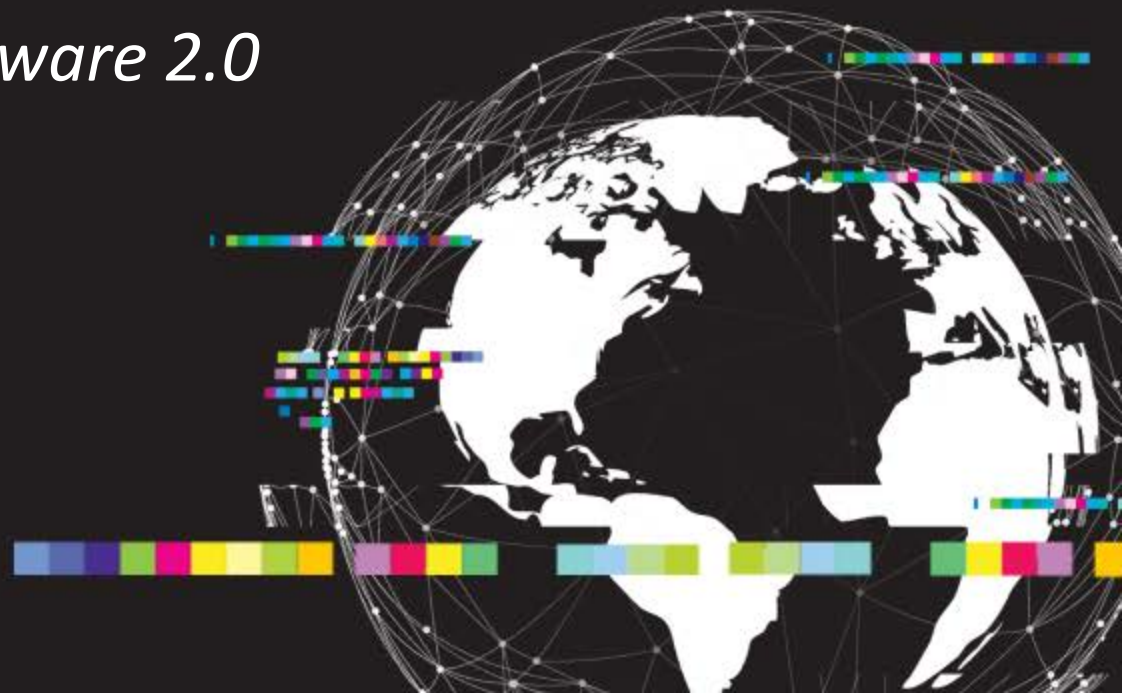
Introducing MLSecOps

DevSecOps for Software 2.0

ADVERSA



Introduction

About

Eugene Neelou

- Built various security products since 2011

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  - Organizer of the MLSEC AI Hacking Competition track
  - Contributor to the NIST AI Risk Management Framework
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Adversa AI

- World-first AI vulnerability research company
- World-first commercial AI red team
- World-first AI protection patent
- and many more

Mission

Adversa AI Increases Trust in AI Systems

by Improving the Security of ML Algorithms

Agenda

- AI is Software 2.0
- Adversarial Machine Learning
- MLSecOps Pipeline Stages
- Takeaways

AI is Software 2.0



AI for Old Products

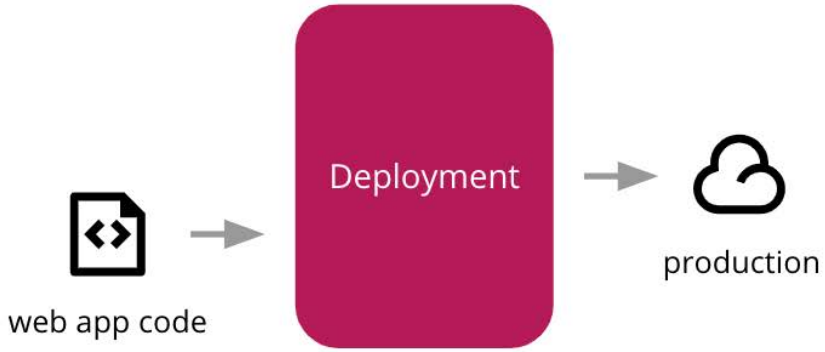
- AI is becoming a core technology for **existing products**
  - Most tech companies will transform into AI companies

AI for New Products

- AI is becoming a go-to technology for **new products**
  - Most disruptive products will emerge from AI-first ideas

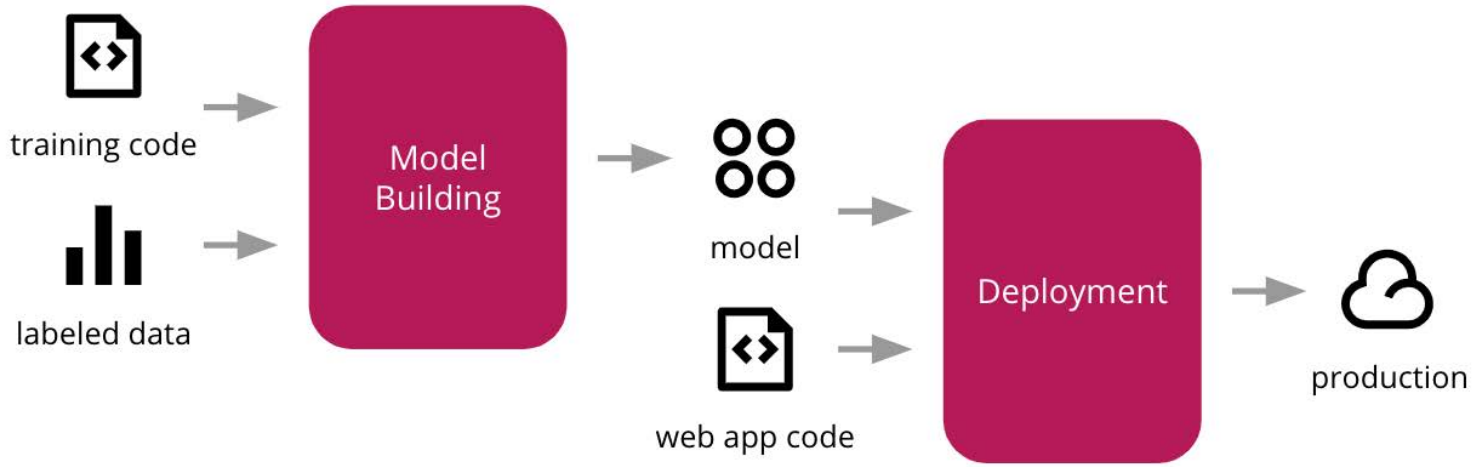
AI is Software 2.0

- AI is the **new paradigm** of software development



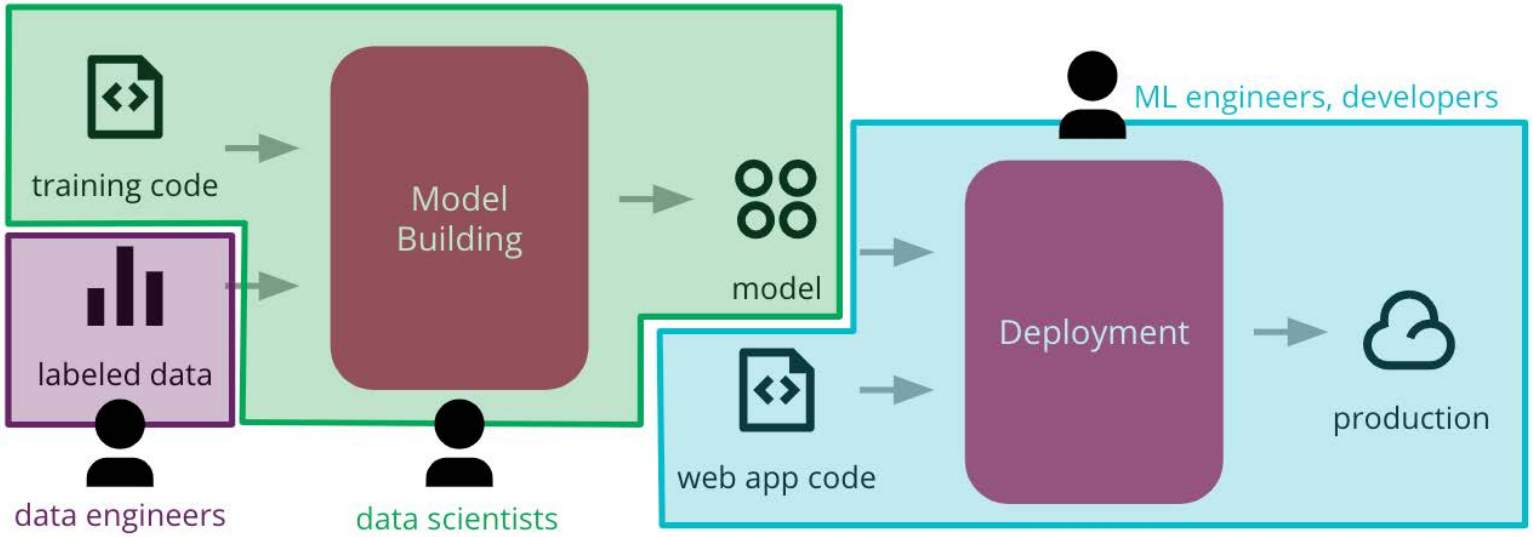
AI Development Process

- AI development brings **model** and **dataset** assets



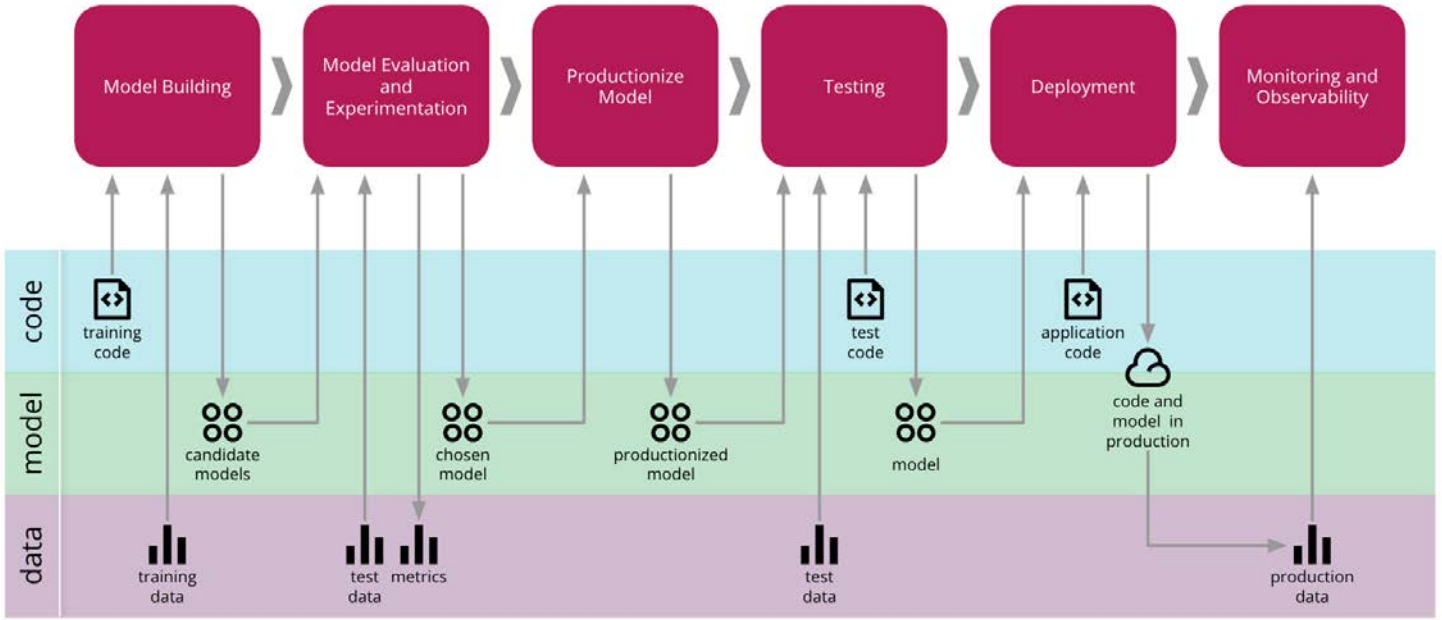
AI Development Process

- AI development requires **data engineers** and **data scientists**



AI Development Process

- AI development enabled by **MLOps pipelines**



Continuous Delivery for Machine Learning (CD4ML)

Adversarial Machine Learning

AI Threats Rising

HELPNETSECURITY

AI industry alarmingly unprepared for real-world attacks

VICE

Hackers Fool Facial Recognition Into Thinking I'm Mark Zuckerberg

The Daily Swig

Cybersecurity news and views

Machine learning security vulnerabilities are a growing threat to the web, report highlights

Tech Informed

The frontier of tech news

Bad Robot: the rise of adversarial AI

As the popularity of AI applications grows, so too do the risks associated with it

WSJ

Faces Are the Next Target for Fraudsters

DARKReading

Expect an Increase in Attacks on AI Systems

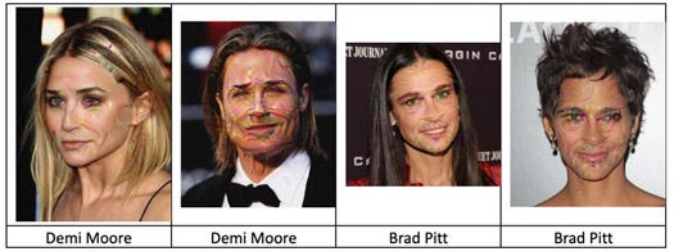
AI Hacking Challenge

Fooling facial recognition

- Preserving image quality
- Impersonating target identity

Evading phishing detection

- Preserving code rendering
- Bypassing malware detector



https://adversa.ai/conf42-mlsec

History of Adversarial ML

Stats for 10 years of AI attacks

- AI is the new attack vector
- Real incidents In AI systems
- AI applications under attacks

AI Security Case Study

- How to attack AI systems
- How to defend AI systems
- Secure lifecycle for AI systems

https://adversa.ai/conf42-hitb

Common AI Attacks

Infection

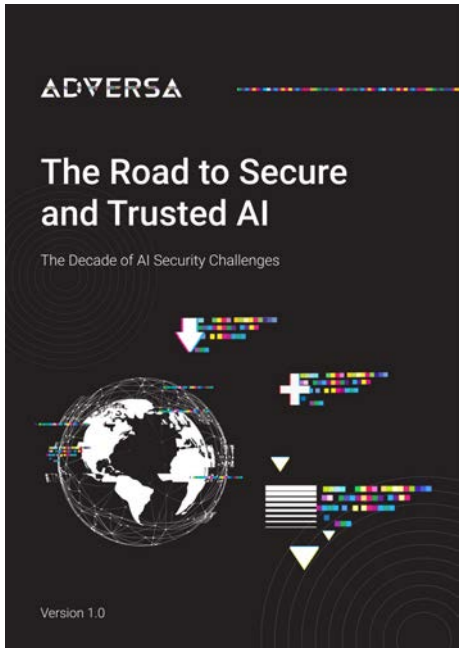
- Poisoning training data
- Supplying trojan models

Manipulation

- Fooling model decisions
- Sabotaging model performance

Exfiltration

- Stealing model algorithm
- Extracting private data



https://adversa.ai/conf42-report

AI Attack Surface

	Traditional Software	AI = Software 2.0
Nature	Fixed program logic	Dynamic model training
Workflow	Commands based on algorithm	Decisions based on learning
Interaction	Graphical UI using menus and buttons	Cognitive UI using images, voice, and text
Security issues	Improper validation, access control issues, incorrect system configurations	Manipulation, exfiltration, infection of models & datasets

MLSecOps Principles

Building Security In

- Security as enabler, not blocker

Building Security In

- ❑ Security as enabler, not blocker
- ✓ Automated and repeated validation

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- ❑ Add security as early as possible

Building Security In

- ❑ Security as enabler, not blocker
- ✓ Automated and repeated validation

- ❑ Add security as early as possible
- ✓ Accumulated controls across lifecycle

MLSecOps Pipeline Stages



MLSecOps Intro

Tasks

MLSecOps Intro

Problems

MLSecOps Intro

Solutions

MLSecOps: Planning

Plan | Collect | Build | Validate | Deploy | Monitor

Tasks

- **Requirements**
- Stakeholders
- Compliance

MLSecOps: Planning

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Problems

- ❑ **No risk assessment**
- ❑ No threat modeling
- ❑ No security governance

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Solutions

- ✓ **Risk register**
- ✓ Attack surface
- ✓ Security baseline

MLSecOps: Planning

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Solutions

- ✓ Risk register
- ✓ **Attack surface**
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MLSecOps: Planning

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Solutions

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- ✓ Attack surface
- ✓ **Security baseline**

MLSecOps: Development

Plan | **Collect** | Build | Validate | Deploy | Monitor

Tasks

- **Data understanding**
- Data preparation
- Data packaging

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- ❑ **Privacy breach**
- ❑ Unreliable sources
- ❑ Data poisoning

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- ✓ **Data privacy**
- ✓ Data integrity
- ✓ Data sanitization

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- Model training
- Model packaging

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- ❑ **Supply chain risks**
- ❑ Code vulnerabilities
- ❑ Non-robust learning

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Solutions

- ✓ **Model integrity**
- ✓ Secure coding
- ✓ Robust learning

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- Robustness testing
- Compliance checks

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- ❑ Weak testing scenarios
- ❑ Vulnerable infrastructure

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Solutions

- ✓ **Security governance**
- ✓ Validation playbooks
- ✓ Secure environment

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MLSecOps: Deployment

Tasks

- **Model deployment**
- Model inference
- Model serving

MLSecOps: Deployment

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- ❑ **Model hijacking**
- ❑ Adversarial attacks
- ❑ Unrestricted access

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- ✓ **Model authenticity**
- ✓ Adversarial robustness
- ✓ Secure communications

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MLSecOps: Monitoring

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Tasks

- **Model performance**
- Anomaly detection
- Feedback loops

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Solutions

- ✓ **Activity monitoring**
- ✓ Analytics playbooks
- ✓ Detection & response

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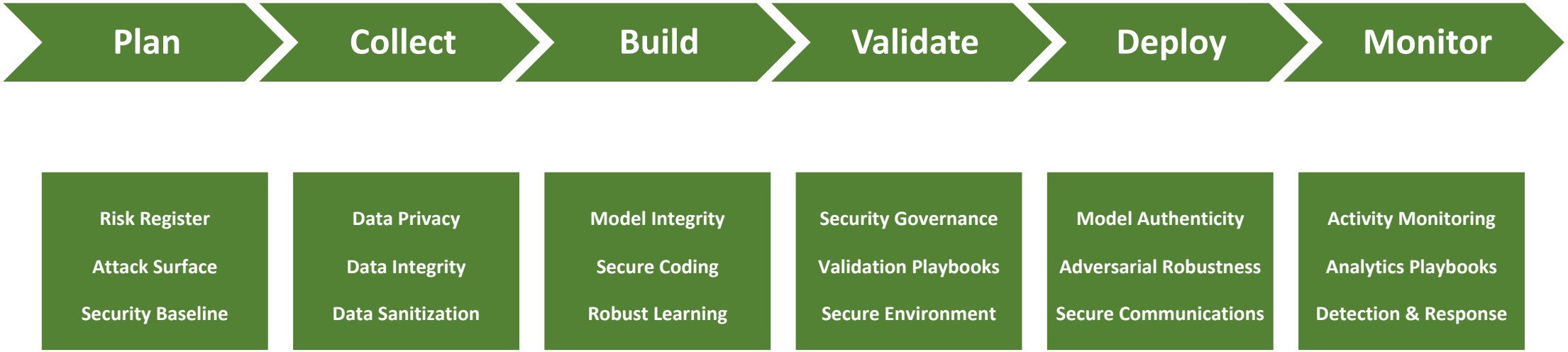
MLSecOps: Full Pipeline



MLSecOps: Full Pipeline

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Risk Register	Data Privacy	Model Integrity	Security Governance	Model Authenticity	Activity Monitoring
Attack Surface	Data Integrity	Secure Coding	Validation Playbooks	Adversarial Robustness	Analytics Playbooks
Security Baseline	Data Sanitization	Robust Learning	Secure Environment	Secure Communications	Detection & Response

* Security of Workspaces

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Thanks!

Let’s talk about AI Security & Safety

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