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All we know is still infinitely less than all that remains unknown.

So said 17th century English physician William Harvey who was the first to describe accurately how the heart pumped blood around the human body. Centuries later, physicians know everything about human anatomy, healthcare has improved immensely and pharmaceutical companies are rolling out medicine by the hour.

Information about patient records, clinical trials and drug efficacy is constantly growing and so is the need to have a clear picture of all the data that helps doctors and healthcare organizations make the best decisions in their efforts to improve patients' health. Here come the principles of Linked Data to provide solutions for smooth data integration from most disparate sources, knowledge discovery out of existing facts and the use of the newly-acquired insights to predict trends.

Why Linked Data?

Linked Data solutions in healthcare break down the barriers of information silos and give an all-around, more comprehensive view of patients' and research data. It integrates medical, hospital and ambulance records with information about drug development and advancement from regulatory bodies as well as from vocabularies of chemistry compounds or known side effects.

Linked Data and big data analytics pave the way for highly-detailed data-backed diagnostics and treatment plans as well as predictive models on possible outbreaks or vulnerability of groups of people to certain diseases.

How Do Linked Data Solutions in Healthcare Work?

Linked Data and Semantic Technology enable physicians, health providers, health insurers and pharma groups to find documents from various sources more easily and integrate data without confusion. Share on X

Semantically-enriched Linked Data solutions in healthcare also help organizations discover more relevant content and generate new knowledge with mappings to Linked Data on biology, genomes, compounds, regulatory approvals, etc.

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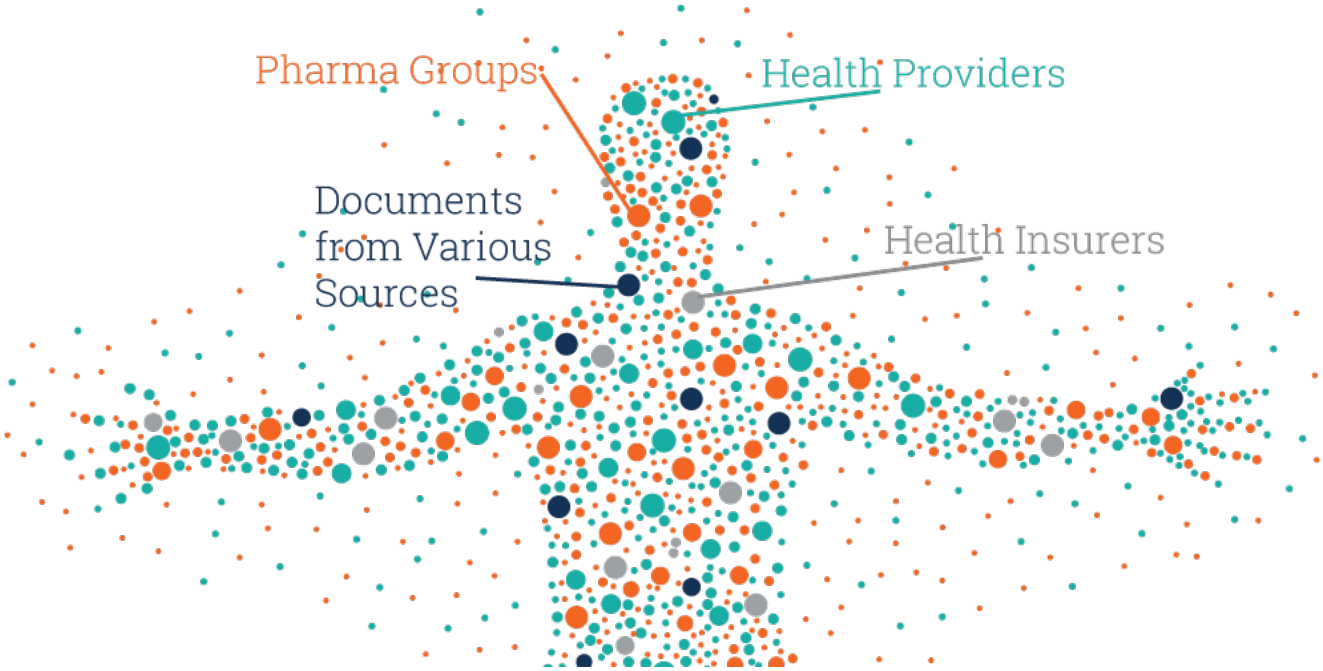
Semantic Technology, namely the semantic graph database (also know as an RDF triplestore), stores information in a Knowledge Graph-based structure in the form of a 'subject-predicate-object' relationship.

For example, in a graph database integrating patient records, the statement 'Patient has a symptom cough' consists of the subject 'patient' and the object 'cough', while the predicate 'has symptom' shows the relationship between the subject and the object. Such a database is able to link patient data with medical terminology databases like SNOMED.



Use Cases for Linked Data Solutions in Healthcare and Life Sciences

Although Linked Data and Semantic Technology are relatively new fields, especially as compared to patient care or medicine, many government bodies and research centers have seen the benefits of publishing and using linked data to improve people's health.

Various agencies have provided linked datasets of information, which researchers use to predict trends and draw scientific conclusions from, on the basis of previous records from

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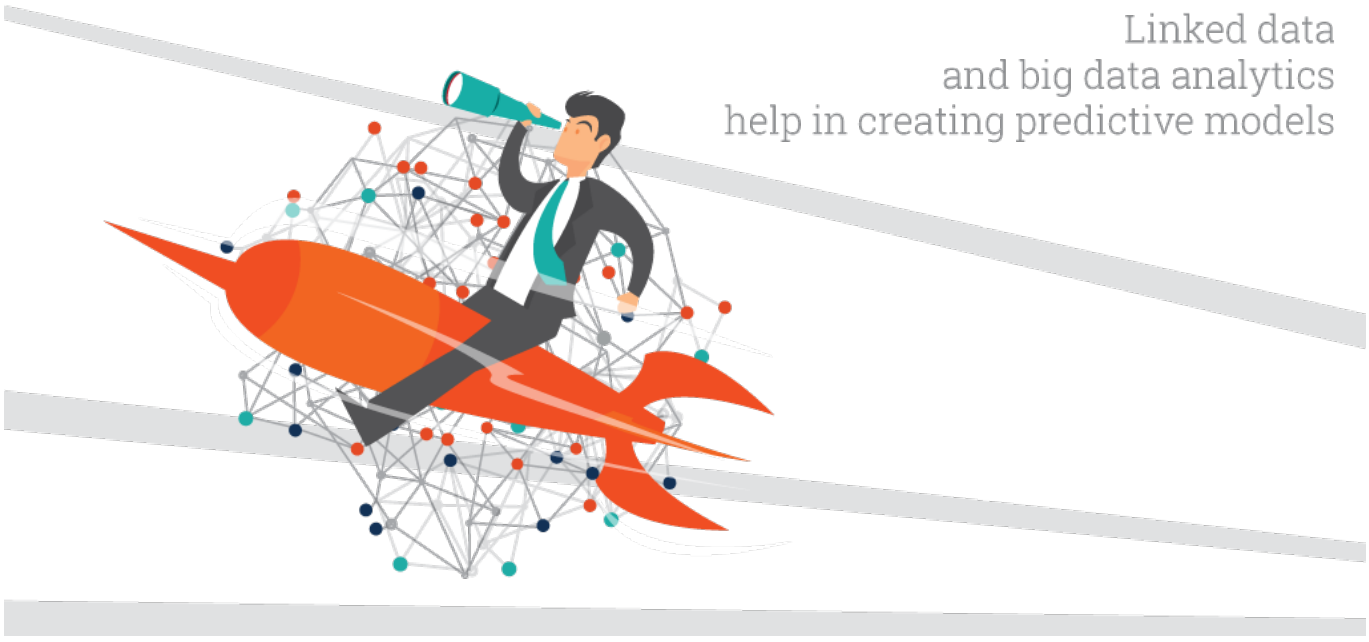
many disparate sources.

For instance, The University of Texas Medical Branch at Galveston recently said that according to a new study, older men using testosterone therapy were less likely to have complications that require them to go back to the hospital within a month of being discharged than men not using this therapy. The study analyzed nationally representative Medicare Linked Data.

As early as in 2012, Dr. Khaled El Emam and his team at The Children's Hospital of Eastern Ontario (CHEO) Research Institute have developed a secure protocol to link data from multiple sources in order to monitor the effectiveness of the HPV vaccine in Canada. The team developed the protocol to allow the linking of individual patient records without revealing personal information.

Pharma giants as AstraZeneca have a long history in providing Linked Data solutions in healthcare. One of the areas is early testing of hypotheses. They have developed a platform for Interactive Relationship Discovery, which allows the identification of long causal relationship chains between the biomedical objects in the Linked Life Data cloud.



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Linked Data & Big Data in Predicting Epidemics

Linked Data, combined with big data analytics, has also helped create predictive models on how epidemics might spread around the world.

HealthMap

The website HealthMap launched in 2006 by a team of researchers, epidemiologists and software developers at Boston Children's Hospital, uses freely available information from disparate data sources, including online news aggregators, eyewitness reports, expert-curated discussions and validated official reports.

In the 2014 Ebola outbreak in Africa, a local news report of a "strange disease" in Guinea had alerted Healthmap of the new Ebola outbreak nine days before the World Health Organization (WHO) said there was one. The emergency is now declared officially over, but between 2014 and early 2016, a total of 28,616 Ebola cases were reported in Guinea, Liberia and Sierra Leone, with 11,310 deaths.

The Zika Virus

Unfortunately, there's always some disease outbreak somewhere. In recent months, the Zika virus has taken center stage in the news. Infectious disease specialist and founder of the company Bluedot, Dr. Kamran Khan and his team have built a map to predict how the Zika virus might spread, using data about population, travel statistics, temperature patterns and the types of mosquitoes in various areas.

Researchers at the Biocomplexity Institute of Virginia Tech are developing a simulation system to forecast the global transmission of Zika. The system uses data on people's movements in and out of regions to predict where the virus is likely to spread.

Dr. Bryan Lewis, Research Assistant Professor and Computational Epidemiologist, said that the team faced challenges in creating the simulation platform. However, they were lucky to find open-source data on estimating human mobility, Dr. Lewis says, hoping the model would be of use to researchers and global health organizations.

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Linked Data Takeaways

As scientists create predictive models, the pharmaceutical companies are actively researching vaccines and new compounds to fight various diseases. Linked Data from chemical and financial records help the pharma groups identify business opportunities for a potential compound or drug.

In addition, linking data about consumer buying trends and prescription drugs and their compounds reveals more chemical knowledge and insights about spending habits.

Meanwhile, disparate data from most divergent sources will no doubt continue to pile up. Using Linked Data solutions in healthcare is an opportunity to extract meaning and make sense out of all those medical and healthcare-related datasets in search of improving our lives and global health.

Learn how to get an all-round comprehensive view of patients' and research data!

Book a Discovery Call

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