



# **IFAL - Federal Institute of Technology of Alagoas**

**PSICO - Usable Security and Privacy for Ubiquitous Communications Group**

**Breno Jacinto Duarte da Costa**

[brenojac@ifal.edu.br](mailto:brenojac@ifal.edu.br)

# About Us

- IFAL is a new public national network of institutions in the field of Education, Science and Technology founded in 2009;
  - IFAL provides courses at High School, Undergrad, and Graduate Levels focused on Science and Technology;
  - Research and Development prioritizes on the application of science and technology to solve real-world problems and improve society;
  - Our aim to keep close relationship with the Industry and its problems.

## About Us (2)

- PSICO Research Group was created in 2012
- 2 Professors and 6 student-researchers
- Right now, we are developing R&D projects in the context of:
  - Usable Security and Privacy
  - Persuasive Technologies
  - Emergency & Community Mesh Networks
- We believe that each of these research areas provides key ideas to the solution of a number of today's communication, security and privacy challenges

# Why Usable Security and Privacy?

- Because today's Security and Privacy technologies are mostly **unusable**
  - Unpatched Windows machines are compromised in minutes through automated robots
  - Phishing web sites costing billions of dollars
  - Most PCs infected with spyware
  - Users have more passwords than they can remember and practice poor password security
  - Enterprises and individuals store confidential information mobile devices that are frequently lost or stolen

# Why Usable Security and Privacy?

- Compromised Privacy is a hot topic in the brazillian Press due to US Monitoring as well as the leaking of private images from famous individuals



# Outline

- In this short presentation we'll talk about two ongoing projects at the PSICO Group

# Why Usable Security and Privacy?

- Despite the fact that we've got **strong end-user** encryption for at least 20 years...
  - PGP was released in 1991;
  - We've got open-source and fully functional hard-drive encryption available (e.g.: TrueCrypt)
- Curiously, we also got AVs, Firewalls, Sandboxing, Intrusion Detection Systems... and still we don't seem to move towards improved security and privacy on the Internet
- Most of the attacks are on the weakest link: **the User!**

# The Challenge

“Give end-users **security controls they can understand** and **privacy they can control** for the dynamic, pervasive computing environments of the future.”

- Computing Research Association 2003



# Behaviour Change?

- In addition, we've got the feeling that **Users Don't Care about Security**

“Users do not want to be responsible for, nor concern themselves with, their own security.”

- **Blake Ross (Firefox)**

- If that's true, How could that be changed?
  - Persuasive Technology
  - Can users be persuaded to change their behaviour towards a security mindset and thus start behaving securely?
- We believe so. It's a research challenge! [2]

# Our Research Project

- Preserving Privacy on the Internet: A Persuasive Technology approach
- Initially Funded by IFAL
- Started in September, 2013
- We're looking for sponsors and partners on this project

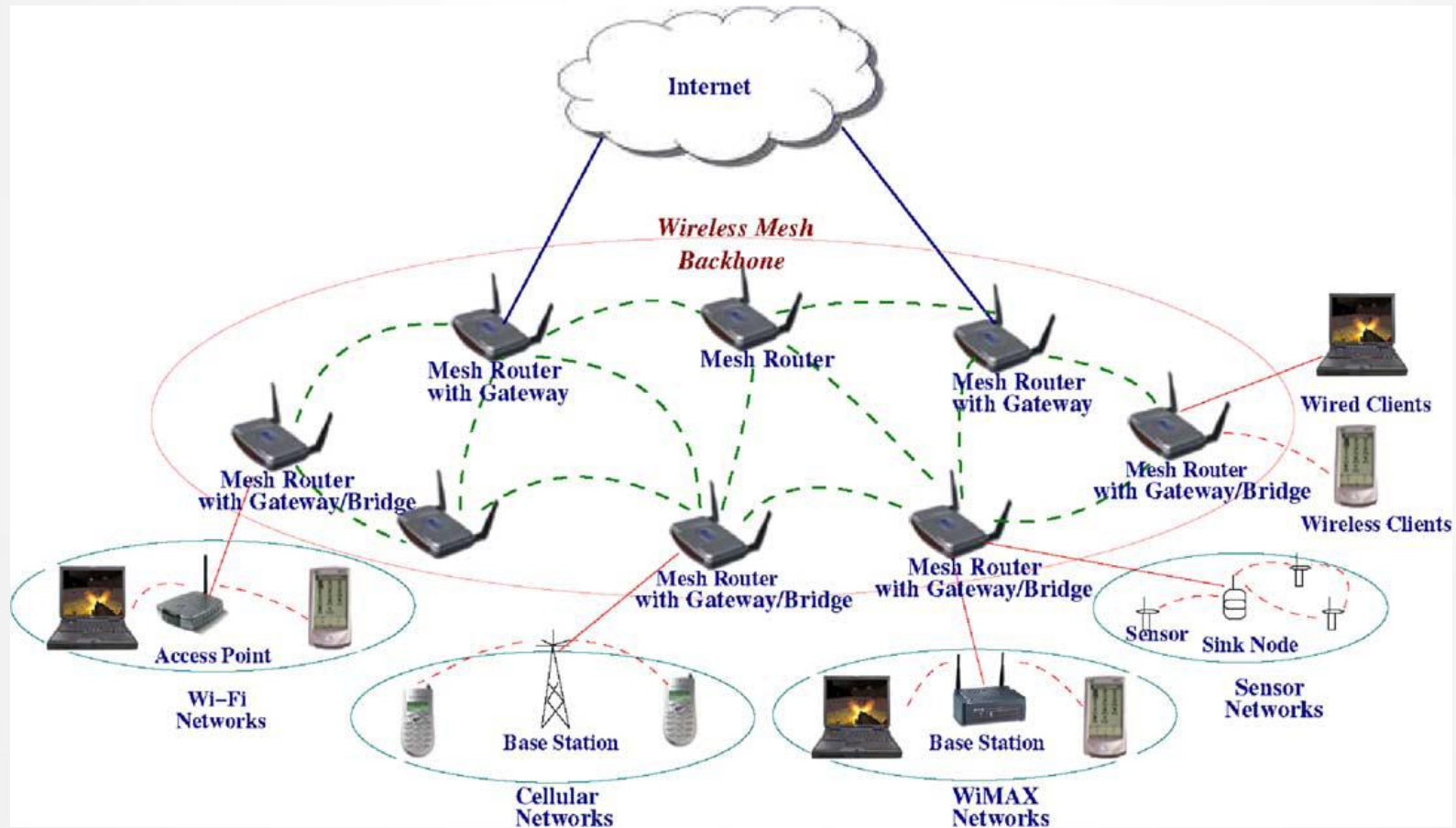
# Promoting Ubiquitous Communication

- Our second Project, initially funded through IFAL
- How can we provide last-mile access in Brazil using wireless technology?
- Equally important, how can we do it **safely**?
- **Community Mesh Networks** are a great promise in this directions
- What are they?
  - Organic, self-organized, disruptive technology
  - Provide communities the ability to share and use communication technology within the Mesh

# Characteristics of WMNs

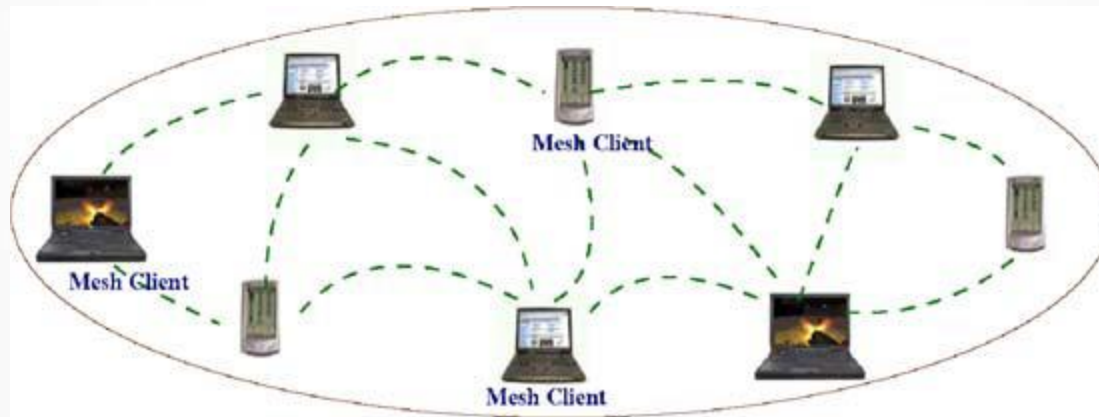
- It is a Multi-hop wireless network:
  - Helps extend coverage range of current wireless networks
  - Can help provide non-line-of-sight connectivity without direct line-of-sight links.
- Mobility dependence:
  - Mesh routers usually have minimal mobility, whereas clients are mobile or stationary.
- Multiple types of network access:
  - Support for both backhaul access to Internet and other networks as well as support for peer-to-peer communication.

# Infrastructured Scenario



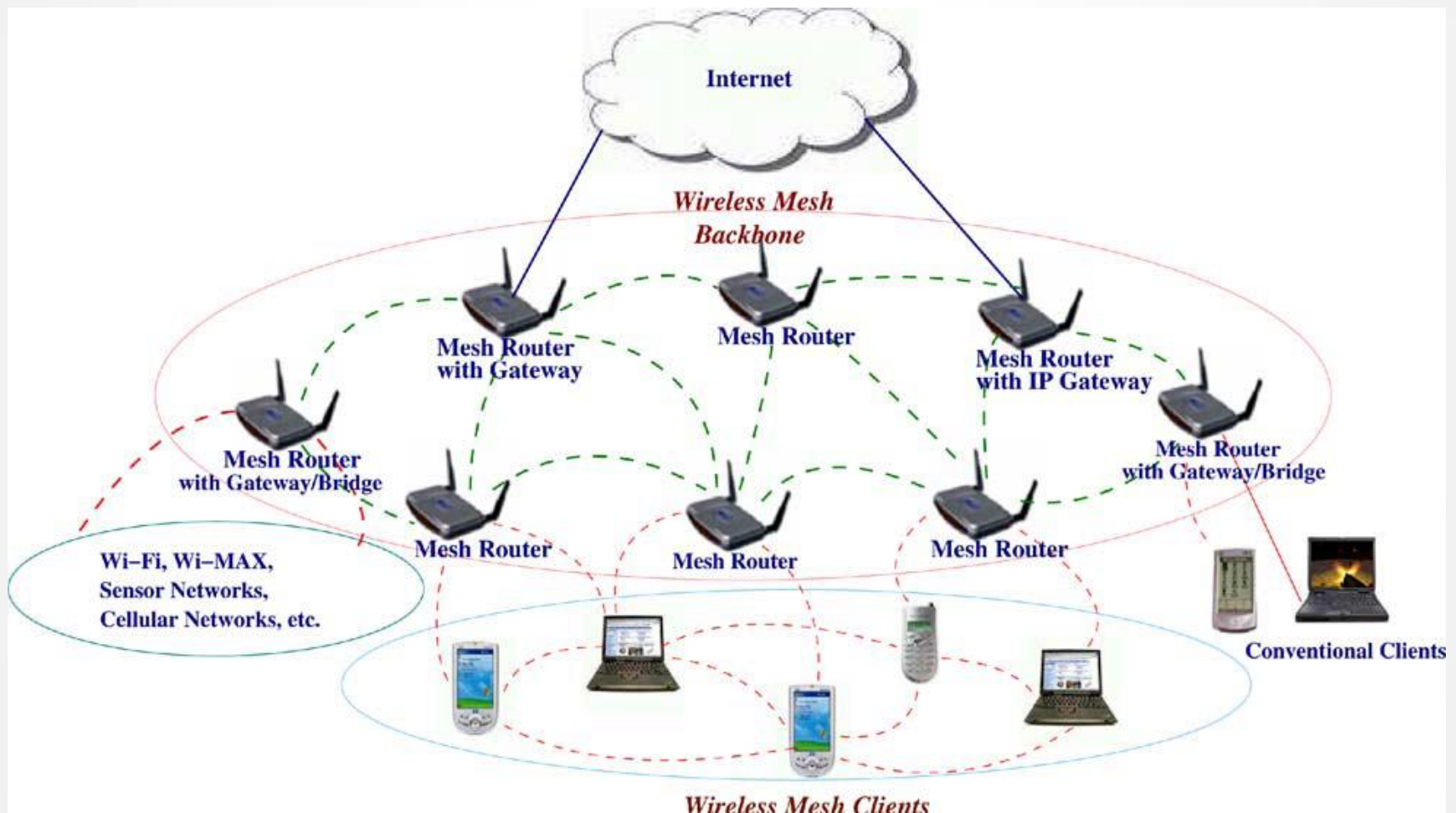
Infrastructured/Backbone Wireless mesh network

# Client WMN architecture (No Infrastructure)



**Client WMN architecture – Classic Mobile Ad Hoc Network**

# Hybrid WMN Architecture



Hybrid WMN architecture



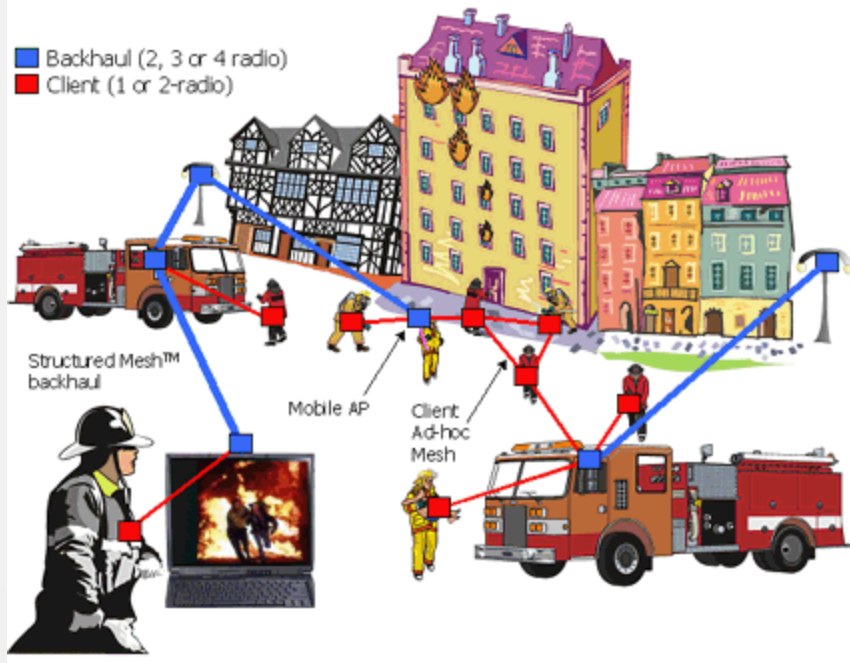
# Emergency Networks?



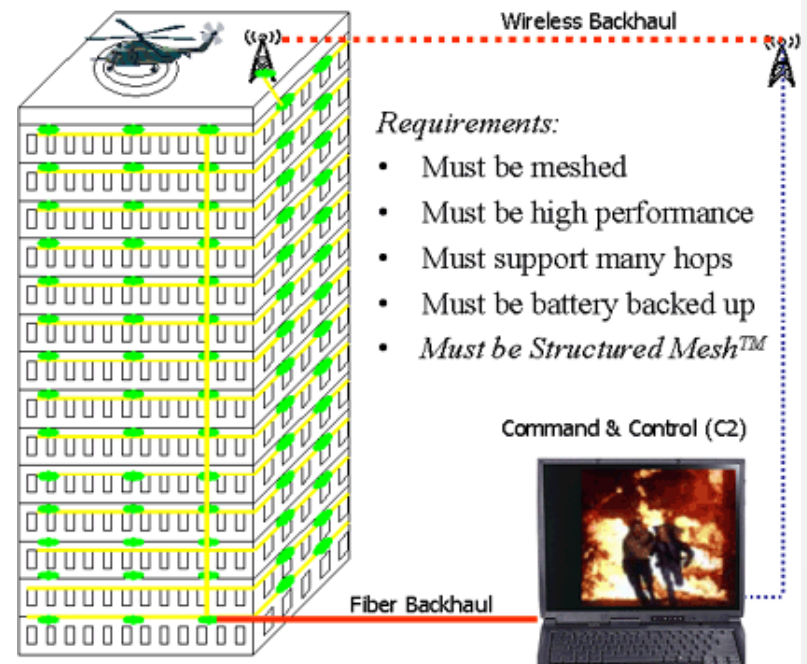


# Emergency Response

## Structured Mesh™ in Emergency Response

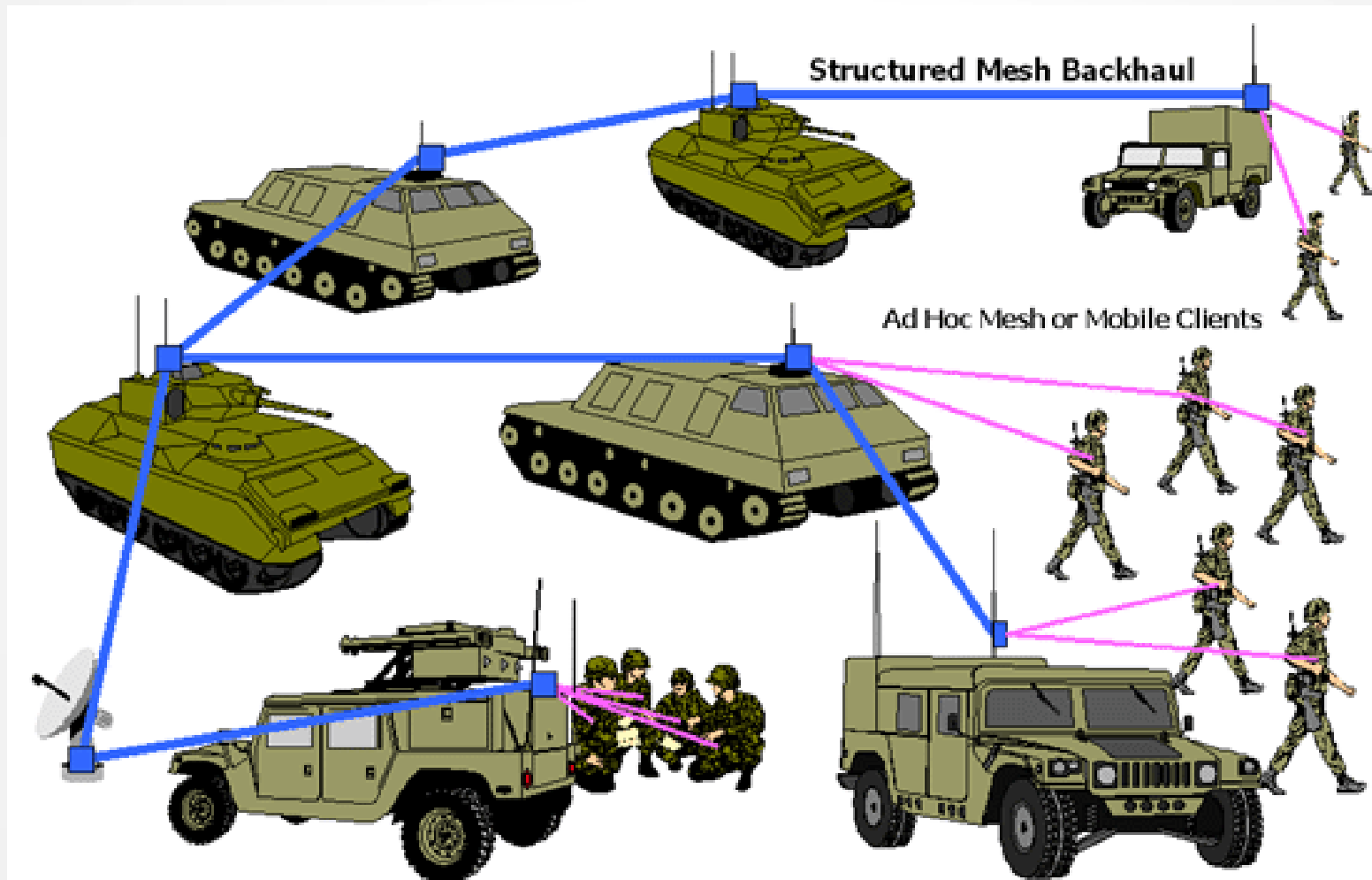


## High Rise Robust Emergency Network



Source: [www.meshdynamics.com](http://www.meshdynamics.com)

# Military Communications



Source: [www.meshdynamics.com](http://www.meshdynamics.com)

# Related Project: Serval

- Australian Project – <http://servalproject.org>
- Two clear goals of Serval:
  - Humanitarian Telecom: Serval members are also part of the VillageTelco project
  - Emergency Networks – they are trying to implement a practical Client-based Mesh Network using everyday Android SmartPhones
- **Open Source Project**



# Related Project: VillageTelco

- Developers of the Mesh Potato
  - A Mesh Router with an ATA (Analog Telephone Adapter) plug, making it possible to do VoIP easily using the Mesh Network
  - **Open Source Hardware and Software!**
  - Runs embedded Linux (OpenWRT), as well as B.A.T.M.A.N e Asterisk (VoIP)
  - It's a Community project maintained by a group of companies and individuals
  - <http://villagetelco.org>
- Interoperable with other hardware such as the Ubiquiti's NanoStation

## VillageTelco (2)

- Mesh Potato – Mesh router + ATA plug



## VillageTelco (2)

- Ubiquiti NanoStation 5 – Long-range outdoor Mesh Routers - +30KM LOS range



# Final Thoughts

- Before a large-scale deployment of Mesh Networks, there are some open research issues, concerning:
  - Security and Privacy of users and data in the WMN
  - Proper Usability of these technologies
  - Performance improvements
- These research challenges can be addressed using PSICO group's members diverse skills in networking, human-computer interaction and information security

- Our current Partners

- Prof. Rafael Amorim, Msc, Computing Institute (IC)
  - Networking Expert, Location-aware systems
- Prof. Fábio Paraguaçu, PhD, Computing Institute (IC)
  - Usability and Human-Computer Interaction Expert
- Prof. Msc. Leandro Sales and Prof. Rodrigo Peixoto
  - COMPELab.org
- IC4MF and Rastru
  - Prof. Russ Davis and Alencar Neto



# IC4MF and PSICO Group

- We're cooperating in order to Provide:  
Forensic tool training and certification of  
qualifications  
Prosecution support via the DFCE-AL

# References

- [1] Introduction to Usable Security, Lorrie Faith Cranor, 2011
- [2] A. Forget, S. Chiasson, and R. Biddle, “Persuasion as education for computer security,” *Healthcare, and Higher Education*, 2007.
- [3] The Serval Project. Available at: [www.servalproject.org](http://www.servalproject.org)
- [4] The VillageTelco Project. Available at: [www.villagetelco.org](http://www.villagetelco.org)

Thank you!  
Questions?

[brenojac@ifal.edu.br](mailto:brenojac@ifal.edu.br)