Engagement with digital behaviour change interventions: Key challenges and potential solutions

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CBC Digital Health Conference 2017

Wednesday 22nd February

Overview

1. What is engagement and how can we measure it? (Olga Perski)
2. How important is engagement for effectiveness? (Ann Blandford)
3. What is the role of just-in-time interventions? (Felix Naughton)
4. What insights can be gained from machine learning? (Alexandru Matei)
5. What study designs are useful for assessing engagement? (Robert West)

1. What is engagement and how can we measure it?

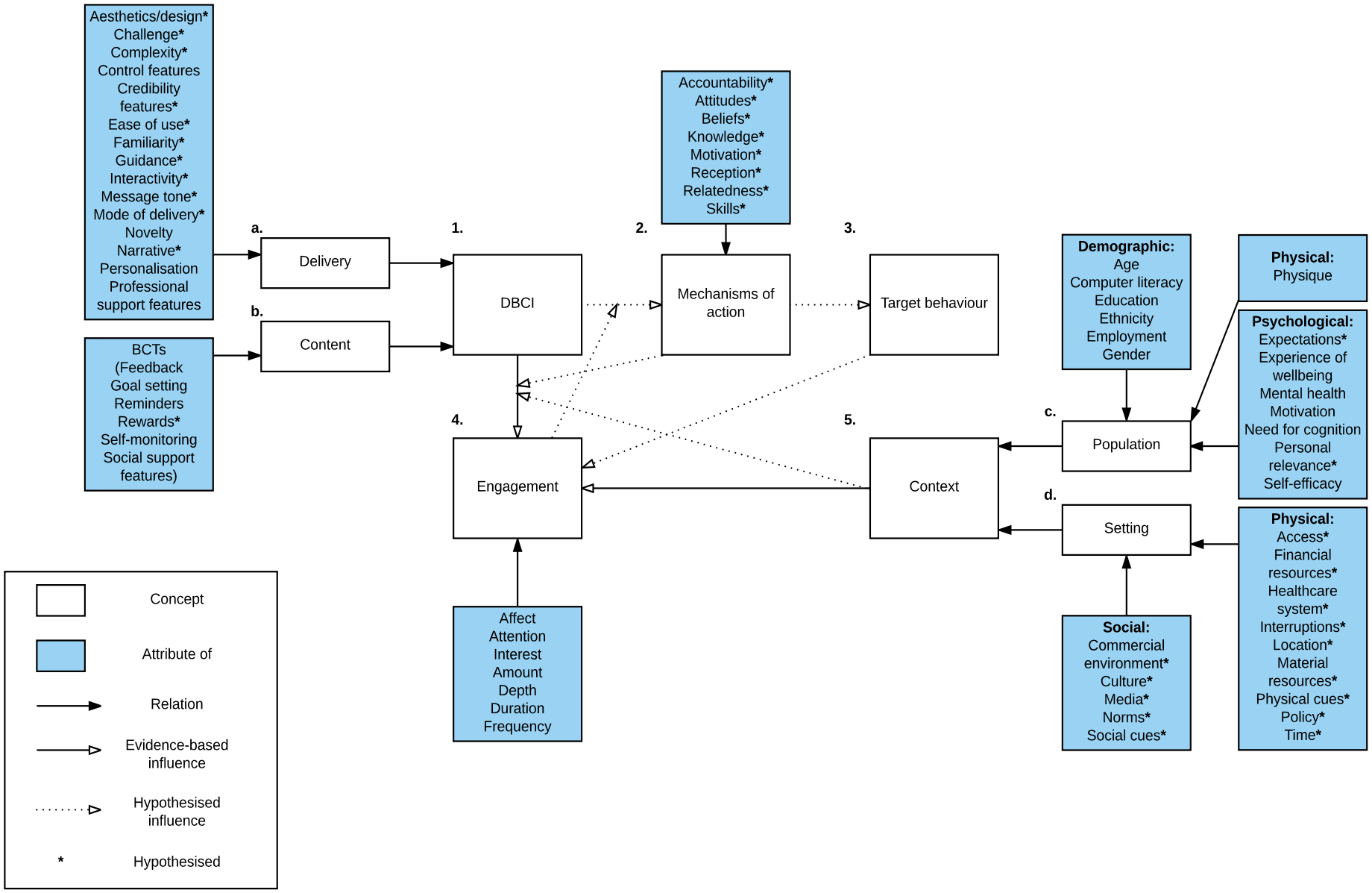
Olga Perski

University College London

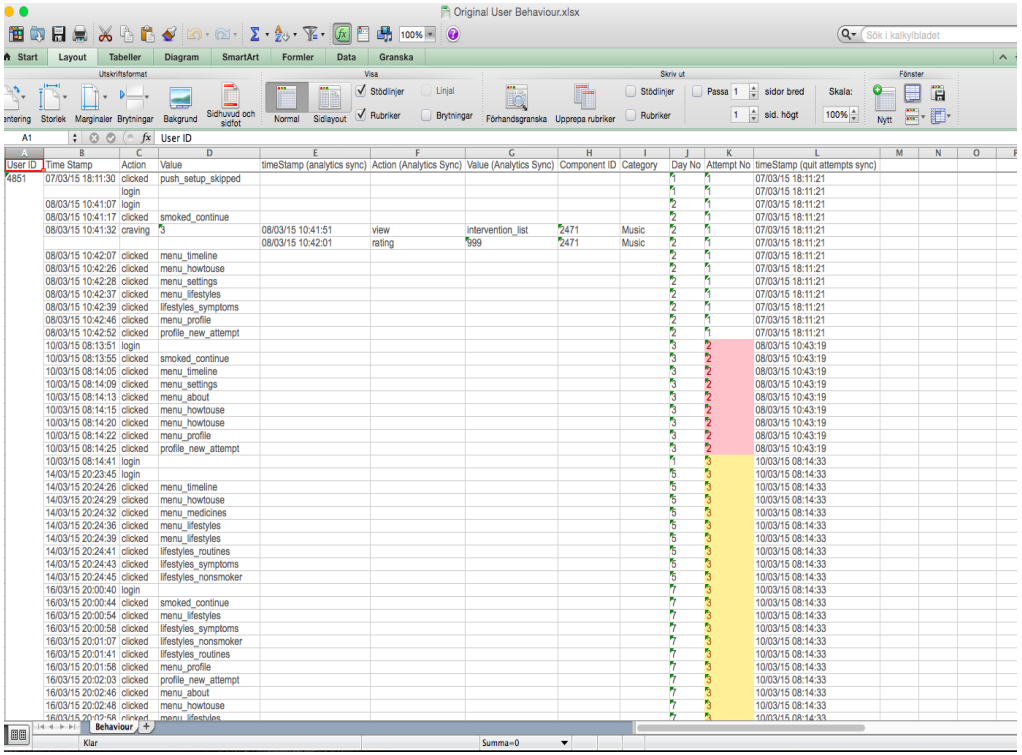
What is engagement?

Engagement is 1) the extent (e.g. amount, depth, frequency, duration) of DBCI use and 2) a subjective experience characterised by attention, interest and affect

Perski, Blandford, West & Michie (2016) *Translational Behavioral Medicine*


Aesthetics/design*
Challenge*
Complexity*
Control features
Credibility features*
Ease of use*
Familiarity*
Guidance*
Interactivity*
Message tone*
Mode of delivery*
Novelty
Narrative*
Personalisation
Professional support features
BCTs (Feedback
Goal setting
Reminders
Rewards*
Self-monitoring
Social support features)
a.
Delivery
b.
Content
1.
DBCI
2.
Accountability*
Attitudes*
Beliefs*
Knowledge*
Motivation*
Reception*
Relatedness*
Skills*
Mechanisms of action
3.
Target behaviour
4.
Engagement
Affect
Attention
Interest
Amount
Depth
Duration
Frequency
5.
Context
c.
Population
Demographic:
Age
Computer literacy
Education
Ethnicity
Employment
Gender
Physical:
Physique
Psychological:
Expectations*
Experience of wellbeing
Mental health
Motivation
Need for cognition
Personal relevance*
Self-efficacy
d.
Setting
Social:
Commercial environment*
Culture*
Media*
Norms*
Social cues*
Physical:
Access*
Financial resources*
Healthcare system*
Interruptions*
Location*
Material resources*
Physical cues*
Policy*
Time*
Concept
Attribute of
Relation
Evidence-based influence
Hypothesised influence
* Hypothesised

How can we measure engagement?



Self-report versus automatically recorded usage data?

2. How important is engagement for effectiveness?

Ann Blandford

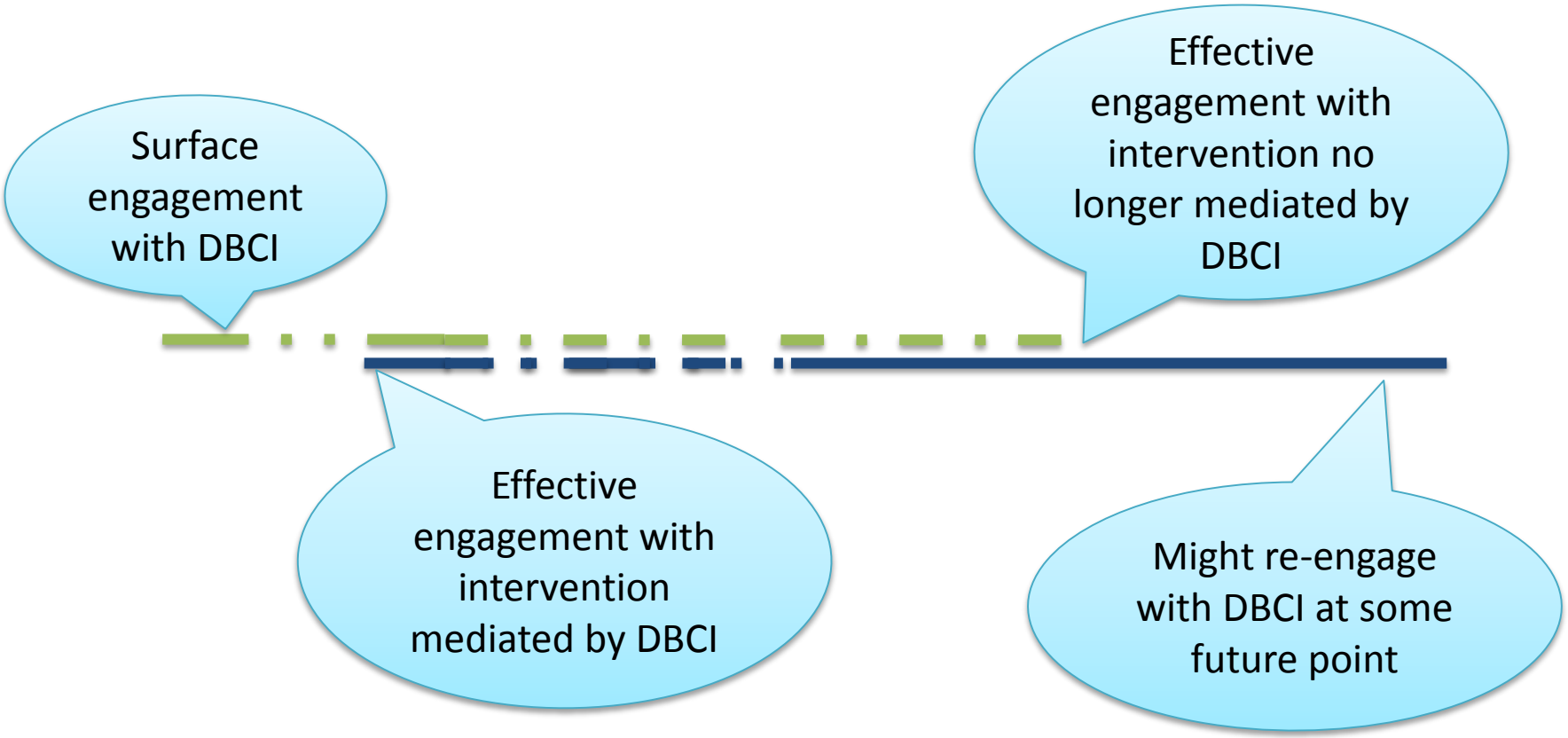
Professor of Human–Computer Interaction

Statement of the obvious

- If someone doesn't engage at all
  then the intervention can't be effective
- Engagement might be brief and effective
  - E.g., new understanding changes motivation, where capability and opportunity already exist
- Or it might require ongoing engagement
  - E.g., to help with managing cravings, to track progress, to provide ongoing motivation

Means or end?

- Long-term dependence = over-reliance



How important is engagement for effectiveness?

- Ultimate focus should be on outcomes
  - Being happier, fitter, stronger, etc.
- Since there is no such thing as a happy pill, fit pill, etc., people need to engage with behaviours that bring about desired outcomes

- The question is not *whether* engagement is important, but what *forms* that engagement takes…

3. What is the role of just-in-time interventions?

Felix Naughton

Senior Lecturer in Health Psychology

UEA

Just-in-time support

User-triggered
e.g. text HELP, open app

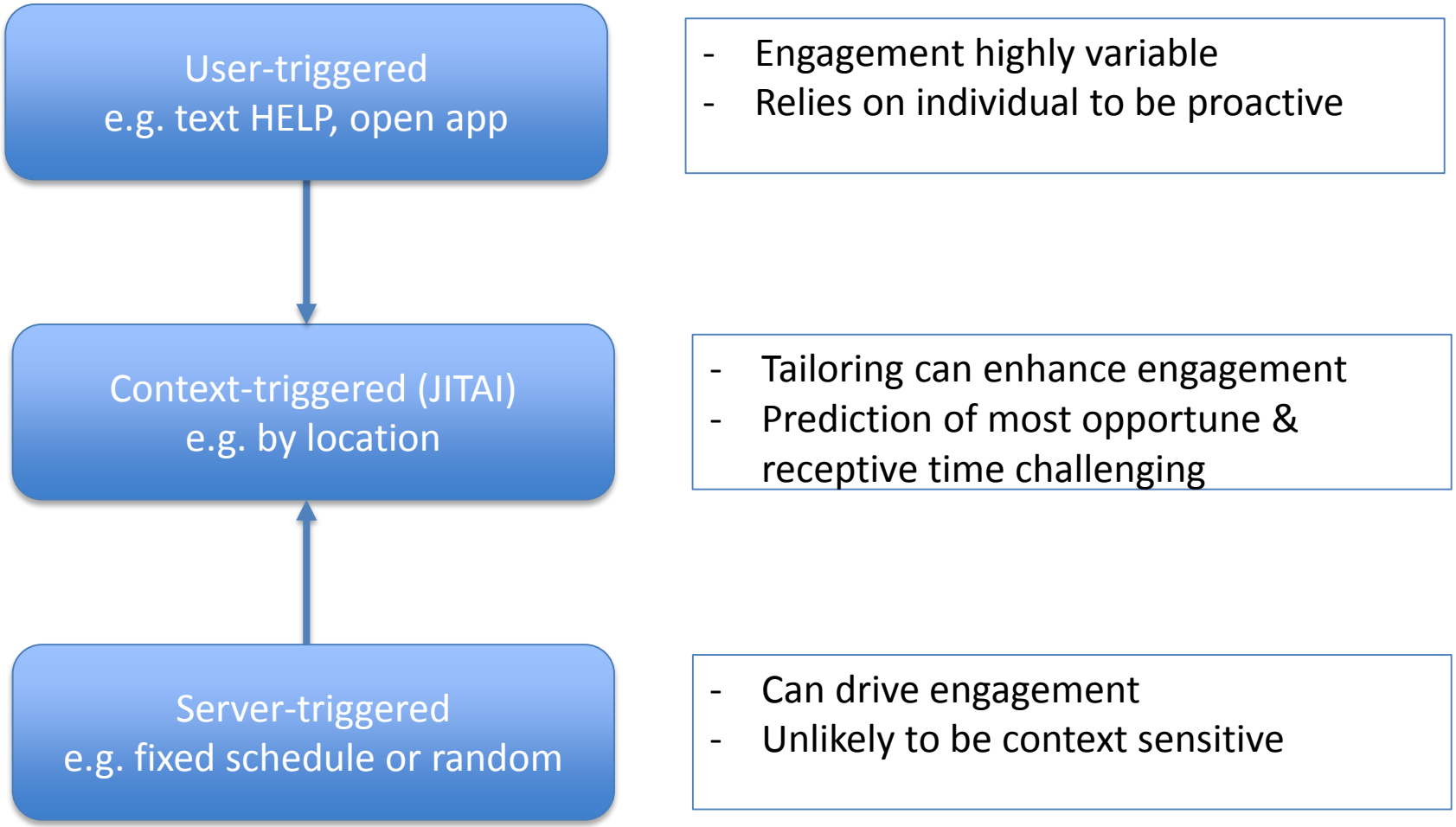
- Engagement highly variable
- Relies on individual to be proactive

Server-triggered
e.g. fixed schedule or random

- Can drive engagement
- Unlikely to be context sensitive

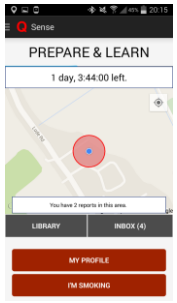
Naughton (2017) *Nicotine and Tobacco Research*, 19(3): 379-383

Just-in-time support



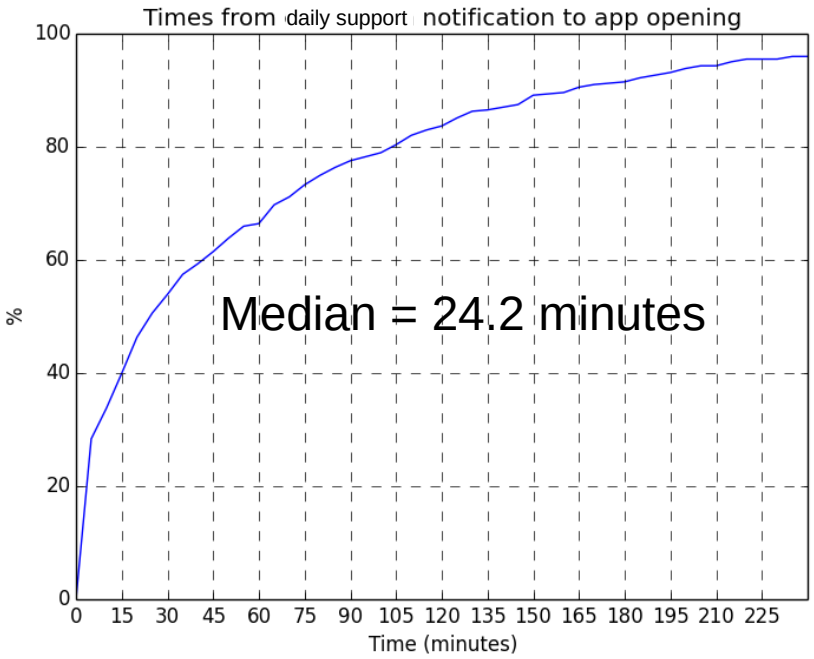
Naughton (2017) *Nicotine and Tobacco Research*, 19(3): 379-383

Speed of viewing support: Q Sense



Server-triggered
(fixed time)

Context-triggered (JITAI)
(by location)



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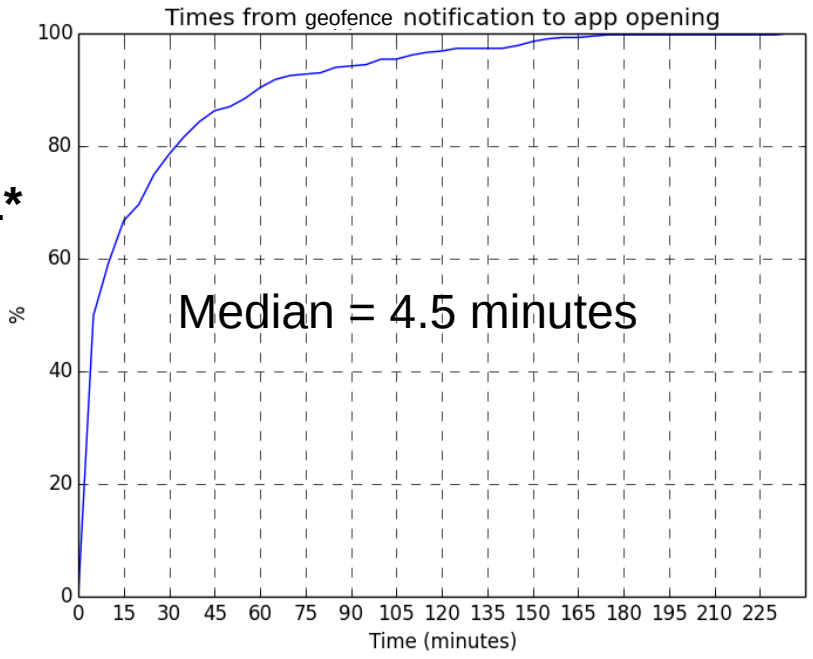


54% alerts viewed within 30 minutes

79% alerts viewed within 30 minutes

* Within and between participant analysis (N=15)

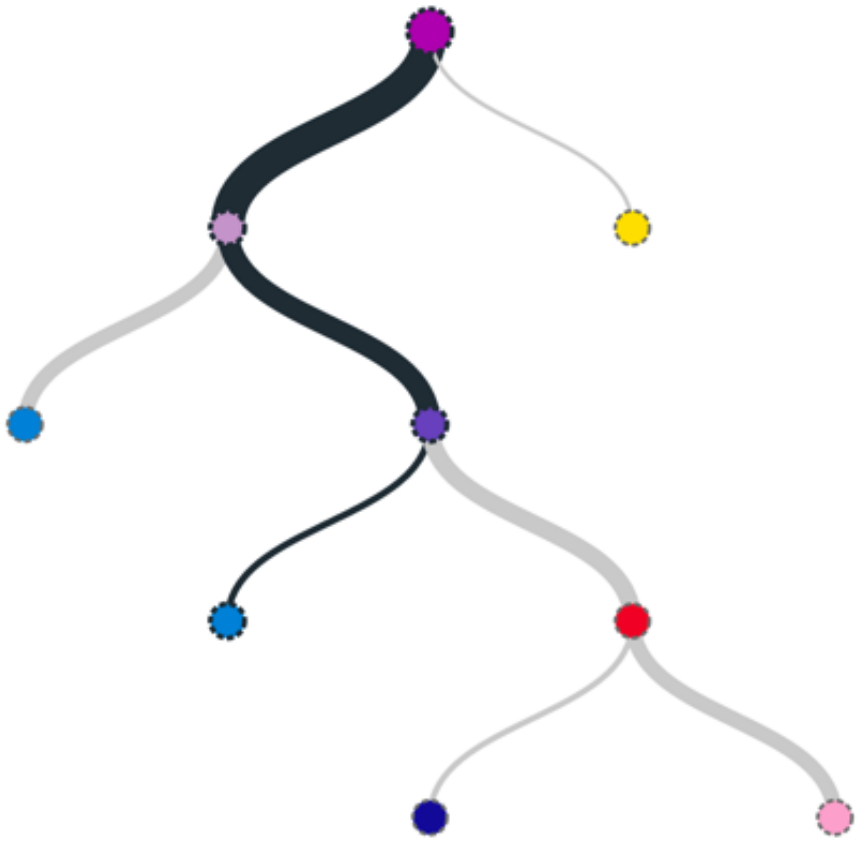
4. Predicting User Behaviour

Presented by Alex Matei

22/ 02/ 2017

Problem Formulation

- Classification
- Logistic regression
- Non-supervised



Feature Engineering

- What is a good time unit
  - Derived from patterns in the **overall population**
  - Relative to past behaviour of **similar users**
  - Linked to the frequency of each **individual's interactions**

- Describing behaviour
  - Counts, Sums, Averages
  - Trajectory, speed of change
  - Non supervised learning to identify clusters, relevant behavioural patterns

How many predictive models and when to run them

- Population wide
- Defined cohorts
- Batch predictions for a cohort
- Predictions triggered in real time