

DR. JOSEPH MAGUIRE

# ALTERNATIVE AUTHENTICATION RESEARCH IN SCOTLAND



University  
of Glasgow

**sicsa\***

The Scottish Informatics &  
Computer Science Alliance



TECHNISCHE  
UNIVERSITÄT  
DARMSTADT

What are you going to hear today?



**sicsa\***

The Scottish Informatics &  
Computer Science Alliance

[www.sicsa.ac.uk](http://www.sicsa.ac.uk)

# UNIVERSITIES

- University of Aberdeen. Department of Computing Science
- University of Abertay. School of Computing and Engineering Systems & Institute of Arts, Media and Computer Games
- University of Dundee. School of Computing
- University of Edinburgh. School of Informatics
- Edinburgh Napier University. Institute for Informatics & Digital Innovation
- University of Glasgow. School of Computing Science
- Glasgow Caledonian University. School of Engineering and Computing
- Heriot-Watt University. School of Mathematical and Computer Sciences
- The Robert Gordon University. School of Computing
- University of St Andrews. School of Computer Science
- University of Stirling. Department of Computer Science and Mathematics
- University of Strathclyde. Department of Computer and Information Sciences
- University of the West of Scotland. School of Computing
- University of the Highlands and Islands. School of Computing

HUMAN CENTRED SECURITY

RESEARCHERS

ully set up the following login information

ions

What is your childhood nickname?

charlie

Who is your favorite cartoon character?

snoopy

What is your least favorite food?



# RECOVERY + TRANSPARENT

**MIKE JUST**

GLASGOW CALEDONIAN UNIVERSITY

sum total of the first three digits of your social se



AWARENESS + EDUCATION



**IAN FERGUSON**  
ABERTAY UNIVERSITY



A close-up, slightly blurred image of a yellow crash test dummy head. The head is positioned on the left side of the frame, facing right. It has a black and white checkered pattern on its forehead. The background is dark and out of focus.

TESTING



**ISHBEL DUNCAN**  
ST ANDREWS UNIVERSITY

# CULTURE



**GEORGE WEIR**

STRATHCLYDE UNIVERSITY

# PRIVACY + NETWORKS



**TRISTAN HENDERSON**

ST ANDREWS UNIVERSITY

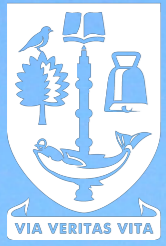
# APP STORES + RECOVERY



**DAVID ASPINALL**  
UNIVERSITY OF EDINBURGH

# UNIVERSITIES

- University of Aberdeen. Department of Computing Science
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- Glasgow Caledonian University. School of Engineering and Computing
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- University of the West of Scotland. School of Computing
- University of the Highlands and Islands. School of Computing



University  
of Glasgow





University  
of Glasgow

- Founded in **1451**, fourth oldest university in the English-speaking world.
- Top **1%** of the world's universities



University  
of Glasgow







University  
of Glasgow

- 1st in Scotland for research impact
- 6th in the United Kingdom for research intensity
- Top 10 in the United Kingdom
- Top 100 in the World

LEADER + COORDINATOR



**KAREN RENAUD**

UNIVERSITY OF GLASGOW

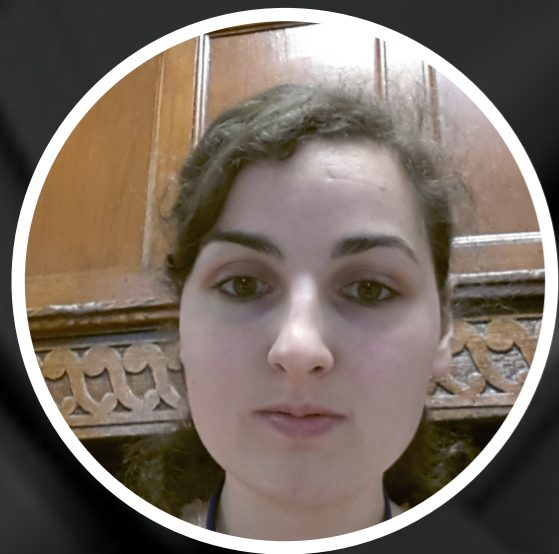
# DISTRACTORS + STRENGTH



**RON POET**

UNIVERSITY OF GLASGOW

# MODELLING + STRENGTH



**ROSE ENGLISH**

UNIVERSITY OF GLASGOW

# CULTURE



**HANI ALJAHDALI**  
UNIVERSITY OF GLASGOW

# INTERFERENCE



**SOUMYADEB CHOWDHURY**

UNIVERSITY OF GLASGOW

CONTINUOUS TRANSPARENT



**HEATHER CRAWFORD**

FLORIDA TECHNOLOGY INSTITUTE



BIOMETRICS





KNOWLEDGE



BIOMETRICS



ACTIVE OR  
PASSIVE

BIOMETRICS



KNOWLEDGE



ACTIVE

KNOWLEDGE



PASSWORDS



Secret Space

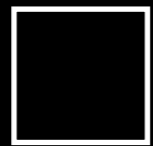
Span contexts

Span languages and cultures

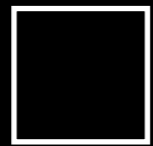
No training required



Secret Space



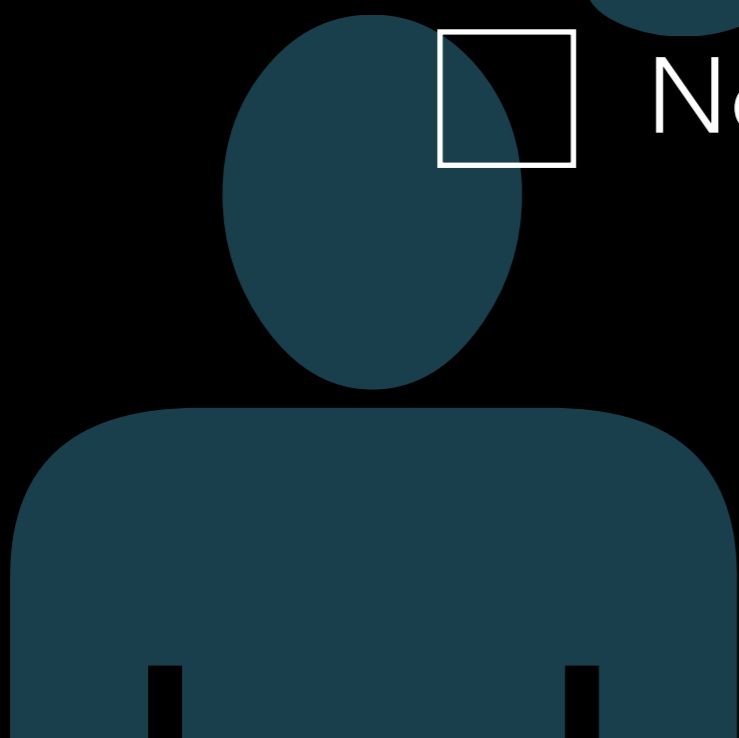
Span contexts



Span languages and cultures



No training required



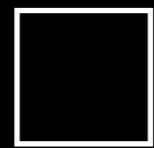




Secret Space



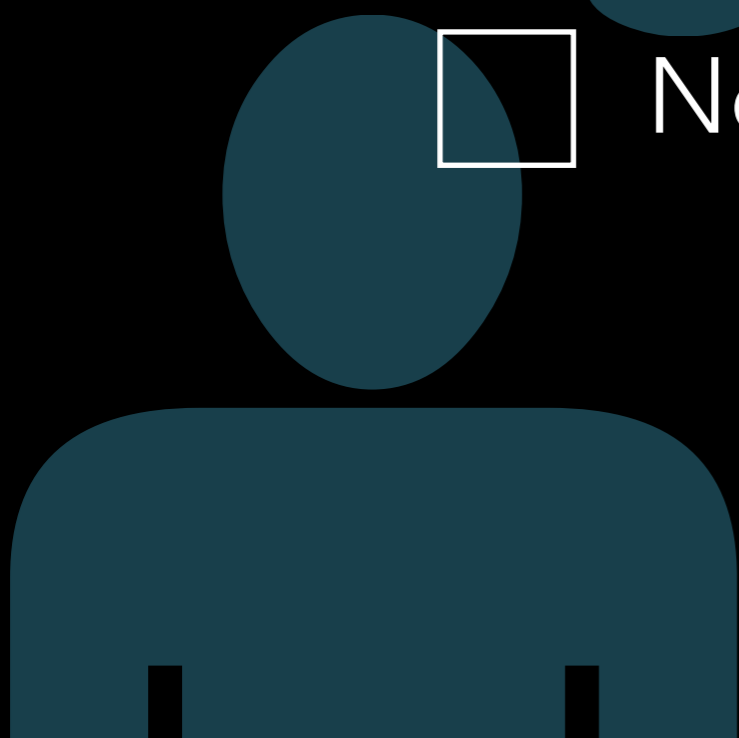
Span contexts

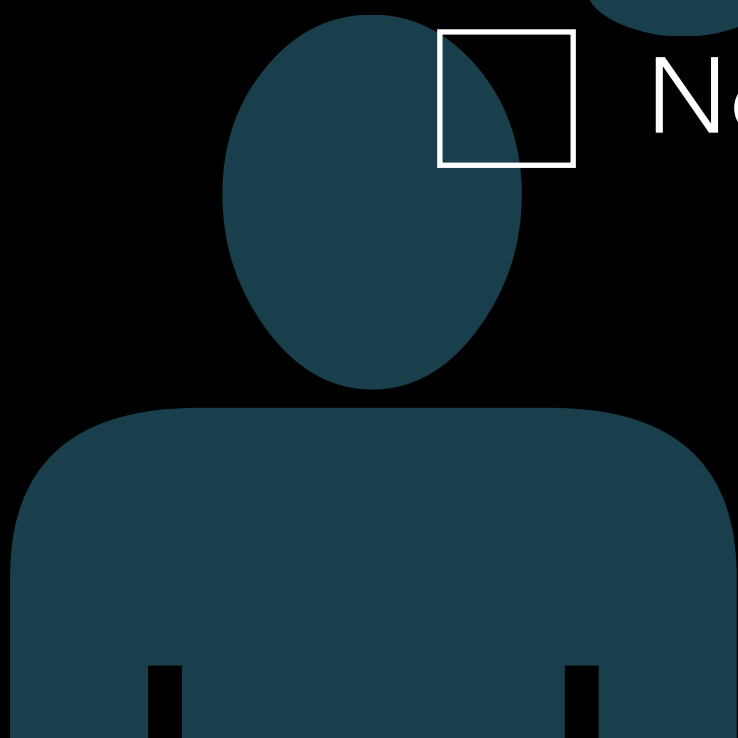


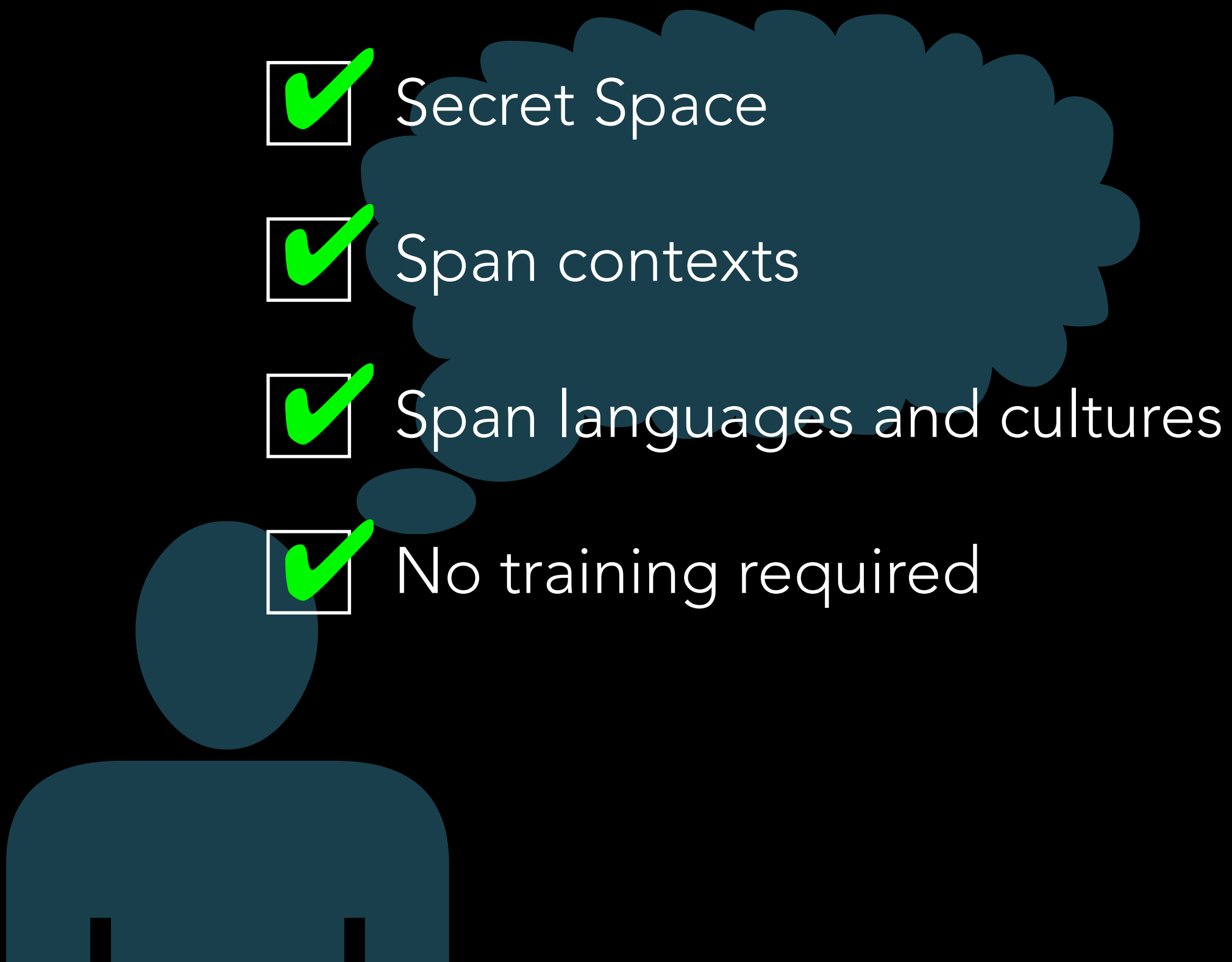
Span languages and cultures



No training required



- 
- Secret Space
  - Span contexts
  - Span languages and cultures
  - No training required

- 
- Secret Space
  - Span contexts
  - Span languages and cultures
  - No training required



JEFF



!Km(9w#Ap

# GRAPHICAL AUTHENTICATION





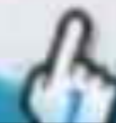


1234567890|



Quit

OK





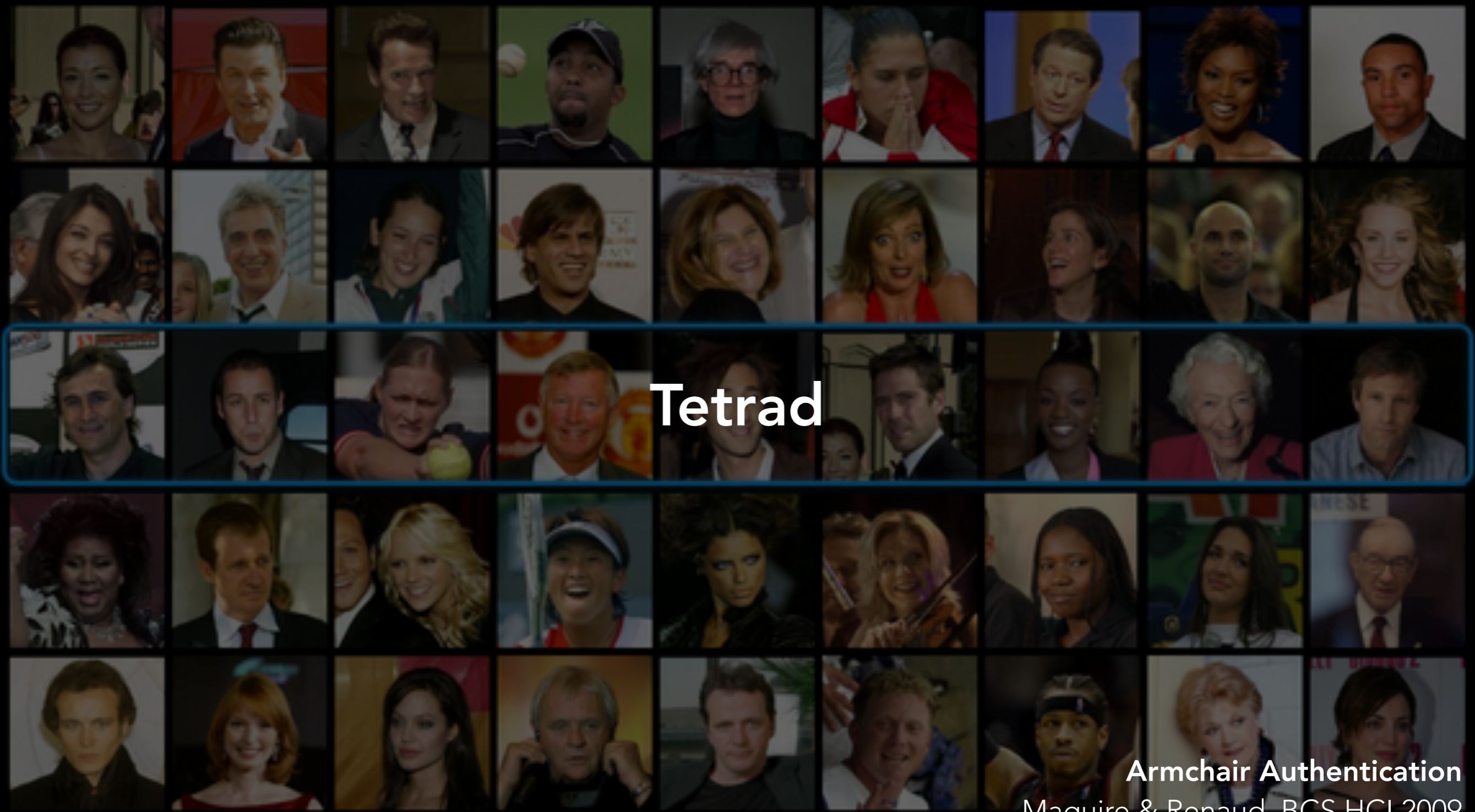


## Wi-Fi Password

Enter the network password for "Fast Courier".  
Network passwords are case-sensitive.

Password: notHidden!\_

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
a b c d e f g h i j k l m n o p q r s t u v w x y z  
0 1 2 3 4 5 6 7 8 9 ! @ # \$ ^ & \* ( ) \ / ? , \_ - +  
" % ' . ; : < > = [ ] { } | ~ ` SPACE CLEAR ←  
DONE



# Tetrad

**Armchair Authentication**

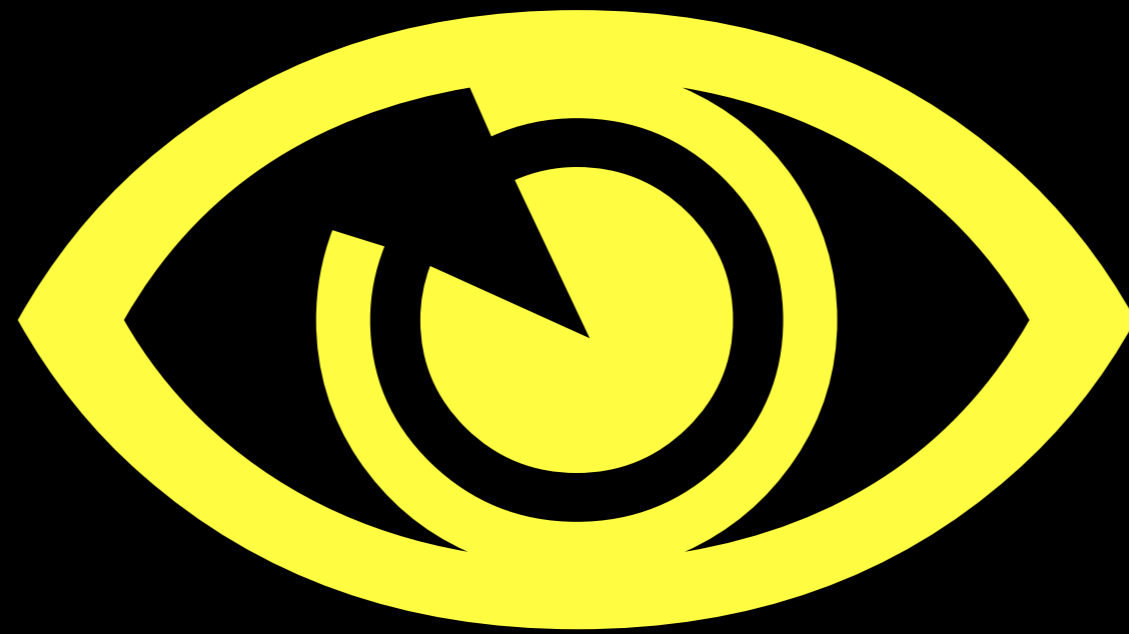
Maguire & Renaud, BCS HCI 2009

**You only live twice or the years we wasted caring about shoulder-surfing**

Maguire & Renaud, BCS HCI 2012

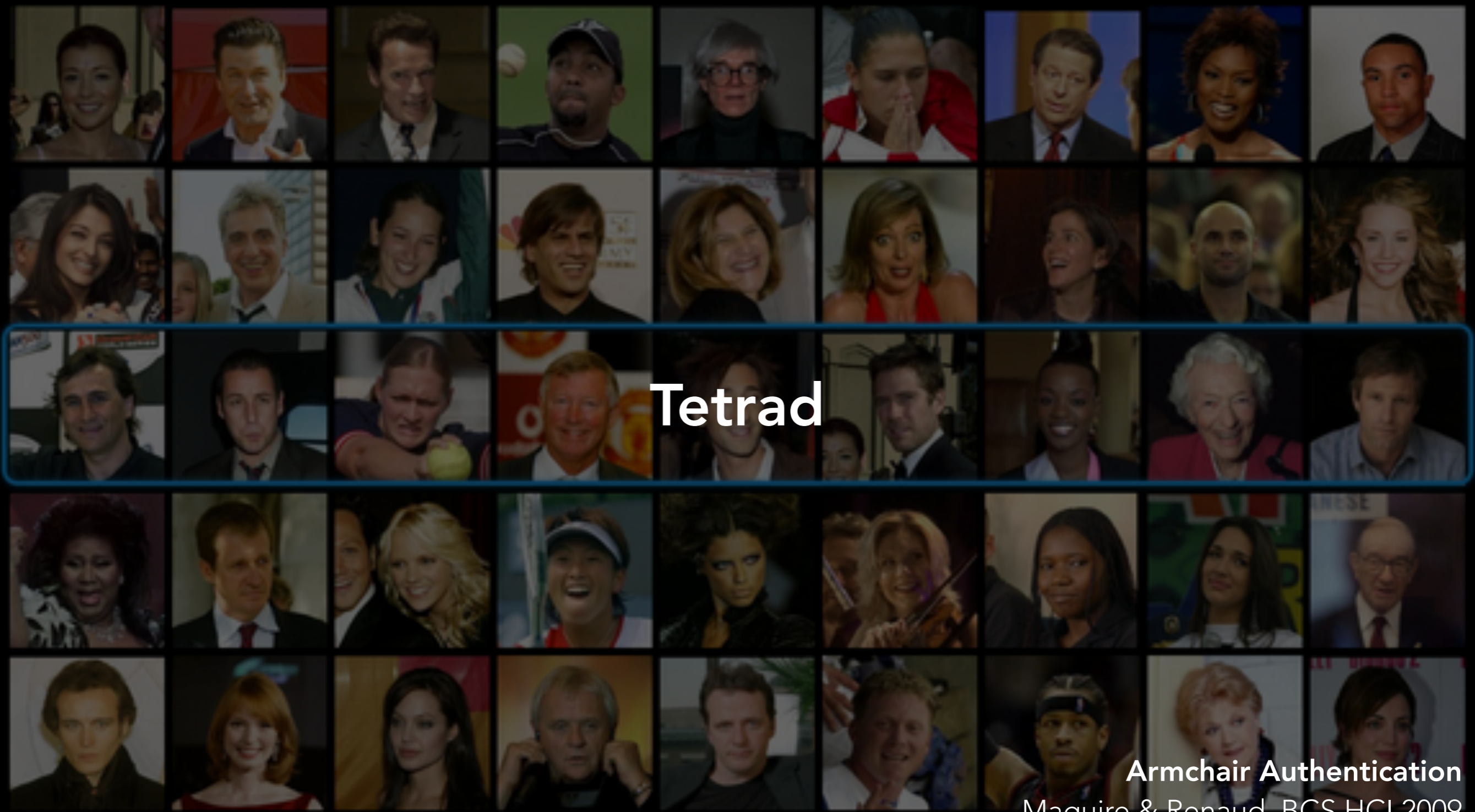












# Tetrad

**Armchair Authentication**

Maguire & Renaud, BCS HCI 2009

**You only live twice or the years we wasted caring about shoulder-surfing**

Maguire & Renaud, BCS HCI 2012

# Tetrad

Time

Secret Space

Observation

Envisioned users

Authentication Tasks

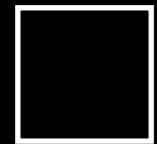
Intended Domain



# Tetrad



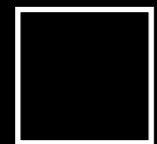
Time



Secret Space



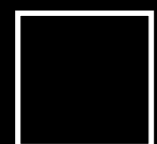
Observation



Envisioned users



Authentication Tasks



Intended Domain



# Tetrad

Time

Secret Space

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Intended Domain



# Tetrad

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Authentication Tasks

Intended Domain



# Tetrad

Time

Secret Space

Observation

Envisioned users

Authentication Tasks

Intended Domain





Poor knowledge transfer ...

Difficult to build upon ...

Few field investigations ...



Poor knowledge transfer ...

Difficult to build upon ...

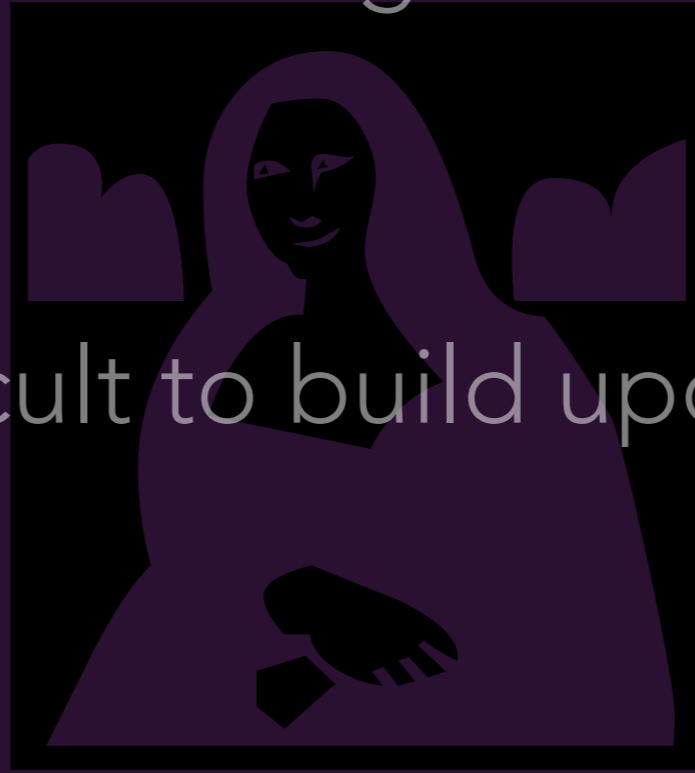
Few field investigations ...



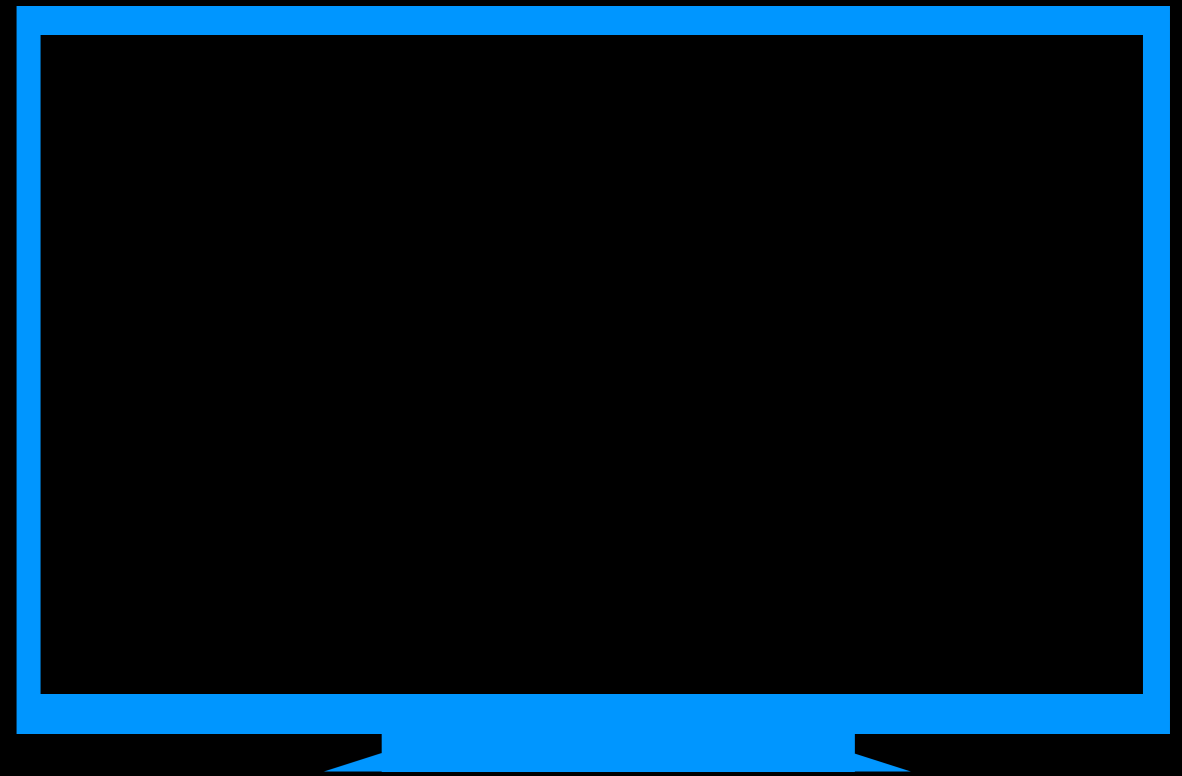
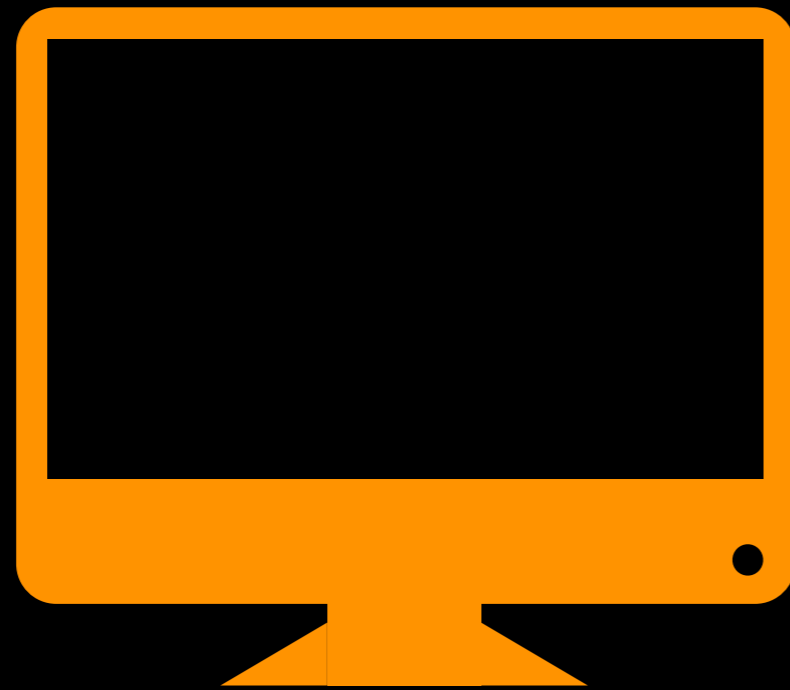
Poor knowledge transfer ...

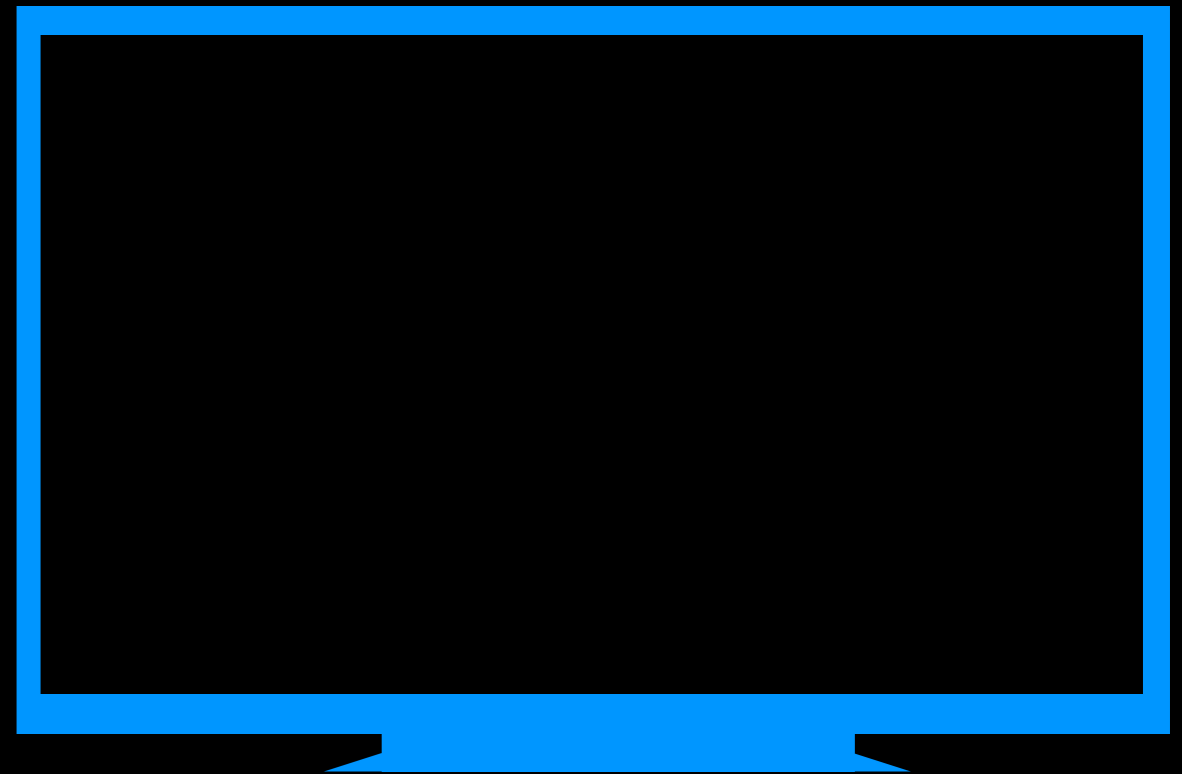
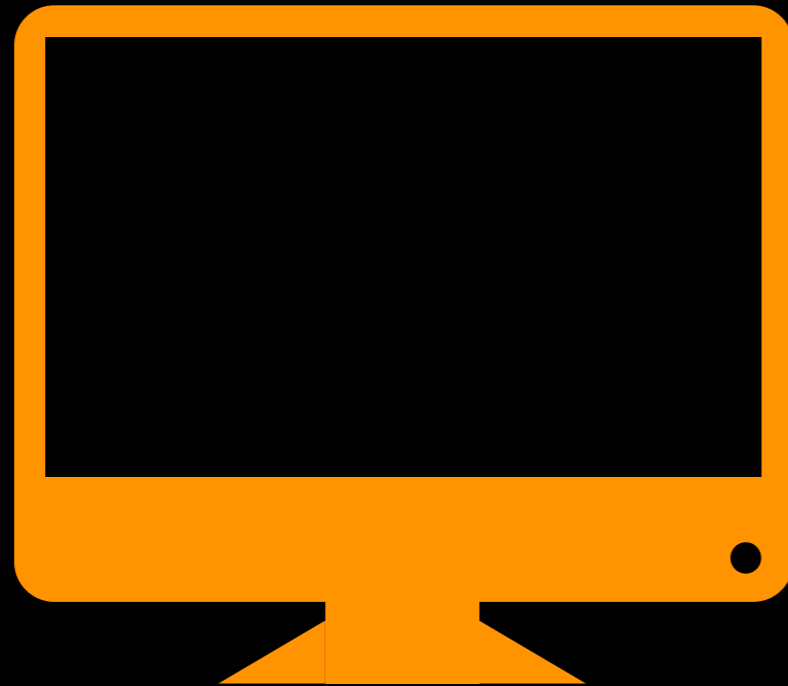
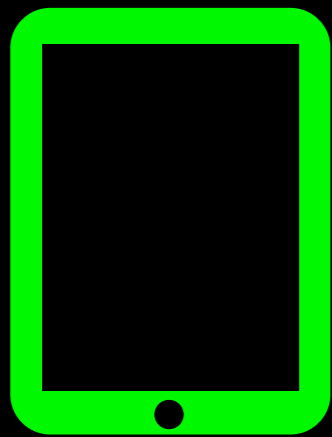
Difficult to build upon ...

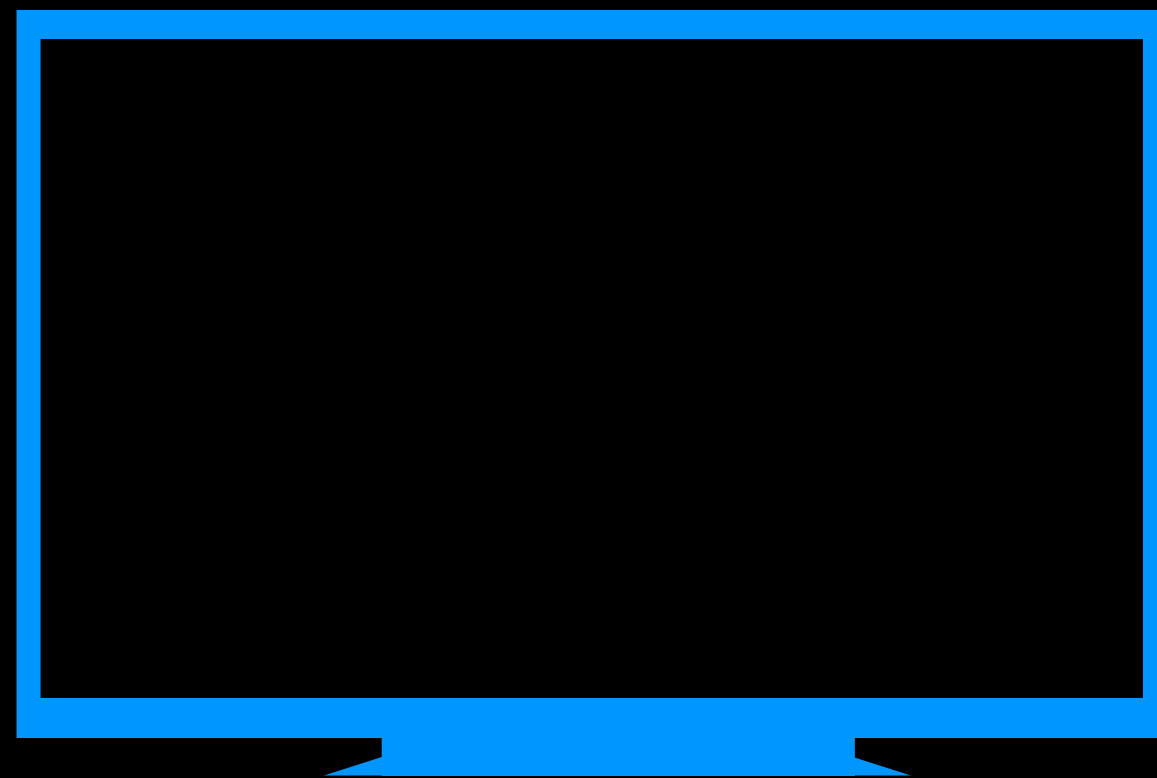
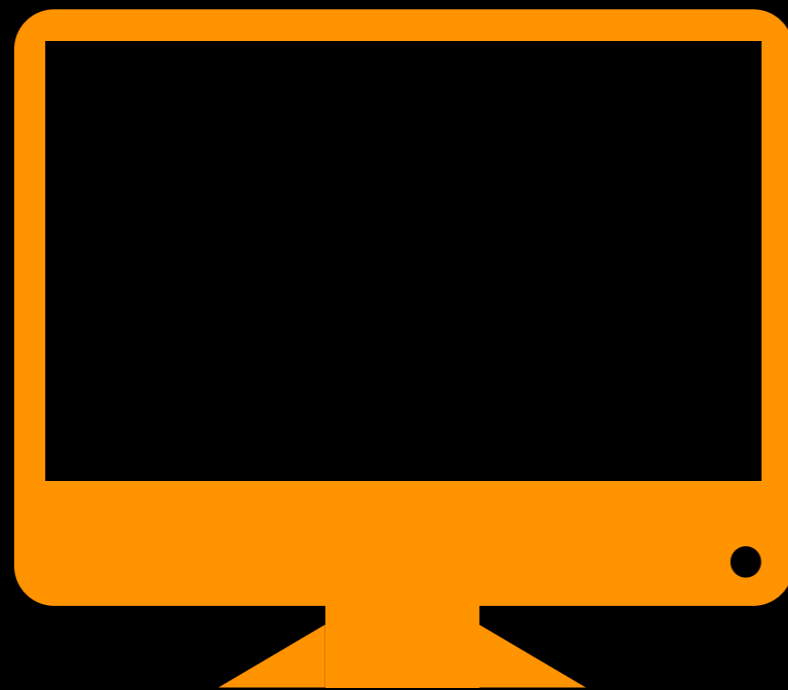
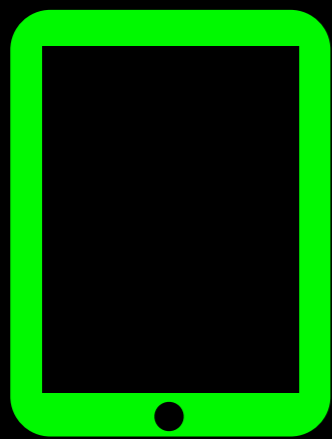
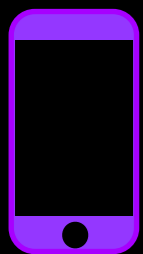
Few field investigations ...

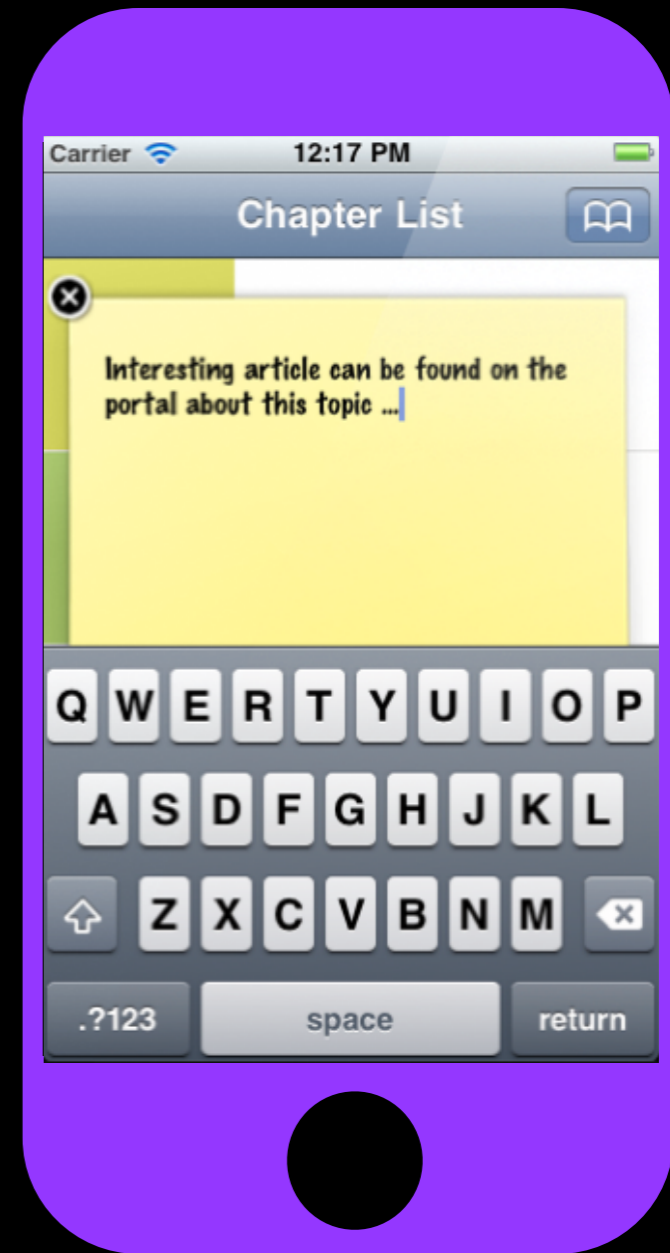
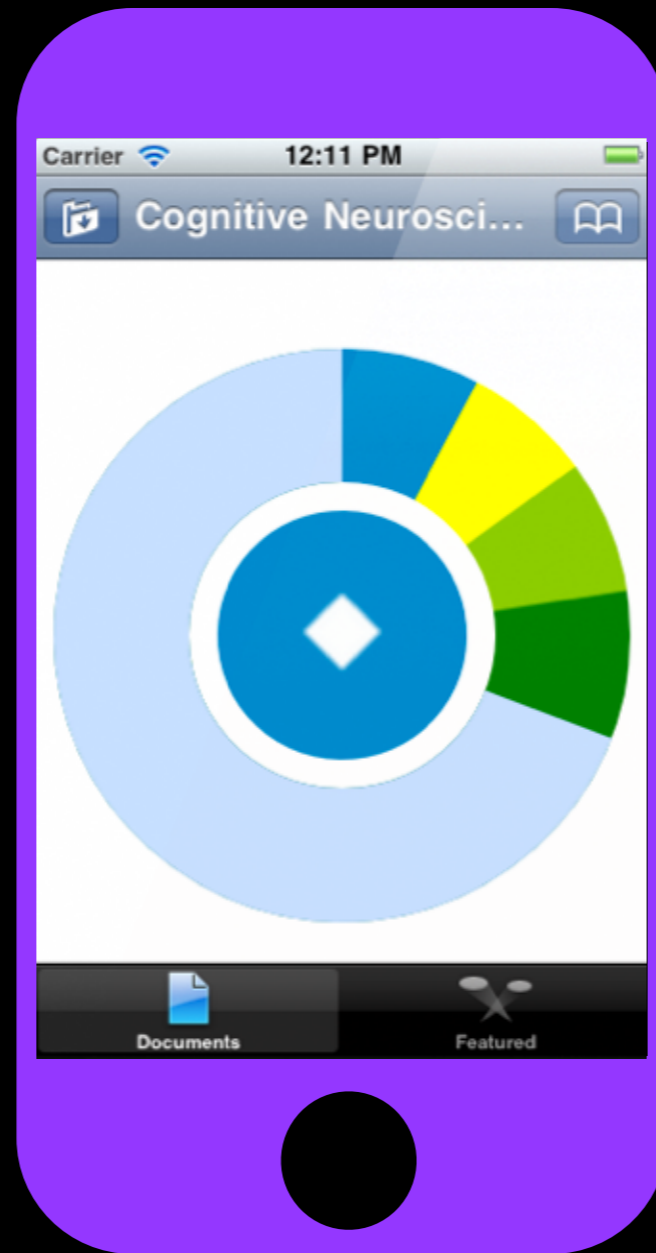
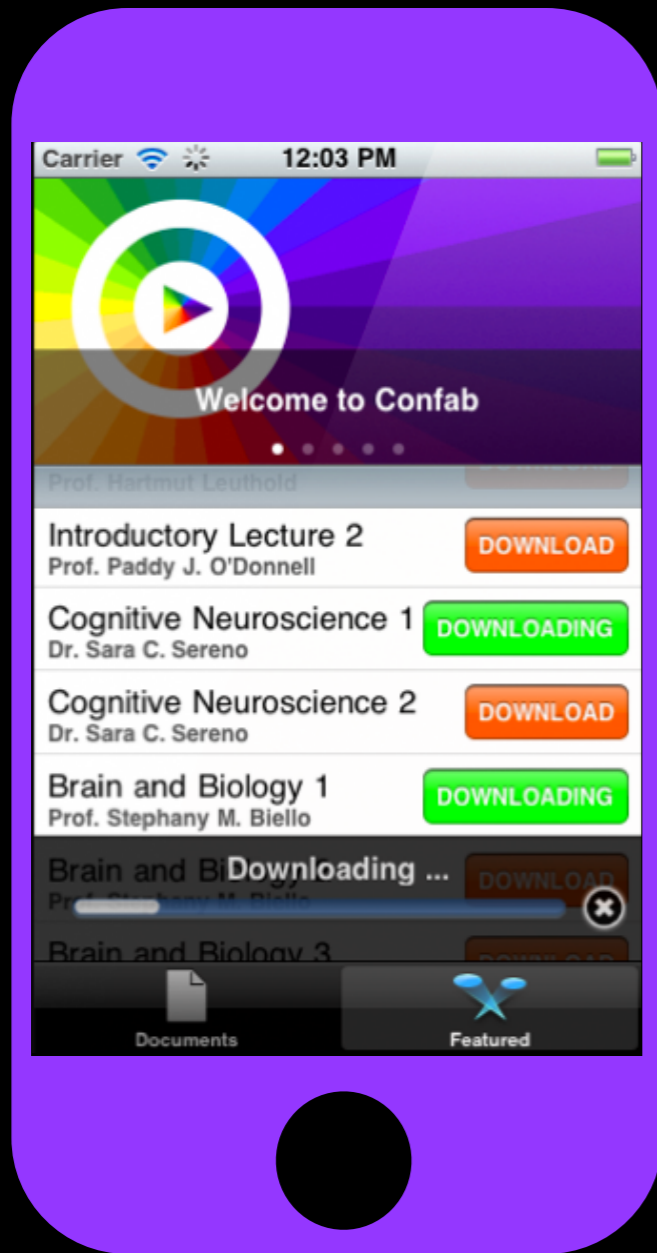




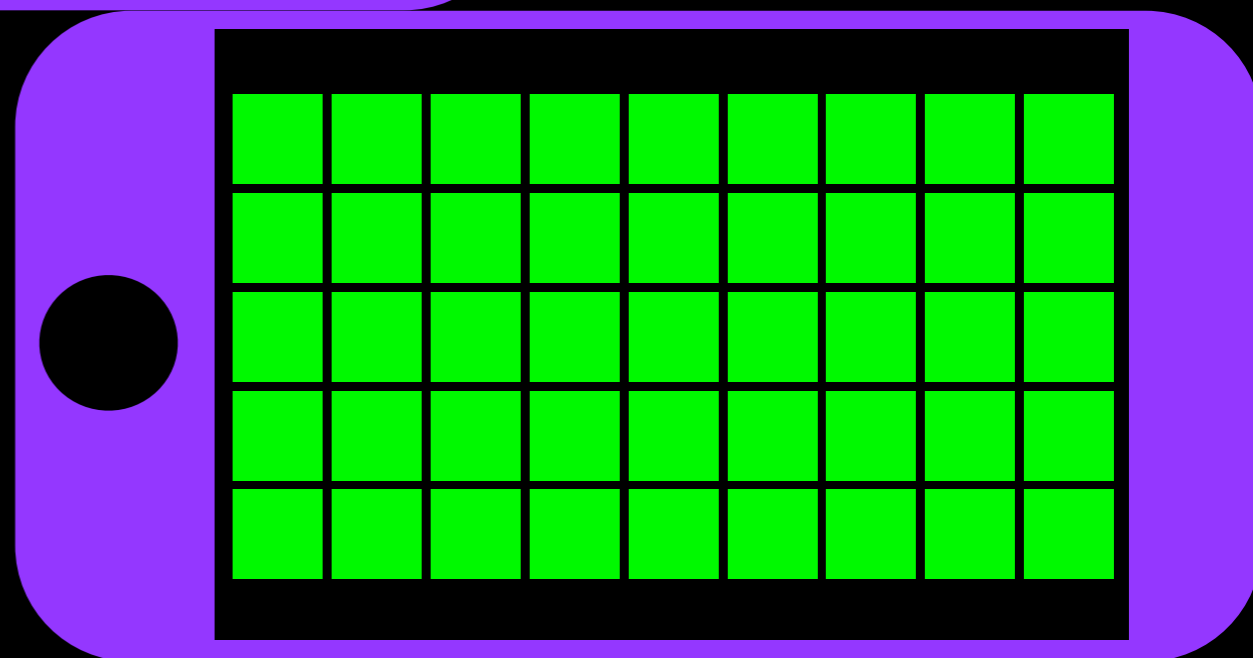
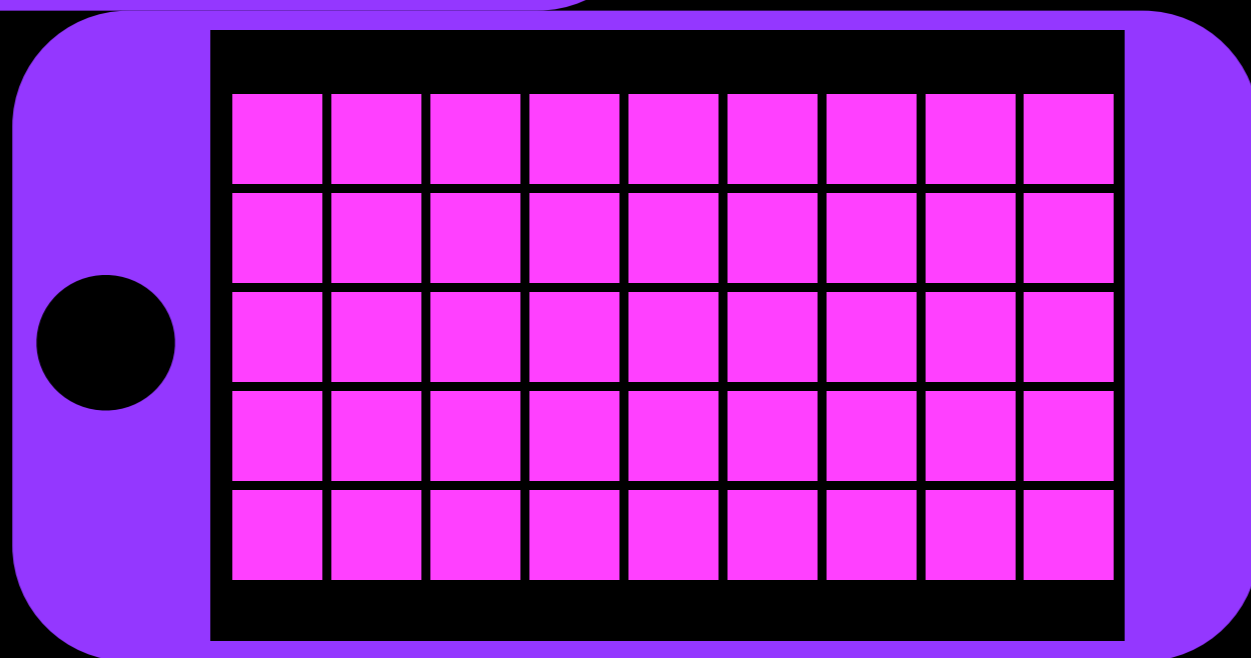
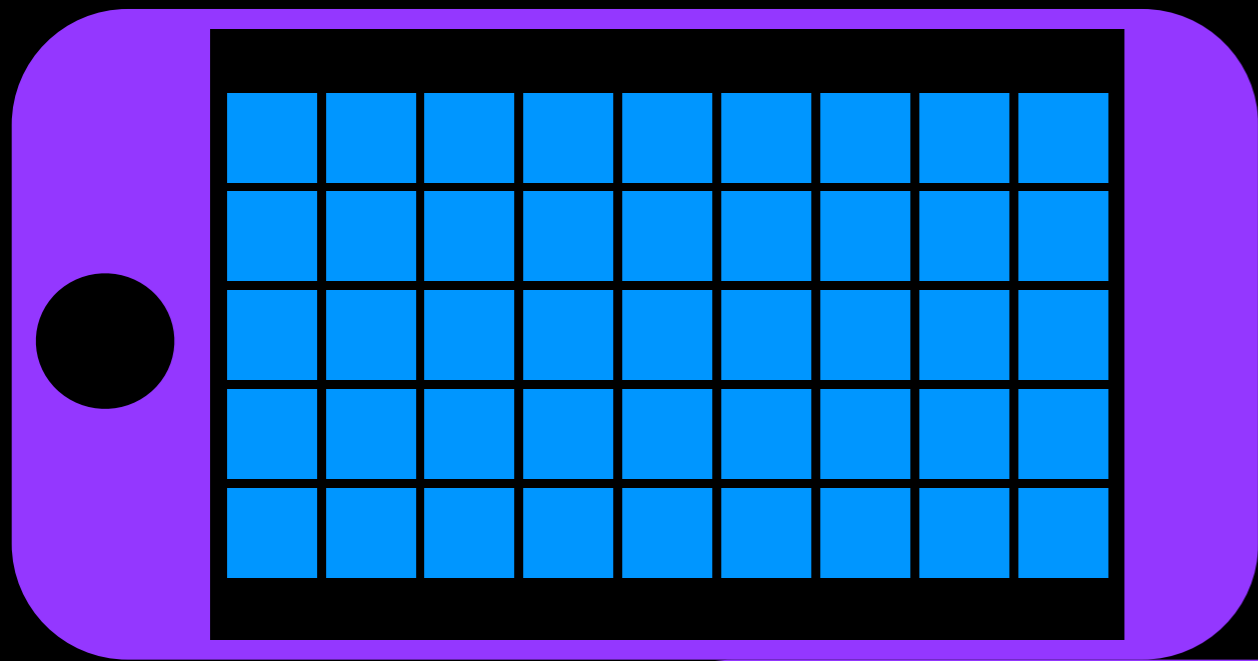












# Tetrad (television)

Time

Secret Space

Observation

Envisioned users

Authentication Tasks

Intended Domain



# Tetrad (cross context)

Time

Secret Space

Observation

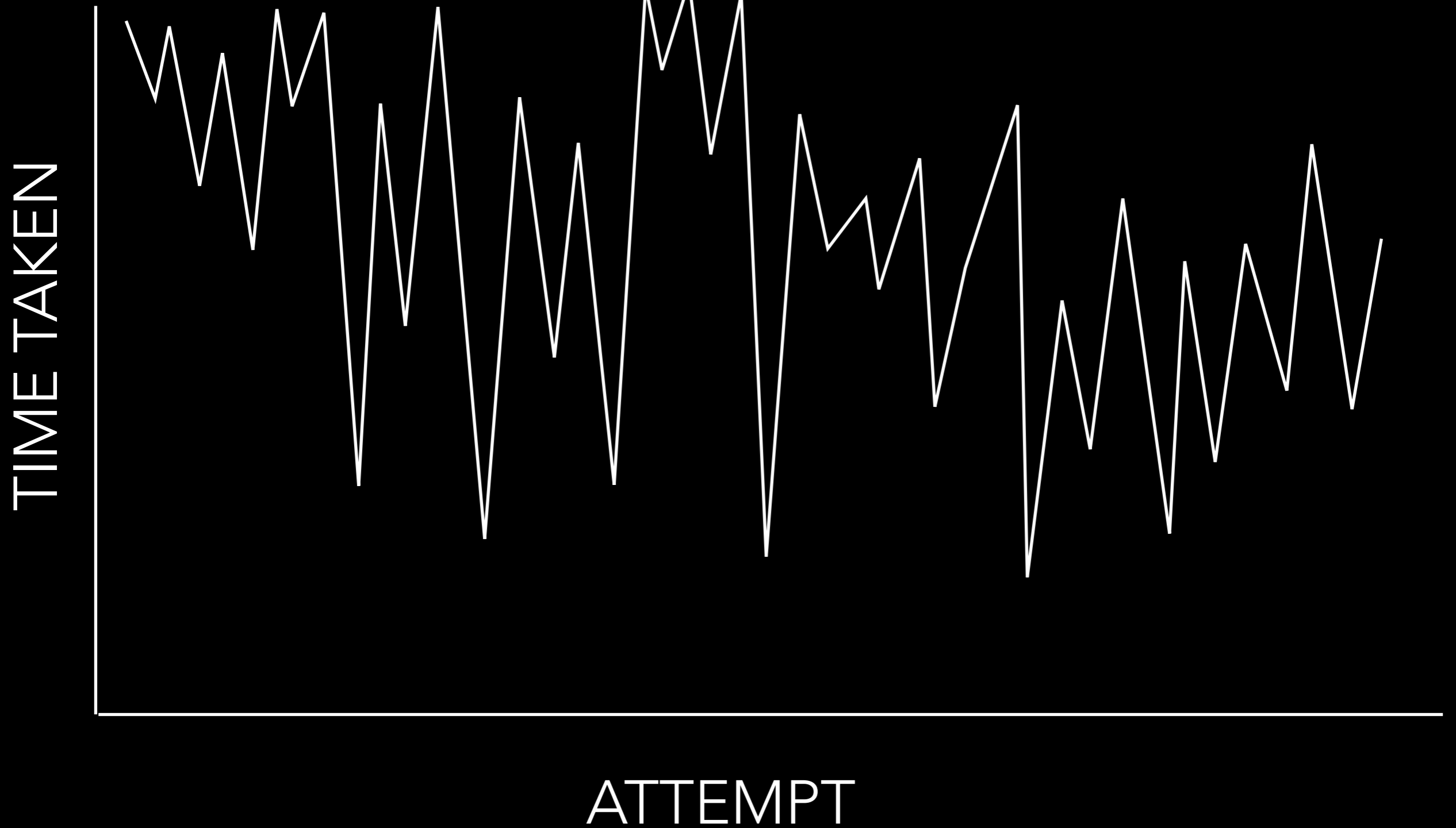
Envisioned users

Authentication Tasks

Intended Domain



# TIME TAKEN AGAINST ATTEMPT







a...





a...





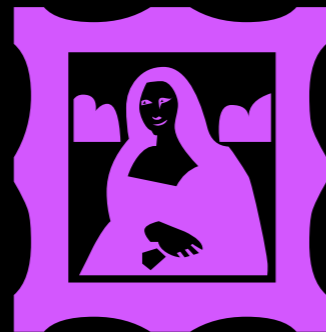
a...

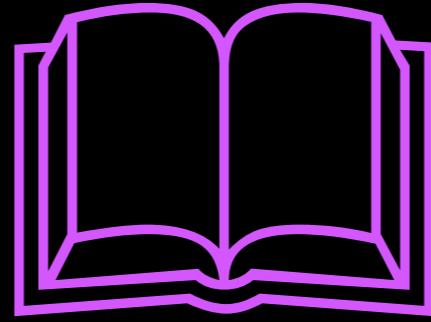






a...





a...



7 6 5 4

CONTEXT

FIELD INVESTIGATION

GUIDELINES FOR FIELD  
INVESTIGATION OF ALTERNATIVE  
AUTHENTICATION SOLUTIONS

# **GUIDELINES FOR DESIGNING GRAPHICAL AUTHENTICATION MECHANISMS**

RENAUD, INTERNATIONAL JOURNAL OF INFORMATION AND  
COMPUTER SECURITY, 2009

# **ACCESS: CONTRASTING AND DESCRIBING AUTHENTICATION MECHANISMS**

RENAUD, VOLKAMER AND MAGUIRE, HUMAN ASPECTS OF  
INFORMATION, PRIVACY AND TRUST, 2013

# CATEGORISED ETHICAL GUIDELINES FOR LARGE SCALE MOBILE HCI

MCMILLIAN, MORRISON AND CHALMERS, CONFERENCE ON  
HUMAN FACTORS IN COMPUTING SYSTEMS, 2013



FULL PAPER

2ND APRIL



CHI 2015

CROSSINGS

SEOUL • KOREA

DR. JOSEPH MAGUIRE

JOSEPH.MAGUIRE@GLASGOW.AC.UK

WWW.DCS.GLA.AC.UK/~JOSEPH



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