FORÇA AÉREA BRASILEIRA
Asas que protegem o País

SIGE 2023

SIMPÓSIO DE APLICAÇÕES OPERACIONAIS EM ÁREAS DE DEFESA

ASA-SimaaS: Advancing Digital Transformation through Simulation Services in the Brazilian Air Force

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REALIZAÇÃO APOIO PARCEIROS PATROCÍNIO

Introduction

- Forecasting battle outcomes: a longstanding military requirement
- 1950s: US Army adopts mainframe computers for data analysis and battlefield simulations
- Accelerated time simulation: a superior simulation method that saves time
- Faster-than-real-time simulations enable armed forces to:
  - Choose appropriate actions
  - Create tactics and doctrines
  - Train decision-makers through war games
  - Assess new acquisitions
  - Innovate new technologies
- Availability of several commercial solutions for accelerated time simulations
- Armed forces exploring in-house development of simulation tools

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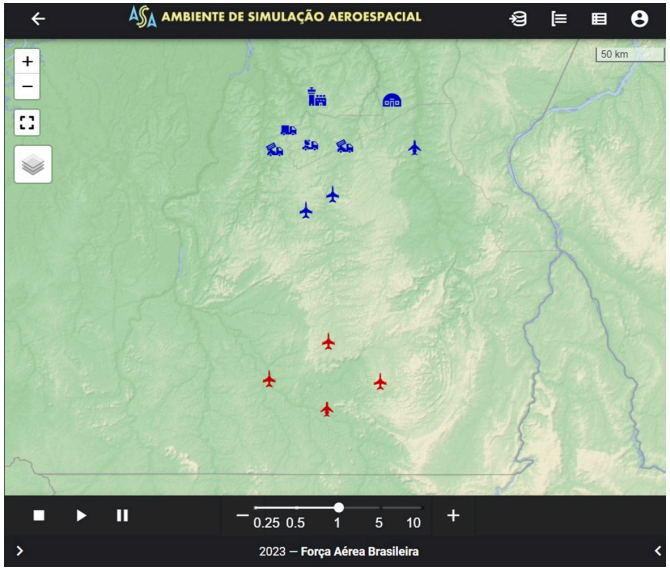
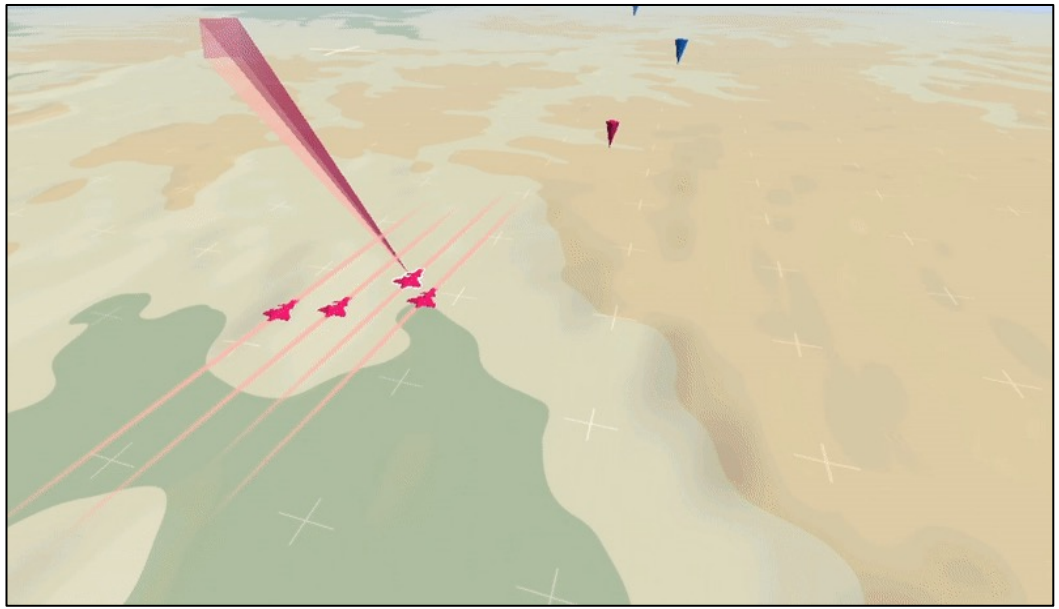
Aerospace Simulation Environment

- Aerospace Simulation Environment or *Ambiente de Simulação Aeroespacial* (ASA) *in Portuguese*
- Custom-made in C++ for advanced programming flexibility
- High-fidelity representation for accurate scenario reproduction
- Supported by the Brazilian Air Force
- Dedicated to modeling and simulation of military operational scenarios



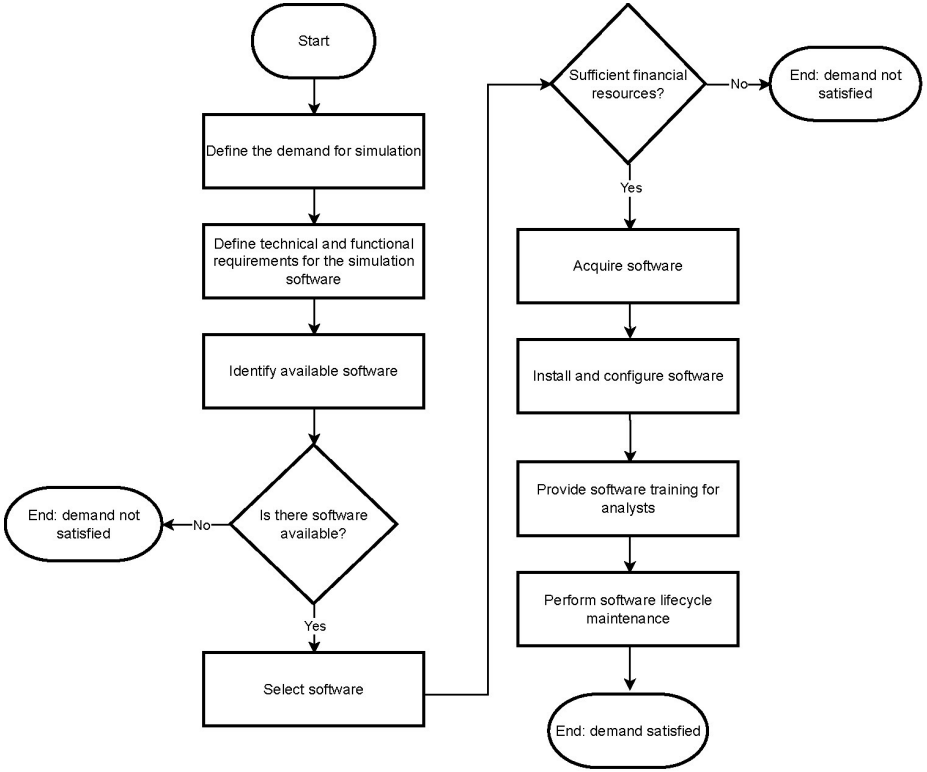
Simulation as a Service



- ASA provides defense scenario simulations via its cloud-based service, ASA-SimaaS
- ASA-SimaaS promotes collaboration between government entities, academia, and Brazilian Defense Industrial Base (BID) entities
- This work presents ASA-SimaaS as an instrument to advancing FAB's digital transformation
- Offers customized cloud-based simulation services for defense scenarios

Before the Digital Transformation

- Simulation initiatives within the FAB are managed in a decentralized manner
- Decentralized acquisition leads to significant initial, training, and maintenance costs
- Procurement of simulation software often results in resource constraints
- Challenges arise in managing license renewals and updates
- ASA-SimaaS offers a centralized, cloud-based solution
- Accessible to all FAB organizations
- Reduces complications of traditional software maintenance and acquisition



Effectiveness and Efficiency Indicators

Effectiveness indicator

$$Effs = \frac{NSS}{NSD}$$

Efficiency indicator

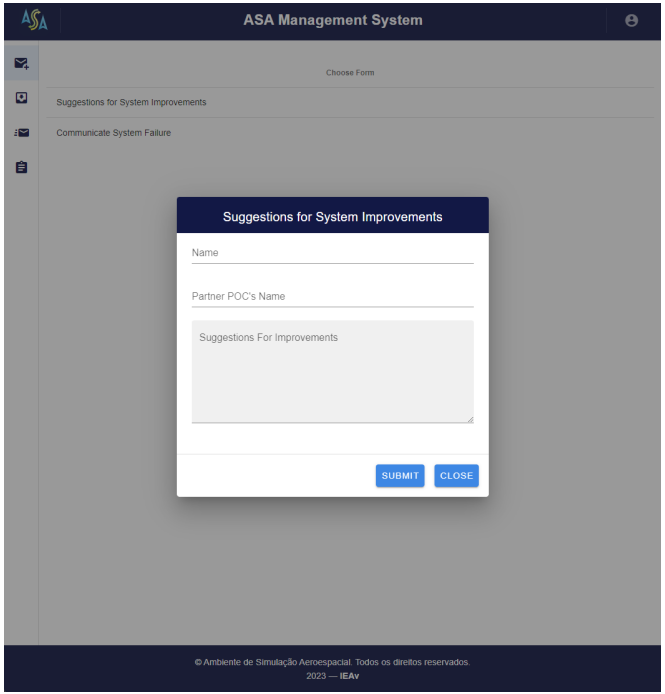
$$Effy = \frac{TVI}{NSS}$$

NSS: number of scenarios simulated

NSD: the number of scenarios demanded

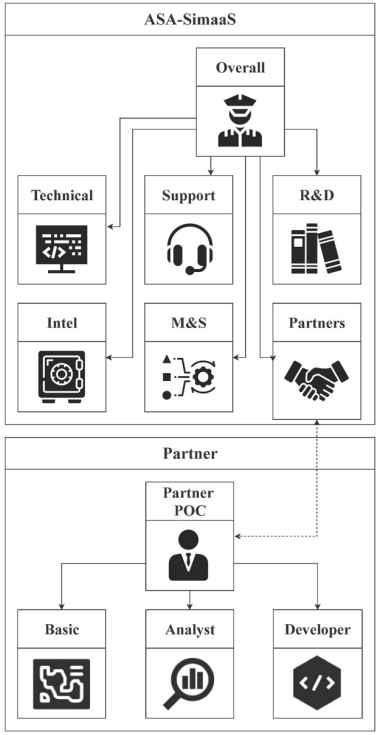
TVI: the total value invested in the acquisition and maintenance of the system in a given period

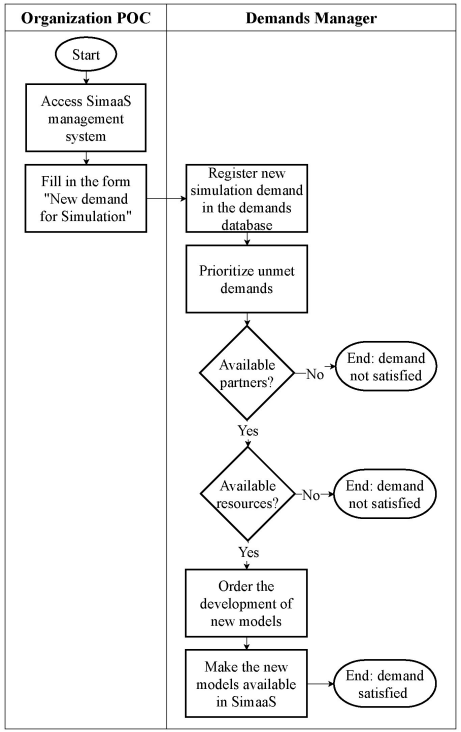
ASA Management System

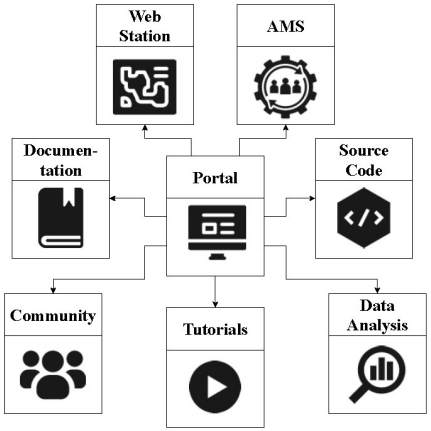


- ASA-SimaaS incorporates a straightforward management system, enhancing communication between users and service managers
- Systematically organizes and prioritizes FAB's simulation needs, preventing superfluous acquisitions and serving more customers
- AMS, a key web application in ASA-SimaaS, simplifies assessment, prioritization, and tracking of update and feature requests
- Ensures rapid and efficient handling of service access requests, overseeing the full ASA service lifecycle
- Centralizes coordination of simulation-related initiatives and needs across FAB, fostering collaborative and efficient organizational simulation needs management

ASA Management System







Advancing Digital Transformation

- **Chief of Staff**
  - Supports Simulation-Based Acquisition (SBA) analyses
  - Enables informed decision-making on acquisitions and future capabilities
- **Operational Commands**
  - Aids in fine-tuning doctrines and tactics
  - Helps in selecting effective Courses of Action (COA)
- **Command and Staff College**
  - Upgrades war game activities
  - Enhances strategic thinking and decision-making training
- **Research and Development**
  - Facilitates the development of AI algorithms
  - Offers a robust environment for testing AI solutions

- **Benefits**
  - Promotes collaboration
  - Increases efficiency and effectiveness
  - Boosts the readiness and success
- **Technology**
  - Cloud-based web service
  - 24/7 sophisticated IT infrastructure
  - Allows complex simulations without high-end PCs

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Conclusions and Future Work

- **ASA-SimaaS: Streamlining Digital Transformation**
  - Enhancing communication: seamless interaction between users and service managers
  - Integral role in decision-making: tactical, operational, and strategic levels
- **Future Enhancements**
  - AI integration: smarter, adaptable simulations
  - Real-time collaboration tools: encouraging collective, data-driven decisions
  - VR & AR integration: immersive, realistic defense scenario simulations
- **Critical Success Factors**
  - Scalability and agility to meet evolving defense needs
- **Overall Impact**
  - Optimized resource allocation
  - Streamlined decision-making processes
  - Enhanced mission support
  - Supporting Brazil in maintaining a robust and streamlined defense posture

Acknowledgments

- Finep: grant nº 2824/20
- CNPq – National Research Council of Brazil: grants nº 304134/2-18-0 and nº 307525/2022-8

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