Title: SE Core STDGC Re-Architecture
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Introduction:

This paper will describe the recent update of the SE Core Standard/Rapid Database Generation Capability (STDGC) architecture.

The U.S. Army's SE Core program provides geospatial terrain databases, standardized visual models, and common simulation components for U.S. Army training systems, enabling systems to interoperable through a common virtual environment. The SE Core Database Virtual Environment Development (DVED) program initially produced correlated geospatial databases for two fielded U.S. Army training systems, CCTT and AVCATT, in ready-to-use runtime formats, using a single specialized database generation tool. Today, the SE Core Common Virtual Environment Management (CVEM) program produces correlated geospatial datasets for over thirteen U.S. Army live, virtual, constructive and gaming fielded systems, in ready-to-use runtime formats, as well as, in industry standard source formats, using a variety of database generation tools and processes. This considerable increase in database formats demanded significant changes in the SE Core STDGC architecture.

SE Core DVED STDGC Architecture:

This paper will identify the requirement basis for the SE Core DVED STDGC tools functionality, and analyzing the strengths and weakness of the STDGC architecture. This section will discuss the:

- Requirement for one central database production site and five satellite database production sites, resulting in SQL based MDB (Master Database) design
- Requirement for World-Wide Geospatial Data Coverage, resulting in MDB APIs to read and write any data extents
- Requirement for 96 hours database production time-line, resulting in automating everything, standardized confederate specific configuration files, single run-time database production tool, and all outputs via plug-ins
- Requirement for focus on CCTT and AVCATT, resulting in a model library focused EPX – SE Core "Generation One", and tools focused EPX and OneSAF

Each functional component of the SE Core DVED STDGC architecture will be discussed, detailing each tool, its usage, its interfaces, and the associated processes. The paper will provide an analysis of the strengths and weaknesses of the architecture, discuss the value of tool customization, and asses the life cycle costs of the custom software.

U.S. Army's SE Core CVEM vision new confederate and format requirements:

The paper will share the U.S. Army's expanding vision for the SE Core program and will itemize the increases in database production requirements. The expanding STDGC vision includes:

- Expand to support new confederates and new formats, including:
  - Virtual Databases for CCTT VBS IG, LCT, CDT, NVIG, VRSG and FLT
  - Constructive Databases for WARSIM, OneSAF, JCATS, JDLM, and AARS
  - Live Databases for HITS
  - Gaming Databases for DSTS, GFT, and ARCENT
- Standardize processes and procedures
- Increase adherence to industry standards
- Establish STDGC tools and formats as De Facto standard
- Refine the affordability model for COTS, GOTS, and custom software

- Share SE Core Master Database content on-line, making the content discoverable and downloadable
- Share SE Core process and procedures, and enable remote sites to build and modify databases

The new functional requirements include:

- Improved urban terrain and building models with interiors
- Increased fidelity of transportation networks, including increased complexity of interchanges, trafficable tunnels, supporting individual lanes, and overall transportation features fidelity improvements
- Support for new database architectures (e.g. VBS)
- Better representation of high-resolution terrain surface in critical training areas
- Improved thermal representation
- Establish identifiable "measures of correlation" in geospatial databases for networked simulation

SE Core CVEM STDGC Reengineered Architecture:

The paper will detail the architectural evaluation of the SE Core DVED architecture against the evolving U.S. Army's SE Core CVEM expanding vision and increased database production requirements. The paper will establish the architecture reengineering objectives, detail the recommended changes database production architecture, and describe the design and implementation of these changes. The functional area addressed will include:

- Support existing database production requirements, while adjusting to support changing priorities and adding confederates and formats:
    - Reduce requirements for custom SEE API Output Compilers
    - Use TerraTools for ITE databases (COTS)
    - Use Environment Creation Tool (ECT) for LCT databases (COTS)
    - Use Visitor4, Multi-map Maker and Oxygen for VBS databases (COTS)
- Maximizing GOTS and COTS tools and eliminating high maintenance cost software, minimizing custom software, and retiring unneeded software, and adding affordable COTS and GOTS tools:
    - Retired Supervisor (GOTS)
    - Eliminated MDB Read/Write APIs (custom)
    - Eliminated ESRI ArcGIS and TerraVista MDB interfaces (custom)
    - Dropped out-of-date Output Compilers (custom)
    - Using U2MG for UHRB production (GOTS)
    - Using PADS for AARS production (GOTS)
    - Using NVESD tools for NVIG database production (GOTS)
    - Using Conform (GameSim) for MDB source data visualization tool (COTS and Government OpenSource)
    - Using LightBox (leidos) and C-nergy (Dignitas) for database correlation testing (GOTS)
    - Using PMGS (GameSim) for automatic model creation (GOTS)
    - Using AlienBrain for art asset management (COTS)
- Making the Master Database "master" by removing upstream simulation data tailoring, eliminating downstream added values actions, and adding dataset specialization intensification and confederate specialization prior to run-time format production.

    - Dataset intensification includes modelization, scatter, and procedural model generation
    - Confederate specialization includes specific thinning and filtering
- Making the database production process flexible and nimble, removing over-automation, decouple components, and establish standard data stores:
    - Redesigned MDB to use industry formats and tools
    - Add sensible automation and minimize touch labor with user focused interfaces
    - Adding simple OpenFlight post processing for 3rd Party data usage
    - Added CIB post processing
- Standardize the content of the Master Terrain Database by defining the required features and attributes and establishing the extraction guidance
    - Published Scale Content Specification
    - Updated vector editing Work Instructions
    - Published database production processes

Conclusion:

The SE Core CVEM STDGC architecture is reengineered to accommodate the U.S. Army SE CORE CVEM vision and additional confederates and formats. The architecture is moving to a “built for change”, not “built to last” architecture. The paper highlights the key architecture changes and provides initial cost per unit area estimates. The paper will end with a short list of the in-work changes, including:

- AGC Co-producer certification
- Synthetic Imagery generation
- Seasonality and climate regions support
- Definition SE Core sharing and reuse of external developed databases
- Define SE Core compliancy