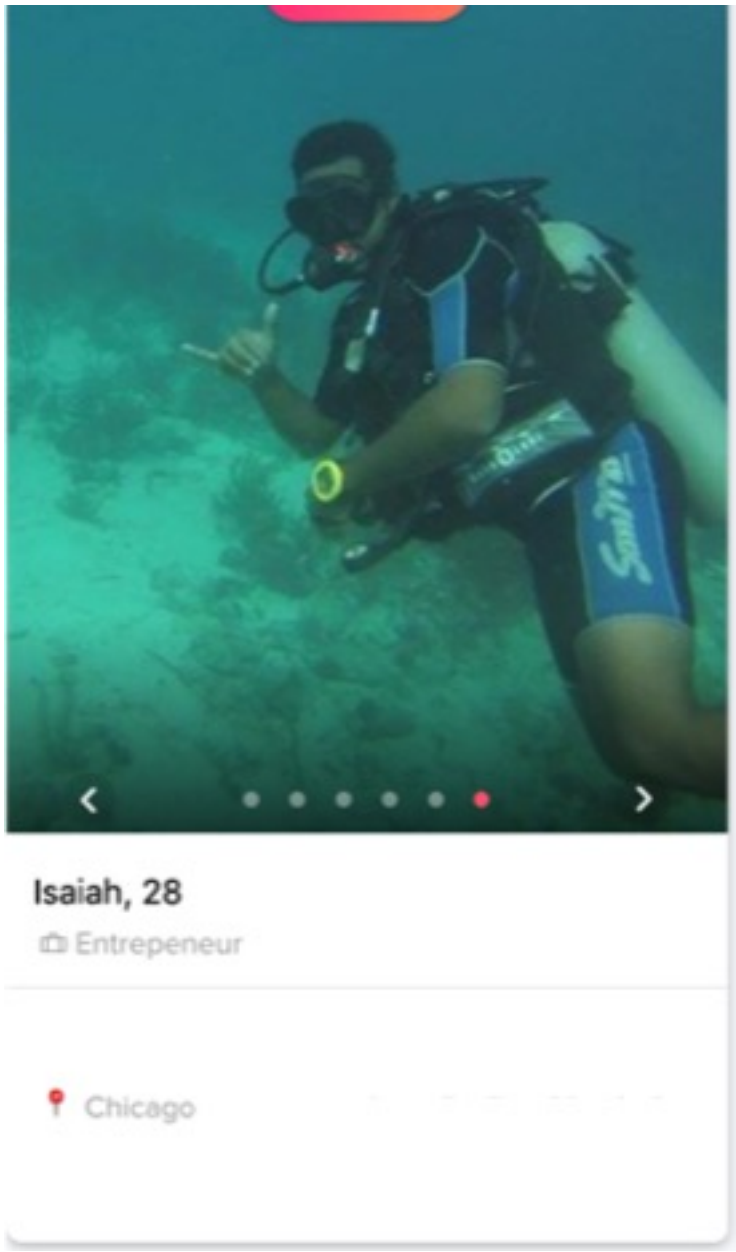
How Threat Modeling Made Me Better at Online Dating

#DateSafe

Isaiah Sarju

Who am I

- Security consultant, co-owner Revis Solutions
- Red teamer
- Teacher
- Anti: nihilism, security theater, wasted time
- Pro: risk based security
- Love chocolate chip cookies

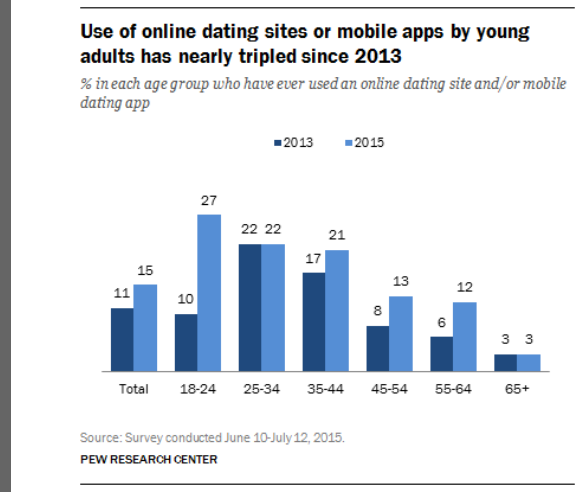


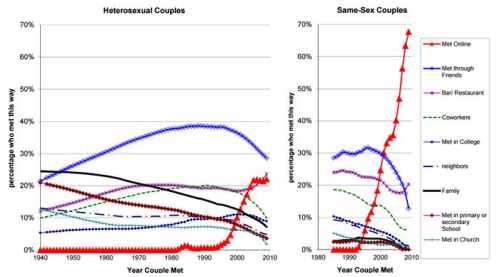
Who is this talk for?

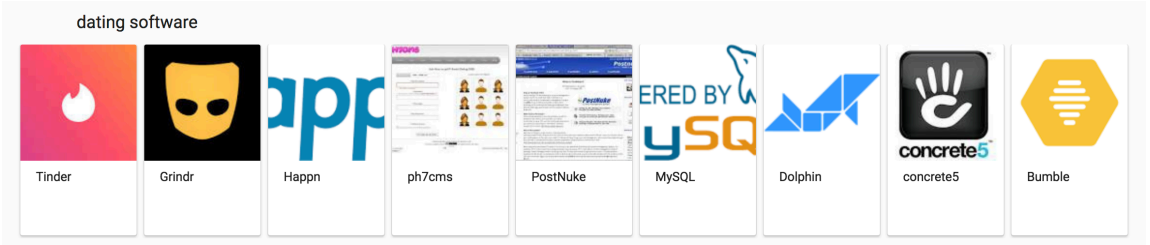
People who want to…

- Know what threat modeling is
- Learn basic steps to do threat modeling
- Apply threat modeling to development stages or end-user usage
- Learn tips for online dating (regarding security)
- Gain a basic understanding of
  - Data flow diagrams
  - STRIDE
  - Attack Trees
  - Principle of nymity/linkability

Technology and Dating







@isaiahsarju

Applications to Online Dating

Avoid	security nihilism
Promote	safe/positive interactions
Build	more privacy/security centric applications
Protect	users: •LGBTQ, Non-normative sexual/romantic preferences, People with disabilities, _____ minorities, (Everyone)

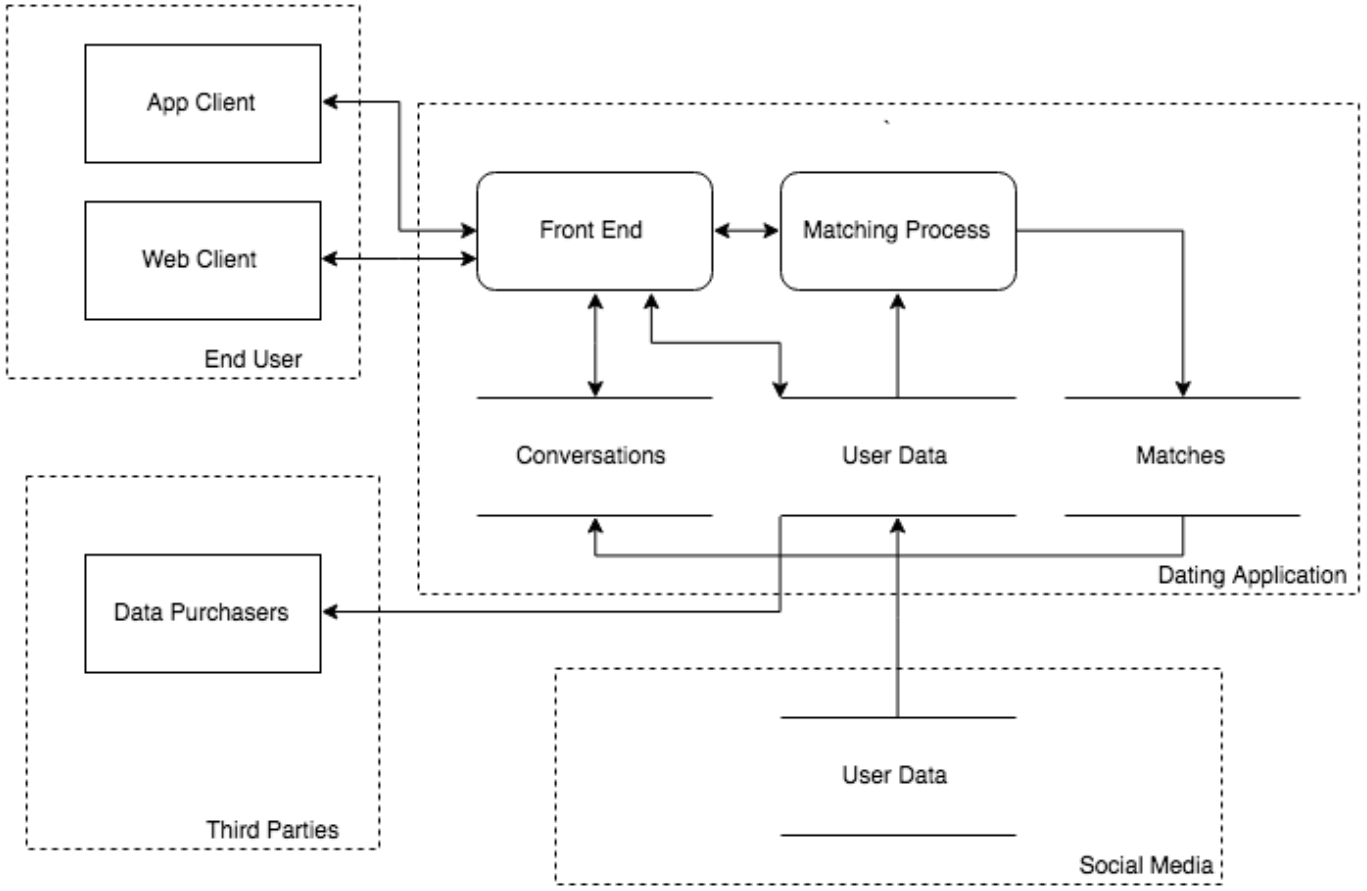
Consequences of Bad Threat Modeling

There are many

Tinder Matching Disclosure

Data Linking Disclosure

DFD


App Client
Web Client
End User
Front End
Matching Process
Conversations
User Data
Matches
Dating Application
Data Purchasers
Third Parties
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Social Media

Data flow diagrams

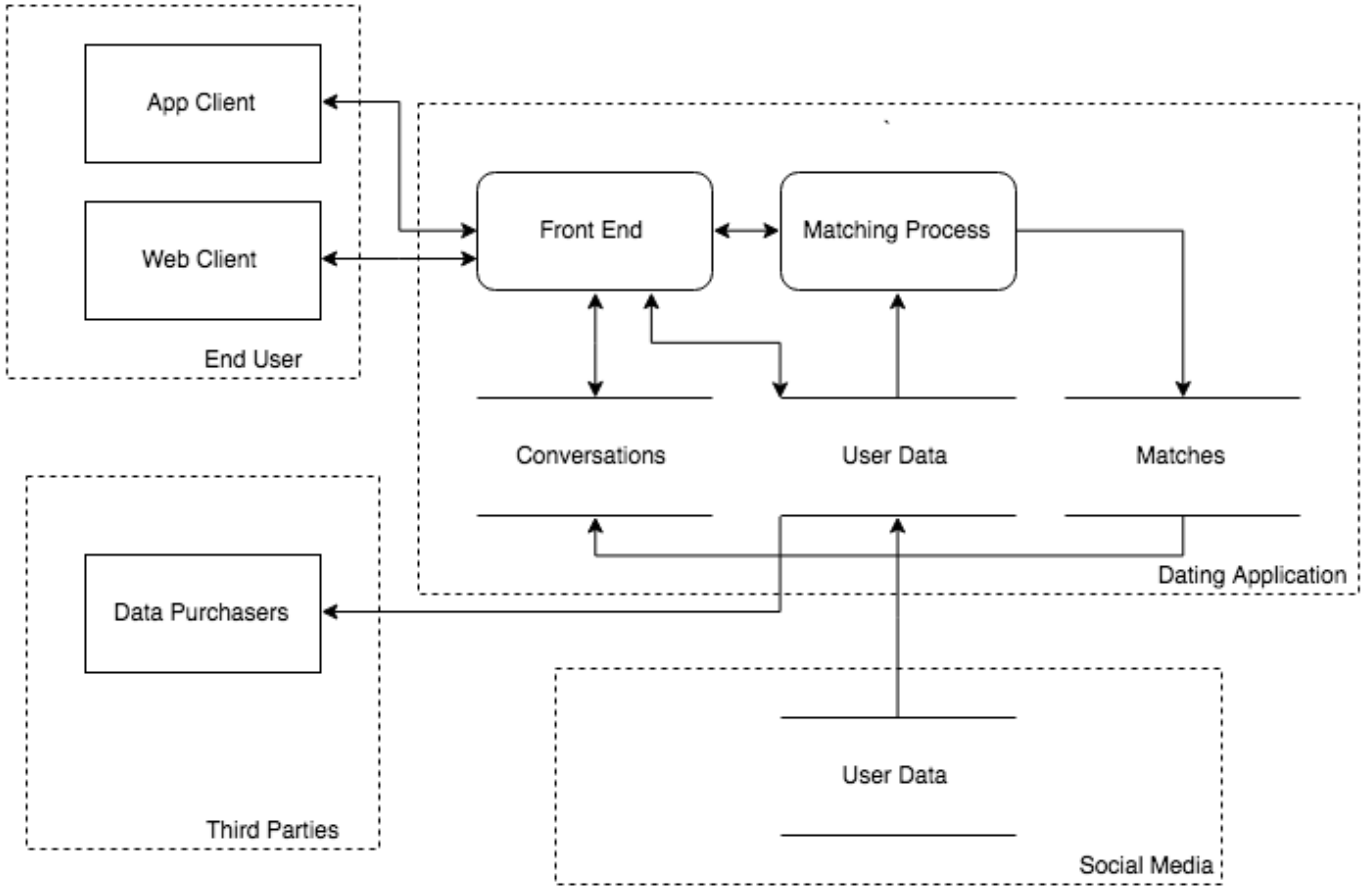
"Problems tend to follow the data flow, not the control flow" – Adam Shostack

Decompose application processes

Understand data flow

Apply STRIDE to each step of the way

DFD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Tinder Front End/Client Risk

STRIDE	Example
Spoofing (Authentication)	Falsely claiming to be Isaiah Sarju on Tinder (Bumble offers “verification”)
Tampering (Integrity)	Changing a presented profile, changing a swipe
Repudiation (Non-repudiation)	“I didn’t swipe right on that person”
Information *Disclosure (Confidentiality)*	Disclosing swipe decision, disclosing matches/chats
Denial of Service (Availability)	Not able to connect to front end via client
Elevation of Privileges (Authorization)	Able to see profiles w/o matching, Facebook “view as” breach

C	SRC-PORT	DST	DST-PORT	SIZE	URL
2.168.8.13	50015	95.136.31.54	80	321	/59887a89b33bbdbd4ba2e9db/640x640_15f315c1-9
2.168.8.13	50015	95.136.31.54	80	321	/59887a89b33bbdbd4ba2e9db/640x640_15f315c1-9f3f-4cd9-8e68-ab1c3
87.57.193	443	192.168.8.13	49973	278	
2.168.8.13	50016	95.136.31.46	80	321	/59887a89b33bbdbd4ba2e9db/640x640_e90157b1-7566-46f6-881b-b7a
87.57.193	443	192.168.8.13	49973	278	
2.168.8.13	50017	95.136.31.46	80	321	/55357ec85509b43422dc69ad/640x640_84b6c9b4-4561-4568-b63c-d2c
2.168.8.13	50018	95.136.31.46	80	321	/55357ec85509b43422dc69ad/640x640_96bde372-3f15-4558-966c-07c
2.168.8.13	50020	95.136.31.46	80	321	/55357ec85509b43422dc69ad/640x640_f2950e00-b526-4d97-a52e-775
2.168.8.13	50019	95.136.31.46	80	321	/55357ec85509b43422dc69ad/640x640_da0b71f1-e933-4490-8026-8fab
2.168.8.13	50021	95.136.31.46	80	321	/55357ec85509b43422dc69ad/640x640_eafdd0e3-8dd5-46ed-8a5c-f2f4
87.57.193	443	192.168.8.13	49973	374	
2.168.8.13	50023	95.136.31.46	80	321	/55ca572908e45e04415719ef/640x640_0a155395-b853-4f18-b7cf-67d7
2.168.8.13	50024	95.136.31.46	80	321	/55ca572908e45e04415719ef/640x640_9845d2fa-78ac-47b8-b820-9bb8
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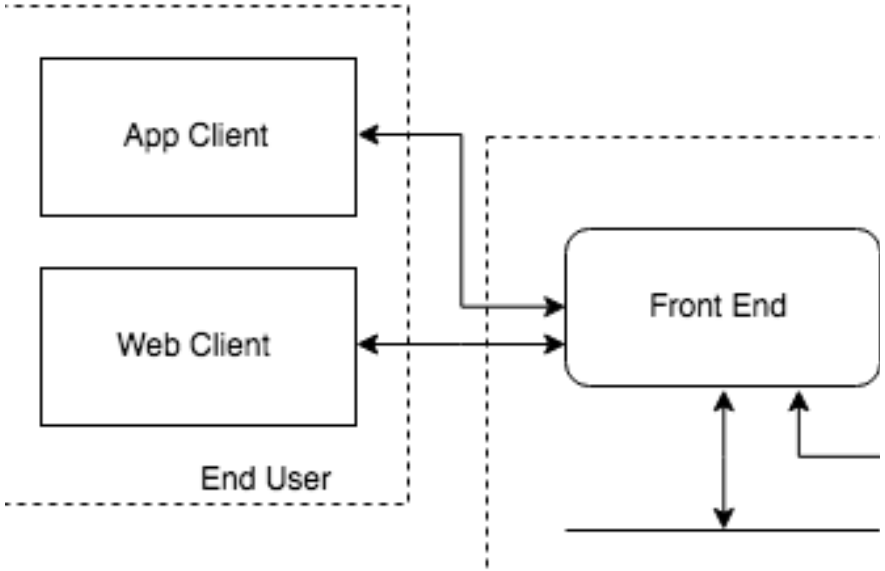


Tinder Information Disclosure (Checkmarx research)

Risk Management Techniques

Acceptance

Avoidance

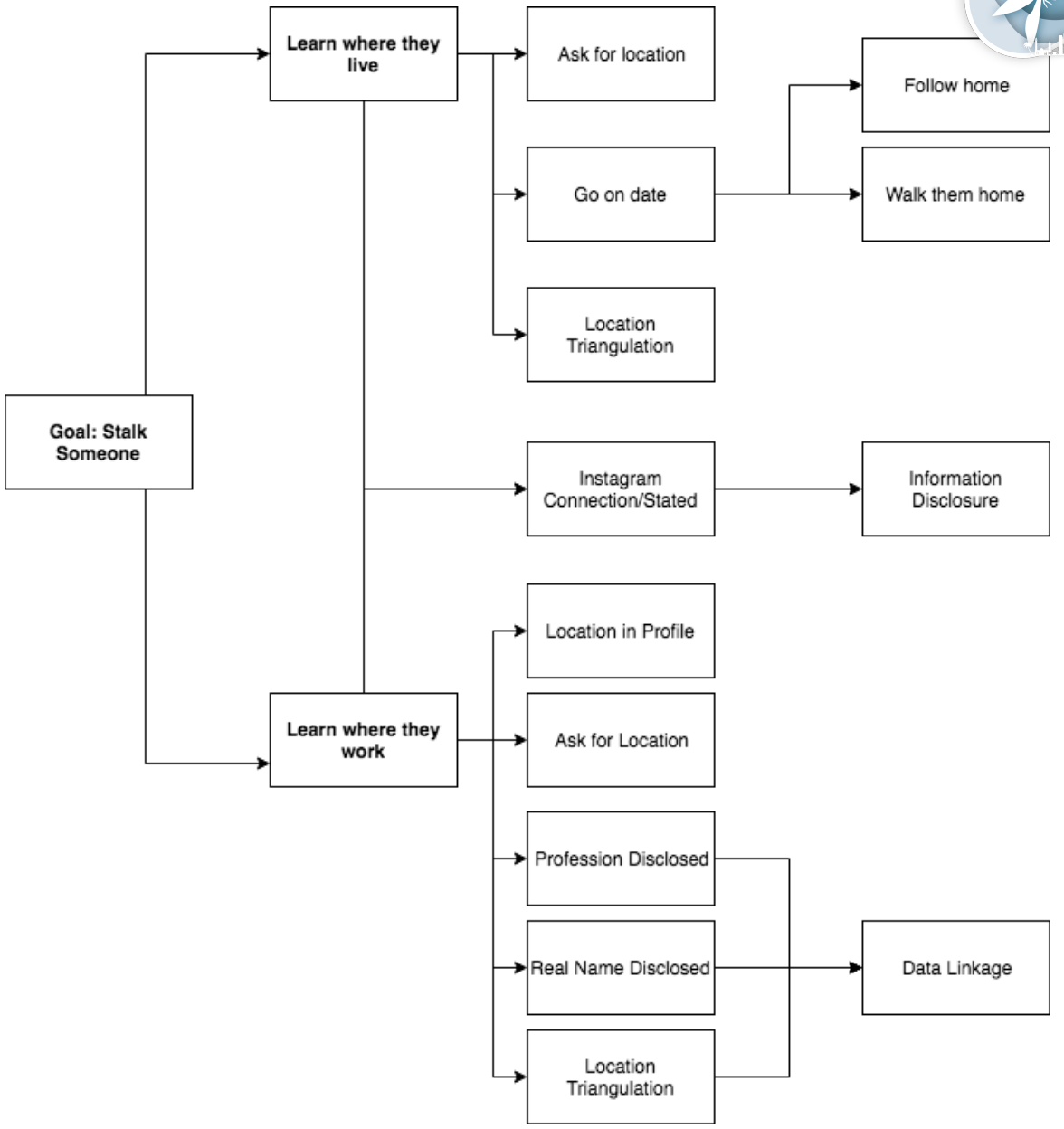
Transference

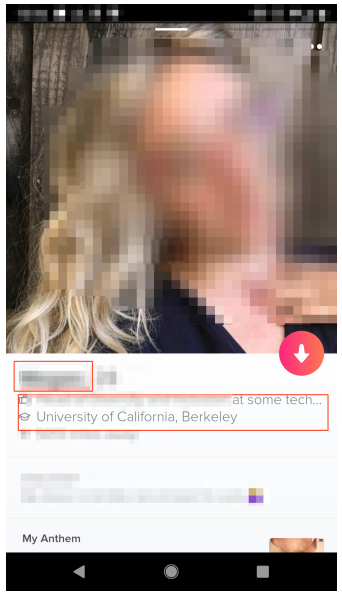
Mitigation/Reduction

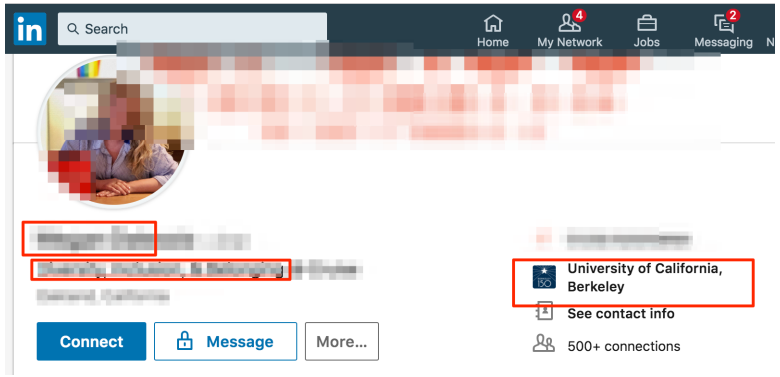
Risk Handling

App	User
HTTPs (mitigation)	VPN (mitigation)
Standardize response size (mitigation)	Only swipe at home (avoidance)
Don’t care (acceptance)	Don’t care (acceptance)

Attack Trees and Nymity/Linkability







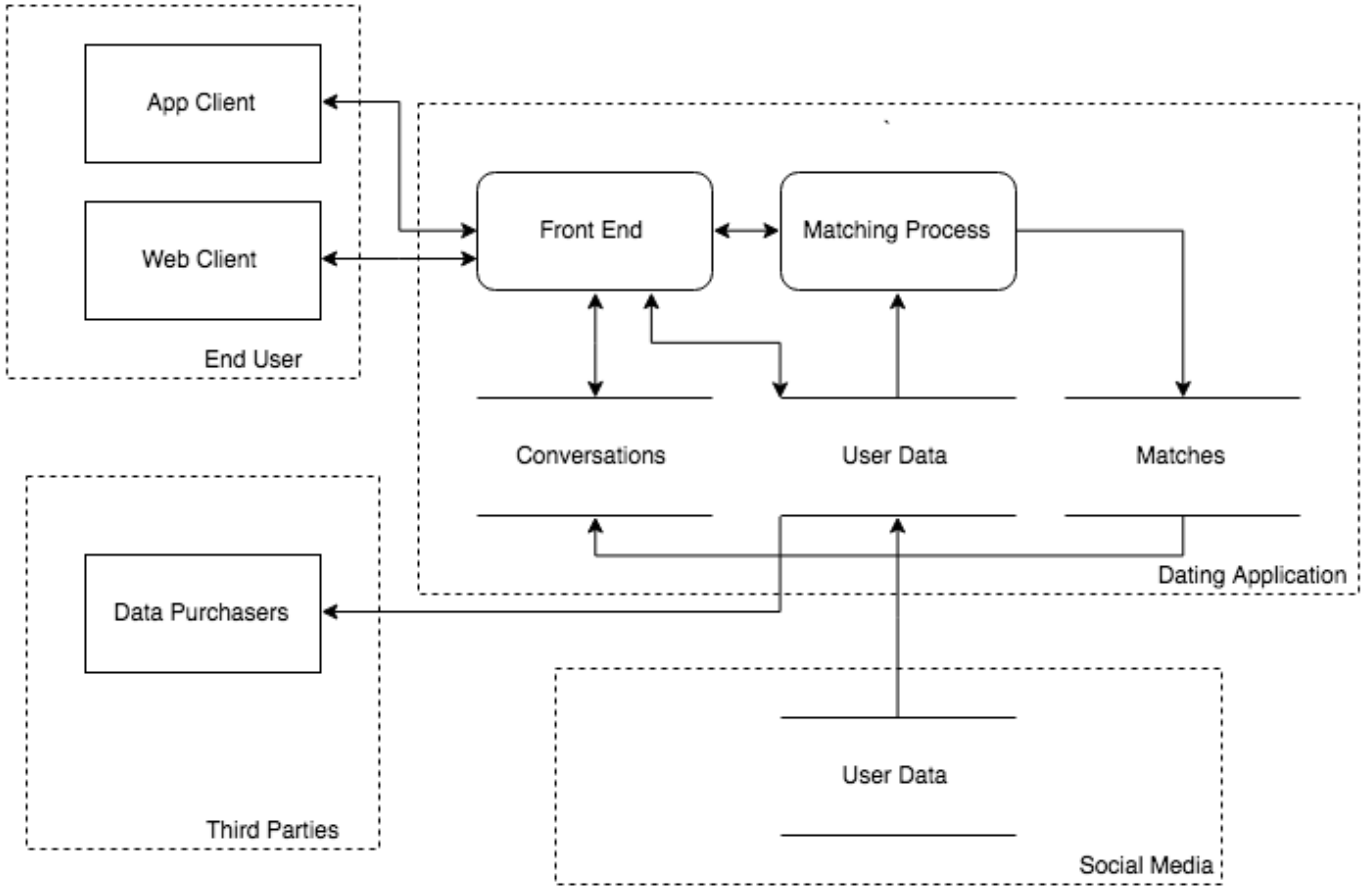
Nymity and Linkability

- Nymity is the “amount of information about the identity of the participants that is revealed” – Ian Goldberg
- Linkability is the ability to bring one or more records together and combine information into a single record based on key(s) (virtual join)

Risk Handling

App	User
Allow users to chose what information they disclose(transference)	Don’t date (avoidance)
Don’t disclose Instagram handle (reduction) (e.g. Tinder vs Bumble) ***Update**	Fake name (reduction)
Fuzzy/delayed location data (reduction) (e.g. Tinder vs Bumble)	Don’t disclose employer (reduction)
Give users ability to hide distance (transference) (e.g. Tinder)	Don’t connect Instagram (reduction)
	Prevent realtime location sharing (reduction) (iPhone vs Android)
	Don’t disclose distance (mitigation) (e.g. Tinder)
	Spoof location (mitigation)
	Don’t care (acceptance)

DFD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My Love of Threat Modeling

Helps builders build better

Helps defenders think intentionally

Helps attackers prioritize attacks

Helps everyone make intentional decisions about data responsibility

Sources

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Q’s

Info

- @isaiahsarju all over The Internet
- https://github.com/isaiahsarju/presentations