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The Next Generation Theater Geospatial Database

*U.S. Army Pacific & U.S. Army Europe Geospatial Enterprise
Solution*

Presented By



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<https://geopac.hi.pac.army.mil>

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The Art of War

The art of war, then, is governed by five constant factors, to be taken into account in one's deliberations, when seeking to determine the conditions obtaining in the field. These are: (1) The Moral Law; (2) Heaven; (3) Earth; (4) The Commander; (5) Method and discipline.

Earth comprises distances, great and small; danger and security; open ground and narrow passes; the chances of life and death.



Sun Tzu, 500 BC

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Objectives

- What & Why of TGD
- Data Model
- Hardware / Software Architecture
- Enterprise Component (JIVA-V)
- Future Enhancements



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What is the TGD

The TGD is an enterprise solution focused on providing critical vector data in support of commanders, analysts, planners and systems. The TGD will greatly improve geospatial data collection, analysis, management and dissemination via the SIPRNET.

The TGD consists of:

- **Standard data model implemented on the Army's Digital Topographic Support System (DTSS)**
- **Standard tools for creating and managing terrain analysis data (i.e., ESRI ArcGIS, ArcSDE, **PLTS**; ERDAS Imagine)**
- **Standard metadata scheme to enhance data discovery**
- **Geospatial data visualization and dissemination capability on the SIPRNet (JIVA-V, GLIDE, DGINet)**
- **New "Information-based" business processes**

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5th EN DET

As the U.S. Pacific Command's (PACOM) Executive Agent for all Pacific Theater terrain analysis and geospatial information, U.S. Army, Pacific has established a Pacific Theater Geospatial Database (TGD). A collaborative, three year, on-going effort with U.S. Army, Europe, Defense Intelligence Agency (ESRI), and with support from the Topographic Engineer Center (TEC), the TGD provides a unique geospatial data production, retrieval, and storage capability at a fidelity not currently offered by any other Department of Defense system or agency.

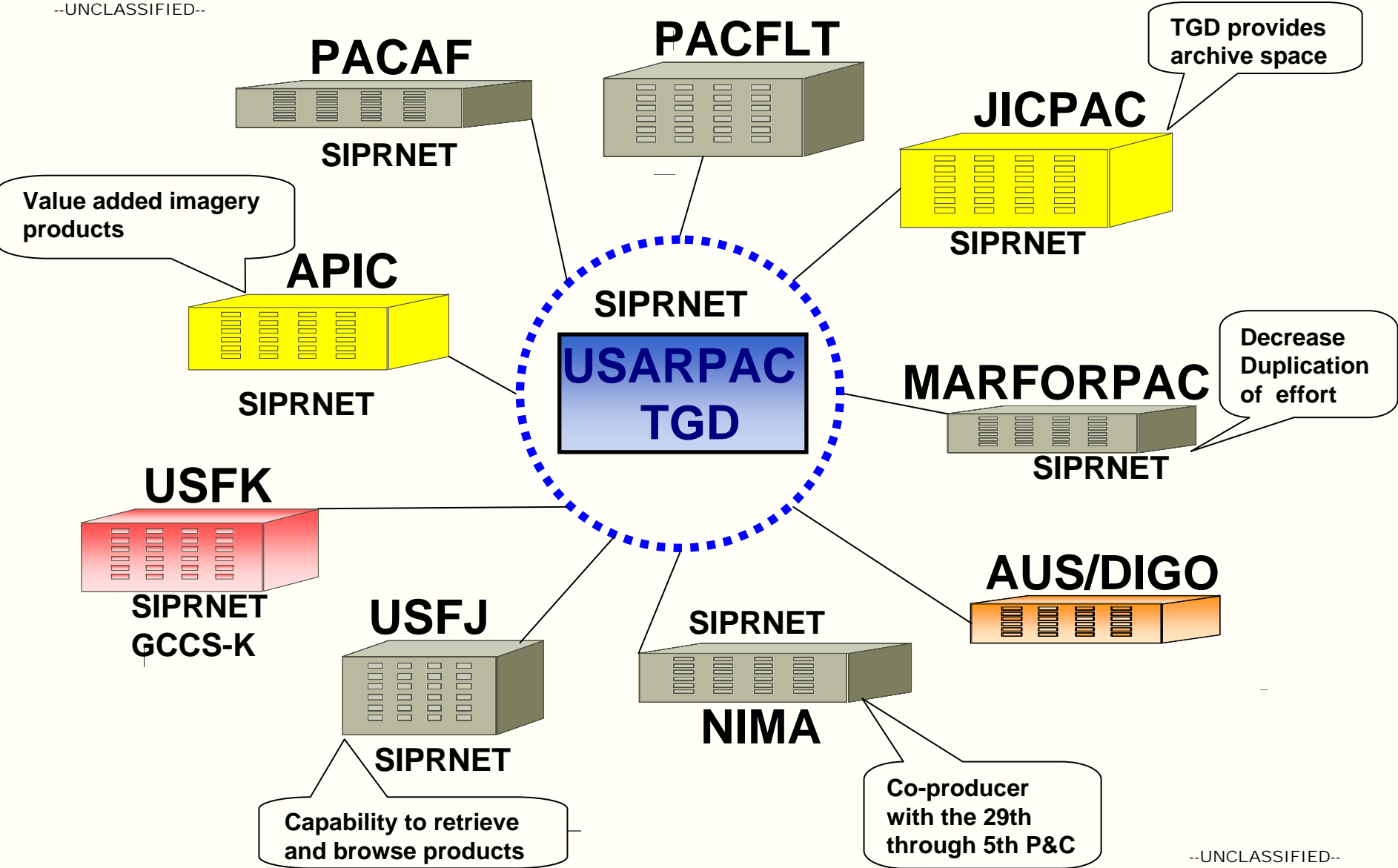
The TGD addresses critical Homeland Security intelligence analysis requirements by consolidating and disseminating extensive Pacific Theater, unique, digital, geospatial information and products.

In addition, the TGD allows intelligence analysts, planners, and operators to integrate, seemingly disparate data to aid in pattern recognition, modeling, and visualization of the battle space.

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TGD Problem Set

- There is no standardized theater geospatial database available to support geospatial and intelligence analysis during the IPB and EBA process.
- There is no effective method for sharing geospatial data with the National Geospatial-Intelligence Agency (NGA).
- Geospatial operations are “product-based” and therefore data are created, managed and disseminated in an ad hoc approach which varies from theater to theater. It’s like building cars one car at a time...
- Standard NGA datasets are incomplete and do not meet data-centric operational requirements.

IPB: Intelligence Preparation of the Battlefield
EBA: Engineering Battlefield Assessment

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What & Why of TGD

- Poor quality, no existing geospatial data
cumbersome data format
- Lack of enterprise solution
- Rapid response in a changing world
- Reduction in man power
- Reduction in available resources
- Lack of standards (database, tools, TTPs)

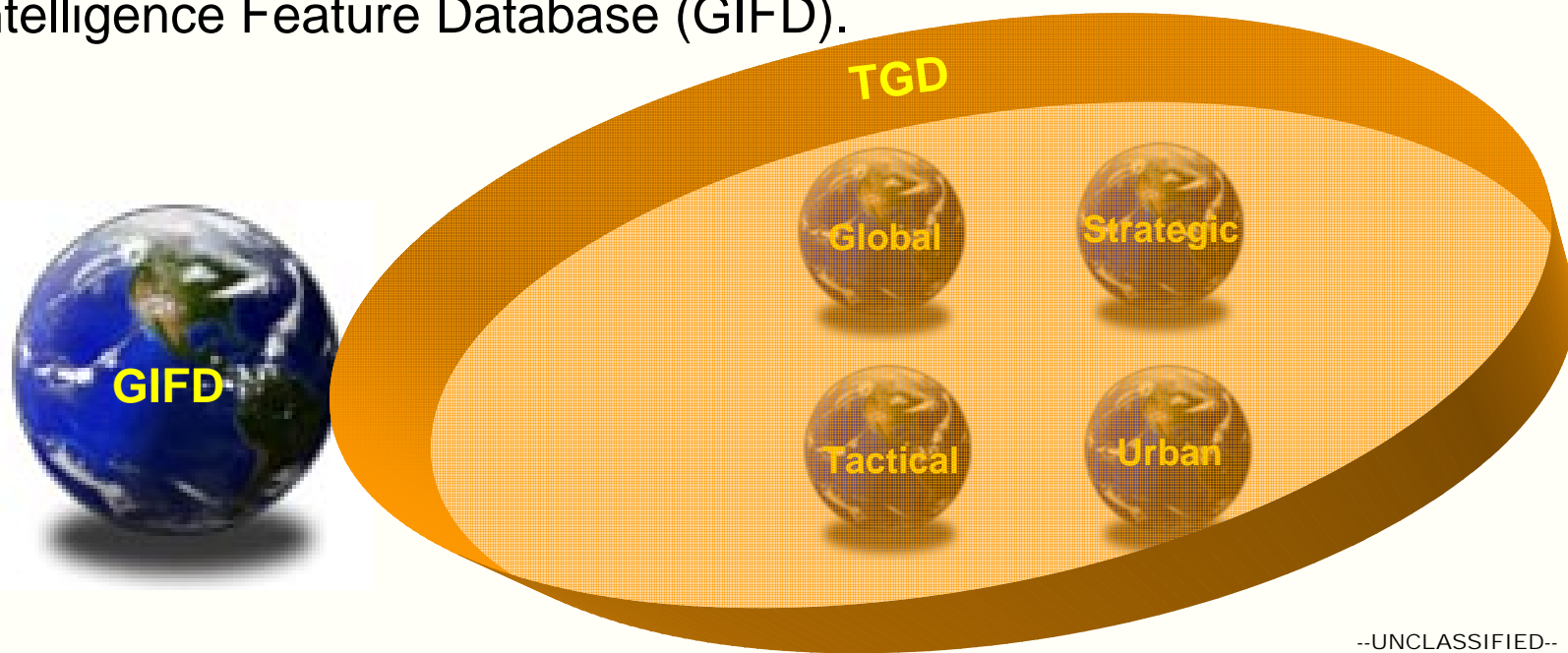
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TGD Essentials

The TGD is a fusion of geospatial technologies, hardware, software, information, and processes. The brain of a geospatial system is the database model. The TGD is based on a scaled down version of the National Geospatial Intelligence Agency (NGA) Feature Attribution Coding Catalog (FACC) data model standard and NGA's Geospatial Intelligence Feature Database (GIFD).



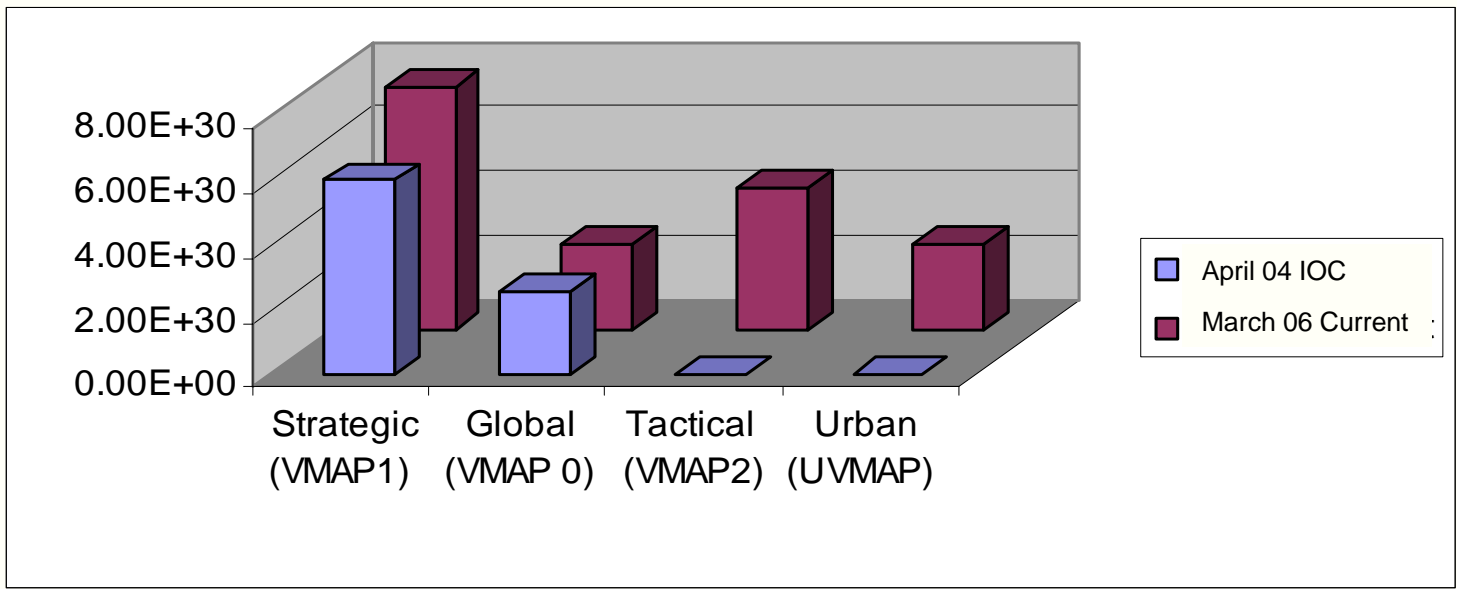
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Geospatial Database Growth

IOC April 2004 to March 2006



- Strategic 6 GB - 7.5 GB
- Global 2.6 GB - 2.7 GB
- Tactical 120 MEG - 7.04 GB
- Urban 40 MEG - 305 MEG

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USARPAC TGD Data to NGA GIFD

Layers

- FactalOperations_Topology
 - Area Errors
 - Line Errors
 - Point Errors
- AerofacP
 - Description
 - All Other Values
- AirportAirfield Point - G005
- BuilP
 - Description
 - All Other Values
 - BuildingPoint - AL015 - Unknown - Operat
 - BuildingPoint - AL015 - School - Operatio
 - BuildingPoint - AL015 - House of Worship
 - BuildingPoint - AL015 - House of Worship
 - BuildingPoint - AL015 - Unknown - Operat
 - BuildingPoint - AL015 - Unknown - Operat
- CulvertP
 - Description
 - All Other Values
 - CulvertPoint - AQ065
- DirP
 - Description
 - All Other Values
- ExtracP
 - Description
 - All Other Values
- ForIP
 - Description
 - All Other Values
- LandUseP
 - Description
 - All Other Values
 - Stadium
 - Monument
- RapidP
 - Description
 - All Other Values
 - RiverStre
- StorageP
 - Description
 - All Other Values
 - TankPon
- TowerP
 - Description
 - All Other Values

Location: (167.738047 8.721701)

Field	Value
VPI_D	Available
PRM	1
CREATIO7	0/16/2004
RSTRN_D8	
INGEST_ID	3947
SEC_CLS10	
RLL	1
RSL_D	Available
PRM_D	Permanent
LEG	0
ACCURATE	Accurate
DIR	0
RST_D	Hard/Paved
DirP	0
VSH_D	Available
SHWC_D	Asphalt
SEC_ID_11	
RSTRN_D12	LIMDIS
OPERATOR	Haldeh
MODI	
SER	1
USE_D	Military
COD_D	Limit
UPDATE_13	crud
RHI_D	Available
ORIGIN14	Digital Globe
VSH	1
PRM	0
RAH_D	Available
VPD_MAR15	0
VSL	1
FHL	0
RFL_D	Available
ADD	0
DirP	0
TSH_D	Available
UPDATE_16	
ACE_EVA17	E2D
GIFD	1429F481D949C3D1970CA43AC035A07
VPI_D	Available
ORIGINATOR	29h EN BN, 70h EN CD
RLL	1
RSTRN_D18	
ALE_EVA19	F2D
COMM_CP20	Copyright 2004 by the National Geospatial Intelligence Agency, U.S. Governm
VPD_WFI21	0
COMM_L122	N/A
SCB_D	Good
ACT	1

GIFD

Layers

- FactalOperations_Topology
 - Area Errors
 - Line Errors
 - Point Errors
- AerofacP
 - Description
 - All Other Values
- AirportAirfield Point - G005
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 - BuildingPoint - AL015 - Unknown - Operat
 - BuildingPoint - AL015 - Unknown - Operat
- CulvertP
 - Description
 - All Other Values
 - CulvertPoint - AQ065
- DirP
 - Description
 - All Other Values
 - SpotDeviationPoint - CA030 - Accurate - A
- ExtracP
 - Description
 - All Other Values

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TGD 3 Data model

	C	D	E
11	AIRPORT_RP_COORDP	AIRPORT_RP_COORDP	
12	AIRSPACEA	AIRSPACEA	
13		AQUEDCTA	
14	AQUEDCTL	AQUEDCTL	
15	AQUEDCTP	AQUEDCTP	
16	BARRIERL	BARRIERL	Add attributes for type of material - wood, steel, concrete, brick, block.
17	BERTHP	BERTHP	
18	BLUFFL	BLUFFL	
19	BNDL	BNDL	
20	BOTCHARP	BOTCHARP	
21		BRIDGEA	
22	BRIDGEL	BRIDGEL	
23	BRIDGEP	BRIDGEP	
24	BUILDA	BUILDA	BDB - Check FACC for attributes "agriculture" "fertilizer plant" AND "Nursery & Farm Supplies". Add attribute BFC116 "Factory". Need to look at BDB for attributes in dBankNAICS specifying type of bank. Consider adding "meeting place" as an attribute - BDB dEatAndMeetFACC1. Add attribute "Resturant" BFC057. Add attribute "University or College" BFC060; "Dormitory" BFC151; "Library" BFC128. Add attributes to BFC list for "Meeting Place" and "Pooling Station". Need attribute for "Gas Station" BFC054. Need to add BFC codes for "executive office", "Ministerial Office", "Human and Social Service Office", "Correctional Institution" from dGovernmentNAICS. Need to add attributes "Market" BFC051 & "Shopping Center" BFC122. Need to add attributes "Commercial Building" BFC133 & some attribute for Newspaper & Broadcasting Building - see dMediaNAICS. Need to add "Nursing Facility" BFC109. Check Crop Production Farm ALD15. BDB - add subclass "backup power or generator" ALD15.
25	BUILDL	BUILDL	
26	BUILDP	BUILDP	
27	BUILTUPA	BUILTUPA	
28	BUILTUPP	BUILTUPP	
29	BUOYBCNP	BUOYBCNP	



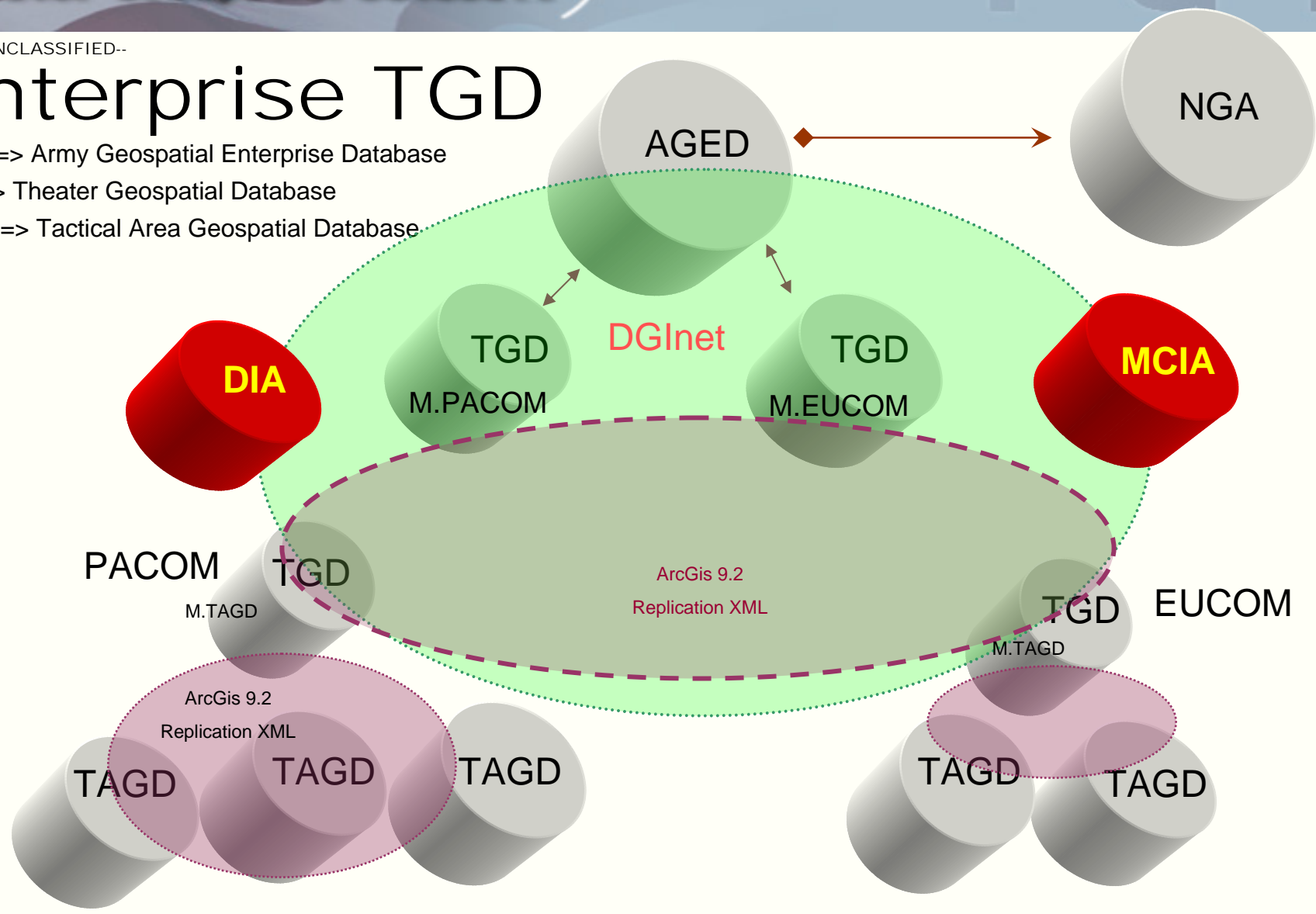
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Enterprise TGD

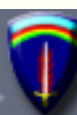
AGED=> Army Geospatial Enterprise Database

TGD=> Theater Geospatial Database

TAGD => Tactical Area Geospatial Database



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USAREUR TGD Web Site

USAREUR Theater Geospatial Database (TGD)

TGD Digital Data

TGD Finished Products

Request Information

Organizational Information

Links & Downloads

New Products

- [Overview Maps of Syria](#)
[Posted: 3/3/2006]
- [Overview Maps of Tajikistan](#)
[Posted: 3/3/2006]
- [Overview Map of the United Arab Emirates](#)
[Posted: 3/3/2006]
- [Overview Maps of Yemen](#)
[Posted: 3/3/2006]
- [Overview Maps of Kuwait](#)
[Posted: 3/3/2006]

Geospatial products & information covering the EUCOM & CENTCOM AORs

Security Banner

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USAREUR TGD IMS

USAREUR Theater Geospatial Database (TGD) - Microsoft Internet Explorer provided by the ISMC

Address: http://60engdet.hqusareur.army.smil.mil/frames.aspx?page=default2.htm

USAREUR TGD

Digital Data Finished Products Request Info. Organizational Info. Links & Downloads

Layers

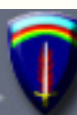
Visible Active

- USAREUR Cooperative Security Location
- HIGH RESOLUTION DATA PROJECT
- COASTLINE Global
- ROAD Global
- INTERNATIONAL_BORDER
- LAND ICE Global
- SEA ICE Global
- TUNDRA Global
- GRASSLAND Global
- SWAMP Global
- CROPLAND Global
- BEACH Global
- TREES Global
- DESERT Global
- DEPTH CONTOURS Global
- COASTAL DANGER Global
- BUILTUP AREAS Global
- OCEAN / SEA Global

Refresh Map

Internet

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USAEUR TGD Products

USAREUR Theater Geospatial Database (TGD) - Microsoft Internet Explorer provided by the ISMC

Address: http://60engdet.hqusaeur.army.smil.mil/frames.aspx?page=browse_products.aspx

USAREUR TGD

Digital Data | Finished Products | Request Info. | Organizational Info. | Links & Downloads

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Abuja Nigeria Topographic Line Maps

Abuja Nigeria Topographic Line Maps (TLM). TLM 1:50,000 scale maps produced in February 2006 by the USAREUR Theater Geospatial Database (TGD). These maps were generated from commercial satellite imagery source acquired from fall 2004 to spring 2005. Large PDF files are in GeoPDF format (layerable maps with coordinates). Please direct any questions or comments to the Program Manager, TGD - refence project: 05-07-003 Abuja Nigeria TGD.

[Meta Data]

Product Files

Abuja_NE.pdf	4 MB	Download	View
Abuja_NE_small.jpg	817 KB	Download	View
Abuja_NE_small.pdf	3 MB	Download	View
Abuja_NWV.pdf	3 MB	Download	View
Abuja_NWV_small.jpg	744 KB	Download	View
Abuja_NWV_small.pdf	2 MB	Download	View
Abuja_SE.pdf	4 MB	Download	View
Abuja_SE_small.jpg	854 KB	Download	View
Abuja_SE_small.pdf	2 MB	Download	View
Abuja_SWV.pdf	2 MB	Download	View
Abuja_SWV_small.jpg	716 KB	Download	View

Preview Image

Adobe Acrobat Reader is required to view Adobe Acrobat (*.pdf) files. Some files have been geo-referenced. To take advantage of this functionality the MAP2PDF plugin for Adobe Acrobat Reader will also need to be installed. If these programs are not installed on your computer, you can download them from the [Links & Downloads](#) page

Internet

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USARPAC TGD /NIPRNET

PACOM TGD Home Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Print Preview Stop

Address <https://geopac.hi.pac.army.mil/Home.htm> Go Links

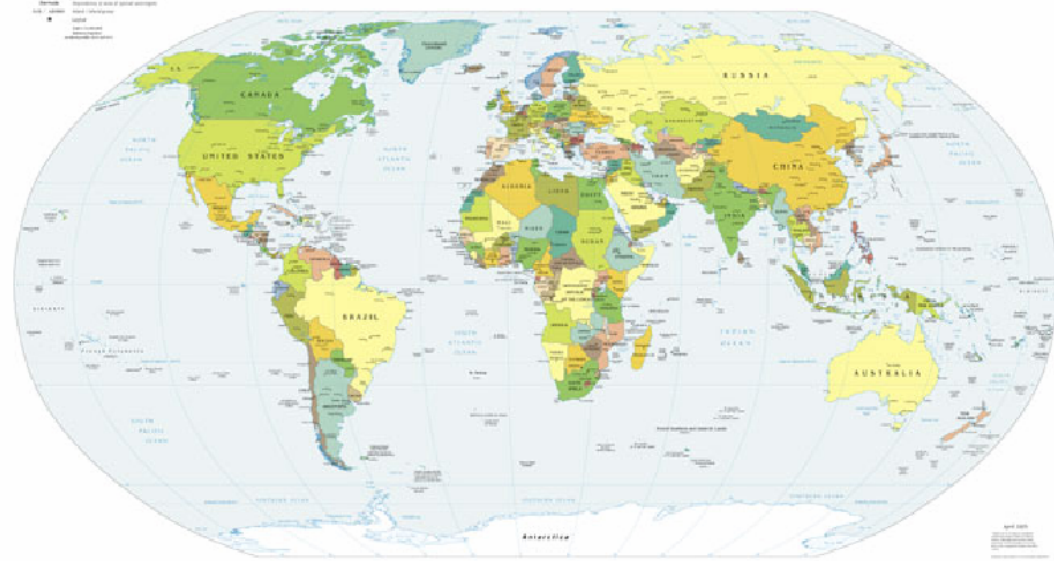
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- Mission
- PACOM Geospatial Links
- AOR Products
- Commodity Datasets
- GIS Tools
- Request Form
- Contact Information
- TGD Project

Political Map of the World, April 2005

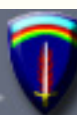


5th Engineer Detachment (P&C)

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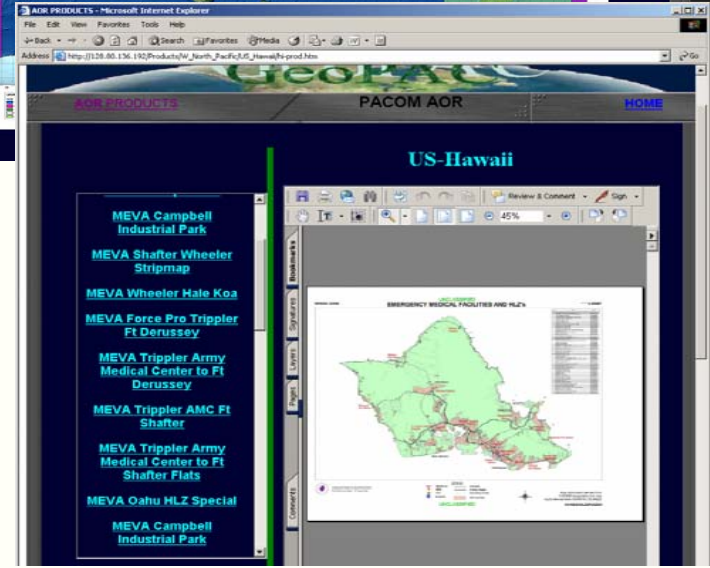
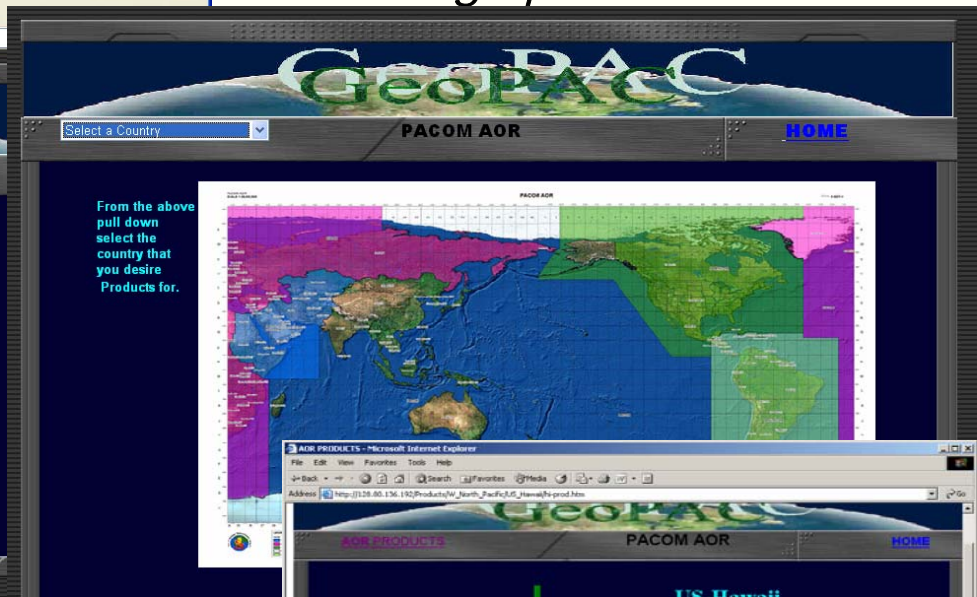
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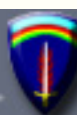
From Concept to Reality "Standing-up the TGD"



<https://geopac.hi.pac.army.mil/>

The "Front Door" of the TGD - NIPRNET

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TGD at work

The screenshot displays the ArcGIS interface with a map of Jolo Island. The left pane shows a legend with the following layers:

- tacticaloperations.TGD.LandIceA
- tacticaloperations.TGD.NuclearA
- tacticaloperations.TGD.IndvoidA
- tacticaloperations.TGD.DisposeA
- tacticaloperations.TGD.ExtractA
- tacticaloperations.TGD.ProcessA
- tacticaloperations.TGD.TreatA
- FiltrationAerationBedsArea - BH040
- tacticaloperations.TGD.StorageA
- tacticaloperations.TGD.AgristrA
- 15jul052206a5249aa00000_0100001aa27
- ortho_04Feb26_8bit.tif
- jolo.sid

The cyan callout box contains the following text:

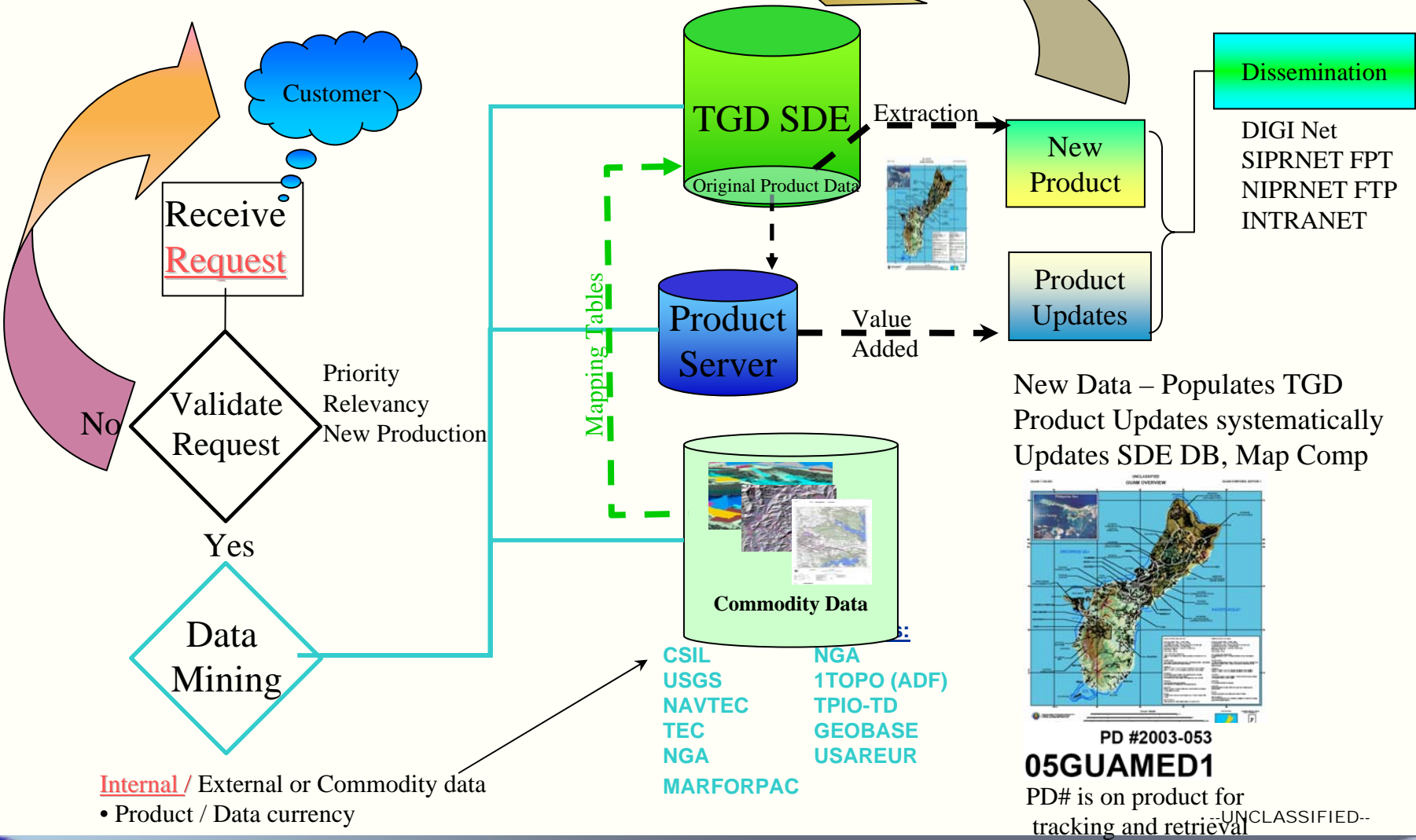
- New Bridge
- Updated Buildings
- Updated Vegetation
- New Road

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Production Workflow



Internal / External or Commodity data

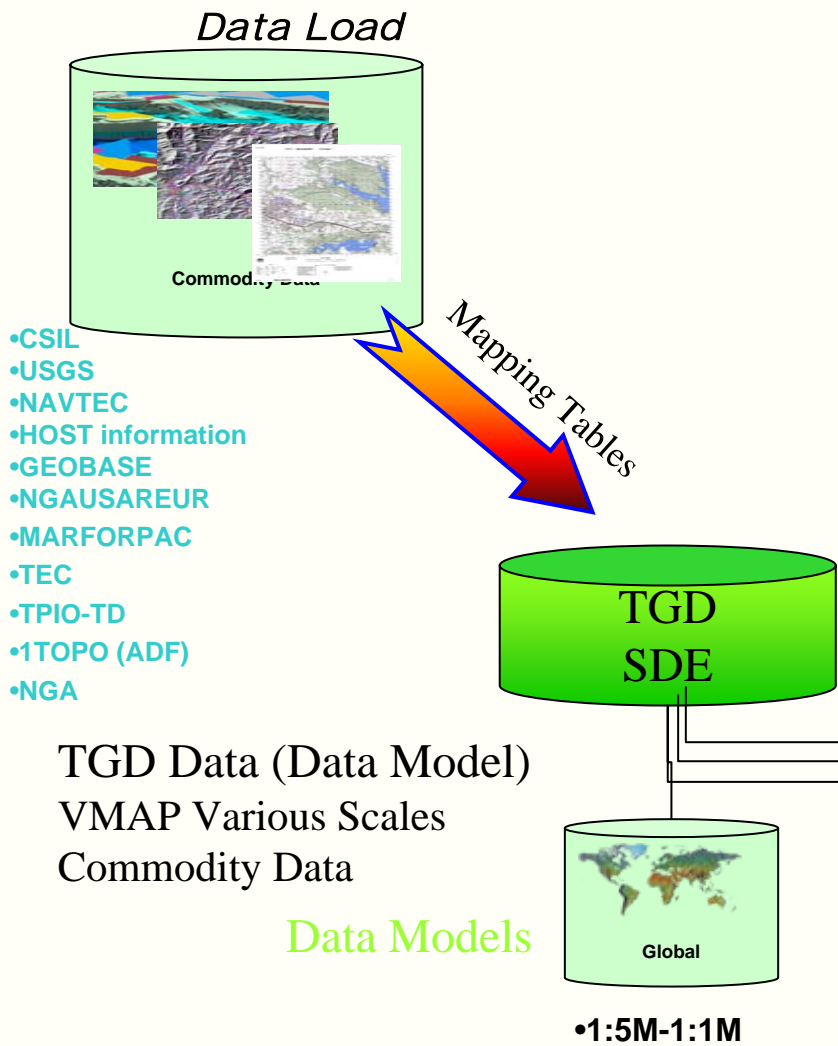
- Product / Data currency

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Data Model



- CSIL
- USGS
- NAVTEC
- HOST information
- GEOBASE
- NGAUSAREUR
- MARFORPAC
- TEC
- TPIO-TD
- 1TOPO (ADF)
- NGA

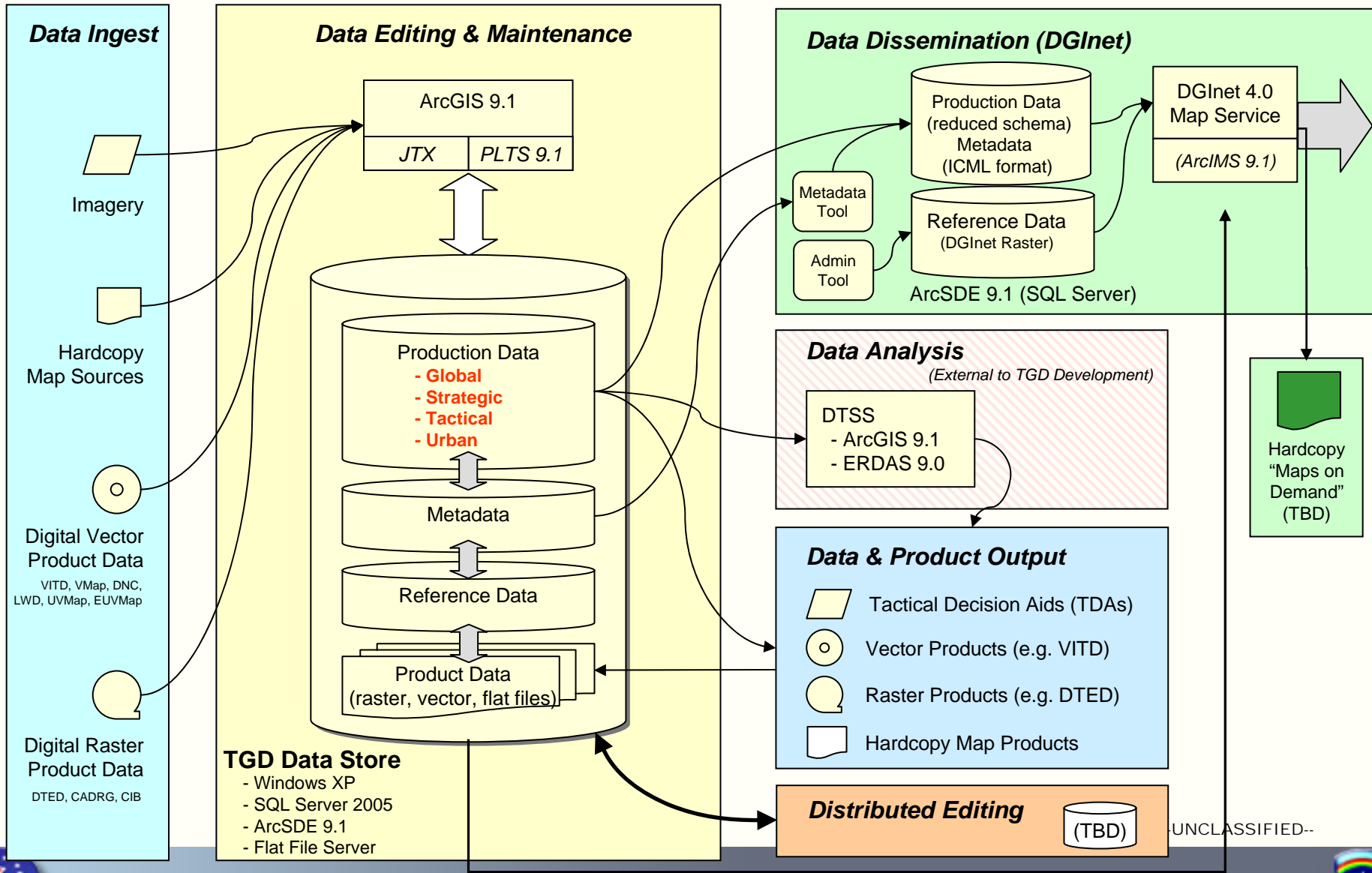
FieldID	InFieldName	OutFieldName	FeatureClass
5440	OBJECTID	OBJECTID	AerofacP
5441	Shape	Shape	AerofacP
5442	FCsubtype	FCsubtype	AerofacP
5443	gfid	gfid	AerofacP
5444	MDLink	MDLink	AerofacP
5445	f_code	f_code	AerofacP
5446	iko	iko	AerofacP
5447	nam	nam	AerofacP
5448	na3	na3	AerofacP
5449	use_	use_	AerofacP
5450	zv3	zv3	AerofacP
5222	OBJECTID	OBJECTID	AquedctL
5223	Shape	Shape	AquedctL
5224	FCsubtype	FCsubtype	AquedctL
5225	gfid	gfid	AquedctL
5226	MDLink	MDLink	AquedctL
5227	f_code	f_code	AquedctL
5228	exs	exs	AquedctL
5229	loc	loc	AquedctL
5230	Shape_Length	Shape_Length	AquedctL
5359	OBJECTID	OBJECTID	BarrierL
5360	Shape	Shape	BarrierL
5361	FCsubtype	FCsubtype	BarrierL
5362	gfid	gfid	BarrierL
5363	MDLink	MDLink	BarrierL
5364	f_code	f_code	BarrierL
5365	Shape_Length	Shape_Length	BarrierL
5177	OBJECTID	OBJECTID	BluffL
5178	Shape	Shape	BluffL
5179	FCsubtype	FCsubtype	BluffL
5180	gfid	gfid	BluffL
5181	MDLink	MDLink	BluffL
5182	f_code	f_code	BluffL
5183	Shape_Length	Shape_Length	BluffL
5874	OBJECTID	OBJECTID	BndvoidA
5875	Shape	Shape	BndvoidA
5876	FCsubtype	FCsubtype	BndvoidA
5877	gfid	gfid	BndvoidA
5878	MDLink	MDLink	BndvoidA
5879	f_code	f_code	BndvoidA
5880	vca	vca	BndvoidA
5881	Shape_Length	Shape_Length	BndvoidA
5882	Shape_Area	Shape_Area	BndvoidA

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TGD Functional Architecture

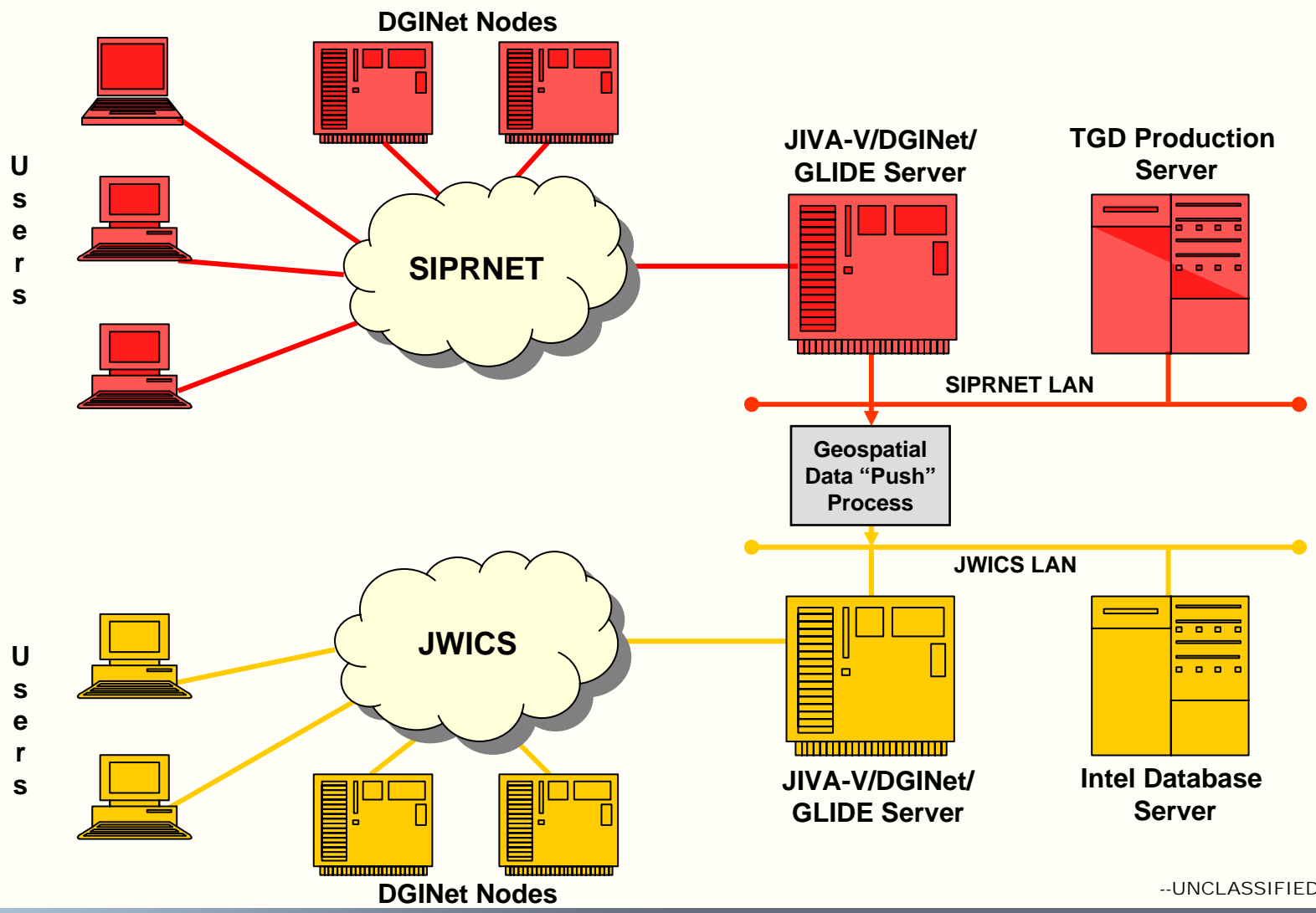


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TGD Architecture



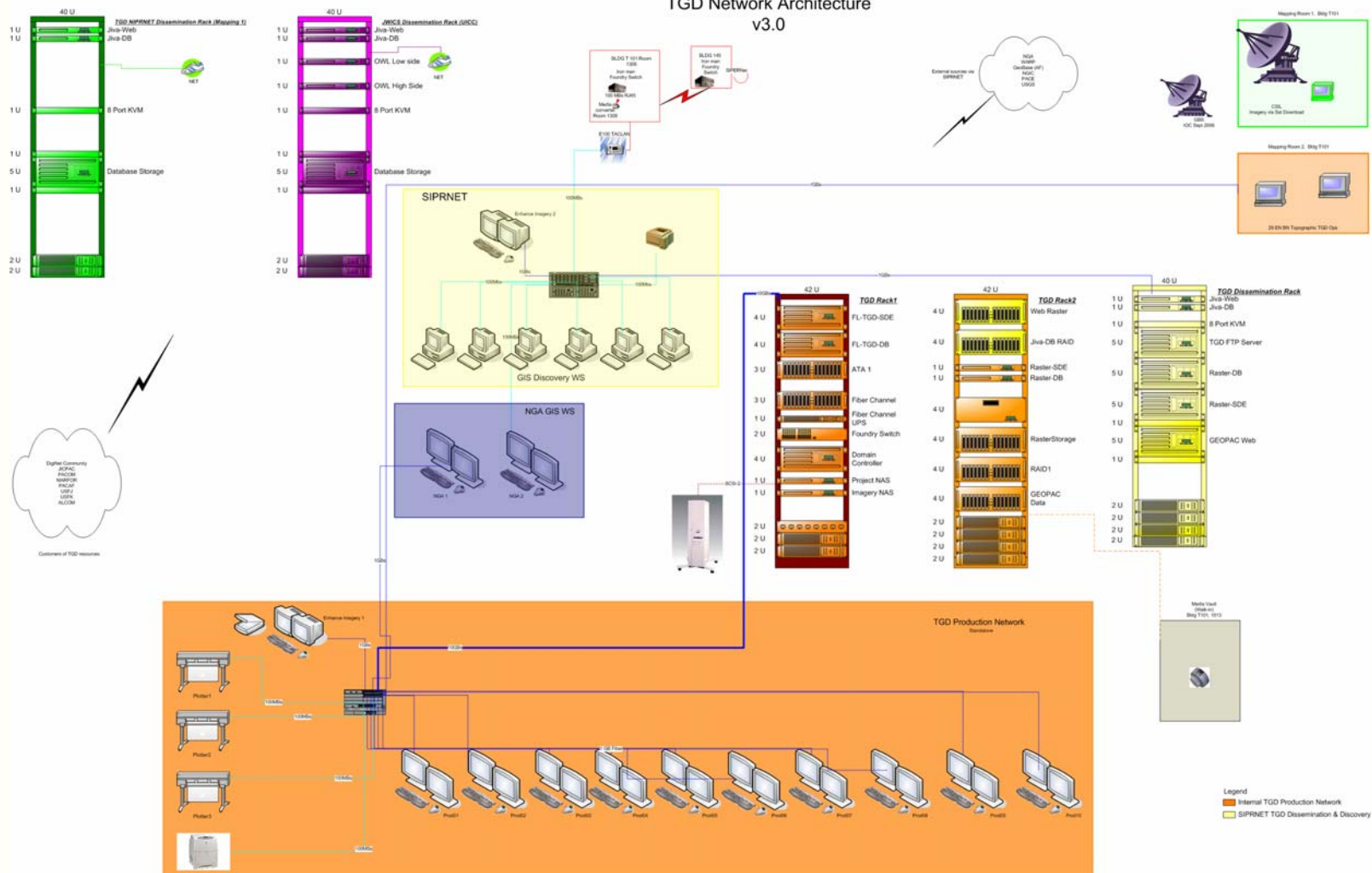
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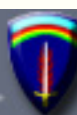
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USARPAC TGD Network

TGD Network Architecture v3.0

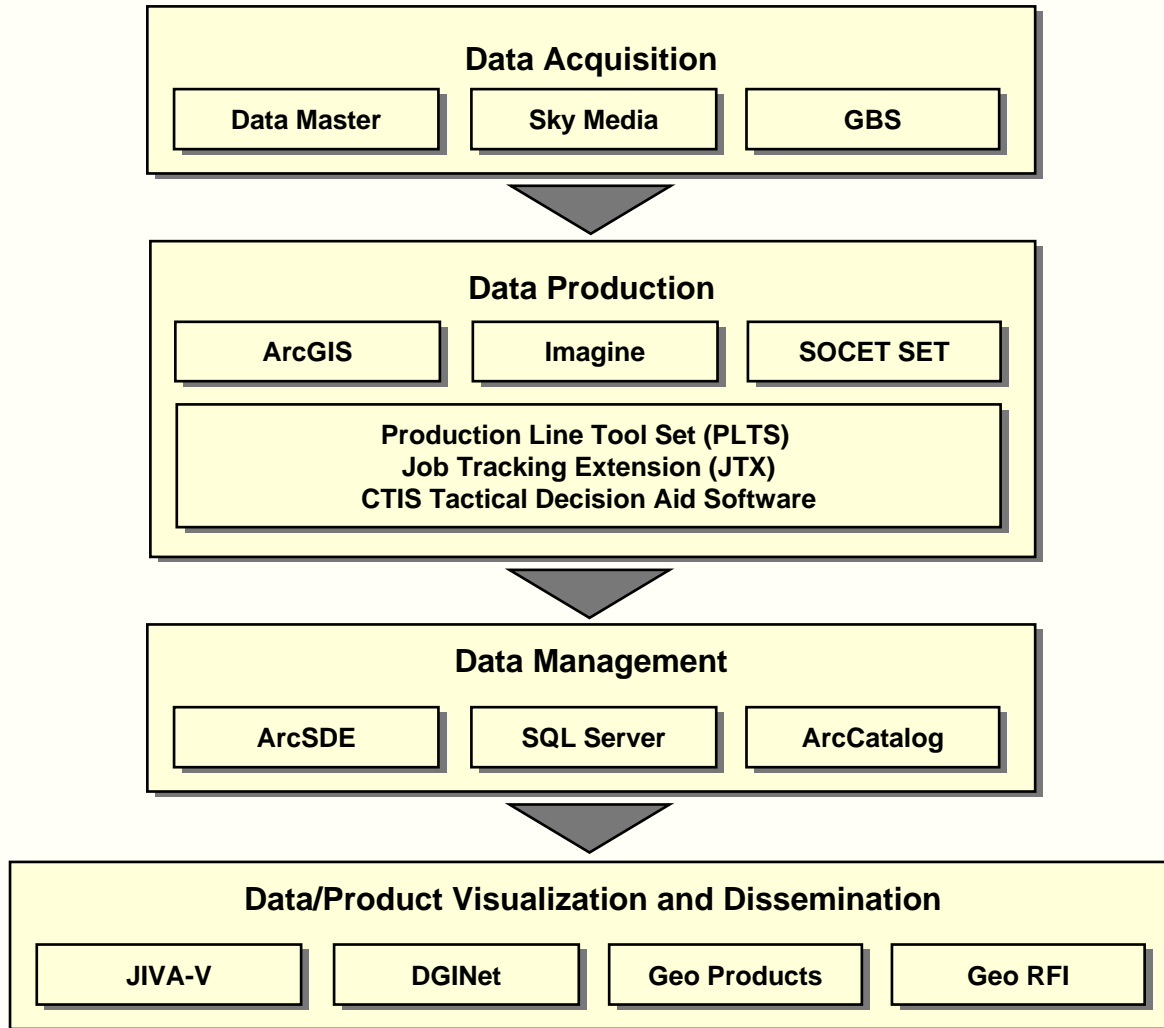


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TGD Software



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Enterprise Component

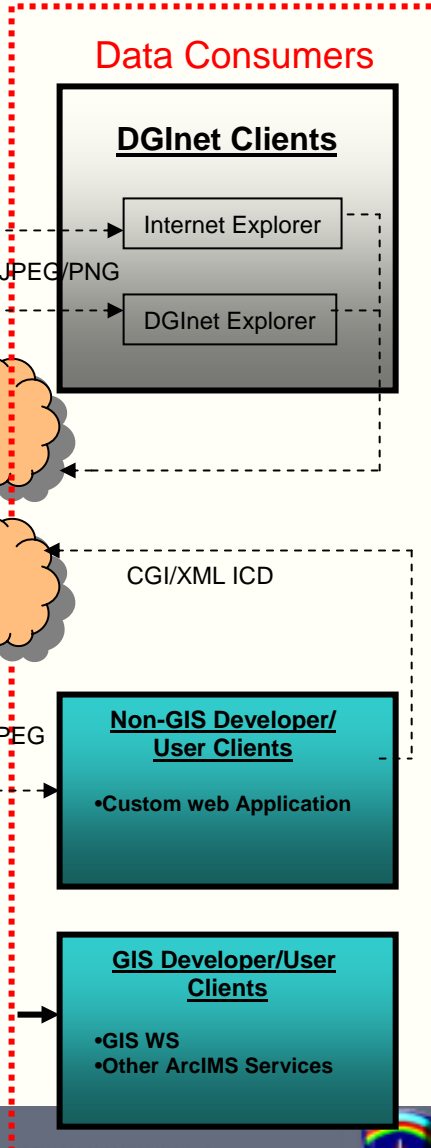
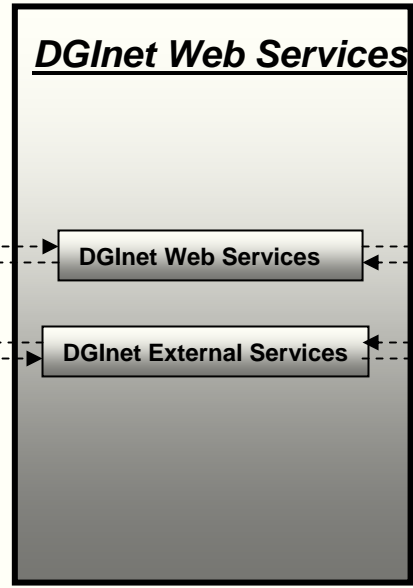
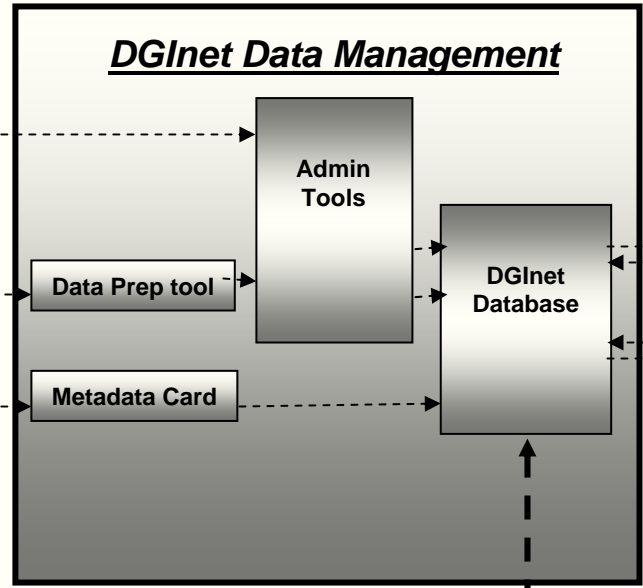
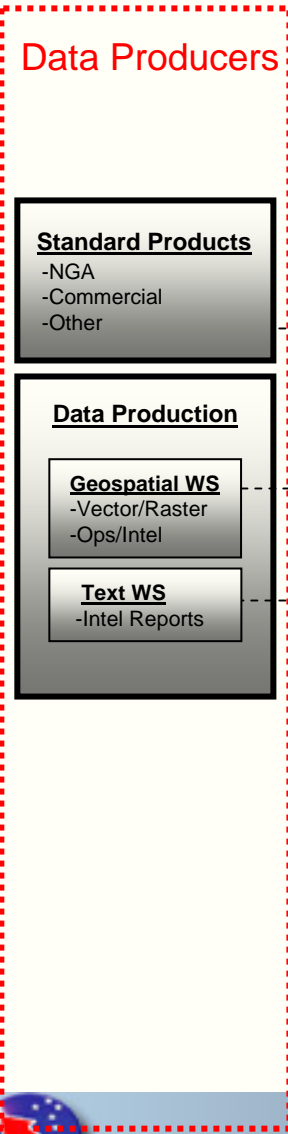
- **Joint Intelligence Virtual Architecture – Visualization (JIVA-V):** Provides capability to quickly and easily find, display, overlay and fuse geospatial **data** from multiple sources.
- **Distributed Geospatial Intelligence Network (DGINet):** Provides analysts the capability to rapidly locate and display data residing locally or at remote sites world-wide.
- **Geographically Linked Information Dissemination Environment (GLIDE):** Provides the capability to quickly locate, display and download geospatial **products** from anywhere on the network.

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What Is JIVA-V/DGInet?



Standard SDE Call



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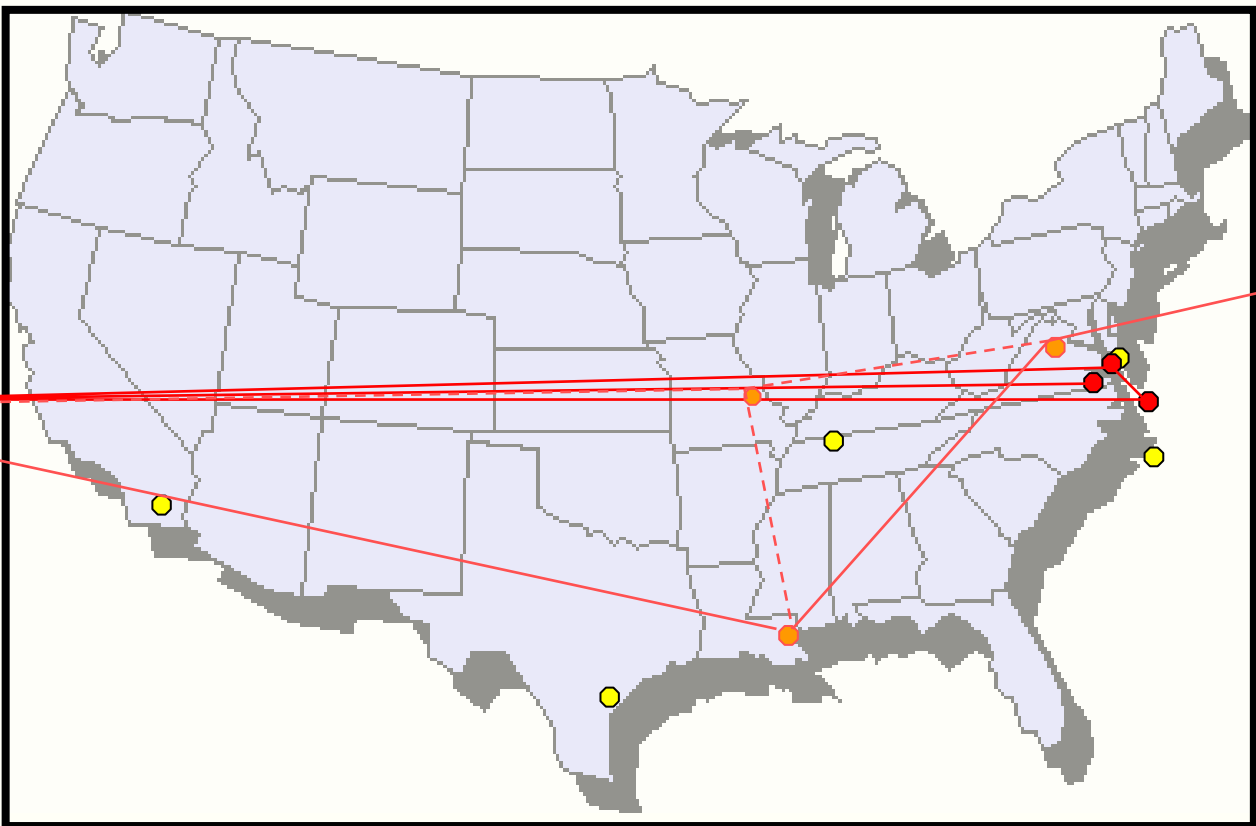
DGInet Operational SIPRNET Nodes

SIPRNET2 Active

- USARUR
- USARPAC
- NAVO
- DTRA
- NGA*

SIPRNET1 Active

- USPACOM
- JFIC
- MCIA (GLIDE)
- NGIC (Prototype)



SIPRNET Planned

- DIAC
- NGIC (Operational)
- 1st MEF
- 2nd MEF
- 3rd MEF
- USTRANSCOM
- JIOC (AIA)

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*From Concept to Reality
"Standing-up the TGD"*

USAREUR - Microsoft Internet Explorer provided by ODCSOPS

Address: <http://tgd.60engdet.hqusareur.army.smil.mil/jiva/servlet/webDGInetClient.ServiceInfoServlet>

USAREUR
FREEDOM'S
BROTHERHOOD
ANY MISSION, ANYWHERE

GEOSPATIAL DGI-NET USAREUR center coordinates lat = lon =

Version 3.0.1 (Build 3.0.1)

lat = 76°56'60"N lon = 87°45'0"E

Find by Name: (Wild card character is *)

USARPAC TGD

GEOSPATIAL DGI-NET USARPAC center coordinates lat = lon =

Version 3.0.1 (Build 3.0.1)

lat = 21°32'2"N lon = 157°34'38"W

DGInet

Search Advanced Search DGInet Providers

Use the options below to create a specific search. Just fill in the fields you need for your current search.

Keyword: Search

Subject:

Publisher:

Facility: ENumber: Category Code: OSuffix:

Current Map extent:

View Metadata View Document Plot on Map

(U) Map: Ford Island, Hawaii

Description:
Author/Producer: USARPAC
Publish date: 03/01/2004
Product Security Marking: UNCLASSIFIED//UNCONTROLLED

View Metadata View Document Plot on Map

Result Page: 1

Address: http://128.80.136.007/Website/Products/2003-43_Ford_Island.pdf

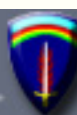
Save a Copy Print Select Text View Adobe PDF files while you're on the road

11%

22 x 22 in 1 of 1

The "Front Door" of the TGD - SIPRNET

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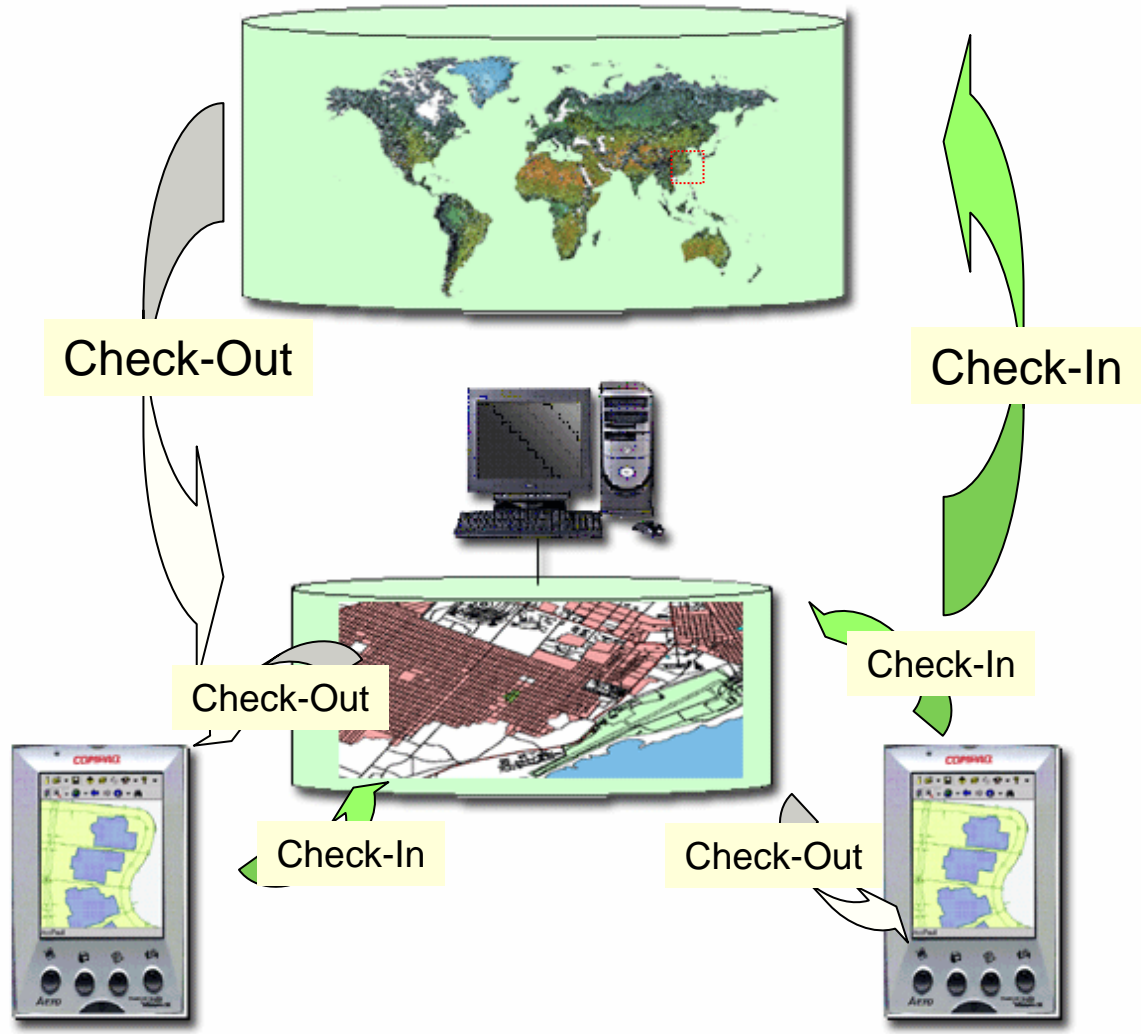
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Disconnected Editing

TGD forms Initial "map" baseline

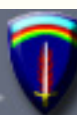
Checkout mission dataset

Check-outs To individual ArcPad devices



Check-In Data to TGD

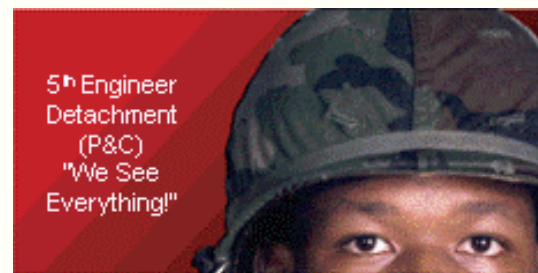
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U.S. Army Transformation 5th EN DET (P&C) to 5th GPC

- 5th EN DET, 11 Mil 1DA Civ, 5 contractors
- 5th GPC, Oct 2007 27 Mil ? DA Civ, ? contractors
- 60th EN DET
- 60th GPC, Spring 2007

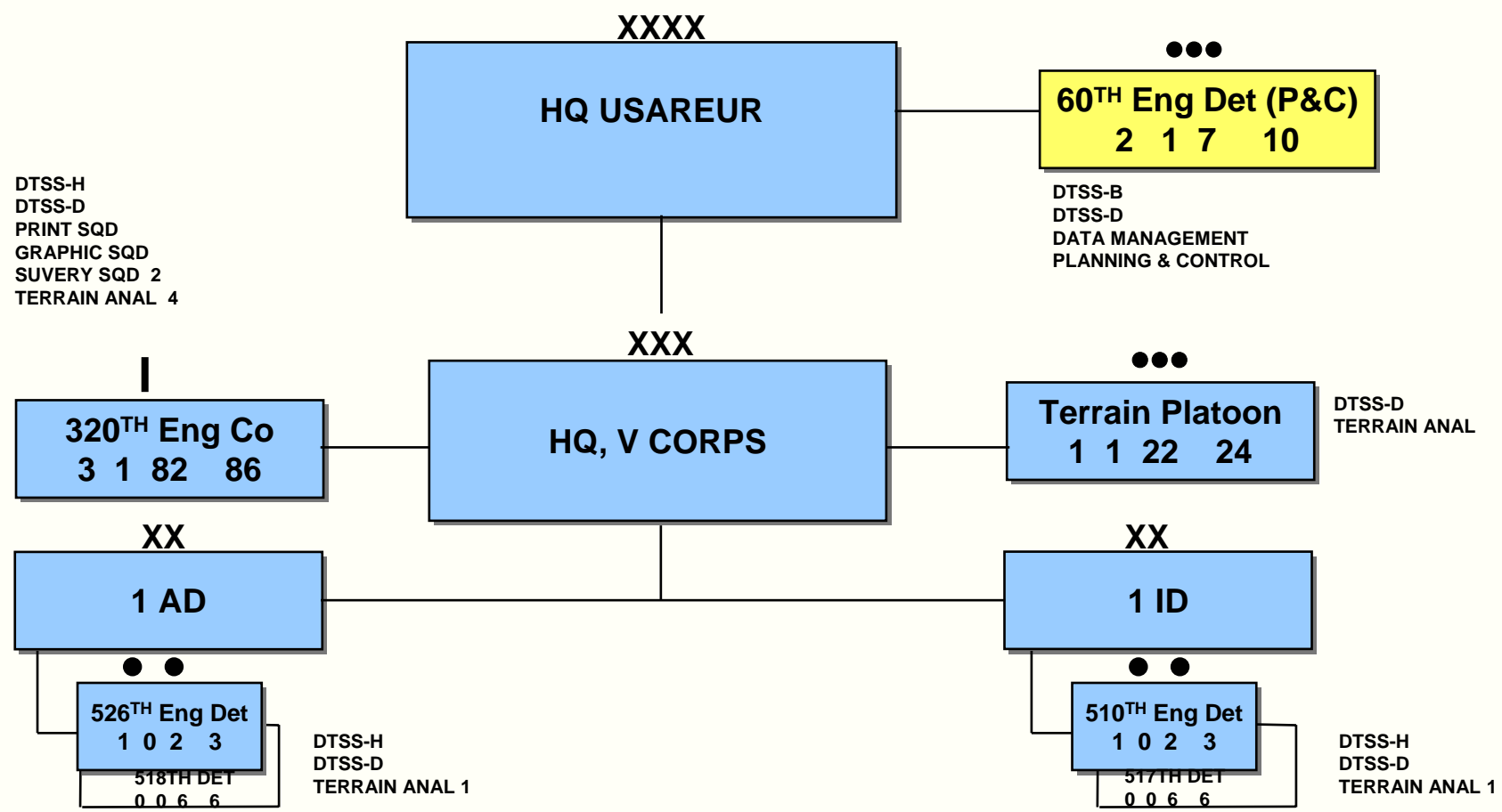


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USAREUR Organization



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Future Enhancements

- **TGD 3**
 - Raster Geospatial Database
 - Glide features (Zip and Ship)
- **TGD 4**
- Improved database performance
- Automatic Feature extraction
- Automatic Map generation
- Automatic Feature change notification

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SIPRNET: <http://128.80.136.192>
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Glossary

- LINCS – Long-range Information Networked Communications Services
- TGD – Theater Geospatial Database
- Jiva-V - Joint Intelligence Virtual Architecture – Visualization
- DGINet - Distributed Geospatial Intelligence Network
- GLIDE - Geographically Linked Information Dissemination Environment
- DTSS - Digital Topographic Support System
- NGA - National Geospatial-Intelligence Agency
- IPB - Intelligence Preparation of the Battlefield
- EBA - Engineering Battlefield Assessment

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Attribution

The following people took part in the ongoing development and implementation of the TGD:

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- ESRI – Jim Ciarrocca, John Grammer, Jack Miller
- USATEC – Dennise Hovanec, Mark Hainsey
- DIA – Terry Busch

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Questions



"A map says to you, Read me carefully, follow me closely,
doubt me not, I am the earth in the palm of your hand"

Beryl Markham -- aviator and author

