Advancing Biometric Intelligence
June 2017
When managing risk in real time is a matter of life and death

130+ million people seek medical care per year

Many have blood drawn to detect illness not visible to the eye

Electronic Medical Records deliver results almost instantaneously

Doctors can intelligently manage risk for better patient outcomes

Source: The American Hospital Association – “Always There, Ready To Care, The 24/7 Role of America’s Hospitals”
When managing risk in real time means helping people find their way

- Over 2.4 trillion miles driven a year (10,000x around the world)
- Drivers access Google Maps a billion times a year
- Uses data to continuously learn and refine directions in real time
- Drivers minimize the risk of getting lost or being late

Source: The Verge – “Google announces over 2 billion monthly active devices on android”
What does this have to do with payments and did I show up at the wrong conference?

A massive knowledge base that helps seed baseline intelligence

Actionable insights in near real time that improve outcomes

Ability to adapt to a dynamic and ever changing environment

And learn in order to anticipate and reduce the risk to as near zero as possible
And it all begins with you knowing the person

Who she is

What she wants to do

How she wants to do it

What else she might want
Visa’s authentication strategy
Help clients create seamless and secure experiences for their members

- Protect data and consumer privacy
- Deliver security and convenience
- Keep commerce moving
- Promote responsible innovation
Today’s complexity makes authentication more challenging

- **Multiple Channels and Devices to Protect**
  - In store
  - Online
  - Mobile
  - IoT

- **Rapid Innovation**
  - Technology evolving faster than regulations and industry standards

- **Today’s Criminals are Sophisticated and Adaptive**
  - As soon as new technologies are introduced, fraudsters are at work to hack them
Our job at Visa is to help you stay ahead

“On the Internet, nobody knows you’re a dog.”
We’re evolving to include more advanced technologies and dynamic data.

**EXISTING**

**What You Have**
- Card
- Chip
- Mobile

**What You Know**
- Password
- PIN
- Signature
- Address
- Security Questions

**NEW & EMERGING AUTHENTICATION**

**Who, What, and Where You Are**
- Biometric markers
- Physical location
- Behaviors
- Contextual Data
Biometrics
Biometrics: Measurable human traits unique to each of us
Why we think biometrics is the next logical step

**SECURITY**
- Complex and unique identifier
- Difficult to steal and forge at scale

**CONVENIENCE**
- Impossible to forget
- Removes friction and improves user experience
Biometrics is here and now

- Voice
- Buy with Alexa, Siri, Allo
- Call center support
- Online checkout
- Mobile banking
- Cardless ATM's
- Digital Pay's
- Access home screen
- Baggage Check-in
## How it looks today and where it’s headed tomorrow

### CommerciaLly Available Solutions

<table>
<thead>
<tr>
<th>Modality</th>
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<tbody>
<tr>
<td>Fingerprint</td>
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<tr>
<td>Iris</td>
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<tr>
<td>Voice</td>
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<tr>
<td>Face</td>
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**Mobile Fingerprint**
- Mobile wallets, banking and retail apps

**Mobile Iris and/or Face**
- Samsung Galaxy Note 7 and S8
- Fujitsu F-04G

**Banking Services**
- Biometric ATMs (proprietary closed-loop systems in Japan, Brazil, India)
- Voice verification for telephone banking

**Government Services**
- National identification (Aadhaar in India)
- Benefits disbursements
- Border protection, Law enforcement

**Smart Home**
- Siri, Alexa, Homey, Allo

### Pilots and Proofs-of-Concept/Limited Commercial Adoption

<table>
<thead>
<tr>
<th>Use Case</th>
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<tbody>
<tr>
<td>Mobile Iris and Facial Recognition</td>
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<tr>
<td>Mobile wallets</td>
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<tr>
<td>Mobile banking apps</td>
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<tr>
<td>Retail apps</td>
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**EMV Chip Cards**
- Template stored on chip, matched against biometrics captured at POS or ATM

**POS Terminal**
- Fingerprint sensor for match-on-card
- Fingerprint sensors embedded on physical card for contactless

### Experimental Concepts

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<td>Behavioral biometrics</td>
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<tr>
<td>Keystroke</td>
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<tr>
<td>Heartbeat/EKG</td>
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<tr>
<td>Gait</td>
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**Multi-modal (e.g. fingerprint + voice)**

**POS Terminal or not**
- Amazon Go
- Google hands-free payment

**Connected appliances (IoT)**
- Match-on-device to gain access or initiate payment
Very promising, but there are real world challenges

**Failure to Accept**
- Noise
- Moisture
- Low light
- Physical conditions

**Accuracy**
Tuning to decrease false acceptance and increase false rejection

**Biometric Theft**
A user's biometric cannot be changed like a password, so what happens in this case?
Investments in liveness detection to reduce the risk of spoofing

Biometrics can be covertly collected

Liveness detection capabilities — which look for pulse, expression and other micro-movements — make it very difficult to synthesize that data to commit fraud.
Liveness detection needs to be intelligent, too

**Biometric Intelligence**
- Texture, reflection, distortion (skin)
- Patterns (voice)
- Nod, blink, video (face & eyes)

**Device Intelligence**
- Identity and Reputation
- Location
- Malware

**Behavioral Intelligence**
- Interaction patterns
- Navigational patterns
- Transactional patterns
Visa’s perspective on biometrics in payments
Extending Visa’s core authentication principles to biometrics

<table>
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<th>Deliver security and convenience</th>
<th>Keep commerce moving</th>
<th>Promote responsible innovation</th>
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<tr>
<td>✓ Account for social needs and privacy concerns</td>
<td>✓ Balance false acceptance and false rejection</td>
<td>✓ Enable for speed, security, scalability and reliability</td>
<td>✓ Select biometric method appropriate to the task</td>
</tr>
<tr>
<td>✓ Store data locally where possible</td>
<td>✓ Use liveness detection to prevent spoofing</td>
<td></td>
<td>✓ Experiment in the test-and-learn phase</td>
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<td></td>
<td>✓ Design secure fallbacks for when biometric fails</td>
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<td>✓ Support and accelerate promising solutions</td>
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How we will get there

ADVANCING INDUSTRY STANDARDS
Collaborating with FIDO, EMVCo, and NIST

PROMOTING PARTNERS TO ADVANCE INNOVATION
Visa Ready Program

DEVELOPING PROOFS OF CONCEPT
New experiences and prototypes
Using EMV chip cards with biometrics

- Standard supports:
  - Fingerprint
  - Iris
  - Face
  - Palm
  - Voice
- Message is sent to issuing bank that biometrics passed or failed
- First likely use: South Africa
  - Government dispersals (10-12M people)
  - Proof-of-life
  - Reliable authentication
  - Deduplication
- Interest from many other countries
Visa Ready for biometrics

Promote the adoption of innovative biometric solutions by evaluating their

**Performance**

**Reliability**

**Security**
Enabling new member experiences

Using biometrics to secure instant digital issuance

New customer initiates application process

Customer scans ID

Customer takes selfie to match against ID photo

Customer confirms and provides additional details

Customer goes shopping!
The collective intelligence of our ecosystem is essential
Not only a better fraud and risk mousetrap... but the best one in the world
Unlocking the true potential of commerce