INTERIM REPORT
Q1 2024

Trust in clients

Crunchfish is a pioneer in offline payments. The technology that Crunchfish has been developing since 2020 can make all kinds of mobile applications more secure. It is finally possible to place trust in clients, regardless of which mobile device the user has. Crunchfish emphasizes this broadening of our offering by making "Trust in Clients" Crunchfish's new tagline.

Offline payments

Offline payments by card has been around for a long time. The challenge is to make offline payments with mobile phones secure, independent of which mobile the user has. Crunchfish has solved that problem and created the only offline payment solution in the world that is both secure and scalable for mobile devices. The solution has been pilot tested in India by leading banks and in December 2023 it was approved by the Reserve Bank of India for rollout.

ACE the Future of Mobile Card Payments

Crunchfish's patented technology can also be used for mobile card payments. We increase security with a new form of card emulation that we call ACE - App-integrated Card Emulation - which handles tokenized card payments securely on the mobile. ACE works like HCE – Host-based Card Emulation – but with the advantage that all security, which would otherwise have to be built into the payment app, is provided by the ACE SDK. While the offline payment market is still in its infancy, there are already around 5 billion digital wallets with mobile card payments. Here, Crunchfish will take a position and become a pioneer in mobile card payments as well.

Mobile client / server applications

Crunchfish has solved many technical challenges for offline payment on mobile and these technical innovations can be generalized to any mobile application. It doesn't even have to be about payment. Today, application security is implemented in the server, but with Crunchfish technology, we make it possible to also trust the clients, which creates more secure applications and novel use case possibilities. Crunchfish technology can be implemented in any mobile application and it is specially valuable when resources should be managed securely, even in the client. Offline payments and mobile card payments are not the only two use cases.
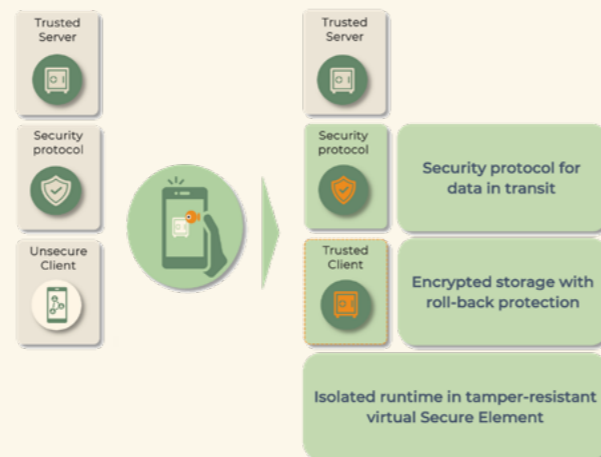

Figure: Device-agnostic trusted client applications for offline use cases in any mobile client / server system.

Data Integrity

Trust in a payment application is based on the ability to handle data securely during execution, when it is stored, as well as during transfer. The execution is very vulnerable because the data is then handled unencrypted in the mobile. To achieve the necessary security, the execution must take place in a secure element. In order not to limit the application to only certain phones, the secure element may not be hardware dependent but implemented by a virtual secure element. Data is stored on the mobile phone in encrypted files. For data integrity, it is necessary to be able to detect if files have been tampered with. The data transfer is encrypted and Crunchfish makes the communication to and from the client secure.

Patented technology

Crunchfish has patented, in addition to improved security through roll-back protection, anti-cloning as well as protocol- and quantum computer-security, functionality such as offline, anonymization, interoperability and responsive Bluetooth interaction. Crunchfish offers trusted client applications that can be integrated with the app and is therefore deployable for all mobile devices. It has great potential in all industries as it complements server security and opens up for novel online and offline functionality.

Gesture Interaction divestment

Since the announcement on February 2, 2024 of Crunchfish's divestment plans of Crunchfish Gesture Interaction the work together with EY Corporate Finance has accelerated. EY Corporate Finance has a long history of successful company transactions and a global network to reach relevant decision makers. Although the transaction market is more challenging nowadays compared to a few years ago a successful process is expected. A number of dialogs have been initiated, several has been terminated for various reasons and some are ongoing. In parallell to ongoing conversations more dialogues are picked up to find a new home of the business that meets as many criterias as possible.

Digital Cash

Digital Cash is live in India

Digital Cash together with IDFC FIRST Bank is now live in India with Digital Cash telecom in the IDFC FIRST Bank Digital Rupee app. An important milestone for Crunchfish Digital Cash and a great reference both in India and the rest of the world.

Crunchfish in collaboration with IDFC FIRST Bank were announced **runner-up for its Digital Cash telecom solution** in Reserve Bank of India's second global hackathon HaRBInger 2023. Crunchfish solution competed in the problem statement "New use cases for CBDC-Retail including offline transactions". The solution allows the user to scan & pay by initiating payments, without internet connectivity, with an SMS to the payment service. The solution was showcased at the HaRBInger Grand Finale October 11th by Crunchfish and representatives from IDFC FIRST Bank that demonstrated the implementation in the **IDFC FIRST Bank Digital Rupee** app.

The Digital Cash telecom functionality has after the HaRBInger award passed both internal quality assurance by IDFC FIRST Bank and security review by RBI. The Android version of the app has been updated with the offline capabilities and made available to a first batch of Digital Rupee app users through Google Play. iOS will follow during Q2. This is the first commercially deployed Digital Cash implementation, a big milestone and important reference in India but also in the rest of the world.

NPCI launched UPI Lite X during the fintech fair GFF in September 2023 to facilitate offline payments. Crunchfish hails NPCI's focus on offline payments and believes that Digital Cash can complement UPI Lite X with a more secure and versatile offline payment solution for the Indian payment ecosystem. Like Crunchfish Digital Cash, UPI Lite X is based on that the payer and the recipient can trust each other and the offline payment, in a similar way that a card terminal can trust a credit card. Crunchfish Digital Cash has applied for a patent for the solution and has also received positive international reports on patentability that protect how each party can forward the offline payment to the payment system's backend in a secure manner, to increase the reliability of the payment system. UPI Lite X uses the same approach and Crunchfish has brought this to NPCI's attention, even though Crunchfish has no granted patents yet in India as they are pending examination.

A Non Disclosure Agreement has been entered with NPCI to explore how Crunchfish Digital Cash can complement and improve UPI Lite X. Based on these discussions Crunchfish has offered NPCI to perform a comprehensive security assessment. The objectives of the assessment will be to identify and evaluate potential impact of vulnerabilities in UPI Lite X and to provide recommendations for risk mitigation using Digital Cash. This could also have a wider impact as NPCI is responsible for delivering offline payments for the Digital Rupee on behalf of RBI.

Discussions regarding a license agreement for Digital Cash with HDFC Bank is still ongoing. HDFC Bank is yet to decide whether to implement offline functionality in its payment applications with Crunchfish Digital Cash and/or UPI Lite X. Discussions about Crunchfish ACE has also been initiated with HDFC Bank. HDFC Bank is the largest card issuer in India and would be a perfect first integrator of ACE.

Crunchfish has entered an agreement with the organizers of the **Global Fintech Fest** in Mumbai, August 28-30, to also this year exhibit at this important fintech event. The Global Fintech Fest is the largest fintech conference in India and a great venue for Crunchfish to develop new and old relations within the Indian fintech industry.

Two CBDC pilot wins and the ECB tender

A majority of the world's central banks are evaluating or preparing to roll out CBDC. Support for offline payments is high on the agenda for most of these projects. Q1 was a very exciting quarter for Crunchfish with inclusion in two Central Bank Digital Currency (CBDC) pilots together with a partner and a large offline tender from the European Central Bank (ECB).

Crunchfish's go-to-market strategy for the CBDC market is to partner with CBDC platform vendors and other relevant companies in the CBDC eco-system. The platform vendors integrate Digital Cash into their solution to be able to offer offline payment to central banks. Two joint proposals for CBDC pilots have been awarded together with one of the platform partners. One is for a central bank in the middle east and the other in western Asia. The pilot projects are in early phase, currently defining requirements and timelines.

Early Q1 European Central Bank issued calls for applications to establish framework agreements for pilots in five focus areas around the digital euro, whereof offline support is one. The offline call is budgeted by ECB at an estimated value of 221M EUR, and with a maximum value at 662M EUR. The call created a lot of interest in the European payment market. Crunchfish could not act as prime in the application due to principles of the call regarding company size and turnover. Instead, a role as sub-supplier to a prime has been Crunchfish's position. Crunchfish were invited to participate in several consortiums as our offline payment expertise was highly sought after. One of these consortiums was selected and a joint submission was done end of February. Originally ECB would during end of March announce up to five consortiums as being shortlisted to participate in a formal RFP process. This timeline has not been met and the decision from ECB is still pending. The RFP process, originally set for this summer, is likely to be delayed as well.

In India IDFC FIRST Bank is an important partner for Crunchfish to address the Digital Rupee, India's CBDC initiative, with the newly released Digital Cash telecom support in the IDFC FIRST Bank Digital Rupee app. India is taking a lead also within the CBDC space, with the Reserve Bank of India promoting features like offline support, privacy and programmability. RBI proposed in February 2024 to enable offline CBDC-R functionality for enabling transactions in areas with poor or limited internet connectivity. Multiple offline solutions (proximity and non-proximity based) across hilly areas, rural and urban locations will be tested for this purpose and introduced through pilots in a gradual manner. Governor Shaktikanta Das recently presented the RBI CBDC vision at the BIS Innovation Summit 2024. The topics covered by Shaktikanta are all very well suitable for Digital Cash, for example privacy was a focus area for the newly released update of the Digital Cash SDK, which also was protected with a patent application.

Crunchfish will continue to position Digital Cash towards the central banks and the surrounding ecosystem of suppliers by attending and presenting at CBDC conferences around the world, as well as releasing new whitepapers. During Q1 a whitepaper about Offline payments for smartphones was released, which outlines the challenges to implement offline payments on smartphones and how to mitigate the risks. In June Crunchfish will exhibit at the Central Bank Payments Conference in Kuala Lumpur and the subsequent Global Payments Summit, both events are organized by Currency Research. CEO Joachim Samuelsson will present on both occasions. In September another Currency Research event will be held in London, the Digital Currency Conference, Crunchfish will exhibit and Joachim Samuelsson will participate in a Plenary Session.

Mobile operators are the door to Africa

Crunchfish's sales efforts have mainly been aimed towards India and the CBDC community. In Africa, mobile payments have become an integral part of the economy, but the lack of sufficient infrastructure and internet connectivity is a limiting factor. With offline payment support, the power of mobile payments in Africa can reach its full potential.

Mobile payments have become an integral part of the African economy, with many businesses and individuals relying on it for day-to-day transactions. Mainly provided by mobile operators and supported by a network of licensed agents, mobile money services allow registered users to deposit cash into a digital wallet, and use those funds for payments and purchases, including peer-to-peer (P2P) payments. However, the lack of sufficient infrastructure and internet connectivity limits the potential and the use of these payment services. With Digital Cash and offline support, the power of mobile payments in Africa can reach its full potential.

To develop opportunities in Africa a partnership agreement was entered with SaaS Expand Agency in Q1. The founders of SaaS Expand Agency bring long experience from dealing with mobile operators in Africa. The company is set up to act as an agent for Crunchfish, working directly with customers as well as through local sub-agents.

After initial onboarding and training activities SaaS Expand is now focusing on establishing relations in the region, with focus on the large mobile operators. Initial discussions have been established with over 80 companies, whereof 90% is operators and the rest banks and e-wallets. NDA has been entered with a major operator group that are present across Africa, to deepen the discussions.
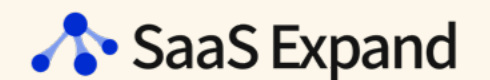
The partnership between Crunchfish and SaaS Expand Agency also covers the rights for SaaS Expand Agency to act as an agent in South America.

ACE the Future of Mobile Card Payments

Crunchfish introduces App-integrated Card Emulation (ACE) offering the security of Mobile Card Emulation (MCE) without sacrificing the scalability provided by tokenized card payments with Host-based Card Emulation (HCE).
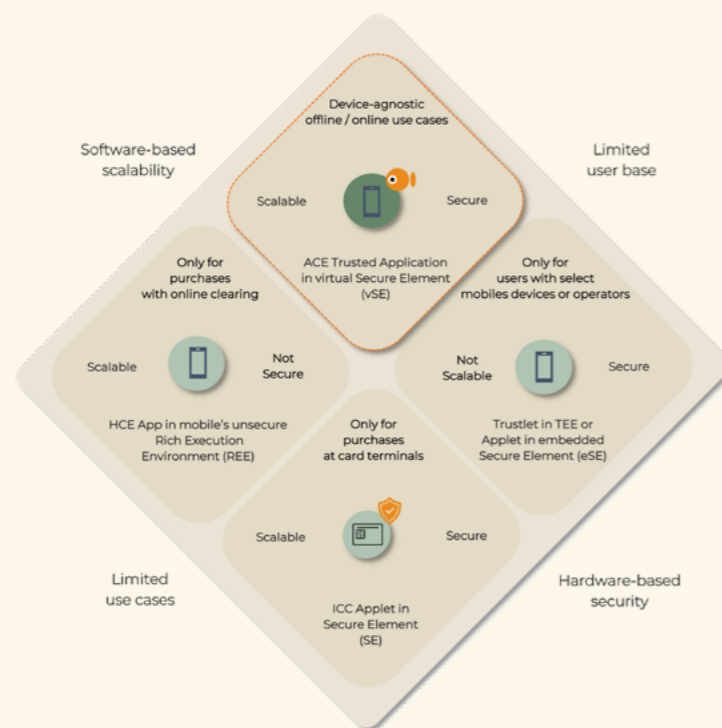

Figure: Overview of implementation architectures and their limitations for mobile card payments.

Mobile card payments require higher security than what is offered by the standard Rich Execution Environment on smartphones. Mobile Card Emulation using a Trusted Execution Environment (TEE) or eSE on the mobile device offers higher security but lacks scalability as the user base is limited to select Original Equipment Manufacturers (OEMs) or Mobile Network Operators (MNOs). The higher level of security can instead be achieved by implementing an App-integrated Card Emulation Trusted Application (ACE TA) protected by a virtual Secure Element (vSE) that provides a virtual isolated runtime and secure storage for tokenized credentials, cryptographic key data and other EMV assets, e.g. risk rules. Crunchfish is **pioneering an App-integrated Card Emulation Trusted Application** protected by a virtual Secure Element and **has filed for a patent of ACE TA**. As far as Crunchfish is aware, this is the only mobile card payment solution that is secure as well as scalable in the market without any Operating System (OS), OEM, or MNO dependency.

With the broadening of its Digital Cash technology to support secure Host-based Card Emulation (HCE) for online as well as offline, Crunchfish can now offer both secure and scalable mobile card payments. This **expands Crunchfish's total addressable market (TAM) manyfold** as it offers to fill a blank spot in the Android/Google Pay ecosystem, as it addresses the tradeoff between security and scalability facing payment provides, banks, central payment systems and card companies today. Crunchfish's approach to HCE payments also enable novel use cases, like offline, scan and pay (QR) and P2P payments.

	Mobile CE (MCE)	Host-based CE (HCE)	App-integrated CE (ACE)
Card Emulation	Only for users with select mobiles devices or operators Not Scalable — Secure Trustlet in TEE or Applet in embedded Secure Element (eSE)	Only for purchases with online clearing Scalable — Not Secure HCE App in mobile's unsecure Rich Execution Environment (REE)	Device-agnostic offline / online use cases Scalable — Secure ACE Trusted Application in virtual Secure Element (vSE)
Description	Mobile Card Emulation (MCE), executing in a TEE trustlet or as an applet in eSE, is as secure as on an Integrated Circuit Card, but not a scalable solution. TEE / eSE is not available on all mobile devices and the TEE / eSE is controlled by the device manufacturer (OEM) or mobile network operator (MNO). No limitation on use cases. Apple Pay and Samsung Pay use a TEE to deliver more secure HCE payments.	Mobile card payments using Host-based Card Emulation (HCE) executing with a HCE SDK in the unsecure Rich Execution Environment (REE). A scalable solution without any dependencies on device manufacturers (OEM) or mobile network operators (MNO). Use cases are limited to e-com or terminal purchases with online clearance.	App-integrated Card Emulation (ACE) executing in a Trusted Application (TA) within a virtual Secure Element (vSE) A secure and scalable solution that may be integrated in payment apps in any smartphone without dependencies on device manufacturers (OEM) or mobile network operators (MNO). No limitation on use cases.
Security environment	TEE / eSE in mobile device	Repository at issuer or cloud	vSE in payment app
CE application	Trustlet in TEE or applet in eSE	HCE SDK in REE	Trusted Application (TA) in vSE
Use case limitations	No limitations	Purchases with online clearing	No limitations
User base limitations	Select OEMs or MNOs only	Smartphone users	Smartphone users
Protection mechanisms	Hardware-based in TEE / eSE	Software-based in REE	Software-based within vSE
Secure on device	Yes	No	Yes
Scalable in market	No	Yes	Yes

	Mobile CE (MCE)	Host-based CE (HCE)	App-integrated CE (ACE)
Implementation architecture	*Standalone TRE* Unsecure / Secure APP OS — eSE — Applet HARDWARE Isolated runtime and secure storage for tokenized credentials, cryptographic key data and other EMV assets.	*REE* Unsecure / Secure APP OS HARDWARE	*App-Integrated TRE* Unsecure / Secure APP — ACE TA OS HARDWARE Virtualised isolated runtime and secure storage for tokenized credentials, cryptographic key data and other EMV assets.
Tamper Resistant Element	Standalone by hardware	None	App-integrated by software
App protection	No	Yes, by software for app or SDK	Yes, by virtual SE within app
Implementation cost	High	Low	Medium
Provisioning	Hard as TEE / eSE is controlled by OEM or MNO	Easy provisioning together with payment app	Easy provisioning together with payment app
Maintenance	Hard to upgrade firmware	Easy to upgrade with app	Easy to upgrade with app
Trust gap issues	Yes	Yes	No
Rooting / jailbreaking issues	Risk of malware attacks	High risk with many attack vectors	Low risk as ACE on rooted / jailbroken are supported
Data integrity	**High**	**Low, limited use case to purchases with online clearing**	**High**
Isolated runtime	Yes	No	Yes, by virtualization
Rollback protection	Limited storage in SE. Rollback protection typically not provided	No, rollback protection typically not provided	Yes, by Crunchfish's proprietary rollback protection mechanisms
EMVCo security protocol	Yes	Yes	Yes

Table: Comparison table between various modes of card emulation for mobile card payments.

Proposed new Board Member

Birendra Sahu, a C-level seasoned banking professional with 30+ years of cross-functional experience in strategic roles across largest private bank to small finance bank in India, is suggested to be appointed as a new board member of Crunchfish. He was introduced to the company by his friend and University alumni Vijay Raghunathan, Crunchfish India Head.

Birendra is an Engineer and Business management graduate with 30+ years of extensive experience in financial services in India. Notably, he has worked in India's largest and most reputed private lender - HDFC Bank and was part of the start-up team that launched IDFC First Bank. He has handled Digital Banking, IT, Sales, Marketing, Cross-sell, Underwriting, Collections and Operations functions. In addition, he is trained as a Master Black Belt in Quality during his stint in GE Consumer Finance.
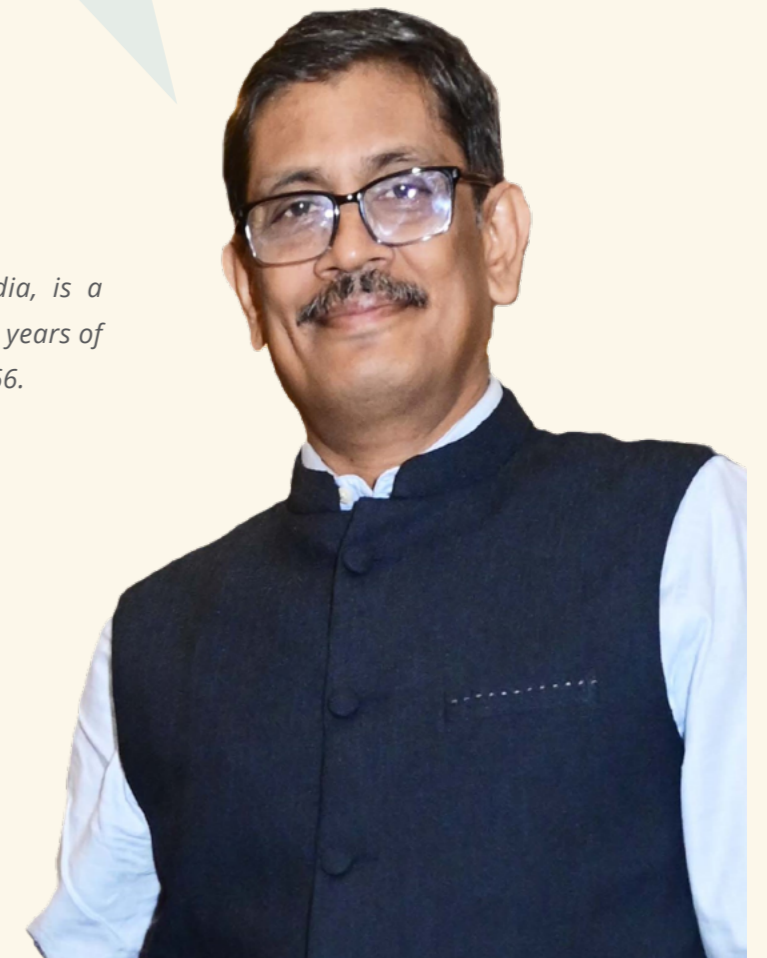
His key competencies include Strategic Initiatives, Technology, Digital, Operations, Sales & Marketing and Channel management, Business Process Re-engineering and Six Sigma. Birendra has the ability to bring about fundamental changes by foreseeing strategic shifts and executing large scale changes. He is a quick learner with analytical bent of mind, an excellent communicator, and has demonstrated capabilities in mentoring and leading motivated teams.

"I am really impressed with the innovative yet secure approach to payments. In a diverse country like India this will resonate with the Regulator, Financial entities and Card networks. Offline payments can be a boon in the vast geography of India that still struggles with poor connectivity. The ACE solution can be a game changer for Banks and Networks with their customer convenience coupled with high degree of security - a rare but much desired combination. I also see a huge potential for this scalable solution to have a Global appeal."

Birendra Sahu *based in Mumbai, India, is a seasoned banking professional with 30+ years of cross-functional experience. Born in 1966.*

Organisation	Designation	Period	Description
PADUP Ventures	Mentor	2022 onwards	Mentoring & advising start-ups
Utkarsh Small Finance Bank	Head Corporate Centre	2019-2021	Spearheading Technology, Digital, Operations, Underwriting & Administration
IDFC First Bank	Head Retail Operations	2014-2019	Retail operations across all products
HDFC Bank	Senior Executive Vice President	2007-2013	Head – Digital & Direct Banking Channels and Premier Banking (2012-13). Head - Retail Operations, Quality & Business process re-engineering (2007-13).
GE Consumer Fin/GE Money	Vice President	1998-2007	Head - Cross Sell, Regional Business Head, Regional Operations Head, Quality
Eicher Limited	Manager	1991-1998	Sales & Marketing and Distribution
IIM Lucknow	PGDM	1991	Finance and Marketing
GEC Jabalpur	Bachelor of Engineering	1988	Mechanical Engineering

Table: Birendra Sahu's professional and academic background.

Gesture Interaction

Pioneering hand-tracking technology

For more than a decade Crunchfish Gesture Interaction has been a pioneer in hand-tracking. With an early focus on augmented reality (AR) and gesture interaction on mobile devices to today's fully-fledged multi-camera XR interaction.

Crunchfish Gesture Interaction (CGI) was founded in 2020 and operates as a subsidiary to parent company Crunchfish, which was founded in 2010 and is headquartered in Malmö. CGI is a computer vision-enabled 3D gesture control provider, a developer of AI technology that detects and tracks hands and body.

CGI collaborate closely with customers looking to complement their own products with a software component for hand-tracking or gesture interaction, i.e. hardware providers in a range of industries or across the XR product value chain.

The CGI team, comprised of 9 experienced and dedicated computer vision engineers, has cross-functional expertise and a proven history of successfully defining, implementing and producing hand gesture interaction solutions.

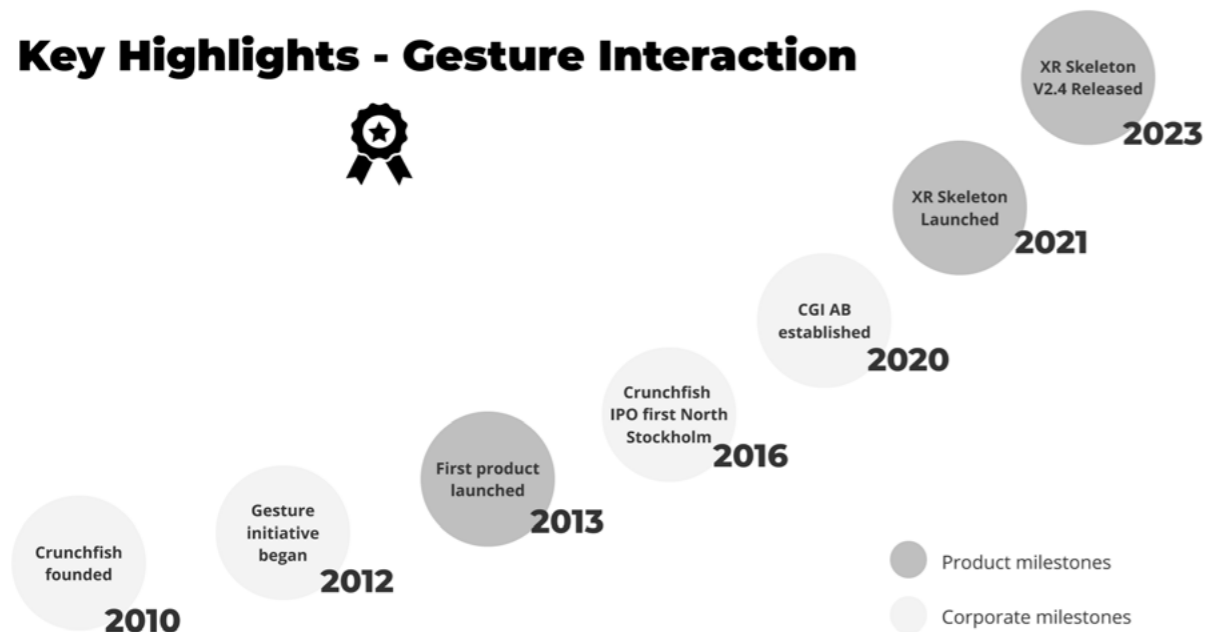## Customer segments
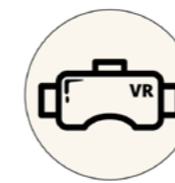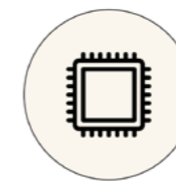
AR & VR Hardware   Chipset   Automotive   E-commerce

Figure: AR/VR hardware providers and chipset manufacturers with demonstrated need for Gesture capabilities through partnership with technology providers. The products inherent flexibility has also attracted interest from diverse range of sectors, with launched pilot projects within e-commerce and the automotive industry.

Key Highlights - Gesture Interaction

- XR Skeleton V2.4 Released — 2023
- XR Skeleton Launched — 2021
- CGI AB established — 2020
- Crunchfish IPO first North Stockholm — 2016
- First product launched — 2013
- Gesture initiative began — 2012
- Crunchfish founded — 2010

Product milestones
Corporate milestones

Why hand- and body-tracking?

Increasing quantity of applications and market advancements within gesture interaction reveal significant societal interest, illustrating the importance for expertise in hand and body-tracking technology.

Recent changes and drivers in the market

As a consequence of gesture interaction technology becoming a 'make-or-buy' decision for many strategic players, driven by need to access the technology either directly through own in-house technology (acquired or developed) or indirectly through relying on strategic partnerships, there has been increased consolidation across the value-chain stemming from several actors making the strategic choice to acquire gesture interaction technology by leading development teams.

Why CGI?

CGI presents a **device-agnostic, patented, flexible solution**, showcasing significant adaptability that serves a broad spectrum of use cases and device interactions. CGI holds three individual innovations granted with patents within gesture interaction, and has generated a versatile product platform with proven scalability, supported by advanced tools and AI technology, that can demonstrate commercial traction for use cases across various industries.

Opportunities for CGI going forward

Opportunity to capture expected uptick in demand for solutions supported by high-performing gesture interaction technology by becoming part of larger operational context through acquisition of CGI. There is an additional untapped potential to be realized with CGI's team continuing as spearhead for in-house development of gesture interaction technology supporting new organization as dedicated solutions provider for designated ecosystem or industry.

The opportunity at hand

Crunchfish Gesture Interaction represent a **team with comprehensive computer vision expertise** and **proven record of creating AI supported gesture interaction solutions**, ready to become part of new organizational setting to facilitate further commercial development.
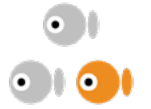
Gesture Interaction Team

Crunchfish Gesture Interaction stems from a product-focused organization with a research-driven development methodology. Innovative team with computer vision expertise with long-term relationship with external consultants providing additional expertise and support.
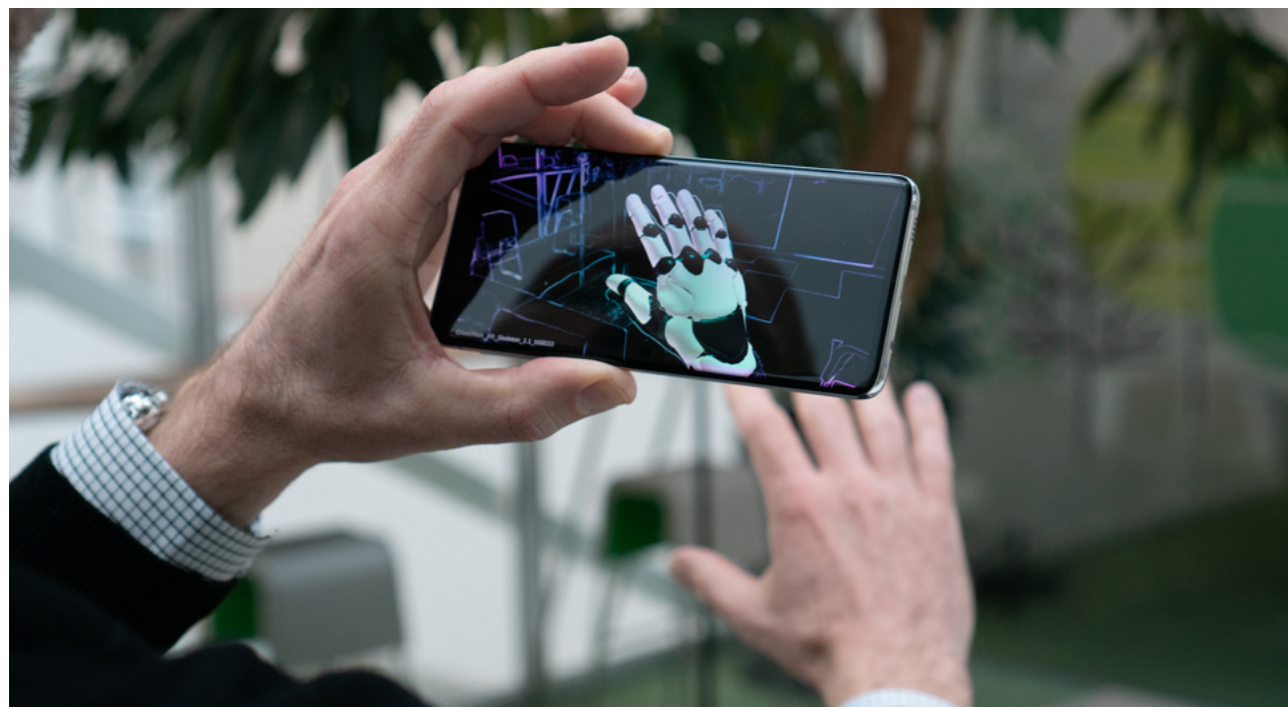
Structured organization to foster innovation
Iterative development process, supported by highly technical competencies in the team, to continuously refine the functionality and underlying tools.

Research-based foundation
Academic and research-based approach by applying structured methodology to development processes and driving a mature development organisation.

Continuous learning by curious team
Dedicated resources to maintain knowledge of the latest published articles and white papers, and support ongoing engagement in new research topics.

Jens-Henrik Lindskov - R&D Director
Jens-Henrik has more than 20 years of experience in software development, in computer vision and machine learning. Experience from Axis Communications, where he worked as a developer and agile team lead for a development team. Master of Science from Lund University of Technology.

Software Engineer, M.Sc:
Core algorithm development

Software Engineer, M.Sc:
Core algorithm development

Software Engineer, M.Sc:
Machine Learning

Software Engineer, M.Sc, Ph.D:
Machine Learning

Software Engineer, M.Sc:
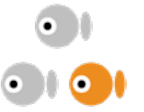**Integrations and 3D applications**

Software Engineer, M.Sc:
Data and test

Consultant
ML/Core algorithm development

**Contractor**
Upwork data annotation

AI-technology for gesture control

Gesture interaction is about controlling 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 them to various functions of a device.

XR Skeleton Platform

Crunchfish develops AI technology that detects and tracks hands and body. The technology can be used in a number of areas and is optimized for XR. Crunchfish has a collection of gesture interaction products powered by XR Skeleton platform and have granted patents for three individual innovations. The XR Skeleton platform leverage advanced image recognition and deep learning algorithms to provide an engine for gesture interaction products.

XR Skeleton Platform
Powerful engine supported by advanced tools
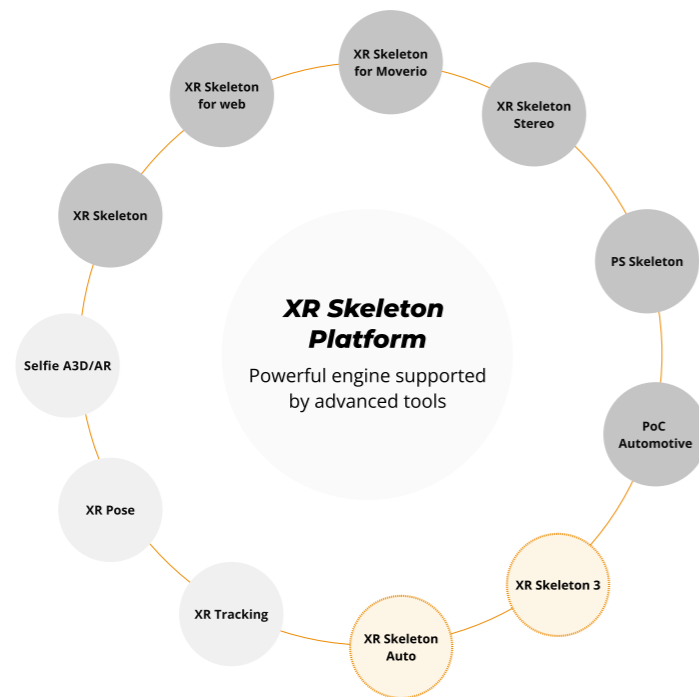
XR Skeleton platform enabling new product launches

XR Skeleton 3: Version 3.0 of the XR Skeleton currently in development to be released in 2024. Combining previous XR Skeleton and XR Skeleton Stereo products

XR Skeleton Auto: New product building on proof of concept for in-cabin monitoring systems is underway
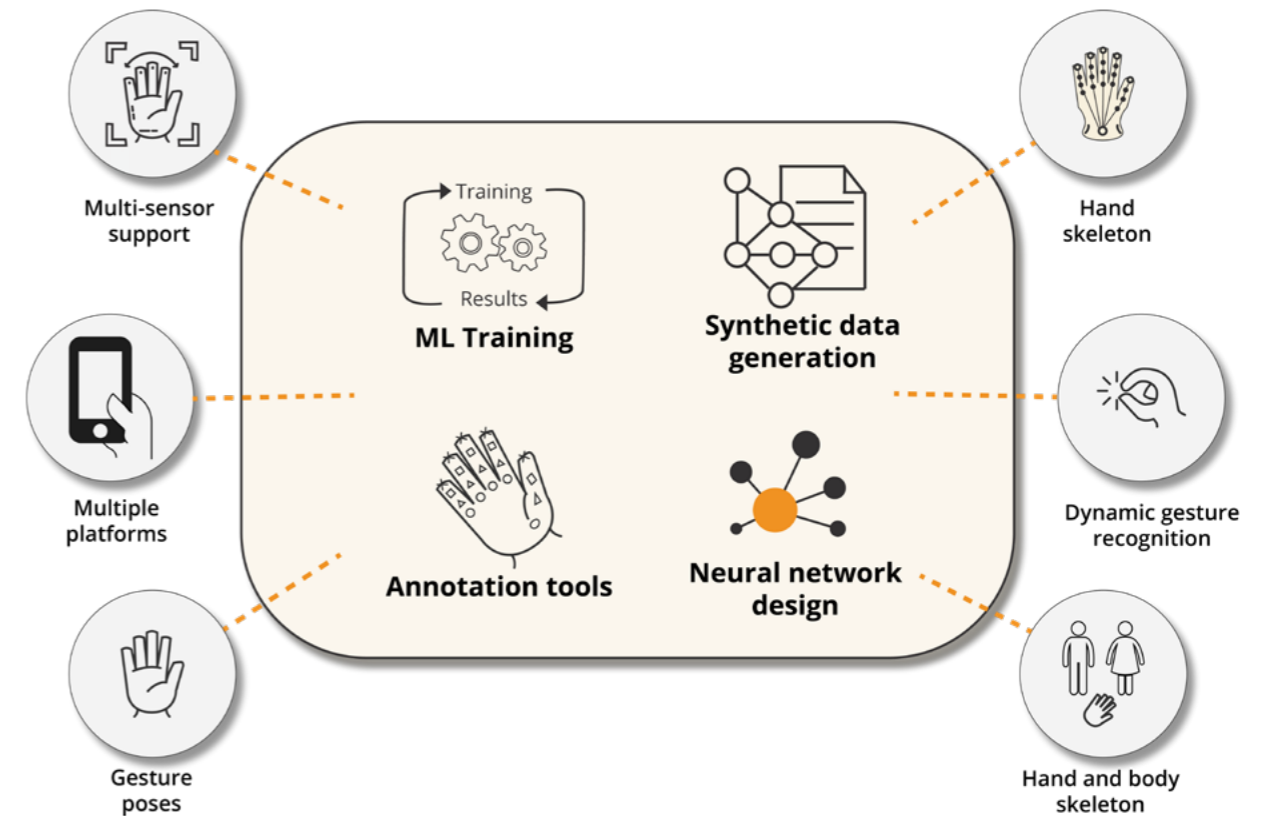
The XR Skeleton Platform of a number of different hardware and software components such as inhouse developed camera rigs, tools, inhouse designed neural networks and processes for generating synthetic data.

ML training
Neural networks form the basis of the XR Skeleton Platform. The networks are trained completely in-house on proprietary data sets and are evaluated iteratively.

Annotation tools
To also provide real image data sets, an annotation pipeline is used where images from multiple cameras are auto-annotated followed by manual inspection in web-based tools to ensure quality.

Synthetic data generation
Synthetic hand gestures and poses in custom animation processes are used to swiftly produce millions of poses in diverse environmental conditions for neural network training.

Neural network design
The neural networks are designed following the latest research and state-of-the-art methods within human-pose recognition and are tailored to the target hardware platform.

An afternoon with Apple Vision Pro

In the first quarter 2024 the long wait for Apple Vision Pro was over as the first devices were shipped by the tech giant. We got our hands on a device thanks to Malmö Yrkeshögskola and got to try it out.

With our long experience in the AR and VR domain it was still amazing to experience a first version of a new product from a company. As many times before, Apple has gone the extra mile to make the user experience appealing. Except for pricing the device is nothing less than awesome. There are many very good and descriptive user reviews online. Some, like Jens Lauritsen's compare it to the first release of the iPhone.

The user interaction which is 100% touchless is a key functionality that is close to heart of Crunchfish Gesture

Interaction's vision of the future. Combining that with a device and app eco-system that works seamlessly together is an impressive setup and over time, with lowered price on the AVP, it is likely to be a very common ditigal companion seen in offices, coffee shops, public transport and during travel both for work and leasure purposes especially live sport events or concerts.

The future is bright, digital and touchless.

Significant news during and after Q1

Crunchfish group

2024-04-11
Crunchfish **published the Annual Report 2023**, and **held a webinar about it**, where Crunchfish CEO Joachim Samuelsson was interviewed by analyst Axel Dahlman from Västra Hamnen Corporate Finance. The interview is in Swedish.

2024-02-20
Crunchfish **held a Q&A in Swedish** with CEO Joachim Samuelsson after the 2023 year-end report.

2024-02-15
Crunchfish **held a webinar about the year-end 2023 report**, where CEO Joachim Samuelsson was interviewed by chief analyst Martin Dominique from Västra Hamnen Corporate Finance.

2024-02-15
Crunchfish **published the company's year-end report** for 2023.

Digital Cash

2024-05-03
Crunchfish **applied for a strategically important and broad patent**, protecting the use of device-agnostic trusted client applications for offline use cases in any mobile client / server system.

2024-04-24
Crunchfish **released an upgraded version of the Digital Cash SDK** which enables privacy by design for offline payments in CBDC and commercial payment systems.

2024-04-15
Crunchfish **introduced App-integrated Card Emulation (ACE)** offering the security of Mobile Card Emulation (MCE) without sacrificing the scalability provided by tokenized card payments with Host-based Card Emulation (HCE).

2024-04-08
Crunchfish **received positive patentability report** for quantum-safe Digital Cash

2024-03-27
Crunchfish broadened the Digital Cash solution by **patenting secure and scalable mobile wallets** using Host-based Card Emulation (HCE).

2024-03-12
Crunchfish **held a Q&A lunch in Swedish** with CEO Joachim Samuelsson after Västra Hamnen's Investor Day presentation.

2024-03-09
Crunchfish CEO Joachim Samuelsson **presented at Västra Hamnen's Investor Day**.

2024-02-13
Crunchfish **announced the Digital Cash protector** as an offline payment application protection add-on for 3rd party offline payment services.

2024-02-12
Crunchfish Digital Cash **entered a partnership with SaaS Expand** to target mobile operators in Africa.

2024-02-01
Crunchfish **released a new white paper** as an independent continuation to the series "Enabling offline payments in an online world", with the tittle "Offline payments for smartphones."

Gesture Interaction

2024-05-20
Crunchfish Gesture Interaction **signed a commercial follow-up agreement with OPPO** Mobile Telecommunications wrapping up the collaboration around pose detection software in their mobile devices.

2024-02-02
Crunchfish together with its Board of Directors have undertaken a strategic review of the business, resulting in a decision **to explore a divestment of the Crunchfish Gesture Interaction** subsidiary.

2024-01-10
Crunchfish Gesture Interaction and LogistiVIEW Inc. **extended the license agreement** and collaboration to continue delivering gesture-based logistics solutions.

Financials

Financial report

Sales and earnings for the 1st quarter

Net sales amounted to SEK 1,665 (171) thousand for the first quarter and operating expenses amounted to SEK 12,812 (11,511) thousand. EBITDA for the period amounted to SEK -3,920 (-5,732) thousand. Loss before tax for the first quarter amounted to SEK -6,255 (-6,828) thousand and has been charged with amortization of intangible assets of SEK 741 (986) thousand and tangible fixed assets of SEK 121 (53) thousand and with impairment om of intangible assets of SEK 1,507 (0) thousand.

Investments

During the first quarter, the Group invested SEK 4,264 (4.104) thousand in intangible fixed assets and 0 (0) in tangible fixed assets.

Liquidity and financing

At the end of the first quarter the Group's cash and cash equivalents amounted to SEK 21,985 (19,029) thousand. Cash flow from operating activities during the first quarter amounted to SEK -4,469 (-6,229) thousand.

Staff

As of March 31, 2024, the number of employees was 22 (22).

Risks and uncertainties

A number of 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 2023 and the annual report for FY 2023, 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

Sales and earnings for the quarter, parent company

The parent company's net sales amounted to SEK 4,173 (4,307) thousand for the first quarter and operating expenses to amounted to SEK -4,523 (-4,757) thousand. EBITDA for the period amounted to SEK 234 (-17) thousand. During the quarter, the shares in the subsidiary Crunchfish Gesture Interaction AB were written down by SEK 2,000 (0) thousand.

Major shareholders for Crunchfish AB (publ) as of March 31st 2024

Name	Number of shares	Share %
Femari Invest AB (CEO Joachim Samuelsson & Petra Samuelsson)	7 500 000	18.92
Corespring Invest AB (Chairmain Göran Linder)	6 953 182	17.54
Nordic Underwriting ApS	2 316 995	5.84
Paul Cronholm (Founder & CTO)	1 101 601	2.78
Carlquist Holding AB	1 000 000	2.52
Mikael Kretz incl. company holdings	760 000	1.92
Håkan Paulsson incl. family and company holdings	625 000	1.58
Mats Kullenberg incl. company holdings	589 339	1.49
Lars Andreasson incl. family holdings	480 000	1.21
Granitor Invest AB	419 757	1.06
Total, ten largest shareholders	**21 745 874**	**54.85**
Other shareholders (approx. 6,000)	**17 901 032**	**45.15**
Total	**39 646 906**	**100.00**

Share price development during 6 months

Mar 28, 2024
SEK7.98

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 2024
May 21st, 2024, 8:30 am CET

Annual General meeting (Malmö) 2024
May 21st, 2024, 10:00 am CET

Half-year report 2024
August 23rd, 2024, 8:30 am CET

Interim report Q3 2024
November 13th, 2024, 8:30 am CET

Year-end report 2024
February 13th, 2025, 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.
E-mail: ca@vhcorp.se
Phone: +46 40 200 250

Further information

For further information, please contact:
Joachim Samuelsson, CEO
ir@crunchfish.com
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, May 21st, 2024

The Board of Directors:
Göran Linder (chairman)
Robert Ekström
Susanne Hannestad
Joakim Nydemark
Joachim Samuelsson (CEO)
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 May 21st, 2024.

Group income statement (SEK)

	Q1 2024	Q1 2023	2023
Operating income			
Net sales	1 665 338	170 572	987 834
Own work capitalized	4 264 171	4 103 996	16 473 949
Other operating income	592 562	464 738	2 089 237
Total operating income	**6 522 071**	**4 739 306**	**19 551 020**
Operating expenses			
Other external expenses	-4 174 361	-4 314 628	-19 691 267
Personnel expenses	-6 284 924	-6 154 205	-25 076 057
Depreciation and impairment of tangible and intangible fixed asset	-2 369 479	-1 039 491	-22 847 399
Other operating expenses	0	-2 286	-1 327 509
Profit/loss from participations in associated companies	17 230	-340	-1 422
Total operating expenses	**-12 811 534**	**-11 510 950**	**-68 943 654**
Operating profit	**-6 289 463**	**-6 771 644**	**-49 392 634**
Financial items			
Other interest income and similar profit items	50 933	2 149	274 708
Interest expense and similar loss items	-16 453	-58 864	-186 674
Profit or loss from financial items	**34 480**	**-56 715**	**88 034**
Profit or loss after financial items	**-6 254 983**	**-6 828 359**	**-49 304 600**
Profit or loss before tax	**-6 254 983**	**-6 828 359**	**-49 304 600**
Taxes			
Tax on income for the period	0	0	0
Profit or loss for the period/year	**-6 254 983**	**-6 828 359**	**-49 304 600**
Key figures			
EBITDA	-3 919 984	-5 732 153	-26 545 235
Earnings per share	-0,16	-0,21	-1,46
Number of shares, average	39 646 906	33 039 167	33 865 134
Number of shares at balance sheet date	39 646 906	33 039 167	39 646 906
Earnings per share after full dilution	-0,16	-0,21	-1,46
Number of shares after full dilution, average	41 059 706	34 672 967	35 239 634
Number of shares after full dilution, balance sheet date	41 059 706	34 672 967	41 021 406

Group balance sheet (SEK)

	Mar 31, 2024	Mar 31, 2023	Dec 31, 2023
Assets			
Fixed assets			
Intangible assets			
Capitalized expenses for development work	28 148 476	36 626 753	26 132 777
Total intangible fixed assets	**28 148 476**	**36 626 753**	**26 132 777**
Tangible fixed assets			
Equipment	1 329 053	481 848	1 449 809
Total tangible fixed assets	**1 329 053**	**481 848**	**1 449 809**
Financial assets			
Participation in associated companies	0	68 313	67 231
Total financial assets	**0**	**68 313**	**67 231**
Total fixed assets	**29 477 529**	**37 176 914**	**27 649 817**
Current assets			
Current receivables			
Account receivables	1 755 516	544 594	48 941
Other receivables	1 468 591	612 352	1 951 018
Prepayments and accrued income	1 324 228	2 140 280	1 139 804
Total current receivables	**4 548 335**	**3 297 226**	**3 139 763**
Cash and bank balances			
Cash and bank balances	21 985 320	19 029 405	30 725 483
Total cash and bank balances	**21 985 320**	**19 029 405**	**30 725 483**
Total current assets	**26 533 655**	**22 326 631**	**33 865 246**
Total assets	**56 011 184**	**59 503 545**	**61 515 063**

Group balance sheet cont. (SEK)

	Mar 31, 2024	Mar 31, 2023	Dec 31, 2023
Equity and liabilities			
Equity			
Equity attributable to parent company shareholders			
Share capital	1 823 758	1 519 802	1 823 758
Other contributed capital	318 492 646	276 131 340	318 492 646
Other capital including profit or loss for the period	-274 308 497	-225 578 043	-268 054 284
Total equity	**46 007 907**	**52 073 099**	**52 262 120**
Long-term liabilities			
Lease liabilities	907 778	0	957 492
Total long-term liabilities	**907 778**	**0**	**957 492**
Current liabilities			
Lease liabilities	453 129	358 668	460 031
Accounts payable	1 462 110	1 107 475	1 046 542
Other liabilities	860 439	780 608	784 093
Accrued expenses and accrued income	6 319 821	5 183 695	6 004 785
Total current liabilities	**9 095 499**	**7 430 446**	**8 295 451**
Total equity and liabilities	**56 011 184**	**59 503 545**	**61 515 063**
Key Figures			
Equity-assets-ratio	82,1%	87,5%	85,0%
Debt-to-equity ratio	3,0%	0,7%	2,7%
Interest-bearing net debt	n/a	n/a	n/a

Changes in the group equity (SEK)

	Q1 2024	Q1 2023	2023
Equity at beginning of period/year	52 262 120	58 771 444	58 771 444
Share issues	0	0	51 209 977
Issue costs	0	0	-8 503 355
Warrant premiums	0	130 014	130 014
Translation difference	770		-41 360
Profit or loss for the period/year	-6 254 983	-6 828 359	-49 304 600
Equity at end of period /year	**46 007 907**	**52 073 099**	**52 262 120**

Group cash flow statement (SEK)

	Q1 2024	Q1 2023	2023
Operating activities			
Operating profit or loss	-6 289 463	-6 771 644	-49 392 634
Adjustments for non-cash intems	2 437 229	1 039 827	24 128 377
Interest received etc.	891	2 149	58 428
Interest paid	-16 453	-23 689	-151 488
Income tax paid	0	0	0
Cash flow from operating activities before changes in working capital	**-3 867 796**	**-5 753 357**	**-25 357 317**
Cash flow from changes in working capital			
Decrease(+)/increase(-) in receivables	-1 408 572	-209 934	-52 475
Decrease(-)/increase(+) in current liabilities	806 950	-265 893	497 749
Cash flow from operating activities	**-4 469 418**	**-6 229 184**	**-24 912 043**
Investing activities			
Investments in technology development	-4 264 171	-4 103 996	-16 473 949
Investments in equipment	0	0	-1 232 856
Cash flow from investing activities	**-4 264 171**	**-4 103 996**	**-17 706 805**
Financing activities			
Share issue	0	0	42 706 622
Loans from shareholders	0	0	7 500 000
Repayment loans from shareholders	0	0	-7 500 000
New loans financial leasing agreements	0	0	1 232 856
Amortization of financial leasing agreements	-56 616	-24 817	-198 818
Warrant premiums paid	0	130 014	130 014
Cash flow from financing activities	**-56 616**	**105 197**	**43 870 674**
Change in cash and cash equivalents	-8 790 205	-10 227 983	1 251 826
Cash and cash equivalents at beginning of period/year	30 725 483	29 292 563	29 292 563
Exchange rate difference in cash and cash equivalents	50 042	-35 175	181 094
Cash and cash equivalents at end of period/year	**21 985 320**	**19 029 405**	**30 725 483**

Parent company income statement (SEK)

	Q1 2024	Q1 2023	2023
Operating income			
Net sales	4 172 874	4 307 418	17 240 870
Other operating income	580 760	429 353	2 053 852
Total operating income	**4 753 634**	**4 736 771**	**19 294 722**
Operating expenses			
Other external expenses	-2 723 678	-2 137 217	-9 958 369
Personnel expenses	-1 796 019	-2 614 699	-8 818 661
Depreciation of tangible and intangible fixed asset	-3 010	-3 010	-12 040
Other operating expenses	0	-2 286	-2 286
Total operating expenses	**-4 522 707**	**-4 757 212**	**-18 791 356**
Operating profit	**230 927**	**-20 441**	**503 366**
Financial items			
Profit/loss from participation in group companies	-2 000 000	0	-48 176 713
Other interest income and similar profit items	41 238	22 882	866 680
Interest expense and similar loss items	-19 208	-35 226	-138 140
Profit or loss from financial items	**-1 977 970**	**-12 344**	**-47 448 173**
Profit or loss before tax	**-1 747 043**	**-32 785**	**-46 944 807**
Taxes			
Tax on income for the period	0	0	0
Profit or loss for the period/year	**-1 747 043**	**-32 785**	**-46 944 807**
Key figures			
EBITDA	233 937	-17 431	515 406
Earnings per share	-0,04	0,00	-1,39
Number of shares, average	39 646 906	33 039 167	33 865 134
Number of shares at balance sheet date	39 646 906	33 039 167	39 646 906
Earnings per share after full dilution	-0,04	0,00	-1,32
Number of shares after full dilution, average	41 059 706	34 672 967	35 239 634
Number of shares after full dilution, balance sheet date	41 059 706	34 672 967	41 021 406

Parent company balance sheet (SEK)

	Mar 31, 2024	Mar 31, 2023	Dec 31, 2023
Assets			
Fixed assets			
Tangible fixed assets			
Equipment	36 089	48 129	39 099
Total tangible fixed assets	**36 089**	**48 129**	**39 099**
Financial assets			
Participations in group companies	123 298 538	123 057 790	121 798 538
Receivables from group companies	7 006 982	10 792 179	0
Total financial assets	**130 305 520**	**133 849 969**	**121 798 538**
Total fixed assets	**130 341 609**	**133 898 098**	**121 837 637**
Current assets			
Current receivables			
Account receivables	1 600 501	544 594	48 941
Other receivables	374 191	364 252	757 005
Prepayments and accrued income	1 313 130	1 312 300	1 128 561
Total current receivables	**3 287 822**	**2 221 146**	**1 934 507**
Cash and bank balances			
Cash and bank balances	20 021 690	18 241 899	29 789 506
Total cash and bank balances	**20 021 690**	**18 241 899**	**29 789 506**
Total current assets	**23 309 512**	**20 463 045**	**31 724 013**
Total assets	**153 651 121**	**154 361 143**	**153 561 650**

Parent company balance sheet cont. (SEK)

	Mar 31, 2024	Mar 31, 2023	Dec 31, 2023
Equity and liabilities			
Equity			
Restricted equity			
Share capital	1 823 758	1 519 802	1 823 758
Total restricted equity	**1 823 758**	**1 519 802**	**1 823 758**
Unrestricted equity			
Profit brought forward	144 629 474	149 171 615	191 574 281
Profit or loss for the period/year	-1 747 043	-32 785	-46 944 807
Total unrestriced equity	**142 882 431**	**149 138 830**	**144 629 474**
Total equity	**144 706 189**	**150 658 632**	**146 453 232**
Current liabilities			
Accounts payable	442 081	466 727	643 293
Liabilities to group companies	5 279 910	0	3 500 000
Other liabilities	357 049	751 376	560 617
Accrued expenses and accrued income	2 865 892	2 484 408	2 404 508
Total current liabilities	**8 944 932**	**3 702 511**	**7 108 418**
Total equity and liabilities	**153 651 121**	**154 361 143**	**153 561 650**
Key Figures			
Equity-assets-ratio	94,2%	97,6%	95,4%
Debt-to-equity ratio	0,0%	0,0%	0,0%
Interest-bearing net debt	n/a	n/a	n/a

Changes in parent company equity (SEK)

	Q1 2024	Q1 2023	2023
Equity at beginning of period/year	146 453 232	150 561 403	150 561 403
Share issues	0	0	51 209 977
Issue costs	0	0	-8 503 355
Warrant premiums	0	130 014	130 014
Profit or loss for the period/year	-1 747 043	-32 785	-46 944 807
Equity at end of period /year	**144 706 189**	**150 658 632**	**146 453 232**

Parent company cash flow statement (SEK)

	Q1 2024	Q1 2023	2023
Operating activities			
Operating profit or loss	230 927	-20 441	503 366
Adjustments for non-cash intems	3 010	3 010	12 040
Interest received etc.	15 364	22 882	650 400
Interest paid	-19 208	-125	-103 028
Income tax paid	0	0	0
Cash flow from operating activities before changes in working capital	**230 093**	**5 326**	**1 062 778**
Cash flow from changes in working capital			
Decrease(+)/increase(-) in receivables	-1 353 315	628 083	914 722
Decrease(-)/increase(+) in current liabilities	56 604	-203 454	-297 547
Cash flow from operating activities	**-1 066 618**	**429 955**	**1 679 953**
Investing activities			
Loans provided to group companies	-8 727 072	-10 792 179	-43 417 461
Cash flow from investing activities	**-8 727 072**	**-10 792 179**	**-43 417 461**
Financing activities			
Share issue	0	0	42 706 622
Loans from shareholders	0	0	7 500 000
Repayment loans from shareholders	0	0	-7 500 000
Warrant premiums paid	0	130 014	130 014
Cash flow from financing activities	**0**	**130 014**	**42 836 636**
Change in cash and cash equivalents	-9 793 690	-10 232 210	1 099 128
Cash and cash equivalents at beginning of period/year	29 789 506	28 509 210	28 509 210
Exchange rate difference in cash and cash equivalents	25 874	-35 101	181 168
Cash and cash equivalents at end of period/year	**20 021 690**	**18 241 899**	**29 789 506**