SpaceSQ Protocol for Advanced Materialization & Generative AI Integration

White Paper: The Universal Matter Format (UMF) & Dream Forge Interface

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Classification: Core Extension / AIGC Standard **Scope:** 3D Asset Import, Text-to-3D Generation, Blueprint Rights Management

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1. Core Definition: From Model to Matter

In SpaceSQ, we reject the storage of static .obj or .stl files as mere geometric surfaces. Instead, we transcode all spatial assets into **UMF (Universal Matter Format)**.

1.1 Universal Matter Format (UMF) A UMF file is a container that encapsulates three distinct layers of data:

- **Geometry Layer:** The mesh topology and UV maps (Visual appearance).
- **Physics Layer:** Mass, friction coefficient, thermal conductivity, and power consumption ratings (Physical interaction).
- **Function Layer:** Executable scripts defining what the object *does* (e.g., "Sit," "Emit Light," "Compute").

1.2 The Philosophy of Materialization Traditional 3D files are "Ghosts" (visible but intangible). SpaceSQ UMF files are "Matter" (they occupy space, consume energy, and interact with the Six Elements).

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2. External Asset Import Standard (The Import Gate)

TDOG permits the importation of legacy assets from open repositories (e.g., Sketchfab, Thingiverse), subject to a rigorous process of **Dimensional Normalization and Re-encapsulation**.

2.1 Supported Formats

- **Primary:** glTF 2.0 (Preferred for PBR materials).
- **Legacy:** OBJ (Geometry only), STL (Geometry only).

2.2 Volumetric Normalization

- **The SSSU Constraint:** All imported models must be mapped to the local coordinate system of a Standard Space Storage Unit (2.0m x 2.0m x 2.4m).

- **Auto-Scaling:** Objects exceeding these bounds must either be scaled down or require a multi-SSSU "Cross-Domain Permit."

2.3 H-S Volumetric Compliance

- **Automated Safety Check:** Upon import, the system calculates the convex hull volume of the model.
- **The 60% Rule:** If the imported asset is designated for a **Carbon Zone** and its volume exceeds 60% of the SSSU capacity, the Import Gate will reject the file to prevent "Spatial Suffocation."

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3. Generative AI Interface (Text-to-Matter)

TDOG integrates the **"Dream Forge"** API, allowing users to materialize objects directly from the latent space of Large Language Models (LLMs) and 3D Generative Models.

3.1 Interaction Logic

1. **Intent Parsing:** The user inputs a natural language prompt (e.g., *"A cyberpunk floating gaming chair with neon accents"*).
2. **Geometry Generation:** The AI generates a point cloud -> mesh conversion.
3. **Auto-Rigging:** The system identifies functional parts (seat, armrest) and applies physics constraints.
4. **Instantiation:** The object is printed into the SSSU via TDOG.

3.2 Compute Economics (NBT Burn) Generative materialization is computationally expensive.

- **Standard Gen:** 500 NBT (Low poly, basic texture).
- **High-Fidelity Gen:** 2000 NBT (High poly, PBR materials, complex logic).

3.3 Cryptographic Uniqueness Every AI-generated object is minted as a **Non-Fungible Thing (NFT)** within the SpaceSQ ledger. Even if the same prompt is used twice, the resulting UMF hash is unique, ensuring the "Soul" of the object is singular.

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4. The Blueprint Marketplace & Licensing

4.1 Spatial Cloning (Templates) Users who curate a perfect SSSU configuration can save it as a "Template."

- **Mechanism:** Templates allow other users to clone the exact arrangement of UMF objects.
- **Monetization:** Creators can list templates on the Genesis Market in exchange for NBT.

4.2 Open Matter License (OML) SpaceSQ encourages the use of the **OML (CC0 Equivalent)** for basic infrastructure blueprints (floors, walls, basic lights) to accelerate the expansion of the Genesis Mainnet.

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