



Privacy-proof diagnostic passports
for safe socioeconomic reactivation

Problem context

How to restart socioeconomic activities in a safe and secure way?

Social distancing efforts are putting economies to a standstill. Communities around the globe are looking for ways to safely return to work and school. Now reliable immunity tests are being introduced, a potential solution is to test for antibodies and give immunity passports to those who test positive. However, we still know little about immunity to SARS-CoV-2, its duration and scale, and collecting immunity data about individuals comes with significant privacy risks.

Our approach

Privacy-proof diagnostic passports

The ViroSure Diagnostic Passport system complements contact tracing solutions. Only in combination, contact tracing and personal diagnostic credentials can coordinate safe socioeconomic reactivation. ViroSure therefore partners with an international consortium that is developing COVID Defender (See next slide): a platform that enables to integrate available contact tracing solutions by offering privacy-preserving means for data storage, exchange, and computation.

- Time to Production Version: 2 weeks
- Funding Requirements: € 200 000



Privacy and compliance first

Privacy is the hallmark of the ViroSure system. Data is stored in a secured cloud environment that meets the highest EU privacy and security standards. Personal access is based on multi-factor and biometric authentication.



Selective disclosure

Passport holders are given complete control over who is able to view their credentials, and to which extent. Holders can generate unique links, enabling restricted viewing by permitted third-parties within a certain time window. Viewing events are logged for complete auditability.



Integration with diagnostic testing

A secure web portal allows for easy registration of tested individuals by accredited healthcare professionals. Individuals and blood samples are linked through unique ViroSure identifiers.



Permitted epidemiological analyses

Test outcomes are stripped from personally identifiable information, and loaded into a secure central database environment. Unique access links are provided for permitted (e.g. government) entities to facilitate near real-time aggregate analyses.

Technology stack



Back end

- Node.js
- JWT tokens
- PostgreSQL / MongoDB as database technology
- Jest as testing framework
- Sentry for debugging



Front end

- Figma and Sketchapp for responsive designs
- React JS as modular development framework
- ANT design as functional UI framework
- GraphQL client: API
- JWT tokens for industry-standard security
- Jest as testing framework



Next steps

Integrating diagnostic passports and contact tracing

For apps to be effective in their aim to coordinate socioeconomic reactivation, population-wide coverage is key. However, the current rush of app development projects risks to result in a highly fragmented landscape of siloed solutions. A pressing need for interoperability can be predicted. The international COVID Defender consortium delivers on this need, building on pioneering work in decentralized identity and access management systems. The project aims at an infrastructure for universal interoperability that also assures long-term data security and privacy.

COVID Defender Testimonial

"Emerging technologies such as those presented by the COVID Defender consortium will be a key component in the global fight to control the novel coronavirus. Sophisticated privacy-preserving mechanisms are key for widespread and secure implementation, and will facilitate mass user adoption. With large user bases, this technology holds tremendous potential for disease containment.*

— Prof. Arnold S. Monto, MD



Dr. Arnold Monto is a **globally recognized epidemiologist** and one of the most renowned influenza experts of our time. He is a **past president of the American Epidemiological Society**, the 2009 **recipient of the the Alexander Fleming Award** of the Infectious Diseases Society of America for lifetime achievement, and the 2012 **recipient of the Charles Merieux award** of the National Foundation for Infectious Diseases.



Privacy-preserving location data storage and computation

COVID Defender offers an API that connects to a privacy-preserving storage service and Trusted Execution Environment (TEE).



Universal interoperability

To link systems and applications, COVID Defender offers a universally resolvable decentralized public key infrastructure (DPKI) that involves decentralized identifiers (DIDs) and verifiable credentials.



Spatiotemporal risk analysis

Advanced mathematical optimization algorithms (AO) are run in the TEE for high-resolution spatiotemporal risk prediction.



Global and individual monitoring and reporting

Privacy-preserving risk heatmaps are generated based on aggregate data, by running computational outcomes through a mapping user interface. In addition, users are able to generate private risk reports.



futurelab

triall

enigma

W3C

alluriam
HEALTH AND WELLNESS

Team & Partners

ViroSure unites expertise in emerging database technologies, immunology, and Life Sciences IT



(10)(2e)

Theoretical physicist, 30 years' experience in database tech. Founder of Splendid Data, TopSystems, Oxxio Energy and others. Boardroom advisor in IT and Finance.

(10)(2e)

Patent-holding innovator and serial entrepreneur with over 25 year experience in IT ventures, including a joint venture with British Telecom.

(10)(2e)

CTO, software developer and agile development leader. Recent winner of the Italian Hackathon.

(10)(2e)

Renowned clinical immunologist, former Head of the Department Clinical and Tumor Immunology, Erasmus Medical Center.

(10)(2e)

Experienced executive in the Life Sciences & Health domain. CEO of CR2O, Triall, Herakles Life Sciences. 17 years' experience in the management of clinical development programs.

(10)(2e)

PhD candidate and management consultant in Medical IT and innovation management. Head of Product Design for Triall.



Splendid Data (NL)

Enterprise service provider with over 20 years of experience in designing and implementing complex database environments.

[SPLendidDATA.COM](https://splendiddata.com)



Triall (NL)

Combines privacy-preserving identity and access management capabilities with thorough understanding of the clinical research (data) management landscape. Dutch partner in the COVID Defender consortium.

[TRIALl.IO](https://triall.io)