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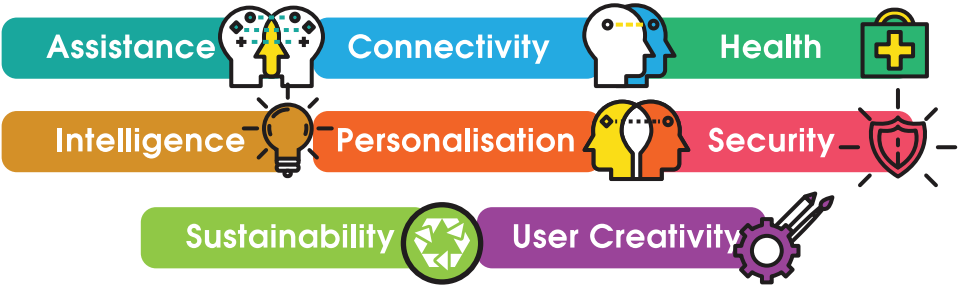
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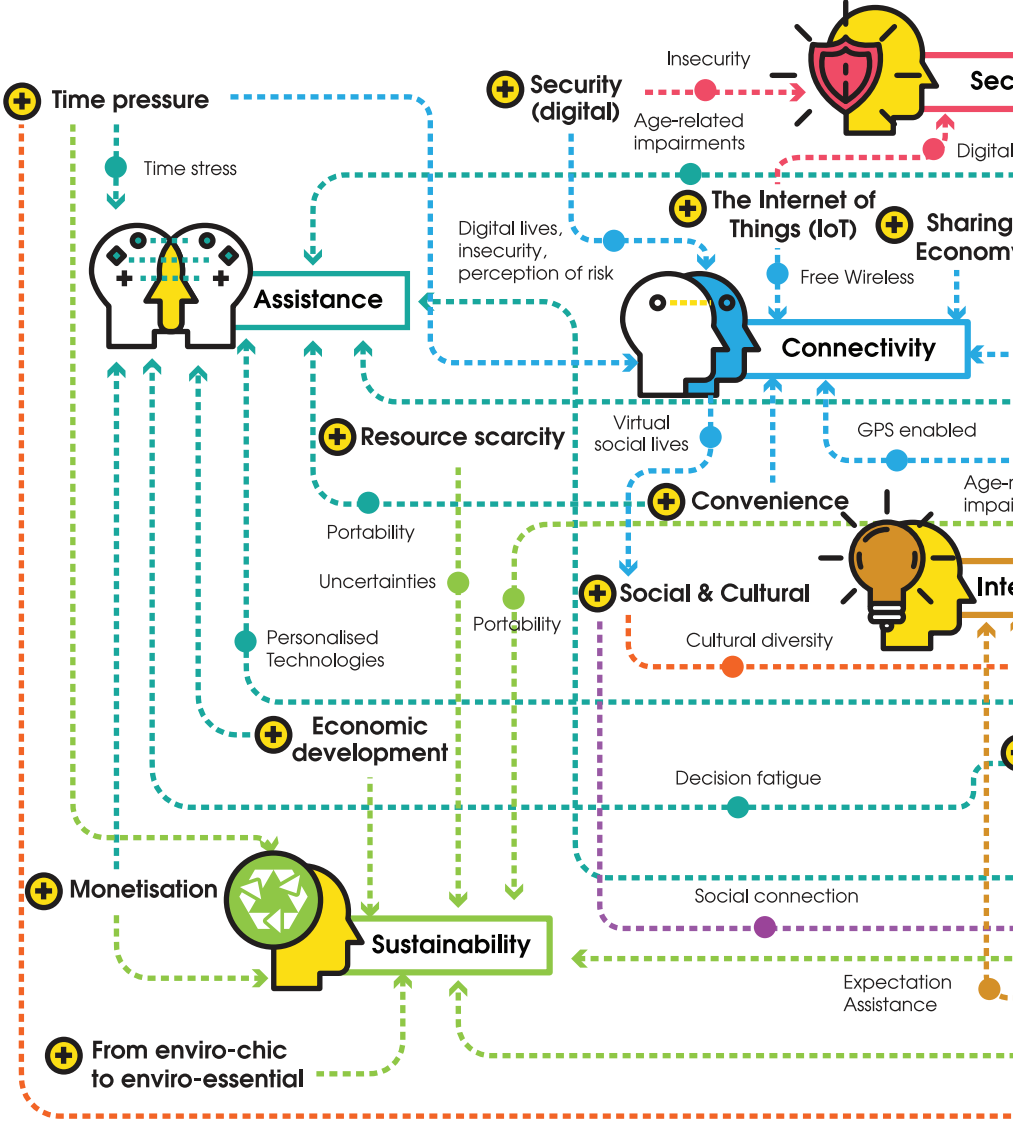


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TOP 8 TECHNOLOGY VALUES



THE DRIVERS OF CHANGE

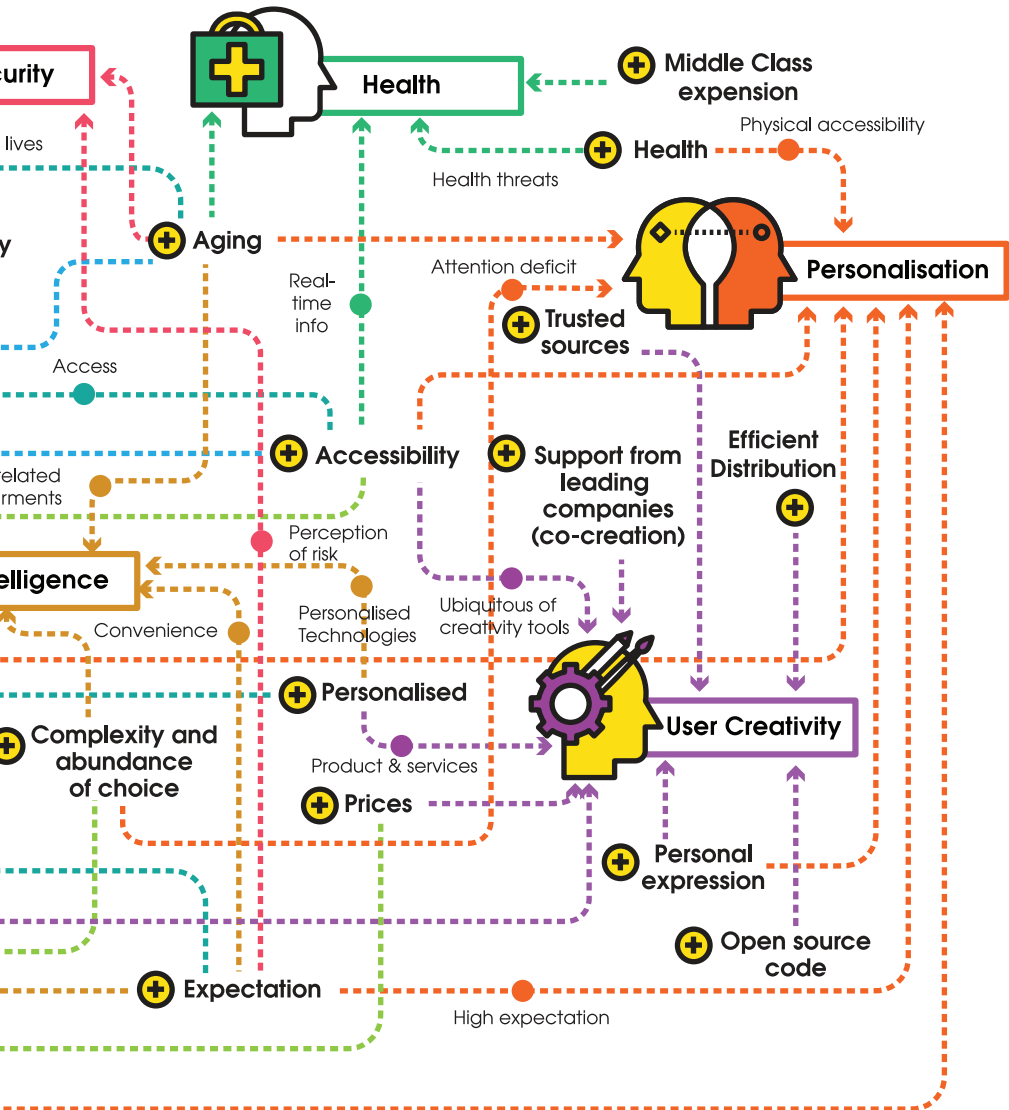


The 8 Technology Values serve as a reference for stakeholders, Government, academia, industry and public who involve directly or indirectly in R&D and innovation related activities. The values were based on research conducted by myForesight® on a number of technology trends that will shape the future. This booklet will provide a brief of each technology values, factors that drive the values also known as Drivers of Change, its implications towards businesses and examples of how the values have manifested in products and services.

There are a number of drivers that contribute towards creation of new technologies, products and services. The following diagram depicts the interconnectivity between the drivers of change and the technology values.

How to read this diagram:

The technology values are driven - - -> by the drivers of change + and its features ●.





ASSISTANCE

People are increasingly facing information overload, time stress, and the technological complexity of modern life, making the value of assistance through simplicity has become increasingly important. Such situations driving them to look for products and services that provide relief from elements of consumer life that seem more complex, hurried, and confusing.

Assistive technologies enable products and services to better meet the needs of consumers of all abilities, ages, incomes, and experience levels. Therefore, products and services will need to incorporate the technology value that make them easy and almost instinctive for consumers to use. It's all about reducing choices and unnecessary steps, narrowing clutter, and adding a touch of elegance wherever possible.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Strong consumer desire for physical and mental enhancement and the increasing need for such assistance will accelerate demand for products such as foods, pharmaceuticals, and supplements.



Products and services that employ assistive technologies help overcome consumer uneasiness about technology. Technologies that empower people, instead of disenfranchising or diminishing them, will create market growth.



Where/ how are people wasting their time? Where/ how are people having difficulty with technology? Where/ how are people looking for information? Where/ how are people stuck? How do people want to be perceived? The answers to such questions will help companies identify the different kinds of assistance that consumers will welcome to make their lives easier.



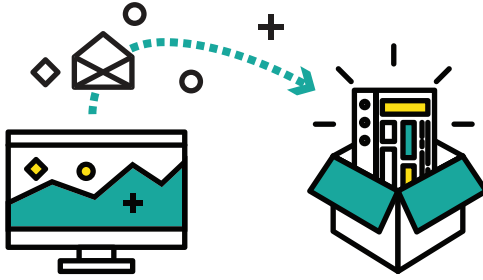
Algorithms used in companies like Amazon, Netflix, and music services are assisting the consumers in making better choices with the options offered. In the coming years, development of such algorithms will become increasingly important in assisting the customers faced with unlimited options and choices.



While many consumers will welcome technologies that assist in managing the challenges of daily existence or mitigate disability or decrepitude, a backlash against such products and services could also develop. This could result in a split market—with some consumers freely availing themselves of mechanical, technological, dietary, and pharmaceutical performance enhancers and others refusing to do so. This do-it -myself market could create new opportunities in the “all natural” market.

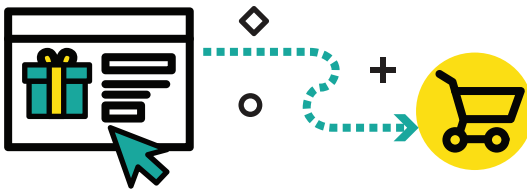


EXAMPLES OF ASSISTIVE TECHNOLOGIES



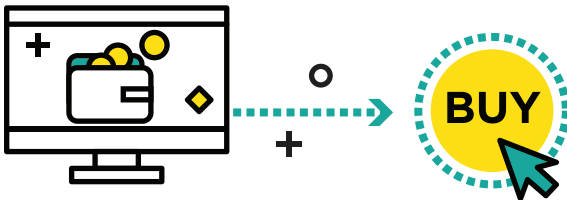
CLOUD SERVICES

Free file storage and sharing through cloud services such as Dropbox, iCloud, and OneDrive provide simplicity while retaining functionality, thereby increasing convenience. Files can be accessed anywhere with an Internet connection and all devices can be synchronised.



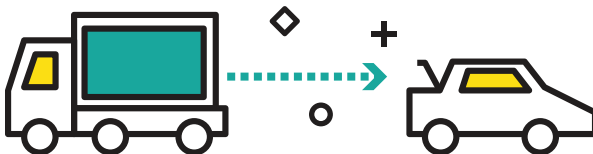
RETAIL CONVENIENCE

Making it easier for consumers to shop, especially in an era in which consumers can choose to do all of their shopping online, is increasingly important to retailers. To simplify shopping, Tesco has introduced four different formats to offer consumers quick and easy access to its offerings regardless of whether they live in dense cities or outskirts—and Walmart is testing formats smaller than its flagship superstores. Tesco's virtual supermarkets allow South Korean consumers to browse through and select merchandise at subway stations for later home delivery.



BLOCKCHAIN TECHNOLOGY

The underlying technology behind BitCoin, the blockchain, is the open, decentralised online ledger which verifies transactions. The technology has the potential to trigger massive simplification of banking processes and cost structure.



TRUNK DELIVERY

In April, 2015, Amazon—in partnership with Audi and DHL—launched a pilot project in Germany that delivers packages directly to consumers cars. The program eliminates the inconvenience, for both consumers and retailers, of missed deliveries. Participating Audi owners allow their cars to be tracked for the timeframe of the delivery, when a DHL driver uses keyless access to the trunk to make the delivery. After the trunk automatically locks, the owner will receive an email notification regarding the completed delivery.



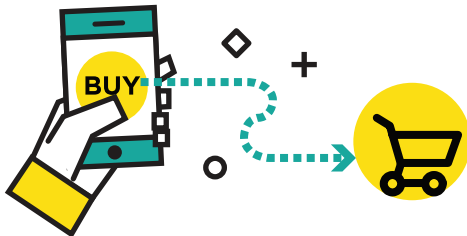
SECOND SIGHT

OrCam is a portable device with a smart camera designed to assist people who are visually impaired. The camera, mounted on a pair of glasses, can read text, describe objects, and identify faces. The device has two parts—a base unit and a head unit that weighs less than an ounce—connected by a thin cable. Operation is intuitive and activated by pointing. The learning curve is designed to be completed within a few minutes and personalisation can be fully accomplished in two weeks.



COGNITIVE BOOSTS

An elixir that promises to improve cognitive ability would be welcomed by millions of consumers suffering from aging memory capacity, dementia, and diseases such as Alzheimer. “Nootropics,” compounds or foods that improve such mental abilities as memory, focus, or even mood, have been the focus of research and development for decades. A University of Maryland study in 2015 demonstrated that cinnamon extract improved insulin sensitivity, an important factor in neuron functioning and therefore cognition. Another 2015 study suggested that a green tea extract slows the progression of Alzheimer’s disease in mice—and can reverse the disease’s effects.



SHOPPING ASSISTANCE

PowaTag, an e-commerce app that combines elements of mobile payments, QR Codes, and audio recognition—provides an all-in-one solution for brands and retailers to target customers in different physical and online environments and encourage them to buy products immediately. The app enables users with smartphones to directly buy what they see or hear, thereby assisting consumers in making purchases (and retailers and manufacturers in making sales).



AGING IN PLACE

Lively, a Silicon Valley start-up, has developed a medical alert and monitoring service to help older adults live safely and independently. The system combines a medical alert device, four passive activity sensors, and an open system that can integrate glucose meters, blood pressure monitors, inhalers, nebulizers, and other biometric mobile health devices. Lively has received support from State Farm, which offers exclusive products and services from Lively to its customers through the insurer’s Connected Care programme.

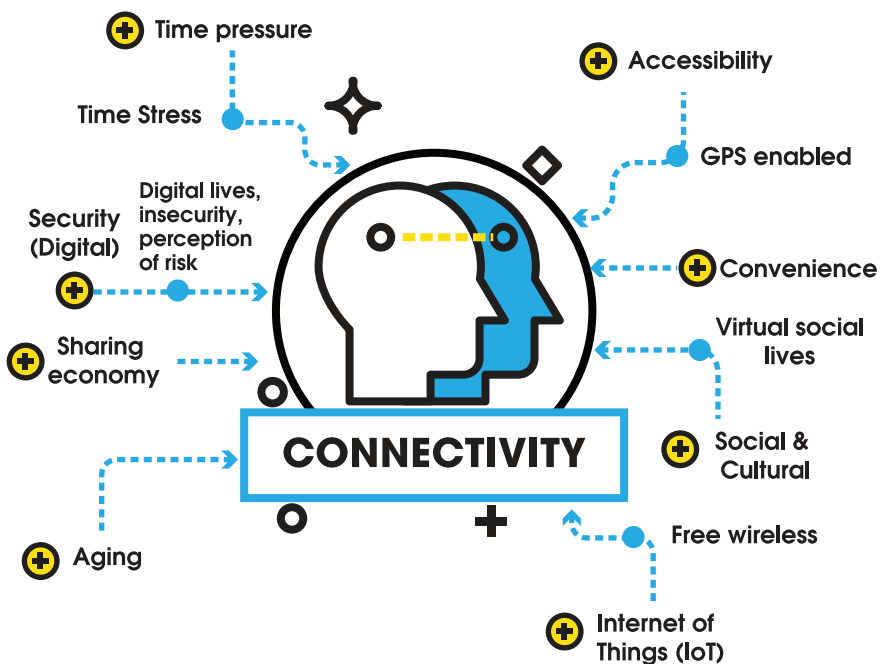


CONNECTIVITY

Connectivity has become an increasingly crucial aspect of emerging technologies. Concepts that had just begun a decade ago—such as cloud storage, online mapping applications, and mobile banking—are now ubiquitous parts of consumers’ daily lives.

It is characterised by trends such as the spread of wired and wireless networks, **enabling quick and convenient access to real-time information, and the ease of communication using multiple devices that connect with each other within and across networks.**

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Consumers have become accustomed to having connectivity - at home, work and on-the-go. Therefore, consumers place a higher premium on establishments and businesses that provides connectivity.



While densely populated city areas offer widespread Wi-Fi coverage, rural and remote areas still present connectivity challenges. Businesses might consider sponsoring free Wi-Fi in popular areas including areas of outdoor activities.



Helping consumers and businesses visualise data will become a growing opportunity as more data is generated by ever more connected devices. This data will also provide increased levels of transparency into the operations of businesses and government.



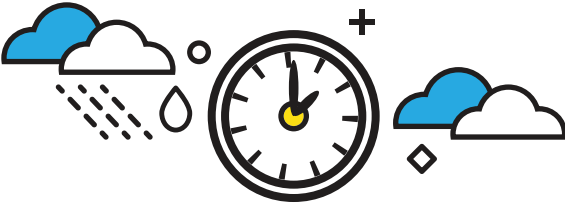
Lines between consumers' online and offline identities will continue to blur, opening up opportunities for businesses to integrate their online and in-person marketing strategies.



Retailers looking to improve their customer service may want to adopt a service like iBeacon which can welcome customers automatically and notify a sales associate when a customer seems stuck on a purchase decision.

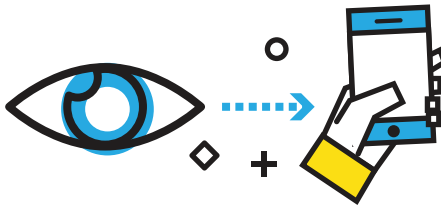


EXAMPLES OF CONNECTED TECHNOLOGIES



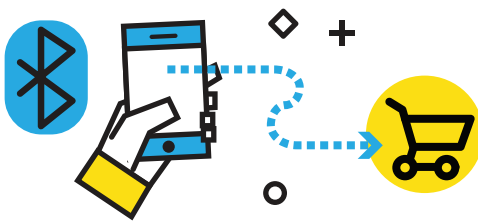
REALTIME WEATHER FORECAST

In addition to providing regular daily and weekend weather updates, the Accuweather.com app provides a 120 minute-by-minute precipitation forecast. With access to such detailed weather information, users can respond in realtime to prepare for weather events.



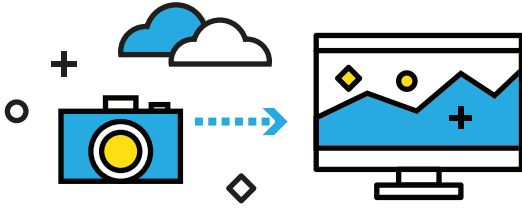
SMART CONTACT LENS

In partnership with Novartis, Google is developing a contact lens capable of monitoring the wearer's glucose levels which is reported back to the user's mobile device in real-time.



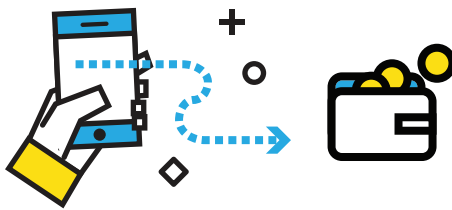
PUSH NOTIFICATION COMMERCE

These hardware devices receive Bluetooth signals from mobile phones. They can be used to track consumers in real-time around a retail environment and push shopping related promotions to users who opt-in. Taking an example of iBeacon, an Apple's implementation of Bluetooth low-energy (BLE) wireless technology create a different way of providing location-based information and services to iPhones and other iOS devices. By passing a beacon in a shop, the retailer's app (assuming you have it installed) could display a special offer alert.



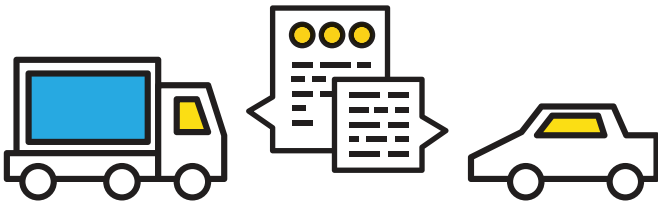
LIVE FEEDS

Nest Dropcam using Wi-Fi enabled video camera streams live feeds through the company's cloud based web service. It has become a popular solution for home monitoring and security. With the Nest Dropcam, home owner can always see what's going on inside or outside of their house, depending on where they choose to place the camera. Going for a holiday should exclude any type of worries, and this easy-to-use invention can definitely help reduce unnecessary stress.



MOBILE WALLET SERVICES

Apple Pay, Google Wallet, and Square are expected to grow from \$3.5 billion worth of purchases in 2014 to \$118.01 billion in 2017. Phone-based peer-to-peer (P2P) consumer transactions are also poised to take off, particularly in emerging markets with limited financial infrastructure.



VEHICLE TO VEHICLE (V2V) COMMUNICATIONS

Major automakers are developing equipment that will allow vehicles to exchange information about speed, position, and direction to others nearby, which could prevent up to 592,000 crashes and save up to 1,083 lives per year.



HEALTH

Health has become an increasingly important technology value in the 21st century as a growing number of consumers prioritise a healthy lifestyle. Products and services that facilitate this goal—reflected by growing number of consumers stating their priority towards healthy lifestyle —will grow stronger in the years to come.

The increasing focus on health will be supported by a range of technologies: from sensor networks that continuously monitor and transmit real-time health information. To gene therapy and genetic modification of food crops.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

The growth of specific health markets depend strongly on the public and consumer perception of health risk. Health scares increase the perception of risk and thus the market for products and services designed to reduce that risk. Monitoring of health risks is thus key to success in the health marketplace.



Global climate change is altering disease vectors, heightening specific risks in different regions of the world. A 2015 White House report, highlighted worsening climate-change-related health risks such as asthma, a rise in heat-related deaths, and the increase of tropical diseases.



Aging and the increasing prevalence of chronic diseases are heightening demands for knowledge and control of health enabled by wearables and other gadgets, as well as more personalised and regenerative medicine.



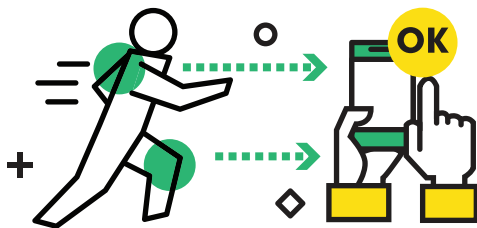
Providers of products and services will place a rising premium on design with the needs of aging consumers in mind. Therefore, businesses will benefit in this regard by visiting senior living facilities and inviting older adults to serve on consumer panels to evaluate design and service ideas.



Growing sensor capacity and transparency are heightening consumer sensitivity to the health impacts of various contaminants and pollutants. This will likely lead to a demand for higher standards as well as a growing demand for decontamination, cleaning, and filtering products.



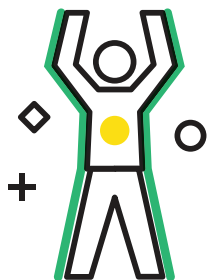
EXAMPLES OF HEALTH TECHNOLOGIES



NANODETECTORS

Advances in nanosensor technology are rapidly increasing the ability to detect disease such health threats as chemical, biochemical, or radiological agents. Researchers at the University of California, Riverside have developed an “electronic nose” that can detect airborne toxins such as chemical warfare agents, gas leaks, volatile organic compounds, and toxic pesticides.

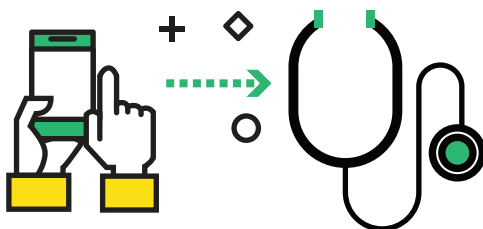
Proteus Digital Health has developed an ingestible, wireless, nanosensor technology that can monitor heart rate, temperature, activity patterns, and other physiological parameters.



EXOSKELETONS AND ROBOTS

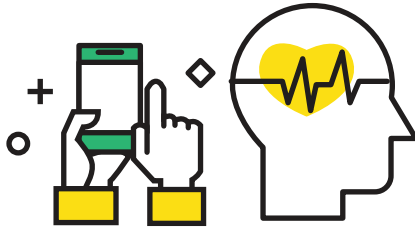
Mechanical exoskeletons—a wearable technology that merges robotics and information systems to provide a framework for the human body is continue to rise.

Proponents tout the technology as helping older users remain healthy, active, and autonomous longer as well as compensating for the effects of such disabilities as muscular dystrophy, paralysis, and general fatigue. 21 Exoskeletons, of course, represent just one application of robotics to health. Robots also perform surgery, assume nursing duties, offer eldercare, and serve as elder companions.



TELEMEDICINE

The expansion of telemedicine is reducing health costs by cutting unnecessary doctor visits and also expanding access to healthcare for rural and remote users. HealthTap in 2013 launched a voice-controlled app called Talk to Docs that provides free access to more than 50,000 physicians to answer simple medical questions. For those who need more hands-on care, a variety of apps will arrange for a doctor to make a house call, usually within an hour. Heal, for example, charges a flat fee of \$99 per visit and operates seven days a week from 8 a.m. to 8 p.m.



DIAGNOSTIC APPS

In addition to monitoring apps, the number of diagnostic apps is also increasing. An app introduced in 2015, for example, will capture video of a sample drop of blood, detect wriggling parasites, and automatically analyse any movement to identify the parasite. The app promises to significantly advance treatment of such tropical diseases as river blindness and elephantiasis.



CONSTRUCTING HEALTHIER HOMES

In addition to employing construction materials that incorporate fewer chemicals and toxic content, homes are increasingly being designed with the health of their occupants in mind. A company based in London, for example, is currently constructing transparent houses, claiming that the glass walls which can be tinted for privacy more regularly expose occupants to sunlight, improving functioning of the body's circadian rhythms and the regulation of sleep cycles.



HOME HEALTH MONITORING

Sensors in phones, implants, and wearables are expanding the ability to provide real-time health monitoring in users' homes. Remote monitoring devices are becoming increasingly integrated. WebMD in 2014 launched an iPhone app that pulls together data from a range of devices that monitor sleep, weight, glucose levels, steps, blood pressure, and other health indicators.

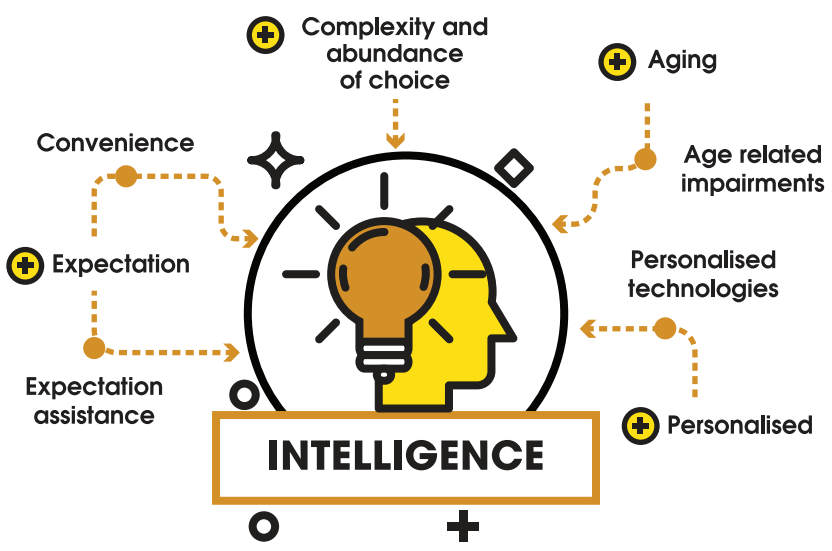


INTELLIGENCE

As technology advances, consumers will continue to **consign the burden of decision-making and remembering to personalise devices**. And intelligent technology is beginning to take on a more multi-dimensional and complex form.

Changing consumer **needs and expectations** regarding machine intelligence are driving technological advancements, especially those pertaining to mobile, handheld devices and web-based systems. And the growing array of products and services to meet these consumer demands is allowing more innovation, choice, and interconnectivity.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Intelligence will be a necessary component to create environments that adapt to changing conditions and consumer needs. Smart and responsive materials, such as self-inflating cushions and auto-darkening smart glass, may aid consumers throughout the day.



Companies may want to explore how intelligent systems, such as recommendation engines, could provide better real-time decision support to consumers when they have access to personal health and financial data to monitor mood and stress levels.



Businesses will have more opportunities to utilise aggregated consumer data in their marketing and decision-making processes to forecast market activity and maximise consumer exposure to targeted advertisements.



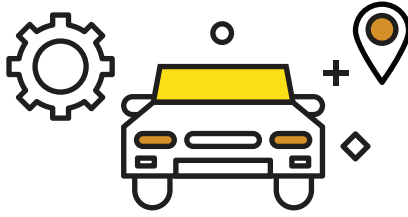
As personal devices become more portable and less costly, consumers will seek to find ways to integrate existing systems of personal data management with each other such as financial planning, social networking, and navigation and location services; and customise them according to individual preferences.



As intelligent systems proliferate, businesses may find opportunities to appeal to consumer nostalgia for simpler times without the use of intelligence system.



EXAMPLES OF INTELLIGENCE TECHNOLOGIES



ROBOTICS AND SMART VEHICLES

While industrial and military sectors have adopted a number of high-priced robotics solutions, the consumer sector has lagged due to lack of technological maturity and high retail costs. However, the advent of smart vehicles and navigation systems may prove to be the exception to this rule. Carmakers such as Audi, Mercedes-Benz, and Tesla are all testing driverless vehicles on public roads around the US, signalling a leap in automation technology that may be applied to a variety of future products and services.



SMART CITIES

City governments will increasingly incorporate intelligent technology into their infrastructure. These systems will help to cut energy costs, streamline transit, and save natural resources by collecting data on everything from pedestrian traffic on sidewalks to the amount of water needed to maintain city parks.



ELDER CARE HEALTH MANAGEMENT

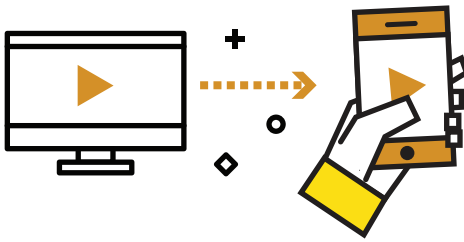
Rather than moving to assisted-living facilities, seniors will have the option of installing smart sensor networks within their own homes, which monitor movement and behavior patterns and can alert physicians to any signs of physical or mental degeneration. These systems, coupled with wearable devices that track vital signs, will allow seniors an increased degree of autonomy and comfort as they age.

INTELLIGENCE



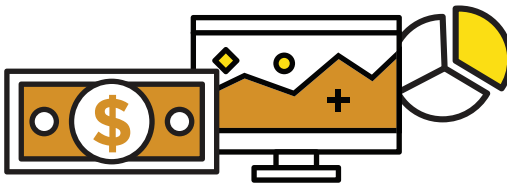
AUTOMATED FINANCES

As consumers' personal data becomes easier to track and analyse, they will rely more on automated intelligent systems to manage their finances effortlessly. For example, Digit, a new money management application, connects to a user's bank account, tracks their monthly spending habits, and uses an algorithm to move small quantities of money from checking to savings at times when the user is unlikely to be financially burdened by the transfer.



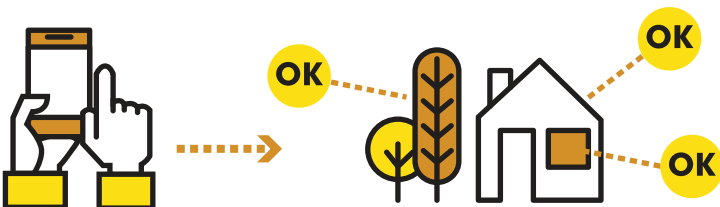
INTELLIGENT ENTERTAINMENT

The rise of online streaming services such as Netflix and Hulu, as well as the widespread availability of print materials in digital form, has exposed consumers to an increased variety of media and enabled them to satisfy diverse personalised interests. These services employ intelligence, using consumers' previous viewing patterns to suggest new entertainment options.



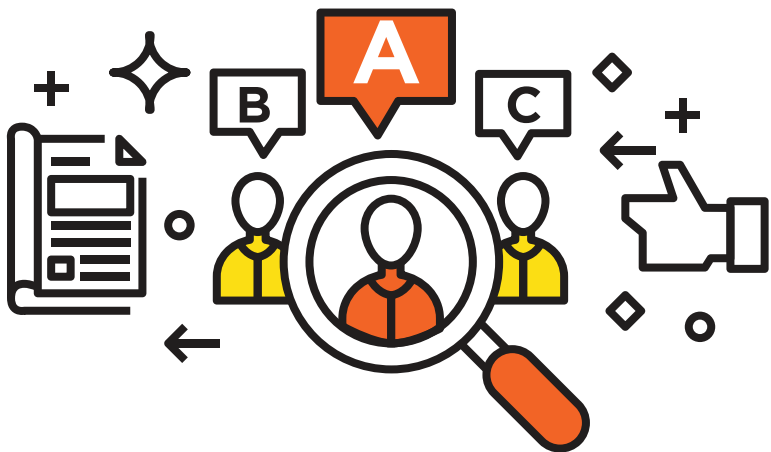
PREDICTIVE E-COMMERCE

Providers of products and services are finding ways to intelligently leverage information based on usage patterns among consumer groups. Predictive analytics, which evaluate data using statistics and data mining, allow retailers to optimise pricing, manage inventory distribution, reach more consumers with advertising, and ultimately increase profit margins. When Stage Stores, a department store chain, recently piloted an analytics program, it found that in 90% of cases, the program outperformed a human control group in making pricing markdown decisions.



INTELLIGENT HOME SYSTEMS

Google's foray into the IoT began with its acquisition of Nest, a smart thermostat that monitors household activity to optimise energy use of cooling and heating at home. 'Works with Nest' seeks to offer consumers smart phone controlled home systems that connect with appliances from washing machines to coffee makers.

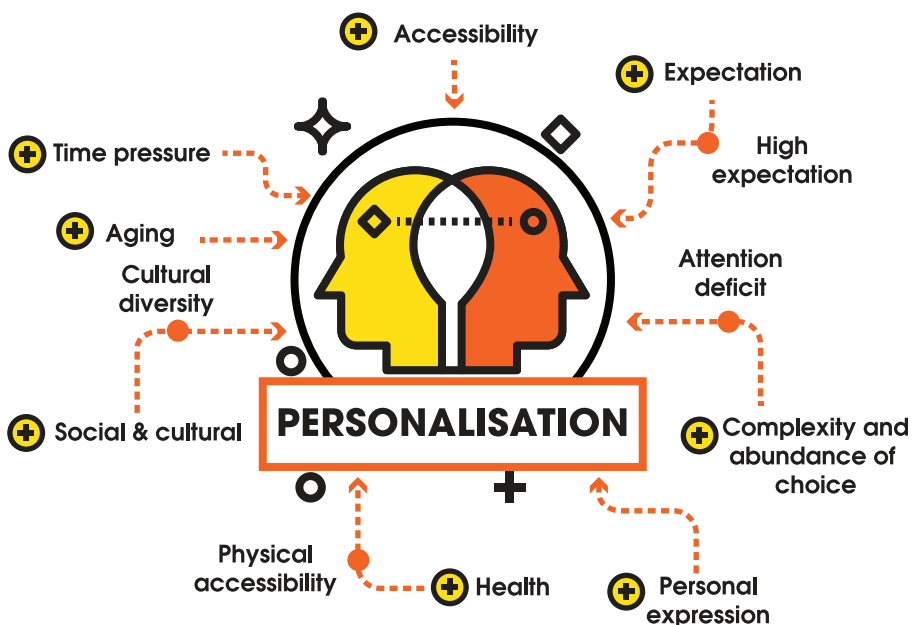


PERSONALISATION

Personalisation refers to products and services that can be **modified in order to meet the specific needs and preferences of individual consumers**. Personalisation can be aesthetic or functional. It encompasses the idea that **products and services should be suitably designed and delivered for users with varying physical needs, abilities, and cultural characteristics**.

Consumers will continue to look for products and services that align with their individual needs and preferences, whether this means the look and feel of a mobile phone or a car's instrumentation, or personalised foods based on one's genetic profile. This enable consumers to customise the look of their purchases or manufacturers can create goods that more closely match the unique specifications of the individual.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Products and services that were originally designed for people with disabilities have great opportunities in the mass market as it may come with extra feature like voice command technology.



Gender shifts in the workplace will require employers to rethink about the design of equipment and tools used in various occupations. For instance, accommodating tools for male in a female dominant industry like nursing.



As we accelerate towards a fully digital world, businesses should consider the needs of religious groups that have a unique relationship with technology. For example, designing apps that take or make payments may need to be Shariah-compliant for religious Muslims.



Offering an array of products or services with some variance in features may not provide the same gratification to customers as allowing them to input their preferences at the beginning of the creation process.



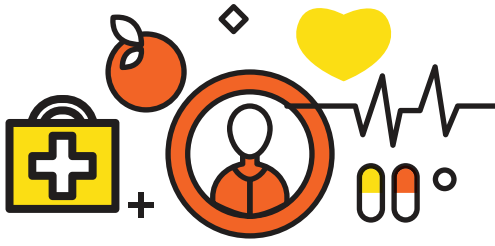
While most consumers will welcome personalised promotions, personalised advertising should take precautions in order to stay in consumers' good graces. Marketeers therefore need to carefully thread the line between personal discovery and invasion of privacy.



Businesses will lose consumers' trust if they mishandle, misuse, or fail to protect the consumers' data. This breach of security will damage the businesses reputation as well as making consumers wary of sharing personal information in the future.

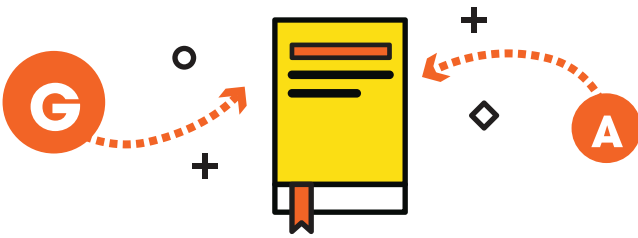


EXAMPLES OF PERSONALISED TECHNOLOGIES



PERSONALISED MEDICINE

Mapping the human genome has allowed personalised medicine that has, for example, changed how AIDS patients are treated. Studies show that patients who carry the HLA-B*57:01 gene have a 60% chance of developing a hypersensitivity reaction when treated with Abacavir, while patients who do not carry this gene do not develop the drug reaction at all. Before the genetic test was developed, diagnosis of the adverse reaction took six weeks of (harmful) treatment.



PERSONALISED LEARNING

Expanding technological capability is enabling personalised learning, which the Department of Education defines as instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners. In a fully personalised environment, the learning objectives and content as well as the method and pace may all vary.



ENTERPRISE AND PRODUCTION SOFTWARE

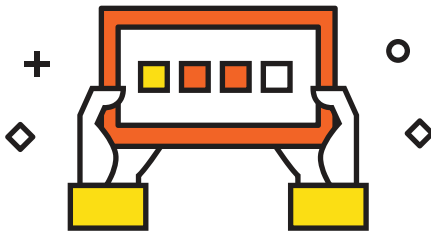
Companies like Just In Time Business Consulting and Configure One have developed software packages that track individualised design features in customer orders and translate them into sourcing and production instructions, thereby connecting front-end ordering with back-end production. Customers are only offered options in stock and get realistic lead times and progress updates, while production staffs know exactly what to assemble and can quickly produce a vast variety of products.

PERSONALISATION



MODULAR HOMES

A leading builder of modular homes, Ritz-Craft tries to move beyond standardised options to offer each customer a singular experience that focuses on his or her personal needs. While they have over 400 published floorplans to choose from, homebuyers also have the opportunity to further alter a plan to better fit their lifestyles.



PERSONALISED TABLET

The Nabi tablets are specifically designed for use by children. Made with rubber bumpers, they are designed to be rugged and durable, but what makes the Nabi different from a traditional tablet is a kid-focused OS that blends learning and entertainment with a comprehensive suite of parental controls, including a chores list. The Nabi is offered in several different sizes and versions to meet the needs children at different stages of development.



GPS SHOES AND GEO-FENCING

Caregivers of those suffering from dementia or Alzheimer's disease can equip them with shoes embedded with GPS technology in the right heel. The service alerts a caregiver when a wearer has left a designated geographic area. Because people with dementia tend to be suspicious of new things, GPS insoles can be discreetly put inside a pair of familiar shoes.



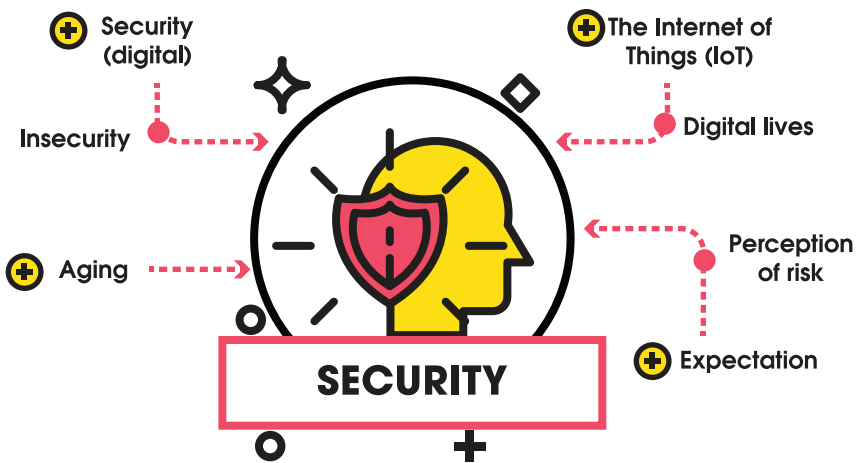
SECURITY

The need for protection has grown an importance over the last decade. Public concern about crime, terrorism, and other security issues has increased with each breaking news - story about pandemic outbreak, tainted food, and the dangers of air bag defects resulted in the largest automotive recall in US history.

Worldwide spread of consumerism and expansion of the middle class are multiplying the number of people who want to protect themselves and the things they own.

The never-ending emergence of **new threats creates new demands for protection from consumers, businesses, and other organisations alike.** These demands are constantly driving the development of new and innovative technologies that offer to protect either person or property - both physical and digital.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

The technology value of protection applies to virtually every products and services' sector. Though it may not involved in any delivering consumers' information, it is to distinguish selling point and to avoid consumers' lawsuits and unwanted publicity that will effect the businesses' reputation.



There will be an expanding demand for protective technologies from the middle class in developing nations, as they wanted security for home, person and property.



Data security will become a necessity serving as the foundation of business relationship. It is a base towards customers trust or worst, mistrust if it were handled with negligence.



Demand will escalate for technologies that offer the aging a greater opportunity for independent living, making devices that allow the elderly to manage their medications and other daily activities.



Wearable technology and portable devices create the need for new, innovative protective systems by businesses concerned with IP security. Businesses now need to establish clear protocols about Bring Your Own Device (BYOD) policy.

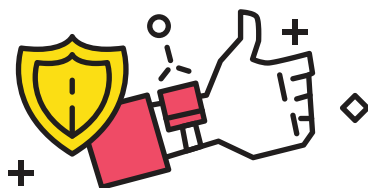


Security often conflicts with other technologies values resulting complicated usage of product or services. This conflict will pose challenges to businesses seeking to balance these technology values.



EXAMPLES OF SECURED TECHNOLOGIES

SECURITY



WEARABLES

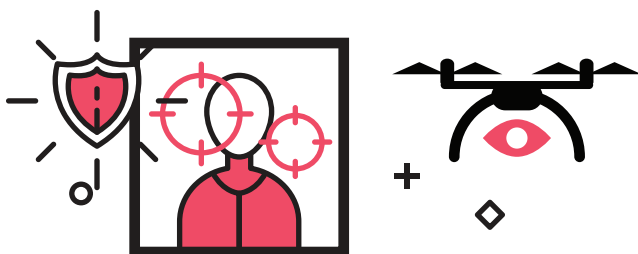
A wide range of wearables now offer various forms of protection for their wearers—everything from monitoring health conditions to locating lost children, alerting family members and/or police and other first responders in case of an emergency.

To guard against security and privacy risks, for example, all LG Watch Urbane smartwatches will come pre-installed with McAfee Mobile Security that allows them to be locked, located, and if necessary wiped remotely



ENVIRONMENTAL QUALITY MONITORS

There are now monitors and apps that aim to protect consumers by providing accurate, real-time measurements of air and water quality. A Vancouver start-up called Tzoa, for example, plans to launch the first wearable that can measure air pollution and UV radiation in the wearer's immediate environment. The company hopes to link “citizen scientists” to produce street-level pollution maps of entire communities.



CROSS-BORDER SECURITY AND SURVEILLANCE

Many organisations are already deploying technologies to replace humans in security related tasks such as border control, crowd surveillance and other situations. This includes drones, facial recognition, and biometrics to facilitate crowd or passenger's movements. In Brazil, an automated border control technology has been installed in preparing the Rio 2016 Olympics.



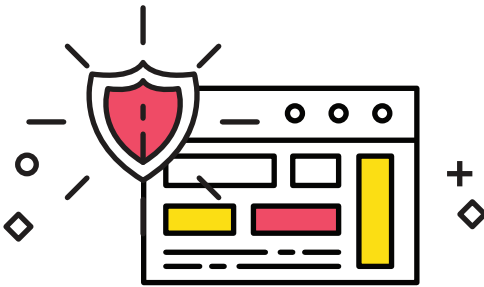
APPLYING GENOMICS TO THE FOOD SUPPLY CHAIN

In 2015, Mars Inc. and IBM Research joined in founding the Consortium for Sequencing the Food Supply Chain. The consortium, which hopes to draw other partners “from across technology, agricultural companies, and academia,” aims to apply insights from genomic data to improve understanding of the growth and interaction of pathogens and other micro-organisms in order to develop healthy and protective microbial management systems within the food supply chain.



CRASH-AVOIDING CARS

Adoption of crash avoidance technologies in cars are increasing. This is due to technology advancement which employ computers, radars or cameras to detect crash risk, warn drivers and if necessary stop automatically. In Insurance Institute for Highway Safety tests of 24 models in 2014, 21 received Superior or Advanced ratings and just 3 received the lowest rating of Basic, which is a marked improvement from 2013 tests.



PROTECTION AND THE INTERNET OF THINGS

Rapid expansion of the Internet of Things (IoT) is creating an urgent need for new protective components, products, and services. The number of IoT devices worldwide are projected to grow tenfold by the end of the decade: from 2.5 billion in 2014 to 24 billion in 2019. Without strong security measures, IoT devices are vulnerable to hackers and other cyber-attacks. This will dramatically increase the demand for protective digital technologies over the next decade.

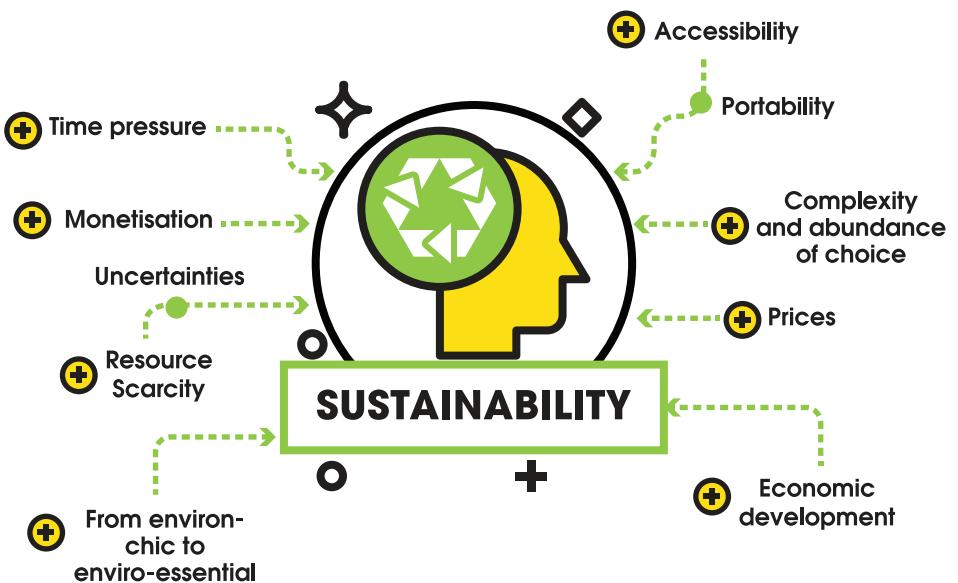


SUSTAINABILITY

Economic and population growth heighten the pressure on resources and the environment. Driven by corporate efforts, public awareness and government initiatives, sustainability has already become a mainstream consumer value. Sustainable development involves meeting the needs of the present without compromising the ability of future generations to meet their own needs—and therefore achieving a higher quality of life for all people through economic and social development in association with environmental protection.

Sustainable technologies, products, and services satisfy consumer needs and desires, also improve quality of life for the user, but at the same time minimise natural resource use, waste, and pollution. The move to sustainability will be supported by a range of technological innovations, such as construction materials, electric car and its infrastructure as well as environment conservation.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Businesses are increasingly recognising sustainability not just as a public relation issues, but as a bottom-line issue as well. Since the long-term success of a business depends on the economic, social, and ecological context—social instability, climate change, or resource depletion, all businesses have a critical stake in pursuing and achieving sustainability.



Rising consumer demand for sustainable practices have made sustainability an important factor for any businesses that aspires growth. Those who lag behind in adopting sustainable practices will ultimately lose market share to those that more readily adapt to sustainability demands.



The complexity of sustainability issues has made it difficult for even the largest and most powerful of businesses to tackle them alone. Thus, a lot of them are seeking to collaborate with government, NGOs, and even competitors to meet the challenges presented.



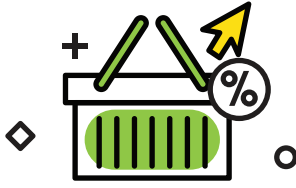
Embracing and achieving sustainability may further a businesses' efforts to enter and grow market share in foreign markets, especially in emerging economies.



Businesses may win consumer interest and approval by linking sustainability efforts with authenticity. Sustainable “innovations” sometimes involve shifting from unsustainable practices to traditional methods that often convey an aura of authenticity to consumers.



EXAMPLES OF SUSTAINABLE TECHNOLOGIES



RETAIL EFFICIENCY

Applications of big data are increasingly touted as an invaluable tool to drive efficiencies across the entire supply chain. In using big data to uncover local/ global supply-demand trends and improve predictive analytics, retailers can optimise inventory, avoid stock-out incidents, and minimise inefficiencies.



“LOVE FOOD HATE WASTE”

WRAP, a government-funded nonprofit in the UK dedicated to eliminating waste, developed a consumer campaign to help “raise awareness of the issue of food waste and offer easy ways for individuals to reduce the amount of food they throw away. Since its launch, consumers have saved £13 billion by not buying food that would otherwise go to waste.”



GREEN BUILDINGS

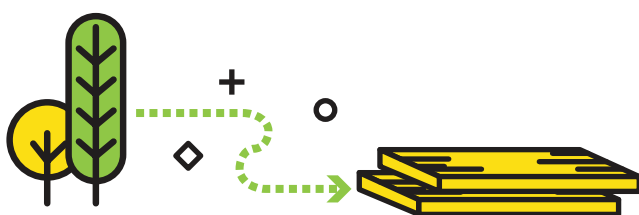
In 2012, 41% of all non-residential building starts in the US—up from 2% in 2005—were green. And according to the US Green Building Council, an estimated up to 48% of new non-residential construction in 2015 will be green. In Malaysia, as of 2015, more than 600 buildings have registered to be certified with Green Building Index Malaysia - a 14% increase from the previous year.

SUSTAINABILITY



SUSTAINABLE PRODUCE, SUSTAINABLY PACKAGED

Red Sun Farms in Ontario offers its customers USDA-certified greenhouse-grown organic vegetables produced in Canada, the United States, and Mexico. Beginning in 2016, it will launch new sustainable packaging—a fully recyclable, biodegradable, and compostable base made from locally-sourced virgin and recycled wood pulp and a resealable top seal that reduces plastic use by 90%—for its organic grape tomatoes. The new packaging thus significantly reduces plastic use, increases use of renewable resources and local production, and reduces waste to landfills.



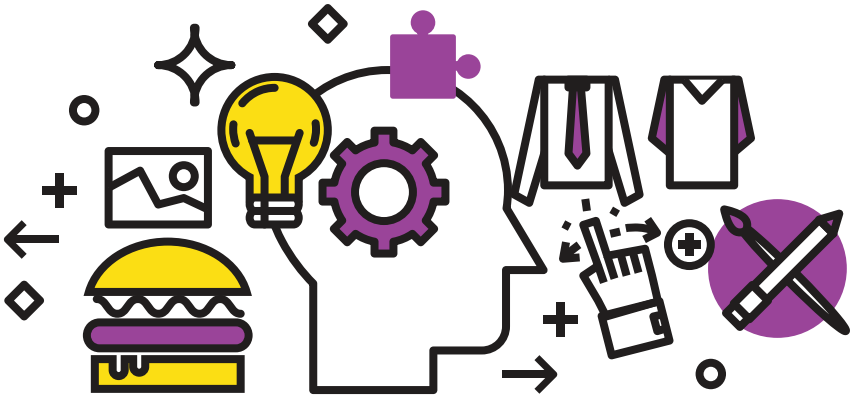
CONSTRUCTION MATERIALS

Kebony, a Norwegian company, has developed technology to enhance the properties of sustainable but non-durable woods. By impregnating non-durable woods with a bio-based liquid derived from agricultural crop waste and adding heat to permanently graft a polymer into the wood cell wall, this environmentally friendly process significantly improves durability and stability. Suitable for indoor and outdoor applications, Kebony wood requires no harmful preservatives, needs no maintenance besides normal cleaning, and does not deteriorate over time as quickly as conventional woods.



SUSTAINABLE TOURISM

Offering tourists sustainable getaways, Churchill Wild—which operates remote luxury eco-lodges in northern Manitoba, Canada—aims to become 100% self sufficient, using only renewable energy resources. Wildlife activities are designed to have as low impact on the environment and wildlife as possible. Guests are encouraged to hike whenever possible, using established trails and beach ridges to minimise environmental impact, and to allow polar bears and other animals to approach on their own terms rather than pursuing or pressuring them. Sustainably harvested and locally sourced wood and recycled materials provide the construction materials for lodges, and the menu includes sustainably and humanely harvested local fish, game, wild berries and salad greens.



USER CREATIVITY

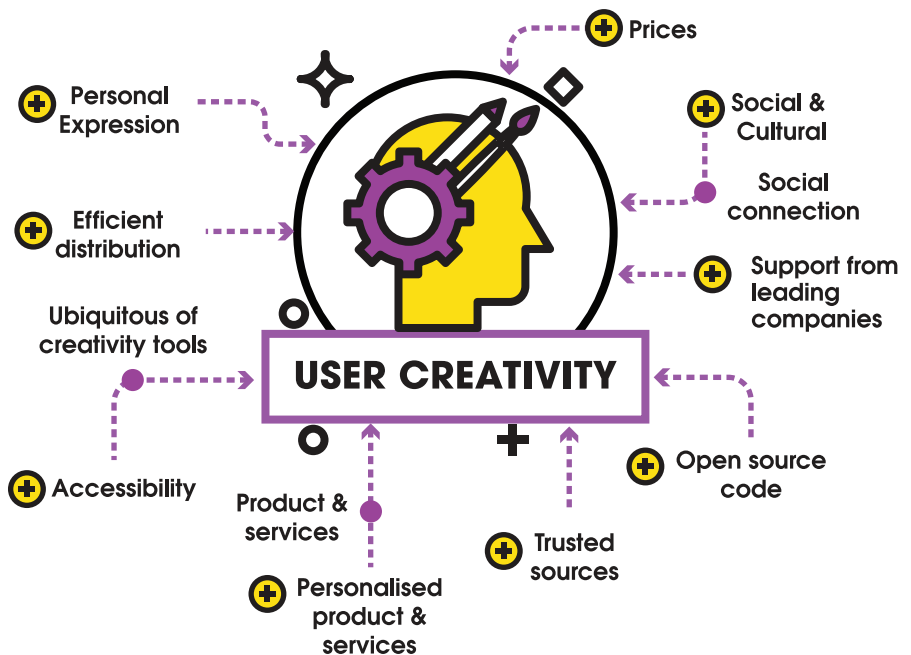
User creativity has become an integral feature of many products and services and playing a significant role in both R&D and product marketing. Online and offline tools are democratising the innovation pipeline: facilitating the ability of individual consumers to develop and/or modify products and services of their own, and also to offer feedback and insights to products and services companies.

The term “user creativity” encompasses two trends:

- 1) The proliferation of products, services, and content that consumers create, augment, and/or distribute themselves.
- 2) Continued growth of consumers shaping mainstream content through feedback processes such as product reviews and collaborative filtering.

Consumers can customise the look of their purchases or manufacturers can create goods that more closely match the unique specifications of the individual. A range of supporting technologies from 3-D printers to social media platforms are facilitating the expansion of products and services that enable user creativity.

DRIVERS OF CHANGE



BUSINESS IMPLICATIONS

Most consumers enjoy taking advantage of the opportunity to play around with new products and services, experimenting and exploring to find out exactly what they can do with them. This opportunity will likely engage more consumers for a longer period of time.



The best social platforms serve as tools that enable user creativity. For this reason, social platforms can serve as key enablers of user creativity and co-creation, bringing important consumer insights into the innovation pipeline. Through social media, it can unite a company's internal sales, service, R&D, and marketing personnel with external consumers, clarifying their needs and desires.



Employing customer co-creation to harness user creativity works more effectively in incremental innovation rather than radical innovation projects. User creativity provides a valuable tool, providing precise information to companies on what consumers really need. However, when companies aim for more radical innovation, the imagination of consumers is often limited, making it difficult for them to imagine anything out of the box.



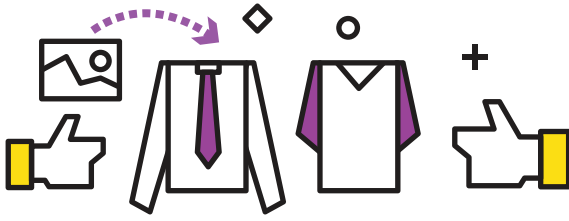
Gen Z, consumers under age 21, tend to think of themselves as more than mere consumers and want to partner with the businesses they patronise. Products and services that offer opportunities for co-creation or other applications of user creativity therefore offer the businesses that provide them an avenue to engage teen consumers more deeply.



Businesses will benefit from encouraging user creativity in the form of product and service reviews. Software that help clients create social communities on their brand sites, even the negative comments, actually demonstrates that the business care about customer satisfaction.



EXAMPLES OF CREATIVE TECHNOLOGIES



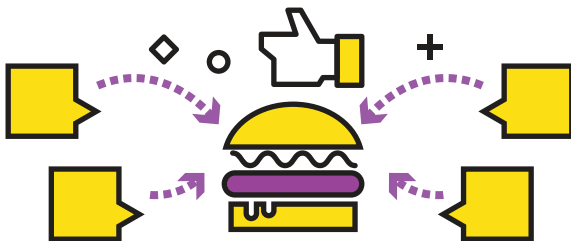
FASHION CUSTOMISATION

Burberry developed Burberry Bespoke, a service allowing consumers to design and order garments online, as an offshoot of its social media outreach. In a 2009 campaign called Art of the Trench, the company asked consumers to upload images of themselves wearing a Burberry trench coat. Burberry designers drew inspiration from these images (400,000 in the first week alone) and recognised as global and local trends in how their signature garment was worn.



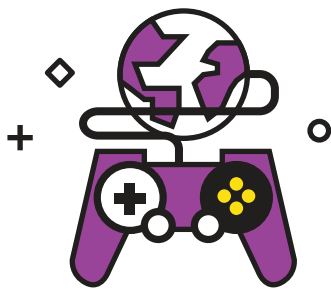
MIX YOUR OWN DRINKS

Coca Cola has introduced a new soda fountain dispenser called the FreeStyle machine that offers more than 100 products, allowing consumers to mix different flavours to create unique taste combinations. Coke has coupled this launch with a new mobile app that let consumers save their blends—enabling any FreeStyle machines to replicate the drink. In addition to enabling user creativity, the dispensers are providing Coke with insight on products and consumer engagement.



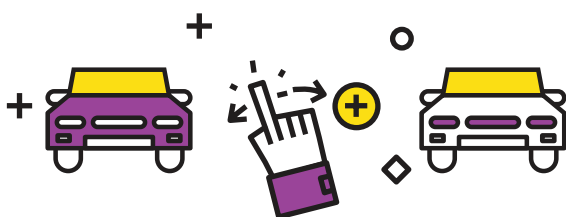
BUILD A BURGER

Beginning late in 2014, McDonald's is gradually rolling out "Create Your Taste" kiosks that allow consumers to custom-create their own burgers by choosing from an extensive list of gourmet ingredient options from guacamole, chipotle mayo, and dijonnaise sauce, to turkey bacon, grilled pineapple, and jalapeno peppers.



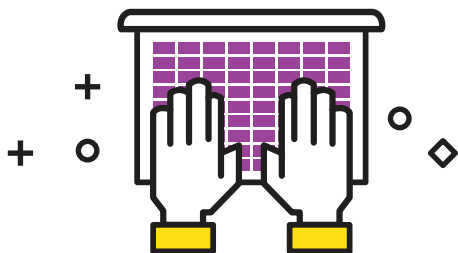
CREATIVE GAMES

Many popular electronics and video games provide users ample opportunities to exercise creativity. Classic examples are numerous, from the Sims, Little Big Planet, and Trials Evolution to Halo, and Minecraft. Newer examples include WarioWare: D.I.Y., which includes an interface that encourage users to make their own video games, and Scream Ride, released in 2015, which allows players to create (and share) their own roller coasters.



CONSUMER-MODIFIED SERVICE

National Car Rental's program that allows frequent customers to bypass the counter and choose the car they want to rent directly from the lot resulted from the input of frequent travellers asked how they would redesign services, to better suit their needs.



CONSUMER CONTROL

General Electric in 2014 partnered with FirstBuild to offer the "Green Bean", a \$20 module that allows users to retroactively program smart capabilities into such non-smart GE appliances as refrigerators, dishwashers, ranges, ovens, washers, dryers, and water heaters. The device requires only an "intermediate level of programming knowledge" for DIY consumers to hack into appliances and modify them to make them responsive to mobile phones, laptops, or other electronic devices.

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