UNIVERSITY OF PADOVA
DEPARTMENT OF INFORMATION ENGINEERING

Biomedical Wearable Technologies
for Healthcare and Wellbeing

# Advanced Topics & Research

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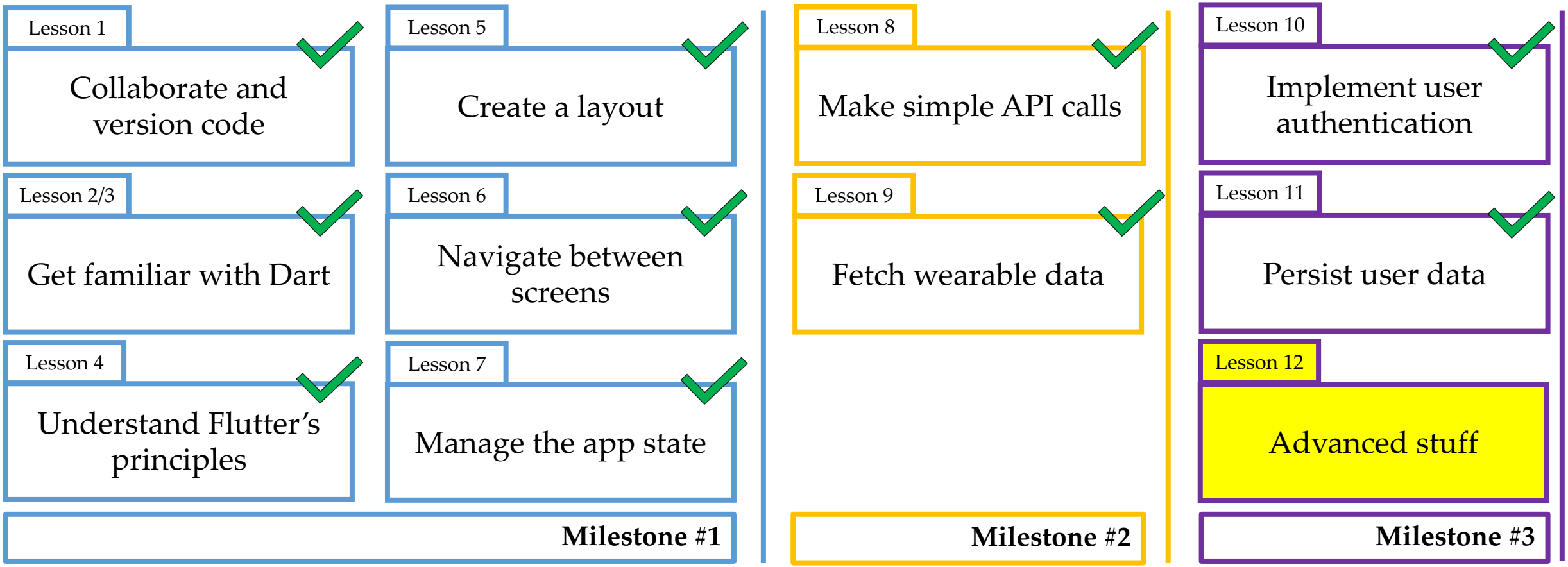
Giacomo Cappon


DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA

# Outline

- **Recap**
- Backend development
- Deployment & Flutter's future
- Research at DEI
- IMPACT
- Resources

# Recap




Do something with your fantasy

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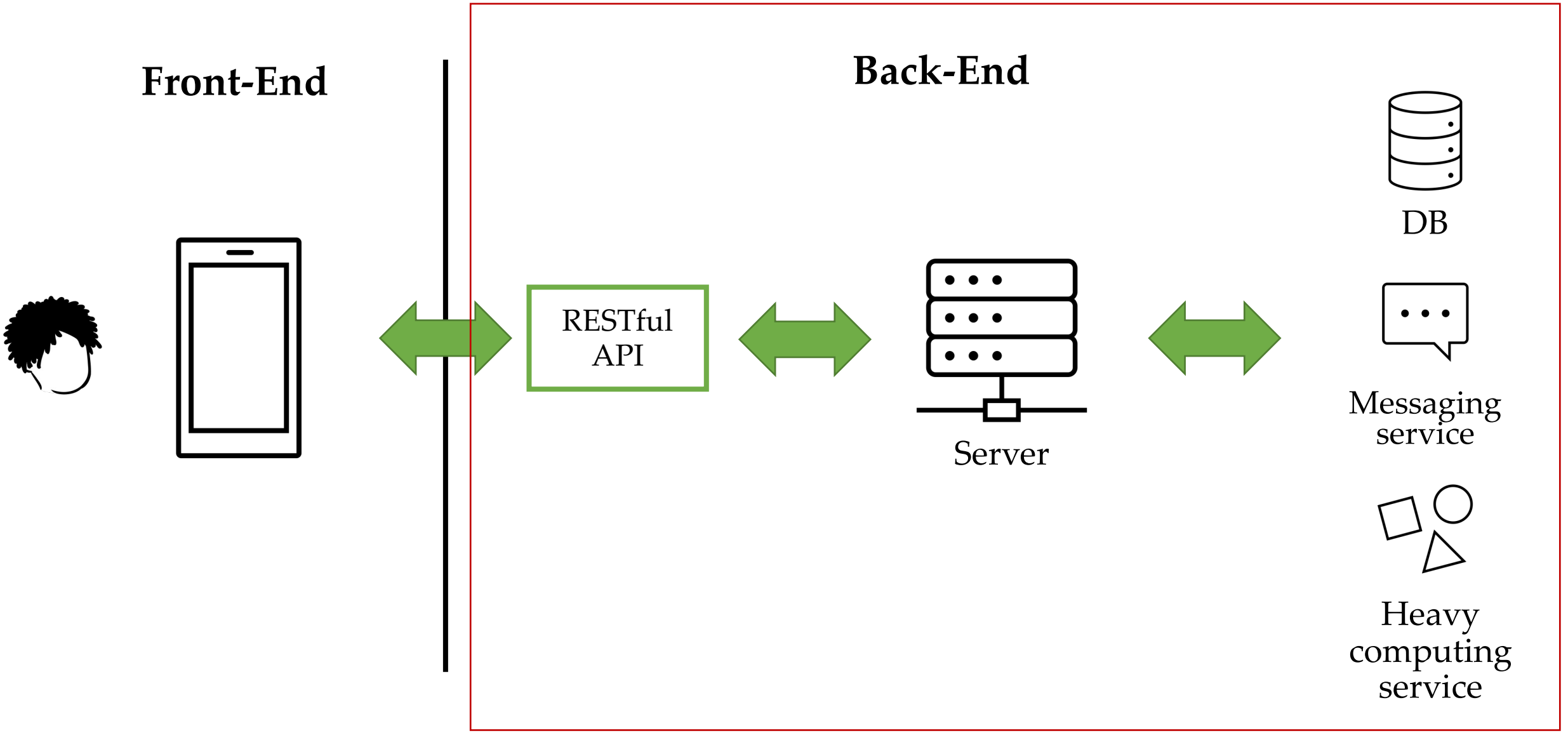
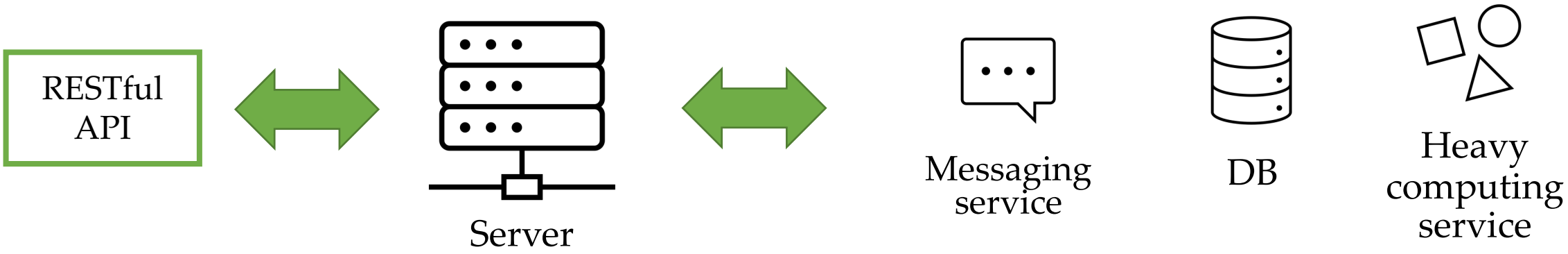
# The network flow



# Backend possibilities

- Define APIs
- Develop a custom messaging service
- Cloud storage
- Deploy heavy computing services



# Backend - How to develop one?

- The answer again is: do not reinvent the wheel, use something already developed.
- There are a lot of solutions (each based on a different programming language), you just have to choose what's the best for your needs and requirements.
- Here's some of the most popular backend frameworks:
  - Django: Python
  - Conduit: Dart
  - Node.js: Javascript
  - …



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# The last step: Deploy

- At some point, one would like to deploy the app on Apple App Store (iOS) or Google Play Store (Android)

# Deploy in Android

- https://docs.flutter.dev/deployment/android

## Build and release an Android app

During a typical development cycle, you test an app using `flutter run` at the command line, or by using the **Run** and **Debug** options in your IDE. By default, Flutter builds a *debug* version of your app.

When you're ready to prepare a *release* version of your app, for example to publish to the Google Play Store, this page can help. Before publishing, you might want to put some finishing touches on your app. This page covers the following topics:

- Adding a launcher icon
- Enabling Material Components
- Signing the app
- Shrinking your code with R8
- Enabling multidex support
- Reviewing the app manifest
- Reviewing the build configuration
- Building the app for release
- Publishing to the Google Play Store
- Updating the app's version number
- Android release FAQ

# Deploy in iOS

- https://docs.flutter.dev/deployment/ios

## Build and release an iOS app

This guide provides a step-by-step walkthrough of releasing a Flutter app to the App Store and TestFlight.

## Preliminaries

Xcode is required to build and release your app. You must use a device running macOS to follow this guide.

Before beginning the process of releasing your app, ensure that it meets Apple's App Review Guidelines.

In order to publish your app to the App Store, you must first enroll in the Apple Developer Program. You can read more about the various membership options in Apple's Choosing a Membership guide.

## Register your app on App Store Connect

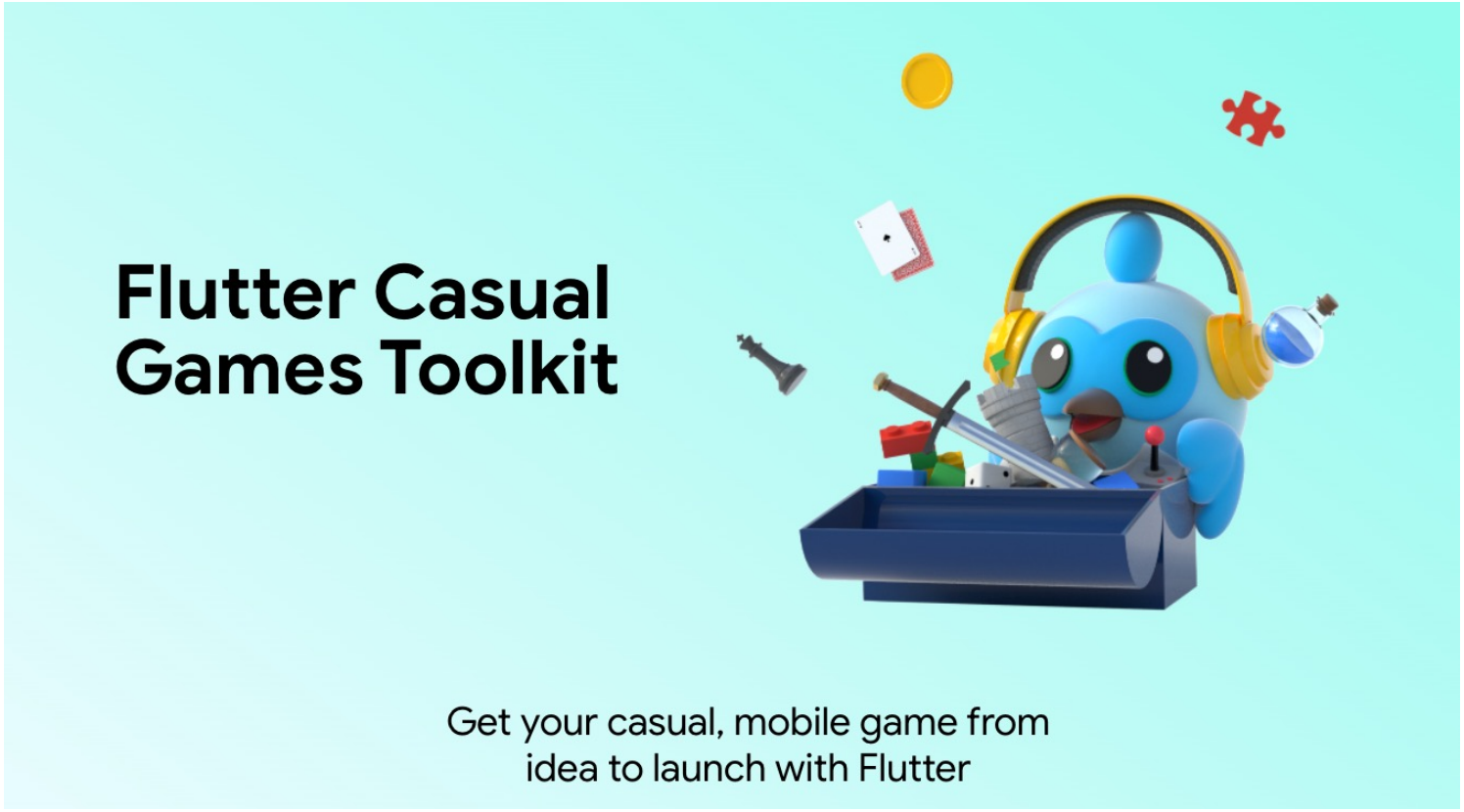
Manage your app's life cycle on App Store Connect (formerly iTunes Connect). You define your app name and description, add screenshots, set pricing, and manage releases to the App Store and TestFlight.

Registering your app involves two steps: registering a unique Bundle ID, and creating an application record on App Store Connect.

For a detailed overview of App Store Connect, see the App Store Connect guide.

# News from Flutter 3: Casual Games Toolkit

- https://flutter.dev/games



# Casual Games Toolkit

- https://docs.flutter.dev/resources/games-toolkit

## What's included

The Casual Games Toolkit provides the following free resources:

- A game template app, available in Flutter's samples repo, includes the following prebuilt features:
  - Main menu
  - Sound & music
  - Ads
  - In-app purchases
  - Achievements and leader boards
  - Crashlytics support
- A video, Build your own game in Flutter, explaining how to use the template
- Source code for a finished tic tac toe game, built using the game template, and released on Android and iOS
- A link to a Flutter Games Discord channel (use the direct link if you already have a Discord account)

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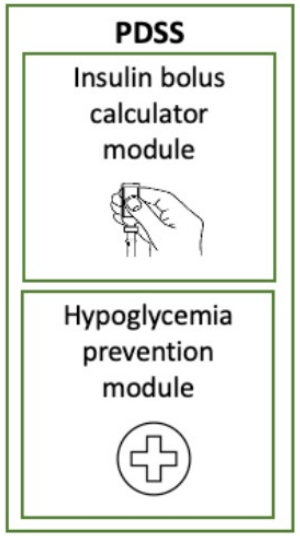
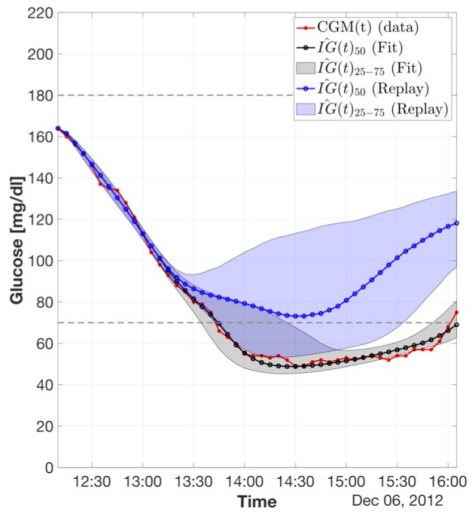
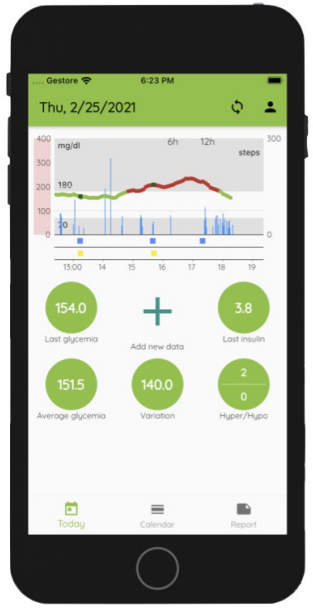
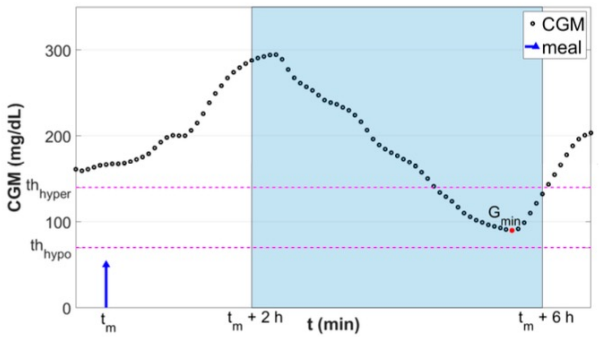
# Research @ DEI

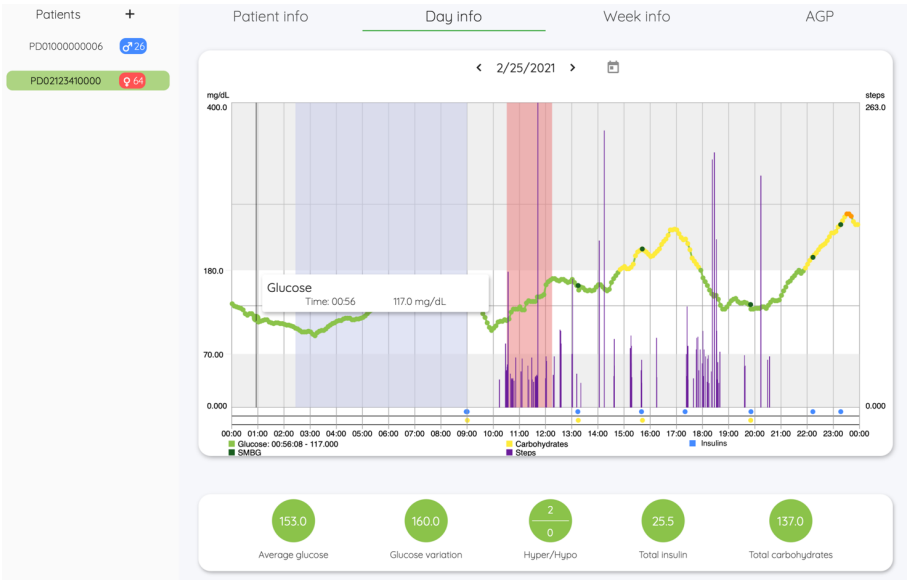
- Decision support systems
- Prediction algorithms
- Clustering and stratification strategies
- Event detection
- **Digital therapeutics solutions**
- …(much more)



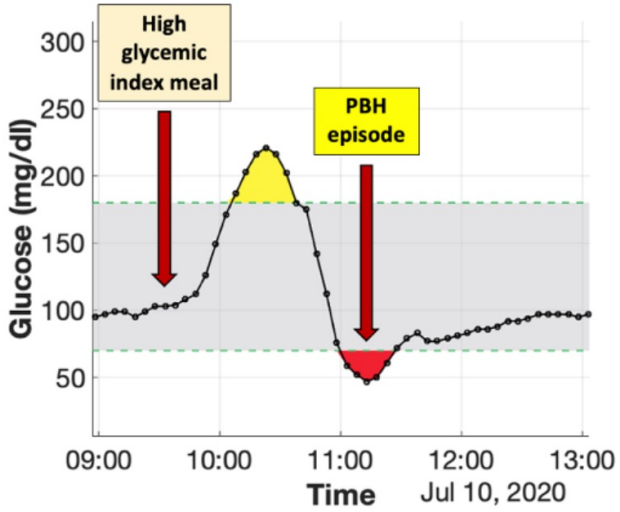



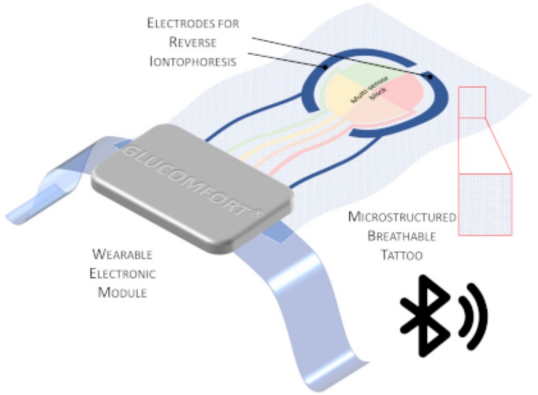



# Active projects

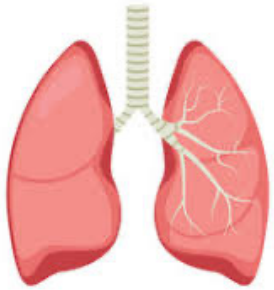
- Development and clinical assessment of a personalized decision support system for postbariatric hypoglycemia management in people who underwent bariatric surgery




- GLUCOMFORT – Development of a noninvasive tattoo-based continuous GLUCOse Monitoring electronic system FOR Type-1 diabetes individuals




- BREATHE - Big data, internet-of-things and aRtificial intelligence to study the impact of personal Exposure to Air pollution on asTHma Exacerbations



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# IMPACT Platform

- IMPACT* is a platform that will play a key role in these projects. Here's the key features:


*G. Cappon, L. Cossu, F. Boscari, D. Bruttomesso, G. Sparacino, A. Facchinetti. An Integrated Mobile Platform for Automated data collection and real-time patient monitoring in diabetes clinical trials. Journal of Diabetes Science and Technology, 2021.

# The IMPACT team

## Core Team

**Giacomo Cappon**
Post-doc fellow

**Luca Cossu**
1st year PhD student

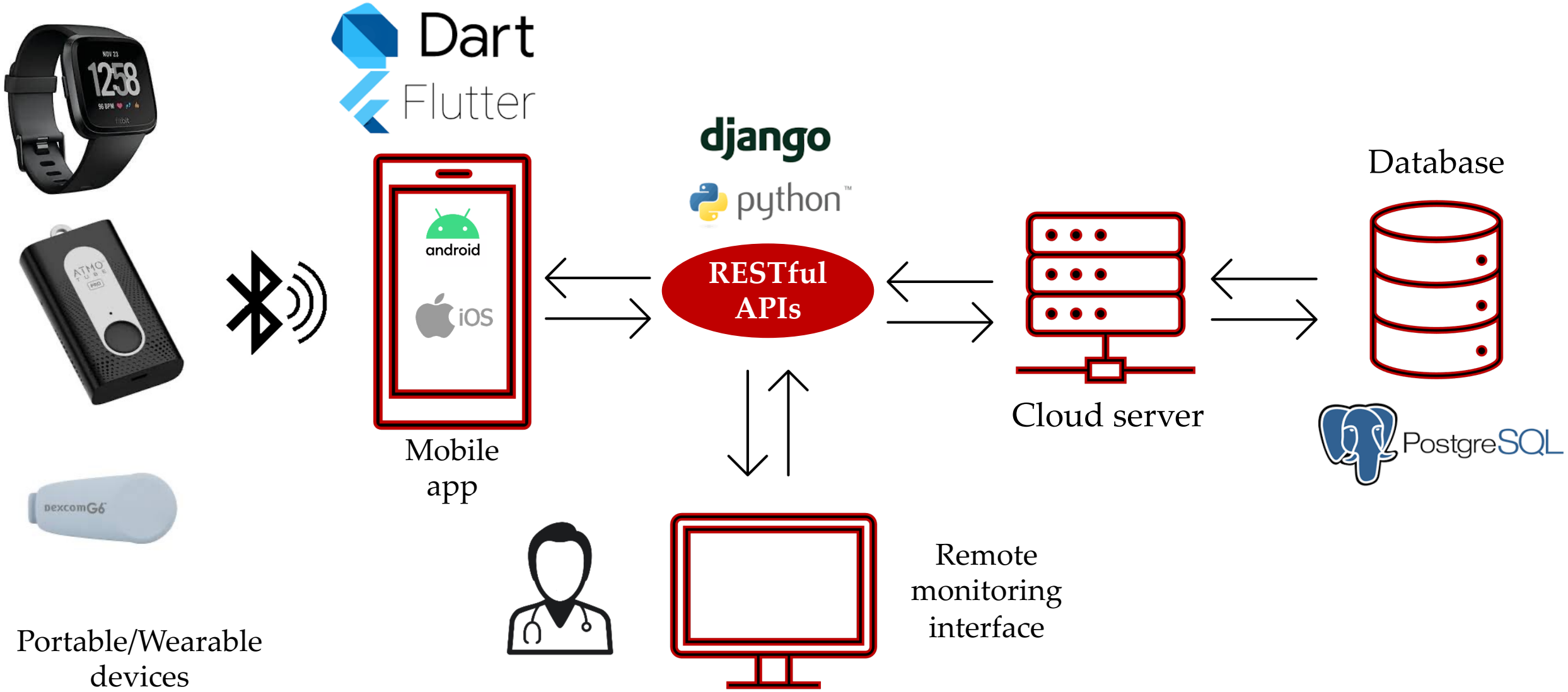
**Michele Atzeni**
1st year PhD student

## Scientific Advisors

**Andrea Facchinetti**
Associate Professor

**Martina Vettoretti**
Assistant Professor

# IMPACT structure



# IMPACT: Live DEMO

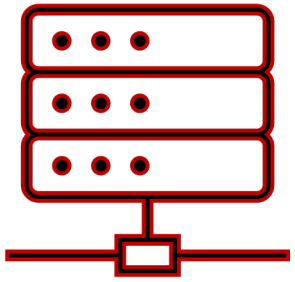

Portable/Wearable devices


Mobile app

Dart
Flutter

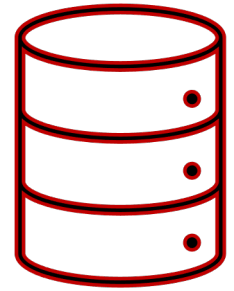
django
python

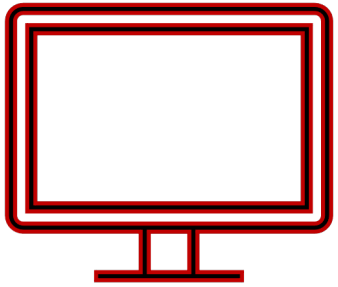
RESTful APIs



Cloud server

Database



Remote monitoring interface

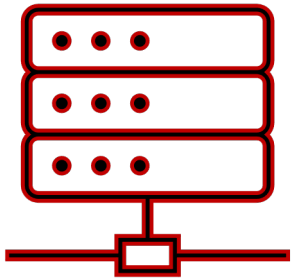
# IMPACT: Live DEMO

Portable/Wearable devices



Mobile app





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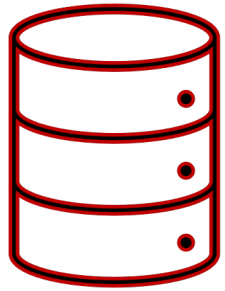
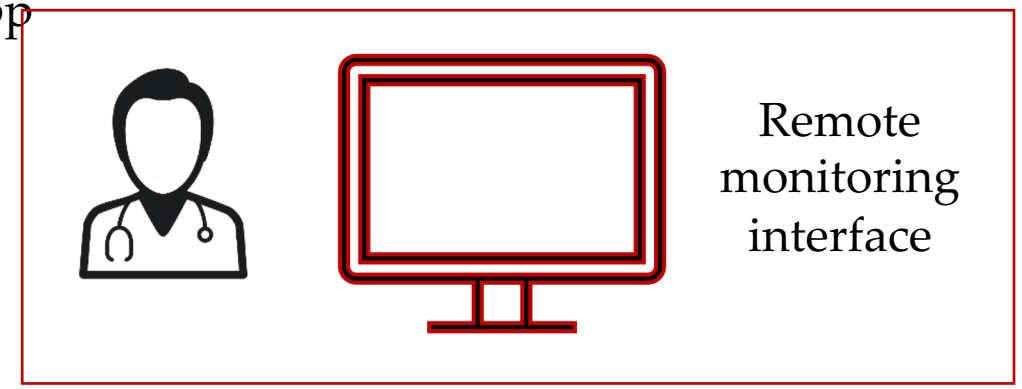


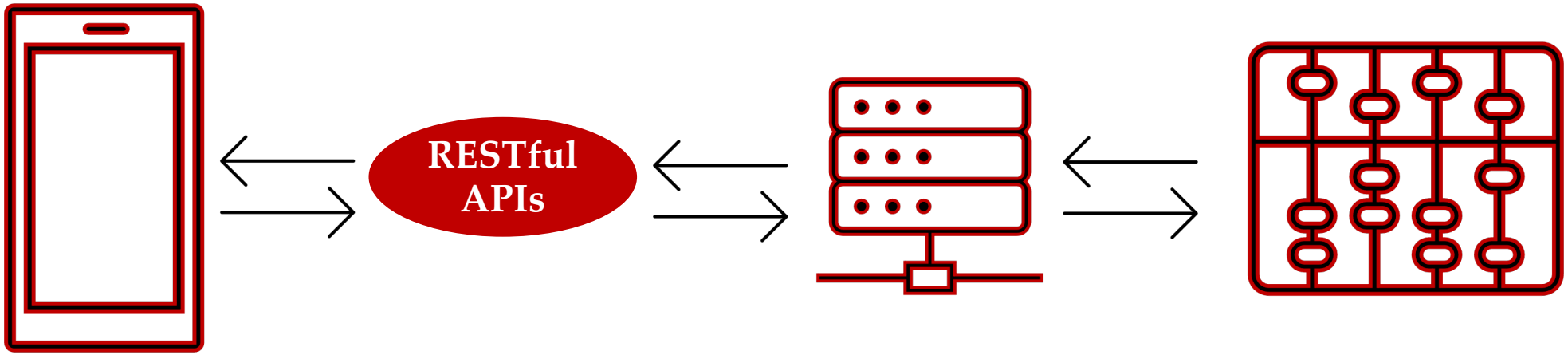
Remote monitoring interface

# IMPACT: Work to do

- Expand fitbitter and integrate it in IMPACT (difficulty: medium)
- Gamify IMPACT (difficulty: medium)
- Explore and add ”mindfulness” capabilities
- Integrate the OpenFoodFacts API
- Explore and integrate open source API of air quality
- Integrating and managing geolocation
- Study and analyzing IMPACT compliance to regulatory
- Integration of new wearable devices via Bluetooth/API
- …

# A lot more…

- **An example**: Development of Digital Tools for education in type 1 diabetes



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  - https://gcappon.github.io/files/cappon_jdst_2021.pdf