



MEET FABEL, THE ARCHAEOLOGY DOG

CANINES STILL TAKE THE LEAD WHEN IT COMES TO SNIFFING OUT INFORMATION. YET NOTHING BEATS CUTTING-EDGE MAPPING TECHNOLOGY FOR SORTING OUT DATA. WHY NOT FUSE THE BEST OF BOTH WORLDS, ASKS KATHERINE LEHMULLER

A combination of state-of-the-art technology and a dog's keen sense of smell was the idea that led archaeologists at a Swedish excavation site to attach a rugged data collector with GNSS accuracy to the back of the world's first licensed archaeology dog.

In 2010, the relatively unknown ring fort of Sandby Borg, located on the Swedish island of Öland, became the subject of an archaeological dig. Looting around the fort's walls prompted researchers to begin excavating this virtually untouched historical site, which dates to the fifth century.

Almost immediately valuable treasures were discovered. Such findings sparked the interest of archaeologists at Kalmar Läns Museum, Sweden: why were such items left behind? It was then that the excavation began in earnest, with little else known about what lay below.

The first three years of digging inside the 5,000m² walled-in fort containing 53 houses uncovered ancient human remains from 11 people, most of them violently killed. The more the researchers dug, the more bones were revealed and Sandby Borg began to present an immense challenge.

It became apparent that a violent attack took place at the prosperous fort roughly 1,500 years ago. Presumably all people living within its walls were killed. Residents were taken by surprise and struck down. Bodies were left abandoned where they fell and valuables from livestock to gold remained untouched to this day. Presumably, there could be hundreds of victims at the fort.

"This place is like a time capsule, offering a unique insight of how daily life might have looked like by the end of the fifth century AD," says Helena Victor, project manager of the Sandby Borg project.

So little time, so much to do

At Sandby Borg, hidden treasures remain buried just centimetres below the surface. The possibility of plundering and looting is a serious threat and important historical information about the largely unknown and turbulent times of Sweden's Migration Period could be lost forever.

Swedish excavation sites are not funded by the government unless the site is threatened by damaging undertakings, such as construction by a company or private builder. In the case of Sandby Borg, the museum had to come up with funds to support the dig, which it could do for only a few weeks' excavation each year, requiring researchers to plan time on the island wisely. But to tell the story of the people who lived and died at Sandby Borg, archaeologists had to know where to dig for remains before arriving at the site, to save valuable time and costs and ensure as little looting as possible.

For this purpose, archaeologist Sophie Vallulv brought Fabel, a detection dog, to Sandby Borg. Fabel has been trained to locate ancient human remains at archaeological excavations, and Sophie and Fabel had worked together on other digs with great success. Using Fabel to find remains helps researchers to plan their time at the excavation optimally and is also a cost-effective solution.



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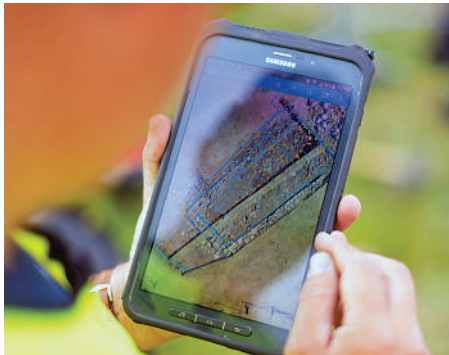
- when it has to be **right**



One of the first gold ornaments found, which led to the start of the Sandby Borg excavations



Fabel's findings help excavations move forward quickly and more accurately



Fabel's searches recorded using the Zeno 20 with ZenoCollector



Remains of one of the skeletons found by Fabel

When Sophie and Fabel worked together on previous digs, Fabel roamed the site looking for remains, while Sophie recorded and placed white flags on the areas to which the dog paid special attention. Afterwards, these positions were recorded and the data sent back to the office.

The size and number of ancient bones at Sandby Borg meant it quickly became clear that this method was too complicated and time-consuming. But a newly released, rugged data collector with GNSS precision was being used to document other parts of the site and this gave the archaeologists an idea.

Moving forward into the past

Before museum researchers acquired the data collector, they set goals to improve the museum's data management. Historical data management between excavations and museum offices had to be improved and simplified, and findings shared faster with the public. To accomplish these goals, a digital solution had to be found to transform and speed up workflows.

Previously, data was collected using smartphones or tablets running Esri's ArcGIS to collect and communicate data. However, people back in the office had to take the time to combine the data with survey-grade measurements because smartphones and tablets are simply not accurate enough to collect precision data. Unfortunately, professional data collectors could not run the Esri's ArcGIS app without a proper operating system on board.

When Leica Zeno 20, a new survey-grade GIS collector running Android, was released, the museum was immediately interested: the Zeno 20 could run Esri's Collector for ArcGIS app (a configuration known as ZenoCollector) to connect field crews and offices in real-time, and increase productivity by reducing the amount of work steps.

A dog's nose knows

To speed up the search for human remains on the site, Nicholas Nilsson and Fredrik Gunnarsson from Kalmar Läns Museum thought of a novel use for the Zeno 20 – attaching it to the dog and collecting his search data. They suggested building an improvised, snug-fitting harness for Fabel and adding a specially made plastic container for the Leica Zeno 20. The gear was made from a heavy-duty dog harness normally used for search and rescue animals, while the collector was securely attached with Velcro tape so it wouldn't fall out when Fabel ran back and forth.

This simple idea worked perfectly. "We tried it out in the field and it worked fantastically," says Sophie. "The harness is comfortable for Fabel and the device is perfect because it's so compact, lightweight and durable. This was a big consideration, since the heavier the device the dog carried, the quicker he would tire."

Sophie adds: "I thought about buying a regular hunting dog GPS device but the accuracy varied from 1-5m, which is extremely bad for documentation purposes. But the Leica Zeno 20 is capable of 1cm accuracy without an external antenna."

A story starts to take shape

Teams back on the mainland now receive highly accurate data quickly and easily. All Fabel's findings are tracked and digitally recorded. Communication of this data with the team on the island, as well as back at the museum on the mainland, is instant. Analysis can begin immediately, maps can be made, and data stored and updated. The public can use the project's website to follow not only Fabel's progress but also archaeologists' other finds. Sophie also easily knows where to send Fabel on his next search.

To date, Fabel has found the locations of 52 skeletal remains with the Leica Zeno 20 strapped to his back. This highly productive workflow saves the Kalmar Läns Museum an enormous amount of time and money. Archaeologists can plan their valuable excavation time far more efficiently, knowing where the bodies are located, and preparations can be effectively carried out.

THE HEAVIER THE DEVICE THE DOG CARRIED, THE QUICKER HE WOULD TIRE

Katherine Lehmueller is the former content editor for Leica Geosystems (<http://leica-geosystems.com>)

FOLLOW FABEL

You can see what Fabel is now up to by visiting the Sandby Borg project website at www.sandbyborg.se/en/home/



Fabel and Sophie at Sandby Borg, searching for remains using the Zeno 20