



# ADDRESSING CHALLENGES IN WIRELESS NETWORKS

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- **W**ireless **S**oftware and **H**ardware platforms for **F**lexible and **U**nified radio and network control**L**
- Call: H2020-ICT-2014-1
- Topic: ICT-11-2014 (FIRE+)
- Type of action: RIA
- Budget: 5.171 M€
- Duration: 36 M
- Partners



# Motivation

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## 'OFF-THE-SHELF' HW AND SW ARE NOT FLEXIBLE

- closed radio drivers
- limited functionality
- minor tweak or adaptation may require huge effort and cost

## SDR PLATFORMS ARE FLEXIBLE, BUT...

- lack high-level specifications and programming tools
- low performance in terms of time control

## MANY WIRELESS TEST FACILITIES EXIST, BUT...

- are located in fixed environments often limiting validity of results
- real-life prototyping and/or involvement of users is hard
- steep learning curve

# Objectives

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## 1 REDUCE THRESHOLD FOR EXPERIMENTATION in view of stimulating wireless innovation

- by building open, flexible & adaptive **software platforms** with unified programming **interfaces** for **intelligent radio and network control**
- by offering these software platforms in wireless **test facilities** that follow the de facto **standards** for testbed interoperability set by the Fed4FIRE project

## 2 TO INCREASE THE REALISM OF EXPERIMENTATION

- to offer **portable testbeds** that can be deployed at any location allowing validation in the real world and involving real users

# Objectives

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## 3 TO ATTRACT 3<sup>RD</sup> PARTIES FOR EXPERIMENTATION

- validating innovative wireless solutions
- using WiSHFUL software platforms and interfaces
- using (portable) facilities and hardware supported by WiSHFUL

## 4 TO ATTRACT 3<sup>RD</sup> PARTIES FOR EXTENSIONS

- new **software** functionality for the WiSHFUL software platforms
- new **hardware** (e.g. mmWave, full duplex radio, smart antennas...)
  - compliant with WiSHUL software platforms, at least supporting the WiSHFUL unified programming interfaces
- new **testbeds** (e.g. IoT, 5G...)
  - compliant with Fed4FIRE tools and interfaces for testbed access and experiment control
  - offering WiSHFUL software platform / interfaces

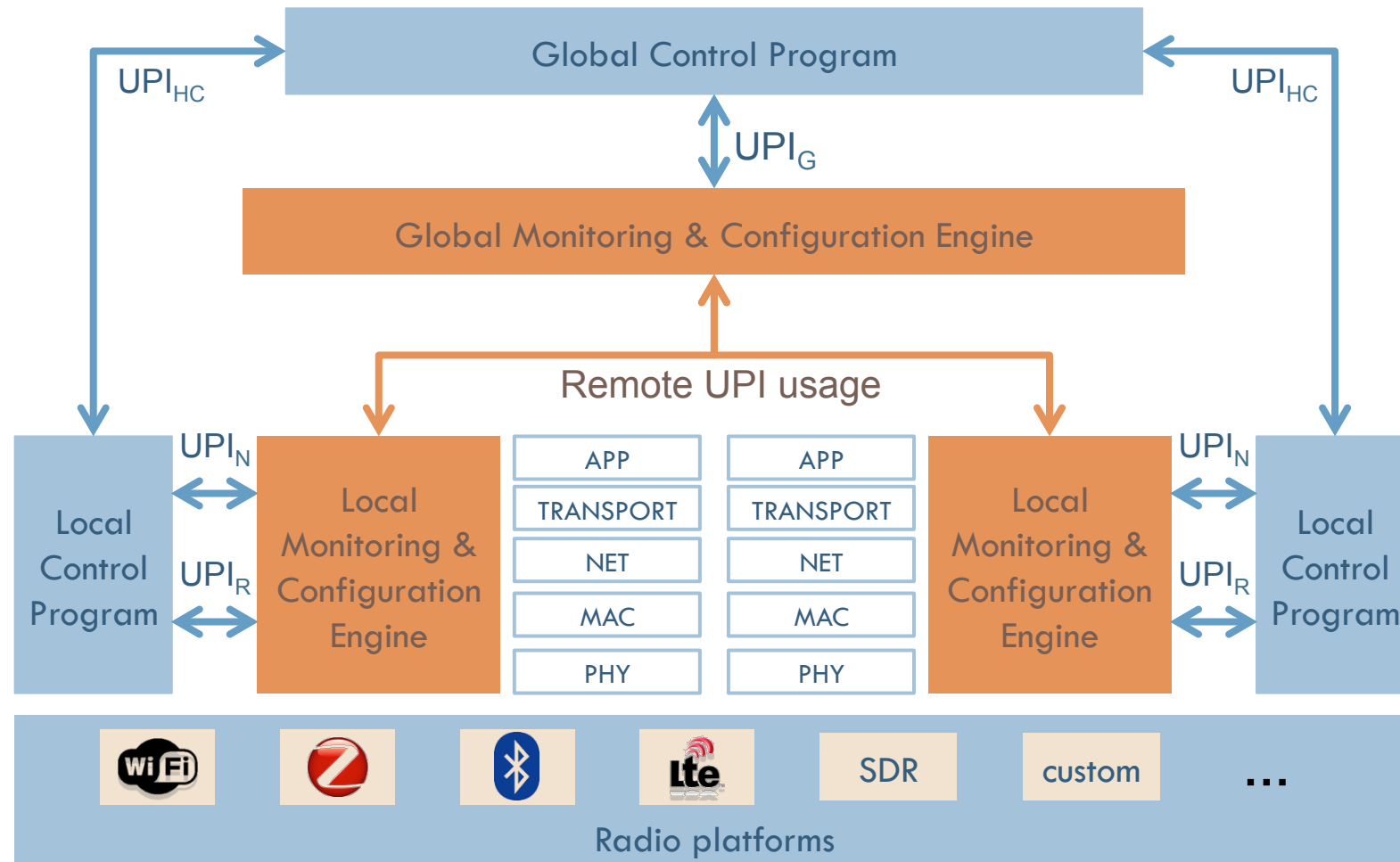
# 1 WiSHFUL software architecture

## □ TODAY

- many radio devices, each of them with specific HW and SW platform
- many implementations of protocol stacks
- non-unified, limited or no control of radio and network



# 1 WiSHFUL software architecture

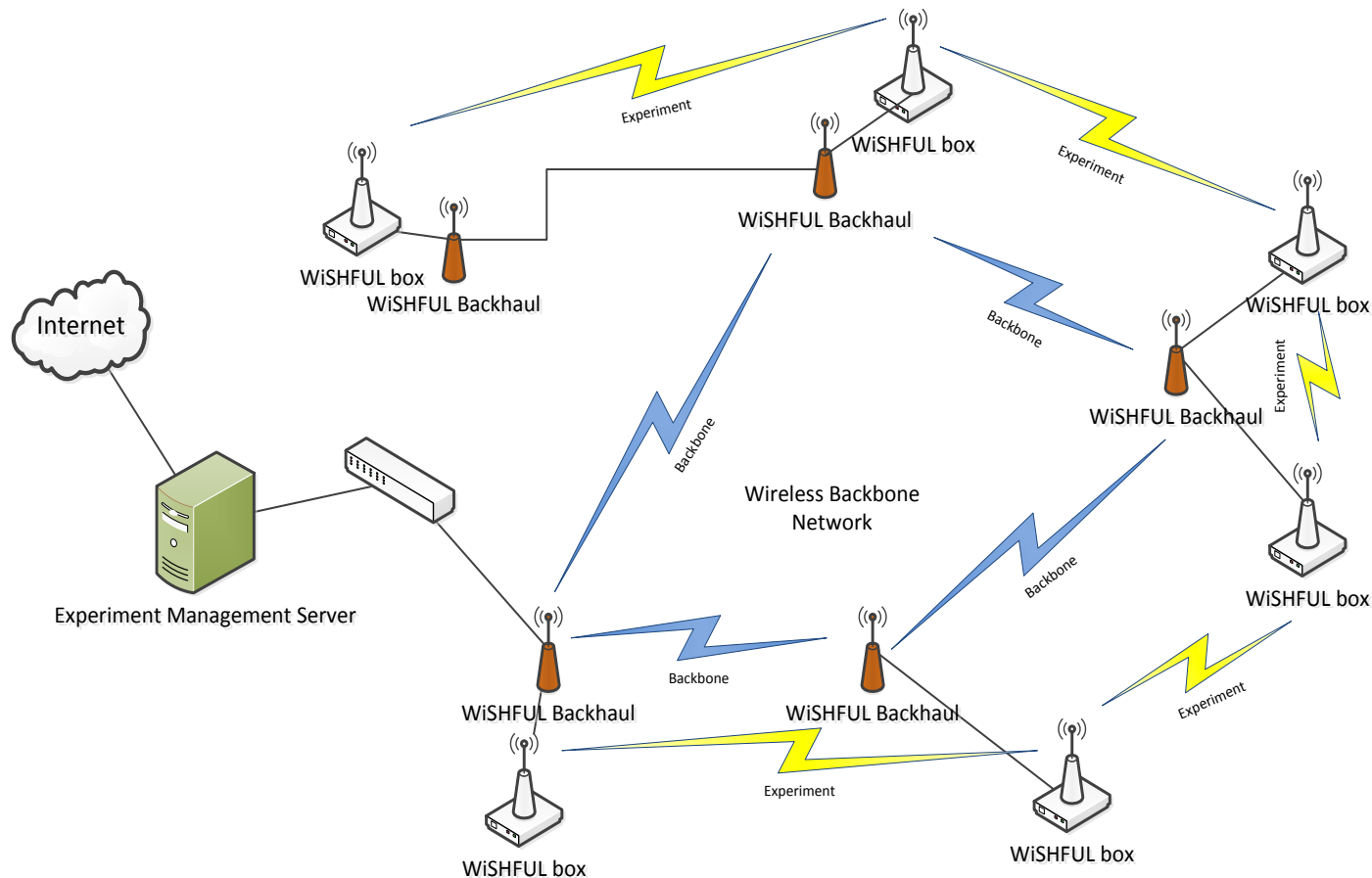


- Device specific (HW & SW platform), implemented by WiSHFUL
- Device independent (within device class), implemented by experimenter

## 2 Portable testbed

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- Portable testbed architecture
  - ▣ replace wired backbone by wireless backbone
  - ▣ same experiment control features as fixed FIRE test facilities





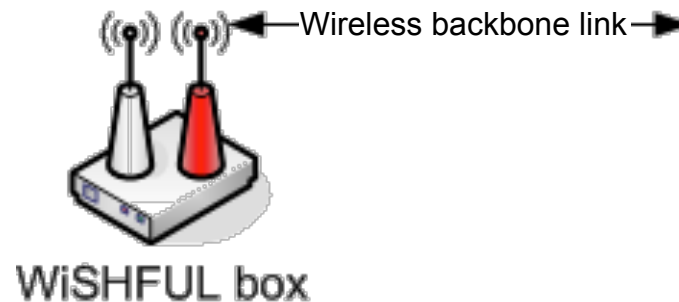
## 2 Portable testbed

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### □ Deployment options of backbone network

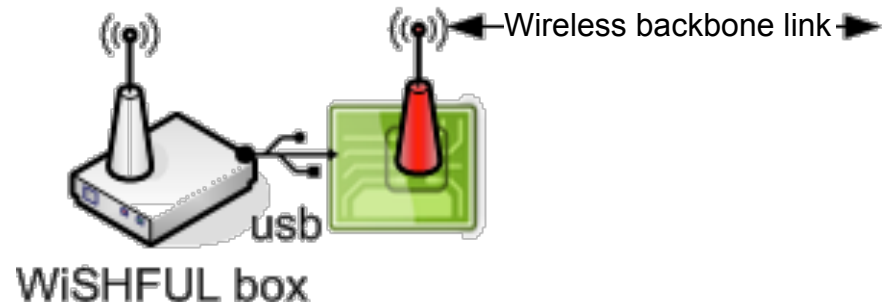
#### ▣ integrated WiFi card

- ISM band
- High bit rate



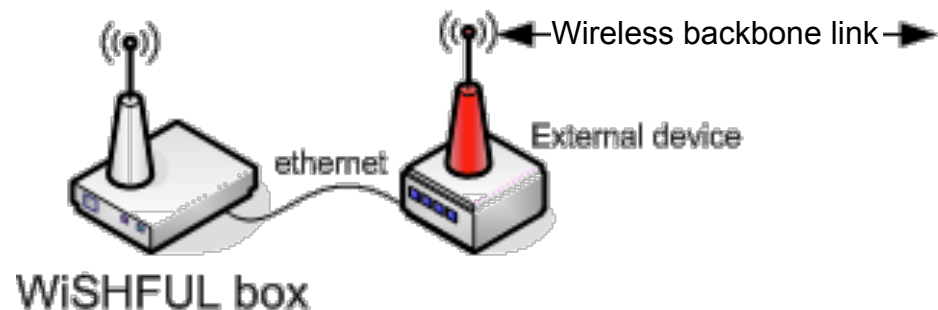
#### ▣ USB powered node

- outside ISM band
- low bit rate?



#### ▣ external device

- dynamic configuration



## 2 Portable testbed

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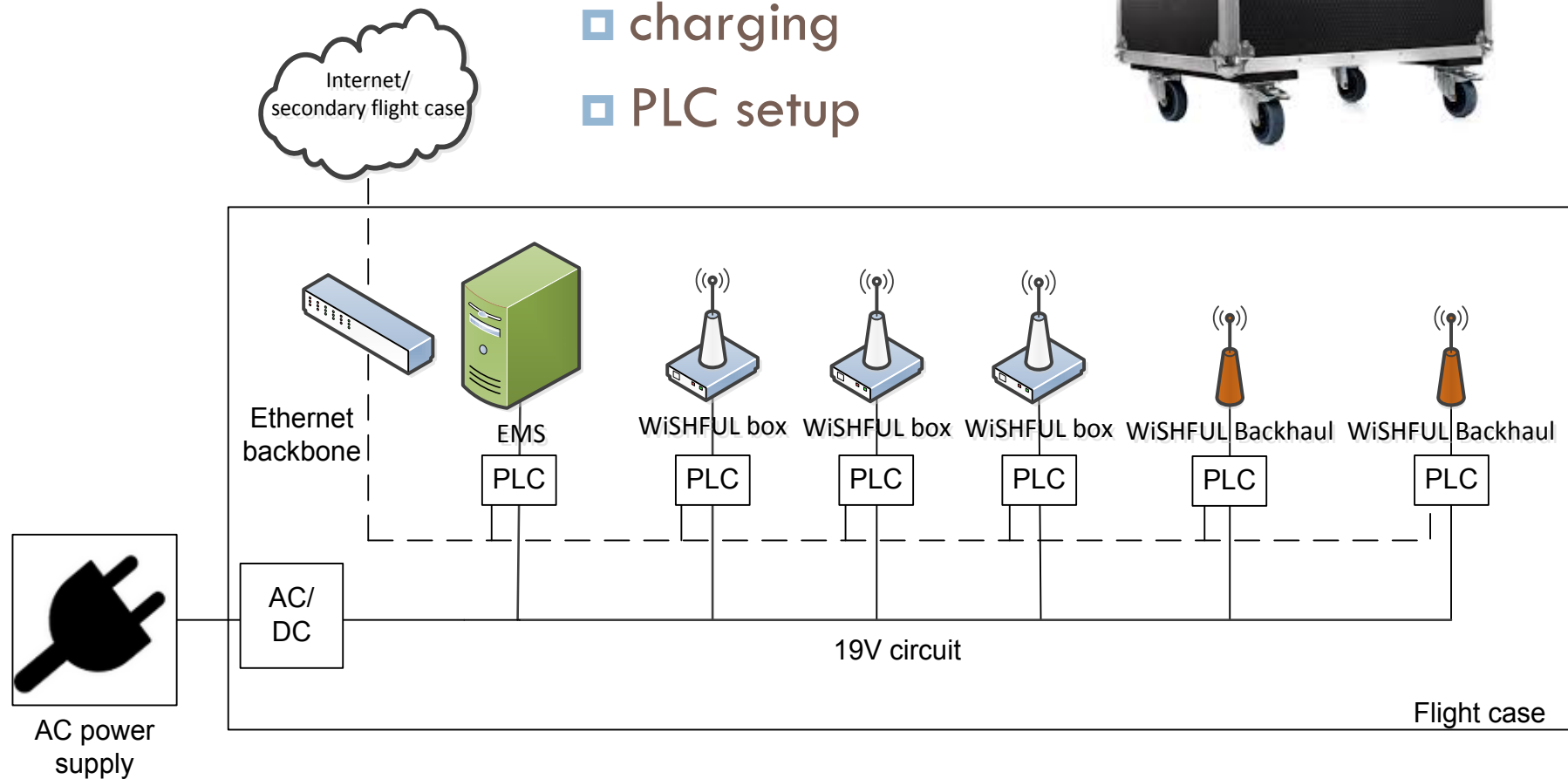
WiSHFUL

### □ Flight case

□ transportation

□ charging

□ PLC setup



# 3 Open Calls

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WISHFUL

## □ Experimentation

### ▣ 5 calls

- First call: December 2015
- 4 monthly calls

### ▣ Budget 900 k€ (180 k€ / call)

- At least 50% for individuals and SME

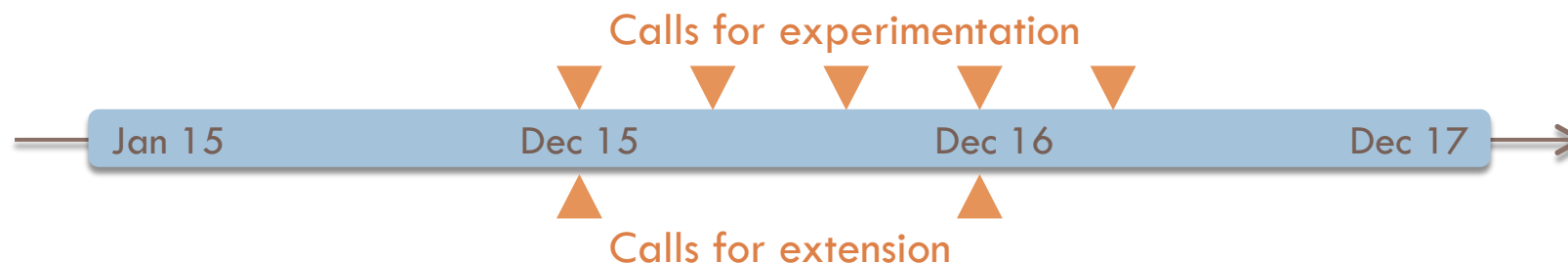
### ▣ Typical budget for a single experiment: 60 k€

## □ Extensions

### ▣ 2 calls: December 2015 & December 2016

### ▣ Budget: 450 k€ (225 k€ / call)

### ▣ Typ. budget for a single extension: 120 k€



## 4 Community Surveys

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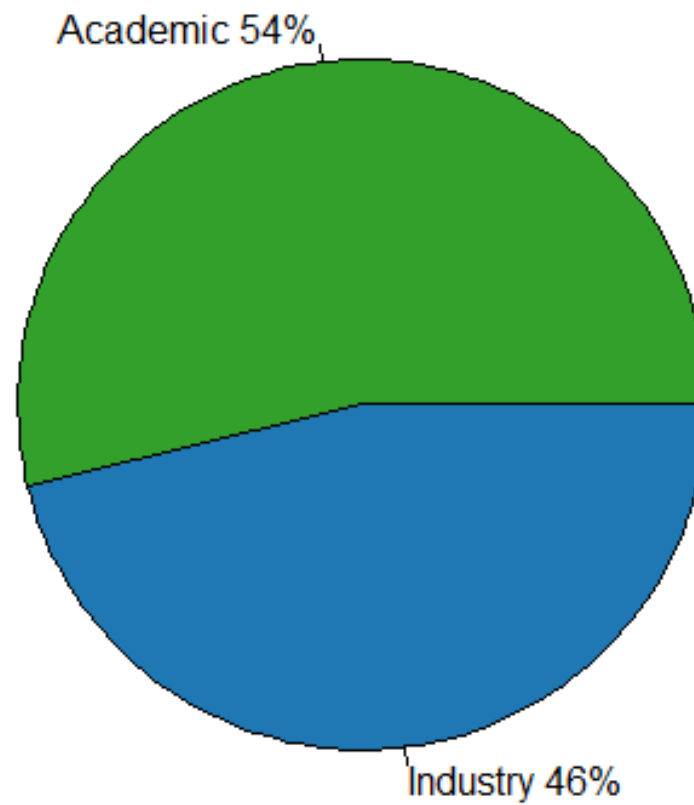
- **Goals**
  - ▣ identify willing participants using WiSHFUL platforms
  - ▣ determine current practices and limitations
  - ▣ determine desired capabilities
- **Two questionnaires**
  - ▣ one targeting Industry (12 questions)
  - ▣ one targeting Academia (10 questions)
- **Maximized quantifiable results**
  - ▣ multiple choice and ranking questions over short answer
- **Distributed through partner connections, FIRE dissemination channels, NetFutures...**

## 4 Community Surveys

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WISHFUL

### □ Responders

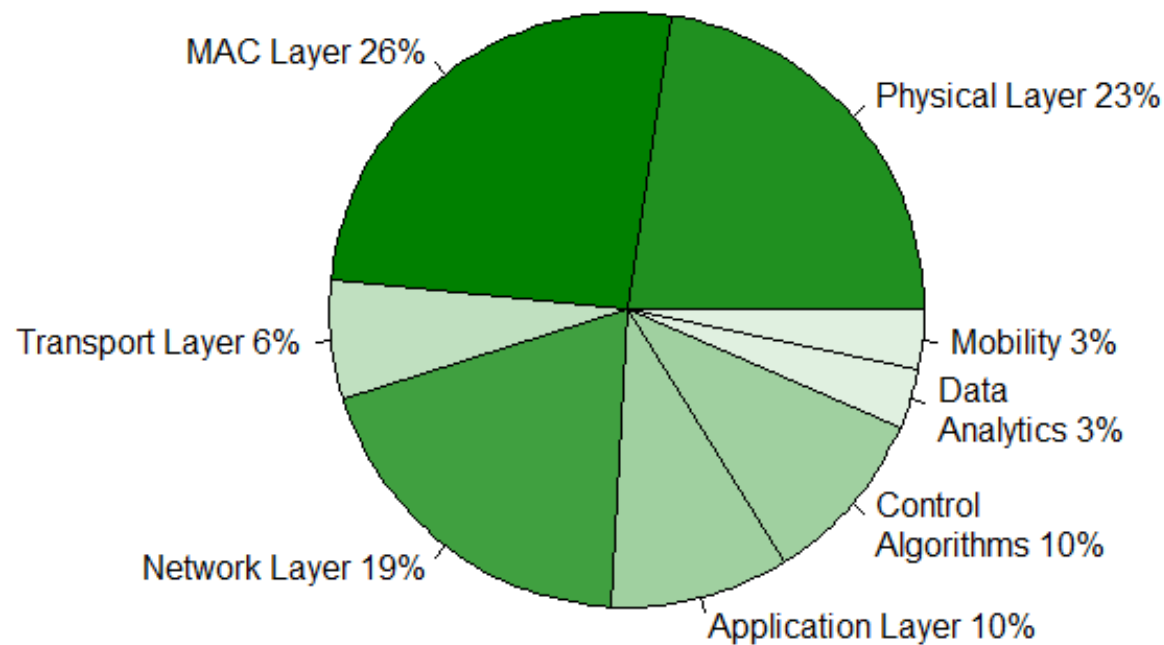


## 4 Community Surveys

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### □ Responder interests: academia

#### Academic research areas

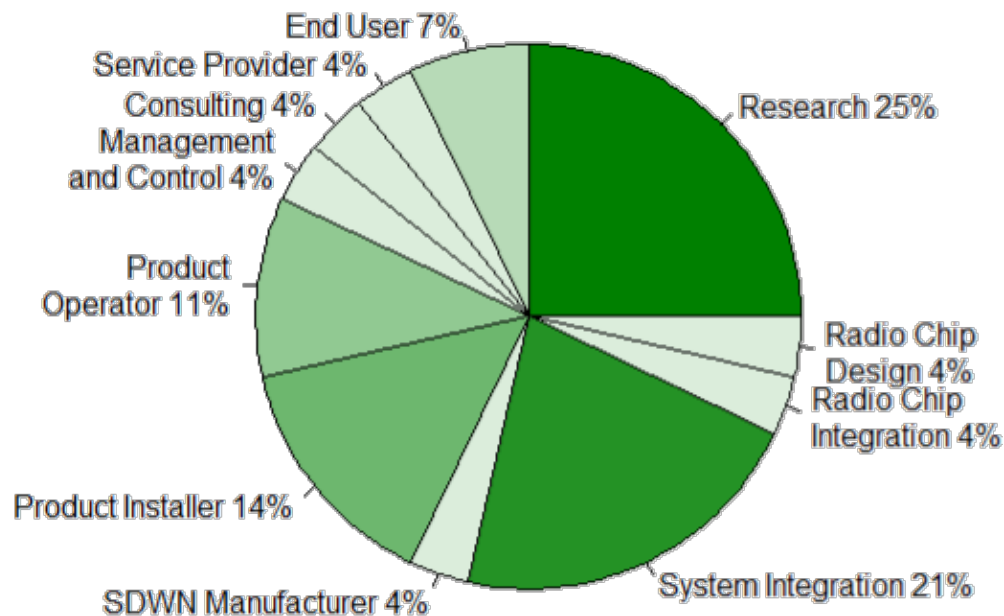


## 4 Community Surveys

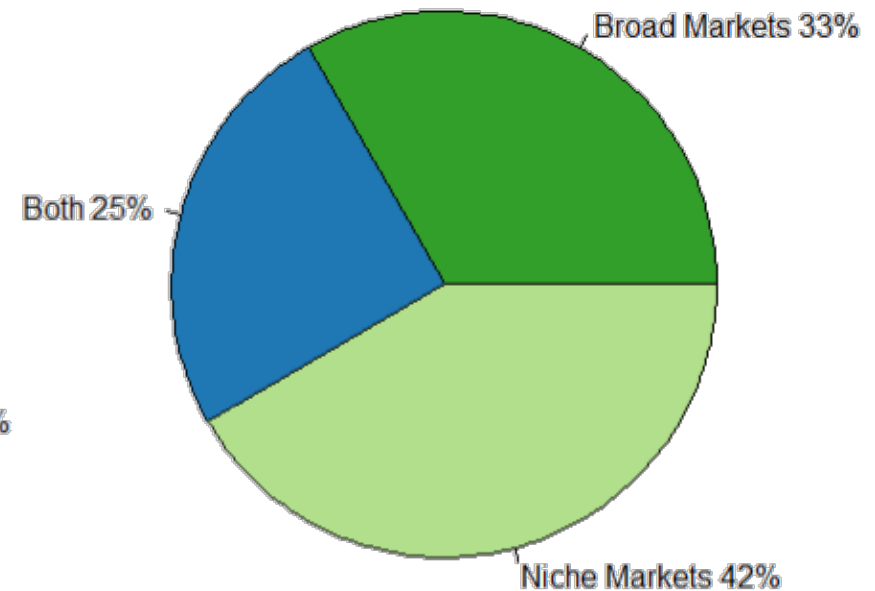
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### □ Responder interests: industry

Industry areas



Target markets

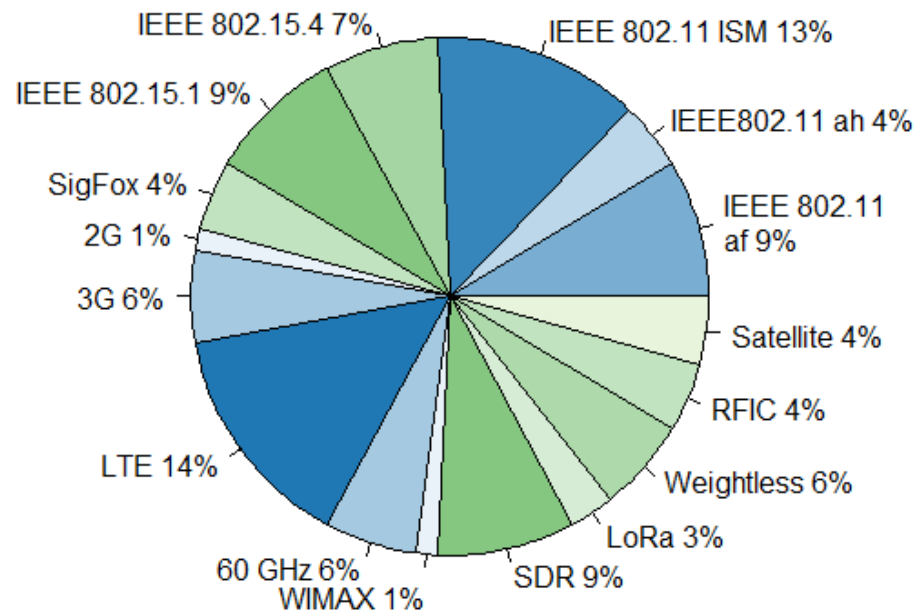


## 4 Community Surveys

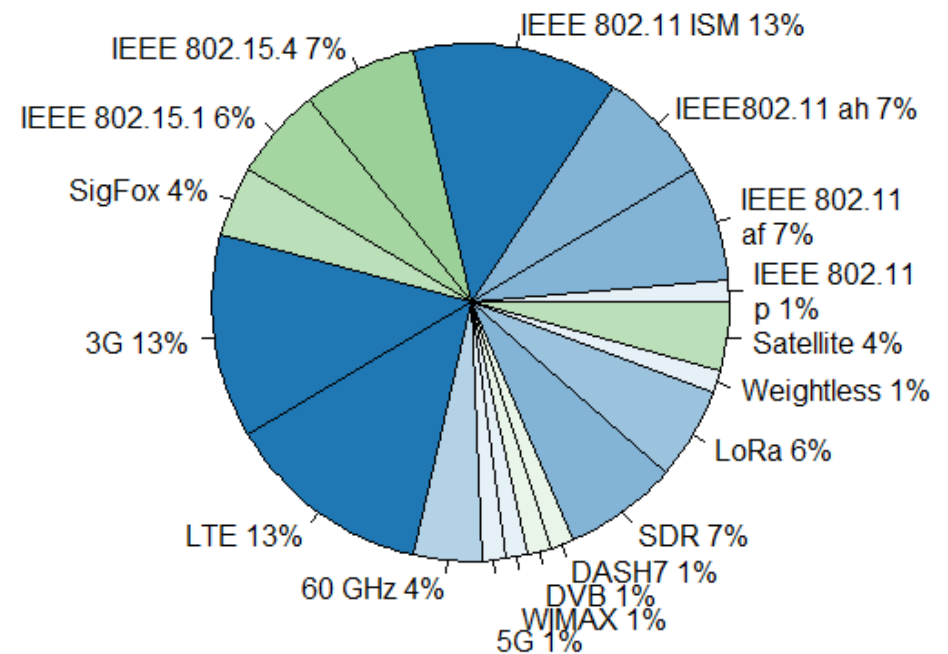
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### □ Interesting communication technologies

Academic technologies



Industry technologies

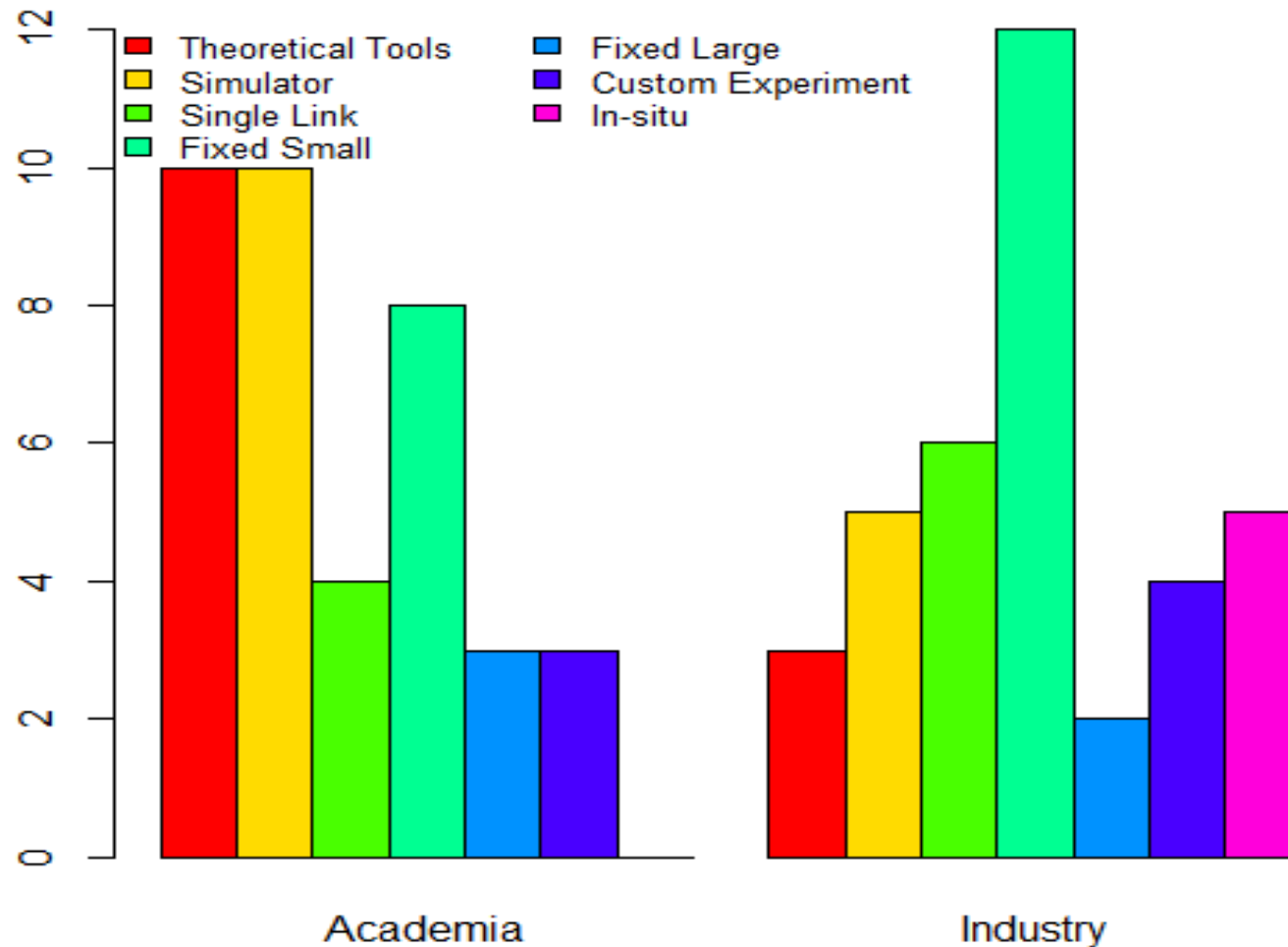




## 4 Community Surveys

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### □ Development/research methods



## 4 Community Surveys

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WISHFUL

### Constructing a wish-list for Control

#### Academia

##### □ PHY Top 3

1. Transmission Power
2. MIMO Settings
3. Modulation Scheme

##### □ Higher Top 3

1. Radio Multi-use
2. Localization
3. MAC Frame Size
4. Exact Timing (tied)

#### Industry

##### □ PHY Top 3

1. Transmission Power
2. Modulation Scheme
3. Bandwidth

##### □ Higher Top 3

1. Radio Multi-use
2. Exact Timing
3. TDMA Settings

## 4 Community Surveys

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WISHFUL

### Constructing a wish-list for Monitoring

#### Academia

- PHY Top Pick
  - ▣ Channel Conditions
- MAC Top Pick
  - ▣ RSSI
  - ▣ Frame Loss Statistics
- Network Top Pick
  - ▣ End-to-End Delay

#### Industry

- PHY Top Pick
  - ▣ SNR
- MAC Top Pick
  - ▣ LQI
- Network Top Pick
  - ▣ End-to-End Reliability

## 4 Community Surveys

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WiSHFUL

### TOPICS FOR OPEN CALLS

will be determined through community surveys

- If you plan to participate to an open call, filling out the survey is highly recommended!
- Pick a flyer with open call info at the WiSHFUL stand (No. 8)

**EUCNC** 2015

European Conference on Networks and Communications | Paris, France

# More info on WiSHFUL

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## □ Website

- [www.wishful-project.eu](http://www.wishful-project.eu)

## □ Open calls

- First open call will be launched in December 2015
- More info will be posted on the website

## □ Visit us at EuCNC exhibition!

- Stand No. 8