



Learning from Legacy Systems: Identifying the Monolithic Services to Redesign for Microservices

William Brooks

GPS IIF Chief Engineer

william.m.brooks2@boeing.com

Keaton Foster

IMOSC SW Engineer

keaton.b.foster@boeing.com

Waihini Gaditano

IMOSC Lead SA

waihini.gaditano@boeing.com

GSAW 2022: February 23 – March 3, 2022



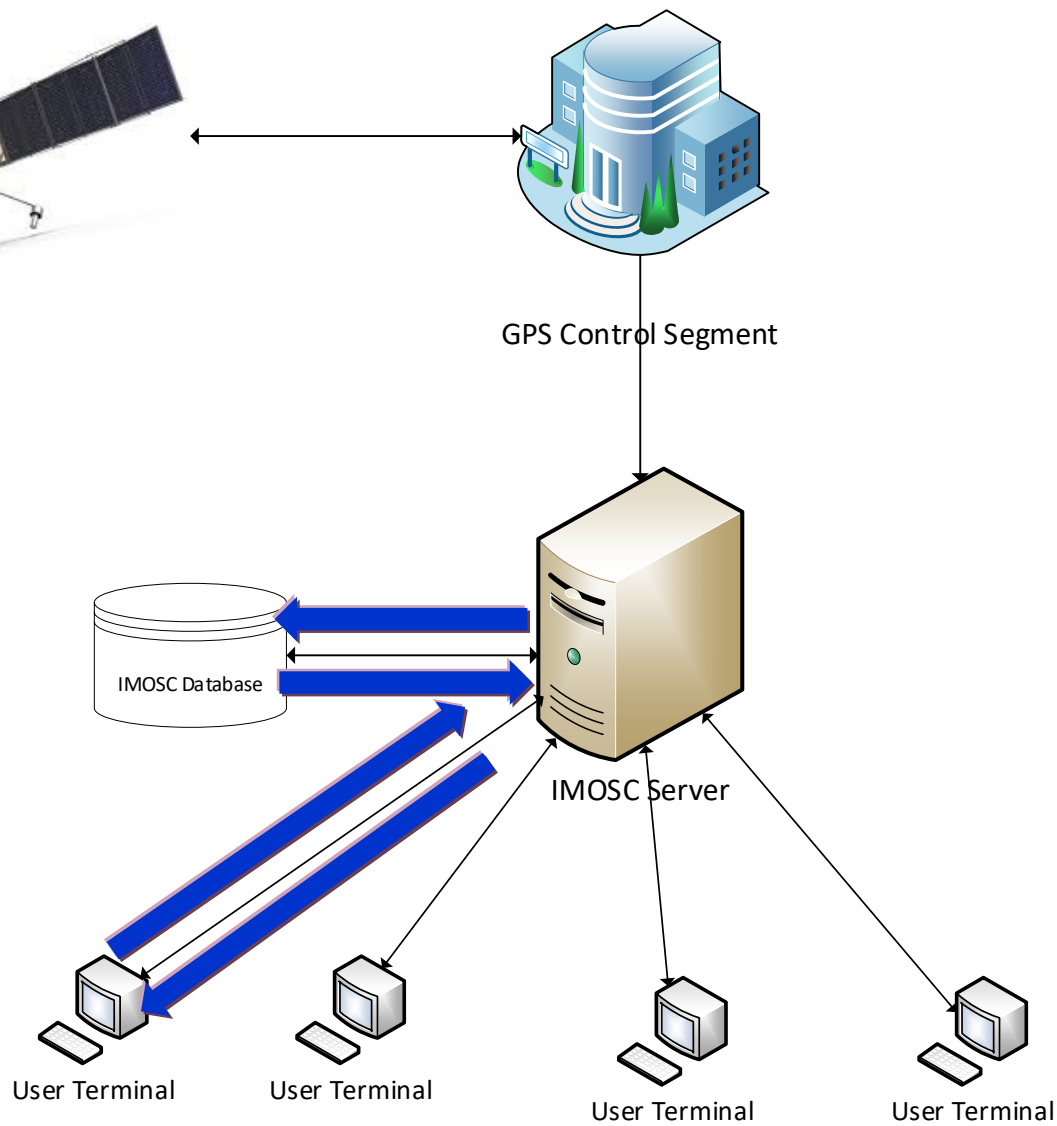
© 2022 by The Boeing Company

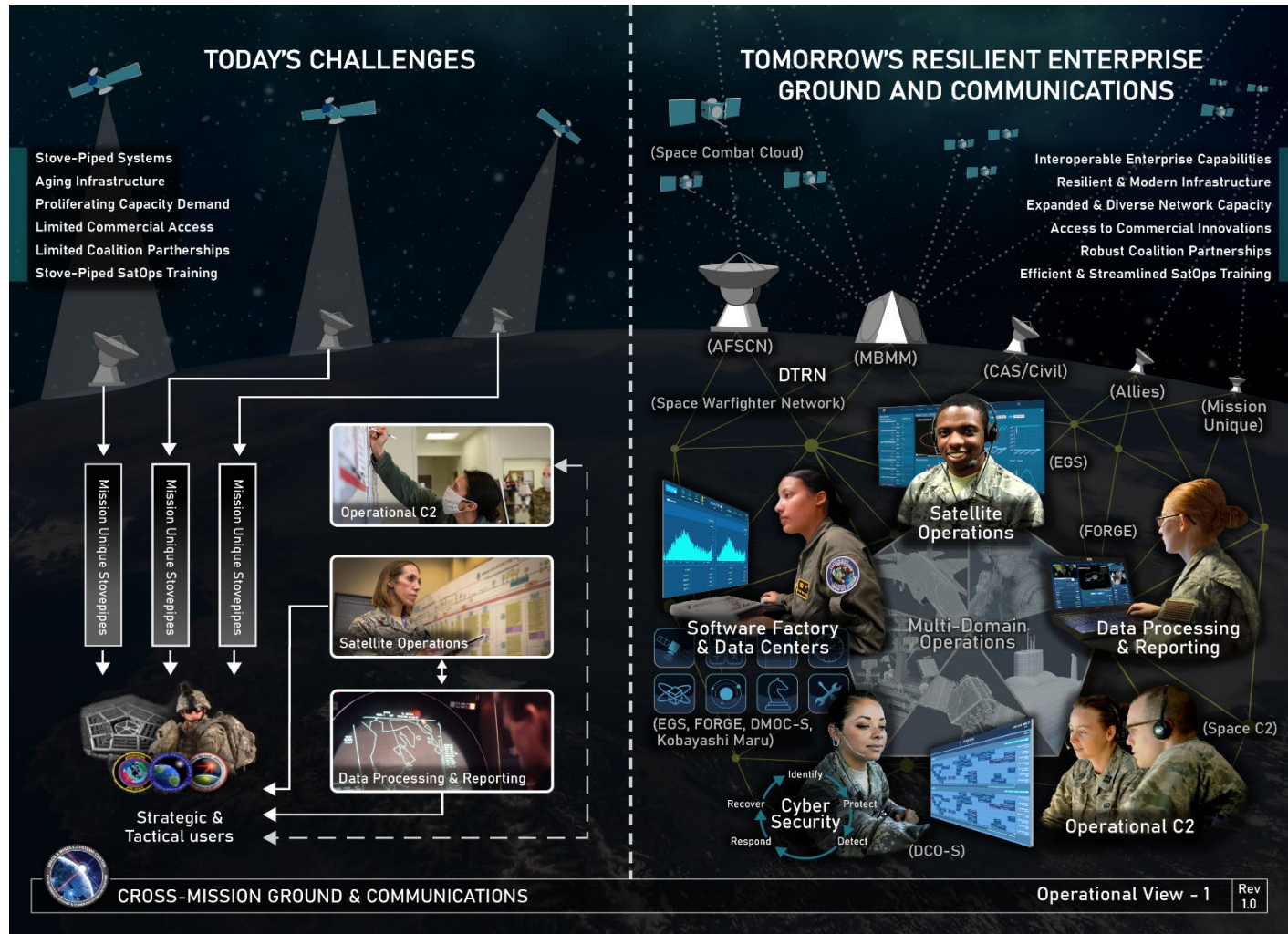
Published by The Aerospace Corporation with permission



- **Background**
- **Overview of Issue**
- **Transitioning the Team**
- **Agile Systems Engineering**
- **Microservice Patterns**
- **Model Legacy System**
- **Microservice Architectural Changes**
- **IMOSC-EGS Cloud**
- **Service Identification**
- **Summary**

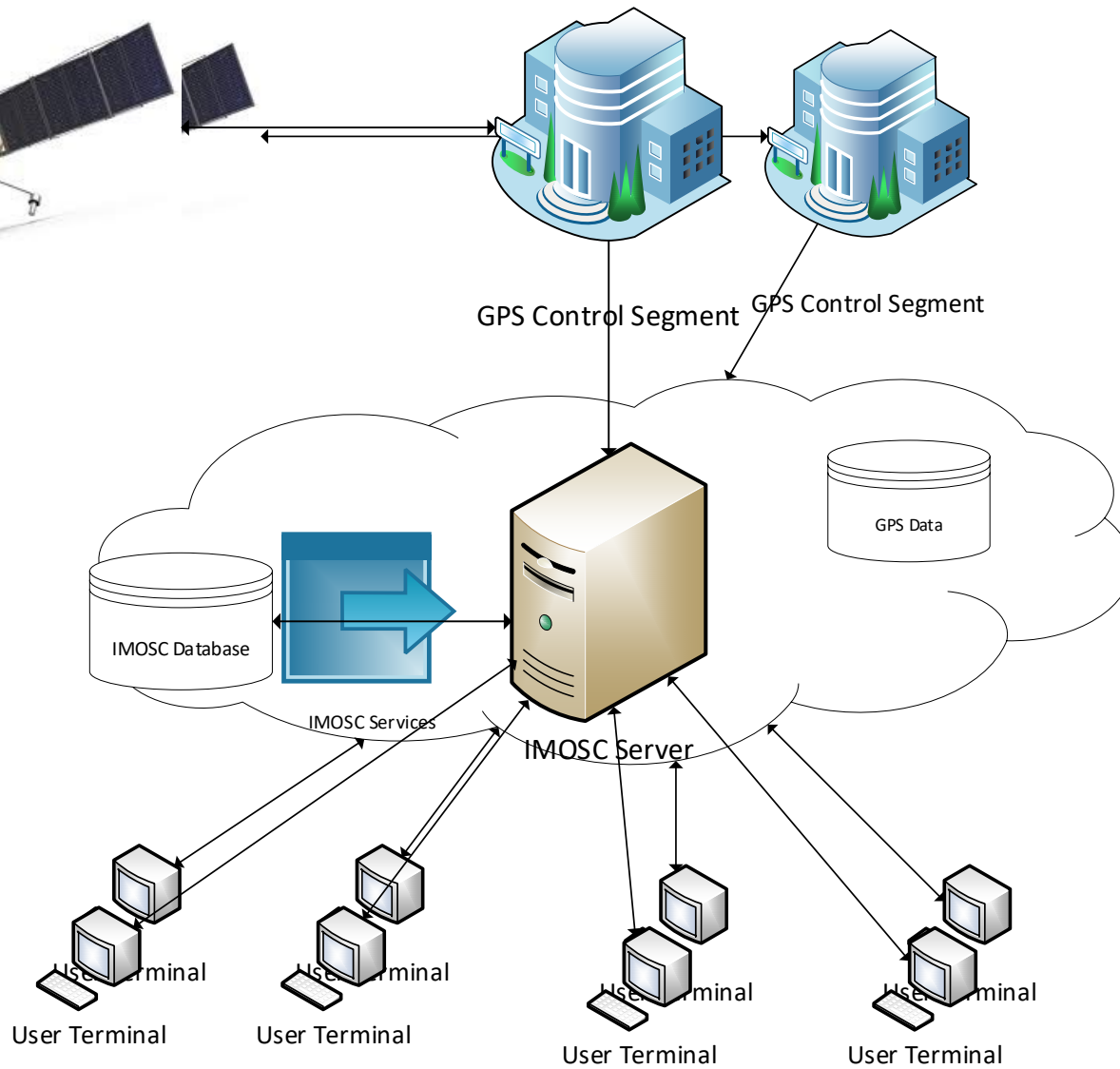






B. Delong and J. Demetrelis, "Enterprise Ground Services: Fight as an Enterprise MVP & Service Delivery Roadmap," in GSAW 2021, Los Angeles, 2021.





- **Steps to Transition Legacy Development to Agile Development of Microservices**
 - Phase 1 (Preparation)
 - Introduce Agile Battle Rhythm
 - Begin introducing DEVSECOPS tools
 - Elicit requirements with stakeholders using Behavioral modeling
 - Phase 2 (Core development)
 - Set the Development Environment
 - Phase 3 (Application development)
 - Develop core client applications



- **Agile Systems Engineering*** – three ways to elicit requirements
 - Flow-Based Use Case Analysis
 - Activity diagrams
 - Decision Logic
 - Scenario-Based Use Case Analysis
 - Sequence diagrams
 - Off-nominal scenarios
 - State-Based Use Case Analysis
 - State Machine Diagram
 - Transitions

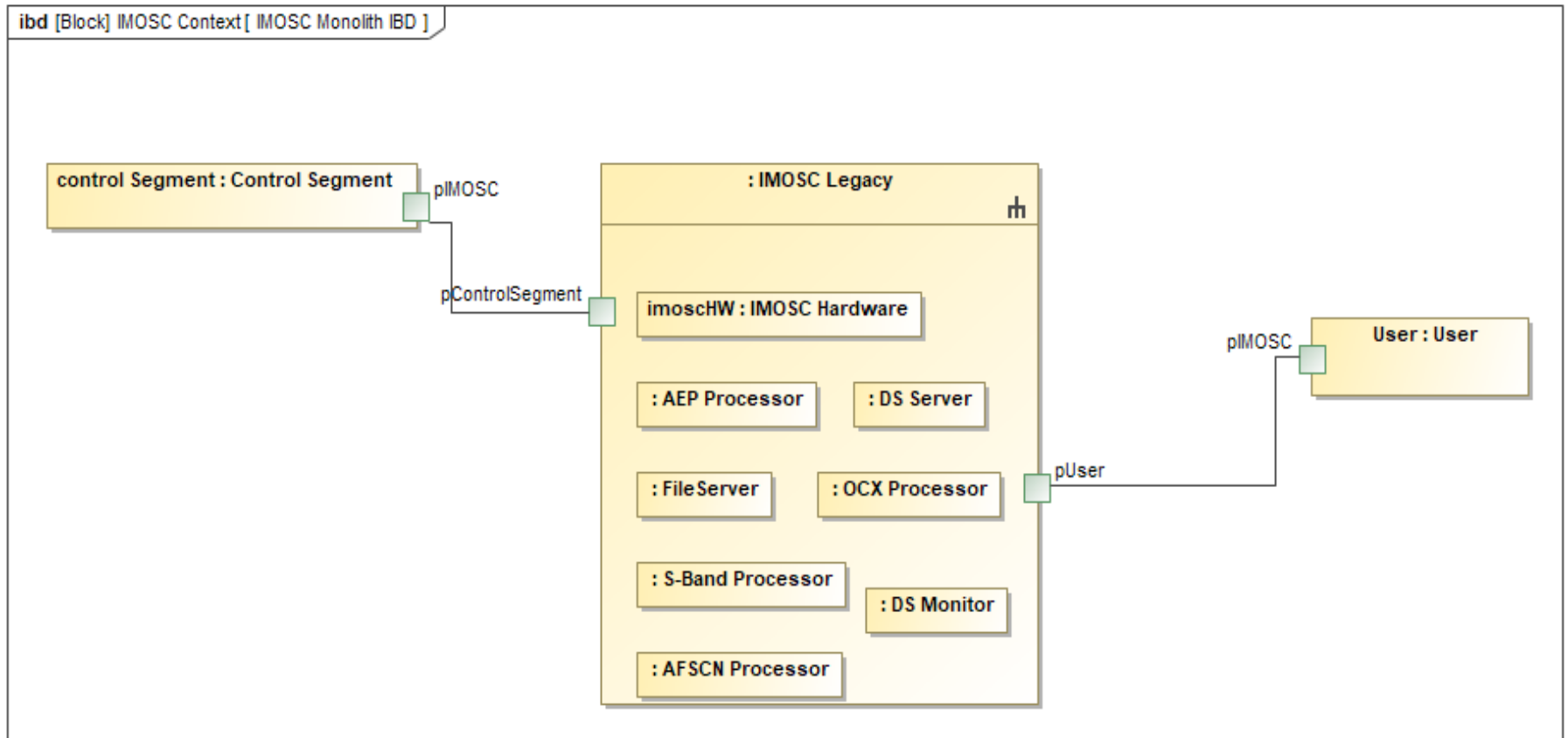
**B. P. Douglass, Agile Systems Engineering, Waltham, MA: Elsevier Inc, 2016.*

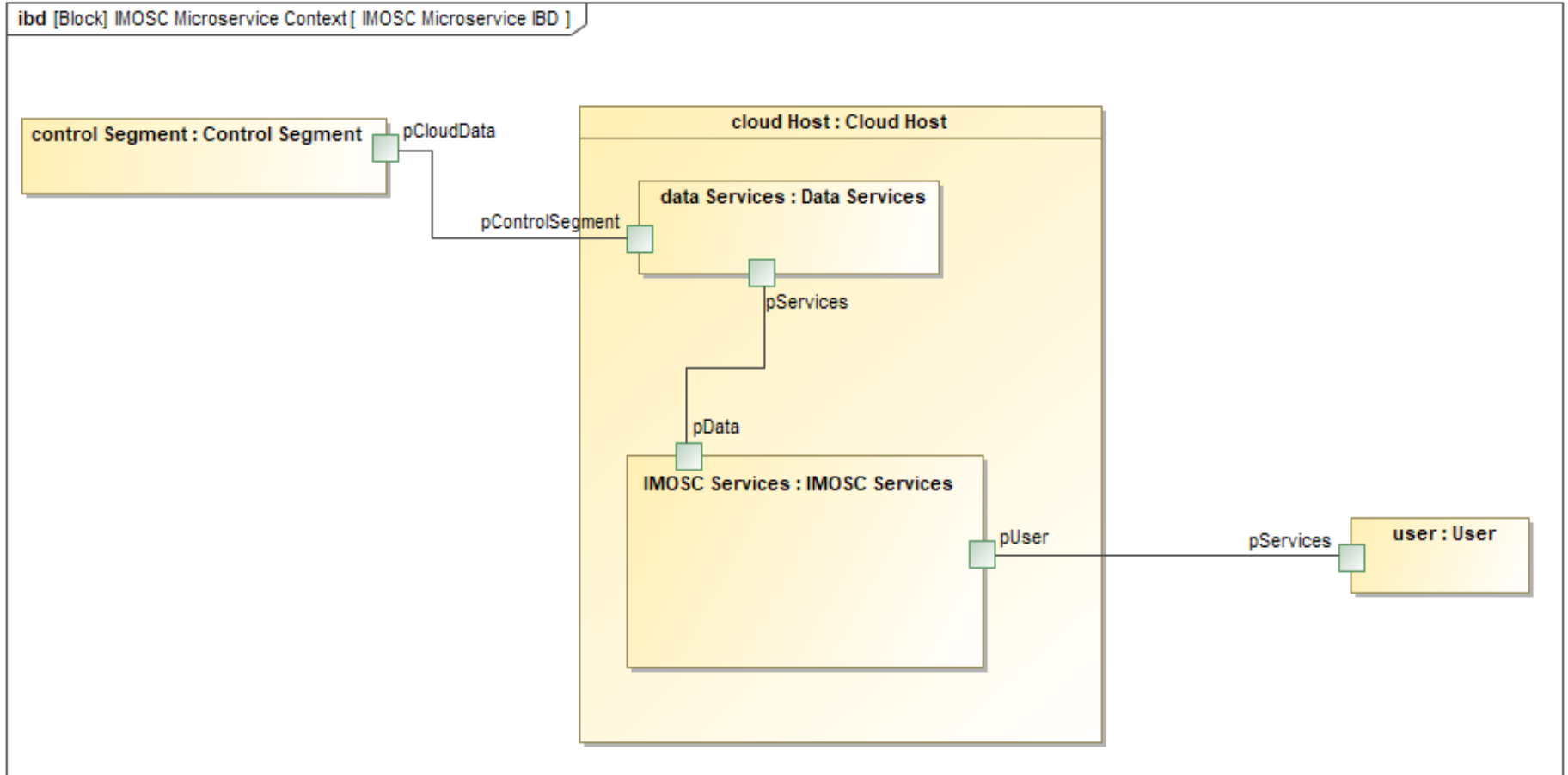


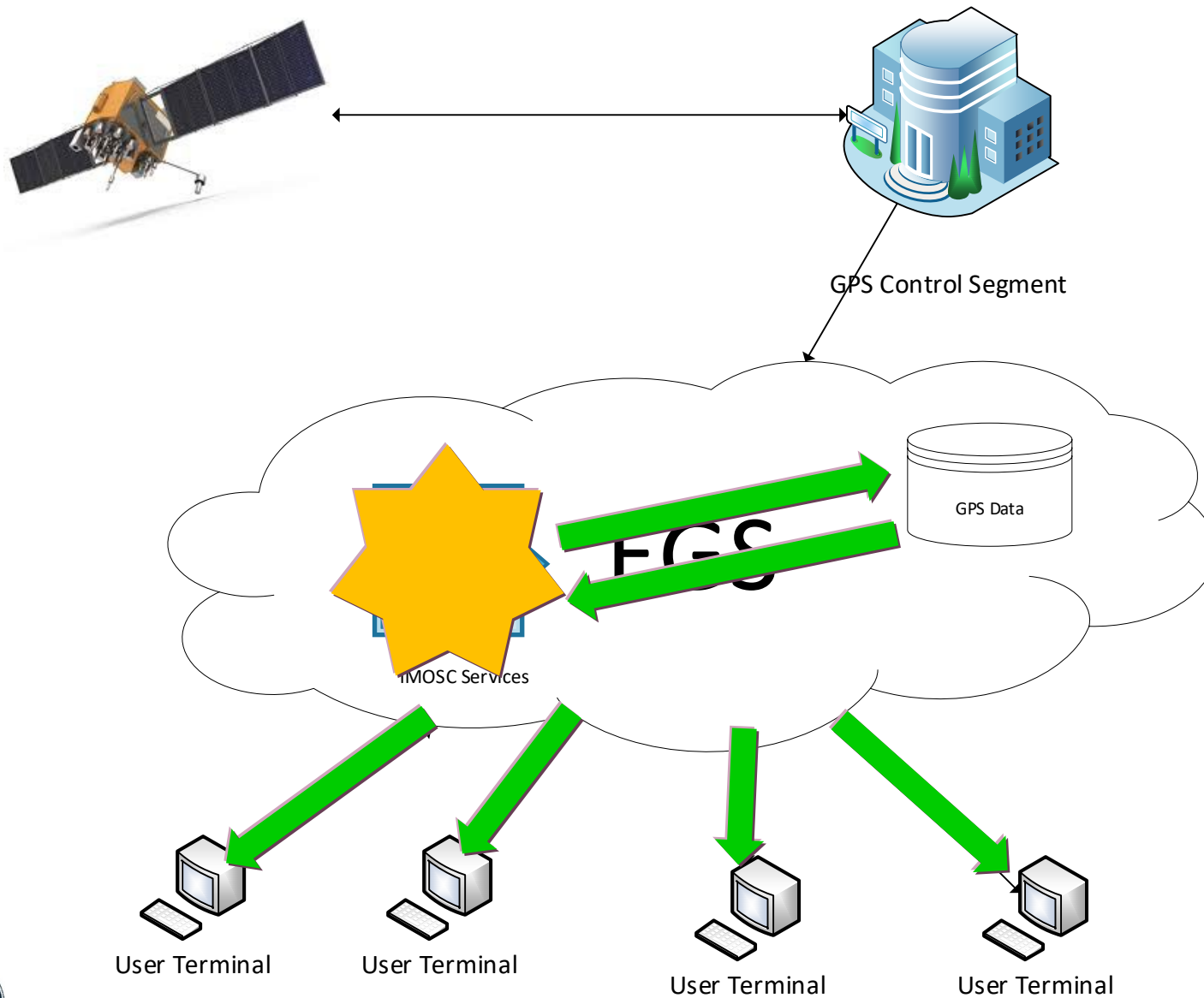
- **Microservice Architecture Pattern Decisions***
 - Service Decomposition Patterns
 - Communication Patterns
 - Data Consistency Patterns
 - Data Query Patterns
 - Service Deployment Patterns
 - Observability Patterns
 - Automated Service Testing Patterns
 - Security Patterns

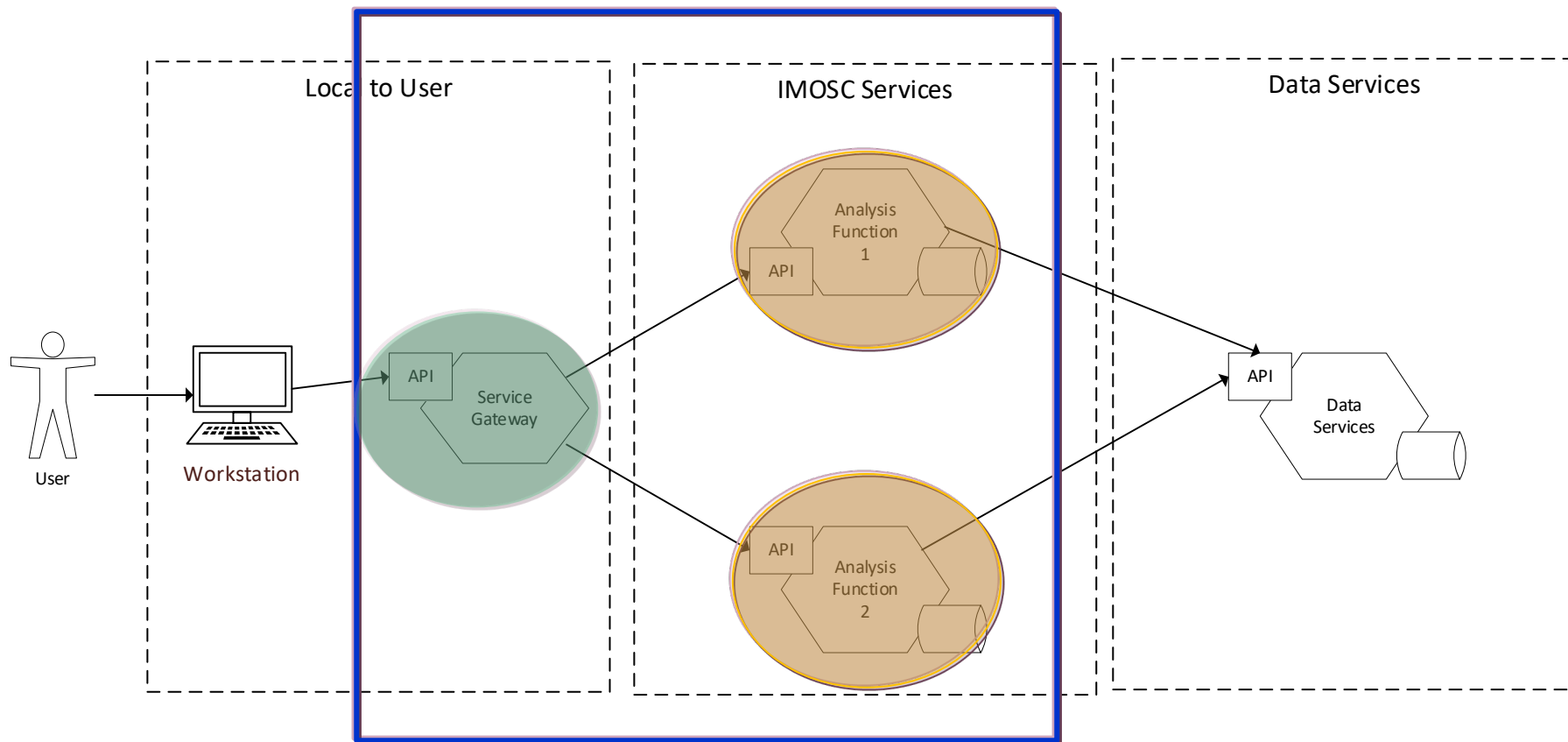
**C. Richardson, Microservices Patterns, Shelter Island, NY: Manning Publications Co., 2019.*











- **Legacy Systems**
 - Successfully serving the warfighter
 - Contain capabilities useful to other programs
- **Migration to EGS Cloud-based Microservices**
 - Requires understanding the Legacy Architecture
 - Extraction of the key functionalities
 - Changes to SA and Cyber functions
 - Change to Agile Development
 - Perform Agile Systems Engineering
 - Leverage Microservice patterns

Migrating a Monolithic Services to the Microservice Architecture enables current and future programs to benefit from Legacy systems



THANK YOU



- **Slide 4:**

- B. Delong and J. Demetrelis, "Enterprise Ground Services: Fight as an Enterprise MVP & Service Delivery Roadmap," in GSAW 2021, Los Angeles, 2021.
- "Breaking Defense," 2021. [Online]. Available: <https://breakingdefense.com/2021/03/smc-building-catalog-for-common-satellite-c2-ops/>. [Accessed 16 January 2022].

- **Slide 7:**

- B. P. Douglass, *Agile Systems Engineering*, Waltham, MA: Elsevier Inc, 2016.

- **Slide 8:**

- C. Richardson, *Microservices Patterns*, Shelter Island, NY: Manning Publications Co., 2019.

