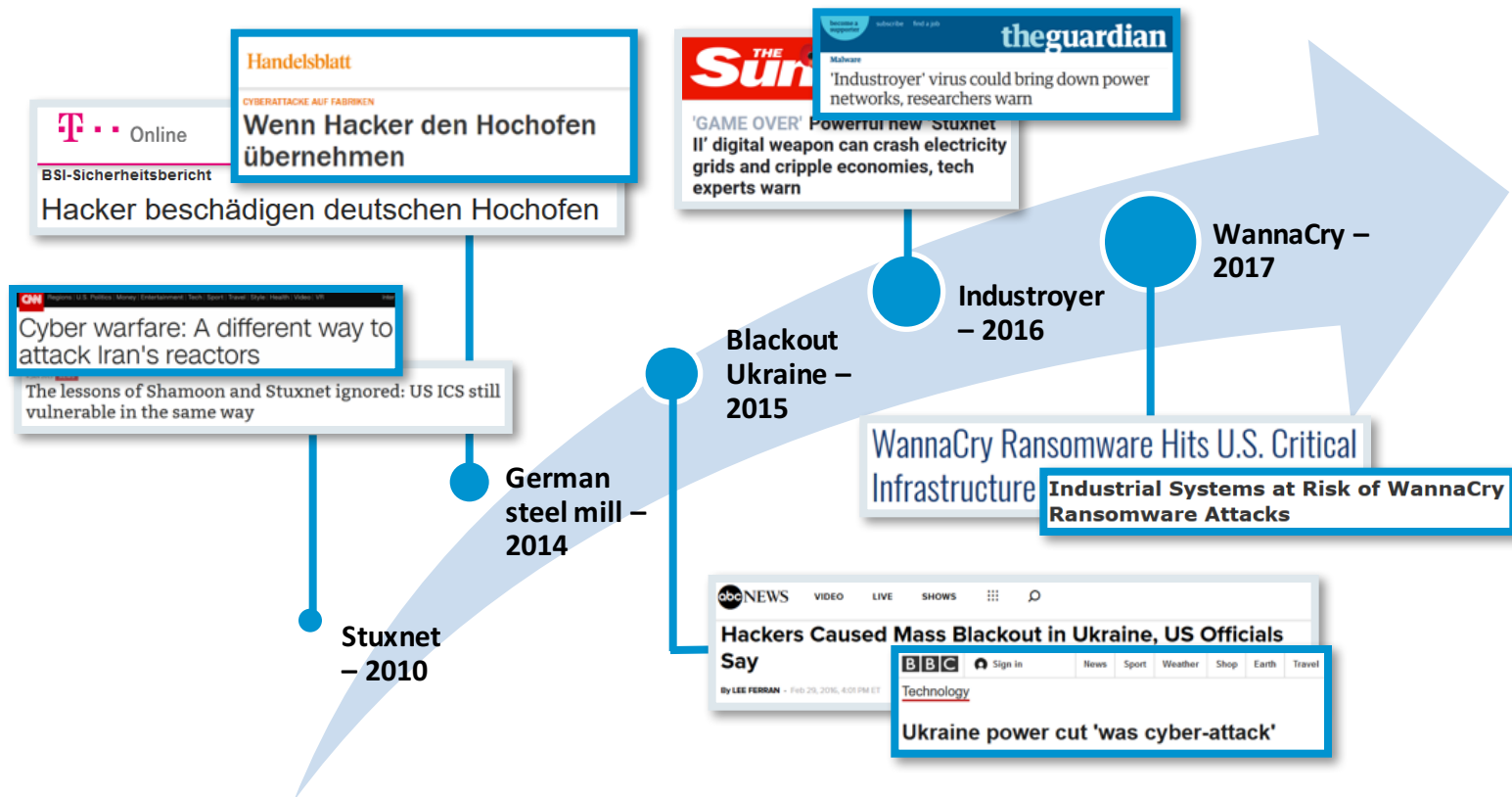




# Mit dem digitalen Zwilling zur sicheren Produktion

Matthias Eckhart, Andreas Ekelhart

# Bekannte Angriffe auf Industrieanlagen





| Technical data             |                            |
|----------------------------|----------------------------|
| Model                      | Model                      |
| Dimensions (mm)            | Dimensions (mm)            |
| Weight (kg)                | Weight (kg)                |
| Power (kW)                 | Power (kW)                 |
| Speed (rpm)                | Speed (rpm)                |
| Light source               | Light source               |
| Light intensity (lm)       | Light intensity (lm)       |
| Light color (nm)           | Light color (nm)           |
| Light beam diameter (mm)   | Light beam diameter (mm)   |
| Light beam length (mm)     | Light beam length (mm)     |
| Light beam width (mm)      | Light beam width (mm)      |
| Light beam height (mm)     | Light beam height (mm)     |
| Light beam area (mm²)      | Light beam area (mm²)      |
| Light beam volume (mm³)    | Light beam volume (mm³)    |
| Light beam density (g/cm³) | Light beam density (g/cm³) |
| Light beam mass (g)        | Light beam mass (g)        |
| Light beam energy (J)      | Light beam energy (J)      |
| Light beam power (W)       | Light beam power (W)       |
| Light beam efficiency (%)  | Light beam efficiency (%)  |
| Light beam lifetime (h)    | Light beam lifetime (h)    |
| Light beam warranty (yr)   | Light beam warranty (yr)   |

```
def main():  
    # Initialize variables  
    x = 0  
    y = 0  
    z = 0  
    # Loop through data  
    for i in range(1000):  
        # Process data  
        data = get_data(i)  
        # Calculate results  
        results = calculate_results(data)  
        # Store results  
        store_results(results)  
    # Print results  
    print_results()
```



# Security and Quality Improvement in the Production System Lifecycle (SQL)

Christian Doppler Labor

<https://www.sqi.at/>



# Team & aktuelle Grundlagenthemen



Edgar Weippl

Laborleiter



Johanna Ullrich

„Blackouts durch Botnetze – Utopie oder Wirklichkeit?“



Nicholas Stifter

„Towards Sustainable Blockchain Engineering“



Matthias Eckhart

„Mit dem digitalen Zwilling zur sicheren Produktion“



Dietmar Winkler

„Prozessverbesserung im Anlagen-Engineering“



Kristof Meixner

„Effiziente & flexible Testautomatisierung im Anlagen-Engineering“



Felix Rinker

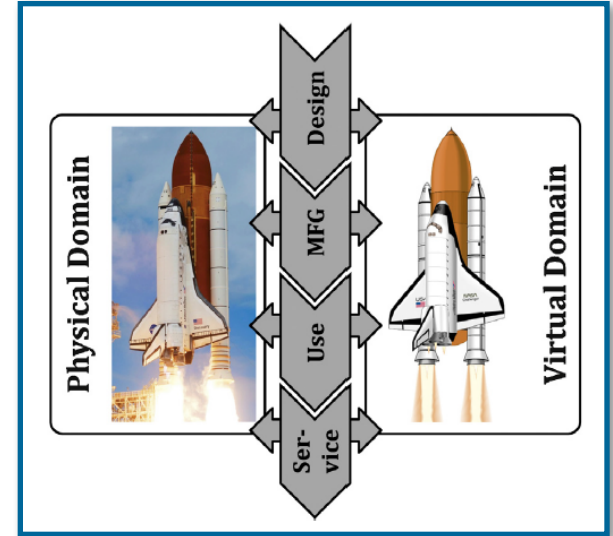
„Software-Ökosystem für paralleles Anlagen-Engineering“

# Der digitale Zwilling

## Die Anfänge

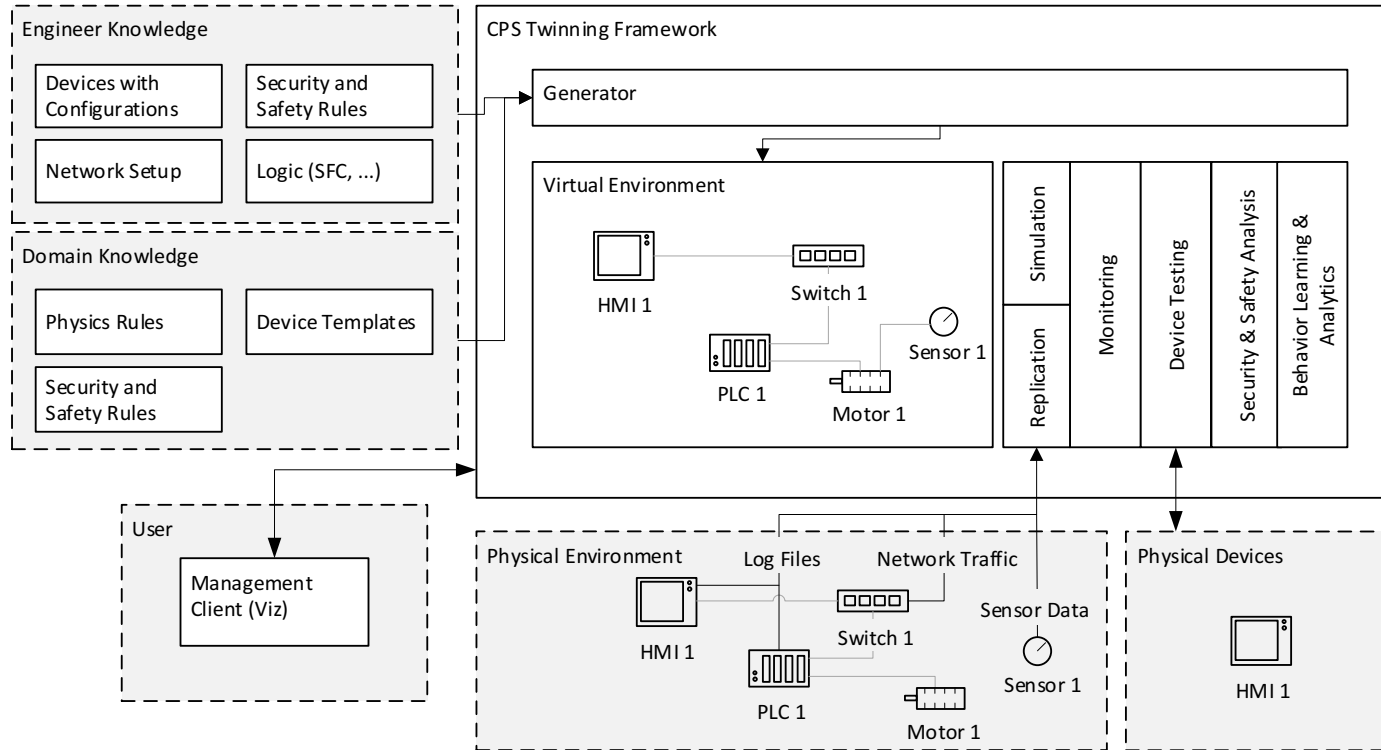
*“A digital twin is an integrated [...] **simulation** of a [...] system that uses the best available **physical models**, **sensor updates**, [...] etc., to **mirror the life of its flying twin**. ”* (Shafto et al., 2010)

- Konzept aus der Raumfahrt
  - NASA
- Gedacht als Unterstützung bei Zertifizierung & Mission selbst
- Im Kontext unserer Forschung:
  - Digitaler Zwilling läuft parallel zum physischen System



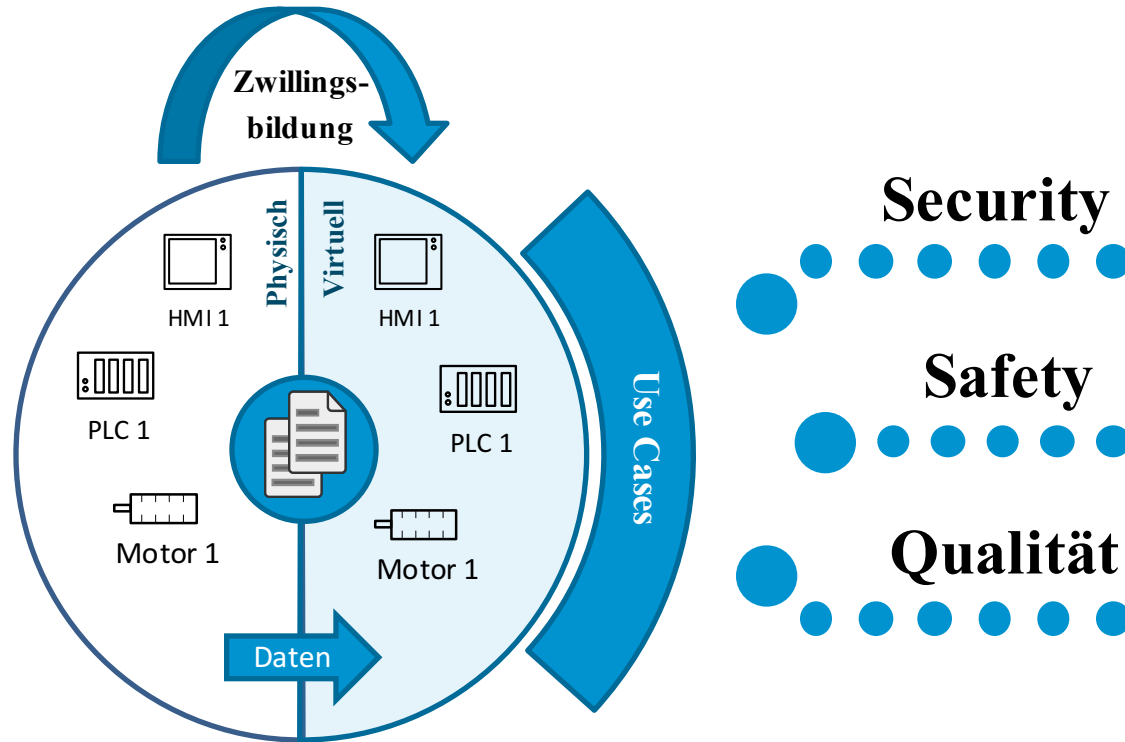
Quelle: Schleich et al., 2017

# Architektur von CPS Twinning





# Zusammenfassung



# Matthias Eckhart

**SBA Research gGmbH**

Favoritenstraße 16, 1040 Wien

+43 664 448 34 35

[MEckhart@sba-research.org](mailto:MEckhart@sba-research.org)