

ARMY GEOSPATIAL CENTER

ENABLING GEOSPATIAL INFORMATION DOMINANCE



Esri International Users Conference 2016
Army Geospatial Enterprise Certification

Presented by:

Daniel Visone

E: Daniel.L.Visone@usace.army.mil

P: (703) 428-6920



US Army Corps of Engineers
BUILDING STRONG.



US Army Corps of Engineers
BUILDING STRONG



BLUF

- Current Army testing is not addressing Geospatial *interoperability* adequately.
- There is no Army traceability of *geospatial interoperability certification or waivers*.
- Current certification testing and documentation will not support National System for Geospatial-Intelligence (NSG) GEOINT Functional Manager Standards Assessment (GFMSA) validation efforts.





US Army Corps of Engineers
BUILDING STRONG

Army Geospatial Enterprise (AGE)



- Army Geospatial Enterprise (AGE) - An integrated system of technologies, standards, data, organizations and processes that delivers a Standard and Sharable Geospatial Foundation (SSGF) at all echelons
- AGC provides geospatial domain expertise and acquisition support to the Army Computing Environments (CEs), Program Executive Offices and Product Managers, to implement the Army Geospatial Enterprise (AGE) compliant with Common Operating Environment (COE) guidance within Army acquisition systems.
- Expertise includes:
 - Architecture design
 - Standards development
 - Data modeling
 - Geospatial systems engineering
 - Test and certification



***Ensures geospatial interoperability across Mission Command
from National to tactical.***





US Army Corps of Engineers
BUILDING STRONG



Current Geospatial Challenges

On the left image there is a KMZ data set visualized in a widely accepted industry application. That data is then ingested and visualized by 5 Army systems that have gone through Army Interoperability Certification (AIC) testing:



- Is data being lost upon system ingestion?
- Are the implementation profiles the same across systems?
- How can we identify, test, analyze and correct geospatial interoperability gaps like this?





US Army Corps of Engineers
BUILDING STRONG



AGE Certification

AGC developed the AGE Certification to validate / verify geospatial interoperability and provide traceability of geospatial interoperability across the AGE and within DoD

- Certification requirements have been integrated into AR 115-11 (geospatial regulation) and AGE Certification is in review to include into AR 700-142 (fielding regulation) updates
- AGC has reviewed and provided GFMSA feedback for the last 3 Draft versions; currently coordinating to verify updates and optimally align AGE Certification.
- AGC Integrated into Army Interoperability Certification testing, providing review and input to test threads, supporting Test Incident Report (TIR) working groups
- The Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA(ALT)) is currently staffing the AGE Certification Process Army-wide (Comments are currently in adjudication) defining AGE Certification policy
- AGC developed a Geospatial Exchange Visualization Process (GEVP) to provide guidance during geospatial testing supporting certification efforts





US Army Corps of Engineers
BUILDING STRONG

Streamlining Founding Geospatial Standards

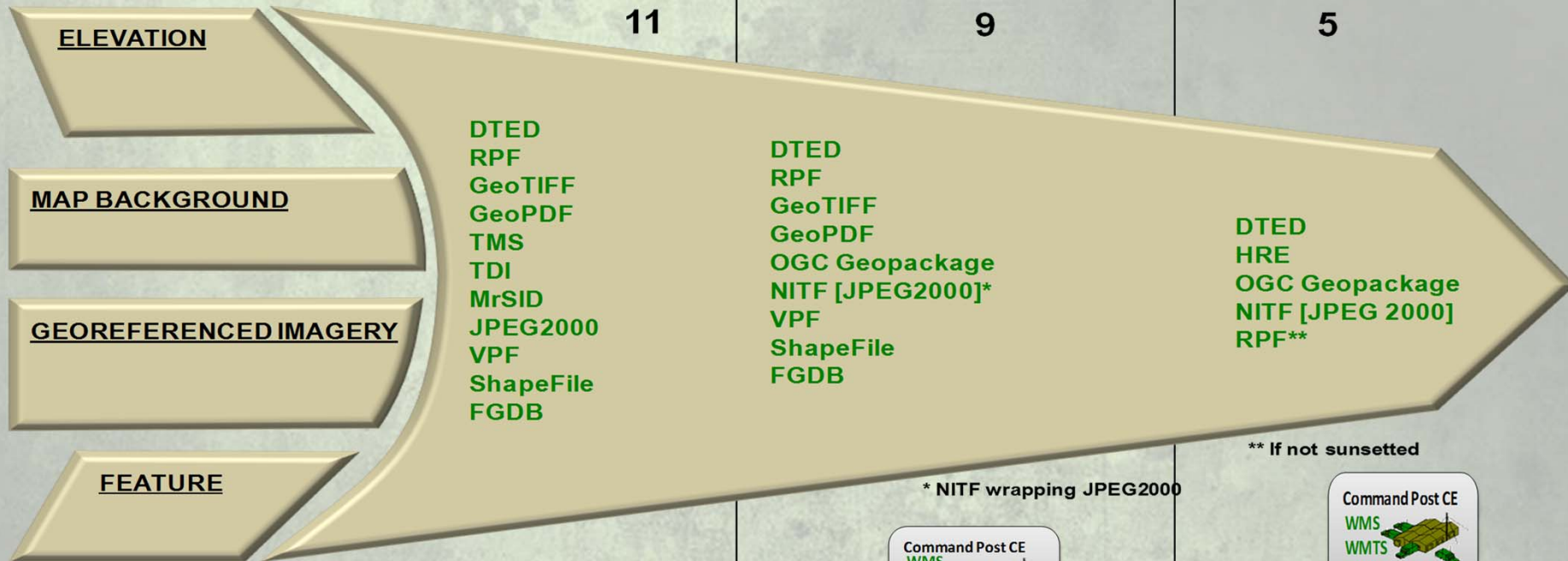


Data Formats
Migration

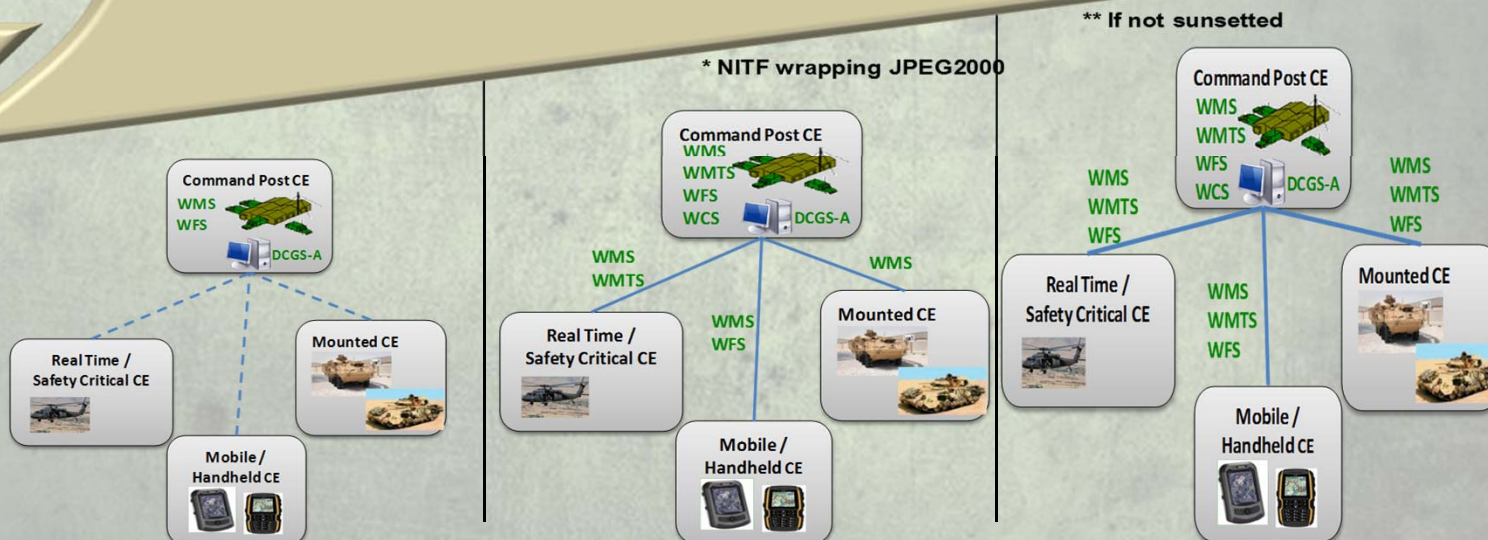
COE v1.1 (FY 17)

COE v3.0 (FY 19)

COE v4.0 (FY 22)



Web Services
Migration (WMS,
WFS, WMTS,
WCS)





US Army Corps of Engineers
BUILDING STRONG

What is the AGE Node?



A physical instantiation of the AGE within COE at the Army Geospatial Center (AGC), Geospatial Research Laboratory (GRL) and Information Technology Lab (ITL).

Provides simulated Common Operating Environment

- **Data Center CE** (e.g. maps.army.mil prototype)
- **Command Post CE** (e.g. DCGS-A, CPOF, GCCS-A)
- **Mounted CE** (e.g. JCR, JBC-P, TIGR)
- **Mobile Handheld CE** (e.g. Nett Warrior)
- **Sensor CE** (e.g. ISA)
- **Real-Time/Safety Critical/Embedded** (e.g. SPIDER)



■ Provide environment for

- Experimentation, integration and engineering of R&D efforts to ensure interoperability within the COE
- Collaboration with industry and academia to enhance GIS technology
- Demonstration and evaluation of current and emerging geospatial standards and standards implementations (e.g. emerging and current OGC and DISR standards)
- Geospatial Interoperability Assessment and Certification

Provides physical environment for AGE compliance testing





US Army Corps of Engineers
BUILDING STRONG

AGE Node Systems



Research

- AIRS
- CJMTK –DMoW
- EASEE
- GeoPackage
- NIPR GETS
- MBPS
- **OPUS**
- ThreatMapper
- **SAGE**
- **LaredoX**
- Rogue
- OGC Test Harnesses
- ARL AIR
- GEAR
- Strider
- OMAR

VMs: 68
Physical: 4

POR's

- AMPS
- **CPOF**
- **DCGS-A**
- DCGS-A
- GeoPortal
- DDS
- FBCB2
- GCCS-A
- **JBC-P**
- **JCR**
- SOMPE-G
- **TIGR**
- **NettWarrior**
- **SPIDER**
- **ENFIRE**
- ISA

VMs: 153
Physical: 8

Reference Implementations

- Esri
- **Google**
- NRL Tile Server
- iSToRE
- ICA
- **RaptorX**
- SSGFG
- GeoServer
- AGC DLS
- AGF
- OneSAF DDS
- EMP

VMs: 41
Physical: 7

User/Test

VMs: 29
Physical: N/A

Total

VMs: 291
Physical: 19





US Army Corps of Engineers
BUILDING STRONG



AGE Node

Army Geospatial Enterprise (AGE) Node's support to Enterprise level testing and development.

- Physical instantiation of the AGE; currently 11 Core Mission Command systems virtualized at 4 echelons loaded and in testing
- Experimentation, integration and engineering of R&D efforts to ensure interoperability within the COE facilitating project transitions to POR's and AGE interoperability; supports risk mitigation
- Developing and Training AIC test operators with step-by-step procedures for system ingestion/visualization; Configuration Managing (CM) this work
- Evaluate/validate proposed geospatial Tactics, Techniques and Procedures (TTPs), architectures and technology assessments in support of AGE interoperability
- Developing tools / test harnesses to validate data and services are in conformance to current/emerging standards; ; CM this work

AGC Pursuing the AGE Node becoming a "federated" test and certification facility for AGE interoperability and compliance testing





US Army Corps of Engineers
BUILDING STRONG



AGC (AGE Node) Test and Certification Tool Development Support

- Use OGC Team Engine (TE) at AGE Node to support OGC format validation:
 - KML, WMS, WMTS, WFS
- Integrate existing validation tools from various parties including open source and industry tools: GeoTIFF, GeoPDF, NITF, JP2
- Additional data standard tools being developed
 - DTED, CADRG, CIB, OGC GeoPackage (*Raster Tiles only initially*)
- Future:
 - AGC will provide tools (code) to NSG for broader community use.
 - AGC is tentatively planning to host tools for online access to Army and potentially broader NSG community online use.
 - NSG Community will need to adapt tests to address NSG profiles
 - (TE tests current support OGC standards, not NSG profiles)
 - Maintenance of these tools as additional NSG standards are adopted and existing NSG standards are updated *e.g. Geopackage adding elevation data to standard.*



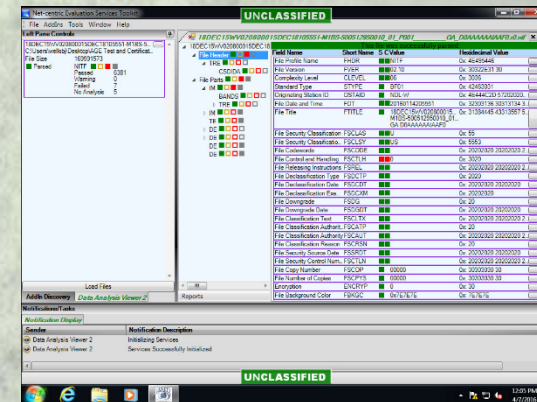
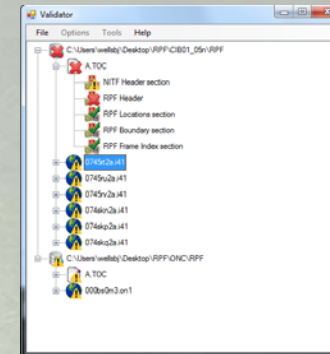


US Army Corps of Engineers
BUILDING STRONG



AGE/NSG Test Tools – Evaluation and Development

- NGA does not have a current tool for RPF Validation
 - Tool is being updated as GOTS
 - Tool will be incorporated into TEAM Engine, and delivered to NGA as NSG capability
- OGC KML Validator was broken
 - OGC Sample datasets failed compliance
 - Discovered during testing within AGE Node
 - Updates/fixes have been made
 - Esri producing non-compliant KML.
 - Collaborating to address and fix issue.
- NITF Validator
 - NITF Specification overly complex
 - Have not discovered an authoritative data provider that will pass compliance
 - Enforces the need for NSG Profiles



UNCLASSIFIED

Necessity for validated test tools to check for OGC specification, as well as NSG Profile, compliance





AGE Testing Harnesses



Format	Version	Organization	POC	Tool	Received	Validated
DTED		AGC		RPOD	Yes *Awaiting DTED capability*	No
RPF		AGC		RPOD	Yes	Yes
GeoTIFF					No	No
GeoPDF		TerraGo	Ray Caputo	TerraGo	Yes	Yes *Working to expand capability*
GeoPackage	1.0	AGC		Geopackage Validator	Yes	No
NITF (JPEG2000)	2.2	JITC		CIVA	Yes	Yes *Based off CIVA SME's top critical failures list*
JP2				Unidentified	No	No
VPF		NGA		VPF Validator	No *May go away*	No *May go away*
Shapefile	N/A	Esri		Unidentified	No	No
FGDB		NGA		ESRI/GGDM	Yes *Awaiting FGDB Capability*	No
KML 2.2	2.2	OGC		Team Engine	Yes	Working – in review
WMS	1.3 (client & server)	OGC		Team Engine	Yes	No
WMTS	1.0	OGC		Unidentified	No	No
WFS	2.0	OGC		Team Engine	Yes	No
WCS	2.0.1	OGC		Team Engine	Yes	No




US Army Corps of Engineers
BUILDING STRONG


AGE NODE Testing Services




Enter keyword All Applications Data & Services [Map Search](#)




ESRI Portal - CADRG
View CADRG served by ArcGIS Server to Portal
[Open](#) [WMS](#)



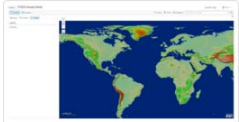
ESRI Portal - Landcover
View Landcover served by ArcGIS Server to Portal
[Open](#) [WMS](#)




ESRI Portal - NaturalVue
View NaturalVue served by ArcGIS Server to Portal
[Open](#) [WMS](#)



ESRI Portal - DTED0 HillShade
View DTED0 HillShade served by ArcGIS Server to Portal
[Open](#) [WMS](#)




ESRI Portal - DTED0 ShadedRelief
View DTED0 ShadedRelief served by ArcGIS Server to Portal
[Open](#) [WMS](#)



ESRI Portal - DTED0
View DTED0 served by ArcGIS Server to Portal
[Open](#) [WMS](#) [WCS](#)

NRL TileServer
Open to see a list of NRL TileServer services.
[Open](#)



NRL TileServer - CADRG
View CADRG served by NRL TileServer to Portal
[Open](#) [WMS](#)

NRL Tile Server

- WMS
- WMTS
- WFS
- WCS
- KML

ArcGIS Server

- WMS
- WMTS
- WFS
- WCS

GeoServer

- WMS
- WFS
- WCS
- WMTS

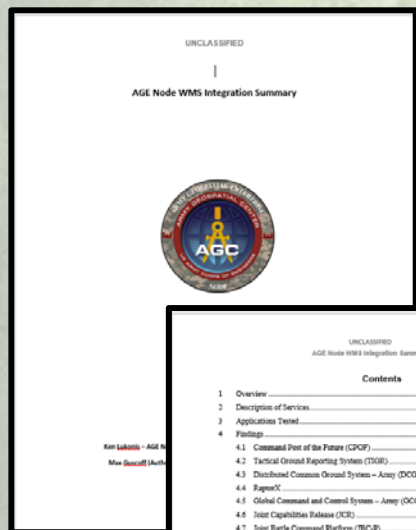
(GeoWebCache)





US Army Corps of Engineers
BUILDING STRONG

Army NSG Assessment (WMS)



UNCLASSIFIED
AGC Node WMS Integration Summary

AGC

Contents

- 1 Overview 2
- 2 Description of Services 2
- 3 Applications Tested 2
- 4 Findings 3
 - 4.1 Command Post of the Future (CPOF) 3
 - 4.2 Tactical Ground Reporting System (TIGR) 4
 - 4.3 Distributed Common Ground System - Army (DCGS-A) 6
 - 4.4 RaptorX 7
 - 4.5 Global Command and Control System - Army (GCCS-A) 9
 - 4.6 Joint Capabilities Release (JCR) 11
 - 4.7 Joint Battle Command Platform (JBC-P) 11
 - 4.8 NetWarrior 11
 - 4.9 Compatibility Matrix 11
- 5 Summary 12

Table of Figures

- Figure 1: CPOF 3500cmdg1307 3
- Figure 2: CPOF display with WMS 3505 4
- Figure 3: TIGR web.config to enable WMS 4
- Figure 4: TIGR with WMS Overlay 5
- Figure 5: WMS Connections Added to ArcMap 6
- Figure 6: WMS Services Added to RaptorX 7
- Figure 7: WMS Services displayed in RaptorX 8
- Figure 8: GCCS-A WMS Connection 9
- Figure 9: GCCS-A with WMS Displayed 10

- Investigated and demonstrated capability of AGE systems to support NSG/SSGF web service formats (OGC WMS)
- Significant interoperability issues still exist
- Developed assessment of interoperability successes and gaps
- Provided suggestions for further phases of detailed assessment
- Requires NSG profile and test harness

Description	Server	Connection	CPOF	GCCS-A	TIGR	DCGS-A	RaptorX	JCR	JBC-P	NettWarrior
CADRG Best Scale	ArcGIS Server 10.3	SSL/HTTPS port 443	Green	Green	Green	Green	Green	Red	Red	Red
CADRG Best Scale	ArcGIS Server 10.3	HTTP port 80	Green	Green	Green	Green	Green	Red	Red	Red
CADRG Best Scale	NRL Tile Server	HTTP port 8080	Green	Green	Green	Green	Green	Red	Red	Red
OpenStreet Map	GeoServer 2.6.2	HTTP port 8080	Green	Yellow	Green	Green	Green	Red	Red	Red

Successful	Green
Partially Successful	Yellow
Unsuccessful	Red

Necessity for NSG Profile and validated test harnesses to check for OGC specifications as well as compliance.





US Army
BUILD

AGE Assessment - POR Systems Loading/Validation



System	Obtain SW	Obtain CTSF Documentation	MVR-26/11-12	MVR-13/COE v1.1	Develop Loading/validation Procedures	Obtain Program Approval
DCGS-A	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Complete	Awaiting CTSF approval
JBC-P	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Complete	Awaiting CTSF approval
CPOF	Received	Received	No, not in MVR-26	No, not in MVR-13	Complete	Haven't submitted
GCCS-A	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Haven't Started	Haven't submitted
NettWarrior	Received	*No documentation exist at this time*	No, not in MVR-26	No, not in MVR-13	Haven't Started	Haven't submitted
TIGR	Received	*No documentation exist at this time*	No, not in MVR-26	No, not in MVR-13	Haven't Started	Haven't submitted
AFATDS	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Haven't Started	Haven't submitted
AMDWS	Follow-up 3/24/16	Received	Yes, in MVR-26	Yes, in MVR-13	Haven't Started	Haven't submitted
AMPS	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Working – in review	Haven't submitted
TAIS	Received	Received	Yes, in MVR-26	Yes, in MVR-13	Working – in review	Haven't submitted
JCR	Received	Received	Yes, in MVR-26	No, not in MVR-13	Working – in review	Haven't submitted



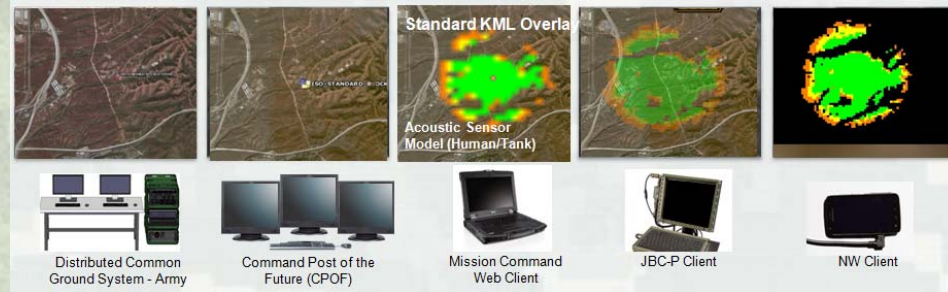
US Army Corps of Engineers
BUILDING STRONG

NSG Standards Status



Too many interpretations of Standards:

- Why – Standards, and Implementation of the Standards, Open to Interpretation
- Solution
 - Adoption of Open Standards
 - NSG/ASG Profiles for Those Standards
 - Open Geospatial Consortium Profiles for Those Standards



OGC Standard	Version	Profile Status
Web Map Service	1.3	Approved
Web Feature Service	2.2	In draft (May 2016)
GeoPackage	1.0.3	In draft (March 2016)
Web Map Tile Service	1.0	In development (Sep 2016)
Web Coverage Service	2.0	In planning (Jan 2017)
Catalogue Service – Web	2.0.2	In development (June 2016)
KML	2.3	In development (Sep 2016)

Working Army/DoD/NSG/ASG/OGC Profiles and Best Practices for consistent implementation and rendering of common overlays and the SSGF

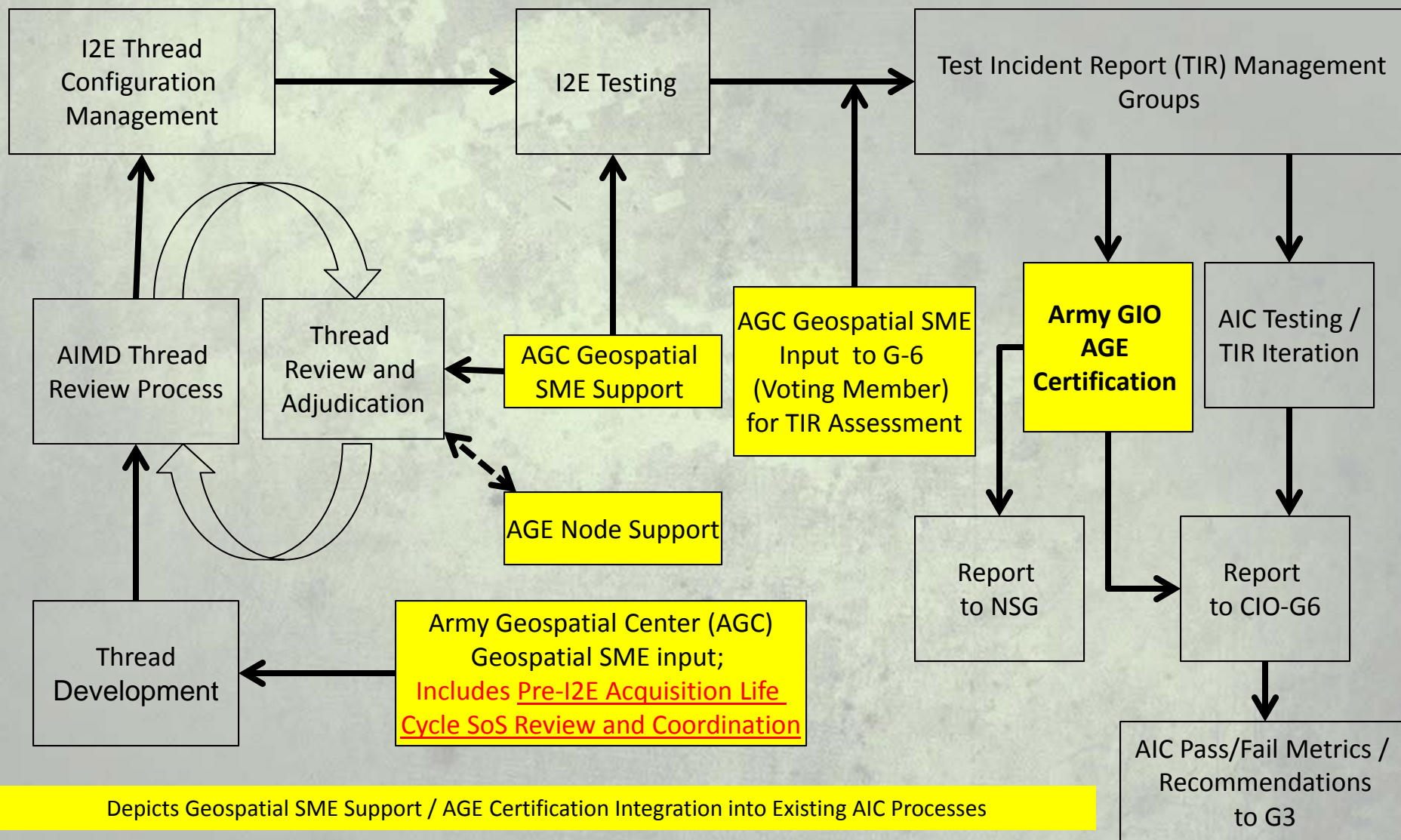




US Army Corps of Engineers
BUILDING STRONG

Geospatial Testing Support

(Geospatial Interoperability and Certification)



Depicts Geospatial SME Support / AGE Certification Integration into Existing AIC Processes





US Army Corps of Engineers
BUILDING STRONG



Questions?





AGE - System/Version Cross Comparison



System	SWB 11-12 Version SWB 11-12 AIC	COE V1.1 Version	AGE Node
DCGS-A	3.1.7.4.1.1 (SWB 11-12 Certified SW)/3.2.4.4 (COE Solution SW to be certified in SWB 11-12.15 AIC)	3.2.4.4	3.1.7.4 / 3.2.3.x
JBC-P	1.6.0.3 P7 and 1.6.0.5 (COE Solution SW to be certified in SWB 11-12.15 AIC)	1.6.0.3	1.6.0.3
CPOF	13.2.3 P4 (COE Solution SW to be certified in SWB 11-12.15 AIC)	13.2.3	13.0.4
GCCS-A	4.3.1 P1 (COE Solution SW to be certified in SWB 11-12.15 AIC)	4.3.1	4.3
NettWarrior	NW EUD 2.0.7.18 and NMP 1.0.2.24 (COE Solution SW to be certified in SWB 11-12.15 AIC)	2.0.5.46	2.0.5.46
TIGR	2.0.4.3 (COE Solution SW to be certified in SWB 11-12.15 AIC)	2.0.4.3	2.0.7.1 p2
AFATDS	6.8.1.1 (COE Solution SW to be certified in SWB 11-12.15 AIC)	6.8.0.1	6.8.0.1 p4
AMDWS	6.6.3.0.3 (COE Solution SW to be certified in SWB 11-12.15 AIC)	6.6.3.0.3	6.6.3.0.2 P3 *Awaiting SW*
AMPS	7.5.10	8.0.1	7.5.9
TAIS	12.0.2.04 (COE Solution SW to be certified in SWB 11-12.15 AIC)	12.0.2.04	12.0.2.02
JCR	1.3.2.0	N/A	1.3.1.5

