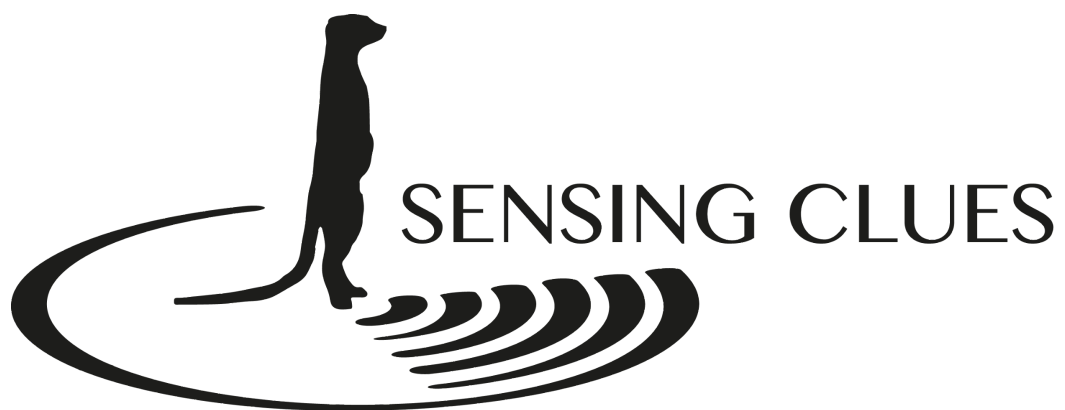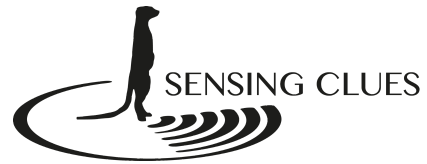# ANNUAL REPORT 2020

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SENSING CLUES

This Annual Report 2020 provides you with an overview of the Sensing Clues Foundation, the purpose, the main activities, organisation, its results and financial performance in 2020, as well the outlook for 2021.

Table of contents

1 Sensing Clues Foundation

1.1 Statutory Purpose

Article 2.1: The purpose of the Foundation is the development and provisioning of technologies, solutions and expertise to strengthen the protection, safety and security of nature, nature conservation areas, flora and fauna.

Article 2.2: The Foundation is realising its purpose by:

a. Engaging organisations and individuals who want to contribute to the purpose by bringing in specialised knowledge, capabilities, technologies, and/or means;

b. Designing and developing (technical and tactical) solutions which directly or indirectly contribute to the purpose;

c. Raising awareness and providing training and support which directly or indirectly contribute to the purpose;

d. Fundraising;

e. And all other lawful initiatives and activities which directly or indirectly contribute to the purpose, in its widest interpretation.

Art. 2.3: The Foundation is not aimed at profit making.

1.2 Formal Status

Sensing Clues Foundation is a not-for-profit organisation, officially registered in the Netherlands as Stichting Sensing Clues with fiscal RSIN number 858159752 and registered at the Amsterdam Chamber of Commerce, number 70140707.

Sensing Clues Foundation is officially registered as ANBI (Public Benefit Organisation) by the Dutch tax authorities. An institution can be qualified as a Public Benefit Organisation solely when at least 90% of the institution's efforts are focused on the public good. It also provides a number of tax advantages to donors, and requires the foundation to comply with specific administrative and transparency requirements.

Sensing Clues Foundation is located in Amsterdam, the Netherlands, and can be contacted through the following means:

Website: sensingclues.org (and.net and .nl)
Email: hello@sensingclues.org
phone: +31(0)6-3603.7414

Members of the Supervisory Board and Executive Board do not receive remuneration for their board-related activities.

1.3 Executive & Supervisory Boards

In 2020, the Executive Board consisted of:

- Dr. Jan-Kees Schakel, Chief Executive Officer and founder
- Ir. Hugo Koopmans, Chief Technology Officer
- Ir. Judith Dekkers, Chief Operating Officer
- Rob van Grieken, Member

The Supervisory Board consisted of:

- Prof. dr. Herbert Prins, Chairman
- Ir. Peter Hagedoorn, Secretary
- Dr. Louis Vertegaal, Member

1.4 Partner Network

In 2020, the Foundation had no employees. All work was executed by individual and corporate volunteers and contractors.

Sensing Clues Foundation actively invests in four types of partners:
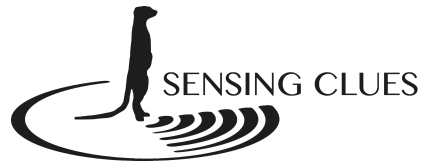
- Solution Partners

- Knowledge Partners

- Field Partners
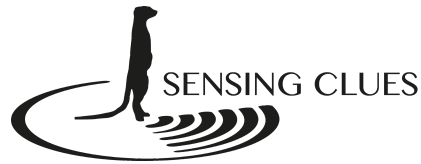
- Individual Volunteers

1.4.1 Solution Partners

In 2020, the following Solution Partners have been engaged and provided pro bono and paid services to further our mission.

SENSING CLUES

Partner name	Core activities	Why partnering with Sensing Clues?	Contribution to Sensing Clues
Baker McKenzie	Baker McKenzie is an international law firm with 77 offices across 47 jurisdictions and 12,000+ employees. The firm advises companies on all legal and tax aspects of doing business. Baker McKenzie is a signatory to the UN's Global Compact, the largest corporate sustainability initiative, and we are committed to applying our legal knowledge for the public good through pro bono advice.	We were impressed by the combination of Sensing Clues' idealism and their smart, technologically advanced solutions, and entered into a long-term relationship with the organization in 2018.	By providing expertise in areas like commercial contracts, tax, corporate governance and data privacy, we help the organization stay compliant so they can focus on their core activities. We are confident that Sensing Clues will have a direct, sustainable and positive impact on nature conservation and wildlife protection.
BIT	BIT is specialised in (green) colocation, internet connections, managed hosting and outsourcing for corporate internet users and offers them the basis of IT and internet infrastructure for quality-conscious organisations.	Sensing Clues is doing important work in the field of global nature preservation and because they are fully dependent on donations, we offer our service free of charge.	The Wildlife Insights tool suite and its datahub where data from several sources comes together, runs on BIT's super redundant hosting platform.
Brendan & MacKenzie	Brendan&MacKenzie is a one-stop custom software development house specialised in the development of web and mobile applications. By working together with you, our dedicated team of designers and developers can create a digital strategy, product or service that will allow your business to launch into the future.	Sensing Clues is one of those great organisations that's making a positive impact on our world. It was therefore a logical step to partner up with Sensing Clues and help them with their mission of turning wild spaces into safe havens.	We support Sensing Clues in the development of the Cluey Android app and the new Focus Data Explorer.
DIKW Intelligence	DIKW Intelligence is a consulting firm that helps customers in data-driven value creation. Our knowledge and expertise is in the domain of data science , data warehousing and artificial intelligence. We work for SME companies and serve as a partner to gain strategic advantage with data. Besides projects we deliver data science and data engineering training and our services label Bluemine Intelligence delivers data logistics as a service.	We were here from the start, as we successfully delivered a realtime big data platform for Jan Kees when he asked us to participate. The technology we develop for Sensing Clues is closely related to our field of expertise and the Sensing Clues purpose is right so for DIKW to invest in this technology is a win-win. We strongly believe that technology is an essential for nature conservationists to keep up and battle those who have a different	DIKW Intelligence delivers technical expertise and support to the Sensing Clues organisation in the form of 1 day a week the CTO office. Sensing Clues hosts the weekly meetings in our office in Nieuwegein and we work on deep learning and Artificial Intelligence solutions, the SERVAL sound sensor in particular. Furthermore we monitor and keep an eye on all systems running.

SENSING CLUES

		perspective on the value of nature.	
frontier oost	We use our knowledge of people and technology to design user-friendly applications that focus on nature and biodiversity.	We are a psychologist and digital strategist, both fascinated by nature. We like to use this knowledge to make the earth a better place for all earthlings. Sensing Clues shows that you can really make a difference with technology and we like to contribute to that.	We ensure that the applications of Sensing Clues meet the needs of the users. We make interaction and interface designs that are very user-friendly, to provide maximum support to users in their most important tasks.
Functional Analytics	Functional Analytics is a software company focused on data science and advanced analytics. Our core product is ownR™, a platform for DevOps automation and productionization of analytics solutions with a focus on the comfort of the non-technical end-users.	Functional Analytics has decided to support the mission of the Sensing Clues Foundation because we feel nature preservation is a worthy cause and we believe in the vision of a data-driven approach to support those working to this end in the fields.	Licences and consultancy.
MarkLogic	Marklogic helps organizations to integrate data for both analytical and operational applications. The software platform is being used primarily within Government, Banking & Insurance companies.	Providing Sensing Clues with the Marklogic data integration platform & supporting this with resources to help build both operational & analytical pplications is our way to help preserve nature and biodiversity. Our employees that hands-on help Sensing Clues, find it also a personal mission to prevent wildlife from becoming extinct and therefore support the cause also in their personal time.	Partner and advice sensing clues in all possible ways. Provide the MarkLogic data platform as a back-end for analytical & operational applications. Provide resources to help build he applications. Leveraging the eco system of Marklogic by asking technology & services partners to participate & sponsor the sensing clues project.
Ridder IT Services	Consultancy in the field of Business Process Management (BPM), Robotics Process Automation (RPA), Marklogic and Java Kotlin.	My work and hobby is applying new technology. At Sensing Clues I can use that for a very good cause.	Ridder IT Services deals with the data load processes. Both balancing and management.
Semantic Web Company	We support companies in mastering the challenges of information management through intelligent data enrichment and analysis using Knowledge Graphs and Semantic AI.	Supporting life on our planet is important to us. Species Extinction and Biodiversity Loss is among the biggest risks to our planet. Using Graph technology helping that is just way cool.	Our contribution to Sensing Clues is our technology stack, PoolParty Semantic Suite(tm), and our ISO-certified cloud infrastructure.

Vantage AI	Vantage AI is a data-science consultancy that offers innovative, flexible and highly motivated talent.	They support causes with social impact by coöperating on a pro-bono basis through their "Vantage AI for Social Good" initiative.	Together with Sensing Clues, Vantage AI developed a deep learning algorithm for detecting and classifying animals in camera trap images.
Wesfin Administratie Belastingadvies & Bedrijfsbegeleiding	Wesfin is a network of specialists. This cooperation makes it possible to pay more attention to the personal situation of our clients. Spider in the web is Theo Willems, who directs this network from Druten. The right man or woman at the table opposite you.	We are proud of the fact that we can be a partner of the Sensing Clues Foundation, given that they contribute to a better world.	Since our organization is seen as a commercial institution, we hope to be able to contribute indirectly with our reduced rate for which we carry out our work.

1.4.2 Knowledge Partners

The following Knowledge Partners have been engaged:

- Wageningen University and Research (WUR): Resource Ecology
- Jheronimus Academy of Data Science (JADS): Data Science
- HvA: development of intelligence products, including ML, AI and DL

1.4.3 Field Partners

This category of partners are active at the frontlines of nature conservation and wildlife protection:

- Wildlife Works, Kenya
- Rewilding Apennines, Italy
- PAMS Foundation, Tanzania
- DP, India
- CSI Wildlife, Sri Lanka, Kenya
- Chengeta Wildlife, Burkina Faso
- classified. Brasil

1.4.4 Individual Volunteers

In 2020 our volunteer network grew from ca 25 to 35 (individual and from corporate partners) contributed to the development of the Wildlife tool suite (WITS), and supportive functions ranging from the creation of manuals to sensor development, online and on-site training, writing social media articles, reporting, and engaging new partners.

2 Results 2020

2.1 Short-list of all results

Thanks to our Solution Partners and our highly dedicated team of volunteers, we were enable to achieve the following results:

- Three new field partners: PAMS Foundation, Chengeta Wildlife and CSI Wildlife
- One new Solution Partner: CWTI
- 19.584 recorded field observations, fueling dozens of biodiversity and law enforcement action plans and reports
- Increase from 25 to 35 volunteers
- Upgraded all software packages and libraries to avoid "technical debt" and maintain the security standards of the platform
- Rebuild of the "Focus Data Explorer", with improved UX/UI and new features
- New tools:
  - automated patrol density maps
  - automated biodiversity hotspot maps
  - automated prediction and risk models
  - automated ranger patrol optimisation routines
- For one of our Field Partners, we developed a sophisticated Bayesian bear habitat model. Its uniqueness lies in the fact that it is based on a combination of scientific knowledge, open source (satellite) data, and Cluey field observations. The combination enables very frequent and cost-effective updating of the bear habitat map, which originally was conducted only once per 5 to 10 year.
- Support new language regions in Cluey: Italian, Hindi, and French
- One on-site field training in Kenya
- Development of Wildlife Law Enforcement and Biodiversity Monitoring training modules for Burkina Faso
- Collection of sound samples and training of the first operational sound recognition model. Idem for species image recognition.
- Participation in the iWildcam competition with Solution Partner "Vantage AI"
- Strengthening of the Executive Board: Judith Dekkers joined in March.

2.2 Shared news items published on our website

February 17, 2020

LIVING WITH TIGERS

End of 2019, PhD-researcher D.P Srivastava started using the Sensing Clues Wildlife Tools Suite to collect and analyse data of tigers in and around the Bhopal city in India. The study aims to understand the situation of tiger presence and survival near the urban landscape of Bhopal City. With the research a few months underway, already 600 observations were created; data analytics in Focus started and D.P. provided a training session for ground staff of the Bhopal Forest Circle.

February 20, 2020

PREDICTIVE WILDLIFE INTELLIGENCE

Wildlife Insights tool suite, WildCAT

When it comes to wildlife protection, reporting historic events is utterly inadequate. To protect wildlife, rangers need actionable intelligence. Two reports were created which provide valuable information.

Heat Map.
Among the first operational applications is the observation heat map. The map can be created for any topic, always shows the latest information and is (re)created in a few clicks. It is used to inform law enforcement, to monitor biodiversity, and to mitigate human-wildlife conflicts.

LikeliHood Map
While the observation heat map is valuable for identifying (temporal) hotspots and cold spots, the data becomes more predictive when it is combined with patrol tracking data. It corrects the inevitable bias of observer presence. More importantly, however, colours of the map point in the direction of not-yet-patrolled areas with higher or lower chances to find (signs of presence) of animals, or illegal activities such as poaching (e.g. snares), charcoaling (e.g. kilns), illegal grazing, logging, mining, or any other subject of interest.

March 25, 2020

REWILDING APENNINES - status update

From October 2019 to January 2020, Rewilding Apennines conducted a pilot with the Cluey Data Collector and Tracking app of Sensing Clues. The pilot started with a training workshop: Dr. Jan Kees Schakel taught Rewilding Apennines' staff and a high-motivated group of Salviamo l'Orso's volunteers the principles and secrets of the data collector. They all learnt how to use Cluey very quickly. Since day 2 of the project, the staff of Rewilding Apennines and ten volunteers of Salviamo l'Orso have recorded over 3,000 observations, including wildlife sightings and signs of presence, wildlife induced damages and protective measures, important food resources, and environmental threats and abuses, including two fish traps. The work of the team was facilitated by the easy and handy functioning of the Cluey app, which operates on Android phones, even in mountain areas with low or no cellphone coverage.
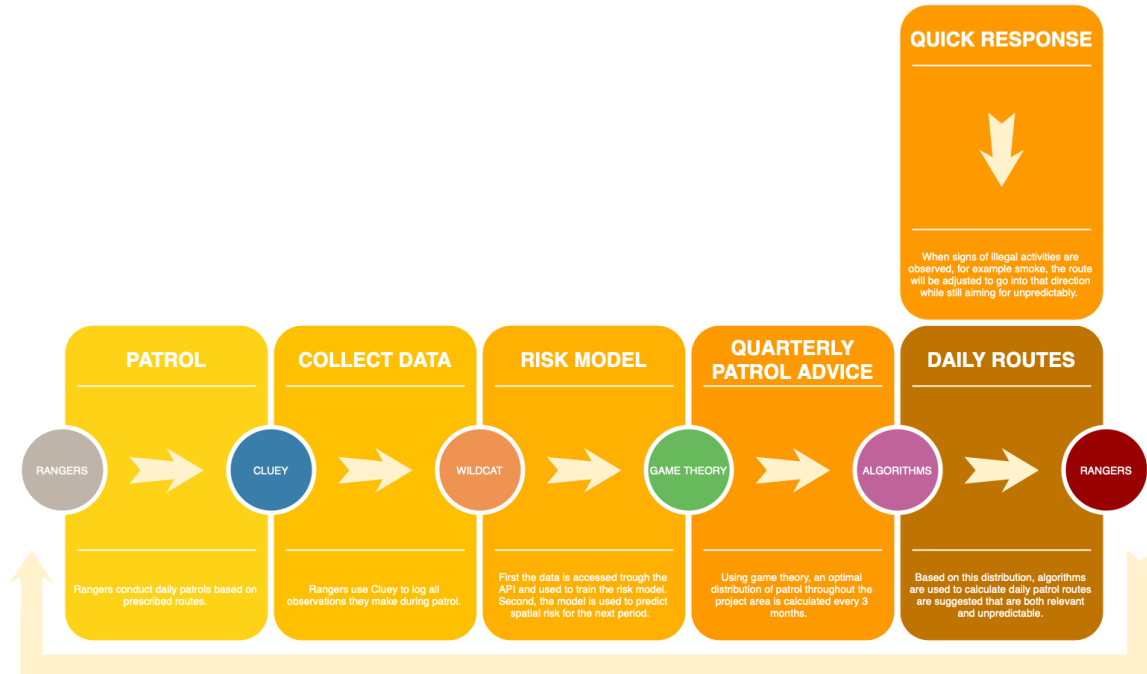
April 8, 2020

CLUEY EXPERIENCES OF WILDLIFE WORKS

We interviewed Keith of Wildlife Works during our trip to Kenya. Learn how the Cluey app changed the way they operate and is making their work a lot easier and safer, check out the video. ▶ How Cluey supports anti-poaching operations

June 11, 2020

HOW WE USE AI TO CONTROL CHARCOALING: A RESEARCH PROJECT

In 2020 Ea Werner graduated at the University of Amsterdam with a project executed with Sensing Clues. The result of this project is quarterly patrol advice for rangers. This is a perfect example of how we apply artificial intelligence technologies to protect nature!

August 3, 2020

CLUEY GOES MULTILINGUAL

In the summer of 2020, our Data Collection and Tracking app Cluey became multilingual! With the help of DP from the Living with Tigers project, and Dara from Salviamo l'Orso , our data collection and tracking app Cluey is translated to Hindi and Italian.Together with English and Dutch, the application is now available in 4 languages.

October 6, 2020

CAMERA TRAPPING FOR WILDLIFE INSIGHTS

In 2019 we announced Vantage AI as our newest Solution Partner, and in 2020 this partnership was confirmed with our first close collaboration: creating an algorithm that is able to detect species from different regions across the globe that are captured by a camera trap.

On 29 October Jan Kees Schakel joined Mike Kraus of Vantage AI for the webinar 'Using computer vision to keep track of animals in the wild' to show how our Solution Partner Vantage AI helped us to develop an image recognition solution.

November 20, 2020

TRAINING AND SUPPORT IN BURKINA FASO

End of 2020, Sensing Clues has partnered up with Chengeta Wildlife and the CWTI to tackle incredibly hard wildlife conservation problems in an area rigged by conflicts.

Read more about Chengeta Wildlife and CWTI in a blog post from ESRI, another valued partner of ours ([link](#))

"When we deal with a problem in a given area, analytics and actionable intelligence inform our planning, coordination, and execution of missions," Young said. "Improving the technology allows for improved command and control."

Services that Sensing Clues is providing include:

- Conducting Foundational Analysis to provide Anti-Poaching Units with a head-start
- Training and mentoring analysts to conduct such analytics on their own
- Training and mentoring law enforcement and criminal investigations principles and (judicial) processes
- Training APU-members and analysts in data collection methods and tools
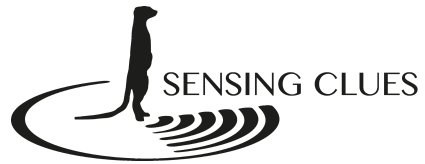- Supporting them with the tools to conduct their work efficiently and effectively

December 8, 2020

RELEASE OF THE YEAR: COMPLETELY RENEWED BACK-END AND FOCUS!

Just before Christmas we released a completely renewed back-end and brand new Focus with a clean interface, improved interaction and optimized performance. Thanks to this, analyzing and exploring areas will be much more intuitive and efficient. Also we enhanced security so safe havens are more easy to create.

2.3 Sensing Clues in the News

August 3, 2020

PAROOL Newspaper

PROTECTING THE LION IN AFRICA, STARTS AT LEIDSEPLEIN IN AMSTERDAM

Wildlife Insights tool suite, Serval Sensor

Dutch newspaper 'Het Parool' interviewed Sensing Clues founder Jan Kees Schakel about our Serval Sensor, the Amsterdam Sounds project and Sensing Clues. Read the full article right here.

Link to article

November 16, 2020

MAGPI Magazine

OPENEARS IN MAGPI MAGAZINE

Serval Sensor

Jan Kees was interviewed by Koen Vervloesem of MagPi Magazine about the technology behind our Serval Sensor OpenEars. Read the full article right here.

Link to article
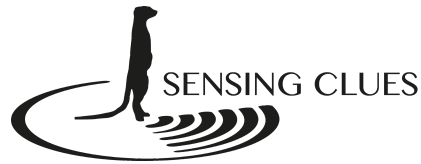
3 Financial Statement 2020

Sensing Clues is an organisation empowered by Solution Partners and volunteers. That's how we can deliver world-class services at minimum cost, and sometimes even for free.

The **thousands of volunteer hours** do not appear in this Financial Statement. Yet, its collective worth for the foundation and its mission cannot be underestimated.

The Solution Partners of Sensing Clues contributed through in-kind services, varying from software licenses, hosting services, and pro-bono consulting services, including data science assignments, UX-design, programming tasks, and legal advice. Their collective **in-kind added value is € 409,406,00.** All income is used for our mission.
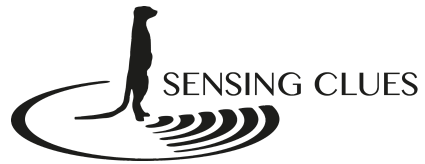
Enkelvoudige winst- en verliesrekening over 2020

	2020	2019
	€	€
Opbrengsten		
Netto-omzet	73.063	55.451
Af: Inkoopwaarde van de omzet	56.213	16.010
Brutomarge	16.850	39.441
Kosten		
Afschrijvingskosten	5.040	590
Verkoopkosten	418	1.187
Algemene kosten	3.297	2.454
	8.755	4.231
Bedrijfsresultaat	8.095	35.210
Financiële baten en lasten	- 248	- 133
Resultaat uit gewone bedrijfsuitoefening	7.847	35.077
Belastingen	-	-
Resultaat uit gewone bedrijfsuitoefening na belastingen	7.847	35.077
Resultaat na belastingen	7.847	35.077

4 Outlook 2021

Action-Top7 for 2021

Contribution to	Action
Mission	1. Increase added (information) value for our Field Partners by developing and exploiting WITS. In 2021 we'll introduce best-of-breed: ● BI and reporting ● An operational Camera-trap image processing solution ● Extend Digital Twin models (simulations & predictions)
Ambitions	2. Contract at least 3 new Field Partners in 2021. 3. Strengthen Executive Board with M&S expertise and set-up a well-functioning M&S team, strategy and related processes. 4. Further develop a healthy pipe-line with relevant and interesting opportunities. 5. Develop strategic partnerships with other service-providers in the field to accelerate growth and boost impact.
Foundation	6. Get all basic business processes in place, create discipline to adhere to these processes. 7. Create a solid (organisational and financial) basis for sustainable growth in the next 3 years.

5 Approval Executive and Supervisory Boards

This 2020 Annual Report of Sensing Clues Foundation has been read and approved by all members of the Executive Board and the Supervisory Board. I hereby declare that all members of the Executive and Supervisory Boards formally agree with its content.

Dr. Jan Kees Schakel

President of the Executive Board

26 October, 2021