- **Virtual Maintenance Training for Industry – Siemens project case presentation**

October 9th, 2019

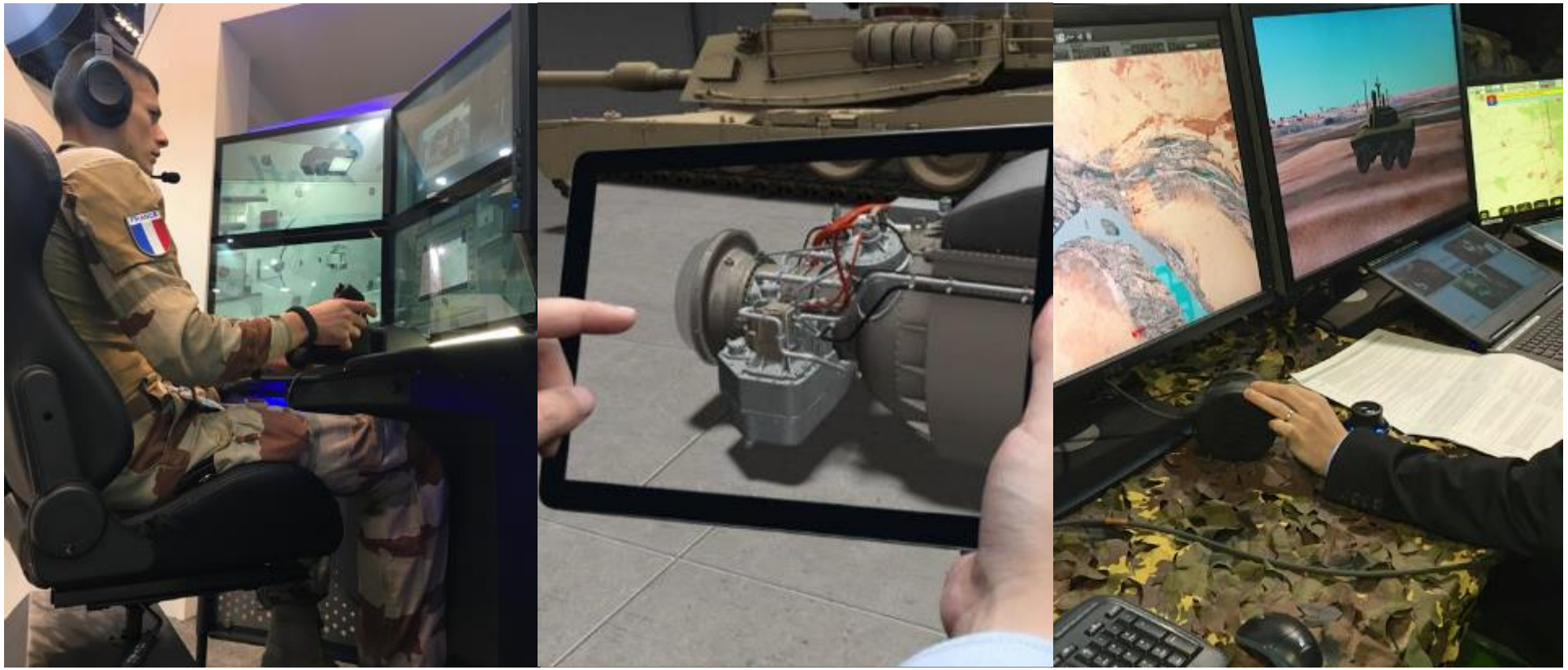
John Cockerill

Agenda

- Introduction – Agueris Presentation
  - The company & Portfolio
  - Examples of Solutions done
  - Virtual Maintenance Trainer Introduction
- Project Case: Siemens – Turbine Virtual Maintenance Trainer
  - Siemens' Context
  - Project Presentation – Phases, Planning and Risks
  - Conclusions – From Agueris and Siemens perspective
  - Virtual Maintenance Trainer perspectives
- Questions / Answers

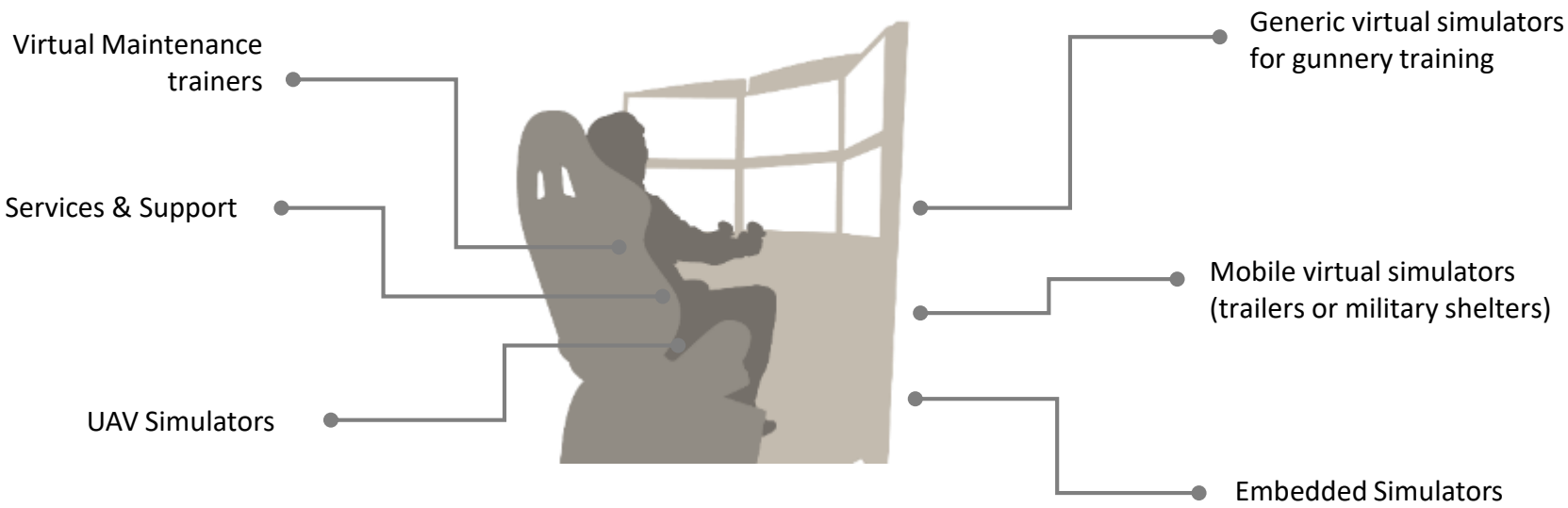
Introduction - Agueris

What We do – Products & Services



- A John Cockerill Defense subsidiary, AGUERIS designs, develops, integrates, deploys and supports innovative **simulation-based solutions** for defense and industry.

A Complete Portfolio



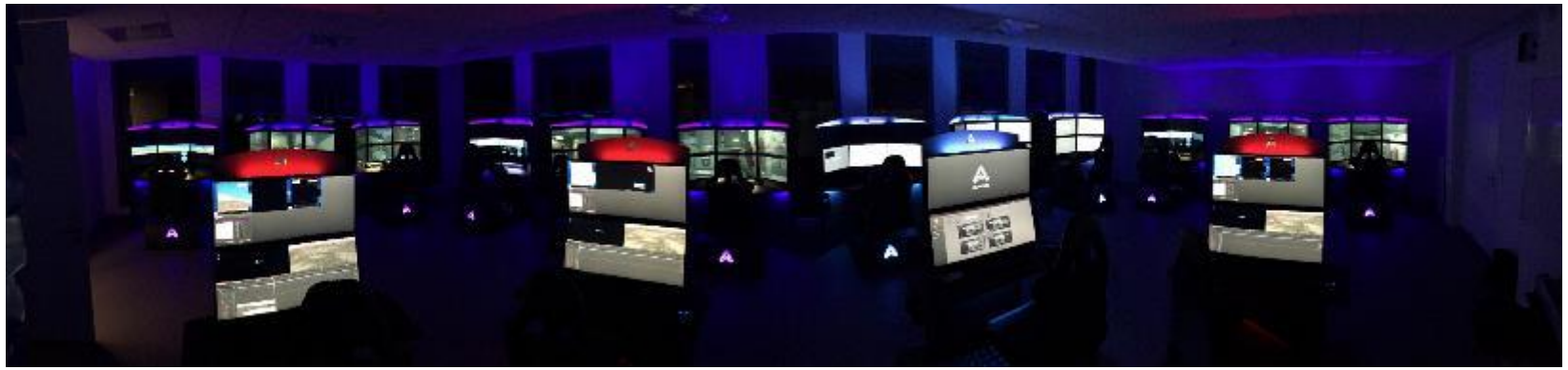
- Basic technical & tactical training
- Individual and collective tactical training & drill
- Assessment and validation of know-how
- Mission rehearsal, pre-projection
- Adaptive reaction, mobile training

Generic virtual simulators for gunnery training

Virtual cockpit : a fully immersive & interactive virtual environment

Operationally deployed

The system is deployed in operational training centers



Commercy : Platoon-Level Simulator – 4 vehicles training in parallel or sharing the same exercise

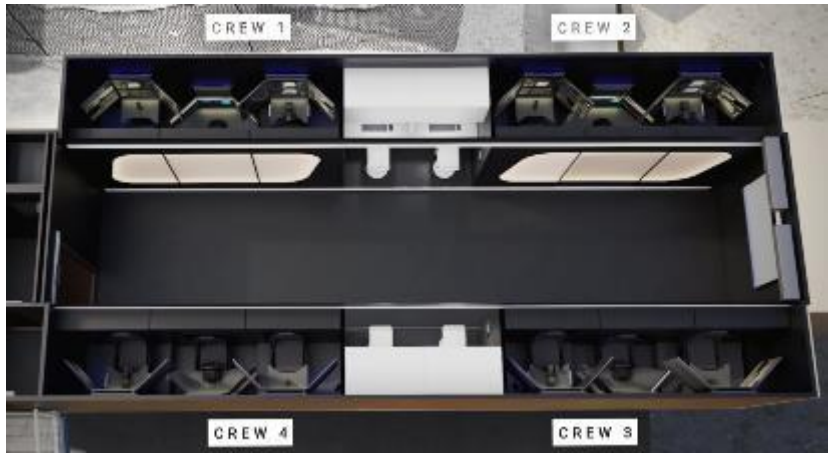
Embedded simulators

The vehicle or turret becomes the trainer

Agueris is a pioneer in embedded training solutions for armored vehicles.

Mobile virtual simulators (trailers or military shelters)

A training solution deployed in mobile trailers

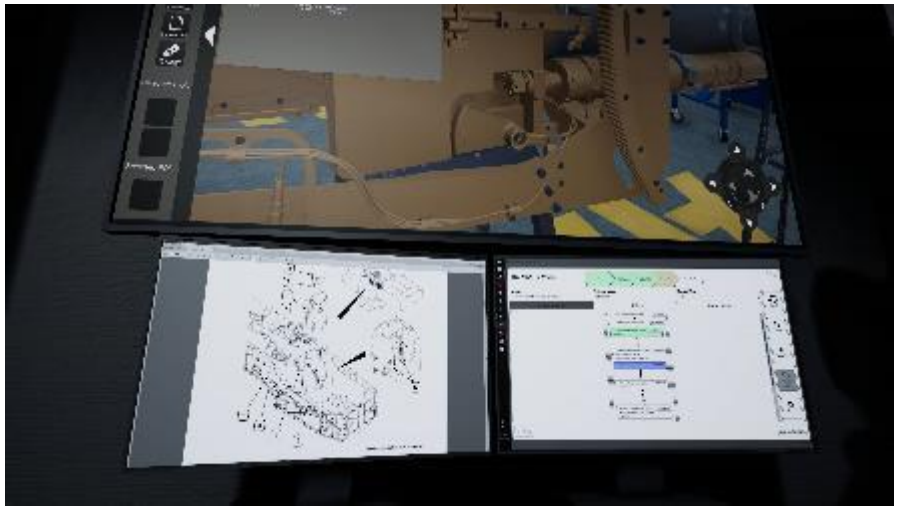


An autonomous truck featuring a full platoon-level simulator (4 vehicles) within an extendable shelter – operationally deployed

UAV Simulators

staRPASs® Generic UAV Trainer

Virtual Maintenance Trainers (VMT)



Project Case: Siemens – Turbine Virtual Maintenance Trainer

Project Case: Gas Turbine VMT

Siemens' context:

- The company
  - Energy – Healthcare – Industry – Building
- Approach: Maintenance Simulation for Siemens Energy
  - Concern Gas Turbine Projects – Training, Maintenance and Support
    - Gas Turbines are difficult and expensive to maintain
      - Full Maintenance – Downtime of 2 weeks (7/7D, 24/24h) 2 times per year
    - Sold Gas Turbines are maintained by local subcontractors
      - Trained by Siemens in Berlin Training Center

Project Case: Gas Turbine VMT

Siemens' context:

- Aims
  - Reduce Siemens' costs: Trainers and Maintenance Experts Time Keeping
    - During the training in Berlin (1 month per team)
    - After the training: Distance Support
  - Optimize earnings:
    - Resale VMT access to the customer
    - Less Time Keeping, Higher competitivity
  - Sales Argumentation:
    - Better training, follow-up and evaluation of trainees to optimize the Gas Turbine downtime
    - Direct access to the information needed for Support

Project Case: Gas Turbine VMT

<u>Siemens' context:</u>

- The Virtual Maintenance Trainer in Siemens:
  - 5 known projects in the USA + 2 others in Germany using the same Technology

- Project Case: VMT Gas Turbine 4000F
  - Disassembly, Inspection and Assembly (3 Lessons)
    - 15 Maintenance procedures
    - Complete 3D Modelisation and Assembly/Disassembly animations between components
  - Solution provided on laptop and Amazon Cloud

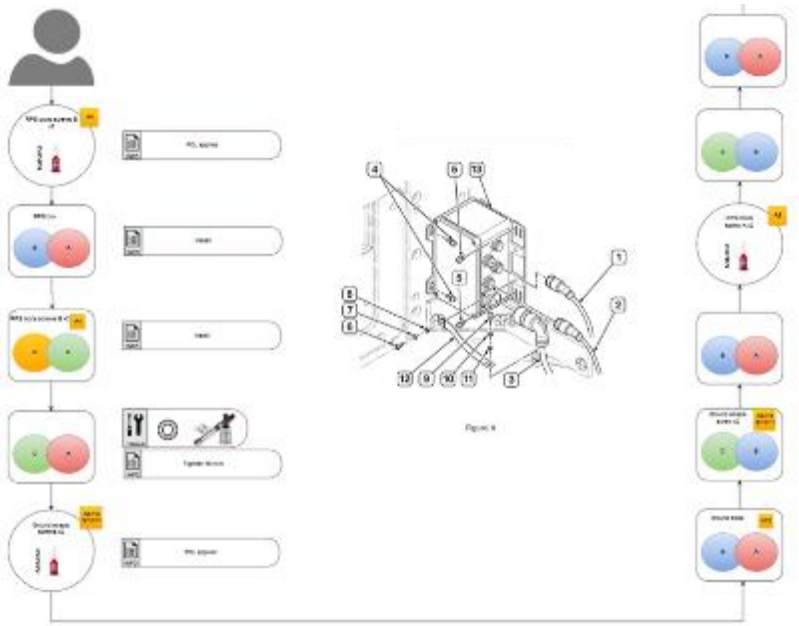
Project Case: Gas Turbine VMT

Project Phases:

- **Preparation**
- Duration: 1 Month when all project inputs received
  - Agueris analysis (Procedures to implement)
    - Agueris feedback – Implementation and Pedagogic Choices
  - Workflow generation (Step by Step – Storyboard for each procedure)
  - Customer Validation

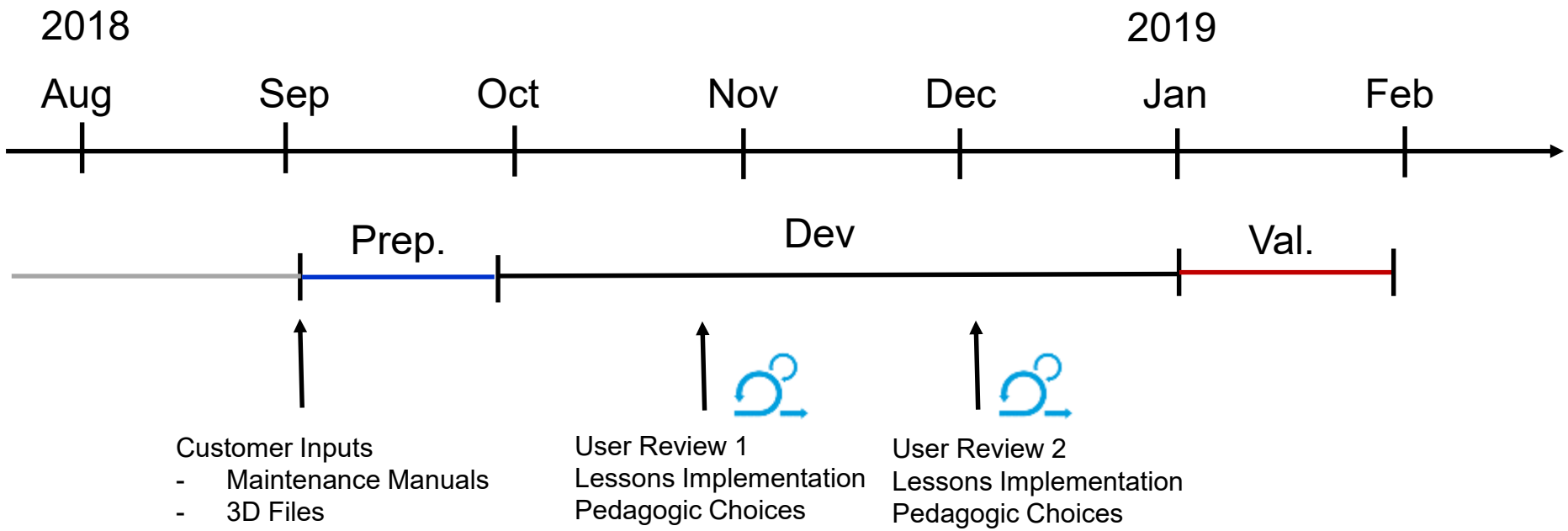
- **Development**
  - Duration: 3 Months
  - Content generation (Procedures, Items, Support tools, etc…)
  - 3D Modelisation and Animations
  - Lessons implementation (Modes, Errors, steps to follow, notation…)
  - Follow-up/validation with Customer (User Reviews)

- **Validation**
  - Duration: 1 Month
  - Acceptance Tests



Project Case: Gas Turbine VMT

Project Phases:



- Main Risks identified:
  - Customer Validations **-> Prep. Phase & User Reviews**
  - Ensure training quality **-> Technico-operational meetings to find the right compromise between Technical / Functional / Pedagogy (User Reviews)**

Project Case: Gas Turbine VMT

VMT – Project Demo

Project Case: Gas Turbine VMT

Conclusion:

- AGUERIS
  - Project **success** in terms of **Duration / Costs / Quality**
  - VMT 4000F V2 **finished** this summer (Including new lessons, new animations between components)
  - A **V3** is under discussion (New lessons / Traduction in foreign languages / Classrooms)
  - A new project was **ordered** this year for a new Turbine and other Pre-sales on-going

- SIEMENS
  - The training in Berlin reduced from 1 Month to **10 Days** per team to train
  - Maintenance Experts **decrease** their support due to the lessons accessibility in the Cloud
  - Better options and **propositions** for Pre-Sales
  - With several VMT implemented using the same solution, Siemens **capitalize** its data (Modelisation, procedures, animations) and can use them on similar future VMT Projects

Virtual Maintenance Trainer Perspectives

Project Synthesis:

- Siemens is **satisfied** of the Virtual Maintenance Solution provided due to:
  - **Easier training** on rare and/or complex procedures
  - **Reduction** of Trainers/Maintenance Experts **costs**
  - Optimized training **minimizing the downtime** of real equipment
  - **State-of-the-art** training solution provided

- Agueris development perspectives:
  - **Extension** in Defense and Industry (Energy, Automotive, Aircraft, …)
    - Any industry with **complex procedures** and/or **Expensive/Delicate** Equipments





Questions / Answers

Thank you

Maxime Miche

Maxime.miche@johncockerill.com

T. +33 1 84 19 56 00

John Cockerill

Office Park, Alleur

Rue Alfred Deponthière, 44
4431 Loncin (Ans)
Belgium

T. +32 4 330 2001

welcome@johncockerill.com

johncockerill.com