Swansea University
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# LocPriS: A Security and Privacy Preserving Location Based Services Development Framework

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# Agenda

- Introduction
- Location Based Services
- LBS Privacy Questionnaire
- Survey of Simulators and Vis Tools
- LocPriS Framework
  - Data Collection Module
  - Visualisation Module
- Examples

# Introduction

- Location Based Services becoming more popular
  - More devices, better technology
- Privacy and security issues more frequent
- Users conscious of privacy and security issues

# Location Based Services

- LBS Problems
  - Location data often transmitted and stored
  - Granularity of data often greater than necessary
  - Users unaware that traces are stored after they stop using services
  - Anonymisation of data often thought to be sufficient
    - Not always the case!
    - Data mining and pattern matching has shown this.

# LBS Privacy Questionnaire

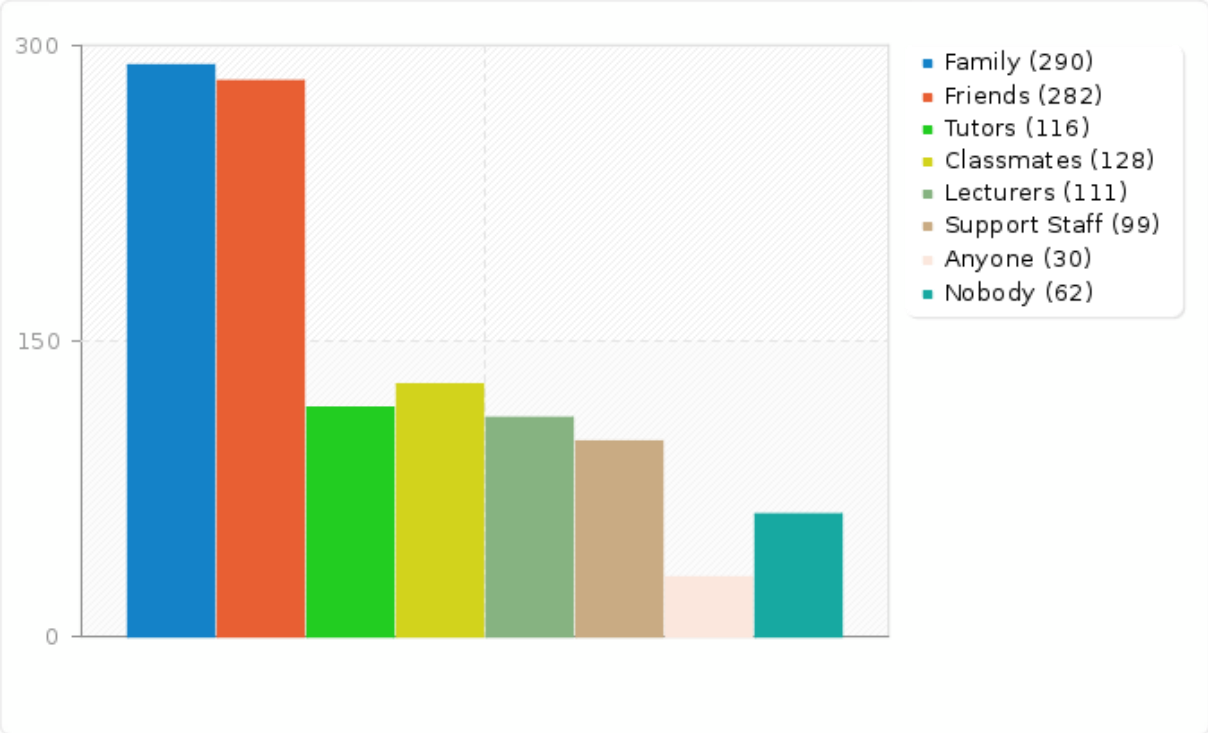
- Ran on 18th March for two weeks
- Anonymous and voluntary, students and staff
- 502 people completed

- Participants that had used a LBS:
  - 43% No, Yes 41%

- Of users who said yes, top two LBS were:
  - GPS Navigation (30%)
  - Mobile Phone Apps (27%)

# LBS Privacy Questionnaire

- *Is privacy an issue you would consider when using a Location Based Service?*
- 47% Yes 35% No
- *Who would you share location information with?*



# LBS Privacy Questionnaire

- Interesting:
- '*If technology could guarantee the privacy of your location, would this encourage you to use a Location Based Service?*'

- 63% of participants felt it would encourage them with only 9% saying it would not.

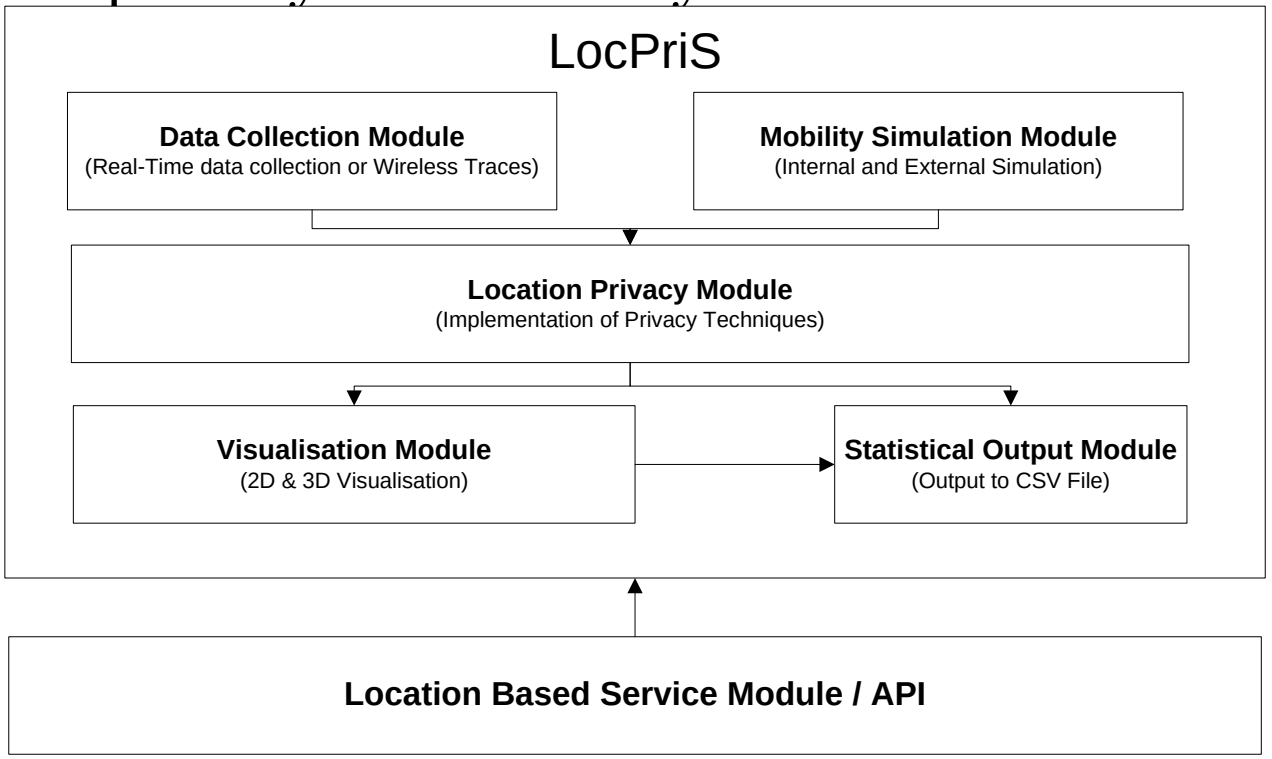
- Does this indicate a level of distrust amongst users holding back on the use of LBS?

# Survey of Simulators and Vis Tools

- Lots of established Network and Wireless/Adhoc simulators available:
  - Ns2, QualNet, OPNET, GloMoSim, SWANS/GTNets
- Number of Mobility visualisation tools:
  - Mobitools, MobiREAL, MoViTo, ViTaN
- None that specifically fit the needs to address Privacy and Security in LBS's.

# LocPriS Framework

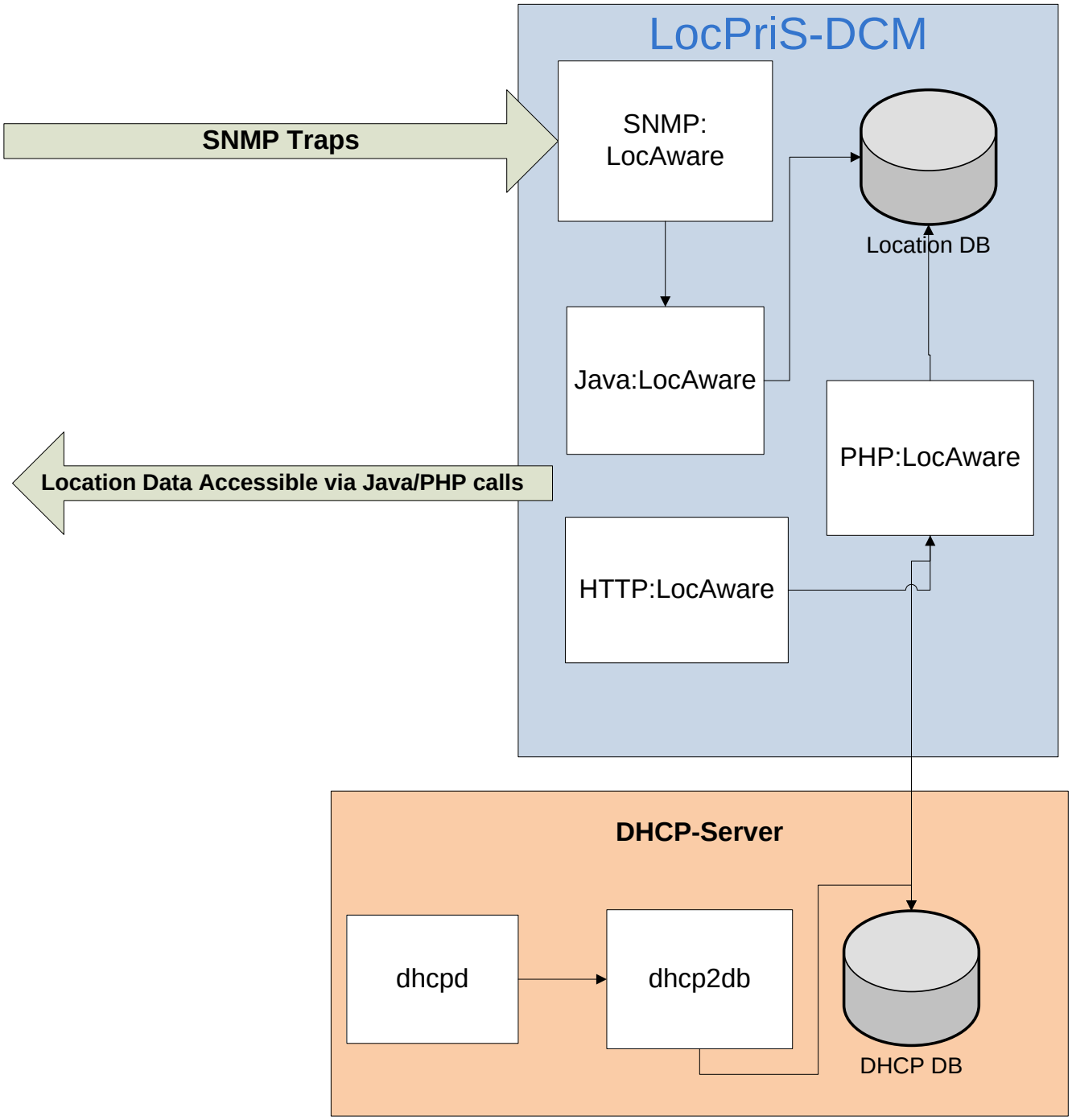
- A modular extensible framework that will provide tools for the development, analysis, comparison and visualisation of LBS's that preserve privacy and security.



# LocPriS: Data Collection Module

- Two main sources of data:

- **Wireless traces** – Wireless traces are available from a number of archives and institutions, including Dartmouth (Crawdad) and USC.
- **Real-time data –** Data from the Swansea University wireless network is being recorded in real time through the use of a SNMP traps and custom java/PHP programs.


LocPriS-DCM
SNMP Traps
SNMP:
LocAware
Location DB
Java:LocAware
PHP:LocAware
Location Data Accessible via Java/PHP calls
HTTP:LocAware
DHCP-Server
dhcpd
dhcp2db
DHCP DB

# LocPriS: Visualisation Module

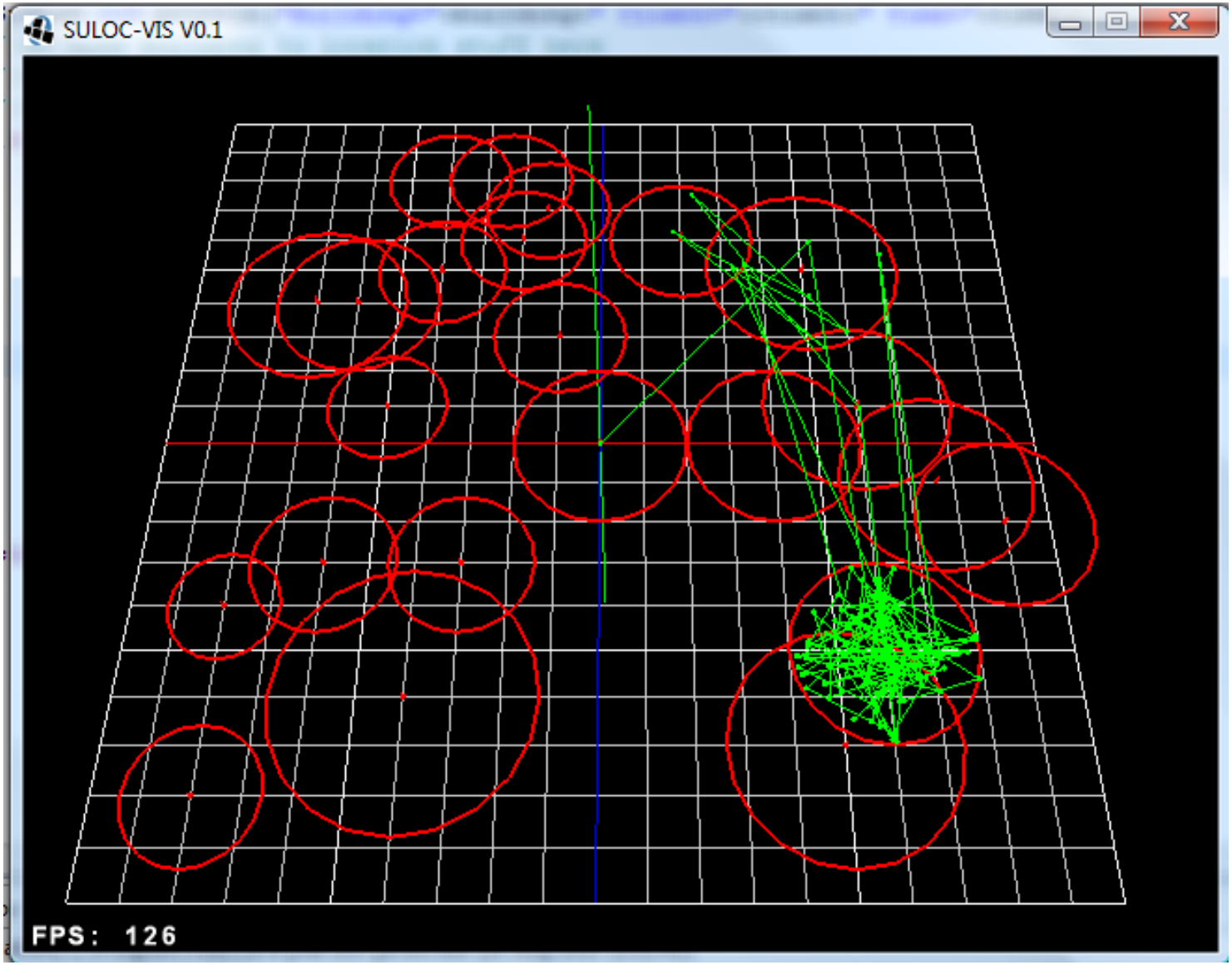
- Java, OpenGL, jME 2.0.
- 2D and 3D Visualisation.

- Visualisation allows for analysis of privacy techniques as well as development of LBS's.

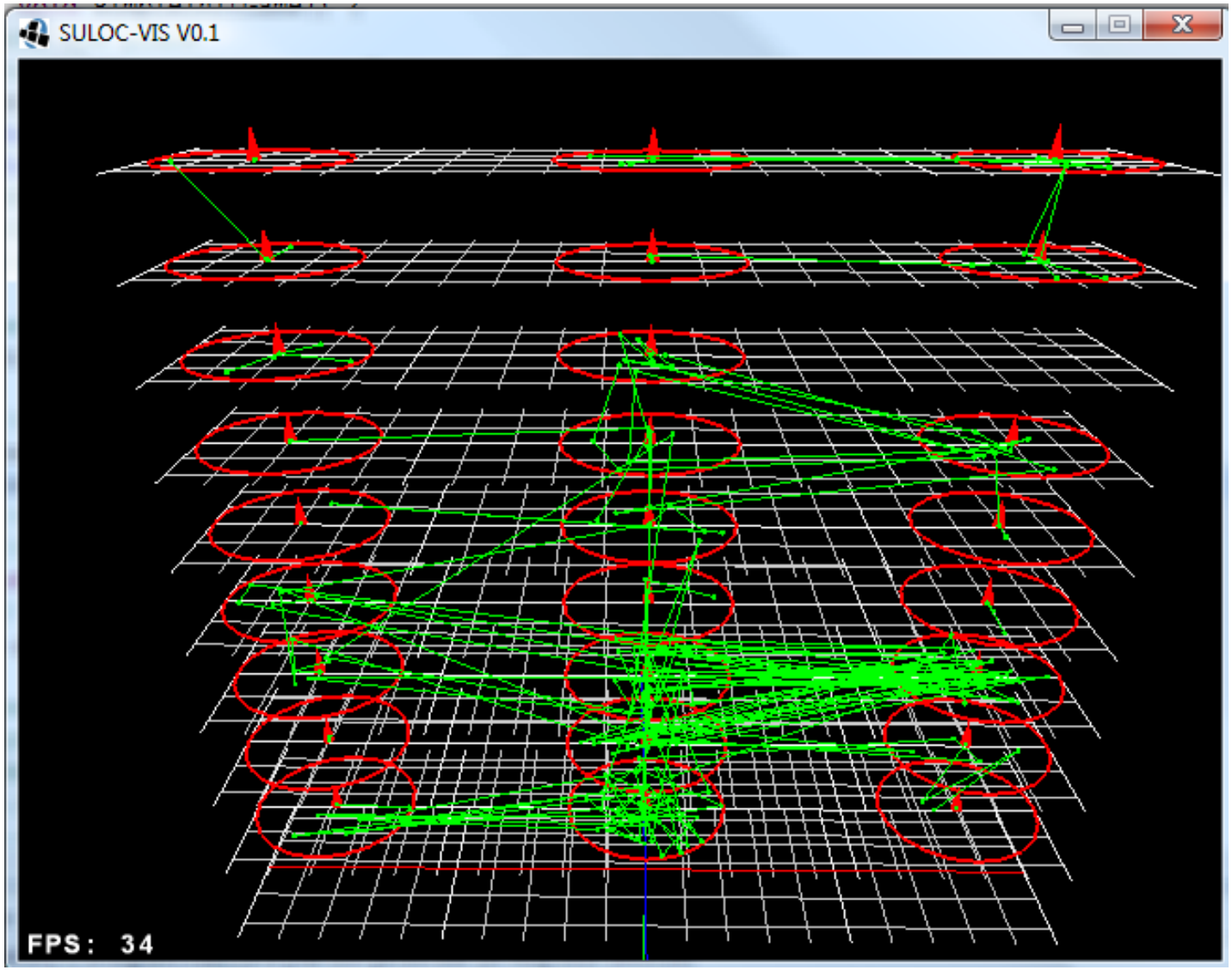
- API will allow to easy interaction with framework to build and analyse LBS and privacy and security techniques.

- Some examples of developments so far…

# Example 1: Campus 1 node, 24 Hours



# Example 2: Hall of Residence 24 Hours



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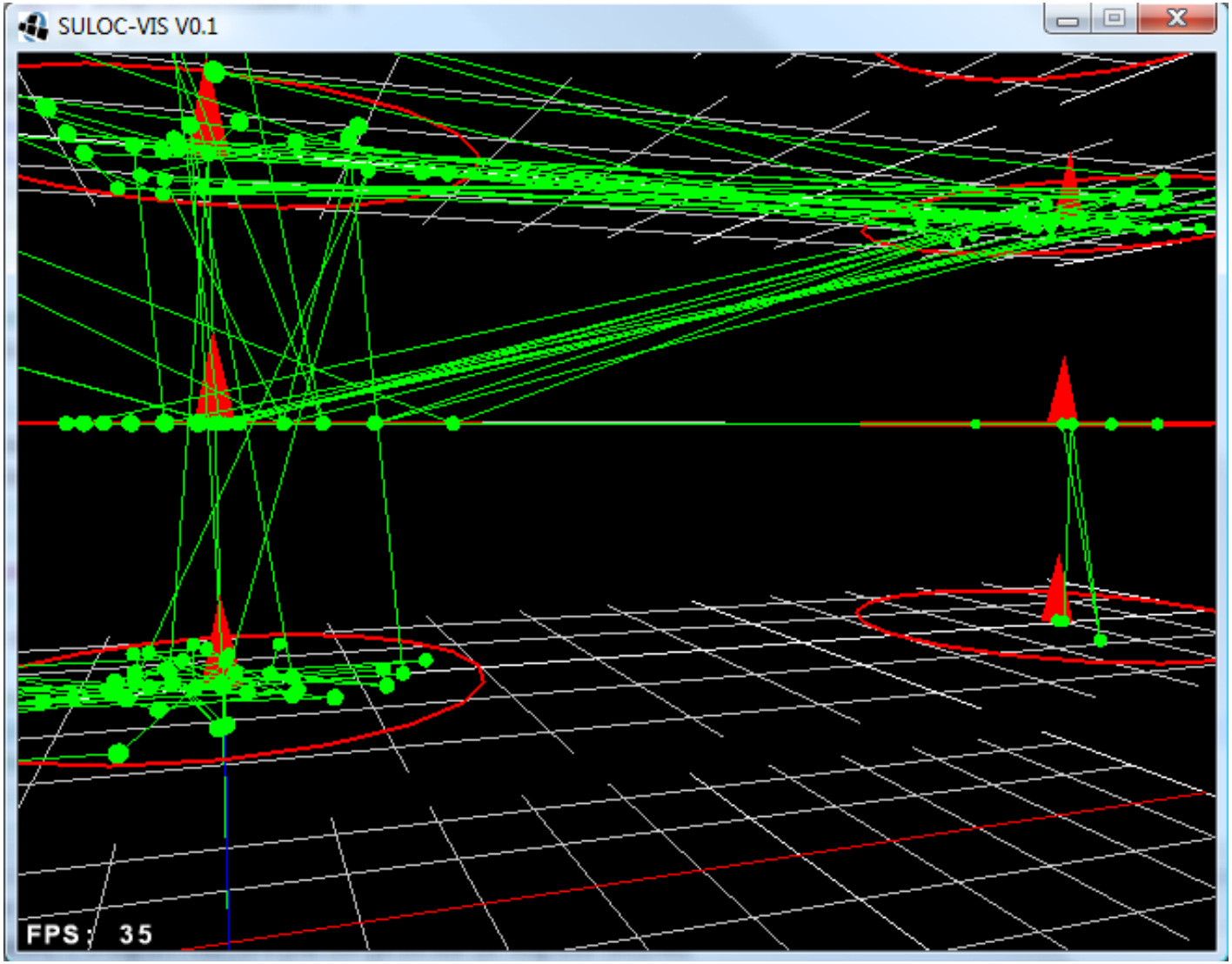

# Conclusion

- LBS becoming more popular
- Privacy important
  - Users need to be aware of privacy techniques
  - Users care about their privacy and their data
- LocPriS – Early stages
  - Hope to provide framework for development of LBS
  - Provide analysis and comparison of LBS privacy and security techniques
  - Development of new techniques

# Questions?

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