Presents

Biometrics Market Development: Mega Trends and Meta Drivers

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ACUITY MARKET INTELLIGENCE

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.

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

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Context

What's really driving the development of the Biometrics Marketplace?

"The market for biometrics technology is poised for sustained growth with global revenues approaching nearly $10 billion annually by 2015. This growth will be driven by broad *Mega Trends* impacting global IT development as well by solutions *Meta Drivers* within specific application areas. Mega and Meta influences lead to the inevitability of biometrics and create a context for understanding the likely evolution of the marketplace and the associated strategic opportunities."

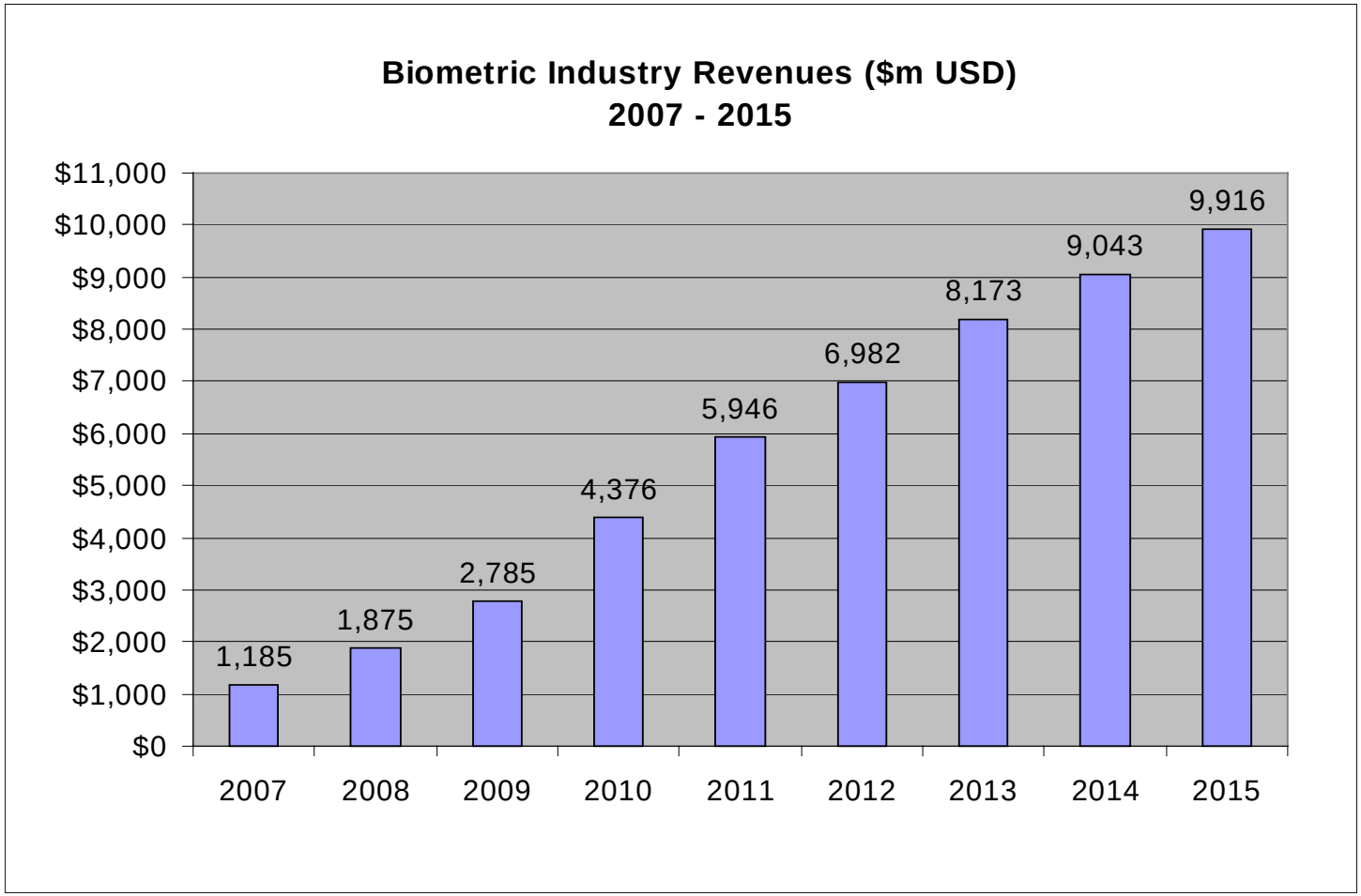
"The Future of Biometrics", Acuity Market Intelligence, April 2007

Today's Discussion

Market Growth	Global, Regional, Technology, Public Sector vs. Commercial
Definitions	Mega Trends & Meta Drivers
Mega Trends	7 Key Global IT Trends
Meta Drivers	Application Solutions Public Sector & Commercial Technology Evolution
Perspective	Driving the Future The *NEW* State of the Biometrics Market Moving Forward
The Bottom Line	*Reality Based* Analysis

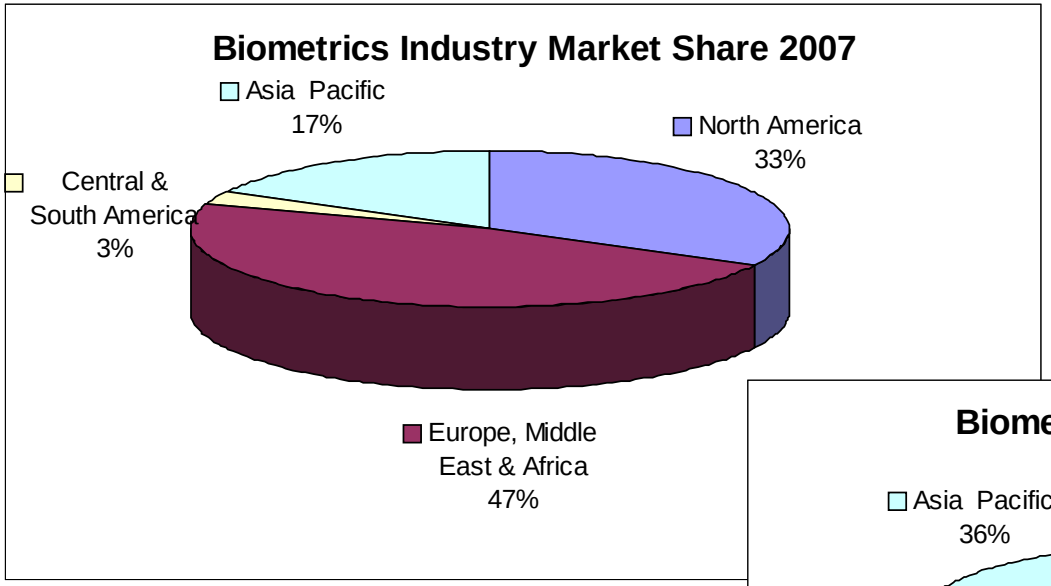
Market Growth

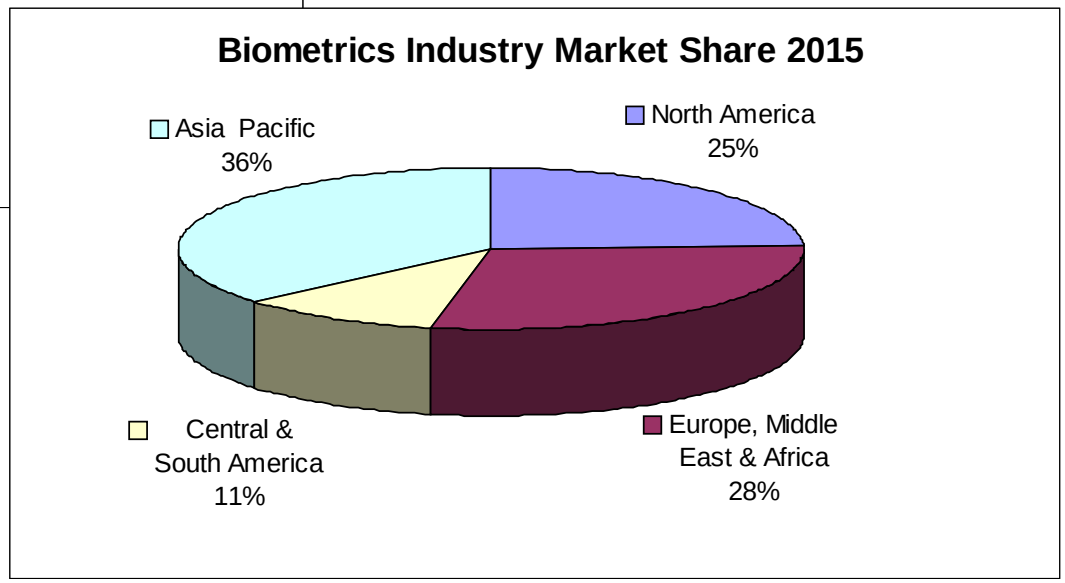
Global Revenues



Market Growth

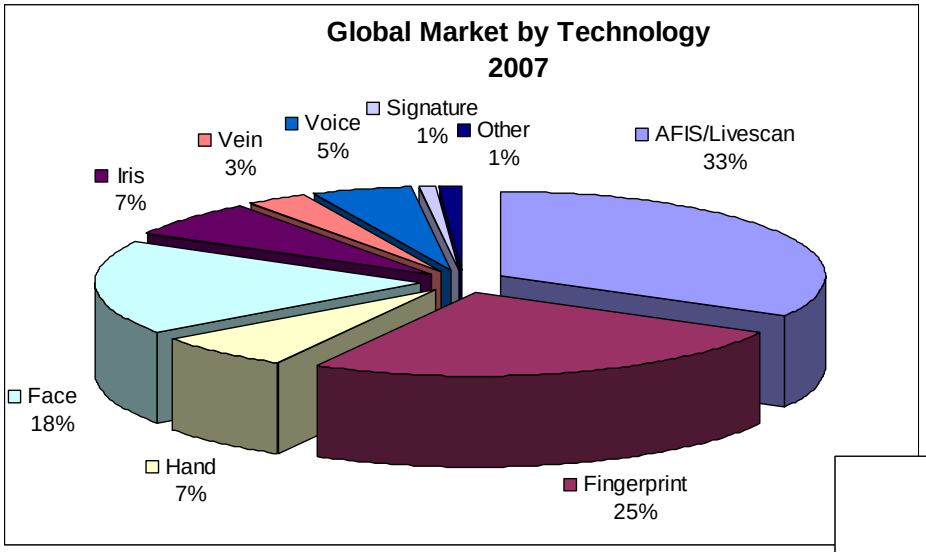
Regional Market Share

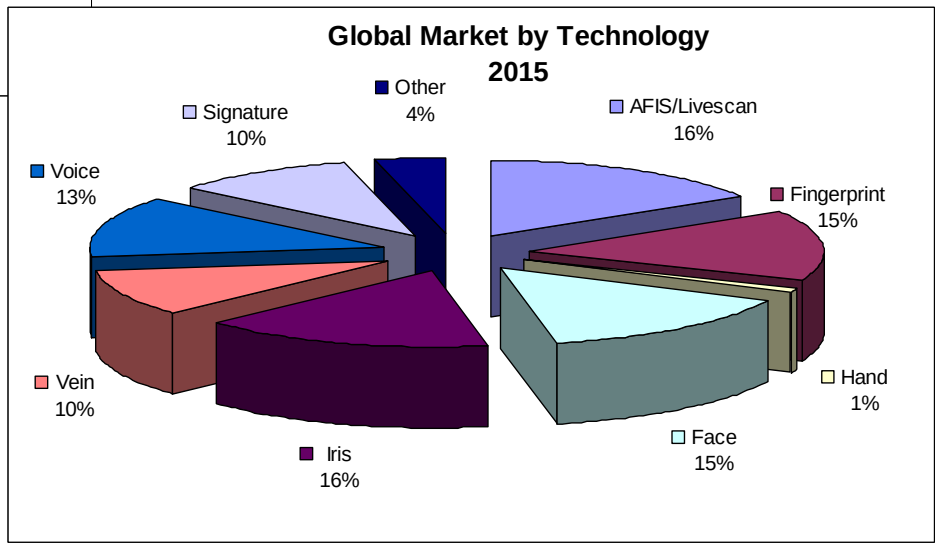




Market Growth

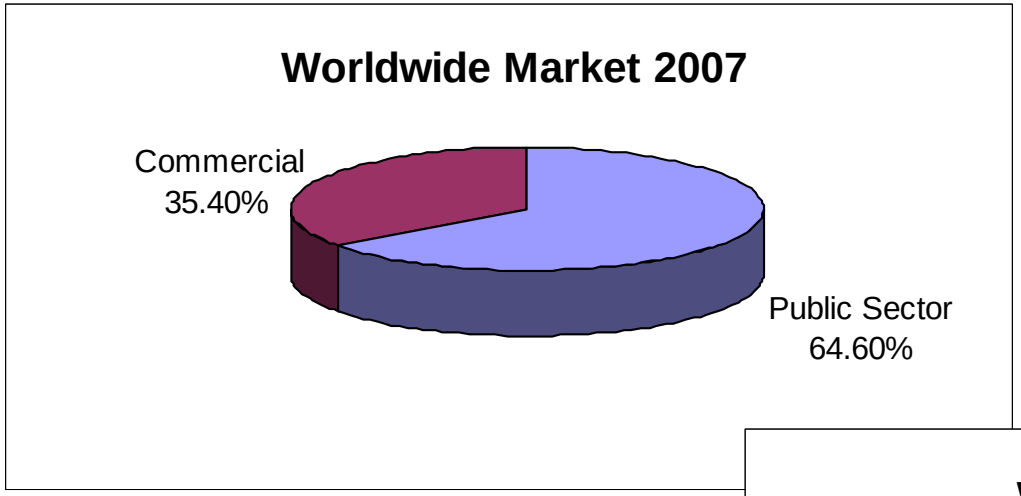
Technology Market Share

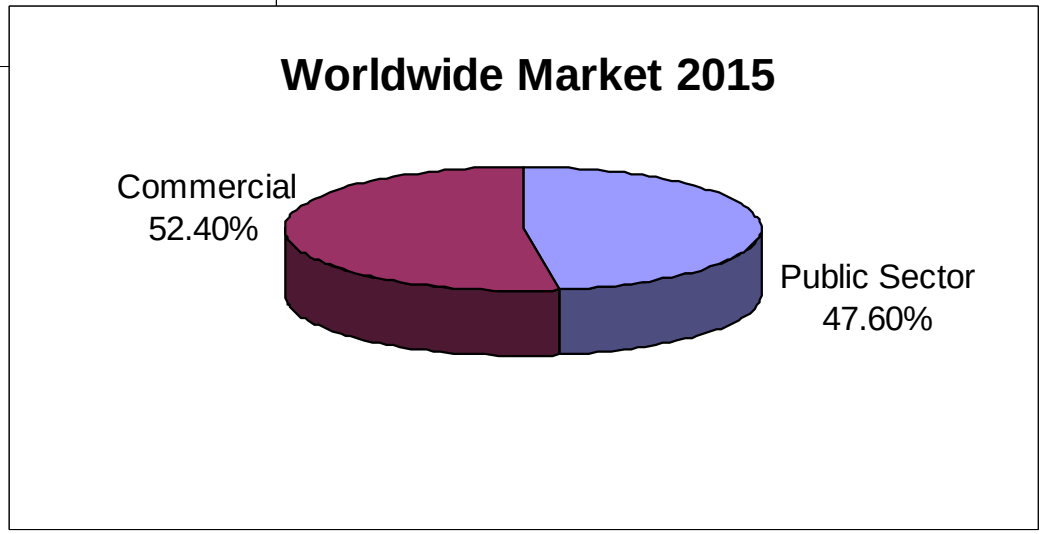




Market Growth

Public Sector vs. Commercial Market Share

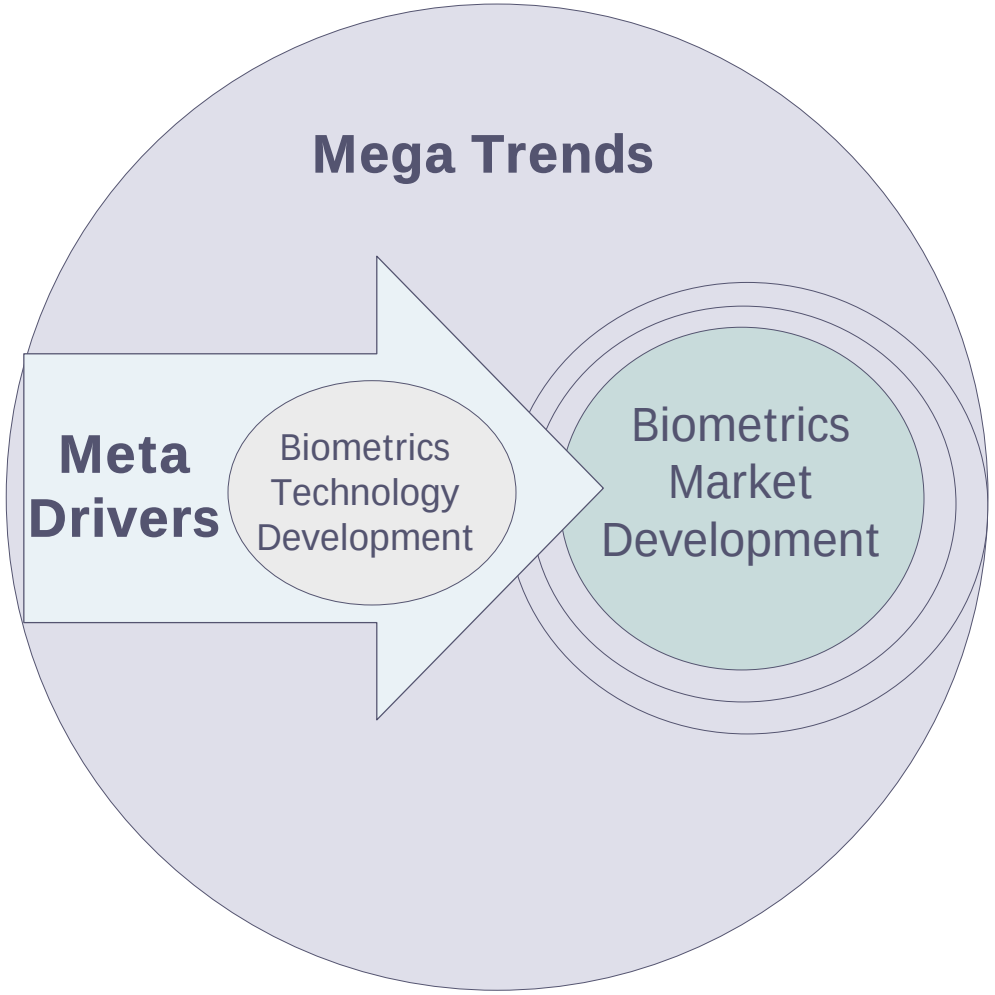




Definitions

Mega Trends & Meta Drivers

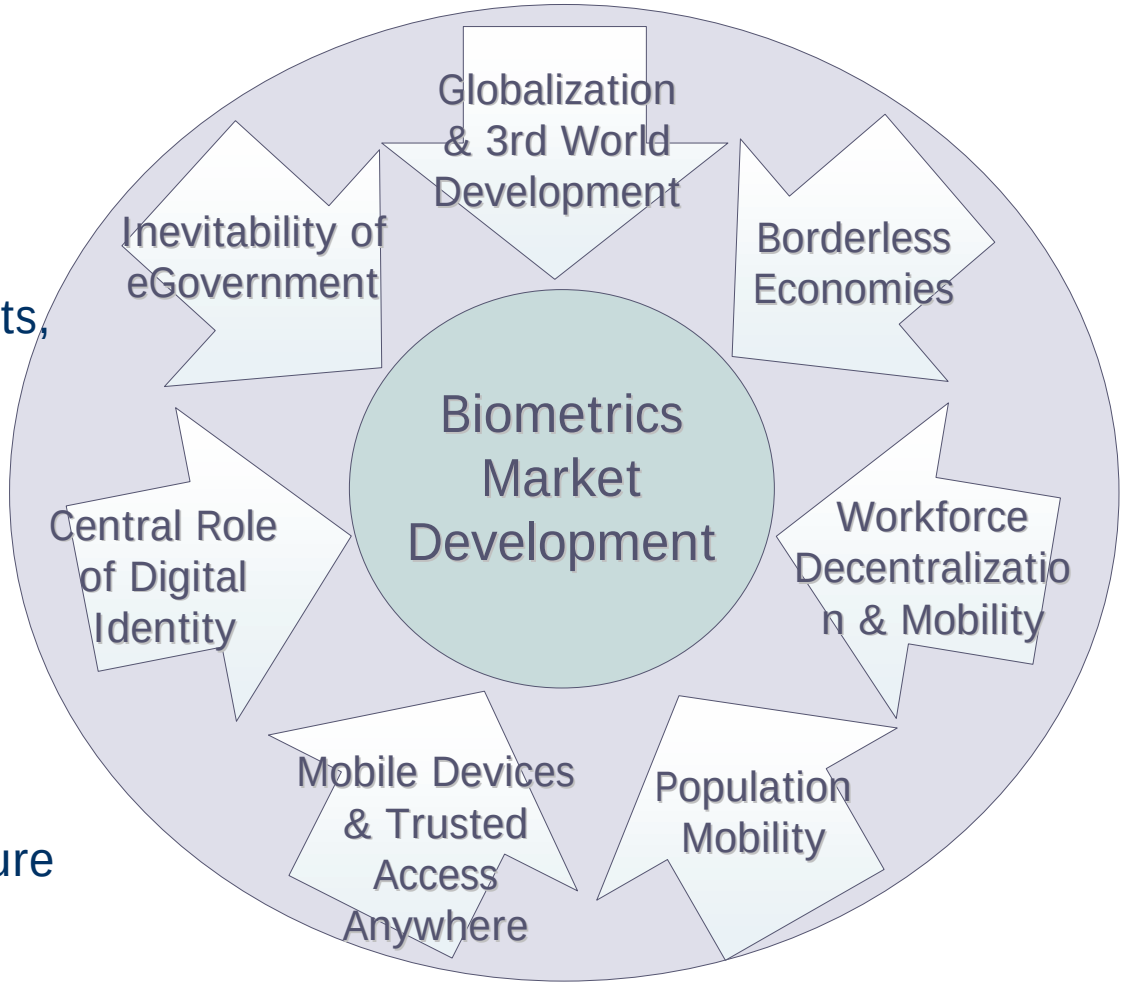
- Mega Trend
  - Mega: large, complex, imposing
  - Trend: general course or prevailing tendency
- Meta Driver
  - Meta - one level of description higher e.g. If X is some concept then meta-X is a process operating on X.
  - Driver - vigorous pressure or effort, maneuver, guide, or steer progress



Definitions

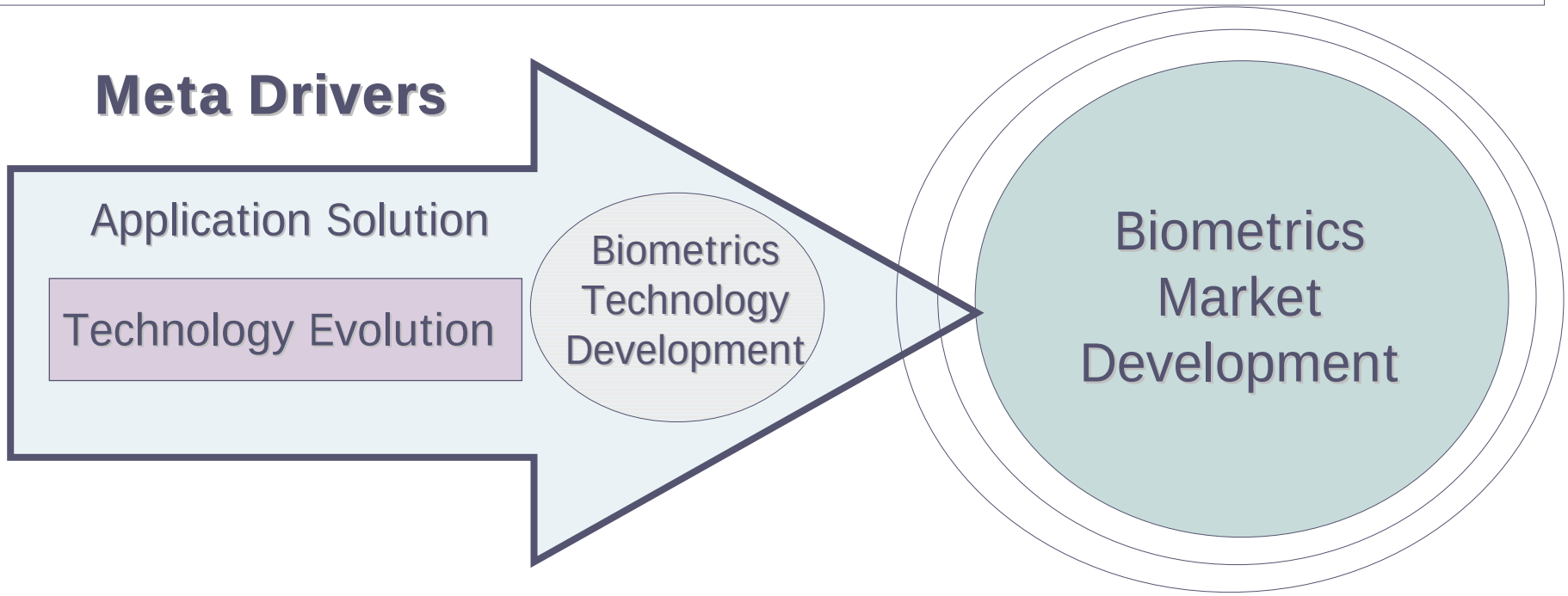
Mega Trends

- 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



Definitions

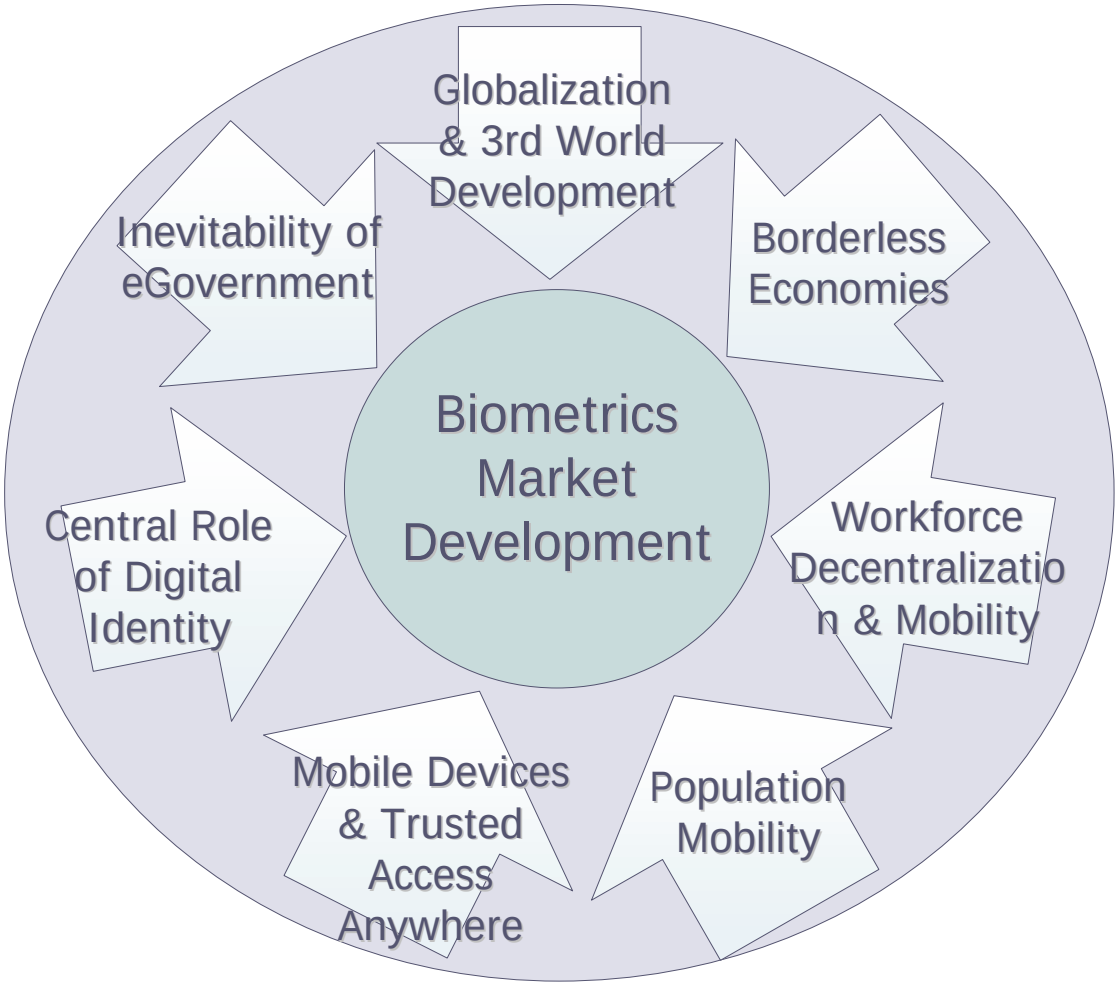
Meta Drivers



- Impact 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

Mega Trends

Seven Key ID Related Global IT Trends



Mega Trends

Seven Key ID Related Global IT Trends

Globalization & 3rd World Development

- Interconnected networks–human and technology–increase in complexity and capacity
- Evolving markets proceeding directly to info. based economies
- Increasing reliance on tech based processes that must be transparent and secure
- Security concept based on a bounded environment—physical or logical—must give way to a digital world controlled through the use of identity; requires stringent authorization and authentication

Mega Trends

Seven Key ID Related Global IT Trends

Borderless Economies

- Physical and Virtual - ports and borders and cyberspace
- Accelerated by near ubiquity of the Internet for personal, commercial and government use - e.g. instantaneous transaction access created unprecedented global financial community
- Expanding EU, NAFTA, CAFTA breaking down traditional physical and logical borders
- Ideal of global unencumbered movement of goods and services came to a halt post 9/11 – still only limited safeguard. Free flowing global 24/7 trade on direct collision course with security

Mega Trends

Seven Key ID Related Global IT Trends

- Closely related to Borderless Economies & Globalization - virtual and non-virtual infrastructures are integrally linked
- As organizations continually rely on remote and scattered human resources accurate, fast, reliable identification and authentication integral to successful commerce
- Location independent business links fate of commercial entities to the establishment of successful government civil ID programs

Workforce Decentralization & Mobility

Mega Trends

Seven Key ID Related Global IT Trends

- Driven by pursuit of economic advantage, human rights, freedom, displacement, refugee status
- Workforce Mobility is usually associated with 1st World pursuits, Population Mobility to 2nd and 3rd World forced dynamics - increasingly inaccurate as global market dynamics create more flexibility in virtual access and restrictions of physical access.
- Result of range of market influencers including off shoring, emergence of IT development enclaves & climate change impacting agriculture, industrial development and consumer behavior
- Border crossing will be more common and more scrutinized spawning sophisticated civil ID and border control mechanisms

Population Mobility

Mega Trends

Seven Key ID Related Global IT Trends

- Corollary of other Mega Trends as enabler and result of IT infrastructure supports changing global dynamics
- Driven by 1st World expectation to be utterly connected and ease 2nd & 3rd World implementation created billion unit business experiencing sustained growth
- Progression of mobile device as phone to personal access device for communication, information, and transactions
- Requires full service high-bandwidth wireless network, routine access for low impact and/or cost tasks free, high value capabilities subscription or transaction based

Mobile Devices & Trusted Access Anywhere

Mega Trends

Seven Key ID Related Global IT Trends

Central Role of Digital Identity

- Digital world populated with ID info that may or may not be accurate, legitimate or known to the subject of the information - personal, commercial, and public sector applications
- Orderly, functioning, secure and owner controlled system is inevitable. Requisite knowledge does not yet exist, but identity infrastructures will be taken for granted by 2020
- Inevitability of identity centric IT leads to the inevitability of biometric - uniquely bridges “human machine identity gap”
- Technical, policy, and process concerns associated with transformation to identity-centric IT infrastructures further complicated by biometrics: data ownership, control, and management raise unprecedented levels of concern
- Appropriate protections embedded in technology and systems that preserve anonymity to the extent possible for any given interaction.

Mega Trends

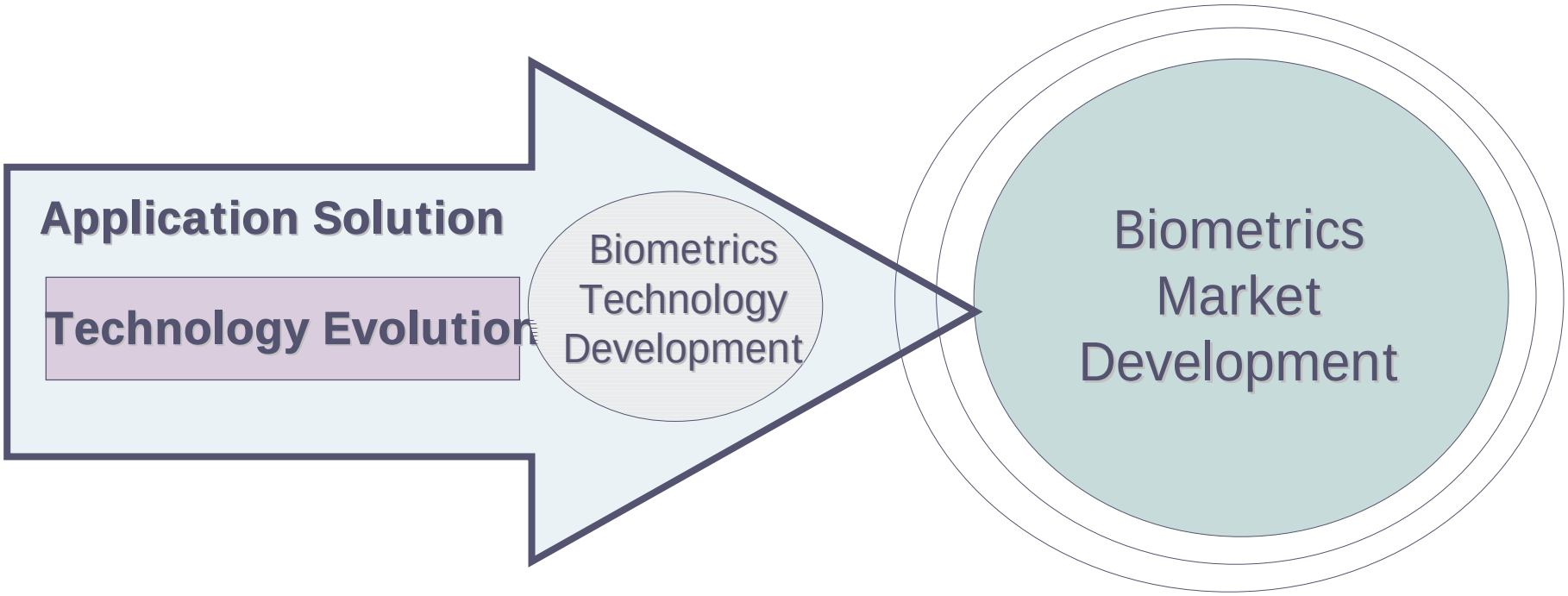
Seven Key ID Related Global IT Trends

Inevitability of eGovernment

- High cost of maintaining manual and semi-automated legacy systems
- Extensive technology based access and service required to maintain/improve service levels
- Widespread Internet access provides citizen interface when accompanied by targeted government investment
- Even where labor costs are low, inefficiencies and potential for abuse
- Long-term savings outweigh short-term investment
- Citizens are beginning to demand the level of automation and convenience they are experiencing in commercial sector interaction with the government
- Increased concern about the privacy and security of personal information held by the government.
- Commercial entities have vested interest in streamlining government interaction to improve operational efficiencies
- Automated high transaction volume eGoverment infrastructure requires sophisticated identification and authentication capabilities

Meta Drivers

Meta Drivers



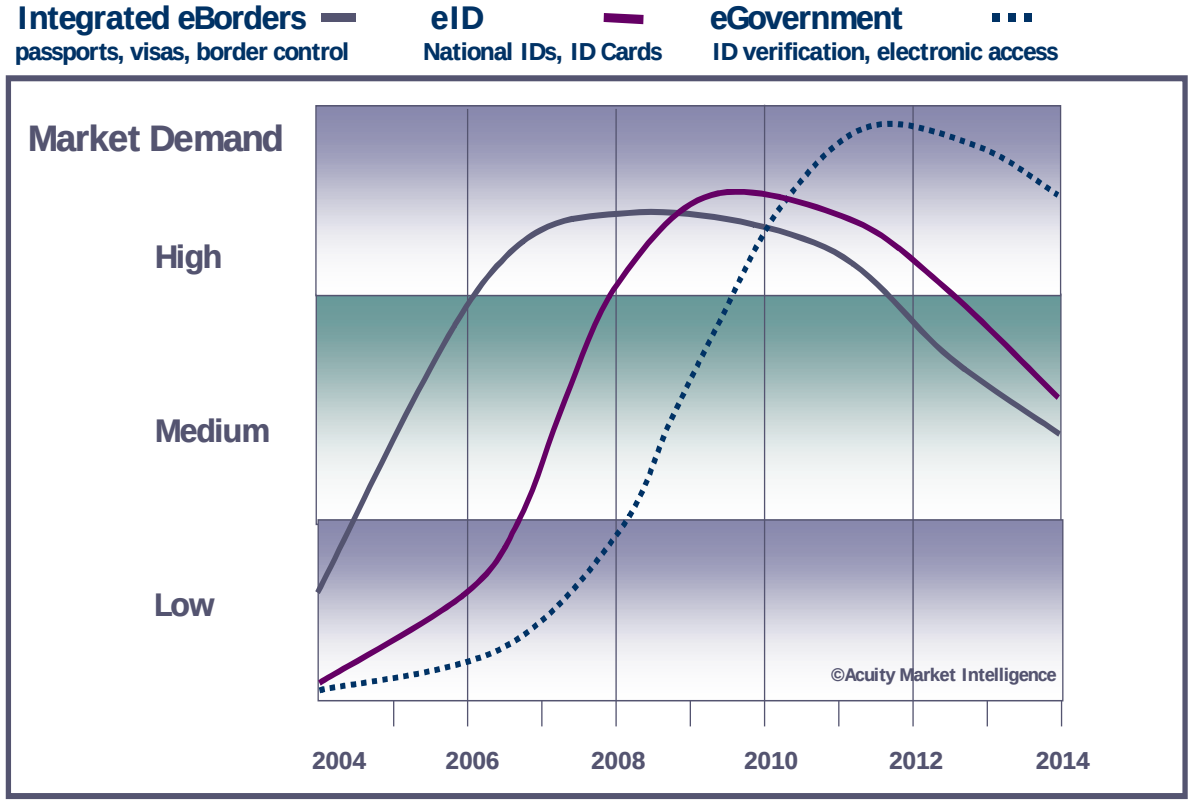
Meta Drivers

Application Solution & Technology Evolution

- Market demand drivers that define conceptual framework for identifying most lucrative market opportunities
- 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

Application Solution Meta Drivers

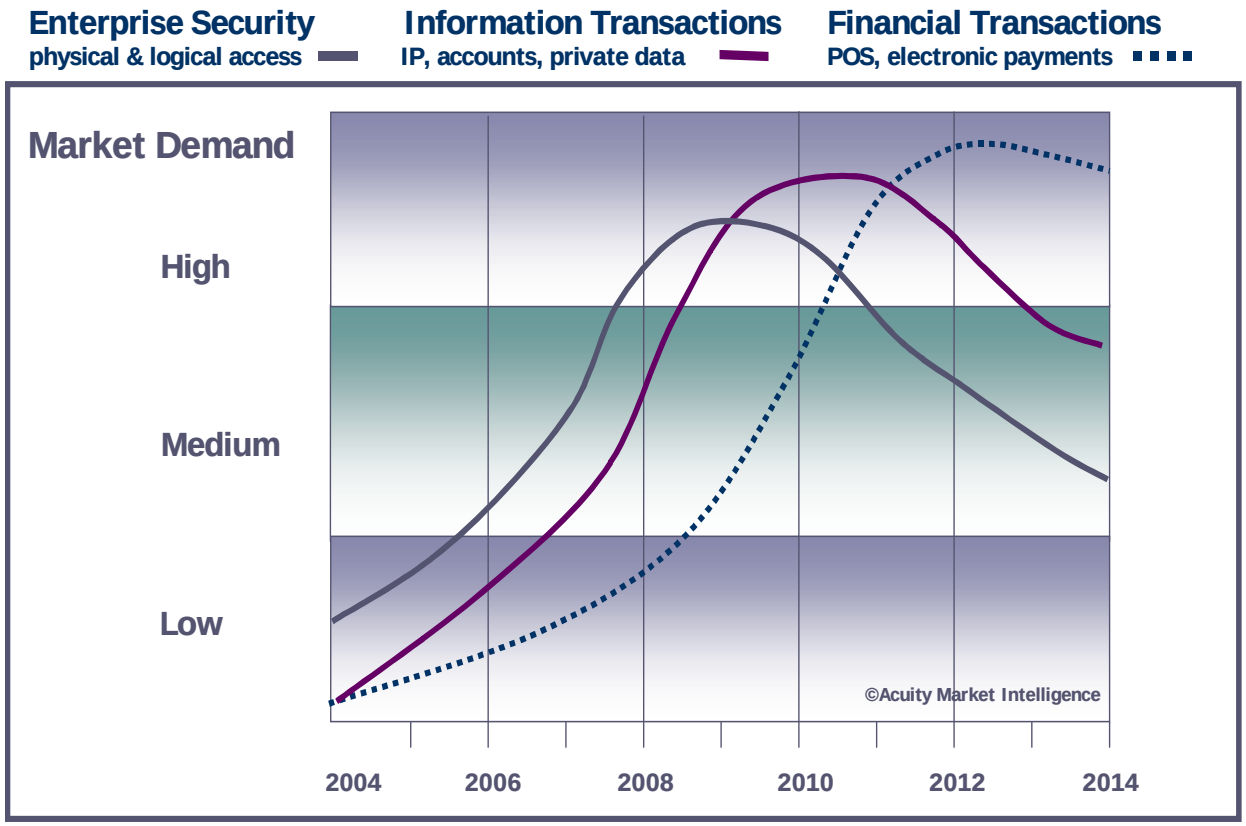
Public Sector Demand Curves



Meta Drivers integrally linked by sequential dependence - solutions progress from targeted groups of participants to broader based groups to citizen wide applications

Application Solution Meta Drivers

Commercial Demand Curves



Evolution from enterprise physical and logical access to biometrically enabled information transactions and ultimately by a global biometric authentication infrastructure that secures financial transactions.

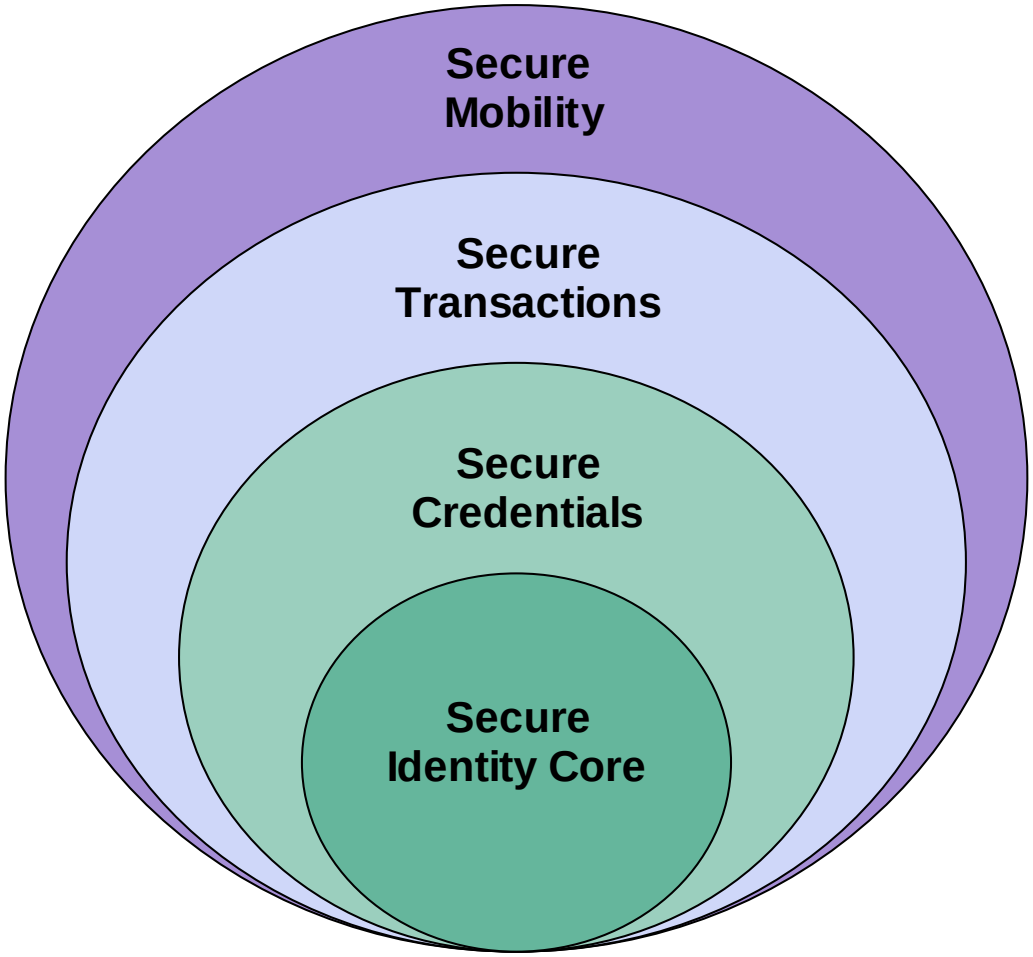
Meta Drivers

Technology Evolution

- Foundational capabilities must be developed to adequately address the requirements of the Application Solution Meta Drivers
  - Secure Identity Core
  - Secure Credentials
  - Secure Transactions
  - Secure Mobility
- Essential components of larger framework enables 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

Technology Evolution Meta Drivers

Components



Technology Evolution Meta Drivers

Components

Secure Identity Core

- Safe house for *digital identity* - conceptual model rather than a physical construct reflecting how identity data ought to be handled
- Developing identity core is a complex and multidimensional problem involving many facets of IT
- Biometrics related issues include
  - Preventing raw image data from being network accessible
  - Distributed storage of various biometrics — image and templates
  - Separation of biometric from other personal details
  - Secure transmission of local authentication for networked applications and secure transmission of centralized authentication for local applications
  - Standards that allow proprietary devices and algorithms to interoperate

Technology Evolution Meta Drivers

Components

Secure Credentials

- Physical and virtual, facilitate the link between an established identity, claimed identity, and individual
- Even in cases where biometrics are not required to confirm the credential holder's identity to complete a given task, biometrics are essential to maintaining the chain of trust throughout the credential issuance process

Technology Evolution Meta Drivers

Components

Secure Transactions

- Bind individuals to actions such as information inquiries or payments
- Dynamic risk analysis determines appropriate level of required authentication including use of biometrics—which modality, multiple, none, etc.
- Level of transaction security varies greatly with the sensitivity and/or value of the specific action and particular circumstances - Is the individual present? Is the transaction routine? Is there an established relationship with the entities involved?
- Near instantaneous within a network capable of securely, anonymously, privately, and seamlessly conducting information, financial, and eGovernment transactions

Technology Evolution Meta Drivers

Components

Secure Mobility

- Result of other three Technology Evolution Meta Driver capabilities allows individuals to move freely virtually and physically
- Vast interoperable environment where various credentials and established identities used to gain virtual or physical access
- Integrate disparate systems relying on only as much data as is minimally necessary to perform a specific task
- “Seamless” experience requires protecting sensitive data while appropriately sharing it in some universal and standard way
  - Defining standards for equivalent credentials: passports, DL, travel cards,
  - Determining what constitutes authentication within a given context: access to travel plans, expedited access through airports, financial transactions
  - Dynamic risk evaluation, adjust requirements appropriately

Perspective

Driving the Future

- Mega Trends demand evolution of an identity centric IT foundation
  Protect the Data not the Perimeter
  - 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**
- As with all emerging technology markets, the more successful and mainstream the technology is, the less of a focal point it becomes
- Make the transition from limited closed loop solutions to enabler of a fully interactive, transaction based, global authentication network.
  - Incremental and iterative process where knowledge is acquired in nonlinear phases and learnings from each phase lay the groundwork for subsequent phases

Perspective

The *NEW* State of the Biometrics Market

- Biometrics market not following typical path of disruptive technology adoption
  - Biometrics have been considered a disruptive innovation on the verge of breakthrough for an extended period of time
  - Post 9/11 security concerns created an expectation of rapid market acceleration that never materialized
  - Breakthrough has not happened for several reasons.
    - Industry focus on incremental technology performance improvements while technology has not delivered on its promise in terms of capabilities
    - Solutions context has not been developed to leverage the capabilities that have been available
- Created new market dynamics
  - ***"Market Making" window passed; Market has been externally defined***
  - Biometrics as a class of disruptive or discontinuous technology has not moved completely through its revolutionary market development cycle and yet is now undergoing significant evolutionary or continuous innovation

Perspective

Moving Forward

- Clear solution development momentum BUT market growth will be linear not the exponential growth most readily associated with disruptive innovation
- Biometrics adoption will mimic the growth curve of ATMS, which achieved nearly 70% adoption through linear growth over 20 years NOT typical "hockey stick" growth curve of innovations such as mobile phones or the Internet
- Provide evolution that delivers on the promise of biometrics by providing working solutions to real problems - *Biometrics that actually work*
- Simultaneously manage progress towards expansion into large looming opportunities while rigorously, systematically addressing immediate market needs - ***Establish the near-term market penetration platform from which large-scale market development efforts can be launched***

The Bottom Line

Reality Based Analysis

- **The Fantasy:** The longed for single, monumental event that will propel biometrics to the forefront of advanced technology development is a pipedream

- **The Reality:** All constituents must make the transition from *survival-mode* based operations to long-term strategic thinking that addresses fundamental issues associated with the development of identity-centric IT

- **The Challenge:** Develop a strategic framework to assess and prioritize short-term opportunities/requirements within the context of building a highly leveragable strategy that focuses on the long-term capabilities/demands of biometrically enabled IT. ***This requires vision, commitment, and strategic flexibility.***

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