“The higher we soar the smaller we appear to those who cannot fly.”

Friedrich Nietzsche

Magnetar Games Corporation
Magnetar Multiverse Highlights

- **Standards** – based virtual alternate reality authoring and runtime web environment.
- **Astrophysics** – themed games and simulations using a scientific data grid.
- **Collaborative** – sandbox with planetary scale procedurally generated alien worlds.
- **Interoperability** – across Open Simulator, High Fidelity and Multiverse virtual worlds.
Magnetar Multiverse
Titles

- **Proof of Concept** - three titles promoting Magnetar Multiverse are being designed.
- **Magnetar Dawn** - first episode of virtual alternate reality game series on Ceres.
- **Magnetar Universe** – viewer and simulation authoring for our Universe.
- **Magnetar Worlds** - user created fantasy reality featuring Worlds in Worlds.
Magnetar Multiverse
Voyager

- **About** - Integrated Web3D development and runtime interfaces for Magnetar Multiverse.

- **Multiverse** – Voyager generic viewer mode
  - **Reality** player for games and simulations.
  - **Sandbox** collaborative user content creator.

- **Matrix** - Voyager repository facility mode.
  - **Asset** library for blueprints and prototypes
  - **Guild** directory of content creation teams.
Magnetar Multiverse
Plan

- **Alpha** – Continuous integration with near term focus on Voyager design.
- **Title** – develop in parallel “Magnetar Dawn” as proof of concept for Voyager.
- **Integration** – of Virtual World, Virtual Globe and RTS Engine to support Dawn project.
- **SURF** – Synthetic Universe Representation Framework introduced as part of Dawn project.
- **Links (Chrome)**
  - [http://magnetarnet.azurewebsites.net/](http://magnetarnet.azurewebsites.net/)
  - [http://www.magnetar.net/](http://www.magnetar.net/)
ADOPTING SEDRIS IN MAGNETAR MULTIVERSE
Magnetar Multiverse

- Publishing, development and execution platforms for web based MMOs (Massively Multiplayer Online)
  - NVE (Networked Virtual Environment)
    - OpenSim, High Fidelity, Cloud Party…
    - Astrophysics application.
      - IVOA compatible systems
  - MMORTS, MMORPG
    - Multiverse, Dark Reign.
Magnetar Multiverse II

- Distributed Application Framework
- Enterprise Information Bus
- Middleware built in MDA (Model Driven Arch.)

- Domain specific models that encapsulates expert knowledge. (i.e. SEDRIS model for env. domain)
- Application
- Game engine/viewer, simulator, repository client, collaborative authoring tools.

Cloud-based backend can be offered as PaaS (Platform as a Service) to the developers.

Modern browsers that support next-generation types of visualization and networking applications.
Multiverse environment data

- Virtual world data
  - DEM, mesh, prim…
  - 2D/3D tile sets, procedural content/terrain…

- Data format
  - XML, JSON, BASE64, PNG…

- Data coding specification
  - EDCS style dictionary.
Metadata modeling with SURF (Synthetic Universe Representation Foundation)

- Metadata modeling formalism for Magnetar Multiverse environment data.
- Capturing SEDRIS meta modeling semantics in ISO standard.
- Plain text for easy meta data exchange.
- Adopting MORPH/OMT for HLA sim
SURF as Domain Specific Language for environment data.

- Standard/template for creating DSL about environment data.
- External DSL expressed in XML
- SURF is also Inspired by
  - XTCRS (Xml Transmittal Content Requirement Specification)
  - SONY Collada ATF (XSD DOM codegen)
SURF and Magnetar Multiverse

ISO18023-6 DRM, SRM, Abstract transmittal specs.

Binary transmittal

SURF (Synthetic Universe Representation Foundation)

DSL instance document

Information modeling standard for environment data

Domain Specific Language describing the underlying environment data

C/C++ SEDRIS API application

Web based Data Access API

Magnetar Multiverse
Example Magnetar Multiverse Application

- Proprietary database and server.
  - Environment data for OpenSim virtual world

- Data Provider
  - NodeJS application to process metadata and relay sim packets.

- Engine
  - DoD’s web based VWF application that delivers virtual world to web browser.
Web based DAL (Data Access Layer)

Web based interface provides data access via REST, Websockets, WebRTC...

Virtual World Framework is supported by DoD and ADL.net. VWF implements an MVC style scene graph for WebGL application.

Mapping component utilizes metadata and 'access API' to produce optimized runtime data.

SURF documents. XTCRS like Markups to express SEDRIS metadata in plain text.
## Compare data access approaches

<table>
<thead>
<tr>
<th>Data source</th>
<th>Dev tool</th>
<th>Application</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>M&amp;S, GIS applications..</td>
<td>C/C++ SDK, TCRS</td>
<td>Applications created to work with ISO transmitter.</td>
<td>FOCUS, SBS, TCRS rule checker, validator..</td>
</tr>
<tr>
<td>OpenSim, Dark Reign, MMO, Astrophysics sim. HLA/ Chronos sim.</td>
<td>Declarative markups and REST API that implements SEDRIS</td>
<td>Cloud-based application, REST web client.</td>
<td>Magnetar Multiverse application suite (game engine, auth. tools ..)</td>
</tr>
</tbody>
</table>
References

- OpenSim [http://opensimulator.org](http://opensimulator.org)
- High fidelity [https://highfidelity.io/](https://highfidelity.io/)
- MultiverseMMO [http://multiversemmo.com](http://multiversemmo.com)
- IVOA [http://www.ivoa.net](http://www.ivoa.net)
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- VWF [https://virtual.wf/](https://virtual.wf/)
- ADL Sandbox [https://vwf.adl.net.gov](https://vwf.adl.net.gov)