

## Case Study

**INDUSTRY**

Healthcare

**USE CASE**

Knowledge Graph

**GOAL**

Improve the quality of life of people with chronic pain

**CHALLENGE**

Collating and analyzing data in different formats from different source systems

**SOLUTION**

Create a knowledge graph based solution to support patients and healthcare professionals

**RESULTS**

- Empower patients with awareness and strategies to improve their quality of life
- Advise healthcare professionals about the most effective treatment for a given patient

**Dooloo**

## E-Health Company Creates Knowledge Graph Solution to Help Patients with Chronic Pain

*Dooloo sought to create a platform that helps people with chronic pain but faced incorporating vast amounts of heterogeneous data securely. A knowledge graph in Neo4j offers a rich structure to surface insights that empower patients and healthcare professionals alike.*

### The Company

[Dooloo](#) is an e-health company that offers the first online platform dedicated to helping people who live with chronic pain.

Patients are at the heart of the program. Dooloo focuses on strengthening patients' autonomy by enabling them to collaborate with healthcare providers and practitioners to improve their quality of life.

### The Challenge

Nearly one person in five suffers from chronic pain, a complex, multi-factorial, multi-dimensional disease whose symptoms are individual and subjective. Often disabling, it is also frequently associated with numerous comorbidities that worsen the prognosis and rule out overly standardized treatment.

Dooloo sought to create a platform that would feature available resources on chronic pain while also providing recommendations to patients based on their self-reported health and behavior. Such a platform would need to synthesize a vast amount of data, including all of a patient's medical records across providers and their prescription history as well as information on the latest treatments and their efficacy. Dooloo also added a key dimension that classical approaches focused on diseases and treatments often omit: patient behaviors.

Laurence Sergheraert, CEO and founder of Dooloo, put it this way: "Our challenge was to be able to take into account everything that happens in the patient's life to understand them better and to support them effectively in their journey, and also guide caregivers in their decisions."

Creating this platform required consolidating data from many different sources that came in an array of disparate formats.

At first, the team tried building a solution in a relational database. "We spent a lot of time arranging our data in two-dimensional tables, in an SQL database," said Laurence Sergheraert, "but we quickly realized the limits." Such platforms cannot flex to absorb dynamic data and answer new questions.

### The Solution

The team turned to an approach that is increasingly used in medical research: creating [knowledge graphs](#) that assemble and organize large quantities of data relevant for solving complex problems. Knowledge graphs support open-ended queries and are ripe for advanced analytics using AI and ML.

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–*Laurence Sergheraert*  
*Founder and CEO, Dooloo*

The Dooloo team heard about the [Neo4j Graph Data Platform](#) and began looking into it. “We were amazed by Neo4j’s ability to visualize the data we were storing and the relationships between the different data points,” said Laurence Sergheraert. “This would transform our own analyses and show patients and healthcare professionals the richness of the data and the kinds of queries we could make.”

Neo4j conducted an Innovation Lab with Dooloo that brought together patients, healthcare providers, subject matter experts, and technical staff to brainstorm the kinds of questions they would want to answer.

Through an iterative process, the team coordinated the various points of view of the participants and created a property graph model in Neo4j that enabled them to import the data and rapidly build a prototype.

The process highlights the ease of evolving the graph model to incorporate new data sources. Dooloo saw how quickly graph-based solutions can be created – critical to compete in e-health.

### The Results

With Neo4j, Dooloo has transformed its capacity to explore and integrate all types of data, providing valuable context for decision-making for patients and healthcare professionals alike.

Dooloo’s platform includes comprehensive, dynamic patient knowledge graphs that highlight all the events in a given period. The platform guides patients to the most effective educational modules and coping strategies given their unique history and set of circumstances.

“The knowledge graph also represents an important support for healthcare professionals in their diagnostic process and in defining the most efficient treatment strategy for the patient based on his or her condition and behaviors, whether it be pharmacological or non-drug treatment,” said Laurence Sergheraert.

The company is conducting trials with patients and caregivers. One trial focuses on fibromyalgia patients while another involves chronic pain patients with various conditions who are being treated with medullary neurostimulation, an effective non-drug therapy.

Dooloo plans to add a layer of AI to enable predictive and prescriptive analytics. For example, the team plans to use graph algorithms at scale to detect similarities between patients and offer refined personalized recommendations that promise even more impact.

“Indeed, helping patients to think, prioritize and raise awareness is good. It is even better if we can, by grouping and similarity, provide other patients like them with the benefit of their experience,” said Laurence Sergheraert. “Likewise, while it is interesting to identify the most efficient treatment strategies based on user profile, it is also interesting to predict which patients could benefit from these strategies.”

Through personalization that takes into account a patient’s full history, Dooloo is positioned to make an important difference by improving the lives of people impacted by chronic pain.

Neo4j is the leader in graph database technology. As the world’s most widely deployed graph database, we help global brands – including Comcast, NASA, UBS and Volvo Cars – to reveal and predict how people, processes and systems are interrelated. Using this relationships-first approach, applications built with Neo4j tackle connected data challenges such as analytics and artificial intelligence, fraud detection, real-time recommendations and knowledge graphs. Find out more at [neo4j.com](http://neo4j.com).

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