POLITECNICO
MILANO 1863

Atos

Leadership and Innovation project

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Number of words : 7879 (annexes excluded)

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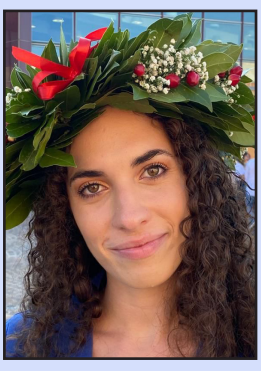

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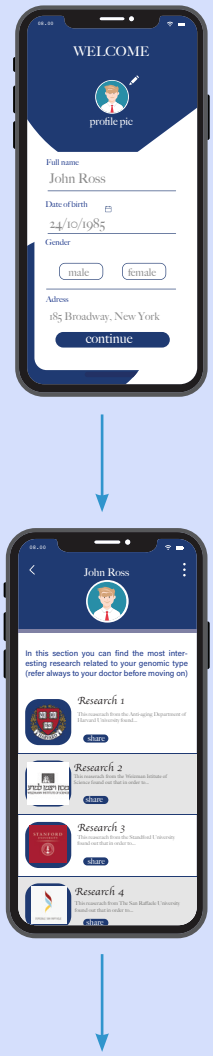
Executive summary

Executive summary

Atos is a global leader in digital transformation with approximately 100,000 employees in 73 countries and annual revenues of around € 12 billion.
The innovation project is divided into 3 main sections: market analysis, presentation of the idea and leadership&team-work. In the first part, we briefly analyzed the market and the user's needs, leading us to the choice of the sector in which to operate, the healthcare one. We searched for the latest trends in this sector, trying to understand the best opportunities.
Using the design driven innovation, we developed a new meaning for personalized healthcare: MedicEasy, a multisided platform aimed at helping people receive personalized treatments and suggestions from health professionals, while also gathering data for research and drug development. This can all be done thanks to Atos' HPCs.
We then performed a profitability and marketing analysis for our project and solved the main problems that arised: data gathering and data security.
According to our projections we expect a low cash flow in the first year (340.000 €), which is quickly improved in the following year, where we have a positive cash flow of more than €7 million. This leads to a positive Net Present Value of 7.536.911,20 €.
Then, finally, we focused on the team dynamics of our group, analyzing our leadership style, interactions and how we are using some models and how we are viewed by the others.



Market analysis

Internal analysis

The first step for our strategy analysis is the internal analysis of ATOS. The model we used is the RCBV. It focuses on spotting the company's superior performance based on its unique resources and capabilities. By leveraging them, ATOS can obtain a sustainable competitive advantage that is difficult for rivals to imitate.

Resources

- Human resources : Atos has a large and diverse workforce (with more than 100,000 employees worldwide). The company has a strong focus on employee development and training, which helps to build a skilled and knowledgeable workforce.
- Technology resources : Atos has invested in developing and acquiring cutting-edge technologies, which enable the company to provide innovative solutions to customers.
- Intellectual capital : with significant Digital and Cloud R&D spending per year, leveraging the innovation of 18 R&D centers with a focus on strategic technologies. Atos excellence in R&D is illustrated by a world-class portfolio of IP solutions and 3,000 patents. It is nurtured by a Group- wide community of 2,600 experts and fellows, and by a unique Scientific Community composed of around 175 scientists, which crafts the Group's vision for the future of technology in business and anticipates upcoming market trends and technologies.
- Extended social and relationship capital : relying on a strong network of partners with leading technology provider (Amazon Web Services, Cisco, Dell Technologies, Google Cloud, Microsoft, Oracle, Red Hat, SAP, Siemens, VMware, Worldline, and many more) . These collaborations help Atos to expand its service offerings and provide more comprehensive solutions to customers.

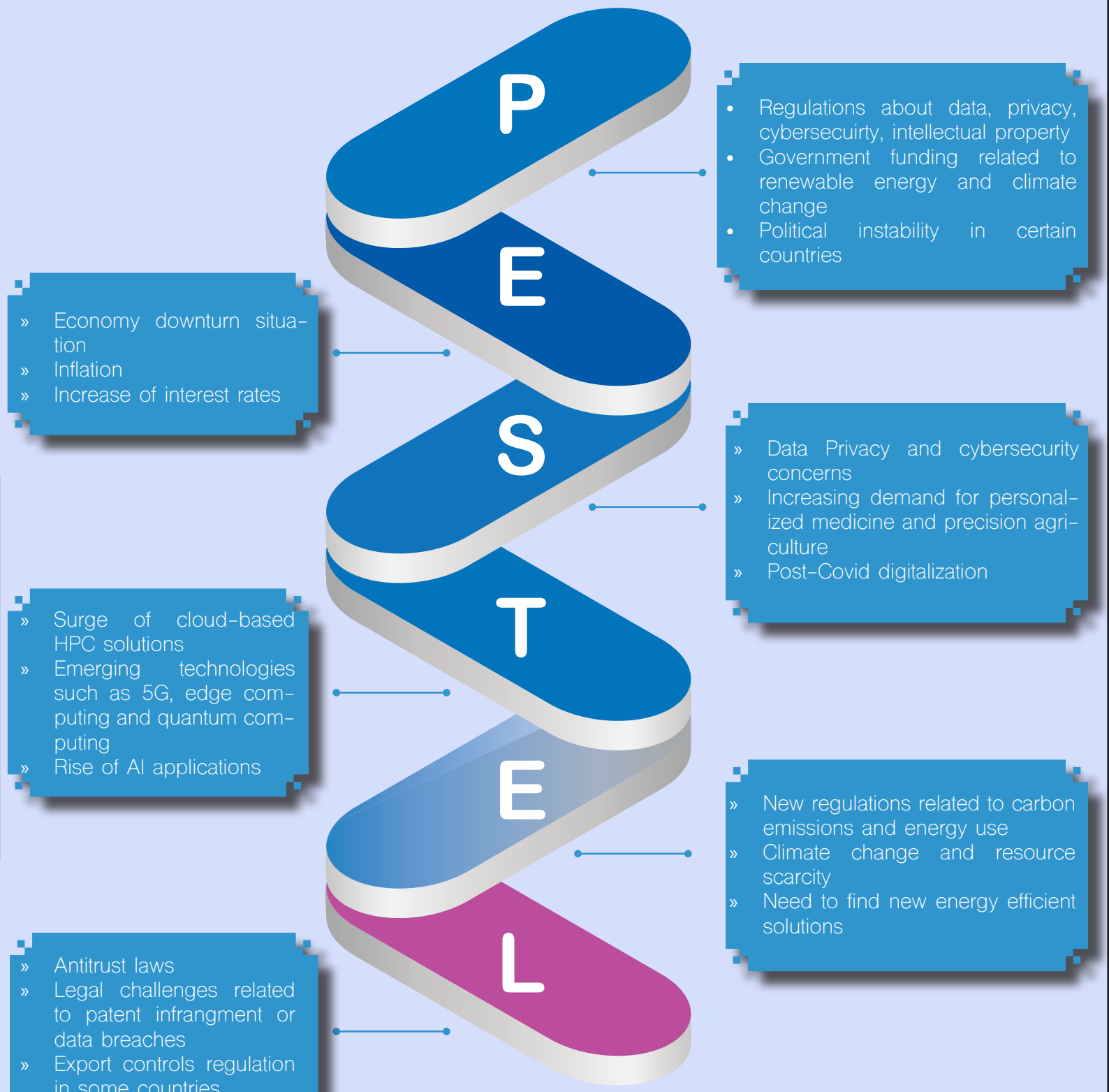
Competencies

- Service delivery excellence : Atos has a reputation for delivering high-quality services to customers. The company has a strong focus on customer satisfaction and has established processes and systems to ensure that services are delivered efficiently and effectively.
- Innovation : Atos has a strong culture of innovation and is committed to developing and implementing new technologies and solutions. The company has a dedicated innovation program and several innovation labs and centres that foster collaboration and knowledge-sharing among employees and partners.
- Sustainability : Atos has made a commitment to sustainability and is working to reduce its carbon footprint and develop environmentally friendly solutions. This focus on sustainability could help the company to differentiate itself from competitors and appeal to customers who prioritize sustainability.

Overall, Atos has a strong set of resources and competencies that enable it to deliver high-quality services, innovate, and pursue growth opportunities. The company's focus on employee's development, strategic partnerships, and sustainability could also help it to differentiate itself from competitors and appeal to customers who prioritize these factors.

External analysis

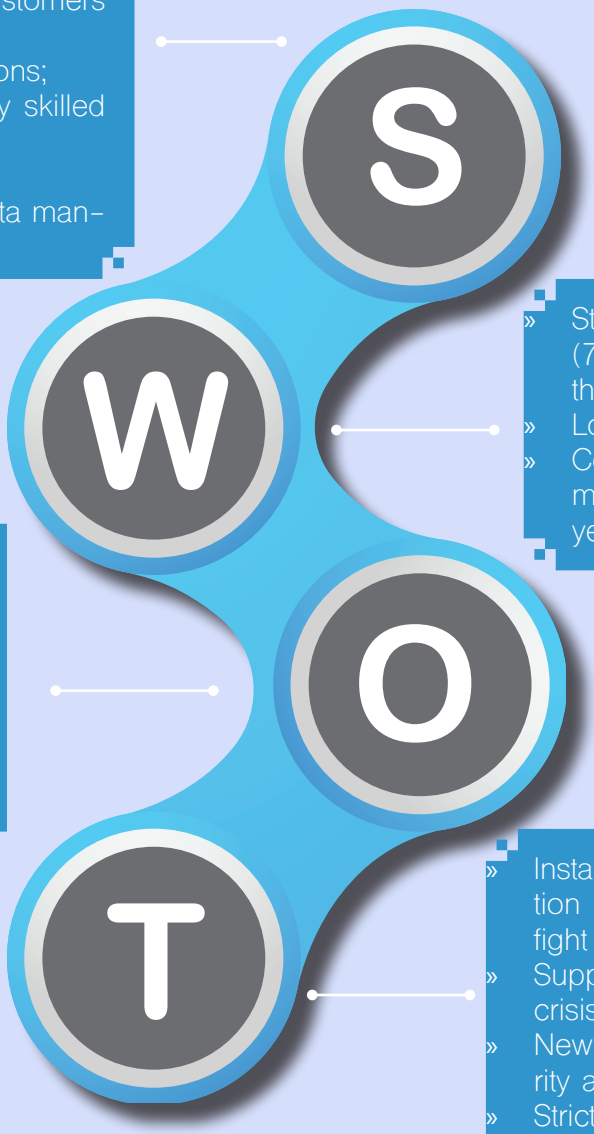
The second step of the strategic analysis that we decided to pursue, in order to find some ideas and innovative trends in the market, is the PESTEL. PESTEL analysis provides a comprehensive framework for analyzing the external factors that impact the industry, and it helps us to find the opportunities and threats that will be needed to perform a SWOT analysis and find some strategic alternatives.



TO SUM UP...

SWOT

- Global presence: Atos operates in over 70 countries and this allows the company to have access to a vast range of customers in different markets;
- Strong partnerships and collaborations;
- Strong intellectual capital and highly skilled workforce;
- High performing IT assets;
- Expertise in security and privacy data management



- Strong dependence from Europe (70% of revenues come from this continent);
- Low brand recognition;
- Complex organization due to multiple acquisitions through the years;

- Growing demand for digital solutions in emerging markets;
- Increasing interest in IT from different sectors, such as Healthcare, Public Administration, Logistics;
- Public enthusiasm towards new applications for AI and Blockchain

- Instable worldwide economic situation (high interest rates in order to fight inflation);
- Supply chain tensions and energy crisis;
- New strict regulations on cybersecurity and data protection;
- Strict regulations related to carbon emission;
- Increasing competition with new innovative business models.

Strategic alternatives

- Leverage Atos' skilled employees and expertise in data management in order to strengthen its presence in growing markets that will need more complex and efficient IT solutions, leveraging its HPC solutions.
- Diversifying Atos' presence by entering new markets like the emerging ones, that are growing and can present a great opportunity to increase worldwide market share.
- Modify Atos' organizational structure in order to become more flat, flexible and responsive to new market needs and changes in the environment.

All three alternatives are valid and present interesting opportunities for the firm. However, among them, we chose the first alternative cause we think it's the one that can impact the most the company's profitability in the long term, and also the one that can be most useful to the whole population.

Healthcare sector

We chose to focus our attention on the healthcare sector. It is the most interesting, since it is also the one in which Atos grew the most between 2020 and 2021 (+1,8% in revenues).
The sector is facing many challenges, a lot of them linked with the ageing of the population and the development of technologies and big data, for which Atos could provide tailored solutions.
The healthcare sector is a vital industry that encompasses a wide range of services and products related to the prevention, treatment, and management of diseases and illnesses. According to the World Health Organization, the global healthcare market was valued at approximately $8.45 trillion in 2018 and is expected to reach $11.9 trillion by 2022. Industry employs millions of people worldwide and is a major contributor to economic growth.

Atos' vision on healthcare:

"A world with a sustainable, high-quality global health system where people are empowered to enjoy health and wellbeing.
We work together with the healthcare providers, payers and life sciences industry to transform to a technology-enabled future that enables a pivot from patient treatment to population wellness, both within and increasingly outside of hospital or laboratory settings."

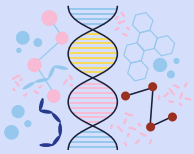
Innovative trends

Patient-centric approach

Focus entirely on the patient's needs and create a system that integrates all stakeholders involved in the patient's journey. This includes promoting healthy living and prevention, and providing support through diagnosis, treatment, recovery, and home care. The goal is to create a personalized 360-degree experience for the patient, where they receive the necessary care and support at every stage of their journey.

Intelligent data-driven orchestration

Offer smart, data-oriented coordination that enables all involved parties to work together in the context of value-based care and precision medicine. This means using data to inform decision-making and coordinating efforts across stakeholders, from healthcare providers to patients, in order to achieve the best possible outcomes.



Complex genomic analysis

Provide patients with highly personalized medical care that is tailored to their unique genomic profile. The idea is to utilize the most recent developments in genomic analysis and High-Performance Computing (including Quantum-based) to facilitate precision medicine. This is considered the future of healthcare.

Cybersecurity for healthcare and life sciences

As the cyber threat landscape continues to rapidly evolve in a complex environment, cybersecurity has emerged as one of the top risks faced by healthcare and life sciences businesses. It is essential to be prepared for the unexpected and ensure that appropriate measures are taken to address potential security challenges.

Disruptive Technologies

The future will bring about more disruptive technologies. However, these emerging technologies have the potential to be transformational in the years ahead. The idea is to anticipate and prepare for these upcoming technologies, to remain adaptable and embrace new technologies as they emerge in order to remain competitive and innovative.

Inspirational projects

Let's firstly focus on the project on which Atos is collaborating at the moment:

Digital tools hold the promise for many health benefits that can enhance independent living and well-being of the elderly.
Motivated by the above, the aim of the SMART BEAR platform is to integrate heterogeneous sensors, assistive medical and mobile devices to enable the continuous data collection from the everyday life of the elderly, which will be analyzed to obtain the evidence needed in order to offer personalized interventions promoting their healthy and independent living
SMART BEAR will leverage big data analytics and learning capabilities, allowing for large-scale analysis of the above-mentioned collected data, to generate the evidence required for making decisions about personalized interventions. The main target for this projects are Cardiovascular diseases, mood, balance, cognitive disorders and hearing loss.

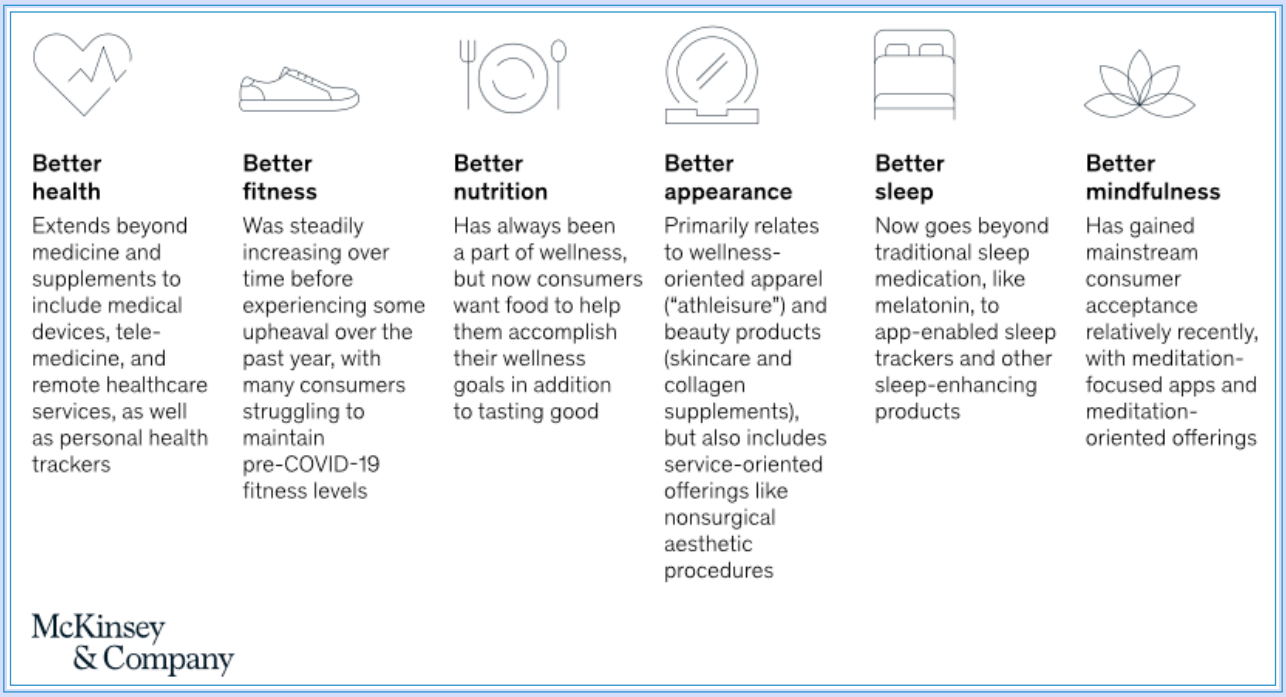
It aims at the assessment of the indoor air quality (IAQ) effects in health on the basis of an extensive monitoring campaign of chemical and biological indoor air pollutants in several very representative at EU level indoor locations together with a deep research on their sources, interactions and main correlations with health problems by means of theoretical analysis, clinical trials and tests (includes in vivo/vitro approaches).

Personalized Medicine (PerMed) opens unexplored frontiers to treat diseases at individual level combining clinical and omics information. However, the performances of the current simulation software are still insufficient to tackle medical problems such as tumor evolution or patient-specific treatments. The challenge is to develop a sustainable roadmap to scale-up the essential software for the cell-level simulation to the new European HPC/Exascale systems.
The goal of PerMedCoE is to provide an efficient and sustainable entry point to the HPC/Exascale-upgraded methodology to translate omics analyses into actionable models of cellular functions of medical relevance.

Users' needs analysis and trends

After understating the industry in which Atos operates and after the choice of the strategic alternative, we evaluated which are the customers we are targeting and which are the needs they need to fulfill.
The best way to understand the user's needs is to not only see what they say through quantitative or qualitative research, but to try to go higher on the pyramid, trying to reach their latent needs. However, these is often not so feasible.

Companies must comprehend the market from the perspective of the consumer because consumer's perceptions of wellness are constantly changing. The categories that consumers are most interested in, according to the article "Felling good: the future of the $1.5 trillion wellness market" by McKinsey, are:



Better health
Extends beyond medicine and supplements to include medical devices, telemedicine, and remote healthcare services, as well as personal health trackers

Better fitness
Was steadily increasing over time before experiencing some upheaval over the past year, with many consumers struggling to maintain pre-COVID-19 fitness levels

Better nutrition
Has always been a part of wellness, but now consumers want food to help them accomplish their wellness goals in addition to tasting good

Better appearance
Primarily relates to wellness-oriented apparel ("athleisure") and beauty products (skincare and collagen supplements), but also includes service-oriented offerings like nonsurgical aesthetic procedures

Better sleep
Now goes beyond traditional sleep medication, like melatonin, to app-enabled sleep trackers and other sleep-enhancing products

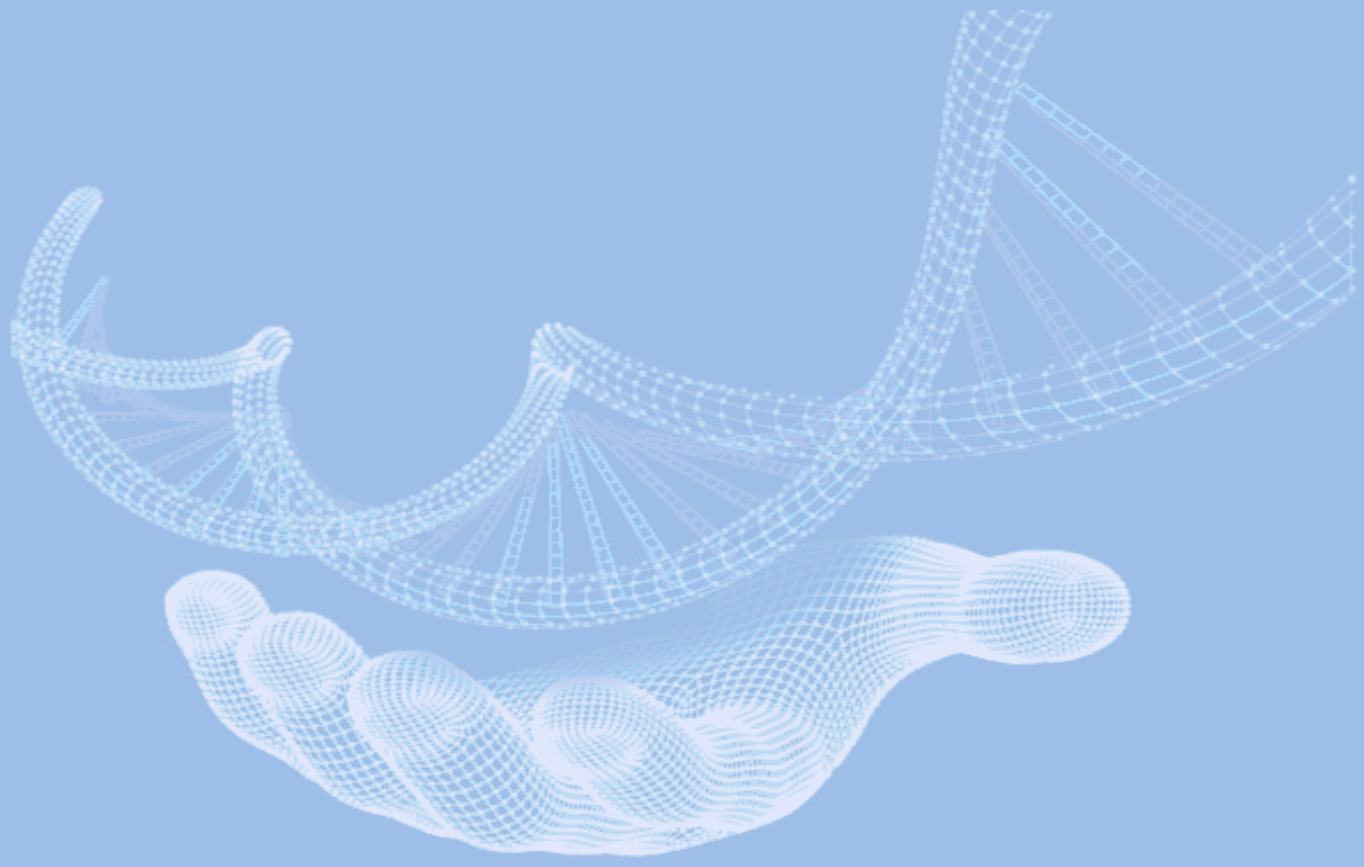
Better mindfulness
Has gained mainstream consumer acceptance relatively recently, with meditation-focused apps and meditation-oriented offerings

McKinsey & Company

In the end, we suggest that Atos conducts its own research about these topics, and we especially suggest the lead user analysis, combined with the beta testing of the innovative project we will discuss later in the paper.

The Innovation

Mediceasy

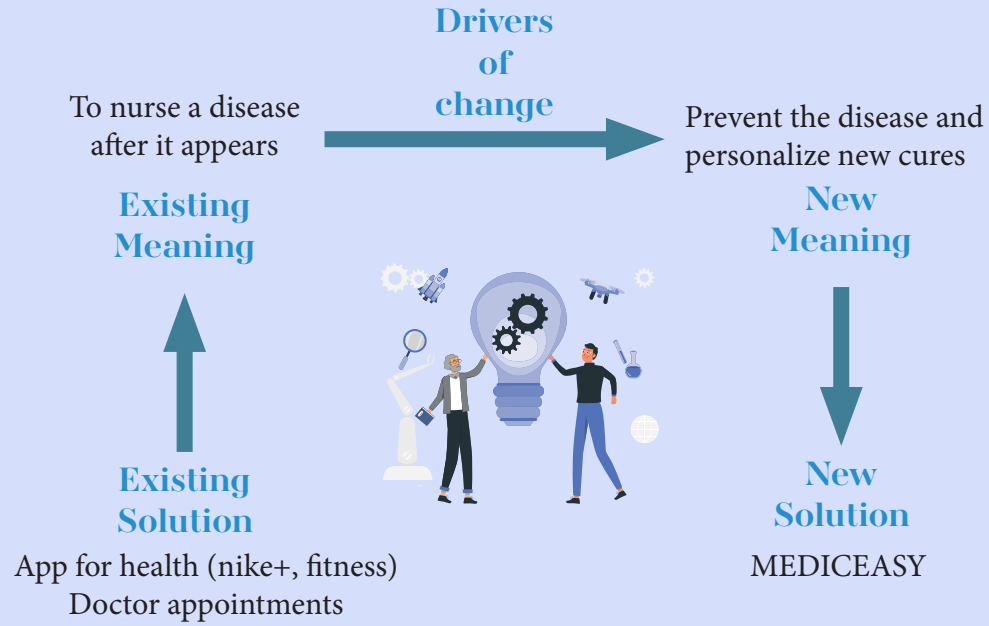


Definition of Innovation Strategy

OPEN INNOVATION

Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand markets for the external use of innovation.
The core process in Open Innovation that Atos should pursue is the Coupled process, which refers to co-creation with complementary partners through alliances, cooperation and joint ventures.
In this specific case, Atos could establish a strict collaboration with research centers giving them the HPC in exchange of the possibility of managing the data about the health trends.

DESIGN-DRIVEN INNOVATION



VISION

"Your health in your pocket"

MISSION

Imagine a world where healthcare is not just a reactive approach to treating illness, but a proactive and personalized journey to achieving optimal health for everyone. Our mission is to develop an innovative healthcare ecosystem that puts the individual at the center, empowering them with the tools and knowledge to manage their health journey.

Using advanced technology and data-driven insights, we aim to create a healthcare experience that is seamless, accessible, and personalized to each person's unique needs and preferences. Our goal is to foster a culture of wellness that promotes healthy living, preventative care, and early detection of potential health issues.

By bringing together healthcare providers, researchers, and technology experts, we will unlock the full potential of precision medicine and transform healthcare from a one-size-fits-all model to a truly personalized approach. Together, we will revolutionize the healthcare industry, making it better and more personalized for everyone.

OBJECTIVES

Increase brand recognition, increase market share, broader the usage of the hpc, standardizing and managing sensitive data in a secure way, ensure medical data security, increase our partnership with government, leading the way to precision medicine.

Business model canvas

KEY PARTNERS

- Governments
- Hospitals
- Doctors & researchers

KEY ACTIVITIES

- Medical research
- Gathering data and managing security issues
- Data analysis and elaboration
- Providing personalized insights to patients

KEY RESOURCES

- HPC
- Electronic health records
- Blockchain and AI (and experts)
- The MinION sequencer

VALUE PROPOSITION

(See next page)

CUSTOMER RELATIONSHIPS

- Dedicated personal assistance
- Automated services

CHANNELS

- Multi-sided platform
- Hospitals

CUSTOMER SEGMENT

- B2C costumers: patients, segmented by age or level of technological knowledge/ easiness of use
- B2B : doctors/ phisicians

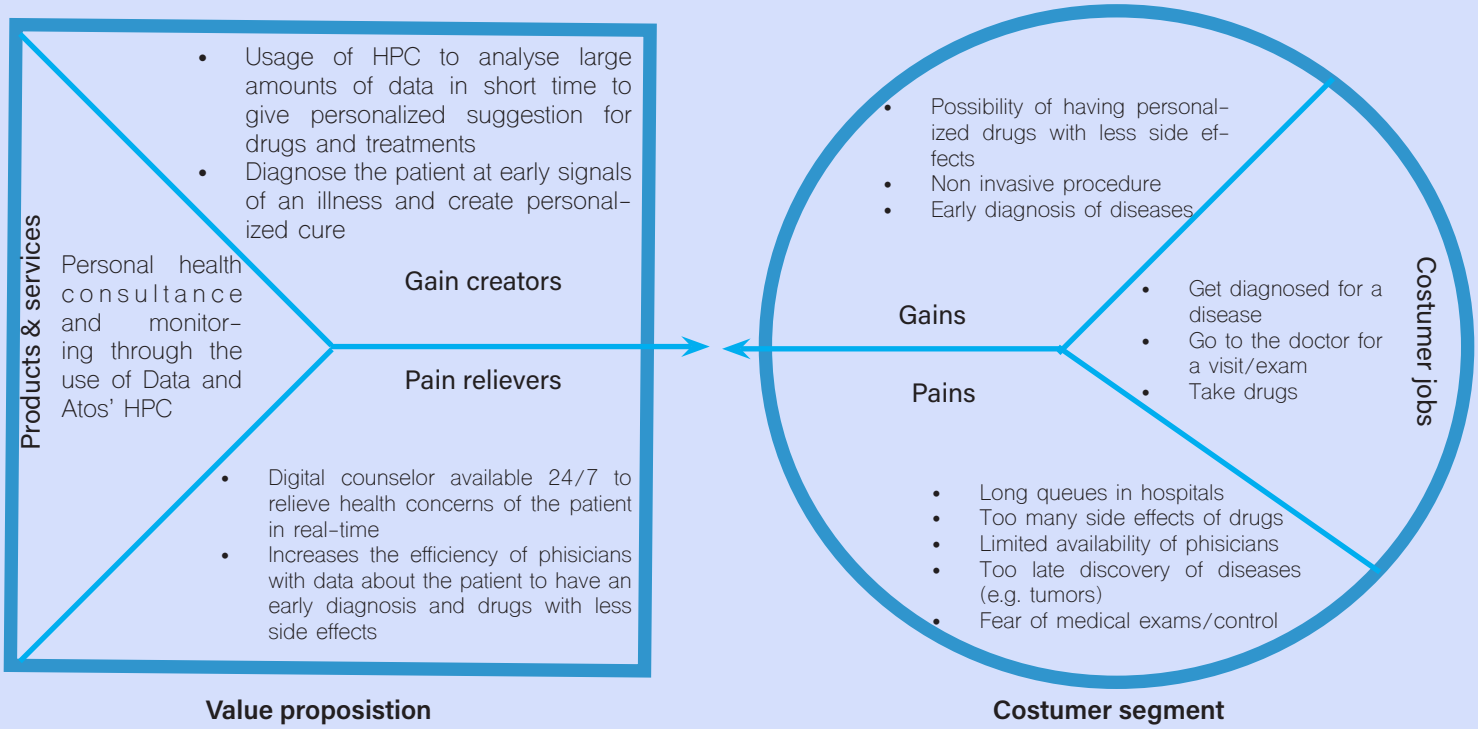
COST STRUCTURE

- IT infrastructure for HPC and Blockchain
- Platform development cost (fixed)
- Employees cost

REVENUES STREAMS

- Financing from government
- Revenues from data sharing with pharma companies to develop better drugs

Another important tool that we used to address the added value we could offer to the users is the Value proposition canvas. We tried to see how we could improve the customers' pains and provide them with gains through the implementation of our idea.



This is the result of the analysis:

Patient side: the app provides a faster process of medical prescription, it could suggest predicitive cures and it can give tips for a healthier lifestyle.

Hospital/doctors side: easier access to new cures and medicines/drugs

And finally...

Our Idea

We want to create an app for patients and medical professionals that enables users to input their personal data and genetic information, which is gathered through the MinION sequencer, and then analyzed by High-Performance Computing (HPC) in order to provide to customers (patients) individualized health and wellness recommendations. Medical personnel would be able to utilize the app to contact with their patients directly, monitor their statistics, and use the collected information for research and predictive medicine. By making individualized health recommendations for each patient and making it easier for doctors to monitor and treat their patients, the suggested solution intends to streamline data collection and analysis in the healthcare sector and to provide better, earlier and efficient treatments to patients. This app could be then farther implemented in the future with additional features as technologies continues developing, so this is an important step towards the future of personalized medicine. Atos will have a central role in the development of this App, as the huge amount of data exctracted will be analyzed through HPC in order to find patterns (also levereging AI and quantum algorithms).

Where to start?

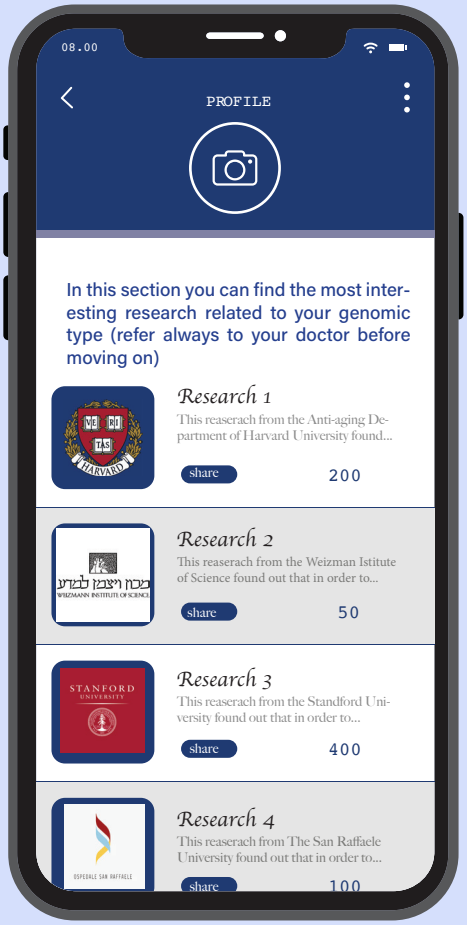
The first countries which we want to target with the app are the Northern Europeans (like for example Norway, Finland...) which are, for now, the ones with the most efficient and complete healthcare systems in Europe. Also, the State there is more open and inclined towards these kinds of initiatives and it is where Atos has the biggest market share. In the future, however, the app could be deployed also in other European countries like Italy and Belgium, after addressing the data gathering and security problems (in fact, for example in Italy especially data gathering and EHRs are not so used and optimized).

SO WE PRESENT...

How to implement the app (overview)

1. Define the app's features and scope: Start by defining the key features of the app, which are: patient data input (like age, previous health issues, where the patient lives...), genetic information analysis, personalized recommendations, physician access, communication features, and data analytics for research and predictive medicine.

2. Select the right technology stack: choose the right technology stack for building the app, considering factors such as scalability, security, and integration with other systems. For data gathering, use the minion sequencer and for genetic analysis and data processing the app will use Atos'HPCs. For data security, as suggested, blockchain technology can be a good candidate.



3. Develop the app's architecture and design: develop the app's architecture, data model, and user interface design. Ensure the app is user-friendly and easy to navigate.

4. Build the app: develop the app using agile development methodologies like SCRUM, continuously testing and improving the app's functionality and user experience.

5. Integrate with relevant APIs and systems: integrate the app with relevant APIs and systems, such as electronic health record (EHR) systems, patient portals, and wearable devices like smartwatches.

6. Test and deploy the app: test the app thoroughly to ensure it is functional and secure, then deploy it to the target users. We suggest a beta-testing approach to receive costumer's feedback as soon as possible, in order to improve the app in the development stage.

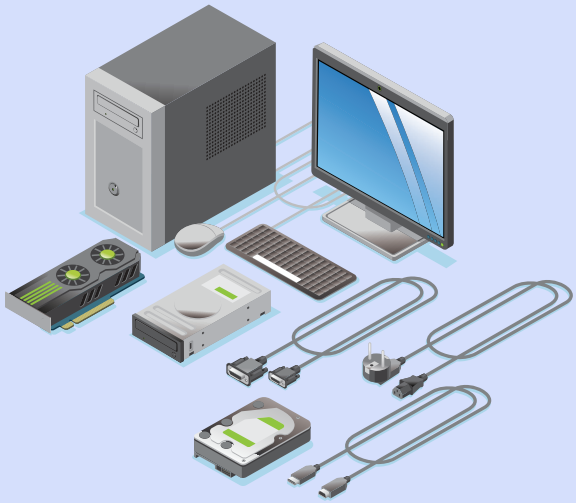
7. Provide training and support: provide training and support to patients and physicians to ensure they can effectively use the app and its features.

8. Monitor and optimize: monitor the app's performance and user feedback, and optimize the app's features and functionality based on user needs and preferences and on the data gathered.

Overall, implementing such an app requires a multi-disciplinary team of experts, including healthcare professionals, software developers, and data scientists. Careful planning and execution are critical to ensure the app meets the needs of patients, physicians, and researchers, while ensuring privacy and security of patient data.

Why do we need Atos' HPC?

Healthcare may gain a lot from using high-performance computing (HPC) to examine genomic patterns and patient data. Huge computing capacity is needed to analyze complicated and huge genomic datasets, and HPC systems are able to process enormous amounts of data quickly. This makes it possible for academics and medical professionals to conduct more thorough and effective analyses of patient data and genomic patterns.



Researchers can use HPC to analyze genetic data and find specific mutations or trends that may point to a propensity for a certain disease or condition. As a result, patients may receive interventions and treatments that are more specifically tailored to their individual genetic profiles.

HPC can also be used to evaluate patient data in real-time, giving clinicians the ability to keep an eye on patients' health and decide on treatments more intelligently. For instance, HPC systems can examine data from wearable medical devices, such as glucose or heart rate monitors, to spot trends and possible health problems.

Overall, the application of HPC in healthcare can lead to more precise diagnosis, individualized treatment programs, and effective patient health monitoring.

Marketing mix

2

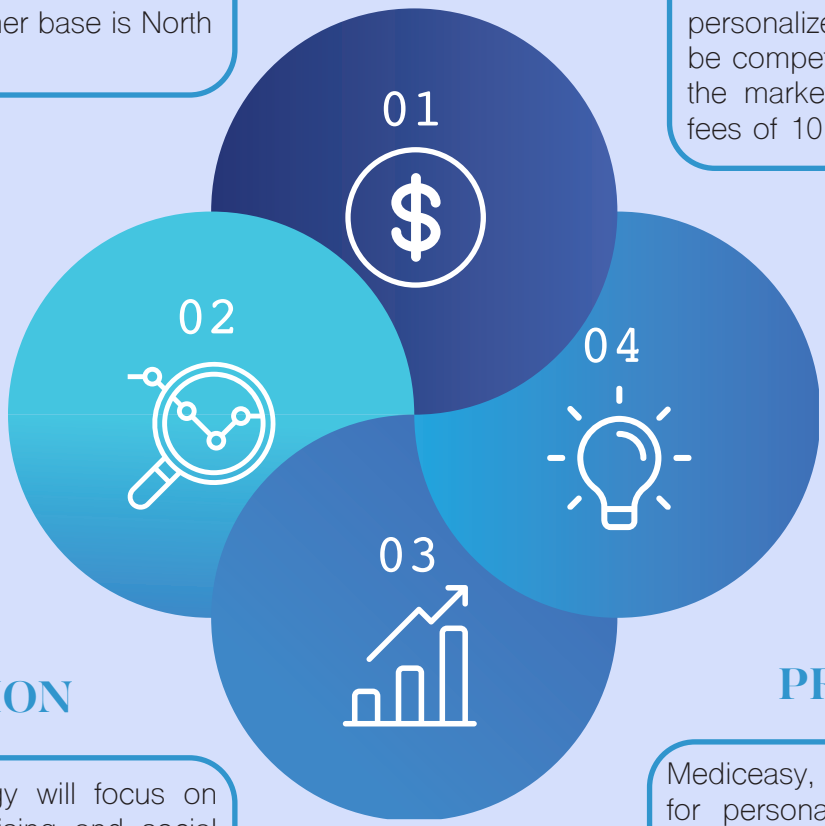
PLACE

Our platform will be primarily accessible through our website and mobile application, which will be available for download on both Android and iOS devices. We will also partner with healthcare providers and clinics to offer our services to their patients. The selected place for costumer base is North Europe.

1

PRICE

Our pricing strategy will be tiered based on the level of access and features that users desire. We will offer a basic free version that provides limited access to data and features, along with paid subscription plans that offer more extensive access to genomic data and personalized health insights. Prices will be competitive with similar platforms in the market, with monthly subscription fees of 10 euros for the premium app.



3

PROMOTION

Our promotion strategy will focus on targeted digital advertising and social media campaigns, as well as partnerships with healthcare providers, clinics, and fitness centers to reach our target audience. We will also leverage influencer marketing and user-generated content to build our brand and engage with our community. In addition, we will offer referral and loyalty programs to incentivize users to invite their friends and family to join Mediceasy.

4

PRODUCT

Mediceasy, the all-in-one platform for personalized healthcare, is the product we are offering. Our platform provides users with easy access to their genomic and health data, along with actionable insights and recommendations. The platform also features a community aspect where users can connect with other experts and health providers.

Revenues streams

REVENUES FROM PHARMA

If Atos obtains explicit agreement from data subjects and has a legal basis for processing, it may exchange genetic data with pharmaceutical companies. Atos might offer pharmaceutical businesses a variety of services, including:

- Data analytics: Atos could offer data analytics services to pharmaceutical companies in order to assist them in identifying patterns and insights into genetic data. These discoveries could be utilized to create novel medications or cures, as well as improve existing ones.
- Drug development: Atos could assist pharmaceutical companies in developing new drugs or therapies based on genetic data, for example in drug discovery, target identification, and preclinical testing.
- Clinical trials: Atos could assist pharmaceutical companies in conducting clinical studies utilizing genetic data. Patient recruiting, data administration, and statistical analysis are examples of such services.

REVENUES FROM COSTUMERS

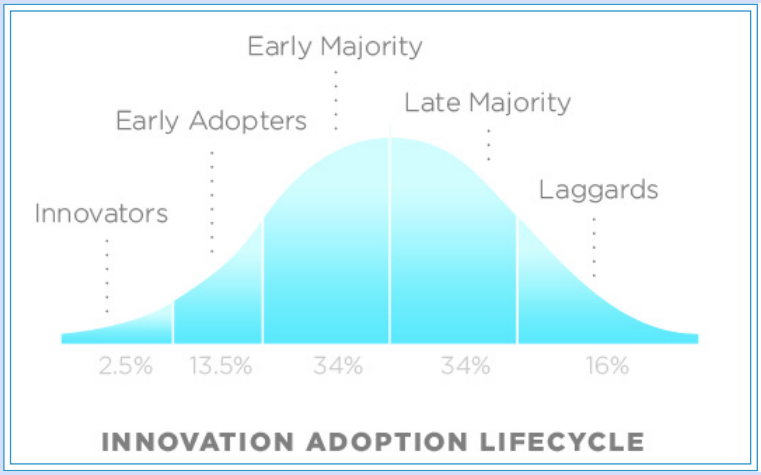
Freemium Model: offer a basic version of the app for free with limited features and a paid version with more advanced features. For example, the basic version could provide general health and wellness recommendations while the paid version could offer personalized recommendations based on genetic data. The cost of the paid version could be around $10 per month.

Estimation of revenues

The targeted user base is the northern population between 20 and 39 (the most likely to download the app, based on our analysis and our target).
According to the World Bank, the population between the ages of 20 and 39 in Northern Europe (Denmark, Finland, Norway, Iceland, and Sweden) was approximately 14.5 million in 2020. However, the percentage of the total population that falls within this age range varies slightly by country:

- Denmark: 26.1%
- Finland: 25.2%
- Norway: 23.3%
- Iceland: 23.3%
- Sweden: 26.1%

Let's estimate the adoption curve of Mediceasy as an innovation curve. Let's suppose that, in the first year, only innovators and early adopters download the app. Therefore, in the first year we will have a user base of 2,32 million of people (16% of our target population), that will increase to the 50%, which is 7.25 million in the second year, including the early majority.



For the revenues from the premium version of the app, let's say 10% of the user require their genetic data to be processed and want the premium version. If we only consider the first 2 years, we will have 725K[1] users, and a 12-month subscription is 120 €/person. So, the total revenue will be 120 €/person x 725K = 87M.

OTHER MAIN ASSUMPTIONS

For our analysis we assumed that the app has a user base of 725k users (the one who buy the paid version) and that pharma companies are willing to pay €1 per user per month for access to de-identified user data to help them develop new drugs. This could generate €2.78 million in the first year from pharma.
Considering all this, we estimated that the number of premium users (10% of total clients) who will eventually need to go through DNA sequencing is only 725k people (232k in the first year and 493k in the second).

[1] which is 10% of 7.25M

The MinION sequencers are manufactured by the British company Oxford Nanopore Technologies (ONT).
Since the MinION can be reused up to 5 times, we can estimate how many sequencers we need and consequently how many ONT needs to produce and sell, and that is an estimated 145.000 sequencers.
If we look at the financial data of this UK company, its current revenues are €200 million. Considering that the current price of a MinION is €1000, we could estimate a premium price for Atos to buy a large number of sequencers. If we assume a premium price of €600 per unit, this would lead to an increase in revenue for ONT of about 43% (estimated at € 87 million).
The cost of the MinION sequencer is covered by Atos for premium customers (who buy the paid version).

CASH FLOW COMPUTATION

» For this calculations we assumed 1 euro= 1 dollar
» The values presented are in euro/year

		YEAR 0	YEAR 1
REVENUES			
Revenues from partnerships	Partnerships with wellness related businesses (gyms, nutrisionists, ecc)	-	900.000,00
	Partnerships with pharmaceutical companies	2.784.000,00	8.700.000,00
Subscription revenues	Paid version of the app	27.840.000,00	87.000.000,00
TOTAL REVENUES		30.624.000,00	96.600.000,00
COSTS			
Cost for the app Mediceasy	Development cost of the app	300.000,00	-
	Mainteinance cost of the app and upgrades (20% of development costs)	60.000,00	60.000,00
Cost of labour for data storage	Data warehouse consultant (full time)	90.000,00	90.000,00
	5 data engineers (full time)	460.000,00	460.000,00
	Database administrator(full time)	74.000,00	74.000,00
	5 data analysts (full time)	310.000,00	310.000,00
Cybersecurity	Security infrastructure	1.000.000,00	1.000.000,00
	Security personnel	150.000,00	150.000,00
Sequencers	Cost for minION sequencers	27.840.000,00	87.000.000,00
TOTAL COSTS		30.284.000,00	89.144.000,00
YEARLY CASH FLOW		340.000,00	7.456.000,00
NET CASH FLOW		340.000,00	7.196.911,20
			NPV: 7.536.911,20

WACC= 3.06% (from gurufocus.com

PROBLEMS TO ADRESS

In trying developing the application, the Company might faces some challenges, in particular :

» Data gathering
» Data protection and privacy
» Ignition strategy

In the next paragraphs, we are going to illustrate this problems, presenting a possible solution to overcome them

Data gathering

A centralized digital platform that enables efficient and safe data exchange between healthcare providers and patients in the EU could be implemented as a potential answer to the issue of digital data gathering. Electronic health records (EHRs) for patients could be incorporated into this tool, allowing for the digital collection of all medical data pertaining to a patient's health history, present conditions, treatments, and medications. Government funding and support could be offered to cover the costs of implementation and training to encourage hospitals and other healthcare organizations to embrace this new project. This centralized digital platform may eventually result in better patient outcomes, more effective healthcare delivery, and better community health outcomes.
An example has been already done in Estonia, where 95% of the patients' health data is encrypted in EHRs, which resulted in a boost in the medical services' efficiency providing to everyone quicker and better diagnosis.

Data security and privacy

As we can read on the Atos site, "One of the most heavily regulated industries is healthcare. Several standards are put in place to regulate and protect sensitive healthcare data from cybersecurity breaches. "
This means that the main issue of implementing Mediceasy and managing genomic data is guaranteeing that the data we collect is safely stored and processed, respecting the main privacy law in Europe which is the GDPR.
Atos has a good reputation in the technology business and has provided GDPR compliance services to its clients in the past. As a result, Atos is likely to have the financial resources and experience to properly implement this compliances.

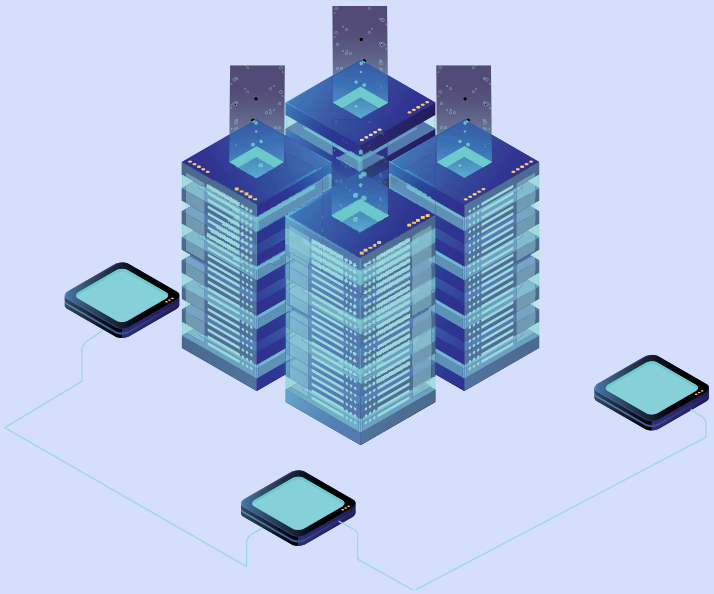
Genetic data is classified as a special category of personal data under GDPR, and its processing is generally restricted unless certain circumstances are met. To lawfully manage genetic data, private companies must verify compliance with it, which include:

1. [Lawfulness, fairness, and transparency]: data processing must be lawful, fair, and transparent. In this case, the patient must be informed and aware of the use that will be made of their genetic data, and this will be given through an agreement they must read before starting the process.
2. [Consent]: companies need to obtain explicit and informed consent from the individuals whose genetic data they wish to process. When the genomic data is collected, the patients will sign the agreement giving their consent to have their data processed and analyzed.
3. [Data minimization]: Companies should only collect and process the minimum amount of genetic data necessary to achieve their specified purposes.
4. [Security]: companies must implement appropriate technical and organizational measures to ensure the security of genetic data, including protection against unauthorized access, disclosure, or destruction. In Atos' case, we think that security can be guaranteed since it has been dealing with healthcare cybersecurity for years, developing an effective infrastructure.
5. [Accountability]: companies must be able to demonstrate compliance with GDPR requirements. Because of this, all transactions that will involve genomic data will be properly documented.
6. [Data subject rights]: companies must respect the rights of individuals whose genetic data they process, including the right to access, rectification, erasure, and data portability. This can be done using blockchain technology.

A possible solution

Blockchain technology permits to handle and securely keep patient genomic data, ensuring that only authorized users can access it. Patients could consent to the use of their data and later revoke that consent, and researchers could safely access the data through the platform with the assurance that it has been de-identified and is secured by blockchain technology.
Patients may feel more empowered by having more control over their genomic information and participating in medical study that could result in more effective treatments for both themselves and others. Here is a description of how patient genomic data might travel through the platform and the blockchain:

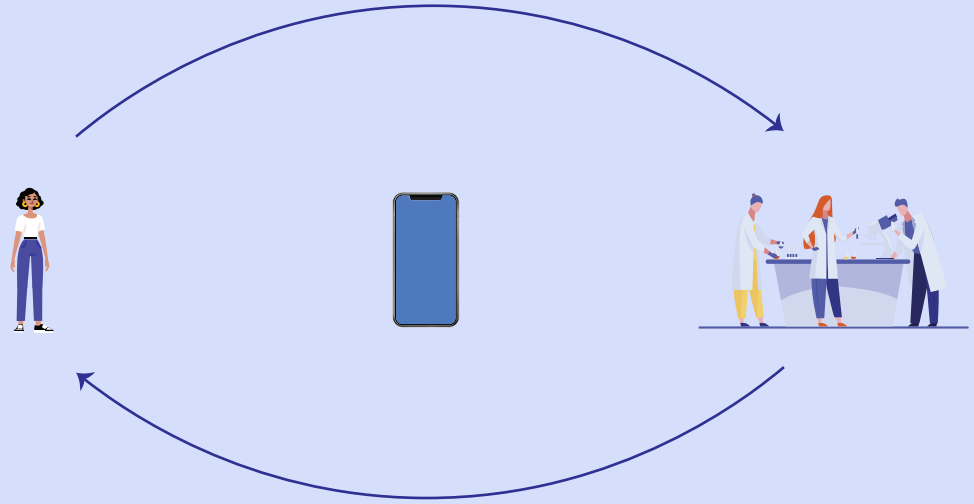
- Data collection: genomic information about the patient is obtained from a healthcare professional utilizing the MinION sequencer, and it is encrypted for security with the other EHR data and the data on the app collected before.
- Blockchain Transaction: the genomic data is then encrypted and uploaded as a transaction to the blockchain, where it is kept in a block connected to the block before it, forming an immutable chain of data.
- Data Access and Authorization: through the platform, researchers or healthcare professionals can seek access to the patient's genomic data.
- Data Retrieval: using their private key, researchers or healthcare professionals can obtain a patient's genomic data once they have the patient's permission to do so.
- Data processing: Atos can process and analyze the retrieved genomic data to produce insights and create individualized treatment options.



In general, blockchain technology allows patient genomic data to be securely stored, accessed, and processed, while also guaranteeing patient privacy and control. It is decentralized, making the data more transparent and unchangeable, and the patient can choose which information to exclude from the transaction.

Ignition strategy

As a multi-sided platform, Mediceasy will suffer from the chicken-and-egg paradox: how to attract each side of the platform and incentive them to join? Multi-sided platforms need a critical mass to function in the best way possible, thus maximizing the cross-sided network effects.

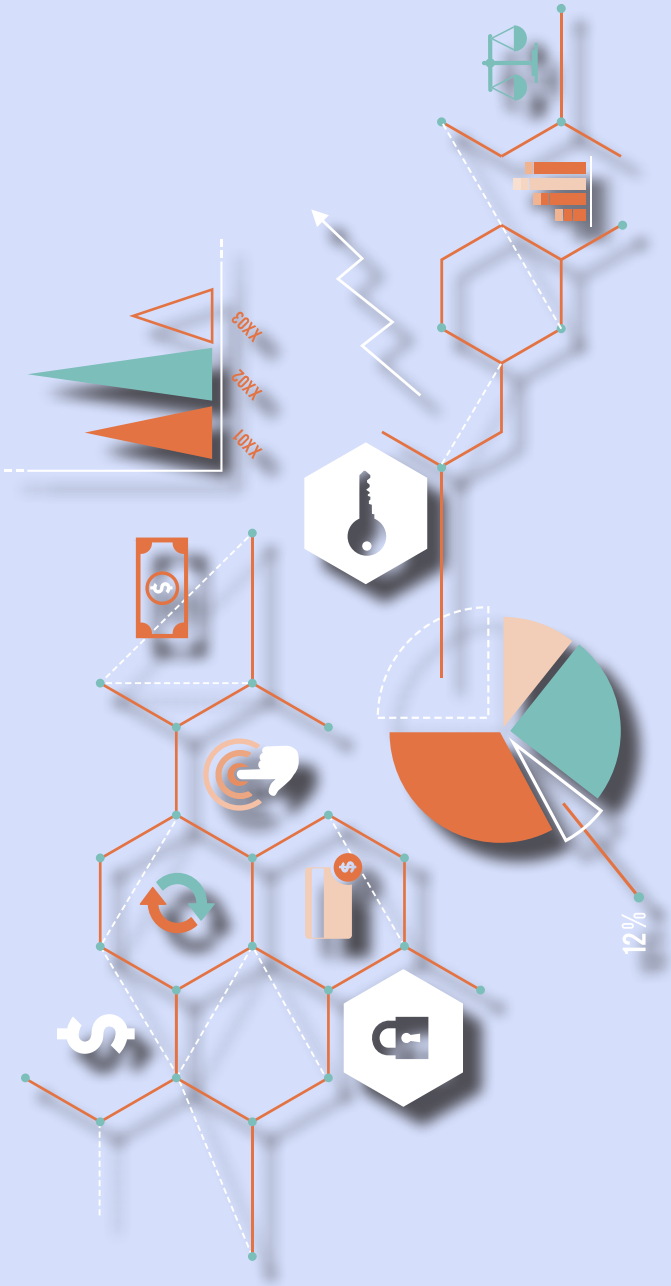


Two-step strategy

The strategy that best fits our idea is the two-step strategy: the first step is to attract the critical mass on the health-care professionals' side, thus assuring a large base of expertise from which the patients can benefit. To do so, Atos should assure its partnerships with the local hospitals, explaining the positive effects of using the app and the importance it will have in the future.
Then, the second step is to focus on attracting the patients' side, which will be already incentivized by the presence of many professionals.

Technical feasibility and robustness of the idea

The technical feasibility of our idea is quite reasonable since Atos has been dealing with the usage of HPCs for years and it has high expertise in this field and in the healthcare sector. The only problem is that the project will require some time to be implemented and effectively deployed. One thing, also, is that our idea is dependent on some assumptions that could change. For example, the number of people that will download the app and use the premium version of it may very well differ from our forecasts, since it also suffers from network externalities. The best thing to hope for is that MedicEasy will be able to attract the interest of many users on both sides and to reach the critical mass as soon as possible, so that it can ignite the bandwagon effect and attract more and more user-base overtime. Also, the idea strongly relies on partnerships with wellness providers and, especially, medical experts and pharma companies. Without these, many revenues will not be earned, which can lead to not reaching the break-even point.



Costumer journey

1 Users download the application

2 Users puts his/her general info inside the app

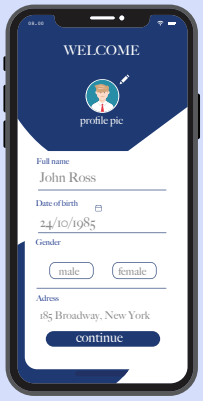
3 Doctors collect the users' DNA from samples and use minION sequencer to read it

4 General data and genomics data are analyzed through HPC using AI and algorithms to find patterns and give insight to both users (on the app) and doctors

5 The informations exctracted can be also used for research purpose

Concrete example of the app

Let's take an example of a user named John who wants to improve his overall health and reduce his risk of developing cardiovascular disease. John can input his health data such as blood pressure, cholesterol levels, and family history of heart disease into Mediceasy. He can also choose to input his genetic information obtained from a DNA sequencing test using the MinION sequencer.

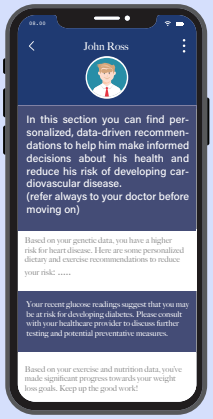


Based on this information, Mediceasy's algorithms can generate personalized recommendations for John such as:

- A personalized diet plan that takes into account his specific nutrient needs, food preferences, and genetic factors that may impact his cholesterol levels.
- An exercise plan tailored to his fitness level, medical history, and genetic factors that may impact his cardiovascular health.
- Recommendations for medications or supplements that may help lower his blood pressure or cholesterol levels, based on his genetic makeup.
- Alerts for any potential health risks or symptoms that he should monitor based on his family history and other health data.

Going more into what the app could say:

- Based on your genetic data, you have a higher risk for heart disease. Here are some personalized dietary and exercise recommendations to reduce your risk(…)
- Your sleep data shows that you're not getting enough quality sleep. Here are some tips to improve your sleep hygiene and optimize your sleep schedule(.....)
- Your recent blood pressure readings have been consistently high. Please schedule an appointment with your healthcare provider to discuss potential treatments and management strategies.
- Based on your activity level and heart rate data, you seem to be under a lot of stress. Here are some mindfulness and relaxation exercises you can do to manage your stress levels(....)
- Your recent glucose readings suggest that you may be at risk for developing diabetes. Please consult with your healthcare provider to discuss further testing and potential preventative measures.



Overall, Mediceasy provides John with personalized, data-driven recommendations to help him make informed decisions about his health and reduce his risk of developing cardiovascular disease.

In conclusion

In conclusion, by utilizing cutting-edge technology to deliver individualized healthcare solutions, MedicEasy has the potential to completely transform the healthcare sector. By giving people actionable insights based on their genetic make-up and lifestyle choices, we can empower them to take charge of their health through our creative and innovative approach and help discover new and better drugs. We can assist people in making knowledgeable decisions about their health and wellbeing by providing a special blend of genomic analysis and AI-powered health coaching.
We want medicine to be accessible for everyone and we want to make it easier. We know that this project is disruptive, bold and revolutionary but, for us, it's the future.
And maybe, some day, you really will have your health in a pocket.

https://mediceasy3.webnode.it

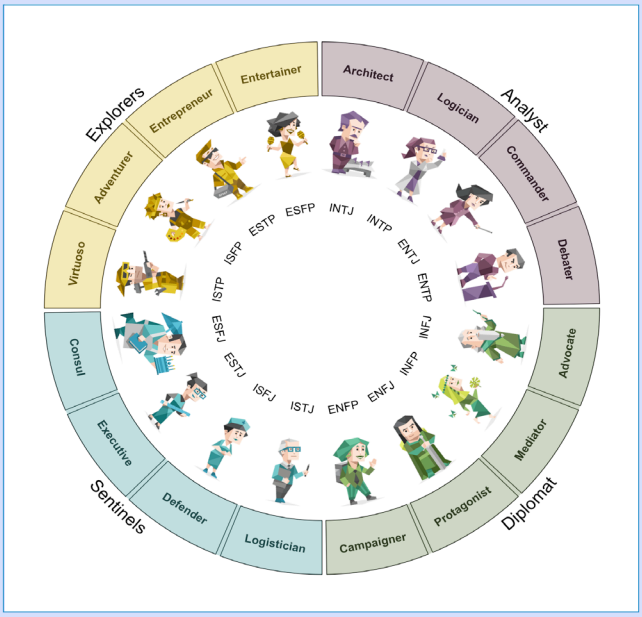
Leadership part

Shared leadership - The Avengers

A shared leadership model is an approach to management where leadership responsibilities and decision-making authority are distributed among multiple team members. This collaborative style encourages all members to actively participate, contribute their unique skills and expertise, and take ownership of the team's goals and outcomes. In our diverse group of eight members, this approach has been highly effective in fostering open communication, promoting active engagement, and encouraging equal participation.

The 16 personalities test

In order to explain the diversity of the group, and how we were able to cover each other weak spots, we decided to take The 16 personalities test, which is a popular peronality assessment tool based on the Myers-Briggs Type Indicator (MBTI) theory. It evaluates individuals on four dichotomies and generates 16 different personality types. This test is widely used in organizational settings to help individuals understand their strengths and weaknesses, improve communication and teamwork, and enhance personal growth and development.



Alberto Maestrelli

According to the 16 personalities test, Alberto is an Architect (INTJ); these personality presents the following carachteristics:

-Logical Thinking: INTJs have strong logical thinking skills that can be useful in solving complex problems.
-Strategic Vision: INTJs have a long-term strategic vision that can help define clear goals for the team.
-Independence: INTJs can work independently and are often motivated by intellectual challenges.
-Self-confidence: INTJs are often very confident in their skills and can help create a positive and challenging work environment.

According to 16personalities.com

According to Team 9

We think that the test overall reflects its personality. Alberto seems reflective rather than impulsive, he helps a lot to mediate during conflicts and, as the group leader, makes sure that everybody's opinion is listened to and tries to include everyone.

Go as far as you can see, when you get there, you will be able to see farther

My motto

BLACK PANTHER

Andrea Magri

According to the 16 personalities test, Andrea is an Architect (INTJ); these personality presents the following carachteristics:

-Logical Thinking: INTJs have strong logical thinking skills that can be useful in solving complex problems.
-Strategic Vision: INTJs have a long-term strategic vision that can help define clear goals for the team.
-Independence: INTJs can work independently and are often motivated by intellectual challenges.
-Self-confidence: INTJs are often very confident in their skills and can help create a positive and challenging work environment.

According to 16personalities.com

According to Team 9

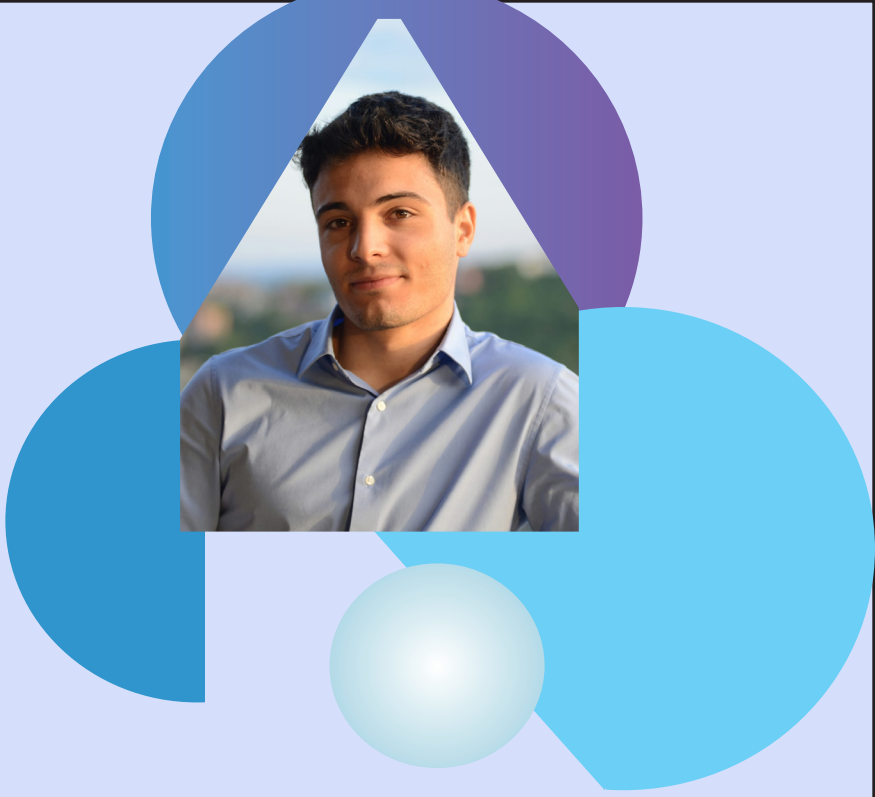
Andrea is always working for the group, 24/7. He is able to understand what needs to be done, and to do it autonomously in a very efficient way. He's also the one curing the most the visual aspect of the project, paying a lot of attention to details and making sure everything is perfect.

TONY STARK

When you are backed against the wall, break the thing down

My motto

DOCTOR STRANGE



Luca Panti

According to the 16 personalities test, Luca is an Architect (INTJ); these personality presents the following carachteristics:

-Logical Thinking: INTJs have strong logical thinking skills that can be useful in solving complex problems.
-Strategic Vision: INTJs have a long-term strategic vision that can help define clear goals for the team.
-Independence: INTJs can work independently and are often motivated by intellectual challenges.
-Self-confidence: INTJs are often very confident in their skills and can help create a positive and challenging work environment.

According to 16personalities.com

According to Team 9

Luca is definitely a good listener, he's always keeping track of what's happening and provides the group with good insights. When you least expect it, however, he gives the best ideas to the group (like the MedicEasy site).

It is the people no one imagines anything of; who do the things that no one can imagine

My motto

Francesco Lepschy

According to the 16 personalities test, Francesco is a Defender (ISFJ);
these personality presents the following carachteristics:

-Sensitivity: ISFJs are very sensitive to the needs of other team members.
-Punctuality: ISFJs are generally punctual and can help maintain deadlines.
-Organization: ISFJs are highly organized and can help maintain team efficiency and productivity.
-Dedication: ISFJs are dedicated and loyal employees who can help create a positive work environment.

According to 16personalities.com

According to Team 9

Francesco is proactive, always ready to do new tasks when needed and, during difficult times, he helps us to calm down and have a good laugh. Since he is sensitive, he is able to understand when the air is too heavy and helps downplay the situation.

THOR

Get out your comfort-zone

My motto

Miriam Inconoronata Marchesani

According to the 16 personalities test, Miriam is a Turbolent Logistician (ISTJ);
these personality presents the following carachteristics:

-Logical Thinking: INTJs have strong logical thinking skills that can be useful in solving complex problems.
-Strategic Vision: INTJs have a long-term strategic vision that can help define clear goals for the team.
-Independence: INTJs can work independently and are often motivated by intellectual challenges.
-Self-confidence: INTJs are often very confident in their skills and can help create a positive and challenging work environment.

According to 16personalities.com

PEGGY CARTER

According to Team 9

Miriam is strongly goal-oriented, she provides us many good ideas and giving also reliable solutions. When she is asked to complete tasks, she is able to do it in the best and organized way possible.

Work smarter, not harder

My motto

SCARLETT WITCH

Salma Moussaoui

According to the 16 personalities test, Salma is an Campainer (ENFP);
these personality presents the following carachteristics:

-Optimism: ENFPs have a positive and optimistic attitude that can help motivate team members.
-Creativity: ENFPs have a strong imagination and can come up with original and innovative ideas to solve problems.
-Empathy: ENFPs are very empathetic and can understand the emotions and needs of other team members.
-Adaptability: ENFPs are flexible and can easily adapt to unexpected changes and challenges.

According to 16personalities.com

According to Team 9

We think the most important characteristic of Salma is creativity, in fact the proposal of the name of the app was hers. She also has strong social skills and empathy, and she's good at understanding the behavior of the others in the group.

The true essence of the human being is the goodness of the heart

My motto

Eleonora Mazzilli

According to the 16 personalities test, Eleonora is a Manager (ESTJ) ; these personality presents the following carachteristics:

-Reliable and accountable: ESTJs are dependable task force members. They take their role seriously and are committed to meeting deadlines and group expectations.
-Organized and Structured: ESTJs have a strong attention to detail and organization. They have a natural ability to create clear and detailed action plans for the work group, which makes projects easier to complete.
-Pragmatic and realistic: ESTJs have a practical, fact-based approach to solving work group problems. They make rational decisions and avoid getting carried away by emotions or assumptions.
-Results-oriented: ESTJs are work-group members who are determined to achieve their goals. They are results-oriented and constantly seek to improve group performance.

According to 16personalities.com

CAPTAIN MARVEL

According to Team 9

We think Eleonora is strongly result-oriented, always trying to keep the group on track and trying to achieve the goals every time. She's also pragmatic, always with her feet on the ground and suggesting feasible and realistic solutions to complex problems.

A fact is worth more than a thousand words

My motto

André Luiz Netto Casotti

According to the 16 personalities test, Andrè is a Logician (INTP); these personality presents the following carachteristics:

-Logical Reasoning: INTPs are able to analyze problems in a logical and systematic manner.
-Creativity: INTPs have a strong imagination and can come up with original and innovative ideas.
-Objectivity: INTPs can demonstrate a high degree of objectivity in their work, which is important in a group setting.
-Problem Solving: INTPs are often able to find effective and creative solutions to problems.

According to 16personalities.com

HULK

According to Team 9

André has always a great number of ideas, he's an interesting mix of creativity and logical reasoning. He's always trying to propose new things and new solutions to problems, while also being reliable.

Good, better, best. Never let it rest, until your good is better and your better is best

My motto

CONFLICTS

As a group, we immediately start working together very well. However, we had some minor conflicts that we were able to resolve through discussion and brainstorming:

Healthcare vs Public Administration

I changed a little bit conflict n1: The first conflict was about the market we wanted to enter with HPC from Atos: We were undecided between public administration and healthcare. The first idea was to develop a digital twin of Poste Italiane to simulate queues and understand where the slowness of this company comes from. The alternative was the healthcare sector. We analyzed all together pros and cons of the two options, and after a constructive discussion we chose healthcare because it was the main field in which Atos was already operating and the HPCs could have been used in a more interesting way.

Where to start?

The second conflict concerned the choice of where to launch the application first; we had 3 different options: USA, Northern Europe, Italy.
The first option was interesting because in the US there is no public healthcare system, so people already bear a lot of costs and are willing to pay for an app like Mediceasy. At the same time, it was very interesting because it was a way for the company to increase its sales in a continent that was not so much in focus. Italy, on the other hand, was ruled out almost immediately because of the lack of medical records and to privacy issues.
We solved this conflict by leveraging the different point of view of the members. By taking advantage of the diversity of background, we presented the advantages and disadvantages of doing the solution in other countries, and together we came to the conclusion that the best option would be to apply it in northern countries for the following reasons:
-They are more social countries that are more likely to invest in their citizens and they are more likely to engage in this kind of innovative project.
-The biggest source of income for Atos is in these regions;
-They already present more complete EHR;

Market pull vs Design-driven

Another conflict present in the group was related to the question of how to approach innovation: Market-pull or Design-driven? Some members of the group understood it as market-pull because the solution was designed to meet user expectations, creating a user-centered product. Others perceived innovation as design-driven because the central goal is to give a new meaning to health monitoring applications and conventional medical diagnostics. As done in the other two conflicts, everyone motivated his thought and then all together we came to the conclusion that design-driven was the most reasonable solution: the goal of innovation with Mediceasy is to treat medicine in a predictive rather than prescriptive way, and in a personalized rather than batched way.

THANK YOU

by Team 9

Annexes and References

APPENDIX 1

Additional study by Weizman Institute of Science

A 2015 study by Weizmann Institute scientists has found that individual blood sugar levels in response to eating the exact same food vary dramatically–which might explain why one person can't shed the extra pounds while a friend who consumes the same foods stays slim and trim.

The scientists also developed an algorithm that accurately predicts post-meal blood sugar levels based on a person's individual biological makeup and lifestyle–throwing into question standard dietary recommendations. Until now, physicians and nutritionists have relied on something called the glycemic index, or GI, to determine what foods are good for everyone. However, the GI is a fixed number for each food item.

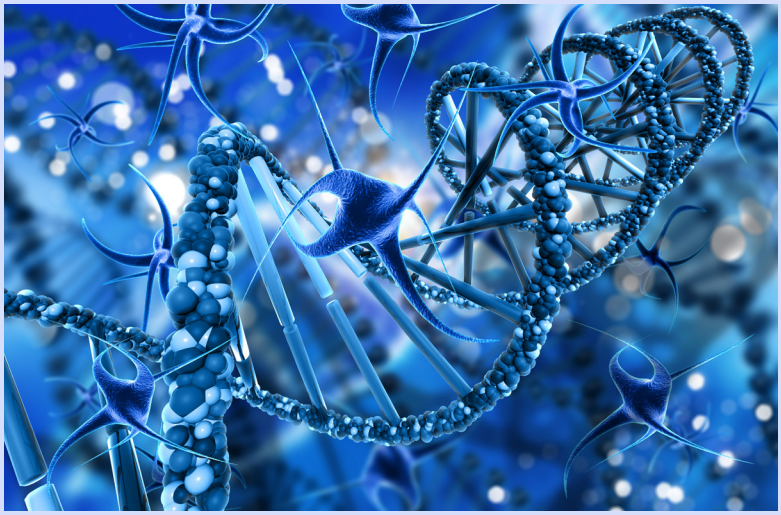
What the Weizmann Institute team found was that this number is a poor predictor of the actual response of many people.

Using information collected through health questionnaires, body measurements, blood tests, glucose levels, stool samples, and a mobile app used to report physical activity and food intake, the scientists went on to devise an algorithm in order to predict personalized blood sugar responses. The algorithm - which they validated in an additional 100 individuals - is able to predict the blood sugar levels following consumption of different foods.

APPENDIX 2

COMPUTATIONAL BIOPHYSICS

Computational biophysics uses numerical algorithms to study the physical principles underlying biological phenomena and processes. It provides a means of approximating solutions for theoretical biophysical problems lacking closed-form solutions, and simulating systems for which experiments are deemed infeasible.



Structural bioinformatics, originally known as structural computational biology, predates other forms of bioinformatics. It can be argued that the seminal 1953 article by Watson and Crick is in fact a modeling paper and arguably the first structural bioinformatics paper. In his account of the birth of the field, Levitt describes how computation was required to accurately refine the tRNA model predicted by Crick in building an actual model that was taller than himself. Thus, computation has been an integral part of structural biology from its early days and has had an ever-increasing role in biochemistry and molecular biology with the passing of years.

Structural bioinformatics or structural computational biology, broadly defined, is a field at the intersection between computer science, physics, chemistry and molecular biology. Historically, the term 'structural bioinformatics' describes data-driven statistical, knowledge-based research of representative non-redundant ensembles of structures to understand the statistical behavior of the system under investigation. Alternatively, 'computational biophysics' describes a hypothesis-driven physics-based treatment of biological molecular systems. Currently, numerous methodologies employ ideas from both approaches. Consequently, hereafter we will refer to both as structural bioinformatics.

Biologically, structural bioinformatics aims to understand the factors that influence and determine the function of biological macromolecules, the interplay between evolution, kinetics and thermodynamics, the determinants of specificity and selectivity in molecular interactions, the dynamic aspects of macromolecular structures and their effect on function and stability and, finally, the ability to use all these for engineering, design and biotechnology. In fact, a complete understanding of biological processes must inescapably pass through an understanding of the factors influencing such processes at the atomic and sometimes even subatomic levels.

APPENDIX 3

MinION sequencer

The MinION sequencer (Oxford Nanopore Technologies) is a paradigm shifting device allowing rapid, real time long read sequencing of nucleic acids (it can read an entire human genoma of 25,000 genes in few days).

1

DNA is a molecule present in all living things (it represents the instructions for building and operating an organism). Sequencing can answer a range of biological questions, providing information on pathogen identity, genetic disease risk or how an organism has evolved.

2

All Oxford Nanopore sequencing devices use flow cells which contain an array of tiny holes (nanopores) embedded in an electro-resistant membrane. Each nanopore corresponds to its own electrode connected to a channel and sensor chip, which measures the electric current that flows through the nanopore. When a molecule passes through a nanopore, the current is disrupted to produce a characteristic 'squiggle'.

3

The squiggle is then decoded using basecalling algorithms to determine the DNA sequence in real time.

4

A strand of DNA is made up of a sequence of different combinations of four nucleotide bases: A, T , G and C. Each base that passes through the nanopore can be identified through the characteristic disruption it causes to the current in real-time. This makes nanopore sequencing unique, in that it is the only sequencing technology that enables direct, real-time analysis of short to ultra-long fragments of DNA, in fully scalable formats.

The power of long reads

Traditional methods are only able to sequence short lengths of DNA which must then be reassembled. It is therefore difficult to sequence repetitive regions for accurate genome assemblies without gaps, resolve large structural variations, or differentiate isoforms. Nanopore sequencing is limited only by the length of the DNA fragment presented to the pore and can therefore span entire repetitive regions, resolve structural variants, and differentiate between different isoforms.

APPENDIX 4

GENOMIC DRUG DISCOVERY

The genome-wide association study (GWAS) is an observational study designed to assess associations between traits and tens of millions of genome-wide genetic variants from population samples. Since 2003, more than 4000 GWASs have been reported globally, with hundreds of thousands of samples in each study.
Examining the volume of papers that have been written on the subject is one way to gauge this expansion. An analysis of papers containing the keyword "genomics" in PubMed, a database of biomedical literature, revealed that from about 10,000 in 2000 to over 50,000 in 2020. Similar to this, there were over 15,000 publications with the keyword "personalized medicine" in 2020 as opposed to just over 1,000 in 2000. This shows that interest in and investment in this subject have significantly increased.
Drug development used to be a trial-and-error process where substances were examined to see if they were effective at curing an illness. However, this method was time-consuming and costly, and numerous medications were abandoned before reaching the market. Pharmaceutical companies can now create medications that are specifically tailored to individuals with certain genetic mutations thanks to the use of genomic analysis, increasing the effectiveness of treatment and lowering the risk of side effects.

To find prospective medication targets, pharmaceutical companies can also use genetic analysis. Scientists can find genes and pathways that are dysregulated in specific diseases by examining the genomic data of patients with those disorders. Using this knowledge, medications that specifically target certain pathways or genes can subsequently be created.
Another advantage of genetic analysis in drug discovery is the capacity to identify patient populations most likely to benefit from a particular treatment. Scientists can find genetic differences that predict a patient's response to a medicine by examining genomic data from patients. This data can subsequently be utilized to create individualized treatment programs for individuals, enhancing treatment effectiveness and lowering the risk of side effects.

APPENDIX 5

REVENUES													
		YEAR 0						YEAR 1					
SOURCE	**DESCRIPTION**	**UNITS**	**[ ]**	**MONTHS**	**UNIT PRICE**	**TOTAL**		**UNITS**	**[ ]**	**MONTHS**	**UNIT PRICE**	**TOTAL**	
Revenues from partnerships	Partnerships with wellness related businesses (gyms, nutrisionists, ecc)	15	Partners	12	- €	-	€/year	15	Partners	12	5.000,00 €	900.000,00	€/year
	Partnerships with pharmaceutical companies	232.000	Premium customers	12	1,00 €	2.784.000,00	€/year	725.000	Premium customers	12	1,00 €	8.700.000,00	€/year
	Paid version of the app	232.000	Premium customers	12	10,00 €	27.840.000,00	€/year	725.000	Premium customers	12	10,00 €	87.000.000,00	€/year
	TOTAL REVENUES					**30.624.000,00**	**€/year**					**96.600.000,00**	**€/year**
COSTS													
Costs of the app Mediceasy	Development cost of the app	250	hours	12	100 €	300.000,00 €	€/year	0	hours	120	100 €	- €	€/year
	Mainenance costs of the app (including updates), equal to 20% of the development	50	hours	12	100 €	60.000,00 €	€/year	50	hours	12	100 €	60.000,00 €	€/year
	Total costs of the app					**360.000,00 €**	**€/year**					**60.000,00 €**	**€/year**
Cost of labour for data storage	Data warehouse consultant (full-time)	1	Professional	12	7.500 €	90.000,00 €	€/year	1	Professional	12	7.500 €	90.000,00 €	€/year
	Data engineers (full time)	5	Professionals	12	7.667 €	460.000,00 €	€/year	5	Professionals	12	7.667 €	460.000,00 €	€/year
	Database administrator (full time)	1	Professional	12	6.167 €	74.000,00 €	€/year	1	Professional	12	6.167 €	74.000,00 €	€/year
	Data analysts (full time)	5	Professionals	12	5.167 €	310.000,00 €	€/year	5	Professionals	12	5.167 €	310.000,00 €	€/year
	Total costs of labour					**934.000,00 €**	**€/year**					**934.000,00 €**	**€/year**
Cybersecurity	Security infrastructure	1		1	1.000.000 €	1.000.000,00 €	€/year	1		1	1.000.000 €	1.000.000,00 €	€/year
	Security personnel	83	hours	12	150 €	150.000,00 €	€/year	83	hours	12	150 €	150.000,00 €	€/year
	Total costs of cybersecurity					**1.150.000,00 €**	**€/year**					**1.150.000,00 €**	**€/year**
Sequencers	**Total costs of MinION sequencers**	46.400	Device (1 device per 5 premium customers)	1	600	27.840.000,00 €	€/year	145.000	Device (1 device per 5 premium customers)	1	600	87.000.000,00 €	€/year
	TOTAL COSTS					**30.284.000,00 €**	**€/year**					**89.144.000,00 €**	**€/year**
	YEARLY CASH FLOW					340.000,00 €	€					7.456.000,00 €	€
	NET CASH FLOW					340.000,00 €	€					7.196.911,20 €	€

FULL COMPUTATION OF THE CASH FLOW

Bibliography

MARKET ANALYSIS

https://www.statista.com/outlook/dmo/digital-health/worldwide

https://www.statista.com/statistics/1334826/ai-in-healthcare-market-size-worldwide/

https://academic.oup.com/bioinformatics/article/31/1/146/2366253?login=false

https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/feeling-good-the-future-of-the-1-5-trillion-wellness-market

minION SEQUENCER AND DRUG DEVELOPMENT

https://nanoporetech.com/support/how-it-works

https://www.nature.com/articles/s41598-018-29334-5

https://www.sciencedirect.com/science/article/pii/S1672022916301309

Lifespan: why we age and why we do not have to ; David A. Sicnclair PhD

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7465049/

DATA MANAGEMENT AND HPC

https://atos.net/en/industries/healthcare-life-sciences/cybersecurity-in-healthcare

https://www.nature.com/articles/s41431-017-0045-7

https://databank.worldbank.org/

https://atos.net/en/solutions/high-performance-computing-hpc/bullsequana-x-supercomputers

APP DEVELOPMENT COSTS

https://www.intelivita.com/blog/app-development-cost/

How much does it cost to update an app? – Software for Enterprise

https://www.gurufocus.com/term/wacc/XPAR:ATO/WACC-/Atos-SE

https://www.zippia.com/data-warehouse-consultant-jobs/salary/

Assumption on partnerships : Come funziona TheFork | Salvatore Aranzulla