The European National eID Industry Report

Market Analysis and Forecasts 2016 – 2021

Comprehensive Market Data - Critical Insight - Targeted Revenue Forecasts

Acuity Market Intelligence
July 2017

About Acuity Market Intelligence

Acuity Market Intelligence is an emerging technology strategy and research consultancy with a proven record of accurately anticipating biometric and electronic identity (eID) market trends. Founded in 2001 to bring strategic market development expertise to the nascent biometrics market, Acuity consistently provides original, thought-provoking, accurate, and reliable biometric and eID industry insight and analysis. Acuity's data-driven approach provides Clients with critical market intelligence that supports the creation and implementation of market development strategies that produce quantifiable results.

Market Development Expertise

Acuity Market Intelligence provides biometrics and eID data driven market analysis grounded in a thorough understanding of technology concepts and processes. As the electronic identity revolution unfolds, Acuity will continue to help vendors, integrators, investors, policy makers, and commercial executives clarify the context and quantify the data that is required to understand this rapidly evolving eID marketplace.

Acuity's expertise is applied in five key areas:

- **Market Analysis** – Identification and evaluation of key technological developments, market trends, industry players, and deployment effectiveness.
- **Opportunity Analysis** – Vertical market segmentation and identification, prioritization, and sizing of the most lucrative opportunities for a given product, service, or solution.
- **Solutions Analysis** – Requirements and functional specifications
- **Due Diligence** – Evaluation of market players to ensure:
    - Opportunities have been adequately and accurately assessed.
    - Financial, operational, and strategic plans are in place to create sustainable market viability.
    - Product and service quality can be demonstrated.
- **Strategic Planning** – Creation of highly leveragable plans to develop, evaluate, and deploy emerging technology-based solutions with the objective of achieving the highest level of customer satisfaction and sustained market dominance.

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- **Executive Briefings/Strategy Sessions** – Interactive sessions provide targeted insight to Executives.
- **Segment Tracking** – On-going coverage of technologies, players, and market drivers and dynamics of a specific industry sector or technology marketplace.
- **Report**s – Targeted analyses focused on a range of topics including: technology evolution, application development, vertical market adoption, opportunity, and competitive analyses.
- **Research** – Standard and custom research projects designed to address specific knowledge gaps.
- **Consulting** – Custom projects designed to support specific Client objectives.

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Report Overview

Scope: This report presents unique insight into the European opportunity for the development and deployment of electronic National ID documents (National eID). The current state of market is evaluated based on extensive data and statistics, and proprietary analysis tools, providing a comprehensive view of the marketplace.

OBJECTIVE: Provide the basis for short-term, mid-range, and long-term strategic planning for technology and solution development, market investment, and phased adoption of National eIDs.

AUDIENCE: Individuals responsible for strategic planning, business and market development, investments, and sales related to National eID initiatives including vendors, integrators, investors, consultants, solution providers, and public sector staff responsible for evaluating, developing and implementing National eID programs.

METHODOLOGY: Data is drawn from market and technical developments, tests, pilots and deployments, public domain and private data sources, research and reports, surveys, and interviews with vendors, integrators, intermediaries, customers, privacy and civil liberties advocates, and other relevant technology and leading industry experts. Forecasts are derived from modeling market opportunities based on public domain and proprietary primary data and secondary data sources and are flexibly structured to account for known and predictive factors. Primary data determines known model data. These include data points like population, annual National IDs issued, and program costs. Models are adjusted to account for market conditions, current deployments, anticipated projects, and existing and planned infrastructure. Conservative assumptions for predictive factors such as technology pricing and anticipated adoption rates are introduced to determine forecasts.

KEY CONCLUSION: By 2021, 36 European countries will be issuing 79 million National eIDs and another 4 million Traditional NIDs with biometrics annually. Approximately 520 million people, roughly 60% pf the European population, will have a National eID card generating more than $2 billion in annual revenues for chip and card manufacturers, biometrics companies, ID solution specialists, and Systems Integrators. However, in the absence of universal mandates, no single model has emerged and the National eID landscape remains a complex and highly varied ecosystem reflecting the cultural, operational, and programmatic diversity of sovereign nations. The success of any individual National eID program is judged by the degree to which it is adopted, utilized, and truly embraced within the context of country specific objectives -- which may be as basic ensuring fraud free elections, or as complex as delivering multi-application, transactional National eID-enabled programs and services. European success, however, may ultimately be judged by how well integrated regional programs become and how easily National eIDs can be used across borders within the region.

AUTHOR: C. Maxine Most, Principal, Acuity Market Intelligence

Preface

Welcome to *The European National eID Industry Report!*

This report is based on 36 European countries that have or will be implementing National eID programs by the end of 2021. It provides analysis and forecasts for annual unit volumes, revenues, and associated technology and solutions level projections for National eID programs each of these 36 countries.

The European National eID Industry Report is one of four regionally focused National eID Industry reports that provides country-level analysis and forecasts as a complement to **The Global National eID Industry Report** which provides a global view and regional level analysis of the marketplace. The other three regional reports focus on Africa and the Middle East, Asia-Pacific, and The Americas. These smaller, targeted reports are being offered in response to market demand for more flexible, economical research options.

Those of you who purchased the 2011 or 2014 edition of *The Global National eID Industry Report* -- which included country level analysis for all regions, including Europe -- will see updates, revisions, additions, and programs that were projected to have been deployed that never materialized.

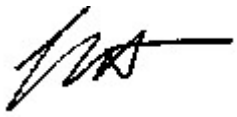
If you want access to country level program detail for all regions, but do not want to purchase all four regional reports, consider purchasing **The Global *National eID* Program Update** to accompany this report. The update is presented in spreadsheet format and provides details on annual units, revenues and circulation numbers, as well as program start dates, biometrics used, validity periods and age requirements for each of the 136 countries covered in all the regional reports.

Alternatively, If you purchase all four regional reports, you will receive **The Global National eID Industry Report** *and* **The Global *National eID* Program Update** at no additional cost.

The projections contained in this report are based on the best data available at the time the data was collected and, as is always the case with a research project of this magnitude -- especially in a highly dynamic marketplace, this means information can be a bit of a moving target. Therefore, while updated information was integrated as it became available -- the report must be viewed as a snapshot in time. It is therefore best used as a foundation reference to which your individual expertise, insight, and proprietary data can be applied.

Despite these challenges, efforts were made to be both as comprehensive and accurate as possible. Even so, the report may contain oversights, mistakes, spreadsheet errors, and perhaps even confusing or misleading data. As always, please contact me directly with questions, concerns, comments, or criticisms. I welcome your feedback, as it is a critical part of the process of continuing to improve Acuity's research process and finished reports.

Cheers,



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Introduction

The European National eID Industry Report is a data driven analysis of the state of the market for electronic National identity documents. The report relies extensively on primary sourced data (which for the purposes of this report is defined as quantitative data obtained from sources directly tabulating or producing this data), and on secondary sourced data from trusted sources. The report leverages model-derived forecasts to present a comprehensive view of the market. Data acquired, modeled, and forecast includes National ID and eID card volumes, revenues associated with National eID programs, biometric enrollment and matching units and revenues, card reader units and revenues, as well as well as key solution components of projected National eID programs.

Definitions and Terminology

For the purposes of this analysis, the following definitions apply:

Traditional National ID (NID): A paper or card based identity document holding at minimum a citizen's biographic data according to the requirements of a particular country. The "non-chip based" identity document may hold biometric data such as the holder's photograph or one or more fingerprints; it may incorporate one or multiple security features to prevent forgeries, as well as automated verification tools such as a barcode or Machine Readable Zone.

National eID (NeID): The initial definition of an NeID was a card-based identity document with an embedded microprocessor chip – e.g. "chip based" card, to facilitate the cardholder's electronic identification and authentication in addition to the visual identification typical of traditional National IDs.

However, given the critical role of biometrics in determining unique identity and that many global National ID programs rely on biometrics and not on chip-based cards, the

definition of NeIDs is expanded in this report. The following are included in the expanded definition of NeID in the context of this report:

- Biometric Registries only as in India's Unique Identification Program (UID) (though India now seems committed to adding a National eID card as well).
- Non chip-based cards – laminated paper or in most cases polycarbonate – that are issued based on a biometric registry and/or store/display biometrics on the card via 2D barcodes or other non-chip based storage media.
- Optical storage cards with or without biometrics.

Therefore, National eID Programs adhere to the following categorization:

1. Category 1: Chip or Optical storage based National ID card with or without biometrics.
2. Category 2: A Traditional or non-chip based ID card leveraging biometrics to ensure each cardholder is uniquely identified.
3. Category 3: A biometric based centralized registry that issues a unique identity number for the enrolled population.

This has significant implications for Adoption and Revenue Forecasts that can be somewhat confusing. Any country that is categorized as having one of the three types of eID program will be counted in the country adoption forecasts as an eID issuing country. However, if this country has a Category 2 NeID Program, the cards themselves will be counted as part of the Traditional NID card volumes. The rationale behind this methodology is to recognize the varied nature of NeID programs, while keeping accurate count of the chip and non-chip based cards issued.

Throughout the analysis, the terms Traditional National ID, National ID, and NID are used interchangeably to mean a card based National ID that does not have chip or optical media storage. The terms National eID and NeID refer to National ID cards that

have chip-based or optical storage media referenced above as a Category 1 National eID Program.

Methodology

A combination of primary sourced data and model based projected data was used to develop the forecasts and analysis included in this report. Primary data acquired directly through government agencies and well-credentialed non-governmental agencies was presumed valid. Data acquired through sources with less qualified credentials or with strong motivation for particular outcomes was validated through additional sources and/or model based alternatives. All data was minimally based from independent sources to ensure acquisition of the best available date.

Data and Data Acquisition

Primary data used to complete the analysis and develop forecasts for this report includes annual National ID (Traditional and eID) unit volumes, population levels and growth, domestic enrollment centers, existing technology pilots and deployments, budgetary allocations and reported costs for relevant programs, and units and value of deployed technology. *Only countries with populations above 100,000 were included in the report.*

Primary data was obtained directly from government agencies such as Ministries of Interior, Defense, Immigration, Population Registry, Finance, and Justice. Additional data was sourced from non-governmental agencies tasked with providing domestic and global insight into population statistics and government expenditures. Source materials include online data and databases, published statistics, policy papers, budgets, program analyses, public statements, press releases, and direct consultation.

Finally, data was obtained through publicly available information from, statements by, and direct consultation with civil servants, consultants, vendors, integrators, analysts, and other third parties directly involved or with direct knowledge of specific relevant

programs and deployments. In some cases, these third parties provided confirmation of the accuracy of data obtained from sources deemed to require validation.

Model Development

Models were developed to project specific data for countries where primary data was unavailable from government or reliable non-government sources. The modeled projections use known data such as population levels and growth, deployment practices, and attrition as a basis for determining unknown values. Available statistics and those from similar countries or regions where primary data is available are used as reference points.

These projections are adjusted to account for regional indicators and variations such as political and social stability, levels of development, financial performance and stability, as well as other country or region specific indicators or influencers. Models are also adjusted to account for existing market conditions, current deployments, anticipated projects, and existing and planned infrastructure. Conservative assumptions for predictive factors such as technology pricing and anticipated adoption rates are introduced to determine forecasts.

Market Analysis

Analysis is drawn from significant market and technical developments, tests, pilots and deployments, public domain and private data sources, research and reports, surveys, and interviews with vendors, integrators, intermediaries, customers, privacy and civil liberties advocates, and other relevant technology and leading industry experts. Critical data and key implications drawn from the primary data and forecasts are filtered through this knowledge base.

Forecasts

Adoption and revenue forecasts are presented globally, regionally, by country, and by solutions components and technologies. The forecasts have been developed through a

rigorous process relying on the best available and or projected data. ***As with all market forecasts, the most significant indicator is the scale of the projections not the precise numbers***. Furthermore, where assumptions were required to calculate forecasts, the underlying principal was to rely on conservative rather than aggressive estimates. In this way, ***the report offers a conservative market forecast baseline indicating the scale of opportunity expected over the next five years***.

Because of the complex nature of the National eID market and the associated complexity involved in modeling data and forecasting revenues, ***it is critical that the methodology, assumptions, and model notes in the Appendix be reviewed to gain relevant insight form the data***. Additional information is provided in the report in specific sections to reinforce the underlying assumptions where deemed necessary.

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1. Executive Summary

The notion of a "market" for National IDs is somewhat misleading. The opportunity for developing and deploying National IDs is more of a collection of closely related markets that share core technologies and evolving standards. These programs are often perceived as being integrally connected to a sovereign state's concept and sense of "national identity". As such, National ID or eID programs reflect the unique needs, environmental factors, and cultural imperatives of individual nations and, sometimes, the regions where they are located.

Unlike similar markets that operate on a global scale, such as ePassports, which have developed in response to very specific imposed requirements and constraints, National ID programs are driven and defined by internal factors, not international mandates. So, while international initiatives, emerging best practices, and standards influence their development, National ID programs and the countries that implement them are not bound by outside authorities or influences. National IDs are as varied as the countries that implement them.

This market context makes distilling meaningful market development patterns and extrapolating unifying market development trends a challenge. Despite this challenging market context, a number of indicators do emerge that help quantify and clarify the European marketplace. These indicators provide insight into how this market will evolve and where the opportunities for enhancement, advancement, evolution, and even revolution are most likely to be found.

1.1. The European Market

Europe is the undisputed leader when it comes to the vision to create seamless cross border e-government and e-commerce services. Trusted, interoperable National eID credentials are a critical element of the successful implementation of this vision

Europe will generate over $14 Billion in National eID revenue during the forecast period representing 25.8% of the total global market. On an annual basis, European revenue share falls from nearly 34% in 2016 down to just 23% in 2021. This reflects Europe's significant drop in overall global volume share of NeIDs from nearly 23% in 2016 to just 14.6% by 2021. The drop is due to completions of initial enrollment and card distribution efforts for new European as well as he aforementioned market magnitude and growth in Asia.

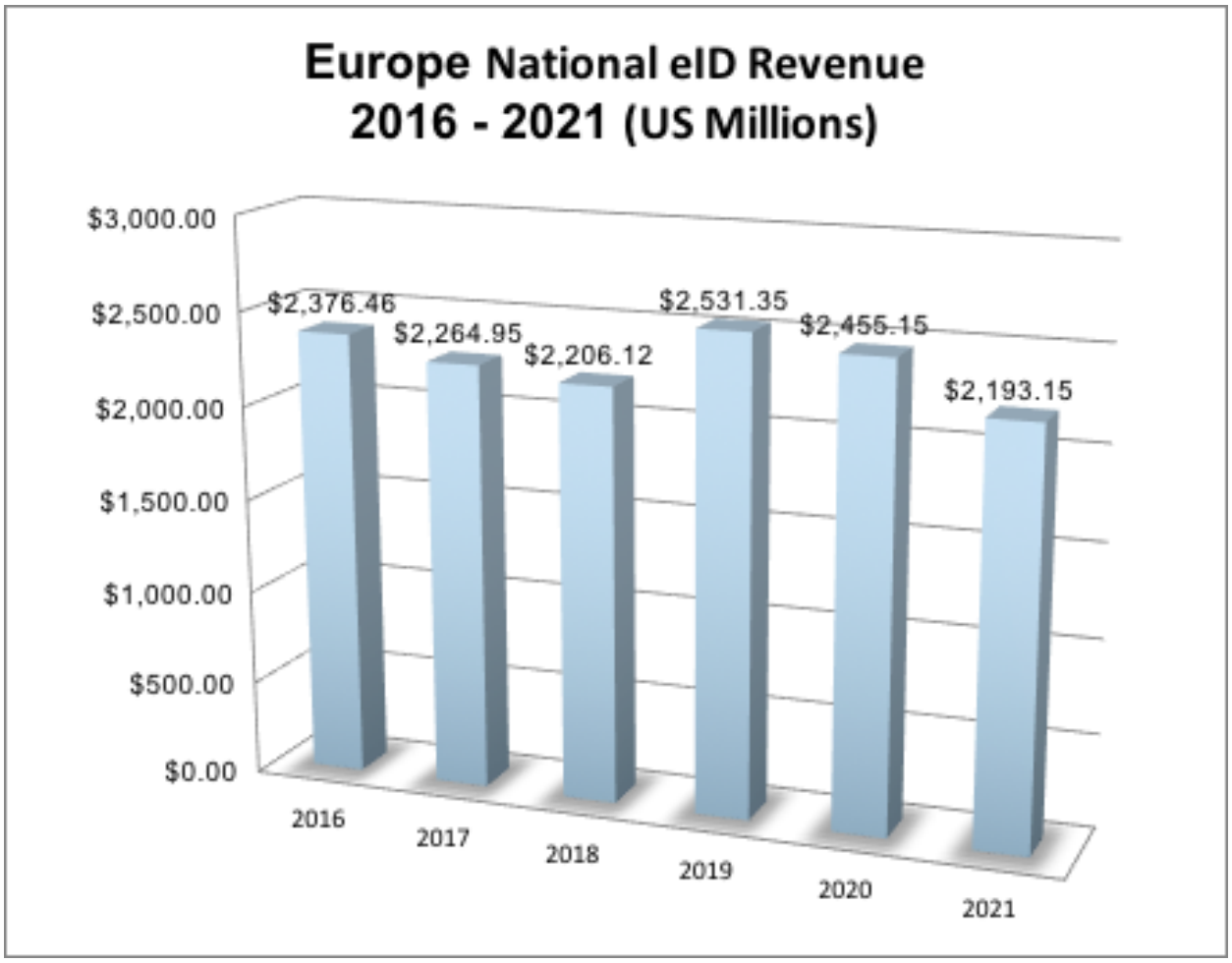

Figure 1-2: Europe National eID Program Revenue Chart

1.3. Defining and Clarifying National eID Programs

Initially, for research purposes, the definition of a "National eID Program" was limited to one with a card-based identity document that includes an embedded microprocessor chip to facilitate the cardholder's electronic identification and authentication. This is

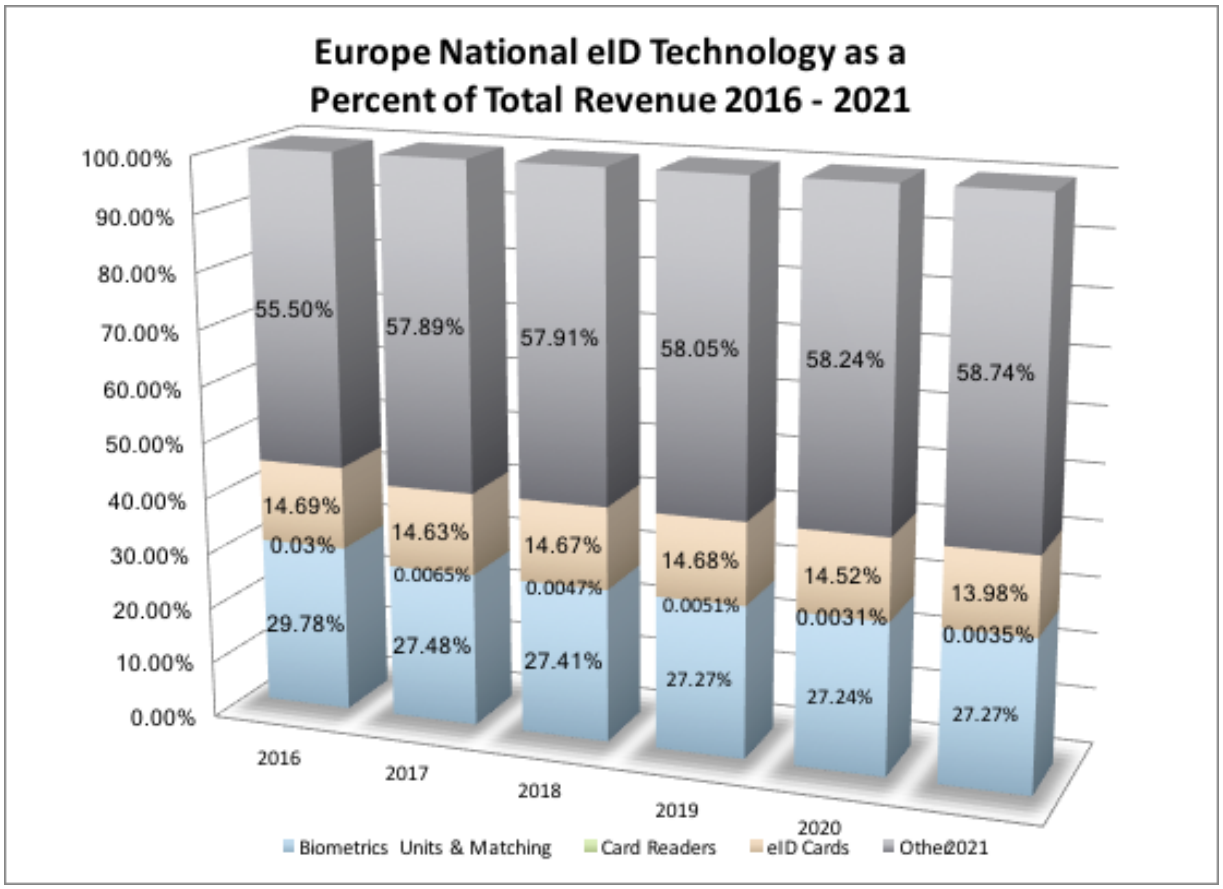

Figure 4-38: Europe NeID Technology Revenue as a Percent of NeID Program Revenue Chart

The table below provides details of Technology Revenue for each European country with a Category 1 or 2 NeID program.

Europe Annual Technology Revenue by Country

Albania

Technology Revenues	2016	2017	2018	2019	2020	2021
Biometrics Units & Matching	$1,075,657	$1,104,801	$1,134,770	$2,595,368	$2,657,585	$1,168,029
Card Readers	$540	$540	$540	$540	$540	$540
eID Cards	$512,028	$526,521	$541,425	$1,267,751	$1,298,691	$557,963

Austria

Technology Revenues	2016	2017	2018	2019	2020	2021
Biometrics Units & Matching	$1,158,207	$1,184,860	$1,212,164	$10,041,794	$10,063,859	$10,085,717
Card Readers	$433	$433	$433	$433	$433	$433
eID Cards	$678,870	$695,437	$712,409	$6,200,913	$6,214,629	$6,228,215

Appendix A: Forecast Methodology and Assumptions

Report content is based on a proprietary approach using customized forecast methods and tools applied to primary and projected data.

Methodology

A combination of primary sourced data and model based projected data was used to develop the forecasts and analysis included in this report. Primary data acquired directly through government agencies and well-credentialed non-governmental agencies was presumed valid. Data acquired through sources with less qualified credentials or with strong motivation for particular outcomes was validated through additional sources and/or model based alternatives.

Primary data used to complete the analysis and develop forecasts for this report includes annual National ID (traditional and National eID) unit volumes, population levels and growth, domestic enrollment centers, existing technology pilots and deployments, as well as budgetary allocations and reported costs for relevant programs, and units and value of deployed technology.

Primary data was obtained directly from government agencies such as Ministries of Interior, Finance, and Justice. Additional data was sourced from non-governmental agencies tasked with providing domestic and Asia insight into population statistics and government expenditures. Source materials include online data and databases, published statistics, policy papers, budgets, and program analyses, public statements, press releases, and direct consultation.

Finally, data was obtained through publicly available information from, statements by, and direct consultation with civil servants, consultants, vendors, integrators, analysts, and other third parties directly involved or with direct knowledge of specific relevant

programs and deployments. In some cases, these third parties provided confirmation of the accuracy of data obtained from sources deemed to require validation.

Models were developed to project specific data for countries where primary data was unavailable from government or non-government sources. The modeled projections use known data such as population, deployment practices, and attrition as a basis for determining unknown values by referencing Asia statistics and those from similar countries or regions where primary data is available. These projections are adjusted to account for regional indicators and variations such as political and social stability, levels of development, financial performance and stability, as well as other country or region specific indicators or influencers. Models are also adjusted to account for existing market conditions, current deployments, anticipated projects, and existing and planned infrastructure. Conservative assumptions for predictive factors such as technology pricing and anticipated adoption rates are introduced to determine forecasts.

Once primary sourced or projected data was available for all relevant countries, forecast models were designed to project unit volumes of eIDs and the related technologies covered in this report – biometrics and card readers. Revenue forecasts were then developed based on these complete primary sourced and projected data sets.

Forecasts for adoption and revenue are presented globally, regionally, by solutions components and technologies. The forecasts have been developed through a rigorous but complex process relying on the best available and or projected data. ***As with all market forecasts, the most significant indicator is the scale of the projections not the precise numbers***. Furthermore, where assumptions were required to calculate forecasts, the underlying principal was to rely on conservative rather than aggressive estimates. ***In this way, the report offers a conservative market forecast baseline indicating the scale of opportunity expected over the next five years.***

Assumptions and Notes

The following assumptions were used in the acquisition, filtering, integration, and calculation of data and the development of associated adoption, and revenue forecasts:

- All revenue forecasts are in United States Millions.
- Card issuance projections include newly issued cards, renewals, and lost and stolen replacements. This means that the number of cards issued in each year do not necessarily increase the total number of cards in circulation by an equivalent number.
- Base population estimates increase or decrease based on published population growth/decline estimates.
- NeID program costs vary widely depending on the existing infrastructure, volume, geographic region, chip capacity, and complexity of applications. Therefore, significant variation in program costs on a per country basis exists.
- NeID program costs include the development, production, and distribution of the cards, the capture, matching and storage of associated biometrics (if any), relevant on card applications, and the technical infrastructure required to support these.
- The percent of overall cost that a smart card contributes to a card-based solution is typically in the 10 to 15% range. However, for the purposes of this analysis, NeID program costs DO NOT include any applications - government or commercial - that leverage the card itself. Therefore, the percent of overall cost that the card itself contributes to an NeID program is in the 20 – 25% range depending on the complexity of the overall program.
- Biometric enrollment costs vary widely depending on the location, application, environment, and available leveragable infrastructure.
- The cost of a card reader varies from $20 to $100. It is assumed that higher cost readers will be used for quality control and issuance verification as opposed to the type of lower cost readers that are distributed to citizens/consumers.
- Production costs include the card itself and personalization costs.

- The replacement rates for damaged or lost deployed biometric live capture units is 5%, The replacement rates for damaged or lost deployed card readers is 5%
- Forecasts were calculated on an annual basis based on the size and scope of individual country projects and the best available revenue data. Revenues were allocated over multi-year item periods based on best available data on how enrollment/issuance will proceed. In some cases, this is even distribution over a number of years, in others, there are significant expenditure "bulges." Regardless, these forecasts should be looked at as average revenues for a given year or over a period of time, rather than a precise measure of revenue for a specific year.
- For all Constellation diagrams, the eID Service Index remains constant over the forecast period.

Modeling Notes:

- Only countries with populations of 100,000 or more were included in the report.
- Where conflicting primary or projected data were identified, conservative estimates were used.
- Independent programs to provide ID cards for non-citizens are not included unless explicitly stated.
- NeID and Biometric based programs for purposes other than National eIDs are not included in the forecasts e.g. voter cards, driving licenses that can also be used as National IDs.
- Where biometric enrollment programs are initiated with traditional (non-chip based IDs) cards, National eID revenues begin once the biometrics are collected even if the biometric collection is added using existing cards.
- Projections rely on weighting factors that are a combination of factors based on region, volume of IDs to be issued, complexity of implementation, condition of and ability to leverage existing infrastructure.
- For National eID adoption and forecasts, Biometric Live Capture units and revenue include live capture at enrollment and verification at issuance.

- Large upfront investments in biometric hardware, software, and supporting systems skew initial program costs. In some cases, these costs are all allocated the first year, for some countries, they are spread out over a few years.
- For National eID adoption and forecast, card reader units and revenue refers to quality control at production and verification at issuance.
- Identified segments i.e. those that require an NeID, of the population are based on a number of country specific factors – the age that IDs are issued, whether IDs are issues only to citizens or all residents, mandatory or compulsory, etc.
- Published budgets and revenues associated with specific NeID program may be intentionally skewed upwards to downwards. Governments tend to underestimate total costs to assuage citizens concerned with large public expenditures. Commercial entities tend to overestimate potential revenues to justify wins via initial below market value pricing with the hopes of higher priced follow on business.

Appendix B: Author Biography

C. Maxine Most

Principal, Acuity Market Intelligence

Acuity Founder and Principal, C. Maxine Most ("max"), has 30 years' experience in international emerging technology market development. Throughout her career, Ms. Most has provided strategic expertise in emerging markets such as biometrics, digital identity, e-commerce, interactive services, and 2D and 3D visualization and image processing. She has worked with start-ups, established technology market leaders, Global 1000's and a range of organizations in between.

Ms. Most founded Acuity Market Intelligence in 2001 to bring strategic market development expertise to the then nascent biometrics market. Since that time, Ms. Most. has earned a reputation for consistently offering original, provocative, accurate, and reliable thought leadership and industry analysis that Clients rely on to achieve business success.

Ms. Most authored Acuity's The Global *Biometrics and Mobility Report: The Convergence of Commerce and Privacy,* The Global Automated Border Control Industry Report: Airport eGates and Kiosks, The Global *National eID* Industry Report, The Global ePassport and eVisa Industry Report, and The Future of Biometrics. She regularly contributes to industry publications and presents at industry events on biometrics and eID trends, visions, and the data that support them.

Previously, she managed the Computer Aided Molecular Design market for Silicon Graphics Computer Systems, directed Pacific Rim operations for a hospitality-based interactive services company, and founded and operated a Silicon Valley-based retail company. She has also designed and delivered sales and technical training courses worldwide and began her career as a software engineer specializing in 3D graphics applications. Ms. Most is a graduate of the University of California, San Diego with a multi-disciplinary degree in Mathematics, Computer Science, Economics, and Visual Arts.