Eye-ing the Future

Biometrics for Intentional Identity Assurance

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Do biometrics-enabled identity assurance increase security and save money?

Yes*

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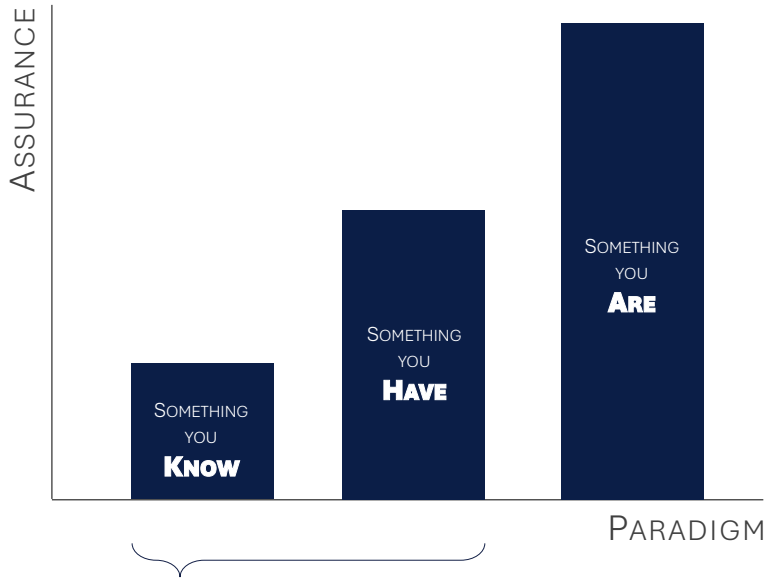
Identity **Assurance**

Biometrics offer clear advantages



CARRY & REMEMBER
VULNERABILITY
INCONVENIENCE

ASSIGN & MANAGE
COMPLEXITY
COSTS

TCO Benefits of Biometrics

Materials and Recurring Consumables

- *NO PER-USE TOKEN COSTS*
- *NO BLANKS, FABRICATION EQUIPMENT*
- *NO REPLACEMENT AND TURNOVER (~10-30% / YR) PROCESSES*

Organizational Risks and Liabilities

- *HARDENED SECURITY = LESS LOSS, CONSEQUENCES*
- *MORE-FOCUSED INCIDENT RESPONSE*

Employee Productivity, Organizational Efficiency

- *NO MORE FORGOTTEN OR LOST KEYS, PHONE, BADGE, ETC…*
- *IMPROVED ACCOUNTABILITY (CARD SHARING, BUDDY-PUNCHING)*
- *REDUCED CREDENTIAL-ADMINISTRATION OVERHEAD*

Identity **Assurance**

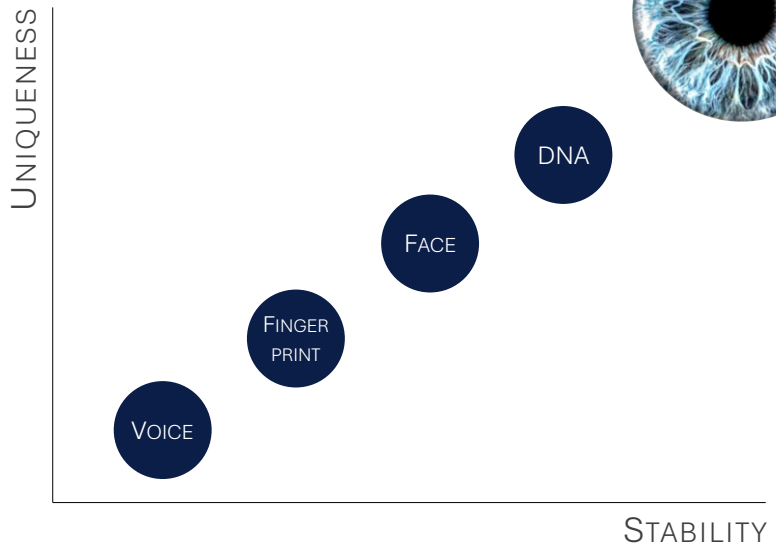
Iris biometrics are THE ideal for intentional distances

INFORMATION

RANDOM STRUCTURE (AGE 3)
GENETICS INDEPENDENT
HIGH CONTENT

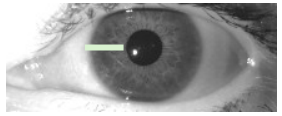
PHYSICAL

ACCESSIBLE / NON-INTRUSIVE
HARD TO OBSCURE / ALTER / SPOOF
SELF CLEANING & REDUNDANT

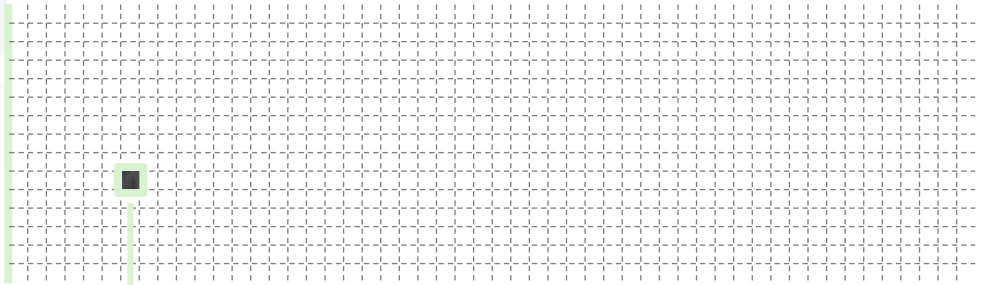


Iris Image → **Digital Template**

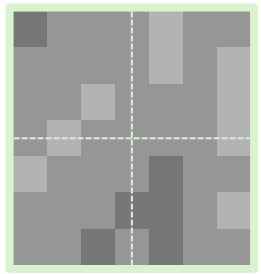
Iris recognition ~ reading a QR code



iris-sclera boundary



iris-pupil boundary



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Adoption of **Iris Recognition**

Iris is more accurate, but face has traditionally been easier… unless you have Iris on the Move™

1936

Dr. Frank Burch, an ophthalmologist,

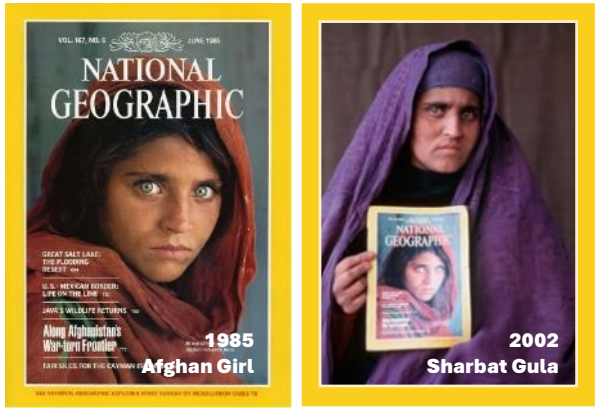
first to suggest iris as biometric identifier

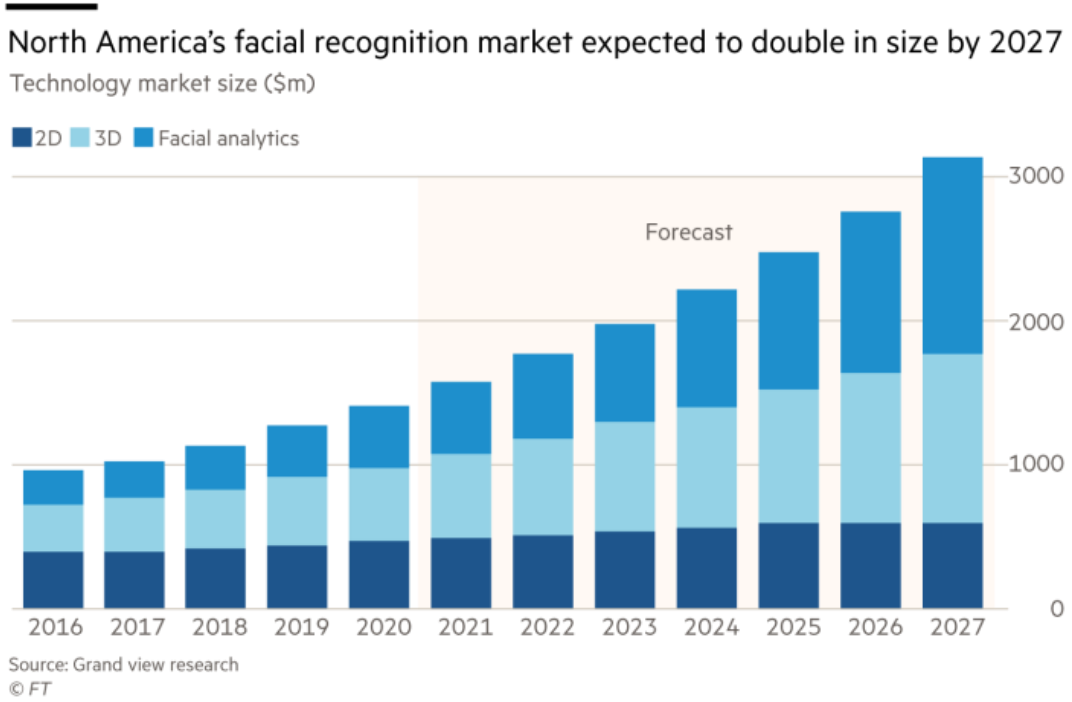
1991

Prof. John Daugman, Cambridge University,

first patents on algorithm, practical framework

2002





Iris vs. Face: **Biometrics**

Iris	Characteristics	Face
✓	Uniqueness	
✓	Stability	
✓	High Information Content	
✓	Genetics Independent	
✓	Accessible / Non-Intrusive	✓
✓	Hard to Obscure / Alter	
✓	Self Cleaning	
✓	Redundancy	

Does it make sense to quantify biometric matching with a percentage?

No

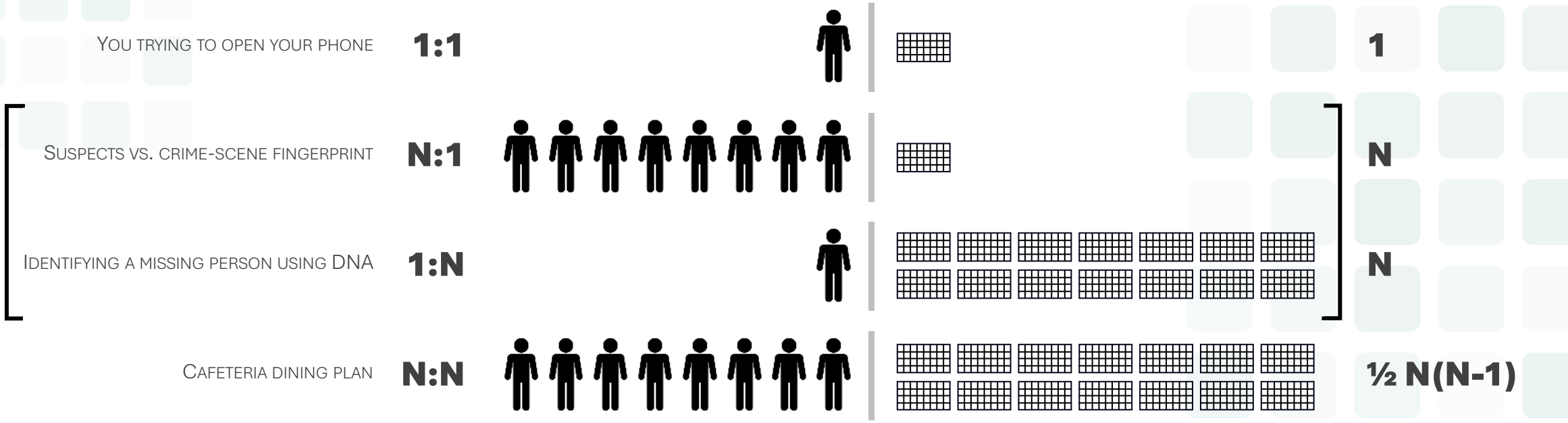
Biometric ID Assurance Metrics: **FMR & FNMR**

Metric	What it is	What it means	Typical Range
FMR *False Match Rate*	Identifying a subject as someone else	• Granting access to someone who should be denied • Charging a purchase to someone else's account	$10^{-3} \rightarrow 10^{-9}$ *one-in-a-thousand → one-in-a-billion*
FNMR *False Non-Match Rate*	Not identifying someone known	• Denying access to someone who should have access • Denying someone's purchase despite an active account	$10^{-2} \rightarrow 10^{-3}$ *1.0 Percent → 0.1 Percent*

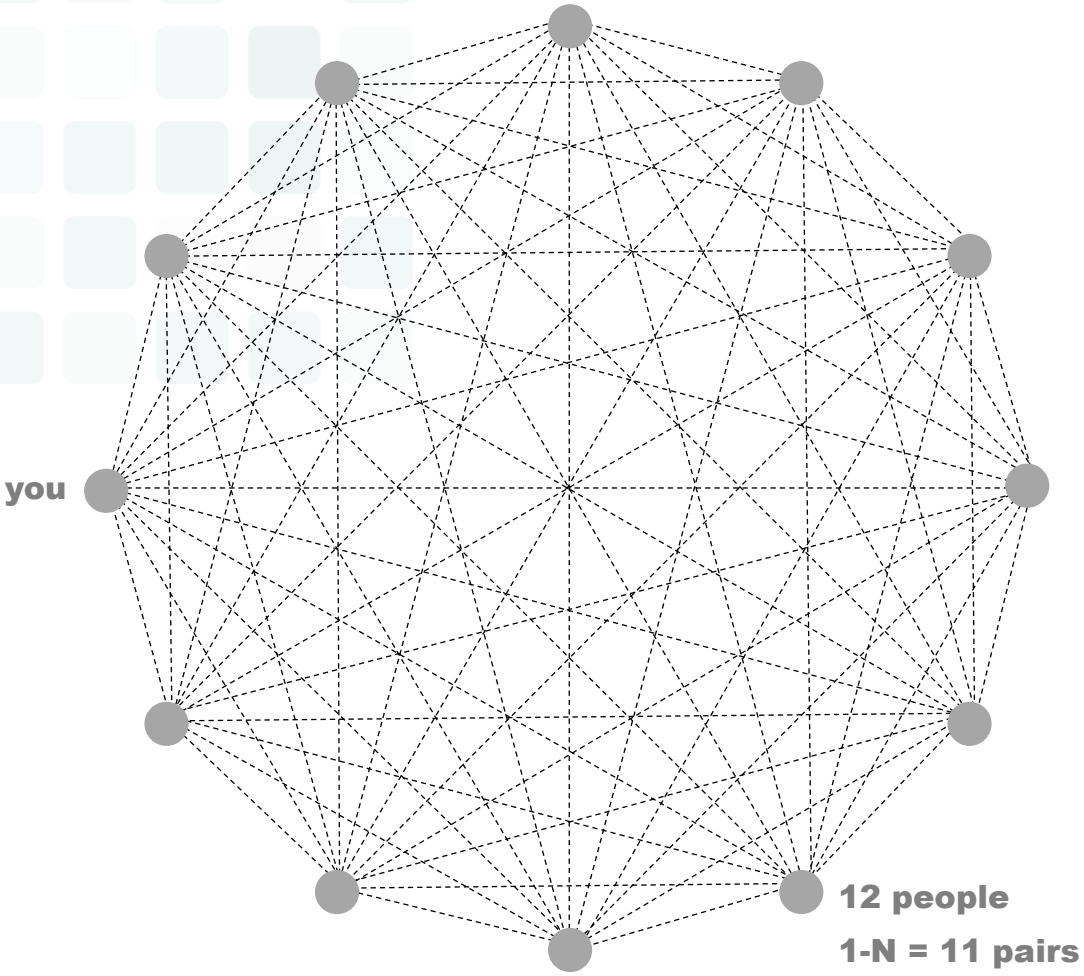
FMR = 0

FNMR = 100%

Examining FMR: **Matching Paradigms**



Examining FMR: **Scalability**

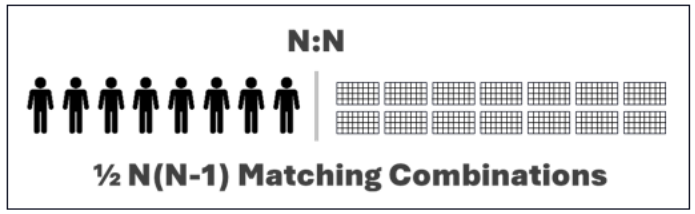


n	½ n(n-1) connections	equivalent FMR
2	1	~10^{-1}
4	6	~10^{-1}
6	15	~10^{-2}
12	66	~10^{-2}
100	4,950	~10^{-4}
1,415	1,000,405	~10^{-6}
44,750	1,001,285,875	~10^{-9}
10,000,000	49,999,995,000,000	~10^{-14}
100,000,000	4,999,999,950,000,000	~10^{-16}
100,000,000,000	4,999,999,999,950,000,000,000	~10^{-22}

Face Recognition is **Limited**

Intrinsic deficiencies restrict critical use

FACE "1 in a million"	N < 1,400
Iris "1 in a billion"	N < 45,000
Iris & Face "1 in a million · billion"	N < 45,000,000
Iris & Iris "1 in a billion · billion"	N < 1,400,000,000

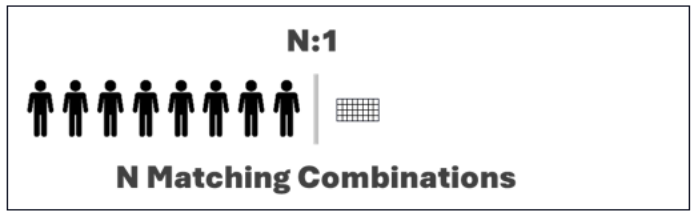


FACE & CARD / TICKET*

Vulnerability
Inconvenience

Complexity
Costs

N < 1,000,000*



Does iris recognition improve on the limitations of face recognition?

Yes

Iris vs. Face: **Recognition**

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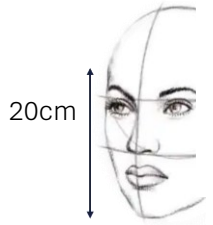
	Iris	Characteristics	Face
Implementation and Usability	-	Touchless / Frictionless	-
		Optics Requirements	✓
	-	Power, Computing, & Storage	-
	-	Algorithmic Complexity	-
	-	Installation Complexity	-
	-	Cost	-
	1m	'Easy' Subject Proximity	**5m**
	-	Subject Motion Tolerance	-
	-	Speed	-
Performance and Results	✓	Pose, Expression, & Apparel Tolerance	
	✓	User Convenience	
	✓	Spoof-Resistance	
	✓	Demographic-Bias Free	
	✓	Accuracy	
	✓	Scalability	
	✓	Privacy	

Iris on the Move™

Enabling a world-class combination of security, convenience, and TCO

The Problem: **Subject Motion**

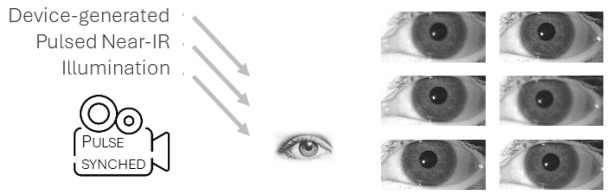


Face requires **15** pixels / cm

Iris requires **150** pixels / cm

Iris is **more accurate** than face, but **harder** to capture.

The Solution: **Iris on the Move™**



Solves subject-motion issues

Improves device speed, accuracy

Reduces HW complexity, costs

Enables stationary and walking portals

Evolution of Identity Assurance for Access Control…

Traditional	RF	Biometric	Biometric	**Next-Generation**
Keys Passwords PIN	Cards Digital Mobile	Voice Fingerprint Face	Iris	**Iris on the Move™**
Vulnerable & Insecure	Fraud & Overhead	Inconvenient & Limited	Slow & Expensive	**Secure, Fast, & Convenient**

How To: Iris Recognition

View the whole video at: https://www.youtube.com/watch?v=2Czq3CbcH9w

Iris Recognition **is Best…**

Require highest possible Security / ID assurance

PPE, Athletics / subject faces obscured

Large user populations, long-term use

N-N matching (not 1-1, 1-N) applications

Avoid demographic / relational bias

NO surveillance, YES privacy

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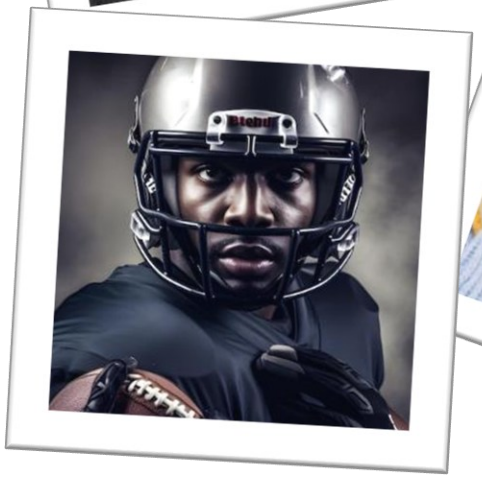



You

Not your Appearance

Thank You.

[Q&A]

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