

crunchfish 



YEAR-END REPORT

2022

The golden circle

CEO JOACHIM SAMUELSSON

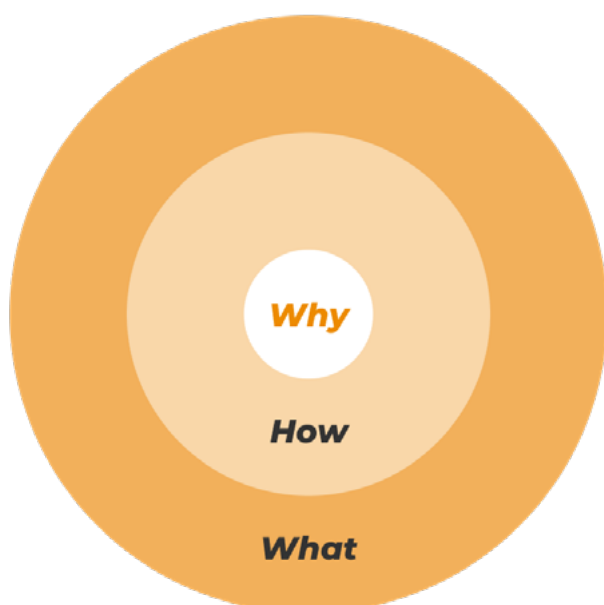
If you're trying to sell a product or push an idea, don't start with a simple description of what it is. Begin instead by explaining why it was created, its purpose. People do not buy what you do, they buy why you are doing it. The purpose of Crunchfish Digital Cash is to make all payment robust, inclusive and private. Communicating from that standpoint will have a profound impact and increase our chance to reach our destined potential to become the underlying protocol of all payments services.

In **Simon Sinek's famous Ted Talk from 2009**, he introduced the golden circle, three concentric circles labelled what, how and why. The innermost circle with the why represents the purpose. It is surrounded by a ring marked how – outlining the process by which the purpose is realised, which in turn is enclosed with a circle labelled what - indicating the products you promote to deliver the purpose. People are always much more inspired by a purpose, and that should always come first when communicating, long before describing the process or products.

Any public good in the society like the electricity, internet or telecom must be carefully designed to continue working despite temporary outages. Digital Payments is also a public good, but it is not as robust as it should be given its critical role in society. Crunchfish Digital Cash solves that by implementing the same **design philosophy as used by**

the internet for digital communications. We believe that the payment services must work in the face of temporary failures, people must have the right to pay privately, and all people should be able to pay digitally, just as with cash today.

The enormous potential of Crunchfish Digital Cash is much better understood from the purpose of making any form of digital payment robust, private and inclusive by our groundbreaking and patented Digital Cash technology. Crunchfish destiny is to upgrade any form of digital payments to this higher level. No other company in the world is anywhere near having the technology that can deliver on this promise. What the internet is for digital communications, Crunchfish Digital Cash will be for digital payments. Furthermore, with the latest innovation we have even improved improved on the internet itself.



Why – the purpose

Crunchfish believe that public and commercial goods as digital payments as well as other digital applications must be trusted, inclusive and survive in the face of temporary failures. This is currently not the case.

How – the protocol

The Trusted Application Protocol is destined to become a foundation for public and commercial digital goods as it provides a more robust and trusted client server communication as well as peer-2-peer communications over a local network or in proximity.

What – the products

Crunchfish provide a solution with native layer-1 or non-native layer-2 tokens using software- or hardware based trusted and secure clients for -offline, -online, -telecom, -non-mobiles, -consecutive, and -quantum-safe applications in payments and other digital application areas..



*"People do not buy what you do,
they buy why you do it."*

- Simon Sinek, 2009

The purpose of Crunchfish Gesture Interaction is to enable users to interact intuitively in the physical as well as the virtual reality. For the automotive industry there is the even higher purpose of saving lives. By enabling intuitive screen interaction with gestures, the driver can keep focus on

driving. More importantly, Crunchfish's gesture technology tracks the behaviour of the driver and passengers with Driver and Occupant Monitoring Systems and alerts if something potentially unsafe happens.

An investor presentation slide for Crunchfish. The title is "Why invest in Crunchfish?" in orange and white text. Below the title is a list of six reasons, numbered 1 to 6, in orange and white text. The background of the slide features a man with his arms crossed, smiling, in front of a cityscape. A small orange fish icon is in the top right corner.

Why invest in Crunchfish?

- 1. Big deals are coming**
- 2. Gigantic market potential**
- 3. Extremely scalable business**
- 4. Patented world-class technology**
- 5. Strong financial position in Q1 2023**
- 6. Curious, creative and caring company**

Crunchfish are in better shape than ever. I gave six reasons for it in my [investor presentation](#) to promote the subscription of shares in the [TO9 warrants program](#). These six reasons are still very much true and the reason for people to care and continue to be long in Crunchfish. Our destination is outer space. Welcome onboard, doors are closing.



***Significant news
during and after Q4***

Crunchfish group

2023-02-15

Crunchfish COO - Joakim Nydemark - leaves his operational roles at Crunchfish and is proposed to join its board of directors.

2023-02-10

Crunchfish announces the **launch of a complimentary report format – Crunchfish iQ** – an interactive view of the year-end report.

2023-01-24

Emergers have **published an equity analysis** on Crunchfish titled “The most interesting fintech rollout since iZettle.”



2022-12-28

To increase the understanding among investors for Crunchfish and our value proposition, and connect with new investors, **Crunchfish has signed an agreement with Emergers** for their Commissioned Research and Corporate Broking service.

2022-12-20

Crunchfish announced the **result of the exercise of warrants of series TO9**. Through the exercise, Crunchfish receives approximately SEK 21.5 million before transaction costs.

2022-12-06

Video of Crunchfish's presentation – Big deals are coming – from Västra Hamnen Corporate Finance Investerar dagen is released.

2022-12-05

Crunchfish CEO Joachim Samuelsson presented, in Swedish, **why to invest in Crunchfish** and answers questions about upcoming milestones.

2022-12-02

On 18 May 2022, the Annual General Meeting of Crunchfish AB resolved on an incentive programme consisting of warrants of series TO2022/2026. **The interest in the**

incentive programme was strong and on November 29th employees and key employees had subscribed for 647,500 warrants.

2022-11-21

Västra Hamnen Corporate Finance publishes an **updated equity analysis on Crunchfish**.



2022-11-16

Crunchfish publishes interim report Q3 2022.

Digital Cash

2023-02-14

Crunchfish have **applied for a patent** protecting a robust solution that enables the digital service to work even offline from a trusted client able to communicate securely client to server or peer-to-peer using an application agnostic Trusted Application Protocol (TAP).

2023-02-08

Crunchfish in partnership with HDFC Bank and another Indian bank are **piloting offline payments** in a project monitored by the Reserve Bank of India (RBI).

2023-02-06

Crunchfish CEO Joachim Samuelsson presented on Aktiedagen in Gothenburg a **new Payments Internet Protocol (PIP)** that is destined to become the foundation of front-end public and commercial digital payments applications.

2023-02-01

Crunchfish **released Digital Cash 2.0** to drive a paradigm shift in payments.

2023-02-01

Crunchfish CEO Joachim Samuelsson comments on the **launch of Digital Cash 2.0** in an interview with analyst firm Emergers. While offline payments protocol may work online, the reverse is not true. Online payments systems are by

design only capable of handling online payments. Hence, the underlying protocol for digital payments must be an offline scheme as it supports both offline and online payments.

2023-01-27

Crunchfish CEO Joachim Samuelsson **participated as an expert panellist** in the panel discussion on “The importance of offline payments for CBDCs and financial inclusion” at the DC3 Conference organised by the Digital Currency Global Initiative by International Telecommunications Union and the Future of Digital Currency Initiative at Stanford University.



2023-01-20

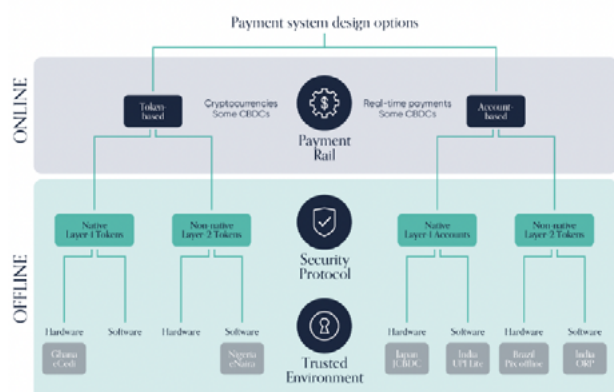
Inaugural **offline payments webinar** by Crunchfish in partnership with Lipis Advisors

2023-01-19

Crunchfish and Lipis Advisors **announced expert panellist line-up** for offline payments webinar.

2023-01-19

Lipis Advisors have **released their first whitepaper**, providing valuable insights to how offline payments relate and can interoperate with online payment system.



2023-01-17

Crunchfish **partner with Wibmo**, a PayU company and an industry leader in payment security and digital payments, to add offline payments to their Digital Banking platform.

2023-01-13

Crunchfish in partnership with Lipis Advisors announce a **new whitepaper series coupled by webinars** in a series on the theme “Enabling offline payments in an online world”.

2023-01-12

Crunchfish **receives clean IPRP** for key Digital Cash patent application.

2022-12-27

A recently announced financial platform provider in India has **finished integration of Digital Cash in their apps** in a short time. The financial platform provider has almost 100 existing integrations with Indian banks already. Crunchfish Digital Cash roll-out is expected to accelerate with this turnkey offline payment solution.

2022-12-20

Crunchfish in partnership with HDFC Bank and one additional Indian bank are ready to **start the pilot for Offline Retail Payments**. The pilot will host real users and real money, supervised by the Reserve Bank of India.

2022-12-14

Crunchfish has **engaged payment experts Lipis Advisors** to research and write two white papers to explore the topic of offline payments.

2022-12-09

Crunchfish expands to the Caribbean and Latin America by **entering a partnership** with Money Square in Jamaica to address this booming region.

2022-11-25

Crunchfish and Central Bank of Nigeria have **entered into a Development and Demonstration Agreement** for a Proof-of-Concept of Crunchfish Digital Cash offline payments with the eNaira, Nigeria’s advanced Central Bank Digital Currency project.

2022-11-24

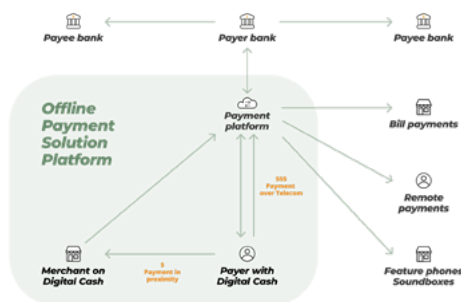
Crunchfish **published an interview** with CEO Joachim Samuelsson about the new pivotal mobile telecom partnership for Africa.

2022-11-23

Crunchfish joins a mobile telecom partnership with the objective to enable mobile operations and services in Africa.

2022-11-22

Crunchfish and a financial platform provider in India have entered into a partnership where Crunchfish will deliver Digital Cash SDK for integration into the provider's financial platform to create a turnkey solution for offline payments.



11/11 2022

Pay offline to anyone, anywhere with new Crunchfish Digital Cash 1.3 version. This new version extends the use of Crunchfish Digital Cash even more as it becomes possible to pay anywhere using telecom connectivity, and to anyone on a domestic payment scheme.

24/10 2022

Crunchfish reach important milestone in the project with Reserve Bank of India. Crunchfish's project for Offline Retail Payments together with HDFC Bank and one additional Indian bank by completing the integration of Crunchfish Digital Cash SDK into both Payer and Merchant apps.

Gesture Interaction

2023-02-08

Crunchfish's XR Skeleton has successfully been integrated into SpectreXR's OctoXR product to enable gesture interaction with virtual objects.

2022-12-15

Crunchfish and SpectreXR have signed evaluation agreements for each other's software products to enable a joint offering to the AR/VR market. Crunchfish's XR Skeleton products integrated with OctoXR from SpectreXR makes it possible to enable any AR/VR device with a powerful object interaction solution in a very short time.



2022-11-14

Crunchfish XR Skeleton 2.0 is ready for release. This is the second generation of the flagship product – XR Skeleton – targeting devices with a single camera.

2022-11-02

Crunchfish sign gesture agreement with OPPO, one of the largest mobile phone manufacturers in the world, to provide their consumer devices with Crunchfish's gesture control technology.

2022-10-27

Crunchfish release upgraded XR Skeleton Stereo with a new detector software module.

Digital Cash



लॉ के स्पे. पकोड़ी, स्पे. पालक पकोड़ी, स्पे. गोभी पकोड़ी



Paradigm shift in payments

Crunchfish Digital Cash is inspired by the design philosophies that was developed by the Defense Advanced Research Projects Agency (DARPA) in the 1970s and became the internet as we know it today. It is an incredible robust protocol based on packet switching. Crunchfish Digital Cash is based on the same design principles and is destined to deliver for digital payments what the internet has for digital communications.

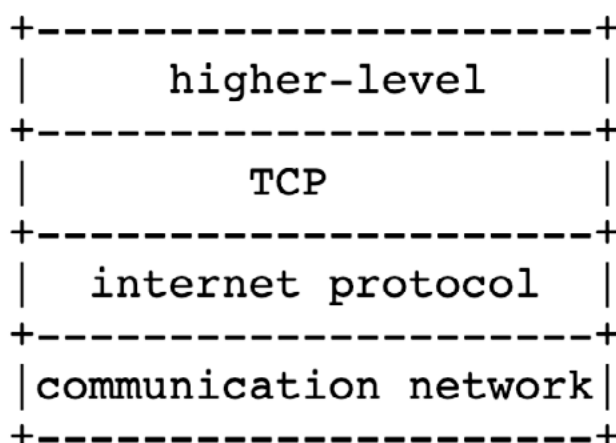
Any public good in the society like the internet, electricity or telecom must be carefully designed to continue working despite temporary outages of the service. It is hard to understand why digital payments, certainly also a public good, is not as robust as other public goods. **Digital payments service must be as robust, inclusive and private as cash payment.**

Financial regulators should demand that all closed-loop and Real-Time Payments services must fulfill these design criteria to be allowed to operate in the country. Central Banks should take it upon themselves to establish these design goals before making any technology choices for their CBDC implementations, as they tend to limit or even work

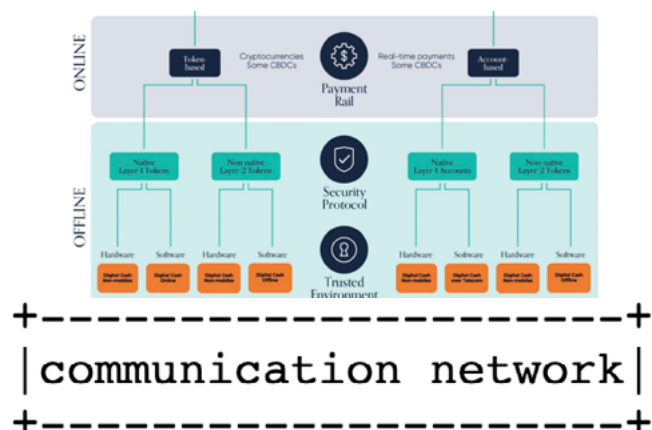
against to their own desired outcome. Crunchfish Digital Cash delivers on all the design goals of the internet and is designed to augment any digital payment service with these necessary properties. Furthermore, Crunchfish Digital Cash delivers the requirements of a CBDC implementation. No other payment service is required.

DARPA developed the 1970s a suite of protocols for packet switched networking. These protocols, which include the Internet Protocol (IP) and the **Transmission Control Protocol (TCP)** are in wide use for commercial networking. These protocols have also influenced other protocol suites, most importantly the connectionless configuration of ISO protocols.

Protocol Layering



TCP/IP in digital communications



Crunchfish Digital Cash TAP in digital payments

In the paper “**The design philosophy of the DARPA Internet Protocols**” published in 1988 by David D. Clark from Massachusetts Institute of Technology he outlines that Internet fundamentally is “a packet switched communication facility in which a number of distinguishable networks are connected together using packet communications processors called gateways which implement a store and forwarding algorithm.” This is how Crunchfish Digital Cash works for payments. He also outlines seven secondary design goals for TCP/IP, for which Crunchfish Digital Cash has an equivalent Trusted Application Protocol (TAP).



Secondary design goals TCP/IP		Crunchfish Digital Cash TAP equivalents
1	Internet communications must continue despite loss of networks or gateways.	Payments need to have survivability in the face of failure, essentially meaning that payments should work offline, regardless of internet connectivity and backend services.
2	The internet must support multiple types of communication services.	Digital Cash must support and be interoperable with multiple payment services.
3	The internet architecture must accommodate a variety of networks.	Digital Cash must be agnostic to the online payment rail and not constrain the type of payment rails that can be used.
4	The internet architecture must permit distributed management of its resources.	The front-end Digital Cash Trusted Application implemented in a Trusted Environment must be an independent payment ledger capable of keeping a balance, private keys used to sign out transactions.
5	The internet architecture must be cost effective.	The front-end Digital Cash Trusted Application must primarily be implemented in software-based Trusted Environment on smartphones or on smartglasses in the not-too-distant future.
6	The internet architecture must permit host attachment with a low level of effort.	The front-end Digital Cash Trusted Application should be able to connect over long-distance using either internet protocols or SS7 signaling over telecom networks to top-up the balance, making offline payments or initiating settlement.
7	The resources used in the internet architecture must be accountable.	The front-end Digital Cash Trusted Application should bind the user to the wallet and the offline transaction. Depending on regulatory Know-Your-Customer requirements the user may be an anonymous alias able to make smaller transactions ensuring privacy balanced with tax evasion and Anti-Money Laundering requirements.

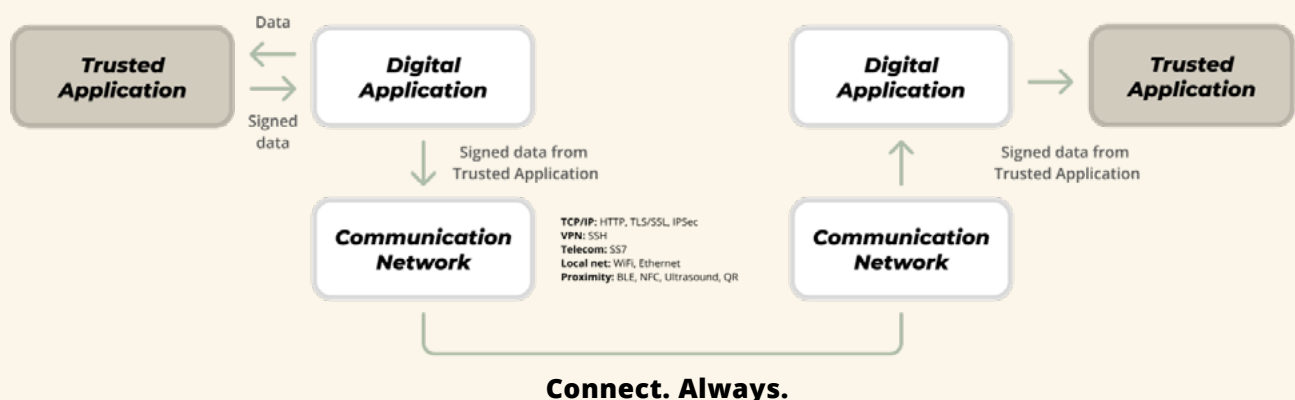
Connect and Pay. Always.

Digital applications of today are typically designed using a client server network architecture. Although reliant on the very robust internet protocol, access to the digital service is nevertheless uncertain as the user may not be able to get online access. Crunchfish has a solution by offering a trusted and secure client using a patent pending Trusted Application Protocol that is application agnostic. This is arguably the most important improvement in digital communications since the internet was introduced in the 90s.

Digital payments are not as robust as should be given their critical role as public or commercial goods in a modern society. The same holds true for digital applications in general. As they are typically implemented using client server network model, the digital service is only available if the user gets online network access over the internet. In the same way as Crunchfish Digital Cash provides robustness for digital payments services, the same approach is also applicable for any digital application. Adding an application agnostic trusted application protocol layer to digital applications has a profound impact on client server applications as it provides trust to the service regardless of the communication network, e.g. TCP/IP, SS7 over telecom or using any local network or proximity bearer.

The Trusted Application Protocol (TAP) is a protocol that can be used by any applications, across any platform and on any communication network, i.e. TAP is extremely generic and completely agnostic to the underlying application, platform, operating system, protocols or communication network.

In addition to making digital payments applications robust, having a trusted and secure client is very useful for any digital application that require login, executing a single command or automatic login without a passphrase to a remote server. This could for instance be used by electronic identification applications. Any application becomes more robust by the the Trusted Application as it is possible to use alternative routes than the internet to connect to the remote server



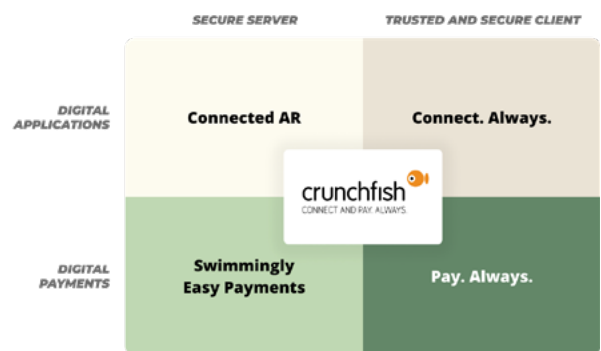
Signed data from a Trusted Application. Application and Communication Network agnostic.

with end-to-end integrity. Even in circumstances where the internet is available TAP adds additional integrity for the application data and ties the user directly to the trusted and secure client, which is beneficial for invoicing in subscription based applications. TAP may also be used for having a trusted identity on social media platform to get improved accountability for what is posted online.

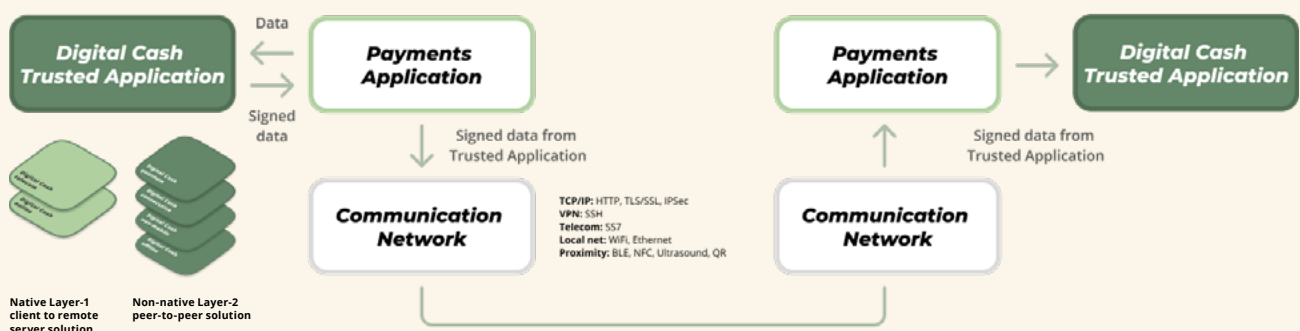
TAP augments any form of digital application by establishing trust and secure clients beforehand, instead of at the moment when the digital application will be used using hand-shaking techniques to establish a secure and encrypted session. Communication from these clients are trusted anywhere as the nodes used by the digital application have established access to a certificate authority beforehand, guaranteeing the integrity of the client as well as its communication.

TAP is arguably the most important improvement in digital communications since the internet was introduced in the 90s. Whereas the internet TCP/IP protocol made digital communications more robust, it is of little use if the application cannot get online access. The TAP protocol provides robustness as well as trust to digital applications by

providing alternative routes to the remote server. For what is the use of a robust internet if a user that cannot get online access to the digital service?



Crunchfish has a patent pending for this key protocol extension that applies to any form of digital application. The business model is mainly a subscription-based Trust-as-a-service model. The patent pending Trusted Application Protocol supports also interaction with digital applications over local networks or in proximity, like Digital Cash offline in payments.



Pay. Always.

Signed data from a Trusted Digital Cash Application. Payments Application and Communication Network agnostic.

India update

Q4 was a great quarter for Crunchfish Digital Cash. The Offline Retail Payments project for Reserve Bank of India (RBI) in India has advanced from development and integration into pilot phase with external customers and merchants, using real money under supervision by RBI. Two partnership agreements were signed with payment platform providers.



Crunchfish in partnership with HDFC Bank and one additional Indian bank have been working together in a project to develop an **Offline Retail Payments** solution for Reserve Bank of India (RBI) and their Regulatory Sandbox*. HDFC Bank is India's leading bank and was among the first to receive approval from RBI to set up a private sector bank in 1994. HDFC Bank has a banking network of 6,499 branches in 3,266 cities. The second bank in the project is one of the leading banks in India.

At the end of Q4 the project completed quality assurance, including a security audit with penetration test by an external security firm. A demonstration of the solution was performed for the RBI before the project advanced into **pilot phase**. RBI was very pleased with the demonstration and requested the two banks to include significantly more customers and merchants in the pilot, as the solution has big relevance and potential for India. Customers and merchants are being onboarded both in the major cities of

*The Regulatory Sandbox was established in 2020 by the Reserve Bank of India (RBI) to foster responsible innovation in financial services, promote efficiency and bring benefit to end users. The Regulatory Sandbox is a formal regulatory program for market participants to test new products and services with customers in a live environment, subject to certain safeguards and oversight. It allows the regulator, innovators, financial service providers and end users to conduct field tests to collect evidence on the benefits of new financial innovations, while carefully monitoring and containing their risks. To be approved access to the Regulatory Sandbox, the proposed financial service shall include new or emerging technology, or use of existing technology in an innovative way and should address a problem and bring benefits to consumers.

India as well as in the hinterland. The pilot is scheduled to run for a period of four months, followed by a one-month evaluation by RBI. If successful, the pilot will provide basis for RBI's guidance and regulatory support in providing Offline Retail Payments, based on Crunchfish Digital Cash platform, to the payment ecosystem of India.

The Reserve Bank of India announced a **Concept Note on Central Bank Digital Currency** (CBDC) for India in October 2022. The Concept Note explains the objectives, choices, benefits and risks of issuing a CBDC in India, referred to as e₹ (Digital Rupee). The e₹ will provide an additional option to the currently available forms of money. It is substantially not different from banknotes, but being digital it is likely to be easier, faster and cheaper. It also has all the transactional benefits of other forms of digital money. Based on the successful demonstration of the Offline Retail Payment solution, RBI has expressed an interest to also evaluate offline payment for the e₹. Meeting will be set up with RBI during Q1 to explore this opportunity.

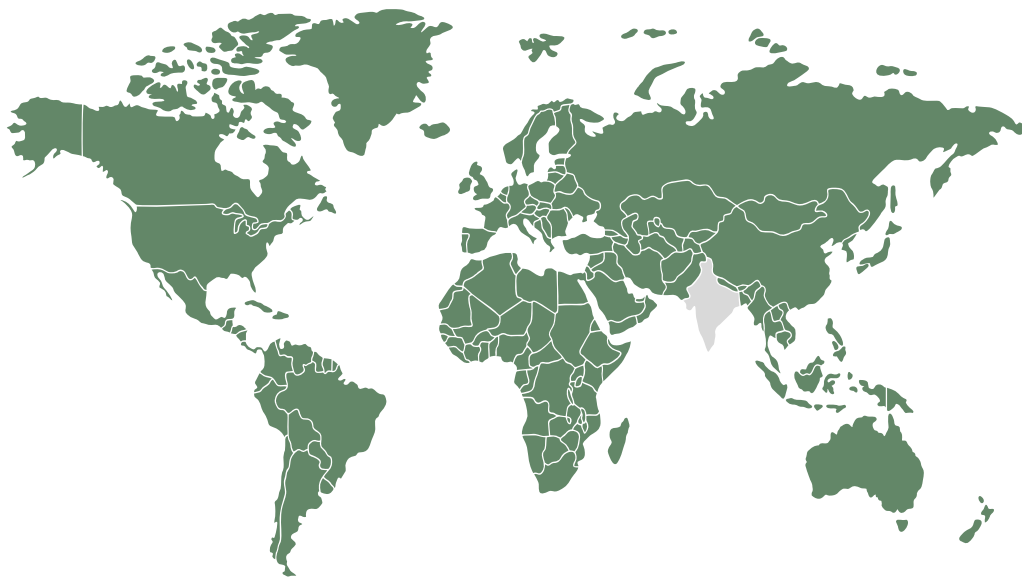
The project with one of the major e-wallets in India is still ongoing and part of the e-wallets development plans for 2023. The e-wallet app today requires online connectivity at startup and thereby needs to be redesigned to host offline payment capabilities. The redesign is planned to be completed during Q2 2023, whereafter integration of Crunchfish Digital Cash offline with Proxilink Bluetooth interaction will start.

The RBI project generates interest among several banks and payments services in India. Discussions and evaluations have started with a few banks. A partnership has also been entered with the payments platform provider Wibmo.



Outdia update

The interest for Digital Cash outside India took off in Q4. In addition to Southeast Asia Crunchfish have now expanded operations to both Africa and the Caribbean. In Africa, Crunchfish are supporting the Central Bank of Nigeria with their CBDC eNaira implementation and joined a pivotal telecom partnership to deliver mobile payments with offline payments capabilities.



Africa

Nigeria, Africa's most populous nation, became the first African nation to launch a CBDC – the eNaira – 25 October 2021. To increase financial inclusion and add additional use cases to the eNaira, the Central Bank of Nigeria (CBN) is in the process of evaluating offline payments. Consequently, Crunchfish and CBN entered into a Development and Demonstration Agreement for a Proof-of-Concept of Crunchfish Digital Cash offline payments with the eNaira. Crunchfish have delivered Digital Cash for iOS and Android and are supporting CBN throughout the evaluation process. CBN will integrate Digital Cash into the eNaira wallet and backend to fully evaluate the user experience and use cases in a potential commercial deployment.



Crunchfish joined a new pivotal telecom partnership with Socio ApS, a Danish management and investment company. The objective of this partnership is to enable telecom infrastructure across Africa to fill critical gaps by enabling mobile services with disruptive technologies, and to provide significantly better cost structures, use cases and quality.



The mindset is Anything-as-a-service to make it possible for companies and entrepreneurs to enter the mobile telecom industry with very little CAPEX. The objective is to enable mobile service operations in Africa and other emerging markets.

Latin America & the Caribbean

Mobile payments are critical to enable people to participate in the digital economy. Cash is still king in Latin America and the Caribbean (LAC), despite the demand for digital transactions brought by the COVID-19 pandemic. To impact the lives of most citizens — especially financially excluded and underserved people — require inclusive, affordable and easy-to-use mobile payments services. Offline payment is crucial for successful deployments of both commercial mobile payment services and Central Bank Digital Currencies (CBDC), as internet availability is undeveloped in the LAC region.

The LAC region is an early adopter of Central Bank Digital Currency (CBDC). The Bahamas was the first country in the world to officially roll out CBDC with the Sand Dollar in October 2020. This was followed by DCash in the Eastern Caribbean Currency Union 2021 and Jamaica's JAM-DEX 2022. During Q4 Crunchfish entered a **partnership with Money Square in Jamaica** to address opportunities within both commercial mobile payment services and CBDC in this interesting region. Money Square will actively promote Crunchfish Digital Cash as an agent, with an initial focus on Jamaica and then address the rest of the Caribbean and select countries in Latin America.



"I believe that Digital Cash is about to forever change the way we do transactions and business in this Digital Age. The Caribbean and Latin America stand to benefit from this revolutionary technology as many of our nationals live in rural areas where there are internet connectivity issues, and local banks tend to have frequent service interruptions and scheduled maintenances, which all affect reliable processing of payments. Thanks to Crunchfish Digital Cash these issues will be eliminated and the future of payments for the Caribbean and Latin America will be bright."

says Maurice K.P. Sinclair, CEO Money Square

Southeast Asia

Co-operation with V-Key and Sirius continue around sales and marketing in Southeast Asia with positive developments. V-Key is coordinating the project in Vietnam with one of the leading e-wallets. Progress has been slow due to regulations and pending approval from Vietnam Central Bank, but a pilot is expected to start mid-2023.

Crunchfish's focus in Southeast Asia during 2023 will be on the VIP-countries – Vietnam, Indonesia and the Philippines. Vietnam has modern communication technology and a government policy that favors a cashless society. In the Philippines there is a strong government push towards digital payments and financial inclusion. The central bank, Bangko Sentral ng Pilipinas (BSP), expects at least 50 percent of payments to shift to digital by 2023. And in Indonesia, the world's fourth most populous nation, the economy has boomed dramatically, giving rise to a connected population, tech startups and steadily improving living standards.

Payments platform partners

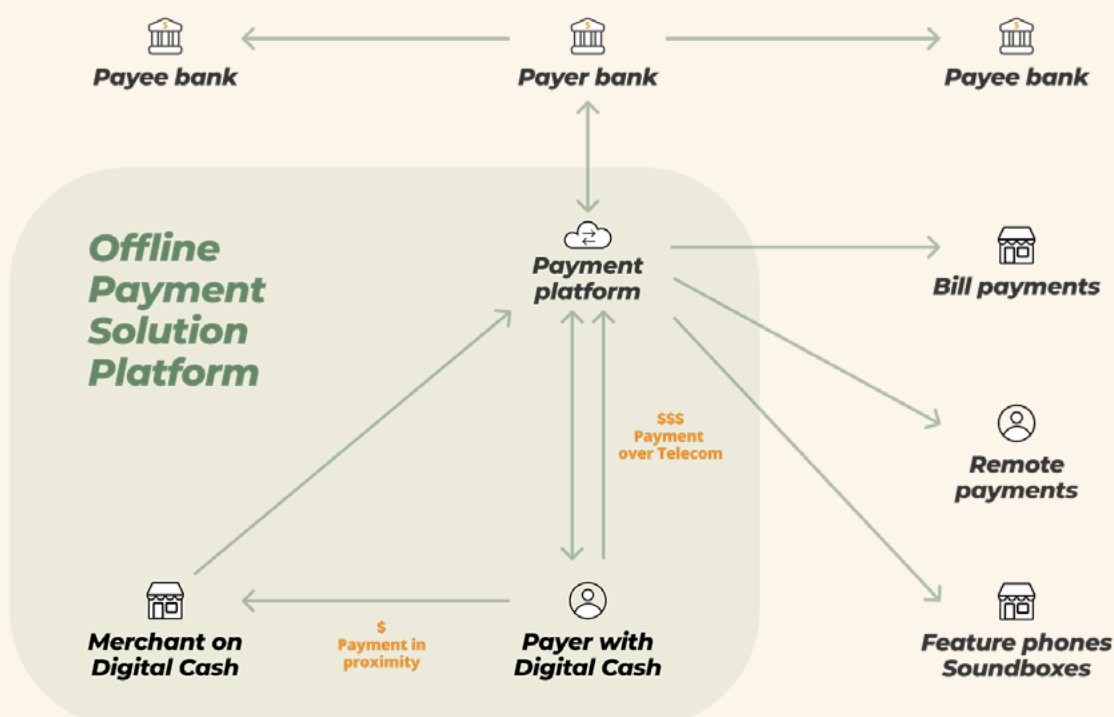
Partnerships with payment platform providers accelerate Digital Cash roll-out as they are already integrated with many banks and payment services. Crunchfish have previously announced integration with the payments platform of Sirius. During Q4, Crunchfish Digital Cash has been integrated into a payments platform chosen by HDFC Bank. Crunchfish have also announced the start of integrations with Wibmo, a PayU company and an industry leader in payment security and digital payments.

Crunchfish and a payments platform provider in India entered into a partnership to create a turnkey solution for offline payments. The financial platform provider has almost 100 integrations with banks in India for various online payment use cases with the same Reserve, Pay and Settle methodology as promoted by Crunchfish.

The integration will accelerate Digital Cash onboarding of banks and payment services as the financial platform is

already integrated with many Core Banking Systems and can be re-used by other banks and payment services. The integration started in November with an initial focus on proximity payments. The company have already successfully integrated Crunchfish Digital Cash into their apps, connected to a sandbox provided by Crunchfish.

Next step is to link these apps to their own financial platform in the backend, instead of using the Crunchfish sandbox.



Wibmo, a subsidiary of PayU, are a global full-stack PayTech company, an industry leader in payment security and digital payments in emerging markets, partnering with 160+ banks & fintechs across 30+ countries. During the quarter Crunchfish **announced a partnership** with Wibmo for integration of Digital Cash into Wibmo's Digital Banking platform. With Digital Cash integration, Wibmo's customers will be able to process offline payments - payers will not have to worry whether they have mobile internet data connectivity or not. Payments will work regardless of whether there is connectivity at customer's or at merchant's end. Moreover, offline payments will be available as a modular, plug and play module within Wibmo's Digital Banking platform.



"The integration with Crunchfish will enable our customers to offer digital payments to the financially excluded and the underserved population. This will truly help people reap the benefits of the digital economy. Crunchfish are an innovator and leader in offline payments and this partnership will further enhance our Digital Banking platform capabilities to support Offline Payments", **says Suresh Rajagopalan, CEO Wibmo.**

Webinars and whitepapers

Payment experts Lipis Advisors in partnership with Crunchfish have released a whitepaper – A practical guide for offline payment design – in the new webinar and whitepaper series “Enabling offline payment in an online world”. This is the first whitepaper which will be followed by others on practical offline payment security / privacy on a bimonthly basis in 2023.

The first whitepaper includes a novel and elegant way to categorize offline payment solutions using three design options: Online payment rail, Offline security protocol and Offline trusted environment. This categorization will be a provide the payments ecosystems and issuers a better understanding of the various kinds of offline payment solutions that may be implemented to augment their online payment systems.

As a deep tech company Crunchfish have made three contrarian bets that we strongly believe are right.



Online Payment Rail:

The options are **token-based or account-based**. All cryptocurrencies are token-based, whereas all real-time payments systems are account-based. Central banks have a choice whether their online payment rail for CBDC should be token- or account-based. Crunchfish CEO Joachim Samuelsson has for almost two years pointed out the **benefits of an account-based payment rail for CBDC**.

Offline Security Protocol:

The design options are either **native (layer-1) or a non-native (layer-2) tokens** security protocol. Native/non-native is reference to the underlying online token-based or account-based payment rail. To ensure privacy by design Crunchfish advocate using non-native layer-2 tokens. Crunchfish has an exceptionally strong IP-position in the area of Digital Cash. It was further strengthened with the positive **international preliminary report on patentability (IPRP)** for offline payments with non-native (layer-2) tokens in proximity.

Offline Trusted Environment:

The options are either **hardware-based or software-based**. Whereas hardware-based solutions are necessary to implement Digital Cash on non-mobile devices, such as cards and wearables, software-based approaches are preferred on the smartphone, for scalability. Crunchfish has strong position in the offline payments market with its software-based approach as the competition have only implemented hardware-based offline solution. This was discussed at the ITU's at the DC3 conference at a panel discussion on **offline payments for CBDCs and financial inclusion**.

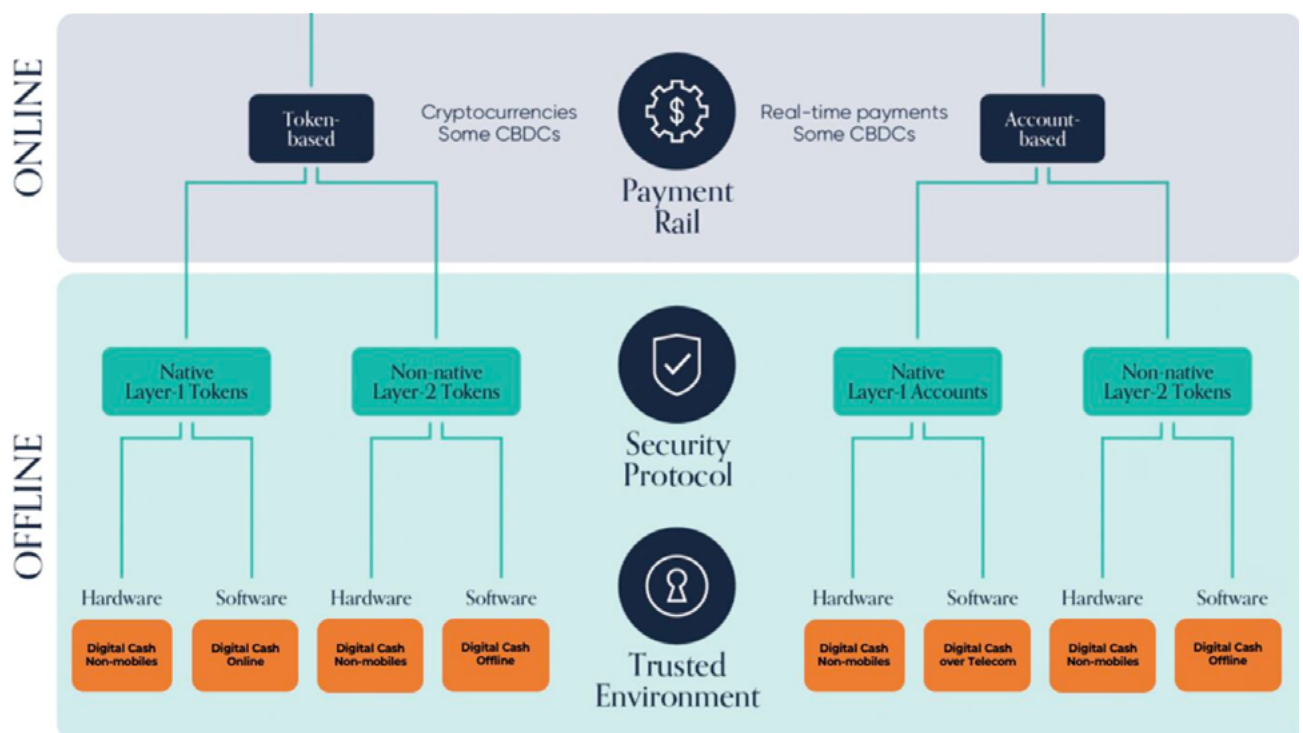
The initial whitepaper presents six offline case studies of which two involve Crunchfish Digital Cash; the **CBDC eNaira project for the Central Bank of Nigeria** as well as **Offline Retail Payments for HDFC Bank**, closely monitored by the Reserve Bank of India in RBI's Regulatory Sandbox. Both projects use non-native layer-2 tokens issued from a Trusted Environment implemented on smartphones. Whereas eNaira has a token-based online payment rail, the ORP project integrates with an account-based online payment rail.

To discuss the whitepaper Crunchfish in partnership with Lipis Advisors hosted a **webinar** where payment expert Bonni Brodsky at Lipis Advisors presented the key insights of the whitepaper, followed by a moderator-led panel discussion with Beju Shah, the Head of Bank of International

Settlement's Innovation Hub in the Nordics, and Crunchfish CEO Joachim Samuelsson as panelists, moderated by Skånemotor's creative director Johan Wester.



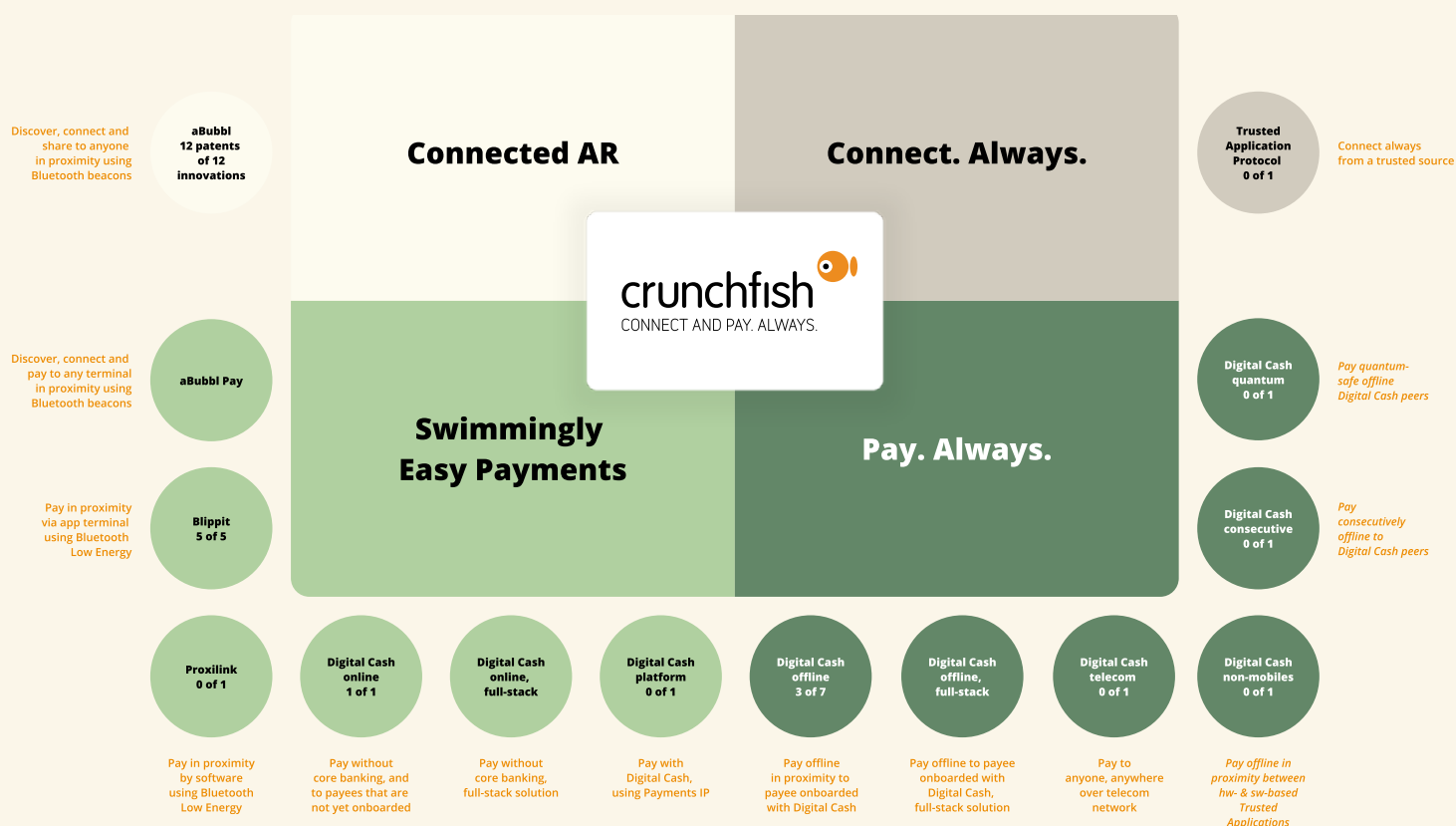
Beju Shah, the Head of Bank of International Settlement's Innovation Hub in the Nordics



Crunchfish provide a solution with native layer-1 or non-native layer-2 tokens using software- or hardware based trusted and secure clients for -offline, -online, -telecom, -non-mobiles, -consecutive, and -quantum-safe applications in payments.

Products and patents portfolio

Crunchfish Digital Cash business area started already pre-IPO in 2014 with an innovation that is should be possible to discover, connect and share information in proximity using Bluetooth beacons. Over the years this has evolved via terminal interaction using Blippit app terminal and proxilink to become the versatile Digital Cash platform of today. From the very start we have very strategically protected our innovations by applying for patents of which most have already been granted. The picture below provide an overview of this journey and links to videos and press releases for the respective products and patents.



Swimmingly easy payments

The initial focus of this business areas was not within payments. We saw an opportunity for any social application to be able to discover, connect and share with anyone in proximity. We called it Connected AR as we provided superpowers to users to be able to get much more information about their surroundings, their personal bubble, than what the naked eye could see. In 2017 we started to apply the technology to payments, but without any success as our designs had weaknesses.

Instead, we started to develop a terminal interaction between a mobile and PC using a Blippit app terminal in partnership with ClearOn. This got more traction and we did an integration with Swish in 2019. Looking already then at the Indian market we realised that Blippit was not a good fit for the Indian market. Of 60 million merchants only 2 million had a Point of Sales terminal with online connection.

We came up with Proxilink that connected a mobile directly using software only to a merchant's Android-based POS. In 2020 we pushed the concept online-by-proxy where a payer could connect online via the merchant's online connection with interest from the Indian market. We had to start the sales effort all over again due to the 4 months long complete lockdown in India between March and June 2020 and we decided to start to focus on Digital Cash offline instead.

Augmenting payments

Early 2020 we generalized our payments solution to become agnostic to proximity interaction. The concept of Digital Cash for offline payments was launched and patented. A lot of interest from the Indian market where online internet connectivity is not as readily available as in Sweden. We continued to generalize the concept with patent applications for interoperable offline schemes being applied for. Digital Cash offline was then launched in July 2021.

In Q3 2021 we realized based on customer feedback from the Indian market that we should generalize the concept once again and Digital Cash online was launched and patented in December 2021. The main focus of the product is to isolate the core banking system from the time-critical moment-of-payment. This is accomplished by reserving an amount beforehand that can be debited without involving the remitting bank in the payment process. It was also to verify a payment from the backend which is very applicable for our important Digital Cash over Telecom product for instance.

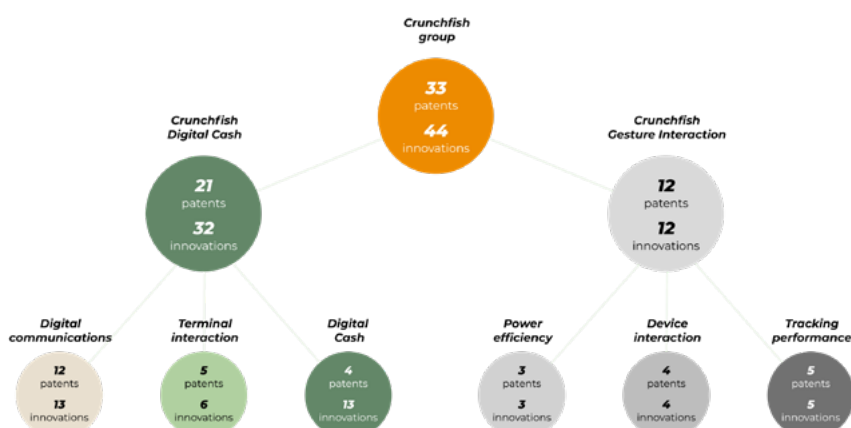
We summarized 2021 as the year when Digital Cash went from an offline product to an offline platform and presented a comprehensive Digital Cashplatform architecture with Digital Cash -online, -offline and for non-mobile devices.

Connect and Pay. Always.

Looking ahead into 2023 we have many important product releases and upgrades coming. We have recently released the refactored Digital Cash 2.0 platform which will form the basis of our next generation products. It is the basis for a paradigm shift in payments as we complement the TCP/IP protocol stack that payment applications use today with the much more robust, inclusive and private Payment Internet Protocol stack by Crunchfish. This will change digital payments in the same way the internet changed digital communications.

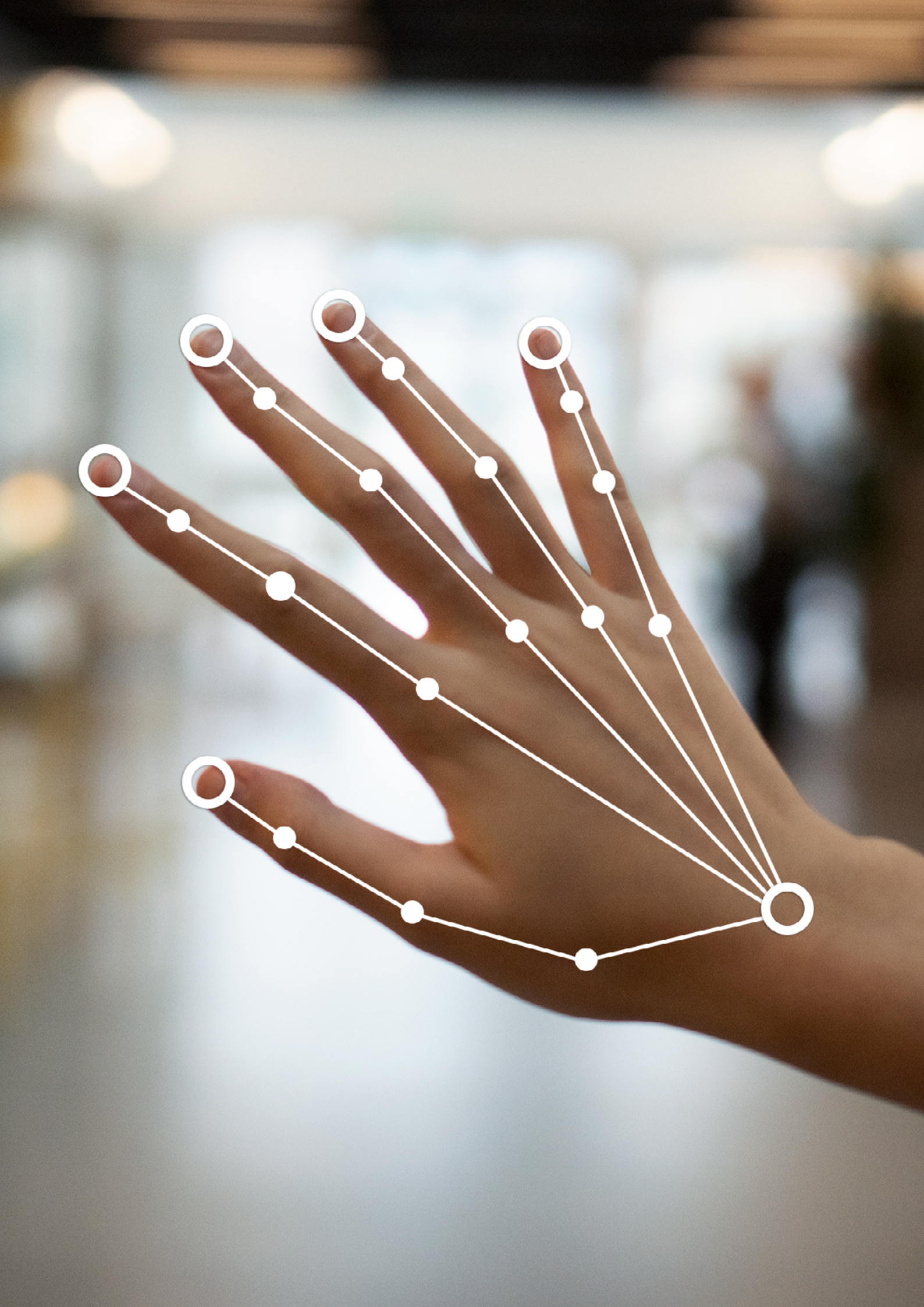
The first product release on the new 2.0 platform is Digital Cash over Telecom already in Q1 2023. A very important addition to the product portfolio. Here we just replace the uplink with telecom instead of the internet from the payers mobile to the backend. In this way the payer does not have to care whether he or she is online or not. It works regardless assuming the telecom connection is available. This is very important in countries like Sweden as it solves the congestion problems experienced at big events where it is difficult to get data connectivity, but the telecom network still works.

We are planning many additional releases and upgrades that we have already showcased but not yet released for production. Digital Cash for non-mobiles is a great example for digital and financial inclusion. To add survivability, we will also release consecutive offline payments that we have already demonstrated at the G20 Techsprint. To make offline payments quantum-safe is important as significantly faster computers will break today's public key encryption schemes. We have a patent pending in this as well as in all other areas. We are also able to deliver a full-stack Digital Cash offline as well as online solution with the strategic acquisition of an Indian payment platform company. The future looks indeed very bright for Crunchfish.



Gesture Interaction





AI-technology for gesture control

Crunchfish develop AI technology that detects and tracks hands and body. The technology can be used in several areas but is optimized for AR/VR (augmented & virtual reality) and the automotive industry. During the quarter a large commercial agreement with Chinese OPPO Mobile Communications as well as a development license agreement with Spectre XR in Croatia were signed. In parallel the work has continued to further extend the product portfolio with product releases of XR Skeleton Stereo and XR Skeleton single camera - supporting two hands.

Gesture Interaction – the purpose

During the last 15 years, the world has been moving from keypads and physical buttons towards touch screens and interactive surfaces. For mobile phones and tablets it is today mandatory to have touch screens and the same goes for larger public screens at train stations etc. In automotive the number of screens increase and are adapting touch interaction as well as touchless interaction. In AR/VR there are no physical displays at all, so the question is how to interact with devices without a physical screen?

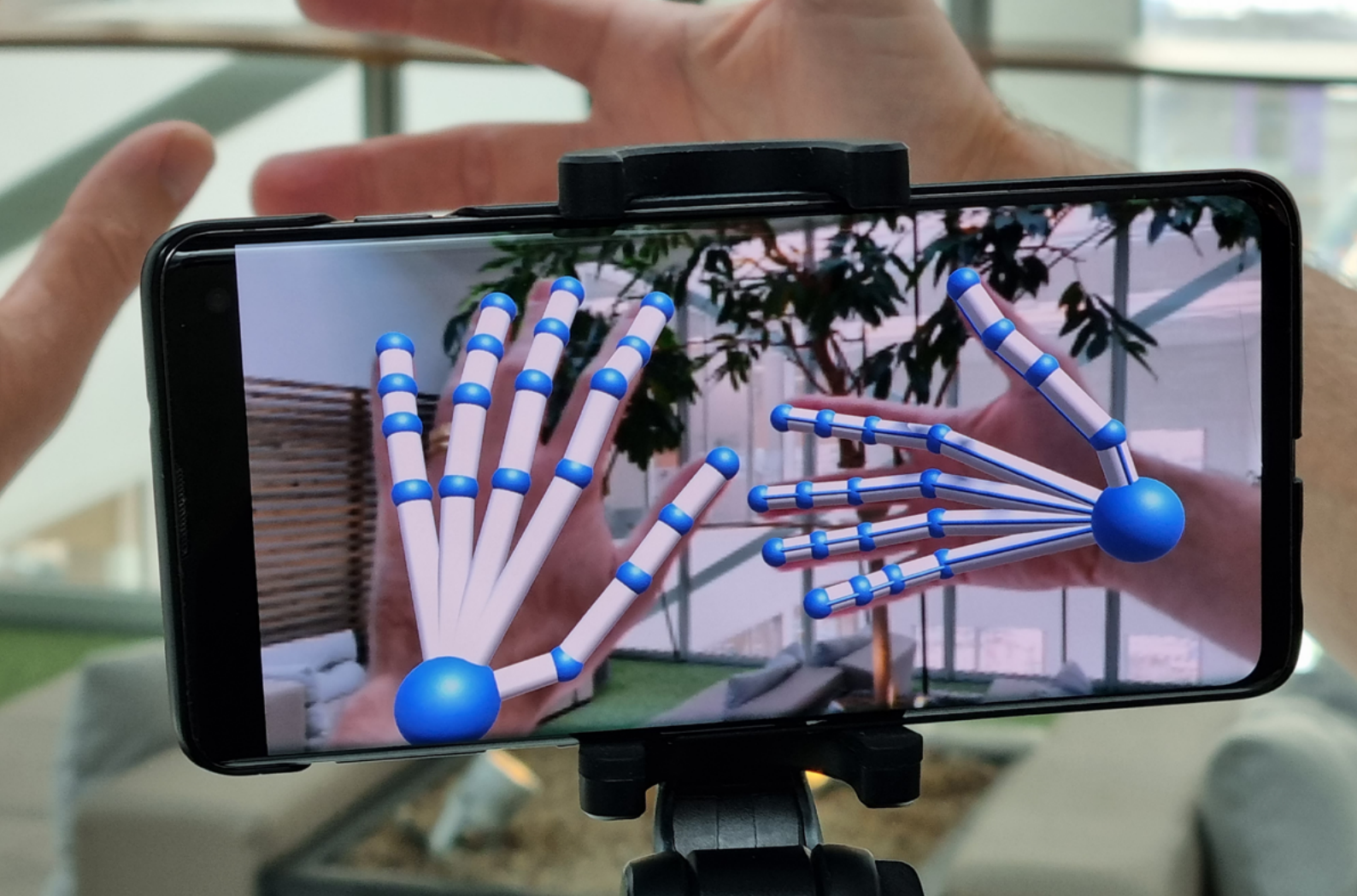
The purpose of Crunchfish Gesture Interaction is to enable users to interact intuitively with any screen. No matter if the screen is physical or virtual and if in Reality, Augmented Reality or Virtual Reality – interaction always need to work and be deeply intuitive.

For the automotive industry and vehicles there is another, even higher purpose – Save lives. By enabling intuitive screen interaction with gestures, the driver can keep focus on the driving. Further, and even more important, Crunchfish's hand&body tracking technology can keep track on driver and passengers' behaviour (Driver Monitoring System and Occupant Monitoring System) and alert the driver if something is not safe. This may include drowsiness, attention on mobile phone instead of driving etc.

Gesture control and Crunchfish Skeleton platform

Gesture control is about interacting with electronic devices without having to touch a screen or press physical buttons. Using a camera sensor and hardware with a processor, Crunchfish's gesture control technology makes it possible to interact from a distance by detecting and tracking the movements of the hands and body and then connecting these movements to various functions of a device.

The product XR Skeleton has a software architecture that enables a skeletal image of each hand represented by 21 points. Unique combinations of different neural networks have been used to train algorithms and create detection and tracking functionality. The development speed of new products that Crunchfish's experienced and sharp development team are demonstrating, not only creates a wide range of new solution areas, but also shows technical ability and flexibility of the company's advanced gesture control software.



Crunchfish Skeleton platform – based on the XR Skeleton product - forms the basis for the continued development of existing and new products and have during the quarter been supplemented with additional functions and adaptations to specific contexts and areas of use. The platform itself consists of several different components such as inhouse developed tools, camera rigs, inhouse designed neural networks and processes for generating synthetic data.

XR Skeleton Stereo is the flagship hand tracking product of the platform and enables high precision tracking and accuracy in all 3 dimensions due to the dual-camera input. The solution also provides tracking of 42 points simultaneously (21 points on each hand) with high precision measurement of the distance between the camera sensors and each point of the hands.

With XR Skeleton as a base, detection of the whole body is also possible by initially applying 21 points and then 34 points from head to toe, which creates a full body tracking solution - FB Skeleton (under development). By combining hand tracking and body tracking, Crunchfish PS Skeleton was developed. PS Skeleton can be used for interaction in vehicles, for interaction with smart TVs etc. since it makes it possible to keep track of the number of people in front of a screen, detect hands super-fast and provide information about body positions and hand movements.

Market update and events

To further increase the market penetration and list of customers and partners, Crunchfish have during the period participated at tradeshows including Augmented World Expo (AWE) in Portugal and Consumer Electronic Show (CES) in US - the most influential tech event in the world. Crunchfish's key market segments are AR/VR and Automotive, where there are usecases with clear demands for gesture technology.

Market for AR/VR and automotive

Smart glasses continue to evolve from devices with a small screen in front of one eye and a single camera sensor to more advanced devices that project the screen in front of both eyes and have multiple camera sensors. For the consumer market, AR glasses with a stereo camera configuration will probably become standard as it adds a lot to the AR experience. From a gesture control perspective, this provides conditions for both greater precision as well as interaction with both hands simultaneously. The recently **upgraded Crunchfish XR Skeleton Stereo** will therefore be an important component in the company's portfolio.

In enterprise and industry, there is great potential for AR/VR with warehouses / logistics, training and machine maintenance with remote expert support as some examples. What model of AR/VR devices that is used in different environments varies depending on the area of use, but common is that they all need gesture control for effective interaction and Crunchfish have several different software products that may be suitable depending on the type of hardware.

The automotive industry is a growing market segment where hand & body tracking is starting to gain momentum. The increase is partly driven by the increase in the number of screens in vehicles, but above all by the forthcoming legal requirements regarding safety.

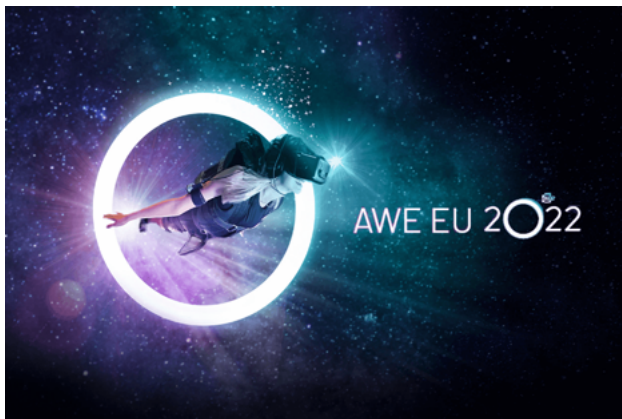
To help prevent accidents, car manufacturers are developing safety systems that keep track of the driver's condition and send alerts when a person shows signs of deviant behavior. These advanced systems include camera-based driver monitoring systems (DMSs) to detect inattention or fatigue of the driver and send an alert if the system detects that the driver appears distracted. There are also systems for monitoring passengers and other things in the vehicle that come in the next step. These are called OMS (Occupant Monitoring Systems) and will be able to provide additional information about the safety of a vehicle.

To meet the automotive usecases, Crunchfish's PS Skeleton was developed and offers a competitive product to the automotive industry. With both hand tracking and soon body tracking, functions such as detection of drivers and passengers are made possible.

With PS Skeleton optimized for RGB and IR camera sensors, Crunchfish have an excellent opportunity to take a position in the rapidly changing automotive industry by meeting the legal requirements that will be set for DMS. To use gestures to interact with entertainment systems in the front seat is another promising usecase in vehicles. As screens are becoming more common also in the back seat, the demand for gesture control will increase in this area to solve problems such as children in car seats not reaching the screen.

Marketing events

Crunchfish have during the last period participated in several major event including Augmented World Expo (AWE) in Portugal and Consumer Electronics Show in the US.



Augmented World Expo (AWE) is a leading series of worldwide events focused exclusively on the business of augmented reality (AR), virtual reality (VR) all known collectively as XR. This year AWE Europe had more than 2000 attendees and 100+ exhibitors providing a wide range of major news announcements and product launches. AWE is a great event to meet companies in the XR industry and see the latest trends. XR hardware continue to improve with more powerful performance, smaller form factor and less power consumption. Also the software and applications show a larger variety of functionality and different usecases, but also provide a better and more immersive user experience. One of the themes at the event was climate change and how XR can be used to fight climate change and it is amazing to see how XR applications can contribute to decrease the carbon footprint. Hand tracking can replace hand controls in XR and thereby decrease the carbon footprint for the actual device, but the key takeaway is that interaction with touchless gestures will be mandatory in the future of XR.

CES is the most influential tech event in the world. With 115,000 visitors from 177 countries, it is the proving ground for breakthrough technologies and global innovators. CES showcases companies including manufacturers, developers and suppliers of consumer technology hardware, content, technology delivery systems and more. Crunchfish had a great show with many positive meetings and good market and tech insights.



Trends this year at CES were sustainability, electrification and XR where especially VR is taking impressive steps forward. When looking at the development of AR and VR devices, most attention is given to VR and in many cases devices with an AR experience by using camera sensors for see-through capabilities. Most larger manufacturers of consumer electronics including players like Apple and Samsung, mean that AR is the future, but since the hardware is not yet good enough for AR glasses, VR drive the adoption of the XR experience and development of VR apps that in a next step easily can be adapted to AR.

Customers and partners

Crunchfish have during the period signed several new agreements where the two-year contract with OPPO is very important and also the largest contract to date. Crunchfish have also initiated partnership with SpectreXR for enhanced object interaction that fill a gap for our customers. The main market segments for the gesture business are AR/VR and automotive, based on the clear demand for hand & body detection as well as tracking.

Customers and partners

A new commercial agreement was signed with OPPO Telecommunications - one of the largest mobile phone manufacturers in the world - to provide their consumer devices with Crunchfish's gesture control technology. The agreement is valid until end of 2023, with an upfront fee of US\$500,000 including a commercial license and technical support.

The signed agreement includes the use of Crunchfish's gesture control software for pose detection in OPPO's devices. The license agreement covers shipment of devices during 2022 and 2023 which means that many of OPPO's consumer products will include Crunchfish's software for gesture control in the coming year. The agreement is valid until end of December 2023.

OPPO strives to be a sustainable company that contributes to a better world and exists to elevate life through

technological artistry. As one of the top 5 largest mobile phone manufacturers in the world and a strong actor in consumer electronics, OPPO is an important influencer on the market. With the new agreement in place, the collaboration between Crunchfish and OPPO continue for another term that enables an even stronger base for future OPPO products.



"We strongly believe the user experience and a smooth interaction is fundamental for the success of consumer products and intuitive gesture interaction will be crucial to ensure a great user experience. We are very happy with Crunchfish's technology and look forward to continuing our collaboration"

says Max Fan, Business Director at OPPO Mobile Communications.



“Bringing hand interactions into AR is a significant milestone and we are happy that it will add extra value to our present and future users and projects”
says Ivan Rajkovic, CEO at SpectreXR.

Crunchfish and **SpectreXR signed evaluation agreements** for each other's software products to enable a joint offering to the AR/VR market. Crunchfish's XR Skeleton products integrated with OctoXR from SpectreXR makes it possible to enable any AR/VR device with a **powerful object interaction solution** in a very short time.

XR Skeleton has successfully been integrated into SpectreXR's OctoXR product **to showcase gesture interaction with virtual objects**. The core ability of this is to grab and manipulate objects, which require both a robust hand tracking technology as well as interaction components that enable all the dynamics and physics behind virtual objects.

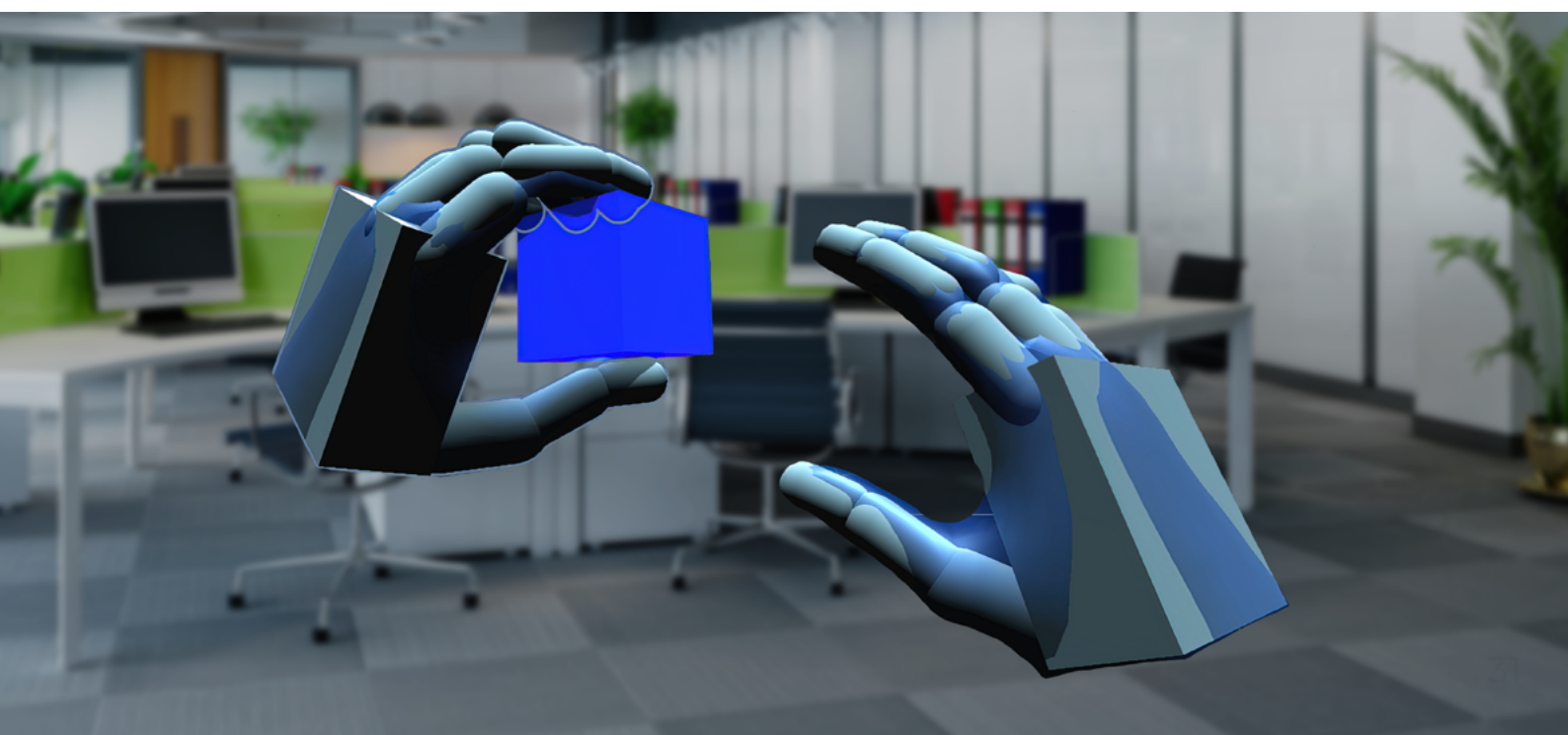
A joint solution by Crunchfish and SpectreXR will significantly reduce the time to develop interactive AR/VR software systems and apps.

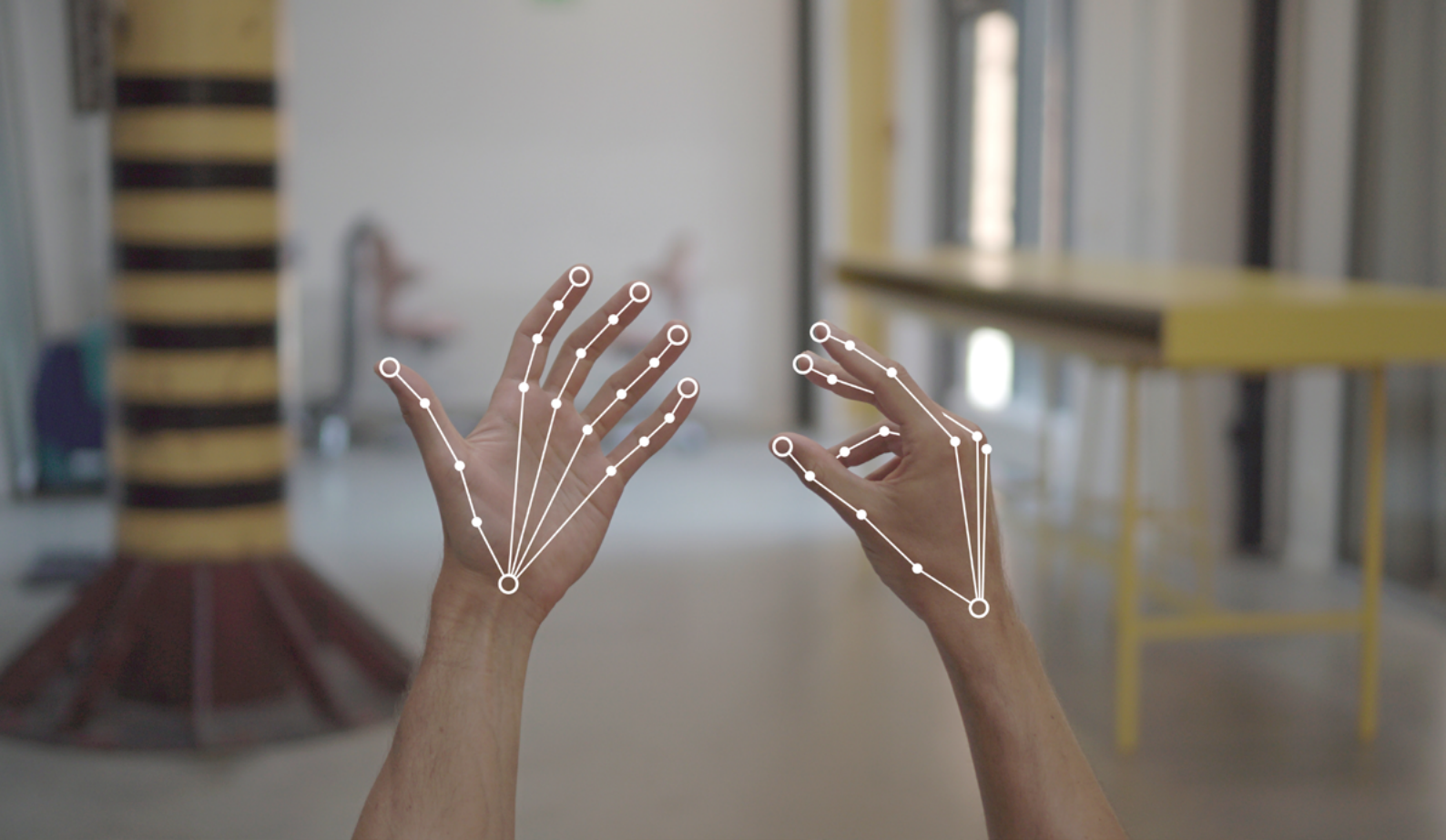
Crunchfish XR Skeleton provides hand tracking capabilities to AR/VR devices by analysing the image stream from the camera sensor(s) and then tracking 21 points on each hand with high precision. These 42 coordinates are then used to enable interaction with virtual objects.

It is very complex to design and develop virtual objects in AR/VR. The objects appear in three dimensions and also need to look and feel as realistic as in real life, which requires advanced software and very specific skills.



“I was very impressed by how fast XR Skeleton could be integrated into OctoXR and get to a working demo. The combination of Crunchfish's XR Skeleton and OctoXR enables a powerful solution that may shorten the time to market for many of our customers”
says Joakim Nydemark, CEO at Crunchfish Gesture Interaction.





During 2022 several other important deals were signed including license agreements with Lenovo and Ximmerse.

Ximmerse (Guangdong Virtual Reality Technology CO LTD) in China signed a commercial license agreement to provide Ximmerse's next generation AR-glasses with Crunchfish's latest hand tracking technologies - XR Skeleton and XR Skeleton Stereo. The agreement gives Ximmerse the right to use Crunchfish's technologies in AR-glasses and other mixed reality products worldwide. XR Skeleton Stereo is the Crunchfish's latest and most advanced software to date and provides support for two-hand interaction and the use of two camera sensors simultaneously.



"We are very excited about our next generation augmented reality products and see that intuitive gesture interaction will be crucial to ensure a great user experience. We are delighted to embrace Crunchfish's XR Skeleton technology and look forward to a fruitful collaboration", **says Mike Bailey, Co-founder at Ximmerse.**

Lenovo

"We strongly believe in the future of AR glasses and intuitive gesture interaction will be crucial to ensure a great user experience. We are very happy with Crunchfish's technology and look forward to a long and rewarding collaboration",
says Karl Lu, Senior Manager at Lenovo Research.



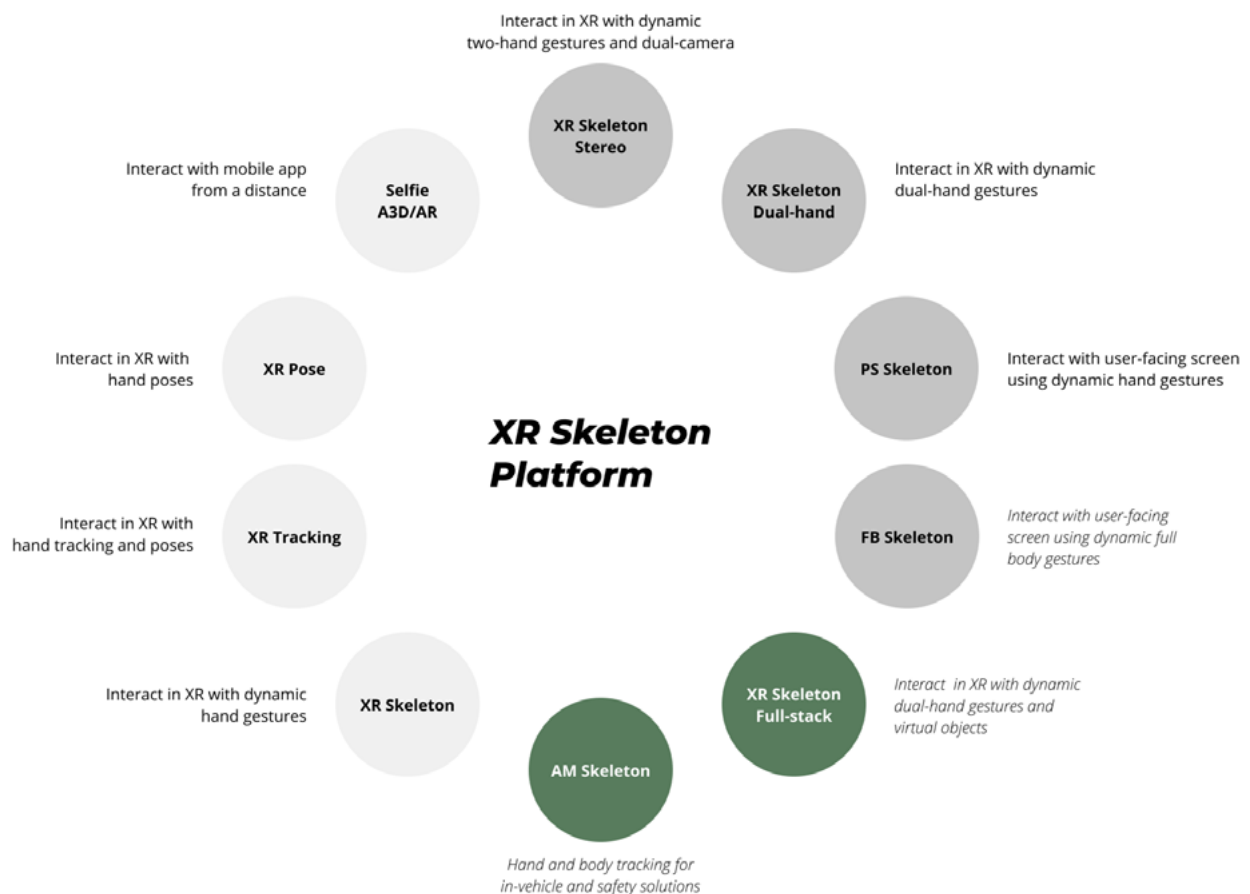
Crunchfish signed a commercial license agreement with Lenovo, to provide Lenovo's new AR-glasses with Crunchfish's latest hand tracking technology – XR Skeleton Stereo. Lenovo has integrated the software in their AR glasses to enable touchless interaction. The agreement gives Lenovo the right to use Crunchfish's software in AR glasses and Smart glasses worldwide. Crunchfish XR Skeleton Stereo is the company's latest and most advanced software to date and provides support for two-hand interaction and the use of two camera sensors simultaneously.



"We are very pleased that Lenovo has chosen to integrate our XR Skeleton Stereo solution into its new AR glasses. With XR Skeleton Stereo, we have taken the Skeleton platform and our hand tracking technology even closer to perfection and enable, as one of the first companies in the world, two-hand tracking with millimeter precision and support for dual cameras"
says Joakim Nydemark, CEO at Crunchfish Gesture Interaction.

Product portfolio

Crunchfish Skeleton platform and a sharp development team not only pave the way for many new solution areas but also show the Crunchfish Skeleton platform's great technical flexibility for advanced hand tracking. During the last quarter, upgraded product releases of XR Skeleton and XR Skeleton Stereo were shipped to customers. The new releases included new functionality as well as improved performance.



XR Skeleton products

XR Skeleton is Crunchfish's 4th generation gesture control product, where each generation still is part of Crunchfish's offering and target different usecases and hardware. The first product – Selfie A3D – is based on traditional image analysis and target mobile devices and tablets for use of pose-interaction. From 2015 the priority was AR/VR devices

and the following products (XR Pose etc.) were trained and optimized for different AR/VR devices. For every new product, the technology became more and more based on neural networks and XR Skeleton is based only on neural networks. With Crunchfish's inhouse developed tools and processes for eg. generating training data, XR Skeleton became the foundation of the XR Skeleton platform.



Lenovo ThinkReality A3AR glasses

Crunchfish Skeleton platform forms the basis of the continued development of existing and new products and have during the quarter generated new and updated product releases such as XR Skeleton Stereo. The platform itself consists of a number of different components including inhouse developed tools, camera rigs, inhouse designed neural networks and processes for generating synthetic data.

and will increase the detection speed substantially as well as provide a 30% higher detection rate. The detection rate is a measure for how fast and reliable the software can detect a specific object in the image streams from the cameras.

The XR Skeleton Stereo solution uses two camera sensors with a distance between the cameras similar to the distance between human eyes, providing true three-dimensional



“With the latest research findings within deep learning and a great team effort, we have developed an extremely reliable and fast detector module that further increases the performance of XR Skeleton Stereo” **says Jens-Henrik Lindskov, R&D Director at Crunchfish Gesture Interaction.**

Release of upgraded XR Skeleton Stereo

A commercial product release of XR Skeleton Stereo has earlier been released to customers and partners. With tracking of 42 points simultaneously (21 points on each hand) and high precision measurement of the distance between camera sensors and each of the points on the hands, Crunchfish enable fantastic true to life interaction with virtual objects in three dimensions.

The development team has also during 2022 worked on a new detector algorithm that is fully optimized for a stereo camera configuration and detection of two hands simultaneously. The new detector algorithm is included in the **upgrade of XR Skeleton Stereo** released during Q4 2022

image information of the distance between camera and every point tracked on the hands. The camera sensors also have a wide-angle perspective, which gives a large interaction space. The hands must be in the camera view (image) to be detected and tracked.

The areas of use for XR Skeleton Stereo includes interaction with virtual objects in AR/VR as well as new ways of tracking hands at a distance and controlling various screen functions and menus ([see video](#)). By identifying all the moving parts and contours of the hand and then linking these points (coordinates) together into a skeletal structure, interaction with objects as in the real world becomes possible.



“After specific requests from many customers regarding support of two hands in the single camera hardware environment, we decided to extend our solution with that functionality. With a modified neural network and programming, I am now proud to be able to deliver this upgraded XR Skeleton product that is faster, consumes less power and support tracking of two hands”

says Jens-Henrik Lindskov, R&D Director at Crunchfish Gesture Interaction.

Release of XR Skeleton 2.0 – Single camera

Crunchfish have during Q4 **made XR Skeleton 2.0 available to customers and partners**. This is the second generation of the flagship product – XR Skeleton - that target devices with only a single camera. In this upgraded version the performance has increased with 20%, but most importantly support for tracking of two hands simultaneously has been added.

XR Skeleton 2.0 is an upgraded version of the XR Skeleton 1.1 and target use cases in primarily AR/VR, but the algorithms are also applicable in the automotive industry. With more wide-angle camera sensors available on the market, single sensor solutions are becoming more common. The benefits with only one wide-angle sensor are lower cost, less power consumption and that it is enough to cover a large area in front of the user that enables a wider interaction space for hand tracking. Interaction with two hands then becomes natural.

Compared with having two camera sensors as in the stereo camera set-up, the accuracy when moving the hands in the depth direction is slightly less precise with a single camera. Still, it is possible to enable a great user experience in many use cases also with a single camera. Especially with a wide-angle sensor since both hands can fit in the field of view of the camera and be used simultaneously when interacting with the device.

In the car environment, often just one sensor is used to track driver and passenger in the front seat. Tracking of two hands and sometimes even four hands is required. Crunchfish's solution can also support four hands with the latest algorithms. In AR/VR and in particularly smart glasses, there is sometimes only one camera sensor between the lenses to save cost. Still, support for interaction with two hands is required, which is supported in XR Skeleton 2.0.

Product roadmap

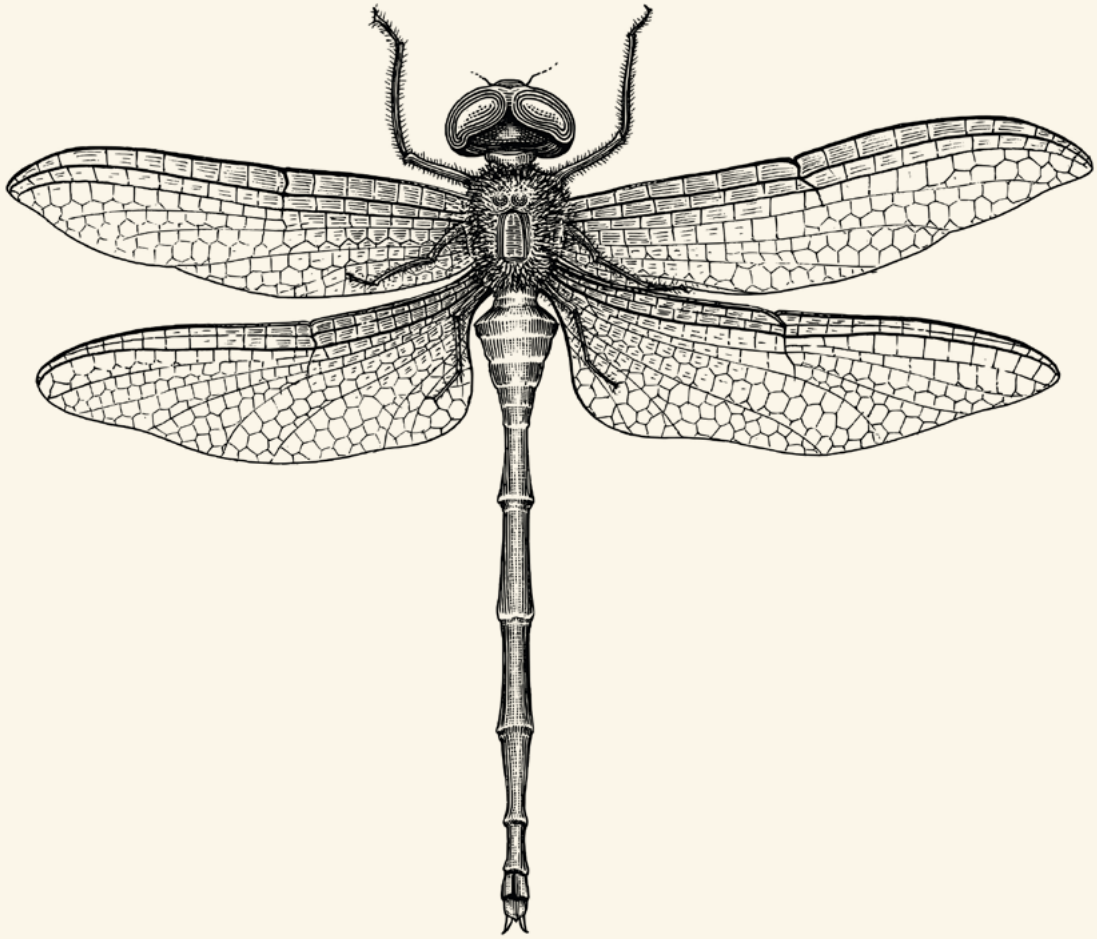
The hardware in future generations of XR (AR/VR) products will certainly be faster, smaller and more energy efficient. They will also support more advanced camera configurations, creating even more gesture interaction opportunities. Therefore, support for multiple camera sensors (stereo camera configuration) that increases precision in all three dimensions, as well as tracking of two hands simultaneously will be very important. For optimal performance, Crunchfish's products also need to be able to execute on custom processors such as Graphics Processing Unit (GPU) and Neural Processing Unit (NPU).

The roadmap for H1 2023 includes work with the next generation's neural network and further balance the solution with large amounts of data, simulated backgrounds, synthetic objects, lighting & shadow conditions, etc., to secure that XR Skeleton will be able to meet even the toughest requirements from customers and end users. A new commercial product release of XR Skeleton as well as XR Skeleton Stereo was delivered to customers during the period and commercial AR products including the software are expected to ship during 2023.

The development of combined solutions with XR Skeleton, PS Skeleton and the full body solution FB Skeleton, will also continue in order to fully support requirements from e.g. the automotive industry. Support for other types of camera sensors will also be important to enable new future use cases.



Financials



Financial report

Sales and earnings for 4th quarter

Net sales amounted to SEK 30 (883) thousand for the fourth quarter and operating expenses amounted to SEK 13,652 (19,208) thousand. Operating expenses decreased due to a loss in the associated company Blippit as per 31/12/2021. EBITDA for the period amounted to SEK -8,284 (-12,421) thousand. Loss before tax for the fourth quarter amounted to SEK 9,649 (14,779) thousand and has been charged with amortization of intangible assets of SEK 1,336 (1,704) thousand and tangible fixed assets of SEK 55 (80) thousand.

Sales and earnings for the year 2022

Net sales amounted to SEK 6,187 (3,957) thousand for the year and operating expenses amounted to SEK 45,973 (57,212) thousand. Operating expenses decreased due to the loss in the associated company Blippit as per 31/12/2021. EBITDA for the year amounted to SEK -18,116 (-29,207) thousand. Loss before tax for the year amounted to SEK 24,031 (38,468) thousand and has been charged with amortization of intangible assets of SEK 5,918 (7,343) thousand and tangible fixed assets of SEK 221 (318) thousand.

The increase in net sales for the year is due to the commercial agreement with OPPO Mobile Telecommunications. The agreement is valid retroactive from December 2021 to December 2023, with an upfront fee of US\$ 500 000 including a commercial license and technical support. The upfront fee regarding the commercial license has been recognized as revenue in 2022 as the software were delivered to the customer before the end of the year and the company has no future commitment.

Investments

During the fourth quarter, the Group invested SEK 3,559 (3,622) thousand in intangible fixed assets and 0 (0) in tangible fixed assets.

During the year, the Group invested SEK 13,555 (14,342) thousand in intangible fixed assets and 60 (0) in tangible fixed assets. Investments in associated companies amounted to SEK 0 (1,500) thousand.

Liquidity and financing

At the end of the year the Group's cash and cash equivalents amounted to SEK 29,293 (32,756) thousand. Cash flow from operating activities during the fourth quarter amounted to SEK -495 (-3,966) thousand. During December 2022, the company raised an additional SEK 21 million after issue costs because of the exercise of warrants. Furthermore, the company raised 1,5 Million in a new incentive program where employees and other key persons subscribed for 647,500 warrants.

Staff

As of December 31, 2022, the number of employees was 20 (20).

Risks and uncertainties

Several different risk factors could impact Crunchfish's operations and industry negatively. It is therefore very important to consider relevant risks in addition to the Company's growth opportunities. Relevant risks are presented in the prospectus issued by Crunchfish AB in October 2021 and the annual report for FY 2021, which can be found at crunchfish.com

Related party transactions

Group management and administrative staff are employed in the parent company Crunchfish AB. Reported sales in the parent company consists of income from services rendered for management and administration of the company's two subsidiaries. Crunchfish Digital Cash AB performs development and administrative services for the jointly owned company Blippit AB. Of the group's net sales for the fourth quarter, SEK 0 thousand (270) relates to fees invoiced to Blippit. Of the group's net sales for the year, SEK 141 thousand (2 631) relates to fees invoiced to Blippit

Sales and earnings for the 4th quarter, parent company

The parent company's net sales amounted to SEK 4,743 (4,686) thousand for the fourth quarter and operating expenses to amounted to SEK -5,168 (-4,890) thousand. EBITDA for the period amounted to SEK -32 (299) thousand. During the fourth quarter, the parent company invested SEK 0 (0) thousand in intangible fixed assets and SEK 0 (0) thousand in tangible fixed assets.

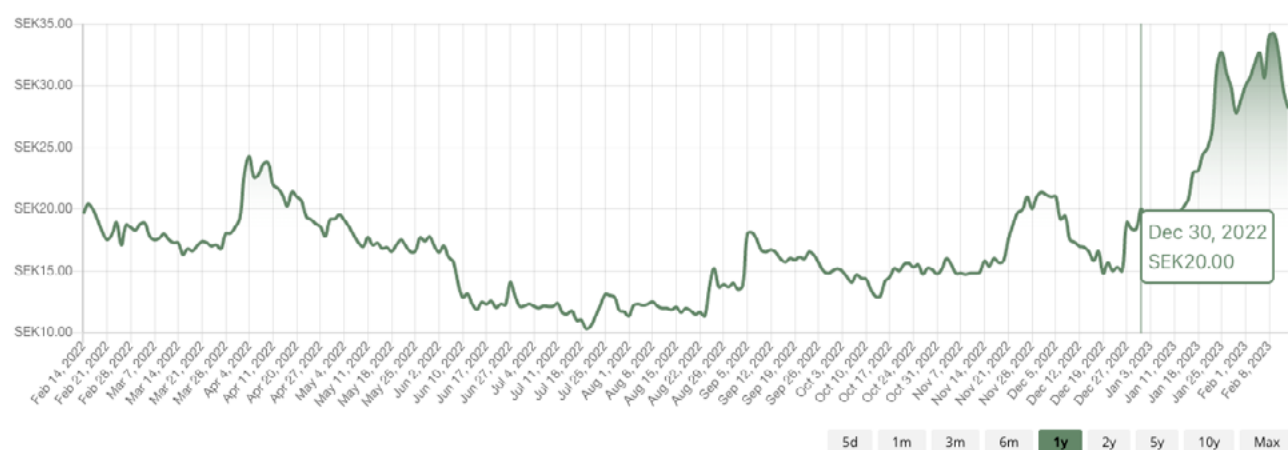
Sales and earnings for the year 2022, parent company

The parent company's net sales amounted to SEK 17,916 (20,932) thousand for the year and operating expenses to amounted to SEK -19,774 (-22,129) thousand. EBITDA for the year amounted to SEK 111 (858) thousand. During the year, the parent company invested SEK 0 (0) thousand in intangible fixed assets and SEK 60 (0) thousand in tangible fixed assets.

Major shareholders for Crunchfish AB (publ) as of December 31st 2022

Shareholder	# of shares	% Share
Femari Invest AB (CEO Joachim Samuelsson & Petra Samuelsson)	7,500,000	22.70
Corespring Invest AB (Chairman Göran Linder)	5,985,441	18.12
Paul Cronholm (Founder & CTO)	1,100,601	3.33
Carlquist Holding AB	1,000,000	3.03
Mikael Kretz incl. company holdings	720,000	2.18
Håkan Paulsson incl. family and company holdings	625,000	1.89
Lars Andreasson incl. family holdings	415,000	1.26
Claes Capital Consulting AB	363,480	1.10
Granitor Invest AB	314,818	0.95
Mats Kullenberg	264,829	0.80
Total ten largest shareholders	18,288,568	55.35
Other shareholders (approx 7,000)	14,750,599	44.65
Total	33,039,167	100.00%

Share price development during 12 months



Financial calendar

Crunchfish AB publishes financial reports after each quarter. Upcoming reports are planned to be published according to the schedule below:

Interim report Q1 2023

May 22, 2023, 8:30 am CET

Annual General meeting (Malmö) 2023

May 22, 2023, 10:00 am CET

Half-year report 2023

August 24, 2023, 8:30 am CET

Interim report Q3 2023

November 15, 2023, 8:30 am CET

Year-end report 2023

February 15, 2024, 8:30 am CET

Accounting principles

This report has been drafted according to the Annual accounts act (Årsredovisningslagen) and BFNAR 2012:1 (K3).

Auditor's review

This report has not been subject to review by the company's auditor.

Company information

Crunchfish AB (publ), corporate registration number 556804-6493, is a limited company seated in Malmö, Sweden.

Certified Adviser

Västra Hamnen Corporate Finance AB is the company's Certified Adviser.

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Further information

For further information, please contact:

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Crunchfish AB (publ)

Stora Varvsgatan 6A

211 19 Malmö

Statement by the Board of Directors and the CEO

The Board of Directors and the CEO hereby assures that this interim report gives a fair overview of the company's operations, financial status, and result.

Malmö, February 16, 2023

The Board of Directors

Göran Linder (chairman)

Robert Ekström

Susanne Hannestad

Joachim Samuelsson

Malte Zaunders

This information is information that Crunchfish AB is obliged to publish in accordance to the EU Market Abuse Regulation. The information was provided by the contact person above for publication on February 16, 2023.



Group income statement (SEK)

	Q4 2022	Q4 2021	2022	2021
Operating income				
Net sales	30,462	882,905	6,186,821	3,956,665
Own work capitalized	3,559,004	3,622,429	13,555,352	14,341,929
Other operating income	387,677	497,625	1,975,692	2,045,203
Total operating income	3,977,143	5,002,959	21,717,865	20,343,797
Operating expenses				
Goods for resale	0	-60,590	0	-210,688
Other external expenses	-4,403,422	-3,457,110	-16,174,705	-16,010,862
Personnel expenses	-5,999,428	-5,812,237	-21,734,875	-23,387,593
Depreciation of tangible and intangible fixed asset	-1,391,024	-1,783,749	-6,138,787	-7,661,499
Other operating expenses	-1 856 868	-471 926	-1 856 868	-755 275
Loss from participations in associated companies	-1,682	-7,622,535	-67,871	-9,186,410
Total operating expenses	-13 652 424	-19 208 147	-45 973 106	-57 212 327
Operating profit	-9 675 281	-14 205 188	-24 255 241	-36,868,530
Financial items				
Profit/loss from participations in group companies	-9,330	0	-9,330	0
Other interest income and similar profit items	37,638	23,942	254,527	111,464
Interest expense and similar loss items	-1,799	-598,145	-20,488	-1,711,092
Profit or loss from financial items	26,509	-574,203	224,709	-1,599,628
Profit or loss after financial items	-9 648 772	-14 779 391	-24 030 532	-38 468 158
Profit or loss before tax	-9 648 772	-14 779 391	-24 030 532	-38 468 158
Taxes				
Tax on income for the period	0	0	0	0
Profit or loss for the period/year	-9 648 772	-14 779 391	-24 030 532	-38 468 158
Key figures				
EBITDA	-8 284 257	-12 421 439	-18 116 454	-29 207 031
Earnings per share	-0,30	-0,49	-0,77	-1,34
Number of shares, average	31 967 254	30 066 262	31 313 537	28 777 708
Number of shares at balance sheet date	33 039 167	30 925 298	33 039 167	30 925 298
Earnings per share after full dilution	-0,30	-0,49	-0,77	-1,34
Number of shares after full dilution, average	33 093 888	31 479 062	32 527 045	30 176 883
Number of shares after full dilution, balance sheet date	34 615 467	32 338 098	34 615 467	32 338 098



Group balance sheet (SEK)

Assets	Dec 31, 2022	Dec 31, 2021
Fixed assets		
Intangible assets		
Capitalized expenses for development work	33 508 932	27 322 509
Total intangible fixed assets	33 508 932	27 322 509
Tangible fixed assets		
Equipment	535,164	696,077
Total tangible fixed assets	535,164	696,077
Financial assets		
Participation in associated companies	68,653	136,524
Total financial assets	68,653	136,524
Total fixed assets	34 112 749	28 155 110
Current assets		
Current receivables		
Account receivables	1,547,884	771,340
Receivables from associated companies	0	33,281
Other receivables	449,987	1,092,731
Prepayments and accrued income	1,089,417	1,384,171
Total current receivables	3,087,288	3,281,523
Cash and bank balances		
Cash and bank balances	29,292,563	32,755,502
Total cash and bank balances	29,292,563	32,755,502
Total current assets	32,379,851	36,037,025
Total assets	66 492 600	64 192 135



Group balance sheet (SEK)

Equity and liabilities	Dec 31, 2022	Dec 31, 2021
Equity		
Equity attributable to parent company shareholders		
Share capital	1,519,802	1,422,564
Other contributed capital	276,001,326	249,140,087
Other capital including profit or loss for the year	-218 749 684	-194 719 152
Total equity	58 771 444	55 843 499
Current liabilities		
Lease liabilities	383,485	560,584
Accounts payable	1,914,397	1,104,350
Current tax liability	0	4,273
Other liabilities	777,788	2,491,917
Accrued expenses and accrued income	4,645,486	4,187,512
Total current liabilities	7,721,156	8,348,636
Total equity and liabilities	66 492 600	64,192,135
Key Figures		
Equity-assets-ratio	88,4%	87,0%
Debt-to-equity ratio	0.7%	1.0%
Interest-bearing net debt	n/a	n/a

Changes in the group equity (SEK)

	Q4 2022	Q4 2021	2022	2021
Equity at beginning of period/year	46,024,740	11,259,398	55,843,499	34,838,074
Share issues	21,478,445	64,427,700	26,077,445	64,427,700
Issue costs	-553,379	-5,064,208	-589,378	-5,064,208
Warrant premiums	1,470,410	0	1,470,410	110,091
Profit or loss for the period/year	-9 648 772	-14 779 391	-24 030 532	-38 468 158
Equity at end of period /year	58 771 444	55 843 499	58 771 444	55 843 499



Group cash flow statement (SEK)

	Q4 2022	Q4 2021	2022	2021
Operating activities				
Operating profit or loss	-9 675 281	-14 205 188	-24 255 241	-36 868 530
Adjustments for non-cash items	2 808 671	9 866 498	7 618 349	17 584 557
Interest received etc.	-106,378	10,439	30,585	12,484
Interest paid	28,437	-598,145	9,748	-1,680,856
Income tax paid	0	0	0	0
Cash flow from operating activities before changes in working capital	-6,944,551	-4,926,396	-16,596,559	-20,952,345
Cash flow from changes in working capital				
Decrease(+)/increase(-) in receivables	5,085,290	1,102,941	194,235	2,425,031
Decrease(-)/increase(+) in current liabilities	1,364,623	-142,276	-450,381	-858,418
Cash flow from operating activities	-494,638	-3,965,731	-16,852,705	-19,385,732
Investing activities				
Investments in associated companies	0	0	0	-1,500,000
Investment in technology development	-3,559,004	-3,622,429	-13,555,352	-14,341,929
Acquisition of fixed assets	0	0	-60,202	0
Change in cash deposits	0	0	0	4,900
Cash flow from investing activities	-3,559,004	-3,622,429	-13,615,554	-15,837,029
Financing activities				
Share issue	20,925,065	59,363,492	25,488,067	59,363,492
Loans from shareholders	0	-25,000,000	0	0
Amortization of financial leasing agreements	-25,864	-57,752	-177,099	-228,474
Warrant premiums paid	1,470,410	0	1,470,410	110,091
Cash flow from financing activities	22,369,611	34,305,740	26,781,378	59,245,109
Change in cash and cash equivalents	18,315,969	26,717,580	-3,686,881	24,022,348
Cash and cash equivalents at beginning of period/year	10,832,578	6,027,701	32,755,502	8,667,692
Exchange rate difference in cash and cash equivalents	144,016	10,221	223,942	65,462
Cash and cash equivalents at end of the year	29,292,563	32,755,502	29,292,563	32,755,502



Parent company income statement (SEK)

	Q4 2022	Q4 2021	2022	2021
Operating income				
Net sales	4,743,233	4,686,375	17,915,726	20,932,097
Own work capitalized	0	0	0	0
Other operating income	387,677	497,625	1,948,733	2,023,356
Total operating income	5,130,910	5,184,000	19,864,459	22,955,453
Operating expenses				
Other external expenses	-2,563,081	-2,173,711	-10,147,595	-10,125,722
Personnel expenses	-2,193,907	-2,711,126	-9,199,908	-11,971,263
Depreciation of tangible and intangible fixed asset	-4,972	-5,105	-20,646	-32,097
Other operating expenses	-405,611	0	-405,611	0
Total operating expenses	-5,167,571	-4,889,942	-19,773,760	-22,129,082
Operating profit	-36,661	294,058	90,699	826,371
Profit/loss from participation in group companies	-28,700	0	-28,700	-610,000
Other interest income and similar profit items	206,870	541,199	541,405	1,346,307
Interest expense and similar loss items	30	-599,027	-2,486	-1,701,717
Profit or loss from financial items	178,200	-57,828	510,219	-965,410
Profit or loss after financial items	141,539	236,230	600,918	-139,039
Profit or loss before tax	141,539	236,230	600,918	-139,039
Taxes				
Tax on income for the period	0	0	0	0
Profit or loss for the period/year	141,539	236,230	600,918	-139,039
Key figures				
EBITDA	-31,689	299,163	111,345	858,468
Earnings per share	0.00	0.01	0.02	0.00
Number of shares, average	31,967,254	30,066,262	31,313,537	28,777,708
Number of shares at balance sheet date	33,039,167	30,925,298	33,039,167	30,925,298
Earnings per share after full dilution	0.00	0.01	0.02	0.00
Number of shares after full dilution, average	33,093,888	31,479,062	32,527,045	30,176,883
Number of shares after full dilution, balance sheet date	34,615,467	32,338,098	34,615,467	32,338,098



Parent company balance sheet (SEK)

Assets	Dec 31, 2022	Dec 31, 2021
Intangible assets		
Capitalized expenses for development work	0	756
Total intangible fixed assets	0	756
Tangible fixed assets		
Equipment	51,139	10,827
Total tangible fixed assets	51,139	10,827
Financial assets		
Participations in group companies	123,057,790	92,343,208
Total financial assets	123,057,790	92,343,208
Total fixed assets	123,108,929	92,354,791
Current assets		
Current receivables		
Account receivables	1,547,884	771,340
Other receivables	211,928	372,859
Prepayments and accrued income	1,089,417	1,193,027
Total current receivables	2,849,229	2,337,226
Cash and bank balances		
Cash and bank balances	28,509,210	32,560,241
Total cash and bank balances	28,509,210	32,560,241
Total current assets	31,358,439	34,897,467
Total assets	154,467,368	127,252,258



Parent company balance sheet (SEK)

Equity and liabilities	Dec 31, 2022	Dec 31, 2021
Equity		
Restricted equity		
Share capital	1,519,802	1,422,564
Fund development expenses	0	756
Total restricted equity	1,519,802	1,423,320
Unrestricted equity		
Profit brought forward	148,440,683	121,717,727
Profit or loss for the year	600,918	-139,039
Total unrestricted equity	149,041,601	121,578,688
Total equity	150,561,403	123,002,008
Current liabilities		
Accounts payable	978,120	631,360
Liabilities to group companies	0	283,336
Other liabilities	766,808	1,116,875
Accrued expenses and accrued income	2,161,037	2,218,679
Total current liabilities	3,905,965	4,250,250
Total equity and liabilities	154,467,368	127,252,258
Key Figures		
Equity-assets-ratio	97.5%	96.7%
Debt-to-equity ratio	0.0%	0.0%
Interest-bearing net debt	n/a	n/a

Changes in parent company equity (SEK)

	Q4 2022	Q4 2021	2022	2021
Equity at beginning of period/year	128,024,388	63,402,286	123,002,008	63,667,464
Share issues	21,478,445	64,427,700	26,077,445	64,427,700
Issue costs	-553,379	-5,064,208	-589,378	-5,064,208
Warrant premiums	1,470,410	0	1,470,410	110,091
Profit or loss for the period/year	141,539	236,230	600,918	-139,039
Equity at end of period /year	150,561,403	123,002,008	150,561,403	123 002 008



Parent company cash flow statement (SEK)

	Q4 2022	Q4 2021	2022	2021
Operating activities				
Operating profit or loss	-36,661	294,058	90,699	826,371
Adjustments for non-cash items	4,972	5,105	20,646	32,097
Interest received etc.	120,030	541,199	461,235	1,272,652
Interest paid	0	-595,945	-2,516	-1,668,399
Income tax paid	0	0	0	0
Cash flow from operating activities before changes in working capital	88,341	244,417	570,064	462,721
Cash flow from changes in working capital				
Decrease(+)/increase(-) in receivables	5,745,330	257,252	-512,003	1,785,307
Decrease(-)/increase(+) in current liabilities	1,300,420	-565,178	-60,949	-1,141,888
Cash flow from operating activities	7,134,091	-63,509	-2,888	1,106,140
Investing activities				
	0	0	-60,202	0
Acquisition of shares in subsidiaries	0	0	0	-25,000
Disposal of shares in subsidiaries	16,300	0	16,300	0
Repayment shareholder contribution	0	0	370,000	0
Loans provided to group companies	-11,779,034	-7,267,645	-31,412,918	-35,745,861
Change in cash deposits	0	0	0	4,900
Cash flow from investing activities	-11,762,734	-7,267,645	-31,086,820	-35,765,961
Financing activities				
Share issue	20,925,065	59,363,492	25,488,067	59,363,492
Loans from shareholders	0	-25,000,000	0	0
Warrant premiums paid	1,470,410	0	1,470,410	0
Cash flow from financing activities	22,395,475	34,363,492	26,958,477	59,363,492
Change in cash and cash equivalents	17,766,832	27,032,338	-4,131,231	24,703,671
Cash and cash equivalents at beginning of period/year	10,655,507	5,531,185	32,560,241	7,816,432
Exchange rate difference in cash and cash equivalents	86,871	-3,282	80,200	40,138
Cash and cash equivalents at end of period/year	28,509,210	32,560,241	28,509,210	32,560,241

