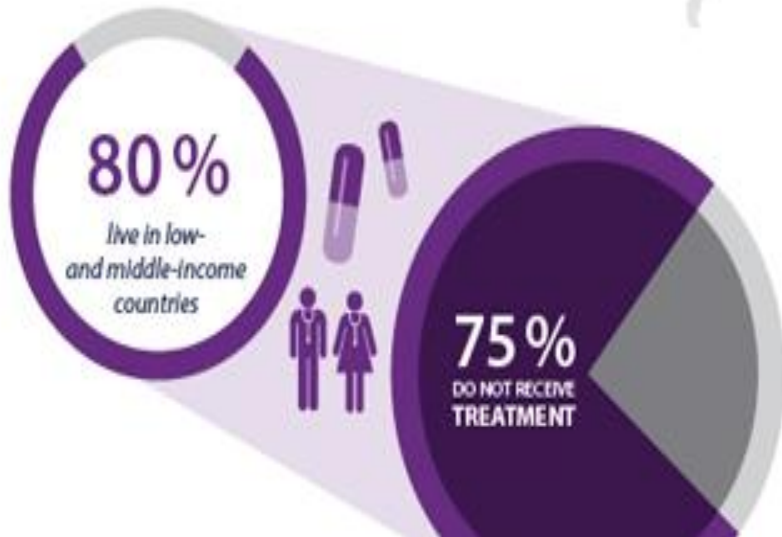


What is the **IMPACT** of epilepsy?

50 000 000

More than 50 million people are living with epilepsy globally

3-6 ^{TIMES}
↑
GREATER
RISK
OF PREMATURE
DEATH



1

Detecting and Tracking Seizures

BY

ABEL WELDAREGAY

CS 410: PROFESSIONAL WORKFORCE 1

SPRING 2019



Overview

1. Problem Description
2. Customers, end-users
3. Characteristics of Generalized Seizures
4. Technical Approach
5. Concept / Flow
6. Potential Competitors
7. Challenges to overcome
8. Conclusion
9. References

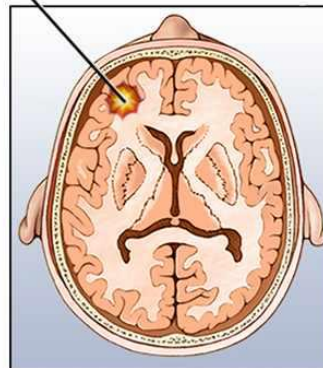


Problem Description

- ▶ More than 50 million people worldwide have epilepsy
- ▶ Which makes it the most common neurological disease in the world.
- ▶ There needs to be a tool that can potentially detect seizures while they occur
- ▶ We will focus on detecting generalized seizures
- ▶ There also needs to be a tool that can help users track seizures

Epilepsy

Hotspot

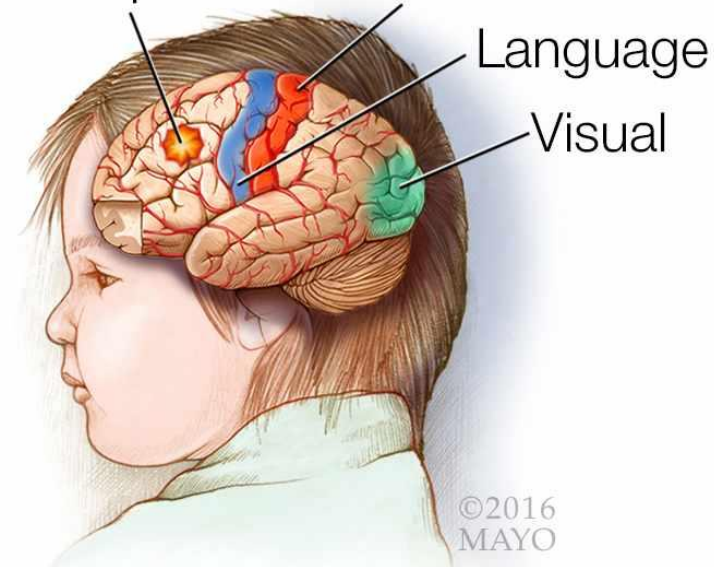


Seizure hotspot

Motor

Language

Visual



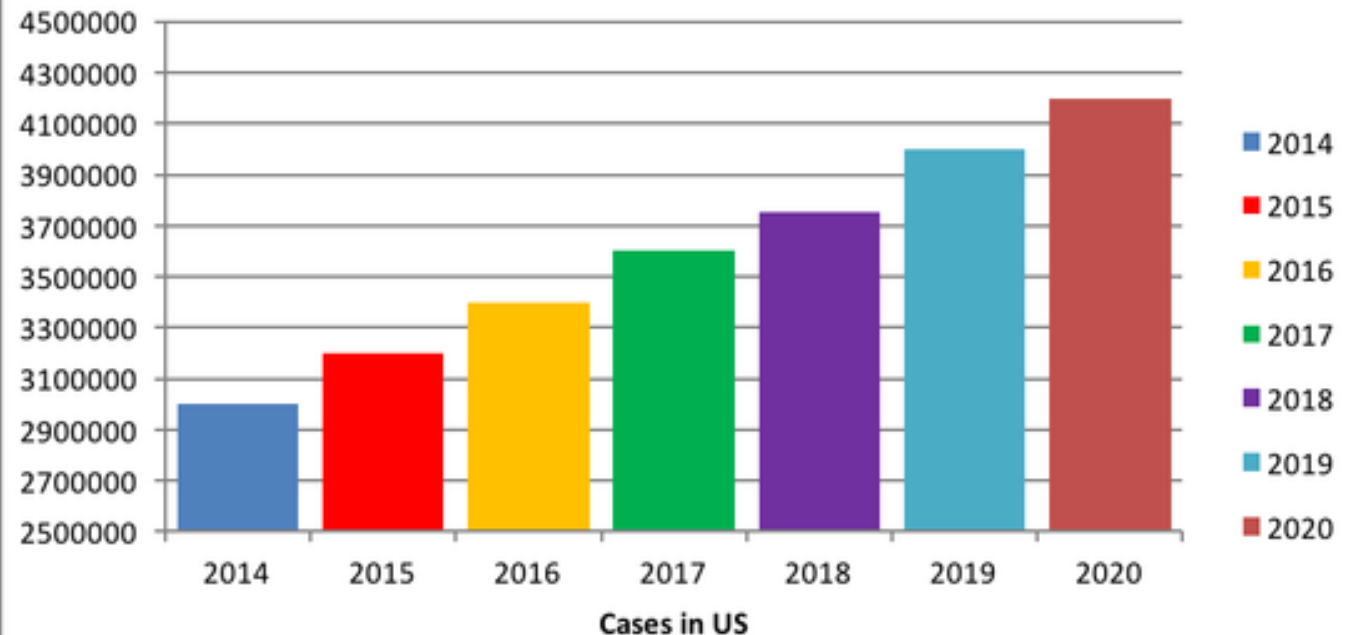
Customers and End - Users

- ▶ **Customers:** Medical Providers
- ▶ **End-users:** Individuals who have these types of generalized seizures:
 1. Tonic-clonic
 2. Clonic
 3. Tonic
 4. Atonic
 5. Myoclonic



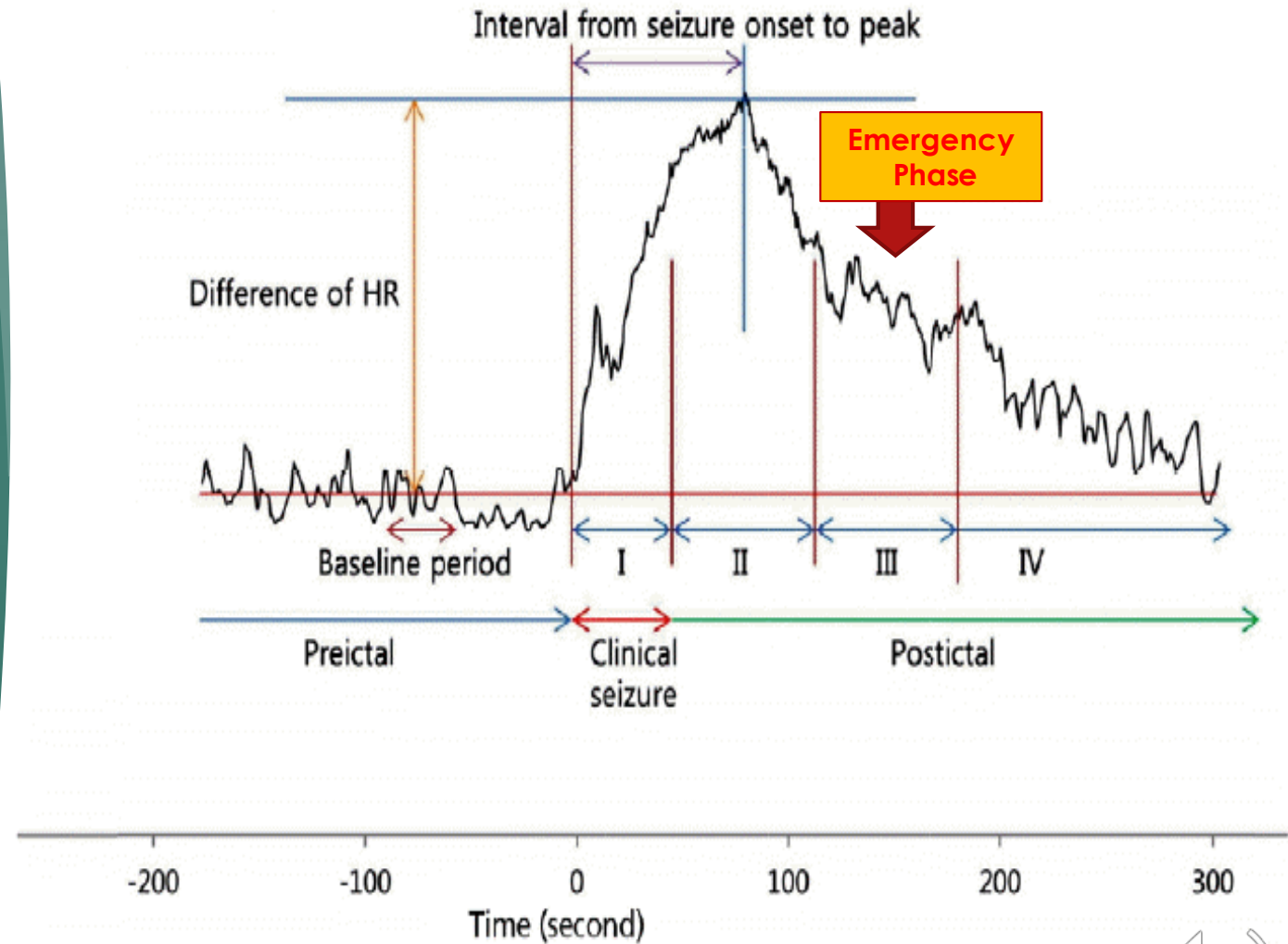
4

Projected prevalence of epilepsy through 2020

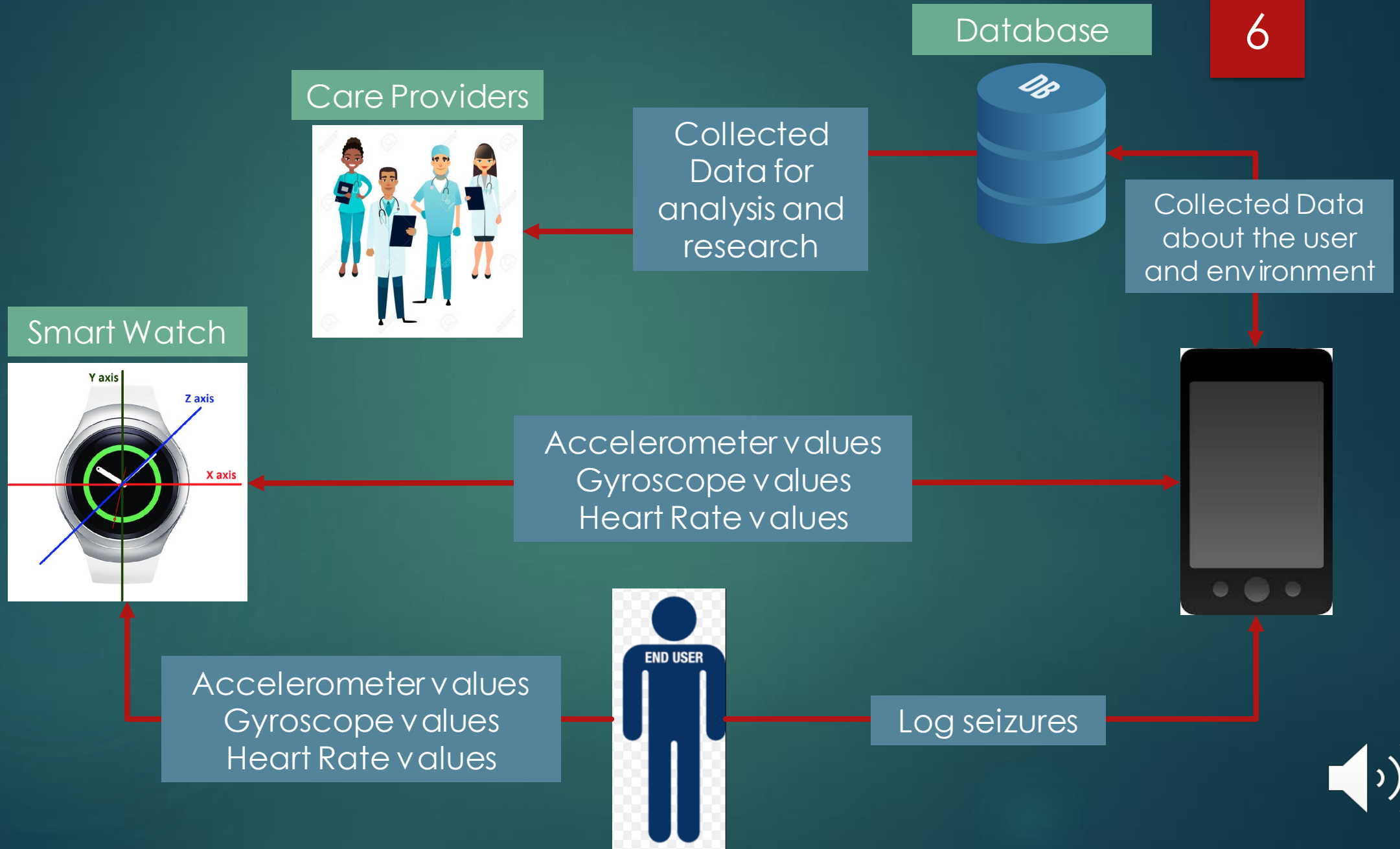


Characteristics of Generalized Seizures

- ▶ Most focal seizures cause an increase in heart rate
- ▶ Increase in heart rate
- ▶ Their limbs and face will appear to jerk rapidly as their muscles convulse.
- ▶ Loose consciousness

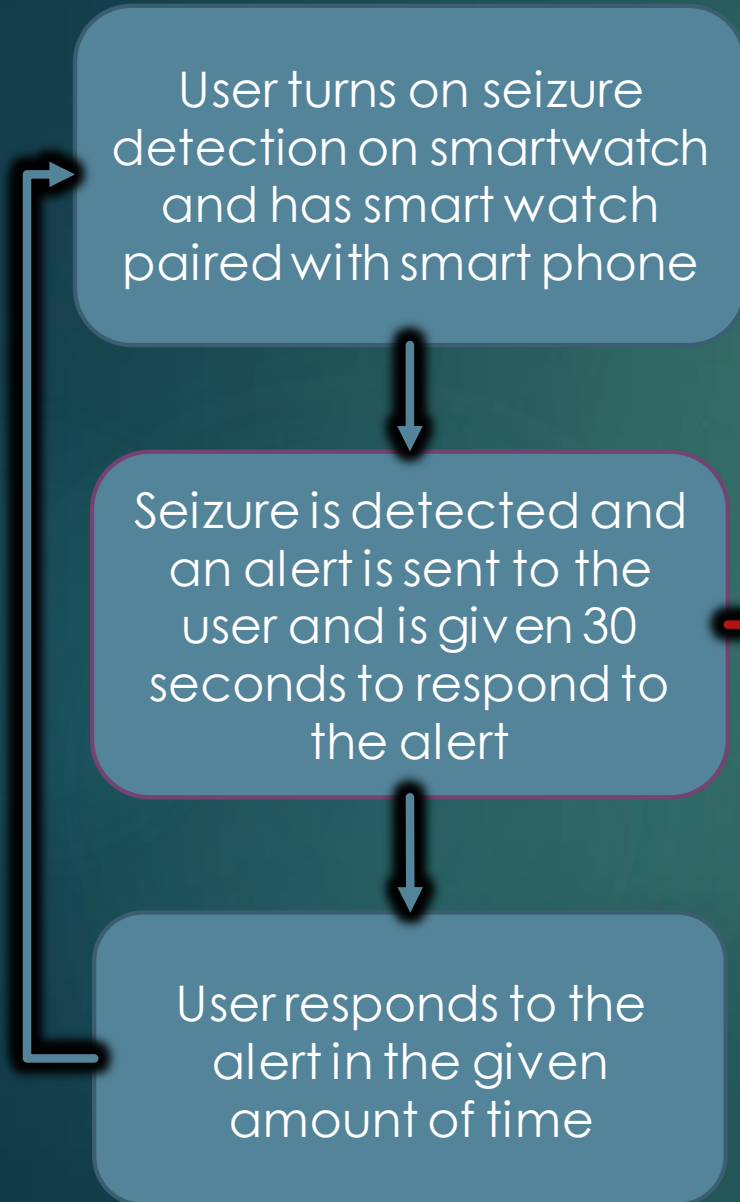


Solution: Technical Approach



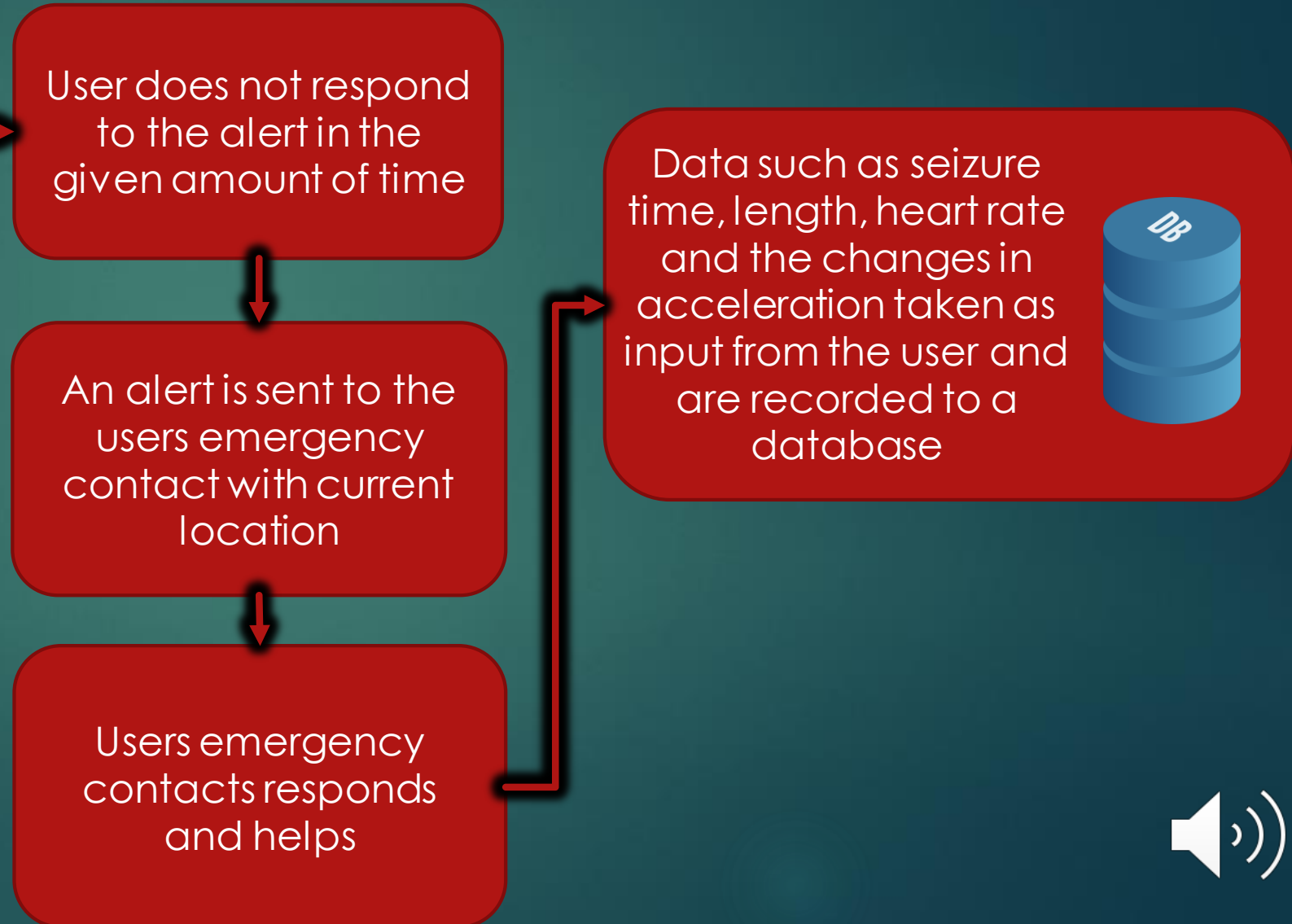
Concept / flow

Case 1





Emergency Phase

Case 2



Potential Competitors

Features	Track it and Detect it!	 Epilepsy Journal	
Detect Seizures	✘		
Track Seizures	✘	✘	✘
Report Collected Data to care providers	✘		
Paired with a smart watch	✘		



Challenges to Overcome

- ▶ Tuning the threshold values that determine when a seizure is taking place to make it unique to each individual user
- ▶ Convincing Medical team to use data collected
- ▶ Finding the best way to send data collected from the device to care providers



Conclusion

- ▶ Detect seizures while they occur
- ▶ It will use the sensors available on smart watches and smart phones to determine if a seizure is taking place
- ▶ Track seizures
- ▶ Distribute collected data to care providers
- ▶ 100% accuracy is not anticipated when detecting seizures but can potentially be life saving



References

- ▶ “Epilepsy-Projections-Table.” Cheef Botanicals, cheefbotanicals.com/using-cbd-oil-for-seizures-and-epilepsy/epilepsy-projections-table/.
- ▶ Nei, M. (2019). Cardiac Effects of Seizures. American Epilepsy Society.
- ▶ https://www.google.com/search?q=database&rlz=1C5CHFA_enUS702US702&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiWjJ-4wqPgAhXOt1kKHx_xDSQQ_AUIDygC&biw=1280&bih=721#imgrc=KI2epM2V7BSWqM:
- ▶ https://www.google.com/search?q=generic+smartphone&rlz=1C5CHFA_enUS702US702&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjT38GkwqPgAhVlwVkkHciqDUsQ_AUIDigB&biw=1280&bih=721&dpr=2#imgrc=IMECEHv_pQVJKM:
- ▶ https://www.researchgate.net/figure/Smartwatch-accelerometer-axes_fig2_317150667
- ▶ <https://www.j-epilepsy.org/upload//thumbnails/er-6-1-16f1.gif>

References continued

- ▶ https://www.123rf.com/photo_99863830_stock-vector-doctors-and-nurses-team-cartoon-medical-staff-medical-team-concept-surgeon-nurse-and-therapist-on-ho.html
- ▶ https://www.google.com/search?q=end+user&rlz=1C5CHFA_enUS702US702&source=Inms&tbm=isch&sa=X&ved=0ahUKEwjR1fbqwqPgAhWLxVkKHVX7AlsQ_AUIDigB&biw=1280&bih=721#imgrc=udfQqgFXEfp40M:
- ▶ https://www.google.com/search?q=prevalence+of+epilepsy&rlz=1C5CHFA_enUS702US702&source=Inms&tbm=isch&sa=X&ved=0ahUKEwjksT6wqPgAhVus1kKHYY61A0gQ_AUIDigB&biw=1280&bih=721#imgdii=lxCW2uzv-dUV8M:&imgrc=QR8FOVaM7TX-nM:
- ▶ https://www.google.com/search?q=epilepsy&rlz=1C5CHFA_enUS702US702&source=Inms&tbm=isch&sa=X&ved=0ahUKEwj_2-uOw6PgAhVfw1kKHYY0ICEkQ_AUIECgD&biw=1280&bih=721#imgrc=R4zYopDMTQxD7M:

References continued

- ▶ <https://www.who.int/mediacentre/infographic/mental-health/epilepsy/en/>