ReCRED

Reaching our goals as a truly successful project

BRUSSELS 2017

IN THIS ISSUE

Everything about the ReCRED project during the last period and while approaching the end

From Real-world Identities to Privacy-preserving and Attribute-based CREDentials for Device-centric Access Control

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Second Review Meeting, Brussels, Belgium

The second project review took place in Brussels in July 2017. The comments received by the reviewers were very positive and encouraging. The partners had addressed the comments of the previous review and they have fully met the expectations for the second year of the project.

As per the reviewers' comments, the ReCRED partners have to focus on the dissemination activities and raise awareness about the project itself and its impact to the society.

During the review meeting, the partners presented the progress of the work of the second project's year and showed a number of videos demonstrating the developed ReCRED's applications. All the presented videos are available on the project's YouTube channel and on the project's website.

Furthermore a mobile device with the ReCRED app and a live connection to the ReCRED server was available for real-time demonstration. The most important functionalities were showcased and all partners answered questions related to the way the ReCRED framework operates. Fruitful comments from the reviewers will be taken into account for the next implementation and integration cycle.

The review ended with a very positive feeling about the future of the ReCRED applications and very clear objectives for the next year. The dissemination and communication activities are of great importance at this stage of the project while the deployment of the pilots and the related ReCRED evaluation process from real users will guarantee the attraction of interest for the ReCRED platform as a whole and for the individual components.

ReCRED's Plenary Meeting in Palermo, Italy

Following the review meeting, the consortium organized a plenary meeting hosted by CNIT in Palermo, Italy, in September 2017 to discuss and organize the next steps. Pilot activities and dissemination actions have been extensively discussed and goals have been set aiming at the highest quality results.

In a highly collaborative spirit the partners have agreed on the way the integration of the various ReCRED components should be completed in order to be ready for the four large scale pilots of the project.

Furthermore a list of dissemination and communication actions has been compiled and tasks have been assigned to all the partners in order to ensure high visibility of the project to various groups in the industry, academia and the general public.

From Real-world Identities to Privacy-preserving and Attribute-based CREDentials for Device-centric Access Control

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Presentation of ReCRED project in conferences & workshops

The consortium partners have dedicated a lot of effort in order to promote the ReCRED project, its concept and outcomes and the huge impact to the European community. All partners participated in a variety of local and European events attracting public attention and spreading the knowledge gained from the process followed in ReCRED. Some of the events where ReCRED was presented with huge success are briefly described in the below sections. You can always find all the presentations made throughout the lifespan of the project together with the respective material in our website.

ReCRED at the Technical University of Darmstadt, Germany

The Collaborative Research Centre (CRC) 1053 "MAKI – Multi-Mechanisms Adaptation for the Future Internet" of the Technical

University of Darmstadt, Germany, invited Prof. C. Xenakis from UPRC to participate in the university's Guest Presentation Series, during the summer semester of 2017. C. Xenakis' presentation, entitled "Beyond password authentication: a device centric approach", focused on the solutions proposed by ReCRED in the era of e-commerce and Internet of Things.

ReCRED at IPICS Summer School on IT Security, Greece

The Intensive Programme on Information and Communication Systems Security – IPICS summer school is a well-established

academic European school on IT security, supported by **ENISA**. It takes place annually for the past 19 years, and brings together experts from many different security fields. This summer, IPICS will took place at the Ionian University at Corfu, Greece. On June 30th, C. Xenakis and C. Ntantogian from UPRC were invited to speak about ReCRED's outcomes and the underlying technologies that the project is built upon, such as the biometric and behavioral authentication, as well as the anonymous credential systems.

ReCRED at International Tyrrhenian Workshop on Digital Communication 2017, Italy

The International Tyrrhenian Workshop on Digital Communication 2017 – "Towards a Smart and Secure Future Internet", that took place in Palermo, Italy, during September 18-20, attracted many researchers who wished to share their latest research insights and present key results on the emerging paradigms for the design of the Future Internet. Characterized by an informal and highly interactive atmosphere, the workshop featured keynote talks, tutorials, panels, demos and technical sessions where invited lectures were given by leaders, in both

academia and industry, to describe recent research results.

The Tyrrhenian Workshop hosted Prof. C. Xenakis and Prof. M. Sirivianos, ReCRED's project and technical management leaders respectively, as keynote speakers, offering them the chance to present our project's approach and outcomes, that are set to influence the Future Internet. Additionally, UPRC contributed a paper, "A Security Evaluation of FIDO's UAF Protocol in Mobile and Embedded Devices", focusing on FIDO, the backbone of ReCRED's device-centric authentication feature. The paper was also presented in the workshop by Dr. C. Ntantogian.

ReCRED at the 21st Pan-Hellenic Conference on Informatics, Greece

The Pan-Hellenic Conference on Informatics (PCI) is the annual rendezvous event for Greek scientists, to present original and high-quality research on emergent topics of Informatics. Organized by the Greek

Computer Society, in tight collaboration with the Greek Academic community, PCI2017 invited researchers to present the results of finished or ongoing research projects in national and European level. During the conference that took place in Larisa, Greece, September 28-30, 2017, ReCRED's results were presented by Dr. Christoforos Ntantogian (UPRC) in a separate session along with other large-scale European ITC projects. After the presentation, Dr. C. Ntantogian was approached by researchers working on fields closely related to ReCRED, to further discuss the new technologies and solutions that are meant to change the future or authentication. UPRC also contributed a paper to the conference, titled "RiSKi: A Framework for Modeling Cyber Threats to Estimate Risk for Data Breach Insurance", acknowledging ReCRED.

ReCRED at Romanian Research Congress 2017, Romania

CertSIGN was invited to participate in the Romanian Research Congress, 2017 edition, were we presented some of the research projects that we implemented. ReCRED had a central role in the discussions and

password-less authentication methods were presented to the large public and

representatives of other science fields as well (e.g. Physics, Aerospace, UAV, etc.). The participants, interested in various sciences fields other than computer software, were at the beginning intrigued to find out how authentication is needed in their science field as well, but were very happy to find out that ReCRED's solution can be easily integrated in their existing applications.

ReCRED at NATO's Information Assurance Symposium 2017, Belgium

ReCRED was presented at CertSIGN's booth during NIAS 2017, NATO cyber symposium. As mobile devices are becoming a key element in information security CertSIGN presence was focused on this direction, providing a prominent visibility to ReCRED.

The device centric authentication was introduced to the audience and the feedback from the industry and defence representatives was very positive. Device centric authentication is not obvious for end-users but once they understand the principle they easily adhere to the concept.

ReCRED at FOSSCOMM 2017, Greece

Organized by Greek open source communities since 2008, FOSSCOMM (Free and Open Source Software Communities Meeting) is the biggest annual conference for open source software in Greece, gathering more than 500 participants every year. Developers, open source technology companies and anyone interested in the field, support the event every year, whose main goal is to promote the use of FOSS. This year, Harokopio University hosted FOSSCOMM 2017, during 4th-5th of

November, offering presentations and workshops discussing open software, open content, open data, open design, open licenses issues and more. Dr. Christoforos Ntantogian from UPRC attended the event on behalf of ReCRED, where he got the chance to introduce our project, which is built on open source technologies, to a wide audience of IT students and professionals. Following the presentation, C. Ntantogian was approached by participants, expressing their interest in the project and asking about the possibility of integrating ReCRED with insurance companies in the future.

FOR MORE INFORMATION

regarding our communication activities
https://goo.gl/dgixnf

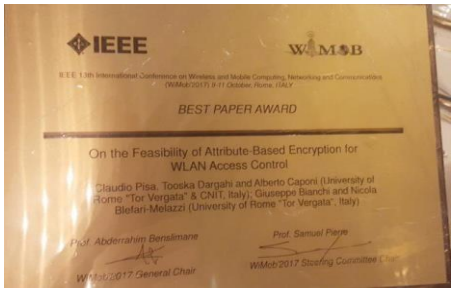
Best Paper Award at IEEE WiMob 2017 for CNIT

CNIT has presented its work entitled "*On the Feasibility of Attribute-Based Encryption for WLAN Access Control*", developed in the framework of the H2020 ReCRED project, at the *13th IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)* in Rome. The paper received the best paper award from the conference chairs.

Wi-Fi (also called wireless local area network or WLAN) is becoming an important part of our lives: it is widely deployed as an increasing number of people is relying on a wireless connection to access - especially from their mobile devices - online services which are now fundamental for everyday activities.

However, Wi-Fi authentication still poses some issues: for example to allow customers to access their networks, businesses rely on open (i.e. passwordless) Wi-Fi which typically after the connection block the users' online activities with splash pages and captive portals. Or, they rely on protected (i.e. using WPA2-PSK) Wi-Fi networks, but then typically share the network's password with all of their customers. These scenarios are far from ideal from a security standpoint. Also more enterprise-oriented networks (e.g. those relying on IEEE 802.1X), which are more secure, might have their limitations from a privacy standpoint.

WI-FAB is a new P-ABAC (Privacy-Preserving Attribute Based Access Control) authentication mechanism designed and prototyped by ReCRED, based on ABE (Attribute-Based Encryption) cutting edge cryptography. Users can be safely



authenticated through their attributes without disclosing their actual identity. WI-FAB does not rely on pre-shared network passwords and does not require an online backend access control infrastructure.

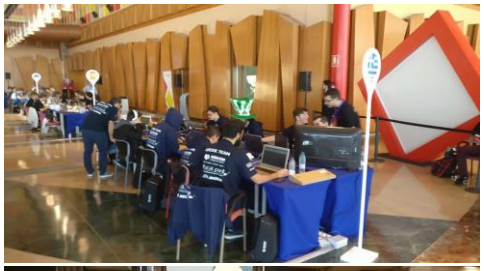
We have extended WI-FAB to become multi-authority: we no longer have to rely on a central authority for user authentication and credential issuing. Instead, several federated authorities can independently issue attribute-based credentials to their users. Network operators can then define access policies based on attributes coming from multiple authorities.

We have first analyzed this approach from a security and privacy perspective. Then we have actually implemented multi-authority WI-FAB, successfully deployed it in an off-the-shelf Wi-Fi router and performed a campaign of experiments to demonstrate the feasibility of our solution.

FOR MORE INFORMATION

regarding the best paper award
https://goo.gl/zL4eRc

ReCRED Supporting the Hellenic Cyber Security Team in the European Cyber Security Challenge



The growing need for IT security professionals is widely acknowledged worldwide. To help mitigate this shortage of skill, many countries launched national cyber security competitions addressed towards students, university graduates or even non-ICT professionals with a clear aim: find new and young cyber talents and encourage young people to pursue a career in cyber security.

The European Cyber Security Challenge (ECSC) leverages on these competitions by adding a pan-European layer. Top cyber talents from each participating country meet to network and collaborate and finally compete against each other. In a nutshell, ECSC is the annual European competition promoted by European Commission through ENISA that brings together young talent from across Europe to have fun and compete in cyber security.

Contestants were challenged in solving security related tasks from domains such as web security, mobile security, HW, RF and IoT security, crypto puzzles, reverse engineering and forensics, while the scoring depend on the ability to resolve them as soon as they can. Teams were also challenged to make a speech to the audience and the jury in the conference room with more than 500 attendees, trying to explain one of the challenges being solved, as we also need cybersecurity professionals with soft skills and the ability to communicate.

Greece was present in ECSC 2017 for the second consecutive year. The competition was held from 30 October to 3 November 2017 in Malaga, Spain, where Greece participated with a 10-member team, aiming at a high distinction. This year, the official nomination for the Greek participation to the contest was assigned to the Department of Digital Systems of the University of Piraeus. More specifically, the Assoc. Professor Mr. Christos Xenakis, together with a specialized team of cyber security volunteers constituted (through a national-level qualifier) and prepared the Hellenic Cyber Security Team. The competition, was organized by 15 European countries representing each of their national teams, promoted by ENISA and the European Commission, bringing together young talent from across the European continent to have fun and compete in cyber security.

ReCRED project supported the Hellenic Team that represented Greece in ENISA's European Cyber Security Challenge (ECSC).

The Hellenic team had also the support from EXUS Software Ltd that promoted the specific event through all the available channels. Throughout the whole procedure, EXUS not only created the right conditions for the success of this effort but it also outreached large national and international communities and set itself a part in a highly competitive market.

FOR MORE INFORMATION

regarding the Hellenic participation in the ECSC 2017 visit https://goo.gl/nRdCSF and http://www.ecsc.gr/

ReCRED Supporting University Of Piraeus (UPRC) Team in TADHack Athens 2017

The Department of Digital Systems, of the University of Piraeus, won the 3rd place prize in TADHack Athens 2017 that took place at the end of September (22-24 September and 29 September – 1 October). The postgraduate students Papadopoulos Polymenis, Karapetsas Sotirios and the undergraduate students Kompolis Marios and Evaggelou Nikos, represented UPRC in the competition with the project "SS7 attacks on Telestax's JSS7 SMSC Gateways", which focused on telecom security, demonstrating attacks on the SS7 network and intercepting SMSs.

The Telecom Application Development – TADHack, the largest telecoms-focused hackathon worldwide, is the global meeting place for people who want to learn, share, code and create using the tools and technologies available in telecommunications. Aiming at building an ecosystem focused on telecom application development, TADHack brings together businesses, developers, non-coders and anyone who is interested in using telecom capabilities in their applications, to solve local and global problems.

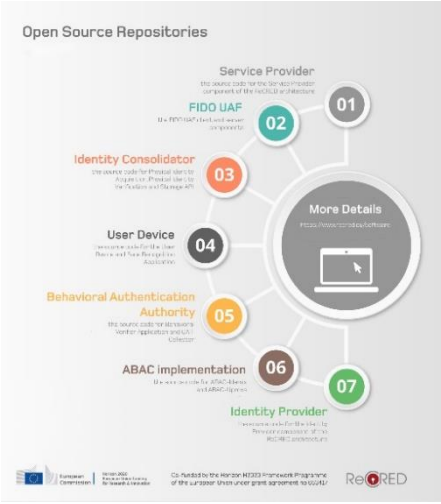
The carried-out R&D task was supported by ReCRED, with the intend to motivate more undergraduate and postgraduate students of the Department of Digital Systems of the University of Piraeus that study information security, to engage further with telecom security tools and technologies.

FOR MORE INFORMATION

regarding the TADHack event and the University of Piraeus team visit https://goo.gl/ycVSA3

ReCRED in a Nutshell Through Infographics

A new section has been recently created in our website, the Infographics section or as it is widely known ReCRED at a glance. The aim of this action is to tie the information derived through the ReCRED project with a form of visual content. The major benefit of using Infographics is that we can easily convey our message more effectively than plain text articles. By visually representing information, the audience can absorb our message faster and remember it better, thus contributing in a more efficient knowledge spread and in



more targeted dissemination activities. Just imagine how much information is generated on a daily basis, which according to several studies performed so far, can reach up to 1.5 billion individual instances or units of content. If you also add nearly 140 million tweets generated each day along with almost 2 million uploaded videos on

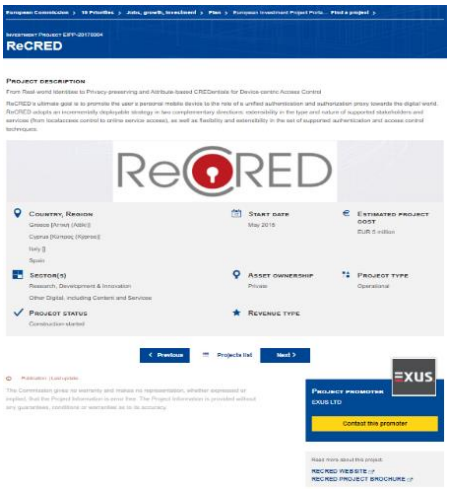
YouTube you will reach to the conclusion that it is very easy for our content to get lost in the jungle – which makes it doubly hard for targeted audience to find us. Thus, in order to avoid the irrelevant traffic and attract the attention of the right people, we considered using infographics. People need the "optic nerve" activated in order to process the more than 90% of information that comes into one's mind, and all these are visual information. If words fail to capture the attention and imagination of our audiences, then perhaps visual elements like Infographics can do the job better.

FOR MORE INFORMATION

regarding our project's infographics visit https://goo.gl/cHwUtG

ReCRED in EIPP

ReCRED has been registered in EC's European Investment Project Portal (EIPP) in order to boost its visibility to a large network of international investors. The Portal offers EU-based private and public project promoters a convenient way to boost the visibility of their investment projects by simply filling and submitting a project form. EIPP will show-case these projects in a structured user-friendly way and will thus attract investors worldwide, who will be able to reinforce their own pipelines with more European projects.



Many professionals from the industry have shown their interest in the project and its outcomes regarding online identity and access management. The uploaded material (Brochure and White Papers) has gained a lot of attention from the European community.

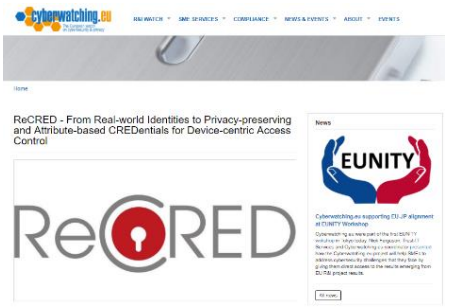
Everyone connected with ReCRED will receive project updates regarding its progress.

FOR MORE INFORMATION

regarding our project in EIPP visit https://goo.gl/jv7dFV

ReCRED in Cyberwatching.eu Observatory

ReCRED joined the CyberWatching observatory which is the European observatory of research and innovation in the field of cybersecurity and privacy. Funded under the European Commission's H2020 programme, this brand-new project will



contribute to making the Digital Single Market a safer and more trusted by promoting the uptake and understanding of cutting-edge cybersecurity and privacy services which emerge from Research and Innovation initiatives across Europe. First to benefit are SMEs who will have unlimited access to a marketplace and catalogue of new services that can improve their services and ensure that cybersecurity becomes a unique selling point for them. In its four-year lifetime, Cyberwatching.eu will also play a key role in policy discussions. In its mission to democratise cybersecurity for all, the project directly responds to the objectives of the recently signed contractual Public-Private Partnership on cybersecurity (c-PPP) which has ambition of becoming the reference framework for the R&I initiatives, both Nationally and across Europe

FOR MORE INFORMATION

regarding our project in Cyberwatching.eu visit https://goo.gl/UtgjRR

ReCRED's White Papers on Behavioral Authentication Authorities & Privacy-Preserving Attribute-Based Access Control

The consortium has published a whitepaper that describes the concept of Behavioral Authentication Authorities and explains their value and potential exploitation. In a device centric authentication scheme, such as the one that ReCRED implements, the Behavioral Authentication Authority (BAA) is a second factor authentication mechanism, totally transparent to the user but closely related to his behavior. The way user walks, moves around or types on his/hers smartphone can characterize and uniquely identify him/her. BAAs are actually a type of Identity providers that apply statistical models to build user behavioral profiles and use them to verify the identity of the user. Unusual behavior can trigger the lock of all or only the critical user accounts preventing the use of a stolen device to access them. The whitepaper can be accessed through the project's website.

In addition, CNIT drafted a whitepaper regarding simpler and privacy-preserving authentication and authorization methods that are currently used in ReCRED. In particular, by adopting "Privacy-Preserving Attribute-Based Access Control (PABAC) ", ReCRED provides the means for the user authorization to use an online service relying on his/her descriptive attributes rather than his/her identity. Owing to the high level of privacy and flexibility provided by ABAC, ReCRED provides a secure, reliable, privacy-preserving and easy-to-use method for the online service providers and the users to communicate with each other.

The mechanisms described in this white paper allow for additional scenarios to be disclosed. The upcoming General Data Protection Regulation (GDPR) will raise the bar on the level of data protection required from businesses to operate. Moreover, European institutions have expressed their favour to whistleblowing to support accountability in the private and public sector. Finally, it could help digital currencies to become more similar to ordinary cash. All these scenarios could be supported by ReCRED's PABAC.

FOR MORE INFORMATION

regarding our project's White Papers visit https://goo.gl/gBxpmy

IN THE NEXT ISSUE

Find out more about the H2020 Project Clustering Workshop and the projects that participated with posters and presentations on their findings, the problems they faced during their project's lifespan and their remarkable outcomes.