DISRUPTING CORRECTIONS

iBAC Alcosystems!
We Care Through Technology!
A real AI system to help Alcohol Monitoring Programs

Who Are We!

Miguel Arias

Miguel Arias- Co-founder and CEO of Alcosystems Sweden AB Innovator and company builder, author of the patent families which IBac consists of and a multi-noted entrepreneur.
Extensive experience of working from ideas to prototypes at all levels to finished commercial products

Michael Nazzareno Trimarchi

Michael Trimarchi is CEO of Amarula Solutions and Linux Software Engineer specializing in both Linux based and custom embedded and RT systems with a keen interest in mobile technology

The Team

Peter Janička Team Leader and head of project development

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Jindřich Mikule Backend development

Andrea Cappelli DevOps and infrastructure engineering

Giacomo Trimarchi QA

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A brief history of Alcosystem

Alcosystems is a Swedish medtech company founded in 2005 specializing in e-health and alcohol monitoring solutions. Our vision is to work for a safer and more controlled alcohol consumption in society through technology.
Bringing alcohol-related diseases into the light at an early stage is an important preventive measure. Through our solutions, we enable organizations, businesses, and private individuals to make their own decisions on alcohol consumption based on data and facts. This vision is illustrated both in our products and how we work with CSR, striving to educate people on how to gain better awareness regarding alcohol consumption.

The problem we try to address

Alcohol effect plays a large role in criminal activities and violence and increases the risk of spontaneous and inconsequential actions. Because of this, we need to look at how technology can help us to better manage and mitigate the problems.

In several areas, eHealth is now used as an accepted concept in treatment. To meet the different needs we face where welfare technology can facilitate care, treatment and control.
iBAC is a company in Digital Care/Health that help individuals and management teams that have a a dependency problem in alcohol.

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What is the Alcosystem proposition?

Alcosystems is a disruptive company working on the field of compact, With iBac a secure breathalyzer using modern technology like Artificial Intelligence (AI) and operating on connected devices. The only needs for a small breathalyzer and a smartphone make the solutions easy to maintain and deploy on the field. The system takes a real step in the direction by working together and side by side with correctional Services, Prisons, and Probation Services. We come with unique patent modern solutions that permit remote monitoring of people that are under alcohol programs or under custodial community permits. Web based modern UI system, portable secure device, easy installation and configuration process, makes the ibac a perfect solution for both users and management

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Alcosystem program option

The **single user** option connects the back-end system to individual iBac Pro units carried by users. The administrator sends a encrypted signal to the user via the smartphone application when a test is due (tests can be scheduled or randomly performed depending on Plan.)

The group user option connects the back-end system to a stationary computer or tablet which is connected to an iBac Pro unit, functioning as the "testing station". The administrator creates user profiles and sends an SMS to the user's phone when a test is due (tests can be scheduled or randomly performed depending on Plan). The user must be present at the testing station to perform the test.
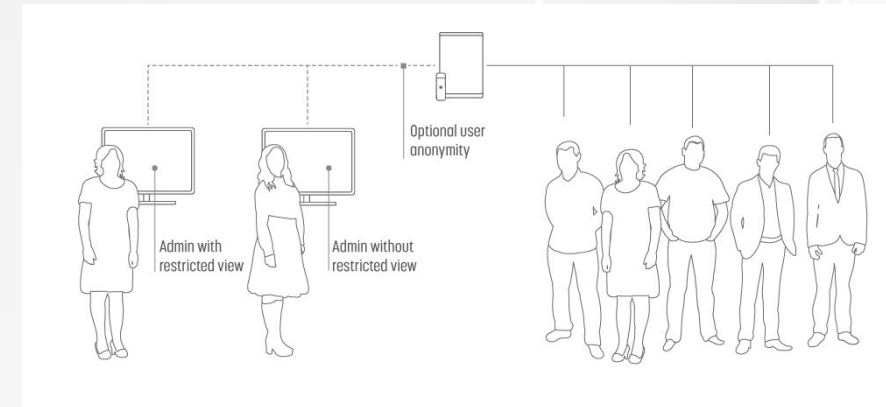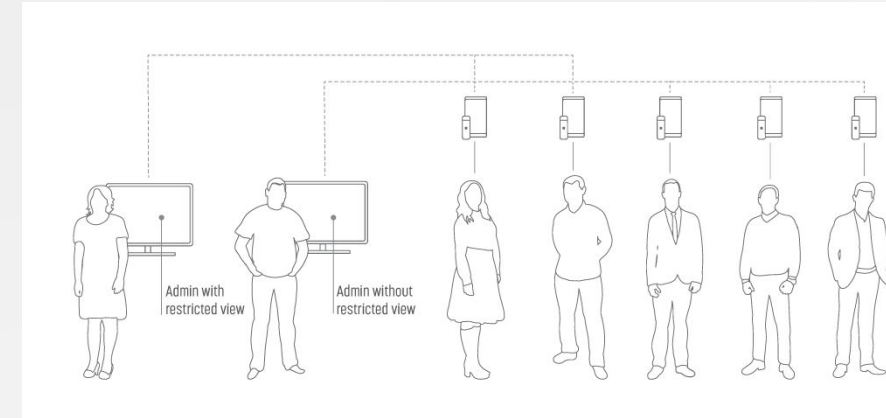
Alcosystem architecture

Alcosystems has a network infrastructure design in order to achieve the following goals:

- Scalable solution
- Best practiced and best recommendation adherence based solution
- Fit for purpose and secure

Every result gathering on a secure mobile phones and user devices transmitting data to a secure location over a secure end to end encrypted network.

The architecture design fulfill the government agencies requirements.

iBac system backend contains following components:

- REST API (iBac Backend App)
- MySQL database (RDS)
- Alcosystem AI (Face recognition)
- Administration front-end (Web UI)

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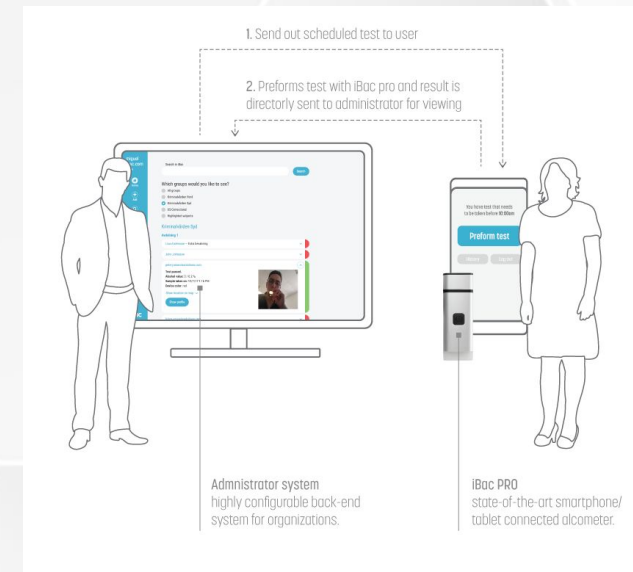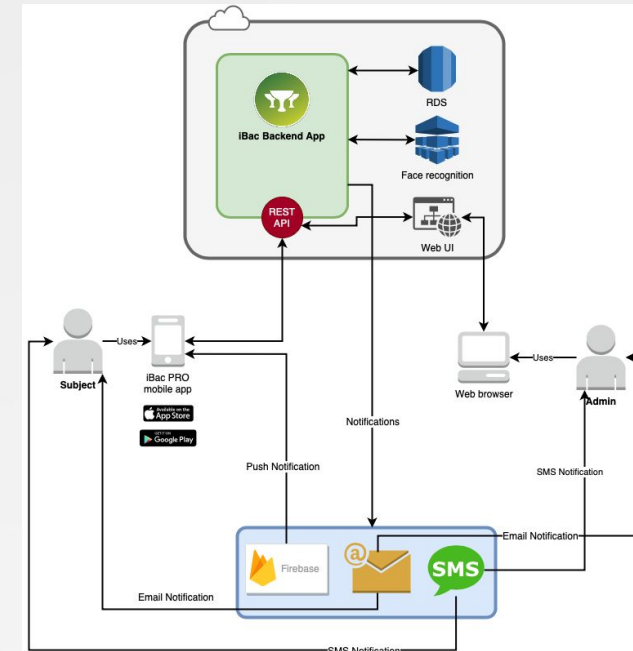
Alcosystem Web UI (1)

Alcosystem WebUI is a complete cloud based interface able to administrate and control all the sets of functionalities.

- Organization
- Ibacs device
- Mobile phone
- Groups
- Agent
- Subjects
- Alerts

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Alcosystem Web UI (2)

Alcosystem Web UI Home Page

- All the functionalities on the left bar
- Different home page functionalities for different roles
- Multi-language support
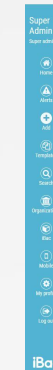- Search of any kind (including mobile phone, ibac, organization …)
- Reporting
- …

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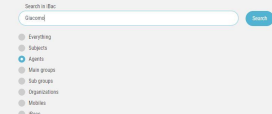
How validation logic works

All the system is used to correctly validate the test. When we can consider it is passed? Let's make it simple

- You are sober
- You have done during your scheduling window
- **You are the right person**

The last point is what tradition system can not easily achieve. This come in the big picture the **Alcosystem AI** that really help to say if it's the **right person doing the test**

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Why AI is needed?

The idea behind the AI is to help to validate the alcohol test

- Validate the subject (Is him/her the right person?)
- Validate the test (Is him is taking the test?)
- Be sure that we can consume low bandwidth
- Make it working on premise

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Alcosystem AI multi check recognition

Alcosystem is using a multi-check AI deep learning technologies

- Face detection
- Face recognition
- IBAC detection
- Face overlap check
- Face landmark check
- IBAC color verification

Alcosystem AI Face detection and Face recognition

The subject that is taking the test

Reference profile picture

Alcosystem AI IBAC detection/face
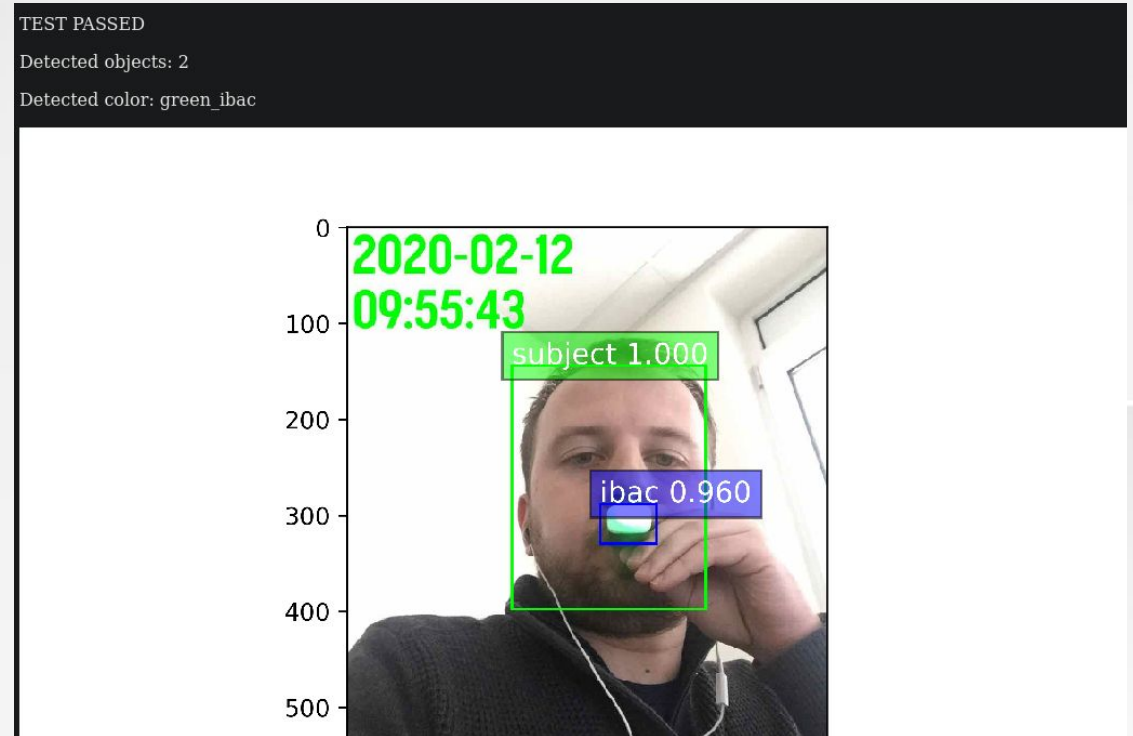
Alcosystem AI Color detection

iBac color coding

- random color of the iBac LED at the end of test to prevent fraud
- driven by iBac PRO app
- sent to the backend for verification of the photo

Alcohol sample photo

- 2 photos taken during the alcohol measurement
  - first photo - start of the test
  - second photo - end of the test
- UTC Timestamp watermark on both photos
- Color coding written in watermark

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How we solve the communication gap? (1)

Foreground service on mobile

- Read status of battery
- Handle connectivity change (lost of mobile connection, lost of network connection)
- Logging events in offline mode
- Send user notification
- Handle forced update for the server
- Configurable heart beat

How we solve the communication gap? (2)

- Mobile information are logged in the portal periodically
- We can request a forced updated from the mobile phone
- Any abnormal situation will raise an alarm
- Mobile phone can be deactivate any time and removed from the probation period

Mobile LGD405c6e6ec01

Edit mobile

Request data upload

Status: ACTIVE

DEACTIVATE

Mobile battery charge: 100 %
Device model: LG-D405
Device description: lge w7_global_com w7ds:5.0.2 LRX22G.A1423481010 15040202274a7:user release-keys
SIM serial: 8942031016152187146
SIM number:
SIM state: Ready
Cell type: WCDMA
Cell signal: Great
Heartbeat interval: 15 minutes

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How we solve the communication gap? (3)

Connection loss

- Application saves all all data (alcohol samples, raised alarms etc.) which were not able to send to the server.
- All alcohol samples contain timestamp when the sample was taken, so the supervisor will always see the correct time of the test in the backend.
- The app regularly tries to upload all stored information during these events: - when app is open - when heartbeat update is triggered (scheduled one or manual trigger by admin from backend) - when internet connection restore event is received from OS

Mobile high availability

In order to reduce and minimized the connection loss all Alcosystems secure mobile phone are equipment with a multi-operator sim able to choose the network with strong connection. Any device that have particular problem on any location can be forced to work on a single operator

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Alcosystem Alarm (1)

AlcoSystem's web platform allow you to monitor the correct functioning of devices in the field, ensuring a continuous flow of information. If the flow of information is interrupted, the platform provides the instrument called "Alerts". The Alerts tool allows you to identify the causes of the problem, alerts all interested parties, via SMS or/and email, that a specific event has taken place, and thus allowing a timely response to restore the correct flow of information.

The tool has a wide range of events such as:

- Expired test;
- Test failed;
- Optional test failed;
- Low iBac battery;

- Ibac Tampered
- AI Failed
- Communication gap with the mobile
- more

Alcosystem Alarm (2)

All events are stored in AlcoSystems cloud, and can be consulted or searched through various types of filters such as:

- search by date, event type, ibac device, phone, subject
- search by subject;
- Main group;
- Sub group;

The tool allows you to monitor the status of the event and solve it by carrying out a series of activities, such as:

- send SMS/Email to subject or other administrators;
- attach a text note to the event;
- close the event.
- more.

Mobile application (1)

Mobile application serves as controller for the iBac device and client application to communicate with the backend - sends the data like tests to server or receives the data like test schedules from the server.

The iBac PRO application gives its users access to comprehensive user experience that includes login with securely stored credentials, push notifications for new tests as well as encrypted user database.
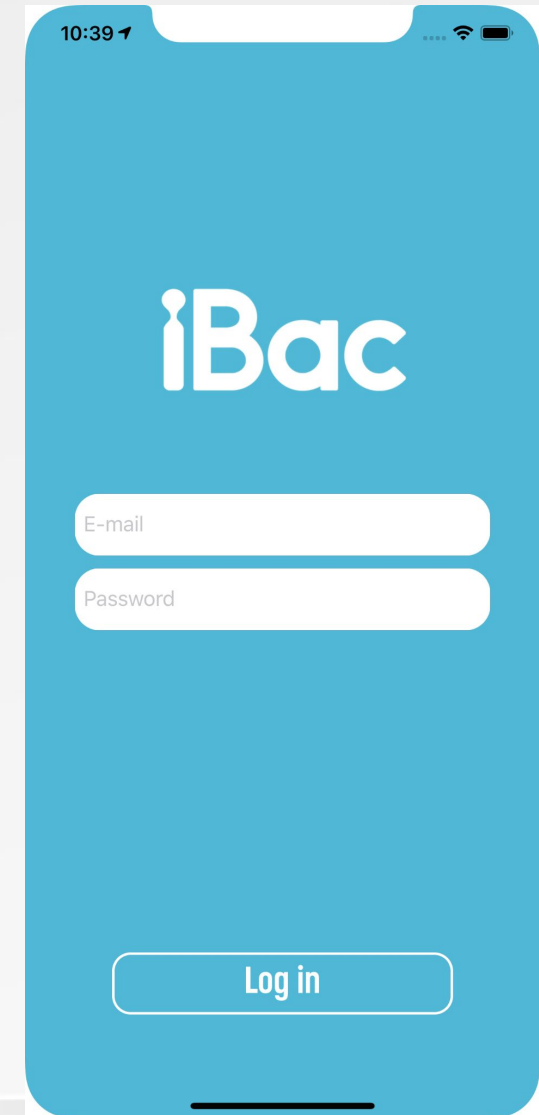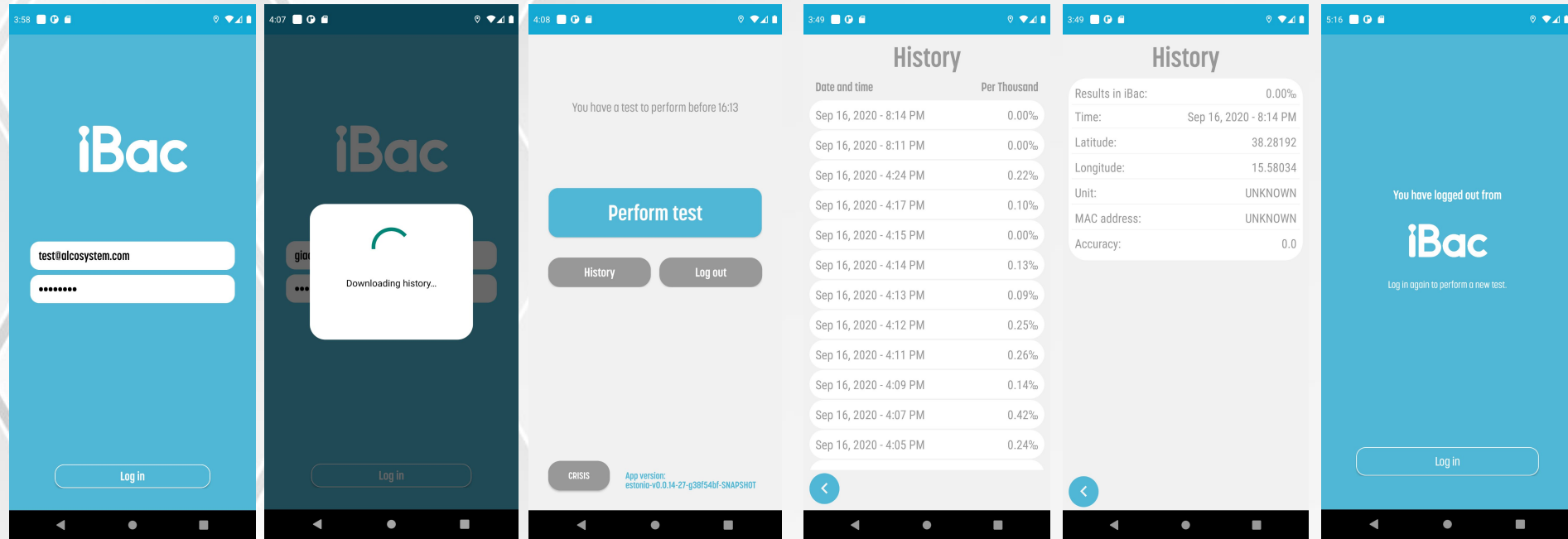
Mobile application (2)

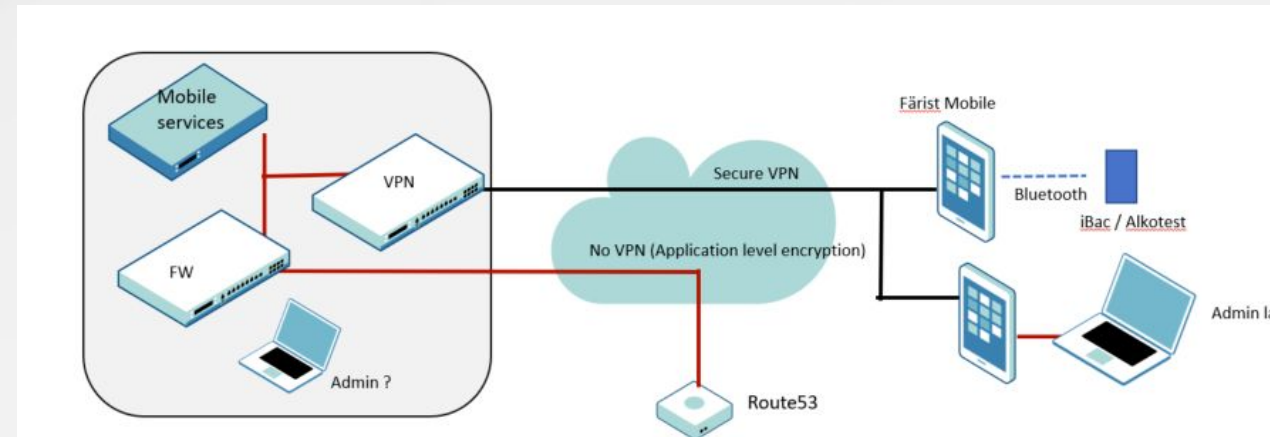Here there are several phases during the test that show how the application works.

Security (1)

iBac PRO apps storage encryption

- Android - 256-bit AES encryption
- iOS - Data Protection feature using the built-in encryption hardware present on devices.

Network communication

HTTPS protocol with TLS cryptographic protocol over VPN

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Security (2)

Data confidentiality

Every time a test is performed, the data is sent from the mobile or stationary application to Alcosystems cloud solution. The data transfer takes place through an encrypted HTTPS protocol for highest possible security. As a reply, the server sends an SMS notification to confirm whether the test was approved or not.
All data can be erased by an administrator with access. If an engagement with Alcosystems ends, we erase the organization account as well as all data pertinent to the client. All user and testing data in the back-end system is saved on Alcosystems cloud servers. All the data are saved according to the GPDR regulamentation

Server locations

Our servers are located within the EU, primarily on Ireland (this can be changed based on client needs.)

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THANK YOU!