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MyHealthMyData: Blockchain and Smart Contracts enhance utmost privacy and security in healthcare
An EU project to empower citizens with regard to the usage of their own health data

MyHealth-MyData (MHMD), a H2020 EU-funded research and innovation project, is poised to be the first open **biomedical information network** centred on the **connection between organisations and the individual**, aiming at **encouraging hospitals** to start making anonymised data available for open research, while **prompting citizens** to become the ultimate owners and controllers of their health data.

MHMD profiles and classifies sensitive data based on their **informational and economic value**, and assesses the most suitable and robust **de-identification and encryption technologies** needed to secure different types of information, while still allowing **advanced knowledge discovery** through **analytics and deep learning** applications running on a growing amount of anonymised or pseudonymised data.

MHMD develops **new mechanisms of trust** and of direct, value-based relationships between people, hospitals, research centres, and businesses, by making use, for the very first time in healthcare, of a **blockchain system**, i.e. a digital ledger where information relating to the distributed storage of the health data is trimmed in hash-based language code, making it possible to describe exactly **what type of data are available**, referring to **what cohorts of patients**, and **data transactions are continuously validated to the entire network** of stakeholders, avoiding any possibility of fraudulent usage.

A **dynamic consent** interface will allow users to grant, deny and revoke data access for different uses according to their preferences through **personal data accounts**, storage clouds enabling individual access from any personal device. In this way, patients will be able to fully leverage the value of their clinical information, turning to different healthcare professionals for second opinion, or searching for profiles of similar patients and contact them upon their permission. Physicians, in turn, will have the possibility to retrieve medical annotations or execute queries to identify patients with analogous features to find cues about a specific clinical case.

Smart contracts, self-executing contractual states in digital form, will regulate data transactions between users, allowing the **permission to access**, and stakeholders, who will be enabled to make direct requests and offer **incentives** in exchange of access rights. This system will be checking its applicability as an operational Infostructure, and will represent an innovative challenge within the EU **General Data Protection Regulation** entering in force in 2018. On this basis, MHMD has the ambition to foster the development of a **true information marketplace** for healthcare.

MHMD will also analyse **users' behavioural patterns** alongside **ethical and cultural orientations**, to identify hidden dynamics in the interactions between humans and complex information services, and will assess the overall security of its multi-modular architecture by testing it through **dedicated self-hacking simulations** and **public hacking challenges**, performed on synthetic data sets.

"MyHealthMy Data is an exciting project which aims at fundamentally changing the propensity to share sensitive data between clinical institutions while facilitating the transition towards a patient-centric approach based on the direct engagement of citizens" declared Edwin Morley-Fletcher, the Project Coordinator. "Blockchain and Smart Contracts will play a key role in providing the maximum degree of privacy protection and security by making trust digitally self-enacted when accessing health data".

MHMD officially started on 1st November 2016, and is now online at www.myhealthmydata.eu. The project, is coordinated by Lynkeus (an Italian SME, based in Rome), and involves 4 other SMEs (from Austria, France, and the UK), 4 research centres and academia (Greece, Italy, Romania, Switzerland), 4 clinical centres (Germany, Italy, UK), a legal firm (Belgium/Italy), and 1 industry (Siemens).

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