

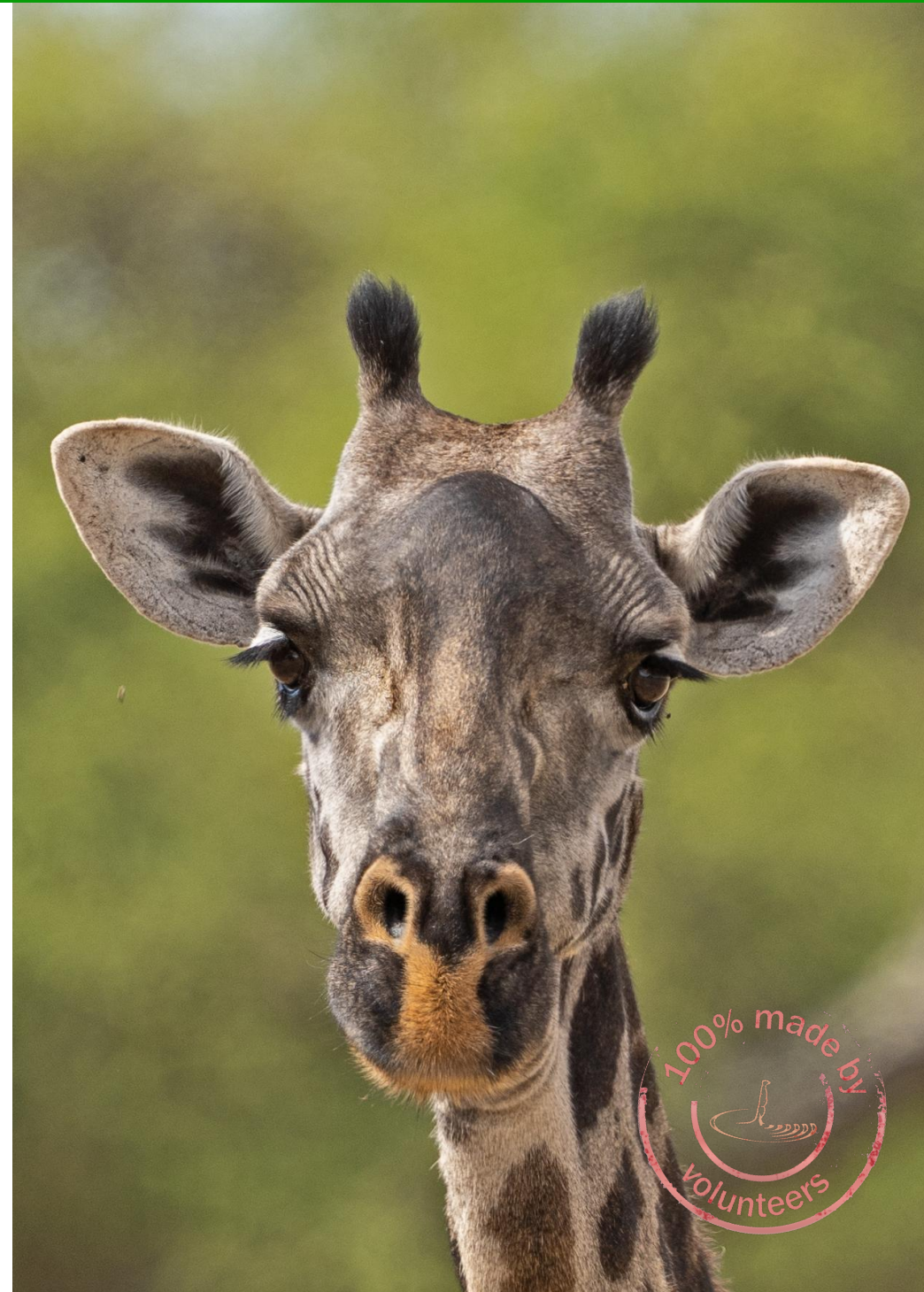
Sensing Clues

2021 Annual Report

Version: 3 November 2022

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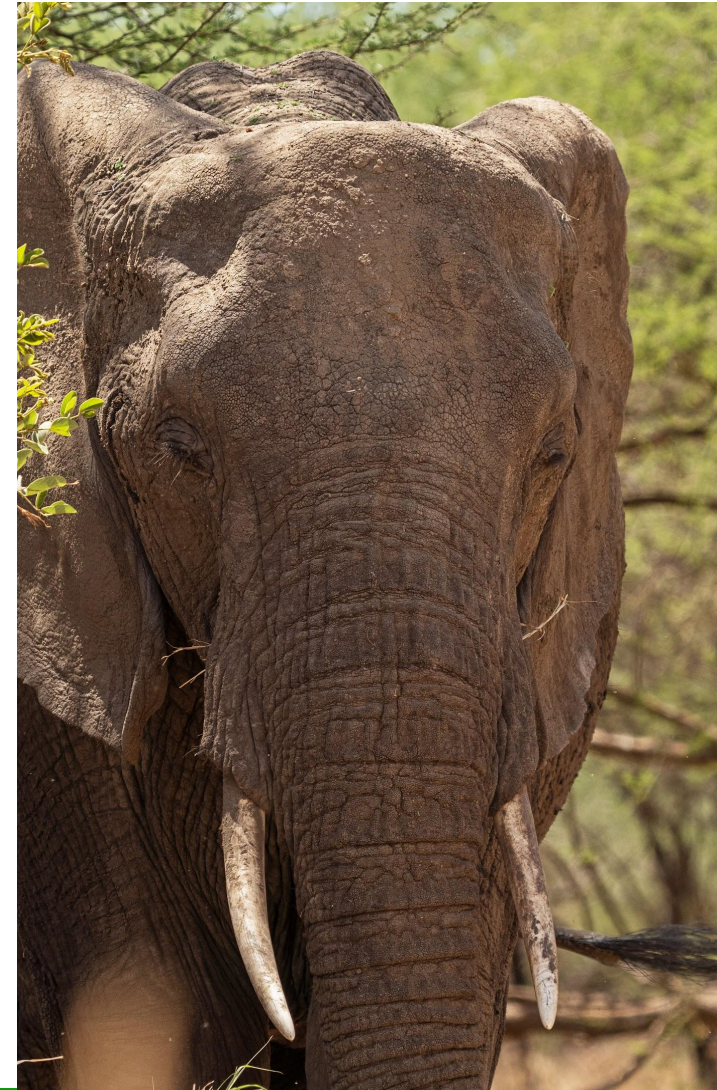


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PART A: GENERAL INFORMATION

1. Foreword of the President of the Board
2. Vision and Mission of Sensing Clues Foundation
3. Business Model
4. Key Activities in 2021
5. Governance
6. Statement of responsibility and confirmation of accuracy of the Annual Report

Highlights: Together with our outstanding Solution Partners and Volunteers, Sensing Clues provides nature conservation organisations with affordable and best-of-industry data-driven technologies to transform data into actionable information. In 2021 we were able to increase our investments with 43% and increase our impact, measured in protected hectares, with 75%.





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Foreword of the President of the Board

2021 was a year with great highs and deep lows. Despite COVID-19 we were very happy to welcome [Nitidae](#), [Transfrontier Africa](#) of the world-famous [Black Mambas](#), and the [International Anti-Poaching Foundation \(IAPF\)](#) as Field Partner. In addition, we've been able to conduct several training programs, including on-site data collection and analytics training in Burkina Faso and Tanzania and online training in Kenya and Madagascar.

For Arly National Park in Burkina Faso and Vale do Javari in Brazil we conducted [\(biodiversity\) threat assessments](#). Both yielded valuable new insights for the protection of these high-value nature conservation areas, in which law enforcement is almost absent.

We were invited by PAMS Foundation to participate in the [MyPlanet project](#). This great initiative aims at linking donors to directly sponsor the people that are making a difference in the field. For example by planting trees, removing snares, placing chilli fences to keep elephants away from crops, and more. Our Cluey Data Collector and Tracking app is being linked to the blockchain technology developed by Zippie, another founding partner of MyPlanet, to provide proof of sponsored activities.

Next to investing in our flagship tools [\(Cluey, Focus and WildCAT, respectively designed for data collection and tracking, real-time situational awareness in command and control centres, and for making advanced risk predictions and reports\)](#) our corporate volunteers invested heavily in developing cutting edge Artificial Intelligence (AI) models. We are using AI for risk modelling, species recognition and for sound recognition. We finished runner up in the Kaggle iWildCam 2021 computer vision challenge. Months later, with the help of IoT Sensemakers Amsterdam, we installed the first operational sound sensor that recognises human activity-related



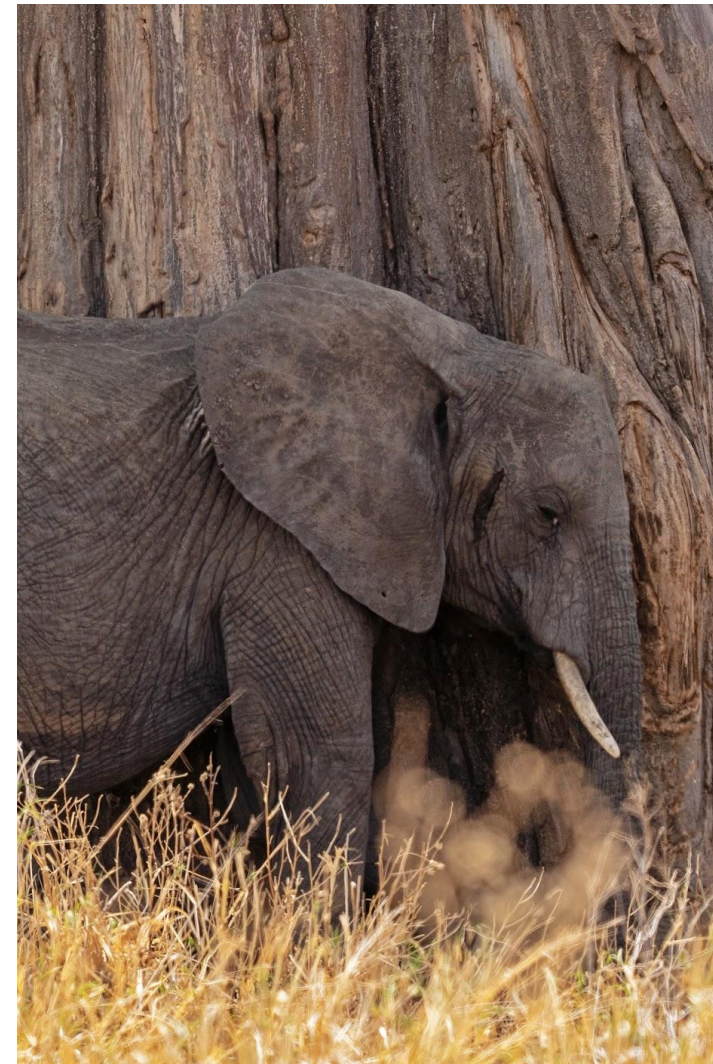
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sounds in the city of Amsterdam, in real-time. Both are big steps towards our ambition to add value and be a force-multiplier for organisations responsible for monitoring and guarding large nature conservation areas.

Despite all these successes, we'll remember 2021 as the year in which we lost our dear colleague **Rory Young**, Founder and President of Chengeta Wildlife. While on his life-long mission to train rangers to protect wildlife, he was senselessly ambushed and murdered by terrorists in Arly National Park, Burkina Faso. We're honoured to have been working so closely together on the toughest possible nature conservation problems. We'll remember him for who he was, his resolve, and his inspirational leadership.

It is an honour to join forces with all of our outstanding Solution Partners, Volunteers and Field Partners from around the world. To all of you, I extend my deepest thanks.

Dr. Jan Kees Schakel
President of the Executive Board





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Vision and Mission of Sensing Clues Foundation

Vision

The power of data is often under-exploited. It is potentially present in many forms and from many different sources. Sensing Clues believes that data is key-enabler to boost nature conservation and significantly increase efficiency and effectiveness of conservation efforts.

**Sensing Clues believes
that there is huge potential
in using the power of data
as a key-enabler to
boost nature conservation.**



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Mission

Most organisations lack the technical and tactical skills and systems to collect, explore, and exploit actionable information from very diverse data sources in a timely manner.

Sensing Clues' multidisciplinary team provides specialised high-end knowledge, expertise and hands-on services. We develop, introduce and maintain the integrated systems and information services that are up to the challenges that conservationists working in rugged nature areas face on a daily basis.

Our unique business model allows us to provide these services at the lowest possible cost to even the smallest of nature conservation organisations.

**Sensing Clues provides
nature conservation professionals
with affordable and best-of-industry
data-driven methods and
technologies to transform data
into actionable information.**



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Statutory purpose

The purpose of Sensing Clues is encoded in its Statutes as follows:

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:

- Engaging organisations and individuals who want to contribute to the purpose by bringing in specialised knowledge, capabilities, technologies, and/or means;
- Designing and developing (technical and tactical) solutions which directly or indirectly contribute to the purpose;
- Raising awareness and providing training and support which directly or indirectly contribute to the purpose;
- Fundraising;
- 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.



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Our slogan

Turn wild spaces into safe havens!

Formal Non-Profit 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.



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Business Model

Core proposition

Sensing Clues helps nature conservation organisations with solutions and services to collect, store, integrate and transform data from very diverse sources into actionable information.

Lowest possible cost of ownership (TCO)

We are able to provide these solutions and services at the lowest possible TCO through our network of Solution Partners and Volunteers, who provide their licences, knowledge, skills and time on a pro bono basis.

How we finance the remaining costs


To finance operational costs and business development, we apply a subscription model, supplemented by projects and donations to fund the development of new functions, custom work, training and consultancy.








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Why our Solution Partners and Volunteers work with us

SOLUTION PARTNERS (in alphabetical order)	
	<p>Baker McKenzie is an international law firm with 77 offices across 47 jurisdictions and 13,000+ employees. The firm advises companies on all legal and tax aspects, offering integrated solutions for a connected world. 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.</p> <p>We were impressed by the combination of Sensing Clues' idealism and their smart, technologically advanced solutions when we entered into a long-term relationship with the organisation in 2018. Over time, we have had the pleasure of seeing many of their plans materialise and their organisation grow. Sensing Clues' holistic approach paired with data-analytics has enabled the organisation to develop pragmatic solutions to global issues. In our view, this really sets them apart from other organisations with a similar mission.</p> <p>By providing expertise in areas like commercial contracts, tax, employment, corporate governance and data privacy, we help the organisation 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.</p>





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	<p>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.</p> <p>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.</p> <p>WITS, where data from several sources comes together, runs on BIT's super redundant hosting platform.</p>
	<p>Camunda specialises in innovating process automation with a standards-based, highly scalable and collaborative approach for business and IT.</p> <p>Camunda is proud to support Sensing Clues Foundation and their worthy goals of protecting wild spaces across the globe.</p> <p>Through the Camunda for Common Good program we aim to help nonprofits and NGOs by providing our full suite of enterprise process automation services free of charge to those organisations who are working to make the planet a better place.</p>
	<p>Since 2013, Dataiku has been the leader in democratising data and empowering organisation-wide collaboration. We've been a part of the AI journey of hundreds of companies, and we have a pretty good idea of the formula for success: Everyday AI.</p> <p>By embodying tech-enabled collective intelligence for positive impact, Sensing Clues demonstrates the power of embedding AI in everyday operations for extraordinary results.</p> <p>Dataiku's AI for good program Ikgig.AI addresses 3 different avenues of impact (DEI, humanitarian & climate):</p>





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	<p>Sensing Clues highlights the paramount connection between restoring biodiversity and advancing social justice for rangers and their communities. It is, in our experience, a rare and crucial mission of Climate Justice which we care deeply about to help advance.</p>
	<p>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.</p> <p>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 perspective on the value of nature.</p> <p>DIKW Intelligence delivers technical expertise and support to the Sensing Clues organisation in the form of providing her 1 day per week free usage of 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.</p>
	<p>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.</p> <p>Functional Analytics supports Sensing Clues Foundation because we believe in a data-driven approach for</p>





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	<p>improving the world, and the life of wildlife in particular. Sensing Clues’ mission has spoken to us from the first time we heard about it and we are a dedicated supporter of her vision. The fact that our tooling can contribute to that work and that it enables more people to volunteer their time and talent is a source of pride for us indeed..</p> <p>Functional Analytics is the platform behind WildCAT. It provides the necessary licences and consultancy services on a pro bono basis.</p>
	<p>Mapbox is a mapping and location cloud platform for developers. We’re the building blocks; the SDKs and APIs for developers and designers to build real-time location awareness into their apps.</p> <p>Location technology for conservation —monitoring, planning, protecting, and advocating for our planet— is improving fast. It's essential these tools are designed to be accessible and inclusive, contributions that help conservationists and local communities act more quickly and responsibly. For this reason, we are proud to support Sensing Clues and their suite of wildlife tools that provide high quality tools at low cost to people who can immediately use them to improve conservation activities.</p> <p>Mapbox provides Sensing Clues with the full power of their platform.</p>
	<p>Marklogic helps organisations to integrate data for both analytical and operational applications. The software platform is being used primarily within Government, Banking & Insurance companies.</p> <p>Providing Sensing Clues with the Marklogic data integration platform & supporting this with resources to help build both operational & analytical applications 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</p>





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	<p>becoming extinct and therefore support the cause also in their personal time.</p> <p>MarkLogic provides Sensing Clues with the MarkLogic data platform as a back-end for analytical & operational applications. In addition, it provides resources to help build the applications.</p>
	<p>The Semantic Web Company supports companies in mastering the challenges of information management through intelligent data enrichment and analysis using Knowledge Graphs and Semantic AI.</p> <p>We are proud to support Sensing Clues in the development of their data-driven methods and technologies for nature and species conservation. Even though the PoolParty Semantic Suite and its graph-based technologies only increase data quality and accuracy by a few percentage points, we have already achieved one of those successes that has always been the driving force of the Semantic Web Company and part of its vision: Helping people and organisations transform their data into valuable knowledge so that our jobs, our products, and ultimately our planet remain valuable and livable.</p> <p>Our contribution to Sensing Clues is our technology stack, PoolParty Semantic Suite(tm), and our ISO-certified cloud infrastructure.</p>
	<p>SmarterVision is a computer vision and deep learning product company, with a large footprint in social solutions. SmarterVision supports Sensing Clues on a voluntary basis for about three years.</p> <p>We like to have social impact and what better way is there then helping Sensing Clues with the mission of wildlife preservation.</p> <p>With current scientific knowledge in the field of computer vision we have helped Sensing Clues with the CaiMan, human-in-the-loop, solution. We have contributed a mutual code-base for annotation, GPU power for</p>



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	<p>training vision models and hosted this year’s camtrap Kaggle competition.</p>
	<p>Vantage AI is a data-science consultancy that offers innovative, flexible and highly motivated talent.</p> <p>We as Vantage AI and Bigdata Republic have been supporting Sensing Clues on a voluntary basis for a number of years now. The social aspect appeals to us and the consultants and we like to contribute in this way.</p> <p>Together with Sensing Clues, Vantage AI developed a deep learning algorithm for detecting and classifying animals in camera trap images.</p>
	<p>Wageningen University and Research (WUR) is a world-renowned research institute known for its high quality and high impact research on the environmental and life sciences. WUR invests heavily in AI and Digital Twins to improve the quality of life.</p> <p>Working with Sensing Clues is a great way to bring impact to the world of nature conservation!</p> <p>We do this by contributing fundamental ecological and conservation knowledge, and state-of-the-art modelling techniques.</p> <p>Among others we are working on Bayesian models and Digital Twins that give insight into the habitat quality and conservation status of endangered species.</p>



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SELECTION OF QUOTES FROM OUR VOLUNTEERS

Chiel. As a mathematician/data scientist (professionally) and nature guide (in my spare time) I can combine my two passions by helping Sensing Clues to attain their goals. I also like the fact that Sensing Clues partners with organisations that aim to empower local people to protect wildlife and wild places.

Emil. I'm volunteering with Sensing Clues because I believe in working together to make the world a better place step by step, and I know that Sensing Clues and all of its cooperation partners and customers care for that same goal.

Geert. I believe we as humans have a responsibility towards nature, with wildlife, rainforests, and reserves in specific. How better to help than by simply doing what you are good at, which in my case is doing full-stack development with knowledge about Linux, Docker, JavaScript, Frontend development, and MarkLogic database.

Gijs. I joined Sensing Clues because I'm passionate about wildlife and I believe technology can and will play an important role in its conservation. Being equipped with the right tools in the field makes a big difference. As part of the marketing and communication team I help Sensing Clues in telling our story.

Madelon. The conservation of biodiversity is one of the most pressing issues of our time. Sensing Clues' unique approach is to provide those already active in the field with cutting edge technology, taking operations to a whole new level. It is exciting to be part of this journey. In the last 2+ years I have helped built the curriculum of the Sensing Clues Academy, provided training in the field, worked on threat assessments for protected areas and on spreading Sensing Clues' message to those that may benefit.

Niall. Joining this project was a very easy choice for me. I have expertise in all things related to Camunda and Sensing Clues decided that their project could benefit from the tech. On top of that I've always had a deep personal interest in wildlife



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preservation since growing up in South Africa.

My contribution so far has been relatively minimal. With my colleague Nele, we built a microservice which periodically gathers new data on fires that have been reported and stores that data in a machine usable format. We have a lot more we'd like to do.

Nicolas. Sensing Clues has a can-do approach to nature conservation and wildlife protection. I strongly believe this mindset combined with their technological know-how allows them to make a real impact. By supporting them with the development of the Cluey app and Focus I hope to make a positive contribution to their mission.

Sanjay. My interest in conservation comes from a love of wildlife that I have developed since my childhood and which has been a part due my family's agricultural background. Coming from a strong analytical background I am passionate about digital tools and I love working on data. Working for Sensing Clues is helping me to balance my personal interest as well as my profession. At Sensing Clues I am helping the team to better promote their data driven methods and technologies through the latest digital marketing techniques. I am more than happy to contribute to this diversified team.

Shehana. Coming from Sri Lanka, nature and wildlife play a close part in my life. I am always looking for ways to contribute to a better planet and came across Sensing Clues. The work Sensing Clues does have a direct impact, and by working for them, I can witness it daily. I help Sensing Clues with their social media related work by creating awareness for the great work at Sensing Clues through social media channels.



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Key Activities

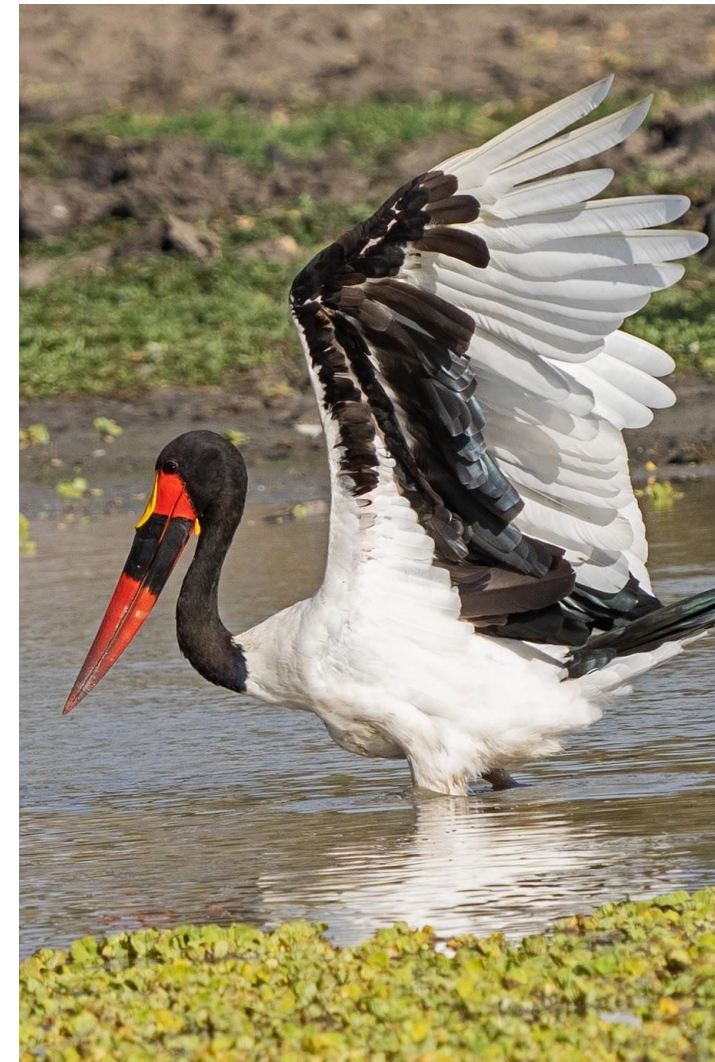
To deliver our promise we engage in the following key activities:

- **Partnership & volunteer engagement** to maximise learning from our Partners and streamline collaboration towards best-of-breed solutions and services.
- **Innovation & continuous development and delivery of solutions** for data-driven nature conservation and wildlife protection.
- **Marketing & communication** to make our solutions and services known and increase impact by supporting more nature conservation organisations.

Governance

In 2021 the Executive Board was formed by:

- Dr. Jan Kees Schakel, founder and President of the Executive Board
- Ir. Hugo Koopmans, Technology and Data Science
- Ir. Judith Dekkers, Operations Management
- Rob van Grieken (resigned in March 2021)





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In 2021 the Supervisory Board was formed by:

- Prof. dr. ir. Herbert Prins, President of the Supervisory Board
- Ir. Peter Hagedoorn
- Dr. Louis Vertegaal

Except for the President of the Executive Board, all members are appointed for 3 year terms, which may be extended.

In 2021 Sensing Clues did not have any employees, and did not award any remuneration for volunteer work or board-related activities. See Part C (*Financial Annual Report*) for an elaborate overview.





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Statement of Responsibility & Confirmation of Accuracy of the Annual Report

The Executive Board is responsible and accountable for the integrity of the Financial Statements of the organisation and the objectivity of all information presented in the Annual Report.

To the best of the Boards' knowledge and belief, we confirm the following:

- All information and amounts disclosed in this Annual Report are consistent with the WBTR and ANBI regulations of the Dutch Government. The report is complete, accurate and free of omissions.
- The Annual Report has been prepared in accordance with the guidelines as issued by the WBTR and ANBI regulations of the Dutch Government.
- The going concern basis has been adopted in preparing the Financial Statements. The Board has a reasonable expectation that the organisation will have adequate resources to continue its operations as a going concern for the foreseeable future.
- Management and employees operated within a framework requiring compliance with all applicable laws and maintenance of the highest integrity in the conduct of all aspects of the business, except where indicated otherwise in the Annual Report.
- The Executive Board is well versed of -and adheres to- its responsibilities as stipulated in the WBTR and ANBI regulations of the Dutch Government. Those responsibilities include, but are not limited to the following:
 - Establishing and maintaining an effective, efficient and transparent system of financial, risk management and internal controls.
 - Managing, including the safe-guarding of assets and for the management of the revenue, expenditure and liabilities of Sensing Clues.



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- Taking effective and appropriate steps to prevent irregular, fruitless and wasteful expenditure, losses resulting from criminal conduct, and expenditure not complying with the operational policies of Sensing Clues.
- Keeping full and proper records of the financial affairs of Sensing Clues.
- Preparation of financial statements for each financial year, in accordance with the WBTR and ANBI regulations of the Dutch Government.

In the Executive Board's opinion, the Annual Report and Financial Statements fairly presents in all material respects, the state of affairs of Sensing Clues, its business, its financial results, its performance against predetermined objectives for the reported year and its financial position as at the 1st of January of this year.

Signed:

Dr. Jan Kees Schakel

Founder and President
of the Executive Board

Sjouke Vrijburg

Acting President
of the Supervisory Board

Harald Tepper

Member
of the Supervisory Board

November 3, 2022.

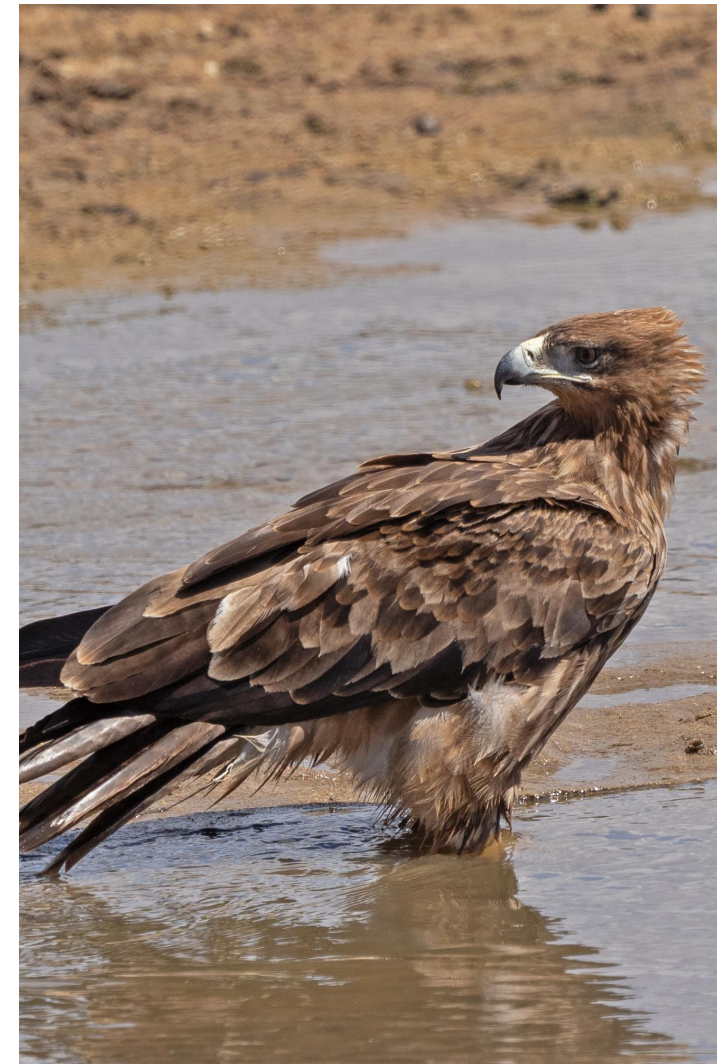


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PART B: PERFORMANCE INFORMATION

1. Impact
2. Overview of our Field Partners and how we support their mission
3. Quotes from Field Partners
4. Investments in 2021
5. Outlook 2022

Highlights: Sensing Clues reaches its impact through its Field Partners. We are successful when *their* nature conservation efforts are strengthened and amplified through the solutions and services that we provide. In 2021 we were able to increase our investments for them with 43% and increased the number of protected hectares with 75%.





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Impact




To assess our impact we use two categories of quantitative indicators: **Scale** (to give an indication of our reach) and **Investments** (to indicate how much resources we were able to mobilise). A third and most important category is qualitative in nature. It describes the **outcome** of all our efforts through the eyes of our Field Partners (next paragraphs).

Indicators of Scale	2018	2019	2020	2021		
No. of continents	1	3	3	4		
No. of countries	1	3	6	7		
No. of supported nature conservation organisations	1	3	7, +130%	9, +29%	* Species are included on this list when Field Partners include them in their plans for nature conservation, wildlife protection, or data collection and analysis. The number of hectares protected equals the sum of areas protected by our field partners.	
No. of protected species*	9	68	82, +21%	109, +32%		
No. of hectares protected (x 1000)	202	385	563, +46%	984, +75%		
No. of Cluey users (rangers)	2	29	101, +348%	179, +77%		
No. of recorded tracks and observations	645	1.703	26.396	26.100**		
Indicators of Investment						** Despite COVID-19, many Field Partners were able to maintain their ranger teams, but sometimes were forced to reduce the number of patrols. The new Field Partners joined towards the end of the year. Hence, their results will become apparent in 2022.
No. of Solution Partners (in-kind value)	5 (n.m.)	15 (n.m)	15 (406k)	15 (305k+)		
Approx. no. of Volunteers	23	35	40	40		
No. of trainings (and training days) given	-	1 (5)	2 (10)	4 (32)		
Nett revenue (subscriptions, projects, donations)	-	55.451	73.063, +32%	104.401, +43%		






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Overview of Field Partners and how we support their mission

	<p>The Black Mambas, an initiative of Transfrontier Africa, is an all-female non-armed ranger team, protecting rhinos in the Balule Nature Reserve, which is part of the Greater Kruger National Park. The Black Mambas are using all available tools of Sensing Clues to monitor and protect rhinos in Balule Nature Reserve.</p>
	<p>CSI Wildlife helps conservationists and wildlife projects in need by assisting in wildlife forensics and investigations and by providing and coordinating volunteers to assist with wildlife projects. CSI Wildlife uses all available tools of Sensing Clues.</p>
	<p>Beautiful creatures such as the rhinoceros and elephant have long been targets of poachers; the rhinoceros for its horn and the elephant for the ivory in its tusks. These are only two examples of the many species in Africa that are reaching near-extinction. IAPF develops and supports programs to stop poachers from targeting and killing these endangered animals. IAPF uses all of Sensing Clues' tools to support its operations.</p>



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	<p>The mission of Elephants Alive is to ensure the survival of elephants and their habitats, and to promote the harmonious co-existence of elephants and people.</p> <p>Elephants Alive participates in a large consortium led by Sensing Clues to develop digital twins to mitigate and prevent human-elephant conflicts and thus stimulate peaceful human-elephant coexistence (proposal stage).</p>
	<p>Spanning more than 85,000 square km (an area the size of Portugal), the Vale do Javari is home to 7,000 Indigenous People, including the largest population of uncontacted people in the entire Amazon. Not only is the Javari an area of tremendous environmental value, it is also of incomparable cultural importance.</p> <p>The mission of the Jarvari Project is to understand and identify the current threats to the environmental and cultural assets of the Vale do Javari and implement the best methods to support the preservation of the region's cultural and environmental value.</p> <p>In 2021 Sensing Clues conducted a baseline study to understand and identify the current threats to the environment. Since then, we have been working with Celine Cousteau and Tadzio to prepare phase two of the project: co-design and implement measures to protect the Vale do Javari.</p>
	<p>Nitidæ's mission is to design, develop and lead projects that preserve the environment while contributing to the local economy. With an operational team of 100 people (economists, engineers, agronomists, forestry specialists, geographers, soil carbon scientists, GIS and remote sensing experts), Nitidæ is currently conducting approximately fifty projects mainly in Madagascar, Burkina Faso, Mozambique and Ivory Coast.</p> <p>In 2021 collaboration with Sensing Clues was started to support their work in Madagascar.</p>



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	<p>PAMS mission is to empower the people who protect wildlife and wild places. Through trusted partnerships with communities, local and national government, key stakeholders and champions in the various landscapes in which they operate, PAMS uses intelligent approaches to seek flexible solutions that address the most pressing challenges faced by wildlife and people living in natural areas.</p> <p>Sensing Clues is supporting the work of PAMS since 2020.</p>
	<p>Wildlife Works is the world's leading REDD+ program development and management company with an effective approach to applying innovative market based solutions to the conservation of biodiversity. Their approach is biodiversity-driven, community-centred and ecosystem-based. The development and sales of nature-based credits enhances forest communities economic self-determination to transition from extraction-based to conservation-based livelihoods.</p> <p>Sensing Clues has supported the wildlife security teams of Wildlife Works since 2018.</p>
	<p>WWF is one the world's leading conservation organisations. They collaborate with local communities to conserve the natural resources we all depend on and build a future in which people and nature thrive.</p> <p>In 2021 Sensing Clues was approached by the Dutch WWF office to conduct an evaluation study for the Forest Foresight programme. Moreover, we received funding for the MyPlanet project that we run with PAMS, and prepared a large EU-proposal with the Bulgarian WWF office to develop advanced technologies to monitor (threats against, and opportunities to strengthen) biodiversity in the Danube Delta.</p>



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Selection of Quotes from our Field Partners in 2021

“We are now really well equipped for the difficult task we are entrusted with”

Bruno, Les Anges Gardiens de la Nature

“They help us to make great conservation impact”

Michele, PAMS Foundation

“The tool suite is really world class”

Greg, Chengeta Wildlife



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Investments in 2021 and 2022

Expansion of Field Partners served, Marketing and Communication

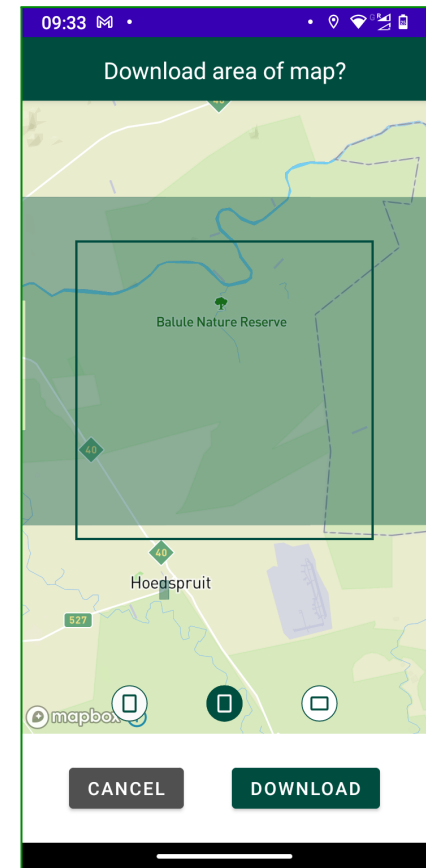
As Sensing Clues' success is measured by the success of its field partners, it is our ambition to grow from 9 field partners in 2021 to 50+ field partners before the end of 2023. This is only possible if our potential clients know about us and if our solutions and services fit their needs.

In 2021 we seriously intensified our search for a marketing leader at board level. As several of our volunteers and Solution Partners joined our search, we are hopeful that we will be successful in 2022.

Flagship tools

The following applications are the flagship tools of Sensing Clues:

- the **Cluey** Data Collector & Tracking app,
- the **Focus** Data Explorer for Command Centres, and
- **WildCAT** (Wildlife Crime/Conservation Analyst Toolbox).





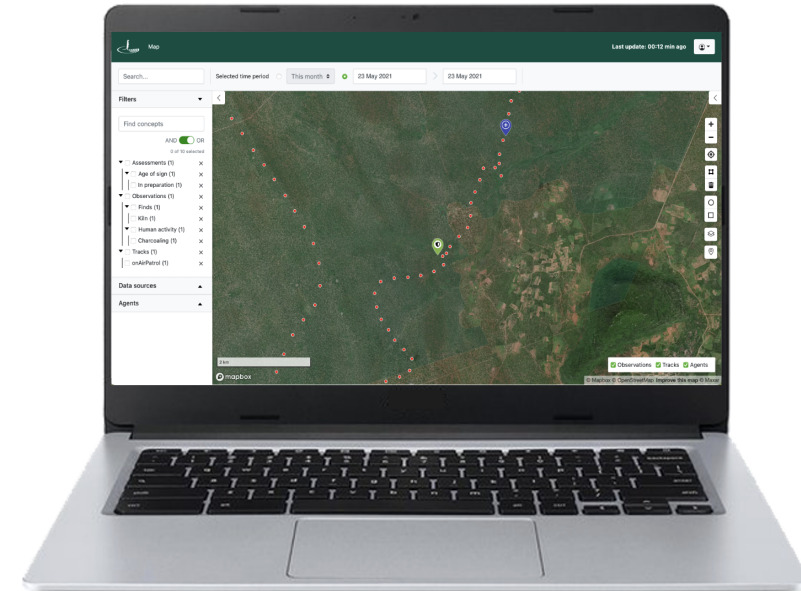
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In **2021** we strengthened all three of them. We added features requested by Field Partners, such as adding satellite images, a compass and a distance metre to Cluey for easier navigation, a filter list of agents in Focus, two base-reports, and three types of density maps in WildCAT. In **2022** we will continue to strengthen our flagship tools, based on a long list of functional requests from field partners. This will include (but not be limited to) data collection options related to community work and the upload of custom map layers (Cluey), the inclusion of Global Forest Watch fire alerts and camera trap photos (Focus), and the development of dynamic risk maps for charcoal and bushmeat poaching (WildCAT).

CAIMAN

Almost each field partner creates hundreds to thousands of images per month for a diverse set of biodiversity monitoring purposes. Existing camera trap solutions are either not open or standalone, which makes integration of processed data with other data sources difficult.

2021 To crack this we started developing CAIMAN. This tool has two purposes: detect if there is an animal on an image and if so classify which animal it is. The CAIMAN solution consists of three components, all fully integrated in WITS: 1) an infrastructure to channel workflow processes; 2) various computer vision AI-models; and 3) a *Human*





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in the Loop-module to verify images and to manually correct classifications if necessary.

To automate the related high-volume workflows, we approached Camunda and found them willing to become a pro bono Solution Partner of Sensing Clues. With the help of their consultants and our volunteers, we started building the infrastructure needed to process the photos from wildlife camera-traps. At the same time, we joined the famous Kaggle iWildCam 2021 competition to develop the first AI-models for classifying species. Our team, consisting of corporate volunteers from SmarterVision, Vantage AI and DIKW Intelligence, ended runner-up.

In **2022** we aim to develop the *Human in the Loop*-module and to pilot CAIMAN at one or two field sites.

SERVAL

Many types of noises can be related to the presence of people. The sounds of car engines, chainsaws, gunshots, music and laughter are obvious. Less obvious but just as valuable are the sounds of domesticated animals like cattle and dogs. To detect them, however, requires next to rocket science. Since 2017 volunteers of Sensing Clues have been studying and experimenting with various AI and machine learning methods to identify different types of sounds.





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In **2021** our volunteers and the *IoT Sensemakers Amsterdam* were able to develop the first fully operational prototype. In the city-jungle of Amsterdam it is being used to better understand noise pollution by processing sounds *in real-time in-situ*. The latter is what distinguishes SERVAL from alternative sensors that typically stream the sounds to the cloud for processing, or which are designed to recognise one sound only.

2022. Many development hours and funds are still needed to develop the SERVAL sensor to a point that it can operate multiple hours on a reasonably small solar panel and send sound-alerts through e.g. satellite-based communication to the command post. As these hardware capabilities are not Sensing Clues' stronghold, the development of SERVAL will not be actively pursued in 2022.

Digital Twins for Nature Conservation

2021. This year we started discussions and preparations for the creation of Digital Twins for Nature Conservation. Digital Twins for Nature Conservation are potentially of extreme high value for nature conservation and human-wildlife conflict prevention. They are also extremely difficult to make. Nonetheless, it is our ambition to develop such digital twins, as together with our partners we've got the necessary ecological knowledge and technical skills to reach results.





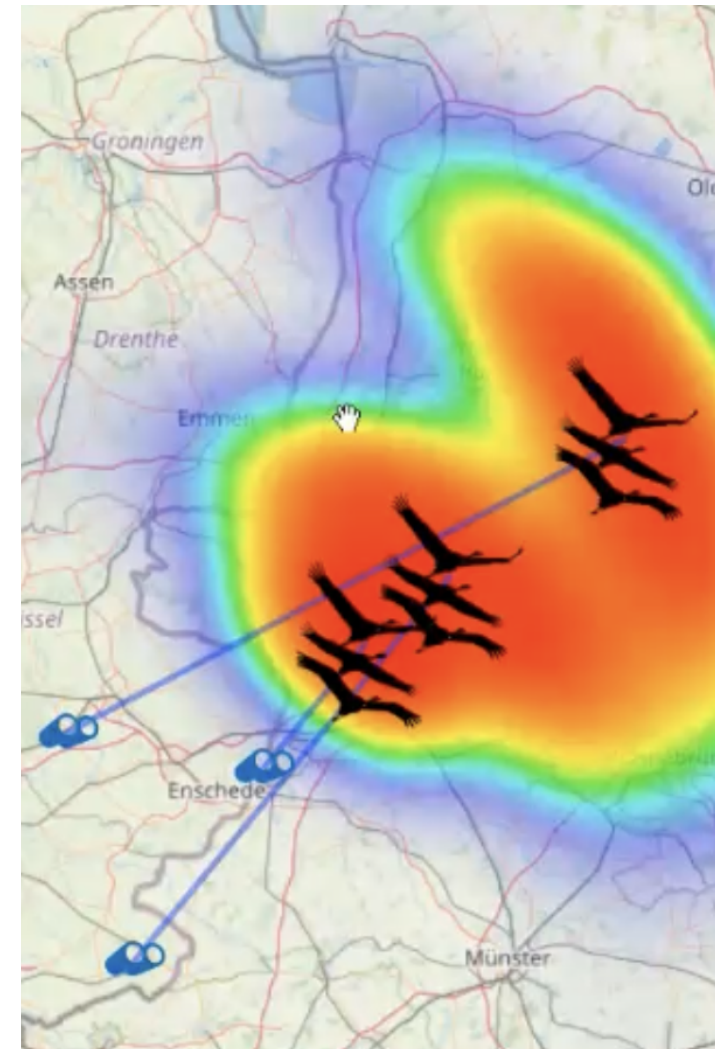
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A Digital Twin (for nature conservation) does three things:

- 1) It models static elements and dynamic processes;
- 2) It predicts the future state;
- 3) Through a real-time feedback loop, it is able to learn and adjust its predictions.

Together with Ass. Prof. Koen de Koning of Wageningen University and Research (WUR) and a wide range of other partners, we've written three proposals (all 3 started in 2021, 2 submitted in 2021) to develop digital twins for nature conservation that are fully integrated with WITS and which will thus directly strengthen and expand our solution portfolio:

- Modelling predator-prey (grassland birds) interactions in the Netherlands (RaakPro financial total size of consortium: ca 1 mln, won).
- Biodiversity monitoring in Southern Europe (EU Horizon, financial size: ca. 5 mln, won, starting in September 2022).
- Preventing Human-Wildlife Conflicts in Southern Europe, South Africa and Tanzania (EU Horizon, financial size: ca. 3 mln, expected result in July 2022)





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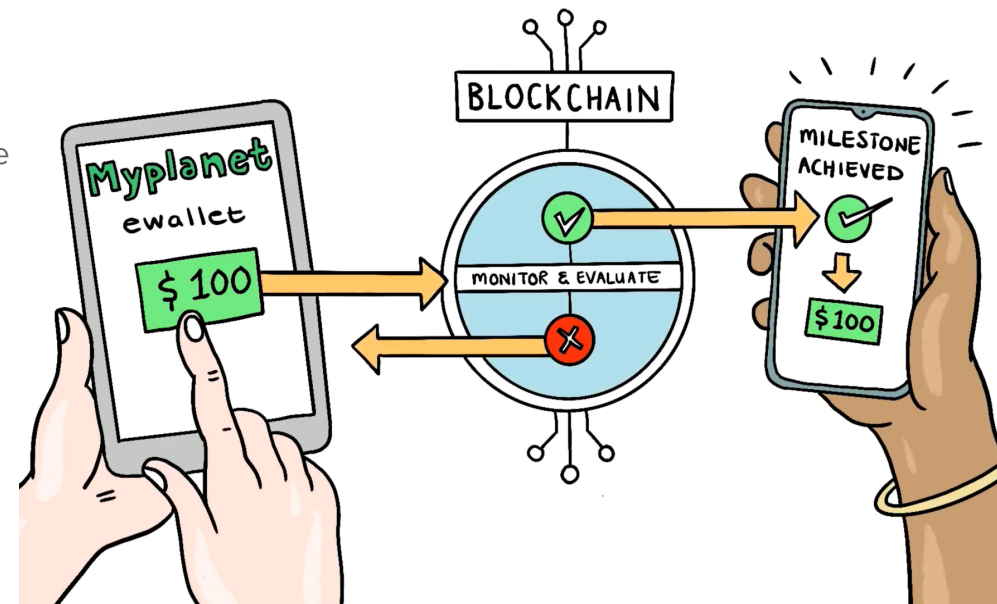
In **2022** we'll develop our first digital twin to model crane migrations. In September the model will be launched in the form of a real-time “crane-radar”, projecting last known positions of the crane and predicting their location in the hours that follow, based on historic observations, scientific knowledge, actual weather forecasts, and more.

MyPlanet

In **2021** Sensing Clues was approached by PAMS Foundation to participate in the MyPlanet project. This great initiative aims at linking donors directly to sponsor the people that are making a difference in the field. For example by planting trees, removing snares, placing chilli fences to keep elephants away from crops, and more. Our Cluey Data Collector and Tracking app is being linked to the blockchain technology developed by Zippie, the founding partner of MyPlanet, to provide proof of executed tasks.

To help fund the integration, an innovation grant was submitted and received from the WNF INNO Fund.

In **2022** the Cluey integration will be created, followed by field trials. Meanwhile, the MyPlanet project will seek additional funding to make the prototype ready for large-scale use and to launch marketing campaigns.





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Other activities in 2021

- We started the “Friday morning Data Science Sessions”. These sessions are open to all our Field Partners and volunteers who want to work on their own projects, such as the creation of reports, maps or models. Sensing Clues’ experts, ranging from ecologists to data scientists and computer engineers take part to provide technical or methodological advice and hands-on help.
- Evaluation assignment of the Forest Foresight project of WWF
- Operations management: implementing measures to comply with Dutch WBTR regulations.
- We contracted NewRelic as a Solution Partner and started building monitoring routines to monitor all services that are running on our servers and to detect and solve possible issues early.
- We started our Outreach programme. In this programme, volunteers of Sensing Clues visit our Field Partners for prolonged periods to build strong partner relations and expand our network. By learning from each other we can tune our expertise and investments to finetune our solutions and services and develop new ones where needed. Jan Kees kicked off the programme, by visiting the Black Mambas in South Africa (3 months).





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- We went on a day trip to see each other live (after a year-long contact through video calls) and to enjoy each other's company. We went Dutch, meaning that everyone paid for his/her own expenses.
- We created a Dutch website, aimed at attracting donations from our homebase.

Other activities foreseen in 2022

- Recruitment of a board-level marketing leader.
- Kickoff of the RaakPro programme..
- Set-up of a forecast management process and system.
- Creation of video content to support marketing, communication and sales.
- Reach-out programme: Jan Kees continues his outreach activities and will be joined by Judith around mid 2022
- Possible start of the Wildlife FIRST programme.
- Development of a proposal for recognising individual dolphins and porpoise.



NATUREFIRST



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PART C: FINANCIAL ANNUAL REPORT

1. Financial Performance
2. Financial Statement

Highlights: In 2021 our net turnover has grown 43%. Of the net turnover, 91% was directly invested in our mission: technology development, training and support for nature conservation and wildlife protection.

Financial Performance

At Sensing Clues we aim at:

- 1) Delivering our solutions at lowest possible Total Cost of Ownership (TCO).
- 2) Transform the core development and support team from part-time volunteers to full time employees in 3 years time.
- 3) Keep overhead below 5%.
- 4) Remain independent.





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This is how we are able to sustainably provide our services at the lowest possible total cost of ownership (TCO):

- All software and hosting services are delivered for free, as all underlying costs are covered by our Solution Partners and Volunteers.
- As all tools can be explained and used within an hour or two, training costs are extremely low. When we conduct field training, most of the time spent is to learn from each other and to lay the foundation for further collaboration.
- Optional subscription fees are used to cover the costs of development and support that cannot or hardly be delivered by Solution Partners or volunteers.
- The efficiency-gains made by Field Partners are manifold. These vary from reduced (till zero) hosting and data storage costs, to a significantly reduced need for technical specialists.

In addition to the ca 305.000 Euro in-kind contributions of our Solution Partners (excluding one) and the priceless inputs of our volunteers (including the creation of this annual report), Sensing Clues received **104.041 Euro**:

- Annual subscriptions: 26.330 Euro
- Projects: 50.279 Euro
- Grants and donations: 27.423 Euro





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Investments in Sensing Clues' Mission

The following investments were made in 2021:

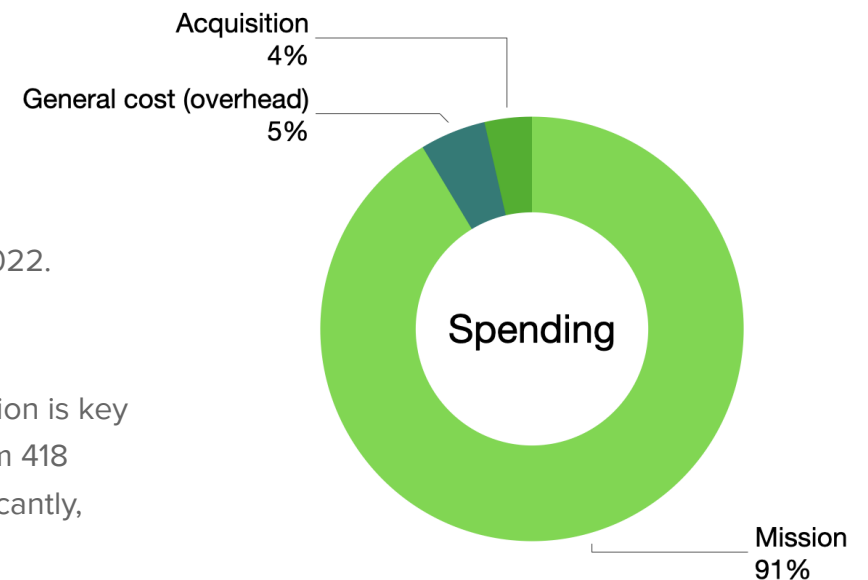
- Capital investment in software development (Cluey, Focus, WildCAT, backend & cyber security): **23.087 Euro**
- Capacity building (training and consultancy) (Javari, FOMEK, AmsterdamSounds, Nitidae): **58.147 Euro**

Due to projects that start in 2022, investments will increase significantly in 2022.

Acquisition and Overhead

Reaching out to all potential Field Partners to inform them about our proposition is key to reaching our mission objectives. In 2021 we intensified these activities from 418 Euro in 2020 to **3,215 Euro** in 2021. We expect these costs to increase significantly, once the new Chief Marketing and Sales is appointed.

The total overhead in 2021 was **4,471 Euro**, which was 4,3 % of our net turnover (licences and subscriptions, Monday, Deepl, Telephone, Banking, Website hosting services, Donation services Mollie and Geef, and accountancy). In 2022 we expect overhead to remain under 5%..





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Financial Statement

Company profit and loss account for 2021

	2021	2020
	€	€
Revenue		
Net turnover	104.041	73.063
Purchase value	87.685	56.213
Gross margin	16.356	16.850
Costs		
Depreciation costs	5.040	5.040
Sales costs	3.215	418
General costs	4.471	3.297
	12.726	8.755
Operating result	3.630	8.095
Finance income and costs	- 363	- 248
Result from business operations	3.267	7.847
Taxes	-	-
Result from business operations after taxes	3.267	7.847
Result after taxes	3.267	7.847





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List of Acronyms

AI	Artificial Intelligence
ANBI	ANBI is the non-profit tax designation in the Netherlands issued by the Tax Office (Belastingdienst) in accordance with the general tax laws (Uitvoeringsregeling Algemene Wet Rijksbelastingen 1994). ANBI stands for (Algemeen Nut Beogende Instelling).
FTE	Full Time Equivalent
HVCS	High Value Conservation Species
HWC	Human-Wildlife Conflicts / Coexistence
KPI	Key Performance Indicators
WBTR	Administration and Supervision of Legal Persons Act (Wet bestuur en toezicht rechtspersonen)
WITS	Wildlife Information Tool Suite
WUR	Wageningen University and Research

