Presented to:

MANPRINT Practitioners Workshop

MANPRINT In Robotics

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Objective

- Highlight role of MANPRINT in Robotics:
  - Challenges
  - Application in Gladiator TUGV Program
  - Path Forward

Key Challenges Include:

- Acquisition Process Often Times are Streamlined
- Commercial Off-The-Shelf (COTS) Systems are becoming Best Practice
- PM Buy-in to Customize COTS Systems/Equipment
- Training is Often Viewed as a Mitigation for Bad Design
- MANPRINT/HFE Often Weak or Not In Solicitation/SOW
- Balancing Test and Evaluation with Soldiers' Urgent Needs
- ……

Gladiator Tactical Unmanned Ground Vehicle

- Practical Application of MANPRINT in the Gladiator Tactical Unmanned Ground Vehicle:

Gladiator Tactical Unmanned Ground Vehicle

OCU

Tactical System

Mobil Base Unit

- Durable, highly mobile 4x4 mobile base unit with turbo diesel engine, armored hull, and run flats
- On-board color/IR camera, microwave proximity detector, GPS, and wireless data link
- Intuitive OCU with monocular screen and HHC
- Versatile mounting system for M240 and M249 machine guns, M32 grenade launcher, and light vehicle obscuration smoke system (LVOSS)
- 400 lb capacity payload module
- Open hardware and JAUS-complaint, modular software allow quick mission configuration

MANPRINT Challenge 1

Commercial Hand Held Controller

HFE Design Principles Applied

MANPRINT Challenge 2

Defense Threat Reduction Agency (DTRA)

- Purchase Gladiator Mobile Base Unit (MBU) without weapons payload.
- Mission: Perform 8 -10 hour shifts using Gladiator MBU to monitor and interrogate a given area after nuclear event.

HFE Challenges Includes

- Performance degradation due to:
  - prolonged use of monocular display
  - muscle fatigue manipulating HHC
- In general, original operator control unit (OCU) is unsuitable for DTRA mission.

Gladiator Original OCU Configuration

Gladiator DTRA OCU Configuration

MANPRINT Challenge 3

HFE/MANPRINT Challenge

- Develop a suitable virtual Gladiator basic skill trainer, which will familiarize Marines and Soldiers with Hand Held Controller, OCU, weapons payload and MBU functionality.

OVERVIEW

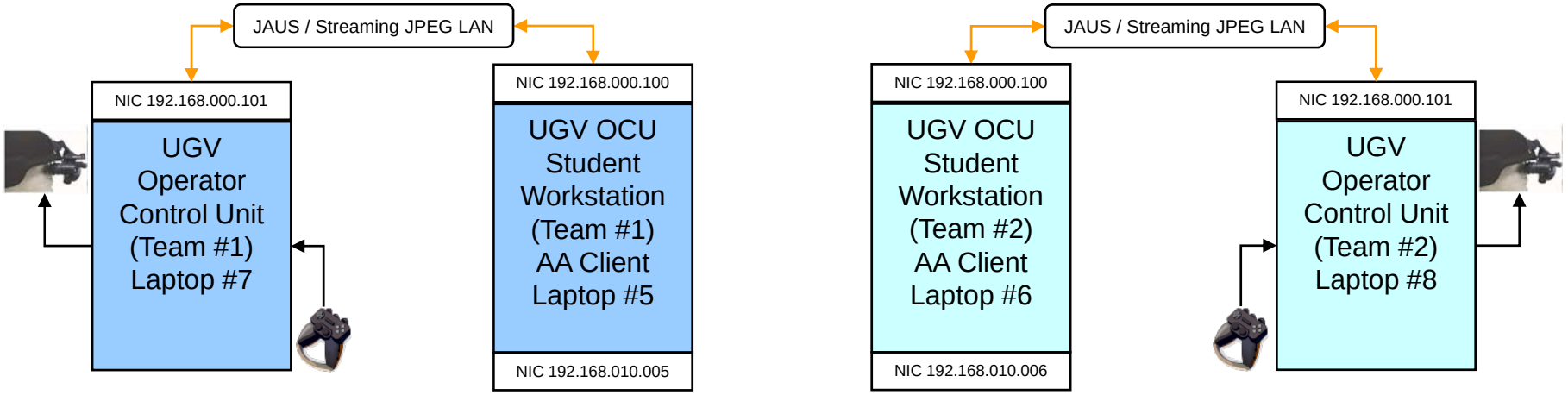
- The Gladiator OCU Basic Skills Trainer (BST) is a rapid development effort based on the America's Army Basic Skills Trainer (AABST).
- The primary focus of the trainer is OCU familiarization with the secondary objective being vehicle mobility and warfare training. To that end, the actual vehicle OCU hardware will be utilized as the vehicle controller in the training environment.

Gladiator Basic Skill Trainer

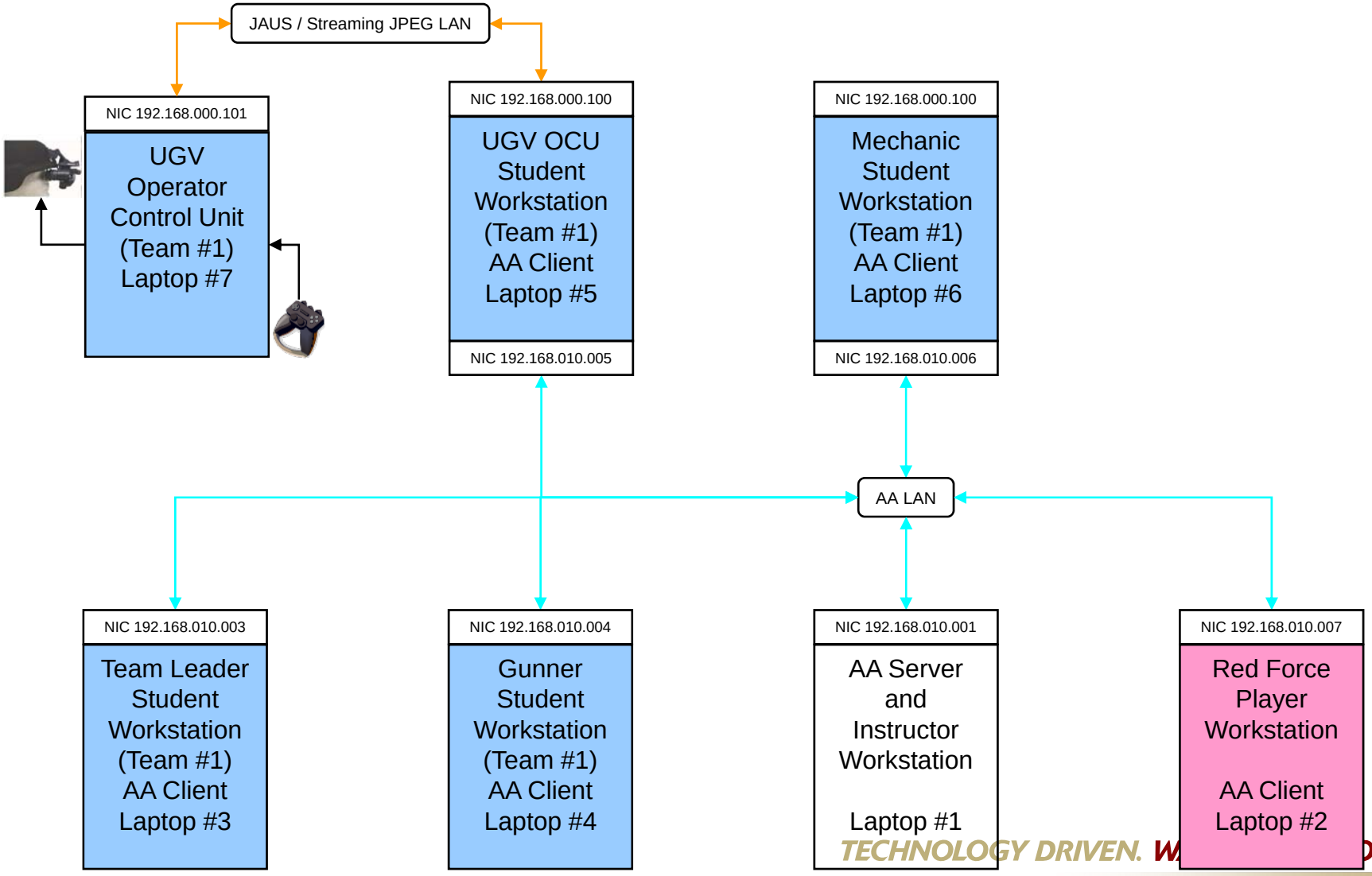
The Gladiator OCU BST enhancements to the AABST include the following:

- A simulation of the Gladiator vehicle and weapon systems.
- The addition of a Gladiator OCU interface based on the Joint Architecture for Unmanned Systems (JAUS) control interface.
- MJPEG streaming video (Gladiator sensors data to the OCU).
- A Gladiator operator avatar.

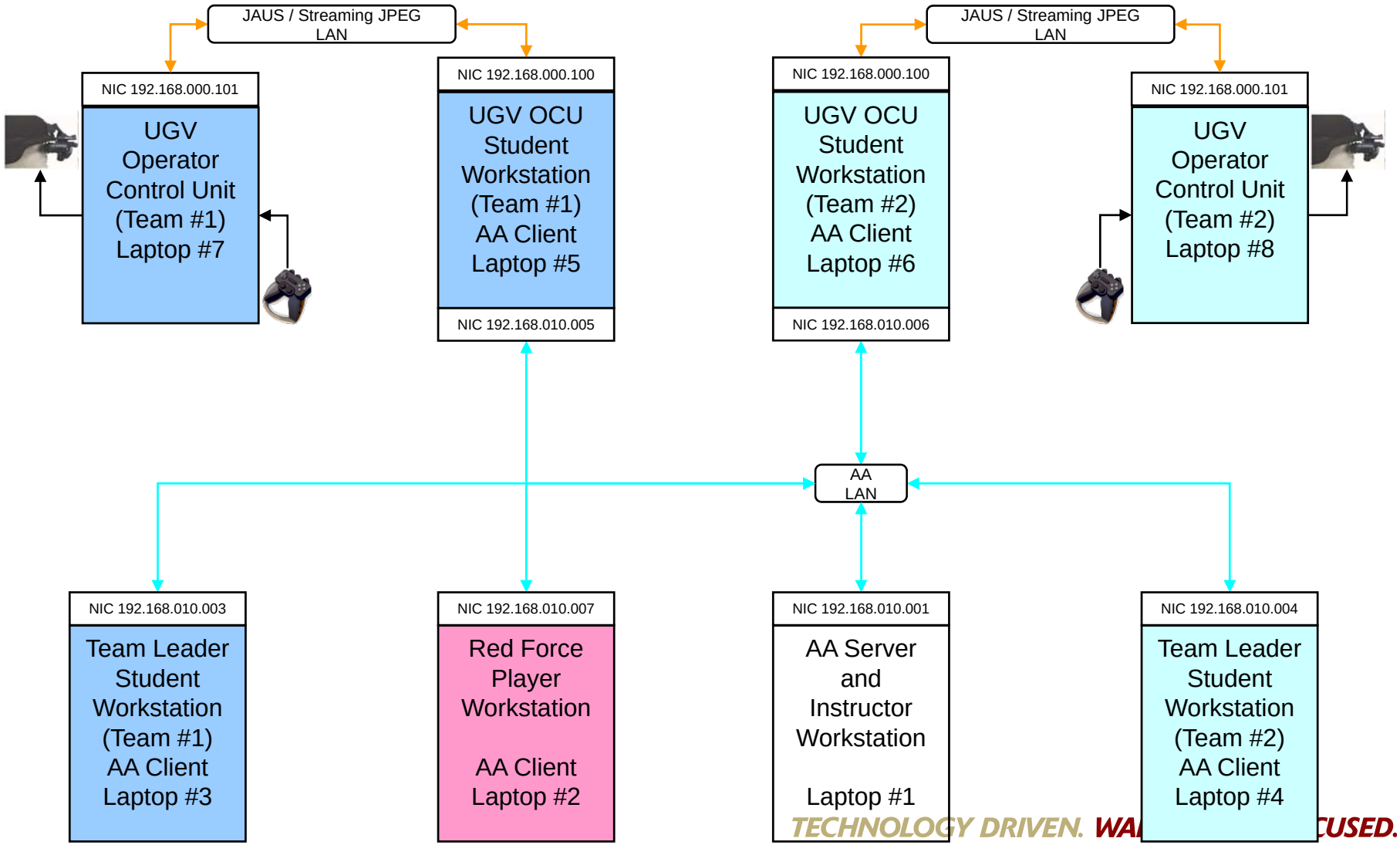
Gladiator Standalone System Configuration



Gladiator Single Team System Configuration



Gladiator Multi Team System Configuration



HFE Impact to overall program include

- Identification of more than 40 usability issues
- Key factor for Navy's Weapon System Safety Review Board granting safety release.
- More than one year reduced development time for basic skill trainer using America's Army Game platform.

Path Forward Include:

- MANPRINT Must be Included in Systems Front End Analysis:
  - Analysis of system requirements by mission, conditions, and function scenarios
  - Identification of the role of Soldier verses Robot
  - Analysis of Workload and Decision Making

Path Forward Include:

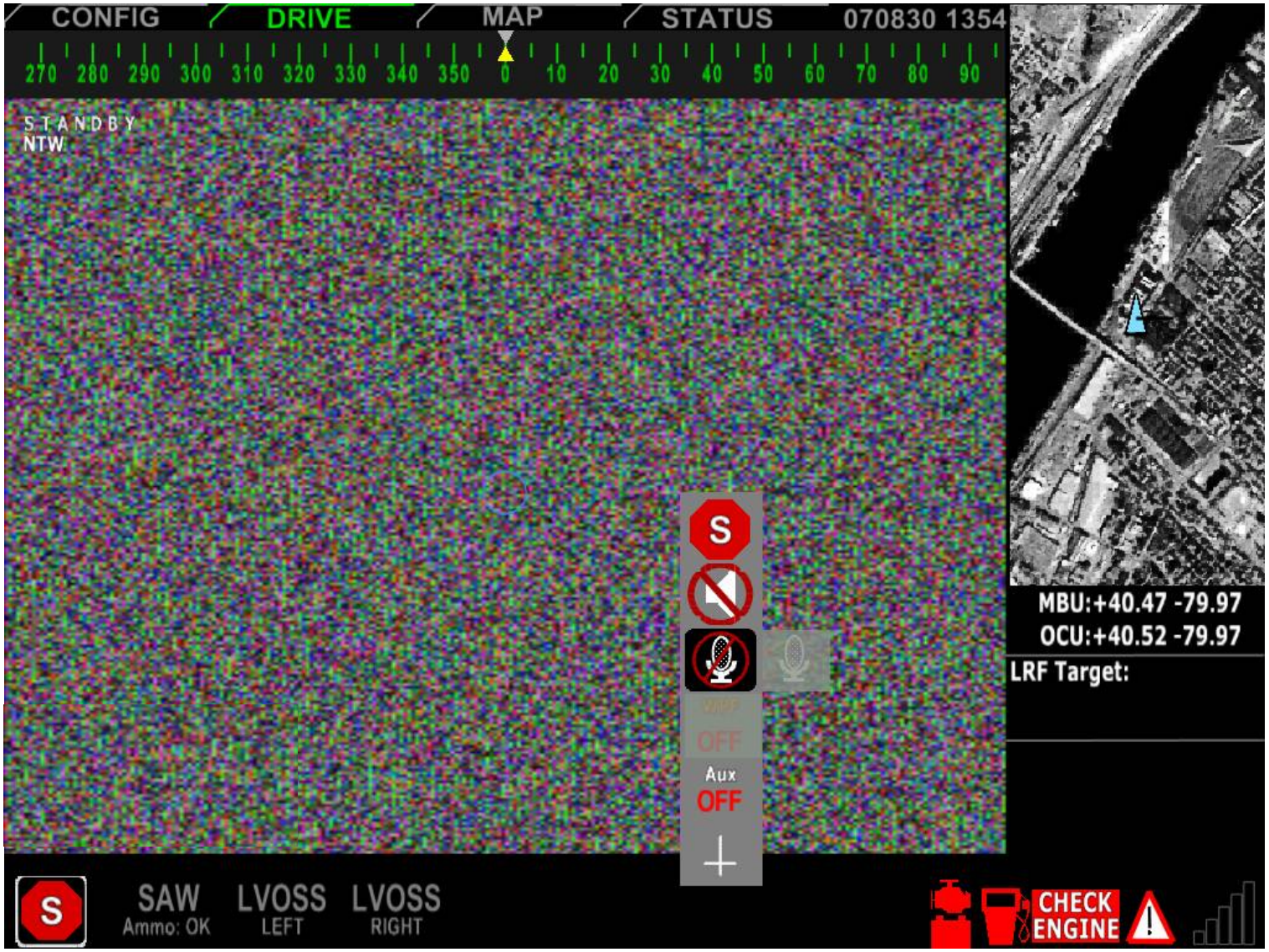
- MANPRINT Practitioners will have to become a central part of PM staff to impact:
  - Solicitations for COTs Systems
  - Training design
  - Minimize training as mitigation for bad design
  - Awareness of MANPRINT/HFE Value added for Soldier/Robot system performance

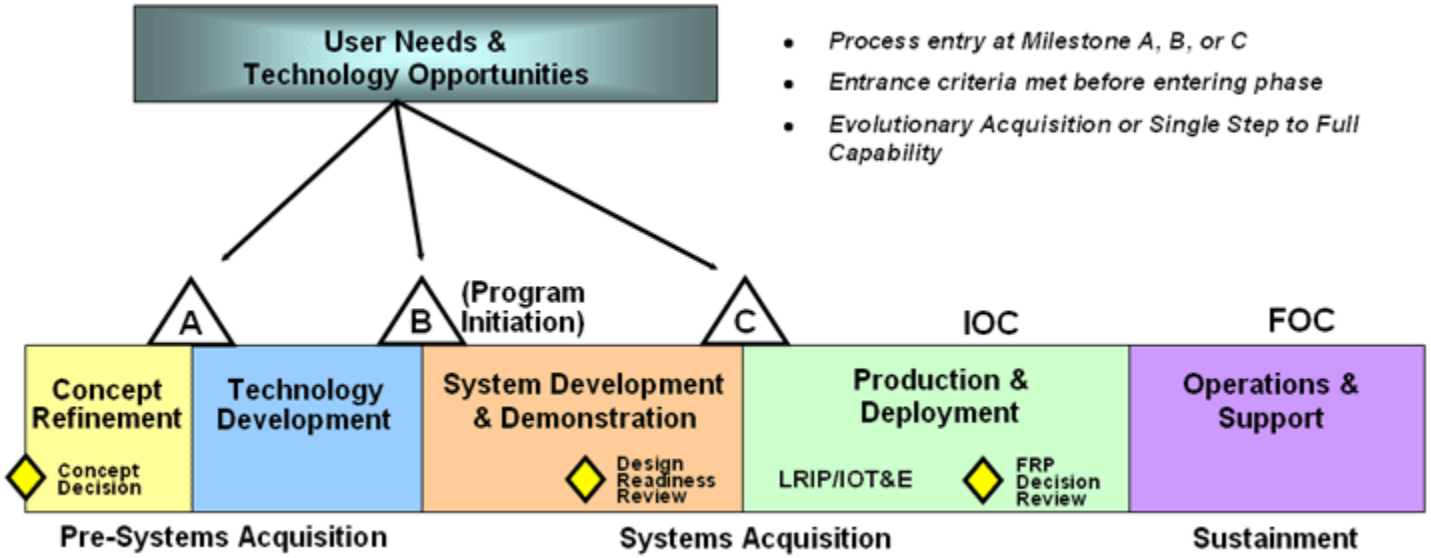
QUESTIONS?

Backup Slides

Gladiator TUGV Password Screen

Gladiator TUGV Driving Screen





Defense Acquisition Management Framework