



UNIVERSITÀ
DI TRENTO

ProSVED
Projection of Security Vulnerabilities
caused by Exploits in Dependencies

Third time's the charm

The dream of the EU project and some tricks to get one
ft. rare events

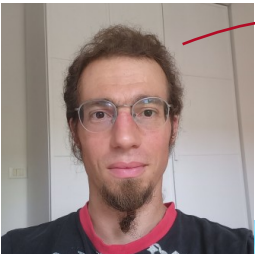
Carlos E. Budde

Security group @ Dipartimento di Ingegneria e Scienza dell'Informazione

carloesteban.budde@unitn.it

20.06.2024





Don't you ever work?



Education:

- BSc, MSc, PhD € UNC ARGENTINA **2007–2017**

Employment:

- **Postdoc fellow** € UTwente THE NETHERLANDS **2017–2021**
- **RTDa** € UniTN ITALY **2021–now**

Don't you ever work?



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Research projects PI:

- **Marie Curie fellow** € UniTN ITALY € **172.750** **2022–2024**
- **PRIN/PRNN'22** € UniTN ITALY € **65.214** **2023–2025**

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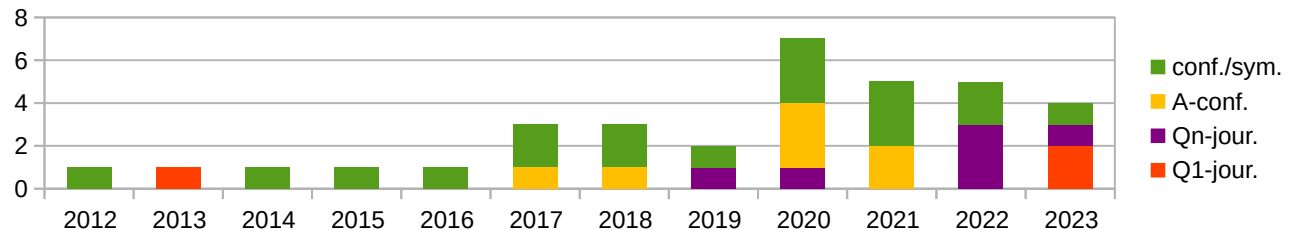
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- **PRIN/PRNN'22** € UniTN ITALY **€ 65.214** **2023–2025**

Scientific output:

- **520** citations
- **14** h-index
- **14** chairs & PCs





Formal methods: statistical model checking

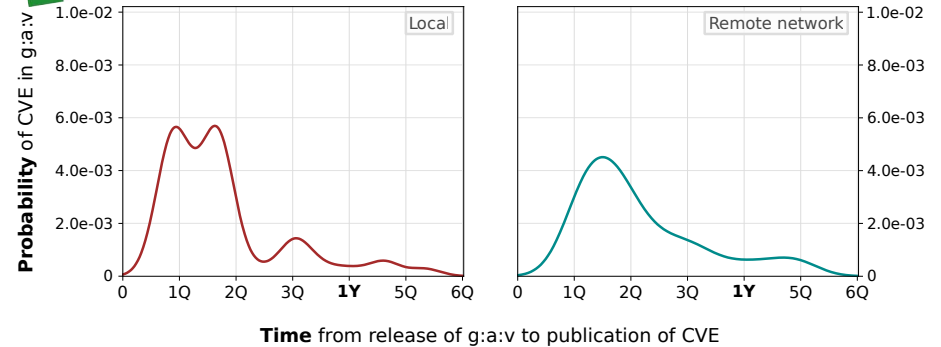
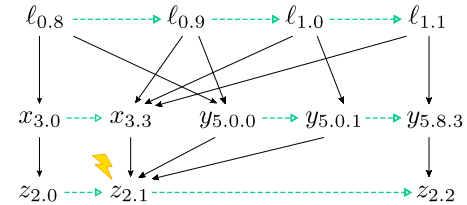
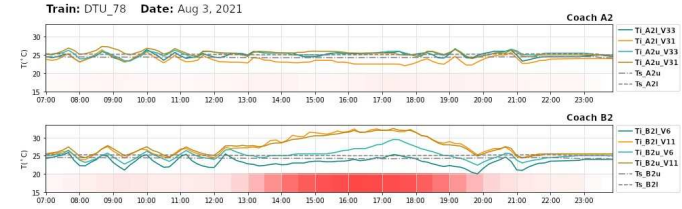
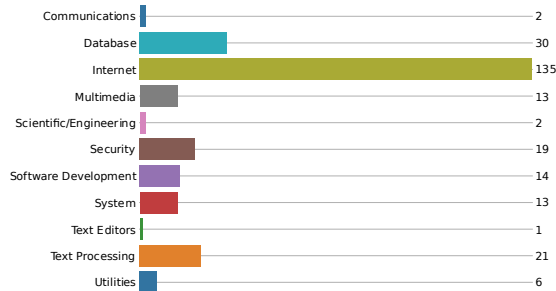
Rare event simulation → automate 

Fault Tree Analysis — Dutch Railways 

Attack Tree Analysis — SW libraries security

Cybersecurity vulnerabilities as rare events 

Forecasting CVEs from repository data



Wasn't this about EU projects or something?



Marie Skłodowska-Curie Actions
Developing talents, advancing research

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About actions

Doctoral Networks

Postdoctoral Fellowships

The information provided on this page is a summary of the ma

Objective of Postdoctoral Fellowships

The objective of PFs is to support researchers' careers and foster excellence in research. The Postdoctoral Fellowships action targets researchers holding a PhD who wish to carry out their research activities abroad, acquire new skills and develop their careers. PFs help researchers gain experience in other countries, disciplines and non-academic sectors.



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Evaluation Result

Total score: 88.00% (Threshold: 70/100.00)

2020

Evaluation Result

Total score: 93.40% (Threshold: 70/100.00)

2022

Evaluation Result

Total score: 98.00% (Threshold: 70/100.00)

MSCA PF submissions by C.E. Budde



What changed?

(other than the amount of hair on my head)

Criteria:

Excellence 50% **Impact** 30% **Implement.** 20%

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• SEAL OF •
EXCELLENCE

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IT





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Criteria:

Excellence 50% Impact 30% Implement. 20%

- Quality and pertinence of the project's research and innovation objectives (and the extent to which they are ambitious, and go beyond the state of the art).
- Soundness of the proposed methodology (including interdisciplinary approaches, consideration of the gender dimension and other diversity aspects if relevant for the research project, and the quality and appropriateness of open science practices).
- Quality of the supervision, training and of the two-way transfer of knowledge between the researcher and the host
- Quality and appropriateness of the researcher's professional experience, competences and skills.



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- Credibility of the measures to enhance the career perspectives and employability of researchers and contribution to their skills development.
- Suitability and quality of the measures to maximise expected outcomes and impacts, as set out in the dissemination and exploitation plan, including communication activities.
- The magnitude and importance of the project's contribution to the expected scientific, societal and economic impacts.



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- Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources
- Appropriateness of the management structure and procedures, including risk management
- Appropriateness of the institutional environment (infrastructure)



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What changed?

(other than the *amorous* *my head* ad)

Good-selling science is easier said than done, heh

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Weaknesses:

1) The number of past relevant journal publications of the host in the area of the proposal is small.

4.5/5 45% 4.6/5 ... 26.6% 4.9/5 19.6%

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Weaknesses:

- 1) The proposal does not explain clearly enough how the expert knowledge and competences of the researcher will be transferred to the host. 19.2%
- 2) The training on synthesis and analysis in parametric formalisms is not described with a sufficient level of detail.

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SEAL OF EXCELLENCE

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Weaknesses:

- 1) The proposal does not explain clearly enough how the expert knowledge and competences of the researcher will be transferred to the host.
- 2) The training on synthesis and analysis in parametric formalisms is not described with a sufficient level of detail.

2022

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5/5 100%

I'm not an expert on parametric models (yet)
Project was all about that

MSCA PF submissions by C.E. Budde: evaluation



What changed?

(other than the amount of hair on my head)

2019

Evaluation Result
Total score: 93.40% (Threshold: 70/100.00)

I'm an expert in rare event simulation

2020

Evaluation Result
Total score: 93.40% (Threshold: 70/100.00) EXCELLENCE

Project was about security via rare events

2022

Evaluation Result
Total score: 98.00% (Threshold: 70/100.00)



Criteria:

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Weaknesses:

∅

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Criteria:

Excellence 50% **Impact** 30% **Implement.** 20%

Weaknesses:	Excellence	Impact	Implement.
<p>1) As a high risk project there is the possibility that no particularly useful unified framework is found, hindering the visibility of the researcher.</p>	4.3/5 ... 25.8%	4.3/5 ... 17.2%	
<p>2) A specific description of the dissemination and communication activities is not clearly reported in the Gantt chart.</p>	4.6/5 ... 28.8%	4.9/5 ... 19.6%	
<p>1) The allocation of resources concerning the implementation of software by a research engineer is not clearly and appropriately described in the project.</p>	4.8/5 ... 28.8%	4.8/5 ... 19.2%	
<p>2) The proposal provides insufficient information regarding planning for managerial and organisational risks.</p>			
<p>3) Some of the countermeasures are not adequate because they convey high risk by themselves and no fail safe is provided.</p>			

Risk? What risk?

S'all good man!

MSCA PF submissions by C.E. Budde: evaluation



What changes
(other than...)

Weakness

1) As a...
no pa...
hinde...

2) A spe...
comm...
the G...

Weakness

- 1) The allocation of resources concerning the implementation of software by a research engineer is not clearly and appropriately described in the project.
- 2) The proposal provides insufficient information regarding planning for managerial and organisational risks.
- 3) Some of the countermeasures are not adequate because they convey high risk by themselves and no fail safe is provided.

D2.1 Conference paper: algorithmic complexity of these two problems in the subclasses studied.

WP3 (semi-)algorithms (2+5 months, medium-high risk)

This begins in the background in the later stage of **WP1** to lower the risk: when deciding the semantics of ParaPTA, it is paramount to keep an eye on the feasibility to represent the mathematical structures as ADTs for algorithmic computation. Thus **WP1** and **WP3** influence each other: If symbolic semantics are chosen then the algorithms will manipulate algebraic structures of finite representation. Else, research is needed to lump together categories of states, e.g. via bisimulation where the ER has experience,²⁵ or POR where the supervisor does.^{25,26} Also **WP2** shapes the approach of this Work Package. If subclasses were found where a problem is decidable, work begins by devising the corresponding computation algorithms, possibly by transforming known algorithms of the closest existent theory. Afterwards semi-algorithms can be addressed for the most promising remaining subclasses, e.g. which in discussions with Étienne André seem to allow models where computations do terminate (this can be estimated by comparisons with the inverse method, also undecidable)

D3.1 Conference paper: (semi-)algorithms for parameter-synthesis and EF-emptiness in selected subclasses.

M2 Practical insight of the complexity of relevant problems in subclasses of ParaPTA, including psuedo-code of (semi-)algorithms for the (un-)decidable instances.

WP4 implementation (8 months, low risk)

To implement the findings, tools currently supported in IPN may be extended with the appropriate semantics...

Implement. 20%

4.3/5 17.2%

4.9/5 19.6%

3/5 28.8% 4.8/5 19.2%

MSCA PF submissions by C.E. Budde: evaluation



What changed?

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Weaknesses:	Excellence	Impact	Implement.
<p>2) 1) As a high risk project there is the possibility that no particularly useful unified framework is found, hindering the visibility of the researcher.</p> <p>2) A specific description of the dissemination and communication activities is not clearly reported in the Gantt chart.</p>	4.5/5 ... 45%	4.3/5 ... 25.8%	4.3/5 ... 17.2%
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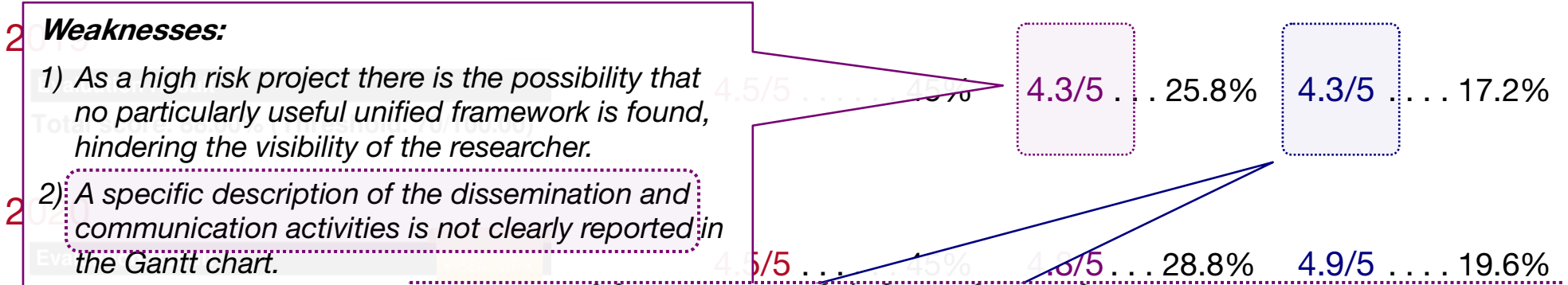


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Criteria:

Excellence 50% **Impact** 30% **Implement.** 20%



Total score: 98.48% (Threshold: 90%)

- Weaknesses:**
- 1) The allocation of resource research engineer is not clear
 - 2) The proposal provides insufficient managerial and organisational details
 - 3) Some of the countermeasures are not clearly defined, increasing the risk by themselves and not addressing the risk

WP5 dissemination (21 months, low risk)

For the **scientific community**, several communication instances are inherent to the progress: presentations in conferences; students supervision; research visits to relevant universities (UT for fault trees, UdS and RWTH Aachen for JANI and the HyPro polyhedra library, Aarhus and Lorraine for algorithm development). For the **general public** the order of actions depends on measures taken by the chosen channels. The fête de la Science and the Eur. Researchers' Night occur in Sep-Oct: one will be chosen for the first year (to be coordinated with LIPN), the other for the second. These events target very young audiences: the ER will awaken curiosity about "inventing the best invention" (synthesise parameters). MATH.en.JEANS targets high-schools, so YouTube tutorials for CS outreach can have great impact, focusing in formal methods (system verification: the plane will not fall, the train will not crush). This will happen between the aforementioned events, filling the time gap.

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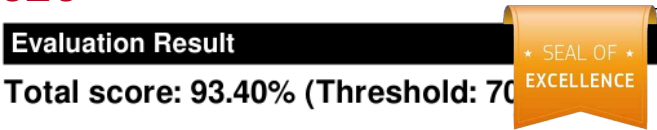
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2022



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Weaknesses: ∅

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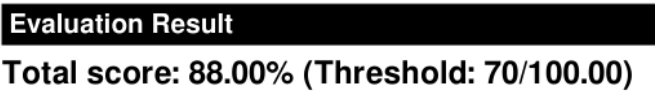
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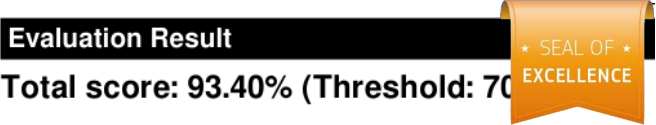
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1) Details are lacking on the expected extent to which the proposal might have societal and economic impact.

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4.5/5 45%

Weaknesses:

1) Details are lacking on time allocation and resource deployment, especially given the existing responsibilities of the researcher as a professor at the host.

4.3/5 17.2%

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EXCELLENCE

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5/5 50%

4.8/5 28.8%

4.8/5 19.2%

Take-homes

What your proposal mustn't lack



- Find your “research line”, make it part of main selling (you’re the expert)
- Apparent connection with host is key
- Clear plan, structured organisation (execution can differ later, don’t worry)
- Risk analysis and mitigation measures (success doesn’t depend on “luck”)
- Plan realistic dissemination to various target audiences

Questions ?



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Third time's the charm

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ft. rare events

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