

P1752.2

Cardiorespiratory Subgroup Teleconference

Working Group Sponsored by IEEE Engineering in
Medicine & Biology Standards Committee

March 23, 2023
UTC 4:00 PM

P1752.2

Cardiorespiratory Subgroup

Agenda

March 23, 2023

Attendance & Introductions

Items:

- ✓ Preparation (session March 7, 2023):
 - Review JSON schema coding
 - Informed by IEEE 1751.1 schemas
 - Esp familiarize with “Metadata” and “Utility” schemas
 - Consider: *Samples* -> *Schemas*
- ✓ Assessing dependencies: Organization of CR schema

Other business

- ✓ Interests for schema groupings
 - ✓ Schema timeline / initial draft target
 - ✓ Next meeting : April 27, 2023
-

Impactful Healthcare

Relevance

Morbidity & mortality
... WHO category of highest prevalence

Cardiovascular disease #1

cerebrovascular

heart failure

dysrhythmias

Preventative medicine
... overall intervention of highest impact

Physical activity & mvt

CV fitness *

Health economics
... as yet unmet need :
semantic interoperability
contextuality

Wearables & ext. detectors

Apps

Internal/implant sensors*

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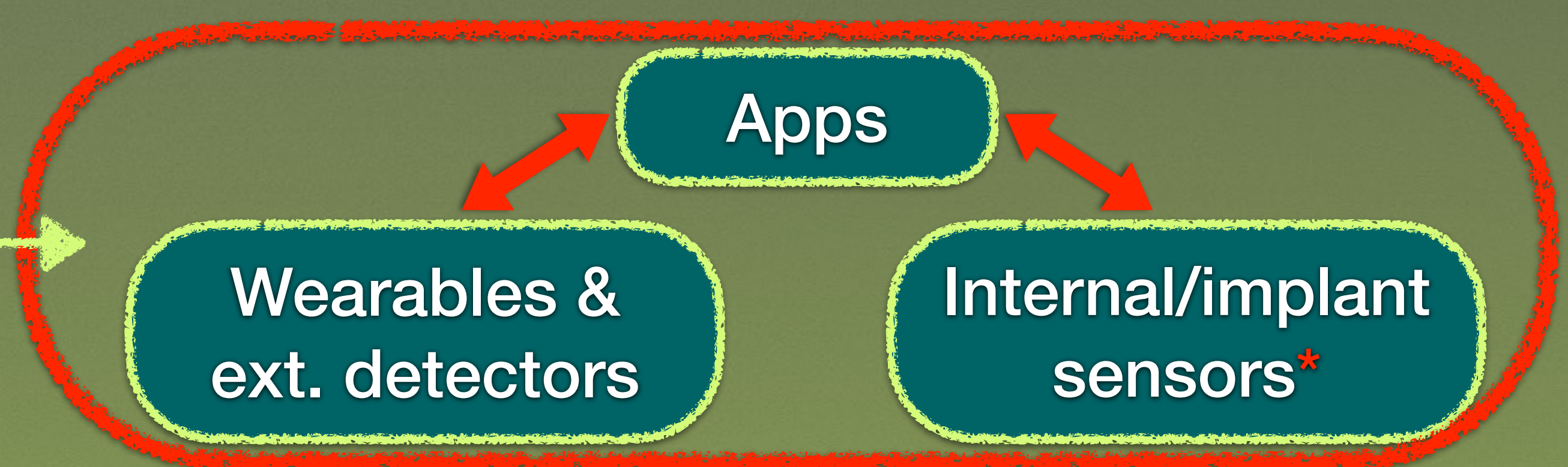
CV fitness *

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... as yet unmet need :
→ semantic interoperability
→ contextuality

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Apps

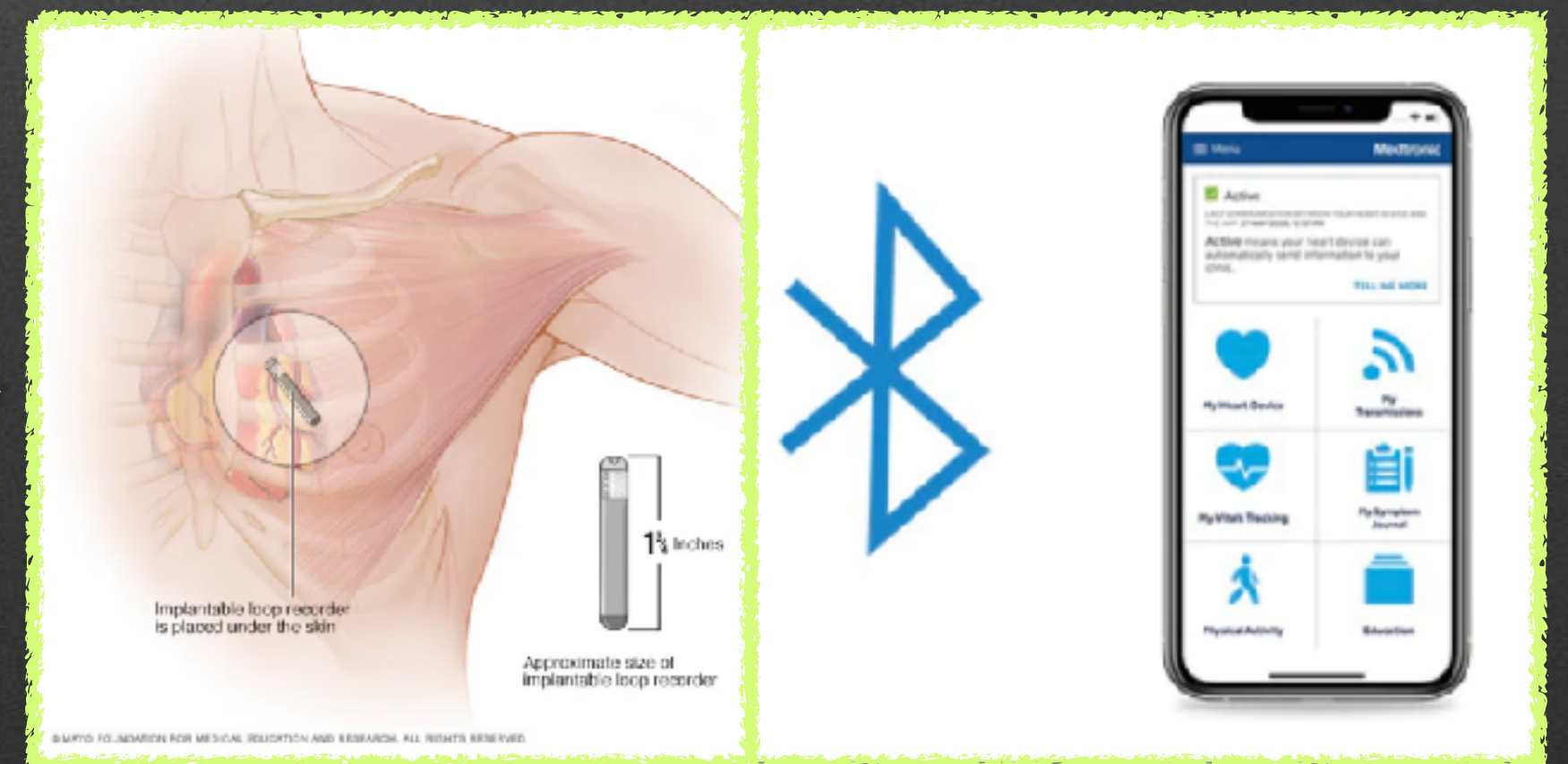
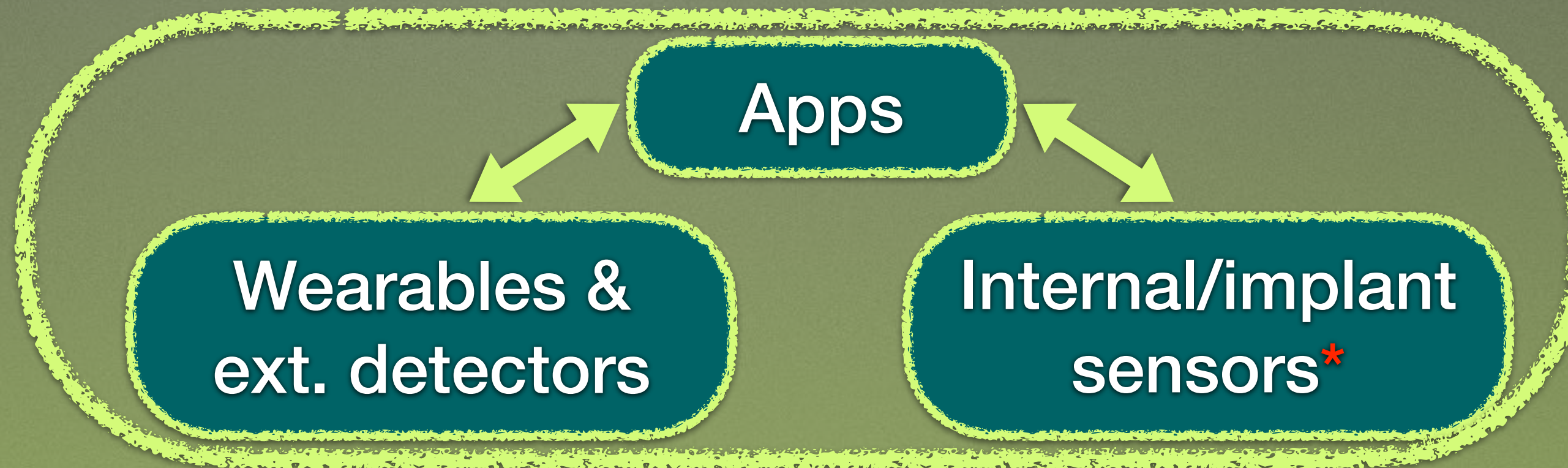
Internal/implant sensors*



IEEE 1752 Standard for Mobile Health Data



*Expansion of Mobile Health Data
overlapping into the Digital
Biomarker Space...*



Standard Patch Rhythm Monitor



- *Medical grade*
- *2 electrodes*
- *Continuous data up to 2 weeks*
- *Atrial and ventricular signals*
- *Morphologic analysis (limited)*
- *Time of day, clustering*
- *Dysrhythmia auto-triggering*
- *Symptom log*
- *Option for real-time alerts*
- *Encrypted communications*

Zio[®] Patch Report for Report #1, Training

Date of Birth	Patient ID	Gender	Primary Indication Arrhythmia (unspecified)
Prescribing Clinician Dr. E. Physician	Managing Location INCC Lincolnshire	This report is a compilation of multiple patients' arrhythmias.	

iRhythm Technologies, Inc.
Tel: (888) 693-2401
www.zioreports.com

Enrollment Period
13 days 16 hours
02/22/13, 01:22pm to
03/08/13, 05:03am

Analysis Time
13 days 11 hours
(after artifact removed)

Ventricular Tachycardia (4 beats or more)
Fastest VT (HR Range 99-182 bpm, Avg 135 bpm) No. of Episodes: **4**

Supraventricular Tachycardia (4 beats or more)
Fastest SVT (HR Range 156-187 bpm, Avg 164 bpm) No. of Episodes: **5871**

Pauses (3 secs or longer)
Longest Pause (5.4 s, 11 bpm) No. of Episodes: **3**

Atrial Fibrillation
Fastest AF (HR Range 126-212 bpm, Avg 158 bpm) AF Burden: **12%**

AV Block (2nd* Mobitz II)
Slowest AV Block - 2nd* Mobitz II (29 bpm) No. of Episodes: **192**

Patient Triggered Event? (± 45s)

YES NO

YES NO

YES NO

YES NO

YES NO

Findings

Patient had a min HR of 29 bpm, max HR of 212 bpm, and avg HR of 72 bpm. Predominant underlying rhythm was Sinus Rhythm. First Degree AV Block was present. 192 episode(s) of AV Block (2nd* Mobitz II) occurred, lasting a total of 1 day 4 hours. 4 Ventricular Tachycardia runs occurred, the run with the fastest interval lasting 7 beats with a max rate of 182 bpm, the longest lasting 16 beats with an avg rate of 135 bpm. 5871 Supraventricular Tachycardia (SVT) runs occurred, the run with the fastest interval lasting 12 beats with a max rate of 187 bpm, the longest lasting 35.3 secs with an avg rate of 133 bpm. Atrial Fibrillation occurred (12% burden), ranging from 45-212 bpm (avg of 84 bpm). 3 Pause(s) occurred, the longest lasting 5.4 secs (11 bpm). Supraventricular Tachycardia, Pauses, AV Block, and Atrial Fibrillation were detected within ±45 seconds of patient triggered/diary event. Isolated SVEs were frequent (5.4%, 76752), SVE Couplets were occasional (3.7%, 26323), and SVE Triplets were occasional (1.7%, 7781). Isolated VEs were rare (0 to <1.0%, 5154), VE Couplets were rare (0 to <1.0%, 19), and VE Triplets were rare (0 to <1.0%, 1). Ventricular Bigeminy and Trigeminy were present. MD notification criteria for Rapid Atrial Fibrillation and AV Block met - notified RN on 03/15/2013 at 12:00 pm CST.

Heart Rate

Maximum HR **212 bpm** (at 07:52pm on 03/04)
Minimum HR **29 bpm** (at 03:46pm on 02/25)
Average HR **72 bpm**

Patient Events

Number of Triggered Events: **3**

Findings within ± 45 sec of Triggers:
AV Block, Supraventricular Tachycardia, Sinus Rhythm, Ventricular Ectopic beat(s), Supraventricular Ectopic beat(s)

Number of Diary Entries: **3**

Findings within ± 45 sec of Entries:
Atrial Fibrillation, AV Block, Pause(s), Sinus Rhythm, Supraventricular Ectopic beat(s)

Ectopics

	Rare:	0 to <1.0%
	Occasional:	1.0% to <5.0%
	Frequent:	5.0%+

Supraventricular Ectopy (SVE/PACs)

Isolated	Frequent	5.4%	76752
Couplet	Occasional	3.7%	26323
Triplet	Occasional	1.7%	7781

Ventricular Ectopy (VE/PVCs)

Isolated	Rare	<1.0%	5154
Couplet	Rare	<1.0%	19
Triplet	Rare	<1.0%	1

Longest Ventricular Bigeminy Episode: 4.8 s
Longest Ventricular Trigeminy Episode: 7.7 s

Final Interpretation

1- Sinus rhythm with first degree AV block. 2- Episodes of second degree 2:1 AV Block. 3- Sinus pauses with longest being 5.4 seconds. 4- Frequent isolated PACs with occasional atrial couplets and triplets. 5- Many runs of SVT many of which appear to be ectopic atrial tachycardia (5871) with longest being 35 sec. 6- Rare isolated PVCs, ventricular couplets and triplets. 7- 4 Runs of VT up to 16 beats rate range of 135-182/min. 8- Atrial fibrillation with a burden of 12% with rates of 45-212/ min. 9- Symptoms appear to correlate with SVT, sinus pauses, AV Block and atrial fibrillation.

Signed by Dr. Example Physician on 03/17/13 at 03:41 PM (CT)

S/N: HTTEST12345

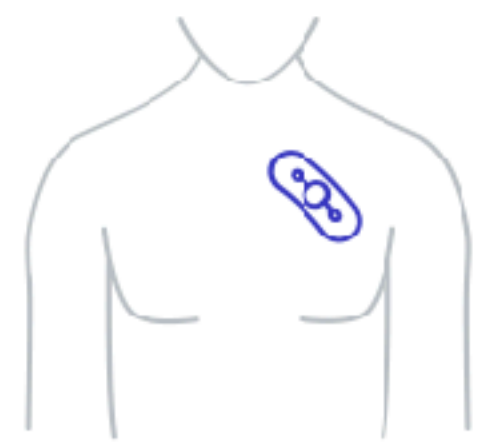
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Mobile Health Data: Example

Wearable “Long-term” Monitoring

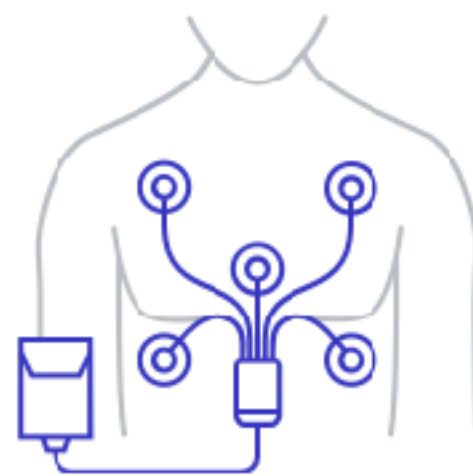
Over 50% of arrhythmias are missed by Holter monitors.²



Over
99%

Detected by Zio XT
in 14 days²

vs



47%

Detected by Holter
in 2 days²



Exercise†



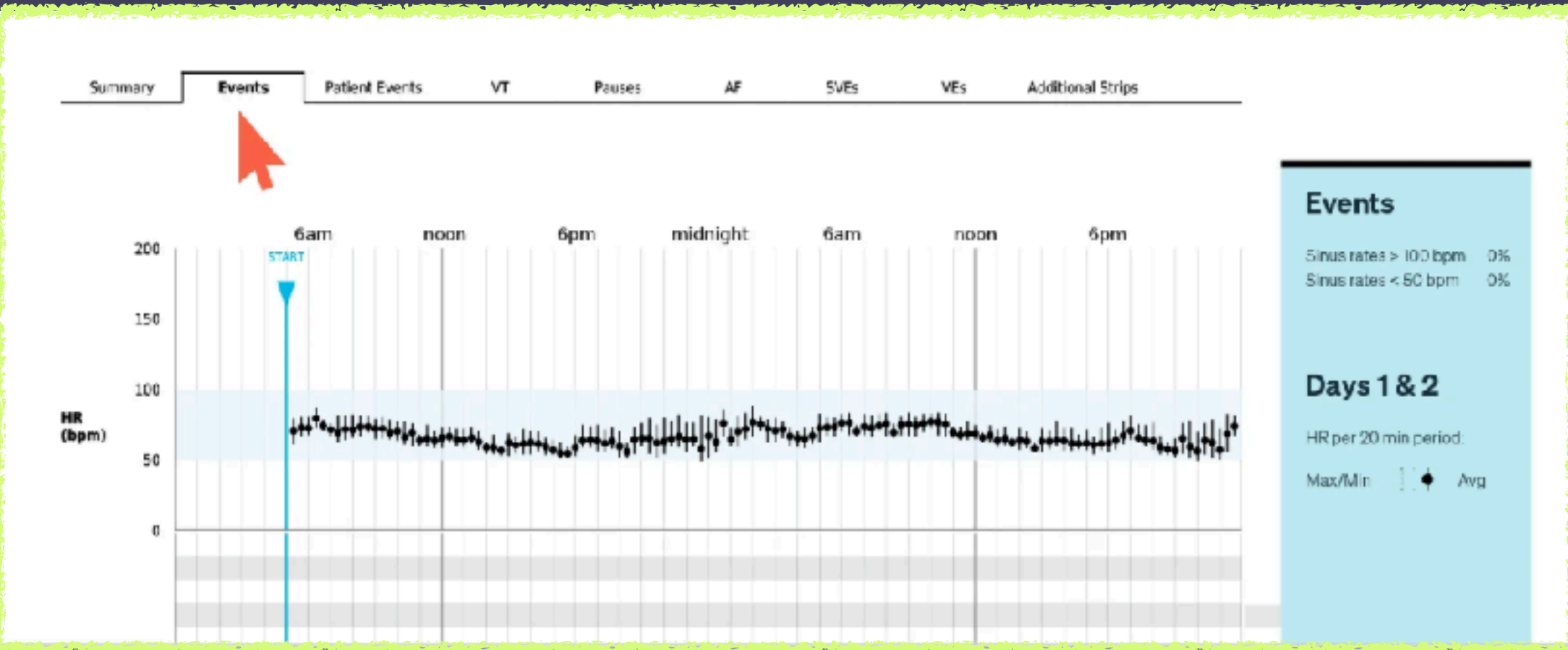
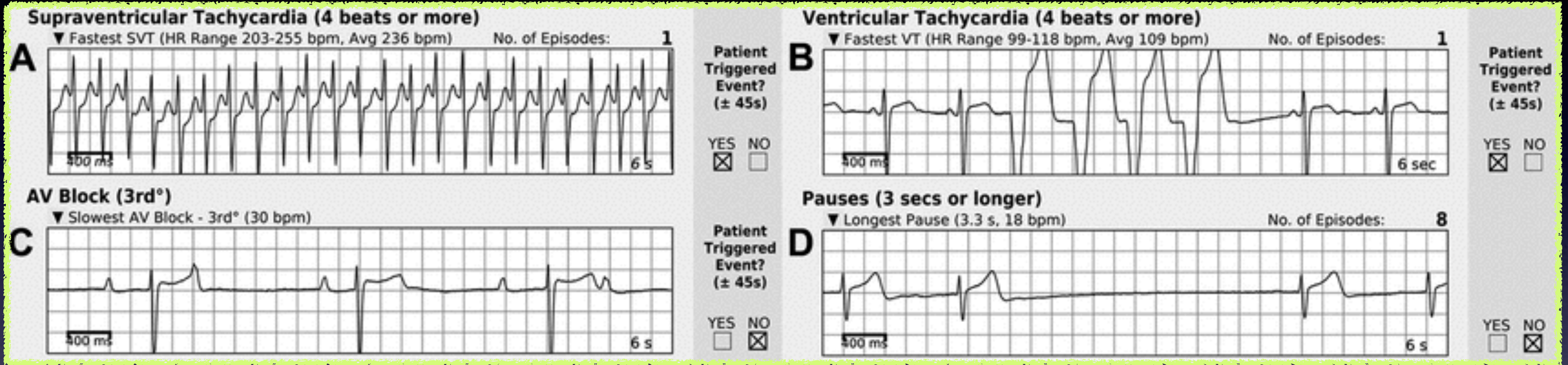
Shower†



Sleep



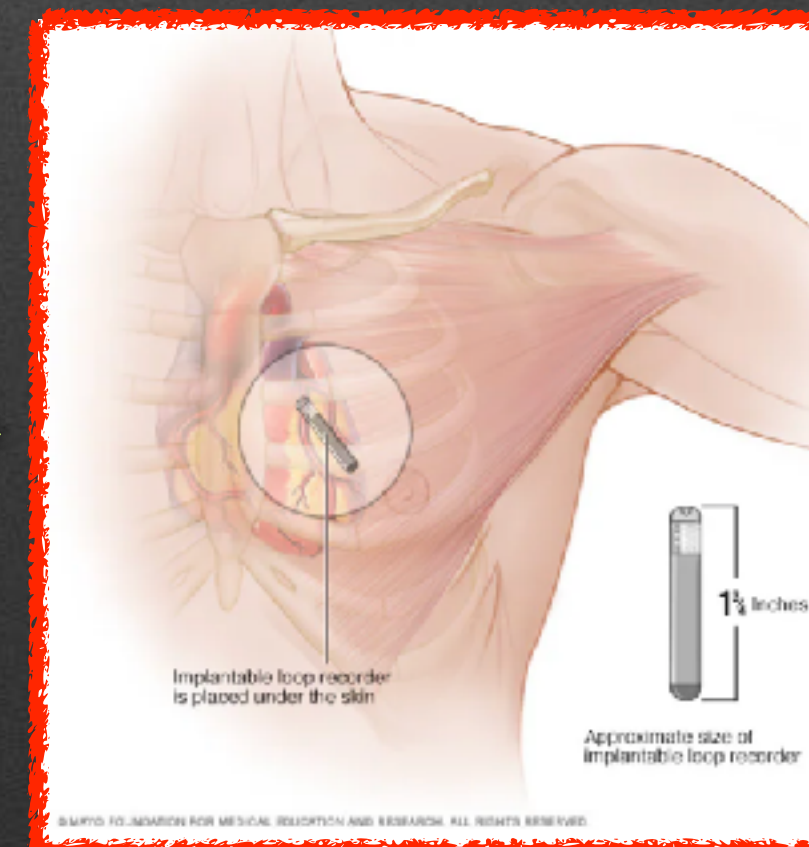
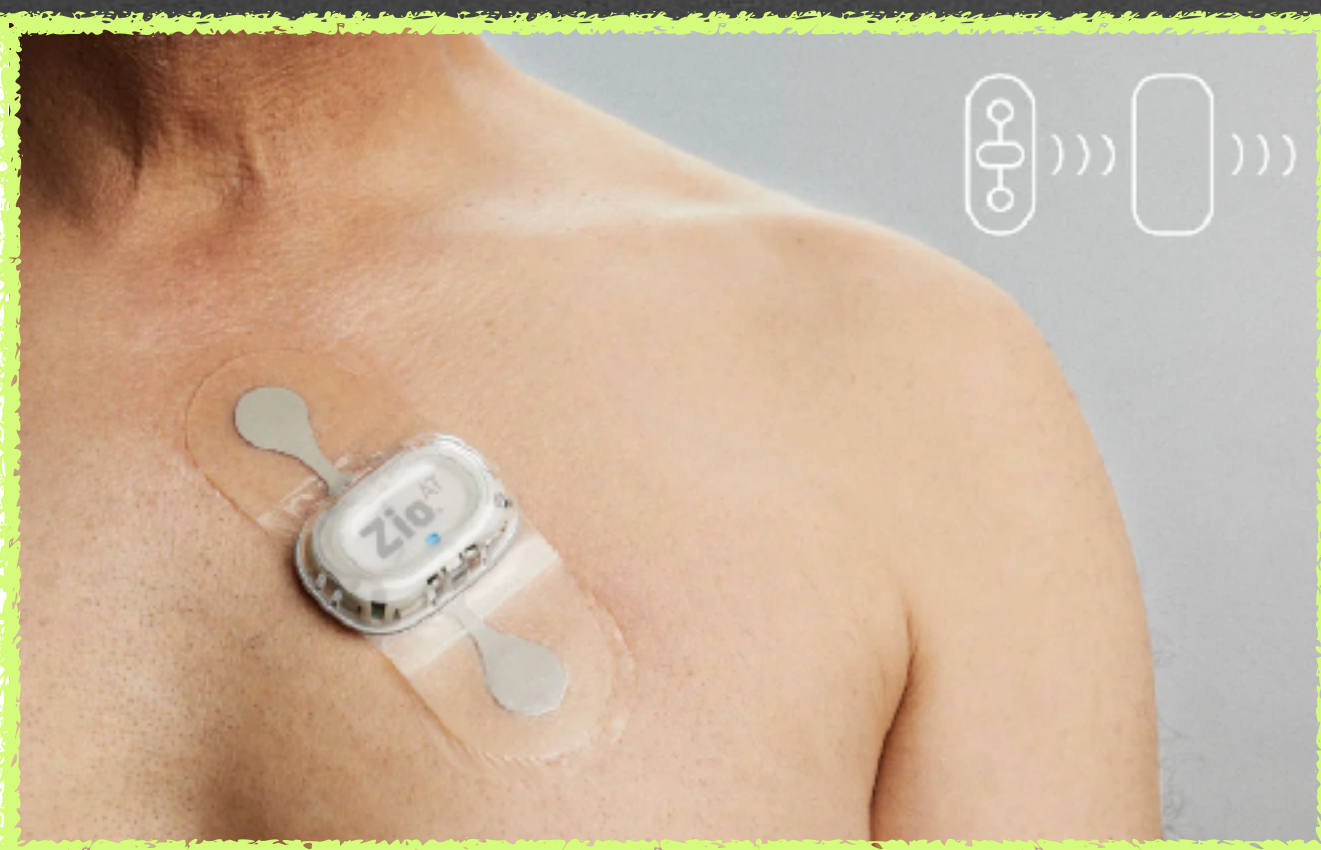
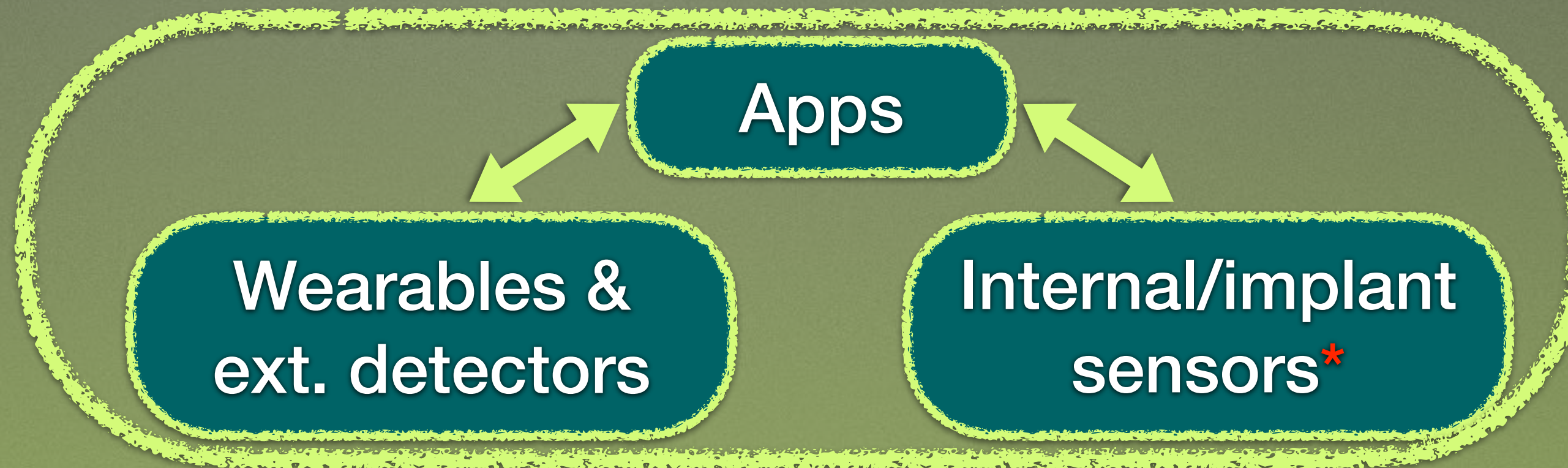
Mobile Health Data: Wearable "Long-term" Monitoring



IEEE 1752 Standard for Mobile Health Data

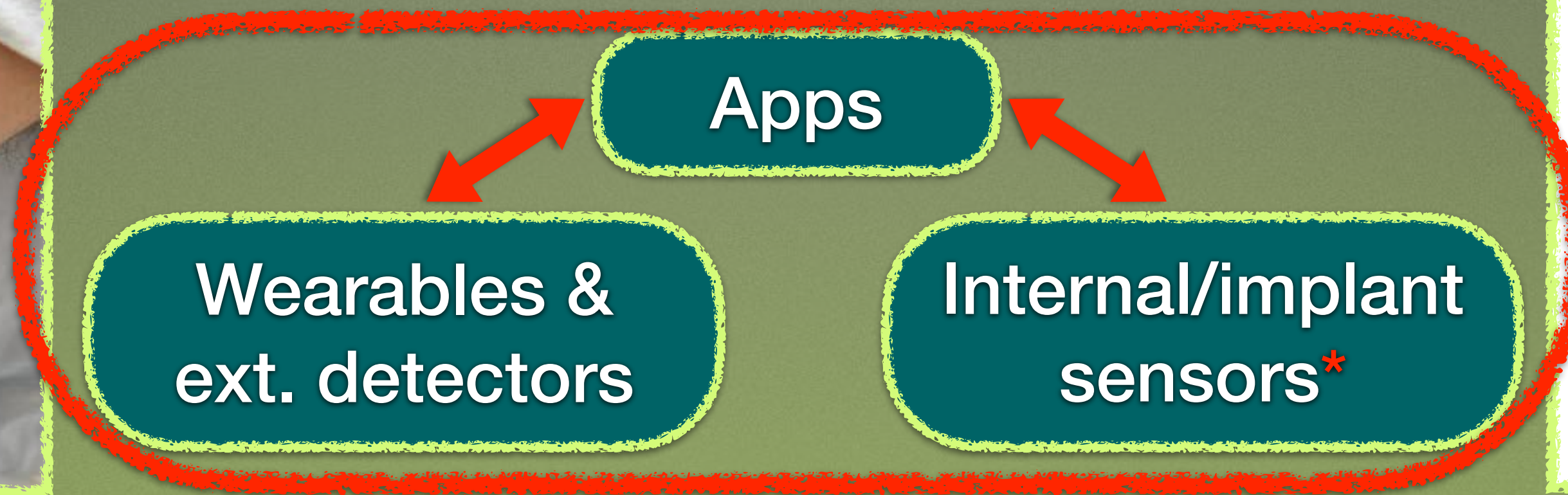


*Expansion of Mobile Health Data
overlapping into the Digital
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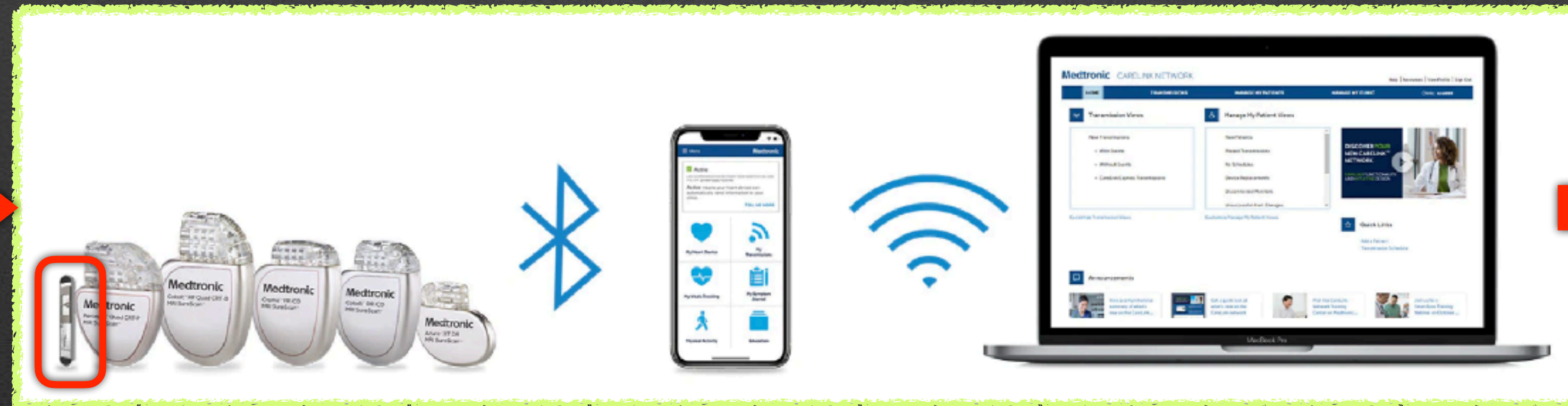
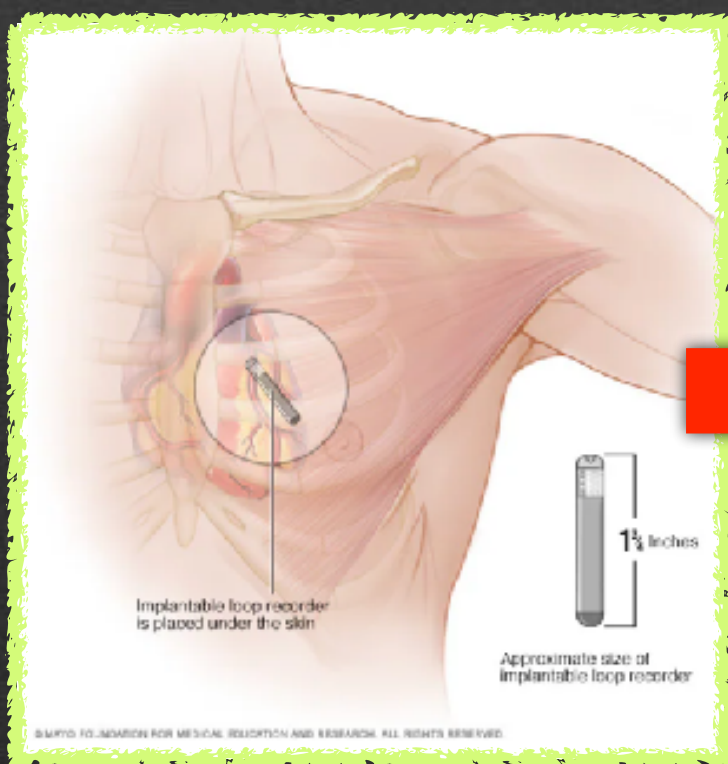


IEEE 1752 Standard for Mobile Health Data

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Wearables ↔ *Apps* ↔ *Implantables*



PHR
EHR
AI & DL

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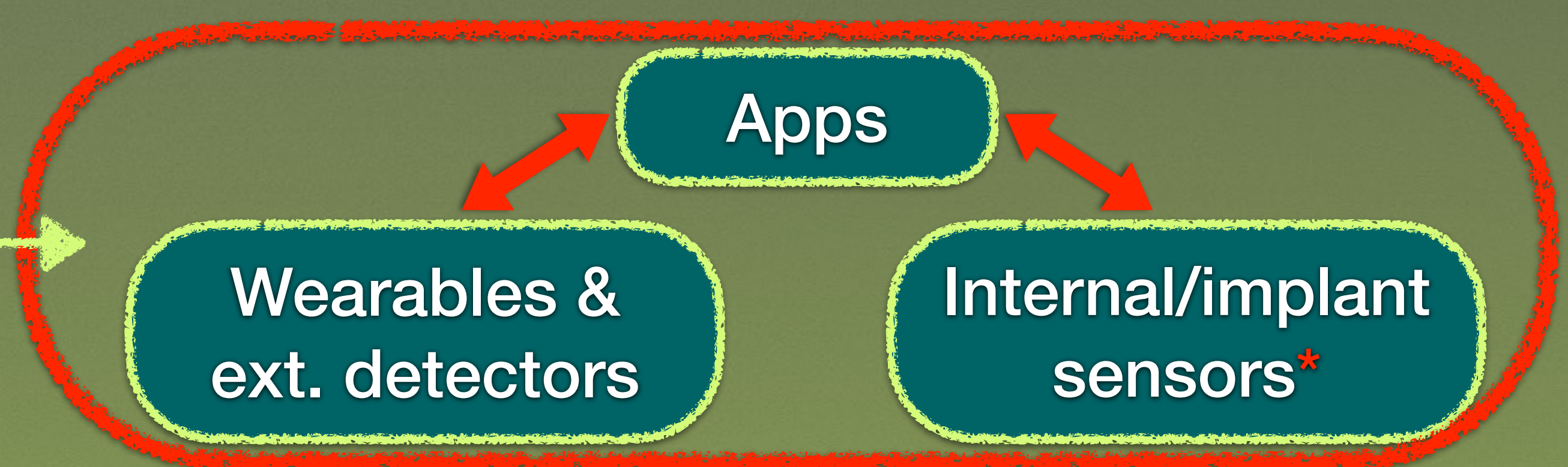
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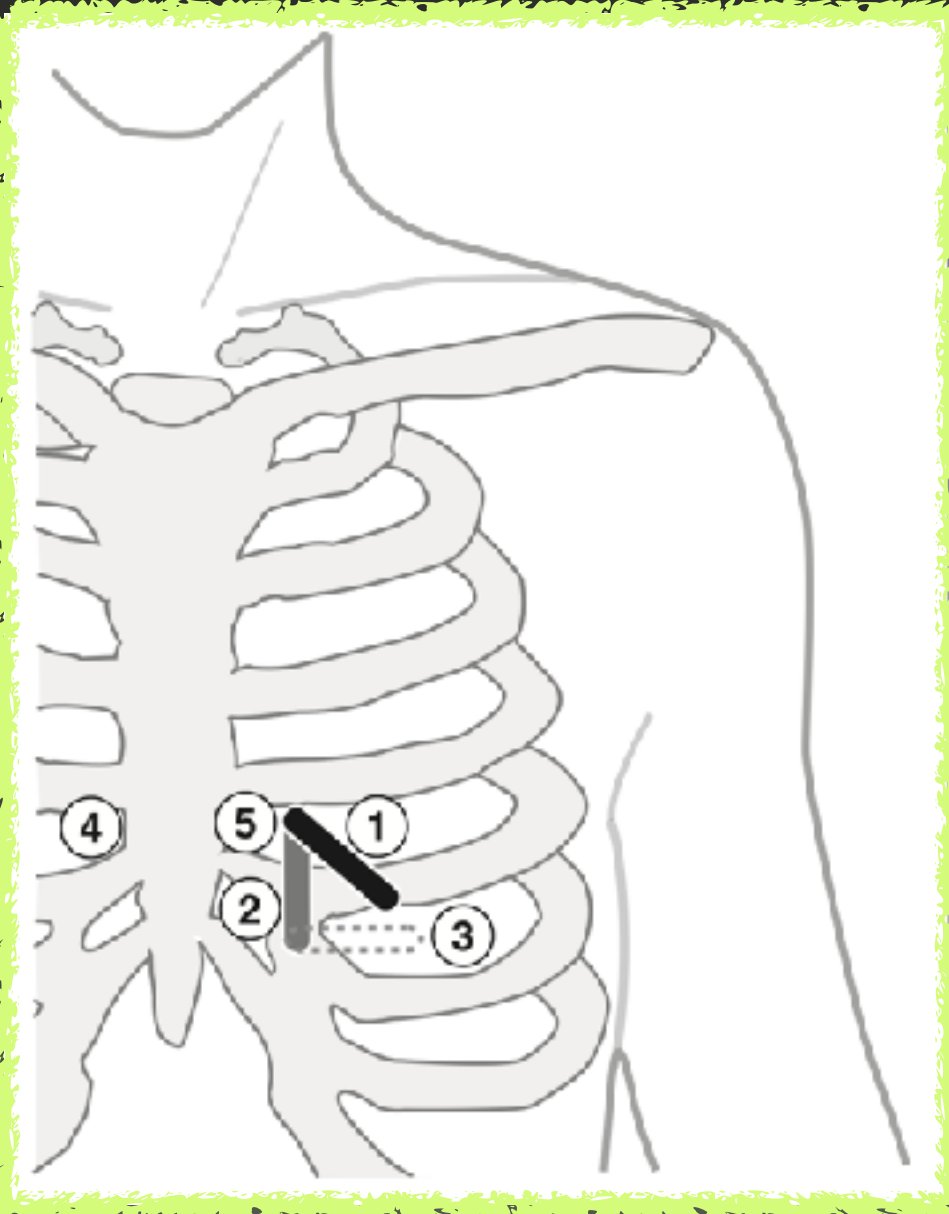
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Parameter	Value
Volume	1.4 cm ³
Mass	3.4 g
Dimensions H x W x D	45.1 mm x 8.0 mm x 4.2 mm
Surface area of device electrode	16.0 mm ²
Distance between the electrodes, centroid-to-centroid	40 mm

Insertable Cardiac Monitor

Sinus

Atrial Tachycardia

Atrial Fibrillation

