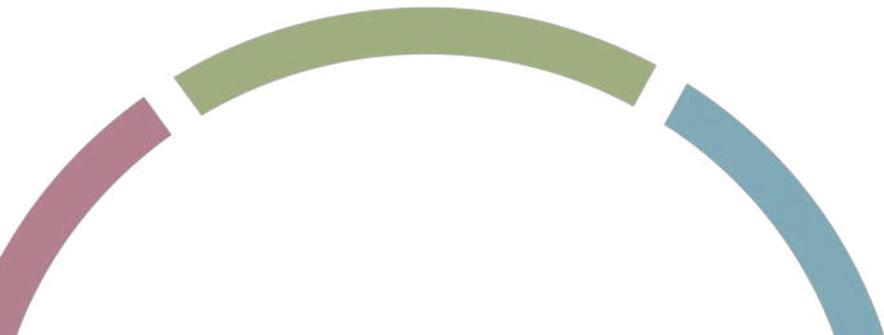


# Advantages of using an app for fertility tracking, data analysis, and research

A.J. Freda  
Software Developer  
NeoFertility



# Who am I?

- ▶ Father of 5
- ▶ > 20 years software dev
- ▶ Wife studied nursing at Franciscan University
  - Has PCOS
  - Learned about RRM while at school
  - 'Retired' in 2017 from pediatric nursing
- ▶ Built her a way to track her cycle
  - First on Pocket PC (2009)
  - Later iOS, Android (2015)
- ▶ Met Melissa & Dr. Tracey Parnell through that effort
  - Tracey invited me to IIRRM
  - Met Phil
  - Rest... is history!



## Disclaimer:

I am a shareholder of Neo Fertility App, LTD.

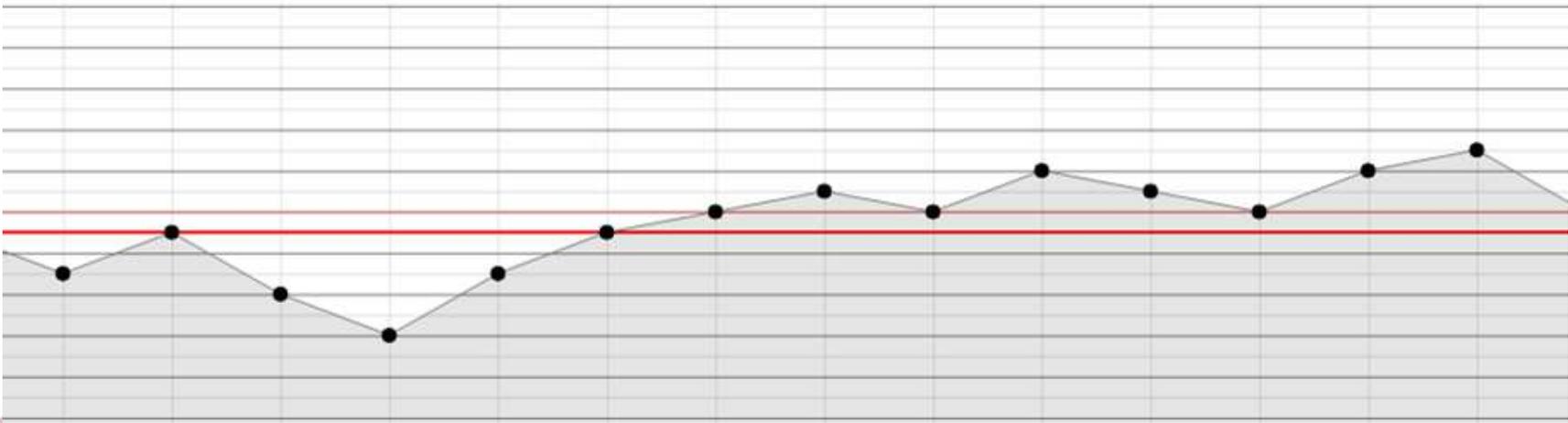
# User Benefits

- ▶ Chart anywhere, anytime
    - At work
    - At home
    - Hiking in the mountains
    - On a mission trip to a 3<sup>rd</sup> world country with poor infrastructure
  - ▶ Spousal Engagement
    - Even when apart, can view and discuss chart
    - Both may record observations
    - Encourages discourse and understanding, moral support
    - More potential here – stay tuned!
  - ▶ Greater data integrity
    - Melissa lost 10 years of paper charts during the floods in Houston!
    - NeoFertility data cannot be deleted (barring GDPR exception)
- 
- A decorative graphic in the bottom-left corner of the slide, consisting of several overlapping curved lines in shades of maroon, olive green, and teal.

# User Benefits

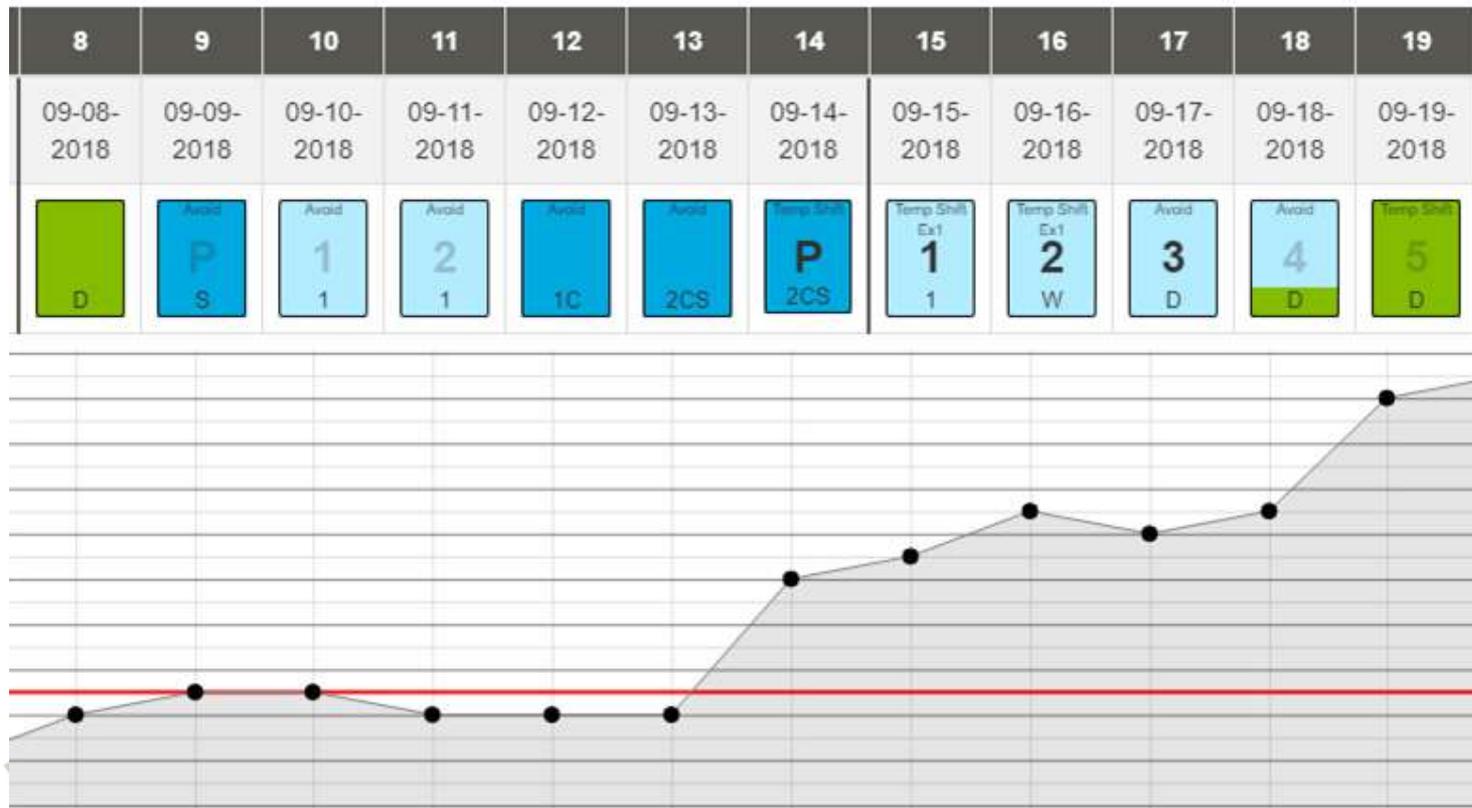
- ▶ Easier interpretation of thermal shifts

8	9	10	11	12	13	14	15	16	17	18	19	20	21
05-15-2019	05-16-2019	05-17-2019	05-18-2019	05-19-2019	05-20-2019	05-21-2019	05-22-2019	05-23-2019	05-24-2019	05-25-2019	05-26-2019	05-27-2019	05-28-2019
D	W	W	Avoid 1	Avoid 1	Avoid 2CS	Temp Shift Ex1 2CS	Avoid 2CS	Avoid P 1C	Avoid 1 D	Avoid 2 D	Avoid 3 D	Avoid 4 D	5 D



# User Benefits

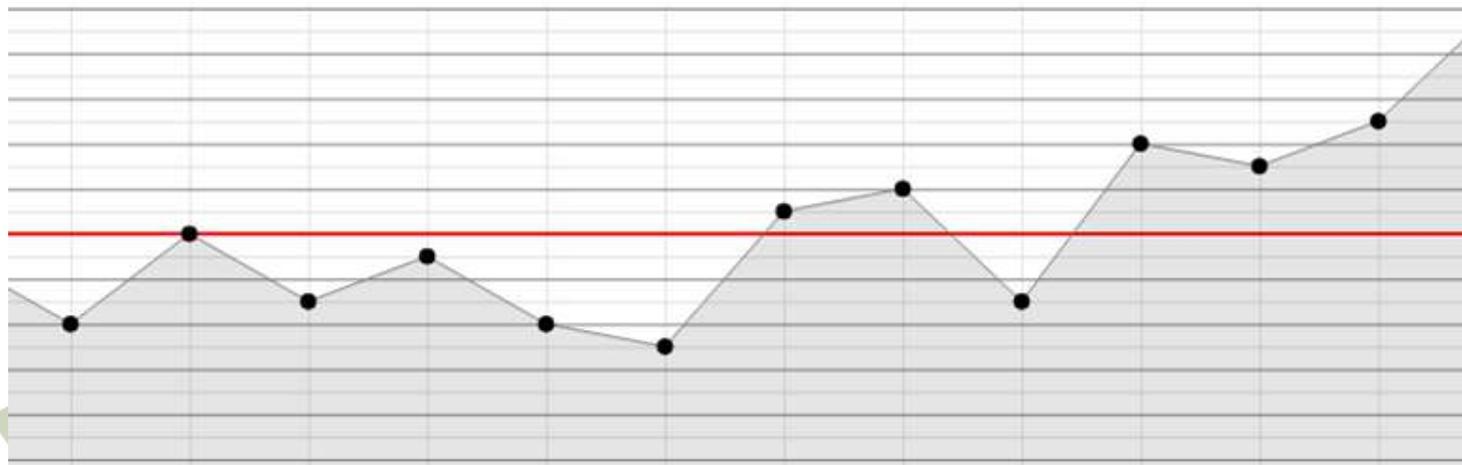
- ▶ Easier interpretation of thermal shifts



# User Benefits

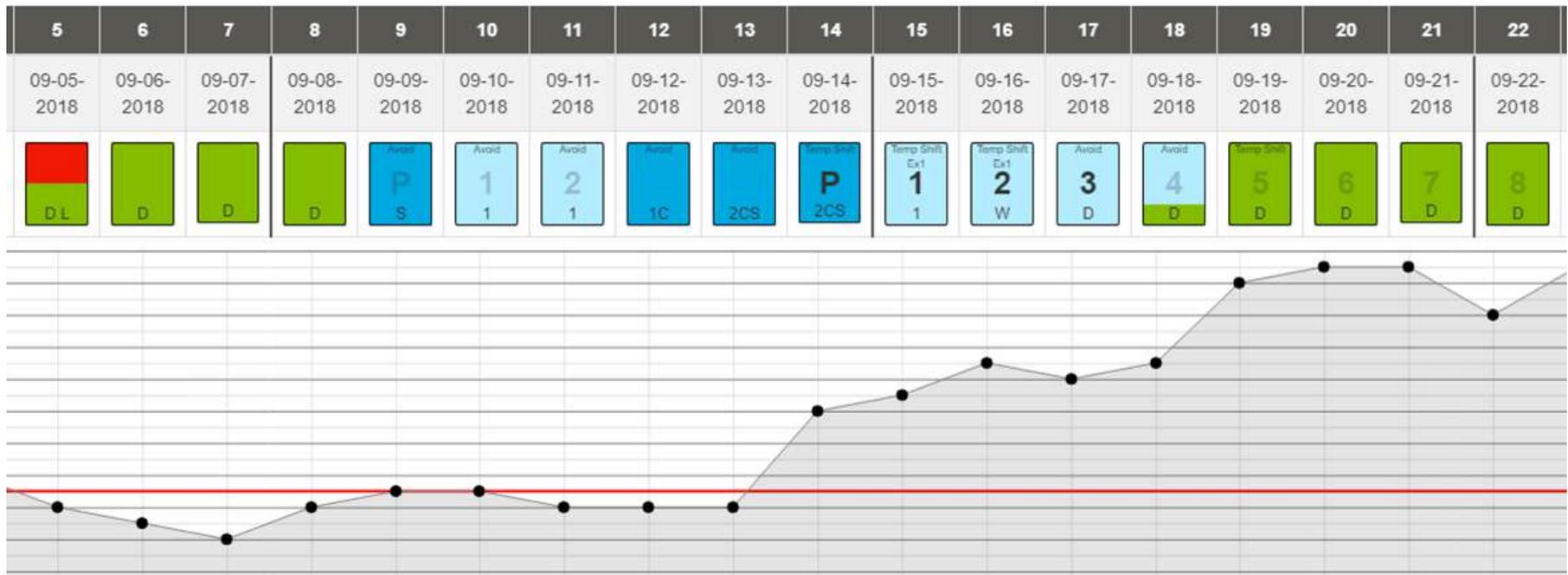
- ▶ Easier interpretation of thermal shifts

10	11	12	13	14	15	16	17	18	19	20	21
04-17-2019	04-18-2019	04-19-2019	04-20-2019	04-21-2019	04-22-2019	04-23-2019	04-24-2019	04-25-2019	04-26-2019	04-27-2019	04-28-2019
W	Avoid 1	Avoid 1	Avoid 2C	Avoid 2CS	Avoid 2CS	Temp Shift Ex2 P 2CS	Avoid 1 P	Avoid 2 P	Temp Shift Ex1 3 D	Avoid 4 D	Temp Shift Ex1 5 D



# User Benefits

- ▶ Optional identification of Peak day
  - Match up Peak days with temp shifts to confirm ovulation

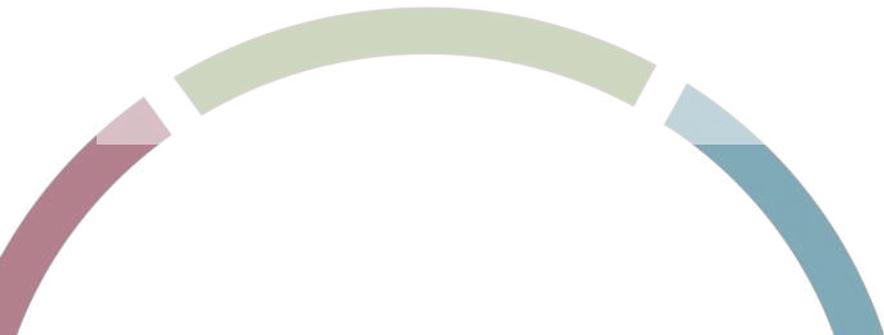


# Provider Benefits

- ▶ Access to client charts, in both paper and electronic format
- ▶ Ability to view client charts before and after corrections
- ▶ Record electronic session notes that both you and the client can access at any time
  - Client is automatically notified when new session notes are created
- ▶ Remote/Group consultations
  - Automatic data masking features for client privacy during screen share
- ▶ Option to grant client access to app at a discount
- ▶ **Doesn't replace** your existing EMR, but **supplements** it

# Legal Compliance

- ▶ General Data Protection Regulation (GDPR) compliance
  - User has full control over their data, chooses whom they share it with and when, can withdraw consent at any time
- ▶ HIPAA compatibility
  - Compatible from a technical/security standpoint
  - Policy/legal coming soon
- ▶ Planning for future privacy regulations
  - Data is collected only on a 'need-to-know' basis – bare minimum identifying information collected and stored



# System Security

- ▶ Security is a major focus
  - Goal is medical-grade
- ▶ Multiple levels to limit damage if any one level were to fail.
  - Encrypted against physical theft
  - Row-Level security protects against API errors (coming soon)
  - Access to database is restricted to only prebuilt routines via whitelist
  - Cryptographically-secure session tokens ( > 240 bits of entropy)
  - All network traffic over SSL/TLS; HSTS also enforced
  - Data on mobile app is encrypted/obfuscated when at rest (avoids export regulations)

More than just a HIPAA-certified server

- Adoption of formal company policies
- Will sign Business Associate

Agreement (BAA)

- Coming soon



User

HTTPS (HSTS & SSL/TLS 1.2)

API token security

Limited (Whitelist) Database  
Access

Row-Level Security

At-Rest Encryption

# System Security

- ▶ All development is done internally
- ▶ More enhancements coming soon
  - Multi-Factor authentication
  - Row-level security (RLS)
  - Rotating session key encoding
  - Various techniques for threat detection
- ▶ But... user experience must not be compromised!



# Research Opportunities

- ▶ > 1600 users volunteering
  - 78% are interested in hearing about research!
  - Data is anonymized/de-identified individually for every research effort – multiple datasets cannot be compared
  - Process complies with HIPAA (45 C.F.R. §§ 164.502(d)(2), 164.514(a) and (b))
- ▶ White paper, “Assessment of menstrual health status and evolution through mobile apps for fertility awareness”: <https://www.nature.com/articles/s41746-019-0139-4.pdf>
  - Fertility awareness body signs, as tracked easily via accessible mobile applications, have not yet been extensively described or studied and it is **unclear how app users are reporting these signs**, as well as whether the reported observations **are consistent with the conclusions of previous smaller-scale medical studies**. Moreover, there are no statistical frameworks to detect ovulation from these self-tracked data, which would be useful to leverage the potential of these data to study fertility, accurately predict pregnancy chances and to overall evaluate the potential impact of fluctuating hormones on the course of chronic diseases.
- ▶ NeoFertility solves this!
  - Can determine which ones are meeting with Advisors, and at what frequency
  - Advisors could potentially provide metadata to indicate how comfortable they feel the user is with charting
  - Standardized medical charting model removes subjectivity (Egg-White, Creamy, etc.)

# Live Demo

