Research and development aimed at enabling Industry 4.0 from a cybersecurity perspective

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Wired in the wireless world

1xx Billion
Wearables & Connected Devices
Connected / Smart Cars
Connected / Smart Homes
Connected / Smart Cities
Connected / Smart Industries

1xx Billion
Electromagnetic spectrum
Air
Cyberspace
Land

CSIR
our future through science
Industry 4.0 meets Cyber 4.0

CPS platform
- Internet of Things
- Internet of Services
- Internet of Data
- Internet of People

Horizontal value network
- Cyber twins
- Physical assets

Vertical integration and networked manufacturing systems
- Smart factory 1
- Smart factory 2
- Smart factory 3
- Smart factory 4

Physical production
- Suppliers
- Logistics
- Computer/server
- Sensors

Industry 4.0
- Digital production
- Customised products
- Virtual production
- Smart products

Humans communicating with robots
Critical infrastructure sectors

ICTs  Finance  Manufacturing  Food  Health

Energy Utilities  Water  Transportation  Safety  Government

http://www.iprem.ca/initiatives/InitiativesPics/CriticalInfrastructureSectors.jpg
Benefits and risks

Doing smart things (Innovation)

Doing things smarter (efficiency and agility)

Wider risk surface (safety and security)
What could go wrong?

- Ransomware attacks
- Data transmission monitoring
- Denial of service
- Distribution system monitoring
- Man-in-the-middle attack
- Waste water management
- Behaviour alteration
- Deception attacks
- Water quality monitoring
- Physical tampering
- Source quality monitoring
- Energy harvesting
- Malware distribution
- Pressure monitoring
- Leakage detection
- Smart metering
Cyber[\textbf{in}]security thinking for Industry 4.0…

Diagram showing:
- People
- Processes
- Technology
- Cyber[\textbf{in}]security
Requirements for a secure and safe Industry 4.0

- Secure-by-design
- Fail securely and safely
- Comprehensive situational awareness
- Rapid data analytics
- Enhanced AI-protection, prevention and detection
- Automated and robotized incident response
- Collaborative threat intelligence sharing
- Human-oriented technologies (safety and security)
Building national capabilities

Haves

Strong cyber power

Have nots

Weak cyber power

Cans

Can nots
Integrated capability management

Capability Development Approach

- Capability definition
- Capability specification
- Capability establishment
- Capability employment
Data science approach to complex problems

- Predictive modelling (Siphon)
- Integrated view of departments/municipalities (Mati)
- Monitoring and evaluation (Motheo)
- Real-time analytics (Elections)

Dr Vukosi Marivate, Ms Pelonomi Moiloa (CSIR Intern): Catching Crime: Detection of Public Safety Incidents using Social Media (WIP)
Early warning detection – situational awareness
CSIR Smart City Platform – Current project

Mobile app visualisation & control
application
Web dashboard visualisation & control
Cloud application infrastructure

Smart City Platform Core

Back-end infrastructure

Smart City Platform Edge
Gateway device
Smart device
Smart device

Gateway device
Smart City Platform Edge
Smart device
Smart device
Cyber threat intelligence Sharing

- Backdoors: 4 (up 4% from last week)
- Domains: 185 (up 3% from last week)
- Emails: 1 (up 34% from last week)
- Indicators: 372 (down 12% from last week)
- IPs: 110 (up 34% from last week)
- Samples: 139 (up 34% from last week)

Threat Activity Past 12 hours

Top Data Sources
- Hail-a-taxi
- Phishtank
- Twitter
- Other

Threat Activity

Data Sources
- Twitter

Malicious Samples per Month

Particular Day of the Month
NESL – Cybersecurity Training
Cyber Range – Security Solutions Testing
Becoming part of the future
Finally…

Robust cyber posture
Cyber strategies
Local Context

Sharing of information
Smart buyer/user
Thank You

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