

AP Cyber Security
Centro di Competenza Cyber
Security del CNR

DIITET

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Outline

- Research topics covered
- Status and current activities
- Future Work

AP Cyber Security - Topics

1. Cyber-Physical Systems (CPS) Security
2. Intrusion Detection and Protection
3. Network Security
4. Privacy
5. Access Control and Trust Management
6. Cyber insurance
7. Cyber-intelligence on Social Media
8. Information Sharing and Analytics
9. Cryptography
10. Secure Software Engineering
11. Cloud Security



Cyber-Physical Systems (CPS) Security

contact: Luca Durante - IEIIT

CPSs have peculiar functional and performance requirements (w.r.t. the ICT world): **real-time scheduling and communications**, **low power**, **harsh environment**, **and more**. Thus ad-hoc developed techniques are needed

- access control policy models and analysis
- performance models and analysis of security controls
- new network paradigms for security, e.g. SDN and NFV

Intrusion Detection and Protection

contact: Luca Caviglione- IMATI

Intrusion Detection and Protection of mobile devices: the investigation of security hazards targeting modern mobile devices

- Steganographic Channels
- Energy-aware Security
- Application and OS Security

Network Security

contact: Flavio Lombardi - IAC

TOR Dark Web - addressed challenges are

- dealing with an ever changing TOR graph and content;
- analyzing content in many different languages and slangs;
- exploring a larger portion of the network;
- leveraging additional analysis techniques.

allowing for more effective Police investigations

contact: Maurizio Aiello – IEIIT

Slow DoS attacks development

- context and environment
- feasibility
- innovative tools

Innovative protection techniques

- identification of last generation threats
- efficient protection from last generation threats

Privacy

contact: Anna Monreale - ISTI

- Privacy-by-design for big data publishing, analytics and mining
- Privacy-by-design for data mining outsourcing
- Privacy enhancing technologies
- Privacy engineering
- Privacy risk assessment

Access Control and Trust Management

contact: Fabio Martinelli - IIT

Access and usage control: study and development of access and usage control languages and mechanisms for data, services, network and IoT

- Authentication protocols
- Languages and mechanism for authorization

Trust management: model and analysis of trust relationships in open systems (and social networks).

- Models and languages for trust management.
- Trust management services

Cyber Insurance

contact: Alba Orlando - IAC

Cyber insurance is an alternative way to deal with residual risks

- deep analysis of the basic knowledge about cyber insurance from both market and scientific perspectives.
- cyber insurance as an incentive to invest in security and on new models for pricing and risk measures assessment.

Cyber-intelligence on Social Media

contact: Maurizio Tesconi - IIT

- **social media data gathering** for intelligence purposes, using both APIs and scraping techniques
- **social media data analysis** (using big data technologies):
- **technology transfer** to LEAs, also through a joint laboratory with Italian Police (CRAIM) and a collaboration with Italian Presidency of the Council of Ministers

Information Sharing and Analytics

contact: Giuseppe Manco - ICAR

- Information Sharing and Analytics (ISHA): the design of machine learning, artificial intelligence and data analytics techniques able to make sense of large amounts of data
 - Approach: study of mathematical models, scalable data processing
 - Challenges: theoretical soundness, behavioral profiling, social sensing, attacks prevention/response
 - Impact: automatically computed meaning to prevent/detect attacks, mitigate risks, and preserve security and safety requirements.



Cyber Security District - Cosenza

- 30M€ investment
 - Initiative of the Italian Ministry for University and Research (MIUR) in the framework of National Operative Program – Research and Competitiveness 2007-2013.
- 200+ professionals involved for 4+ years
- Over 30 organizations including SME LE, Research centers, Universities, Consulting agencies
- Strategic in the core business of LE
 - Poste Italiane
 - NTT

Cryptography

Contact: Giovanni Schmid - ICAR

IoT: Cryptographic primitives for securing Wireless Sensor Networks and Sustainable, non speculative blockchain systems

Anti-counterfeiting: unforgeable analog-digital tags (PACs)

Database-as-a-Service: encrypted full text allowing fast searches on compressed and encrypted data sources

Contact: Massimo Bernaschi - IAC

New cryptographic approaches are required because of emerging cipher-breaking platforms, too. Cost-affordable massive farms and large-scale networks of high performance computing units (eg; GPUs, ASICs) are already used for this purpose, and quantum computers are on the way.

Secure Software Assurance

contact: Eda Marchetti - ISTI

Secure Software: integrated approach to software intensive systems

- Secure requirements and quality attributes collection
- Software or system construction and evaluation
- On-line monitoring, control and assessment of security
- Integration of security management and control facilities
- Verification and Validation of access and usage control systems
- Model-driven approaches for specification and evaluation

Cloud Security

contact: Paolo Mori - IIT

- Identity and Authentication Management
- Access and Usage Control
- Cloud Platforms for the Public Administrations
- Integration of Cloud with the Internet of Things and the evolution to Edge computing

European context positive for the next decade

- New regulations in Cyber
 - Network and Information Security (NIS) adopted in 2018, Data Protection Regulation (GDPR)
- Revision on EU cyber security strategy (Cybersecurity Act)
 - New certification strategy
- The topic is high in the political radar
 - H2020 budget doubled thanks to the cPPP⁽¹⁾ construction (also thanks to direct action of CNR)
 - A new program on Digital Europe Programme (proposed by the EC) asks for 2B€ for cyber in addition to FP9 (Horizon Europe) 1B€, in total 3B€ in cyber till 2027 (still proposal)
 - This activity also stems from the ECSO⁽²⁾ cPPP and related actions promoted directly by CNR
 - Call for Pilot of Cyber Security Competence centres
- VP Katainen mentioned that the priority of Europe (in 27) is defense and security
 - See also the new program of European Defense Research
 - Cyber Defense is becoming main stream
- More pragmatically, the number of Units dealing with security at DG CONNECT doubled (while this is just one for robotics and AI together).

(1) contractual Public—Private Partnership

(2) European Cyber Security Organisation

Status

- The AP asked to be considered a **centre of competence** and act as a virtual Lab with several nodes
- This allowed us to make a federation with CINI to create the **Italian** Committee for research in Cyber Security



- CNR has a leading role in **Europe** with ECSO, the cPPP in Cyber Security



- CNR joined the national competence centre in cyber security
- CNR joined two of the four pilots in Europe for the new European Competence centres
 - A few organizations were able to be formally in two
- Since 2016 the number of European projects where CNR is involved in cyber doubled
 - Good results !!!

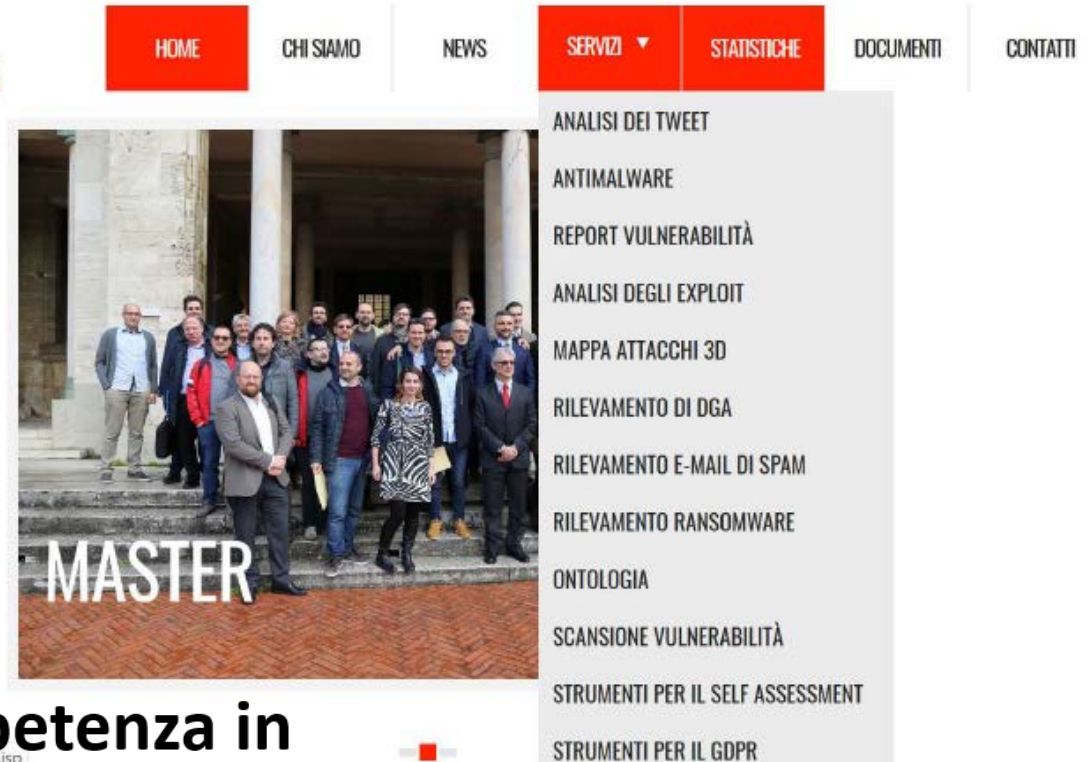
Centre of Competence in Cyber Security

- Several Institutes involved
 - Referents for Institute
 - IIT
 - ICAR
 - IAC
 - ISTI
 - IEIIT
 - IMATI



Future (I)

- Consolidate the Centre of competence of CNR
 - At EU level
 - At National level
 - At regional level
 - Calabria, Toscana, etc.
- Finalize a web site
- Extend the Observatory in Cyber Security developed by IIT-CNR



C3T Centro di Competenza in
Cybersecurity Toscano
osservatorio.it/it/Services/statistics.jsp

Future (II)

Cyber Security:

The protection of cyber as the protection of everything

- Increase cooperation among nodes and joint activities
- Tackle the many vertical domains !!!
- Cyber security is a discipline of its own



See you at
ITASEC 2019
(12-15 Feb. 2019, Pisa)!