

EfA Technologies Case Study



MORAVIAN BUSINESS COLLEGE OLMOUC

Healthcare Innovation Institute

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Olomouc 2025

INTRODUCTION

Blood tests are a key diagnostic tool used across many medical fields. One of the most commonly performed tests is a complete blood count (CBC). This test is usually performed either at general practitioner's office or in specialized collection centers. The collected samples are then sent to certified laboratories, where they are analyzed by trained professionals.

The results of a blood count provide doctors with important insights into a patient's overall health. They help detect infections (bacterial or viral), inflammation, blood disorders such as anemia or leukemia, bleeding disorders, and abnormalities in the immune system. Based on these findings, the physician can recommend appropriate treatment or alternatively refer the patient to a specialist.

However, traditional blood testing requires specialized equipment and trained medical staff. It is often time-consuming and costly process, which can significantly limit its access, especially in remote or underdeveloped areas. As a result, blood tests for determining health status remain extremely difficult to access for people living in sub-Saharan Africa, South America, or India.

This case study focuses on RevDx device developed by EfA Technologies, which aims to overcome these limitations. The RevDx is a portable and user-friendly diagnostic device that enables on-site blood analysis, delivering results quickly without the need for a laboratory or complex infrastructure.

The study begins by exploring the motivation behind the founding of EfA Technologies and its development in recent years. It will then provide a detailed overview of the RevDx device, including its operating principles and the wide range of potential applications.

1 EFA TECHNOLOGIES STARTUP

EfA Technologies (short for Engineering for All) is an Israeli startup based in Caesarea, specializing in the development of innovative medical devices. The company was founded in 2016 by a team of professionals with years of experience in medical sciences, optics, and bioengineering. In 2019 EfA officially began operations thanks to seed funding. Their mission is to make high-quality diagnostics and healthcare accessible to everyone, everywhere, without exception.

The idea of EfA Technologies originated with Yoel Ezra, a graduate of the Israel Institute of Technology (Technion) in Haifa. After earning his Engineering and Physics degrees in 1988, Ezra joined the Israel Defense Forces (IDF), where he served for 23 years. He eventually became the commander of a special technology operation unit with a broad focus ranging from materials science and engineering to optics and chemistry. For his contributions, he was honored by the Israeli Prime Minister. This experience reinforced his belief that technology has no limits. In the army, he learned that even the most demanding challenges can be solved, no matter how impossible they may seem at first. His personal motto was “to expand the boundaries of the possible,” and with the right people and dedication, he believes it can be achieved.

Ezra’s military background played a key role in his decision to launch his own startup. After retiring from the army, he decided to fulfill his childhood dream of working in the healthcare industry. He joined the American companies Medtronic Ventrator and Edwards Lifesciences, where he was involved in the development of artificial heart valves and gained valuable experience in medical innovation. In these medical companies, he learned that R&D is only one part of a long chain and process in medical devices, and that it is essential to have a physician join the journey and collaborate with clinicians in the field.

Although Ezra was working on the cutting edge of medical technology, he gradually realized that his work was not truly fulfilling. He realized that the technologies he was helping to develop were accessible almost exclusively to people in developed countries, while millions in less developed regions remained out of reach. Determined to better understand this disparity, he traveled to Africa, where he visited remote and modestly equipped clinics. There, he spoke directly with doctors and medical staff to gain a deeper understanding of their real-world challenges and needs. Through these conversations, he gained valuable insight into what technologies would be most beneficial in their context and what innovations would make a genuine difference.

Upon returning to Israel, Ezra partnered with Pears Challenge and TechForGood, an Israeli non-profit initiative that provides mentorship and networks to social impact startups. In 2016, he received a Tnufa grant from the Israel Innovation Authority and co-founded EfA Technologies with Eli Mor who invested his own money in the company. Shortly thereafter, they established a partnership with Dr. Ami

Neuberger, head of the Tropical Diseases & Travel Medicine Center at Rambam Hospital in Haifa, who joined as the company's medical advisor. Over time, other prominent experts joined EfA's medical board, including Prof. Aaron Ciechanover, winner of the 2004 Nobel Prize in Chemistry, and Dr. Joseph Rosenblum, Medical Director of the eHealth Ventures incubator. Together, this multidisciplinary team developed a groundbreaking portable device called RevDx (short for Revolution Diagnostics), an automated platform designed to perform complete blood count testing as the first clinical application in virtually any setting. The device also supports remote development and updating of additional applications.



EfA Technologies' team with its founder Yoel Ezra at the head of the table

As a participant in the Pears Challenge 2017, EfA Technologies joined the Israeli startup delegation that visited India in September of that year. India's response was very enthusiastic, and the company gained valuable insights into the culture and needs of the Indian market, recognizing pricing as the key criterion for acceptance.

In 2018, EfA achieved its first major milestone by winning the eHealth Ventures technology incubator competition. A series of further successes quickly followed. In November 2017, EfA won the TechForGood Scaling SocialTech competition. Just two months later, in January 2018, the company took first place in the digital health startup competition organized by Ernst & Young and IBM. In June 2018, EfA presented its project at the international Global Startup Talent@Taipei event, further raising

its global profile. In 2019, the startup showcased its innovation in the Czech Republic at the Czech-Israeli Innovation Day, an event focused on smart health technologies.

In December 2018, EfA was officially accepted into the eHealth Ventures, a technology incubator focused on the effective development of digital health startups. Thanks to eHealth Ventures' alliance with strategic healthcare partners, the company also received additional funding beyond the support provided by the incubator itself.

1. 1 Business Model and Marketing

The business plan of EfA Technologies for expansion into target markets in rural and remote areas is a hybrid business model combining B2B (Business to Business), B2B2C (Business to Business to Consumer), and B2G (Business to Government) approaches. The company intends to offer its device to private clinics and healthcare organizations, which will use it to provide essential medical services directly to local populations. At the same time, these organizations will collaborate with government institutions to leverage the RevDx device for collecting valuable epidemiological data, thereby contributing to more effective public health management. Interest in the RevDx device has already been expressed not only by some government representatives, but also by international health organizations, such as the Malaria Consortium, as well as several other global institutions.

The startup ensures profitability through the implementation of the *razor and razor blade business model*, which is a business strategy where the basic device is sold at an affordable price, sometimes even below the cost of production, while the company's profit comes from the recurring sale of accessories necessary for its use. In this model, the *razor* refers to the RevDx device itself. It is offered at a relatively low price to ensure accessibility for a wide range of customers, including smaller medical practices, facilities with limited budgets, and healthcare organisations in developing countries. This approach allows for rapid market penetration and widespread deployment of devices in the field. The *razor blades* in this case are disposable test slides with an integrated chip that must be used for each examination. These test cartridges represent the main source of recurring and long-term revenue. RevDx devices cannot be used without the original test cartridges, which naturally creates a customer dependency on the manufacturer. The main advantage of this model for EfA is the stable and recurring income, as the customer has to continuously purchase test cartridges, thus generating profit from each use of the device. Since the cartridges are exclusively RevDx compatible and are manufactured only by EfA, customer loyalty is also strengthened. In the future, the company may expand its business model by introducing, for example, monthly cartridge subscriptions for RevDx users or implementing volume discounts to encourage higher test usage and bulk purchases.

The additional business model will be based on EfA's cloud connectivity, enabling the collection of approved data from each device for further analysis and allowing remote updates of new applications and features for users.

When Yoel Ezra presented a prototype of the RevDx device, it attracted significant international interest. Countries such as the United Arab Emirates (Dubai), India, Ivory Coast, Portugal, Turkey, Sri Lanka, Nigeria, Philipines, UK, Europe, Latin America expressed strong interest in the technology. However, Ezra remains committed to his carefully planned market entry strategy. The company's go-to-market strategy, based on agreements secured so far, begins with Brazil (following obtained ANVISA approval), expands to the UK and Europe (based on CE approval), and subsequently targets the USA and other regions including India, Africa, and beyond. An additional parallel market will be the veterinary market.



Efa's team presenting RevDx at BiOMED exhibition

In 2023, the RevDx diagnostic device received CE certification for in vitro medical devices, confirming that the product meets all the essential requirements of European legislation regarding safety, health, environmental protection and consumer rights. To obtain the certificate Efa followed official CLSI guidelines for laboratory testing and got inspiration from similar predicates. However, the IVDD certificate will be replaced by the new IVDR regulation in 2028. The company has already begun the process of complying with the new requirements and plans to apply for certification in 2026. After two years of intensive preparation and testing, Efa received approval from the Brazilian health regulatory authority Anvisa in October 2023. This milestone enabled the company to officially enter the Brazilian market with the RevDx device on April 10, 2024. Currently, there is an ongoing commercial order in Brazil, and the devices are being installed in emergency departments. At the end of 2024, the RevDx

patent was granted in China and then in early June 2025, the company announced the launch of sales in Italy, further expanding its international footprint. Typical customers in Italy are blood banks, pharmacies, nursing homes, and remote clinics. Currently, negotiations regarding the initiation of distribution in the UK are underway.

At the same time, EfA secured overall \$10.5 million in growth capital. The current investment round was led by existing investors such as eHealth Ventures, which decided to support the startup in the expansion phase, the Israel Innovation Authority and health insurer Maccabi Healthcare Services (Maccabi HMO). Family offices and private investors also joined the rounds, including Venturing Tech and ARC Impact Ventures. The funding will support EfA's efforts to expand its market reach and to further develop and enhance its technology platform. In addition, EfA has received five consecutive grants from the Israel Innovation Authority.

In the long term, Yoel Ezra says EfA also wants to reach rural areas in developed countries, especially in the United States, where around 20% of the population lives in regions with limited access to health services. In addition, about 30 million Americans do not have health insurance, which often leads them to seek medical care only in emergency situations. EfA hopes that its accessible and affordable diagnostic technology can help bridge this gap and contribute to more equitable healthcare delivery.

Access to healthcare is a core value for EfA Technologies. The startup's motto *Where you live should not determine whether you live* aptly reflects the company's mission and commitment to global health equity. According to Yoel Ezra the company has a development plan in place to expand the use of the RevDx device. This includes enhancing the software to enable the diagnosis of a broader range of diseases, as well as adapting the system to work not only with blood samples, but also with other body fluids. These advancements could transform RevDx into a versatile and flexible diagnostic platform with wide-ranging applications across various healthcare settings.

2 REVDX DEVICE (REVOLUTION DIAGNOSTICS)

The method of blood sample collection has remained virtually unchanged over the last decades. In most cases, blood is drawn by a nurse in a general practitioner's office, or the patient is referred to a specialized blood collection center. A separate tube of blood is usually required for each type of test, which is then sent to the laboratory. Here, the sample is processed by medical laboratory technicians, transferred to a slide and examined under a microscope, or automated blood analysis is used to determine specific parameters. However, patients often have to wait several hours or even days, sometimes even a whole week, for the results of these tests. Moreover, if a patient is referred by their general practitioner to different specialists and each of whom requires new samples, multiple blood draws per week can become very demanding, especially for anemic patients.



RevDx device

2. 1 What Makes RevDx Device Unique

A revolutionary solution in the collection and analysis of blood samples offers the RevDx, a portable device that can completely evaluate blood count and the presence of pathogens in the blood from a single drop of blood taken from the fingertip. The RevDx weighs only 2.5 kilograms and can be used virtually anywhere as it does not require an internet connection or electrical power supply. The device performs the analysis of the blood sample autonomously within minutes, allowing the physician to immediately begin the necessary treatment without having to wait for the results from the laboratory. Its features make the RevDx particularly useful in areas such as sub-Saharan Africa, South America or India, where access to modern healthcare is often limited and transport to the nearest healthcare facility can take hours or even days. The use of equipment in the field not only helps to improve access to diagnostics, but also helps to prevent unnecessary overuse of antibiotics and the related problem of antibiotic resistance.

RevDx can also detect malaria from a blood sample, which is often misdiagnosed. The device gives the doctor an early signal to begin antimalarial treatment, which can be life-saving when administered promptly. The use of RevDx device is also possible in developed countries, for example in telemedicine solutions for remote areas, in homes for the elderly where transport to hospital is complicated, or in the difficult conditions of field hospitals during war conflicts and natural disasters.

As part of the certification process, clinical trials were conducted for both the CE and ANVISA certificates. These trials compared the performance of the RevDx device against the laboratory gold standard Sysmex hematology analyzers. In addition, a study was carried out in a hospital in Brazil to further validate the device's accuracy and reliability in a real-world clinical setting. Beyond these formal validation studies, ongoing research is continuously performed in EfA's laboratory. This work focuses on updating and enhancing the device's diagnostic capabilities, improving test performance, and introducing new features to deliver greater value and usability for healthcare professionals.

2. 2 Functionality of the Device

RevDx is based on three core technologies: microfluidics, optomechanics and artificial intelligence. In the area of microfluidics, the device uses a disposable microfluidic cartridge that not only collects the blood sample but also automatically prepares it for analysis. The optomechanical system includes an integrated microscope that captures high-quality images of the sample while simultaneously performing spectroscopic measurements. Last but not least, artificial intelligence is integrated into the system, which uses advanced algorithms to evaluate blood samples and provide doctors with fast and accurate results.



Switched on device

Using the device itself is very simple and requires no special skills. Once the device is switched on and the doctor logs in, he can easily operate the device thanks to its intuitive and user-friendly interface. To record a new patient, the doctor needs to enter basic information such as name, gender, age and registration number. The doctor then uses the pre-made sampling cartridge, which contains a chip encased in a glass slide and marked with a QR code. Using a reader, the doctor scans this code, whereby the machine automatically matches the sampling cassette to a specific patient. The doctor then takes a drop of blood from the patient's fingertip, applies it to the slide and inserts the chip into the device. Within minutes, the device displays all the necessary results. These are clearly expressed in numbers and percentages and the cut-off values are highlighted in red for better orientation. In addition, the results can be easily printed out.



Preparation of the sample

3 DISCUSSION

The main competitive advantage of RevDx device is its ability to operate completely without the need for electrical power or internet connection, allowing it to be used virtually anywhere, even in extremely challenging conditions. Its portability, light weight and compact design make it ideal for use in remote developing areas such as regions of sub-Saharan Africa, rural India or parts of South America. In these areas, a large proportion of the population has limited, often none, access to health care, and travel to the nearest health facility can take hours or even days.

Introducing the RevDx device to every village or community in these regions could dramatically improve the availability and speed of basic diagnostics, thereby significantly increasing the chances of timely and effective treatment. The benefits of the device are particularly evident in the case of bacterial infections, where healthcare workers could make an immediate decision on the use of antibiotics based on the results from a single drop of blood. This helps not only in controlling the spread of infections but also in reducing the unnecessary use of antibiotics, a key factor in combating antibiotic resistance. Another key advantage of RevDx is its potential to combat malaria, particularly in sub-Saharan Africa, where the disease is still one of the leading causes of childhood mortality. The early and accurate detection of malaria-causing parasites in the bloodstream with RevDx would enable the immediate administration of crucial antimalarial treatment. Prompt treatment of those affected by malaria can substantially increase the chances of survival, significantly reduce mortality and contribute to improving the overall health status of populations in the most affected regions. Overall, RevDx thus represents a revolutionary step towards more equitable access to healthcare, especially in areas where resources and medical infrastructure are very limited.

The RevDx device would find application not only in developing regions, but also in developed countries where it can significantly improve access to healthcare for specific segments of the population. It would be very beneficial, for example, in homes for the elderly or nursing homes, where transporting immobile or mobility-impaired patients to collection centres is often logistically challenging, time-consuming and physically and mentally exhausting for the patients themselves. In addition, the elderly often suffer from fragility of the vascular walls, which makes conventional venous blood sampling difficult or even painful. RevDx offers a less invasive alternative requiring only a single drop of blood from the fingertip. This gentler and less painful method of blood collection is thus particularly suitable for elderly or frail patients or patients in palliative care. Children could also benefit significantly, as many are afraid of needles or distressed by conventional blood sampling. Likewise, the device is ideal for individuals who experience nausea or anxiety during standard blood draws. By offering a simple, less invasive testing method,

RevDx enhances patient comfort and expands access to diagnostics in settings where conventional blood collection is difficult or undesirable.

The RevDx device would also find valuable application in remote or mountainous areas where healthcare services are often limited and where is often only one GP responsible for visiting patients in their homes. In these regions, healthcare infrastructure is often limited, laboratory services are unavailable and transporting patients to remote collection centres is difficult or unrealistic. Thanks to its light weight and compact size, the RevDx device can be easily carried in the doctor's bag and used in the field without the need for electricity or internet connection. This greatly simplifies and speeds up diagnosis directly at the patient's site, significantly reducing the time to initiate the appropriate treatment. This approach is particularly beneficial for people with reduced mobility or the elderly who are unable to visit the GP's office in person. The ability to perform blood count on-site significantly increases accessibility to healthcare and enables effective health monitoring even in hard-to-reach locations.

The RevDx device would also find a place in the equipment of rescue workers or mountain rescue services. Thanks to its portability and independence from electricity, it enables rapid diagnosis in the field, which will facilitate decision-making on the urgency of transport and speed up the initiation of treatment in critical situations. Thanks to these attributes, the device could also be fully utilised in emergency departments for patient triage and rapid assessment of their health status, enabling the prompt initiation of treatment.

The device could also be very useful in GP offices, as there is often a lack of equipment for a complete blood count and samples have to be sent to external laboratories, resulting in long wait times for results. However, many practices already have machines that can measure the CRP level in the blood (a marker of inflammation) on the spot, and the doctor can prescribe antibiotics in the office if a bacterial infection is suspected. However, CRP tests have limitations as they can only show the current concentration of C-reactive protein in the blood, which alone does not allow you to distinguish with absolute certainty whether the infection is viral or bacterial. In addition, CRP levels can change throughout the day and their interpretation may be biased by certain diseases or the use of medications such as anti-inflammatory drugs. In contrast, the RevDx device does not measure CRP itself, but instead provides the actual number and ratio of all subtypes of white blood cells, red blood cells and platelets. This comprehensive blood cells profile provides the physician with much more detailed information about the nature of the ongoing disease and allows for more accurate differentiation between viral and bacterial infections, leading to better diagnosis and more appropriate treatment. As a result, RevDx can significantly improve patient care even in the general practitioner's office. Thanks to the immediate display of results, the need for a follow-up

appointment with the doctor to discuss laboratory findings would be significantly reduced, as there would be no waiting time for results from an external lab.

The RevDx device would also be highly valuable in a military environment, particularly due to its portability, light weight and ability to operate without electrical power or internet connection. It can be easily carried and used even in the harsh and improvised conditions common in military operations, military deployments during natural disasters or humanitarian missions. In field hospitals, where full laboratory facilities are often unavailable and where rapid diagnosis and initiation of treatment can make the difference between life and death, RevDx would be a valuable tool for military doctors. It enables quick and accurate on-site evaluation of blood count and pathogen presence, greatly speeding up treatment decisions and potentially saving lives. In addition to acute care, the device would also help in monitoring the health status of soldiers during long-term field deployments where conventional laboratory equipment is not available. The device could also play a key role during global pandemics, particularly in the improvised sampling centres often operated by the military. In such situations, it is essential to confirm infection as quickly as possible and to decide whether to initiate quarantine. During pandemics, the device could also be used effectively by the military at border checkpoints and airports, where it would allow immediate testing of passengers arriving from high-risk areas.

Another important feature of the RevDx is its low cost of acquisition and operation, which makes it an attractive solution for developing countries as well as for healthcare facilities with limited budgets. The initial investment in the device can be quickly recouped, especially due to its long-term usability and minimal operating costs. The RevDx does not require a permanent electrical supply as it runs on batteries, and the only recurring cost is the disposable test slides with integrated chip that are used during each examination. The lower cost of the test itself could also be key in the context of socially disadvantaged populations, such as those without health insurance or those who delay seeing a doctor because of financial concerns. Easier access to screening could contribute to earlier detection of diseases, reduced mortality and increased life expectancy, especially for chronic or neglected conditions. Furthermore, implementing RevDx device could significantly reduce the considerable costs associated with traditional blood draws, such as staffing costs at collection centres, transporting samples to laboratories and processing them. This would save money within the health system that could be used for other, often urgent needs such as prevention, vaccination or care for the chronically ill. As part of the healthcare savings, the RevDx device could also be used for preventive screening programmes for the public to map the prevalence of certain diseases in the population, ensure their early detection and enable early initiation of treatment.

A big challenge, but also an opportunity for the future, could be the introduction of RevDx directly in pharmacies. This would significantly expand the availability of basic diagnostics and bring it even closer to the general public. A model use of RevDx would be in cases where a person is not feeling completely healthy (experiencing mild symptoms like fever, sore throat, cough, etc.). Instead of waiting several days for a doctor's appointment or spending hours in a crowded waiting room, he could visit the nearest pharmacy where trained staff would take a small drop of blood from his finger and evaluate his blood count in a few minutes. Based on the results, the pharmacist could then recommend an appropriate course of treatment, for example whether conventional over-the-counter medicines (e.g. paracetamol or ibuprofen) would be sufficient or whether it is advisable to see a doctor as soon as possible because of a suspected bacterial infection that may require prescribed antibiotics. This approach could significantly relieve busy GP surgeries, speed up initial diagnosis and improve access to care. In addition, early diagnosis would help to reduce the risk of transmission of infectious diseases, as patients would gain information about their health situation before possibly unknowingly spreading it further. The introduction of RevDx in pharmacies could also strengthen the role of pharmacists as important links in the public health system, and open up new opportunities for rapid diagnosis, especially in cities and areas with limited access to medical care.

The device could also be gradually implemented in refugee shelters, asylum centres, or facilities for the homeless, as these groups often do not have health insurance and regular access to medical care. Free testing and subsequent treatment of infected persons could make a significant contribution to protecting the wider population from the spread of infectious diseases.