



**PhD in Information Technology and Electrical Engineering**

**Università degli Studi di Napoli Federico II**

PhD Student: Rosario Catelli

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**XXXIII Cycle**

**Training and Research Activities Report – Second Year**

**Tutor: Prof. Valentina Casola (DIETI)**

**Co-Tutor: Eng. Concetta Pragliola (Hitachi Rail STS) until 14<sup>th</sup> October 2019**



UNIVERSITÀ DEGLI STUDI DI NAPOLI  
**FEDERICO II**

### 1. Information

I obtained my master's degree in Electronic Engineering in September 2017 at the University of Naples Federico II. My Ph.D. grant was funded until October 14, 2019 by Hitachi Rail STS (formerly Ansaldo STS) under the title "Cybersecurity tools and techniques to protect telecommunication and railway signalling systems" and I joined the CSAC (Cyber Security Assurance & Control) Department and its activities concerning (1) Policy, Guidelines and Compliance, (2) Standards and Metrics, (3) Security Incident Management, (4) Verification and Validation and (5) Internal Audits.

In October 2019 I won a research grant to conduct research activities under the PON OK-INSAID (Operational Knowledge from Insights and Analytics on Industrial Data) research program at the Institute for High Performance Computing and Networking (ICAR-CNR) where I started working on October 15, 2019.

### 2. Study and Training Activities

During this second year I followed these courses, external courses and modules:

- *Elettromagnetismo e relatività* (5 CFU) held by the Prof. Amedeo Capozzoli.
- *Network Security* (6 CFU) held by the Prof. Simon Pietro Romano.
- *Internet Censorship: Enforcement, Detection, and Circumvention* (2 CFU) held by the Prof. Giuseppe Aceto.
- *Cambridge C1 Advanced* (0 CFU) held by the Prof. Janet Parker.
- *Gestione del trasferimento tecnologico* (3 CFU) held by the Prof. Pierluigi Rippa.

And these seminars:

- *Bitcoin e blockchain oltre l'hype* (0.6 CFU) held by G. Sabbatini, L. Giustozzi, M. Monaco, F. Balsamo (Organizer Prof. Giorgio Ventre).
- *Presentazione ADI: vittorie, sfide, obiettivi* (0.2 CFU) held by Lorenzo Fattori (Organizer Agostino Guarino).
- *Advanced technology at the service of visitors to cultural heritage sites* (0.4 CFU) held by Prof. Tsvika Kuflik (Organizer Prof. Francesco Cutugno).
- *Ethics, science & society in brain computer interface* (0.6 CFU) held by Prof. W.F.G. Haselager (Organizer Prof. Pasquale Arpaia).
- *On reinforcement learning for computing channel capacity with feedback* (0.2 CFU) held by Haim Permuter (Organizer Prof. Antonia M. Tulino).

### 3. Research activity

I was involved until October 14, 2019 in the management and operational activities related to cybersecurity governance carried out by Hitachi Rail STS, which mainly focus on the implementation of an Information Security Management System (ISMS) for business systems and tools in accordance with ISO 27001 and GDPR (General Data Protection Regulation) with particular attention to privacy aspects.

The massive presence of activities carried out manually by humans has led me to move towards Natural Language Processing (NLP) techniques in order to process the large amount of information at stake.

With ICAR CNR, we started exploiting NLP techniques for textual analysis based both on classic approaches and deep learning. Particularly, we are experimenting several neural networks applied to classification, such as CRF, LSTM, ELMO and BERT based nets, to represent language for Named Entity Recognition (NER) task with benchmark datasets, comparing them on the basis of their capabilities to represent words and related context. Finding an entity is a useful first step to answer questions or to link the text to information in

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structured knowledge sources, but many applications will also need to use specific types of entities to be defined as privacy-relevant information (date of birth, gender, etc.).

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**Cycle XXXIII**

	Credits year 1								Credits year 2								Credits year 3								Total	Check
	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary	Estimated	1	2	3	4	5	6	Summary		
<b>Modules</b>	20	0	0	6	3	3	7.2	19.2	11	5	6	2	3	0	0	16	0							0	35.2	30-70
<b>Seminars</b>	5	0	0	0.6	5.2	0	0	5.8	5	0.6	0	0.2	0	1.2	0	2	2.2							0	7.8	10-30
<b>Research</b>	35	10	10	3.4	1.8	7	2.8	35	44	4.4	4	7.8	7	8.8	10	42	57.8							0	77	80-140
	60	10	10	10	10	10	10	60	60	10	10	10	10	10	10	60	60	0	0	0	0	0	0	0	120	180

## 4. Products

I published two conference papers:

- Casola, V., Catelli, R., & De Benedictis, A. (2019, June). A First Step Towards an ISO-Based Information Security Domain Ontology. In 2019 IEEE 28th International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) (pp. 334-339). IEEE.
- Mokalled, H., Catelli, R., Casola, V., Debortol, D., Meda, E., & Zunino, R. (2019, June). The Applicability of a SIEM Solution: Requirements and Evaluation. In 2019 IEEE 28th International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) (pp. 132-137). IEEE.

I published one journal paper:

- Mokalled, H. , Catelli, R. , Casola, V. , Debortol, D. , Meda, E. and Zunino, R. (2020) The Guidelines to Adopt an Applicable SIEM Solution. Journal of Information Security, 11, 46-70. doi: 10.4236/jis.2020.111003.

## 5. Conferences and seminars

I participated to the IEEE 28th International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE) in June 2019, where I presented the paper “A First Step Towards an ISO-Based Information Security Domain Ontology” listed above.

## 6. Activities abroad

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## 7. Tutorship

I carried out 50 hours of tutoring, didactic-integrative, preparatory and recovery activities for first-year students.