

## Analysis of Recent Trends in E-health Solutions Developed by Pharmaceutical and Biotech Companies

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### BACKGROUND

- Digital transformation is affecting all industries and the pharmaceutical sector is not an exception. Pharma and biotech companies are starting to invest in such sector as e-health innovations could improve many areas of the pharma value chain, from drug development to diagnosis and patient care. Digitalization can bring better patient outcomes, broader access to quality, data-informed care and significant cost reduction.
- Most effective way for pharmaceutical companies to achieve these benefits is to enter into collaboration with technology companies, as implementing these technologies often requires strong technological know-how.

### OBJECTIVE

- The objective of this study was to identify recent trends in e-health solutions developed under collaborations between drug/biotech and technology companies.

### METHODOLOGY

- Top 10 largest pharmaceutical and biotech companies were identified based on the revenue generated in 2018.
- A free-term research was performed using Google search engine by combining each company's name with various keywords related to e-health (e.g. "telemedicine", "software", "digital", "mobile"). Search was supplemented by reviewing websites of these companies for press releases associated with e-health.
- All identified information about collaboration between pharma/biotech and tech industry for the development of e-health was collected and analysed in terms of year of collaboration, purpose of technology being developed, health condition, and involvement of artificial intelligence (AI).

### RESULTS

- The top 10 pharmaceutical/biotech companies included in the analysis were: Abbott, AbbVie, Bayer, GSK, Johnson & Johnson, Merck, Novartis, Pfizer, Roche, Sanofi.
- Overall, 61 activities attributed to cooperation of pharma/biotech and technology companies for e-health development were identified.
- Among 10 analysed companies, Novartis was participating in the highest number of digital innovations (16 initiatives), followed by Pfizer (8 initiatives) and Roche (7 initiatives). (Fig.1.)
- The most dominant therapeutic areas were diabetes (15%), oncology (15%), nervous system (11%) and respiratory system (5%), however significant part of solutions did not target any specific condition (39%). (Fig. 2.)

Figure 1. E-health initiatives of pharma/biotech companies

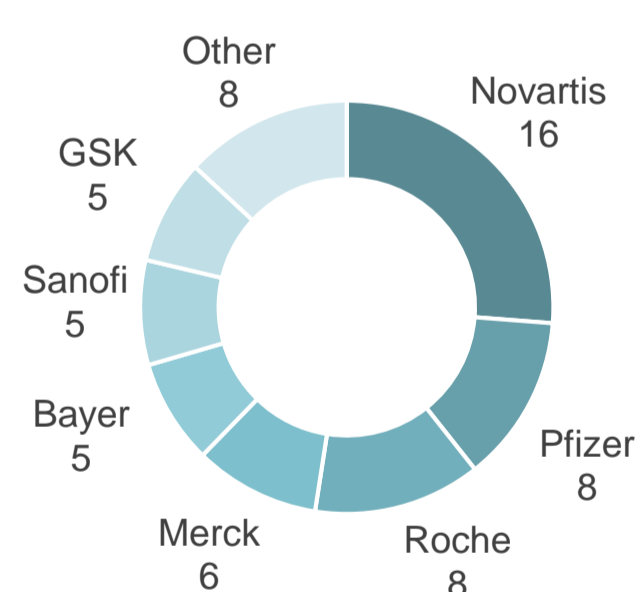
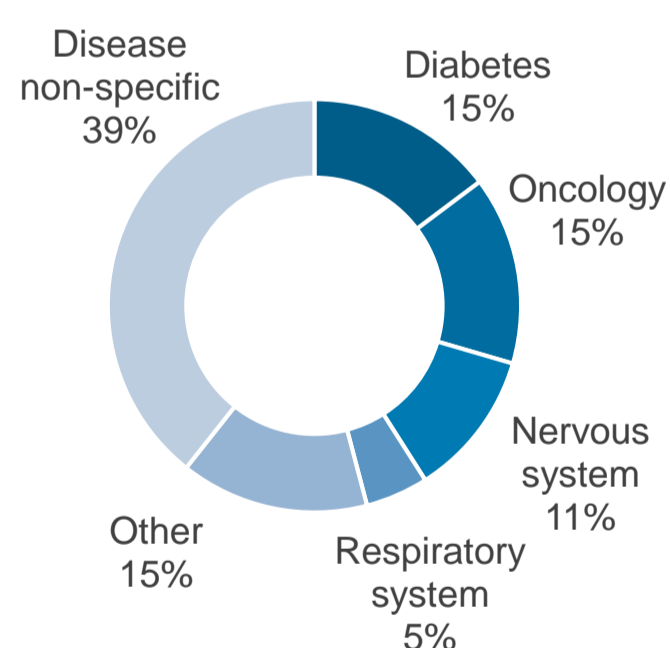
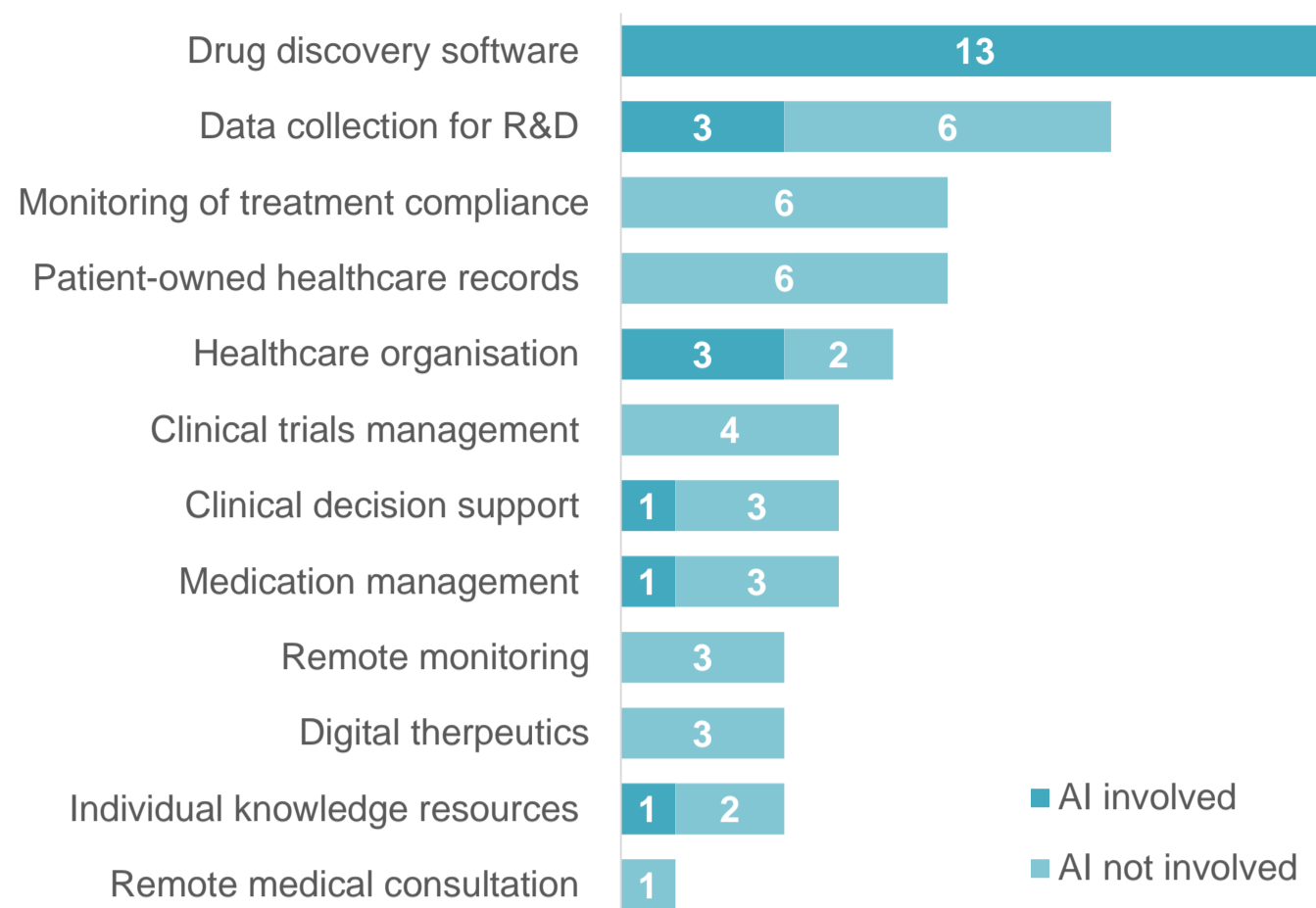


Figure 2. Development of e-health by disease area



- Analysis of the purpose of e-health solutions developed under collaboration with tech companies showed that pharma/biotech companies are mostly interested in using such solutions to support new molecules discovery (13 initiatives), collection of patient's data for research purposes (9 initiatives), monitoring of patient's compliance and patient's personalized health tracking (6 initiatives). (Fig. 3)

Figure 3. Development of e-health by purpose



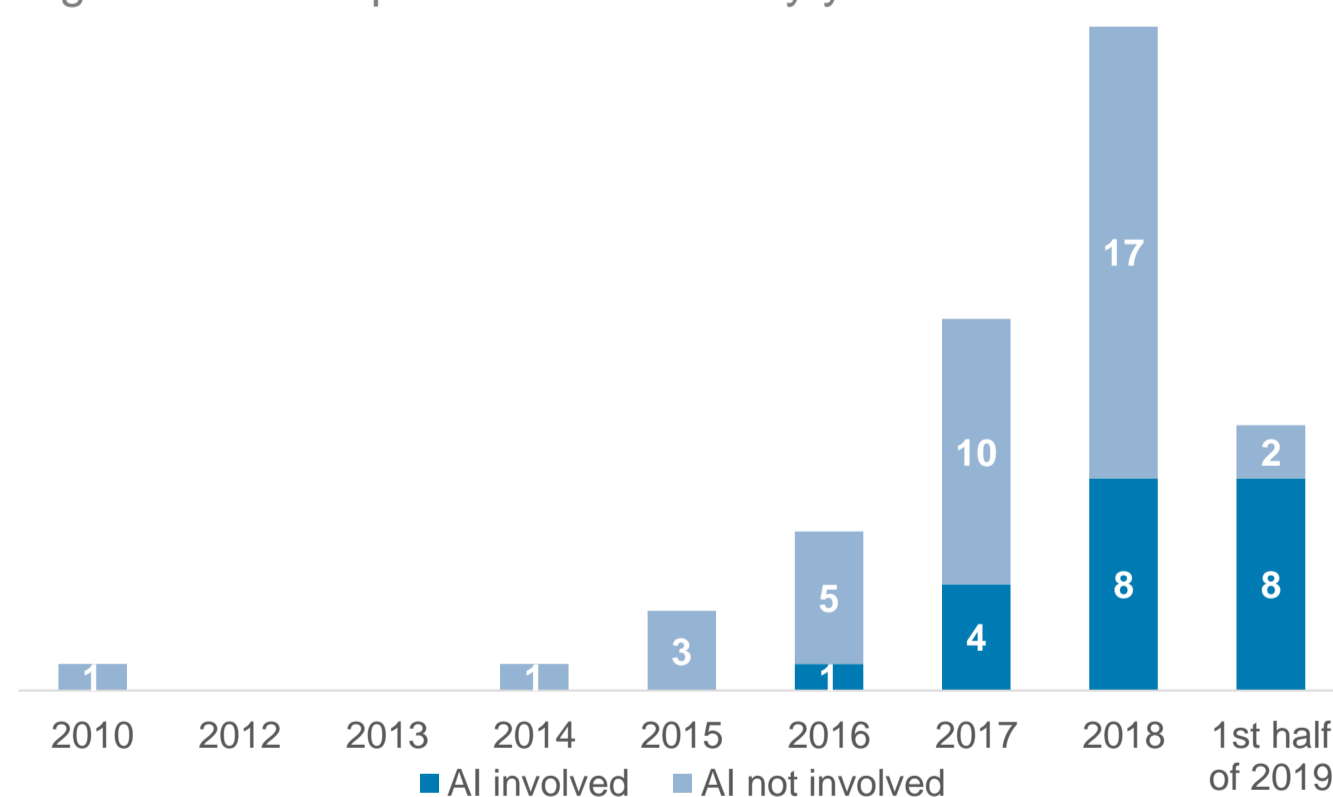
- The analysis indicated a considerable interest in technologies using AI since 1/3 of e-health solutions under development involved such technology. Besides solutions supporting drug discovery, where all collaborations considered AI-based technology, AI was also applied in other fields such as "Data collection for R&D" and "Healthcare organization" (Fig. 3). Exemplary e-health solutions of the top most often developed categories are presented on Figure 4.

Figure 4. Examples of developed e-health solutions

Collaborators	Description
<b>Drug discovery software</b>	
<b>Novartis &amp; AbCellera [1]</b>	Technology based on microfluidics system, which can screen a large number of single antibody-producing B cells from natural sources to identify the best antibodies for any given target. The platform uses genomic sequences, artificial intelligence and data visualisation techniques to determine which of the antibody molecules will be the best drug candidates.
<b>Data collection for R&amp;D</b>	
<b>Pfizer &amp; IBM [2]</b>	E-health solution based on a system of sensors and mobile devices providing real-time monitoring of Parkinson's disease symptoms (including motor function, dyskinesia, cognition, sleep and daily activities). IBM's machine learning capabilities will be used to find unique connections between recorded symptoms and other clinical data (e.g. drug dosing) in order to obtain a better understanding of disease progression and medication response.
<b>Monitoring of treatment compliance</b>	
<b>Novartis &amp; Propeller Health [3]</b>	Add-on sensor developed to work with the capsule-based dry powder inhaler by passively recording and transmitting compliance data. It is aimed to provide information through the platform to users and their doctors about medication adherence and other factors affecting treatment.

- Analysis of e-health collaboration on year-to-year basis has shown rapid growth since 2014, with the number of initiatives almost doubling each year (Fig. 5). Interestingly, in the first half of 2019, more AI-based than non-AI-based initiatives were launched, which suggests significant increase of interest in this field.

Figure 5. Development of e-health by year



### CONCLUSIONS

- With the advent of digital transformation, drug companies become increasingly involved in development of digital solutions.
- Drug discovery and molecule testing with the use of AI seems to capture the greatest interest of drug companies. This technology has a potential to be highly valuable for both, pharma (due R&D costs reduction), and for patients (due to faster access to new therapies).
- Data collection through apps, wearable devices and online communities is another important area of pharma/biotech companies' activity. Access to data on patterns of the disease, individual patient profile and prescribing behaviour, and AI-supported data analysis of these data may enhance development of more precise treatment and guide the clinical practice. Data collected with wearables can also be used to better capture treatment benefits in clinical trials or to prove real-world effectiveness of a therapy in registration filings and value dossiers.
- Digital health technologies will become unavoidable attributes of future drug life-cycle, from boosting fast development of new drugs, though facilitating patients data collection, to support every-day clinical practice and patient care. The cooperation of pharma/biotech companies and technology providers is the key to successfully fit this emerging model as it allows to combine expertise in healthcare and life science with practically unlimited capabilities of information technology.

### REFERENCES

- Pharmaceutical Technology. AbCellera and Novartis enter into multi-target partnership. Available at: <https://www.pharmaceutical-technology.com/news/novartis-abcellera-antibody-technology-multi-target-partnership/> [Accessed 09 Oct. 2019]
- Pfizer. Pfizer Taps IBM for Research Collaboration to Transform Parkinson's Disease Care. Available at: [https://www.pfizer.com/news/press-release/press-release-detail/pfizer\\_taps\\_ibm\\_for\\_research\\_collaboration\\_to\\_transform\\_parkinson\\_s\\_disease\\_care](https://www.pfizer.com/news/press-release/press-release-detail/pfizer_taps_ibm_for_research_collaboration_to_transform_parkinson_s_disease_care) [Accessed 09 Oct. 2019]
- Mobi Health News. Propeller and Novartis collaborate to develop add-on sensor for COPD treatments. Available at: <https://www.mobihealthnews.com/content/propeller-and-novartis-collaborate-develop-add-sensor-copd-treatments> [Accessed 09 Oct. 2019]

