





LE NUOVE TECNOLOGIE PER IL PHARMA 4.0: COME AI, IOT, BLOCKCHAIN POSSONO AIUTARE LE AZIENDE AD INNOVARE PROCESSI E PRODOTTI

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New forces are challenging the future of Life Science company competitiveness

It is time for a paradigm shift

The MGI Industry Digitisation Index for Europe

2015 or latest available data



New regulatory requirements (Serialization, IDMP, EU GDP)



Structured and unstructured **data explosion** (RWD, Pharma IoT/I4.0)



New **business models** (shift toward high value but lower volume products)



Shift from Quality by Inspection to Quality by Design



New **supply chain** requirements (flexibility, responsiveness, transparency)



Holistic Lifecycle Management (knowledge, products & processes)



New ecosystem and value network requirements



2 FU-28



Relatively low digitisation Relatively high digitisation

 Digital disruptors within relatively less-digitized sectors Usage Labou Assets Share of Share of value employ ment, 2015² Overal habbe digiti-2013¹ sation 2.7 4.5 1.2 1.1 5.4 3.0 6.3 6.0 6.5 5.3 4.4 4.2 2.3 1.9 2 2.3 1.0 0.1 0.2 7.8 8 1 0.8 0.4 • 12.1 1.0 5.0 5.2 4.4 8.8 3 6.3 7.8 5 7.1 6.5 5.3 7.7 • 74 11.1 1.7 13

Knowledge-intensive sectors that are highly digitised across most dimensions

Capital-intensive sectors with the potential to urther digitise their physical assets

Service sectors with long tail of small firms aving room to digitise customer transactions

B2B sectors with the potential to digitise their customer interactions

3.0

1.7

5.3

47

4.2

6.8



Labour-intensive sectors with the potential to provide digital tools to their workforce



Highly localised and fragmented sectors that lag across most dimensions

1 Value added as proxy for GDP; 15 countries used as proxy by EU-28

NOTE: The level of sector digitisation measures digital assets, usage, and labour by sector, It does not refer to the intensity of digital competitive threat in

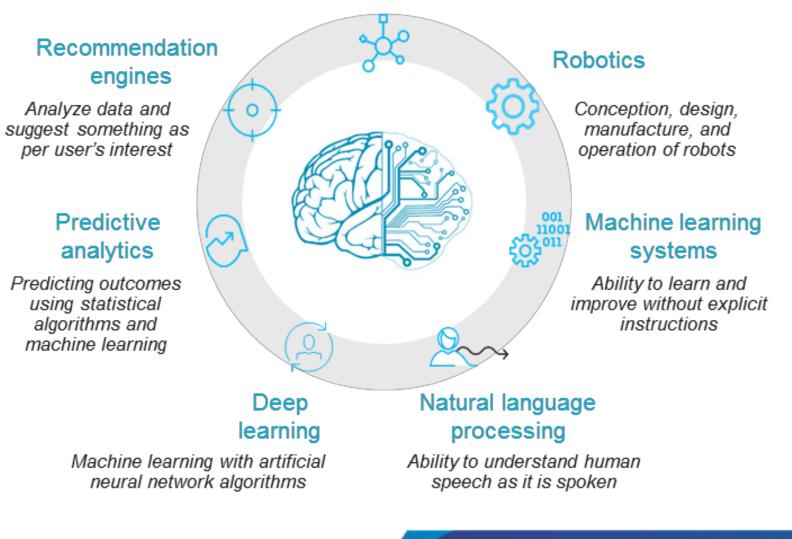
SOURCE: EU Klems: Eurostat: OECD: McKinsey Global Institute analysi

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Digital technologies have become a source for creating new value in Life Sciences

Artificial intelligence

Simulation of human intelligence processes



Business Value

New digital technologies can enable value for the whole ecosystem by:

- Generating **new insights** from knowledge and data
- Increasing efficiency and value to stakeholders > Ensuring better **compliance and risk** >
- management
- Improving customer engagement and value to > healthcare system
- Enabling new services and business models >



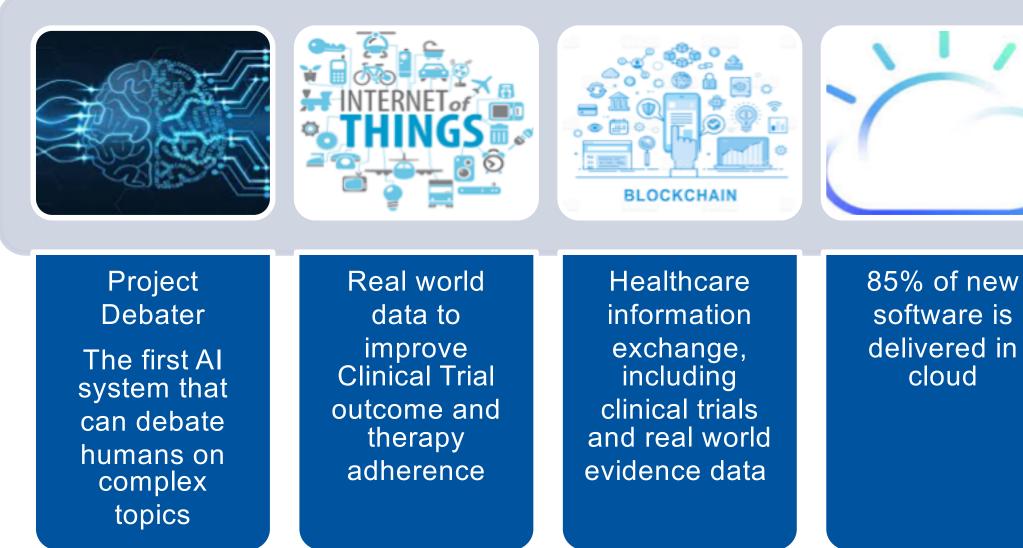
Connecting

Pharmaceutical





Innovation into Life Science companies can be accelerated by technology pillars that are transforming many industries





Pharmaceutical

Knowledge

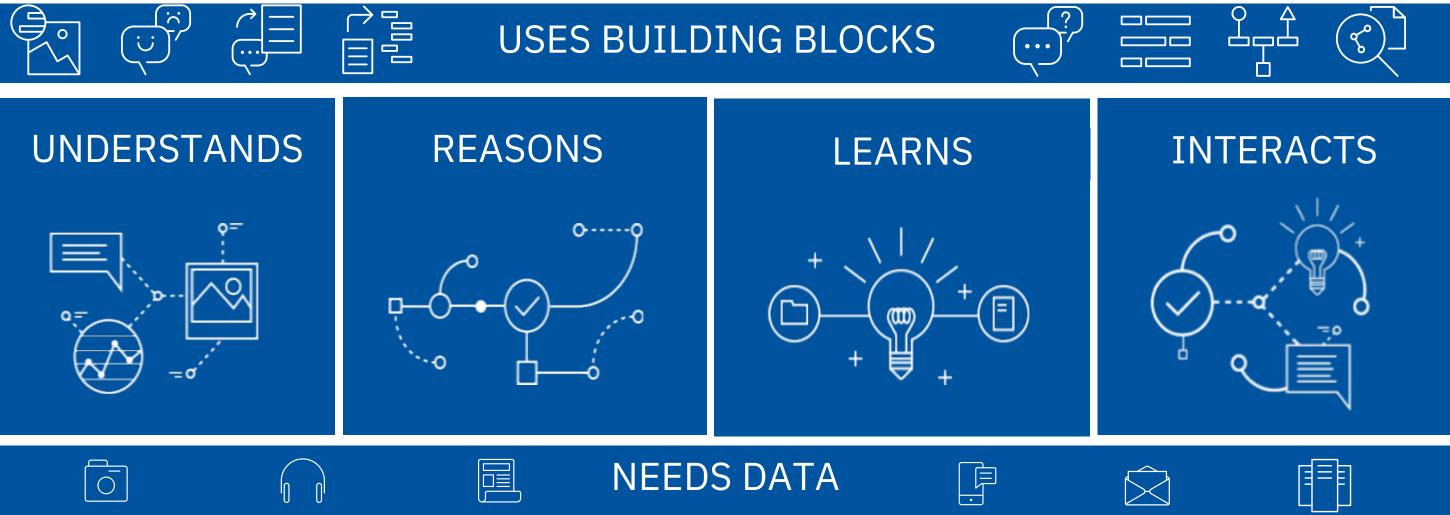


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SOME CONCRETE EXAMPLES



IBM solutions are amplified by the power of Cognitive Computing





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Watson for Drug Discovery is helping Barrow Neurological Institute identify new genes potentially responsible for amyotrophic lateral sclerosis (ALS)

Watson for Drug Discovery (WDD) investigated whether:

- Unknown RNA binding proteins are involved in ALS
- Unknown prion-like proteins are linked to ALS



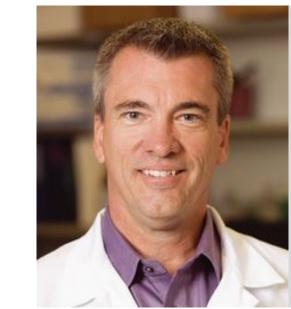
RAPID EXPLORATION: Within months, using predictive modeling, rank ordered 1,500 RNA binding proteins for their association to ALS



VALIDATED PREDICTIONS: Barrow examined Watson's top evidence-based predictions & found 8 of the top 10 ranked proteins were linked to the disease



NEW DISCOVERY: Uncovered 5 never before linked proteins altered in patients with ALS







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Knowledge

"By using Watson for Drug Discovery we can make scientific breakthroughs in a fraction of time and cost, increasing our knowledge of diseases faster than ever before."

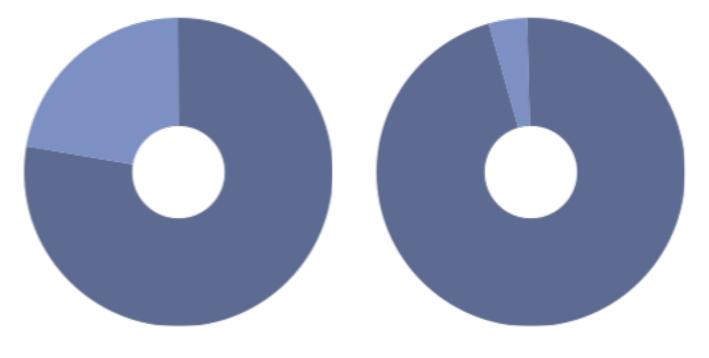




Cognitive technology optimizes screening and matching for clinical trials in a community cancer practice

During a 16-week trial period, data from 2,620 visits by lung and breast care patients were processed in the **Clinical Trial Matching (CTM)** system

Watson for Clinical Trial Matching successfully demonstrated the ability to expedite patient screening for clinical trial eligibility, reducing processing time from 1 hour and 50 minutes to 24 minutes



78% Reduced pre-screening wait time

2017 ASCO Annual Meeting. Cognitive technology addressing optimal cancer clinical trial matching and protocol feasibility in a community cancer practice. DOI: 10.1200/JCO.2017.35.15_suppl.6501 Journal of Clinical Oncology 35, no. 15_suppl (May 2017) 6501-6501. Accessed at: http://ascopubs.org/doi/abs/10.1200/ICO.2017.35.15_suppl.6501#affiliationsContainer



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Knowledge



94%

Omitted 94% of non-matching patients automatically

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IBM Watson IoT for Manufacturing drive cost savings and operational efficiency across the factory value chain

Intelligent assets and equipment

Intelligent assets and equipment utilizes IoT and cognitive capabilities to sense, communicate and self-diagnose issues so they can optimize their performance and reduce unnecessary downtime

Primary Use Case

Asset Performance Management

Business Metric

Reliability, Downtime

Cognitive processes and operations

Cognitive operations and processes bring more certainty to business by analyzing a variety of information from workflows, context and environment to drive quality, enhance operations and decisionmaking.

Utilize IoT and cognitive insight to optimize resources (worker, energy, expertise) using geolocation data, individual data, usage data and environmental conditions along with analytics.

Primary Use Case Manufacturing Performance & Quality

> **Business Metric** Yield, Productivity

Primary Use Case Resource Optimization





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Smarter resource and optimization

Business Metric Safety, Cost



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L'Oréal's Industry 4.0 program augments machines, operators and facilities

The leading FMCG manufacture partners with IBM to implement a connected manufacturing platform in 40 sites globally

Business problem

The maintain world-class manufacturing status, L'Oreal needs to capture, analyze and derive insights from instrumentation and sensors in its production facilities

Lack of such insights was reducing overall operational excellence, productivity and throughput, as well as increasing labour and working capital costs

Solution

IBM will use Watson IoT for Manufacturing platform to build a predictive maintenance solution that enables visualization of production lines for detection of short term events, predictive Analytics on OEE and speed of machines and real time monitoring of operator health and safety









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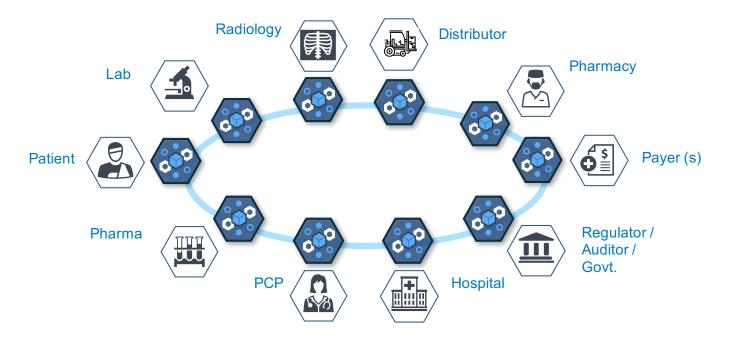
Blockchain enables trusted, secure business networks, across multiple partners with diverse solutions

Blockchain Benefits

- Provenance All consent, data access and updates can be traced back to origin
- > Accountability Immutable BC records keep parties accountable
- > Transparency Regulators can monitor activities and detect abusive practices
- > Security Unlike traditional systems, Blockchain security is a core design
- > Privacy Only authorized parties can see health data they are permissioned to see

Shared Ledger

Append-only distributed system of record shared across business network. Single source of truth (and trust), and record depository of digital assets.



Privacy & Security

Ensuring transactions are secure, authenticated & verifiable. Tamper proof, permission controlled, auditable identity and ownership.



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Smart Contracts

Business terms embedded in transaction database & executed with transactions, referred to as Chaincode.

Consensus

All parties agree to network verified transaction (modular protocol). Permissioned networks.

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Example Blockchain use cases in Healthcare and Life Sciences



Patient Consent and Health Data Exchange

- Patient control of his health data >
- Secure medical data exchange including EMR, genomics, image, exogenous >
- Blockchain ensures consent, compliance, auditability, provenance, governance >



Clinical Trial Management

- Clinical trials data exchange automation with auditability, provenance, traceability >
- Use blockchain for regulatory processes, oversight, fraud detection >
- Traceability of protocol design elements to data collection >

Drug Supply Chain Provenance and traceability

- Motivated by patient safety, counterfeit fraud, drug traceability, brand protection >
- FDA and EMA regulations, e.g. FDA DOSA >

Outcome-based Care

- Contract between Payer and Provider or Pharma for outcome based payment in BC >
- Contract, data and computation of outcomes in SmartContracts >
- Outcomes accessible by authorized participants >
- Blockchain provides trust among parties on outcomes with provenance and auditability >



News room > News releases **IBM Watson Health Announces Collaboration** to Study the Use of Blockchain Technology for Secure Exchange of Healthcare Data

The joint initiative with the FDA is aimed at leveraging blockchain technology to improve public health.



Knowledge





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Watson Platform for Health (GxP) represents one of the vertical implantation of IBM Cloud service for Life Science

Watson Platform for Health provides a foundational building block – essential to glean insights from big health data.

Watson Platform for Health enables Life Sciences companies to...



Develop applications that use the Health Data Platform

Collect health data from mobile applications or devices

Govern how data can be used by helping to mask identities and track usage consent

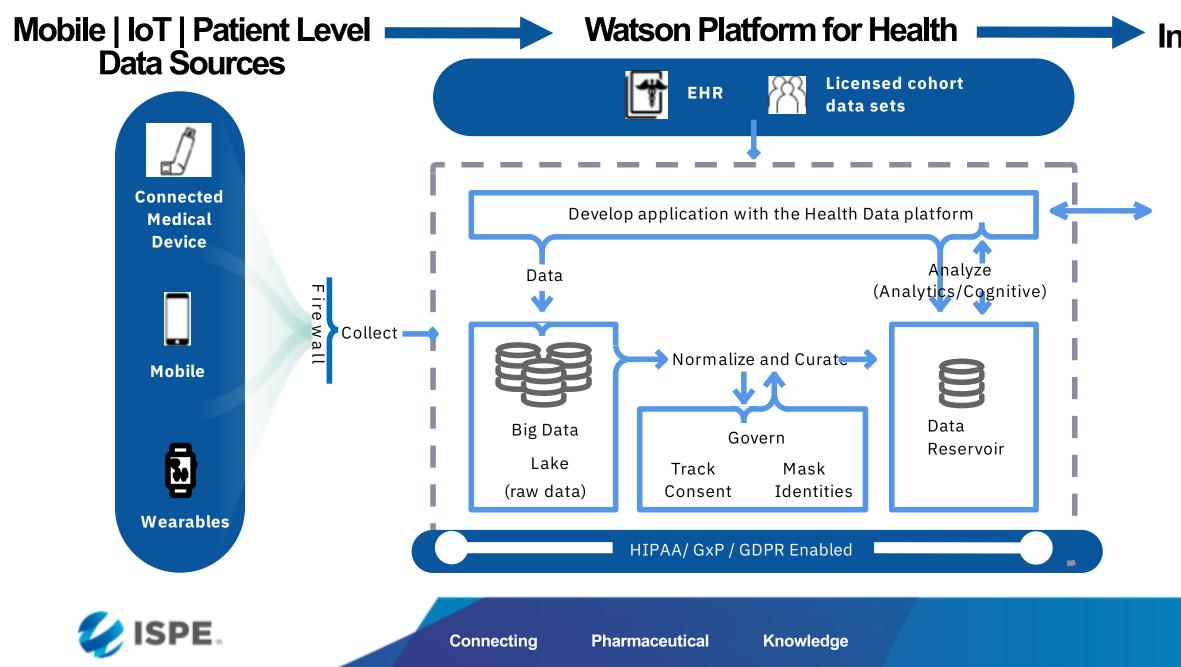
Normalize and Curate data into standardized models ready for analytics

Adhere more readily to industry security, privacy, and regulatory controls (HIPAA, GxP, GDPR)





Watson Platform for Health enables companies to build innovative solutions using insights from big health data



Insights and Analytics

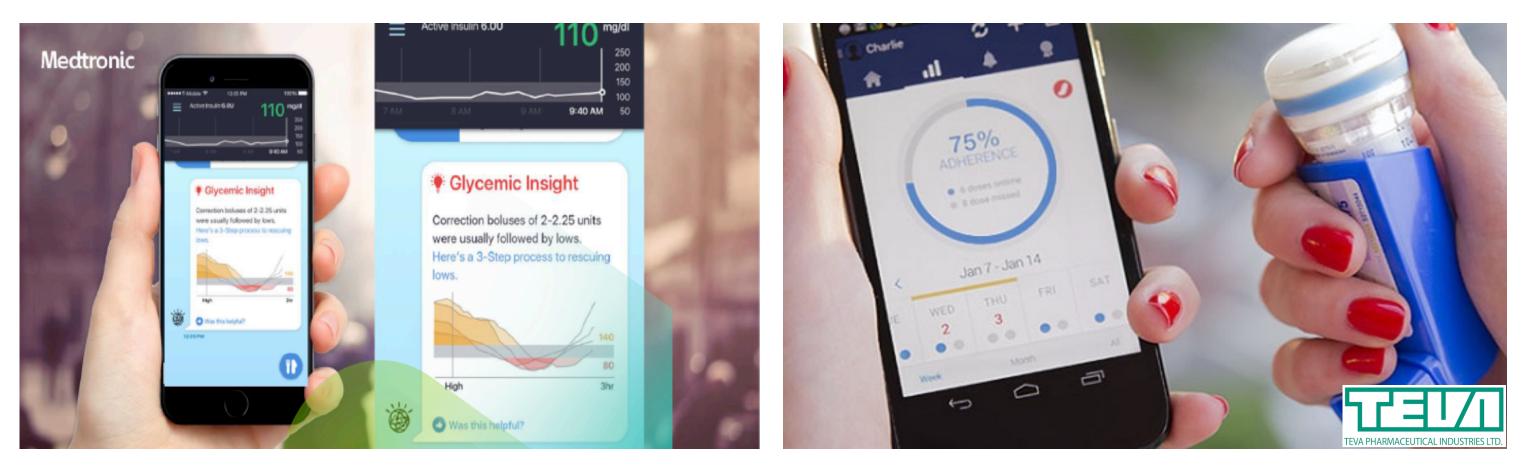
Data Scientists

Deliver innovative insights and recommendations





Deploying AI + Cloud + IoT in the same solution can help Life Science companies to develop innovation and breakthrough services

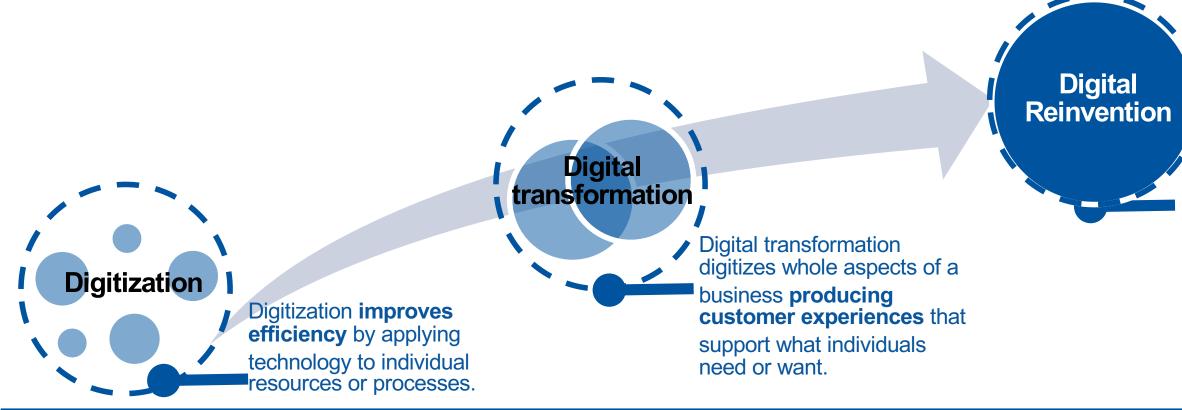




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To excel in this scenario Life Sciences firms need holistic reinvention based on the principles of Digital Reinvention



Digitization in LS organizations involves implementing technologies with the aim of making better decisions and establishing more efficient processes. For e.g. digitizing clinical test records and activities

Digital transformation in LS organizations involves leveraging digital technologies to transform legacy business models and business processes. For e.g. building analytics capabilities to deliver new services or insights

positive health outcomes and customer



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Digital Reinvention incorporates digital technologies like never before to create revenues and results via innovative strategies, products and experiences.

Digital Reinvention in LS mean reshaping the entire framework of an organization by placing experiences at the core of the firm. For e.g.

attracting, engaging, and delighting consumers by building non-traditional capabilities embedded in new ecosystems based operating models



THANK YOU FOR YOUR ATTENTION

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