BLE by example

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Polidea

BLE by example

- Core Location

  - iBeacons

- Core Bluetooth

  - BLE peripherals communication

Examples

- Estimote's Beacons

  - Knoll's *r/evolution workplace™* project with *Bounce by Knoll™* app

- Texas Instruments' SensorTags

  - MCE Jitter's Prototyping fun with TI's SensorTag Workshop

iBeacons

- What is inside?

- What have we faced?

- What have we delivered?

What is inside?

What is inside?

- Core Location

- Regions identification with:

  - proximity UUID

  - major

  - minor

What is inside?

- Registering:

```
CLBeaconRegion *region = [[CLBeaconRegion alloc]
initWithProximityUUID:@"39EF98AA-3100-515B-842D-9E218FE143E5"
          identifier:@"eu.tgrf.beacons"];

[locationManager startMonitoringForRegion:region];
```

What is inside?

- Getting location:

```
- (void)locationManager:(CLLocationManager *)manager
      didRangeBeacons:(NSArray *)beacons
            inRegion:(CLBeaconRegion *)region {
    if (CLProximityNear == [beacons.firstObject proximity]) {
      // we're in!
    }
}
```

What have we faced?

What have we faced?

- Provide an app for the NeoCon conference for Knoll, utilising iBeacon technology

- Contextual information, ready to be modified from backend

- Estimote Beacons surrounded by large number of people

What have we faced?

- NeoCon event, June 9th, 2014

- North America's largest design exposition and conference for commercial interiors

- attended by over 40,000 architecture and design professionals

What have we faced?

- Knoll's *r/evolution workplace™* project

  - measuring office space utilisation

- *Bounce by Knoll™*

  - a part of *r/evolution workplace™*

  - contextual information

  - user location tracking

What have we faced?

- Polidea's office as a testing ground

  - testing in similar area

  - interoperating with other BLE devices

  - fewer people than on NeoCon

What have we faced?

What have we faced?

- Testing in the wild

  - even one person could be a problem

  - exit notification could be received after a long time

  - estimated number of Beacons will be different than used in practice

What have we faced?

- Testing in the wild

  - Proximity estimated correctly (almost) only in perfect conditions

    - Zones (far, near, immediate) as a good compromise

  - Phantom notifications about being in range

What have we delivered?

What have we delivered?

What have we delivered?

- Tricks and findings

  - Merging Beacons into groups with the same ID

  - Triggering actions after second or third "in range" notification

  - Placing Beacons over people's heads

What have we delivered?

- Results:

  - http://www.knoll.com/knollnewsdetail/revolution-workplace-knoll-at-neocon-2014

  - http://techcrunch.com/2014/06/17/estimote-knoll-partner-to-bring-ibeacons-into-office-space-planning/

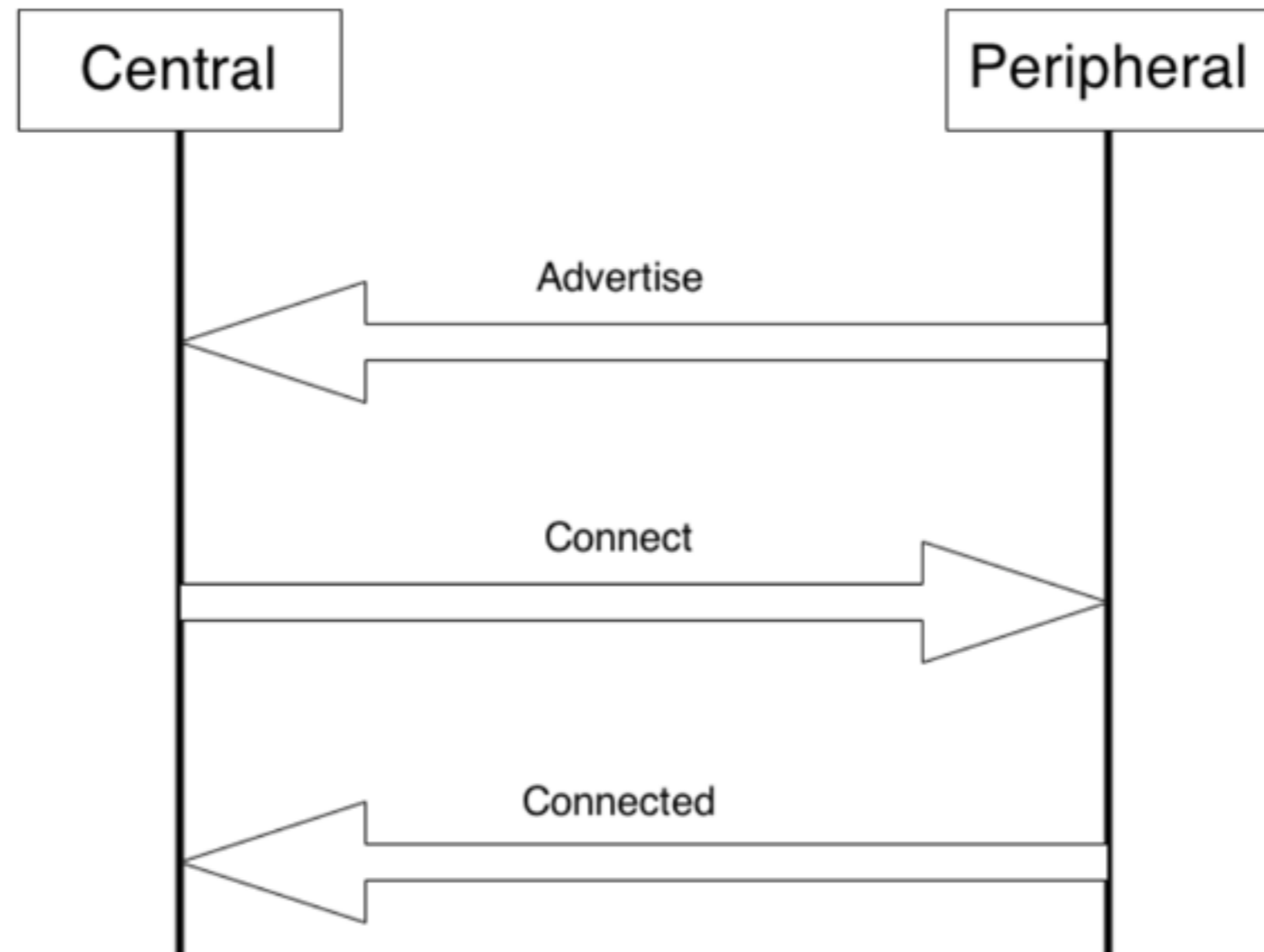 - https://itunes.apple.com/us/app/bounce-by-knoll/id882507990

BLE peripheral

BLE peripheral

- What is inside?

- What have we faced?

- What have we delivered?
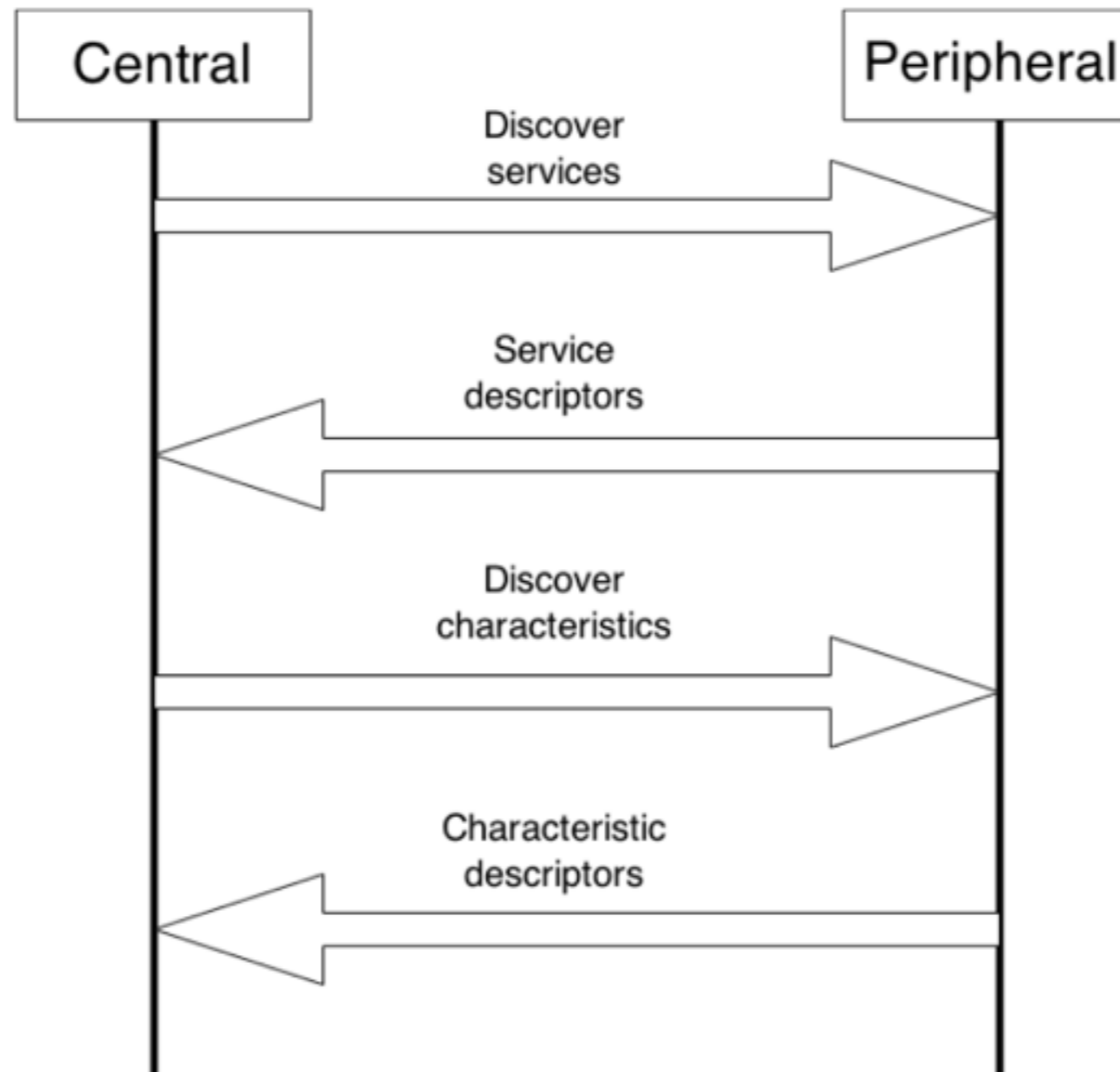
- How have we done it?

What is inside?

What is inside?

- BLE Stack - connecting

What is inside?

- BLE Stack - discovering

What is inside?

- Core Bluetooth

- iOS Bluetooth Stack

  - CBCentral

  - CBPeripheral

What is inside?

- CBCentral

  - scanning

  - establishing connection with peripheral

- CBPeripheral

What is inside?

- CBCentral

- CBPeripheral

  - discovering services and characteristics for them

  - reading and writing values to/from characteristics

What have we faced?

What have we faced?

- MCE Jitter's Prototyping fun with TI's SensorTag

  - over 40 people

  - developing their ideas into a working prototypes with TI ST

  - teaching basis of BLE and peripheral integration

What have we faced?

What have we delivered?

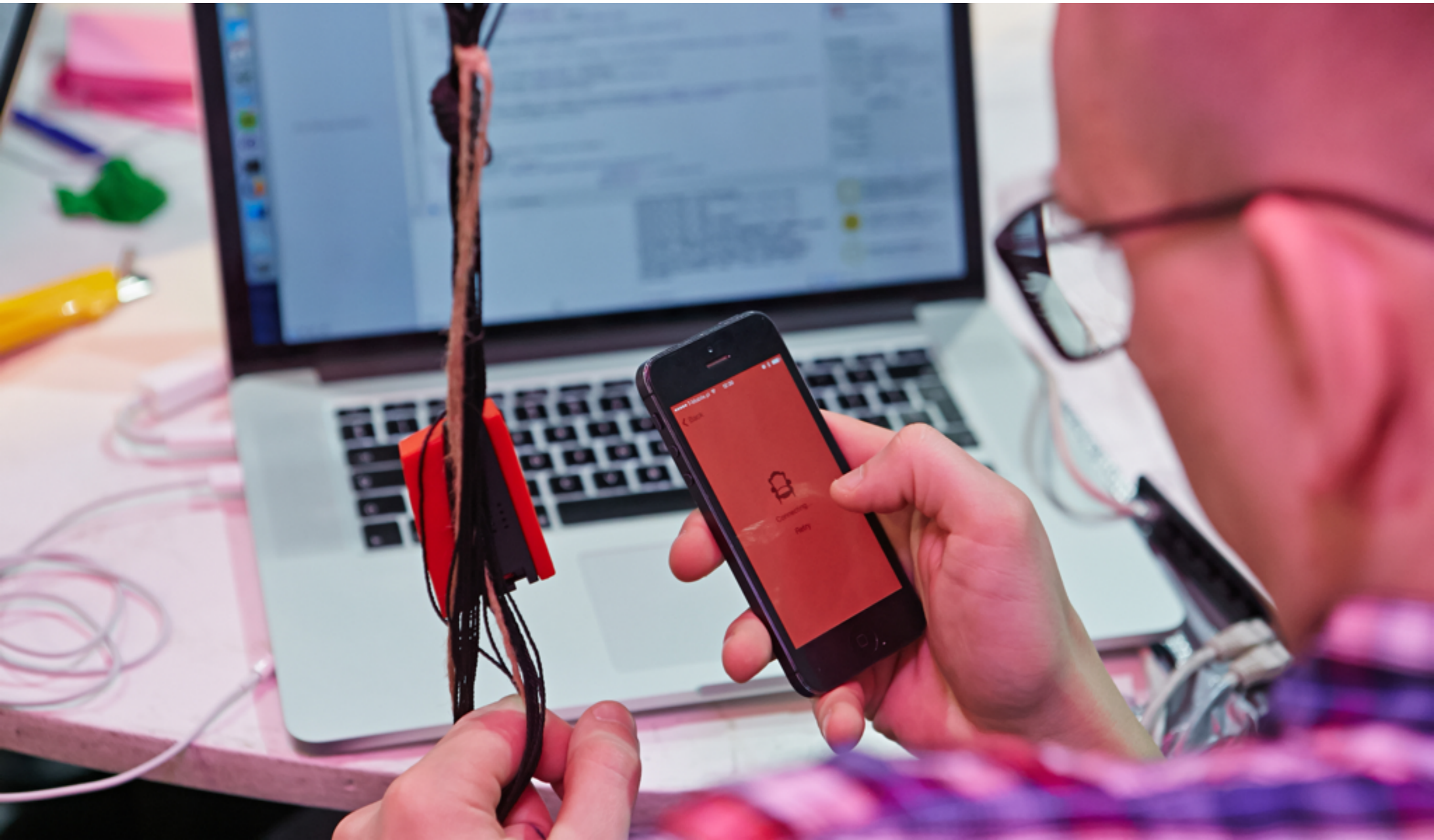What ~~have we~~ has been delivered?

What has been delivered?

What has been delivered?

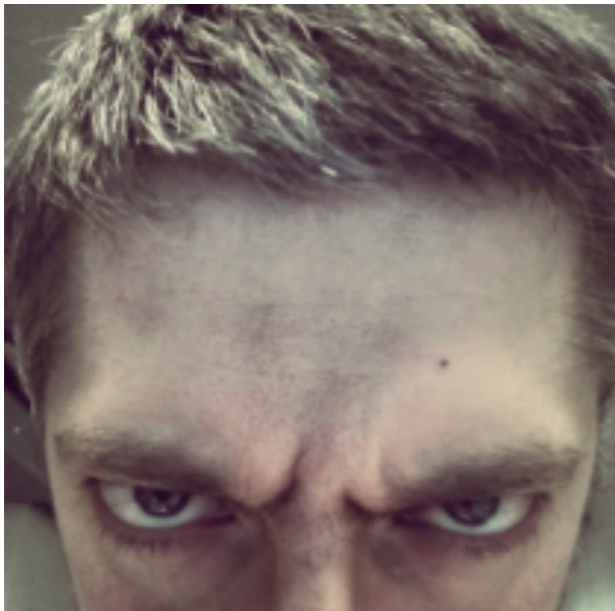# What has been delivered?

How have we done it?

How have we done it?

- Findings:

  - it's easy:

    - if you have tested it before

    - with app skeleton

  - batteries will run out of power just exactly during your show after over a year

How have we done it?

- With a great team!

Kudos

- Błażej Marcinkiewicz, @blazejmar

- Krzysiek Wróbel, @MrChrisWrobel

- Alek Piotrowski, @pelotasplus

- Przemek Pomaski

Tech details

Tech details

- https://github.com/tgrf/TISensorTag

- https://developer.apple.com/ibeacon/Getting-Started-with-iBeacon.pdf

- https://developer.apple.com/library/mac/documentation/NetworkingInternetWeb/Conceptual/CoreBluetooth_concepts/AboutCoreBluetooth/Introduction.html

- http://www.raywenderlich.com/52080/introduction-core-bluetooth-building-heart-rate-monitor

Q&A

Thanks!

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