comment]*

- **Many smart wearable devices can even monitor mental-health data**

  (Source: Miami Herald) *[Return comment]*

- **FutureNeuro and Ergo partner to enhance eHealth infrastructure for providing better epilepsy care**

  (Source: News Medical, 11 Oct 2018) *[Return comment]*

  "FutureNeuro, the SFI Research Centre for chronic and rare neurological conditions based at RCSI, has announced its partnership with Irish Cloud solution provider Ergo to enhance crucial eHealth infrastructure in Ireland and provide improved monitoring for people living with epilepsy"

- **Three artificial intelligence and tech tools trying to boost people's mental health**

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

- **Addiction and microtargeting: How "social" networks expose us to manipulation**

  (Source: Medium) *[Return comment]*

- **Designing experiences to improve mental health**

  (Source: Smashing Magazine) *[Return comment]*

- **Detecting mental illness by watching you type**

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

  "Researchers are experimenting with artificial intelligence (AI) software that is increasingly able to tell whether you suffer from Parkinson's disease, schizophrenia, depression, or other types of mental disorders, simply from watching the way you type."

- **Focus on employee mental health linked to boost in profits**

  (Source: Telegraph) *[Return comment]*

- **Health by mindstrong: The app that can diagnose depression**

  (Source: Tech) *[Return comment]*

  "Finding an effective way to treat mental health problems at scale is one of the biggest challenges facing policy makers, clinicians and everyday people like you and me. However, one San Francisco startup, founded by three doctors, believes it has found the way to diagnose a range of mental problems quickly, easily and proactively."

- **How a new therapy uses virtual reality (VR) to help those with depression, trauma, PTSD, and other mental health issues**

  (Source: South China Morning Post) *[Return comment]*

- **Internet 'damaging mental health, destroying families'**

  (Source: Independent) *[Return comment]*

- **Internet obsession among adolescents leading to mental disorder**

  (Source: CanIndia) *[Return comment]*

- **Lack of mental health resources a global issue**

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

  "All countries can be thought of as developing countries in the context of mental health according to a new global mental health report. A lack of resources for those dealing with mental health issues is a major problem around the world, a new report has found"

- **Many smart wearable devices can even monitor mental-health data**

  (Source: Miami Herald) *[Return comment]*

- **UN launches workplace mental health and well-being strategy**

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

  "The United Nations has launched a strategy to underscore the workplace mental health and well-being in the UN System. UN staff struggling with anxiety, depression, post-traumatic stress disorder or other circumstances have reported feeling isolated and ashamed, with no-one to turn to for help"

- **UK workers turn to technology to help look after their mental health**

  (Source: Accenture) *[Return comment]*

- **Tech innovations that make dealing with mental illness a little bit easier**

  (Source: Design Indaba) *[Return comment]*

- **Schools will be asked to track children's happiness amid fears about growing mental health epidemic**

  (Source: Telegraph) *[Return comment]*

- **Meet HARR-e, the artificial intelligence taking on the male mental health crisis**

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

  Suicide is the number one killer of men under the age of 45 in the UK. This is an unacceptable situation but there's still confusion about what needs to change. While the sentiment of encouraging men to talk about their mental health is valuable, it overlooks the reality that many men don't feel able to share their feelings freely with their support network, and others might not have a support network at all.

- **A neuroscientist explains the limits and possibilities of using technology to read our thoughts**

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

Mobile devices and wearables   [Back to Quick links]

- **Thousands of Swedes are inserting microchips under their skin**

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

  "Technology continues to grow closer and closer to our bodies, from the phones in our pockets to the smart watches on our wrists. Now it's getting under some people's skin. In Sweden, a country rich with technological advancement, thousands have had microchips inserted into their hands."

- **The promise of Google and Apple tech for health app development**

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

  "In the connected and digitally hyperactive world of today, staying observant of health complications and fitness metrics is easier than ever. Besides the overwhelming number of fitness and daily-life health gadgets and mobile health/fitness apps of all types, the people's mindset is now turned more towards self-care."

- **mHealth apps and digital doctors: The future of the healthcare sector?**

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

  "Technology is taking the lead in healthcare. We all do and strive to work towards what we desire but are we taking care of ourselves in the process are the million-dollar questions. mHealth apps and digital doctors are showing promising opportunities for the entire healthcare industry."

- **Portable cancer test uses smartphone, new gold biosensor**

  (Source: Techxplore) *[Return comment]*

- **Tiny wearable sticks to your forehead to measure your sleep**

  (Source: Fast Company, 18 Oct 2018) *[Return comment]*

  "If you attach a new, postage-stamp-size wearable to your forehead before you sleep at night, the device can help tell you if you have sleep apnea–the disorder that can make you stop breathing repeatedly as you sleep, making you tired during the day and raising your risk of other conditions like diabetes and depression."

- **Wearables in US healthcare**

  (Source: Business Insider) *[Return comment]*

- **Global wearable medical devices market 2018-2023**

  (Source: Business Wire) *[Return comment]*

- **Dubai Health Authority unveils virtual health app for GP consultations**

  (Source: Computer Weekly, 18 Oct 2018) *[Return comment]*

  "The Dubai Health Authority (DHA) has unveiled a new virtual health app, which uses artificial intelligence (AI) and is aimed at allowing general practitioners (GPs) to provide remote consultations. The initiative is part of the Dubai Future Accelerators (DFA), an intensive nine-week programme for public and private sector organisations and startups that are using Dubai as a living test bed to co-create solutions for global and local challenges."

- **The rise of health-tracking technology**

  (Source: The Society Pages, 8 Oct 2018) *[Return comment]*

  "The latest Apple Watch can now warn users when it detects an abnormal heartbeat. While Apple may be on the cutting edge, many people have been using apps to track their food intake and exercise for some time"

- **What is the future of medical app development?**

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

  "Numerous wellbeing applications for iOS and Android are increasing day by day. It signifies the importance of healthcare mobile app development"

- **TGA to update regulation for health apps**

  (Source: IT News, 11 Oct 2018) *[Return comment]*

  "The Therapeutic Goods Administration (TGA) will update regulations for "software as a medical device" – including health apps – and embark on additional internal software development work in the coming year"

- **How to adopt the right mobile app technology to improve healthcare**

  (Source: Healthworks Collective, 13 Oct 2018) *[Return comment]*

  "Thanks to the proliferation of mobile app technology in the healthcare sector, there has been a big change in the way modern society accesses the healthcare industry. While several hospitals and clinics around the world are adopting mobile health app technology, patients (on their own part) are rapidly adapting to the use of mobile health apps so as to be able to effectively access health information"

- **How smartphone apps could help keep health records accurate**

  (Source: TechCrunch, 3 Oct 2018) *[Return comment]*

  "Suppose the next time you go to a new doctor's office, you wouldn't have to balance a clipboard on your knee, write down your whole medical history, remember the five-syllable name of every medication you're taking and list all your allergies"

- **Blackberry announces its Enterprise of Things (EoT) platform to be used in healthcare**

  (Source: Blokt, 5 Oct 2018) *[Return comment]*

  "BlackBerry introduced the world to its new flagship platform that enables its Enterprise of Things (EoT) vision. Called BlackBerry Spark, the platform will launch with a host of new partnerships and customers, along with an ultrasecure blockchain solution for sharing data."

- **The Verizon GizmoWatch puts a quick-communication device on your kid's wrist**

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

  "Today's smartwatches may be largely tailored to adults, but that doesn't mean that kids have to be left out completely. In fact, Verizon has announced a new addition to its lineup of smartwatches for children"

- **Wearables support health and build research data to help patients in Saudi Arabia**

  (Source: Mobihealth News, 12 Oct 2018) *[Return comment]*

  "Jazan University in Saudi Arabia is empowering patients to monitor their health at home so they can gain insights into their own body using wearables; the tool is also aggregating data during the patient-run experiments"

- **Do wearables have a role to play in precision medicine?**

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

- **Enhancing the value of medical wearables**

  (Source: Small Cap Network, 11 Oct 2018) *[Return comment]*

- **Forces driving the growth of wearable medical device market**

  (Source: Healthworks Collective, 11 Oct 2018) *[Return comment]*

  "Grand View Research, a U.S. based market research and consulting company, reported that the wearable medical device market is estimated to be worth USD 58.3 billion by 2025. Wearable technology in healthcare is predominantly used for monitoring and diagnostic purposes."

- **Healthcare mobile apps – The impact of wearables on the industry**

  (Source: Whatech, 11 Oct 2018) *[Return comment]*

- **Where is wearable health tech taking healthcare?**

  (Source: QR Code Press, 5 Oct 2018) *[Return comment]*

  "Fitness trackers, wearable heart rate monitors are trendy, but are they medically sound? Wearable health tech is used in everyday life either for fitness tracking, monitoring glucose or heart rates and even to potentially diagnose various diseases"

- **Apple sees role for Apple Watch app in hip and knee replacement recovery**

  (Source: Healthcare Dive, 16 Oct 2018) *[Return comment]*

  "Apple is partnering with Zimmer Biomet to study the Apple Watch in supporting patients before and after knee and hip replacement surgery. A clinical trial will evaluate the impact of mymobility — an app that uses Apple Watch to connect patients with their surgical care teams — on patient outcomes"

- **Are patients going to replace their doctor with an app?**

  (Source: World of DTC Marketing, 10 Oct 2018) *[Return comment]*

  "Ada, a London and Berlin-based health tech startup just received major funding from Bill and Melinda Gates. Ada isn't claiming to replace your doctor anytime soon, but patients may do just that which could worsen a serious health problem."

Patient engagement

- **Patient portals reveal records, prescriptions and physician access**

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

   "Almost everything a phone call to your doctor can accomplish, an online patient portal can do better and at any time of the day or night. That's the sentiment — and reality — from those on both sides of the patient-care equation in this age of electronic health records (HER) and online access to everything"

- **Healthcare design isn't about downloads, it's about changing behavior**

   (Source: Mobihealth News, 12 Oct 2018) *[Return comment]*

   "Designing apps and platforms for healthcare isn't necessarily about ticking off how many downloads the product has. Most of the time the main goal is changing the end user's behavior — whether that be a patient's health habits or some outdated workflow process used by providers."

- **Technology can only save healthcare if it connects with and leverages people**

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

- **Online patient scheduling tech lowers no-show rate at Prevea Health to 4%**

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

   "38 percent of online appointments are booked after hours, which helps with both patient retention and new patient acquisition. Wisconsin-based Prevea Health is an integrated multispecialty group practice with more than 350 primary care providers and specialists, 40 health centers and 26 employer-based clinics"

- **Patient appointment scheduling jumps 131% with new IT at UAB Medicine**

   (Source: Healthcare IT News, 24 Sep 2018) *[Return comment]*

   "Thisstudy examines how patients are spending 273 percent more time booking appointments on the UAB Medicine website, a big win for the goal of boosting patient access"

- **Patient-matching effort needs standards and smartphones**

   (Source: Modern Healthcare, 3 Oct 2018) *[Return comment]*

   "As patient identification and matching errors continue to put patient safety at risk, industry groups say healthcare organizations should renew their focus on the problem and consider new ways to solve it"

- **Survey finds significant gaps in doctor-patient conversations**

   (Source: Eurekalert, 10 Oct 2018) *[Return comment]*

   "Many Americans experience a disconnect between how they personally define health and how they talk about their health with their doctors. Nearly half (45%) of US adults who have a primary care physician say they wish they talked with their doctor more about why they want to be healthy, and a majority of younger people (57% of those aged 18-44) say they wish their doctor would talk to them about treatments that do not involve medication"

- **Personalized health platform Mobile Health acquires patient engagement startup Doctorbell**

   (Source: Mobihealth News, 9 Oct 2018) *[Return comment]*

   The transition from paper to digital health records has transformed care delivery, but challenges persist with interoperability—the exchange of electronic data among different systems. One of the central problems is inadequate patient matching; that is, the ability to accurately link an individual's electronic health records (EHRs) from multiple doctors' offices or hospitals within or across health systems"

• **Innovators use digital tools to translate patient experiences into meaningful data**

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

"Patient Toolkit, which lets patients digitally record symptoms and treatment"

• **How tracking and visualizing data leads to better patient outcomes**

(Source: MedCity News, 8 Oct 2018) *[Return comment]*

"Healthcare institutions have access to large amounts of patient data, but oftentimes it is so complex and disorganized that they spend more time managing their data than analyzing and actually using it"

• **Industry must protect doctor-patient relationship in pursuit of convenience**

(Source: Healio, 4 Oct 2018) *[Return comment]*

"The online marketplace has given rise to an industry that offers subscription-based delivery for a wide variety of goods. With a touch of a button, we no longer have to remember to pick up razors or toothbrushes at the store"

• **At the top of patients' wish lists: price transparency**

(Source: KevinMD, 11 Oct 2018) *[Return comment]*

"One of the most important factors on patients' minds is affordability of care. According to a recent McKinsey study, 72 percent of consumers are concerned about at least one kind of health care expense, be it related to health insurance, routine medical procedures, end-of-life care or otherwise"

• **Call centers can improve patient experiences**

(Source: Call Accounting, 19 Oct 2018) *[Return comment]*

"On the upside, medical research has led to innovative solutions and successful treatments for a wide range of diseases and other health challenges. On the downside, health care affordability, prescription drug addiction, and lack of transparency regarding the cost of medicine and medical care are major problems."

• **How artificial intelligence in healthcare can improve patient outcomes**

(Source: Healthworks Collective, 15 Oct 2018) *[Return comment]*

"Healthcare isn't only a big business, it's serious business. Artificial intelligence is making its mark in the field as well."

Pharma and medicine   [Back to Quick links]

• **DNA-based molecular computing will pave the way for programmable pills**

(Source: MIT Technology Review, 17 Oct 2018) *[Return comment]*

"Scientists have long known that living cells use a complex system of signals to sense their environment and to transmit this information internally and to their neighbors. Specific signaling molecules, their concentration, and the way this changes over time are some of the factors that go into this system."

• **Toronto bioscience firm determined to corner the cannabis-drink market**

(Source: Vancouver Sun) *[Return comment]*

• **Considering the challenges posed by technology that tracks whether you took your meds**

(Source: Stanford, 9 Oct 2018) *[Return comment]*

"A new pill detects when it is ingested, then sends a signal to an app and to people the patient designates, such as clinicians or family members."

- **Ypsomed teams up with Philips for the development of its new digital services to simplify medication adherence monitoring**

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

    "The two companies agree to build a solution for Ypsomed's new SmartServices™ based on Philips HealthSuite digital platform -The combination of Ypsomed connected self-medication devices with Philips' HealthSuite digital platform"

- **Here are 18 industries cannabis is disrupting**

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

    "Once an illegal and somewhat niche product, legal cannabis is now a fast-growing global industry. And it's proving to be disruptive, impacting everything from beverage production to home construction. Recent analyst reports estimate that the global legal marijuana industry will reach more than $20B by 2025."

- **An agile pharma R&D operating model**

    (Source: McKinsey) *[Return comment]*

- **Big pharma's bets: where they're investing across genomics, biotech, and digital health**

    (Source: CB Insights) *[Return comment]*

- **Patient involvement in the lifecycle of medicines according to Belgian stakeholders: The gap between theory and practice**

    (Source: Frontiers in Built Environment, 11 Oct 2018) *[Return comment]*

- **Use of artificial intelligence in pharma grows as drug-makers see big benefits**

    (Source: Techtarget, 20 Oct 2018) *[Return comment]*

    "Drug discovery, drug manufacturing, targeted clinical trials and personalized healthcare are just some of the areas in which the pharmaceutical industry has implemented artificial intelligence"

- **40 Companies using tech to get drugs to patients more quickly, cheaply and safely**

    (Source: CB Insights) *[Return comment]*

- **A new way to create molecules for drug development: Innovative process gives more control over free radicals**

    (Source: Science Daily) *[Return comment]*

- **Artificial intelligence in healthcare: Can artificial intelligence solve the health tech puzzle of new drug discovery?**

    (Source: Information Age, 18 Oct 2018) *[Return comment]*

    "R&D is critical in the world of healthcare, but it is also tricky; progress is slow, and further progress is hampered by the way different researchers and drug developers work in silos, data is kept secret, locked away from the rest of the world."

- **Digital therapeutics are moving toward a supplement-drug dichotomy**

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

    "As digital therapeutics move to cross boundaries of regulatory approval and efficacy data, the healthcare industry will begin to move to a bifurcated world of digital health apps in the same way that drugs are now divided up into largely unregulated supplements and heavily regulated pharmaceuticals"

- **How an Alzheimer treatment's success highlights the failures in Alzheimer's drug research**

    (Source: Forbes) *[Return comment]*

• **Hundreds of dietary supplements are tainted with prescription drugs**

(Source: Scientific American) *[Return comment]*

• **Neural network that securely finds potential drugs could encourage large-scale pooling of sensitive data**

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

"MIT researchers have developed a cryptographic system that could help neural networks identify promising drug candidates in massive pharmacological datasets, while keeping the data private. Secure computation done at such a massive scale could enable broad pooling of sensitive pharmacological data for predictive drug discovery"

• **Repurposing existing drugs could let us treat intractable illnesses**

(Source: Scientific American) *[Return comment]*

• **Striking a balance between patient-centred care, tech solutions and accessibility to increase drug adherence**

(Source: Healthcare IT, 9 Oct 2018) *[Return comment]*

"According to a report published by the World Health Organisation, only about 50 per cent of people take their daily medications correctly. Drug non-adherence is costing people their lives and over US$700 billion each year in avoidable medical expenses. As healthcare providers and governments try to find new ways to ensure their patients follow prescriptions properly, the dignity and respect for patients must be at the forefront of any solution"

Physician's practice   [Back to Quick links]

• **5 fears physicians face today**

(Source: KevinMD) *[Return comment]*

• **The practice of medicine has experienced its own version of climate change**

(Source: KevinMD) *[Return comment]*

• **Artificial intelligence integration into workflows minimizes tools to ease doctor burden**

(Source: Mobihealth News, 18 Oct 2018) *[Return comment]*

"Intel explains how artificial intelligence benefits workflows with its direct impact to be a seamless integration for physicians and the patient experience"

• **Improving the doctor's practice with the right technology**

(Source: All Top Startups, 12 Oct 2018) *[Return comment]*

Every professional activity can be treated as a business. Indeed, the core of a business is the build sustainability and stability – two objectives that all professionals share. Consequently, and as surprising as it might sound, the healthcare sector needs to be described in those business terms too.

Robotics and automation   [Back to Quick links]

• **Robot seeks out skin cancer with suction**

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

"A semi-autonomous robot that can take different types of measurements from the skin has been developed by researchers at the Massachusetts Institute of Technology (MIT). Fitted with suction cups to help it move, the prototype can be fitted with a dermatoscope to help look for signs of abnormalities, including skin cancer, something normally done manually by a doctor."

- **Tiny soft robot with multilegs paves way for drugs delivery in human body**

  (Source: Science Daily) *[Return comment]*

- **Medical robotics and computer-assisted surgery market**

  (Source: Empowered News, 18 Oct 2018) *[Return comment]*

- **Small wonders: microbots in medicine and engineering**

  (Source: Orange Business) *[Return comment]*

- **Surgeon performs mastectomies using robotics**

  (Source: AP News, 20 Oct 2018) *[Return comment]*

  "A surgeon has performed two mastectomies using robotics in a procedure that he said left no scars on his patients' breasts"

- **Medical robots market leading companies and emerging technologies 2025 by top companies**

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

  "A medical robot can be controlled through computer program to assist surgery, rehabilitation process or care. The robot allows surgeons greater access to areas under operation using more precise and less invasive methods"

- **Nearly a third of Scots willing go under knife for surgery by robots**

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

  "Nearly one in three Scots would be willing to go under the knife for major surgery carried out by a robot, according to a new survey which charts shifting attitudes towards the use of artificial intelligence"

Telemedicine, remote care and homecare   [Back to Quick links]

- **Teleneurology works**

  (Source: KevinMD, 21 Oct 2018) *[Return comment]*

  "Teleneurology is the new and vastly expanding practice of neurology involving the use of technology and/or video chat to improve access to services. With an ever-increasing aging population there is and will continue to be a shortage of neurologists in the United States."

- **Diabetes care going virtual**

  (Source: Live past 100, 22 Oct 2018) *[Return comment]*

  "BOSTON – Harnessing the power of digital health technology — smart phone apps, telemedicine and mobile health (m-health) — can provide powerful tools to help people with diabetes self-management, ultimately improving A1c levels, reducing complications and lowering healthcare costs"

- **Virtual exams: The right prescription for what ails you?**

  (Source: KSL, 10 Oct 2018) *[Return comment]*

  Discusses the use of virtual medical examinations by doctors, with patients at remote locations.

- **Five questions for the patient-centered data home**

  (Source: Medcity News, 3 Oct 2018) *[Return comment]*

  "Health Information Exchanges (HEIs) are back and in a big way. Looking beyond interoperability, HIEs are now focused on creating nothing less than the Patient-Centered Data Home, accessible nationally. The timing is, paradoxically, good and bad."

- **Internet of things (IoT) is driving a home healthcare industry**

    (Source: Digital Journal) *[Return comment]*

- **Healthcare virtual assistant from Epic and Nuance points to trend**

    (Source: Techtarget, 20 Oct 2018) *[Return comment]*

    "Growing collaboration between major players in the health and technology fields has resulted in strides toward new healthcare-centered products. Earlier this year, Apple announced that it was teaming up with Cerner to make health records available via the Apple Health app, and Epic partnered with CVS to expand visibility to lower drug cost alternatives."

- **Docs on call: Ayala invests in booking app for health-care services at home**

    (Source: Business Inquirer, 18 Oct 2018) *[Return comment]*

    "The Ayala Group's health-care arm announced an investment in homegrown tech startup AIDE, an app that allows users a bevy of health-care services such as medical consultations and lab extraction and interpretation at home."

- **9 merits of online doctor consultations**

    (Source: Green Prophet, 4 Oct 2018) *[Return comment]*

    "Online doctor consultation has emerged as a blessing for those who live a hectic lifestyle and are not willing to travel long distances for a doctor's appointment."

- **New project aims to improve long-term patient monitoring through remote assessment**

    (Source: News Medical, 9 Oct 2018) *[Return comment]*

    "Under conventional medical practice, monitoring long-term patients is done in the clinic or hospital, assessing such things as treatment effects, adverse events and disease course. In some cases, visits may not be frequent enough to identify individuals at risk of significant changes in disease state, including relapse"

- **Remote Care: The new normal**

    (Source: Mobihealth News, 15 Oct 2018) *[Return comment]*

    "Centralized care, with a hospital as the "hub," is the standard in the US today. However, this familiar model is changing rapidly, as providers embrace remote care at scale. After decades of experimentation, why now?"

- **Remote patient monitoring via smartphone cuts one-week post-partum visits by 57%**

    (Source: Healthcare IT News, 12 Oct 2018) *[Return comment]*

    "This study shows how UPMC Magee-Womens Hospital accomplished a reduction in post-partum visits by sending new mothers home with a free blood pressure cuff and access to a remote monitoring portal"

- **The challenge of remote patient monitoring**

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

    "Remote patient monitoring (RPM) uses digital technologies to monitor patients outside of conventional clinical settings, such as in the home, and electronically transmits that information securely to their health care providers"

- **Alan partners with Kry's Livi for telemedicine appointments**

    (Source: TechCrunch) *[Return comment]*

• **Defendants named in $1B telemedicine fraud that allegedly mislead patient, doctors**

(Source: Mobihealth News, 16 Oct 2018) *[Return comment]*

"Seven companies and four men were charged with involvement in a $1 billion telemedicine fraud scheme, where they allegedly filed false claims for payment and mislead doctors and patients in order to defraud private health benefit programs, according to the Department of Justice."

• **Doctors skeptical about CMS's virtual check-in provision**

(Source: Mobihealth News, 15 Oct 2018) *[Return comment]*

• **Experts debate telemedicine merits and myths**

(Source: Mobihealth News) *[Return comment]*

• **Financial and business opportunities in the emerging telemedicine field**

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

"Healthcare providers and insurance companies can provide a higher quality of care and either save money or increase revenue when they offer telehealth services. Telehealth is an opportunity to provide better care and increase patient satisfaction, as well as quality of life."

• **TeleHealth services interactive patient education helps hospitals address national opioid crisis**

(Source: Telecom Reseller) *[Return comment]*

Treatments, surgery and diseases   [Back to Quick links]

• **'Paintable' chemotherapy shrinks skin tumors in mice**

(Source: Science Daily) *[Return comment]*

• **Precision medicine alliance brings democratization of precision medicine**

(Source: Healthcare Informatics) *[Return comment]*

• **Look how far precision medicine has come**

(Source: MIT Technology Review, 23 Oct 2018) *[Return comment]*

"Skeptics say drugs based on genetic insights have underdelivered. But look carefully and they're everywhere. The growing tally of personalized or targeted medicines consists of those drugs whose label includes information about how genetic makeup can affect a person's response to a drug."

• **Gene treatment made for a single child cuts a hyper-personal path for precision medicine**

(Source: MIT Technology Review, Oct 2018) *[Return comment]*

"Today In a fascinating first, a child is receiving a genetic treatment customized to overcome a one-of-a-kind DNA error in her cells. The patient: Mila Vitarello (pictured above) loved skiing and biking, but then she fell ill with a super-rare form of Batten disease, which causes brain damage."

• **The personalised medicine revolution is finally happening and it'll change the way we think about cancer**

(Source: Science Alert) *[Return comment]*

• **Surgery in space: Medicine's final frontier**

(Source: Scientific American) *[Return comment]*

• **Scoliosis linked to essential mineral: Children with severely curved spines may be unable to use manganese**

(Source: Science Daily) *[Return comment]*

- **How precision care and consumerization will modernize healthcare delivery**

  (Source: Medcity News, 10 Oct 2018) *[Return comment]*

  "There is tremendous innovation in cancer research these days, which was recognized when the Nobel Prize in Medicine was awarded to two pioneers of immunotherapy"

UK and NHS   [Back to Quick links]

- **Cloud-first, mobile-first: Can this ambitious tech plan fix the NHS?**

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

  "Video - New rules for tech in the NHS are on the way. But without any more money, will they make much difference?"

- **The NHS in numbers: What the service does in one day**

  (Source: BBC) *[Return comment]*

- **A new era of collaboration for the NHS**

  (Source: Computer Weekly, 19 Oct 2018) *[Return comment]*

  "The opening of Great Ormond Street Hospital's (Gosh) Drive research and innovation unit is an important first step towards reimagining how the NHS can make better use of technology to deliver healthcare services."

- **UK health minister sets out tech-first vision for future care provision**

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

  "The UK's minister for health has made technology one of his stated priorities. He has set out a vision for transforming, root and branch, how the country's National Health Service operates to accommodate the plugging in of "healthtech" apps and services — to support tech-enabled "preventative, predictive and personalised care""

- **Hospitals turning to healthcare assistants to plug the care gap**

  (Source: Maldon and Burnham Standard, 17 Oct 2018) *[Return comment]*

  "NHS hospitals are "plugging the care gap" with healthcare assistants where they are struggling to recruit nurses, a new report suggests. The document, by BPP University School of Nursing, states that while nursing positions rose by 0.5% between December 2015 to December 2017, the number of healthcare assistants rose by 6.5%."

- **The tech behind the NHS**

  (Source: Trend in Tech) *[Return comment]*

- **Take a look at the latest medical technology in the NHS - including blockchain and artificial intelligence**

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

- **Mental health support scheme opened up to all NHS doctors**

  (Source: Halstead Gazette) *[Return comment]*

- **New NHS mental health data hub, Babylon Healthcheck and more UK digital health news briefs**

  (Source: Mobihealth News, 10 Oct 2018) *[Return comment]*

  NHS Digital has created a mental health data hub to give healthcare workers, patients, charities and others easier access to national mental health statistics, with its launch coinciding with World Mental Health Day.

• **NHS must follow the lead of driverless cars and embrace technology**

(Source: Telegraph) *[Return comment]*

Virtual Reality (VR) and Augmented Reality (AR)   [Back to Quick links]

• **Applications of Augmented Reality In the Healthcare Industry and Its Impact on Surgical Outcomes**

(Source: Healthworks Collective, 18 Oct 2018) *[Return comment]*

"Technology is playing a vital role in changing the face of business, across nearly all verticals around the world. In healthcare, the influx of technological advances has shown incredible promise for the future of diagnostic, treatment, and surgical needs."

A selection of the emerging technologies continuously monitored by DeltaHedron®

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

Business impact and cross-cutting themes

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

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.

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