



SERUMS

SHARING PATIENT DATA IN A SAFE AND SECURE WAY ACROSS EUROPE

Security and Modelling on the Serums integrated platform, University of St Andrews.



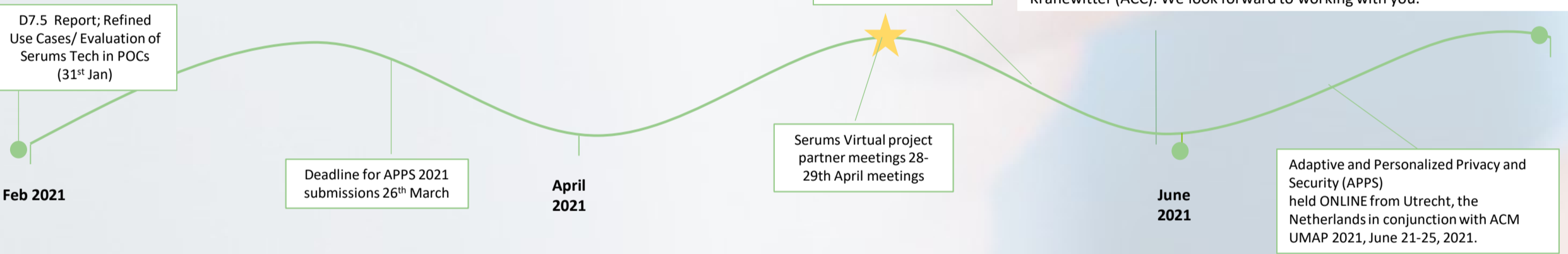
The team at the University of St Andrews work alongside Serums partner organisations with the aim of integrating the technologies associated with Serums and applying different analysis tools and approaches to evaluate its effectiveness and efficiency as a healthcare system.

One of the first challenges when developing a proof of concept that contains state-of-the-art module proposals, such as; novel authentication mechanisms, blockchain for access control and use of a data lake to efficiently store and retrieve metadata, together with several other attached technologies, is to address the capabilities the system has in terms of computational effort and security to deliver what is expected and beyond. The creation of models and the use of simulation is a key factor in validating and designing the system. It was also essential that concerns surrounding patient data security were also approached early in the design phase.

While building and coding the integrated system, the Serums team can build representations of the system using formal modelling and simulation approaches to analyse the system design and evaluate actionable changes without disrupting the system in production. In this sense, it is possible to design alternative scenarios to the functioning of the system and evaluate its behaviour and performance under several circumstances to pinpoint the most effective or efficient outcomes, according to metrics and goals.

Blockchain greatly boosts security, but it is not invulnerable to attack. It is, however, possible to detect such attacks through analysis of the requests that are being made of the system and comparing them to other legitimate (or simulated malicious) actors, potentially even detecting previously unknown attacks through tools such as machine learning.

Previous & Upcoming Events



www.serums-h2020.org



https://www.youtube.com/channel/UC-Cwk8RyJ4Q_atLsSDBL0vA

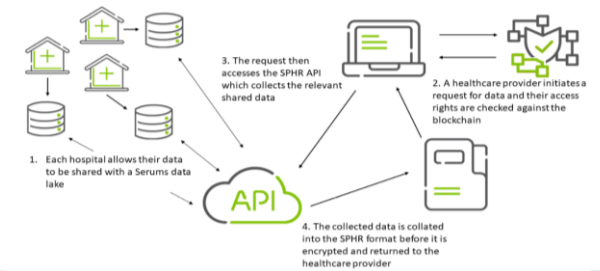


https://mobile.twitter.com/serums_h2020

Data sharing, Sopra Steria.



Different organisations store data in different ways, Serums is capable of combining different data sets from multiple healthcare providers into a single record. Data is encrypted for transmission so there is no interceptable single master key or password that would put all data at risk. Every time a patient's data is requested, new keys are used to encrypt the data. Therefore, any nefarious actor would have to break two forms of encryption for each potentially intercepted record.



A fond farewell and a warm welcome Serums bids farewell to Mark Mestrum (ZMC), Josep Pujol (FCRB), Guilherme Redeker (USTAN) and Arnoud Bevers (ACC). We thank them for all their hard work on the project and wish them the best for the future. We wish to welcome Matthew Banton, Andy Bowles (USTAN), Julio Burgos (FCRB), Larrisa Haen-Jansen (ZMC) and David Kranewitter (ACC). We look forward to working with you.

News



An Optimal Noise Adding Mechanism, SCCH.

As the modern information technology enables acquisition and storage of increasingly detailed private data, there is heightened interest in the computational definition of privacy. This has given rise to the urgent need for privacy preserving computational algorithms. The goal is to simultaneously protect the private data of individuals in a dataset while permitting statistical and computational analysis of the whole dataset.

The classical approach to protect an individual's privacy is to alter the model's output by adding 'noise'. However, adding noise into an algorithm to preserve privacy results in a loss of the algorithm's accuracy. To address this problem, a novel optimal noise adding mechanism was developed, using the entropy level as a design parameter.

The derived optimal noise adding mechanism results in the magnitude of noise a multi-fold reduction up to several ten times over the classical Gaussian mechanism. In short, leading to an increased level of accuracy while keeping the same level of privacy.

News



Introducing new Serums partners, The University of Dundee.

The University of Dundee have recently joined Serums. They will exploit their expertise in machine learning and big data analysis to develop mechanisms for pre-processing unstructured medical data in order extract the necessary structure, enabling further machine-learning based data analytics.

The University of Dundee has a long-standing collaboration with the National Health Service in Scotland and has worked alongside them in many areas, such as developing techniques for machine learning based image analysis; which is used in the early detection of certain types of cancer.

If possible, it is hoped that the University of Dundee will be able to conduct further testing of Serums technologies on different classes of users, where the technologies developed by the school are evaluated on different patient groups, such as the elderly. This will form part of the work conducted by the User Centre, managed by the University's School of Computing.

News



Storage, Processing, and Transmission, Sopra Steria.

Sopra Steria has been responsible for the storage, processing, and transmission of the medical records within the Serums Smart Health Centre System (SCHS). Each of these has presented unique opportunities to develop systems which focus on data privacy and security.

The data storage solution relies on each use case partner having their own completely separate space in which to store the data that they wish to be part of the SCHS (any data within the SCHS has either been fabricated via the IBM Data Fabrication Platform or, in the case of images, is pre-existing anonymous data used for training within a use case partner's health centre). While API is capable of accessing all of these separate storage spaces and acting as if they are a single entity, no single institute has direct access to anything other than their own data.

Every organisation stores their data differently, so the process is capable of combining multiple data sets from different healthcare providers into a single record. The process is designed to allow flexibility. Should a new provider join, complex redesigns of existing data structures are not needed; new data is mapped to the existing format and the underlying structure automatically adjusts to accept this change.