



Welcomes you to the

Highlights from
The Future of Biometrics
Webinar

October 1, 2009

Presented by C. Maxine Most
Principal, Acuity Market Intelligence



Acuity Market Intelligence

An emerging technology strategy and research consultancy with a proven record of accurately anticipating biometric and associated identification solutions market trends.

Markets Identification Solutions, Biometrics, Authentication

Services Market Research, Analysis & Strategic Planning
Opportunity Assessment & Analysis
Technology Adoption & Deployment Evaluations

Clients Vendors, Solution Providers, Integrators, Investors, End Users





The Future of Biometrics 2009

- ☛ Update to Original Published in April 2007
 - ☐ 30 Pages of Analysis, 75 Pages of Forecasts (LOTS OF DATA)
 - ☐ Includes 10 Figures, 68 Tables, 88 Charts, and 115 Graphs
- ☛ Underlying Inquiry
 - ☐ How will industry will evolve?
 - ☐ What will drive evolution?
 - ☐ Where the most lucrative opportunities will be?
- ☛ Differentiation
 - ☐ Not an Industry Primer - Advanced Strategic Analysis
 - ☐ Thought provoking, high-level context for considering and evaluating market evolution and market development strategy
 - ☐ Detailed "Market Based" forecasts based on "Bottom-up" models



Today's Discussion

- ☛ 45 Minutes of Discussion of the some of the Key Insights and Forecasts presented in the report
 - ☐ Chasm Crossing Collapse
 - ☐ NFC, Mobile Devices and the Evolution of a Biometrically Enabled Transaction Infrastructure
 - ☐ Critical Adoption Drivers in Financial Services and Healthcare
 - ☐ The Meteoric Rise of Biometric Surveillance
 - ☐ Key Take-Aways

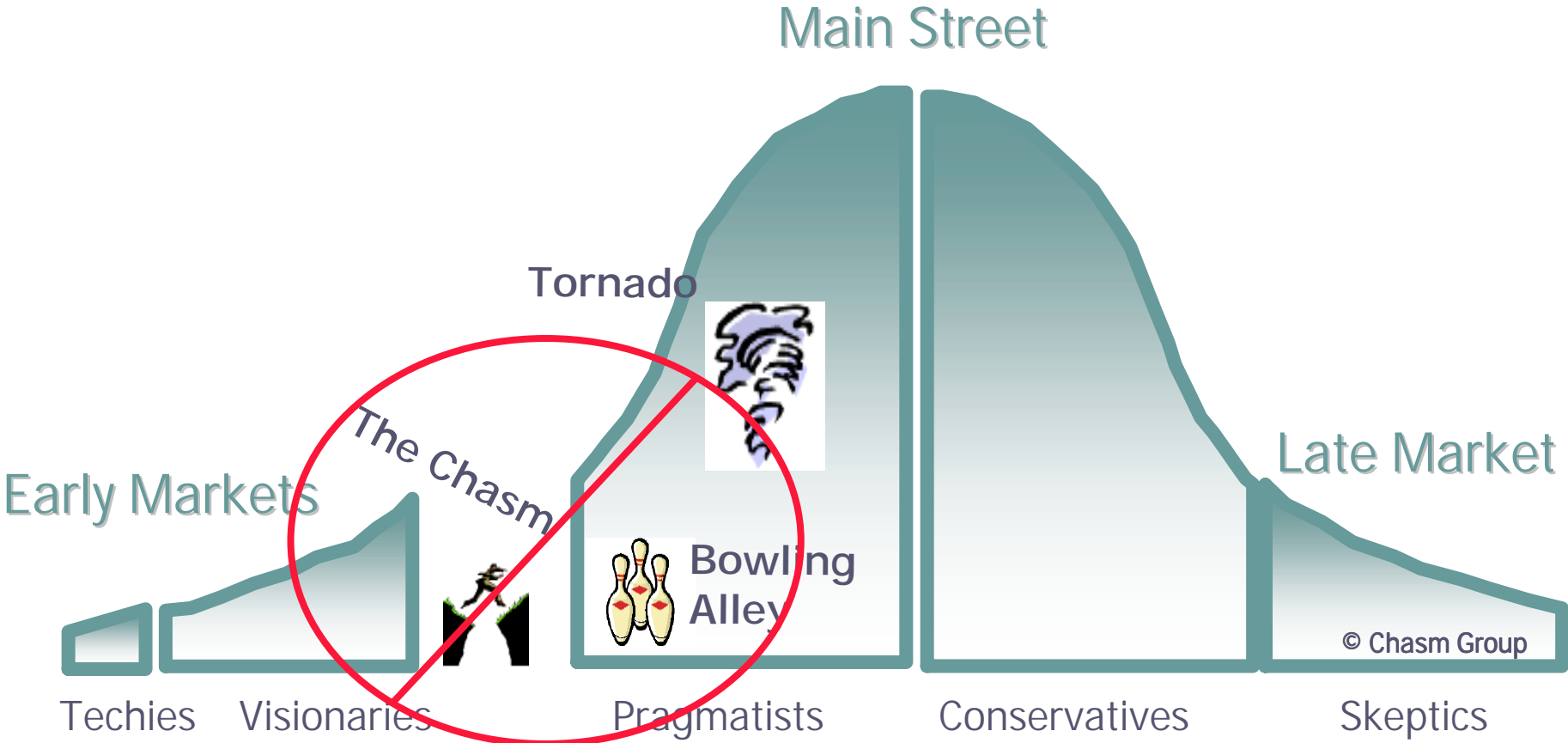


Chasm Crossing Collapse



Chasm Crossing Collapse

Classic Technology Adoption Lifecycle



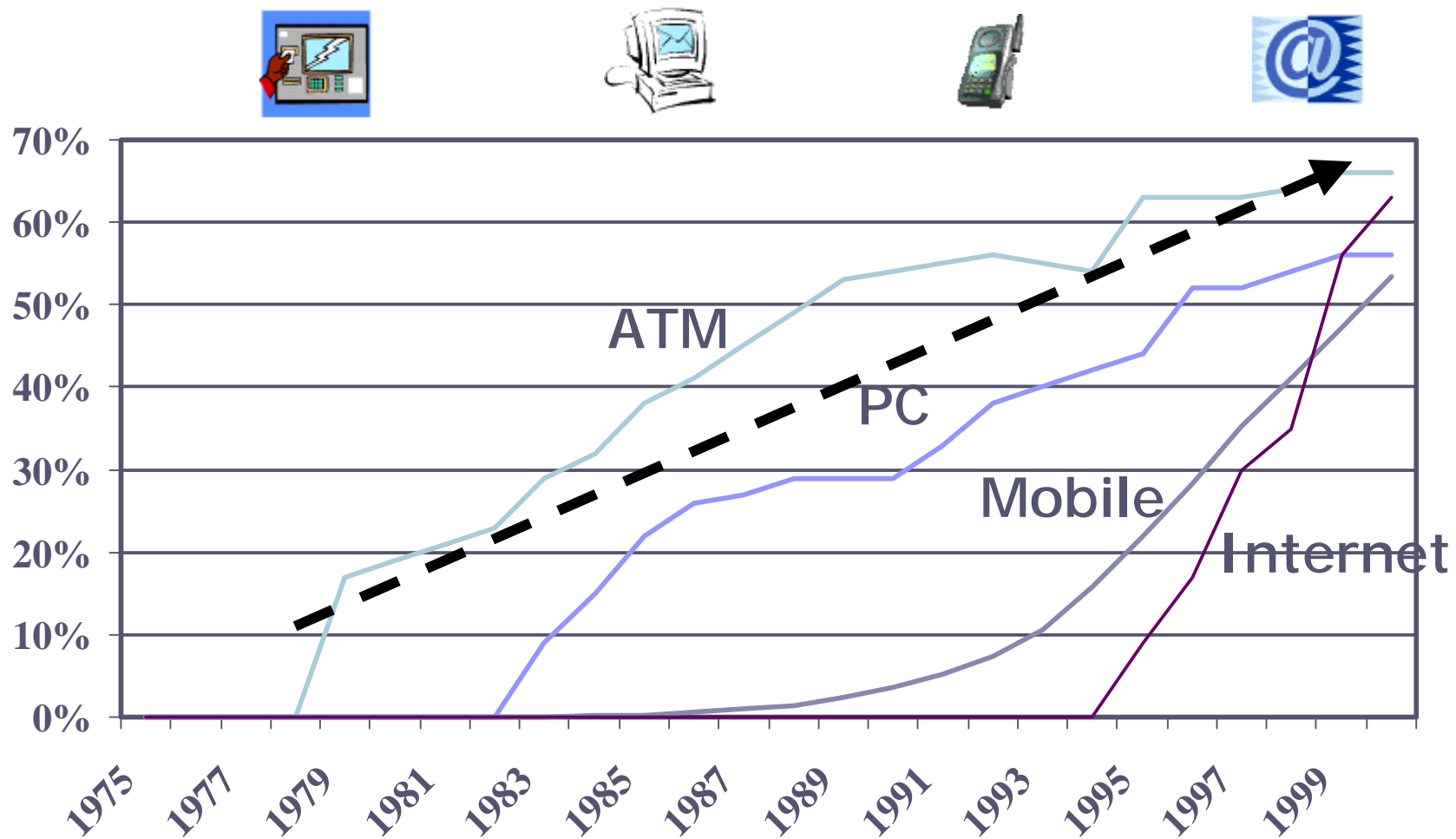


Chasm Crossing Collapse

- ☞ Post 9/11 rapid market acceleration never materialized
- ☞ Biometrics market not following typical path of disruptive technology
 - ☐ Focus on Government over Commercial Opportunities
 - Government sector driving requirements for large scale ID solutions
 - Slow progress, on-going delays, programs unrealized: e.g. TWIC multiple delays, originally 9-12M, scaled back to 1M Maritime only
 - Enrollment/credential issuance deployed independently of authentication: e.g. PIV Cards issued as of 12/1/08 32% enrolled, NO Readers
 - No Commercial “Business Breaking” Problems Identified
 - ☐ Focus on performance improvement over leveraging existing capabilities
 - Focus on Technology NOT Solutions
 - Focus on Potential NOT Delivery
- ☞ Atypical Emerging Tech Market Development Environment
 - “Biometrics as a class of disruptive or discontinuous technology has not moved completely through revolutionary market development cycle and is now undergoing significant evolutionary or continuous innovation”*
- ☞ “Market Making” window passed - Market externally defined
- ☞ **RESULT: Linear Market Growth/Steady and Sustained Adoption**
 - ☐ OVERALL Market - NO Explosive Growth – No “Tornado”- NO “Hockey Stick”
 - ☐ Linear Growth Mimics ATMS With 80% Adoption over 20 years
 - ☐ **EXCEPT FOR SPECIFIC TARGET SECTORS**



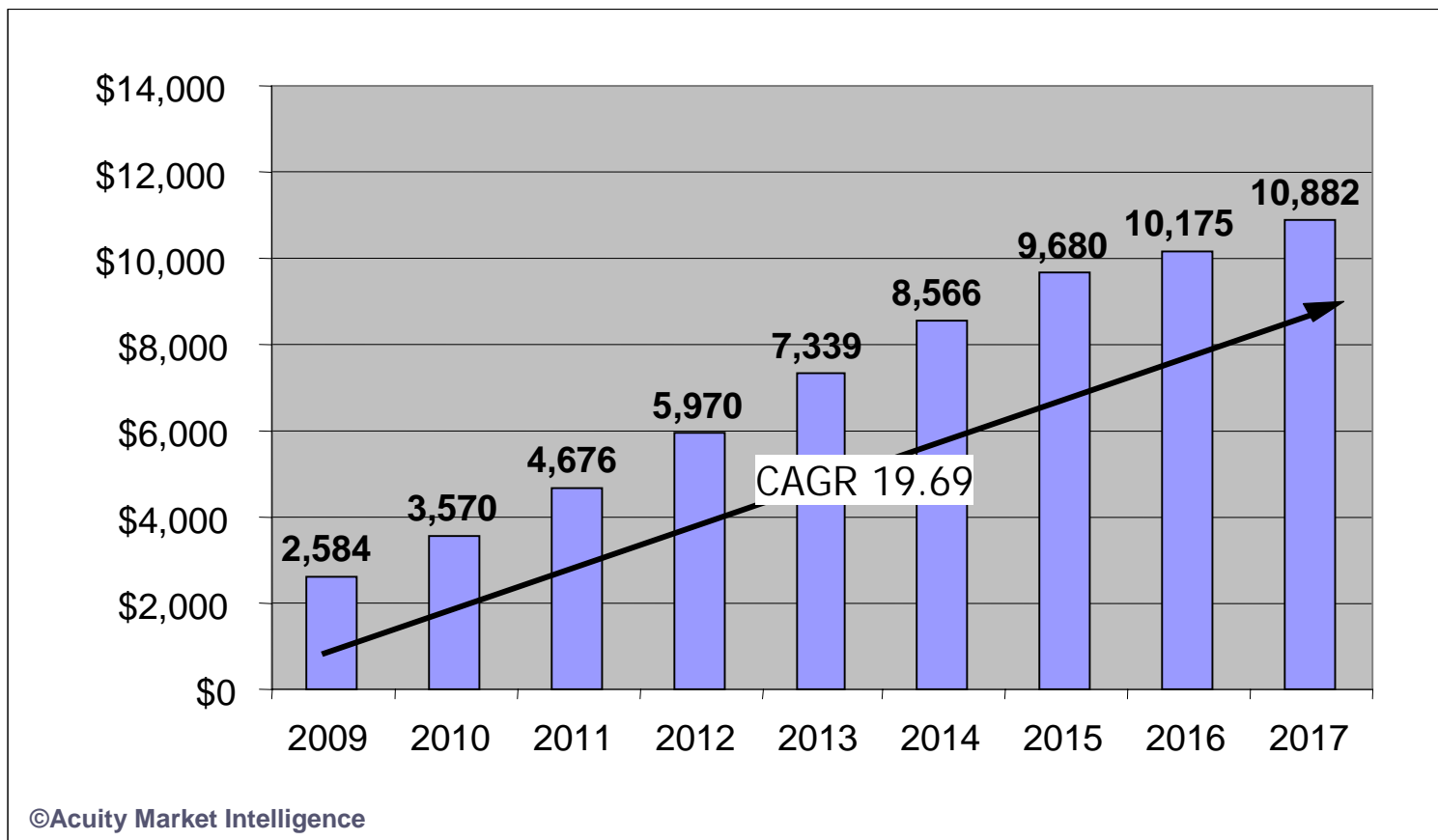
Historical Adoption Rates





Global Market Growth

Biometrics industry Revenues 2009 – 2017 (USD \$M)

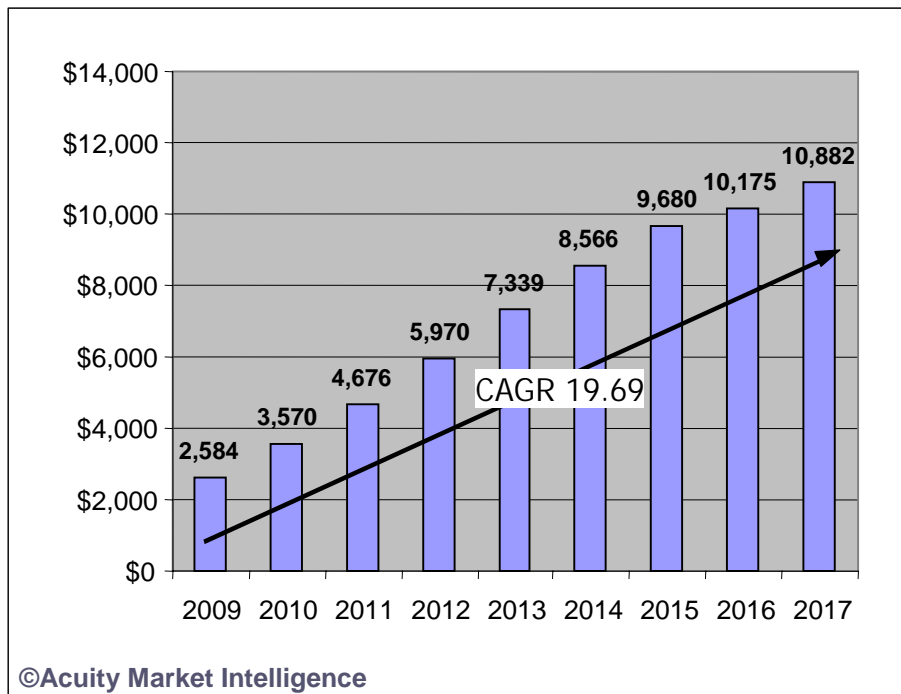


Graph 2.1



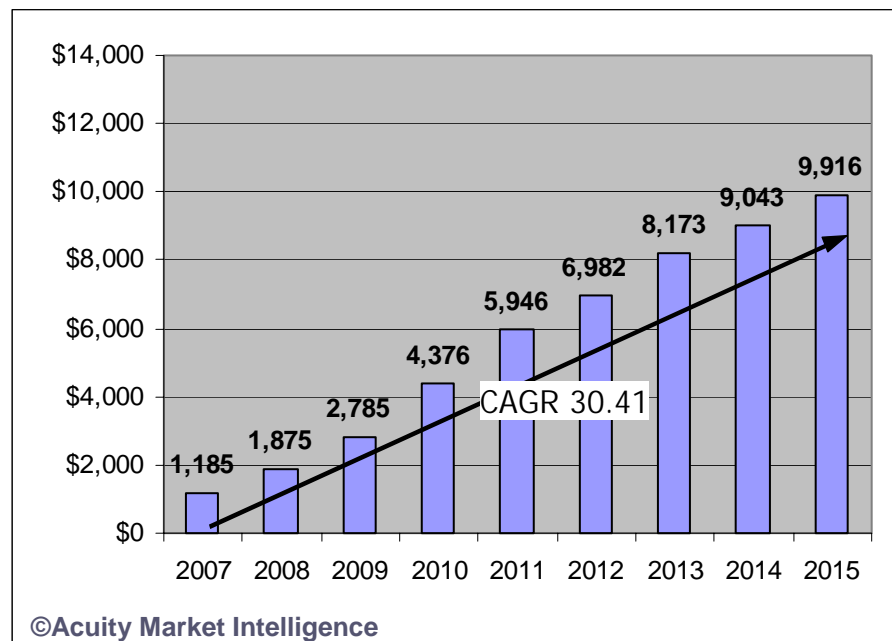
Global Market Growth

**Biometrics industry Revenues 2009 – 2017
(USD \$M)**



Graph 2.1

**Biometrics Industry Revenues 2007 – 2015
(USD \$M)**



Graph 2.2



NFC, Mobile Devices and the Evolution of a Biometrically Enabled Transaction Infrastructure



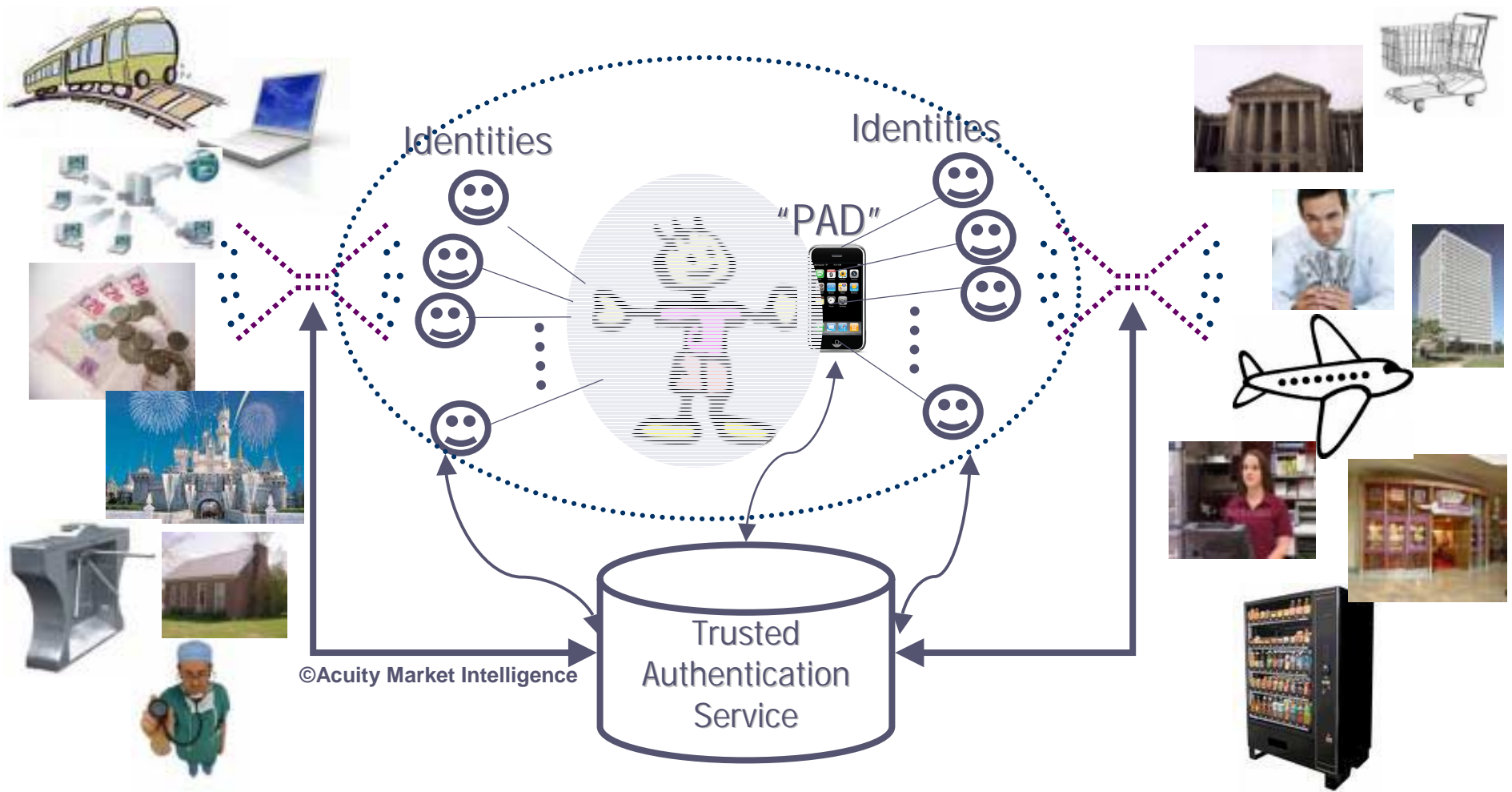
NFC/Mobile Device Transaction Infrastructure

- ☛ NFC enabled mobile devices (phones, PDAs, etc) could be engine that drives biometrics adoption for FS, HC, and other enterprise/web applications
 - ☐ As NFC proliferates, mobile phones and PDA's become personal authentication devices (PADs)
 - ☐ Dozens of successful pilots/tests in US, Europe, Asia, India, and Australia.
 - ☐ When the pilots/tests are complete, participants do not want to give up device
- ☛ Success **REQUIRES** Development of Advanced Transaction Infrastructure
 - ☐ Increasingly more advanced information and financial transaction capability
 - ☐ A problem crying out for biometrics
 - Control access to increasingly valuable devices holding personal, financial, government information & credentials
 - Authentication requirements based on risk level or value of information and financial mobile
- ☛ Significant Obstacles
 - ☐ Service Delivery/Infrastructure
 - ☐ Revenue Model(s)
 - ☐ Authentication Certification/Liability
- ☛ Authentication for Mobile Transaction Infrastructure REQUIRES Biometrics



NFC/Mobile Device Transaction Infrastructure

Inevitable Evolution Toward Biometrically Enabled Transactions





NFC/Mobile Device Transaction Infrastructure

| Global Total | \$2,584.31 | \$3,570.31 | \$4,676.05 | \$5,970.38 | \$7,339.17 | \$8,565.59 | \$9,680.41 | \$10,175.09 | \$10,882.43 |
|----------------------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| eBorders | \$699.29 | \$932.70 | \$1,198.76 | \$1,378.80 | \$1,515.29 | \$1,540.21 | \$1,521.46 | \$1,498.68 | \$1,505.82 |
| eID | \$579.43 | \$818.61 | \$904.48 | \$1,050.55 | \$1,193.92 | \$1,354.84 | \$1,540.70 | \$1,548.43 | \$1,460.96 |
| ✓ eGovernment | \$95.47 | \$154.28 | \$319.65 | \$502.71 | \$811.62 | \$1,059.43 | \$1,210.90 | \$1,458.02 | \$1,548.15 |
| Enterprise Security | \$590.89 | \$763.62 | \$898.74 | \$984.62 | \$1,219.59 | \$1,388.02 | \$1,471.42 | \$1,382.99 | \$1,427.76 |
| ✓ Information Transactions | \$52.59 | \$84.67 | \$189.88 | \$381.84 | \$599.35 | \$819.11 | \$1,004.02 | \$1,134.73 | \$1,329.05 |
| ✓ Financial Transactions | \$161.36 | \$262.01 | \$429.79 | \$629.97 | \$921.92 | \$1,135.52 | \$1,476.42 | \$1,752.50 | \$1,982.53 |
| Other | \$405.26 | \$554.42 | \$734.76 | \$1,041.89 | \$1,077.47 | \$1,268.47 | \$1,455.49 | \$1,399.75 | \$1,628.16 |

Table 2.8

| Sector CAGR Values 2009 - 2017 | eBorders | eID | eGovernment | Enterprise Security | Information Transactions | Financial Transactions |
|-----------------------------------|----------|--------|-------------|---------------------|--------------------------|------------------------|
| | 10.06% | 12.25% | 41.66 % | 11.66 % | 49.74 % | 36.83 % |

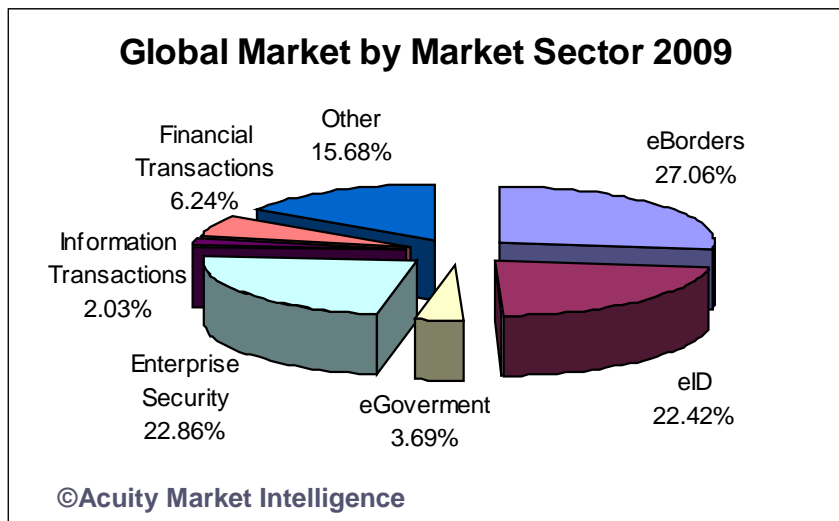


Chart 2.17

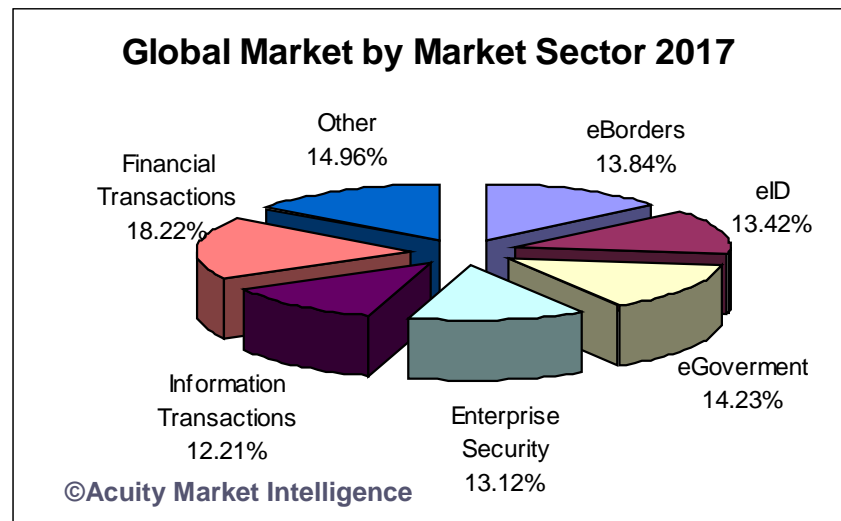


Chart 2.18



Critical Adoption Drivers: Financial Services & Healthcare



Critical Adoption Drivers: FS & HC

- ☞ Hype versus Reality for Biometrics in Financial Services and Healthcare
 - ☐ Financial Services and Healthcare at or near top of every vendor “target” list
 - ☐ Strong Justifications
 - Highly regulated with compliance based identification and authentication needs
 - Required by law and consumer demand to protect the privacy of their customers
 - Share operations and service delivery issues that are well served by biometrics
 - ☐ **YET “Gold Mines” have Failed to Materialize as Expected /Projected**
- ☞ Critical Issue - Lens through which Market Development is Viewed
 - ☐ Financial Services and Healthcare DO NOT represent single vertical markets
 - ☐ Complex industries with elaborate operational infrastructures representing range of market opportunities for targeted biometric solutions
- ☞ Segmentation (Context) in FOB Reveals Opportunities/Drivers
 - ☐ Financial Services and Healthcare split into components of the Commercial market sectors—Enterprise Security and Information Transactions.
 - ☐ Commercial Market Sector Devoted Exclusively to Financial Transactions.
 - ☐ Each of these sectors is divided into multiple targets and mapped against applications— Physical Access, Logical Access, Identity Services, and Surveillance—creating a complex targeted segmentation of these industries



Critical Adoption Drivers: FS & HC

Commercial Market Segmentation

| ©Acuity Market Intelligence 2009 | | Enterprise Security | | | | Information Transactions | | | | Financial Transactions | | | | |
|--|-------------------|---------------------|------------|----------------|-------|--------------------------|------------|----------------|-------|------------------------|-----|-----|---------------------|-------|
| | | Financial Service | Healthcare | Transportation | Other | Financial Service | Healthcare | Transportation | Other | Consumer | B2B | ATM | Inter-bank Transfer | Other |
| Physical Access – Facility, Access, Secure Area Access, Time & Attendance | Customers | | | X | X | | | | | | | | | |
| | Staff & 3rd Party | X | X | X | X | | | | | | | | | X |
| Logical Access – PC, Networks, Mobile Devices, Kiosks, Accounts, IP | Customers | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Staff & 3rd Party | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Identity Services – Background Check, Enrollment, Credentialing, Document Issuance, | Customers | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Staff & 3rd Party | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Surveillance & Monitoring – Cooperative & Non-cooperative Including Time & Attendance and Watchlists | Customers | X | X | X | X | X | X | X | X | X | X | X | X | X |
| | Staff & 3rd Party | X | X | X | X | X | X | X | X | X | X | X | X | X |

Chart 2.5



Financial Service Markets



Healthcare Markets



Critical Adoption Drivers: Financial Services

☛ Typical Financial Services Technology Path

☐ Limited adoption

- Physical Access in isolated cases, no genuine market momentum
- Logical Access slow, sporadic adoption in spite of inconvenience and cost of PWs

☐ 2008 Economic Crisis Golden Opportunity? Another Red Herring

☐ Strong Arguments for Biometric Fraud Prevention e.g Societe Generale Bank

- Single trader with back-office experience circumvented controls and lost billions
- Problem – no real risk assessment until breach occurs combined with a “can’t happen here” mentality

☐ Not even *Near Total Collapse* of the Global Financial Services system or events at Societe Generale Bank are enough to Spur Rapid Adoption

☛ Bright Spots in Financial Services

☐ Rural and under-banked in India, Africa. South America

- Establishing identity of rural depositors to expand banking to illiterate
- Biometric ATMs support micro financing initiatives
- Initiatives evaluating access low-cost ewallet government benefits cards

☐ AllTrust Networks check cashing operation spun off from Pay By Touch

- Thriving: 5 million users enrolled, 62 M biometric transactions worth \$27B in 2008
- Focused solution reduces risk and increases profits and customer convenience in highly lucrative, high-risk check cashing business

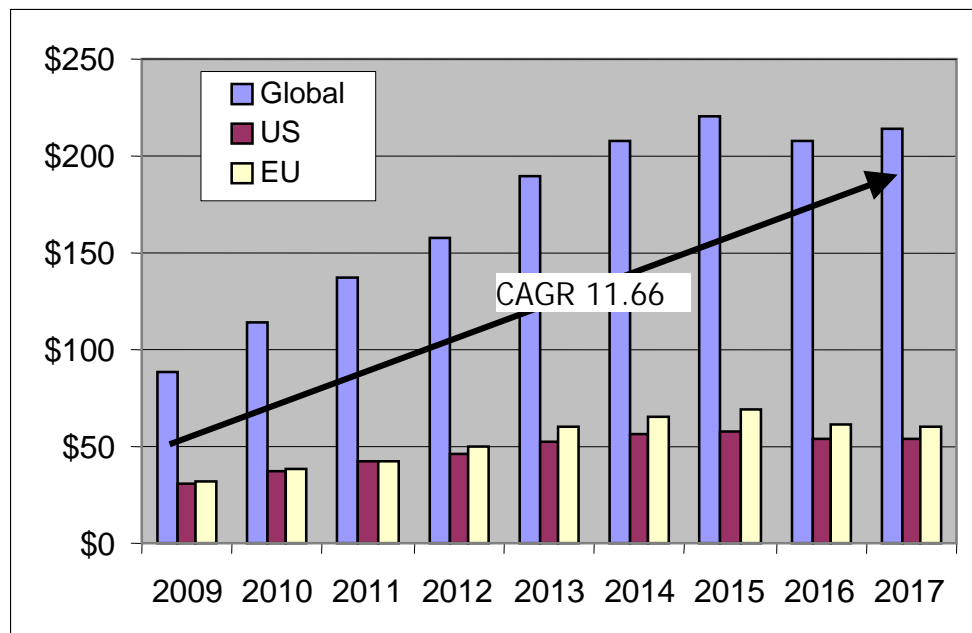
☐ NFC Mobile Device Driven Opportunity



Enterprise Security: Financial Services

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|
| Financial Services | | | | | | | | | |
| Global | \$88.63 | \$114.54 | \$136.86 | \$157.14 | \$190.00 | \$208.20 | \$220.71 | \$207.45 | \$214.16 |
| US | \$31.15 | \$36.78 | \$42.72 | \$46.22 | \$52.82 | \$56.93 | \$58.23 | \$54.38 | \$53.41 |
| EU | \$32.68 | \$38.00 | \$42.68 | \$50.36 | \$60.33 | \$65.07 | \$69.00 | \$61.19 | \$59.73 |

Table 2.39



©Acuity Market Intelligence

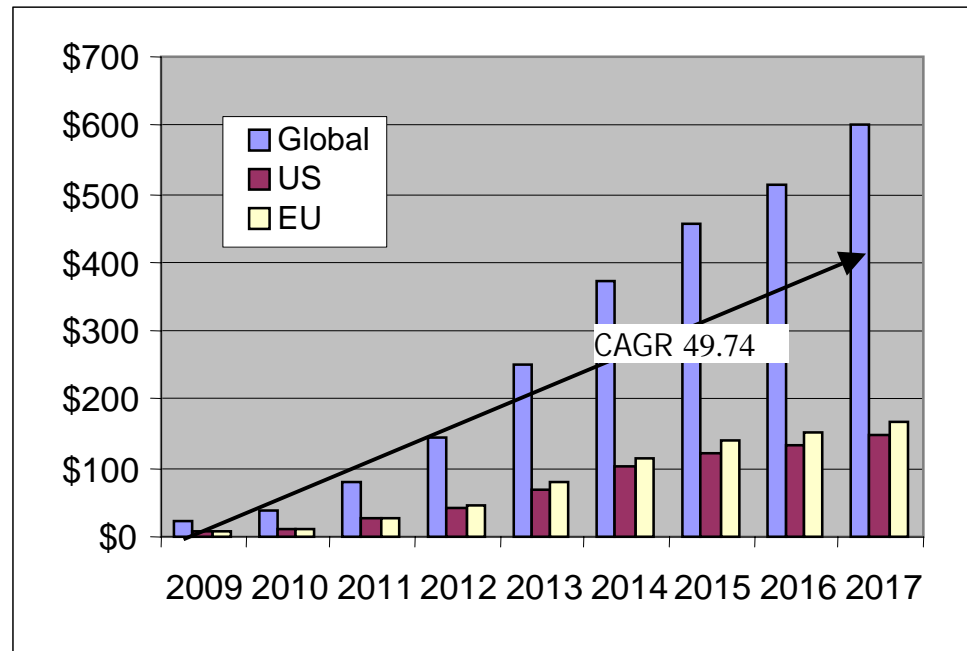
Graph 2.74



Information Transactions: Financial Services

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|
| Financial Services | | | | | | | | | |
| Global | \$23.82 | \$38.36 | \$79.82 | \$144.44 | \$250.17 | \$371.06 | \$454.82 | \$514.03 | \$602.06 |
| US | \$8.37 | \$12.32 | \$24.91 | \$42.48 | \$69.55 | \$101.46 | \$120.00 | \$134.75 | \$150.14 |
| EU | \$8.78 | \$12.72 | \$24.89 | \$46.29 | \$79.44 | \$115.96 | \$142.18 | \$151.61 | \$167.90 |

Table 2.46



©Acuity Market Intelligence

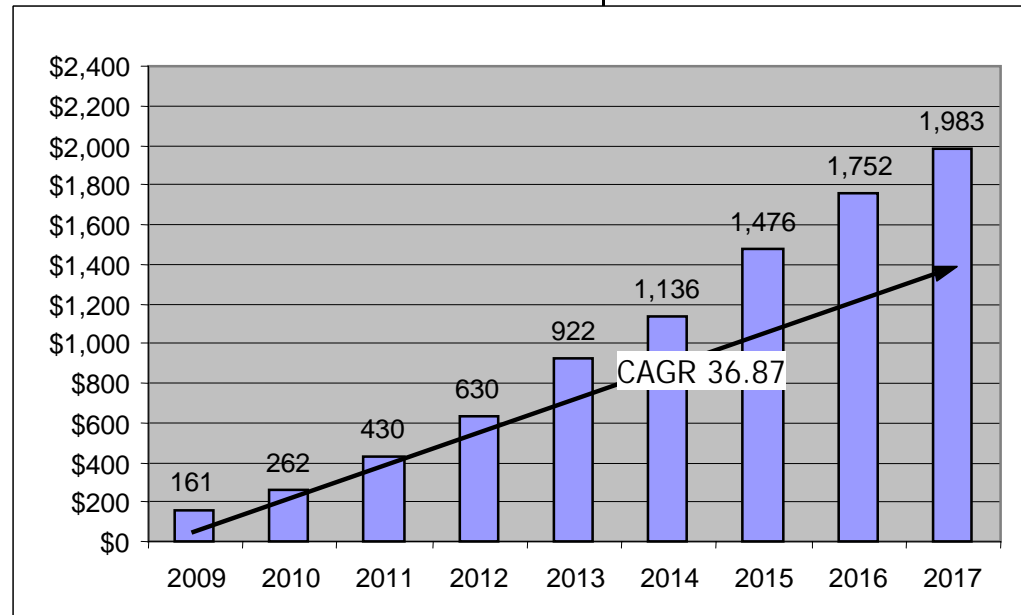
Graph 2.87



Financial Transactions

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------------------|----------|----------|----------|----------|------------|------------|------------|------------|------------|
| Financial Transactions Total | \$165.95 | \$261.40 | \$415.53 | \$671.83 | \$1,012.29 | \$1,207.83 | \$1,589.64 | \$1,841.91 | \$2,155.37 |

Table 2.47



©Acuity Market Intelligence

Graph 2.88

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------------|---------|----------|----------|----------|----------|----------|----------|------------|------------|
| Consumer | | | | | | | | | |
| Global | \$97.30 | \$157.99 | \$259.16 | \$379.87 | \$555.92 | \$684.72 | \$890.28 | \$1,056.76 | \$1,195.47 |
| US | \$34.19 | \$50.73 | \$80.89 | \$111.73 | \$154.55 | \$187.23 | \$234.89 | \$277.02 | \$298.12 |
| EU | \$35.88 | \$52.41 | \$80.81 | \$121.74 | \$176.53 | \$213.98 | \$278.31 | \$311.68 | \$333.39 |

Table 2.51

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| Interbank | | | | | | | | | |
| Global | \$23.72 | \$38.52 | \$63.18 | \$92.61 | \$135.52 | \$166.92 | \$217.03 | \$257.62 | \$291.43 |
| US | \$8.34 | \$12.37 | \$19.72 | \$27.24 | \$37.68 | \$45.64 | \$57.26 | \$67.53 | \$72.68 |
| EU | \$8.75 | \$12.78 | \$19.70 | \$29.68 | \$43.03 | \$52.16 | \$67.85 | \$75.98 | \$81.27 |

Table 2.52



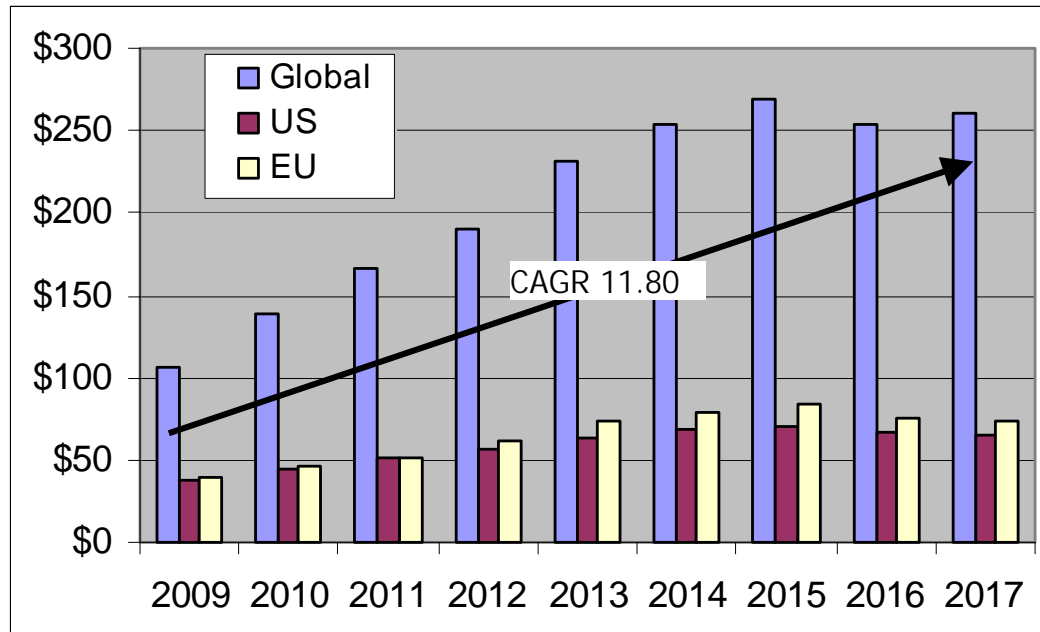
Critical Adoption Drivers: Healthcare

- ☞ Some Progress Integrating Biometrics in Healthcare
 - ☐ Physical and Logical Access to facilities, equipment, and drug cabinets and Logical Access to computers, networks, patient records, etc.
- ☞ US Healthcare Reform Could Drive Significant Adoption
 - ☐ Conversion to Electronic Medical Records a top priority in achieving improved healthcare outcomes and reducing costs
 - ☐ Transition to Electronic Records
 - Massive paper records conversion
 - IT infrastructures to support secure, accurate, and reliable creation, storage, management, and sharing of these record
 - Alternative scenario replicates present day management of individual's personal and financial information scattered across cyberspace in thousands of locations with little security and no ownership control.
 - IDEAL OPPORTUNITY to promote the Biometric Access for patients, medical practitioners, and administrators when accessing health or payment records, insurance information,
- ☞ **As mobile device based NFC transaction infrastructure may push Financial Service to incorporate biometrics to protect enterprise, biometric protection of Electronic Medical Records may do the same for Healthcare industry**



Healthcare: Enterprise Security

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Healthcare | | | | | | | | | |
| Global | \$107.07 | \$138.60 | \$165.88 | \$190.77 | \$231.04 | \$253.59 | \$269.27 | \$253.09 | \$261.28 |
| US | \$37.62 | \$44.50 | \$51.77 | \$56.11 | \$64.23 | \$69.34 | \$71.04 | \$66.34 | \$65.16 |
| EU | \$39.48 | \$45.98 | \$51.72 | \$61.14 | \$73.37 | \$79.25 | \$84.18 | \$74.65 | \$72.87 |



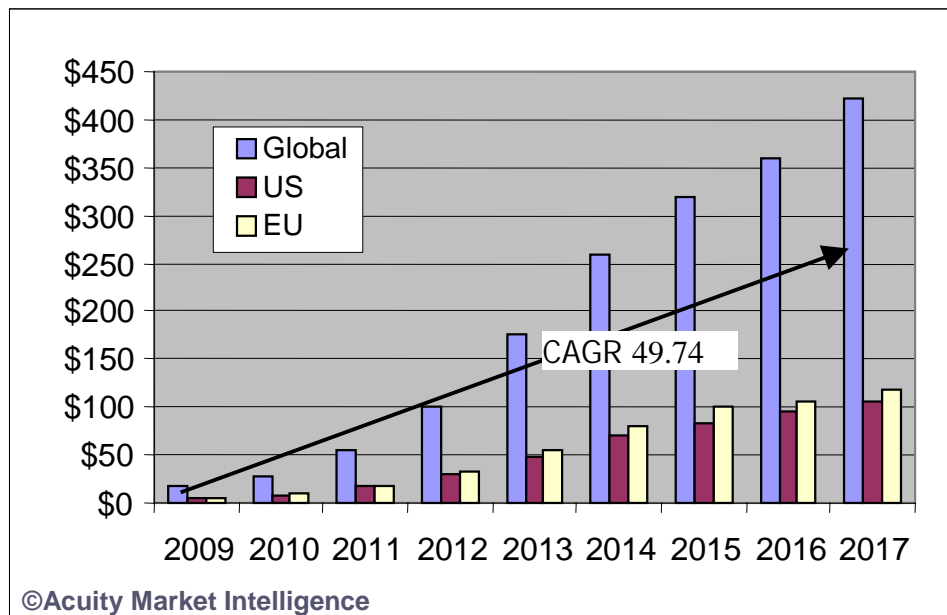
©Acuity Market Intelligence



Healthcare: Information Transactions

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------|---------|---------|---------|----------|----------|----------|----------|----------|----------|
| Healthcare | | | | | | | | | |
| Global | \$16.67 | \$26.84 | \$55.86 | \$101.07 | \$175.06 | \$259.66 | \$318.28 | \$359.71 | \$421.31 |
| US | \$5.86 | \$8.62 | \$17.43 | \$29.73 | \$48.67 | \$71.00 | \$83.97 | \$94.29 | \$105.06 |
| EU | \$6.15 | \$8.90 | \$17.42 | \$32.39 | \$55.59 | \$81.15 | \$99.50 | \$106.09 | \$117.49 |

Table 2.45



Graph 2.86



Meteoric Rise of Biometric Surveillance



Meteoric Rise of Biometric Surveillance

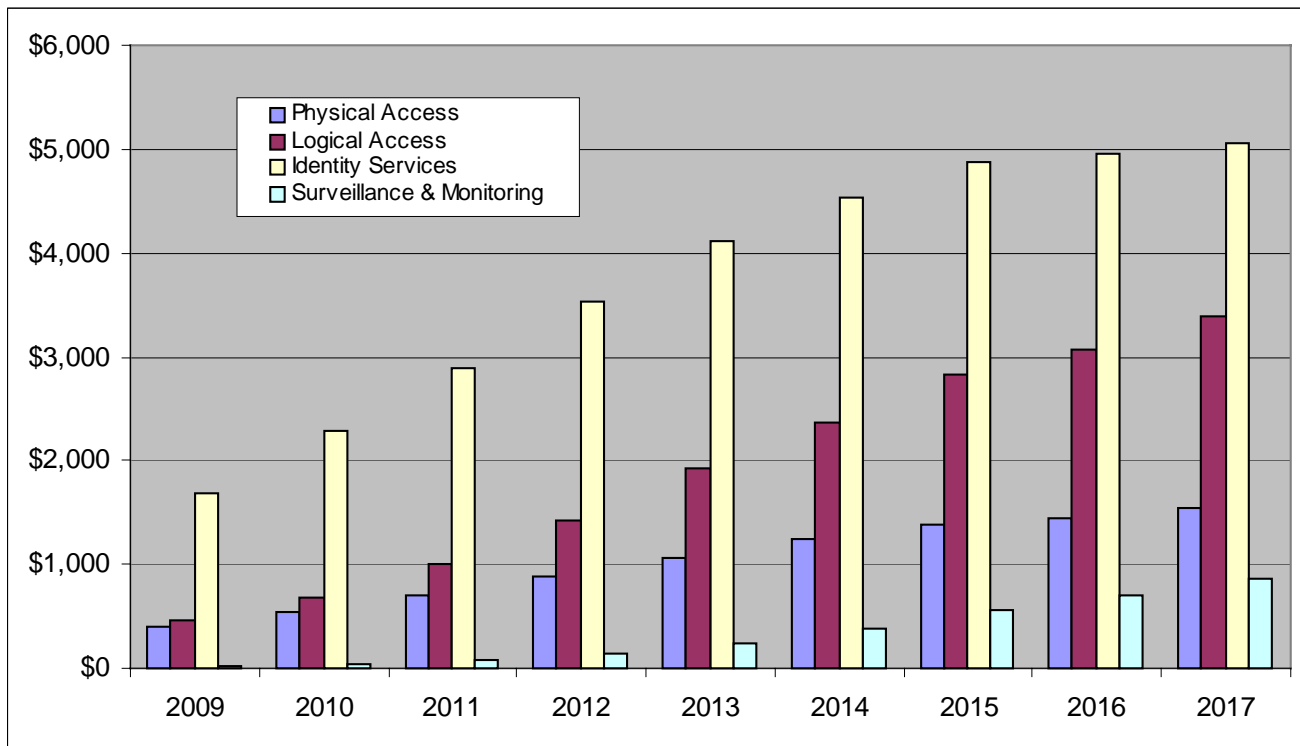
- ☞ Ultimate Dream Application of Intelligence/Defense Communities and Waking Nightmare of Privacy and Civil Liberty Advocates
 - ❑ Debate had been largely academic
 - ❑ Significant R&D investment raises profile of biometrics as threat to democracy
- ☞ Now Distance Real-Time, Non-Cooperative Image Capture is Available
 - ❑ Face/Iris Available in Active and Passive Modes 2M Range
 - ❑ On Verge of Operating in 10M range
- ☞ Distance Based Identification Valuable and Life Saving Capability
 - ❑ Military threats on approach to facilities and checkpoints
 - ❑ Alert police to kidnapped child transported through airport or train station
 - ❑ Convenience-based Applications
 - Increased throughput for airport passenger check-in and security lines,
 - High-speed staff access control
 - Ensure cruise passengers re-boarded ship before port of call departure,
- ☞ Regardless of “Positive” Applications Capability Opens Pandora's Box
 - ❑ Privacy/civil liberties advocates BELIEVE biometrics inherently pose a threat
 - Biometrically “tracking” takes surveillance society to a new fear level
 - Recent unrest in China, Iran and US warrantless wiretapping exacerbate issues
 - ❑ Significant pushback to biometric ID programs in US and Europe
 - As the surveillance capabilities expand, so to will the opposition
 - Passage of sate laws defying REAL-ID, the NO2ID group in the UK
 - ❑ Non-Issue in Middle East, Africa, Asia



Meteoric Rise of Biometric Surveillance

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| Physical Access | \$403.07 | \$544.71 | \$697.15 | \$879.39 | \$1,071.42 | \$1,251.52 | \$1,385.86 | \$1,441.66 | \$1,541.60 |
| Logical Access | \$469.08 | \$680.30 | \$999.41 | \$1,415.37 | \$1,920.23 | \$2,369.81 | \$2,836.67 | \$3,074.06 | \$3,397.73 |
| Identity Services | \$1,692.86 | \$2,295.00 | \$2,893.09 | \$3,524.80 | \$4,103.99 | \$4,541.57 | \$4,873.51 | \$4,956.32 | \$5,056.89 |
| Surveillance & Monitoring | \$19.33 | \$39.37 | \$72.40 | \$134.53 | \$232.77 | \$391.09 | \$571.78 | \$697.79 | \$872.32 |
| Application Total | \$2,584.34 | \$3,559.39 | \$4,662.06 | \$5,954.09 | \$7,328.41 | \$8,554.00 | \$9,667.82 | \$10,169.82 | \$10,868.54 |

Table 2.5



Graph 2.5

Application CAGR Values 2009 - 2017

| | |
|--------------------------------------|--------|
| Global | 19.69% |
| Physical Access | 18.26% |
| Logical Access | 28.08% |
| Identity Services | 14.66% |
| Surveillance & Monitoring | 60.77% |



Meteoric Rise of Biometric Surveillance

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Physical Access | 13.11% | 13.13% | 13.40% | 13.81% | 13.93% | 14.15% | 14.11% | 14.20% | 14.33% |
| Logical Access | 21.17% | 21.74% | 23.37% | 25.01% | 27.14% | 28.38% | 29.69% | 30.28% | 31.13% |
| Identity Services | 65.00% | 63.76% | 61.42% | 58.66% | 55.61% | 52.77% | 50.16% | 48.62% | 46.43% |
| Surveillance & Monitoring | 0.73% | 1.06% | 1.51% | 2.25% | 3.17% | 4.57% | 5.90% | 6.85% | 7.98% |

Table 2.6

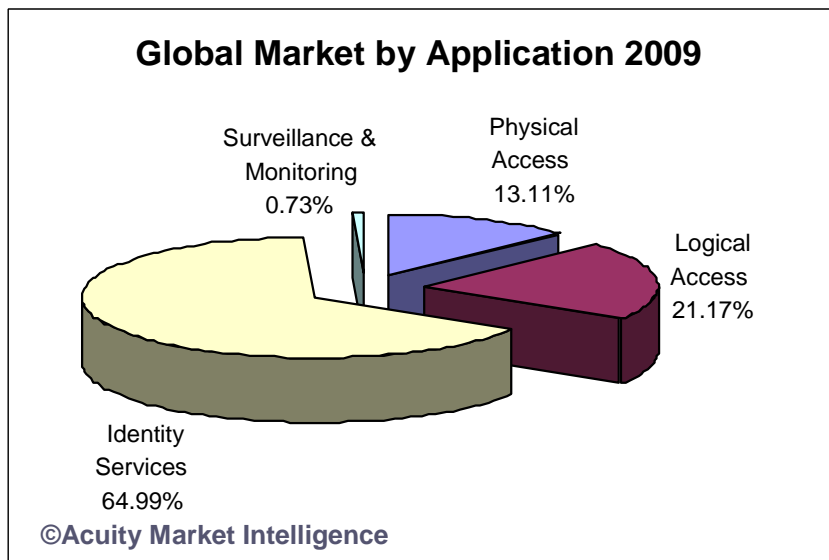


Chart 2.13

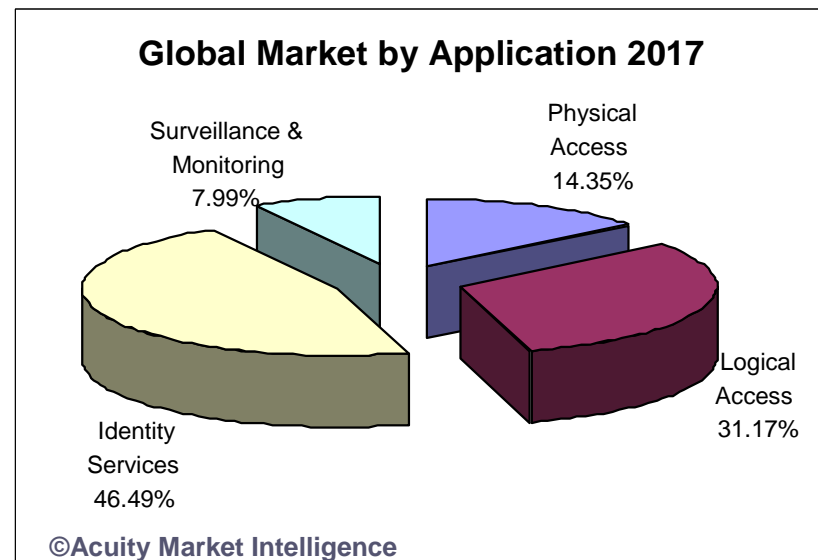


Chart 2.14



Key Take Aways



Key Take Aways

- ☛ The mainstreaming of biometrics simultaneously enables and is driven by true mass deployment of biometrics for personal, commercial, and government transaction-based applications.
- ☛ Mobility is a critical component of this market evolution.
- ☛ A secure, multi-level, risk-based transaction infrastructure (information and financial) that relies on “risk appropriate” authentication will fuel and ultimately define the genuine opportunity for revenue associated with deployment of biometric technologies.
- ☛ The on-going prominent position of Identity Services (enrollment and credentialing - issuance, renewing, revoking) along-with and in-relation to this transaction infrastructure, drives biometrics revenues towards an “as a Service” model.



Questions????

| | |
|---------------------------------|------------------|
| The Future of Biometrics | \$1595.00 |
| Executive Summary | \$ 125.00 |

For more Information, Whitepapers, Articles, & Analysis
www.acuity-mi.com

C. Maxine Most
Principal, Acuity Market Intelligence
cmaxmost@acuity-mi.com
+1 303 449 1897