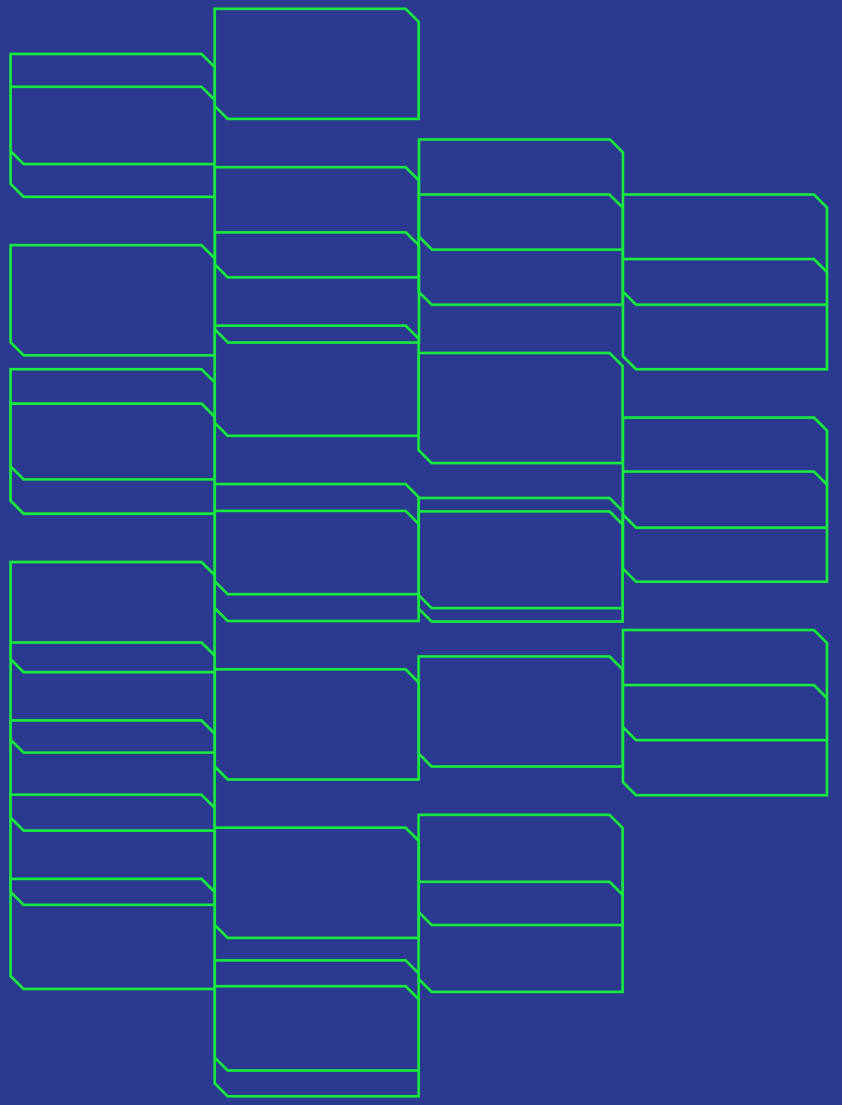
Security .Days <Prague.CZ> <9-11 April 2024>

Security of bespoke solutions vs academic curricula

Maciej Miłostan, PhD, (ISC)2 SSCP
PSNC and PUT

Co-authors: Mikołaj Dobski, Gerard Frankowski



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About myself

Maciej Miłostan, PhD
(ISC)2 Systems Security Certified Practitioner

30 YEARS OF POZNAŃ
SUPERCOMPUTING AND NETWORKING CENTER

- Two main hats:
  - PSNC (since 2003):
    - Member of ICT Security Department (Security Team in short)
    - Rep. of PIONIER-CERT team (TI accredited)
    - GN5-1 WP8 T3-4-CTI plus support of SCT (Secure Coding Training) activities within WP9
    - R&D Projects (Threat Modelling, decision aiding etc.)
  - PUT (since 2000):
    - IT infrastructure administration at Computing Science Institute
    - Teaching activities (security and programming)
- Other activities
  - Cybersecurity @ University Merito in Poznań

Introduction to the problem

Projects and resources

Security team @ PSNC

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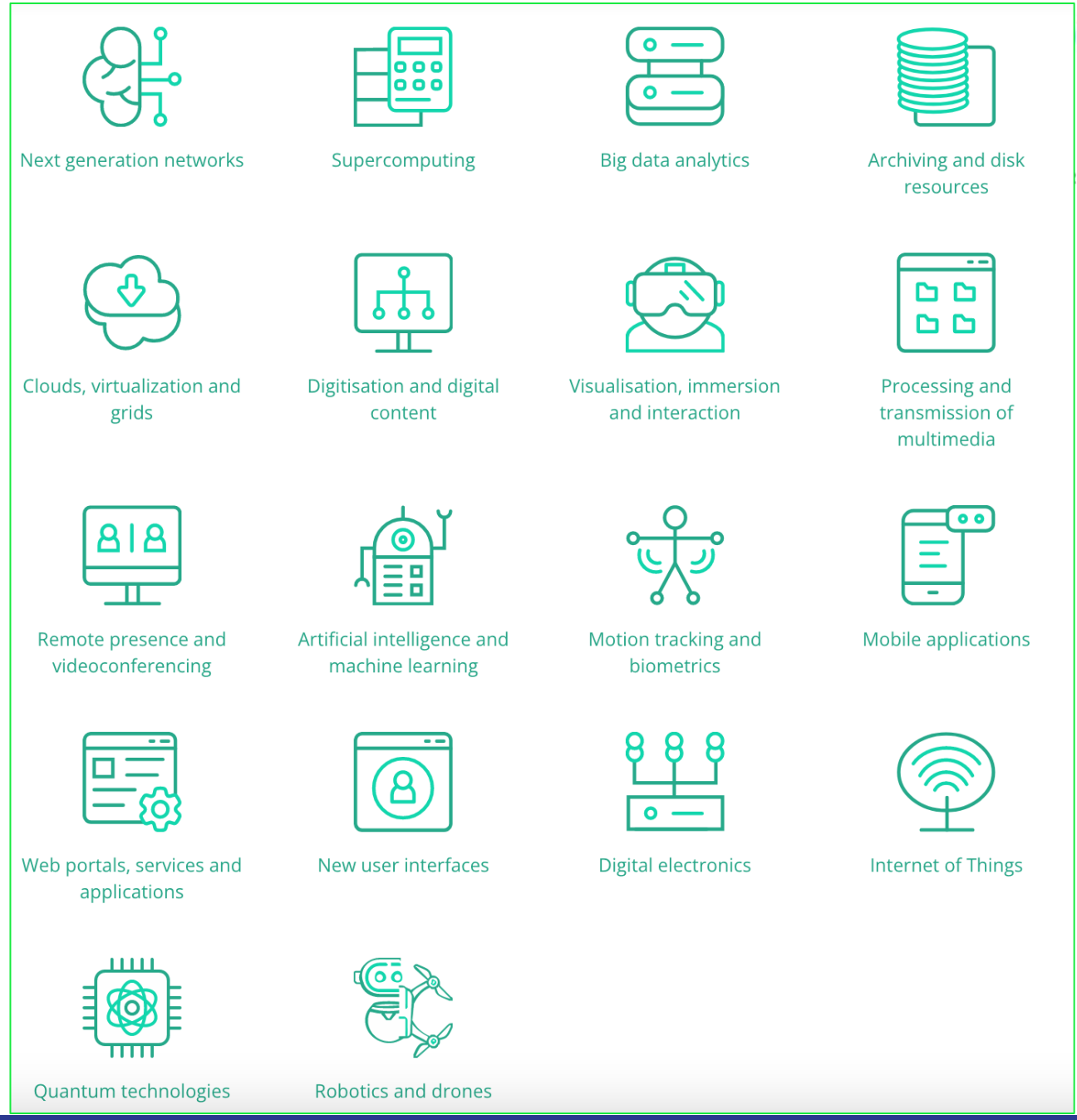
- Security team conducts:
  - code audits,
  - pen-tests,
  - threat modeling,
  - trainings
  - and more ☺

R&D Projects

- Diverse portfolio of project and activities @ PSNC
- No off the shelf solutions
- Limited number of functionalities available out of the box
- Bespoke (custom) software is a must



Projects and resources

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Projects to be done and code ☺

Money we have

Projects and resources

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Projects to be done and code ☺

Money we have

We need fresh mates / juniors!

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Projects to be done and code ☺

Junior Staff
(AI generated)

We need fresh mates / juniors!

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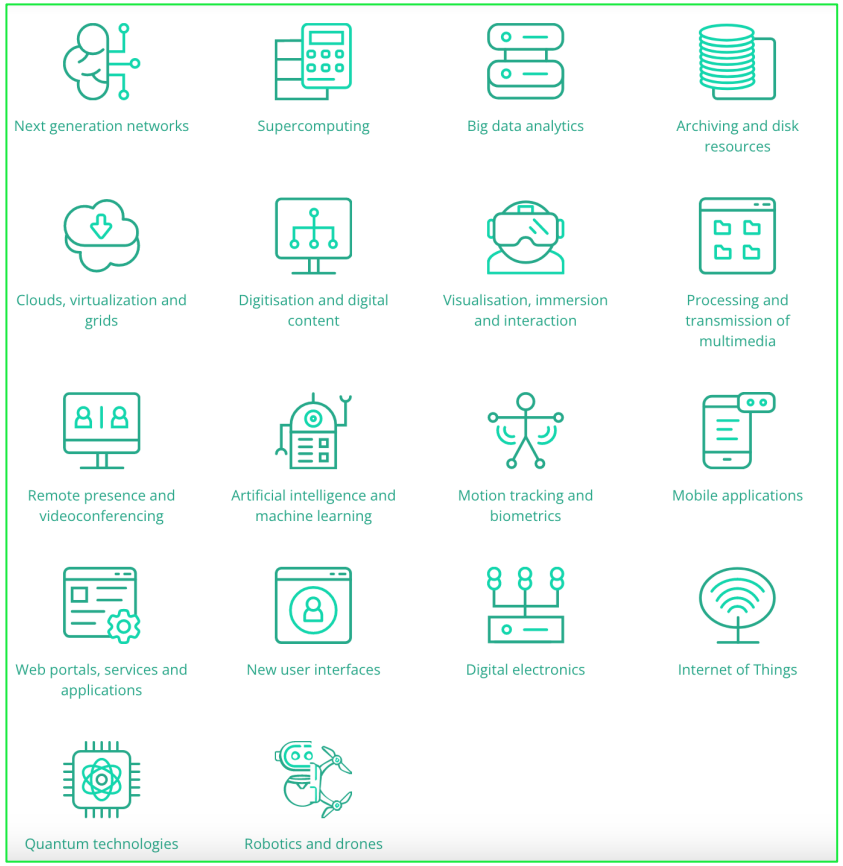
Projects to be done and code ☺

Junior Staff
(AI generated)

We need juniors (and seniors as well)



Projects to be done and code ☺

Junior Staff
(AI generated)
+ experienced ~~master~~ senior

The problem

How to develop secure software with limited resources?

The problem

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- Entry data
  - Team
    - A team of (mostly) gifted by not experienced programmers (only a few seniors)
    - with different backgrounds and education paths, and
    - with growing financial expectations (one of the reasons of leave and rotations)
  - Projects
- Goal
  - Secure software
  - Happy team!

Frequent rotation vs software quality

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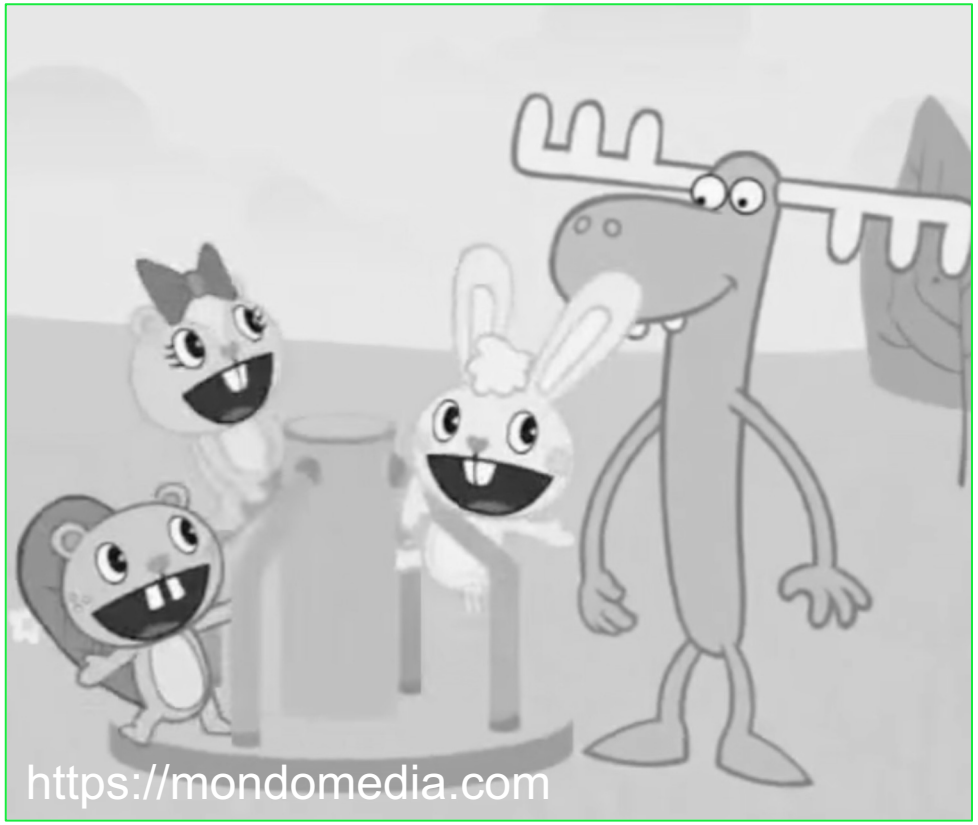
- We want to keep our junior employees in the team (at least happy)
- But we can’t afford to keep them all
- We want to provide high level of software ~~quality~~ security



How to build secure software?

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- Mentoring and well defined software development processes
- Make programmer a team player
- Educate your employees
- Know what your employee knows and fill the knowledge gap

Do not leave your staff alone

SDL(C)

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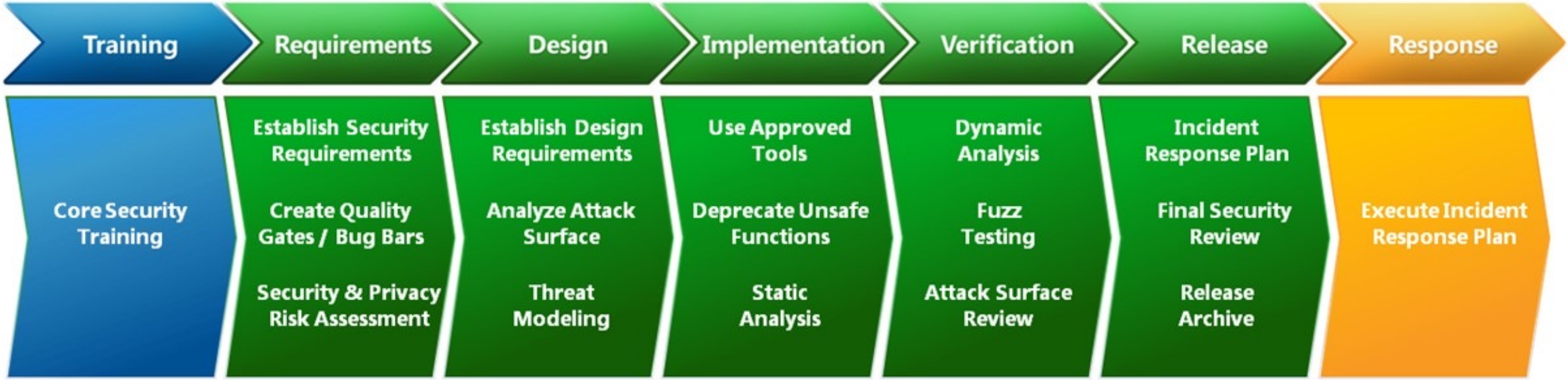
We cultivate the adoption of the Microsoft Security Development Lifecycle within the projects whenever possible.



The knowledge gap

Do developers know enough about SDLC?

The reality

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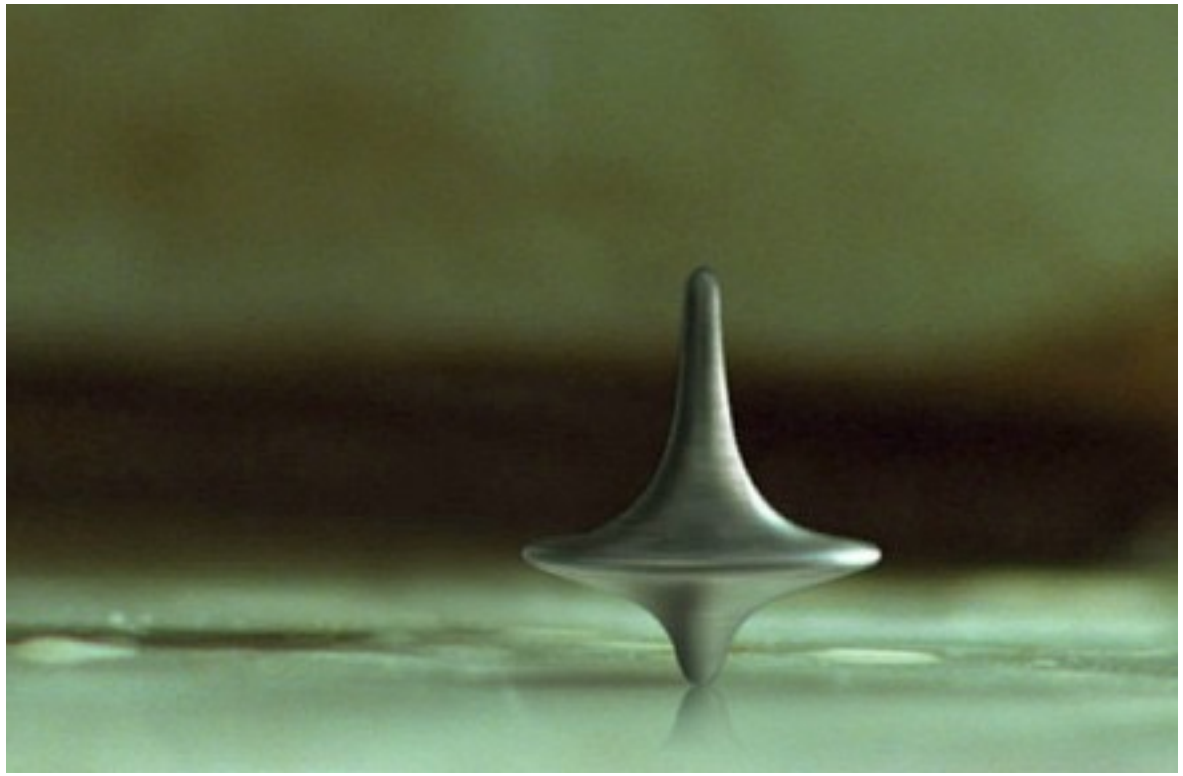
- Let’s make a step back
- Are we all (especially programmers and security team) in the same universe?
- What knowledge and skills should we expect from graduates (or even students) in general?



What do junior staff know?

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Programming principles?

Data structures?

Basic algorithms (e.g. sorting, branch & bound, meta-heuristics)?

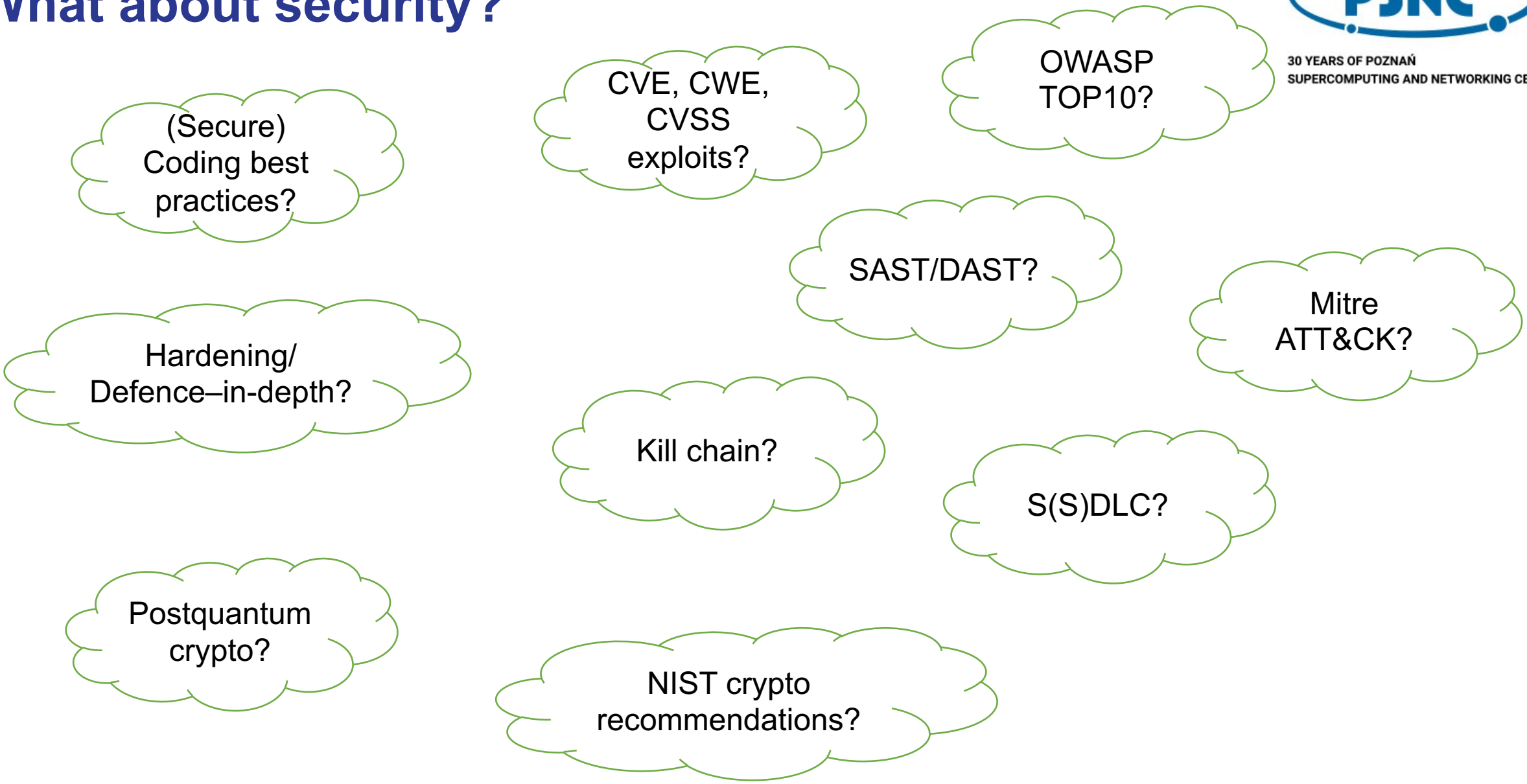
AI/ML algorithms?

It depends!

IDE, compilers, dev tools?

Principles of cryptography?

What about security?



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What about DevOps / SystemOps skills?

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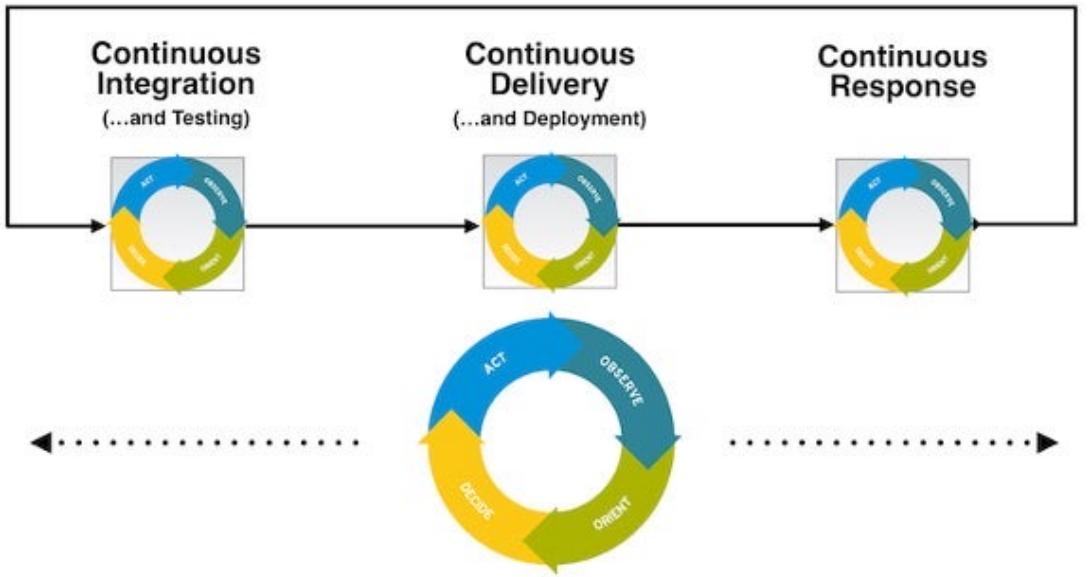
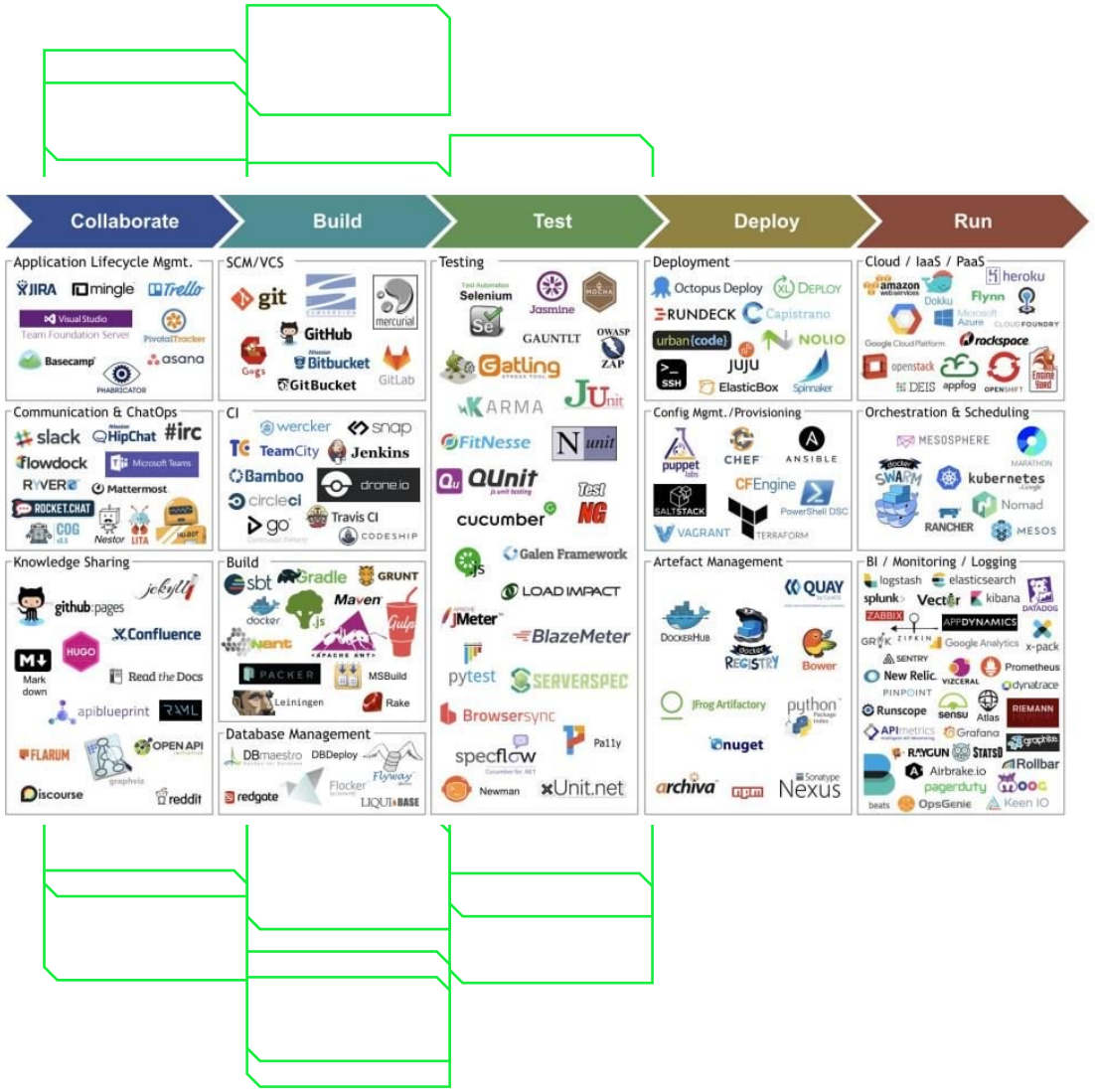
- System management and automation skills
  - Virtualization
  - Containerization
  - Collaborative platforms (usage and setup)
  - System Configuration and Hardening
- Basic skills
  - SSH, git
  - Secure access (VPN, IP forwarding)



Holistic DevOps Cycle

What about newest technologies?



- Continuous / Self learning
  - building the learning skills
  - analytical / educational Fridays
- Internal courses
- Access to training platforms
- Building problem solving skills

Feedback from the audits

What does need improvement and possible emphasis in academic curricula?

Feedback from software audits and pen-tests

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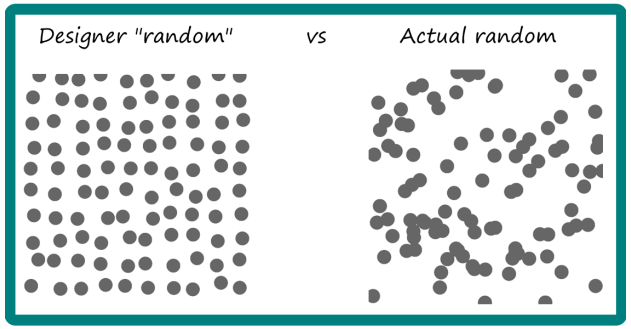
- Feedback comes not only from internal projects – we are doing also external audits
- Software audits
  - Inappropriate input validation
  - Lack of /Poor encryption
  - Lack of randomness
  - Insecure randomness
  - OWASP TOP 10 never dies
- Pen-tests
  - Same as code audits plus
  - Outdate software
  - Exposed services
  - Problems with external dependencies



What to do?

Let’s put some more security in academia and universities

What to do to limit the security knowledge gap?

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- Within GÉANT community
  - Let's keep providing and socialize available complimentary education:
    - Secure Coding Training
    - Summer School of Software Engineering
    - Expand portfolio of GLAD courses
  - Let's provide access to quality pen-tests and code audits (e.g. cross checks within the community)
  - What about organizing CTFs / Hackathons?
- Outside the community
  - Engage in preparation of curricula for CS / AI students
  - Promote usage of best practices
  - Influence decision makers
  - Provide complimentary courses, especially around emerging technologies
  - The voice of the security community should be heard

Any questions?

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