NIEM Business Architecture Committee (NBAC)
Fiscal Year (FY) 2017 Annual Report

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Executive Summary

NBAC Members and Stakeholders,

FY17 is in the books and went down as a terrific growth and maturation year for the NIEM Program. First and foremost, we want to thank all those who have contributed to the ongoing development and advancement of NIEM, and the NBAC members who have exhibited tremendous commitment to ongoing collaboration, cross-organizational dialogue and an unyielding focus on results.

The NBAC in partnership with NIEM Program Management Office (PMO) delivered NIEM Major Release version 4.0 in July 2017 that provided updates to the Core and 14 Domain namespaces, including new content from the Agriculture domain, and consolidated Child, Youth and Family Services content into the Human Services domain. Additional updates are planned for NIEM version 4.1 in FY18.

Working collaboratively with NIEM Communities of Interest (COIs) and with the support of the NIEM PMO, the NBAC approved the establishment of the Agriculture and Human Capital domain, while also supporting the re-launch of the Health domain. Congratulations to the U.S. Department of Agriculture and Department of Defense for being the FY 2017 Best of NIEM Award winners.

After reviewing the NIEM Domain Self-Assessment Performance Scorecards, the NBAC published our Strategic Roadmap to improve NIEM adoption and implementation through outreach and continued program expansion, with plans to refresh the stewardship and management of stagnant domains, and further advance international participation.

To expand the utility of NIEM data sets to a larger global audience, the International Tiger Team, initially launched in late 2016, made progress in harmonizing US-centric definitions with international data models. This work is expected to continue in FY18 with a focus on engagement and inclusion of international exchange partners within the NIEM development process.

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<tr><td>Kamran Atri</td><td>Ryan Schultz</td></tr>
<tr><td>NBAC Co-Chair</td><td>NBAC Co-Chair</td></tr>
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Current State of NIEM

The NIEM Program has made tremendous strides in recent years with strong guidance from NIEM PMO, active business and technical committees, effective tiger teams and technical support, increasingly robust domains and ever evolving data models. From a macro Program perspective, NIEM has matured, evolved and expanded across multiple operational fronts.

Program Maturation

NIEM has been incredibly impactful in the Federal public sector and is beginning to gain traction in other arenas, including state, local, and international. NIEM brings its resources, platforms, communities and technical prowess to a much broader audience reducing barriers to information exchange and unleashing the potential of rapidly advancing technology.

Program maturation solidifies policies, processes, platforms, tools and community engagement practices. NIEM continually works to refine, streamline and broaden (where warranted) our reach and capabilities. Credit should be given to the PMO, NTAC, and NBAC stakeholders for their intentional focus on results and enhanced offerings.

Program Evolution

The NIEM Program promotes a concerted community effort to fill gaps, increase adoption, ease implementation, address technical and community issues, and solve problems across business sectors at every level. FY17 evolution included new domains, new faces in old domains, new tools and new communications platforms. The NBAC Strategic Roadmap describes the way forward for NIEM to support the evolving needs of users and stakeholders to improve information sharing.

Program Expansion

Program expansion goes hand-in-hand with evolution, as NIEM blends new and enhanced functionality with an ever increasing roster of users, stakeholders and advocates. The addition of multiple domains in FY17 speaks to an increased traction within the public sector. This is driven by need, familiarity, efficiency gains, and community mandates. With each new domain and member, we gain more knowledge, grow stronger and are increasingly capable of achieving higher level information sharing goals. The continued focus on grass roots state and local growth, coupled with enhanced international utility and inclusion put NIEM in a position to continue its expansion in FY18 and beyond.

Figure 1 shows how NIEM has expanded by adding new domains during the version releases. There are currently 14 domains that maintain reference schema content.

NIEM Version – Domain History

1.0 2006	2.1 2009	3.0 2013	3.1 2015	3.2 2016	4.0 2017
Emergency Management

Immigration

Intelligence

Infrastructure Protection

International Trade

Justice

Screening | Chemical, Biological, Radiological, Nuclear

Maritime

Child Youth Family Services (CYFS) | Biometrics | Human Services (HS)

Military Operations | Surface Transportation | Agriculture

CYFS merged into HS |

Figure 1 Initial Domain Content by NIEM Version Release

NBAC FY2017 Highlights

Throughout the FY17 period, NBAC maintained continual contact with members and stakeholder via recurring monthly meetings, tiger teams and events, such as the Face-to-Face meetings. While the section below is not meant to be an exhaustive list of all NBAC FY17 activities, it does seek to provide details on some of the most significant accomplishments, activities, deliverables and milestones within the fiscal period.

NIEM 4.0 Release

In a 10-month development period, the NIEM 4.0 content team facilitated over 25 model harmonization calls, 3,000 elements reviewed for updates, 24 NIEM Configuration Control Tool (NCCT) issues resolved, and 3 rounds of final content/alignment reviews in order to make NIEM 4.0 a reality.

The final public release was published in July 2017 with updates to both Core and Domain component content. Through the efforts of the International Tiger Team, several aspects of Core were 'internationalized', including the addition of content around public service, crisis, and financial account information, updates of "Place" to expand terminology relating to addresses, regions, and borders, information related to privacy of personal data under the terms of more stringent European data

protection laws and mapping international requirements like name information and Tax Identification Number to "Person".

The U.S. Department of Agriculture contributed new Agriculture domain content in NIEM 4.0, while the Children, Youth and Family Services (CYFS) domain content was transitioned to the Human Services domain. Many existing domains contributed new model content, including Biometrics, Emergency Management, Human Services, Justice, Military Operations and Surface Transportation. Figure 2 shows the NIEM 4.0 Core and Domain specific data elements count that includes an additional 590 properties and 481 types for a total of 1,071 new components, an 8% increase from NIEM 3.2.

NIEM 4.0	Property Count	Type Count	Code Count
Core	**1,586**	**269**	**208**
Domains	**9,486**	**2,341**	**8,621**
Agriculture	64	8	
Biometrics	1018	530	1411
Chemical, Biological, Radiological, and Nuclear	608	147	
Emergency Management	670	278	629
Human Services	684	224	785
Immigration	457	95	1388
Infrastructure Protection	31	8	3
Intelligence	66	17	
International Trade	534	91	
Justice	4140	496	196
Maritime	339	47	180
Military Operations	213	95	120
Screening	599	255	3731
Surface Transportation	63	50	178
Code Sets		1084	65500
Grand Total	**11,072**	**3,694**	**74,329**

Figure 2 NIEM 4.0 Core and Domain Data Element Count

In addition to model updates and harmonization, updates were also made to enable a more flexible technical architecture:

- An updated NIEM Code Lists Specification (version 4.0) that supports code lists defined as CSV spreadsheets or Genericode XML documents. This allows the use of code lists defined outside XML Schemas, as well as supporting dynamic (run-time) identification of code lists, and a syntax for code lists that can support web service-based code validation.

- Updated the [Naming and Design Rules](#) (NDR, version 4.0), including:

    - Support for linked data (LD) methodology, including a new structures:uri attribute, supporting cross-document and within-document references, as well as updating the NIEM conceptual model's use of RDF to align with linked data & [JSON-LD](#).

    - Eased requirements on naming; allowed all legal ASCII characters in component names (now allowing hyphen, underscore, and period); lessened the requirements level on many naming rules from MUST to SHOULD, allowing for easier migration of community vocabularies to NIEM.

    - Support for the code lists; introduction of a new, flexible code type; consistent naming for code elements; allowing code types that are not based on XML Schema enumerations.

    - Allowing use of fixed required attributes in XSDs, allowing schemas to more precisely constrain messages.

NIEM Tools and Processes

Access tooling that was updated in tandem with 4.0 release includes:

- *[Movement](#)* is a new tool that allows users who would like to leverage only the NIEM terms and definitions when building custom JSON objects for a lightweight exchange. Movement is an open source tool that offers a better way to search model content and simpler way to use it. The tool provides users an intuitive way to pick and choose NIEM model content and automatically export a conventional JSON Schema for their simple exchanges.

- *[Subset Schema Generator Tool (SSGT)](#)* - Enables users to search through the NIEM data model and build a NIEM subset. Works with all NIEM versions: 1.0, 2.0, 2.1, 3.0, 3.1, 3.2, and 4.0. The 4.0 update allows user to search the new 4.0 content.

- [ConTesA](#) - Assists developers by automatically identifying potential locations of non-conformance within IEPD artifact using the NIEM NDR and IEPD specifications. Works with NIEM 2.0, 2.1, 3.0, 3.1, 3.2, and 4.0.

International Tiger Team Results

In FY2017, the NIEM International Tiger Team kicked-off a concerted effort by the NIEM community to increase the utility and usability of NIEM for our International users and information exchange stakeholders across the NIEM user

universe. The International Tiger Team was launched just prior to the NIEM 3.2 incremental release and its activities carried on through the NIEM 4.0 development period and will extend beyond into NIEM 5.0 planning and development as additional activities and objectives are layered into the initial scope.

The FY17 International Tiger Team activities that were aligned to the NIEM 4.0 release included:

- Call for new attributes that did not exist within NIEM (both Core and Domain associated). This was on ongoing process involving multiple parties looking to identify new unique data sets and existing exchanges that might include attributes, which could enhance the international value of the NIEM data models. Once new attributes were identified, they were vetted by Tiger Team participants, which included a wide variety of domain participants with international stakeholders. Once approved, the refined attributes were passed to the 4.0 Content Tiger Team for final review and refinement. Attributes that were approved by the 4.0 tiger team were then passed along to NBAC for final approval before inclusion in the NIEM 4.0 updates.

 - The International Tiger Team also reviewed definitions associated with existing attributes in both Core and the Domain models to determine whether these could be revised to make them less US-centric. This process was also facilitated by 4.0 Content team and owes a huge debt to the efforts of Christina Medlin from GTRI.

- For FY18, the International Tiger Team will continue to search for new attributes utilized in existing International data sets and exchanges and map them to either domain incremental releases or the Core 5.0 release. Efforts to expand tiger team participation will include grass roots outreach and collaborative efforts between multiple domains that are active within the international community.

In summation, the International Tiger Team reviewed a diverse selection of international data sets and models and put forth approximately sixty (60) new attributes for inclusion in core. These attributes focused on the areas of public service, humanitarian relief activities, and financial services, including new person, account and payment information. Within Core, 168 Elements with US-centric definitions were reviewed in order to determine whether US-specificity was required in the context of global utilization.

NBAC Strategic Roadmap FY2017-18

The NBAC Strategic Roadmap (FY2017-18) was produced in FY17 and put forth to the NBAC for review and comment with voting on the final release on June 30. The document provides an overview of NBAC, including Core Ideology (Vision,

Mission and Values), Fundamental Drivers and Goals and Deliverables for the 2017-18 period.

As stated within the document, the Core Mission of the NBAC is "to set the business architecture and requirements of NIEM, manage NIEM core, and facilitate the processes for the regulation and support of NIEM domains."

The ten goals put forth in the Strategic Roadmap were as follow:

1) Advance the Enterprise Model approach to adopt NIEM
2) Lead internationalization of NIEM
3) Advance each domain's maturity
4) Maintain alignment across NBAC, NIEM PMO and NTAC
5) Produce periodic quality model content update
6) Increase adoption of NIEM
7) Ensure continuous committee improvement
8) Elevate NIEM implementation
9) Embrace transparency in governance and model management
10) Maintain NIEM relevance as technologies emerge

Going forward, the NBAC Strategic Roadmap is expected to remain a guiding document for NBAC activities and plans. Goals and accomplishments will be updated accordingly.

Best of NIEM Winners

The FY2017 period yielded two 2016 Best of NIEM Winners: Agriculture and MilOps. Summaries of each winning submission are below.

U.S. Department of Agriculture, Agriculture Domain

While developing their Acreage Crop Reporting and Streamlining Initiative solution, USDA ran into a problem. They found that business users had difficulty understanding NIEM. To make it easier to understand the data that needed to be shared, USDA decided to create a business glossary. Their data standards work was open and on GitHub—which allowed for others in the NIEM community to see what they were doing and realize a greater potential use of it. Fast forward a few months and the simplified search and discovery found in the Movement tool is powered by a business glossary similar to USDA's—making NIEM model content accessible to technical and business users alike.

Listening to users concerns, recognizing innovation and accomplishments, and advancing as a Program and as a community—here lies the true Power of NIEM.

U.S. Department of Defense, Military Operations Domain

NIEM's reusable terms, definitions, and repeatable processes allowed the Department of Defense (DoD) to plan, develop, and implement an enterprise solution faster. The Warfighter Mission Area Architecture Federation and Integration Portal (WMAAFIP) is used by approximately 7,000 DoD staff members across more than 400 DoD organizations—and realizes cost savings of at least $4 million annually.

DoD has hundreds of thousands of staff members, warfighters, resources, and capabilities. A capability is defined as anything that the warfighter uses to do their job, whether it's a tank, communications device, or IP service. At DoD, every capability has a requirements document associated with it, and every requirements document has an architecture model and data dictionary to support it. DoD uses an architecture framework to help organize and share the massive amount of information about its capabilities. DoD developed a standard for exchanging this information, but over time the standard became very complex and difficult to use.

Using NIEM, DoD created the WMAAFIP, an open source, centralized hub for architecture information on all of DoD's capabilities. NIEM enabled DoD to share its architecture data dictionaries in a single, simplified, integrated view. Now, with information in a standardized structure and format, DoD can analyze and share information more effectively—even as DoD's capabilities evolve and grow.

Domain Self-Assessment Highlights

Domain responses to the annual self-assessment varied in terms offering comprehensive overviews across domain operations for all domains with some domains providing substantive comments and others offering less material for consideration.

The annual domain self-assessment responses yielded highlights from a select group of domains that exemplify best practices in domain operations and are appropriate for showcasing within this annual report.

Agriculture: The Agriculture Domain noted that it maintains formal monthly communications with Industry partners as a primary method of community outreach and engagement. The domain participated in conferences and other events in FY17 to promote the domain with the intent of increasing these activities in 2018. 2018 promotions will be tied to release of the Acreage and Crop reporting IEPD.

Biometrics: The NIEM Biometric domain continues to provide technical assistance and training to a variety of community partners. The domain served in all FY17 NBAC Tiger Team and played a major role in reviewing identity management artifacts for the international tiger team attribute identification effort. The domain manages its own domain collaboration zone on the APAN platform for document/artifact review and engages its broad stakeholder base via a dedicating domain facilitator email platform.

Emergency Management (EM): The EM domain has a mature communication framework utilizing multiple platforms, including EM Facilitator email blasts, NIEM.gov community and APAN pages, DHS announcements and more. The EM domain conducts continual outreach, offers training and technical assistance and participates in all NBAC events, including face-to-face updates. In FY17, the domain representatives served as co-chair to the domain lifecycle tiger team and the state and local tiger team and were also a primary participate in the 4.0 Content and International tiger teams. The FY17-18 transition period saw the EM domain facilitate an Interoperability Training workshop at DHS S&T. More of this is expected in the next fiscal year.

Health: The Health domain has already engaged strongly during the FY17-18 transition period with virtual briefings on planned community engagement. In FY17, the domain met with Department of Housing and Urban Development (HUD) to discuss NIEM Community Introductions and a Housing Data Model.

The Health domain noted that it has found that committee meetings have been beneficial to understanding the NIEM clinical element requirements, but not as conducive for healthcare business needs given the standards and terminologies they are already heavily involved with. This has results in the aforementioned community engagement and plan to maintain more of a grassroots approach in FY18 versus new model development and management within the NIEM structure.

Human Capital: The Human Capital domain continuously conducts outreach to providers, agencies, and industry partners. Though the domain is relatively new, there is an abundance of data to capture and structure, including focus in the coming year on blockchain and payroll items.

Human Services: The Human Services domain highlighted its very mature communications and engagement capabilities and platforms, including: e-mail (interoperability@acf.hhs.gov); organization website (http://www.acf.hhs.gov/about/interoperability#chapter-3); live meetings (monthly HSD workgroup meeting with stakeholders from federal, state and organizations);

NIEM.gov website. HSD conducts outreach at federal, state and local level and provides highlights at NBAC F2F.

Justice: Justice continues to operate as a very mature domain with few new changes, but a strong communications framework (XSTF) in place.

Military Operations (MilOps): The MilOps domain continues to operate as a mature domain with an excellent governance framework and expanding communications and engagement capabilities. As domain steward, DDC5I continuously monitors domain activities, reports to the Joint Staff J6 leadership, and incorporates feedback as appropriate.

The MilOps domain reviews its community page on NIEM.gov regularly and submits updates to the NIEM PMO for review and publication. MilOps noted that its domain stakeholder community is comprised of 300 individuals - primarily representatives from DOD Commands/Services/Agencies, as well as individuals representing other government, state, local, and international organizations. The domain hosts virtual meetings with domain stakeholders and constituents on a quarterly basis.

Surface Transportation: The Surface Transportation domain has identified key information sharing needs for roadway safety and asset management. The domain has engaged USDOT and State stakeholders through existing forums. Stakeholder forums have provided input on areas of focus for the domain. This represents an initial maturing of the domain. Many other areas are possible to address. Stakeholders participate through regular meetings of Traffic Records Coordinating Committee.

NBAC – NTAC Coordination and Collaboration

The NBAC provides a best-practices data model and collaboratively supports the NIEM Technical Architectural Committee (NTAC) in coordinating with Open Standards organizations (i.e. Organization for the Advancement of Structured Information Standards (OASIS), Open Geospatial Consortium (OCG), etc), and new information exchange technology such as JavaScript Object Notation (JSON) information exchanges.

Progress Relative to Way Ahead from FY17

The 2016 NBAC Annual Report listed 7 items framing the "Recommended Way Ahead for FY17). These were:

1) NIEM 4.0 - achieved with Summer 2017 major release)

2) International Community Engagement - achieved via data set/attribute review of artifacts provided by International stakeholders. Will carry forward into 2018 with new grassroots outreach and inclusion efforts.

3) New Technologies (JSON) – achieved with new JSON materials added to NIEM.gov. Carries forward into 2018 with training and alignment processes developed for NIEM implementers.

4) NBAC At-Large Participation – achieved via posting NBAC At-Large participation opportunities and selection of new NBAC At-Large member who participated in issue review and voting in FY17. Initiative to continue into 2018.

5) Strategic Guidance Document – achieved via development, review and release of NBAC Strategic Roadmap

6) Expand and Mature NIEM Community of Domain – achieved with addition of new domains, re-invigoration of formerly static domains and mapping of content from defunct domains to new stewards.

7) NBAC Co-Chair rotation – FY17 Co-Chair remain in place to ensure transitional continuity. FY18 Co-Chair rotation under consideration.

Recommended Way Ahead for FY18

Looking to the FY18 period, there is a tremendous amount of work for the NBAC to do in order to capitalize on the increasing momentum and reach of NIEM. The following focal points and activities include, but are not limited to:

1) Improving and expanding executive leadership advocacy to drive enterprise adoption of NIEM by new domains and reinvigorating inactive domains

2) Engaging Domain representatives with an updated NIEM message to identify stakeholder equities and support requirements

3) Advancing International adoption of NIEM to improve information sharing during global events and multinational activities

4) Increasing the synergy between the NBAC and NTAC to promote and expand tool offerings and best practices

5) Establishing Tiger Teams to incorporate new and future technology into NIEM to increase standardized information exchanges (e.g. Sensors, Internet of Things (IoT), etc.)

6) Facilitating dynamic cross-Community collaboration to move from unity of command to unity of effort across the whole of government for enterprise information sharing solutions (e.g. person-centric identity management)

7) Exploring cross domain information exchange pilots and grant opportunities

8) Developing specialized and tailored NIEM training and on-line resources to promote senior leader endorsement, program manager decision making, and facilitate software developer implementation of NIEM conformant information exchanges

Conclusion

As always, the NBAC Co-Chairs would like to express their tremendous gratitude for the support of all domain stewards and members and other active participants within the NIEM Business Architecture Committee.

Our FY17 accomplishments have been significant, but we have only scratched the service of NIEM potential in terms of community uptake and organizational knowledge maturity across information stakeholders. Likewise, as new technologies continue to emerge, we will have to remain flexible and capable of rapid response in order to safeguard alignment, harmonization and relevancy.

Going forward, we want to encourage you to embrace the challenges of 2018 and beyond and to work collaboratively and diligently to maintain the momentum we have established in recent years.