

Conserving Endangered Wildlife by Creating Digital Twins

Representing Big Animals as Digital Twins



A picture showing the probably biggest elephant on earth (figure from [Telegraph UK](#)).



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Introduction **Protecting Endangered Wildlife**

Wild animals are hunted illegally on a large scale, with millions of individual animals of thousands of species being killed or captured in their home areas worldwide. This poaching poses a growing threat to elephants, rhinos and other extraordinary species. Future generations should be allowed to enjoy this biodiversity and recognize the unshakable importance of wildlife for our well-being and environment.

Only a rigorous conservation effort can help to reduce poaching and protect wildlife habitats.

“Conserving endangered wildlife is an expensive, time consuming job, but new technology may make protecting animals, and catching the poachers who threaten them, easier,” Rachel Nuwer wrote on [BBC](#).

As an advocate of innovative IT solutions, we are committed to deliver innovative, state-of-the-art and secure software to our customers and partners. We tasked ourselves with the question, how we at Traversals can contribute with our knowledge, experience and possibilities. A first step is by connecting the various worlds together.

Digital Twins

According to [Abdulmotaleb El Saddik](#), digital twins are being redefined as digital replications of living as well as non-living entities that enable data to be seamlessly transmitted between the physical and virtual worlds. Digital twins facilitate the means to monitor, understand, and optimize the functions of all physical entities and for humans provide



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continuous feedback to improve the quality of life and well-being.

If you take a closer look at wildlife conservation programs like [Save the Elephants](#), you can see that a lot of time is spent cataloguing and tracking individuals of a species. Collected data is used to directly protect the individuals and to further explore them. Looking more closely at the definition of a digital twin, it becomes clear that the same terminology can be used to connect the animal world and its virtual representative.

It is often the small insights that lead to new solutions.

Traversals' Idea

We at Traversals don't have a solution yet. But we are excited to contribute our knowledge and expertise from more than 10 years of experience to support NGOs in their daily lives and make wildlife safer.

The Data Fusion Platform has been developed as a generic platform. The goal is to collect data from different sources and to bring them together to a common denominator. A variant of the Data Fusion Platform can be used to catalog digital twins, integrate their data and evaluate the data using artificial intelligence. There is no technical reason why what works well with machines can't work with living creatures.

The Data Fusion Platform can therefore be used to bring the latest AI-based innovations to nature conservation.



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Technical Overview

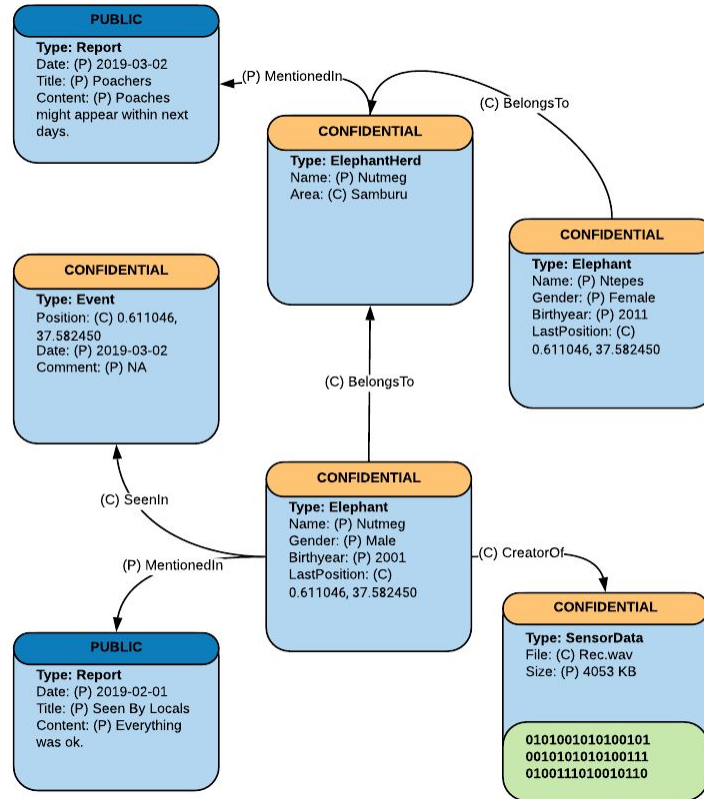
Enterprise Knowledge Graph to Store and Model Digital Twins

The Traversals Data Fusion Platform allows organizations to securely store relevant entity information such as creature details, HUMINT reports or even wildlife tracking systems in an easily searchable environment that is accessible to analysts, researchers and processing modules. In addition to the structured and unstructured entity information, the Enterprise Knowledge Graph also stores information about the relationships between entities, such as hierarchies or in that particular case, herd information.

All data stored in the system is categorized with configurable classification levels such as UNCLASSIFIED, SECRET or TOP SECRET. It guarantees confidentiality of the information. Through an attribute-based access control system, it can be guaranteed that users only see the information to which they have access. All queries and mutations executed by a user, are logged and available for security audits.



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Traversals Data Fusion Platform offers a flexible data model. The example shows information on elephants, their herds and reports linked to both.

The Enterprise Knowledge Graph can be used as a secure collaboration platform between wildlife conservators and researchers. A software development kit for user interface, data model and processing modules allows a continuous modification of the system even when it has been deployed to production.



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Automated Processing

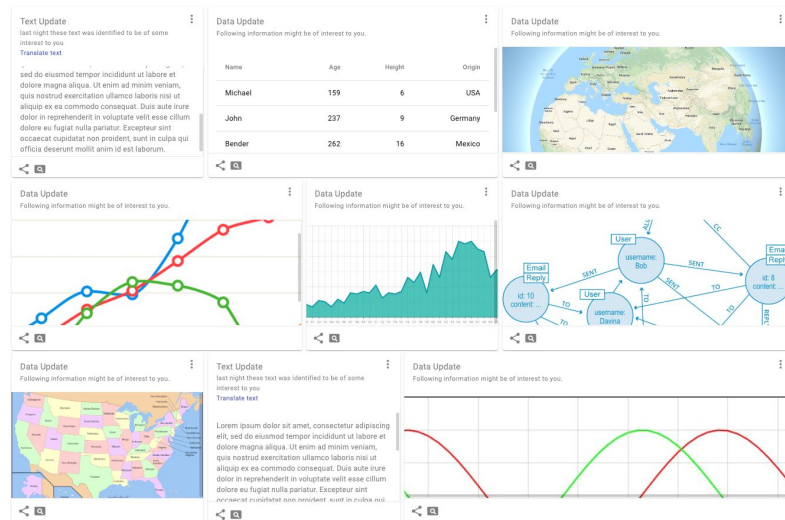
Processing modules can be implemented easily and efficiently using the DFP SDK. For example, it is possible to implement a geo fencing module with little effort, which triggers an alarm as soon as a creature approaches a certain area. Warnings are forwarded to the Notification Feed of the DFP solution.

Another module could use AI to analyze the track of a creature, e.g. to detect when it has left the herd, has not moved for a long time or no longer appears. Also in that case, the Notification Feed is the place where all warnings come together.

Research partners such as universities can use the DFP SDK to implement their own processing modules and to bring them into the production.

Notification Feeds

Notification feeds in the Data Fusion Platform give investigators a continuous picture of interesting results. Notifications contain information about the when, where, and what, and have a classification level derived from the information stored in the Enterprise Knowledge Graph.



Traversals Data Fusion Platform features notification feed which delivers the user a constant update of incoming information.

Agile Task Board

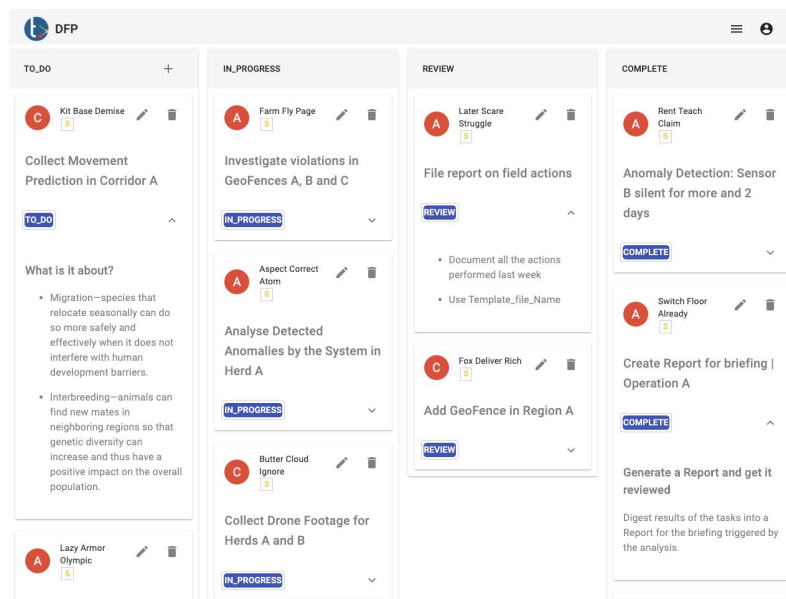
One insight from the cyber security environment is that the world of security is moving very fast and attackers are chasing organizations with sticky feet. Attackers do everything they can to not be recognized and to achieve their intended goal.

Poachers benefit from the problems nature conservationists face. To stay ahead of the poachers, the amount of information the conservationists must collect and collate is vast and difficult to be coordinated. Their intelligence operations trying to prevent harm to animals are often slower due to these problems. With Data Fusion Platform, they can conduct agile operations with up to date and enriched information and quickly coordinate actions to prevent and respond to threats vectors in a timely manner.



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The Data Fusion Platform has a multilingual Agile Task Board with classification levels such as UNCLASSIFIED, SECRET or TOP SECRET, known from the Enterprise Knowledge Graph. The multilingual Agile Task Board promotes collaboration, understanding of requirements, and team connectivity even if team members don't speak the same language.



In the Image above, we can see how we can use DFP for agile operation management. The tasks are organised by type and status. Each task can have classification assigned to control visibility of sensitive information. Data can be directly linked to the tasks to have persistent context about the task at hand.

Operational Overview

System Size

The Data Fusion Platform is horizontal scalable in all aspects. It can be deployed in the Cloud or be installed



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on-premise. On-premise entry-level systems can start with six CPU cores running on a Laptop and scale to multiple IT racks for mass data processing and high availability.

Constant and Secure Updates

Since the data world is constantly and quickly changing, it is necessary to keep monitoring systems permanently up to date. The Data Fusion Platform is part of Traversals' Secure Software Supply Chain which ensures that secure libraries without known vulnerabilities/threats are used.

Summary

Intention of this Concept Paper

As mentioned above, this concept paper is not intended to propose a ready-made solution. However, the current architecture and roadmap are inline with a quick solution as a first approach. The proposal should rather connect the different worlds and point out ways which protect our nature in order to preserve it for future generations.

The ideas in this paper would help to make processes more efficient and safer. The information generated would also be enriched with further valuable knowledge.

For us this article is a starting point. We will continue to develop the ideas and seek contact with NGOs.

We cannot donate money, but knowledge, experience and motivation.



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Make Data Speak Your Language

Traversals is an analysis and intelligence company based in Erlangen/Germany. It offers software products and related services for companies and authorities. Traversals plays a decisive role in making data understandable for people who are not data scientists.

For More Information

If you have questions or would like to discuss this data sheet, please contact us. As an advocate of innovative IT solutions, we are committed to keeping a dialogue open on technologies, processes and best practices that will help us to support our customers.

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