

2017

Life Science Talks

Innovation in Healthcare: What is the Point?



GenSearch
TALENTS & EXCELLENCE

Innovation:

What is the Point?

The Life Science Industry and in particular healthcare, is currently undergoing considerable change. Healthcare systems are facing ever increasing demands. One of the drivers for this increasing burden in developed countries is ageing and rising chronic disease. In emerging countries, providing high quality care to all as affordably as possible is critical, as well as dealing with infectious and other diseases.

All around the world healthcare systems are having to deal with difficult challenges in a complex environment ranging from tightening national healthcare budgets in developed countries to limited resources in other emerging countries. This, ultimately, means delivering more with less.

Paradoxically, new technologies can drive up costs in healthcare. The innovation driven Life Sciences industry will be forced to find new ways to create innovative solutions to meet these challenges.

The 2017 Life Sciences Talks illustrate just a few examples of the creation of innovation that have successfully transformed different levels of life science businesses to create value for key stakeholders.

In this white paper, you will discover instances where innovation in technology and organisational operations are connecting patients to healthcare providers and are sharing secure clinical data with researchers. Others have disrupted traditional manufacturing methods to improve processes and some have even transformed organisational operations to create customer trust, value, and to improve outcomes for patients.



SÉBASTIEN STOITZNER, CEO - GENSEARCH

The Speakers

Talk of innovation and its importance is everywhere in Life Sciences as in all industries. We don't always take the time to ensure that we have the same understanding of what we mean by innovation even within an organization. Is innovation limited to R&D, or R&I, or D&I as some design & innovation functions are now called? Does innovation expand to all functions and employees in an organization, including innovating the culture? Do we sufficiently have our attention on creating the conditions required for innovation to flourish?

A useful question to ask ourselves is: "who are we innovating for?" When you use the following definition of innovation, "anything novel or new that creates new value", your attention is immediately drawn to the end-user and the person or people who will benefit from the value and those who will be willing to pay for it.



MARIE-CAROLINE CHAUVET

Partner,
Insigniam



PROFESSOR JAMES BARLOW

Professor of Technology and
Innovation Management
Imperial College London



BENJAMIN DAMIEN

Director of Business Development
Univercells



LUKASZ KOWALIK

Head of the Innovation Think Tank
Merck Group



DAVID MANSET

CEO, CSO & Blockchain Entrepreneur
almerys



NEIL WILLIAMS

Director, Front-End Innovation:
Head of Connected Health
Medicom, a Phillips-Medisize Company



COLLEEN SCHULLER

Vice President, Global Head of Selling
Excellence at GlaxoSmithKline

MARIE-CAROLINE CHAUVET

Partner,
Insigniam

GenSearch is a European Executive Search and HR services consultancy dedicated to the Life Sciences. Its focus covers the Pharmaceutical, Medical Devices and Biotech industries. Over the years, the firm has gradually acquired a profound interest and insight into the transformation of the European healthcare systems and their stakeholders.

Each year GenSearch holds the Life Science Talks from which a white paper is written. The conference focuses on the challenges and current changes in healthcare by showcasing actual examples and experiences from key stakeholders.

The theme for 2017 was “Innovation: What is the Point?”

The speakers, game changers in their domain, were invited to present the innovative changes they have made or contributed to and give their advice on breaking down barriers to change.

The Life Sciences Industry is facing significant challenges today as it continues to provide solutions for new health problems, while facing the burden of an increasingly ageing and obese population in complex health systems. Complexity in the health sector differs around the world. In developed countries, technological advances have driven the cost of healthcare to unsustainable levels. The developed world needs cost-effective healthcare solutions. Emerging countries lack key resources and infrastructure and so will need to develop their own solutions to provide quality healthcare. They can both find inspiration from each other and the innovative solutions that emerge from different health systems worldwide.

Providers of scientific innovation and new R&D business models are emerging as a response to the rising challenges. Science is becoming increasingly open to anyone with an innovative idea. New sources of funding for research are making the development of these ideas possible.

Access to secure health data is a key issue to improving patient outcomes. Monitoring health data for patients with chronic conditions can improve patient adherence to medication, reduce morbidity and mortality associated with poor adherence. At this event we discussed how connected healthcare can improve patient adherence. People living with chronic conditions can also make their health data available for Medical research. We also explored how Blockchain technology is being used to provide high quality and secure health data for medical research.

Finally, as large pharmaceutical companies are being challenged to become more cost effective while developing new products, there is also a real need to build customer trust. As a result, innovation is also disrupting bio manufacturing, pharmaceutical sales and innovation production models. We will discuss three examples of successful innovation in this environment.

This white paper shows that innovation in healthcare can disrupt the old business models and create value for patients, providers and the industry. These examples show that innovation can be placed at any point in the industry and within organisations, no matter their size, while new stakeholders are also joining this journey towards better healthcare.

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1. Challenges in the Life Sciences industry

1.1 Introduction

Today, the Life Sciences industry is facing significant challenges. The industry needs to continue to provide solutions for new health problems linked with an increasingly ageing and obese population.



Nearly 30%

of the world's population - are either obese or overweight¹

According to Professor James Barlow of Imperial College London, Health systems are complex not only in developed countries, but also in emerging countries. In these different parts of the world, a mix of challenges are preventing patient access to quality healthcare. However, the reasons behind the complexity of healthcare systems is different. Paradoxically, in developed countries, healthcare has become increasingly expensive with the rise in new technological developments. In emerging countries, challenges arise from their severe lack of resources.

The 2017 Life Sciences Talks gives some examples of where the Life Sciences industry is already applying innovative solutions in digital technology and new thinking to create value for patients, physicians and providers.

“

If we do not fix our healthcare system the US may go the way of General Motors - paying more, getting less and going broke

Barack Obama 2009

1.2 Emerging health challenges

The world is currently undergoing an epidemiological transition which is characterised by an increasingly ageing population. This change is shifting the focus of healthcare away from treating infectious diseases towards managing chronic conditions such as obesity and diabetes.

Other key issues that we are facing are: the widespread use and misuse of antibiotic therapies which has led to an increasing level of antimicrobial resistance. Climate change is also allowing new epidemics to emerge and spread, with significant numbers of people around the world already affected.

At present the Life Sciences and MedTech industries are working on finding new solutions to deal with emerging health challenges within the constraints mentioned above.

1.3 Healthcare systems: different, but complex

Healthcare models in developed countries are complex and unsustainable. In these countries, the problems with healthcare systems revolve around the rapid uptake of technology leading to escalating healthcare costs in a climate of constrained resources and rising demand. These issues are driving healthcare providers and systems to seek new solutions to pay for and control rising costs.

Although their focus is different, emerging countries also have complex healthcare systems. Their challenge is to provide better healthcare and most importantly, to

improve accessibility for the population, as affordably as possible. However, while new technological solutions might exist, they remain inaccessible partly because costs often prevent healthcare systems from taking up new technology. This inaccessibility is also due to lack of training or supporting infrastructure, or inappropriate technology for the local context. Nevertheless, some innovative solutions in the industry are appearing that significantly improve access to healthcare for patients in these countries.

According to Professor Barlow, it would be dangerous for emerging countries to copy the developed world's healthcare model, which is unsustainable. Both the developed and developing worlds will need to re-evaluate how healthcare is delivered and paid for while also learning from new ideas coming from other countries.



The current climate in developed nations with complex healthcare systems obstructs innovation at three levels: Innovation productivity, innovation adoption and innovation cost inflation paradox.

Professor Barlow, Imperial College

1. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013.”

How fast is the pace of change in medical knowledge?



Medical information doubles every **19 years**

Medical knowledge doubles itself every **19 years** - physician needs 2 million facts to practice

Volume of new medical information doubles every **10 to 15 years** and increases tenfold in 23 to 50 years

Today it is recognized that medical knowledge doubles every **6-8 years**, with new medical procedures emerging everyday

There are about **20.000 - 30.000** medical journals published and the amount of medical information doubles every **fifth year**

Medical information doubles every **four years**

Clinical Knowledge is estimated to double every **18 months**

Medical knowledge doubles every **two years...** and with that kind of growth it is nice to know that the Children's Hospital of Michigan offers plenty of research



Source: partly derived from The Organization of Knowledge, Concepts of Information i218, Geoff Nunberg, UC Berkeley school of Information ,17 Feb 2009

1.4 Innovation and R&D productivity



It takes a long time for an idea to come through from a fledgling PhD idea. After a serendipitous meeting with Almerys, a company specialising in the treatment of industrial data, I realised that my research in healthcare was similar to other areas.

Dr David Manset

The traditional closed innovation model in Research and Development is changing. This research model assumes that only qualified professionals have expertise. The research to development process used to be like a funnel where research projects were conducted in professional silos and filtered into development according to their expected success, one at a time.

Now, research innovation is becoming more open. Research funding is at present more accessible with crowdfunding. Expertise is also becoming more available with crowdsourcing platforms that have allowed individual experts to be sourced from outside the company, when needed for specific projects. Also, science culture is opening up to anyone interested in biology and willing to try out their ideas. This open science culture is known as Biohacking. Biohacking² is a

new way of conducting research. It takes place in unconventional labs, garages or workspaces where individuals or small groups work on specific projects. Recently, La Paillasse³ in Paris, which is one of the largest Biohacking spaces in Europe has taken Biohacking to another level by creating an interdisciplinary space, which helps, funds and connects a wide variety of research projects. This interdisciplinary proximity creates an environment for innovation that brings more projects to development.

One surprising finding from the GDHI 2016 report⁴ is that patients are cited almost as frequently as professional colleagues as sources of ideas for health professionals. Recognising that patients are an important source of ideas to improve healthcare is part of the open innovation agenda – ideas and solutions can come from anywhere⁵.

There is clearly an advantage in stimulating the search for solutions outside the professional environment.

1.5 Adoption of technology is slow

The amount of science available is not the issue. Medical knowledge, in terms of publications, and information as well as the number of new medical entities made available continues to increase. The problem lies in our complex health systems.

Many developed countries invest heavily in researching and developing new technologies and medicines, but fail to support these innovations further down the line, so the adoption of new ideas is often slow. Sometimes it can take up to 17

2. The Beginner's Guide to Biohacking: What Is It & How To Do It, <https://supplementpolice.com/health-guides/biohacking/>

3. La Paillasse is the largest biohacking and open science space in Europe. <https://citiesintransition.eu/place/la-paillasse>

4. Global Diffusion of Healthcare Innovation: Making the Connections, Report of the Global Diffusion of Healthcare Innovation (GDHI) Working Group, Professor the Lord Ara Darzi, World Innovation Summit for Health - 2016

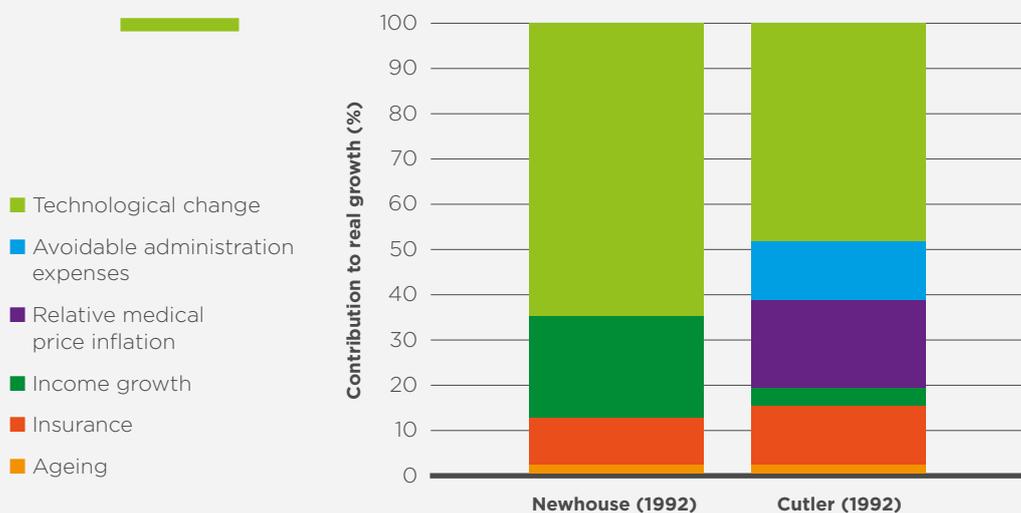
5. Global Diffusion of Healthcare Innovation: Making the Connections, Report of the Global Diffusion of Healthcare Innovation (GDHI)

years for a new research idea or product to be adopted into clinical practice. In some European countries like France and Germany, adoption tends to be early but implementation slow, where other countries like the UK and Nordic regions adopt new ideas later, but implement them faster.

Professor Barlow suggests that government support for healthcare could be more balanced throughout the development of

new medicines and technology from the idea stage all the way to its final adoption and implementation, rather than focusing largely on the basic science and initial R&D phases. In addition, there is a need to simplify our highly complex healthcare systems. Integrating healthcare systems need to share innovation across primary, secondary or social care systems to breakdown budgetary silos and therefore share risk and reward.

1.6 Technological Improvements: increasing healthcare costs



In most other industries improvements in technology have reduced costs, in healthcare technology they are driving costs up.

Adopting new medical technology was responsible for inflating healthcare costs from 27% to 48%, between 1960 until 2007.⁶

Source: John Appleby (2013) Spending on health and social care over the next 50 years. Why think long term? The King's Fund.

1.7 Healthcare Challenges and Innovation

According to Professor Barlow, the combination of changing healthcare needs around the world and the rising costs of healthcare solutions are challenges that will continue to require new thinking to break-down traditional barriers and produce new solutions.

“ Professor Barlow suggests combining three focal points for innovation.

Meeting 21st century global healthcare challenges is going to require a holistic perspective on innovation; Innovation in research and development productivity, improve adoption of new ideas and solve the technological paradox.

⁶Income, insurance, and technology: why does health spending outpace economic growth? Smith S, Newhouse JP, Freeland MS (2009). 'Health Affairs.

2. Improving patient outcomes with innovation in technology

2.1 Introduction



Advances in technology in the Life Sciences industry is a paradox. Instead of driving prices down as has occurred in other sectors, technology has been driving healthcare costs up, without necessarily improving patient outcomes.

There are different approaches to innovation, some of which are described below:

- Reverse innovation is the phenomenon by which products and services initially intended for low-income countries spread to high-income countries;
- Frugal innovation is the process of reducing the complexity and cost of technologies or delivery models in order to sell them to overlooked customers⁷.
- Disruptive innovation is happening in resource-poor contexts and is driving innovation in areas such as Diagnostics.

7. IMPACT INNOVATION OF MEDICAL DEVICES TO SERVE LOW-INCOME PATIENTS, KRISTA DONALDSON | AJ VIOLA | KELLY BLANK, 2016 - <http://d-rev.s3-us-west-2.amazonaws.com/wordpress/wp-content/uploads/2016/02/Impact-Innovation-Paper.pdf>

Therefore, can disruptive innovation cure healthcare? In what ways are developed countries applying technology to attempt to reduce costs and improve patient outcomes?

Connected solutions are being applied to improve access to healthcare for patients and improve patient outcomes. This is done by providing accurate clinical data to key individuals in the healthcare network that surrounds patients living with chronic illness.

Complex programming technology for protecting data (Blockchain) is being used in healthcare to make sensitive data available for research. This is improving the quality of epidemiological research.

The challenge remains to provide such advanced technology at a lower cost.

Frugal Engineering: improving access to diagnostics

Frugal engineering has allowed diagnostic machinery to be made simpler and at a lower cost.

In India, the GE MAC 400 ECG machine was developed to improve patient access to cardiac diagnostic technology. The challenge was to simplify modern technology to achieve the same result with a simpler, cheaper machine. This resulted in an ECG machine that cost \$800 per unit, as opposed to its equivalent at \$2000.

This machine is now helping developed countries like Finland and Germany provide state of the art care, less expensively.

Source: Market-Relevant Design: Making ECGs Available across India, The Pulse on Health, Science and Tech - <http://newsroom.gehealthcare.com/ecgs-india-reverse-innovation/>

People living with chronic conditions: part of a complex ecosystem

People living with chronic conditions are part of a complex ecosystem where value is created through their adherence to medication as well as to the measured and expected health outcomes.

Yet in reality,

- 50% of all medicines are not taken as prescribed.⁸
- Numerous studies have shown that patients with chronic conditions adhere only to 50-60% of medications as prescribed despite evidence that medical therapy prevents death and improves quality of life.⁹
- Poor treatment adherence has been estimated to account for 33% to 69% of medication-related hospital admission.¹⁰
- Failure to follow prescriptions causes some 125,000 deaths a year in the United States and up to 10 percent of all Emergency Department admissions. This is equivalent to 8 airplanes falling out of the sky per week.¹¹

8. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med. 2005 Aug 4;353(5):487-497

9. Long-term persistence in use of statin therapy in elderly patients. Benner JS, Glynn RJ, Mogun H, Neumann PJ, Weinstein MC, Avorn J

10. Adherence to medication. Osterberg L, Blaschke T N Engl J Med. 2005 Aug 4; 353(5):487-97

11. The \$289 Billion Cost of Medication Noncompliance, and What to Do About It, Brian Fung Sep 11, 2012 The Atlantic

2.2 Connected Health: Patient Engagement

To manage chronic conditions, healthcare providers regularly monitor key biological data. This is to manage their patients and their conditions in order to adapt their treatment or other interventions accordingly.

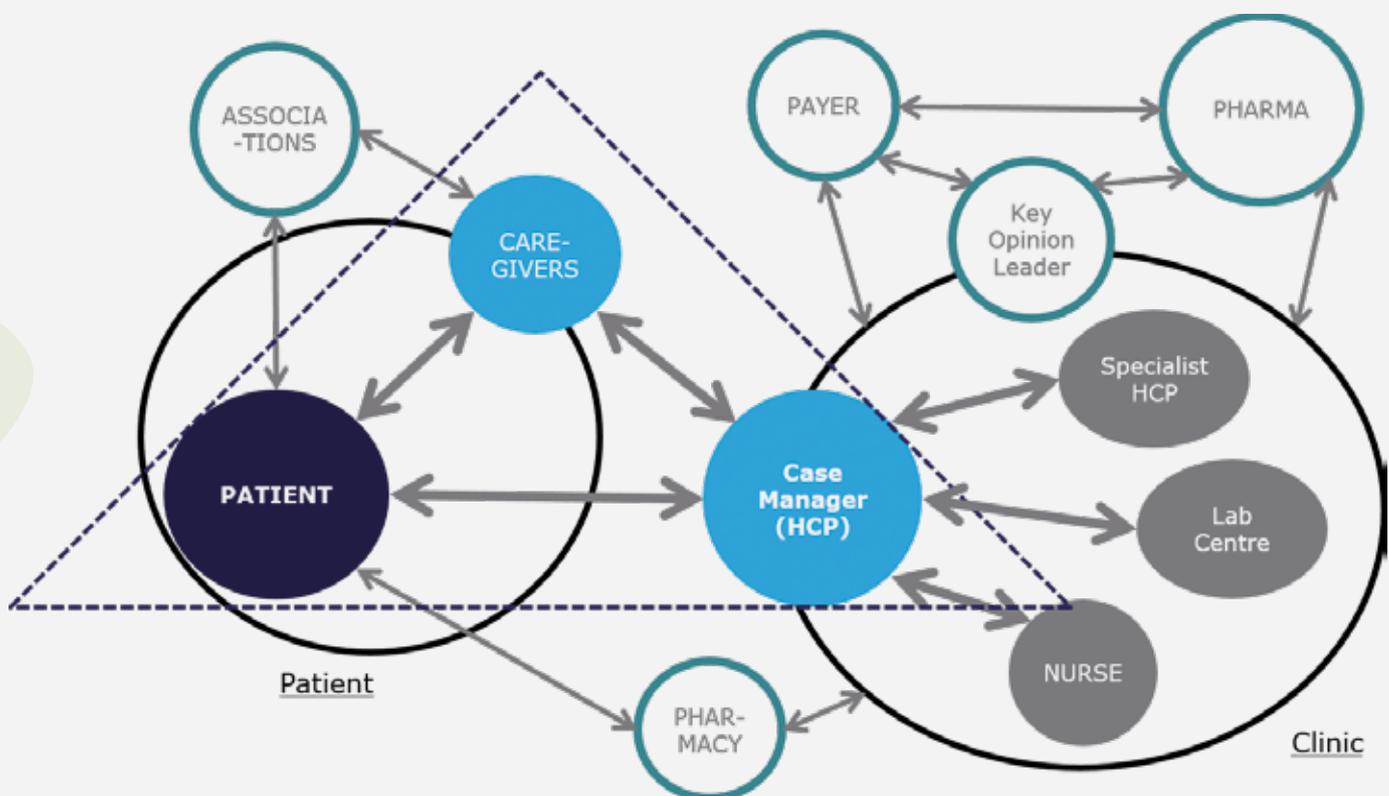
Yet, patients do not always provide accurate biological (or lifestyle) data. People living with health conditions are busy getting on with their life.



There is existing evidence showing that connected health is effective at improving compliance. Correctly implemented the management of personal health information is safe and secure.

Neil Williams, Medicom Innovation Partner – a Philips- Medisize company

**Patient Ecosystem = complex stakeholder map
value is created through adherence, measured and reported,
expected outcomes**



Source: © to Medicom Innovation Partner, used with permission.

2.3 Focus on Medicom Innovation Partner – a Philips- Medisize company

Although mobile technology is everywhere, only 9% of mHealth apps allow for data export, fewer still effectively share health data with 2% of mHealth apps allowing for data sharing.

- 68% of 14,500 respondents reported behavioural change as a result of using devices and services to manage their chronic conditions¹²
- More than 33% of physicians recommend mHealth apps¹³

Payers are becoming increasingly demanding for evidence that the medicines work as predicted by clinical trials. A P-value from a clinical trial is no longer enough.

Yet, connected health can disrupt the traditional way data flows from the patient to the healthcare professional to a database by providing a direct contact between the patient their carers and healthcare professionals. Having direct contact and insight from the consumer and providing professional feedback, can improve compliance and thereby patient retention and re-prescription of their medication.

2.4 Health Data for Real-life Studies

Health data from patients is increasingly required for: medical research, health surveillance and pharmacovigilance. To conduct this research, clinical researchers and epidemiologists require a secure (anonymous), high quality (homogeneous) data source. Yet, hospital systems in Europe struggle to record data in a systemic way. Standards and protocols vary between hospitals and across borders. Existing, stored data is therefore often incomplete or inadequate for clinical research use.

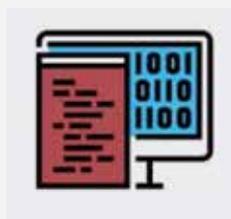
What is blockchain technology?



A digital ledger that keeps a record of all transactions taking place on a peer-to-peer network



All information transferred via blockchain in encrypted and every occurrence recorded, meaning it cannot be altered



It is decentralised, so there's no need for any central, certifying authority



It can be used for much more than the transfer of currency; contracts, records and other kinds of data can be shared



Encrypted information can be shared across multiple providers without risk of a privacy breach

Source: How Blockchain is eliminating online fraud - It has the potential to eliminate common frauds perpetrated online and help secure financial services from cyber hackers 2016 <https://www.raconteur.net/business/how-blockchain-is-eliminating-online-fraud>

12. McKinsey "Unlocking Digital health" April 2015 / McKinsey Consumer Health Insights Survey

13. IMS Institute for Healthcare Informatics "Patient Adoption of mHealth" September 2015

Additionally, the current data privacy laws have become increasingly tighter at both national and regional levels. Privacy directives in the European Union suggest 8 directives for collecting data and ensuring patient confidentiality¹⁴.

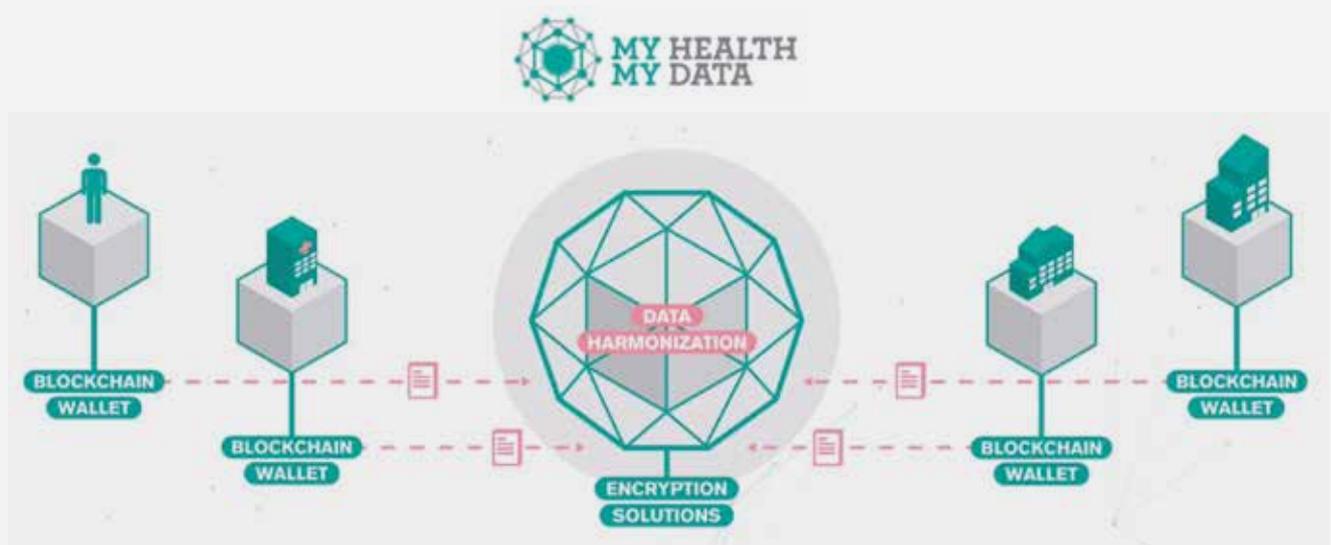
Blockchain technology is a new way of generating, storing and transmitting data in a highly secure manner, whilst also making it available for specifically identified needs. This programming technology creates specific data contracts between patients and individual stakeholders to protect sensitive clinical data from unwanted users. Blockchain technology defines who can have access to the data and for which purpose. This means that individuals can choose to make their specific data points available for medical research or to accelerate access to healthcare providers or solutions.

2.5 Focus on MyHealthMyData – almerys



10 years ago we were struggling to structure patient health data so it could be shared for medical research. Each research centre had different standards and protocols. Also, we had to ensure that this sensitive data could be made available across borders.

Dr David Manset, Head of Research and Innovation, almerys.



source: <https://www.almerys.com/>

14. Big Data and Privacy: Fundamentals of Digital Trust Toward a Digital Skin D. Manset. In L. Menvielle (ed.), Connected Health: New Challenges for The 21st Century

This inspired them to develop MyHealthMydata. A new model for medical data storage and access. This model uses Blockchain technology to record and cryptographically sign medical data sources. It then assigns specific access rights for each piece of clinical information and for each pre-defined stakeholder.

Therefore, this system creates a network between the patient, medical researchers and healthcare providers who all require access to secure, patient information.

The patient is empowered to choose which pieces of clinical data to release (or not to release). This data may include demographic, clinical or lifestyle information. The patient also chooses which end-user has the right to use each piece of data and how it can be used. An end-user may be a carer, a health professional, a clinical research group or a patient association.

The Blockchain software protects the data, makes it anonymous and unrecognisable to a third party in line with the current legal and regulatory framework and best practices.

2.6 Innovation in Technology: What is the Point?

Where innovation in technology usually drives prices down and increases value for consumers in healthcare, technology has been driving costs up with little perceived added value for the patient or healthcare provider.

To respond to this challenge, innovation in the Life Sciences industry is rethinking the use of connected solutions. For healthcare professionals managing patients with chronic diseases, this means they will have access to accurate, updated patient information. In clinical research, researchers will soon have access to large pools of homogenous clinical data that can be used for epidemiological research.

“ So far, big drug makers have been slow to join the m-health revolution, though there are some exceptions...¹⁵

The Economist, 2016

15. Things are looking app, Mobile health apps are becoming more capable and potentially rather useful - 2016 - <https://www.economist.com/news/business/21694523-mobile-health-apps-are-becoming-more-capable-and-potentially-rather-useful-things-are-looking>

3. Gaining more from process innovation

3.1 Introduction

Manufacturing in the pharmaceutical industry has created significant barriers that are preventing small players from emerging. They also hinder reactivity to manage many priority health problems such as in times of epidemics or when new diseases emerge.

Barriers in healthcare manufacturing include complex internal processes, costly and inefficient manufacturing structures.

Disruptive innovation in healthcare manufacturing and organisations means breaking these barriers down to impact global health and create real added-value for patients by improving access to priority healthcare.

Changing the Manufacturing Rules

One of the early disruptive innovators in manufacturing was Henry Ford, who began by building cars on a continuous assembly line. In the chemical industry, continuous manufacturing was applied to streamline the industrial chemical industry evolving from stone furnaces towards the development of continuous metal casting. Manufacturers were therefore able to reduce factory sizes, simplify quality checking and automate processes. This allowed steel to become affordable and available in large quantity, leading to the development of steel construction (Rail transportation, bridges, steel boats, skyscrapers, etc.).

How can this be useful in healthcare?

“

The global vaccine market will reach 48Bn\$ in 2021, and 90% in the developed countries.

Source: Vaccine Market by Technology Route (IM, SC, ID, Oral), End User (Pediatric, Adult) & Type - Forecast to 2022

3.2 Vaccines: a Need for Supply on Demand

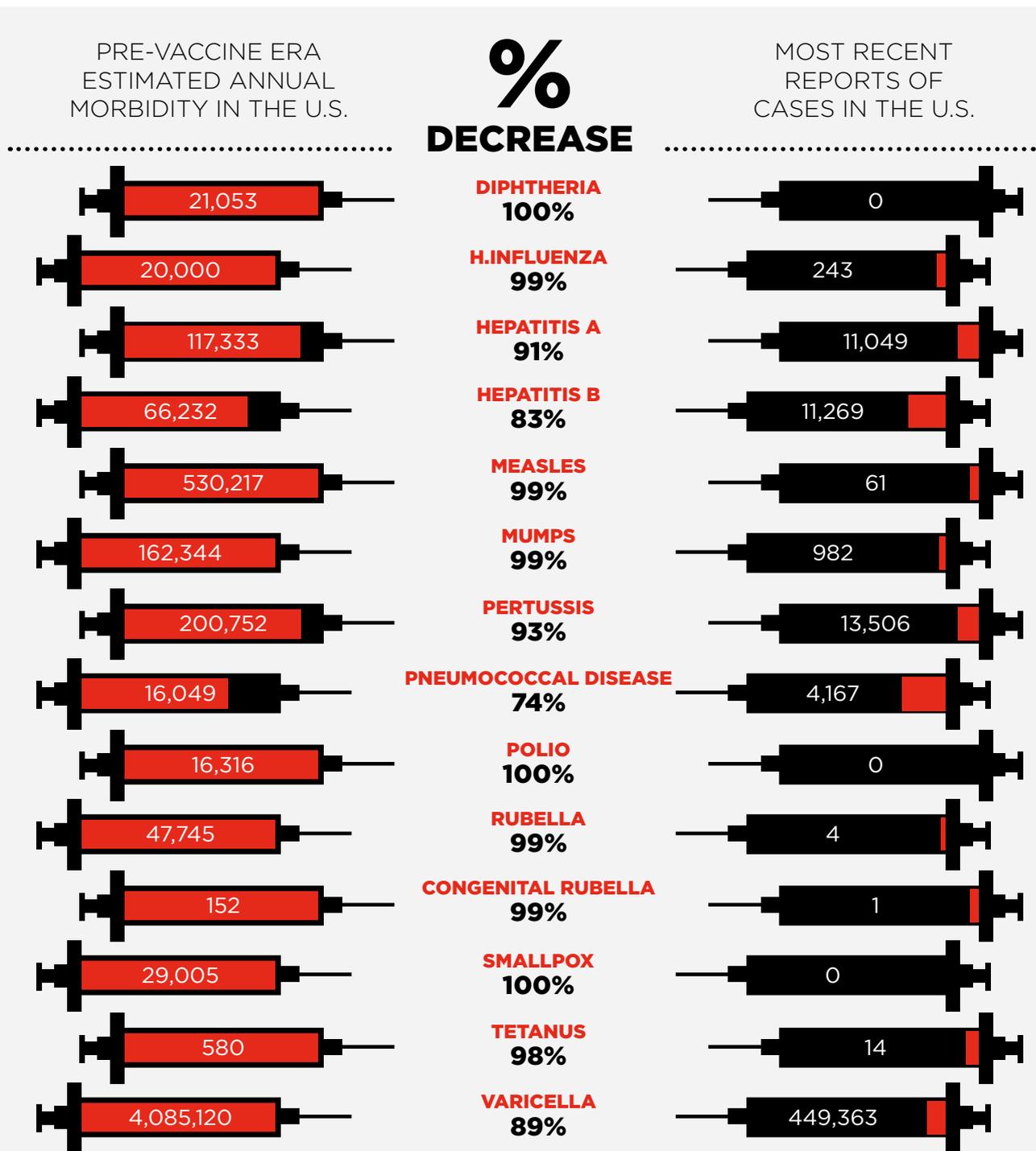
Vaccines are the most efficient tools in the medical arsenal to prevent infectious diseases. These have corresponding economic and societal value in averted costs, gains in productivity and reduced poverty.

In developed countries, regular vaccination programs protect children from common, debilitating and deadly childhood infections. In emerging countries vaccination rates are often lower than expected due to high prices and limited production capacity which creates shortages. Around the world, there is a constant need for stable supply of vaccines.

In emerging countries, access to priority vaccines is exceedingly low, as the manufacturing and transport costs associated with acquiring these vaccines from traditional suppliers, makes them unaffordable. There is a need to empower third world countries to make their own vaccines.

Increasingly the need arises to create large amounts of specific vaccines in specific

places at specific times to deal with these new infections. Vaccines need to be readily available when and where they are needed. According to Univercells, this will require an industry paradigm shift from the current, centralised manufacturing model to a distributed manufacturing model, where local production facilities could supply local populations with affordable treatments.



Source: How Vaccines Have Changed Our World In One Graphic, 2013 -Leon Farran, 2013 FORBES - <https://www.forbes.com/sites/matthewherper/2013/02/19/a-graphic-that-drives-home-how-vaccines-have-changed-our-world/#62fdf7c33302>

3.3 Vaccine Manufacturing Today

Vaccines are produced in laboratories by growing living cells on a flat surface in a controlled environment. When scaled up to a factory level, this requires housing many thousands of flat bottles, which are cumbersome to handle, expensive and take up a considerable amount of space.

These manufacturing processes are associated with significant financial and logistical barriers that are preventing small players from emerging in developing markets to manage vaccine supply when needed.

For example:

- A high number of manual aseptic operations that are sources of potential contamination.
- Regulatory and quality control are expensive and complex
- The processes are highly complex and require a well-trained workforce
- Production capacity is low and costs are high

3.4 Focus on Univercells: Process Innovation to Improve Affordability and Access to Vaccines

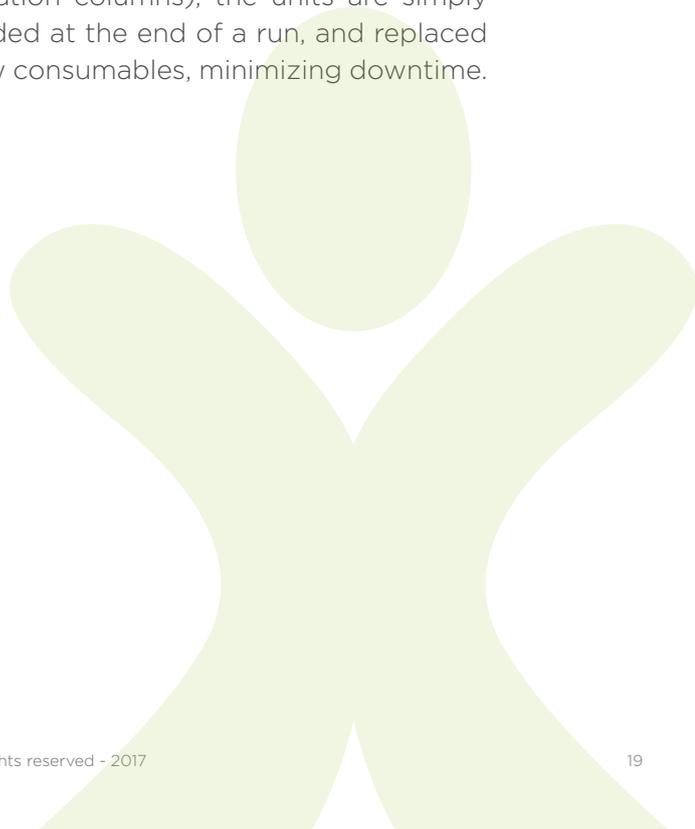
Univercells have completely disrupted the traditional manufacturing processes and changed the paradigm for vaccine production. They have re-invented the way

vaccines are manufactured by designing single-use bioprocess solutions which are changing the rules in biomanufacturing.

The first step in this process has been to develop a single-use bioreactor. This bioreactor has replaced the flat bottles with a honeycomb-like matrix structure on which many more cells could grow. This honeycomb structure has increased the surface area for cell growth in a given space, therefore increasing the number of cells that can be grown to produce the vaccine. However, additional steps are still required to purify the product.

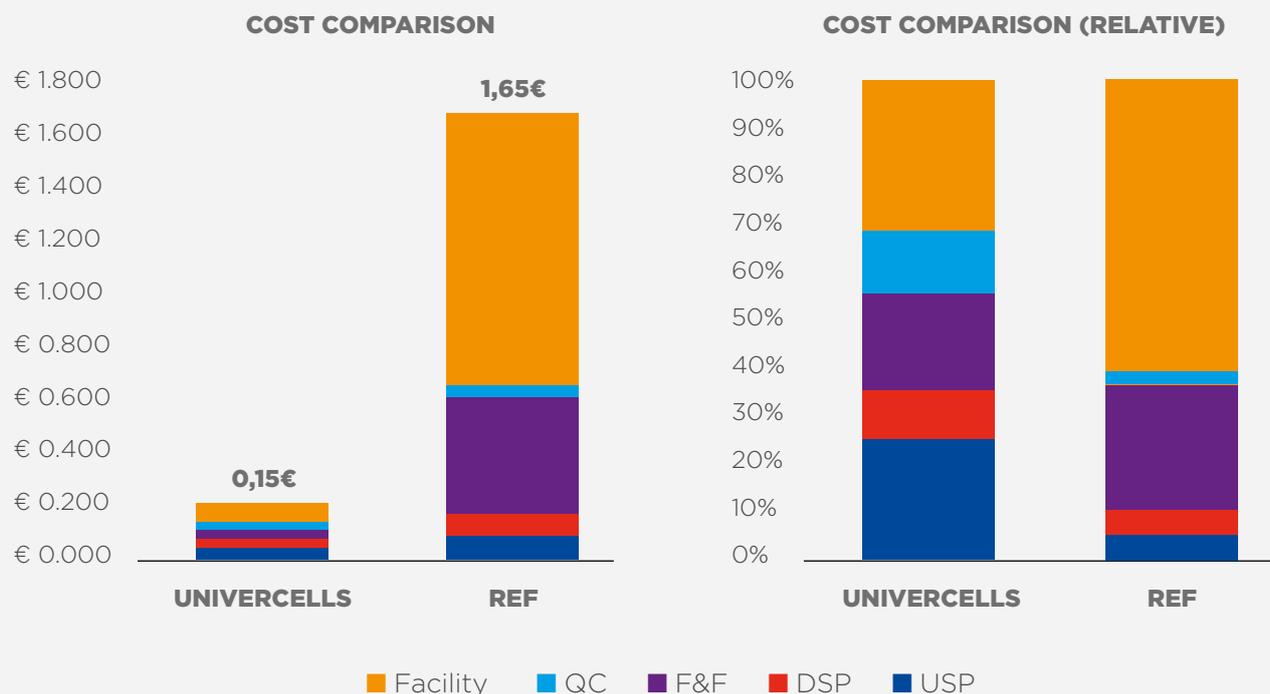
Taking inspiration from continuous manufacturing in other industries, Univercells has developed manufacturing processes implementing single-use cost-effective bioreactors operated in fed-batch or perfusion modes, with in-line clarification and capture operated in simulated continuous mode. This allows to operate on a 24/7 basis and treat the harvests of several bioreactors, followed by continuous feeding of capture on small affinity chromatography columns. Most importantly, as there is no longer a need to prepare the factory and run separate batches, safety is maintained and downtime is reduced.

As the process is based on disposable consumables (single use bioreactor and purification columns), the units are simply discarded at the end of a run, and replaced by new consumables, minimizing downtime.



Impact of the micro facility of the fully-loaded cost of manufacturing

Case study on the manufacturing of a trivalent Sabin Inactivated polio vaccine (sIPV)



Univercells has integrated and intensified biomanufacturing processes, enabling the creation of a manufacturing unit with a sufficiently smaller footprint to make it distributable anywhere in the world. The whole unit fits into the floor space the size of a cupboard around 1.8 M x 3M and ensures the containment of the viruses, increasing safety for the environment and the operators. Therefore, infrastructure investment and sales price cost of manufacturing have been considerably reduced. In a test case using a traditional polio vaccine (Sabin) that usually costs \$1.65, Univercells has been able to produce the same vaccine for \$0.15.

To continue to pursue the worldwide development of this endeavour, Univercells was awarded a grant in 2016 from the Bill & Melinda Gates Foundation.

Univercells innovative approach breaks entry barriers and allows clients to develop local bioproduction facilities. These production units are less costly to build and to operate, while maintaining high levels of safety and offering flexible capabilities, from

small to large batches. This means a vaccine manufacturing unit can be set up almost anywhere, wherever a supply of vaccine is required, in a short amount of time.



We are extremely honoured to partner with the Gates Foundation to significantly increase global access to priority vaccines by lowering their manufacturing cost¹⁶

Hugues Bultot, CEO and co-founder of Univercells

16. Univercells and consortium partners Matrix Separations and Batavia Biosciences Receive \$12 Million Grant from Bill & Melinda Gates Foundation to Radically Reduce Vaccine Costs for Developing Countries <http://matrixseparations.com/gates-vaccine-grant>, 2016

**Narayana Hospital:
combining technological
and process innovation to
provide cardiac care for
people on low income**

Narayana Health in India, is an innovative project emerging from a developing country. Their challenge was to provide state of the art cardiac care for low income earners. The cardiology unit was redesigned by streamlining medical and payment processes, improved construction design and applied digital technology for telemedicine. This increased patient access to life saving healthcare at 1/30th of the cost in the US.¹⁷



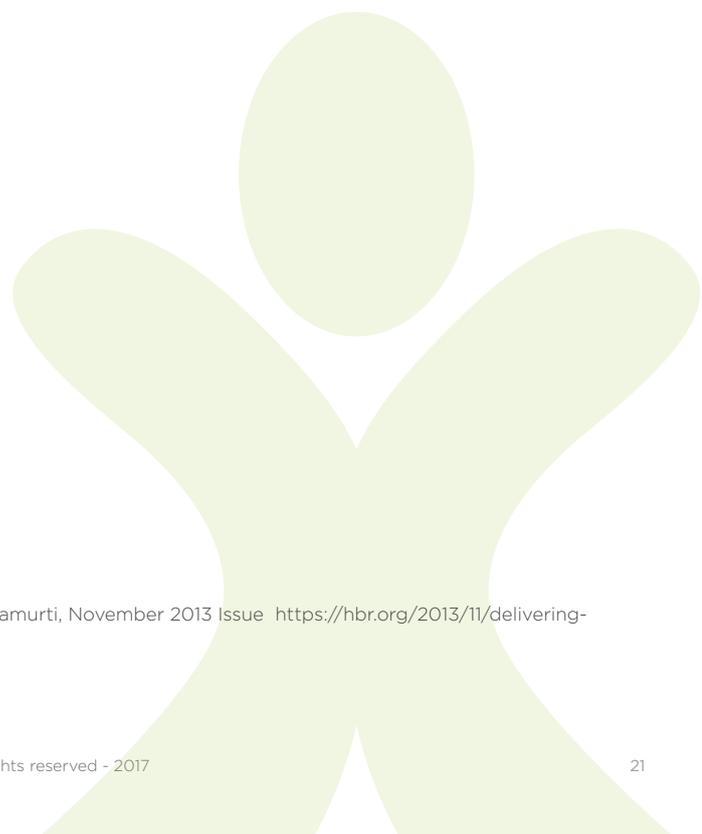
The aim is to be able to develop such a small process that you don't need a factory as such. One cabinet is your cell culture, one for your purification, one cabinet for deactivation all done in a continuous process.

Benjamin Damien, Director of Business Development, Univercells

3.5 Process Innovation: What is the Point?

The above examples illustrate that combining process with technology creates value for patients. By rethinking manufacturing and internal processes, these organisations have been able to streamline their activity to provide lifesaving healthcare for patients at a fraction of the cost. Process innovation enables the healthcare industry to provide a high standard of healthcare at a lower cost.

17. Delivering World-Class Health Care, Affordably, Vijay Govindarajan/Ravi Ramamurti, November 2013 Issue <https://hbr.org/2013/11/delivering-world-class-health-care-affordably>



4. Creating Value with Organisational Innovation



It's bad for patients when sales reps are paid based on the number of drugs that they sell. Sales targets make sense in a retail store, they make sense at a car dealership, and they don't make sense in hospitals. In fact, it's a dangerous trend.¹⁸

Dr. Martin Makary, Professor of Surgery at John Hopkins University

The traditional pharmaceutical sales model was based on building face-to-face customer relationships between the pharmaceutical sales representatives and key clients and prescribers.

However, in recent years the pharmaceutical industry has been at the centre of a number of events that have significantly eroded customer trust.

For decades, it has been standard industry practice for pharmaceutical companies to sponsor doctors attending medical conferences, and for them to pay salesforces commission on the prescriptions written by the doctors they visit. However, in recent years these practices have come under increased scrutiny by regulators, particularly in the U.S. which is the world's biggest medicines market¹⁹.

4.1 Focus on GSK: Disrupting the Employee Motivation and Sales Model



We believe that it is imperative that we continue to actively challenge our business model at every level to ensure we are responding to the needs of patients and meeting the wider expectations of society.²⁰

Sir Andrew Witty, Chief Executive of GSK

18. Eyeforpharma - GSK new 'Ethical' customer approach: Is it delivering? 2016 - <https://social.eyeforpharma.com/commercial/gsk-new-ethical-customer-approach-it-delivering>
19 & 20. Why GSK sales shift is a turning-point for pharma, Catherine Boyle, 2013 - <https://www.cnn.com/2013/12/17/why-gsk-sales-shift-is-a-turning-point-for-pharma.html> |



GSK set themselves the objective to become the best in class in pharmaceutical sales.

To rebuild customer trust, create value and take away potentially perceived conflicts of interest, they decided to turn the traditional pharmaceutical sales model upside-down and change the way the company communicates with its customers.

GSK disrupted traditional sales methods by replacing individual sales targets with a three-dimensional relationship of trust between employees, customers and patients.

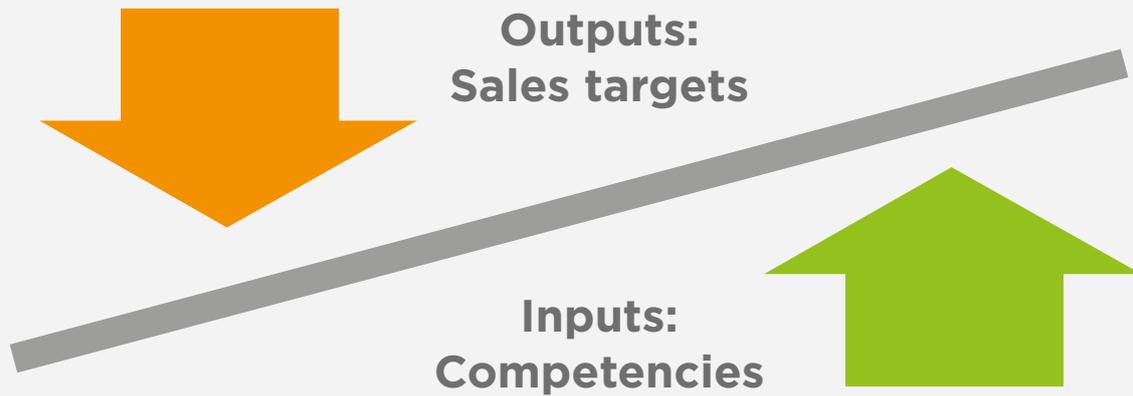
They changed their compensation model to focus on patient needs by:

- Removing individual sales incentives at the sales professional and first line sales leader level,
- Removing direct sponsorship to medical conferences, and providing indirect medical education support,

- Removing speaker sponsorship,
- Modernising customer engagements with digital capabilities.

Good selling outcomes were built on the combination of strong leadership and technological support.

The quantity and quality of sales leader coaching was modernised, change management operations were implemented and multichannel directions were planned and set. Remote technology engaged the salesforce to increase knowledge and motivation.



The salesforce was no longer paid on sales targets (outputs), but on key competencies such as technical knowledge and the Quality of Service they provided to clients (inputs).

Lessons learned:

- The need for strong leadership and moving towards a shared goal.
- Have a clear understanding of employee motivation
- Ensure sales leaders have the capabilities for leading change
- Supporting change management

4.2 Innovation by Breaking Down Silos

Most traditional pharmaceutical companies tend to work in silos of expertise, even more so, if they belong to a group of companies. Creating innovation in this type of set-up can therefore be a challenge due to their size and complexity.

One of the ways in which innovation can be introduced is by creating an environment that facilitates the cross pollination of ideas and breaking down barriers.

4.3 Focus on Merck: Innovative Interfaces Disrupting Company Culture

Merck has three different business sectors (healthcare, life science and performance materials) which are traditionally standalone businesses. Senior management decided that in order to continue to grow, to stay competitive and adapt to the ever-changing environment they needed to introduce innovation.

They decided to create opportunities between and beyond their business sectors by setting up an innovation centre which would work across the three organisations and provide an ecosystem for innovation bringing ideas, knowledge and people together.

At Merck, an opportunity was identified to create an environment for innovation from inter-sector synergy. This idea was built on the belief that innovation does not only occur in laboratories and in research and development units. Anyone in the company is capable of creating and driving innovation.

Merck's 350th anniversary provided the opportunity to build the Innovation Centre with an objective to disrupt business models and develop radical technologies to:

- **build new business**
- **create champions for innovation**
- **spread the culture of innovation**

Implementation has proved to be a long process. Corporate buy-in was needed and managers needed to accept temporarily releasing staff from their position. When resistance was felt, key stakeholders were invited to the centre to see, feel and understand the value being created.

Participants also had to be willing to step out of their comfort zone and temporarily leave a safe job.

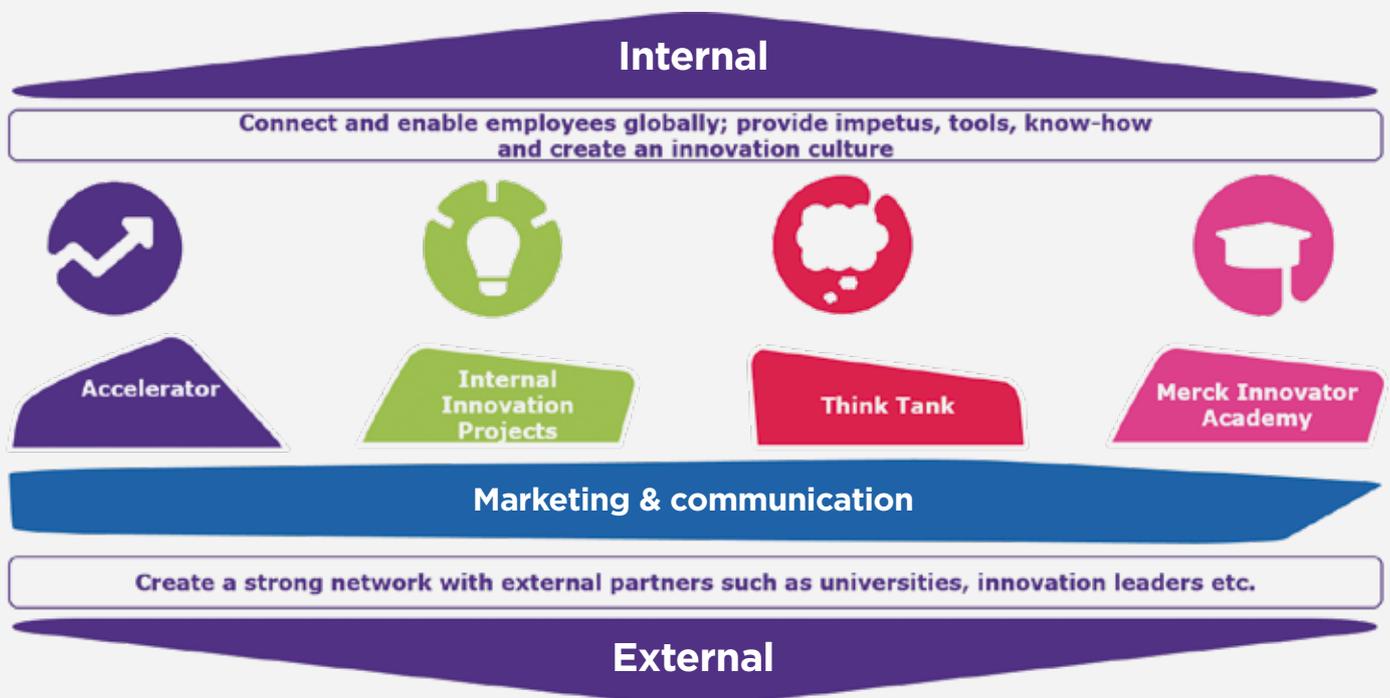


Although at Merck, innovation in each business unit was going well, the company wondered if further gains could be made by driving innovation at the intersections of the business units.²⁰

Lukasz Kowalik, Merck Innovation Center, Merck

The Merck Innovation Center helps ideas grow

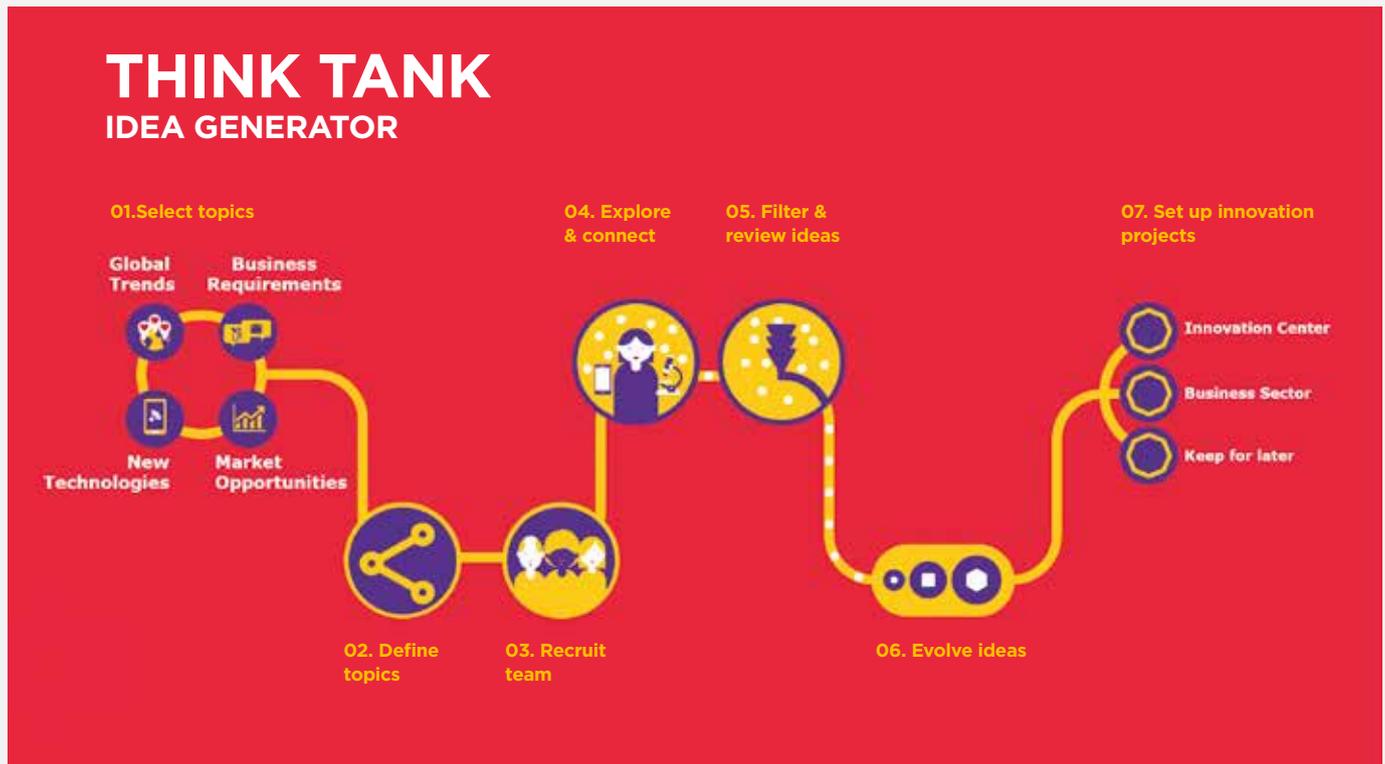
Provide an ecosystem for innovation bringing ideas, knowledge and people together



4.4 The Think Tank: Idea Generator

The think tank idea is a pillar of the Innovation Centre that provides an ecosystem for

innovation bringing new ideas, knowledge and people together. The Think Tank also builds a strong network with external partners such as universities, innovation leaders etc. This innovative culture, brings together employees from different sectors globally. It provides the teams with the tools, the know-how and guided support, then leaves them to work, create and experiment.



Source: Merck

The Merck Innovation Center helps ideas grow

One out of two people over the age of 65 can develop cataracts, making it the top cause of blindness in the world.

To treat cataracts the opaque lens is replaced with a polymeric IntraOcular Lens (IOL). However, in most cases, optimal vision after cataract surgery is not achieved. Patients are often required to wear glasses following surgery.

One project team at the Innovation Centre realized that laser can be used to change properties of the lenses inside a human eye. With laser pulses, optical properties of lenses can be individually adjusted to the needs of each patient. .

21. The focal point: Our liquid crystal expertise - <http://ar2015.emdgroup.com/magazine/a-clear-view>

Corporate immune system



Source: Merck

4.5 Organisational Innovation: What is the Point?

In the continual process of improving business practices and finding better ways to create products and services in the life sciences industry, these examples illustrate how innovation can improve organisational operations to create value. Value for both the organisation as well as healthcare providers and their customers.

Conclusion

The Life Sciences Talks 2017 brought together various innovators who are breaking down barriers in the Life Science industry to provide value for patients, healthcare providers and payers.

At a time when the healthcare industry is facing major challenges around the world, innovation in technology, process innovation and organisational innovation will be key to meeting those challenges.

Healthcare systems in both developed and emerging countries are complex. The developed world is facing various budgetary and regulatory challenges which restrict their innovation processes. However, emerging countries are having to do more with less but with much fewer regulatory restrictions. This freedom enables them to deliver technology based solutions which the developed world is observing with interest and may adapt to tackle their own challenges

Connected health is providing healthcare professionals access to accurate, updated patient information to help them manage their patients better. In clinical research, Blockchain technology will soon give researchers access to large pools of homogenous clinical data in an appropriate form for epidemiological research. Process innovation has made vaccine manufacturing possible anywhere in a factory the size of a cupboard and to make critical healthcare available to people on low incomes. Lastly, Life Sciences businesses continue to improve their own practices to create value and build trust with their customers, patients and healthcare providers.

Innovation in Healthcare: What is the Point? The point is that not only does it create value, but innovation can transform and bring about new ways of delivering services, new treatments and solutions for emerging countries and mature markets alike. What has been made obvious is that innovation no longer just sits in the hands of traditional players. We are now seeing a new influx of non-traditional newcomers such as patients, IT and telecommunications players, as well as other stakeholders, who are challenging the way the industry has always functioned. The aim of these innovations is ultimately to reduce budgets increase efficiency and deliver improved patient centric services.



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