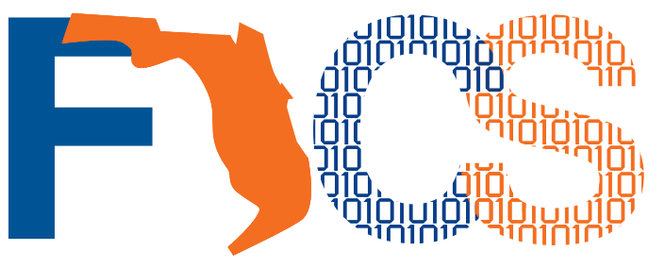
Grid Security

Mark Tehranipoor

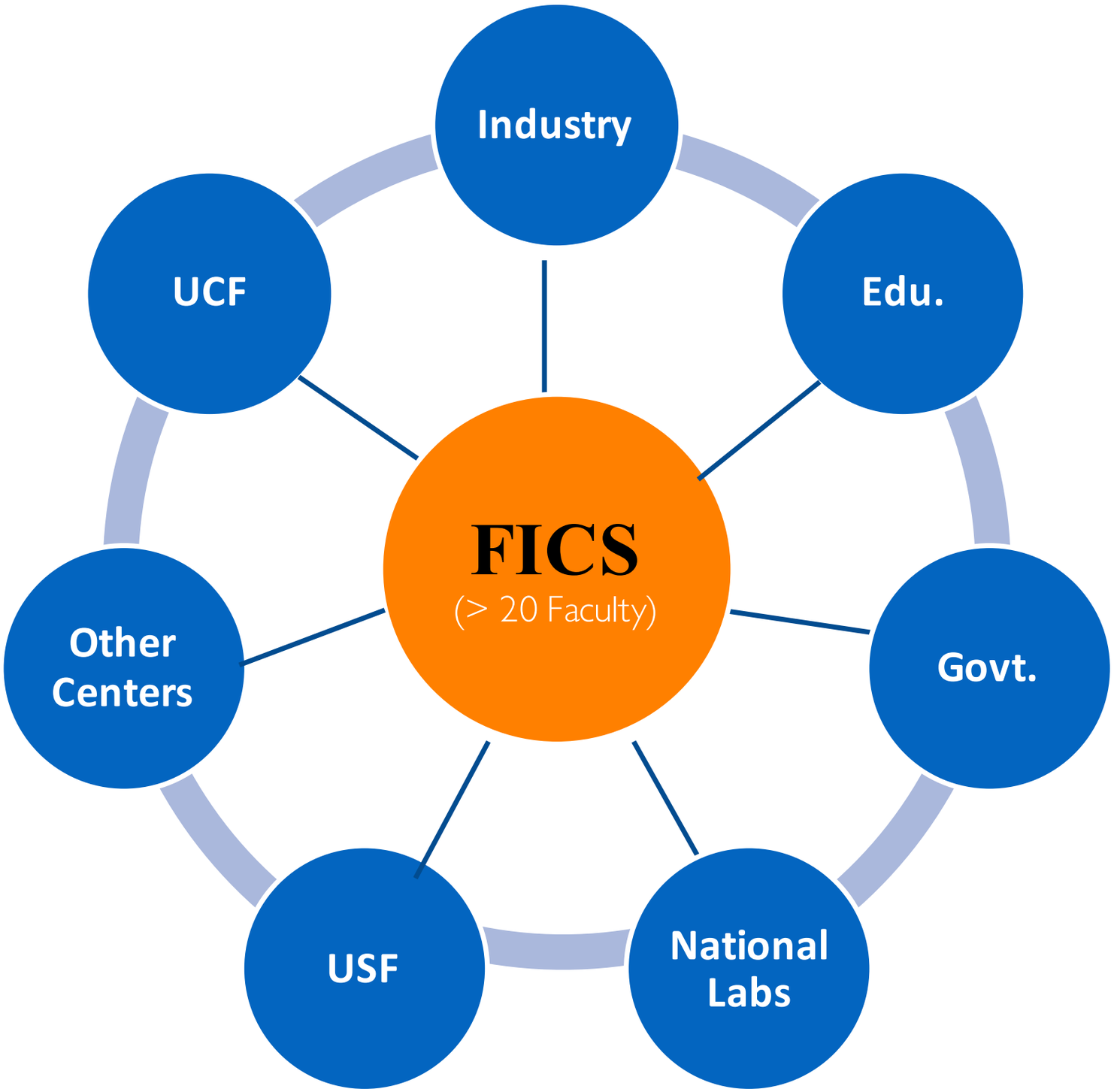
Florida Institute for Cybersecurity Research (FICS)



Florida Institute for Cybersecurity Research

- FICS's mission is to perform ground breaking research and education on cybersecurity, reliability, availability, and trustworthiness of the information systems. To this end, FICS will establish a newly coordinated field of knowledge in systems assurance and security.
- FICS will place emphasis on:
  - **Education**: To develop the much needed workforce for government and industry, and to educate cybersecurity professionals through certificates, online courses, tutorials, etc.
  - **Research**: To develop innovative and holistic solutions to ever increasing cybersecurity challenges
  - **Outreach**: To raise awareness about cybersecurity problems from K-12 students, to US citizens, to industry, and to government

FICS: Multi-disciplinary and Multi-university



FICS Research Thrusts

UF UNIVERSITY of FLORIDA

- Applied Cryptography and Privacy
- Cloud and Distributed System Security
- Internet/Mobile Security
- Systems and Storage Security
- CPS Security
  IOT Security
- Nanoscale Security (Bottom-up Security Solutions)
- Supply Chain Security (Electronics / Non-electronics)
- System-on-Chip Security and Trust
- Biometrics and Security

Education and Training

Courses

Computer and Network Security
Computer and Information Security
Introduction to Hardware Security and Trust
Advanced Topics in Hardware Security and Trust
Malware Analysis and Reverse Engineering
Cybersecurity Seminar
Hardware Trojan Design, Detection, and Prevention
Penetration Testing–Ethical Hacking
Cryptology
Cybersecurity
Malware Reverse Engineering
Secure Programming

Online Tutorials

Online tutorials on selected topics will be presented by FICS faculty

Online Courses

Computer and Network Security

Past and Present Sponsors

Microsoft Research
DARPA
Lincoln Laboratory, Massachusetts Institute of Technology
Honeywell
Xilinx
freescale semiconductor
LSI
Avago Technologies
IBM
Texas Instruments
comcast
Battelle The Business of Innovation
MediaTek
R3 Logic Inc.
Altera
SRC
Department of Education
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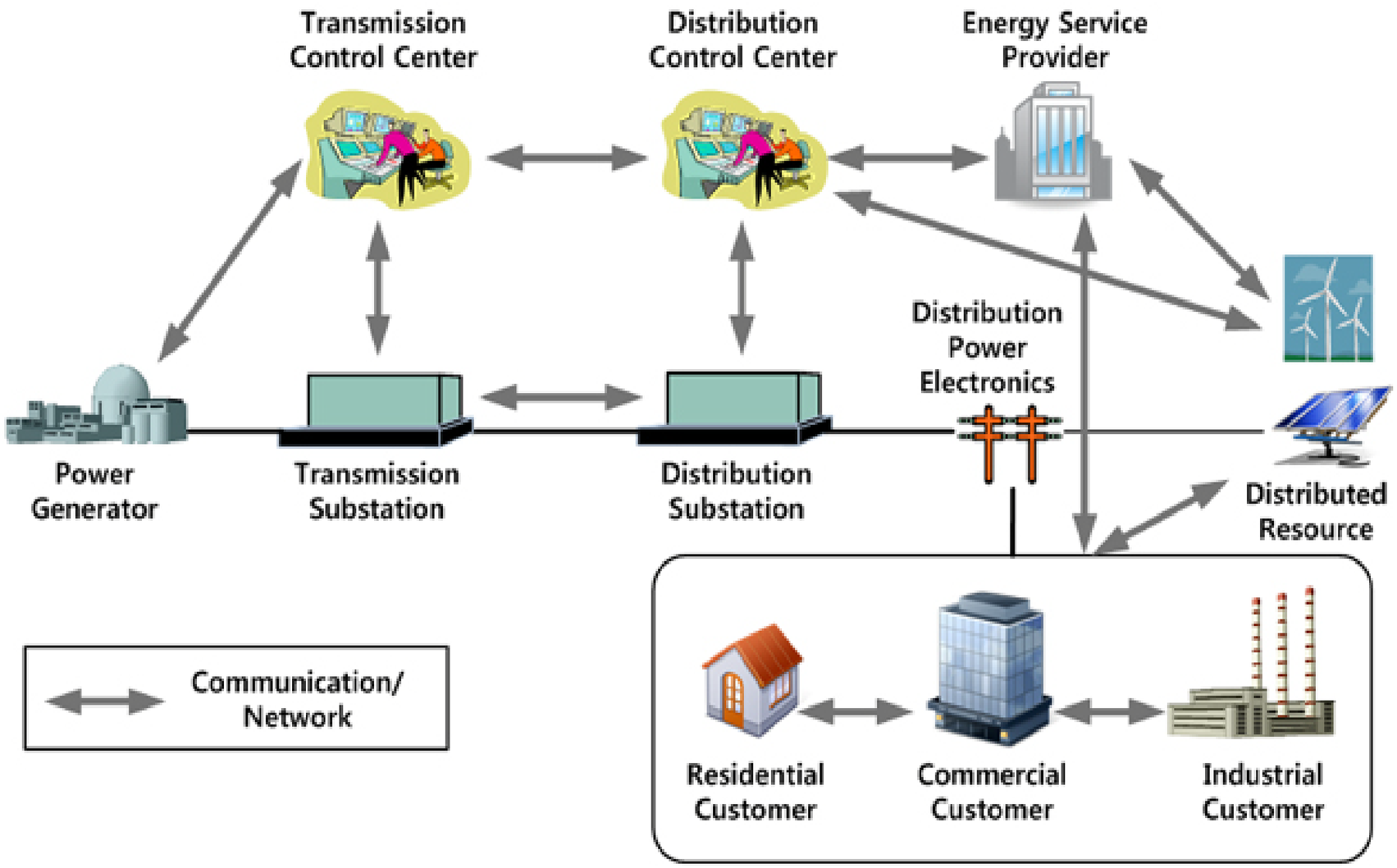
Air Force Research Laboratory
Department of the Navy ONR Science & Technology
intel
Qualcomm
NSF
SYNOKEY
Mentor Graphics
Verigy
Cisco
GRC
ellisys Better Analysis.
Department of Defense
Agilent Technologies
Alfred P. Sloan Foundation
Department of Defense IASP
Google

FICS Equipment & Capabilities

- Imaging Capabilities (X-ray, SEM, TEM, …)
- Industrial Systems Control Systems
- Hardware Security Assessment Capabilities
- Electrical Test Capabilities
- Reverse Engineering Capability
- Medical Device Test Capability
- Computing Resources

Power Grid Infrastructure

- "Smart" made the "Grid" less secure, more ITs, more sensors, and more software
- Every step is vulnerable
- Government is investing in power grid security
- Indications are we already have malware in our power grid system



Source: http://cnslab.snu.ac.kr/twiki/bin/view/Main/Research

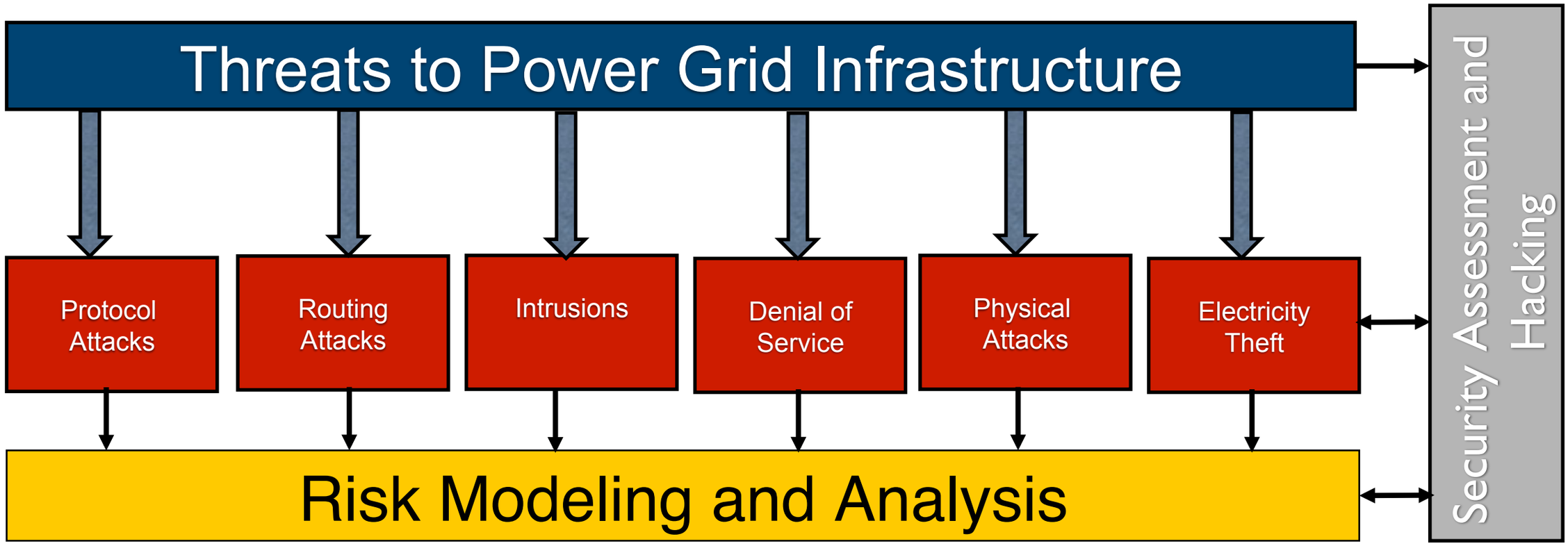
UF Strength in Power Grid Security

- Expertise on hardware, network, and software security
- Strong group on power electronics and smart grids
- Strong relationship with government and industry

Cyber Threat to Power Grid

- **Sensors**, **actuators**, **control systems**, **IT infrastructure**, **smart meter**, etc. are all subject to attack
- **Control systems** are vulnerable to an array of cyber attacks, including well-resourced hostile governments, terrorist groups, and disgruntled employees
- Repository for Industrial Control System (RISI) incident report, indicates the number of cyber attacks on power grid systems are on the rise
- McAfee report – “In the Crossfire: Critical Infrastructure in the Age of Cyber War”, shows similar data and increase in cyber incidents
- **Electricity theft**: in billions $

Cyber Threat to Power Grid



UF Team can help with:

- Development of defensive mechanisms: Prevent, detect, defend, and recover (grid resiliency against cyber and physical attacks)
- IT security – Defending against intrusion, Network penetration test, White hacking of sensors, actuators, etc., Identity and access management, Cyber and data forensics
- Gathering intelligence about the health of the network and the grid
- Grid modeling and risk analysis
- Preventing electricity theft, Customer profiling
- Making mock grid systems at UF, Creating SCADA test beds, Standardization
- Education, training, and raising awareness (protecting critical assets, understanding the company and user confidential information)

Power and Cybersecurity Team

Mark Tehranipoor
Intel Endowed Chair, ECE, UF
Expertise: H/W Security, IoT Security

Patrick Traynor
CISE, UF
Expertise: Mobile Security

Swarup Bhunia, ECE, UF
Expertise: SoC/IP Security

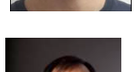
Kevin Butler, CISE, UF
Expertise: Systems Security

Daniela Oliviera, ECE, UF
Expertise: OS Security

Domenic Forte, ECE, UF
Expertise: Biometrics, Hardware Security

Prabhat Mishra, CISE, UF
Expertise: Formal Tech.

Yier Jin, ECE, UCF
Expertise: Piracy, Hardware Security, Rev. Eng.



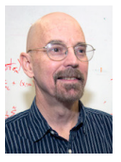
Shigang Chene,CISE, UF
Expertise: Internet Security

Renato Figueiredo, ECE, UF
Expertise: Security in Virtualized Environments

Juan Gilbert, CISE, UF
Expertise: Voting Security

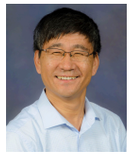
Tom Shrimpton, CISE, UF
Expertise: Applied Crypto

Richard Newman, CISE, UF
Expertise: Computer/Network Security



Joseph Wilson, ECE, UF
Expertise: Software Security, Network Penetration Test

Andy Li, ECE, UF
Expertise: CPS & Network Security



Michael Fang, ECE, UF
Expertise: Network and Mobile Security, Smart Grid Security

My Thai, CISE, UF
Expertise: Smart Grid Security

Sean Meyn, ECE, FIT
Expertise: Signals and Systems

Arturo Breta, ECE, UF
Expertise: Electromagnetics & Energy Systems

Shuo Wang, ECE, UF
Expertise: Green Energy Conversion and Grid Integration

Conclusions

- **Florida is the 3rd largest state in the country – top in the country for cybersecurity attacks**
- **Requires a collective effort of different companies working together to address grid security**

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