



Secure Identification

The World of Biometrics & Smart Cards

C. Maxine Most - [cmaxmost@acuity-mi.com](mailto:cmaxmost@acuity-mi.com)

Principal



**The Future of Biometrics:** Market Shaping Trends, Drivers & Opportunities

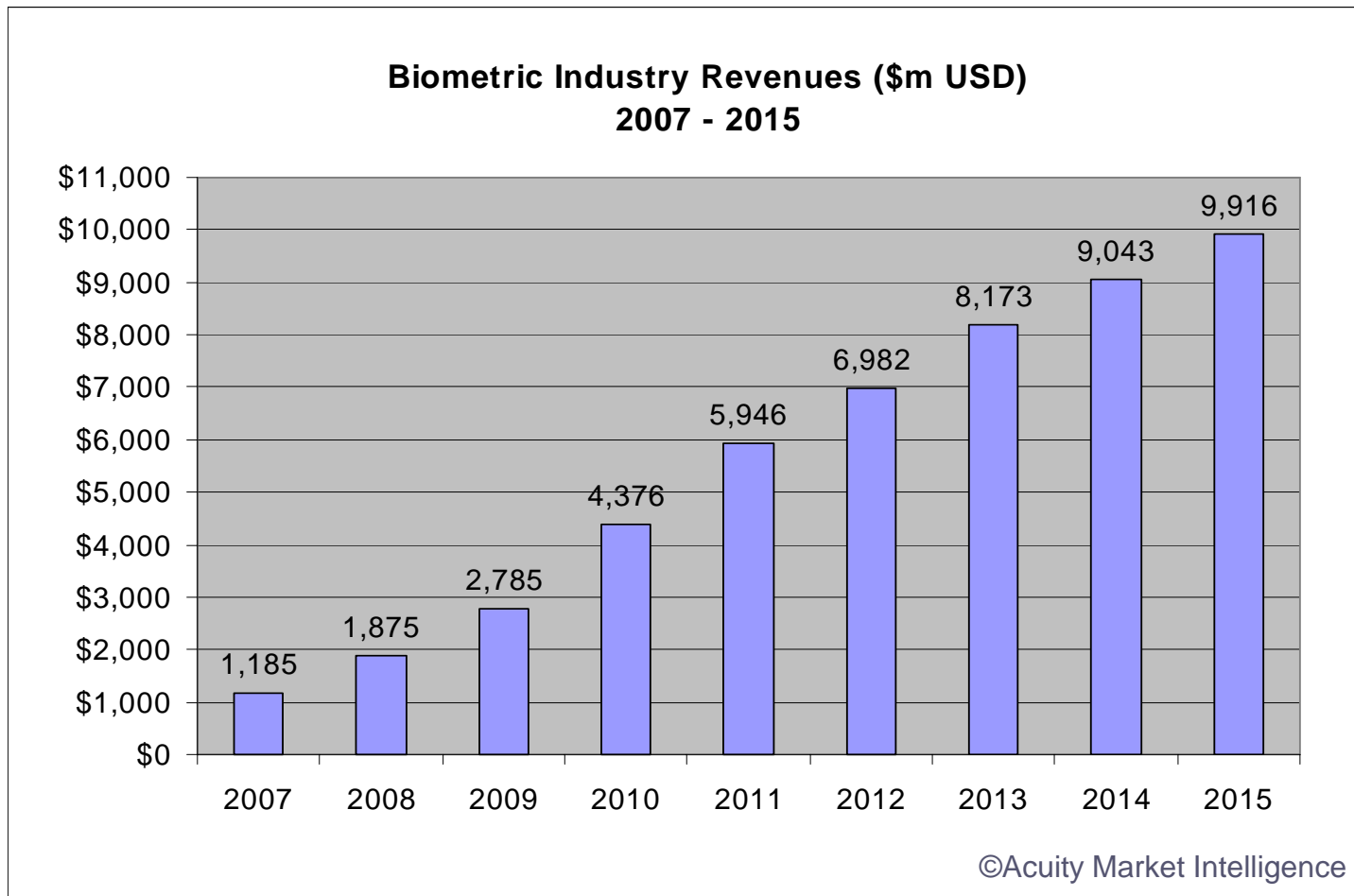
Acuity Market Intelligence is an emerging technology strategy and research consultancy with a *proven record of accurately anticipating biometric and associated identification solutions market trends*

|                 |   |
|-----------------|---|
| <b>Markets</b>  | Identification Solutions, Biometrics, Authentication  |
| <b>Services</b> | Market Analysis & Strategic Planning<br>Opportunity Assessment & Analysis<br>Technology Adoption & Deployment Evaluations |
| <b>Clients</b>  | Vendors, Solution Providers, Integrators, Investors, End Users  |



# Context

## Projected Market Growth



# Context

## Questions to Address

**How will the biometrics market evolve?**

**What will drive and shape this evolution?**

**Where will the most lucrative opportunities be?**

# Today's Discussion

## Market Shaping Forces

Drivers & Trends

Mega Trends

Application Solution Meta Drivers

Technology Evolution Meta Drivers

Obstacles & Opportunities

Future for Key Technologies

## Market Opportunities

Segmentation & Forecasts

Public Sector Priorities

Commercial Priorities

Forecast Data

## Perspective

The Future Defined

Key Forecast & Analysis Findings

Identity "Rules"

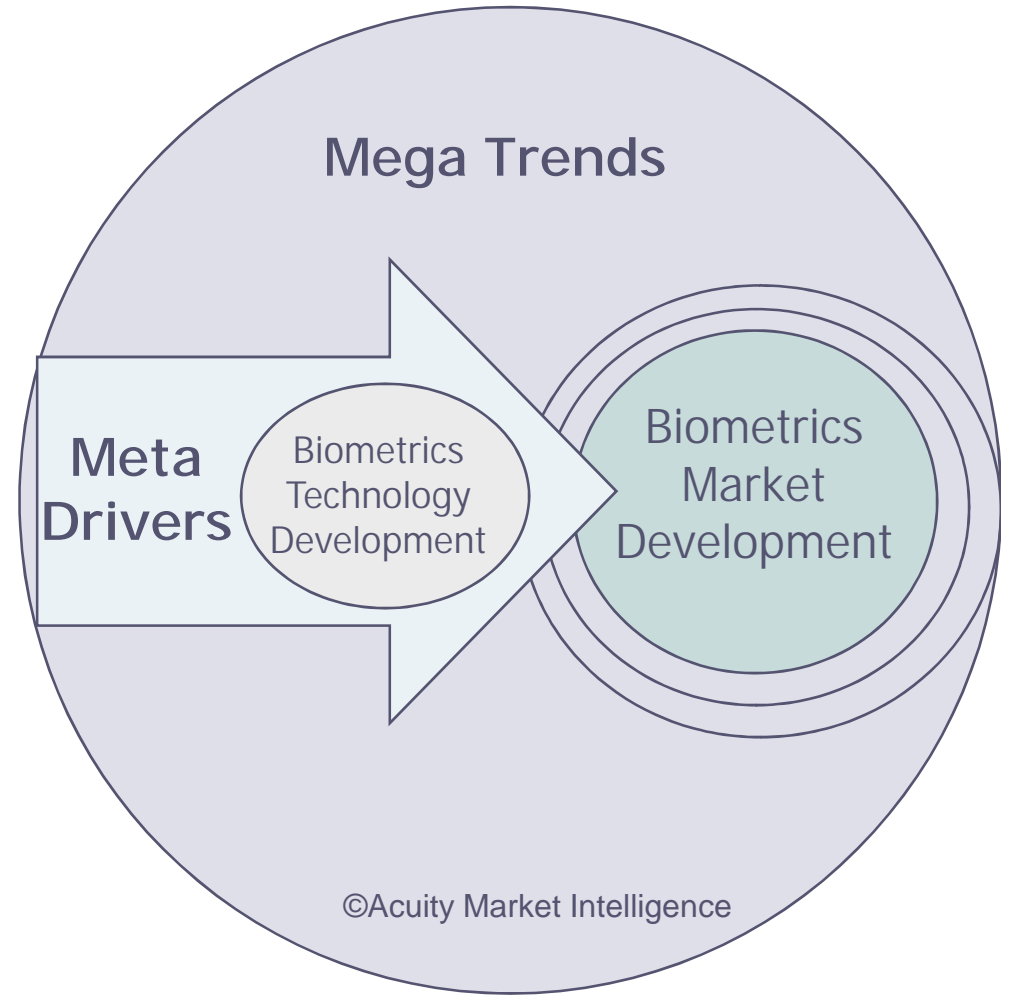
# Market Shaping Forces

## Drivers & Trends

# Market Shaping Forces

## Mega Trends & Meta Drivers

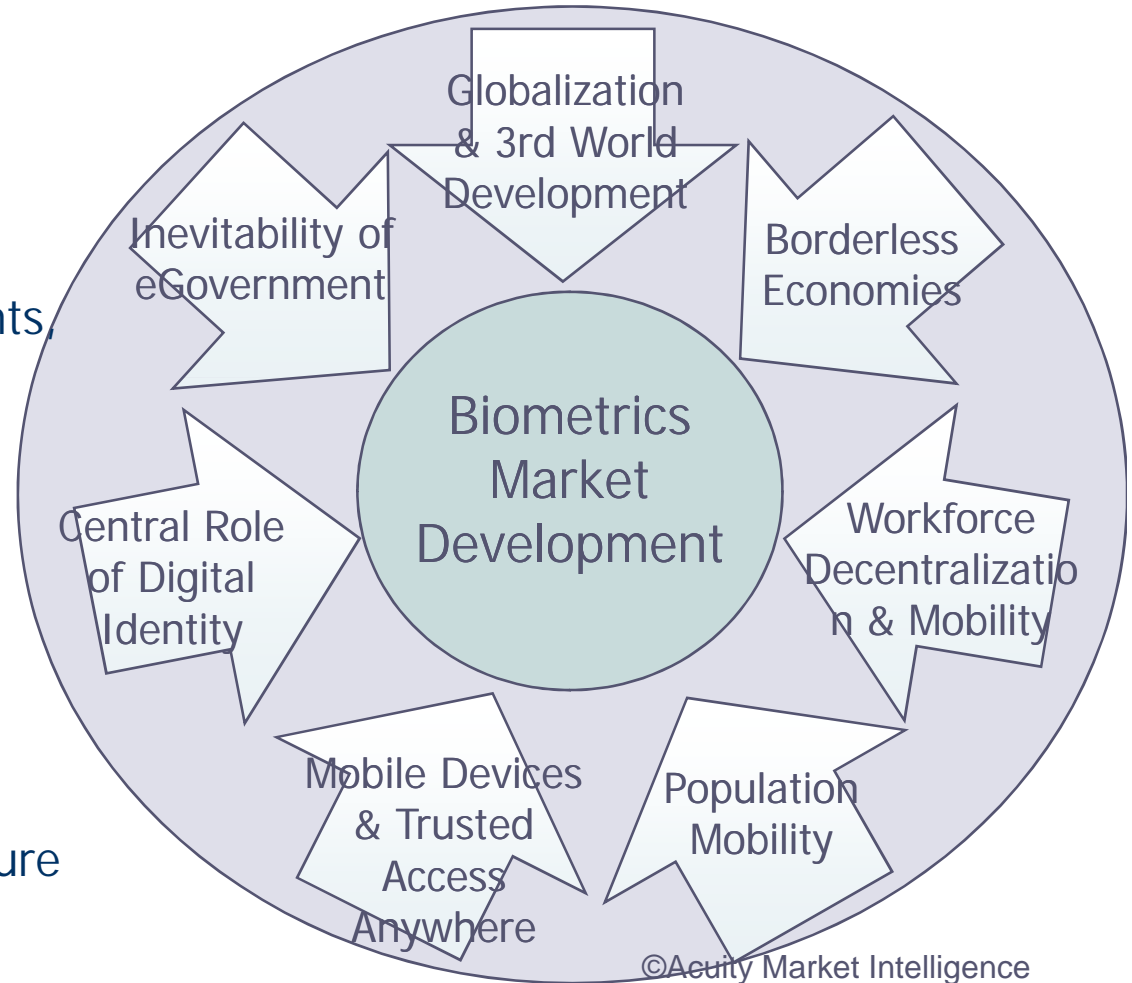
- ☛ Mega Trend
  - Mega: large, complex, imposing
  - Trend: general course or prevailing tendency
- ☛ Meta Driver
  - Meta - one level of description higher e.g. If X is some concept then meta-X is a process operating on X.
  - Driver - vigorous pressure or effort, maneuver, guide, or steer progress



# Market Shaping Forces

## Mega Trends

- Seven key ID related global IT trends
- Impact and impacted by management & linking of populations to identity based rights, privileges, actions, and services
- Volume & complexity of ID in a global community that is simultaneously shrinking - more connected - & expanding - more inclusive
- Ability to establish and link an individual to a claimed identity is fundamental to digital infrastructure on which the global community increasingly relies

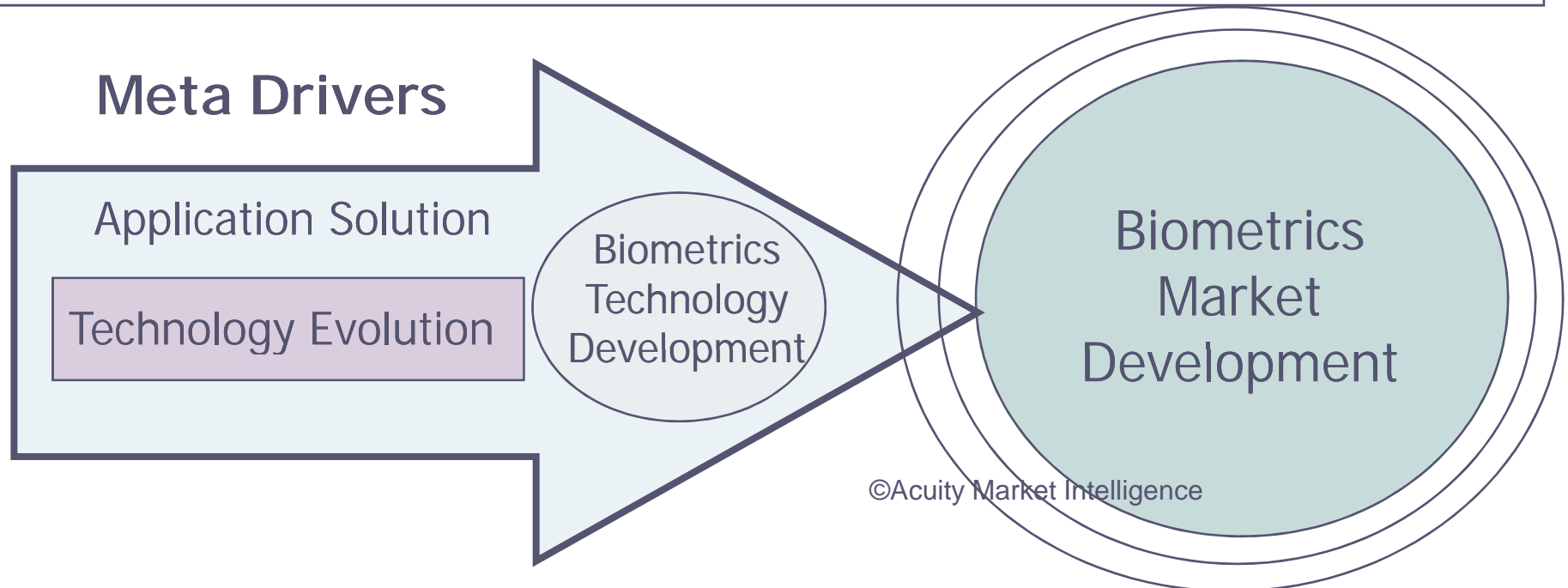


©Acuity Market Intelligence



# Market Shaping Forces

## Meta Drivers



- Application Solution Meta Drivers shape the opportunities for widespread deployment of biometrics
- Technology Evolution Meta Drivers are the capabilities that support the demands of these market forces

# Meta Drivers

## Application Solution

- Application Solution Meta Drivers are market demand drivers that define the conceptual framework for identifying the most lucrative market opportunities.
- Biometrics market can be broadly divided into two major Application Solution domains—Public Sector and Commercial—where each domain has three key Meta Drivers.
- Framework is not comprehensive in reflecting every possible market opportunity, but rather focuses on key growth markets for biometrically enabled solutions in their respective Application Solution domains.

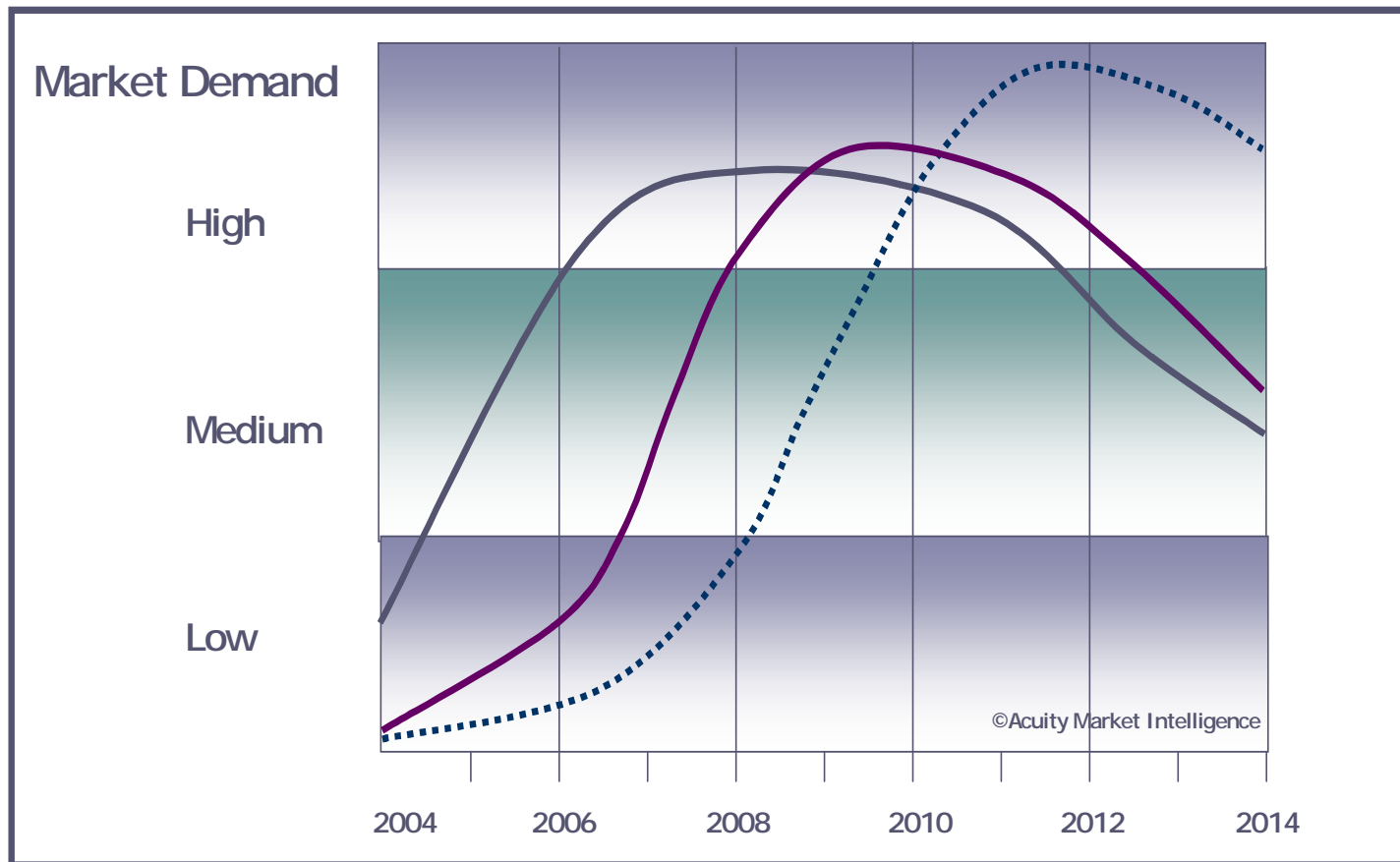
# Application Solution Meta Drivers

## Public Sector Demand Curves

**Integrated eBorders** —■— ■—  
 passports, visas, border control

**eID** —■— ■—  
 National IDs, ID Cards

**eGovernment** ... ■ ...  
 ID verification, electronic access



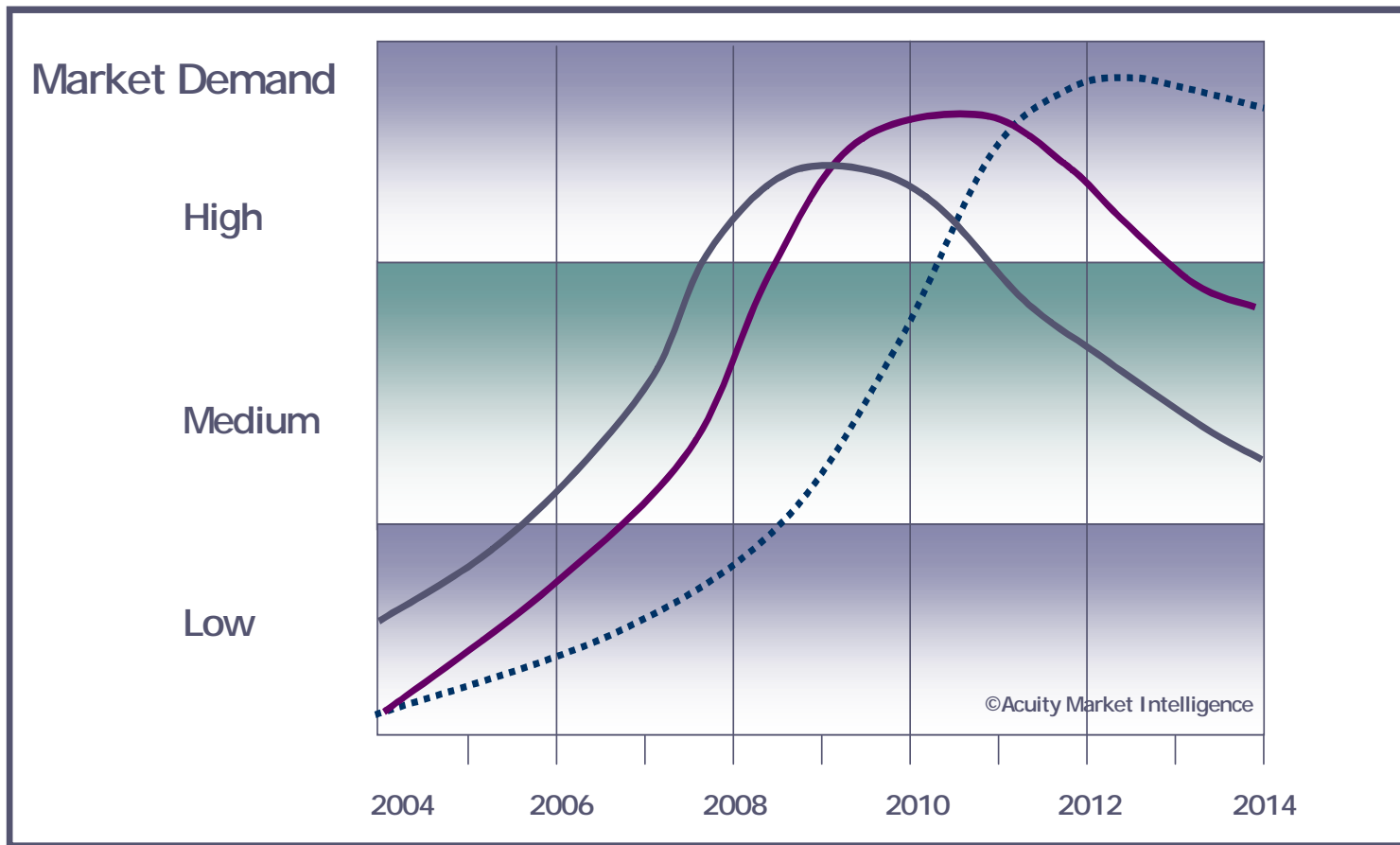
# Application Solution Meta Drivers

## Commercial Demand Curves

Enterprise Security  
physical & logical access

Information Transactions  
IP, accounts, private data

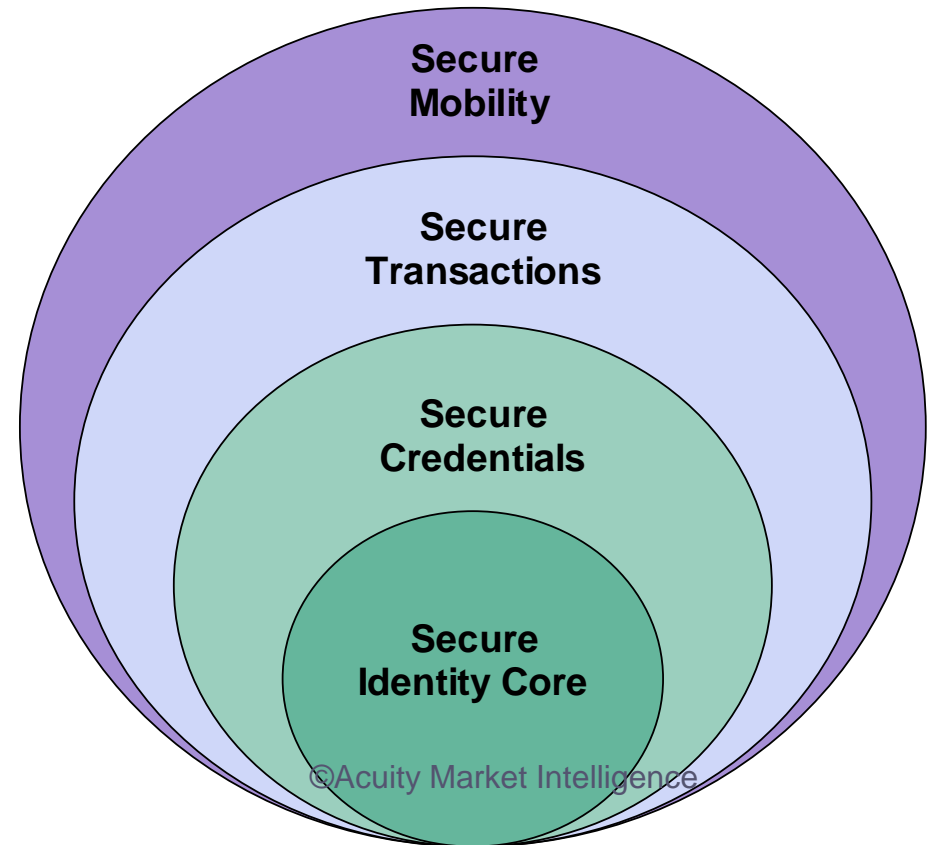
Financial Transactions  
POS, electronic payments



# Meta Drivers

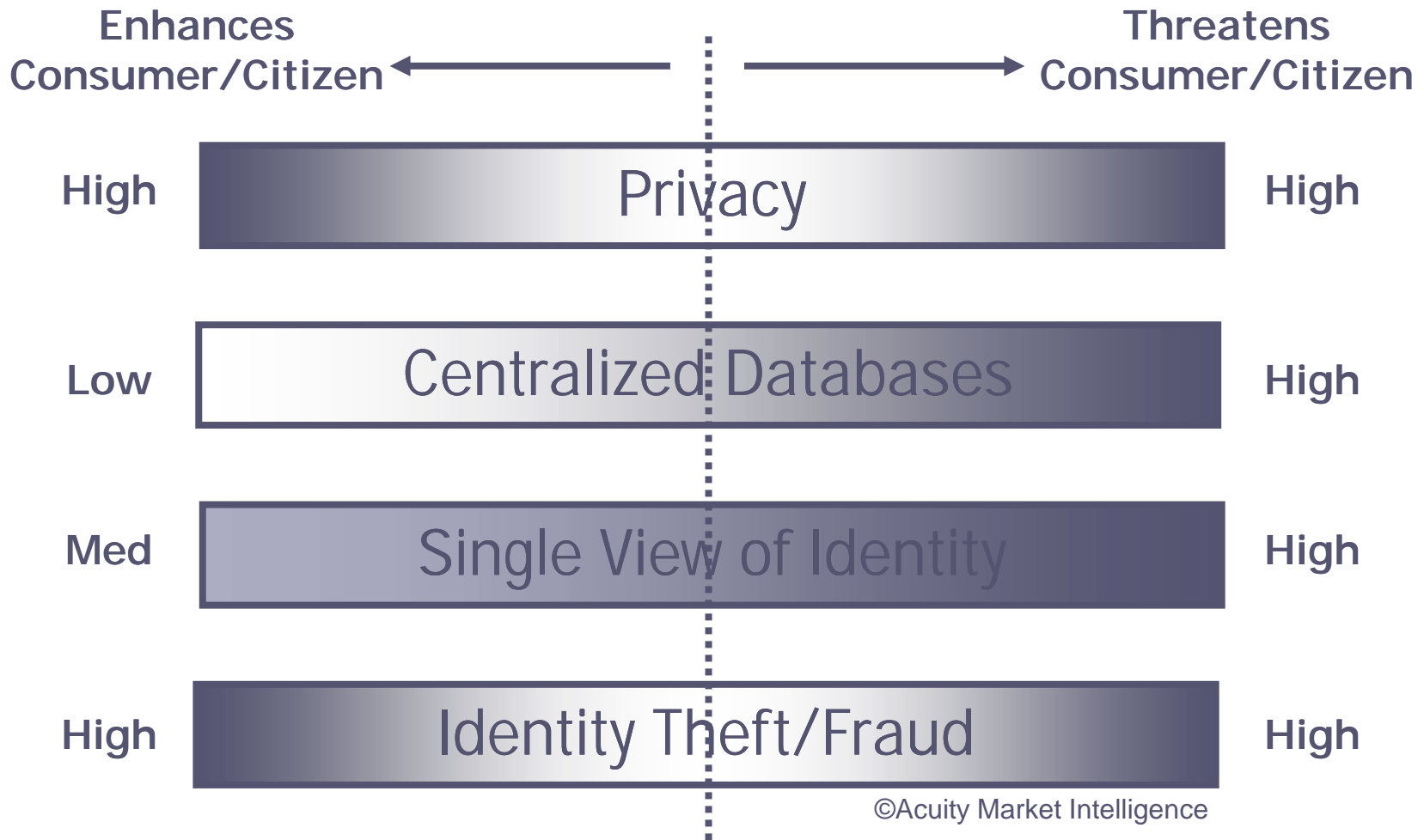
## Technology Evolution

- Set of foundational capabilities that must be developed to adequately address the requirements of the Application Solution Meta Drivers
- Essential capability components of larger framework that enables the development of reliable, secure, worldwide identity centric IT infrastructure that biometric authentication simultaneously plays a central part in creating and relies on for significant market expansion



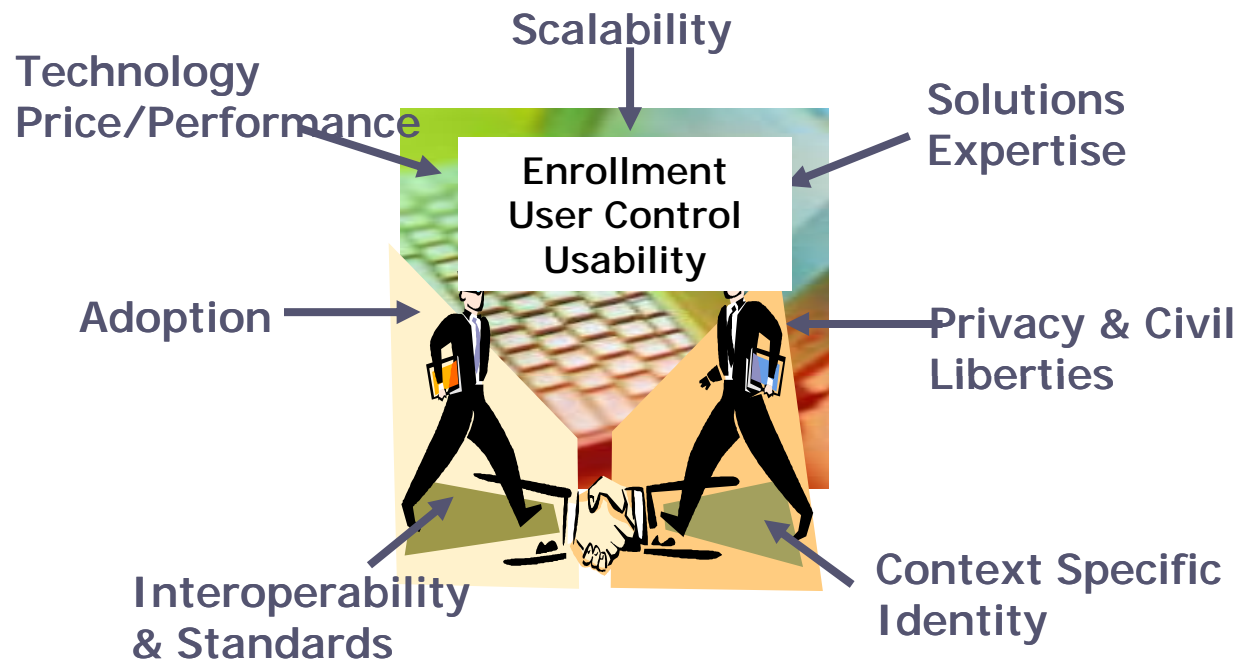
# Obstacles & Opportunities

## Opportunity/Threat Dichotomy



# Obstacles & Opportunities

## Integrally Linked Core Issues



### Bridging Human-Machine Identity Gap

- ☛ Enrolment
- ☛ Human Factors:
- ☛ Privacy/Civil Liberties

### Solutions Development

- ☛ Extensible Security
- ☛ Context Specific Identity
- ☛ Price/Performance
- ☛ Interoperability/Standards

# Future for Key Technologies

| Mode                      | Legacy  | Today   | Future  |
|---------------------------|---|---|---|
| <b>AFIS/<br/>Livescan</b> | Established LE staple for 1:n searching. Not real-time performance  | Continues to be an LE focused technology 4 major AFIS, 2 major livescan vendors with extreme barriers to entry. Best results in a 60m DB 2 – 4 minutes turn around.   | Full hand including palm become standard. Potential for integrating with vein though will likely remain a contact based biometric.. Low end systems increase market potential.  |
| <b>Finger</b>             | Multiple technologies – optical, silicon, ultra sound, (and vein see below), Many players trying to establish themselves as the technology of choice. | Widely used for range of applications – govt., commercial, consumer. Making enterprise inroads. Now shipping on close to 20% of laptops. Phone use in Asia significant. Over 50M sensors shipped worldwide. Minutia based interoperability established. Market remains fragmented.                                      | Good future for minutia based because of interoperability. Likely integrated with other technologies for more critical applications. Long term viability of silicon because of optical image capabilities? A touchless alternative is likely.       |
| <b>Face</b>               | Marginal performance for real time ID, Lots of bad PR. Established for database search e.g. DL,, passport. Significant environmental issues.          | High potential yet limited perceived usefulness – except image database search . Significant capability & performance fixes for 2D over past few years. 3D has proven effective. Proven deployments commercial and government. Verification speed does not impact normal workflow. Environmental issues being overcome. | Future is 3D especially 3D at a distance., Significant price/performance drops for widespread applications. Image capture on personal handheld devices. Significant potential for surveillance and cooperative touchless, user acquiring solutions. |
| <b>Iris</b>               | Accurate but expensive. Non functional outdoors. Limited usefulness except for high end applications.   | Only technology for real-time large scale 1:n searching. Enrollment issues – positioning. Environmental issues still preclude outdoor use. 80 million enrolled though database is not consolidated and de-duping has not begun.   | P/P curves continue to drop. Large real-time databases (100M+). Outdoor problem solved enabling host of contactless, touchless applications including kiosk based – ATM, transport, etc.  |



# Future for Key Technologies

| Mode               | Legacy   | Today   | Future   |
|--------------------|--|---|--|
| <b>Hand</b>        | Widely deployed fro T&A and physical access. Adequate for 1:1 verification for high security | Considered somewhat dated. Integrated with 3D face to improve capacities and appeal   | Use will decline . Replaced by other technologies.   |
| <b>Signature</b>   | Significant potential but underutilized. Legal acceptance of electronic signatures an issue. | Still limited traction but looming large potential . Legal/structural basis for electronic signatures lacking .   | Routine for contracts, payments, legal documents. Proliferates with widespread use of tablet notebooks/PDAs.                                     |
| <b>Voice</b>       | Positive user experience, plagued with channel issues.                                       | Channel issues being resolved. Uptake imminent especially in financial services arena.  | Widespread use by consumers especially in financial services.  |
| <b>Vein</b>        | Not taken seriously as a challenge to finger based biometrics                                | Finger & palm based. Battling for Japan's ATMs. Minimal acceptance by customers due to cooperation issues among banks . Expanding in the US and EU markets. Recent move to allow cross enrolment. | Contactless has strong appeal). Palm based does not have law enforcement connotation like fingers. Strong replacement for hand.                  |
| <b>Other</b>       | Lots of R&D but most perceived as quirky   | A number of serious researchers and funded start-ups are committed to developing breakthrough biometric technology - Gait, Odor, Ear, Retina  | Winners will be based on accuracy and speed, social acceptability, and price/performance.  |
| <b>Multi-modal</b> | Some trials, minimal deployment  | Beginning to see for use in ePassports and eVisas as well as credentialing for other document issuance  | More complex solutions require range of modalities..Rewards relationship building, Role of BASPs grows with complexity of customer requirements. |

# Future for Key Technologies

## Impact of Related Technology Development

- ☞ Biometrics benefit from entry of sophisticated, well-funded market players with expertise in high resolution image capture, large scale data management, high speed data processing, etc.
- ☞ Ongoing development of related technologies - smart cards, mobile phones, PDAs, cryptography, identity management, and risk analysis tools - provide essential components of broadly based identity centric IT infrastructure required for biometrics to thrive
  - Biometrics are essential component of authentication capability required for secure, trusted ID centric operating environment
  - All of these technologies are integrally related and interdependent in regards to successful market growth and must be considered in the context of building this overarching ID centric IT infrastructure
  - Recent promising innovations: NFC, iPhone, Very High Bandwidth Internet transmission

# Market Opportunities

## Segmentation & Forecasts

# Opportunities

## Public Sector Development Priorities

| ©Acuity Market Intelligence 2007   |                     | Integrated eBorders |                  |           |                      | eID                         |                            |                                   |  | eGovernment   |  |
|--|---------------------|---------------------|------------------|-----------|----------------------|-----------------------------|----------------------------|-----------------------------------|--|---|--|
|  |                     | Travel Docs         | *Port Facilities | *Vehicles | *Expedited Travelers | Civil - DL, National, Voter | Benefits - Health, Welfare | Government Admin - Civil Servants | Military & Defense - Staff & Contractors | Citizen - Tax, License, Utilities, Court, Education | Commercial - Tax, License, Regulatory, Court |
| * Solutions for these markets will likely be paid in part by commercial enterprises      |                     |                     |                  |           |                      |                             |                            |                                   |  |   |  |
| <b>Physical Access</b> – Facility Access, Security Checkpoints                           | Citizens            |                     | X                | X         | X                    |                             |                            |                                   |  |   |  |
|  | Staff & 3rd Parties | X                   | X                | X         | X                    | X                           | X                          | X                                 | X  |   |  |
| <b>Logical Access</b> – PC, Networks, Mobile Devices, Kiosks                             | Citizens            | X                   | X                |           | X                    | X                           | X                          |                                   |  | X   | X  |
|  | Staff & 3rd Parties | X                   | X                | X         | X                    | X                           | X                          | X                                 | X  | X   | X  |
| <b>Identity Services</b> – Background Check, Document Issuance, Enrollment               | Citizens            | X                   | X                |           | X                    | X                           | X                          |                                   |  | X   | X  |
|  | Staff & 3rd Parties | X                   | X                | X         | X                    | X                           | X                          | X                                 | X  | X   | X  |
| <b>Surveillance &amp; Detection</b> – Cooperative & Non-cooperative including watchlists | Citizens            |                     | X                | X         | X                    |                             |                            |                                   |  | X   | X  |
|  | Staff & 3rd Parties | X                   | X                | X         | X                    | X                           | X                          | X                                 | X  | X   | X  |

Tier 1 (3 years)
  Tier 2 (3-7 years)
  Tier 3 (5-10 years)

# Opportunities

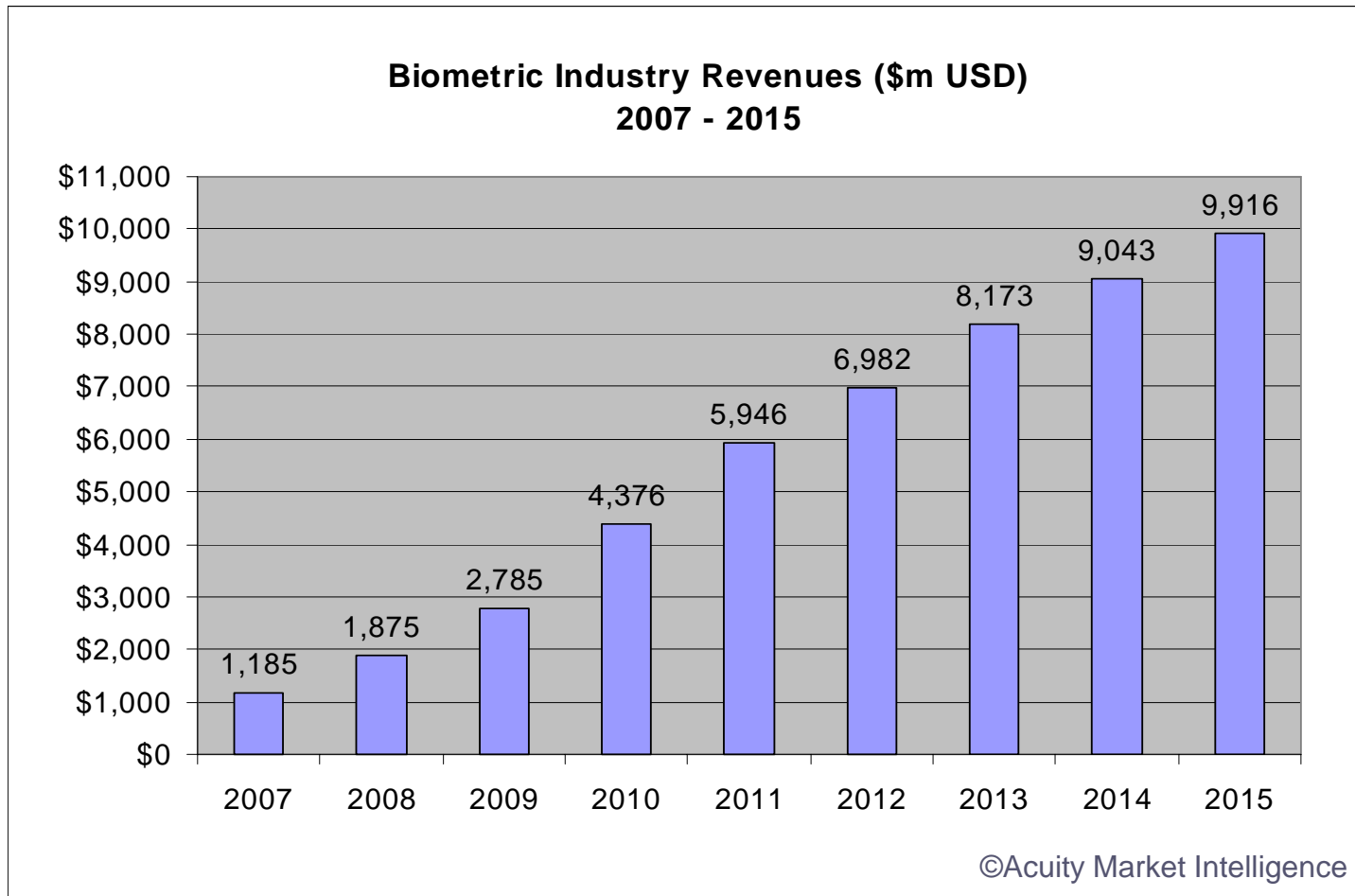
## Commercial Development Priorities

| ©Acuity Market Intelligence 2007  |                     | Enterprise Security |            |                | Information Transactions |        |           |        | Financial Transactions |     |     |                     |
|---|---------------------|---------------------|------------|----------------|--------------------------|--------|-----------|--------|------------------------|-----|-----|---------------------|
|   |                     | Financial Service   | Healthcare | Transportation | IP Management            | Travel | Financial | Health | Consumer               | B2B | ATM | Inter-bank Transfer |
| <b>Physical Access</b> – Facility, Access, Secure Area Access   | Customers           |                     |            | X              |                          |        |           |        |                        |     |     |                     |
|   | Staff & 3rd Parties | X                   | X          | X              |                          |        |           |        |                        |     | X   |                     |
| <b>Logical Access</b> – PC, Networks, Mobile Devices, Kiosks, Accounts, IP                                      | Customers           | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |
|   | Staff & 3rd Parties | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |
| <b>Identity Services</b> – Background Check, Document Issuance, Enrollment                                      | Customers           | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |
|   | Staff & 3rd Parties | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |
| <b>Surveillance &amp; Monitoring</b> – Cooperative & Non-cooperative including Time & Attendance and Watchlists | Customers           | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |
|   | Staff & 3rd Parties | X                   | X          | X              | X                        | X      | X         | X      | X                      | X   | X   | X                   |

Tier 1 (3 years)
  Tier 2 (3-7 years)
  Tier 3 (5-10 years)

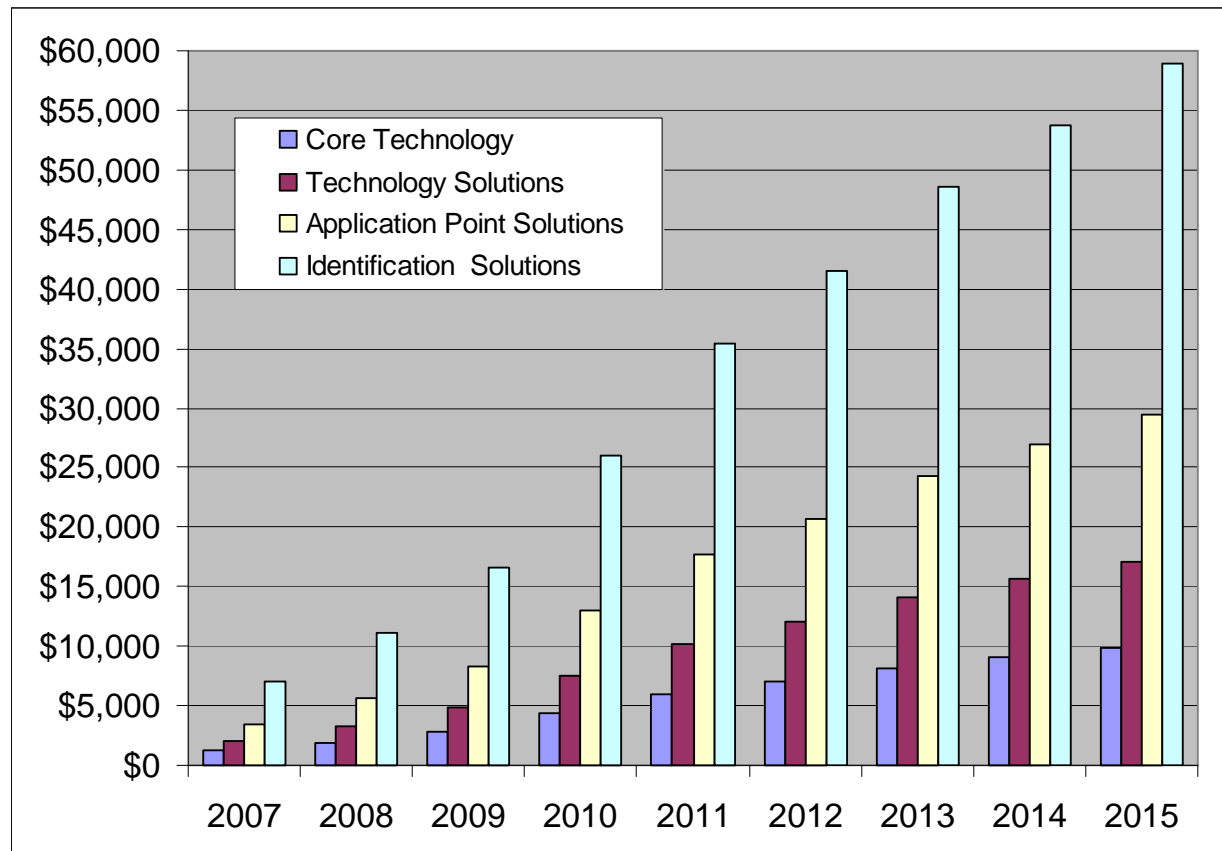
# Forecasts

## Global Revenues



# Forecasts

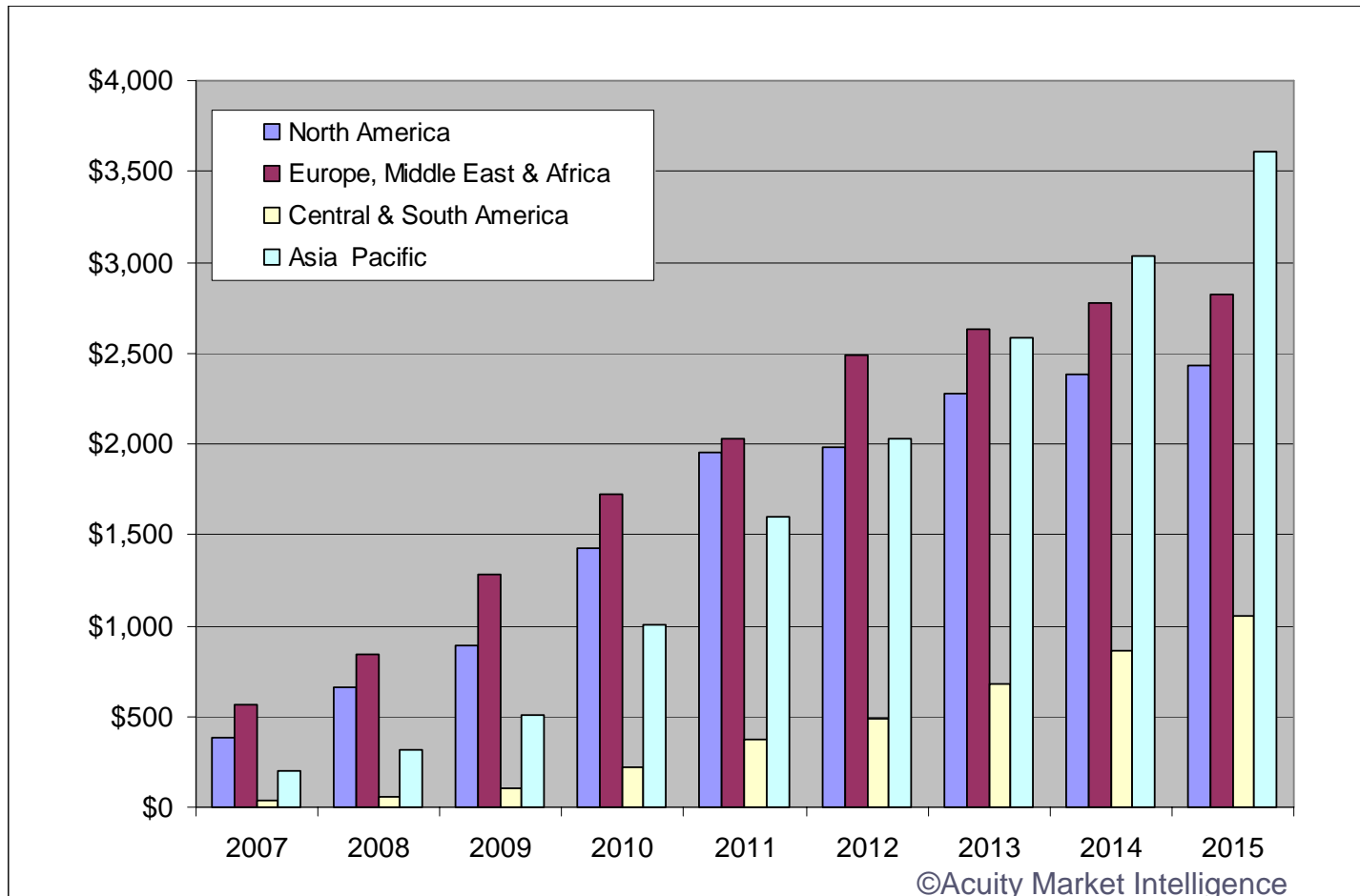
## Value Chain Revenues



©Acuity Market Intelligence

# Forecasts

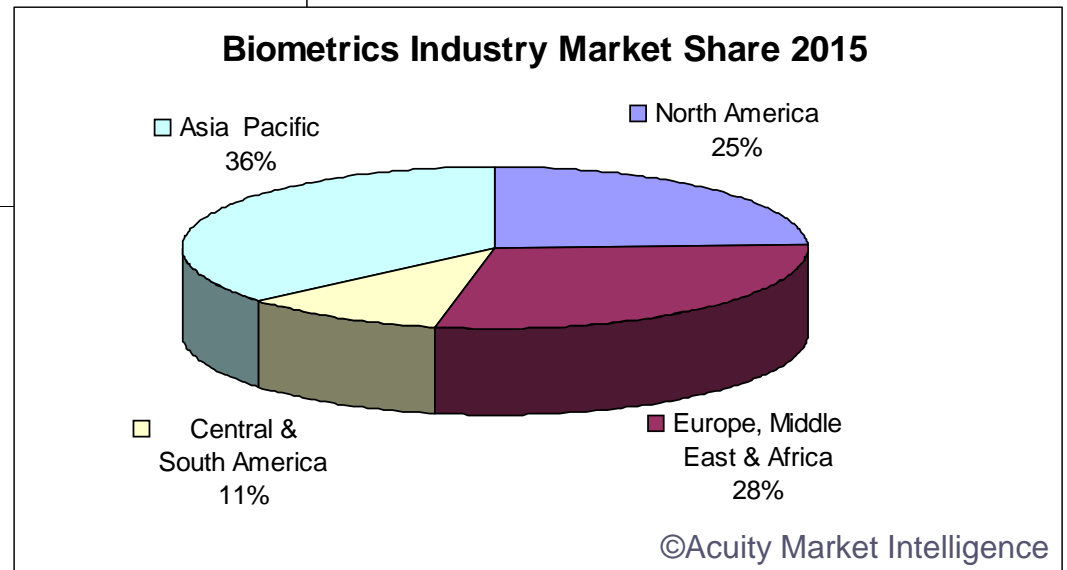
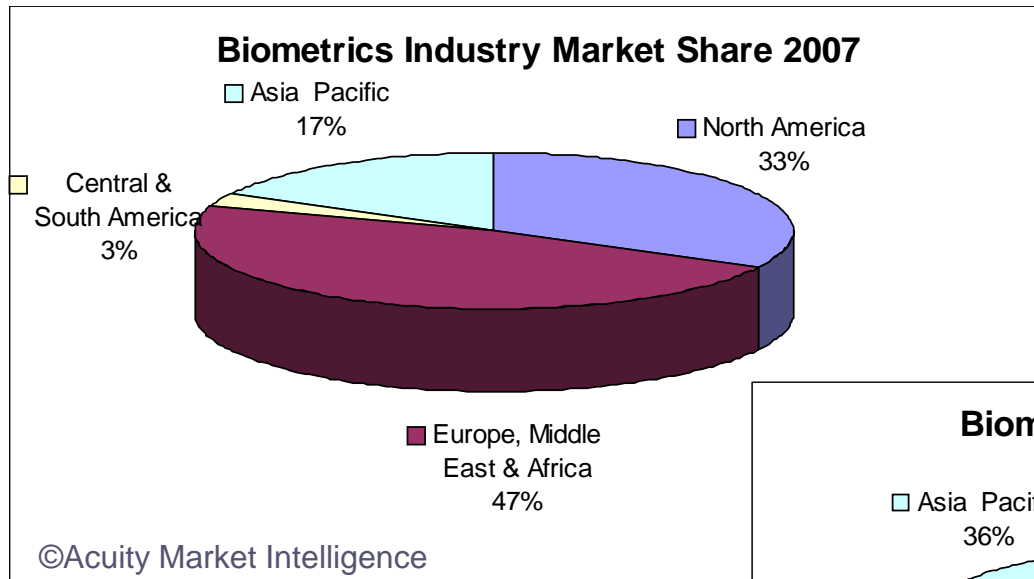
## Regional Revenues





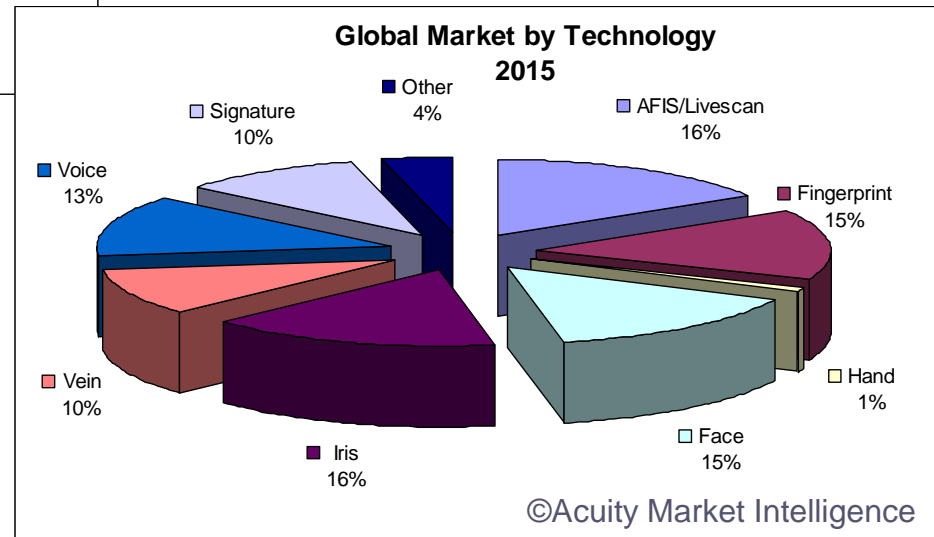
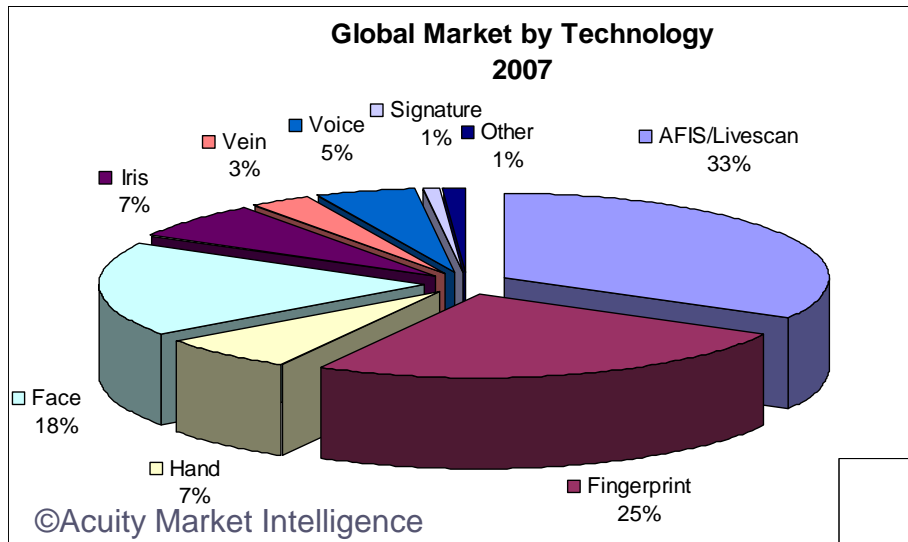
# Forecasts

## Regional Market Share



# Forecasts

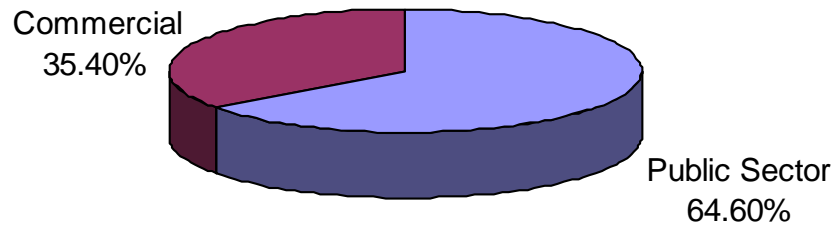
## Technology Market Share



# Forecasts

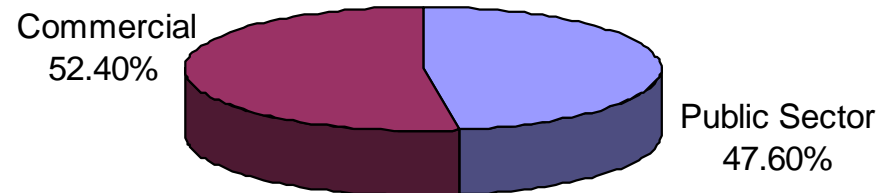
## Public Sector vs. Commercial Market Share

**Worldwide Market 2007**



©Acuity Market Intelligence

**Worldwide Market 2015**



©Acuity Market Intelligence

# Perspective

## The Future Defined

# Perspective

## Key Forecasts & Analysis Findings

### Forecasts

- Commercial revenues supersede Public Sector revenues in 2012 and represent more than 52% of the total global market for biometrics core technology by 2015
- Overall market dominance will shift from Europe (and the greater EMEA region) and the US (and the greater North America region) to Asia (and the greater Asia Pacific region). By 2014, the Asia Pacific Region generates greatest revenues
- Transactions ultimately provide majority of revenue. Information and financial transactions for Commercial applications by 2012 and eGovernment for Public Sector applications by 2015

### Findings

- Confluence of Mega Trend factors require authentication available only through biometrics
- Entry of market players with expertise from related problem solving in varied fields elevate technological capability and provide requisite knowledge for sustained industry growth
- Technological capabilities revolutionize ease of use, accuracy, performance
- Contactless, user acquiring biometrics will become a preferred method of authentication for two primary reasons
- Maturing business models evolve from product to service based offerings
- **Secure transaction capability defines genuine opportunity for large scale, wide spread deployment of biometric technologies**

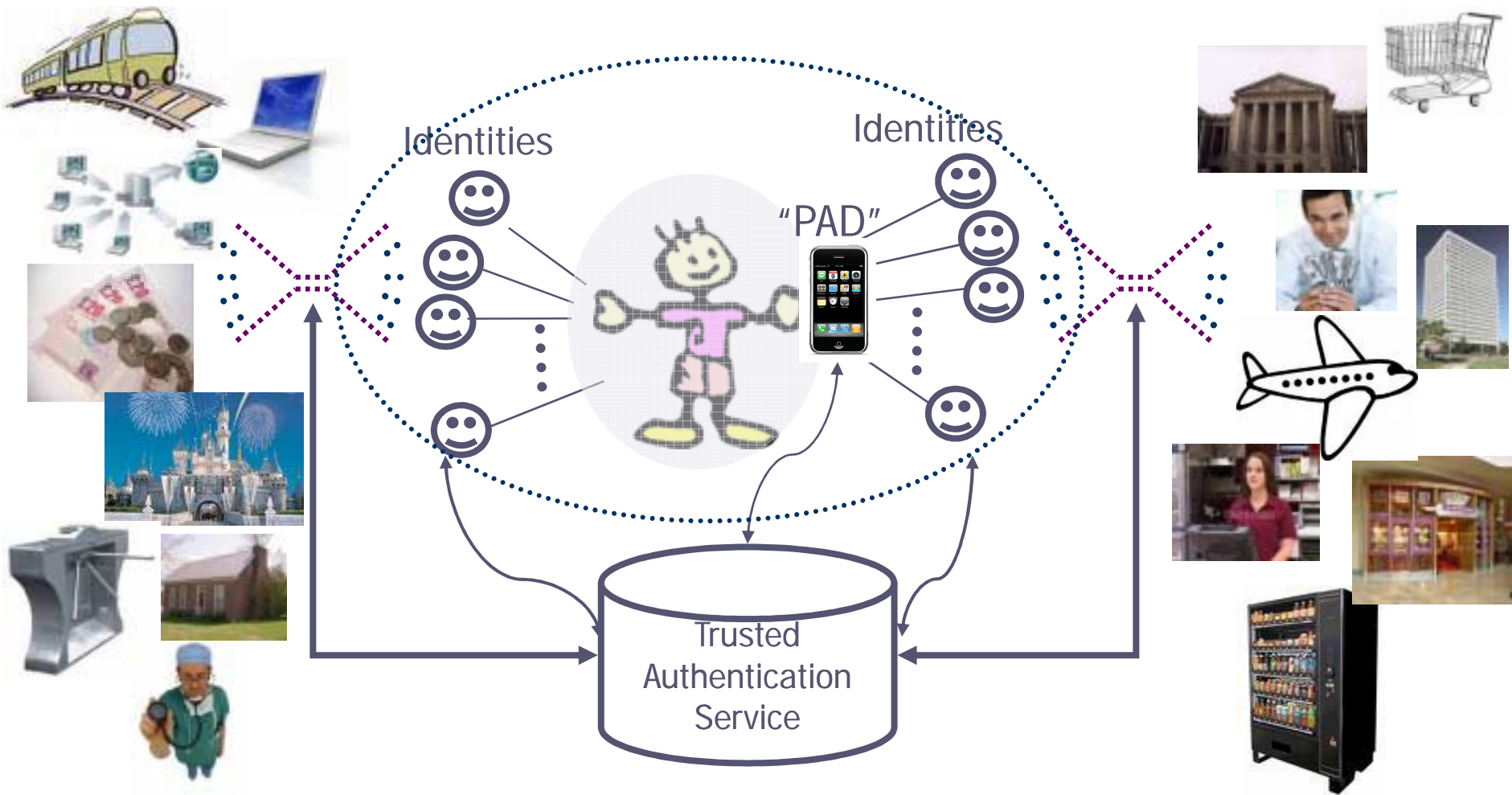
# The Future Defined

## Identity is Center

- ☞ Evolution of an identity centric IT foundation
  - *Protect the Data, NOT the Perimeter*
  - *Individual ownership of CONTEXT BASED Identities*
- ☞ Already begun and will increase dramatically through 2020
- ☞ Specific role of biometrics within this IT revolution driven by the Application Solution Meta Drivers which requires the development of a trusted authentication infrastructure based on the Technology Evolution Meta Drivers
- ☞ Creates dynamics that promote sustained, *not exponential*, growth of the biometrics marketplace through 2020.
- ☞ **Most significant, long term opportunities for biometrics revolve around problem solving at this level**

# The Future Defined

## Personal Identity Ownership





**ACUITY**  
MARKET INTELLIGENCE

c. maxine most, principal  
640 w linden st, louisville, CO 80027  
+1 303.449.1897  
cmaxmost@acuity-mi.com



For more information: [www.acuity-mi.com](http://www.acuity-mi.com)

*Now Available*

### **The Future of Biometrics**

#### **Market Analysis, Segmentation & Forecasts**

Insight into the Trends, Drivers & Opportunities that will Shape the Industry through 2020

### **The REPs Biometric Directory**

Industry's only online interactive resource guide

*Coming Soon*

The *NEW* State of The Biometrics Market

*Complementary Subscription*

