Hyper-collaboration in the healthcare and life science industry – The new imperative

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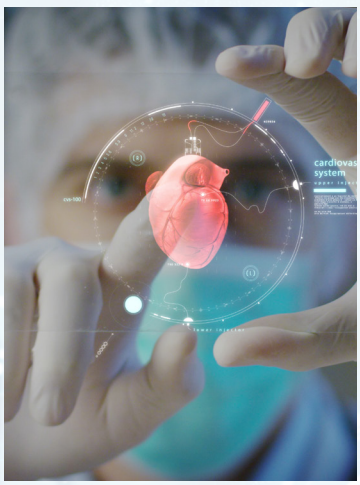
The successful rapid development and rollout of multiple COVID-19 vaccines has demonstrated the potential speed of innovation within healthcare and life sciences. Our third article explains why the same ecosystem collaboration approach is underpinning wider changes in healthcare, transforming innovation speed as we move to the Future of Health.

The COVID-19 pandemic demonstrated the ability of the healthcare and life science industry to respond to unexpected needs with unprecedented speed. However, independent of the pandemic, the industry was already facing transformation in light of multiple, highly disruptive innovations not only in the traditional field of drug modalities, but also in related fields such as digital, AI, data and medical devices. This new "Future of Health" is driven by a multitude of new players and innovations with disruptive potential and new ways of thinking about health, both at a large scale for population health and at an ultra-targeted level through the potentially curative treatment of individual diseases, such as for CAR-T or gene therapies and precision medicine.



The industry's response to the pandemic and its transformation towards the Future of Health may at first seem unconnected, but they share the same foundation – innovation is no longer driven by one or two companies, but rather, by a large number of players in an extended partner ecosystem, requiring collaboration at an unprecedented scale. Driving innovation at speed requires all players to think and act in large "hyper-collaboration" networks.

What does hyper-collaboration mean?

"Hyper-collaboration is based on the fundamental belief that it is innovation ecosystems, not individual companies, which will deliver the novel solutions the world is waiting for. Hyper-collaboration means seeing ecosystems for what they are: not just candy stores full of opportunities, but fiercely competitive arenas in which companies fight for the best partners, technologies, and networks to create, build and defend added value. It also implies adopting a mind-set that, until proven otherwise, someone somewhere has already figured out what works best – and that it is unlikely that this person works in your company." [Ecosystem Innovation, Prism First Semester 2017]

Although hyper-collaboration itself is not new, it is now becoming central to success in a growing number of sectors. Companies that fail to change and adapt risk being sidelined by newer, more agile players. The remarkable success of small biotech companies in beating established players in the race for a COVID-19 vaccine is just one recent example of this trend.

In this article we look at how hyper-collaboration is now becoming a key success factor for the healthcare and life science industry, and draw some lessons on how to make it work effectively. These lessons are also relevant for other highly complex industries with new and potentially disruptive players, such as aerospace, transportation and finance.

A fast-evolving landscape creates a need for hyper-collaboration

Innovation is happening at a faster pace than ever, with digital and data-driven technologies alongside new molecular treatments disrupting the healthcare and life sciences industry and causing new players to emerge.

This is manifested through:

- A greater ability to combine basic research and large data approaches to rapidly improve understanding of the human body and diseases.

- New tools to develop and deliver medications in terms of both biological tools (such as CRISPR gene editing) and hardware such as robotics and 3D printing.

The time from discovery to clinical concepts has therefore shortened significantly, with a multitude of new concepts rapidly emerging and moving into usage.

Innovation across the sector is also becoming much more complex. The industry has moved from being dominated by seemingly simple chemical molecules that could be applied as tablets or solutions such as aspirin, to the introduction around 20 years ago of more complex biological compounds such as recombinant proteins and antibodies (e.g., insulin or Herceptin). These have been driving much improved treatments for diseases such as rheumatoid arthritis and cancer, and have been a major growth driver.

Today, the landscape is changing again, with more and more complex drug modalities, including cell and gene therapies and mRNA vaccines (as seen in COVID-19 vaccines), now becoming commercially available.

The hemophilia example below demonstrates both how innovation has accelerated over the last decade and how well-established players can rapidly be made irrelevant by new and innovative approaches that are often driven by new-entrant biotech companies. A further insight is that there are a multitude of radically different new treatment options on the horizon, with some uncertainty as to which technology will ultimately win.

Case study – Hemophilia A

The evolution of treatments for hemophilia highlights the pace of change in healthcare. This rare disease leads to uncontrolled bleeding due to a lack or reduced levels of coagulation factor VIII. The first treatments with coagulation factors purified from blood became available about 50 years ago, but were mostly used to treat acute bleeding episodes. Treatment was revolutionized in the early 90s with the production and preventive use of recombinant coagulation factors, which allowed patients to live much more normal lives and survive much longer into adulthood and beyond, although with a heavy treatment burden.

But then very little happened until, in 2014/2015, approval was given to the first recombinant factors with extended half-lives, resulting in less frequent injections and more effective treatment. However, there was still a significant population of patients for whom the treatment became inefficient through autoimmune reactions. Although this effect can be treated, it is a significant burden on patients. This effect has now been solved by Roche's Hemlibra®, a bispecific antibody that mimicked the effect of factor VIII and was initially approved in 2017/2018. This is now quickly surpassing other treatment options.

However, in parallel with traditional protein and antibody treatments, alternative treatment options such as siRNA and, most impressively, gene therapies are about to become available. The first gene therapy for hemophilia is now in regulatory review, with a potential approval this year, and promises a complete cure for this genetic disease that will – if successful – make both existing treatments and those that are still in development obsolete.

New alliance models in times of hyper-collaboration

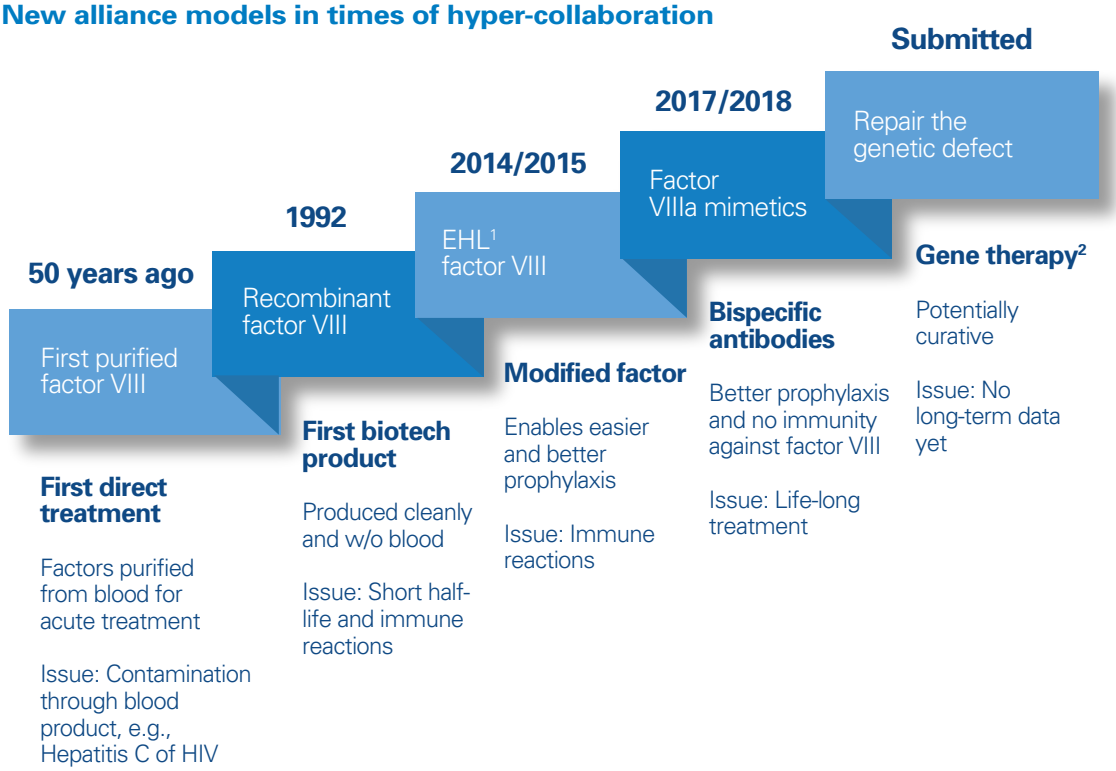


Figure 1: Haemophilia treatment developments

The same effect has also been demonstrated in the race for a COVID-19 vaccine, in which traditional methodologies competed with novel and largely unproven new approaches such as vector vaccines and mRNA vaccines. Ultimately, these were more successful, but it would have been impossible to predict mRNA's resounding success even a year ago. As technological complexity and innovation speed increase, effective collaboration becomes central to success.

Managing greater complexity in ecosystems

Oncology (the treatment of cancers) is a further example of hyper-collaboration and gives us a taste of the future of medicine in general as we move towards the "Future of Health". Although cancer treatments are traditionally based on a combined approach of surgery and radiotherapy or chemotherapy, newer treatments also see combinations with molecular therapies based on the characteristics of individual tumors. Additionally, in recent years, we have increasingly

seen approaches using the activation of the immune system, either in immune-oncology drugs or with the use of ultra-targeted cell therapies such as CAR-T.

For the future, there is an expectation that treatments could well entail the use of between five and seven drugs or drug modalities in combination, which will require a network of multiple players and IPs. In addition to these complex drug combinations, future treatments will require the development of the right diagnostics and tools to analyze tumors, as well as the right support to analyze and curate the data gained to predict the right treatment for the right patient (precision medicine). On top of that, we expect that, with constantly improving treatments, cancer will become a chronic disease and require treatment of patients in their own homes, supported by remote monitoring. This is where innovations such as Alexa and the logistics offered by an Amazon pharmacy can bring in additional players and innovations. Again, this is a trend that was also accelerated by the pandemic, when immune-suppressed cancer patients were rightfully scared of being treated in hospitals with COVID-19 cases.

This results in significant complexity challenges when it comes to organizing clinical trials, and also raises questions around the management of IP in order to make collaborations more attractive for small biotech or medtech players, as well as large pharma or tech companies.

How hyper-collaboration helped develop the COVID-19 vaccine in record time

As well as picking the right solution from a widening number of potential treatment options, innovation success now depends on hyper-collaboration between multiple players and biotech companies.

The development of COVID-19 vaccines is a best-practice example of how companies have tapped into new types of partnerships and technology to successfully bring novel pharmaceutical products to market in record time. During the

first half of 2020, hundreds of promising COVID-19 vaccine candidates entered preclinical trials. The majority of these candidates were co-developed by pharmaceutical companies, academic research institutes and governmental agencies, such as AstraZeneca and the University of Oxford, Arcturus Therapeutics and Duke-NUS Medical School, and Moderna and the American National Institute of Allergy and Infectious Diseases (NIAID). Partnering in such constellations secured joint access to quality research, as well as drug development capabilities and funding.

Of the four established global vaccine powerhouses (Pfizer, Merck, GSK and Sanofi), only the first actually delivered an effective solution – but solely by choosing an unproven technology (mRNA) in a new partnership with BioNTech. The other three major vaccine makers stuck with proven methods involving much longer timelines and failed to get the same results. Merck abandoned its trials, while GSK and Sanofi have some promising vaccine candidates, but are well behind the frontrunners. GSK has belatedly stepped up its efforts to build out its partnership with CureVac, another company focused on mRNA technology.

So what did Pfizer do differently to succeed, not only in the vaccine field, but also by becoming a major player in mRNA technology through its partnership with BioNTech[1]?

1. It acted decisively in mobilizing its resources toward developing an mRNA vaccine. It bet on an unproven technology and an untested partnership with BioNTech. The partnership was started on a handshake, and the contracts followed later – which is highly unusual in drug development. In contrast, Merck's CEO declared early on that timelines of less than a year were unrealistic, and it stuck to its existing development methodology.

1. From "How we did it" by Albert Bourla, Harvard Business Review May-June 2021

2. Pfizer recognized that the global need and urgency changed the environment, with risk and short-term return becoming less important. It went all-in for the "moon-shot" challenge of a six-month vaccine development timeline, "doing the right thing" while also playing the new circumstances well and taking full advantage of regulatory flexibility.

3. It leveraged the partnership with BioNTech optimally, which is clearly the other big winner in this story. Well before the final terms of the partnership were hammered out, investments were made and confidential information shared because of mutual trust from working together previously.

The importance of ecosystems

However, Pfizer's success was not due to a single partnership – there was a whole ecosystem behind it. This included the Chinese researchers who shared the genetic sequences of the COVID-19 virus (which made the fast development of all vaccines possible), the designers of the boxes that allowed vaccines to be shipped and stored at ultra-cold temperatures, and the developers of the liquid nanoparticle vesicles, which deliver the mRNA to the cells in the body.

New alliance models in terms of hypercollaboration

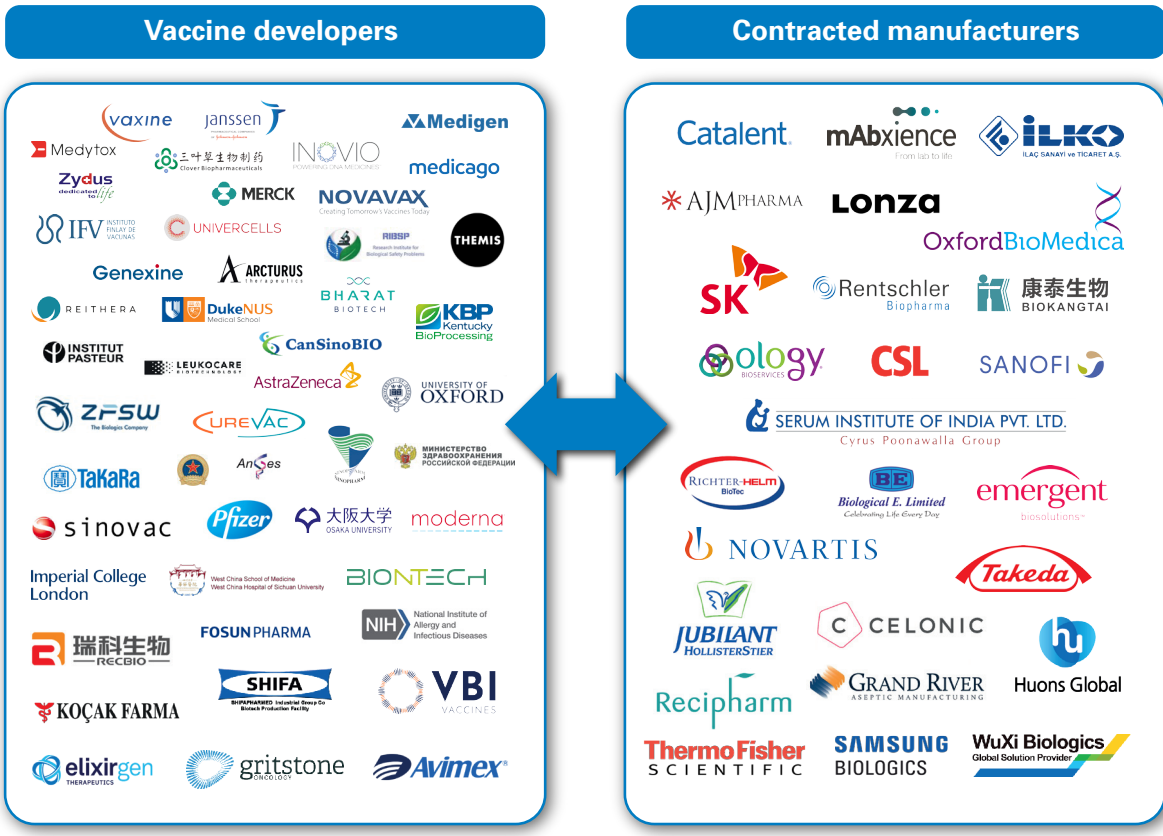


Figure 2: COVID-19 vaccine-manufacturing partnerships

Most importantly, as vaccine candidates moved from preclinical into clinical trials, their developers began to establish additional partnerships with vaccine manufacturers to secure large-scale production capabilities. Given the huge demand, this required partnerships with up to 20 different contract manufacturers for each vaccine, which brought significant challenges around complexity and scale.

The hyper-collaboration extended beyond traditional contract manufacturers, as their capacity remains insufficient. This has given rise to a new type of innovative partnership, in which pharmaceutical companies offer their spare capacity to their own competitors. For example, Sanofi conducts fill-and-finish activities for BioNTech, while Novartis, which no longer has a vaccine business, produces vaccines for Pfizer-BioNTech and CureVac.

Of course, Pfizer was not the only winner in the vaccine race, and others also achieved great success due to collaboration:

- Moderna accelerated its strategy by 3–4 years and was close on the heels of Pfizer with a highly effective vaccine. It saw its share price increase sevenfold.

- AstraZeneca was not an established name in vaccines before the pandemic, but it (rather than UK rival GSK) moved fast and quickly established a collaboration with the University of Oxford, and delivered an effective vaccine within the year.

Lessons on managing extended networks effectively

Although alliances are not new to the healthcare and life science industry, their current scale and complexity are, and this will only grow over time. Instead of traditional bilateral networks, partnerships and alliances will often require involvement of multiple players, including biotech, pharma, medical device and health tech companies, as well as academia, payers/providers and even regulators. This makes it critical to be able to successfully manage not only one or two collaborations, but a network of hyper-collaborations. The same is also true for other highly regulated industries, such as telecommunications and utilities.

Hyper-collaboration brings multiple benefits, including shared risk, reduced cost, greater utilization of unused IP, better access to funding and talent networks, more innovation capacity, and improved transparency and trust with patients.

However, there are also challenges, including alignment of goals, objectives and incentives; tracking progress across multiple partners; managing IP; standardizing processes around data collection, annotation and sharing; and logistics.

Like any stress test, the pandemic has shone a spotlight on how well – and how badly – businesses are set up to respond to disruption. Executives should be wary of writing off the pandemic experience as a "one-off", and instead make the most of it to bring about essential and valuable change.

Alliance management is different from project management, requiring a strong focus on governance, communication, culture, problem solving, and conflict resolution. All types of partnerships and collaboration need a well-designed steering committee that oversees the research plans, governs the collaboration and ensures compliance. This is a key success factor to prevent and solve problems early on to build the relationships, agree on and manage intellectual property, and set the overall objectives of the collaboration. As the partnerships, alliances and networks grow in complexity, the role of the steering committee will become increasingly important for success, as it sets the foundation for collaboration on all levels.

We can draw some lessons from those companies in healthcare and life sciences that have been successful in pursuing hyper-collaboration:

- **Alliance purpose, strategy and vision – What to look for in an alliance**
  Alliances are collective efforts to achieve a common goal, with each party contributing certain capabilities/ innovations/technologies. Accordingly, it is imperative to clearly define the purpose, strategy, and vision of an alliance and the key elements needed to achieve the goal. When building or entering an alliance, each player needs to understand its role and position, as well as the role of the other parties involved and what each should contribute in terms of human resources, cash, knowledge, IP, and equipment.

- **Adequate alliance management**
  With a multitude of different players involved, it will be complex to align the overall objective and make sure all players work towards the same goal. Problems that occur need to be quickly and efficiently resolved, and it is essential to ensure compliance from each party involved. The alliance management and governance structure need to be clearly defined and agreed at operational, tactical and strategic levels. Sufficient resources with the right capabilities need to be allocated to manage the partnership. Specific areas of focus

should include information and data management, IP management, commercialization of outputs, and operational models.

- **Fair risk and benefit allocation – A new business model?**
  All parties involved need to be adequately incentivized to contribute. With collaboration partnerships becoming more diverse, greater attention needs to be paid to relevant risk/benefit-sharing models. With a large amount of IP and innovation involved, this will require new and innovative business models to share development, launch and production risks, while also offering fair compensation models outside traditional IP and patent approaches.

- **Cultural change – From competition to collaboration**
  Collaborating in alliances requires a different mind-set and culture. To make network- and alliance-based collaboration models work, companies need to adopt an open mind-set to share knowledge, data and information, while at the same time protecting key assets. Assess whether your corporate culture encourages enough entrepreneurial risk-taking, and if not, how it can be changed.

- **Assess and improve your agility**
  Companies should learn from their pandemic experience to understand their current level of agility and what can be done to improve it, as well as assess organizational set-up and culture from an "ambidextrous" perspective – can scale/productivity capabilities and speed/creativity capabilities be delivered in a balanced way?

Although none of these factors alone may seem completely novel, the need to be proficient in all of them has now become central to companies that want to remain relevant leaders in their fields. Healthcare demonstrates this – in the recent pandemic we have seen examples of big players being sidelined by small biotech companies or competitors that were able to build meaningful alliances, such as Pfizer and AstraZeneca. In the future corporate success will depend on having the capability to build, maintain and drive complex networks of alliances and collaborations that are attractive to all players – will you be able to shape the future, or will you be relegated to the margins?

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