Sogitec

DIGITAL INNOVATION FOR
SUCCESSFUL FLIGHTS

SISO

RIEDP, SISO STANDARDS FOR ENVIRONMENTAL DATA SHARING

Auteur : JL GOUGEAT

Code Affaire / Code projet :

Référence – Date : 08 August 2018

AGENDA

- Introduction
- Training Requirements
- Building a Flight Simulator Database
- RIEDP Key Concepts
- Zoom on Semantics
- Way Forward
- Conclusion

RIEDP : Reuse and Interoperation of Environmental Data and Processes

SISO : Simulation Interoperability Standard Organization

WHO IS TALKING TO YOU ?

Jean-Louis GOUGEAT

Sogitec

- Currently Project Manager
  - Flight Simulators / Simulation Centers
  - Networking and other Research &Technology areas
- Previously
  - Support of the French MoD in R&T areas
    - French Army, Navy, Air Force Simulation Projects
    - Studies for Staffs in Distributed Simulation
- Database Generation area
  - Not an expert
  - Trying to make the experts talk together !
  - Chairman of the RIEDP PDG
- SISO Member since 1996
- jlgougeat@sogitec.fr

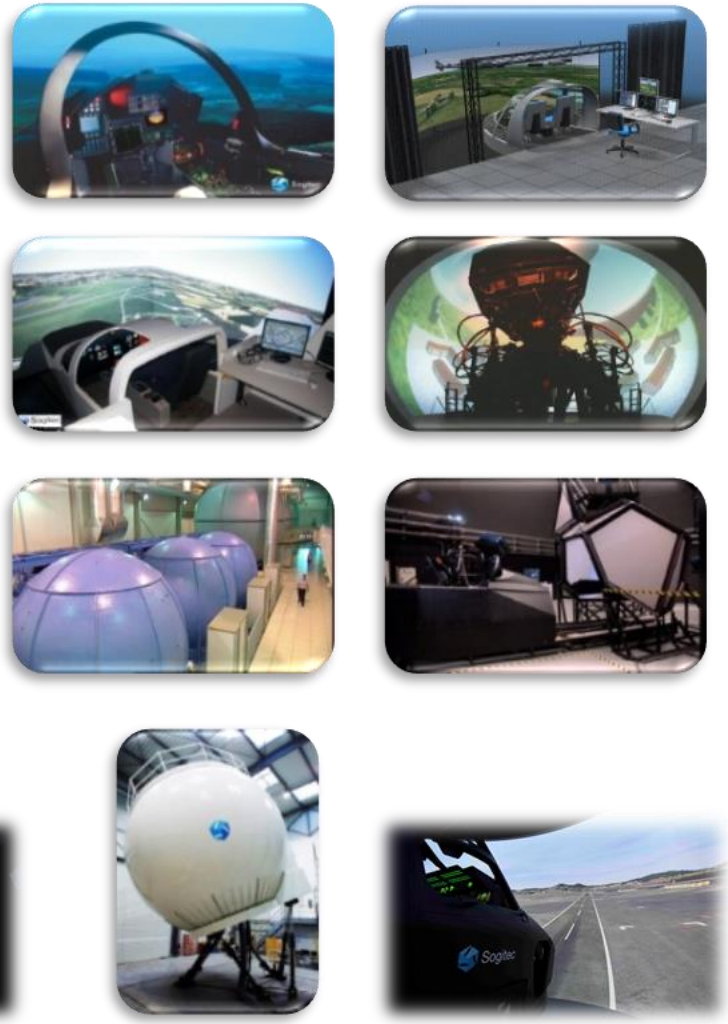
SOGITEC AT A GLANCE

Simulators for Training

- Mirage Family (F1, -5, D, -9, H, …)
- Rafale Omnirole A/C
- Helico (NH90, Dauphin, Cougar)

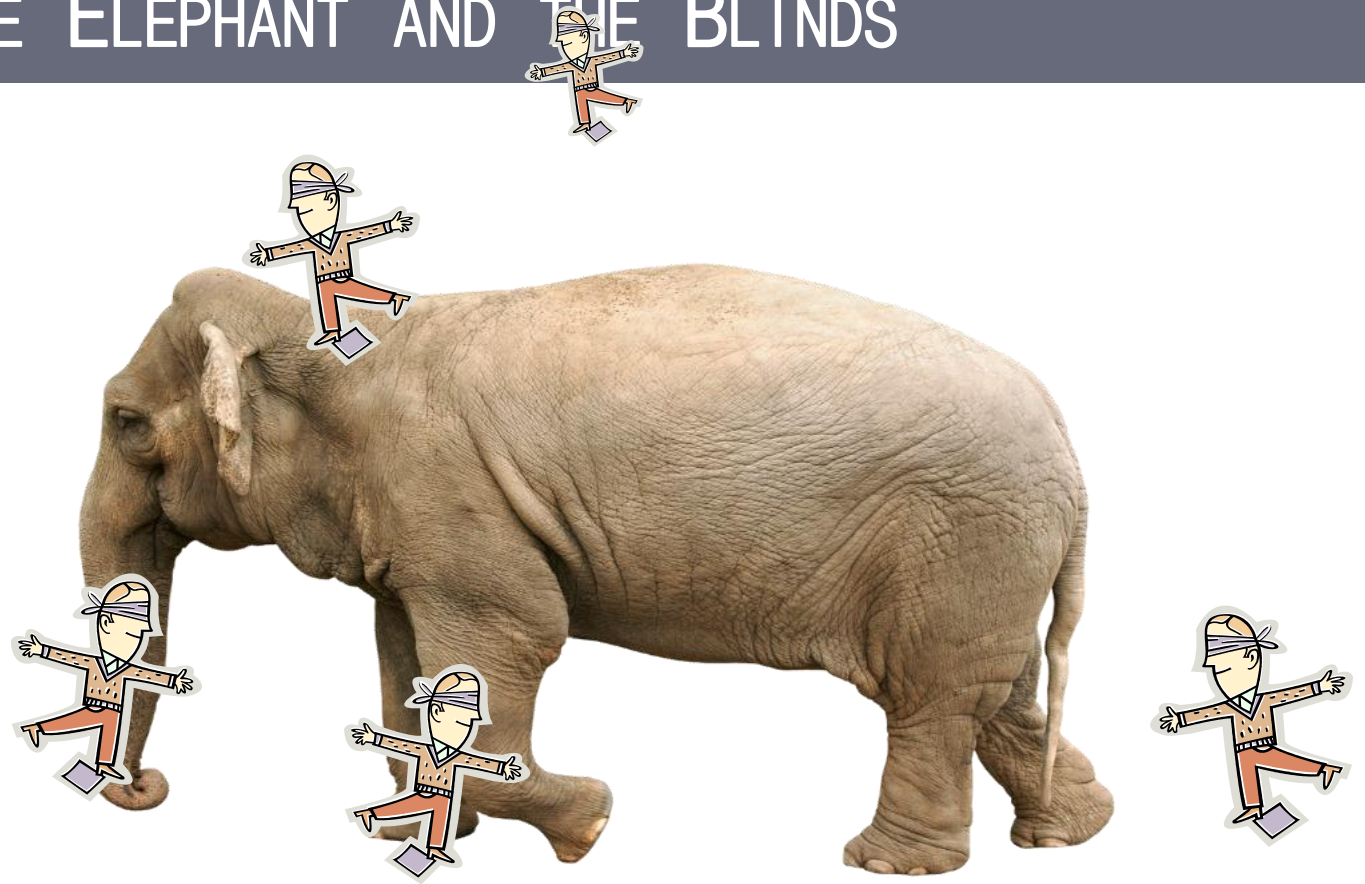
Users

- France
  - FAF, Army Light Aviation, Navy
- Foreign users
  - NATO
  - Middle East (Egypt, Qatar, UAE, …)
  - Taiwan
  - India
  - …



TRAINING REQUIREMENTS

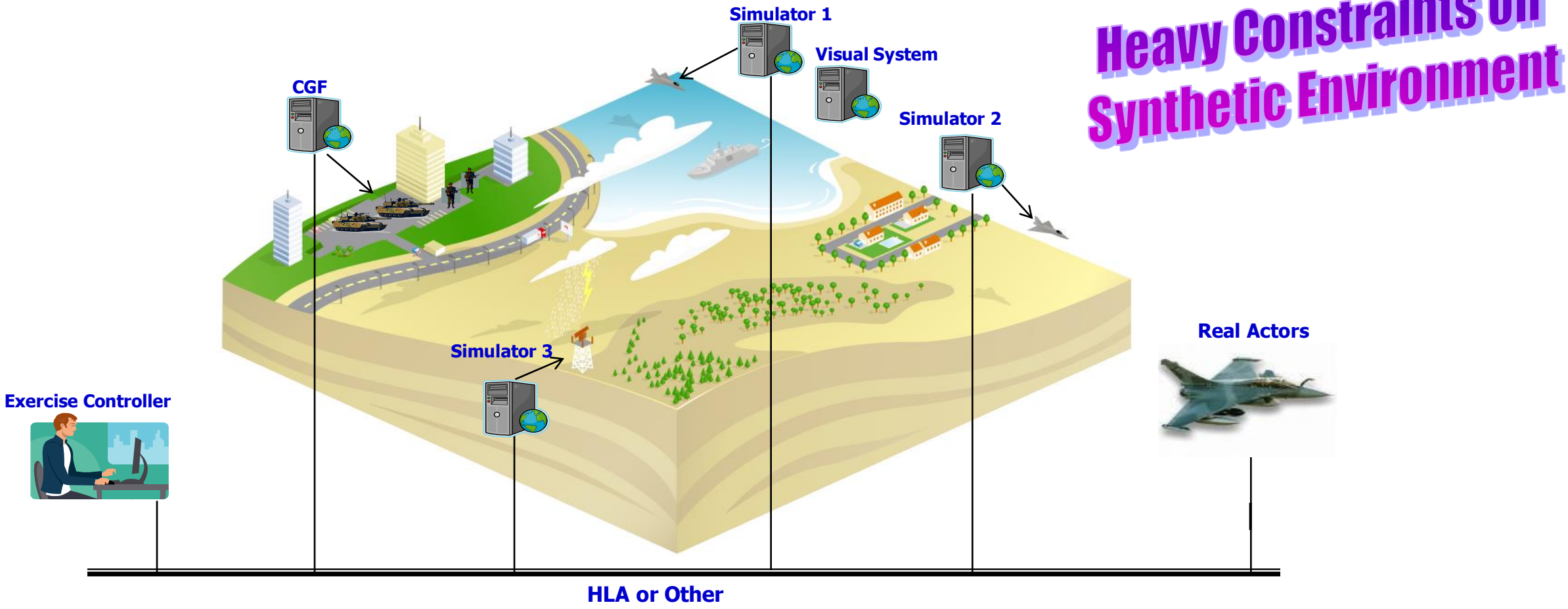
Fable of "The Elephant and the Blinds"



Representation of complex Things heavily depends on the Standpoint …

LVC Training

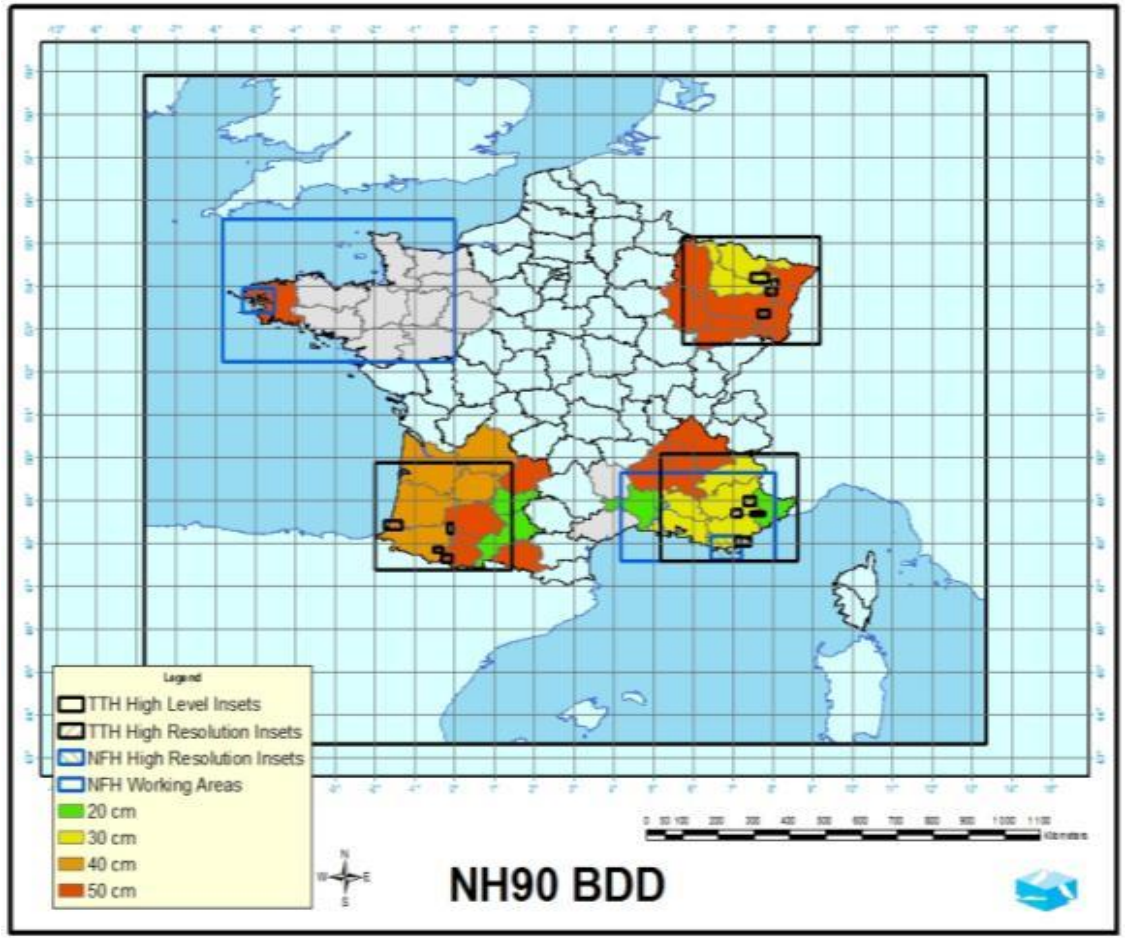
LVC : Live Virtual Constructive

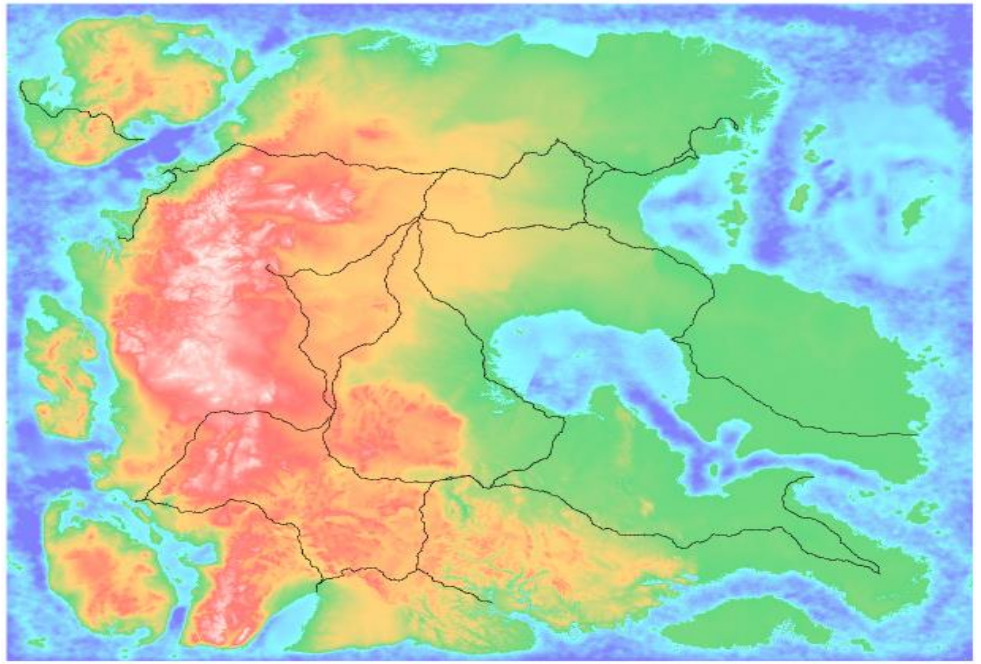


Heavy Constraints on Synthetic Environment

SYNTHETIC ENVIRONMENT – REQUIREMENTS FOR AN AIRCRAFT SIMULATOR

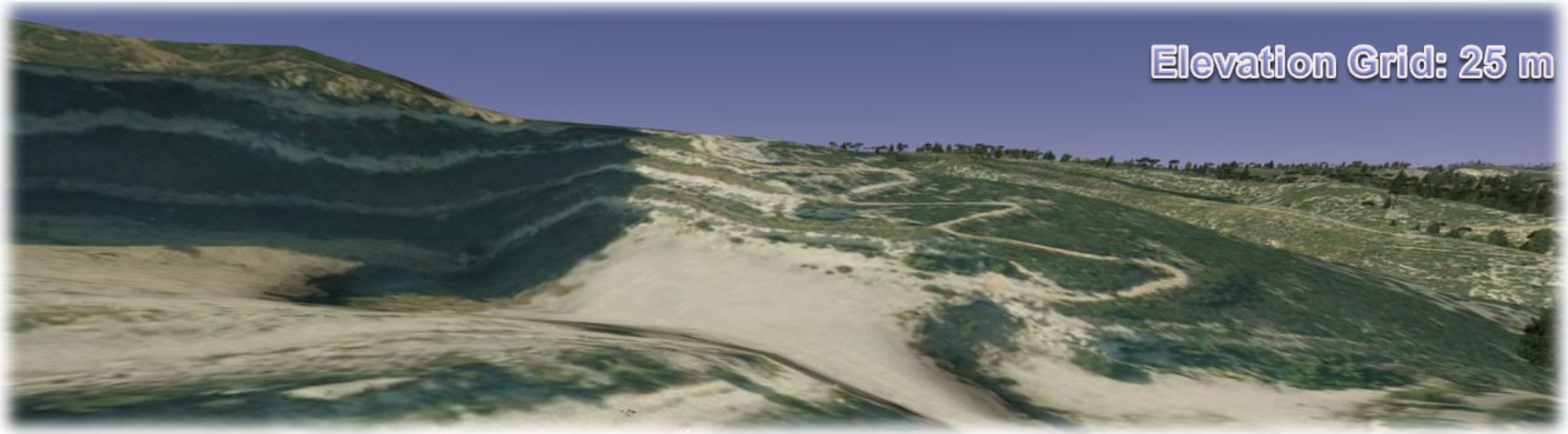
SYNTHETIC ENVIRONMENT – REQUIREMENTS / LARGE AREAS





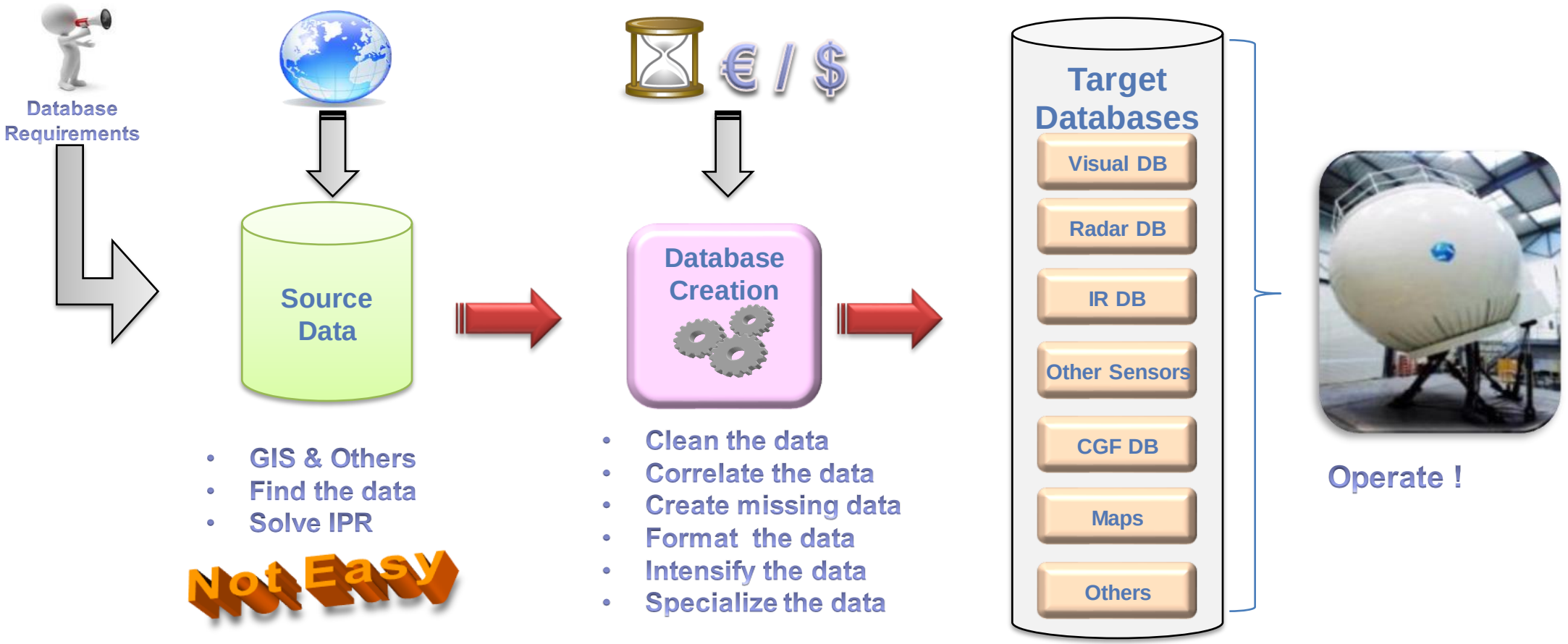
NATO "Missionland"
2000x2000 km

SYNTHETIC ENVIRONMENT – REQUIREMENTS / FIDELITY



BUILDING A SIMULATOR DATABASE

Building a Simulator Database



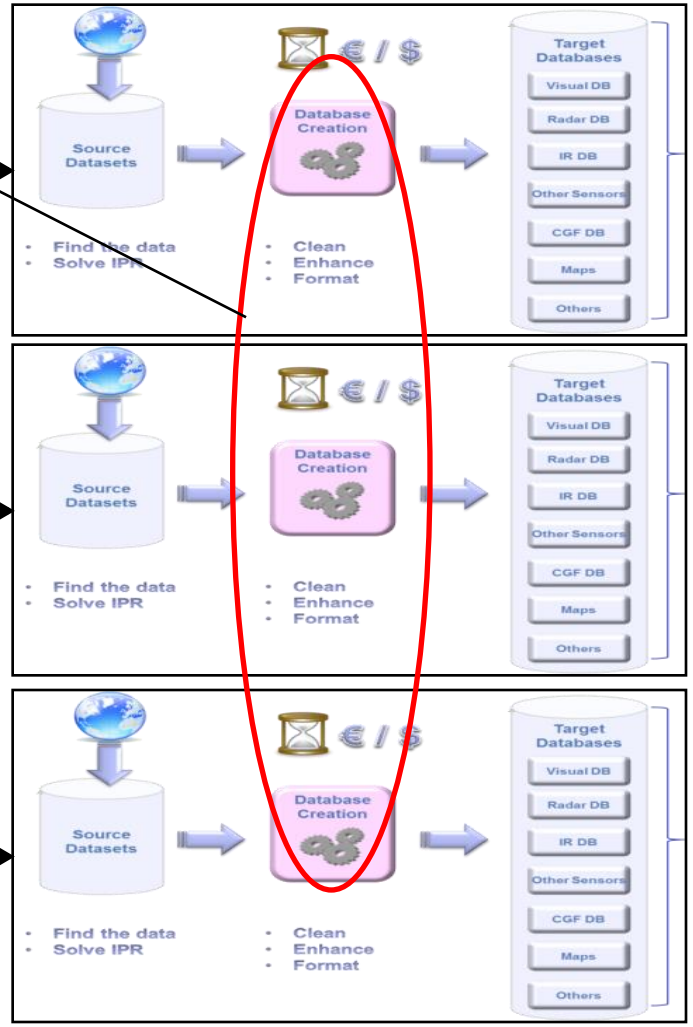
ADDITIONAL ISSUES FOR DISTRIBUTED SIMULATION / LVC
REUSE - CORRELATION - INTEROPERABILITY ….

Duplication of efforts

Duplication of Cost

Time to market

Requirements



Sim A - Provider 1

Sim B - Provider 2

Sim C – Provider 3

Consistency ?

Schedule ?

M&S Interoperability is even more critical in the International Arena with Multiple Providers and Multiple M&S Solutions

M&S INTEROPERABILITY

What it is NOT

- The same Product and associated Solutions for everyone
  - Does not work, certainly not in the International Arena
  - Puts Innovation at risk
  - What product to choose? Single Solution sufficient ?

What it is

- Consistency in Modelling, associated Data and Semantics at Component Level
- Allowing Components to work together at System & System-of-Systems Levels
- Fostering Multiple-Provider Solutions (e.g. : I/ITSEC/OBW Federations)

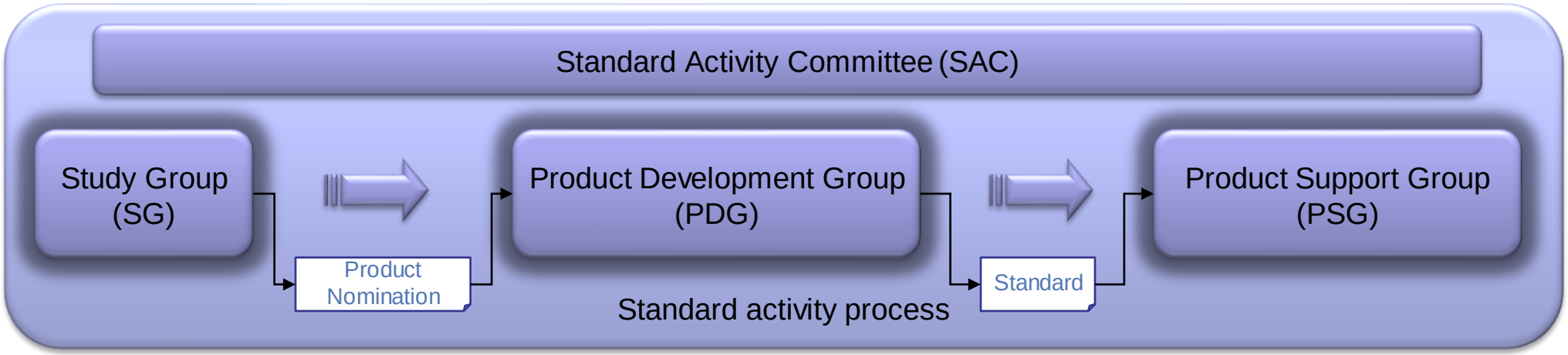
Interoperability relies on **Appropriate Standards**

SISO Simulation Interoperability Standards Organization "Simulation Interoperability & Reuse through Standards"

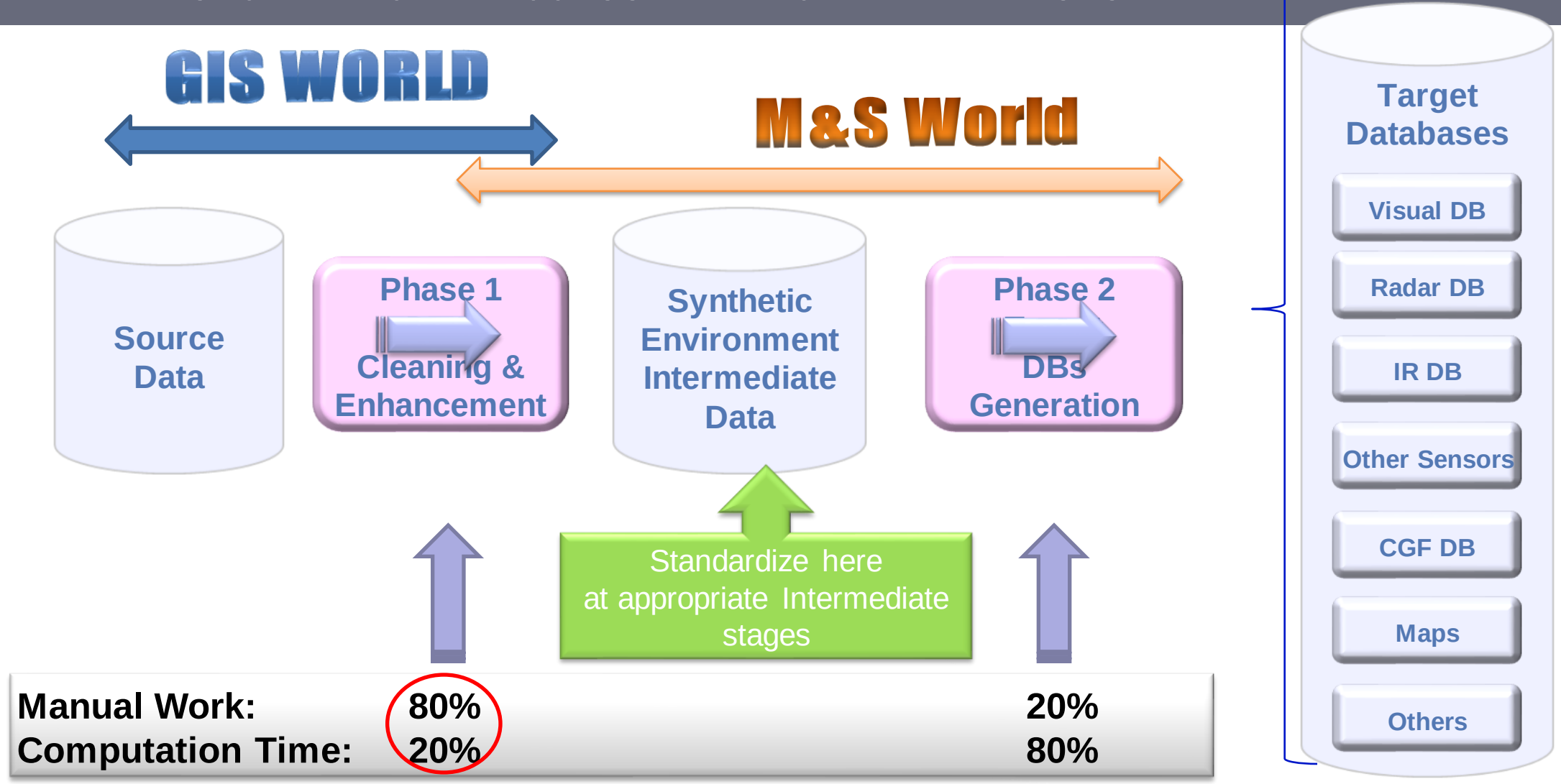
ROLE OF SISO

- Domain of the Simulation Interoperability Standard Organization (SISO)
- Who : International M&S Experts
- Why : Interoperability, Reusability of M&S assets .
- What : Open forum
  - Conferences/Workshops
  - Standardization Activity
- Where : USA & Europe
- When : Annual SISO Innovation Workshop in September + Seminar at ITEC

DIS, HLA, FOM, CiGi, DSEEP



Data Transformation Process - Two main phases



DATA TRANSFORMATION PROCESS - POSSIBLE IMPROVEMENT

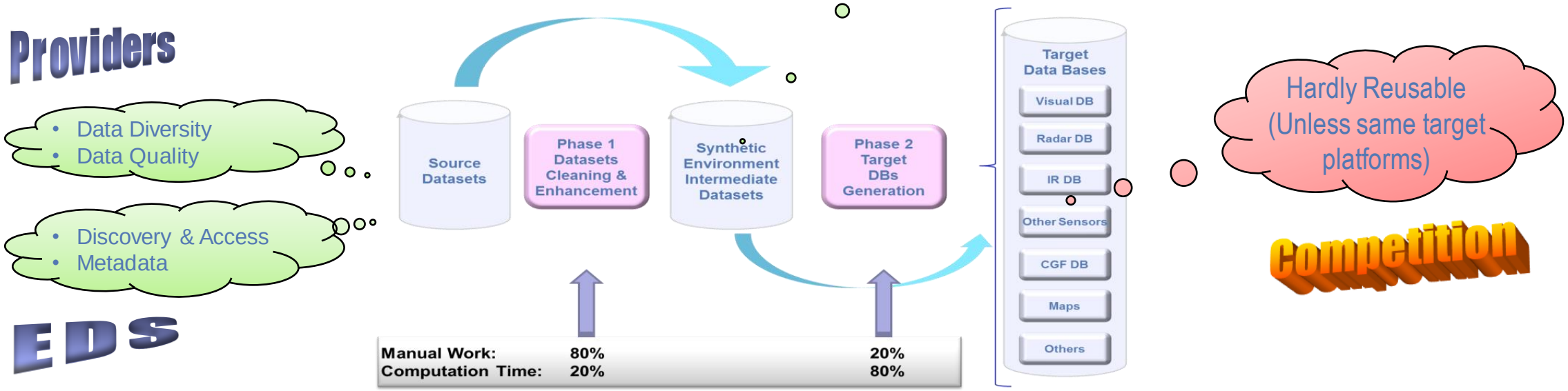
MTDS : Mission Training via Distributed Simulation

The process may be made more efficient in MTDS

- If Source data is comprehensive and consistent
  - Within each and between the layers
- If previous creation efforts may be reused
  - At Source Data Level (Linked to GIS World)
  - At Intermediate Level
    - Requires Common Processes, Representations, and Formats at this level

Reuse of Intensification efforts

RIEDP



RIEDP KEY CONCEPTS

Key Topics for Database sharing

When reusing data from a partner, you need to know

- How the database was built → Tasks performed or not
- How the database is represented → Conceptual Model
- How the database is spatially referenced → Spatial Reference Model
- How the database is structured → Physical data model
- How the database is organized on the media → Files/Folders/Hierarchies
- How well the database conforms to Standards → Compliancy & Profiles
- Information about the data product → Metadata

No existing solution fully satisfies all of these requirements

INTERNATIONAL M&S INITIATIVES / STANDARDIZATION EFFORTS

Process oriented *DB oriented*

Nature	M&S standards		Projects / Initiatives						Other
Name	SIF	SEDRIS	NPSI	AFCD	SE Core	CDB	Missionland	Other	EDS
Origin	US DOD	US DOD	US Navy	USAF	US Army	USSOCOM	NATO	e.g. French Air Force	US DoD
Introduction Date	1991	1994	2004	2006	2008	2004	2010	2006	201x
Standard	Yes	Yes ISO	User Standard	User Standard	User Standard	User & Commercial Standard	User Standard	User Standard	Reuse of Standards
Open Standard	Yes	Yes	limited	limited	limited	OGC	limited	limited	-
Approach	Format according to standard	Standardized Semantics and Data Model + Format according to standard	Based on de-facto standard formats (GIS Source but - No consistent Sema - Simila RIEDP addresses these Topics						Data Discovery & Access
Availability of Commercial Support Tools	Obsolete	Tools developed in SEDRIS COI	Commercial tools for commercial & standard formats						Portal

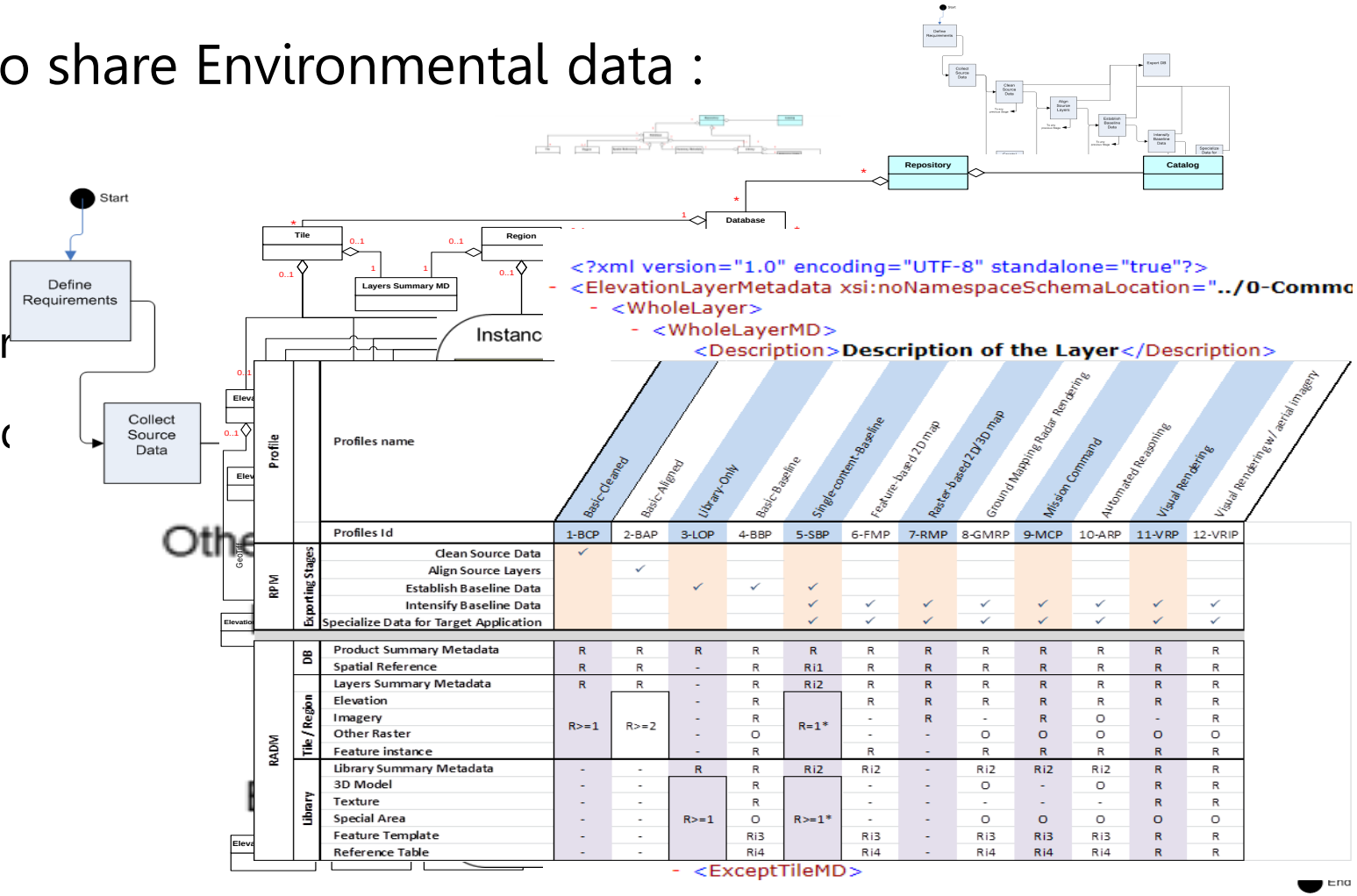
AFCD: Air Force Common Dataset
EDS: Enterprise Data Services
NPSI: NAVAIR Portable Source Initiative

CDB: Common Database
SE Core: Synthetic Environment Core
SIF: SSDB (Standard Simulator Database) Interchange Format

RIEDP AT A GLANCE

RIEDP provides what is needed to share Environmental data :

- A Reference Process Model
- A Reference Abstract Data Model
- A Tiling Scheme and Spatial Refer
- A List of Formats from the GIS and
- A Consistent Semantics (through
- An Organization on the Media
- A Metadata structure
- A set of Exchange Profiles



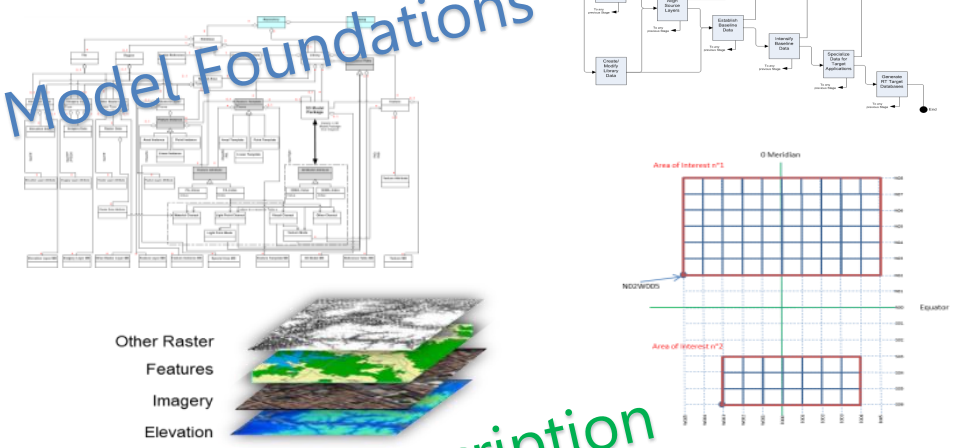
Profile		Profiles name	Basic-Cleaned	Basic-Aligned	Library-Only	Basic-Baseline	Single-content-Baseline	Feature-based 2D map	Raster-based 2D/3D map	Ground Mapping Radar Rendering	Mission Command	Automated Reasoning	Visual Rendering	Visual Rendering w/ aerial imagery
		Profiles Id	1-BCP	2-BAP	3-LOP	4-BBP	5-SBP	6-FMP	7-RMP	8-GMRP	9-MCP	10-ARP	11-VRP	12-VRIP
RPM	Exporting Stages	Clean Source Data	✓											
		Align Source Layers		✓										
		Establish Baseline Data			✓	✓	✓							
		Intensify Baseline Data					✓	✓	✓	✓	✓	✓	✓	✓
		Specialize Data for Target Application					✓	✓	✓	✓	✓	✓	✓	✓
RADM	DB	Product Summary Metadata	R	R	R	R	R	R	R	R	R	R	R	R
		Spatial Reference	R	R	-	R	Ri1	R	R	R	R	R	R	R
	Tile / Region	Layers Summary Metadata	R	R	-	R	Ri2	R	R	R	R	R	R	R
		Elevation	R>=1	R>=2	-	R	R=1*	R	R	R	R	R	R	R
		Imagery			-	R		-	R	-	R	O	-	R
		Other Raster			-	O		-	-	O	O	O	O	O
		Feature instance			-	R		R	-	R	R	R	R	R
	Library	Library Summary Metadata	-	-	R	R	Ri2	Ri2	-	Ri2	Ri2	Ri2	R	R
		3D Model	-	-	R>=1	R	R=1*	-	-	O	-	O	R	R
		Texture	-	-		R		-	-	-	-	-	R	R
		Special Area	-	-		O		-	-	O	O	O	O	O
		Feature Template	-	-		Ri3		Ri3	-	Ri3	Ri3	Ri3	R	R
		Reference Table	-	-		Ri4		Ri4	-	Ri4	Ri4	Ri4	R	R

RIEDP - Two Products

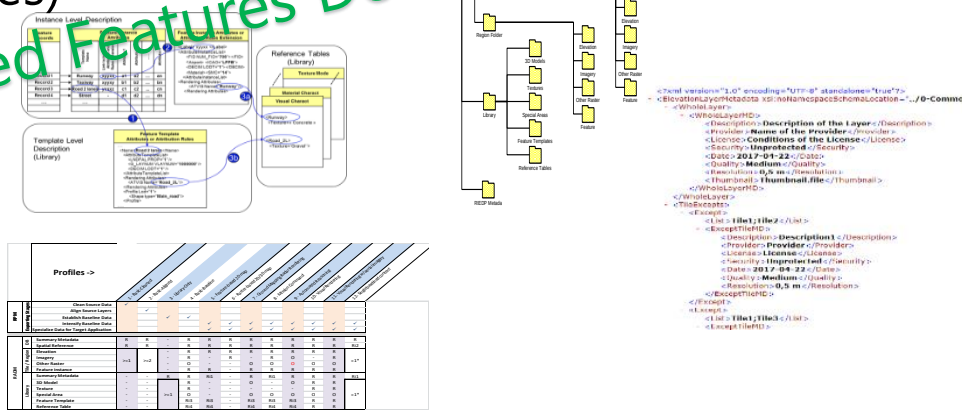
RIEDP provides what is needed to share Environmental data :

- A Reference Process Model
- A Reference Abstract Data Model
- A Tiling Scheme and Spatial Referencing
- A List of Formats from the GIS and M&S worlds
- A Consistent Semantics (through Features, attribution rules)
- An Organization on the Media
- A Metadata structure
- A set of Exchange Profiles

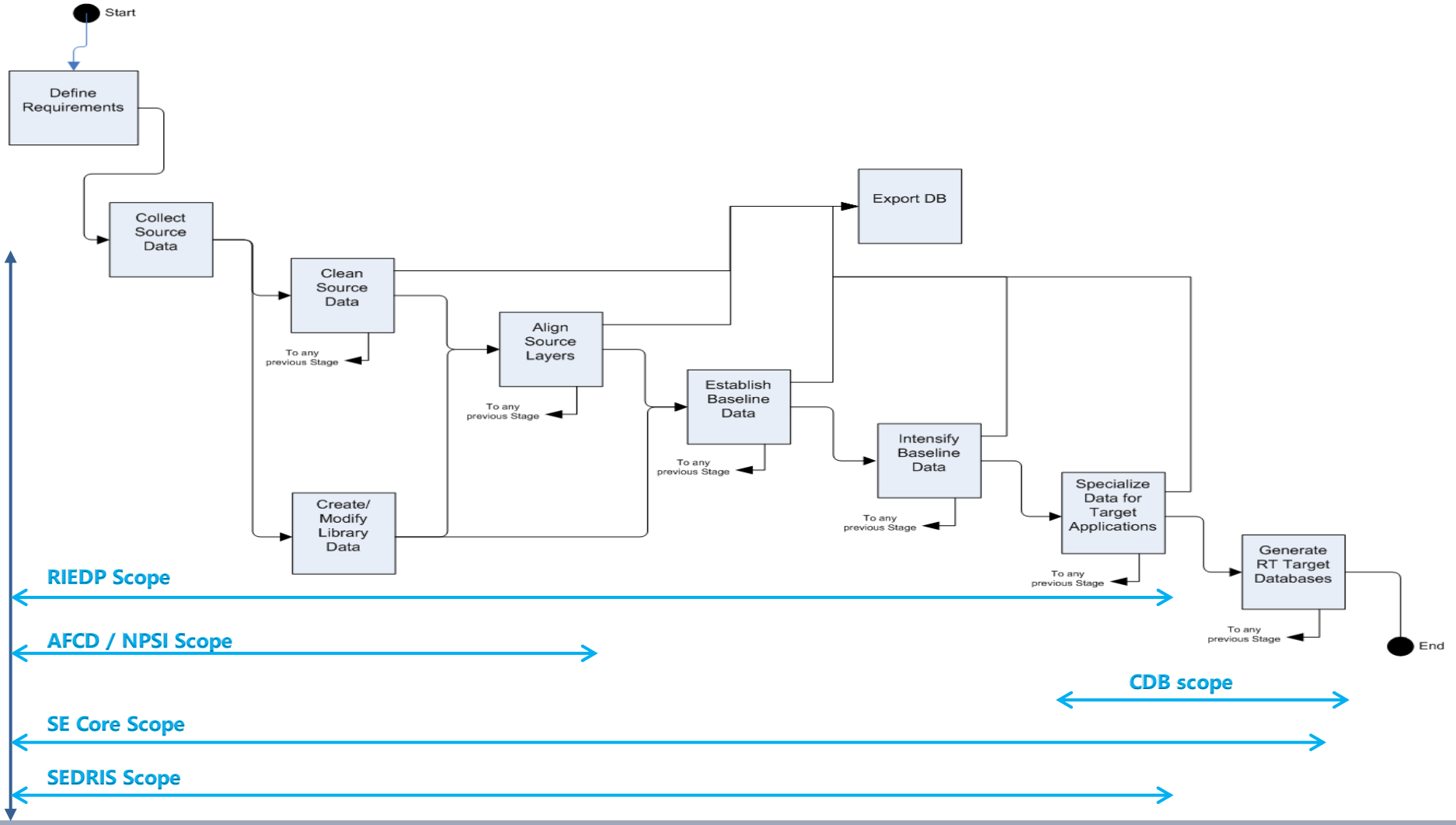
RIEDP Data Model Foundations



RIEDP Detailed Features Description



RIEDP vs other Initiatives – Process view



CURRENT STATUS OF RIEDP PRODUCTS

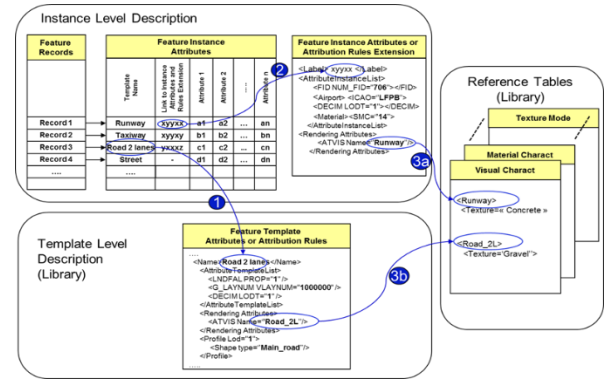
Product n°1

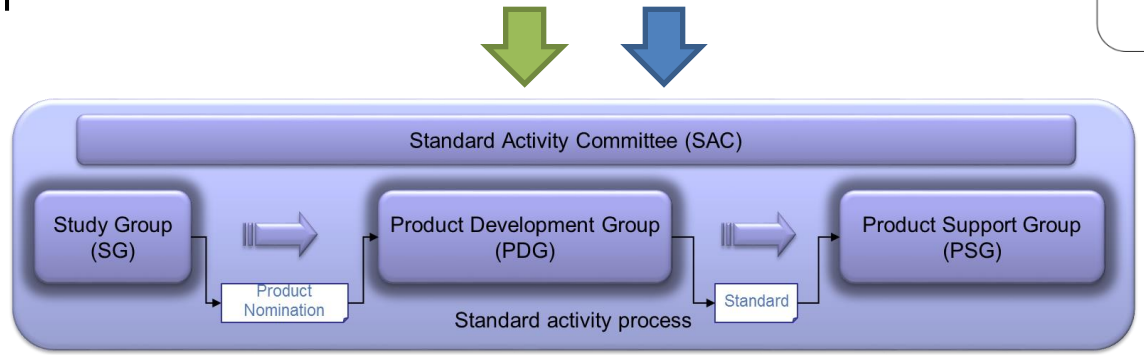
- RIEDP Data Model Foundations
  - SISO Guidance Document
  - Submitted to **Balloting** : During March ‘18
  - Approval expected Fall ‘18

RIEDP DM Foundations V 1.2a

Product n°2

- RIEDP Detailed Features Description
  - SISO Standard Document
  - Development initiated Summer 20107
  - Conclusion expected End ‘18

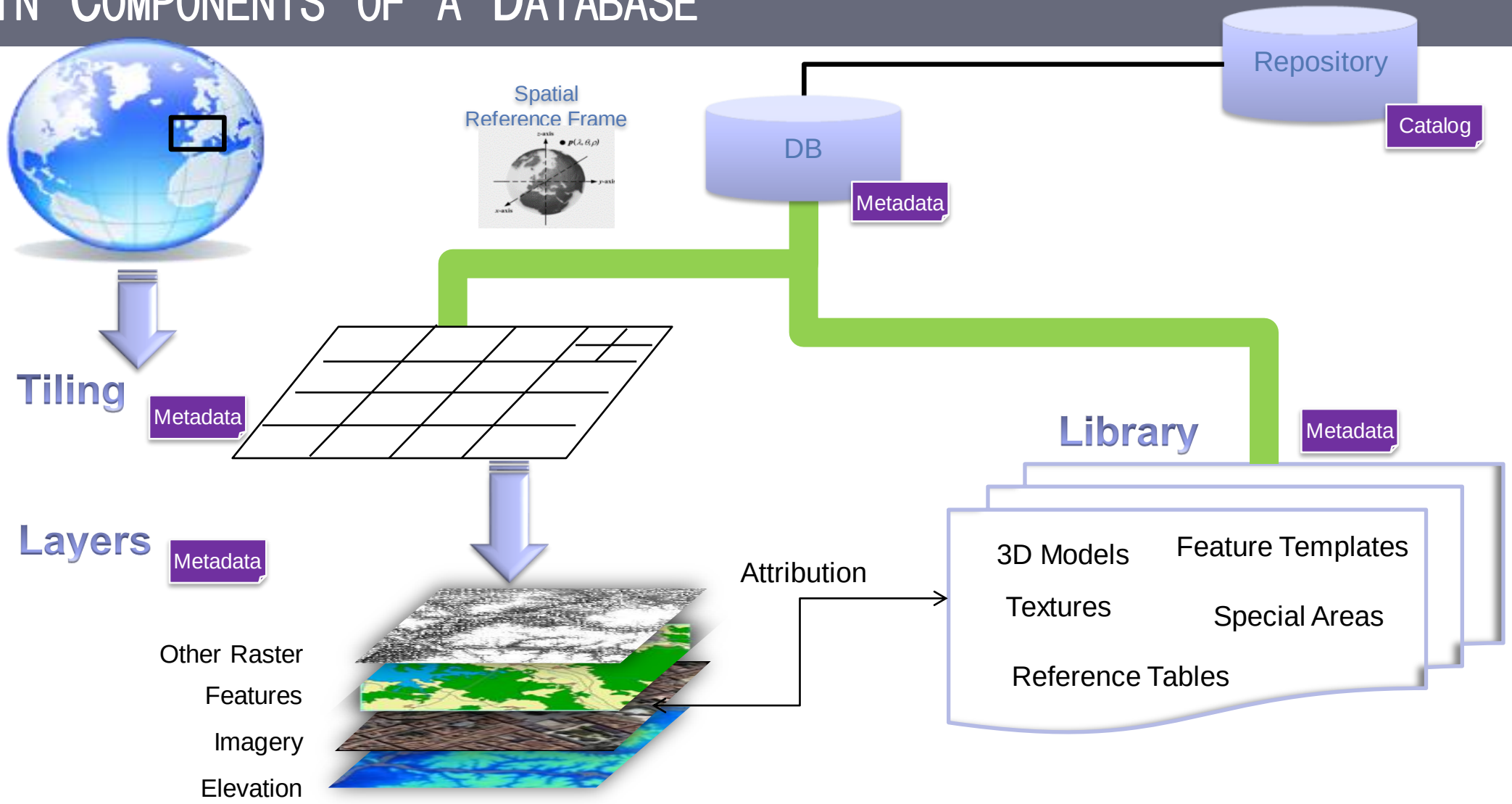




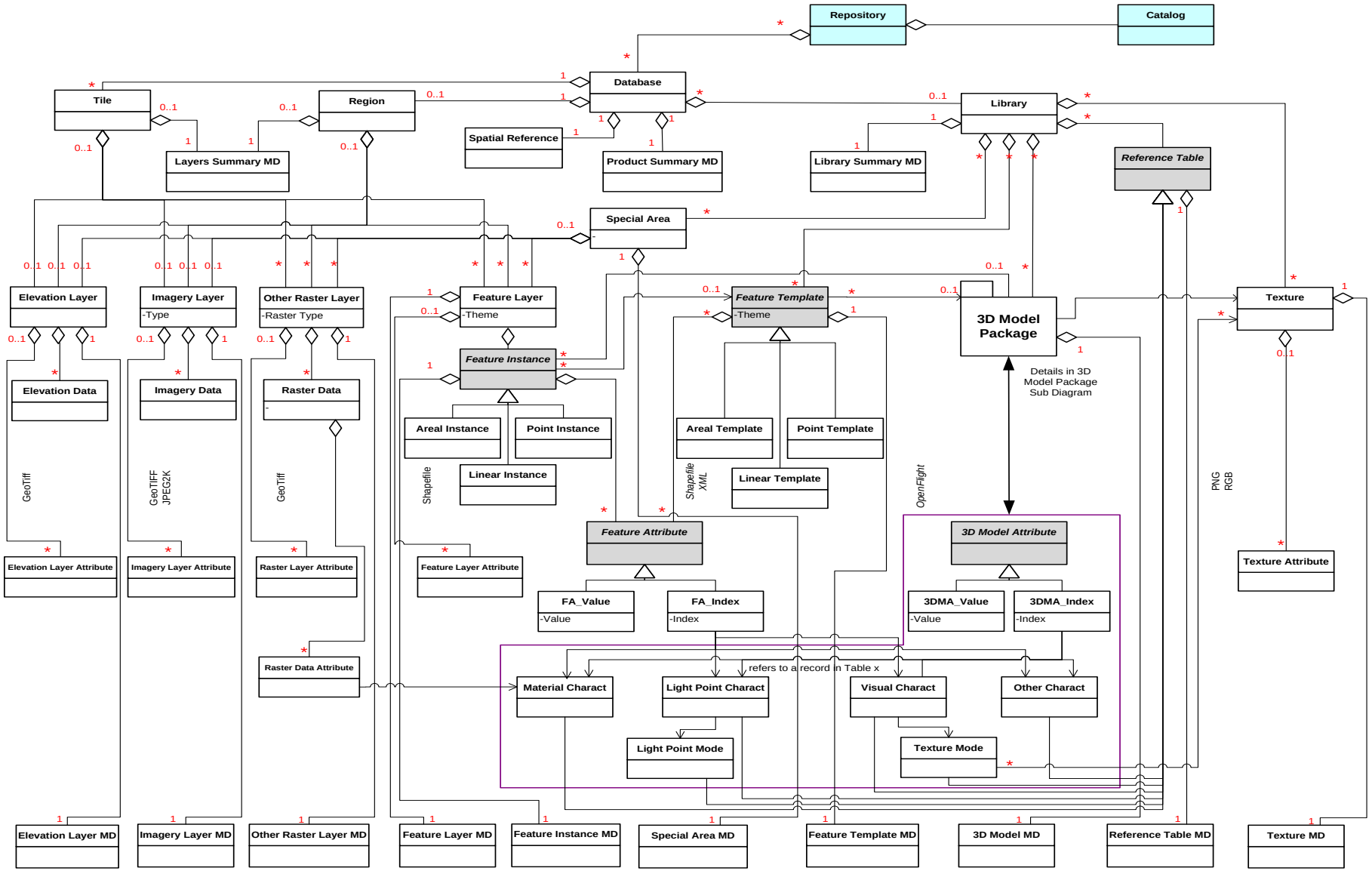
RIEDP PRODUCT 2 "DETAILED FEATURES DESCRIPTION" DEVELOPMENT

A SISO Standard

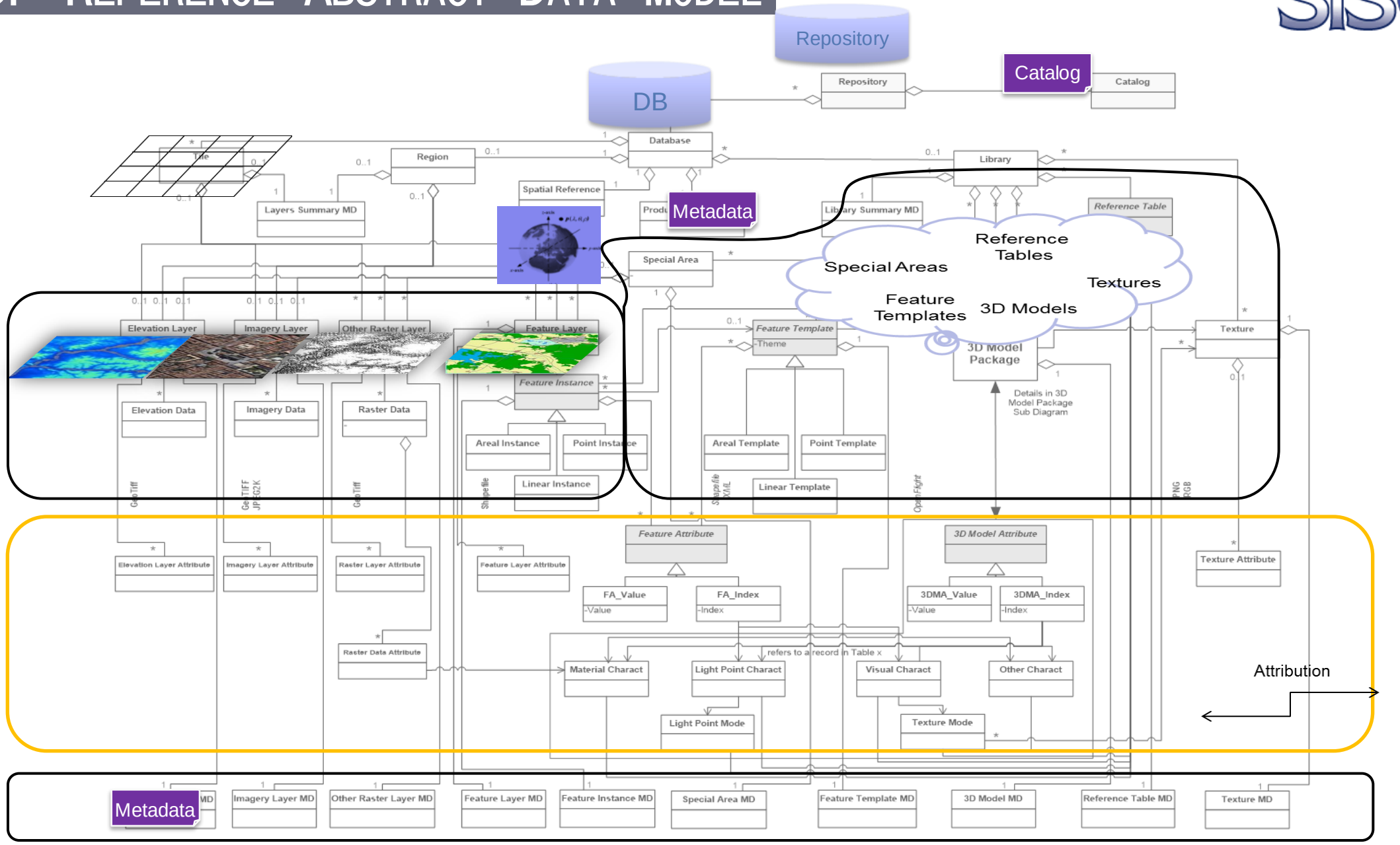
Main Components of a Database



RIEDP Reference Abstract Data Model



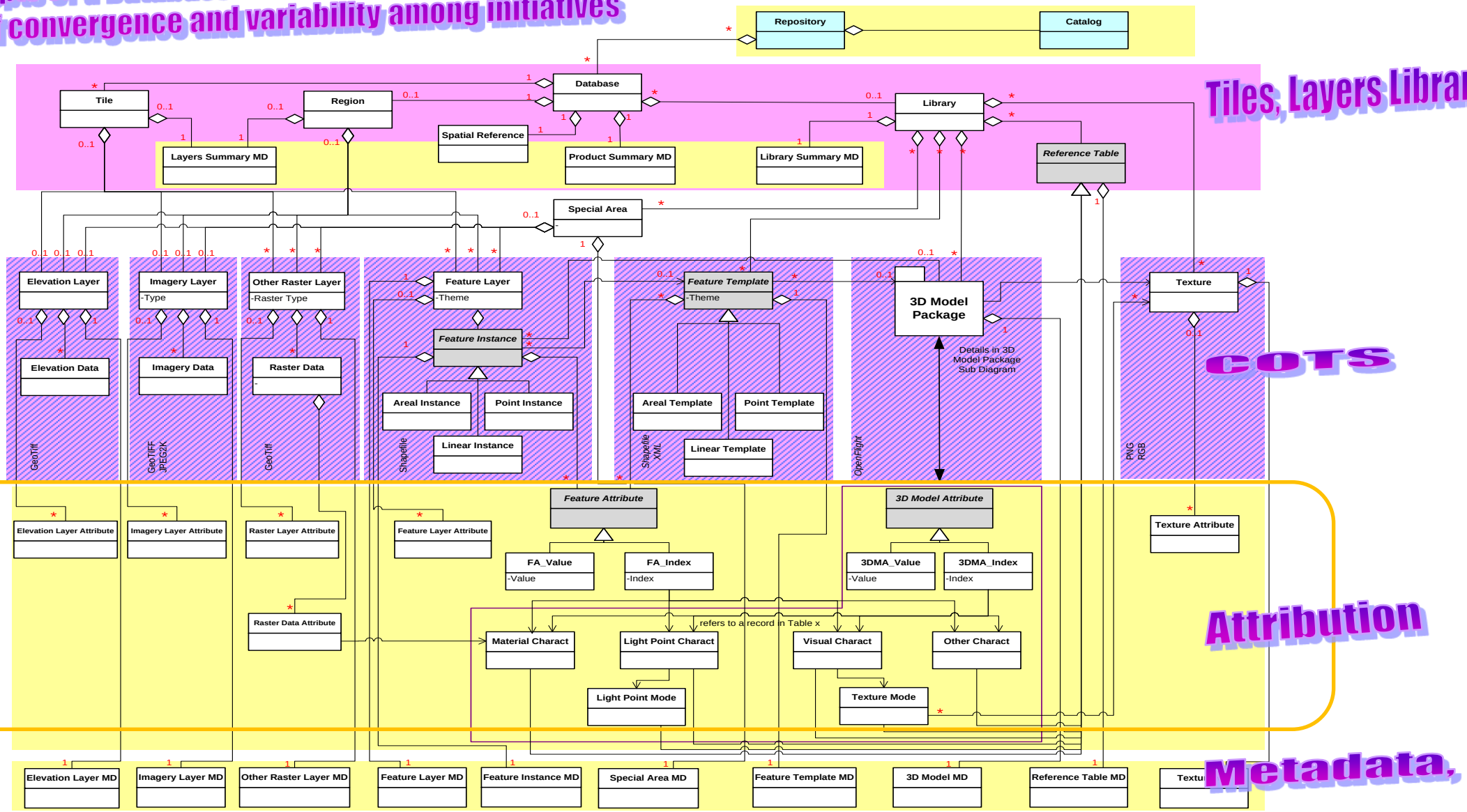
RIEDP Reference Abstract Data Model



Zoom on the RADM

Convergence
Common format
Variability

High Level Concepts of a Database
Showing areas of convergence and variability among initiatives



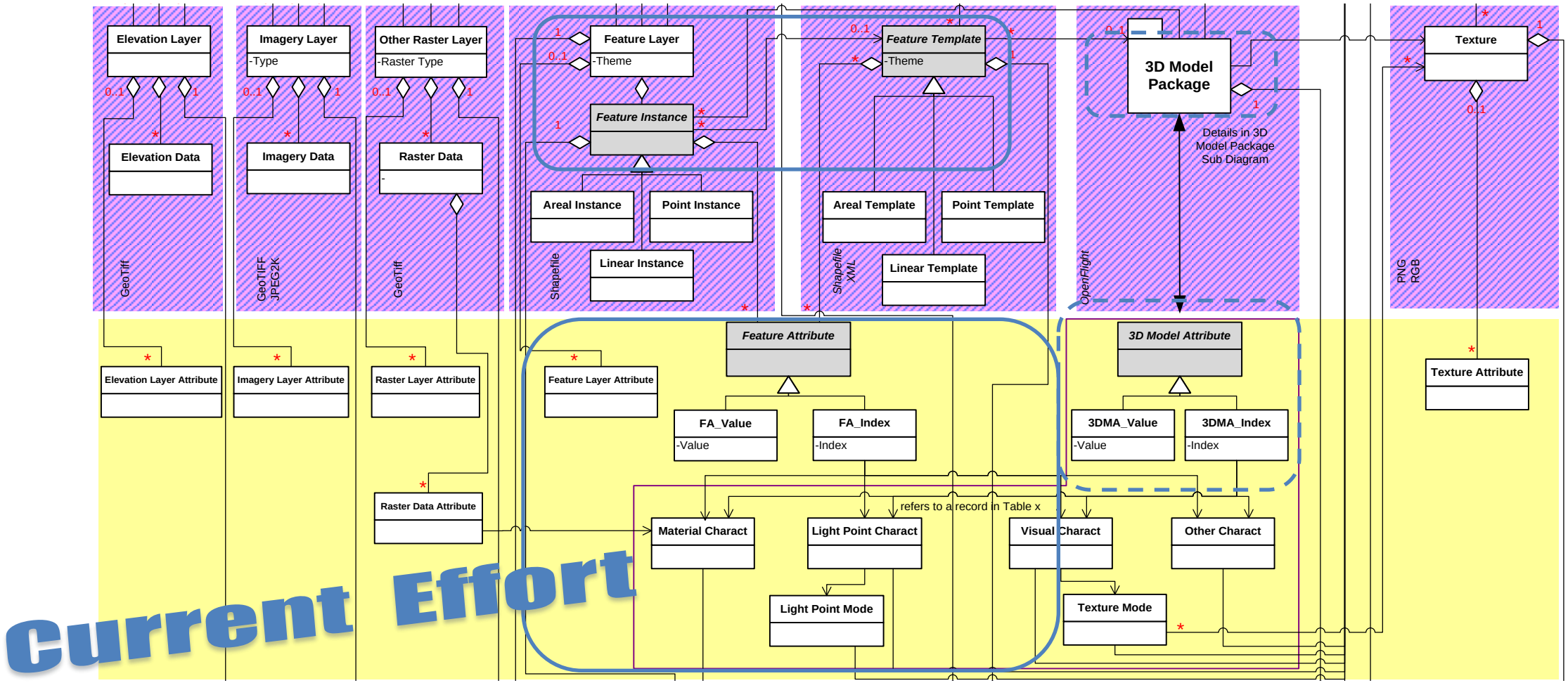
Tiles, Layers Library,

COTS

Attribution

Metadata,

THE ATTRIBUTION PART OF THE RADM



Detailed Features Description – Rationale

Improve Data Interoperability through:

- Identification of List of Features, Definitions, Attributes, …
- Organization of the Document to help the Database Creator

- Not reinventing the wheel by referring to Standard Dictionaries
- Providing the Information needed by the International Training Community
- Allowing future Evolution

CHOICE OF DICTIONARY

- Standard Dictionaries
  - FACC
    - DIGEST Part 4 – Feature and Attributes Coding Catalog (outdated)
  - DFDD
    - DGIWG Feature Data Dictionary
  - NFDD
    - National System for GeoSpatial Intel Data Dictionary (US Specific version of DFDD)
  - EDCS
  - Other

- Options for Dictionary Selection
  - Is one and only one of the standard Dictionaries (to be chosen by DG3);
  - Is any of the standard Dictionaries (chosen by Provider, DB per DB);
  - Is made up by selection of Features in the standard Dictionaries (the Dictionary is indicated with the Feature) (chosen by DG3)
  - Is built from Scratch (done by DG3);
  - Does not exist, each Provider indicates, on a Feature basis, the source dictionary, among the standard Dictionaries
  - Does not exist, each Provider indicates, on a Feature basis, the source dictionary freely built by the Provider.

CHOICE OF DICTIONARY

- EDCS will be used primarily
  - it's an International standard
  - it fully supports M&S
  - Most of DFDD content comes from EDCS and FACC
  - Most of EDCS content comes from FACC plus many other sources
- DFDD
  - when EDCS is not enough
- AMDB
  - for specific Airport Notions
- RIEDP specific notions
  - Defined if the notion does not exist in any of these dictionaries;
- FACC not used
  - deprecated, and replaced by DFDD
- NFDD not used
  - as it is US-centric
  - for what RIEDP needs, DFDD covers it
- RIEDP will have its own Code Space
  - RIEDP will NOT use EDCS or DFDD Codes
  - But will use everything else from those
- If an existing definition needs Change
  - This Change must be requested to the Source Organization.

List of Tables Related to the Semantics of Features and/or Attributes

- Features
- Attributes
- Associated enumerations
- Units and scales
- Process-related attributes

- Prescribed feature-attribute combinations along with
  - valid value ranges,
  - their specific enumerations (if any),
  - default values (including enumerates)
  - units, scale

CONTENT OF THE TABLES

- Insight in the Excel Spreadsheet

- The structure will be described in Product 2
- The content will be in Product 2 / Annex

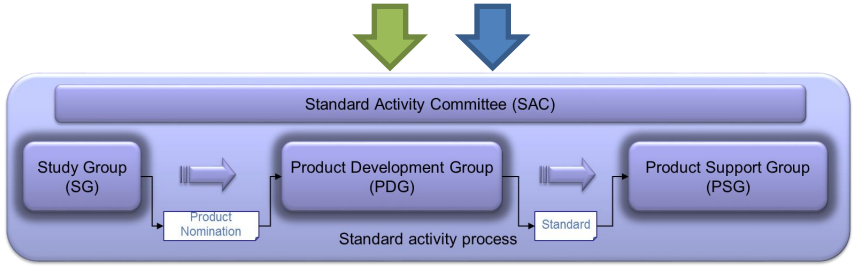
- Eventually, the Content will be managed as a SISO Reference product
  - Same principle as SISO Enumerations

WHAT IS NEXT ?

WHAT IS NEXT

Product 1

- Approval by SISO/SAC and EXCOM
- Launch of the Product Support Group (PSG)



Product 2

- Finalization of the Feature/Attribution/Enumerant Topics
- Other Semantics Topics (Non Feature Layers)

RIEDP Test Database (current effort)

- Sogitec to convert the Emerald City Database
- NLR to convert the NATO "Mission Land" Database
- Partners to Import and Assess / Check the results
- Provide feedback to the Development Effort (and future PSG)

CONCLUSION

CONCLUSION

At this stage:

- RIEDP DM Foundations" is finalized
  - To be approved by SAC at Fall SIW 2018
- RIEDP Detailed Feature Description is under development

- RIEDP Test Databases will be available soon
  - To Reflect the Structure of RIEDP Product 1 and Product 2
  - To Support Finalization of Product 2

Please Join us to contribute to

- the RIEDP Product 2 Effort
- and/or Evaluation of the RIEDP Databases
- and/or the Product Support Group to come

RIEDP PDG - GET INVOLVED

Please Join SISO by becoming a SISO Member

- by attending the SIW Meetings
- by registering on the Web Site ($ 95)

Then share with the community

- SISO WebSite : www.sisostds.org
- PDG SISO Discussion - Register for Discussion:
  - Logon to SISO Discussions and select
    - SAC-PDG-RIEDP (Don't forget to select SUBMIT !)
- PDG SISO Webpage - Complete Affiliation Form:
  - Standards Activities > Development Groups >
    - Reuse and Interoperation of Environmental Data and Processes (RIEDP) PDG
- PDG SISO Library File Folder – Access PDG Documents:
  - SISO Digital Library > Development Groups > RIEDP PDG

CONCLUSION

- Thank you for your attention !
- Any questions ?

- jlgougeat@sogitec.fr