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Deloitte Centre *for*
Health Solutions

Accelerating the future

Life Sciences and Healthcare Predictions 2030

Beyond Algorithms: How data AI and human expertise can transform R&D and commercial functions

ACDM March 2025

About our 2030 predictions report

- Fourth of a series of global LSHC predictions reports which we have launched every three years since 2014. This year's report comprises ten predictions exploring:
  - how the life sciences and healthcare ecosystem could look in 2030
  - what it might feel like for different stakeholders
  - the evidence today that informs our views of tomorrow
  - how AI technologies, specifically how GenAI might help bring the future closer.

- Insights were derived from interviews and workshops with Deloitte subject matter experts, Deloitte's global research and published thought leadership, and published literature.

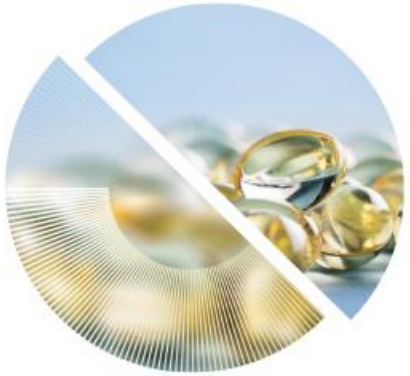
- Mostly optimistic and deliberately provocative view of 2030, to encourage discussion and debate and help organisations prepare for the changes ahead.

- Four cross-cutting constraints that will need to be addressed to realise each of the predictions, specifically:
  - having the right skills and talent
  - developing new funding and operating models
  - navigating the growing complexity of the regulatory landscape
  - addressing the challenges involved in sharing personal data, interoperability and cyber security.

Accelerating the future: 10 predictions for 2030

For todays presentation I' will focus on three of these predictions but first a short overview

***Consumers are the CEO of their own health**: Expecting more personalised preventative products**

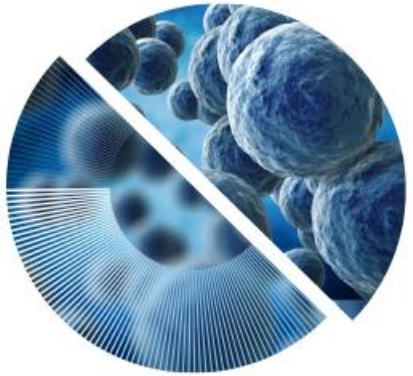


***The rise of a dynamic consumer health market**: Responding to meet consumer expectations and gain trust*

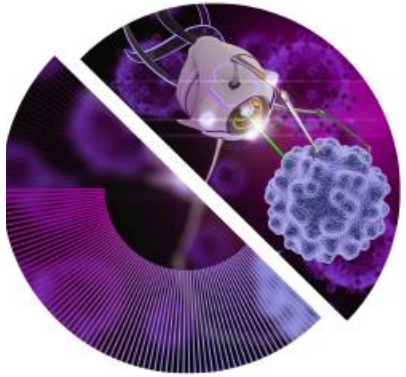
***Intelligent healthcare and the democratisation of health data**: Delivering 5P healthcare*

***Sustainable healthcare systems:** Collaboration innovation and 'climate – smart' thinking**

***Convergence of AI technologies and human expertise in pharma R&D:** Achieving value and access*



***Interdependent innovations in science and technology:** Reshaping treatment paradigms*



***MedTech Innovation :** Improving productivity across the healthcare system*

***M&A, divestitures and restructuring**: Helping life sciences companies realise optimal value*

***Health, wealth and longevity services converge**: Collaborating* to build a resilient economy*

***Digital and technological innovation of pharma:** Transforming pharma's commercial functions*

The focus of the presentation

- **Present our life sciences focused predictions and what they could mean for you:**
  - **The convergence of AI technologies and human expertise in pharma R&D**
  - **Interdependent innovations in science and technology are reshaping treatment paradigms**
  - **End-to-end transformation of pharma's commercial activities**
- **Explore the findings of our Measuring the returns from pharmaceutical innovation report**
- **Identify Some lessons we've learned on data management**
- **Consider how Ai impacts the pharma value chain**

The convergence of AI technologies and human expertise in pharma R&D

By 2030, the biopharma industry has undergone end-to-end digitalisation, leveraging AI technologies, automation, and patient-centric technologies across the R&D value chain to significantly accelerate R&D timelines and improve productivity. Clinical trial teams deploy integrated digital platforms that enhance data interoperability and support R&D collaboration using AI in trial design, participant recruitment, and dossier compilation and submission. This approach, combined with strategic alliances, outsourcing and innovative funding models, has led to faster delivery of groundbreaking therapies for previously untreatable diseases and new life-extending or curative treatments for some of the most highly prevalent diseases. New value-based funding models have enabled a greater focus on preventative therapies including mRNA vaccines. As a result, the return on investment (ROI) in biopharma innovation has increased year-on-year since 2023.

The world in 2030

- **AI and advanced technologies accelerate drug discovery:** Quantum computing, GenAI, in-silico research, digital twins, computational science and advanced gene editing techniques have vastly improved the speed and accuracy of drug discovery.
- **Clinical trials are more cost-effective: A**dvanced gene editing, multiomics technology digital platforms, synthetic control arms and GenAI tools. Have improved design of more personalised medicines.
- **Hybrid trials and data-driven optimisation:** Internal and /or outsourced hub and spoke command centres manage virtual clinical trials employing data rich visualisation tool and trial enrichment strategies, optimising recruitment enrolment monitoring and retention of participants.
- **Diversity, real-world evidence, and equitable drug development:** The integration of RWE, AI-recruitment tools, defined enrolment targets and raised awareness of R&D staff trained on diversity and inclusion has helped ensure more equitable and representative clinical trials and healthcare solutions.
- **Strategic partnerships and collaborations:** M&A to acquire innovative pipelines, replenishing assets impacted by the patent cliff, and bolster internal R&D capabilities, is complemented by strategic partnerships and to access cutting edge-technologies and accelerate therapy development.

Accelerating value for companies and quicker innovations for patients

Enabled by

Functional collaborations, CROs, and an agile workforce combining engineering, biotechnology, computational science, medical and AI skills.

Public-private funding partnerships, subscription-based drug access, and value-based care models to incentivise innovation.

Pharma's response to regulations that demand transparency, comprehensive quality data, better links to pricing and affordability.

Robust cyber and data security measures that ensure compliance and accelerate approvals.

Accelerated by GenAI

Unlocking substantial financial value using AI for drug discovery and in clinical trials ($65/75bn company could save $5-7bn by scaling use of AI over 5 yrs (R&D 30-45%)

Accelerating drug discovery through modelling, identifying promising drug candidates, and enabling drug repurposing.

Streamlining clinical trials, by automating documentation, optimising trial design and recruitment, and data analysis.

Improving efficiency by real-time monitoring of clinical trial data, detect patterns/issues, design digital twins, and automate RWE collection and report generation.

Success rates appear to be higher for AI-discovered drugs. As of December 2023, 24 AI-discovered molecules had completed phase I trials, of which 21 were successful, suggesting a success rate for Phase I trial AI discovered molecules of 80-90%, substantially better than historical industry averages (40-65%).

Tufts Center for the Study of Drug Development found that DCTs are associated with reduced clinical trial timelines and provide substantial extra value to sponsors developing new drugs. If applied to Phase II and Phase III trials, value increased by US$20mn per drug with a seven-fold ROI, lower failure rates and fewer protocol amendments

Transforming pharma R&D through the strategic application of GenAI

Drug repurposing

Role of AI: Perform metanalysis of clinical trial and research data to generate high-quality hypothesis for drug repurposing

Value levers
- Reduced pre-clinical costs
- Reduced time to market
- Higher new drug applications (NDAs)

AI-driven drug discovery

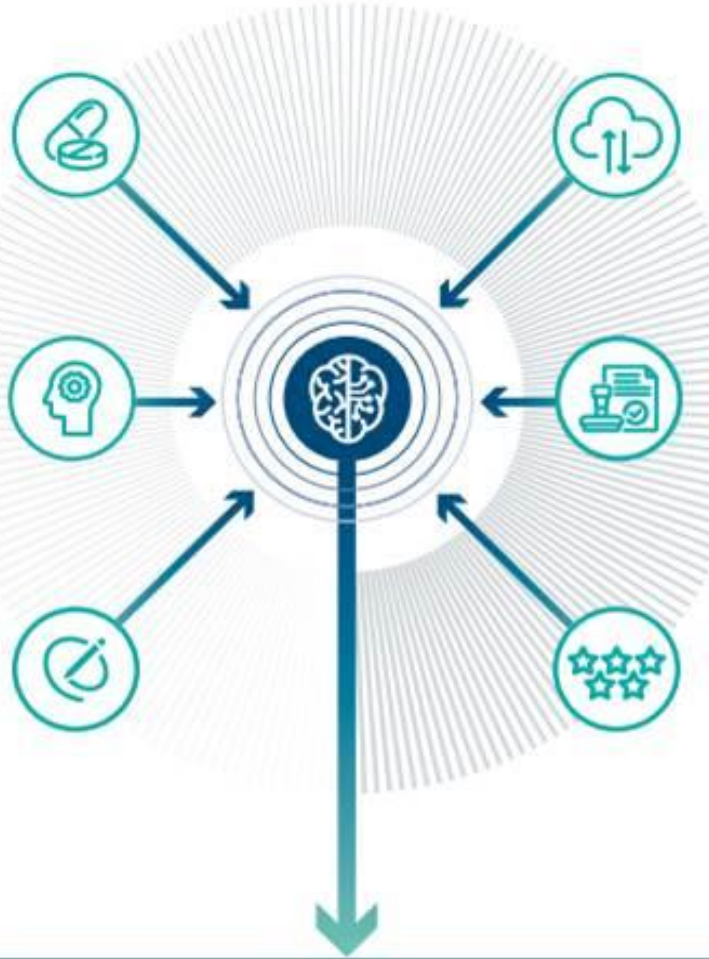
Role of AI: Optimise target and biomarker identification and shortlisting candidates while accessing toxicity and therapeutic efficacy

Value levers
- Improved clinical success rate
- Higher number of NDAs

Rapid design and startup

Role of AI: Automated protocol generation, drafting of study documents (consent form, agreements) and regulatory submissions

Value levers
- Lower average protocol authoring time
- Lower average time to first enrollment



Digital data flow

Role of AI: Collate and standardise trial data elements to create analysis-ready data sets and to auto-populate tables and charts in trial artifacts (e.g., case report forms)

Value levers
- Reduced total time per phase
- On-time database lock
- Faster artifact creation

Regulatory intel and submission excellence

Role of AI: Identify regulatory requirements across geographies, generate drafts of dossiers, and understand competitor regulatory strategy

Value levers
- Higher regulatory success

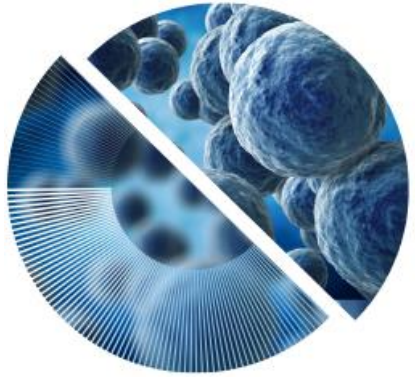
Participant experiences

Role of AI: Enhancing participant experiences with strategic nudges to revolutionise recruitment and retention strategies

Value levers
- Reduced dropout rate
- Faster recruitment
- Lower terminations for insufficient recruitment

Realising value requires governance to monitor investment and risk, addressing resistance and scepticisms and frequent demonstrations of value

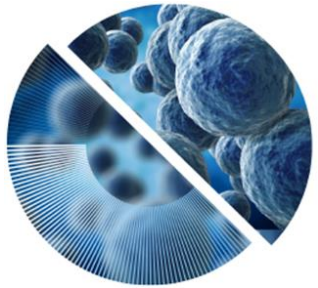
Interdependent innovations in science and technology are reshaping treatment paradigms



In 2030, technological and scientific innovations play off each other transforming healthcare delivery. The integration of quantum computing, AI, and diverse health data sources from MedTech devices, wearables, and genomics, enables precise diagnostics and the development of life-extending therapies. Real-time population health profiles, ethically constructed from these data, facilitate the identification of disease drivers and the creation of advanced, personalised treatments, building on earlier breakthroughs in gene therapies and immunotherapy. These advancements, along with innovations in pharmacogenomics, nanotechnology, and implantable devices, have significantly increased survival rates for some diseases.

The world in 2030

- **Rapid genomic data analyses:** Enable accurate diagnoses, personalised treatment plans, and enhanced survival rates, contributing to improved population health outcomes.
- **Multi-omics and microbiome therapies:** Technologies like proteomics and metabolomics, alongside microbiome-based therapies, provide a deeper understanding of human biology and offer innovative treatment options for various diseases.
- **Precise, targeted therapies and diagnostics:** Developments in vaccine technology, drug delivery systems, and liquid biopsy assays allow for more precise diagnoses and more targeted and cost-efficient healthcare interventions.
- **Neurotechnology and personalised mental health:** Quantum computing, brain-computer interfaces, and customised mental health treatment plans based on genetics and biomarkers are revolutionising neurological and psychological care.



Enabling more precise, predictive and personalised diagnostics and treatments that deliver better health outcomes

Enabled by

- Collaborations between staff skilled in clinical pharmacology, computational biology, regulatory compliance, multi-omics and AI-driven treatments
- Outcomes-based funding models that incentivise innovation and equitable access to healthcare.
- Regulatory bodies that balance innovation with consumer protection, incorporating RWE into decision-making.
- Robust cybersecurity measures that ensure data integrity and patient privacy.

Accelerated by GenAI

- Analysing diverse datasets to provide deeper insights to revolutionise healthcare delivery.
- Enabling personalised treatment plans by integrating polygenic risk scores with behavioural insights.
- Accelerating the discovery of new treatments, optimising dosages, and predicting adverse reactions.
- Enhancing medical imaging analysis and automating radiology reporting.

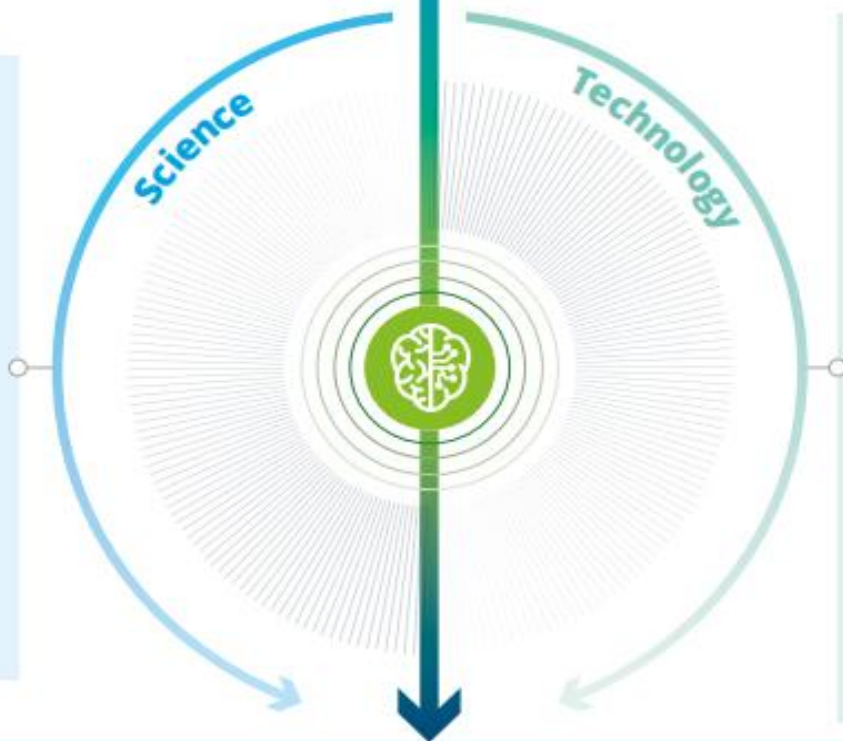
The number and adoption of GLP-1 drugs celebrated for their effectiveness in weight loss and diabetes management has risen exponentially, with the market estimated to reach US$157bn by 2030 (a CAGR of 17.5%, by 2035 24mn people in the US (7% of the population) will be using GLP-1 drugs. Emerging evidence supporting their efficacy in treating other conditions, such as Alzheimer's disease and cardiovascular issue.

mRNA technology was first approved for COVID-19 vaccines in 2021, by March 2024 there were more than 1,000 mRNA drugs in the pipeline, with 33 in phase III trials. A personalised mRNA immunotherapy vaccine for melanoma has entered a phase III clinical trial in the UK, aimed at preventing the recurrence of cancer after removal of the tumour. The phase II trial showed a 49% reduction in the risk of recurrence or death after three years, compared with the standard treatment.

The interdependent innovations in science and technology that are poised to transform the future of health in 2030

Innovations in science

- Next-gen vaccines for cancers/mosquito borne viruses etc
- Microbiome-based therapies
- Next-gen immunotherapy treatments
- Liquid biopsies
- Nanomaterials
- Targeted cell therapies
- Multi-omics
- mRNA vaccines
- Gene editing/CRISPR
- Cell and gene therapies
- Radiopharmaceuticals home infusion therapy
- Psychedelics for pain management



Innovations in technology

- Brain-computer interface, deep brain stimulation and neuroprosthetics
- Next-gen platforms
- Quantum computing
- Advanced 3D biomanufacturing
- Computational chemistry and biology
- Next-gen data accessibility
- Advanced nano and micro technology and nanorobots
- Extended reality
- Next-gen connectivity
- Advanced robotics
- Multi-omics technologies
- Internet of Medical Things
- Portable AI-enabled imaging and in-vitro diagnostics

The effective adoption of these innovations is contingent on the implementation of end-to-end digital transformation, and will be accelerated by AI and GenAI tools

8. End-to-end transformation of pharma’s commercial activities

Pharma's commercial operations have undergone a complete digital transformation, leveraging AI and data cloud providers, and customer relationship management (CRM) providers to streamline processes and shift from a product-centric to a customer-centric approach. This has led to personalised marketing and support, improved customer experiences, and reduced costs. Pharma companies are also adopting innovative pricing models, outsourcing non-core functions, and prioritising AI-powered pharmacovigilance and patient support programmes to ensure medication safety, equitable access, and better health outcomes.

The world in 2030

- **360-degree customer view:** Pharma companies are using AI to create a holistic view of their customers, integrating internal and external data to develop a deep understanding of buyer needs and behaviours for targeted engagement.
- **Data-driven stakeholder engagement:** AI-powered CRMs and real-world data (RWD) enable early and effective communication with stakeholders, demonstrating product value, improving launch while optimising commercialisation strategies.
- **Personalised omnichannel experiences:** Companies leverage data to segment markets effectively and use dedicated customer relationship teams to deliver tailored omnichannel campaigns, ensuring messages resonate with individual stakeholder needs and accelerating time-to-value.
- **Patient-centric approach:** Marketing technologies and budgets are shifting towards prioritising the patient experience, with dedicated teams using RWD to understand patient needs and deliver superior support through various touchpoints.

Customer-centric, platform-based, commercial models have enhanced productivity and the customer experience

Enabled by

Adoption of advanced analytical, cognitive, digital and AI skills, across all functions. Data scientists and software engineers design high quality PSPs. Leaders foster an agile and entrepreneurial culture.

Companies adopting data-driven incentive structures, advanced CRM systems, and a shift towards value-based pricing models.

Companies balancing innovation with regulatory compliance with robust data privacy measures and proactive risk management.

Cutting–edge data analytics, ML and cloud-based platforms harness customer data to derive deep consumer insights; FAIR data mgt practices; connectivity and interoperability secure data exchange.

Accelerated by GenAI

Analysing patient data to tailor marketing messages, create engaging content, and optimise ad spending .

Facilitating more successful product launches by analysing market trends and predicting demand.

Identifying potential drug safety signals faster, enabling proactive risk management and improving pharmacovigilance efforts.

Personalising patient support programmes, leading to better adherence and health outcomes and identifying individuals at higher risk of experiencing adverse events.

A top-10 biopharma company unlocked 14% higher sales in just 9 months by activating next best action (NBA) programmes and partnering with Aktana to bridge the gap between strategy and execution

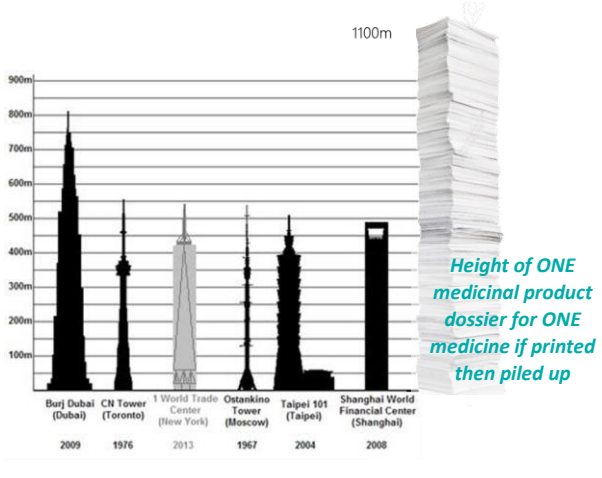
In October 2024, Boehringer Ingelheim reached a significant milestone in its journey towards transforming Boehringer's Patient Engagement Capability by successfully implementing and deploying its Patient Identity Management function, improving the security of patient's identifiable data.

The 'string-of-pearls' approach to commercial strings together multiple use-cases to transform the entire process

Insights from client facing work on data management

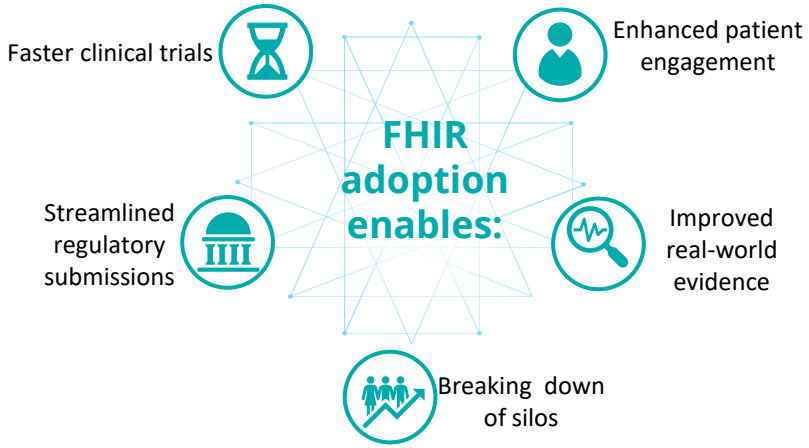
The industry challenge: Unlocking value from unstructured data

The pharma industry heavily relies on unstructured data

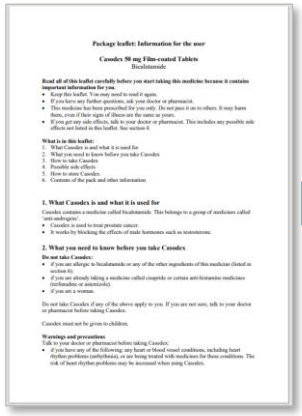


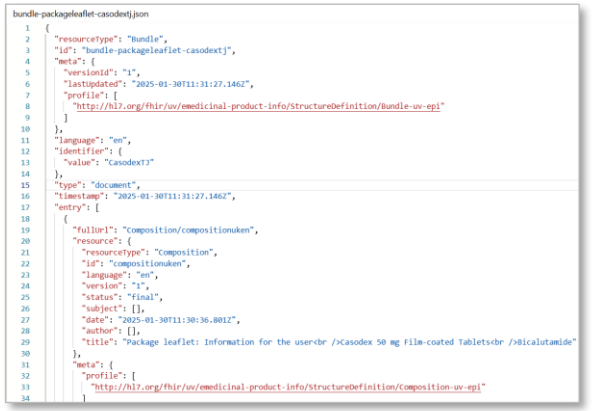
Height of ONE medicinal product dossier for ONE medicine if printed then piled up

Adopting FHIR (Fast Healthcare Interoperability Resources) standards will improve data flow and unlock insights



But, existing approaches to convert documents to FHIR format is arduous, and costly





Inaccessibility hinders innovation, efficiency, and decision-making

$500k-$1m+

Daily cost of delays in drug development and approvals

HL7® FHIR®

- ***Globally adopted standard***
- ***Only global standard for Electronic health records***
- ***Regulatory bodies are increasingly adopting FHIR***

To translate one page of a pharma document, 2000-3000 lines of code, taking 10-20 hours of manual work, are required. For a typical pharma company:

15,000 ***patient information leaflets***

>500,000 ***hours to migrate***

20 to 40 ***dossiers per year for the EMA/FDA***

> 1 billion hours ***per year to migrate manually***

How to accelerate the journey to structured, FIHR data

An engine to automate conversion and validation of unstructured content into structured FHIR format using agentic artificial intelligence:

Reduces conversion time from days or weeks to minutes, enabling faster submissions, improved patient safety, unlocking real-world evidence and unlocking significant cost savings

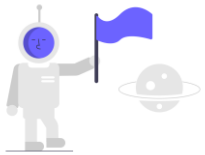
Uses an agentic approach where multiple AI agents perform different roles (FHIR standards, conversions, external validators, QA) with full logging of all agent activities, decisions and reasoning

Leverages GenAI precision to **minimise errors** and provide automated importing and validation of reference values against external data sets

Includes **automated translations** and the **ability to back-convert from FHIR to pdf or HTML** for 'human in the loop' review

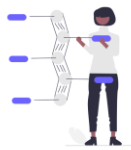
Flexible deployment options can **scale to meet both volume demands and regulatory changes**

Deloitte's proof of concept has successfully assessed the ability and performance of the FHIR Engine:



Achievements

- Demonstrated the FHIR Engine's ability to **rapidly and accurately convert** PDF patient information leaflets to FHIR format



Key results

- Reduction in conversion time from a **manual 5-40 hours** to a **fully automated 5-12 minutes**
- Potential to **save ~$10m in initial conversion costs** to convert from patient information leaflet to electronic product information

Next steps

- **Deploy the FHIR Engine in a live environment** for patient information leaflet conversions and explore expansion to other regulatory document types

Actions for Clinical Data Managers and R&D leaders

Do you understand the legal and compliance requirements needed to protect the increasing volume of R&D data?

Do you have a clear understanding of the completeness, accuracy and potential bias in historical trial data?

Have you developed a robust and sustainable AI strategy for R&D?

Do you have a strategy for developing the future workforce to leverage AI in clinical development?

What are the main cost drivers of your clinical trial process? Where could AI have the most impact?

How are you adapting your M&A strategy?.

Have you established effective strategies for engaging with regulators? Is the regulatory function seen as a strategic asset?

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