aim
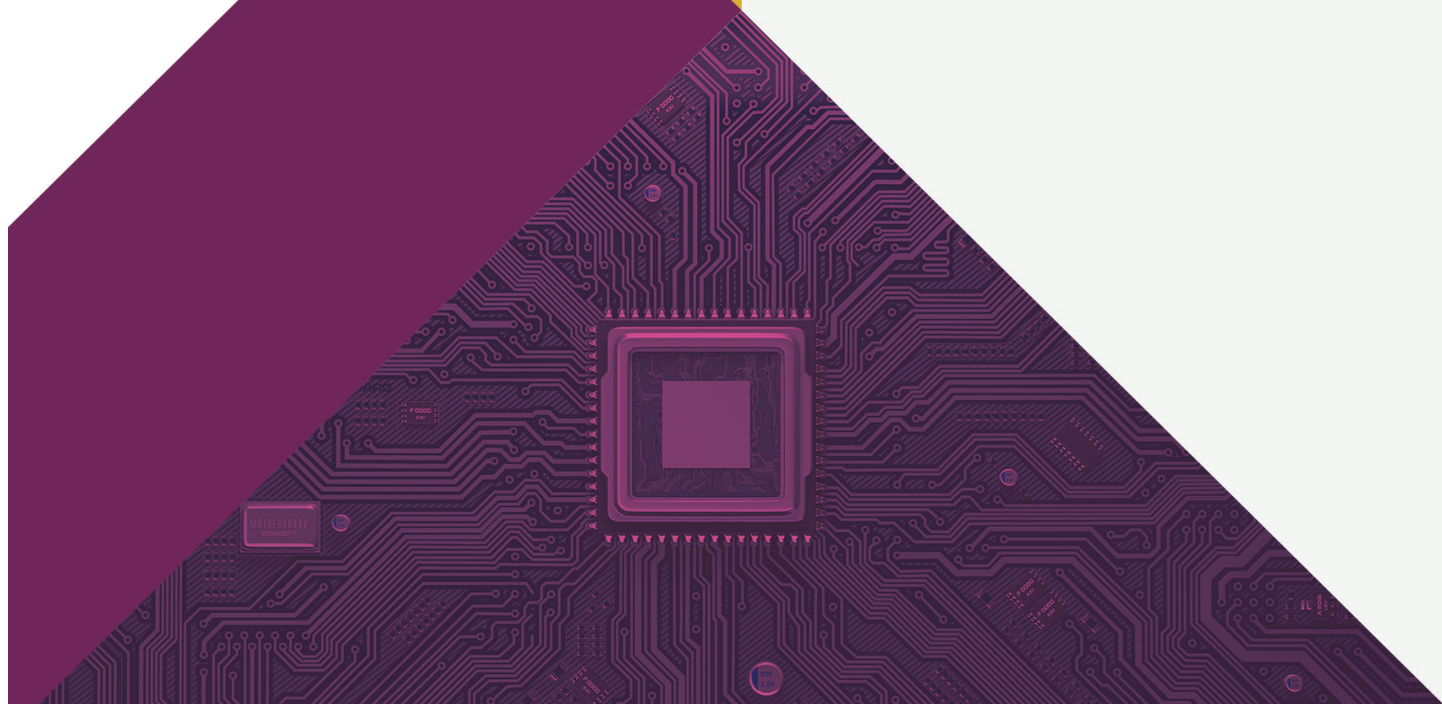
Defining Today's
Technology Standards;
Empowering Tomorrow's
Solutions.

YEAR IN
REVIEW

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AIM Celebrates 50 Years of Automatic Identification and Data Capture Innovations - Building Community, Resilience, and Impact Around the World

In 1973, AIM embarked on its journey as the vanguard of the Automatic Identification and Data Capture (AIDC) industry. Now 50 years later, the founding pioneers of the AIDC industry certainly did not envision that one day every person would be walking around with a barcode scanner in their pocket, nor did they know at that time that AIDC technologies would become robust data collection tools connecting the physical world to the computer world enabling the birth of Wi-Fi, Artificial Intelligence (AI), the Internet of Things (IoT), Bluetooth, and Robotics.

AIM's 50th Anniversary was marked by a series of global events. A Partnership Breakfast was held at RFID Journal LIVE! in Orlando, FL. This celebration was packed with illuminating sessions, including discussions on supply chain digitization, insights into the cannabis industry, and the history of RFID. The inaugural AIDC Connect Asia in Singapore, a premier 3-day event, fostered dialogue on global digitalization trends, automation, and the digital economy.

The celebrations concluded at the AIM Summit in Wiesbaden, Germany; in collaboration with Wireless IoT Tomorrow; marked a significant milestone, showcasing the industry's evolution. The summit featured enlightening sessions, including discussions on wireless IoT trends, AIDC standardization, RFID technology, and healthcare compliance.

As AIM celebrated its history and milestones, these events not only acknowledged its legacy but also paved the way for continued growth, technological innovation, and industry collaboration.

> "AIM was built on innovation and the courage to try new things. Today, digital data capture technologies are reimagined into new efficiencies enabling supply chains around the world to be more equitable, sustainable, and resilient.
>
> Chuck Evanhoe
> AIM Board Chair
> President, Aware Innovations

Special thanks to our anniversary sponsors

AIM Introduces VerifyReg™ the Cutting-Edge Solution for DSCSA Compliance

VERIFYREG.ORG

VerifyReg™ is an innovative data integrity tool designed to simplify compliance with DSCSA regulations. The traceability of each package starts with a barcode or product identifier and VerifyReg™ is the assurance that the mark is accurate and follows the outlined regulatory guidelines. This solution focuses on validating data markers in pharmaceutical products and packaging.

VerifyReg™ stands as a hallmark of AIM's commitment to the industry. The solution focuses on validating the intricate code structures of both mandatory and preferred data markers found on pharmaceutical products and packaging. The result ensures complete and unwavering compliance with the DSCSA's rigorous standards.

VerifyReg™ aligns with industry standards, including ISO/IEC 15416:2016, ISO/IEC 15415:2011, and ISO/IEC 29158:2020, ensuring a robust and standardized verification process. The process is seamless and efficient. The certificate of compliance, issued post-review, features a QR code for real-time validation that can be accessed by any supply chain participant.

> Regulations and standards can be convoluted and constantly evolving, so staying compliant is a significant challenge. VerifyReg enables our customers to sort through the clutter and confusion of data related to standards, compliance requirements, and quality assurance protocols.
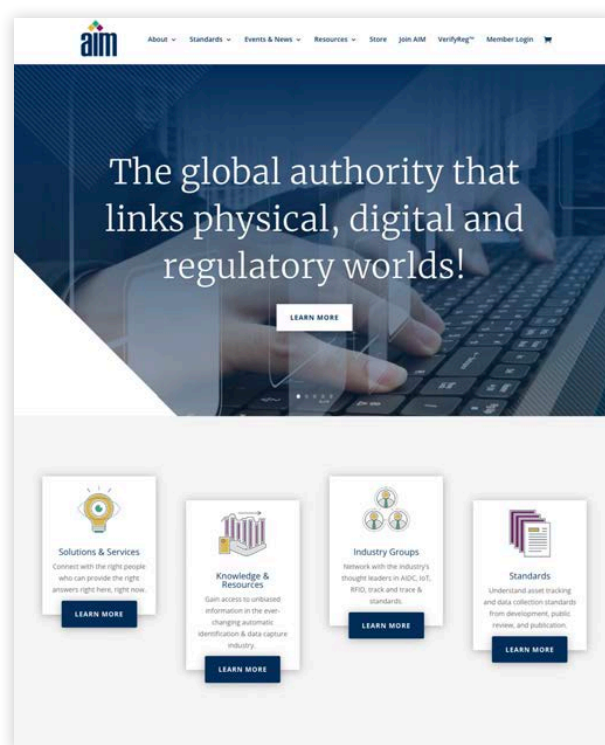>
> Tony Fonk
> CEO
> SpotSee

Revolutionizing Our Web Presence

In a significant stride towards modernizing our web presence, AIM proudly presents the revamped version of our website, harnessing the power of WordPress to elevate user experience and provide a fresh online environment for our members.

Some of the standout features of the upgraded website is the enriched Member News section, designed to amplify the visibility of our members and their accomplishments. This enhancement allows our community to stay informed about the latest industry developments, fostering a sense of connection and collaboration.

Furthermore, AIM has redefined its resource section, offering a seamless repository for all the free resources we have available. Items such as whitepapers, case studies, and various educational materials can be found in this part of the website. The redesigned layout ensures easy navigation and accessibility, empowering our audience to delve into a wealth of information effortlessly. The calendar for industry events has also received a facelift, presenting a more intuitive and interactive interface for users to stay ahead of the curve with upcoming activities.

The adoption of WordPress not only contributes to enhanced SEO metrics but also unlocks a range of options to bolster AIM's search engine visibility. This, in turn, magnifies the exposure and recognition of our members within the digital landscape. The new layouts across the website pages further contribute to an enhanced and crisper user experience, reflecting AIM's commitment to staying at the forefront of technological advancements and providing a dynamic online platform for our valued community.

The global authority that links physical, digital and regulatory worlds!

LEARN MORE

Solutions & Services
Connect with the right people who can provide the right answers right here, right now.
LEARN MORE

Knowledge & Resources
Gain access to unbiased information in the ever-changing automatic identification & data capture industry.
LEARN MORE

Industry Groups
Network with the industry's thought leaders in AIDC, IoT, RFID, track and trace & standards.
LEARN MORE

Standards
Understand asset tracking and data collection standards from development, public review, and publication.
LEARN MORE

www.aimglobal.org

Follow AIM on Social Media

Resources |

Automatic Identification and Data Capture Industry Direction Report

AIM commissioned a market research report on the commercial outlook for AIDC technologies, including the leading technology purchasing influences, priorities and obstacles for clients and prospects in leading AIDC markets. This global report provides insights on the growth, challenges, and opportunities of current and emerging technology innovations across multiple vertical markets. Purchase your copy here.

Industry Publications

- **Harnessing AIDC Technologies for Food Waste Prevention, Rescue and Recycling** - This whitepaper addresses the overarching food chain issues, discusses the AIDC technologies capabilities for creating a more resilient food supply chain and highlights regulatory initiatives that are driving awareness and change.

- **Driving Authenticity: The Key Role AIDC Plays in Reducing the Proliferation of Counterfeit Items** - Trade of counterfeit and pirated goods continues to increase at alarming rates. Throughout this whitepaper, relevant examples and staggering numbers will be highlighted to drive home how big of an issue this is worldwide. The paper discusses the AIDC solutions to help prevent fraud.

- **RFID FAQ for Retail** - In collaboration with the Retail Value Chain Federation, this first document is intended for those in business operations and talks about terms, concepts, and basics. The next iteration will be technical in nature and intended for use by solution providers to retail, plus supplier, and retail personnel tasked with implementation and troubleshooting.

- **Data Content Executive Summary** - Addressing the fundamental question of choosing the right standard for tag data formatting, this guide serves as an introduction to the intricate world of encoding schemes. Delve into the essential distinctions between different encodings, understanding their specific standards, and learn how adherence to a standardized numbering system mitigates challenges like tag clutter, ensuring uniqueness, supporting interoperability, and optimizing memory space within RFID implementations.

Technical Specifications

Ultracode 2023 is a 7-year update with powerful new improvements from the legacy version, which is a family of color multi-row, variable size two-dimensional (2D) matrix symbols incorporating both structural rules for symbol damage detection and Reed-Solomon Error Correction (RSEC) for codeword error correction. The Ultracode symbol is designed to be printed with any color printer or displayed with a standard Red, Green, Blue (sRGB)-compliant electronic display.

RFID Guideline REG 396: RFID chips and transponders — Verification and qualification of design and manufacture — Part I: Tires - This guideline targets item level tagging where the RFID tag may be present in various formats, including a label, incorporated into a patch which then becomes permanently affixed to the inner or outer surface of a tire, or incorporated during manufacture into the structure of the tire as an integral part of the tire. The use of RFID for tires will help address the increasing demand to be able to identify and track tires for various applications even for the life of the tire. The guideline is intended to be used as an aid to the manufacturer, the consumer, and the public.

AIM Webinar Series

Embark on a journey through the world of AIDC technology with AIM's exclusive webinar series. Featuring contributions from our esteemed members, these webinars offer invaluable insights into a wide range of tech-related topics. Join us live on the AIM YouTube Channel. and discover the transformative power of AIDC technologies.

- 50 Years of RFID Adoption
- Invention, History and Evolution of QR Codes
- AIDC Applications in Industrial Construction
- Streamlining Document Custody with Automation
- How Electronic Data Capture Supports Traceability
- Efficiency in Motion: Leveraging Technology to Enhance Patient Safety
- Standards for Efficient Global Supply Chains and Successful Automation

AIM North America also hosted more than a dozen webinars in 2023 focused on four key areas: food supply chain, UDI in medical devices, cannabis, and pharmaceutical. Check out the AIM NA YouTube Channel.

> " AIM is a highly collaborative environment where industry experts come together to develop standards, educate, and share expertise on requirements, as well as ensuring device traceability by advocating for standard interpretation and implementation of harmonized global requirements.
>
> Olga van Grol-Lawlor, MPhil
> Manager Global Regulatory Intelligence & Advocacy
> Boston Scientific

Resources | View or download items by visiting the [AIM Store](#) online.

Hear & Know Podcast Series

Dive into the minds of industry leaders as AIM uncovers the secrets of their success, discusses cutting-edge trends, and explores the latest breakthroughs in technology. Tune in to the AIM Podcast Page for insightful interviews that shed light on the future of our ever-evolving field.

- Rick Warther from Vanguard ID Systems
- Mehul Patel from Honeywell
- Tyler Chaffo from Accenture
- Jim Roddy from RSPA
- Laura Thompson from PMMI
- Julie McGill from Trustwell
- Ardi Batmangheldij from Innovatum
- Quresh Tyebji from Shipcom Wireless
- Sanjive Mehta from AIM India
- Dominque Guinard from Digimarc
- Lana Makhanik from VUEMED
- Patti Blessing from Zebra Technologies

News Publications

- **AIM Insider**
  AIM Insider is a bi-monthly newsletter that highlights industry executives, key AIM initiatives and industry news.

- **AIM News**
  Must read announcements that will impact your business.

- **AIM Solutions Showcase**
  A weekly spotlight of members' latest technological innovations and applications.

Liaison Relationships

- **CEN/TC 225 |** European Committee for Standardization - AIDC Technologies
- **ETSI |** European Telecommunications Standards Institute
- **IIC |** Industrial Internet Consortium
- **NFC Forum |** Near Field Communication development, application & solutions
- **MHI MH10 |** Unit-Loads and Transport-Packages
- **ISO/PC 308 |** Standardization in the field of Chain of Custody for products
- **ISO/TC 122 |** Packaging
- **ISO/TC 104 |** Freight Containers
- **ISO/IEC JTC 1/SC31 |** Automatic identification & data capture techniques
- **ISO/IEC JTC 1/SC 41 |** Internet of Things & related technologies

Speaking Opportunities

Throughout the year, members actively participate in various speaking opportunities, enlightening audiences on the nuances on the immense potential of automated data capture technologies. Collaborating with our valued members, AIM presented insightful talks at prominent events such as RFID Journal LIVE!, Wireless IoT Tomorrow, PACK EXPO, VARTECH, and at several University functions. Our discussions spanned a diverse array of topics including technology standards for labeling, blockchain's impact on supply chains, sustainability enhancements through RFID, compliance considerations like FSMA 204 and DSCSA, UDI implementations, AIDC standardization for seamless data exchange, and much more. These engagements collectively reached over 10,000 individuals, providing our members with an exceptional platform to highlight their expertise in automated data capture solutions to an audience eagerly seeking innovation and solutions.

Member Demo Videos

AIM and our member companies actively engage in industry events across the world such as RFID Journal LIVE!, PACK EXPO, HIMSS, and other collaborative gatherings. During these events, our members take center stage, presenting and educating attendees about their cutting-edge technologies. These innovations are designed to enhance visibility, ensure compliance, and elevate customer satisfaction. AIM shines a spotlight on these remarkable advancements through member demonstration videos, crafted from on-site recordings at these industry events. These captivating videos serve as invaluable assets for our members, resonating to diverse audiences across various social media platforms. Throughout the year, these videos have collectively garnered thousands of views, effectively displaying the transformative impact of our members' technologies.

> As a startup in the sustainability sector, focusing on traceability, AIM has been invaluable in connecting us to a large network of AIDC experts and partners worldwide.
>
> Kimberley MacDonald
> Engineering Lead
> Reath ID

Aware Innovations

Aware Innovations is a software and technology solutions provider specializing in RFID, GPS, barcode, and other technologies. Our ItemAware system provides tracking and management of tools, trucks, equipment, materials, office assets, and much more. We help you increase productivity, profitability, and safety by reducing losses and maximizing utilization.

BlueStar
Your Solutions Distributor

BlueStar is the leading global distributor of solutions-based Digital Identification, Mobility, Point-of-Sale, RFID, IoT, AI. AR, M2M, Digital Signage, Networking, Blockchain, and Security technology solutions. BlueStar works exclusively with Value-Added Resellers (VARs) to provide complete solutions, custom configuration offerings, business development, and marketing support.

DIGIMARC

Digimarc Corporation, a global leader in product digitization and pioneer in digital watermarks, connects every physical and digital item to a digital twin in the cloud. Digital twins capture product data, record events and interactions, and support powerful new automations. Digimarc is recognized for deterring counterfeiting, ensuring product authenticity, improving plastics recycling, and protecting content creators in an era of generative artificial intelligence.

GS1

GS1 is a neutral, not-for-profit organization that provides global standards for efficient business communication. We are best known for the barcode, named in 2016 by the BBC as one of "the 50 things that made the world economy." GS1 standards improve the efficiency, safety, and visibility of supply chains across physical and digital channels in 25 sectors. We enable organizations of all types and sizes to identify, capture and share information seamlessly. Our scale and reach – local Member Organizations in 116 countries, more than 2 million user companies and over 10 billion transactions every day – help ensure that GS1 standards create a common language that supports systems and processes across the globe. Find out more at www.gs1.org.

Honeywell

Honeywell Safety and Productivity Solutions develops and deploys an innovative range of solutions, software, and services that help keep people healthy, workers and workplaces safer and more productive, and supply chains and assets more efficient, accurate and reliable. We leverage connectivity, advanced data analytics, artificial intelligence, software, robotics, sensors, advanced materials and integrated human and automated systems.

Laxcen 立芯

Laxcen Technology, founded in 2012, is one of the leading suppliers of IOT products and solutions. Powered by industry's elite R/D team, state-of-the-art manufacturing plants and global partners. We provide end-to-end products and turn-key solutions to over 1500 customers from more than 50 countries around the world. Laxcen's product lines cover a wide spectrum of IOT applications that include RFID hardware, Robots and solutions for retail, aviation, healthcare, libraries, archives, etc.

* Discover more about these AIM sponsors & industry leaders by clicking on the company logo.

Loftware

Loftware is the world's largest cloud-based Enterprise Labeling and Artwork Management provider, offering an end-to-end labeling solution platform for companies of all sizes. We help companies improve accuracy, traceability, and compliance while improving the quality, speed, and efficiency of their labeling.

Lyngsoe Systems
elevating logistics

Lyngsoe Systems has been a world leader in the field of cutting-edge electronic logistics control for over 40 years and is leading within the radio frequencies identification (RFID) technology. We are devoted to helping libraries transform by supporting them to work smarter and save time on material handling with smart library solutions. We are experts and trusted by libraries in providing automated material handling solutions, self-service equipment, and intelligent material management systems.

scansource®

ScanSource, Inc. (NASDAQ: SCSC) is a leading hybrid distributor connecting devices to the cloud and accelerating growth for customers across hardware, SaaS, connectivity, and cloud. ScanSource sells through multiple, specialized routes-to-market with offerings from the world's leading suppliers of point-of-sale, payments, barcode, physical security, UC, collaboration, telecom, and cloud services.

BarTender®
BY SEAGULL SCIENTIFIC

Global business relies on BarTender software to create and manage over 100 billion labels, barcodes and RFID tags each year, keeping products traceable, moving, and safe. BarTender is available in more than 175 countries through a global network of local partners.

SpotSee®

As a global leader in condition-indicating and monitoring solutions, the company helps customers in the life sciences industry to identify changing conditions to protect life sciences and ensure supply chain integrity. From product to patient to pallet to porch, SpotSee provides products that enable more than 4,500 customers and partners in 62 countries to detect changes in the condition of everything from vaccines to spaceships. The company's solutions include temperature, impact, tilt, vibration, humidity, and liquid detection monitoring devices, available via visual, RFID, QR Code, 2D Code, cellular or satellite connection.

TSC PRINTRONIX AUTO ID

We are a leading provider of innovative thermal label printing solutions. Founded in 1991, we own and operate ISO certified production facilities and have offices around the world, serving customers in more than 100 countries.

* Discover more about these AIM sponsors & industry leaders by clicking on the company logo.

Wiliot is an ambient IoT data platform company. Our Visibility Platform connects the digital and physical worlds using IoT Pixels, battery free smart tags that push data to the cloud in real-time without human intervention. Our platform exists within a fast-growing ambient IoT ecosystem.

Zebra Technologies helps organizations monitor, anticipate, and accelerate workflows by empowering their frontline and ensuring that everyone and everything is visible, connected and fully optimized. Our award-winning portfolio spans software to innovations in robotics, machine vision, automation and digital decisioning, all backed by a +50-year legacy in scanning, track-and-trace and mobile computing solutions. With an ecosystem of 10,000 partners across more than 100 countries, Zebra's customers include over 80% of the Fortune 500.

Zugang Technology Connections empowers companies of all sizes to achieve sustainable business success. We fully understand data-driven intelligence supported through data capture technology, identity technologies, Web3, AI and authentication across trusted and transparent supply chains.

Discover more about these AIM sponsors & industry leaders by clicking on the company logo.

👥 Gold*

ASYGN

With the combination of both identification and sensing capabilities, Asygn has developed a unique solution for the RFID market. Asygn has a large portfolio that includes seven different kinds of products, each with different sensors. All these sensors include temperature and selectively humidity, strain, and lighting.

ELATEC
RFID Systems

ELATEC is a global leader in user authentication and identification solutions for business and consumer applications. We work with our global partners to develop innovative RFID and mobile credentialing systems that enable secure, convenient, and frictionless access to places, devices, equipment, and data.

PTS Portable Technology Solutions
Barcode, RFID and BLE Software Solutions

Portable Technology Solutions, LLC (PTS) leads in user-configurable mobile data collection, RFID, barcode, and BLE systems. With TracerPlus and ClearStream RFID, PTS offers adaptable solutions for all organizations and budgets. No programming skills are needed to streamline your IT processes and reduce your costs. PTS bundles top-tier hardware with its software while prioritizing budget and project goals to ensure a return on investment. PTS collaborates with leading hardware manufacturers, serving 8,000+ organizations worldwide since 2000.

SICK
Sensor Intelligence.

SICK is one of the world's leading manufacturers of sensors, safety systems, machine vision, emissions monitoring systems, flow measurement, encoders, and automatic identification products for industrial applications. With more than 3,500 patents, SICK continues to lead the industry in new product innovations. The diversity of its product line allows SICK to offer solutions at every phase of production in the logistics, automotive, packaging, electronics, food and beverage, material handling, and process automation markets. SICK AG was founded in 1946 and has operations or representation in 65 countries worldwide.

>Terry Burton CONSULTING

Terry Burton Consulting provides consultancy, analysis, and software development in AIDC and standards setting. We would like to help with your project, whether you are implementing DotCode, rMQR, adding support for ECI, or undertaking something truly unique. Contact us to find out how we can make a difference.

ZIIOT

Founded in 2014, ZIIOT is a scientific research service institution focusing on identification technology research and standard formulation. In 2018, ZIIOT was jointly approved by three international organizations of the International Organization for Standardization (ISO), the Commission for European Normalization (CEN), and the Association for Automatic Identification and Mobility (AIM) as the global code issuer, and the issuing code (IAC) is MA. ZIIOT is responsible for the management and maintenance of ISO/IEC 15459 series of international standards of "Information technology, automatic identification and data acquisition technology, unique identification" for MA Identification Code System, ZIIOT has the right to establish the Global top nodes of MA Identification Code's service system, registration system and parsing system, and distributes code to the world.

👥 Silver*

hana

TIP of the℠ SPEAR CONSULTING LLC

* Discover more about these AIM sponsors & industry leaders by clicking on the company logo.

Industry Groups

AIM industry groups are created by our members to create, learn, and share information to help stay at the front of the line with the latest processes in automatic identification and data capture technologies. Initiatives these groups partake in include standards development, technical reports, educational materials, advocacy, and insights around the latest industry trends. Many symbologies and standards published as AIM specifications have been adopted by the international community via the ISO standardization process. Participation in these groups bring members together from all parts of the industry and vertical markets and create a unique atmosphere that solves many of the shared challenges and opportunities members face.
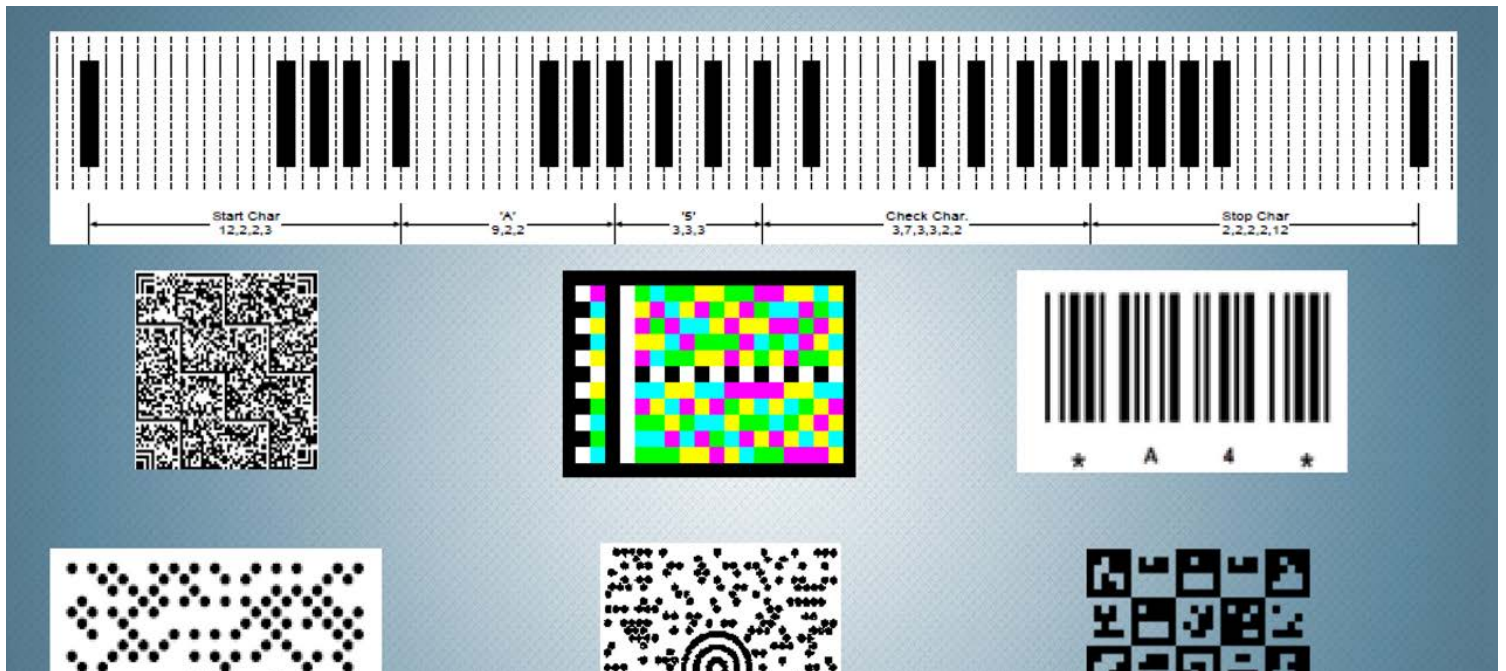
Technical Symbology Committee (TSC)

Chair | Steven Keddie, GS1 Global Office

This industry group provides the market with comprehensive technical specifications. Many of our published symbologies have become international standards through the ISO standardization process. Join us in setting the gold standard for symbologies worldwide.

Key Initiatives:

• Revised Ultracode, which represents the next generation of 2D color barcodes. This robust 2D symbology balances real world color printing constraints and the business need for data rich compact symbology.

• Creating an informative barcode infographic that displays the pivotal role of symbology verification and the diverse markets where they find application.

• Reviewed several ISO/IEC JTC 1/SC 31/WG 1 : Data Carrier projects; including ballots for ISO 15415.2 Information technology, Automatic identification and data capture techniques — Barcode symbol print quality test specification — Two-dimensional symbols and 15424 Information technology — Automatic identification and data capture techniques — Data Carrier Identifiers (including Symbology Identifiers) and ICAO Datastructure for Barcode Technical Report.

• Ad hoc helped with the implementation of verifying products for AIM's VerifyReg™ platform.

Industry Groups

Radio Frequency Identification Experts Group (REG)
Chair: Scott Austin, Zugang Technology Connections

This group helps unlock the potential of RFID technology. Here, we bring together the brightest minds in the industry to advance RFID's impact on our everyday lives. Join us in revolutionizing the way we interact with data and objects in our increasingly connected world.

Key Initiatives:

- Released an informative RFID FAQ for Retail in collaboration with the Retail Value Chain Federation (RVCF), providing retailers with comprehensive insights into key considerations and addressing common queries surrounding RFID implementation.

- Published a revised Executive Summary and in the process of updating AIM's Technical Guideline: Guidance on Data Content and Structure in Passive RFID Tags Version 1.1, which aims to offer practical solutions to prevalent inquiries encountered during the development of RFID applications.

- Undertaking a thorough revision of AIM's Global RFID Guideline: RFID Chips and Transponders — Verification and Qualification of Design and Manufacture Part 1: Tires (AIM REG 396). This initiative seeks industry input to ensure REG 396 remains an invaluable resource for both the automated data capture and tire sectors. With your support, we're confident in achieving this goal.

- In the works is a comprehensive whitepaper on RFID-enabled sensors within material handling environments. This paper will spotlight sensors employed for predictive or preventative maintenance and product protection, illustrating how these technologies converge to optimize supply chain efficiency.

> " The auto ID industry is ripe with opportunities for company, professional and personal growth — but AIM is one of the few organizations that converts these opportunities into real growth. AIM not only presents their members with numerous opportunities to grow their business and their personal auto ID skills, AIM also provides the tools and connections to convert these opportunities.
>
> Chris Brown
> RFID Subject Matter Expert
> TSC Printronix

Industry Groups

Visibility Technologies Industry Group
Chair: Kimberley MacDonald, Reath ID

Created from the fusion of AIM's IoT and Track and Trace groups, this dynamic collective is dedicated to seamlessly connecting systems and ensuring complete visibility across product lifecycles. Together, we're shaping a future where information is more visible and interoperable.

Key Initiatives:

- Published Harnessing AIDC Technologies for Food Waste Prevention, Rescue and Recycling. This whitepaper addresses the overarching food chain issues, discusses the AIDC technologies capabilities for creating a more resilient food supply chain, and highlights regulatory initiatives that are driving awareness and change.

- Published Driving Authenticity with AIDC. This paper examines the AIDC technologies that brand owners can utilize to improve their efforts in product authentication and anti-counterfeiting.

- Developing an AIDC in AI and Robotics whitepaper which delves into the interplay between data capture technologies and the cutting-edge realms of AI and Robotics. It examines how AIDC solutions amplify data accuracy and streamlines information which helps the flow of the future of intelligent automation.

- Creating a sustainability with AIDC products whitepaper, examining the sustainability and end-of-life disposal methods of AIDC products with ISO standards.

- Submitted comments to the FCC regarding to their notice for comments on IoT Cybersecurity labels for Smart Devices.

> "
> AIM has been an invaluable resource for me. In working with AIM and its committees, I have made connections that have proven to be greatly beneficial for my daily job. Without AIM's assistance, I would not have been able to pull off one of the best events I've ever put on.
>
> **Duane Roebuck**
> **Retail & IoT Channel Manager**
> **BlueStar US**

Standards & Compliance

Standards remain critical in today's world. Without proper development, implementation, or compliance, they can impact the success or failure of a new technology, product or business and affect consumer safety. As a leader in AIDC industry standards, AIM works with ISO (International Organization for Standardization) and ANSI (American National Standards Institute) to develop, revise, and educate both companies and users to ensure compliance in the global marketplace.

ADC1 Technical Advisory Group (TAG)
Chair: Chuck Evanhoe, Aware Innovations

AIM acts as the administrator of the U.S. Technical Advisory Group (TAG) to the International Organization for Standardization (ISO) Sub Committee SC 31. The TAG serves as the delegate to the American National Standards Institute (ANSI) responsible within ISO for all work on standardization in automatic identification and data capture in the U.S. Members of ADC1 represent companies with technical knowledge in AIDC who work together providing input during the process of standardization to ensure both U.S. involvement and consensus on standards.

Highlights

- Review and response to work on all standards related to:
  - Data carriers (TG1)
  - Data & structure (TG2)
  - Radio & communications (TG4)
  - Application of AIDC standards (TG8)

> " I appreciate the opportunity to give input on new technical specifications as part of AIM's global standards community working along with the top experts in the industry to move technology forward in Symbologies and Quality Verification.
>
> Glenn Spitz
> Engineering Director
> Cognex Corporation

Registration Authority

In addition to its role as a U.S. TAG administrator, AIM also acts as the international Registration Authority (RA) for several ISO standards, including ISO/IEC 15459 Information Technology – Unique Identification, which saw increased interest as the result of new European Union and Chinese regulations passed that require all tobacco and alcohol products to carry a unique identifier. As the RA for ISO/IEC 15459, AIM is responsible for the approval of applications from organizations requesting Issuing Agency Codes that are guaranteed to be unique and compliant with all aspects of the standard.

Chapters and Regional Organizations

AIM Asia

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www.aim-asia.org

Dr. Anna Lau President
Annalau@aim-asia.org
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To mark the commencement of AIM Asia's third year, we orchestrated the inaugural Asia Meeting for AIM and AIM Asia from October 10th to 12th, 2023, aptly named AIDC Connect Asia 2023, as part of the grand celebration of AIM's 50th anniversary. This event also marked the maiden annual meeting and exhibition for AIM Asia, drawing over 150 registered participants from diverse backgrounds, including AIM members, AIDC company executives and sales personnel, esteemed IEEE fellows, professors, diligent researchers, government officials, and industry associations. Over the course of three eventful days, attendees engaged in a rich assortment of programs, encompassing the retrospective of AIM's 50-year journey, the inauguration keynote speeches for AIM Asia, an extensive exhibition, a VIP dinner, and an exclusive visit to AIM Asia member companies.

In our collaborative efforts, AIM Asia fostered close partnerships not only with AIM's chapters but also with other influential organizations such as the IEEE Council on RFID. One notable joint initiative was the Marina Forum, which drew the participation of over 200 academic researchers and industry experts, facilitating the exchange of cutting-edge technological insights. Furthermore, AIM Asia forged alliances with GS1 China and the China Air Transport Association, leading to the establishment of an RFID Standard and Testing expert work group tailored for the aviation sector.

AIM China

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Fang Fang – General Secretary
fangf@ancc.org.cn
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In 2023, AIM China organized several expert review meetings on association standards. Experts from GS1 China, local standards institutes and related enterprises attended the meeting and reviewed and gave technical guidance on the drafting of standards, specific content, and other matters. Finally, three association standards were passed and published, covering agriculture, medical care, manufacturing, and other fields. In the future, AIM China will also actively promote the transformation of the association standards into national and international standards.

The video production of article numbering and AIDC technology led by AIM China was completed. This video aims to introduce the important relationship between article numbering and AIDC techniques and popularize relevant knowledge to the public. At the same time, the video was also shown at "AIDC Connect Asia 2023" as a gift to celebrate the 50th anniversary of AIM Global.

AIM China, successfully held "Label Connect China" a series of food industry Public Welfare training. The first two training courses were held in Nanchang, Jiangxi Province and Hefei, Anhui Province in July, and August 2023, respectively. The meeting invited more than 600 experts and representatives of food enterprises from the National Health Commission, the National Food Safety Risk Assessment Center, GS1 China and other government agencies. The training has built a platform for exchanges and sharing among relevant parties in the food industry chain, and guided food industry practitioners to actively participate in the internationalization, digitalization, and intelligent transformation of labels through relevant training. It is hoped that this training can help enterprises achieve digital transformation and sustainable development.

On October 10-12, 2023, AIM China attended "AIDC Connect Asia 2023" held in Singapore. During the event, AIM China exchanged with the participants and reached cooperation intentions in related fields. At the same time, the Secretary General of AIM China delivered a keynote speech, focusing on the main work and outstanding achievements made by AIM China in promoting the development of China's automatic identification industry in the past two decades.

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Main activities and highlights of the year were the annual 'RFID & IoT in the Nordics' Conference, and the special event 'The Smart Company' over 3 days at the large HI Event in Herning.

It was great on 4. June 2023 to again organize and host the largest RFID Event in the Nordics at the IT University in Copenhagen 4. June. It was a successful event with good presentations, good exhibition, and a lot of networking.

The follow-up on 'The Smart Company' events in 2019 and 2021, was with primary focus on The Smart Company Guided Tours. The Event took place 3.-5. October 2023 and we had 3 guided tours every day. The 'guide' was an AGV with two 55" monitors on top. The guided tours took the visitors through work processes in a digitalized company with a focus on Data Capture and the benefits of using Barcodes and RFID technology. In addition, also had Real-Time Localization and SW-integration demonstrated.

Other member activities last year included general meetings for all members, and a couple of open seminars with a focus on Data Capture and the value of data for decision-making.

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Once again, 2023 AIM was more than happy to join LogiMAT mid-April in Stuttgart, Germany. The AIM community booth was sold out, the AIDC Live Scenario "Tracking & Tracing Theater" was a remarkable success, and the AIM Experts Forum was more than well visited.

For the third year, Wireless IoT and Tomorrow took place in the RMCC in Wiesbaden. AIM members were present as experts and speakers, sponsors, and exhibitors – and, again, AIM had a booth at the show which was a great success. Furthermore #WIOT was collocated by the 50th Anniversary Jubilee Summit from AIM Global. Experts Forums, Panels, Receptions, and a Dinner Event were part of the Wiesbaden AIDC Week.

Ongoing Projects include:
- GPos: Global Positioning Group: The three associations (AIM – OMLOX & PNO/PI – OPC Foundation) have joined forces to develop a new OPC UA Companion Specification "Global Positioning". The goal is to define geometric positions in space on a local and global level to ensure a seamless transition between production, intralogistics, and logistics.
- WIPANO-II / SPOQ: Funding project on AutoID & Security: Standardised processes to guarantee product security and anticounterfeiting based on AIDC technologies – in cooperation with VDE, universities, and companies.
- The AIM Experts Group on Systems Integration now is part of a joint working group on RFID and IO-Link: the first standardised IO technology worldwide (IEC 61131-9) for the communication with sensors and actuators.

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AIM Europe had a very busy year. Together with AIM Global we appointed Olaf Wilmsmeier as our new representative within the European Standardization Bodies as well as the Expert Group consulting the European Commission on any decisions related to Radio Enabled Devices.

Concerning Cyber Security, Cyber Resilience Act, and the availability of the upper frequency band for UHF RFID, AIM Europe had to deal with many standardization groups and related stakeholder groups to ensure the best position of the AIDC industry for future technology and market developments. In the next years, a lot of activity and support from any of our members is mandatory to reach the best possible solution. We invite all our members to support our work.

We supported all activities of AIM Global to celebrate the 50th anniversary of AIM over the entire year. In October we executed the AIM Summit in Europe at the WIOT Tomorrow in Wiesbaden, Germany. We received extraordinary support from the WIOT organizers and had a great and vibrant summit. We thank all our supporters, sponsors, and members for enabling a great AIM Summit in Europe.

AIM India

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The year 2022-2023 is the birth year of AIM India. Many activities went into making AIM India an entity. The first visibility of AIM India was in November 2022 with the display at Label Expo. From November 2022 to March 2023 various certifications, government approvals, bank account, email IDs, etc. were put into place.

Finally, the first meeting of the chapter took place in March 2023. In this meeting the Board of Directors were appointed. The President, two Vice-Presidents, a Treasurer and an acting CEO were appointed. April to October monthly member meetings were held. New members have been inducted. Further organizations are being approached for membership.

In September the chapter saw the advent of its first newsletter. In October 2023 first full time secretary was appointed to make the working efficient and efforts for expansion to be multiplied.

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Signed an MOU for business cooperation with the Korea Smart City Society. This agreement contains the contents of active cooperation between the two organizations for the use of automatic recognition technology in the right place for the successful implementation of smart cities. Through this, it is expected that various AUTO-ID technologies can be utilized in the implementation of smart cities.

AIM Japan

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AIM Japan, established in 2019, continues education and training programs in AIDC for academia and end-users, and for system integrators we also started basic support, ID scheme and RFID systems, from this year.

As for academia, like previous years, we continued joint research and had presentations/awards in international/domestic conferences such as IEEE and IPSJ. With support for overseas F2F conferences, we were able to give more experience to the future talents/students for AIDC.

In terms of support for end-users and system integrators, to proceed to the next step, we started to provide basic support for the proprietary AIDC systems to standards, even though we had historical difficulty in the existing systems from the 1970s.

Furthermore, we continued our surveys on the AIDC usage in the Japanese market, it showed we still had so many companies who use proprietary id schemes in their systems even though in their latest systems with RFIDs.

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New in 2023 was the launch of a collegiate hackathon competition in conjunction with Wright State University in Dayton, OH USA. The event drew more than 100 student competitors who created solutions to some of the most pressing supply chain challenges in the food and pharmaceutical industries. The students transformed an idea into a business solution in 24 hours. A panel of judges from industry and academia evaluated submissions based on level of innovation, real-world impact, and execution. Entries ranged from first-year students to graduate students. Award winners shared $6,000 in prizes.

The chapter hosted AIM's 50th anniversary US celebration at RFID Journal LIVE in Orlando, FL. More than 160 industry constituents took part in the celebratory Partnership Breakfast. Members of the AIDC100 supported a historical artifact display filled with readers, printers, scanners, tags, books, and patents.

AIM NA work groups continue to address the needs of users/customers in the food supply chain, cannabis, UDI for medical devices, and pharmaceutical vertical markets. These groups published whitepapers/Quick Guides, developed articles for publications, and responses to the U.S. Food and Drug Administration (FDA)'s FSMA, DSCSA, and UDI regulations, conducted a number of webinars, collaborated with like-minded organizations, and identified speaking, exhibiting, and networking opportunities for members. Targeted partnerships breakfasts and Solution Showcase special editions were also initiated.

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AIM Russia membership was stable in 2023 and the Chapter continued with standardization, advocacy, and education activities.

AIM Russia, in conjunction with GS1 Russia, provides Secretariat to Russian and CIS Technical Committees on AIDC Standardization, and represents the Russian National Standards Body (GOST R) in ISO/IEC JTC1/SC 31. In accordance with the Standardization Plan for 2023-2025 experts from AIM Russia member companies continued developing CIS and national AIDC standards based on corresponding ISO standards, in particular, a national standard was approved on test methods for RFID tags performance (based on ISO/IEC 18046-3:2020).

On March 2, 2023, AIM Russia hosted a virtual meeting of Technical Committee 355 "Automatic Identification and Data Capture Techniques" and its Subcommittees, attended by 22 participants.

In cooperation with GS1 Russia, AIM Russia continues to provide expert support to the national project on the use of AIDC technologies for the identification of goods to ensure traceability and optimize business processes in the logistics supply chain. The scope of the project is expanding continuously and currently covers a wide range of food and non-food products. AIM Russia provides regular consultations and trainings for users involved in the project.

AIM Awards

Each day AIM members and partners make unique contributions to the industry and world marketplace that positively impact business and consumers alike. Annually, AIM recognizes those individuals and organizations which not only promote the advancement of automatic identification but demonstrate significant contributions to enhanced and new technologies. Meet the Class of 2023 winners:

Richard Dilling Award
2023 Recipient | Josef Preishuber-Pflügl, Innobir e.U.

Since 1984, the Richard Dilling Award is the highest award given in the Automatic Identification and Data Capture (AIDC) industry. Named for Richard R. Dilling, an industry pioneer and former Vice President of AIM, it is presented to executives, scientists, and engineers in recognition of outstanding contributions that have furthered the growth of the industry.

Ted Williams Award
2023 Recipient | Dr. Bahar Aliakbarian, Axia Institute Michigan State University (MSU)

Named in honor of Ted Williams, an industry innovator, collaborator, and long-time member of the AIM Global Technical Symbology Committee, the award was introduced in 2007 and is presented annually in recognition of innovative and exceptional contributions to the development of the automatic identification industry that can further the growth of the industry through their work as a teacher, researcher, or entrepreneur.

Don Percival Award
2023 Dual Recipient | Chipotle Mexican Grill and Gregg Gorniak, Cencora (formerly AmerisourceBergen)

The Don Percival Award was established in 1982 to honor Don Percival, an early founder and pioneer in the development of bar code scanning. The award is presented each year to an individual or organization from the user community recognizing outstanding contributions to the application of automatic identification and data capture technologies.

Clive Hohberger Technology Award
2023 Recipient | Dominique Guinard, Digimarc

Created in 2018 to honor the lifetime contributions of Dr. Clive Hohberger, this award recognizes the scientists, engineers, software developers, or systems integrators for outstanding contributions that have furthered the growth of the industry through important applications and new technological developments.

Bert Moore Excellence in Journalism Award
2023 Recipient | Steve Statler, The Mister Beacon Podcast

In 2007, the Bert Moore Excellence in Journalism Award was established to recognize a journalist or media representative in the automatic identification industry whose work exemplifies the qualities of honest, educational, and unbiased reporting of the automatic identification and mobility industry. The award was renamed in 2012 to honor the late Bert Moore, long-time AIM contributor and industry expert.

Paul Bergé International Business Development Award
2023 Recipient | Gwen Volpe, RPh, LSSBB, FASHP; Fresenius Kabi

The Paul Bergé Award, established in 2020, recognizes the extensive international AIDC business development efforts spearheaded by Paul Bergé throughout his career. Presented each year, the Paul Bergé Award will distinguish an individual or an organization that demonstrates an international impact on expanding AIDC technology awareness and implementation.

Allan Gilligan Award
2023 Recipient | Jon Gurney Bell, Jeff Walp and Darryl Forbes of the UPS Advanced Technology Group

The Allan Gilligan Award was established in 2012 to honor a revolutionary developer of supply chain standards across multiple industries. The award is given to a member of the industry who has made outstanding contributions to the development of automatic identification and data communications (AIDC) applications in materials handling and logistics in the supply chain.

AIM Case Study Competition

The AIM Case Study Competition honors leading organizations within the global AIDC community that are contributing to the faster adoption of new and innovative technologies, as well as to engage international industry collaboration while sharing success stories around applications commercially available in the marketplace today. To learn more, click on the company logo.

Blockchain Winner | Digimarc
Digimarc collaborated with IOTA, an open-sourced distributed ledger and cryptocurrency designed for the IoT, to create a Digital Product Passport (DPP) blueprint in support of some of the European Union (EU) initiative requirements including the use of open standards, decentralized architectures, and accessibility.

RFID Winner | Mojix
Mojix implemented a solution for Tosca, a returnable packaging organization, with complete visibility of their returnable transit items throughout the supply chain, enabling the company to share valuable traceability data with its customers.

IoT Winner | Shipcom Wireless
Shipcom collaborated with the South Dakota Department of Health (SD DoH) to develop and implement a digitized and automated Inventory Management Solution (IMS) to streamline the management of critical public safety teams.

We identify with success.

AIDC Winner | Cybra
CYBRA, partnered with a major healthcare services company to leverage cold-chain technology for specialty pharmaceutical products. The solution delivered an innovative "over the air" labeling solution that automated the creation of shipping labels for their client's eco-friendly Ember Cubes.

AIM's Outlook & Predictions

Nearly two dozen of the most respected thought leaders in the industry offer their predictions on what's in store for 2024.

As you read through the following commentaries, you'll note that, of course, the current economic situation is addressed by the majority of our thought leader contributors. However, while most mentioned this factor, they also offered their own insights on how the industry can work together to move past these trying times.

AIM Global

Mary Lou Bosco
CEO

Looking Ahead: AIDC Acceleration & Transition

Some of the leading events that will drive AIDC adoption in 2024 could have a much longer-term impact on the industry. We can say with some certainty that enterprise demand for more visibility, consumer desire for more transparency and regulators' requirements for more traceability will lead many enterprises to explore new uses for AIDC technologies. That exploration could be the start of a sustained adoption increase as those trends continue and many related programs expand, including electronic traceability requirements to satisfy the European Union's Digital Product Passport (DPP) legislation, the Food Safety Modernization Act (FSMA), the FDA's separate Drug Supply Chain Security Act (DSCSA) and UDI programs, a resurgence in retail RFID tagging programs, new retail product labeling standards championed by Procter & Gamble and GS1, and more. Here's a brief look at how those developments could impact the AIDC community in 2024.

Compliance is a common bond among many of the expected 2024 demand drivers. For example, Walmart, Chipotle and American Eagle are among the large chains that are known to be expanding their RFID programs and requiring tagging by their suppliers. There are also ongoing and expanding regulatory requirements that will expand AIDC use. The EU's Digital Product Passport is being phased in and has requirements that can be satisfied with barcode or RFID. Many companies that will need to comply are currently evaluating their technology strategy, so actual adoption and volume growth will likely increase more in future years. Similarly, the large-scale transition from traditional U.P.C./EAN barcodes to 2D symbols for use at retail checkout is still a few years out. Meanwhile, the DSCSA, FSMA and UDI programs are more mature, and their volumes of AIDC-identified products will continue to grow.

As these transitions occur it is easy to foresee a period where product makers, retailers and their distribution partners will concurrently use 1D and 2D barcodes and RFID tags in combination throughout the value chain. Similar transitions are already taking place in other core markets for AIDC technologies, notably manufacturing and distribution. For example, traditional barcode scanning is being supplemented with machine vision to capture more information, and AI is giving machine vision new capabilities. Barcode, RFID, vision, and robotics components are being combined for picking, put away and other warehousing operations. AIDC technologies are increasingly used within IoT systems that include sensors, cameras, and other inputs. Blockchain has its own place in traceability.

AIDC manufacturers, resellers and users should use 2024 to consider their own transitions. What role will you play in providing solutions that require more traceability and intelligence? Is a new direction for product development needed? Do you have the right products and partners to thrive as converged, multi-technology systems become more common? AIM has been helping organizations navigate the future of AIDC technologies since we were founded 50 years ago and stand ready to help you in 2024 and the following 50 years.

AIM China

Thea Zhou
Engineer

In the process of data collection, sensitive information such as private information and business secrets may be involved, which needs to be protected. With the increase of personal data protection regulations, data capture solution providers need to ensure the compliance of collecting, storing, and processing user data, and protect user privacy. At the same time, modern enterprises involve various types and formats of data sources, such as structured databases, unstructured texts, images, audio, and video. It is a challenge to effectively collect, integrate, and analyze data from these diverse sources.

With the popularity of intelligent hardware devices, more and more devices begin to generate a large amount of data. This data needs to be collected and processed by data capture technology in order to provide more abundant, comprehensive, and accurate support for all walks of life. At the same time, intelligent hardware devices also provide more possibilities for data acquisition technology, such as sensor technology and Internet of Things technology.

With the continuous advancement of informatization, the market demand for automated, high-efficiency and low-cost data collection is becoming more and more intense. As one of the most important driving forces in the field of data capture, artificial intelligence technology is constantly upgrading, which also brings more possibilities for data capture. Through machine learning and deep learning and other technical means, machines can continuously improve their data collection capabilities, while also reducing the cost of manual intervention and improving the accuracy and speed of data collection.

AIM D e.V

Peter Altes
Managing Director

The biggest threats facing data capture solution providers is the general (global) market situation; wars (Ukraine / Middle East), insecure and unstable political situations and constellations, the global supply chains, and the ongoing chip crisis.

The biggest opportunities for the AIDC-Industry are mostly related to the biggest challenges (see below): automation and autonomous processes will be an answer as well to environmental requirements as to e.g, the shortage of skilled workers. And recycling will become not only a challenge for our industry, but also a chance: AIDC-Technologies are supporting recycling solutions (e.g.: Digital Watermark / Digital Product Passport (DPP) etc.). Furthermore AIDC-Technologies will support border control and homeland security. Finally, applications for an increasingly aging population (health and care) will become growing markets. And, the growing together of different technologies – such as AIDC, AI, Robotics, 5G, LoRaWAN etc.) – will be both: a challenge and a chance. But, foremost, it needs courageous and innovative companies which are developing chances out of threats and challenges instead of complaining about the situation. And I´m optimistic: Our industry is well positioned!

The technology or service that will have the most significant impact on end user customers in the next few years is wireless technologies and `plug and play´ solutions – this means, solutions which might become easily integrated in smartphones (e.g.: multi frequency readers for HF (NFC) and UHF and scanners for Barcodes, QR Codes etc.) and which are driven by easy to use Apps (e.g. in the field of Anti-Counterfeiting) and are directly connected to the (Industrial) Internet of Things (IoT / IIoT).

For 2024 and beyond, the biggest challenge is environmental requirements, energy prices, shortage of skilled workers, EU (Cyber Security) Regulations, global frequency regulations and global standardization. But first, the markets need to calm down and recover again. New projects are needed, projects that have been postponed must become realized.

ACSIS, Inc.

David Perrine
Director Sales & Partnerships

AIDC Industry Ecosystem in 2024: Navigating ESG, Sustainability, and Regulatory Compliance

AIDC Industry Ecosystem in 2024: Navigating ESG, Sustainability, and Regulatory Compliance

In 2024, the Automatic Identification and Data Collection (AIDC) industry and its partner and channel ecosystem of resellers and solution providers is, facing not only its traditional opportunities and challenges but also the growing emphasis on Environmental, Social, and Governance (ESG) reporting, sustainability, and regulatory compliance.

There are several great opportunities and predictions ahead.

- **Digital Transformation and ESG Integration:** Providers can capitalize on the global ESG movement by offering solutions that facilitate ESG data capture and reporting. Businesses are increasingly seeking tools to monitor and report their ESG performance, creating a market for AIDC solutions that align with sustainability objectives.
- **IoT and Sustainability:** The convergence of IoT and sustainability presents a significant opportunity. AIDC solutions can enable the monitoring and optimization of resource consumption, waste reduction, and energy efficiency, contributing to sustainable practices.
- **Data Security and Regulatory Compliance:** The growing emphasis on data security aligns with regulatory compliance requirements, such as the Food Safety Modernization Act (FSMA) and the Drug Supply Chain Security Act (DSCSA). AIDC providers can expand their offerings to include comprehensive data security and compliance solutions.
- **ESG and Reporting Integration:** ESG reporting will gain prominence as a critical aspect of corporate governance. AIDC providers should anticipate the integration of ESG-related data capture and reporting features in their solutions.
- **RegTech Solutions:** AIDC providers will pivot towards Regulatory Technology (RegTech) solutions, streamlining compliance with complex regulations like FSMA and DSCSA. These solutions will encompass data capture, tracking, and reporting functionalities.
- **Sustainability as a Competitive Edge:** Sustainability initiatives will become a competitive differentiator. AIDC providers embracing eco-friendly materials, energy-efficient manufacturing, and sustainable practices will stand out.

The AIDC industry in 2024 and beyond is navigating the intricate convergence of ESG, sustainability, and regulatory compliance. Meeting these demands necessitates solutions that efficiently capture and analyze data while ensuring data security and compliance with evolving government standards.

- **Cybersecurity Risks and Regulatory Fines:** With data security and regulatory compliance intertwined, cybersecurity breaches can lead to regulatory fines and legal consequences, posing a dual challenge to AIDC providers.
- **Complex Regulatory Landscape:** The dynamic regulatory environment, including standards like FSMA and DSCSA, presents a formidable challenge. AIDC providers must remain adaptable and stay current with evolving requirements to ensure compliance.
- **Supply Chain Vulnerabilities:** Disruptions in the global supply chain can hinder AIDC providers' ability to deliver critical components, impacting product availability and compliance efforts.
- **ESG Integration:** Develop ESG data capture and reporting capabilities in your solutions to meet the growing demand for ESG reporting.
- **RegTech Solutions:** Invest in RegTech solutions that simplify compliance with regulations like FSMA and DSCSA, encompassing data capture, tracking, and reporting.
- **Sustainability Commitment:** Embrace sustainability practices, including eco-friendly materials and energy-efficient manufacturing, to align with market expectations.
- **Data Security and Compliance Focus:** Prioritize robust data security to mitigate the risks of cyberattacks and regulatory non-compliance. Stay adaptable to evolving regulations.
- **Collaboration and Knowledge Sharing:** Collaborate with industry peers, regulatory bodies, and compliance experts to stay informed about regulatory changes and best practices.

In conclusion, the AIDC industry in 2024 is not only about seizing opportunities and mitigating threats but also adapting to the demands of ESG reporting, sustainability, and regulatory compliance. By proactively addressing these aspects, AIDC providers can position themselves as trusted partners in an era where data accuracy, security, and compliance is paramount to businesses across industries.

Aware Innovations

Chuck Evanhoe
President

Automatic identification and data capture (AIDC) technologies are critical to enabling the future of the internet of things (IoT) and digital twin. IoT is being recognized as a key driver in producing "big data" and then needing "artificial intelligence" to help take action on the data. These will enable digital twin to be effective in helping across the whole manufacturing lifecycle, from designing and planning to maintaining existing facilities.

We also see interfaces with the distributed ledger technologies, e.g., blockchain, developing soon as a validator of IoT transactions, as well as with Cloud Computing for the inclusion of cloud provisioning of IoT services. Again, AIDC will be the key enabler for effective use of these services.

Another emerging trend in a relevant area is Smart Cities. We believe that this work is directly related to IoT and will need automatic identification of "things" to work effectively. This will need to be a focus for the AIDC industry going forward.

Despite these industry drivers, the uncertainty in the world economy and geopolitical conflicts will impact the market opportunities for AIDC. However, in both very good times and very bad times, automation is the key to continued operations. Therefore, we see that the lack of human resources will continue to drive the AIDC market.

BlueStar

Dean Reverman
Vice President Marketing

John Martin
Content Marketing Manager

Looking ahead at what to expect and where to focus in 2024 is as simple (and as complex) as revisiting some of the most significant talking points in 2023: Labor, AI, and Robotics. These topics have plenty to discuss individually but inevitably weave together into a broader story about the future of AIDC and the supply chain.

Labor is the main issue today and will be for the next few years. The ripple effect from COVID is still being felt, along with more empowered workers and competition. No industry is immune, but we view this as an opportunity for our channel, which delivers efficiency and technology-powered solutions that seek to augment workers, automate redundant tasks, and help businesses do more with less while addressing employee burnout and creating engaged workplaces.

AI is everywhere in conversations and planning, but execution has yet to be fully realized. The foundations are there, and we're seeing a rapid influx of startups and existing infrastructure investments to prepare for a predictable wave of AI-based solutions. Now is the time for VARs and SIs to develop their ecosystem of partners that will enable explosive growth likely to begin in the next 2-3 years. AI will directly impact labor and dramatically improve data capture, giving businesses that embrace it a dramatic market edge. This is a clear example of a situation where you do not want to be playing catch up.

Despite what most science fiction or technophobes may tell you, robots are our friends. Labor constraints in the supply chain, in particular, can be tackled with automation that makes warehouse processes faster and each worker more productive. Robots can facilitate that, eliminating wasted time, steps, and processes and helping address a never-ending consumer demand to be faster and better than before. The channel continues to develop a play with robots. While the opportunity may only be suitable for some, VARs and SIs with the commitment and discipline to establish RaaS (Robots-as-a-Service) solutions will reap considerable benefits in the future, enabling immediate ROI for existing labor gaps in the budget.

Hardware supply chain is back to normal ranges, with a modest expected growth in demand. A bright spot? Zebra's 2023 Warehousing Vision Study indicated that decision-makers expect the size and number of facilities to expand, and they are preparing for that by accelerating modernization timelines and funding, but deals seem to be pushed due to economic conditions and a general fear of adopting "unproven" solutions. While interest rates may decrease slightly in 2024, financing is still expensive. It is critical to look to your channel distribution partner to assist with financing options like a Hybrid SaaS model to offer flexibility for end users while addressing both CapEx and OpEx needs. Meanwhile, utilizing the channel to build a partner-assisted ecosystem will give you the foundation to provide solutions that are indeed reliable and replicable (but still customizable to a customer's specific needs) and deliver on the next generation of innovation.

Digimarc

Dominique Guinard
VP of Innovation

Product digitization is a vital piece of a modern business toolbox. It provides more transparency into the product lifecycle, helps brands shine a light on the dark corners of the supply chain, and reveals consumers' behavior. In 2023, we witnessed an exciting development with consumer brands and retailers stepping forward to lead the industry conversation, demonstrating why product digitization is required in today's global economy.

In 2024, I predict consumer brands and retailers will adopt product digitization platforms at scale. Related, there will be significant advancements in transformative Automatic Identification and Data Capture (AIDC) solutions powered by innovative technologies and standards. The following summarizes what we can expect across industries in the coming year.

Advances in Factory Automation

2024 is likely to see improved detection efficiency in production, fulfillment, distribution, and recycling facilities using digital watermark-powered automatic identification compared to traditional 1D or 2D barcode symbology or vision systems. Improved detection will address business challenges in the following environments:

- Parts Matching (or Anti-Mixing): Automating anti-mixing quality control checks in manufacturing facilities to prevent incorrect matching of finished product components or mislabeling.

- Packaged Goods Processing: Automating the processing, sorting, and shipping of packaged goods to fulfill orders from production and fulfillment to distribution.

- Packaging Recycling: Automating the identification of packaging materials entering material recycling facilities (MRF) to generate sustainability metrics.

- A video is worth 1000 words. You can observe the technology in action here (https://vimeo.com/882311674/d5138a8cbe?share=copy).

The Sunrise of 2D Codes

We predict consumer brands and retailers will fully embrace product digitization as a business strategy – transitioning from 1D barcodes to 2D codes and from numeric identifiers to web identities. Five years ago, we contributed to the release of the GS1 Digital Link standard, which promised to disrupt the consumer goods industry for the better by allowing products to be digitized at scale – transforming the way brands and consumers interact. GS1 Digital Link upgrades the 1D barcode used by over two million manufacturers on more than four trillion product items yearly. Every product can now connect to the web, be smartphone interactive, and transact with point-of-sale systems. New 2D codes encode GS1 Digital Link.

Over the past five years, the standard has gained momentum, with the industry setting ambitious goals for wide adoption, including setting a date for 2D to be ready at point-of-sale, referred to as Sunrise 2027.

GS1 Global

Kevin Stark
Senior Director, Innovation

Innovation in a world of continuous disruption

Uncertainty. That one word captures the continued disruption we've seen over the past few years, despite a waning global pandemic: global inflation worries, climate change driven extreme weather events, financial instability due to inflation and interest rate fluctuations, as well as increased geopolitical tensions. Yet, in light of these uncertainties, there is accelerated investment and commitment to combat climate change and improve corporate sustainability. According to Deloitte in their survey of 2,000 corporate executives across 24 countries, 78% are optimistic that steps being taken can help avoid the worst impacts of climate change and 84% believe economic growth can be achieved while also reaching climate change goals.[1] Complementary to the global focus on sustainability initiatives is an increased emphasis on circular economy practices to improve the collection, recycling and reuse of goods and their materials.

While analyzing these and other business trends, the rapid advancement of technologies that can serve to accelerate these business trends is also an essential focus. While 2022 was the year of hype around the Metaverse, 2023 has become the year of massive hype for artificial intelligence (A.I.) after the public launch of ChatGPT 3.0 in November 2022.[2]

As we continue to evaluate trends impacting the future of the industries, the themes of Flexibility, Collaboration and Innovation are strong principles that will guide companies through periods of uncertainty.

Flexibility

Up and down the supply chain, companies need to continue to look for new ways to be nimble against small and large disruptions. Supply chain digitalization – a new trend featured in this report – is key to gaining visibility into new insights that allow companies to adapt and compete in an ever-changing global landscape.

Collaboration

Distributed hybrid and remote workforces have challenged companies to evolve their approaches for ensuring strong collaboration. Additionally, workforce demographics are shifting dramatically: Generation Z workers (those defined as being born after 1997) will make up 30% of the global workforce by 2030.[3] Throughout the COVID-19 pandemic, proficiency in leveraging connectivity and cloud-based tools aided in connecting people-to-people, systems-to-systems and people-to-systems.

Innovation

Continuous improvement and reinvention through innovation has never been more important. In fact, over 50% of the Fortune 500 companies in the year 2000 have either gone bankrupt, been acquired, or ceased to exist.[4] But how can you innovate effectively and stay ahead when everyone else is doing it too? It all comes down to effective problem-solving: knowing how to choose the right problem, deciding what impact solving that problem will have and, most importantly, leveraging internal and external talent, resources, and solutions to create new opportunities for innovation and growth.[5]

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Sheila Marino Gill
National Strategic Channel Manager

Navigating Efficiency: The Future of Honeywell's AIDC Solutions

Honeywell's foray into the realm of Automatic Identification and Data Capture (AIDC) has been nothing short of transformative for industries reliant on streamlined data management and operational efficiency. As we peer into the future, the outlook for Honeywell's AIDC solutions is both promising and pivotal in shaping the landscape of data-driven industries.

Revolutionizing Data Management: Honeywell PSS technologies like barcode scanning, mobile computing, and RFID (Radio Frequency Identification), have played a crucial role in revolutionizing how businesses manage and utilize data. Looking forward, we can anticipate an even more profound impact as these technologies continue to evolve.

The integration of artificial intelligence and machine learning into AIDC solutions is set to enhance data processing capabilities. This advancement will not only improve the accuracy and speed of data capture but will also enable businesses to derive valuable insights from the vast amounts of data generated in real-time. As industries become increasingly data-centric, Honeywell's AIDC solutions will be at the forefront of empowering businesses to make informed decisions efficiently.

Mobile Computing and Connectivity: The proliferation of mobile devices in the workplace has reshaped how businesses operate, and Honeywell is well-poised to leverage this trend in its AIDC solutions. The future is likely to witness a seamless integration of mobile computing and AIDC technologies, allowing for enhanced connectivity and mobility in data capture processes. Even as robotics increase in warehouse applications, Honeywell solutions are utilized at every corner.

With the advent of 5G technology, the speed and reliability of data transfer will reach unprecedented levels. Honeywell's AIDC solutions can capitalize on this by providing real-time data access, enabling businesses to operate with unparalleled agility. Mobile devices equipped with advanced scanning capabilities will empower workers with the tools needed to efficiently manage inventory, track assets, and streamline workflows on the go.

Elevating Supply Chain Efficiency: In an era where supply chain resilience is of paramount importance, Honeywell's AIDC solutions are positioned to be instrumental in enhancing efficiency and visibility. The integration of AIDC technologies with cloud-based platforms and analytics will enable businesses to gain real-time insights into their supply chains.

Predictive analytics, powered by Operational Intelligence data, will play a pivotal role in anticipating and mitigating potential disruptions in the supply chain. This foresight will be crucial for businesses looking to optimize inventory management, reduce lead times, and ensure the smooth flow of goods from production to delivery. As supply chains continue to evolve, Honeywell's AIDC solutions will be a cornerstone in fortifying their foundations.

Challenges and Opportunities: While the future for Honeywell's AIDC solutions looks promising, challenges such as cybersecurity threats and the need for standardization in data formats may arise. Honeywell's ability to proactively address these challenges and adapt to evolving industry standards will be critical in maintaining its position as a leader in the AIDC space.

In conclusion, the outlook for Honeywell's solutions is one of continued innovation and impact. The convergence of AIDC with emerging technologies, coupled with a focus on mobile computing and supply chain optimization, positions Honeywell at the forefront of shaping the future of data-driven industries. As businesses strive for efficiency and agility in an increasingly digital world, Honeywell's solutions are set to play a central role in enabling them to navigate the complexities of the modern business landscape.

Laxcen Technology/AIM Asia

Anna Lau
CEO/President

In 2024, the Automatic Identification industry is likely to face both opportunities and threats, with certain predictions shaping its landscape. As the president of AIM Asia, I would like to share some views focusing on Asia side.

I believe there are still a lot of opportunities, especially from the five areas such as E-Commerce, IOT and Industry 4.0, emerging markets, government initiatives area and retail and hospitality.

For E-commerce growth, Asia is experiencing rapid e-commerce expansion, creating significant opportunities for automatic identification technologies. Efficient supply chain management, order fulfillment, and inventory tracking will be in high demand. About IoT and Industry 4.0, the adoption of IoT and Industry 4.0 concepts in manufacturing and logistics will drive the need for automatic identification systems to enable seamless data collection and process optimization. As emerging markets in Asia continue to develop, there is a growing need for efficient and accurate identification systems, especially in sectors like healthcare, agriculture/food traceability, aviation, and transportation. In the areas of Government initiatives, governments in Asia are investing in smart cities, digital transformation, and infrastructure development, providing opportunities for automatic identification technologies in areas like aviation, transportation, access control, and public services. The retail and hospitality industries in Asia are expanding, offering opportunities for automatic identification systems to improve customer experiences and streamline operations.

Of course, there are threats for AIDC industry too. Data Privacy Concerns in Asia has seen an increasing focus on data privacy and cybersecurity. Automatic identification systems may face threats related to data breaches and regulatory challenges. And the competitive market: The industry is highly competitive, with local and global players vying for market share. This competition can lead to price pressures and the need for innovation to stay relevant.

In the predictions, biometric adoption such as facial recognition and fingerprint scanning, will see increased adoption in Asia for applications in access control, payments, and security. There is an increased demand for traceability: Growing concerns about product authenticity, safety, and sustainability will drive demand for advanced automatic identification systems. Industries such as food, pharmaceuticals, and aerospace will require robust traceability solutions. In the wake of global disruptions, there will be a heightened focus on improving supply chain resilience through enhanced tracking, traceability, and automatic identification systems. And governments across Asia are likely to introduce or update regulations related to automatic identification, particularly in areas like data protection and consumer rights. In addition, there will be a growing emphasis on sustainable and eco-friendly automatic identification solutions, driven by environmental concerns and government incentives. Automatic identification technologies will increasingly be integrated across industries, creating more versatile and interconnected solutions. Also, it will extend to rural and remote areas in Asia, improving access to services, healthcare, and education.

In 2024, the Automatic Identification industry in Asia is poised for growth and innovation, driven by technological advancements, economic expansion, and government initiatives. However, it must also address challenges related to data privacy, cybersecurity, and competition to maintain sustainable development.

Loftware

Josh Roffman
SVP Marketing & Product Management

In an era characterized by rapid technological advancement, it has become increasingly apparent that cloud technology stands on the frontline of innovation, poised to transform the way businesses and end-users experience and interact with digital services.

As we look ahead to 2024 and beyond, the omnipresence of the cloud, coupled with its ongoing evolution, holds the promise of reshaping not just the technology landscape, but also the very essence of how companies harness the power of data and computing. One area undergoing such a transformation is labeling.

The future of labeling lies in the cloud

Cloud adoption is proving to be the cornerstone of impactful digital transformation programs, as evidenced by the strong feedback we have received from our customers and partners. Among the many benefits on offer, cloud technology provides quick deployment times, lower upfront costs, easy access, the ability to scale, and automatic updates.

This trend is backed up by the research: According to Gartner, more than 50% of enterprises will use industry cloud platforms to accelerate their business initiatives by 2027. Furthermore, our 2023 'Top 5 Trends' survey revealed that nearly three-quarters (71%) of business leaders believe the cloud or a hybrid solution will be their preferred deployment method for labeling within the next three years.

Enabling traceability for greater supply chain efficiency

One area in which cloud-based labeling will play a vital role in the coming years is its capacity to establish and promote a transparent and sustainable supply chain. According to a 2022 EY study, not only do supply chains account for more than 90% of an organization's greenhouse gas emissions (GHG), but also 50%-70% of their operating costs. So, how do companies go about solving this issue?

Part of the equation is around how social, ethical, and environmental performance factors into the process of selecting suppliers. With sustainability at the forefront, digital traceability can help companies deliver on their environmental commitments. Being able to trace products both upstream and downstream will become important for managing the product lifecycle and ensuring sustainable sourcing.

These intelligent supply chains can track, trace, and authenticate products at every stage of the journey, from raw materials to consumer goods. Additionally, cloud-based labeling solutions reduce inventory, eliminate a large global footprint, and ensure that all products are made, shipped, and delivered to the right place, thereby avoiding unnecessary loss and waste.

As companies of all sizes strive to drive growth, green their operations, and streamline processes, we expect to see a growing number of forward-thinking organizations adopt the cloud for mission-critical business processes including labeling.

RAIN Alliance

Aileen Ryan
President

The RAIN Alliance is a consortium of companies that together want to create a smarter and more sustainable world by using RAIN RFID to connect trillions of everyday items, across an item's entire lifecycle, simply and inexpensively.

For me, the topic of sustainability offers the single biggest opportunity that we have. In fact, I don't regard this as an "opportunity" so much as an "imperative". I believe that as an industry, we MUST do everything we can to:

1. Firstly, ensure we do no harm
2. Secondly, do whatever we can with our technologies, solutions and the supporting standards and guidelines, to enable our members, their customers, and their customers' customers to minimize their impact on our planet.

And I regard this as not an imperative for the far distant future. Rather, it's a challenge we need to be addressing right now, together.

I am encouraged to see many initiatives paying attention to this topic.

Legislation is emerging globally related to waste, recycling, circularity, and safety – driving us in the right direction. We must collectively engage to ensure there is standardization across these legislative initiatives, so that we can build scalable solutions that can be deployed globally.

Many of our AIDC industry associations already have Working Groups focused on this topic. Some are tracking and influencing legislation. Others are identifying opportunities for technical advancement and solution development in response to the emerging legislation. More are producing proof of concepts and guidelines showing exactly how our technologies can provide quantifiable benefits in the sustainability space.

And amongst our membership bases, it's truly inspiring to see the level of commitment there is to sustainability. Many of our members have committed to science-based targets and have ambitious internal programs to reduce their scope 1, 2 and 3 emissions. Others are already measuring how their solutions are enabling their customers to reduce waste, enable better recycling, create rental and re-use markets for their goods, and ensure the correct disposal of items at their end of life.

As the RAIN Alliance enters its 10th Anniversary year in 2024, I look forward to working collaboratively with our AIDC community to seize this opportunity, ensure these initiatives grow, and collectively deliver a significant, positive impact that we can all be proud of.

Seagull Scientific

Ian Einman
Chief Technical Officer

The era of 2D barcodes

The AIDC industry has been working toward the conversion from 1D to 2D barcodes for a few years now, building a technological infrastructure to support the transition — BarTender has included "one-click" Digital Link encoding since 2018, and our hardware partners have been building scanners and printers to facilitate this change.

But the GS1 Sunrise 2027 initiative marks an inflection point. The retail and logistics verticals are now grappling with the nuts and bolts of a mandate to migrate from a UPC-based retail supply chain to one that runs on 2D web-enabled codes.

While industry works through the challenges, it should not lose sight of the tremendous opportunity this evolution in data carriers presents. Web-enabled 2D codes provide the ability to capture and convey information in real time for every individual item in the supply chain: data that consumers want including allergen, nutrition, and provenance; data to expedite recalls like handling, chain of custody, lot and batch; and the item's most current location and states.

Digital connections to the physical world are going to become expected, not exotic.

RFID as an enhancement, not a replacement

New encoding schemes (TDS 2.0, for example) are being implemented so that RFID can also carry the same data payload as 2D barcodes, enabling the physical – digital (or "physical") connection.

Rather than becoming a replacement for barcodes, though, RFID is used as a complement. By encoding RFID and printed data carriers with the same information — in the case of Digital Link, pointing them to the same web resolver — each node of the supply chain can access identical, real-time product data in the most efficient way. Bringing a pallet into a storage facility? Its location is logged via RF interrogators at the dock door. Stocking shelves with a case from that pallet? Purchasing an item from that case? A barcode scan at stocking or point-of-sale records that.

Using the two technologies in tandem builds real interoperability into the supply chain.

Seamless experiences across devices

Industry is just beginning to appreciate the benefits of labeling in the cloud: the resources required to manage infrastructure are vastly reduced; centralized access and management creates efficiency and flexibility; and fifth generation cellular (5G) enables design and data access from anywhere.

Cloud customers expect a seamless experience, wherever in the world they are, and it's a mistake to assume that everyone is working from a Windows device. Labeling needs to be device agnostic, accommodating the user's preference. Zebra and Android devices are common in the field and in the warehouse, and our customers expect to be able to work with their labeling where they are.

Are we headed for a day when end-to-end label design and data integration happen on smart phones? Probably not. But the power of cloud computing includes putting the convenience of simple tasks like workflow approvals and minor edits in the hands (or pockets) of users, anywhere, any time.

SpotSee

Tony Fonk
President & CEO

The world of AIDC is changing fast. 2023 was a hangover year as supply chains "destocked" after a robust and supply constrained 2022. Fortunately, it appears markets are starting to normalize.

Track and trace regulations are growing around the world, which will be a tailwind for the industry going forward, most recently with the US Drug in the Supply Chain Security Act (DSCSA) in November 2023. Given that the USA represents over 50% of the global pharmaceutical demand, these regulations will impact global pharmaceutical supply chains, not just the USA. Most importantly, these regulations pave the way for standardized track and trace at a "saleable unit level" that is interoperably shared across supply chain participants, creating a supply chain information highway that can and will be applied to multiple industries in the future. It is already happening. For example, in 2026, the US Food Safety Modernization Act will utilize similar methods for gathering (2D Code) and communicating (interoperability) supply chain information such as recalls and even point of origin for food.

Standardization and interoperable information sharing will also start to drive supply chain benefits that extend beyond just protecting patients from counterfeit products. For example, recent changes to the DSCSA guidelines define pharmaceuticals that have had a temperature excursion that could affect efficacy of medicines or cause other harm as "unfit for distribution" under the law. Given the issues with temperature sensitive pharmaceuticals, it is only a matter of time before enforcement begins.

Fortunately, new technologies are emerging that leverage the 2D codes, RFID, or other low-cost standardized track and trace methods to detect and communicate temperature excursions or other changes in environmental conditions that may affect fitness for use by end users. These innovations will only expand the value proposition of track and trace and increase the return on infrastructure investment.

Best of all, technologies are starting to combine to bring traceability down to a consumer level – which is very important in the growing ship-to-home economy. For example, combined RAIN (UHF) and NFC RFID chips enable consumers to provide supply chain feedback via their mobile phones using NFC. Imagine a patient receiving their medication where the temperature is compromised. A tap of the phone reads the information and sends the feedback to the rest of the supply chain all the way back to the pharmaceutical manufacturer. Meanwhile, distributors, manufacturers, and last mile carriers (such as UPS) can utilize the RAIN (UHF) functionality for fast, automated shipping, receiving and cycle counting. This is also true with the use of QR codes and mobile phones with 2D code reading capability (all Android…iPhones still require an app). As products continue to adopt these standardized track and trace technologies, supply chains and consumers can be smarter about the origin, status, and condition of the products they receive on their doorsteps. This will propel our industry to the next level. Get ready!

TSC Printronix Auto ID

Chris Brown
RFID Program Director

The biggest threats facing data capture solution providers are weak economic conditions, supply chain issues and complex regulatory environments.

Data capture solution providers rely on a healthy economy to power their customers. If the end-user customer base is facing weak demand from their customers, this translates into reduced demand for data capture solutions. Many believe that 2024 will be a challenging year for the general economy, which may translate into weak demand for AIDC products and services.

Although most of the critical supply chain issues have been resolved, their effects have not been completely worked out. 2022 was a banner year for the AIDC channel as supply chains came back online. However, many AIDC providers and end-users "overbought", creating an inventory glut for many AIDC products.

Complex regulations are both a threat and an opportunity for data capture solution providers. They are a threat in that solution providers expose themselves to liabilities if they make an error. Solution providers must invest heavily into unraveling and understanding all the nuances involved to ensure they offer compliant solutions. Conversely, regulations and mandates are an opportunity for the AIDC channel, as capable, competent solution providers can provide a genuine value-added service and gain a competitive advantage.

From a technological perspective, RFID is a major opportunity for 2024. Retailer mandates are in full swing, and solution providers are now well poised to help their customers comply. Additionally, RFID is gaining traction in the Food and Healthcare industries. RFID implementations will not be large-scale in 2024 for Food and Healthcare, but there will be numerous proof-of-concept and pilot implementations. Additionally, RFID products and the requisite skillset have matured sufficiently for RFID to become commonplace as an Asset Tracking solution.

Regulations and mandates can be viewed as a major opportunity for the AIDC channel. Buzzwords such as FSMA 204, DSCSA, Retailer mandates, and ATA Spec2000 all need to be decoded by our channel. Resellers who can clearly explain the requirements to their customers, explain how AIDC solutions can help flip the switch from non-compliance to compliance, and finally implement such AIDC solutions will have numerous opportunities in 2024.

The ability to implement standards-based solutions is another opportunity for 2024. Regulations and mandates do not work unless trading partners and regulatory authorities are using the same standards. This may sound obvious, but the reality is that many standards are not clearly understood, and other standards are not yet fully developed. Data capture solution providers who can implement standards-based solutions – and explain the standards in use – have a major competitive advantage for 2024 and beyond.

RFID has crossed multiple critical thresholds in terms of cost, ease-of-deployment, functionality, and market acceptance. End-users are getting the message that RFID does work and, if implemented correctly, can have a significantly positive ROI.

In connection with RFID, we have significant improvements in their associated standards. Historically, RFID adoption has been hampered by a lack of maturity in RFID-related standards, but we have crossed a threshold in this area too. Standards are no longer an obstacle; standards are now a driver of RFID adoption.

Finally, "trend setters" like Walmart and Chipotle and regulatory authorities are now factoring RFID into their labeling requirements and guidelines. We do not have RFID regulations connected with Food or Pharma yet, but don't be surprised if we do in a few years. In any case, numerous entities that generate labeling requirements are now on board to some extent or another for RFID. Over the next few years, this will drive the adoption of RFID.

Wiliot

Steve Statler
Chief Marketing Officer

The Biggest Opportunities Facing Data Capture Solutions Providers In 2024?

The biggest opportunity for our ecosystem is "ambient IoT", a segment that almost everyone reading this has been preparing for (whether they know it or not) and can participate in, that is vaulting on shoulders of the hard slog that has been invested for decades by the players in the UHF RFID IoT ecosystem.

Beyond the work by some of the early adopters, some of the largest retailers, a postal service and major airline, using the first ambient IoT tags (>150m of them last year), 2023 saw momentum build in the standards that will provide the common set of rails for this ecosystem to grow beyond billions to trillions of connected things. This scale was implicit in the original vision of IoT, an internet that went beyond just expensive things to include the everyday things that are the life blood of our economy and daily lives.

When we open the gates and apply the power of the cloud and (generative) AI to packaging, food, clothing, medicine, luggage we reclaim this vision. But as we metaphorically go from using flashlights in darkened rooms to turning on the lights everywhere, the visibility we enable will not be just in parts of the supply chain but end-to-end through the entire product lifecycle. At this point, the internet of things will be truly ambient.

By ambient we mean everything all around us talking to most of the radios that surround us. The key difference between the first wave of mass deployed electronic auto-ID, is the use of the commodity radios that are in every phone, smart speaker, car, Wi-Fi access point, TV; every device that has a Bluetooth, cellular or Wi-Fi chip in it. That's ambient IoT.

In 2023 large numbers of engineers have been doing the hard work of architecting extensions to 5G Advanced and 802.11 to enable more of those devices that surround us to talk to low-cost tags that resemble RAIN RFID but have more compute, security, and sensing, and are pushing data out to the cloud without the labor required to tap or scan. Bluetooth is already powering the version of ambient IoT that we are deploying today, but this standard too may evolve further to reduce friction and cost, opening the technology and making deployments more plug-and-play.

At one level there are a myriad of use cases enabled by ambient IoT, but fundamentally one can look at it as one change, running our businesses and our lives knowing, to quote the Oscar winning movie - where is "everything, everywhere, all at once". How did we get this far without being able to do this effortlessly? We will look at the days before ambient IoT rather like we do at the days before the Internet itself.

There is still a lot to do, a lot to learn, but anyone that has been immersing themselves in serialization, RF or data capture standards has a head start on a new wave of auto-ID that can unlock huge value, savings and profits , with what I believe will prove to be our most potent weapon for reducing waste, crime, food safety issues, health care inefficiencies, supply chain issues and the climate crisis.

Wilmsmeier Solutions

Olaf Wilmsmeier
Founder & Owner

The world needs AutoID - or does it?

In my role as the AIM delegate for standardization topics with a focus on European standardization activities, I can directly emphasize that the opportunities for the AutoID market outweigh the risks. Depending on the AutoID technology, there are certainly current challenges. For example, the frequency harmonization of the UHF RFID spectrum here in Europe - unfortunately, not all European countries have yet cleared the way for the use of the 915 to 921 MHz frequency range - which would be a benefit for global logistics chains, as all countries worldwide would then support this frequency range. In addition, some frequency bands are also desired by other technologies. We must be careful here to ensure that AutoID applications continue to enable the globally established applications in the usual way in the future. Co-existence of the individual technologies must be guaranteed - standardization is also a key issue here.

Digitalization and automation continue to advance. AutoID is a basic technology for achieving this. The industry is growing. Initiatives such as the European Green Deal include many ideas that cannot be realized without AutoID. Just look at topics such as Digital Product Passport, Product Carbon Footprint or Asset Administration Shell - without AutoID technology, none of these requirements can be implemented effectively, if at all.

In addition, the merging of AutoID technology with the sensor world results in completely new applications. AutoID in combination with sensor technology is becoming more and more established – mainly RFID based. The possibilities have not yet been exhausted. Passive solutions in which sensors are powered by energy harvesting from the RFID field are particularly interesting, but semi-active systems in which only the radio transmission is passive, without a battery, are also gaining ground. I am delighted to be able to drive this exciting topic for AIM here in Germany as head of the relevant working group.

In addition to the general global economic situation, which will certainly be felt by the AutoID and digitization industry, some important and far-reaching requirements in cyber security will take effect in the coming months and years. In Europe, for example, the amendment to the RED, which will take effect in August 2025, or the subsequent Cyber Resilience Act (CRA). The CRA will affect all digitalization products, not just radio devices, and includes far-reaching requirements for cyber security and maintainability over the life cycle of products. All providers need to take this challenge seriously and address it now to be prepared for the future.

Will the world still need AutoID in the future? The answer is, of course, more than ever! As mentioned above, AutoID is and will remain an important basic building block for implementing future-oriented automation solutions and environmental standards.

Zebra Technologies Corporation

Michael Fein
Director of Product Management, RFID, and Advanced Location Technology

2023 was not just another year of RFID growth. In our view it marks the begging of a new, accelerating phase of adoption. We saw milestone deployments from several blue-chip organizations in key verticals. With tag silicon supply challenges squarely in the rear-view mirror, use-case expansion and innovation returned. A major T&L carrier deployed RFID across their full network for package-level visibility. In retail, adoption of RFID for apparel inventory continued to expand and a major retailer expanded source tagging to include general merchandise. In food and restaurant, a major chain began requiring suppliers to source tag fresh foods and we're seeing initial adoption of the new GS1 DSGTIN+ that includes important date and lot traceability data within the tag data. As demand for visibility grows - for items, packages, cases, pallets, containers, assets, etc. - it will take all of us in AIDC to continue to partner and collaborate.

It's hard to believe that 2024 will mark 20 years since GS1's first publication of the EPC "Gen2" protocol. While no longer a "new" technology, there's so much innovation in use cases, readers, tags, data standards, software solutions, etc. -- that RFID is entering a modern era. A new stage of growth lies ahead of us where RFID will become even more ubiquitous and impactful to the world than was envisioned nearly 20 years ago. I hope that all AIM members share Zebra's excitement about the opportunity ahead!

Zugang Technology Connections

Scott Austin
CEO

Our industry has been blessed over the last 4 years by the enormous update of our technology by end users who wish to benefit from the efficiency, trust and transparency that is brought to fruition through deployment. This could be the uptake in new industries such as RFID in the cannabis supply chain, the expansion of RFID deployment with the largest retailers in the world, or the at scale implementation of QR, data matrix and 2D barcode technology supported by ever increasing standardization often through AIM's engagement and council.

We have seen normal cyclical activity in the RFID and NFC world as the market comes off the boil, demand decreases, stocks are high and price pressures – well, aren't they supposed to reduce in such environments?

So that's our challenge in 2024 – times are tougher, demand reducing and, one would expect prices for deployment, should start decreasing. This, however, will impact margins that industry may have enjoyed in stronger times.

The opportunities facing data capture solutions providers are value added in nature and the fact that the value proposition from the enormous deployments over the last few years have been proven which will hopefully lead to broader adoption by new verticals and by more players in the existing verticals already using auto id at scale. Industries such as the food, automotive (EVBs) and pharmaceutical verticals are looking to achieve greater transparency and efficiency not to mention support legislated initiatives around trust. So, the opportunity in 2024 is new adopters under well-structured and often legislated requirements e.g., DSCSA by the US, Food and Drug Association or the European Union's Product Passport initiatives.

As far as the technology or service that will have the most significant impact on end user customers is the obvious cliché; Artificial Intelligence and to some extent this may be so, but, and a big but, it is legislation, trust and transparency that will drive Auto ID adoption over the next few years. This will be supported by the changing internet where yes, AI, blockchain (smart contracts) and machine vision will underpin a connected world like we've never seen before.

In these times, our industry's biggest challenge in 2024, is often the smaller companies that suffer as the large global organizations have the capacity to flex their muscle when there's not a lot to go around. Smaller players in industry can address this through innovation, agility, and smart focus on their strengths. AIM participation is a worthwhile play for smaller players in 2024 as the exposure and networking supported through AIM membership can prove invaluable.