

Informatics Europe Awards Ceremony 2021

Best Practices in Education Award

Award Committee Chair:

Jean-Marc Jézéquel

IRISA / University of Rennes, France

Sponsored by



Best Practices in Education Award

“Cybersecurity”

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Gabriela Marcu, University of Michigan, US

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Alexander Pretschner, TU Munich, Germany

Lili Nemeč Zlatolas, University of Maribor, Slovenia

Sponsored by



**Informatics Europe
2021 Best Practices in Education Award**

Presented to

Cybersecurity National Laboratory CINI

in recognition of the outstanding educational
initiative on
“Cybersecurity”



The *Training Chain* of the CINI Cybersecurity National Lab.

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CYBERSECURITY
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LABORATORY

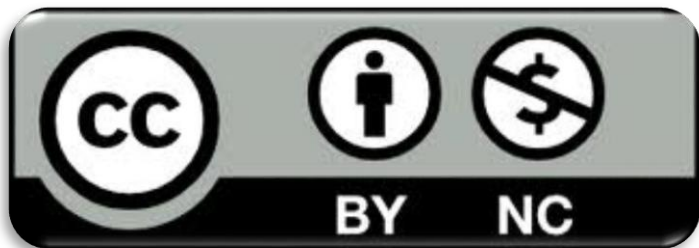
<https://cybersecnatlab.it>

License & Disclaimer

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What's it

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CYBERSECURITY
NATIONAL
LABORATORY

<https://cybersecnatlab.it>

What's it

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CYBERSECURITY
NATIONAL
LABORATORY

The Academic “Leg”
of the Italian
Cybersecurity Ecosystem

<https://cybersecnatlab.it>

What's it

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CYBERSECURITY
NATIONAL
LABORATORY

<https://cybersecnatlab.it>

- One of the National Labs of



- A consortium of 49 Italian Universities that
 - do research in CS/CE
 - deliver BS, MS, PhD degrees
 - are public funded



Training Chain

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Training Chain

11



CYBER
HIGH
SCHOOLS

CYBERSECURITY
NATIONAL
LABORATORY



OLICYBER

OLIMPIADI ITALIANE DI CYBERSICUREZZA

POWERED BY  CYBER
CHALLENGE.IT

Program aimed at fostering and encouraging the approach to cybersecurity of students of ALL years of ALL high schools.

The Program



Registrations to the 1st edition, in 2021



14

- The pilot project involved:
 - 184 high schools
 - 80 Italian provinces in 18 regions
 - 1,112 students enrolled
 - 250 students admitted to the training course

National Competition – Saturday June 12th, 2021



15

- 318 Participants
- 7 hours of competition
- 16 challenges
- 1,523 submissions
- 464 resolutions

Olimpiadi Italiane di Cybersecurity 2021

Miscellaneous

40 IN1 - Il test di ammissione 1 misc	40 IN2 - Il test di ammissione 2 misc
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Network Security

40 NS1 - Ir(A)ls network	295 NS2 - Dispositivo Non Sicuro network
-----------------------------	---

Web Security

21 WS1 - FrittoMisto 1 web	495 WS2 - FrittoMisto 2 web
40 WS3 - FlagDownloader 1 web	495 WS4 - FlagDownloader 2 web

Cryptography

40 CR1 - Un po' di storia crypto	143 CR2 - Small bits of RSA crypto
464 CR3 - SoundOfSystem crypto	500 CR4 - Large bits of RSA crypto

Software Security

474 SS1 - La settimana enigmistica binary	488 SS2 - Algoritmo Sicuro e Resistente binary
499 SS3 - I predatori dell'indirizzo perduto 1 binary	499 SS4 - I predatori dell'indirizzo perduto 2 binary

Additional returns for participants

16

For all

- OpenBadge
- Soft skills
- Game-based Assessment
- Training portal

Additional returns for participants

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For all

- OpenBadge
- Soft skills
- Game-based Assessment
- Training portal



New Training Portal

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<https://training.olicyber.it/>



All the training material developed within OliCyber is freely accessible through the new Training Portal of the Cybersecurity National Lab.

New training material

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🏛️ Materiale didattico

Introduzione	Network security	Web Security 1
📖 Modulo 5 lezioni	📖 Modulo 2 lezioni	📖 Modulo 2 lezioni
📁 Challenge 16 challenge	📁 Challenge 16 challenge	📁 Challenge 16 challenge
Web Security 2	Cryptography 1	Cryptography 2
📖 Modulo 2 lezioni	📖 Modulo 1 lezione	📖 Modulo 1 lezione
📁 Challenge 12 challenge	📁 Challenge 16 challenge	📁 Challenge 16 challenge
Software Security 1	Software Security 2	
📖 Modulo 3 lezioni	📖 Modulo 3 lezioni	
📁 Challenge 16 challenge	📁 Challenge 12 challenge	

- Material completely in Italian and organized in 8 weeks of training
- 16 hours of lectures on various cybersecurity topics
- Prepared by experts

New hands-on challenges

20

Challenges

Hide challenge tags Compact view

Olimpiadi Italiane di Cybersecurity

Introduction

Bright sun	42	456	Byte-flag	58	416	Bel paesaggio	54	427
2048	33	473	Dashed	46	447	Suoni misteriosi	41	458
Corrupted flag	27	482	Zipception	34	471	Guess Where	26	483
Execute me!	24	486	Infinite Server	12	497	based and encoded	13	496
Zipception2.0	18	492	gitqud	21	489	Villa Pisani	8	499
Into the Linux rabbit hole	10	498						

Network Security

easy stream	51	435	Useless	32	475	Protocollo datagramma utente	28	481
Sniff 'n' byte	27	482	G4tto	38	464	wordwang	8	499
doppelganger	3	500	DNS e-mail security	1	500	Sicurezza dei trasporti	8	499
Poca Cola's Recipe	7	499	C-H-A-O-S	12	497	Quantum Transport Layer	1	500
That's a lot of Fs	3	500	A melody in my head	5	500	you complete me	1	500
Super Secret Agent 0x42	1	500						

Web Security

No robots here	87	310	Click Me	74	363	Headache	70	377
Just a reminder...	54	427	Sito vuoto	84	323	Admin Login	54	427
ConfuseMe	27	482	A TOO small reminder...	19	491	Password changer 3000	45	449

150+ challenges on the most important cybersecurity topics:



Sicurezza Software



Sicurezza Web



Sicurezza delle Reti



Crittografia

Excellence training

21

The training and the development of the training material was supported by the 10 best Italian Capture-the-Flag teams, composed of CyberChallenge.IT participants and members of the Italian National Cyberdefender *TeamItaly*



National Register of Excellence

22

- The winners of the CyberChallenge.IT and OliCyber.IT programs will be included in the INDIRE national register of excellence.
- Economic rewards for the winners



ALBO DEI PREMIATI IN COMPETIZIONI

Nominativi degli studenti delle scuole secondarie superiori che hanno conseguito risultati di alto livello in competizioni di qualificata valenza formativa e scientifica.

<https://www.indire.it/eccellenze/>

Training Chain

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- First Italian training program in cybersecurity for high-school and university students (aged 16-24)



Why?

- Creating and growing a *community of cyber defenders* by investing in young talents

Why?



CYBER
CHALLENGE.IT

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- Creating and growing a *community of cyber defenders* by investing in young talents
- Tackling the *workforce shortage*



World-wide workforce shortage

27

The Need

By The Numbers

\$170B

In worldwide cybersecurity spending by 2020

By The Numbers

3.5M

Projected unfilled jobs worldwide by 2021

By The Numbers

2.5M

Data breaches worldwide 2017

➤ <https://cyber-nyc.com>

Why?



CYBER
CHALLENGE.IT

28

- Creating and growing a *community of cyber defenders* by investing in young talents
- Tackling the *workforce shortage*
- Raising *awareness & cyber culture*



CyberChallenge.IT – Some Data

Year	Venues	Schools	Participating students								
			Signed in							Admitted	
			Total	Gender		Origin					
				M	F	Schools		Universities			
			#	#	#	#	%	#	%	#	%
2017	1	-	683	603	80	57	8.3	626	91.7	20	2.9
2018	8	-	1866	1698	168	583	31.2	1283	68.8	160	8.6
2019	18	19	3203	2830	373	1341	41.9	1862	58.1	360	11.2
2020	28	114	4452	3848	604	1960	44.0	2492	56.0	560	12.5
2021	34	128	4896	4255	641	2262	46.21	2634	53.79	663	13.5

CyberChallenge.IT – Some Data

Year	Venues	Schools	Participating students									
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2017	1	-	683	603	80	57	8.3	626	91.7	20	2.9	
2018	8	-	1866	1698	168	583	31.2	1283	68.8	160	8.6	
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- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- Additional Returns for Participants

- System Action
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System Action



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- The program has been made possible by the nature of the National Lab.
- No single Italian university would have had the capability to realize it by its own, reaching today levels.

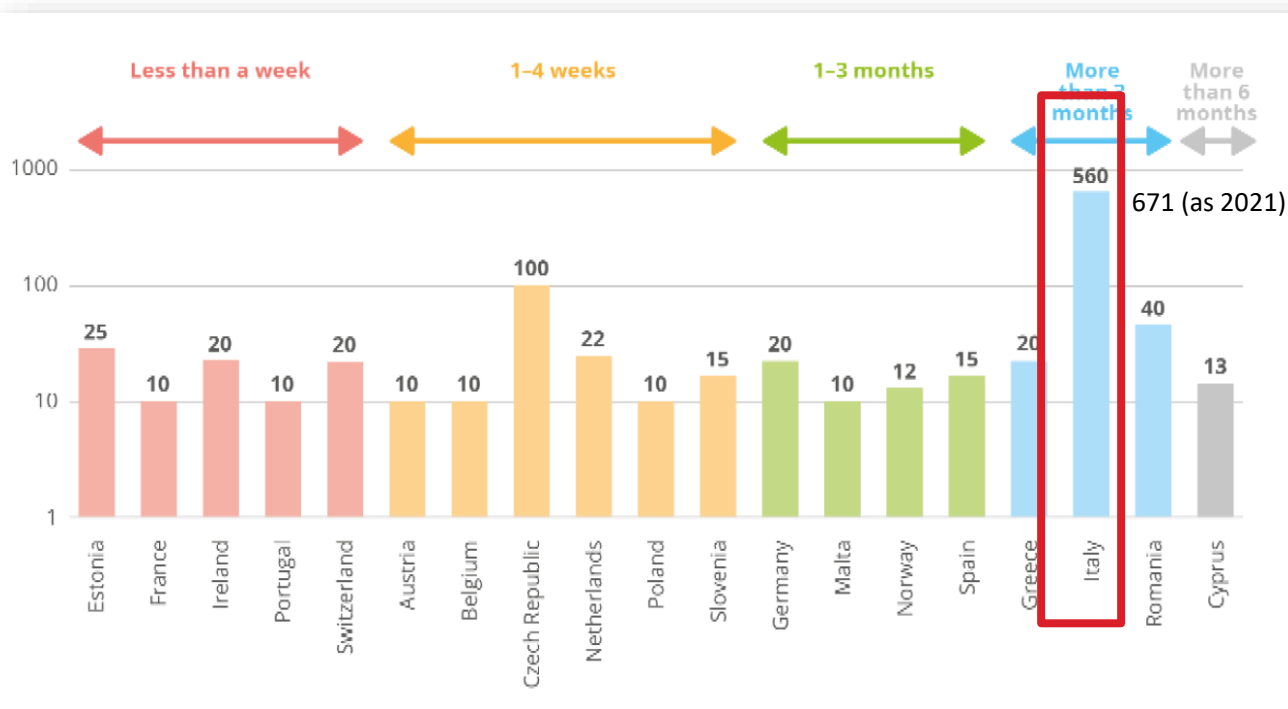
System Action

- Significant role in Europe



Training provided by national completion organizer with respect to time and number of participants trained for ECSC - 2020

35



The CyberChallenge.IT program is **in first place as students participating in the project** and in the first places for the duration of the training program

Training provided by national completion organizer with respect to time and number of participants trained for ECSC - 2020

36



The CyberChallenge.IT program is **in first place as students participating in the project** and in the first places for the duration of the training program

Number of participants in national cyber security competitions

37

Country	Signups	Active users
Austria	600	250 (40 "very" active)
Cyprus	157	65
Czech Republic	Over 5.000	From 3.000 to 4.500
Estonia	300	100
France	2.000	-
Germany	770 (junior and senior category) 1068 (open competition)	200 (junior and senior category)
Greece	50	-
Ireland	300	-
Italy	4.452 4.900 (as 2021)	518 620 (as 2021)
Malta	20	-
Netherlands	145	145
Norway	158	55
Poland	77	38 (solved at least one challenge)
Portugal	42	-
Romania	500	250
Spain	1.792	168
Switzerland	1.000	200-100
Total	17.363* (*17 countries)	1.989* (*11 countries)



The CyberChallenge.IT program involves more than 25% of total European signups and active users of all training programs in the European Union

- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- Additional Returns for Participants

➤ System Action

➤ Training Path

➤ Training Materials & Platforms

➤ Free of charge

➤ Additional Returns for Participants

➤ Workflow:

➤ Admission Tests

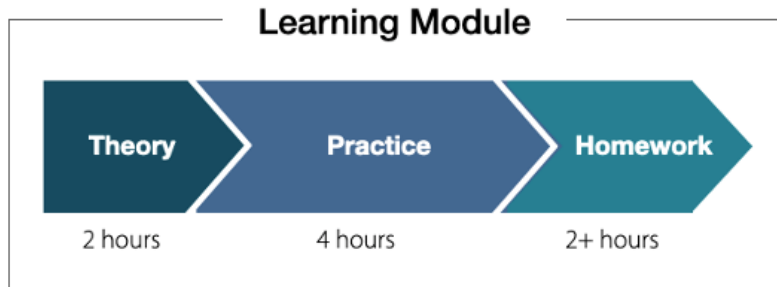
➤ Training path

➤ Final competitions

Training Path

40

- 12 weeks
- 1 module / week

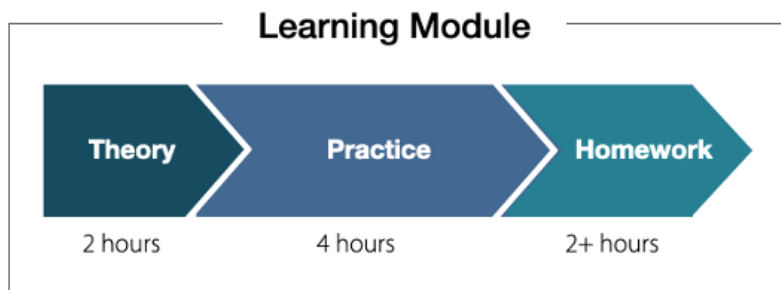


- Key Role of Gaming

Training Path

41

- 12 weeks
- 1 module / week



- Key Role of Gaming

- Areas:
 - *Introduction to Cybersecurity*
 - *Cryptography*
 - *Hardware Security*
 - *Software Security*
 - *Network Security*
 - *Web Security*
 - *Attack/Defense*
 - *Ethics & Soft Skills*

Training Path

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➤ 1

➤ 1

New Areas for the 2022 edition:

- *CanBus*
- *OsInt*
- *Malware Analysis*
- *Machine Learning*
- *Adversarial Attacks*

➤ **Key**

➤ **Areas:**

- *Introduction to Cybersecurity*
- *Cryptography*
- *Hardware Security*
- *Software Security*
- *Network Security*
- *Web Security*
- *Attack/Defense*
- *Ethics & Soft Skills*

Some data for the 2021 edition

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- *Challenges (practice problems/exercises):*
 - 62,000+ attempted resolutions
 - 23,500+ correctly solved by 750 participants

Final competitions

44

- *Capture-the-Flag:*
 - Local competitions:
 - *Jeopardy*
 - National competition:
 - *Attack-Defense*



CTF Finals: Chiavari (Ge),
June 27, 2019
STELMILIT Compound

- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- Additional Returns for Participants

Teaching materials

46

- All in English
- Is systematically:
 - revised (during the preparation phase)
 - updated (after each edition)
- Targets both *BlueTeaming* and *RedTeaming*

Platforms

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- In-house availability of ALL the platforms for:
 - Admission Tests
 - Training
 - Jeopardy Competitions
 - Attack/Defence Competitions
 - Portal & Site
- Continuous upgrades
- High standards in terms of
 - Quality
 - Security
 - Dependability
- All available with several deployment solutions

PAIDEUSIS (Παίδευσis)



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- *Hybrid CyberRange* that each student can access for *Network* and *Hardware security* training



Rel. 26.10.2021

PAIDEUSIS (Παίδευσis)

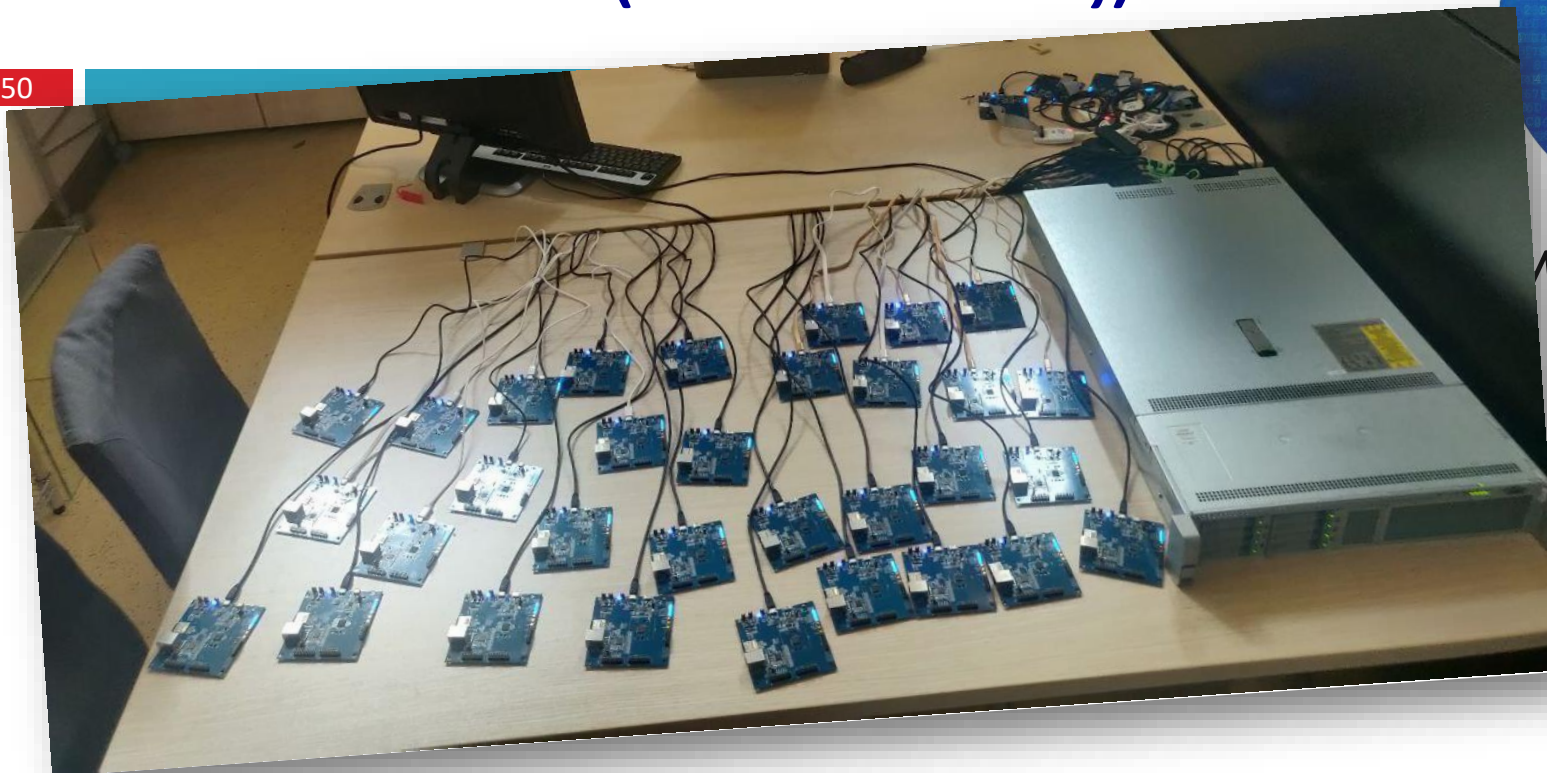


49

- Current equipment:
 - 4 servers, with 200+ USB interfaces for VMs
 - 40 modems/routers
 - 40 Open security Platforms
 - 40 Platforms for Side Channel attacks
 - 40+ platforms for IoT and IIOT
 - SCADAs & ICS'
 - CanBus's
 - ...

PAIDEUSIS (Παίδευσis)

50

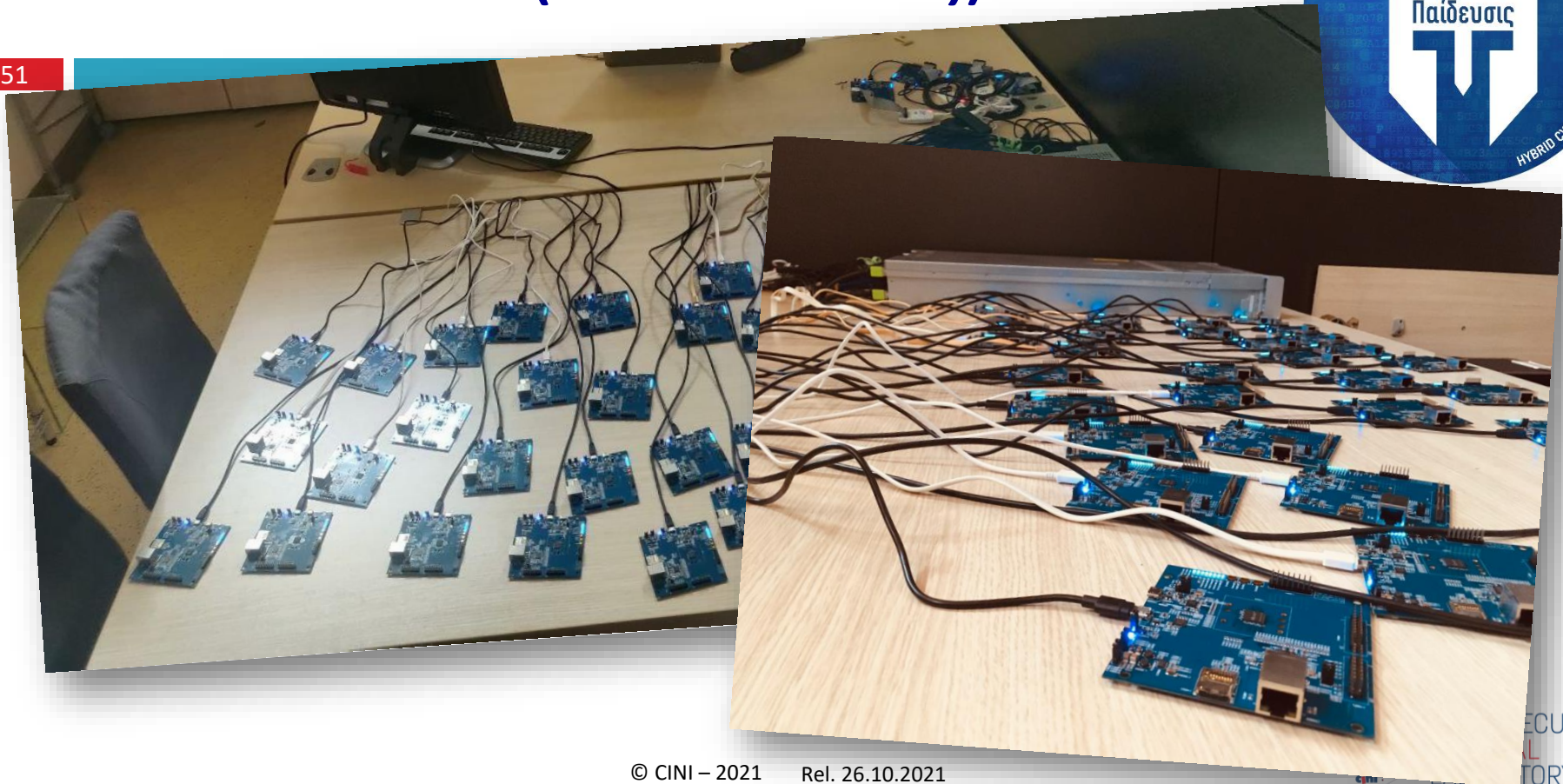


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PAIDEUSIS (Παίδευσis)



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ΠΑΙΔΕΥΣΙΣ (Παίδευσις)



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- Systematically used for national CtF competitions, both Jeopardy & Attack/Defence, with hundreds of participants

- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- Additional Returns for Participants

Free of charge

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- Student participation is completely FREE

- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- Additional Returns for Participants

- System Action
- Training Path
- Training Materials & Platforms
- Free of charge
- **Additional Returns for Participants**
 - Open Badges
 - Carrier Opportunities

Carrier Opportunities

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- Credits (ECTS) recognized by several Italian Universities and High Schools
- Continuous link with private companies and public institutions

CyberChallenge.IT availability

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- If any University/Institution is interested in joining / adopting CyberChallenge, please contact me!!

Training Chain

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- The *National Cyber-defender Italian Team*
- It attends international competitions, such as the *European Cybersecurity Challenge - ECSC*



TeamItaly



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TEAM ITALY Edition 2021 2020 2019 2018 2017

Twitter Facebook LinkedIn Instagram



WHO WILL JOIN THE NEXT ITALIAN CYBERDEFENDER TEAM?

CYBER CHALLENGE.IT

CYBERSECURITY NATIONAL LABORATORY

CINI

A group photo of approximately 25 people, mostly young men, standing outdoors in front of greenery. Many are wearing blue t-shirts with the "TEAM ITALY" logo. Two men in suits stand on the far left and right of the group. The photo is overlaid with a dark blue banner at the bottom containing logos and text.

<https://teamitaly.eu/>

2019 European Championship



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ECSC 2019 – Bucharest, October 8-11

2019 European Championship

TEAM
ITALY
CYBERDEFENDER

63



EC



2019 European Championship

TEAM
ITALY
CYBERDEFENDER

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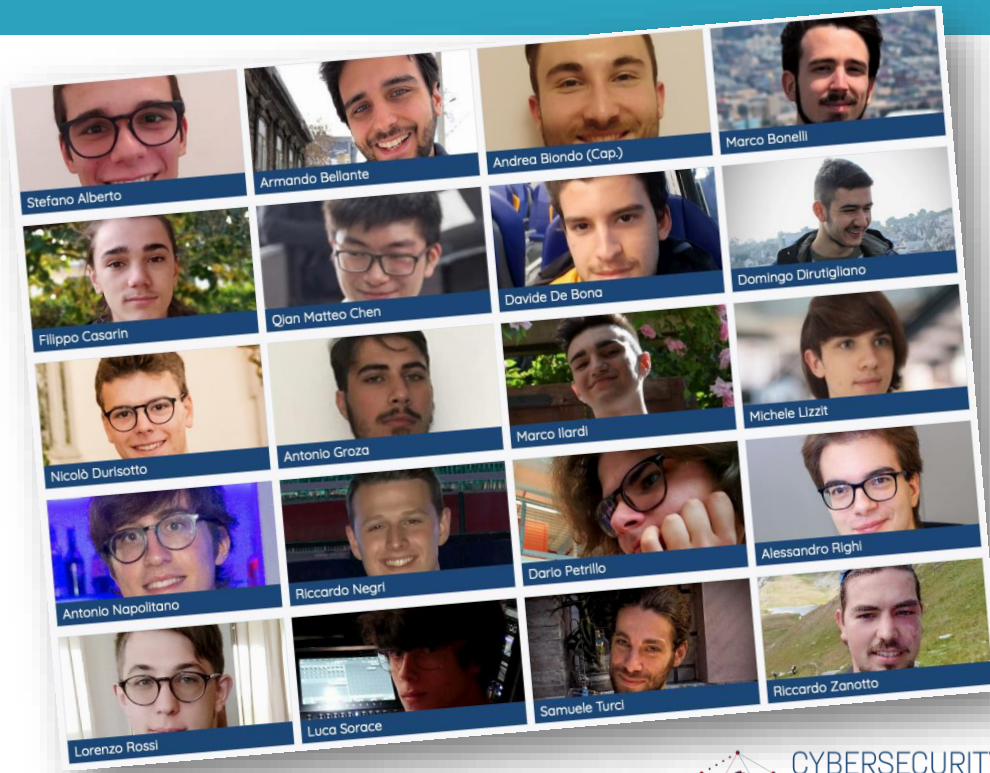


TeamItaly 2020



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- 20 people call-up to the national team
- Completely remote bootcamp
- Team Building training remotely
- *European Championship:* just a friendly match



TeamItaly 2021



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Coach

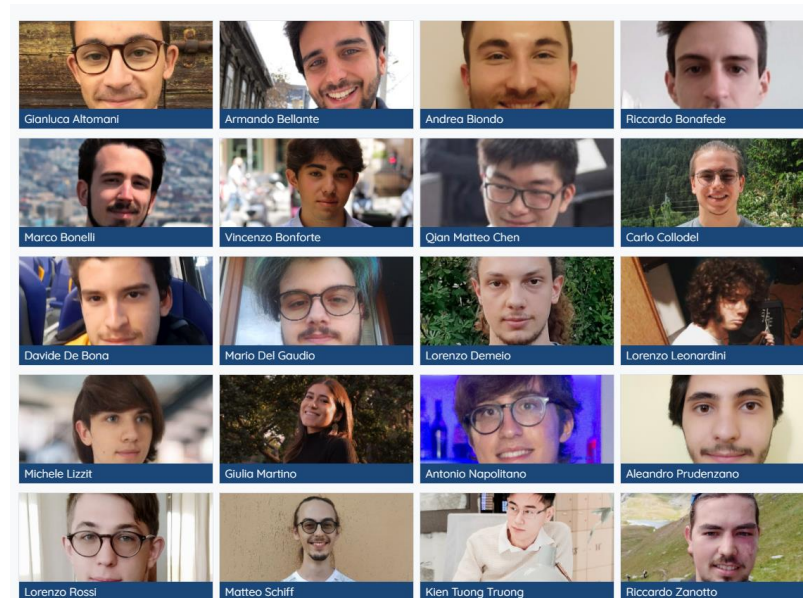


Mario Polino

Supervisor



Gaspare Ferraro



TeamItaly 2021



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First woman to join TeamItaly

Coach

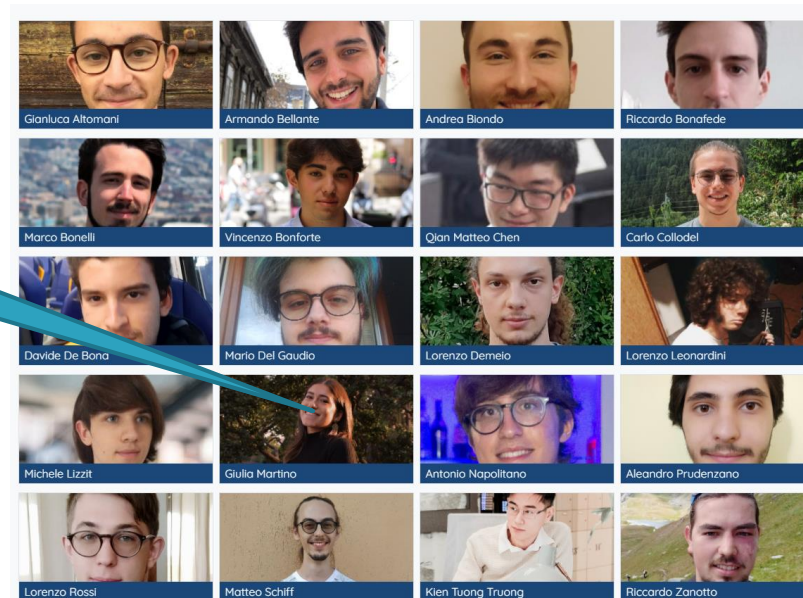


Mario Polino

Sup



Gaspare Ferraro



TeamItaly 2021



68

Winner of OliCyber.IT 2021,
the youngest member of the team
(17 years old)

Coach

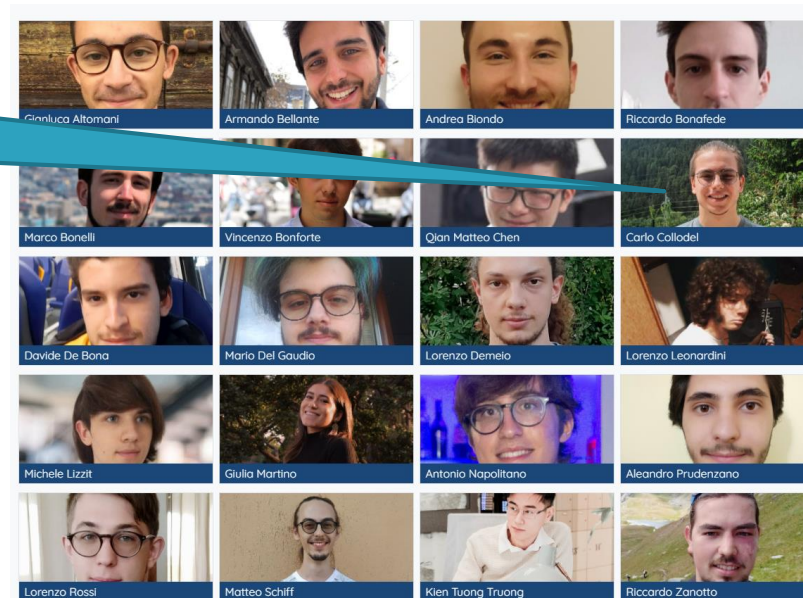


Mario Polino

Supervisor



Gaspare Ferraro



TeamItaly 2021



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- Bootcamp in presence, in Turin, at the ITC-ILO ONU Center, from 5 to 12 September



TeamItaly 2021

TEAM
ITALY

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Team's Kit



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Team Building & Soft Skills activities



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Technical Training



Scelti i 10 giovani hacker etici del team italiano di cybersecurity

Il Team Italy parteciperà alla European cybersecurity challenge, le gare per decretare la miglior squadra di hacker in Europa, a Praga dal 28 settembre all'1 ottobre



Il TeamItaly 2021 (foto: Laboratorio nazionale di cybersecurity)



2021 European Championship



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2021 European Championship



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TeamItaly 2024

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- We shall organize in Italy the European Championship !!!



Training Chain

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CyberHighSchools

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- Goals:
 - activate a network among the High Schools
 - create an intermediate level of training and interaction with students
 - Contribute to the growth of a community of professors increasingly aware of issues related to cybersecurity

CYBER HIGH SCHOOLS



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CyberHighSchools

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➤ Goals:

- activate a new generation of Cyber High Schools
- create an international network for training and information exchange for students
- Contribute to the development of a community of increasingly available resources to cybersecurity



*Up to now,
190
federated
High Schools*

CYBER HIGH SCHOOLS



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Courses for teachers

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- *Free courses for high school teachers*
 - Introduction to Cybersecurity
 - Training for the Olympics OliCyber

Courses for teachers

83

- *Free courses for high school teachers*
 - Introduction to Cybersecurity
 - Training for the Olympics OliCyber



*100 registrations
in just 2 days !!*

Training Chain

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Training Chain

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*So far we didn't
get a single cent
of public funding
!!!!!!!!!!!!!!*



Training Chain

86



*So far we didn't
get a single cent
of public funding
!!!!!!!!!!!!!!*



- All self-funded
thanks to*
- *Contributions
from Nodes*
 - *Private sponsors*

Малые Автюхи
Калинковичский район
Республики Беларусь

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