

## Lesson 6: Digital Identity and Authentication

### Module 1: FinTech Fundamentals

Digital Finance

# Digital Identity Challenge

## Identity Verification Problem

- 1.7B unbanked adults
- Lack of identity documents
- Fraud losses: **\$5.8B** (2023)
- Remote onboarding need

## The Digital Identity Challenge

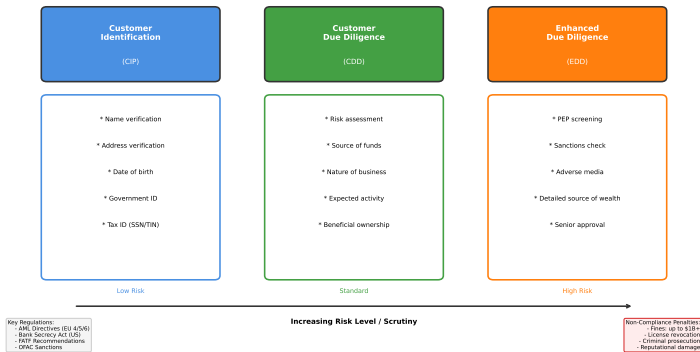
How do you prove who you are online?



Source: Javelin Strategy, FTC Consumer Sentinel Network (2023)

1.7 billion adults remain unbanked—identity verification is the primary barrier to financial inclusion.

## Know Your Customer (KYC) Framework



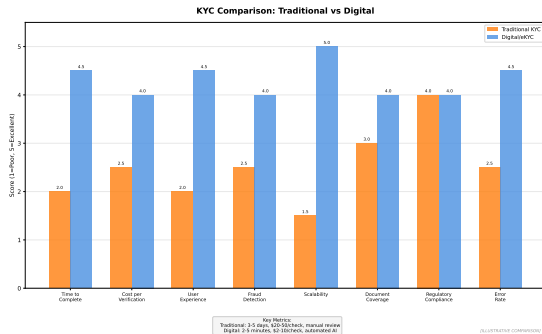
Source: FATF Guidelines, AML regulatory frameworks

KYC is legally mandated for all financial institutions—FATF, AMLD, and BSA set global standards.

# Traditional vs Digital KYC

## Process Comparison

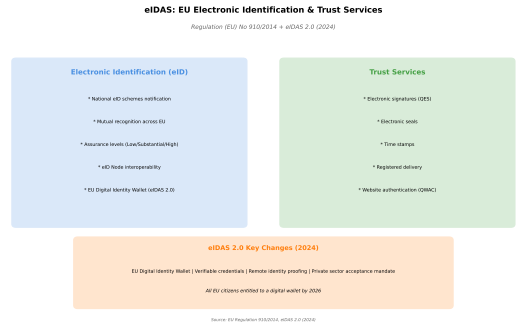
- Traditional: 7-14 days
- Digital: 5-10 minutes
- Cost: **\$60** vs **\$5**
- Drop-off: 40% vs 15%



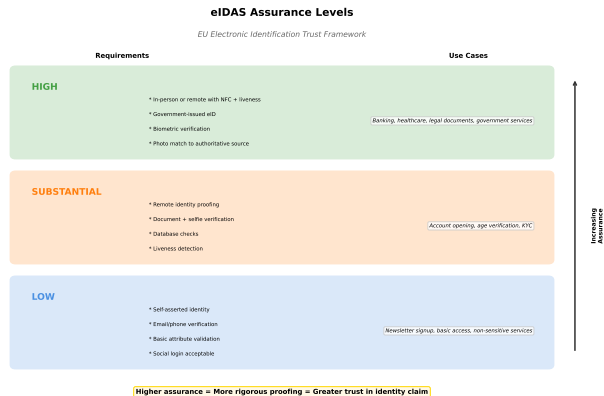
Digital KYC reduces verification time from 7-14 days to 5-10 minutes—at 90% lower cost.

## EU Digital Identity

- Electronic ID recognition
- Trust services regulation
- Cross-border validity
- Three assurance levels



eIDAS enables cross-border electronic identity recognition across all 27 EU member states.



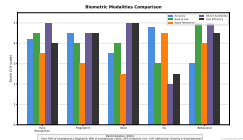
Source: EU Regulation 910/2014, implementing Regulation 2015/2502

Three assurance levels (Low/Substantial/High)—High requires in-person or equivalent verification.

# Biometric Authentication

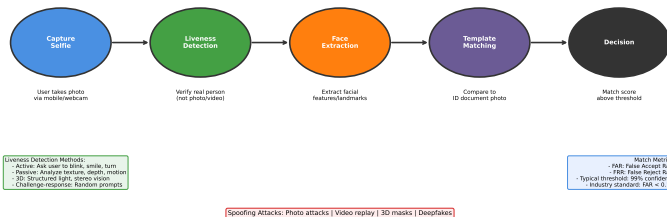
## Modalities

- Fingerprint: 99.8% accuracy
- Face recognition: 99.5%
- Iris scan: 99.99%
- Voice: 95% accuracy



Iris scanning achieves 99.99% accuracy—face recognition (99.5%) is preferred for mobile UX.

## Facial Recognition Verification Flow



[CONCEPTUAL PROCESS FLOW]

Face capture to match takes 2-3 seconds—AI extracts 128+ facial landmarks for comparison.



## Anti-Spoofing

- Active: User actions
- Passive: Texture analysis
- 3D depth sensing
- Challenge-response

## Liveness Detection Methods

Preventing Presentation Attacks

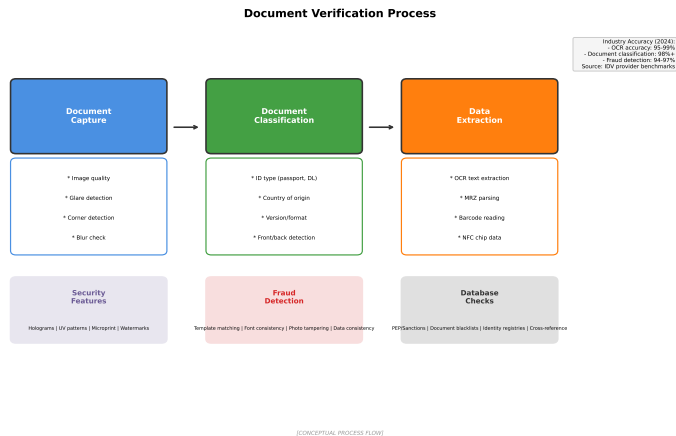


Aspect	Active	Passive
User friction	Higher	Lower
Time required	5-15 sec	1-3 sec
Spoof resistance	High	Medium-High
Accessibility	Limited	Better
Drop-off rate	10-20%	2-5%

Common Attacks: Photo attacks | Video replay | 3D masks | Deepfakes | Screen replay

Source: Industry liveness detection standards (ISO/IEC 30107)

Liveness detection prevents photo/video spoofing—3D depth sensing defeats deepfake attacks.



AI detects document tampering by analyzing holograms, microprinting, and UV security features.

## Automated Extraction

- Optical character recognition
- Machine-readable zone (MRZ)
- NFC chip data (ePassports)
- Security features check

Document Data Extraction: OCR vs NFC

OCR (Optical Character Recognition)		NFC (Near Field Communication)	
1. Image Capture	Camera captures document	1. Chip Detection	Phone detects NFC chip
2. Pre-processing	Debates, noise reduction	2. BAC/PACE Auth	Authenticate with MRZ data
3. Text Detection	Locate text regions	3. Data Read	Extract chip data groups
4. Character Recognition	RL-based text extraction	4. Active Auth	Verify chip authenticity
5. MRZ Parsing	Machine-readable zone decode	5. Passive Auth	Validate digital signature
6. Validation	Check-digit verification	6. Clone Detection	Verify chip is original

Metric	OCR	NFC
Accuracy	95-99%	100%
Security	Medium	Very High
User effort	Take photo	Tap phone
Device req	Camera	NFC-enabled
Tampering detect	Limited	Cryptographic

Best Practice: Combine OCR + NFC for maximum security and accuracy

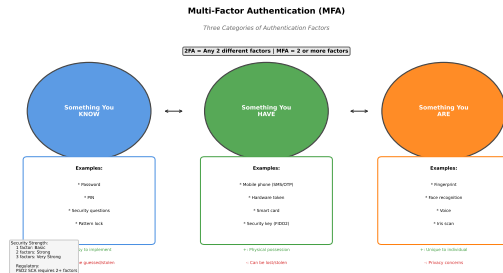
Source: ICAO 9303 (Machine-Readable Travel Document-4), ePassport specifications

NFC chip reading provides cryptographic proof—data signed by issuing authority cannot be forged.

# Multi-Factor Authentication (MFA)

## Authentication Factors

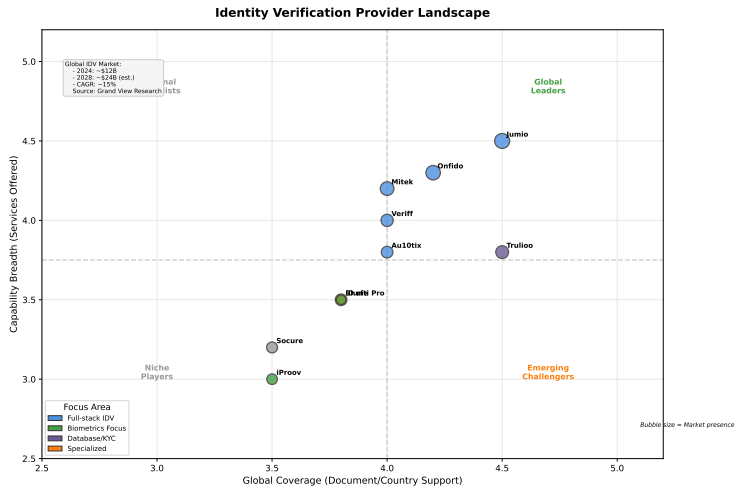
- Knowledge: Password/PIN
- Possession: OTP token
- Inherence: Biometric
- Reduces fraud 99.9%



Source: NIST SP 800-63-3 Digital Identity Guidelines

MFA combining 2+ factors reduces account takeover fraud by 99.9%—now standard for banking.

# Identity Verification Providers

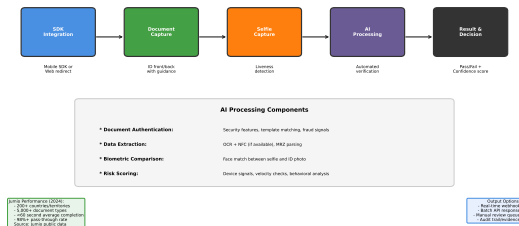


**Jumio, Onfido, and Trulioo lead the \$15B IDV market—consolidation accelerating via M&A.**

## AI-Powered KYC

- 1B+ verifications
- 5 minute verification
- 95% automation rate
- 200+ countries

Identity Verification Workflow (Jumio Example)



Source: Jumio product documentation (2024)

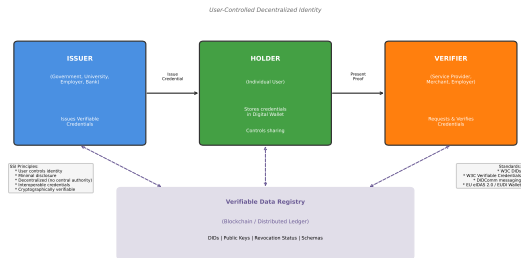
Jumio processed 1B+ verifications—95% automation rate with 5-minute average completion.

# Self-Sovereign Identity (SSI)

## Decentralized Model

- User controls credentials
- Blockchain-based
- Verifiable credentials
- Privacy-preserving

## Self-Sovereign Identity (SSI) Architecture

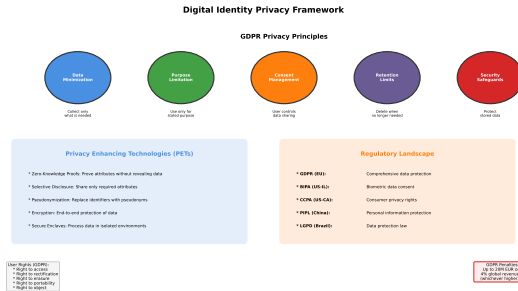


Source: W3C Decentralized Identifiers (DIDs), Verifiable Credentials Data Model

SSI gives users control over their credentials—verify age without revealing birthdate.

## Data Protection

- GDPR compliance
- Biometric template storage
- Data minimization
- Right to erasure



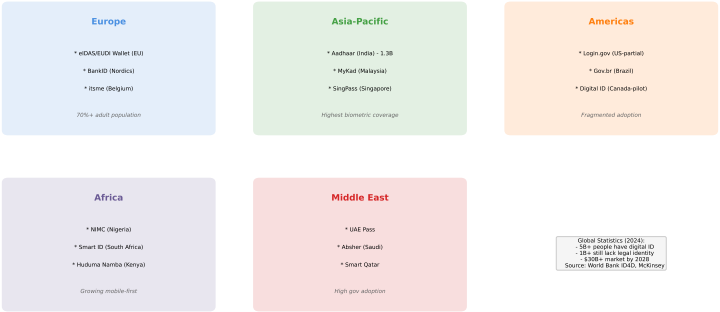
Source: GDPR (EU 2016/679), NIST Privacy Framework

GDPR requires data minimization and right to erasure—biometric templates are sensitive personal data.



## Global Digital Identity Landscape

National Digital ID Systems by Region (2024)

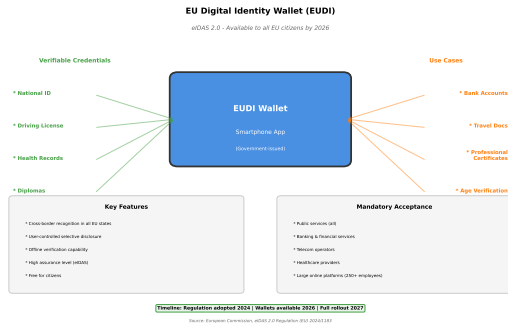


Source: World Bank ID4D Global Dataset 2024, Regional government sources

India's Aadhaar (1.4B), Estonia's e-ID, and Singapore's Singpass lead global digital ID adoption.

## EU Digital Identity Wallet

- eIDAS 2.0 mandate
- 2026 rollout target
- Universal EU acceptance
- Private sector integration



EU Digital Identity Wallet mandated by 2026—every EU citizen will have government-issued mobile ID.

# Key Takeaways

- **KYC:** Digital verification reduces cost 90% and time 95%
- **eIDAS:** EU framework for cross-border identity
- **Biometrics:** Face + liveness detection standard approach
- **MFA:** Multi-factor prevents 99.9% of fraud
- **Future:** Self-sovereign identity and digital wallets

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Digital identity is the foundation of financial inclusion—secure verification enables trusted services.