

G-OS Operational Volume: Governance Operations and Drift-Free Execution (Value $\rightarrow$ Back $\rightarrow$ Gate $\rightarrow$ Front $\rightarrow$ Human)

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Abstract

This Operational Volume defines the governance procedures, migration requirements, parallel operation mechanisms, production transition criteria, and incident response structures of G-OS / PEACE-MAKER. While the Structural Volume formalizes the causal architecture (Value $\rightarrow$ Back $\rightarrow$ Gate $\rightarrow$ Front), the Operational Volume specifies how this architecture is executed in real-world institutional environments. The system ensures drift-free, transparent, and institution-compatible AI governance while preserving human command authority.

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1 Chapter 0: Representative Assumptions

Purpose This chapter defines the representative assumptions that serve as the causal origin of all operational procedures in G-OS.

Representative Assumptions

- The production environment can fail.
- Disaster recovery (DR) environments can also fail.
- Communication networks can be disrupted.
- Humans can make mistakes.

These assumptions justify the need for multiple DR sites, multi-channel communication, a continuously running Pseudo-G-OS, and a Human Phase for final decision-making.

2 Chapter 1: Migration Requirements (Phase 1)

Purpose Migration Requirements define the foundation-building phase for establishing semantic and operational consistency across Production, DR, and Pseudo-G-OS.

2.1 1.1 Mandatory Conditions

- Preparation for parallel operation.
- Semantic consistency of snapshots.
- Operational readiness of multiple DR sites.
- Survival of multi-channel communication.
- DR placement based on country-specific disaster risks.

2.2 1.2 Integration of Pseudo-G-OS

The Pseudo-G-OS (Single-Layer Model) must be fully operational before entering Parallel Operation. It serves as the mirror environment for causal consistency checks.

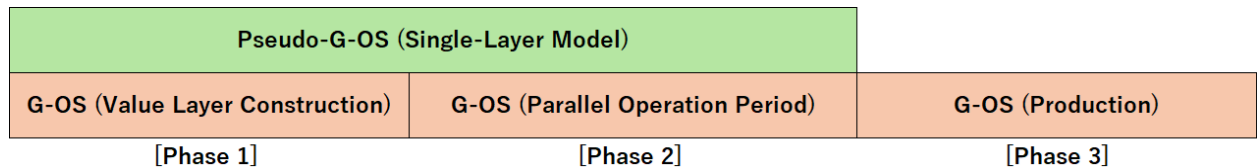


Figure 1: Operational Phases of G-OS and Pseudo-G-OS

Figure Description The diagram illustrates the three operational phases of G-OS under the supervision of the Pseudo-G-OS. The Pseudo-G-OS runs continuously across all phases, ensuring causal consistency and providing a fallback environment during communication failures.

2.3 1.3 Completion Criteria

- Production / DR / Pseudo-G-OS exhibit operationally meaningful consistency.
- Value Layer consistency is verified.
- Measurement infrastructure for Phase 2 is established.
- Human Phase approval is obtained.

3 Chapter 2: Parallel Operation (Phase 2)

Purpose Parallel Operation is the causal verification phase where Production and Pseudo-G-OS run simultaneously to validate consistency.

3.1 2.1 Causal Structure

Value $\rightarrow$ Back $\rightarrow$ Gate $\rightarrow$ Front

- Value Layer $\rightarrow$ Production Layer consistency checks.
- Front consistency scoring between Production and Pseudo-G-OS.
- Inconsistencies are processed using the same causal flow as Normal Incident Response.

3.2 2.2 Completion Criteria

- Front consistency score $\geq$ threshold (e.g., 90%).
- Zero inconsistencies in Production layers.
- Verified Value Layer consistency.
- Human Phase approval.

4 Chapter 3: Production Transition (Phase 3)

Purpose Production Transition is the final causal verification phase before the system becomes operational.

4.1 3.1 Requirements

- Front consistency score $\geq$ threshold.
- Zero inconsistencies in Back / Gate / Front.
- DR sites synchronized.
- Multi-channel communication alive.
- Human Phase final approval.

4.2 3.2 Execution Steps

1. Final consistency verification.
2. Front consistency score confirmation.
3. DR synchronization check.
4. Communication survival check.
5. Human Phase approval.
6. Production transition (Front switch).
7. Post-production verification.

5 Chapter 4: Incident Response

Purpose Incident Response defines how the system restores operations using the established foundation.

5.1 4.1 Normal Incident Response

Normal incidents follow the causal flow:

Front $\rightarrow$ Gate $\rightarrow$ Back

1. Front detects anomaly.
2. Gate rolls back to previous Front version.
3. Back receives snapshot and performs reproduction testing.
4. Error analysis and cross-environment comparison.
5. Fix $\rightarrow$ Retest $\rightarrow$ Gate approval $\rightarrow$ Front update.

5.2 4.2 Major Incident Response (DR Switching)

When communication is alive

- Switch to DR1 $\rightarrow$ DR2 $\rightarrow$ DR3.
- Reconstruct Front stability at DR.

When communication is disrupted

- Deploy personnel to Pseudo-G-OS.
- Human Phase elevates Pseudo-G-OS to Production.
- Synchronize with Production / DR after communication recovery.

When DR is unavailable

- Switch to another DR.
- Or elevate Pseudo-G-OS.

6 Conclusion of Operational Volume

G-OS / PEACE-MAKER ensures drift-free, transparent, and institution-compatible governance operations by:

- Establishing representative assumptions as the Value Layer's causal origin.
- Building a consistent operational foundation through Migration Requirements.
- Verifying causal consistency through Parallel Operation.
- Ensuring safe deployment through Production Transition.
- Maintaining stability through structured Incident Response.

This Operational Volume completes the governance blueprint defined in the Structural Volume.