

LIFE SCIENCES DIGITAL WEB WATCH 2022

Digital technologies
as Life Science cornerstones
for innovative Healthcare

INTRODUCTION

The Life Sciences Digital Web Watch is based on officially communicated data and seeks to capture the digital trends and developments in the Life Sciences Industry.

The first part of our analysis focuses on three different categories of initiatives, namely those related to pharmaceuticals and medical devices.

Next, we studied the annual trend and compared it to previous years, both globally and for each of the major Pharma companies, Device Manufacturers, or Google, Apple, Facebook, Amazon, and Microsoft (GAFAM).

Furthermore, we focused our analysis on how every step of the Life Sciences Industry value chain is impacted by digitization, from the early phases of Research and Development to Marketing and Sales and Post-Marketing Studies.

By evaluating the distribution of these initiatives according to the stages, we identified major technologies trends (AI, IoT, Telemedicine...) having an impact on the Life Sciences sector.

Finally, we concentrated our final analysis on Metaverse tech. In 2021, the Healthcare sector accelerated digital innovations related to immersive technologies, marking the first steps towards the Metaverse. We chose to present its impacts on the Life Sciences value chain.

Sources *

Pharmaceuticals

MobiHealthNews, TICPharma, FiercePharma, Outsourcing

Medical Devices

Pharma Medical Product Outsourcing, Medical Device Network, FierceBiotech, eHealthNews

Non specialized

Digital-focused (Usine Digitale, computing UK) or popular reviews (Wall Street Journal, Bloomberg, Les Echos), company's website

**2021 EU & US scope (French or English language)*

THREE MAIN AREAS OF THE LIFE SCIENCES VALUE CHAIN ARE IMPACTED BY DIGITAL...



DIGITAL R&D

Digital technologies to ensure and reinforce a high level of study quality, optimize the study timeline, and reduce overall costs.

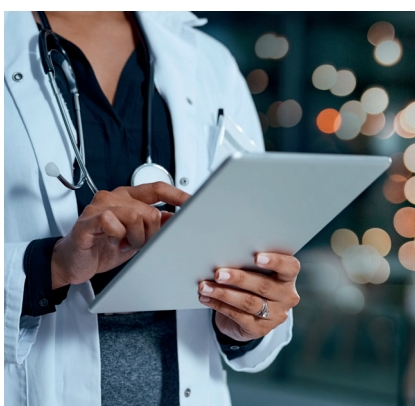
Digital R&D requires various digital technologies, such as Artificial Intelligence, Blockchain, and IoT.



DIGITAL MANUFACTURING & SUPPLY CHAIN

Technology-based integrated approach to optimize end-to-end manufacturing and supply chain processes, including procurement.

Digital manufacturing and supply chains use data integration to link different silos and processes of the manufacturing and distribution lifecycle.



DIGITAL HEALTH

Digital health is the convergence of digital technologies to enhance the health and wellness of patients through effective, sustainable, and personalized healthcare delivery.

Digital Health comprises several aspects of healthcare delivery, such as the ability to store, share, and analyze health related information, enhanced communication with healthcare providers, improved diagnoses, and improved quality of life for patients.

...THROUGH VARIOUS TYPES OF DIGITAL TECHNOLOGIES

AI

Ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent human beings

TELEMEDICINE

Remote patients' diagnosis and treatment by means of telecommunications technology and internet

OPEN INNOVATION

Business management model for innovation that promotes collaboration with people and organizations outside the company

RPA

Application of technology, governed by business logic and structured inputs, to automate business processes

APPLICATION

Computer program or software application designed to run on a mobile device

IOT

Objects with a diverse set of functions, due to being connected to the Internet

PROCESS SOFTWARE

Process of digitalization of business process from legacy software

AR/VR/METaverse

Immersion of the user in a virtual environment or appearance of virtual elements in the user's real environment

Other digital technologies screened in the LS Digital WebWatch:

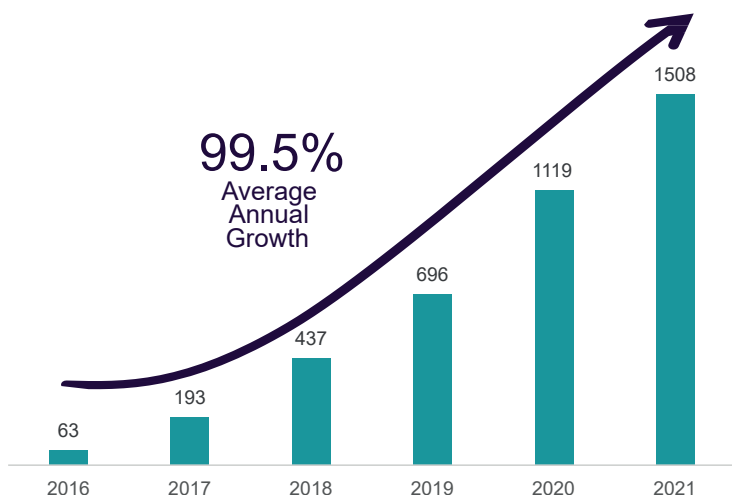
Cloud	Blockchain	3D Printing	Data Analytics
Social Network	eCommerce	Quantum Computing	Unique Device Identification



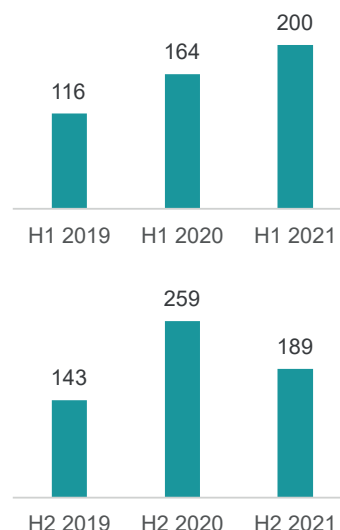
PHARMACEUTICALS

THE ACCELERATION OF DIGITAL INITIATIVES FROM THE PHARMACEUTICAL SECTOR STABILIZED IN 2021...

of Pharmaceutical related digital initiatives evolution (cumulative data)



Distribution of Pharmaceutical related digital initiatives in 2019 vs. 2020 vs. 2021



Note: information is based on officially communicated data; cumulative data for 2016 - 2021, non exhaustive.

...AND RE-DOMINATED BY THE TOP FIVE PHARMA, WHILE GAFAM REDUCED THEIR INITIATIVES BY 50%.

Distribution of Pharmaceutical related digital initiatives per company in 2021

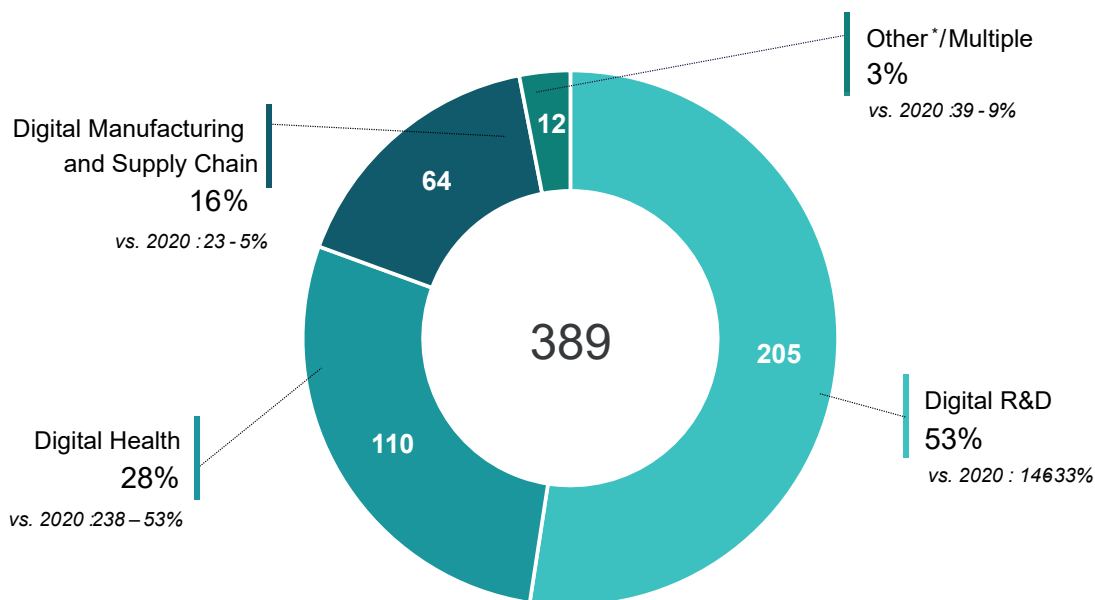
 22 vs 16	 18 vs 11	 12 vs 31	 10 vs 11	 10 vs 8	OTHER Pharma companies, Biotech and small startups with five or less initiatives <i>Including:</i> Amazon, Alexion, Galapagos, Biogen, Regeneron, BioNTech, Boehringer Ingelheim, Servier and Teva
 20 vs 18	 18 vs 12	 10 vs 21	 8	 8	
 19 vs 17	 17 vs 14	 10 vs 9	 8	 7	
		 9 vs 10	 6	 6 vs 4	

Number of digital initiatives in 2020

Note: information is based on officially communicated data; data for 2021, non exhaustive

DIGITAL R&D INITIATIVES TOOK THE ADVANTAGE OVER DIGITAL HEALTH AREA, DUE TO CLINICAL DEVELOPMENT ACCELERATION. MEANWHILE DIGITAL MANUFACTURING INVESTMENTS INCREASED, HIGHLIGHTING MARKET MATURITY.

Distribution of Pharmaceutical related digital initiatives per area

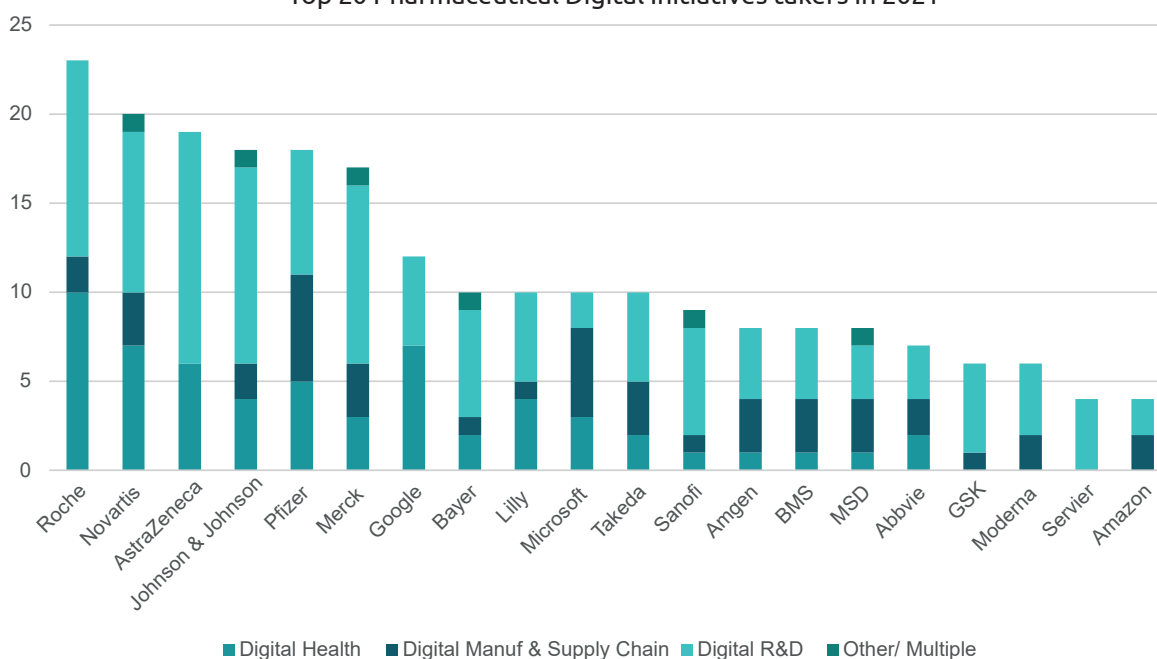


Other: initiatives in other area (e.g., support function, payments, innovation lab)

Note: Information is based on officially communicated data for 2021, non exhaustive.

AMONG THE TOP 20 PHARMACEUTICAL DIGITAL INITIATIVE TAKERS, BIG PHARMA WERE DOMINANT IN 2021

Top 20 Pharmaceutical Digital Initiatives takers in 2021



Note: information is based on officially communicated data; data for 2021, non exhaustive

DIGITAL R&D INITIATIVES SKYROCKETED, AI AND OPEN INNOVATION REPRESENTED MOST OF THE DIGITAL R&D INNOVATIONS IN 2021 (74%), CONTRIBUTING TO THE STRONG GROWTH OF THIS SEGMENT.

	AI	Open innovation	AR/VR/Metaverse	Process Software	Data Analytics	Other	Digital R&D
AstraZeneca	3	2		2		2	13
Johnson & Johnson	2	3					11
Merck	3				2	2	10
Roche	3	2		2		2	10
Novartis	3	3	2			2	9
Pfizer	3	2					7
Bayer	3			2	2		6
Sanofi	3	2					6
Google	2			2	2	2	5
GSK	2	3					5
Lilly	3					2	5
Takeda	2	2	2	2	2	2	5
Total 2021	107	44	13	13	8	20	205









Note: information is based on officially communicated data; data for 2021, non exhaustive

Number of digital initiatives: =1 >1 ≥3

Digital R&D has been growing strongly this year with 53% vs. 35% in 2020. The development of AI has been enormous this year, representing 52% of the innovations in this segment. The innovations identified are more focused on advancing research and less on development and clinical operations. AI is now well established and supports the upstream phases of research. It is mainly driven by Big Pharma, Google, and specialized startups. Open innovation is also on the rise and the trend to collaborate is increasing.

<p>AI</p> <p>Biogen and Envisagenics Announce Collaboration to Advance RNA Splicing Research</p> <p>As part of the collaboration, Biogen will leverage Envisagenics' proprietary artificial intelligence (AI)-driven RNA splicing platform, SpliceCore® to define and understand the regulation of different RNA isoforms in CNS cell types.</p>	<p>Open Innovation</p> <p>Collaboration Between Abbvie, Biogen and Pfizer Creates World's Largest Browsable Resource Linking Rare Protein-Coding Genetic Variants to Human Health and Disease</p> <p>The browser gives access to results from analyses of whole exome sequencing data from 300,000 UK Biobank research participants. These genetic data have been paired with detailed health information to create this browsable resource.</p>	<p>Quantum Computing</p> <p>AstraZeneca and the Tec's Guadalajara campus designed a knowledge transfer program for various cutting-edge technologies, incl. quantum computing</p> <p>The project is working on proposals to accelerate the development of talent in this area and to thus increase the number of advanced quantum computing algorithms implemented.</p>
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IN 2021, DIGITAL INITIATIVES IN MANUFACTURING AND SUPPLY CHAINS SIGNIFICANTLY INCREASED WITH +40 PROJECTS LAUNCHED IN QUALITY, PLANIFICATION, AND REMOTE WORKING.

	Process Software	AI	AR/VR/Metaverse	Blockchain	RPA	Other	Digital Manufacturing & Supply Chain
	■ ■	■ ■				■ ■	6
		■ ■				■ ■ ■	5
		■ ■			■ ■		3
			■ ■		■ ■		3
	■ ■		■ ■			■ ■	3
	■ ■			■ ■		■ ■	3
	■ ■	■ ■		■ ■			3
			■ ■		■ ■		3
Total 2021	16	11	7	7	7	16	64

Note: information is based on officially communicated data; data for 2021, non exhaustive

Number of digital initiatives ■ =1 ■ >1 ■ ≥3

While last year, Digital Manufacturing and Supply Chain initiatives were scarce, 2021 was prolific in this segment. Big Pharma, led by Pfizer, and Microsoft were the best initiative takers in 2021, with an industry cloud strategy to consolidate their foundations and to leverage AI capabilities across healthcare. Initiatives in Process Software, RPA and Blockchain remained numerous but last year also marked the great rise of AI and AR/VR/Metaverse for the Digital Manufacturing and Supply Chain segment.

AI

Amgen Invests in AI-Assisted Packaging Inspection

In an industry first, the biotech leader has equipped and validated an inspection system with artificial intelligence (AI) to boost particle detection by 70%, cut false rejects by 60%, and differentiate bubbles from unacceptable contaminants in syringes.

AR/VR/Metaverse

BMS used Augmented Reality tools for production during pandemic













Equipped with an augmented reality headset, Bristol Myers Squibb Senior Research Investigator watched the labs and production area of a pharmaceutical manufacturing facility in Asia in real time as it produced clinical trial batches of a new investigational medicine for the company.

Data analytics

After triumphant pilot, GSK eyes 'digital twins' to fine-tune vaccine production, development

GSK piloted a digital twin of the manufacturing process for vaccines. Essentially, the twin serves as a computer-simulated experiment of a real-time process, allowing the manufacturing team to digitally observe what's happening. GSK can fine-tune its production using a range of models and machine learning techniques and parse and model manufacturing variabilities.

DIGITAL HEALTH INITIATIVES WERE MAINLY DRIVEN BY APPS AND AI, WHICH ACCOUNTED FOR MORE THAN A HALF OF ALL DIGITAL HEALTH INITIATIVES.

	APP	AI	Open Innovation	Telemedicine	Process Software	Other	Digital Health
	■ ■ ■	■ ■ ■			■ ■	■ ■	10
	■ ■ ■					■ ■ ■	7
	■ ■ ■	■ ■	■ ■			■ ■	7
	■ ■	■ ■ ■	■ ■	■ ■			6
	■ ■		■ ■	■ ■		■ ■	5
	■ ■					■ ■	4
	■ ■		■ ■		■ ■	■ ■	4
	■ ■ ■						3
				■ ■	■ ■		3
			■ ■			■ ■	2
		■ ■				■ ■	2
	■ ■		■ ■				2
Total 2021	42	18	11	9	8	24	110

Note: information is based on officially communicated data; data for 2021, non exhaustive

Number of digital initiatives  =1  >1  ≥3

Contrary to previous years, the market for digital health initiatives has slowed down this year, accounting for 28% of all digital initiatives in 2021 vs. 53% in 2020 and 44% in 2019. Just like last year, the trend is still towards applications, AI, and telemedicine, in line with the Covid-19 pandemic period. Open innovation initiatives are on the rise, favoring interactions between Big Pharma and startups.

APP

Roche Introduces a Mobile Application Solution iThemba Life to Empower Patients in South Africa

Themba Life empowers patients to receive their diagnostic test results directly on their smartphones, a critical need in low- to middle-income countries with infrastructure limitations.

AI

Israeli startup uses AI to identify healthy embryos and increase IVF success

Embryonics aims to use AI to improve the odds of successfully implanting an embryo during in vitro fertilization. The company is currently piloting 11 women for their algorithm technology to predict embryo implantation probability.

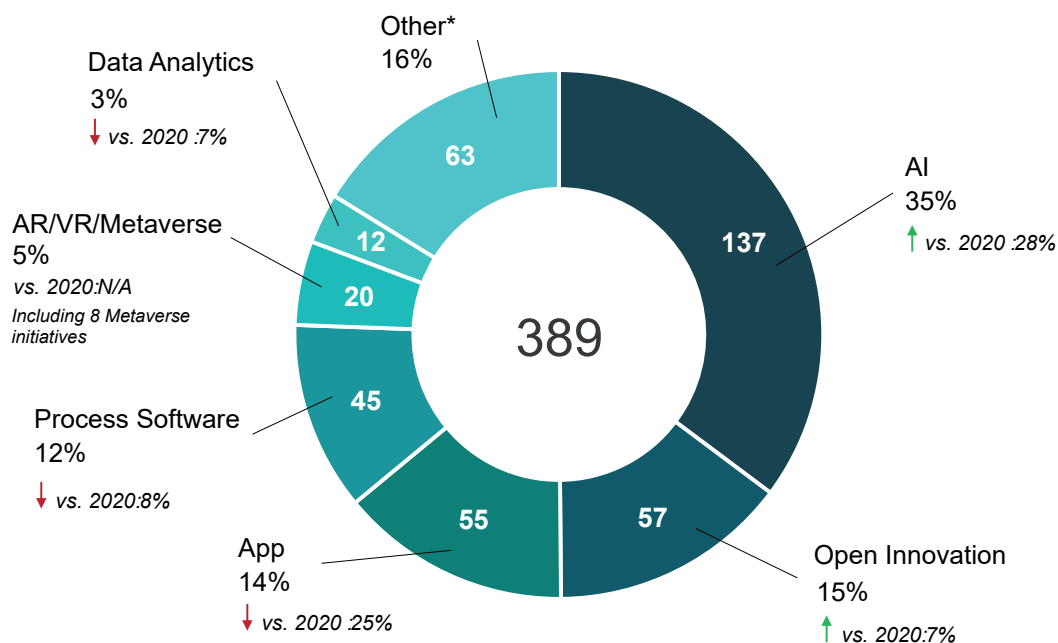
Open Innovation

Digital Medicine Society teams up with AbbVie, Novartis, Pfizer, UCB, Janssen on digital endpoints initiative

The effort will be focused on using nocturnal scratch as an endpoint for atopic dermatitis. The collaboration aims to establish digitally measured nocturnal scratch as a broadly accepted endpoint for use in registrational trials.

IN 2021, AI REMAINED THE PREFERRED TECHNOLOGY TO SUPPORT DRUG DISCOVERY WHILE OPEN INNOVATION REMAINED A STRONG TOOL TO FOSTER COLLABORATION.

Distribution of Pharmaceutical related digital initiatives per topic in 2021



Other: initiatives in other area (e.g., support function, payments, innovation lab)

Note: information is based on officially communicated data; data for 2021, non exhaustive

AI accounted for one third of digital innovations in the pharmaceutical sector. This technology is now very **well established and** applied to various areas and types of work. It facilitates big advances in R&D, to model enzymatic structures and reactions or to study RNA splicing mechanisms, for example.

It has also improved the performance of medical imaging for several years and continues to support many innovations in this field. Its use is becoming more and more common in production lines and along the supply chain.

2021 is also a year of growth for **Open Innovation initiatives.**

Most of the Open innovation initiatives relates to the creation of innovation hubs or projects to create shared databases.

Apps are the most represented type of innovation in digital health in the pharmaceutical sector.

Sometimes associated with **connected objects**, they are particularly valuable in the monitoring of **chronic diseases** and **produce** a lot of **data**.

AR/VR/Metaverse makes its appearance in this ranking in 2021.

Immersive technologies are growing rapidly, and we note the appearance of digital initiatives related to the **Metaverse**.

MEDICAL DEVICES

BrightSpeed S SYS#ctb
Ex: 6904
Se: 2
IC I100.56
Im: 81

Acc Num: BMR1378616
M 59 QP-545301
DOB: 21 Sep 1954
17 Jan 2014 512

DFOV 47.3cm
STND/+/E



1024: 7075
Idle
Archive Status
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Film Composer started ****
Hardware reset successful.

Exam - +
Series - +
Image - +
Image 81

Zoom 1.0

Erase All
Hide

Image Enhance
Display Normal

Reference Image
Flip Rotate

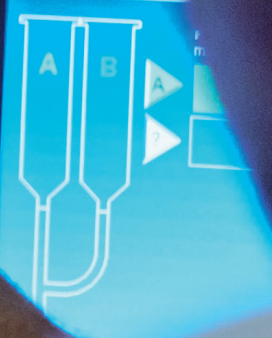
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Save Screen
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kV 120
mA 318
Noise Index: 20.0~
Large
1.250mm/35.00 1.75:1
Tilt: 0.0
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W: 400 L: 40

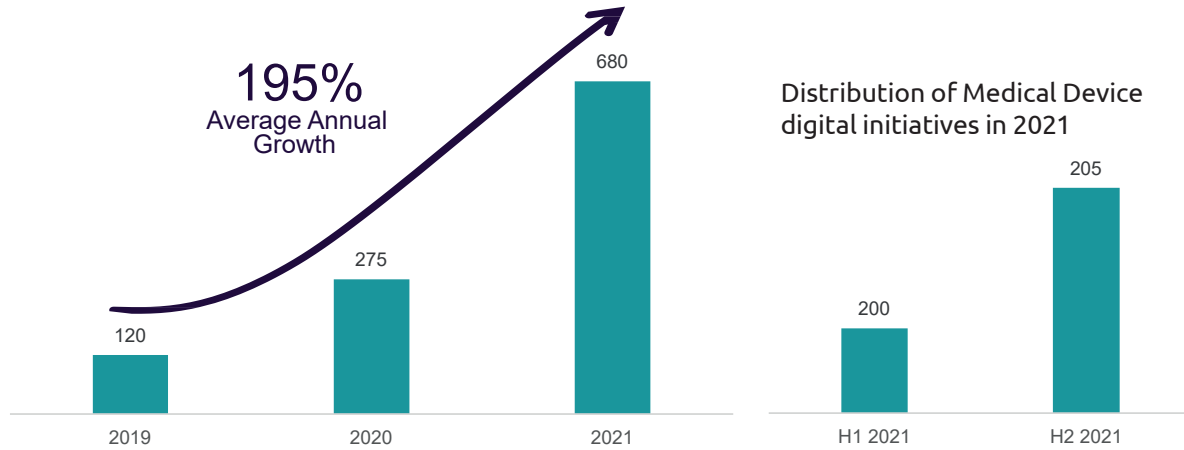
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ABDO*



DIGITAL INITIATIVES IN MEDICAL DEVICES HAVE TAKEN OFF IN 2021, WITH VERY IMPRESSIVE GROWTH...

of Medical Device digital initiatives evolution (cumulative data)



Note: information is based on officially communicated data; cumulative data for 2019 - 2021, non exhaustive.

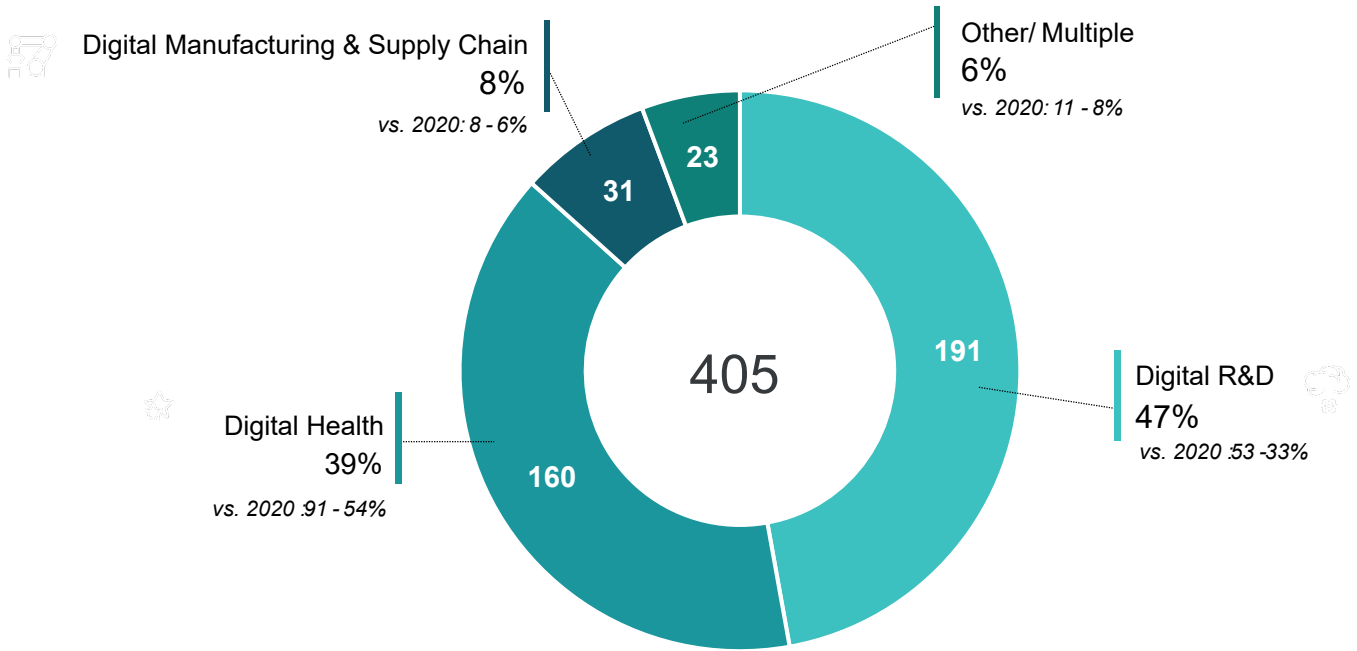
...LED BY LARGE MEDICAL DEVICE MANUFACTURERS, SUCH AS GE, PHILIPS, SIEMENS, AND MEDTRONIC.

Distribution of Medical Device digital initiatives per company in 2021

 26 vs 14	 17 vs 21	 9 vs 5	 8	 7 vs 16	OTHER Medical devices companies, and small startups with two or less initiatives <i>Including: Accenture, AstraZeneca, IBM, MediVR, Roche, Samsung, AWS, GSK, LG, Merck, Moderna, Pfizer, Lilly, IQVIA, etc.</i> 253 vs. 26
		 7 vs 4	 6	 6	
		 20 vs 36	 13 vs 16	 6	
		 6	 5	 5	

Note: information is based on officially communicated data; data for 2021, non exhaustive

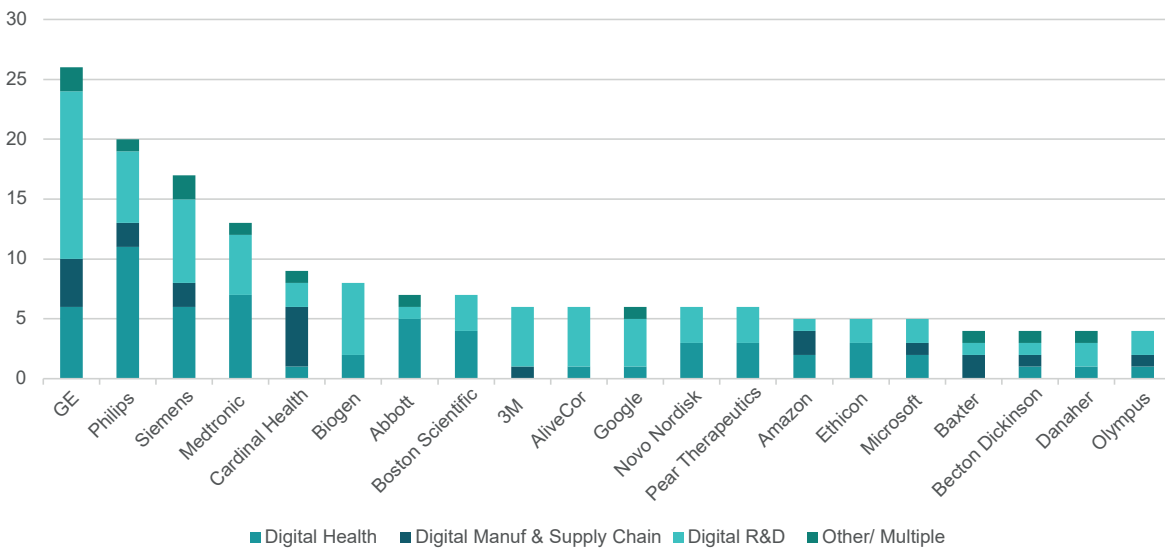
IN 2021, JUST AS IN THE PHARMACEUTICAL SECTOR, R&D INITIATIVES HAVE TAKEN THE LEAD.



Note: Information is based on officially communicated data for 2021, non exhaustive.

AMONG THE TOP 20 MEDICAL DEVICES DIGITAL INITIATIVES TAKERS, BIG PHARMA WAS DOMINANT IN 2021.

Top 20 Digital Initiatives takers within Medical Device companies in 2021



Note: information is based on officially communicated data; data for 2020, non exhaustive

A FOURTH OF DIGITAL R&D INITIATIVES ARE LED WITH AI.

	AI	Open Innovation	APP	Process Software	Cloud	Other	Digital R&D
							14
SIEMENS							7
							6
							6
							5
AliveCor							5
Medtronic							5
Google							4
Total 2021	54	22	19	18	16	62	191

Note: information is based on officially communicated data; data for 2021, non exhaustive

Number of digital initiatives

Digital R&D initiatives skyrocketed this year, driven by more than a quarter of AI-related initiatives. GE is the leader this year, with numerous partnerships related to AI.

Moreover, medical devices are natively connected to patients, MedTech companies should leverage stronger digital initiatives by capturing data along patient lifecycle, and market acceleration should keep its pace.

Open Innovation

GE Healthcare and Minerva Imaging sign strategic partnership to accelerate precision medicine and targeted radionuclide therapy

Partnership aims to establish a state-of-the-art center for molecular imaging and clinical development of targeted radionuclide therapy. It will also facilitate the success of Minerva Imaging’s growth plans, which include opening a new facility in 2022 and expanding its R&D footprint by 50%.

AI

Clinical trials for AI robotic device for minimally invasive surgeries eyed in South Korea




















The ANT-X system helps clinicians perform safe and accurate percutaneous needle placement. NDR emphasizes that with this device, a quick needle alignment renders less fluoroscopic time and thus, less radiation exposure for both patients and clinicians.

AR/VR/Metaverse

Canada-based startup Luxsonic landed Class 2 Medical Device clearance from Health Canada for its virtual reality suite, SieVRt, to be used in diagnostic radiology.

Clinicians can use the software on a VR headset in order to see radiology images in 3D. Specifically, this new designation will let clinicians work remotely and diagnose patients off-site.

PROCESS SOFTWARE AND AI WERE THE MAIN DRIVERS OF THE DIGITAL INITIATIVES' GROWTH IN MANUFACTURING AND SUPPLY CHAINS FOR MEDICAL DEVICE COMPANIES.

	Process Software	AI	IoT	Open Innovation	RPA	Other	Digital Manufacturing & Supply Chain
							5
							4
							2
							2
							2
							2
Total 2021	8	7	5	4	3	4	31

Note: information is based on officially communicated data; data for 2021, non exhaustive



In 2021, innovations in Digital Manufacturing and Supply Chains are back with 8% of the Medical Devices sector digital initiatives.

Initiatives related to Process Software, AI, and IoT are the most prevalent, accounting for more than a half of all Digital Manufacturing and Supply Chain initiatives.

RPA

Cardinal Health Teams Up with Zipline for Automated, On-Demand Delivery to Retail Pharmacies

Cardinal Health will use Zipline's service for on-demand replenishment of pharmaceutical and medical products to retail pharmacy locations. The operation aims to help mitigate risk of inventory stock-outs for certain products and deliver to customers the right products at the right time for their patients.

Data analytics

Swiss CDMO Lonza and Agilent Technologies have agreed to collaborate on an effort to change the manufacturing process for personalized cell therapies.
































Cell therapy products pose a significant manufacturing challenge because of their complexity and patient-specific needs. Lonza's Cocoon is an automated and closed platform that was designed to overcome manufacturing challenges presented by patient-scale personalized therapies.

AI

Philips launches new AI-enabled MR portfolio of smart diagnostic systems, optimized workflow solutions and integrated clinical solutions at RSNA 2021

Philips' new MR portfolio of intelligent integrated solutions is designed to speed up MR exams, streamline workflows, optimize diagnostic quality, and help ensure the efficiency and sustainability of radiology operations.

APPS AND AI LED THE DIGITAL HEALTH SEGMENT FOR MEDICAL DEVICE COMPANIES.

	APP	AI	Telemedicine	IoT	AR/VR/ Metaverse	Other	Digital Health
							11
Medtronic							7
							6
SIEMENS							6
 Abbott							5
Boston Scientific							4
ETHICON <small>PART OF THE Johnson & Johnson FAMILY OF COMPANIES</small>							3
 Novo Nordisk							3
stryker							3
welldoc							3
Total 2021	39	29	19	17	15	43	160

Note: information is based on officially communicated data; data for 2021, non exhaustive

Number of digital initiatives 

This year, digital health losses reached 20% (representing only 39% of the Digital Health initiatives of the Medical Devices sector against 59% last year). The representation of App, AI, telemedicine, and IoT categories is in line with the previous year. We can observe continuing investment here to capture data through apps and to accelerate their exploitation through AI.

In parallel, a new important technology appears with AR/VR/Metaverse. It represents 9% of the initiatives in Digital Health and offers such innovative solutions as gamification, making it possible to manage stress and pain.

AI

Audibel launches AI-enabled hearing aids that react to the user's environment

The sound quality is driven by an AI algorithm that automatically adjusts hearing aids to the wearer's environment. The hearing aids are also able to help detect a fall.

AR/VR/Metaverse

XRHealth launches VR gaming program to aid pain management

The new program will use a VR game designed by Reducept to help train a patient's brain to manage pain. The gamified experience offers targeted behavioral experiments and techniques to tackle pain, which are based on acceptance and commitment therapy, as well as cognitive behavioral therapy.

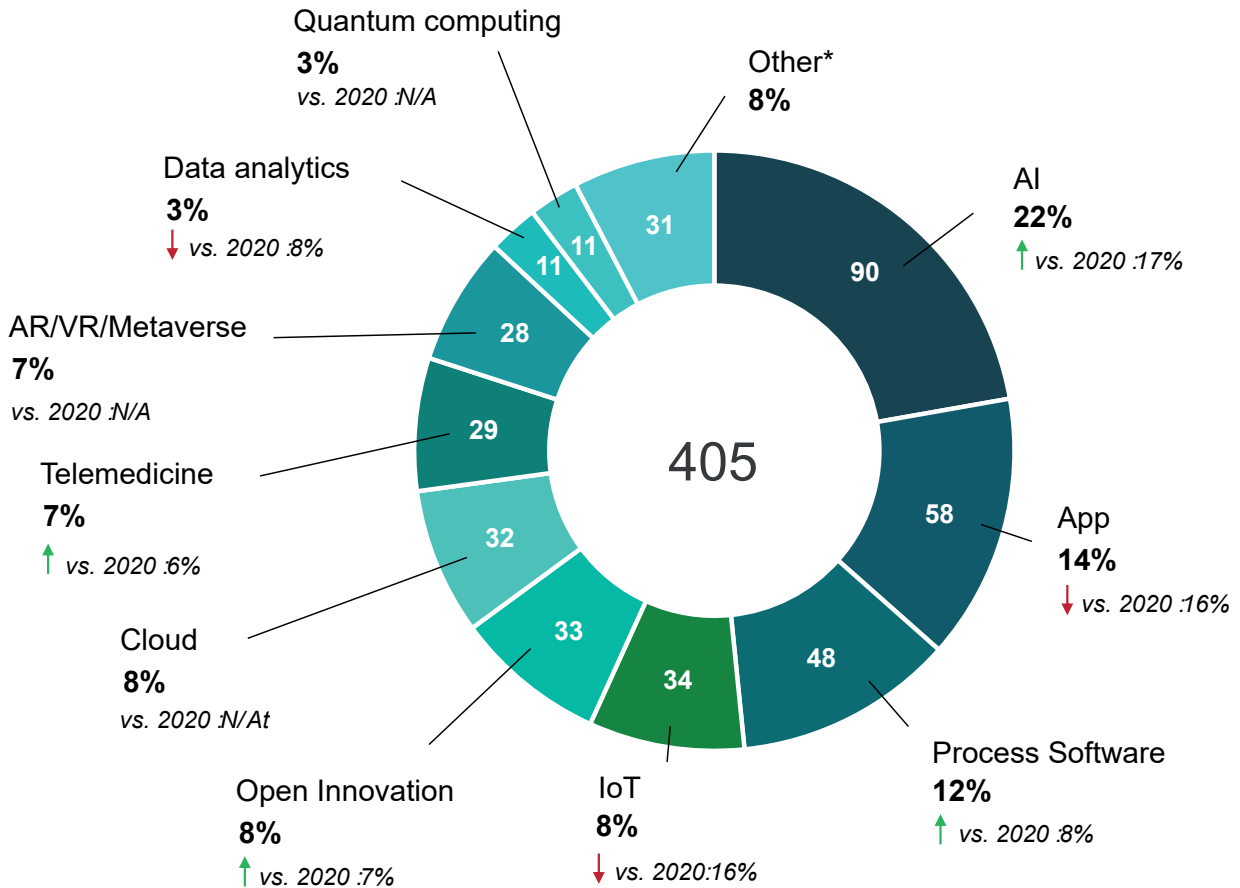
RPA

First Gynecological Procedures Performed with Medtronic Hugo™ Robotic-Assisted Surgery System

The Hugo RAS system is a modular, multi-quadrant platform designed for a broad range of soft-tissue procedures. The six cases included hysterectomies and myomectomies performed in Panama City, Panama.

AI, APPS, AND PROCESS SOFTWARE WERE THE MAIN DRIVERS FOR DIGITAL INNOVATIONS IN THE MEDICAL DEVICE INDUSTRY IN 2021

Distribution of Medical Device related digital initiatives per topic in 2021



Note: information is based on officially communicated data; data for 2021, non exhaustive

AI accounted for a fifth of the innovations in the medical device sector. It enables improved connected objects by integrating and facilitating **data analysis**. AI is integrated in many projects, including **robotics**. It is also used to improve the performance of the **Supply Chain** where optimization is concerned.

There are still many applications this year. Associated with connected objects, they facilitate the **collection and analysis of data**, as well as to transmit them to the medical community. They give more **autonomy** to patients.

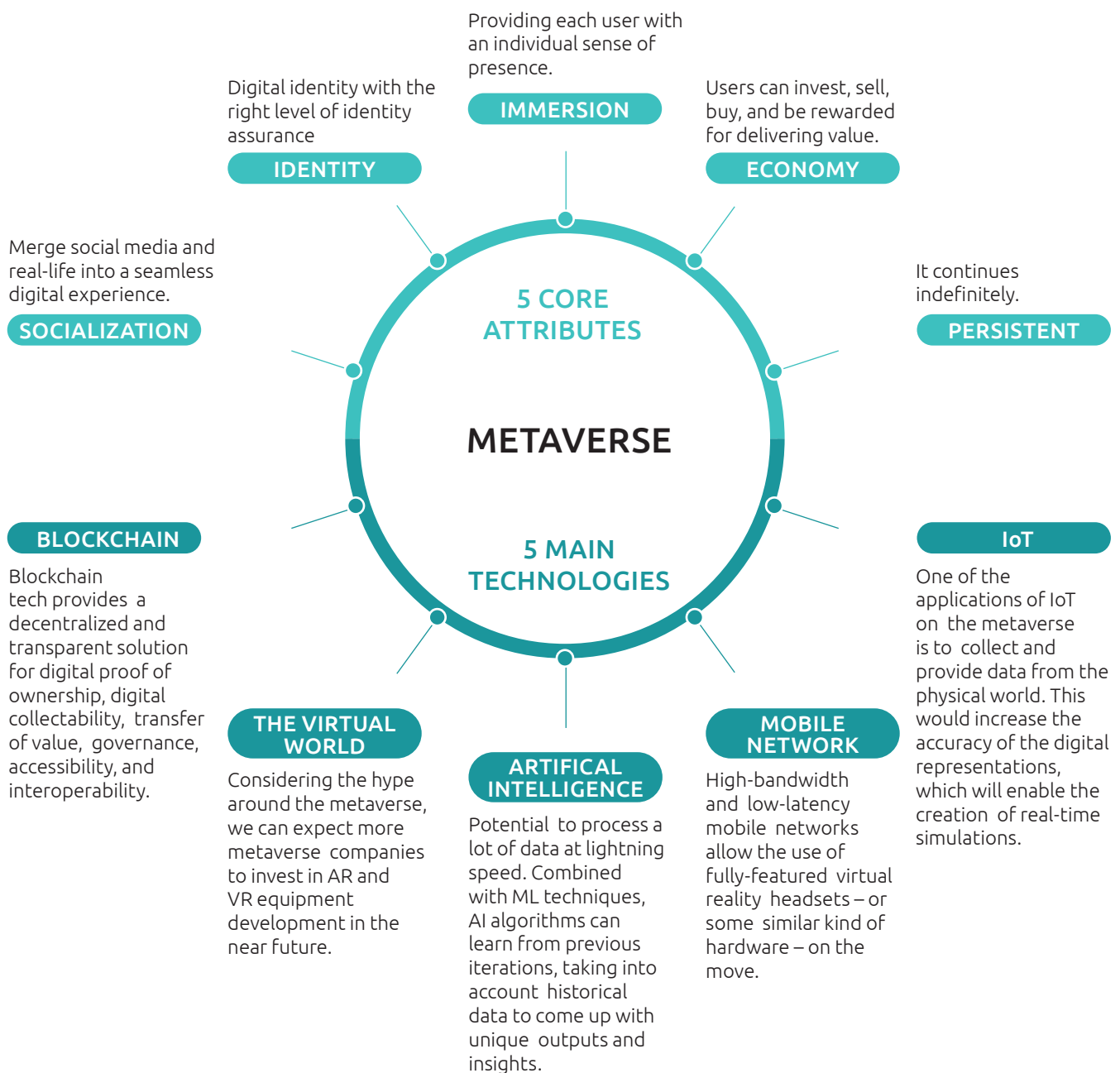
Connected objects are at the heart of initiatives to track and monitor data. They facilitate **real-time, personalized and home-based patient monitoring**.

EMERGING TRENDS: METAVERSE

The image depicts a futuristic, digital environment. The scene is dominated by glowing blue and red geometric shapes, including cubes, rectangles, and lines, which appear to be floating or constructed in a virtual space. The background is dark, with a grid of glowing blue lines forming a perspective of a room or platform. The floor is a checkered pattern of blue and white squares, also glowing with a blue light. The overall aesthetic is high-tech and digital, representing the concept of the metaverse.

METaverse: A PARALLEL WORLD COMBINING ONLINE DIGITAL AND REAL-LIFE EXPERIENCES RELYING ON FIVE CORE ATTRIBUTES AND FUELED BY FIVE MAIN TECHNOLOGIES.

The **metaverse** is a container of **2D or 3D virtual spaces**, a persistent place parallel to the physical world, aiming at **combining online digital and real-life experiences** with the sense of presence



METaverse TECH ENABLES VIRTUAL LEARNING AND ENHANCES AND SECURES “PATIENTS’ JOURNEY” AND WILL SUPPORT THE ROAD TO MARKET AUTHORIZATION...

DIGITAL HEALTH

Enhance & secure “patients’ journey”

- Tailored treatments
- Gamified experience
- New therapies for mental health related pathologie

Break down physical and geographical barriers

Provide new tools & methods for the training and practice of HCPs

- Optimized care management with real-time data
- Training and certification of HCPs

DIGITAL R&D

Support the road to Market Authorization

- Ease collection and analysis of RWE data (Real World Evidence data)
- Perform test in-silico at scale

DIGITAL MANUFACTURING & SUPPLY CHAIN

Enable virtual learning, certifications & development

- Extended Reality (XR) enabled trainings for pharmaceutical manufacturing & operative care

... AND WILL BE BUILT ON A FOUNDATION LAID BY THE 2021 INITIATIVES...

2021 METAVERSE INITIATIVES

DeHealth*

The British non-profit organization announced the start of the creation of a Decentralized Metaverse.



The Asian Society for Cardiovascular and Thoracic Surgery (ASCVTS) provided lung cancer surgery training through a metaverse platform at an online conference.



2 Takeda sites, in Massachusetts (Cell Therapy Manufacturing Facility) and California, tap virtual reality training.



Novadiscovery announced clinical simulation collaboration with Takeda to predict drug efficacy and optimize clinical trial development.

« Doctors have shown great enthusiasm for the use of Mixed Reality, they describe this learning methodology as more effective than the traditional methods ».

Carlotta Gaggini, Product Manager Tecentriq, Cancer Immunotherapy Roche

« We are leveraging these changes to create a new form of healthcare that is accessible at any time of day, from any location in the virtual environment of the metaverse, where treatment can be personalized and adjusted based on real-time analytics ».

Eran Orr, Chief Executive Officer XRHealth

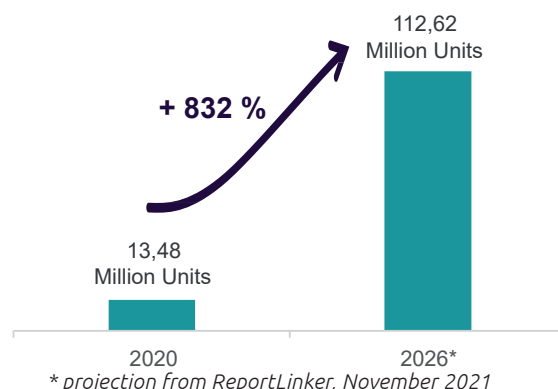
... DRIVEN BY A MARKET EXPECTED TO GROW BY 832% OVER 6 YEARS.

The global **XR* market size** is expected to be worth close to **\$300 billion by 2024**.

Source: Bloomberg Intelligence

* Extended reality is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables.

Global virtual reality device shipments



CONCLUSION

Digital innovation has slightly decreased this year for the Pharmaceutical sector, but has experienced strong growth in the Medical Devices sector.

- Out of the 794 digital initiatives screened in 2021, 50% related to the Pharmaceutical market, while half was related to the Medical Devices market.
- R&D becomes the leading area for digital initiatives, representing respectively 53% and 47% for both industries' results.
- Digital health is down this year but remains important, while Digital Manufacturing and Supply Chain related initiatives are growing steadily.
- AI is now well established and, along with Apps, is the main driver of digital innovation this year.
- The tendency to collaborate is notable in the pharmaceutical sector. Open Innovation is increasingly used.
- Immersive technologies are booming and ambitious Metaverse projects for HealthCare are emerging.
- The landscape of the life sciences industry has transformed during the pandemic as the emphasis towards digital initiatives stood at the forefront.
- These trends confirm how biopharmaceutical and medical technology companies continued their progression towards the integration of more sophisticated technologies. They also highlight the investments in digital initiatives that pursue their transformation by developing their assets and building solid foundations.



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Capgemini Invent also thanks Indian team members for their contribution.

About Capgemini Invent

As the digital innovation, design and transformation brand of the Capgemini Group, Capgemini Invent enables CxOs to envision and shape the future of their businesses. Located in more than 36 offices and 37 creative studios around the world, it comprises a 10,000+ strong team of strategists, data scientists, product and experience designers, brand experts and technologists who develop new digital services, products, experiences and business models for sustainable growth.

Capgemini Invent is an integral part of Capgemini, a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided everyday by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of 325,000 team members in nearly 50 countries. With its strong 55 year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2021 global revenues of  18 billion.

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