STANFORD BYERS CENTER FOR BIODESIGN

What is CardinalKit?

Overview of iOS/GCP Framework

Welcome!

cardinalkit

https://cardinalkit.org/

Oliver Aalami, MD
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Ingredients of a Digital Health App

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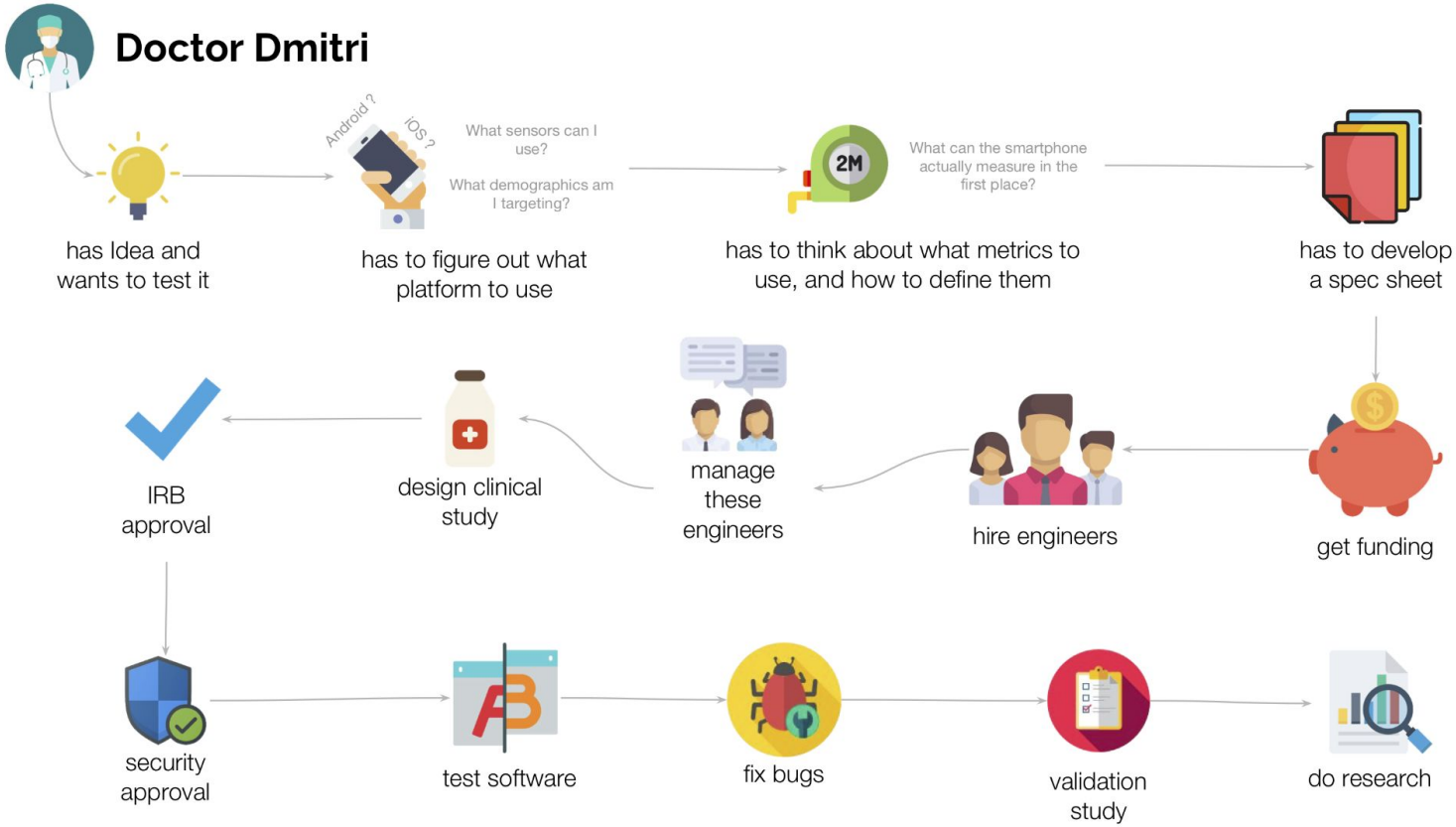

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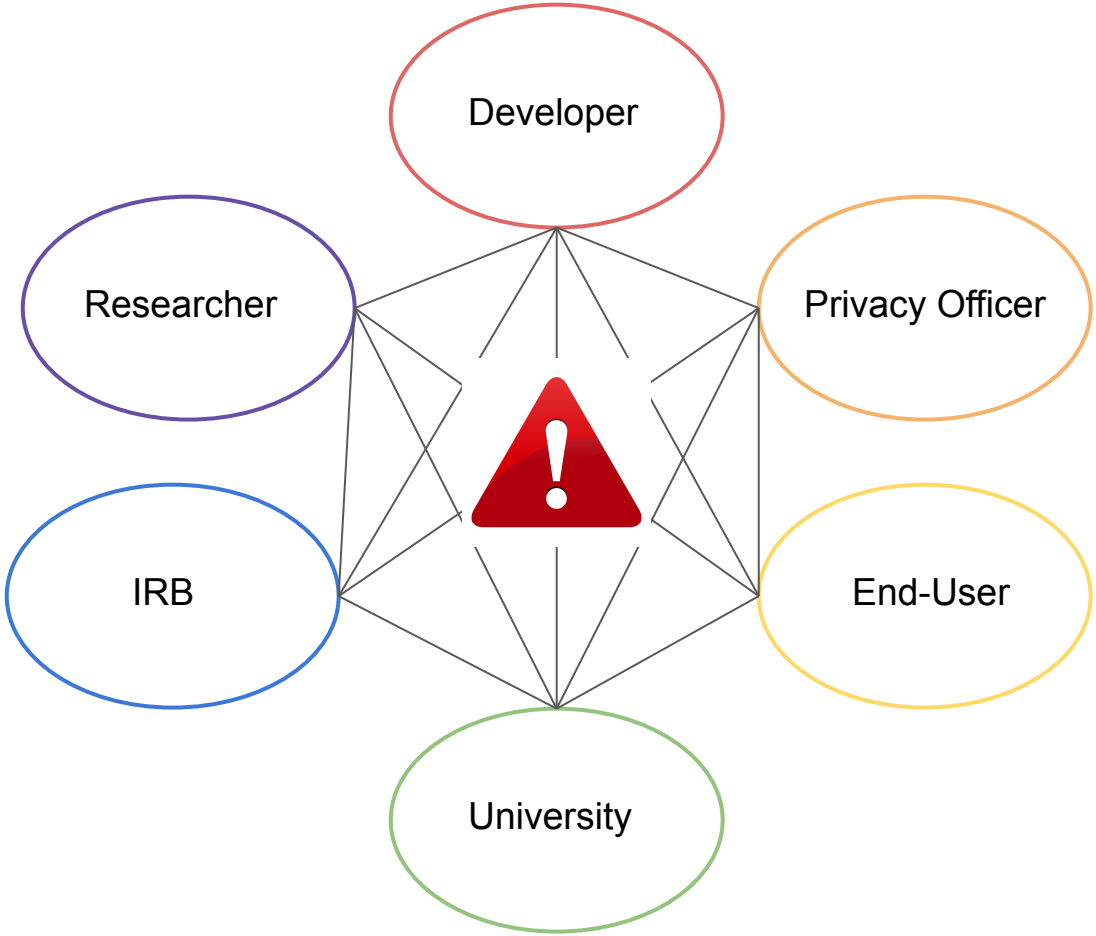
Stakeholders

Risk Management



That’s a tall order!

The road ahead is long and expensive.

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External app development budget of last app until launch

Externally outsourced

47% budget outsourced (avg.) → **$200,000** externally outsourced (avg.)

Outsourced for marketing

11% of budget outsourced for marketing (avg.) → **$47,000** outsurced on marketing (avg.)

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The road ahead is long and expensive.

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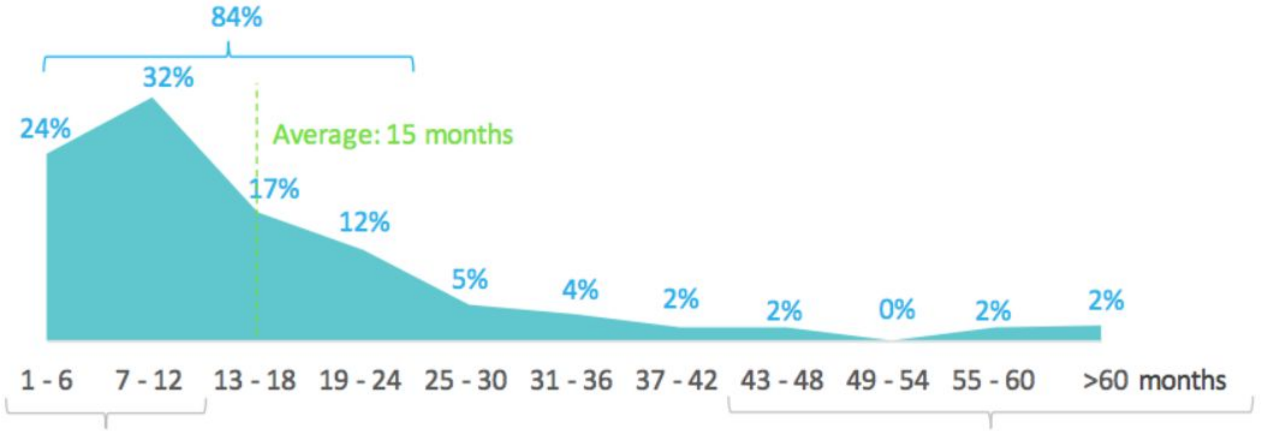
84% OF ALL HEALTH APPS NEED 2 YEARS UNTIL LAUNCH. THE AVERAGE DEVELOPMENT TIME IS 15 MONTHS.

How many months did/will you invest in the development of your last/current mHealth app until launch?



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So we built a cable-car.

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Introducing

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An Open-Source Platform & Codebase for Digital Health Research and Applications


iOS


ResearchKit


HealthKit


Firestore / SOM IT


Google Cloud

What is CardinalKit?

- Compliant starting point for **mHealth Researcher**
  - Save $150,000
  - Save 18 months development time
- leverages existing code to connect critical services
- HealthKit, ResearchKit, Bluetooth Sensor Harness
- Fork & Customize for quick iteration

mHealth Researcher

- Scalable **University IT** managed back-end
  - Access controls, low maintenance & overhead, BAA
  - Analytics
  - Staging & Production Environment

University Research IT

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The cardinalkit framework

Frontend

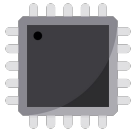

iOS

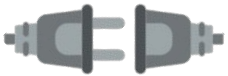

ResearchKit


HealthKit


Bluetooth


watchOS


CoreMotion
(sensors)



Backend


Google Cloud


Cloud Identity


Google
Cloud Storage


Firebase


Google
BigQuery


Cloud
Firestore

and more!

Data Pipeline and Architecture

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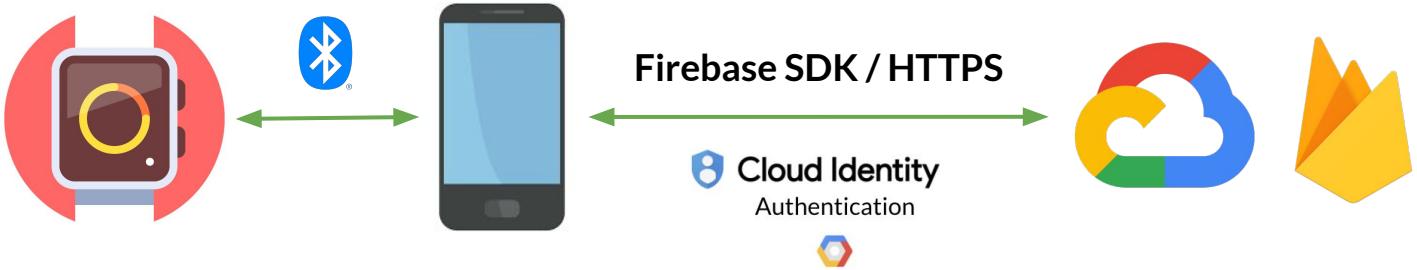

Wearables

Bluetooth pairing

iOS data encryption at rest

Two factor authentication (biometric)

Data sharing permissions

Serverless backend

Manage users and groups

Two factor authentication

GCP services (BigQuery, etc.)

Stanford MEDICINE

SOM managed instance

Custom rules / IAM

Stanford managed Two factor authentication

Own BAA

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The cardinalkit framework

Is just PART of the HIPAA equation.

The 7 Elements of HIPAA Compliance

1. Implementing written policies, procedures, and standards of conduct.
2. Designating a compliance officer and compliance committee.
3. Conducting effective training and education.
4. Developing effective lines of communication.
5. Conducting internal monitoring and auditing.
6. Enforcing standards through well-publicized disciplinary guidelines.
7. Responding promptly to detected offenses and undertaking corrective action.

Ref: https://compliancy-group.com/what-is-hipaa-compliance/

More info about Google Cloud and HIPAA Compliance can be found here:
https://cloud.google.com/security/compliance/hipaa

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Shared Responsibility Matrix

	Server	Mobile App iOS	Patient	Team
Security Rule	Data Encryption at rest	Data Encryption at rest / in flight		BAA
	Data center / infrastructure / operations security standards - annual security audits			HIPAA training
Privacy Rule	2-factor authentication	Data Access Permissions	Obtain consent to collect and share data	Access Controls
Breach Notification Rule	Breach Notification			Breach Notification

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Developer

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Shared Responsibility Matrix

	Server	Mobile App iOS	Web App	Patient	Team
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Breach Notification Rule	Breach Notification				Breach Notification

CardinalKit Developer University IT

@ Stanford
Partner with University Research IT

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https://med.stanford.edu/mhealth.html

@ Stanford
Partner with University Research IT

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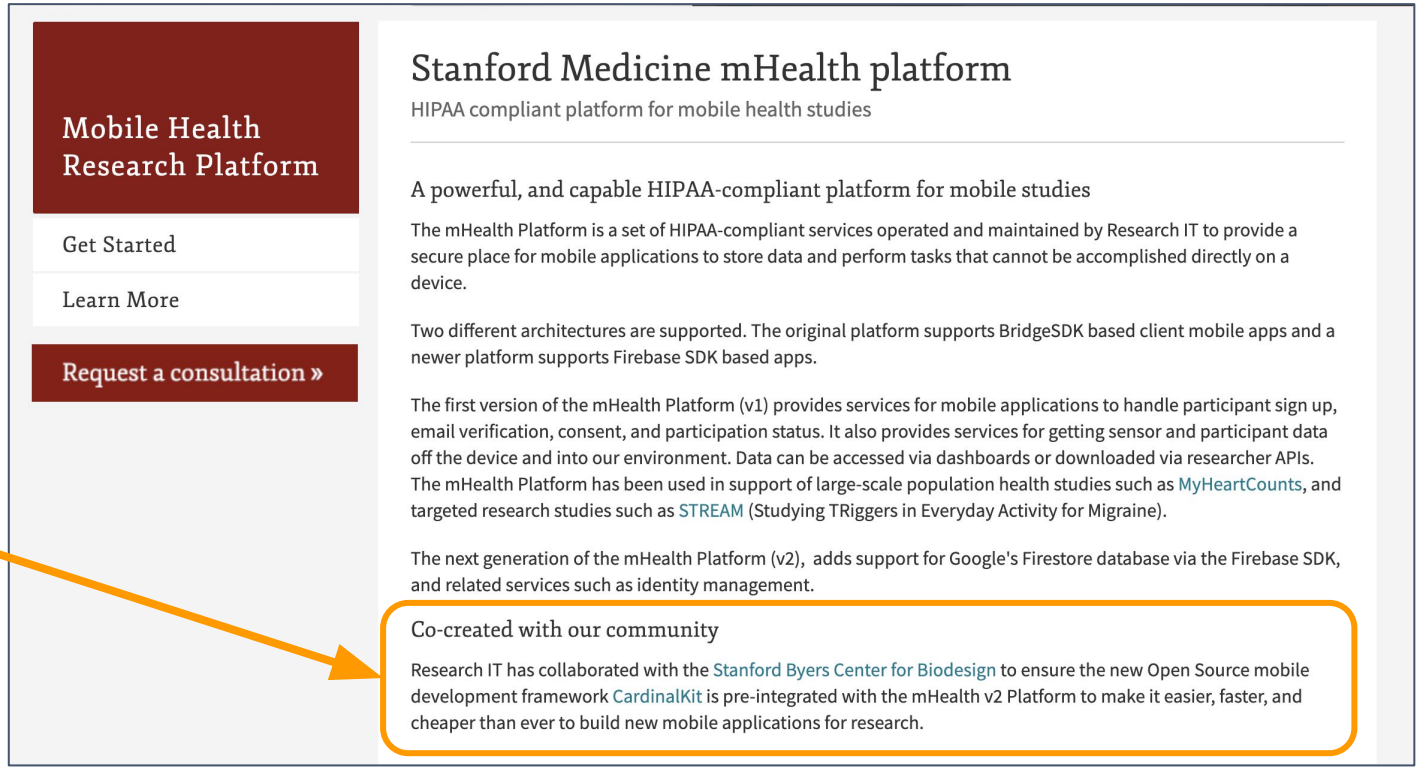

TSA Pre™

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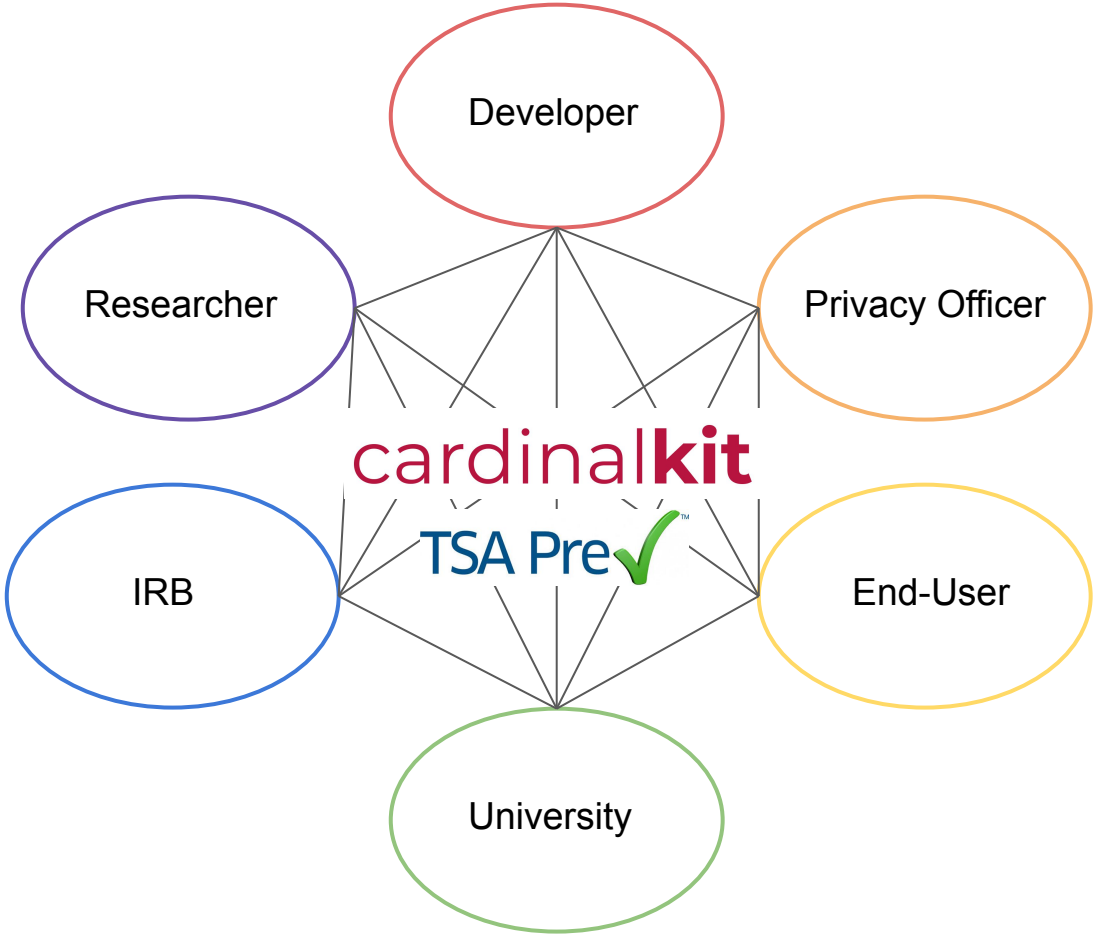
https://med.stanford.edu/mhealth.html

Catalyst


Developer
Researcher
Privacy Officer
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TSA Pre
IRB
End-User
University

Recap

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Saves you 18 months of design and development
Saves you $150,000 in development cost

What you get:

- Basic Application to start with
- 2FA Authentication
- Modern and scalable architecture
- Secure GCP schema
- Data pipeline and integrity (heart rate, steps, activity etc.)
- Informed Consent
- HIPAA - ready (compliance involves more than code)
- Community of mHealth developers
- Native HealthKit, CareKit integration
- Open mHealth mobile/wearable data interoperability
- FHIR data store

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Thank You!

Contact Info:
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Data Pipeline and Architecture

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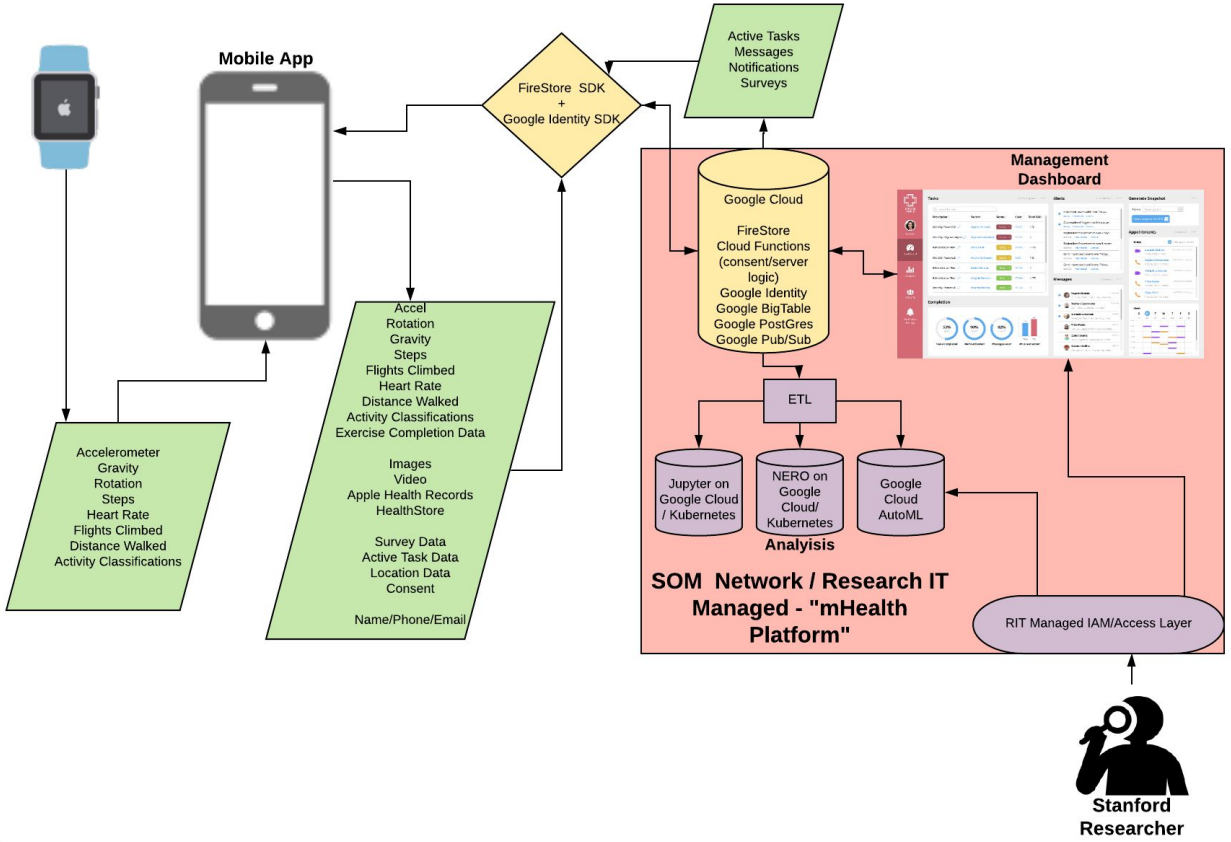

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Data Pipeline and Architecture

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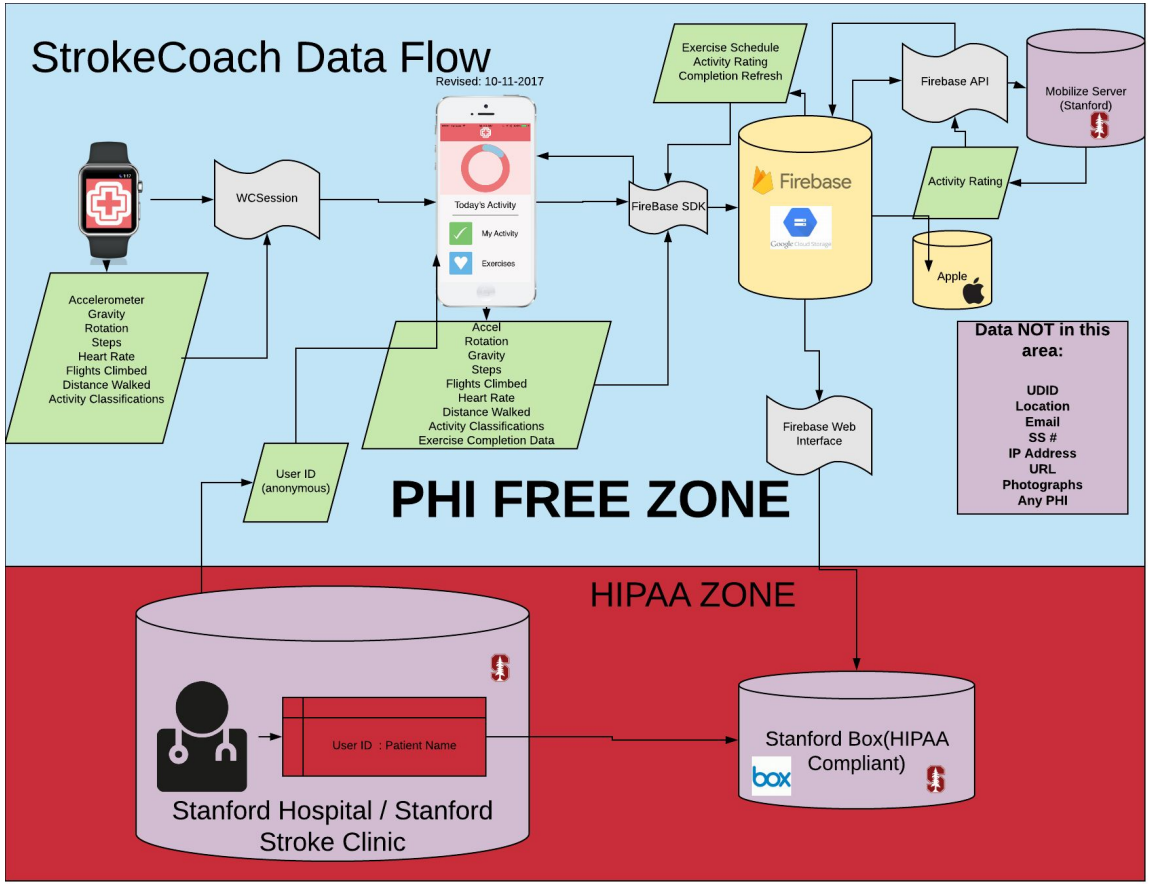

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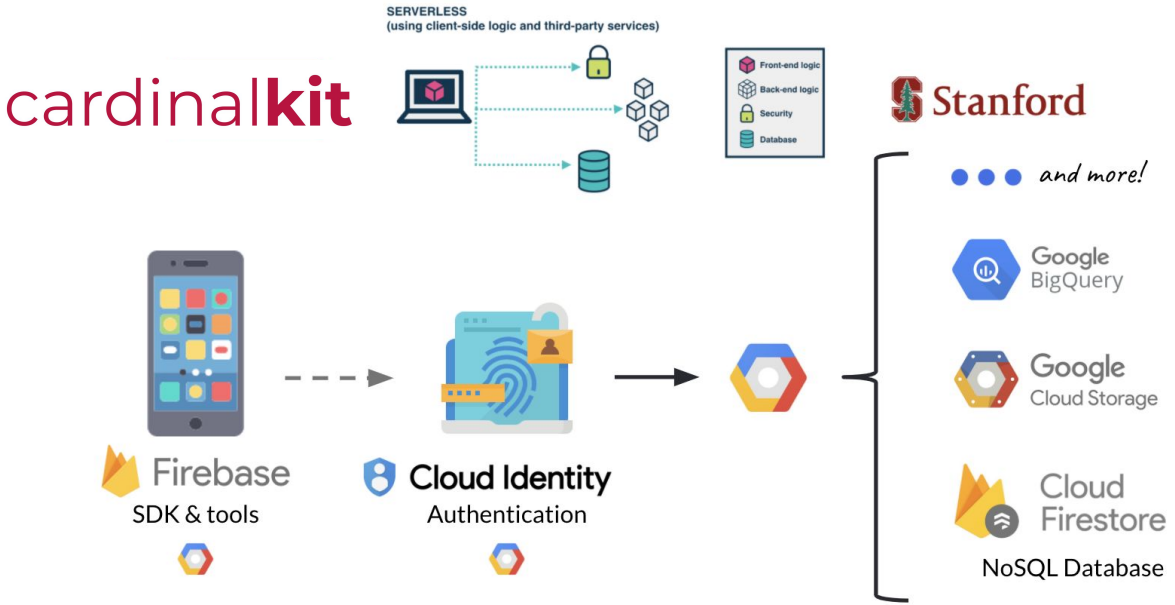

ISO & SOC Compliant for Privacy and Security
(see more: https://firebase.google.com/support/privacy)