



CyberChallenge.IT 2020

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1 Introduction

This document aims at presenting the CyberChallenge.IT project, with particular emphasis on its general aspects and the specific details of the 2020 edition.

Section 2 illustrates the objectives of the project and the different phases of the training process. Section 3 is devoted to the description of the team of National Cyberdefenders, that is the country representative in the main international competitions; the section also contains a brief description of the main international competitions in which the team has been and will be involved.

2 The Project

2.1 Presentation

2.1.1 Mission

CyberChallenge.IT is a training program for young talents that aims to significantly reduce the current shortage of the IT workforce, being the main Italian initiative aiming at identifying, attracting, recruiting and placing the next generation of IT security professionals. The goal for the 2020 edition is to involve at least 4,000 of the best students in Italy and encourage them to fill the ranks of future cybersecurity professionals, thus making their skills available to the country system.

2.1.2 Whom is the program addressed to

The candidates are young people between 16 and 23 years of age who live study in Italy.

2.1.3 Objectives

The project aims to create and grow the cyber defender community by investing in young people. In particular, it aims at:

- stimulating interest in technical-scientific subjects and, in particular, in information technology topics;
- presenting the professional opportunities offered by the training courses on information security;
- putting young people in direct contact with companies, also thanks to the challenges they will have to face;
- identifying young cyber talents and contributing to their orientation and professional training.

2.1.4 Methodology and training contents

The program combines traditional training activities with a gamification-oriented approach that translates into participation in competitions in virtual arenas where different scenarios of networks and real work environments are simulated. The proposed model is unique on the international scene; in fact, it exploits not only gaming as an instrument for attracting young people, but offers a significant multidisciplinary training, as well. The course focuses on technical, scientific

and ethical issues related to information security, alternating theoretical lectures and hands-on experiences on various topics such as cryptography, malware analysis, and web security.

2.1.5 Modalities of participation

Students are selected through two tests, after extensive information campaign in high schools and universities. The former test is carried out online remotely and serves for a first selection, while the second is carried out in the classrooms of the different universities participating in the project and is the one used to select the actual participants to the training courses.

The 2020 edition, like the previous ones, will offer selected students training courses at the participating universities and will culminate in the third Italian Capture-The-Flag (CTF) championship in cybersecurity. This, in turn, will allow to identify the National Team of Cyberdefender that will participate in the European Cyber Security Challenge (ECSC)¹. The 2020 edition will also aim to search for and select a greater number of female talents, experimenting with innovative forms for their involvement and will aim for greater involvement of high school students, also by exploiting the specific governmental educational program *“Percorsi per le competenze trasversali e per l’orientamento”*².

2.1.6 Impact

The CyberChallenge.IT project is an initiative supporting local and national stakeholders aimed at:

- Valuing talents for the benefit of the training system and local stakeholders (public administrations, companies, government agencies, etc.);
- Providing an immediate response to the urgency of the country to get new professionals in the field of information security;
- Guaranteeing to the selected young people and to universities, institutions and supporting companies visibility at national and international level;
- Offering support to young people for career orientation and placement programs in the field of cybersecurity, also thanks to the support and involvement of representatives of major domestic and international companies;
- Promoting the development of the project both at a local level, foreseeing expansions on the territory, and at an international level, exporting the formula and the platform to other countries.

2.2 The assets of the project for the country system

The current technological revolution and its systemic implications are closely linked to the definition of the ICT phenomenon as a set of common challenges that Institutions, Companies, Research and individual citizens must necessarily face. Therefore, if on the one hand cyberspace

¹ <https://www.europeancybersecuritychallenge.eu>

² <https://miur.gov.it/web/guest/-/linee-guida-dei-percorsi-per-le-competenze-trasversali-e-per-l-orientamento>

becomes more and more a critical infrastructure, which acts as a junction in the process of providing essential services, on the other hand it presents vulnerabilities deriving from its own nature: a world of human creation, parallel but also by now deeply correlated to the natural one and based on the transmission of data and information. In this context, cybersecurity is everywhere: in hardware, software, communication systems, business processes, public services, ...

Information security therefore becomes the essential element of this new dimension in order to guarantee, over time, an adequate level of security for our relations, our businesses and our democracies.

Italy is currently struggling to respond adequately to some of the challenges, because the number of IT security professors and researchers is still too low; universities and research institutions have difficulty in developing adequate teaching and research plans and companies have difficulty in recruiting people with the appropriate skills. To reverse this trend, financial investment and ideas involving universities, research, public administration, and private companies are needed.

The CyberChallenge.IT project wants to be a contribution in this direction, being its main objective precisely that of creating and growing the cyber defender community by identifying young talents to be directed towards a career in information security, attracting their interest through information technology challenges, simulations in protected virtual environments and, in general, through initiatives that allow participants to experience possible operational contexts and to evaluate opportunities for professional growth. Gaming is used as a tool of attraction for young people, but it is accompanied by a significant multidisciplinary training course; moreover, the selection phase allows the various Italian universities to present to many young people their training activities (degrees, masters, master degrees) related to computer security issues.

In this way, the project, encouraging more young people to study computer science, will increase the number of cybersecurity specialists who can help to make safer those companies operating in Italy and the Italian local public administrations. Moreover, selecting the best talents and making their curricula available to the central Public Administration, the project will give the country the opportunity to draw on a pool of skills that are essential to secure our country and our democracy.

Finally, a significant spin-off of the project is the training of TeamItaly, the national team of Italian Cyber-defenders, which is successfully representing Italy in the most important international competitions, such as the European Cyber Security Challenge (ECSC), the main European competition for cyber-defenders promoted by the European Union Agency for Cybersecurity (ENISA). The National Team is called upon to include the youngsters who have best demonstrated their skills, both individually and as a team game, during the various stages of CyberChallenge.IT.

Participation in these European competitions, although globally highly expensive, represents an excellent opportunity to make Italy visible in this field. Because of this, we are considering to apply to the call for organizing the ECSC competition as soon as possible, that is in the autumn of 2023.

2.3 The role of the main stakeholders

The CyberChallenge.IT project involves many actors who, synergistically, contribute to the organization, financing, visibility, and success of the initiative, among which we must highlight:

- CINI National Cybersecurity Laboratory
- National Intelligence Department

- Ministry of Defense
- Ministry of Education, University and Research
- Ministry of Foreign Affairs and International Cooperation
- Italian University System
- Private companies.

In particular, the CINI National Cybersecurity Lab acts as coordinator of the entire project, manages its several phases, ranging from promotion to daily management, and ensures the quality of training. The Laboratory also maintains contact with the universities and with the stakeholders who participate in the project. The Laboratory contributes to financing by providing its own personnel and equipment.

Since cybersecurity is increasingly emerging and therefore the availability of professional figures capable of guaranteeing it is essential for the security of our country, the project benefits from collaboration with the National Intelligence Department and the Ministry of Defense. The first considers the project in line with the provisions of the *Piano Nazionale per la protezione cibernetica e la sicurezza*, while the second contributes to the organization of the final national competition, also hosting it in its own facilities.

The Ministry of Education, University and Research, which considers important all those initiatives that aim to encourage young people to study technical and scientific disciplines (STEM), promotes the project to all higher education institutions, also through targeted notices, and contributes to the support of activities within the initiative "*Percorsi per le competenze trasversali e per l'orientamento*".

The Ministry of Foreign Affairs and International Cooperation, through the Directorate General for the Promotion of the Country System and the Deputy Commissioner General for Expo 2020 Dubai, has included the CyberChallenge.IT project within the program of initiatives concerning the themes of Cybersecurity that will take place during the semester of the Universal Exhibition Expo 2020 Dubai, which is known dedicated to the theme "*Connecting minds, creating the future*" (October 2020 - April 2021).

Obviously, the project avails itself of the collaboration of the various actors of the Italian University System: in the 2019 edition 18 universities joined the project. Each university also uses the project as an opportunity to publicize their degrees in computer science and computer engineering, but, above all, provides support for the development of the training course, in terms of space and teaching staff involved. The role of the Regional Competence Centers in Cybersecurity, which are now emerging in various Italian regions as a form of collaboration between universities and research centers for research activities and support to businesses and local public administration, is also significant in this regard.

At this stage, the lack of experts in information security is putting many companies in difficulty at the international level and Italy is no exception. For this reason, we are pleased to see the willingness of several private companies to support economically, through sponsorships and, in some cases, also through the provision of specific skills and relevant industrial case studies for the training activities. In return, companies can access the curricula of young people selected for training and have the opportunity to meet them at targeted events, organized on the occasion of local and national competitions.

2.4 Past Editions

The project has reached its fourth edition. Table 1 shows the evolution of the three previous editions and shows that for the 2019 edition, after the two tests, 360 young people were selected from the 3,200 initially enrolled. These young people followed a multidisciplinary training course at 18 universities throughout the country. At the end of this course, there was first a local competition with the same and contemporary challenges in all locations, and then a national competition: the second Italian championship Capture-The-Flag (CTF) in cybersecurity, organized in Chiavari (GE) jointly by the CINI Cybersecurity National Laboratory and the School of Armed Forces Telecommunications (STELMILIT), under the patronage of the Information System for Security of the Republic and the Ministry of Defense.

Since 2018, CyberChallenge.IT is supported by the Information System for Security of the Republic, Presidency of the Council of Ministers and the 2019 edition was also sponsored by the Ministry of Defense.

In 2018 and 2019, the Nucleo di Sicurezza Cibernetica (NSC) entrusted the CINI Cybersecurity National Laboratory with the task of organizing and managing the activities of the Team of Italian Cyber-defender and participating in international competitions in the sector.

Table 1 - Partecipanti alle precedenti edizioni del progetto

Year	Locations	Involved students								
		Booked							Enrolled	
		Total	Gender		Origin					
			M	F	High Schools		Universities			
		#	#	#	#	%	#	%	#	%
2017	1	683	603	80	57	8,3	626	91,7	20	2,9
2018	8	1.866	1.698	168	583	31,2	1.283	68,8	160	8,6
2019	18	3.203	2.830	373	1.341	41,9	1.862	58,1	360	11,2

2.5 Phases of the project

Each edition of the CyberChallenge.IT project includes:

1. The registration (free of charge) to the project by interested students through the project portal: www.cyberchallenge.it.
2. The possibility of training for the admission through the platform that will be used for the test; this allows registered students to access both the exercises of previous editions and a simulation of the tests.
3. An admission test aimed at selecting students with excellent logical, problem-solving, and programming skills; no previous knowledge on cybersecurity issues is required.

The admission test takes place in two phases:

- a. an on-line test that, if passed, allows access to the next one, in presence;
- b. a test in presence, carried out simultaneously at all the sites involved, which leads to the selection of a group of 20 participants for each site.

4. A training course aimed at providing a technical and ethical introduction to cybersecurity and at acquiring the skills required to face the final competitions CyberChallenge.IT, which follow the format of classic CTF competitions.
The course has a total duration of about 70 hours spread over three months and is held at each location at times compatible with the educational activities of the students (e.g., Friday afternoon / Saturday morning).
5. A local individual CTF competition, aimed at selecting the best students from each site. At each site, the competition is followed by a local award ceremony and a recruitment fair where students have the opportunity to meet local sponsors.
6. A national team CTF competition (one team from each local site) followed by:
 - a. a national award ceremony, presided over by representatives of Italian institutions;
 - b. a meeting with the companies, where young people meet the sponsoring companies at national level.

2.6 Registration and participation

For the 2020 edition, enrolments are open to young people between the ages of 16 and 23 in 2019, i.e., those born in 1996-2003; enrolment is free of charge.

2.7 Chronology of activities for the 2020 edition

The chronology of activities for the 2020 edition is summarized in Table 2.

Table 2 – Chronology of the 2020 edition

Activity	Date
University site signing-up	Before 30/11/2019
Sponsor signing-up	Before 30/11/2019
Student signing-up	02/12/2019 - 17/01/2020
Pre-Test on-line	22/01/2020 - 24/01/2020
Admission Test	17/02/2020
Teaching period	02/03/2020 - 30/05/2020
Local competitions	08/06/2020
Local Award ceremonies	09/06/2020
National competition	09/07/2020
National Award ceremony	10/07/2020

2.8 Incentives for participating students

In addition to media visibility and public recognition of their skills, participants receive prizes of various types and nature, such as medals, certificates, electronic devices.

In the sequel, three new initiatives are presented, aimed at offering participating students recognition at the school career level.

2.8.1 Project “Valorizziamo i talenti”

Mechanisms are being studied with CRUI, the Conference of Rectors of Italian Universities, to ensure that universities can offer different facilitation for enrolmen aimed initially at involving the greatest number of young people and, subsequently, at enhancing the "talents" identified through the project, granting them recognition and opportunities, thanks to the collaboration between the National Laboratory of Cyber Security of the CINI, CRUI and Italian universities.

2.8.2 Recognition of University Educational Credits

CINI's CyberSecurity National Laboratory recommends that universities participating in the CyberChallenge.IT project grant University Educational Credits (ECSs) for students who have participated in the project. Given the overall commitment required of each participant, it is considered appropriate to recognize 6 ECSs, in a manner locally deemed most appropriate.

2.8.3 Percorsi per le competenze trasversali e per l'orientamento

In the light of the positive results obtained in the experiments carried out in some places in previous editions, it is strongly recommended that participating Universities and High Schools launch “Percorsi per le competenze trasversali e per l'orientamento”.

2.9 Incentives for participating High Schools

High schools interested in joining the project are offered a *federation program* that will enable their teachers to access additional teaching materials aimed at supporting them in the training activities of their students in the preparation of admission tests to CyberChallenge.IT.

Participating schools will be given adequate visibility on the project's website³ and it will be strongly recommended to start the *Percorsi per le competenze trasversali e per l'orientamento* program.

An experimental pilot course for training in cybersecurity teachers from the participating schools on will be launched this year.

3 Italian Team of Cyber-defender

The CINI Cybersecurity National Laboratory has been mandated by the Nucleo per la Sicurezza Cibernetica of the Italian Republic to set up the National team of Cyber-defender to represent Italy in international competitions.

The National Team, which has taken the name of *TeamItaly*, is composed of the best youngsters who have best demonstrated their skills, both individually and as a team game, during the various stages of CyberChallenge.IT.

³ <https://www.cyberchallenge.it>



In 2019, Dr. Mario POLINO (Politecnico di Milano) was called to coach the team.

Participation in international competitions, although globally particularly expensive, represents a significant opportunity for visibility for the country.

3.1 European Cyber Security Challenge (ECSC)

To mitigate the lack of experts in the field of cybersecurity, many countries have launched competitions aimed at discovering young talent and encouraging new generations to pursue a career in cybersecurity.

At the Italian level, the most significant initiative is the CyberChallenge.IT project of the CINI National Cybersecurity Laboratory, which offers a free training course and the possibility of joining the Italian cyber-defender team.

At European level, ENISA (European Union Agency for Cybersecurity) is the driving force and, building on the experiences of individual countries, organizes every year the European Cyber Security Challenge (ECSC) with the aim of encouraging the exchange of knowledge and talents across Europe. The competition is open to all European countries. Each country that registers for the event participates with a team of 10 players aged between 14 and 25 years.

Italy took part in ECSC for the first time in 2017 and took third place (on an equal footing with the United Kingdom). In 2018 he took sixth place.

In 2019 the competition, now in its sixth edition, was hosted by Romania from 8 to 12 October at the Palace of Parliament in Bucharest and saw the participation of 20 countries. The organizing committee was composed, in addition to ENISA, of the National Cyberint Center (Romanian Intelligence Service, SRI), the CERT-RO (Romanian National Computer Security Incident Response Team, coordinated by the Ministry of Communications and Information Society) and by the National Association for Information Systems Security (ANSSI). In this edition, the Italian National Team took the podium, earning second place, preceded only by the Romanian Team.

The next edition of the competition will take place in Vienna from 4 to 6 November 2020.

In preparation for the participation in each edition of ECSC, the Italian team convenes for a week of “retreat” at the IMT School for Advanced Studies in Lucca.

3.2 Participation in Dubai Expo 2020

Within the framework of the Cyber-week organized by the Ministry of Foreign Affairs and International Cooperation within the framework of the Universal Exhibition Expo 2020 in Dubai, in

addition to the presentation of the project CyberChallenge.IT in a prestigious international show-case, the CINI Cybersecurity National Laboratory is called to organize a competition in which the Italian National Team of Cyber-defender will meet other national teams formed by youngsters of similar age.