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Aerospace & Healthcare: crossovers and challenges

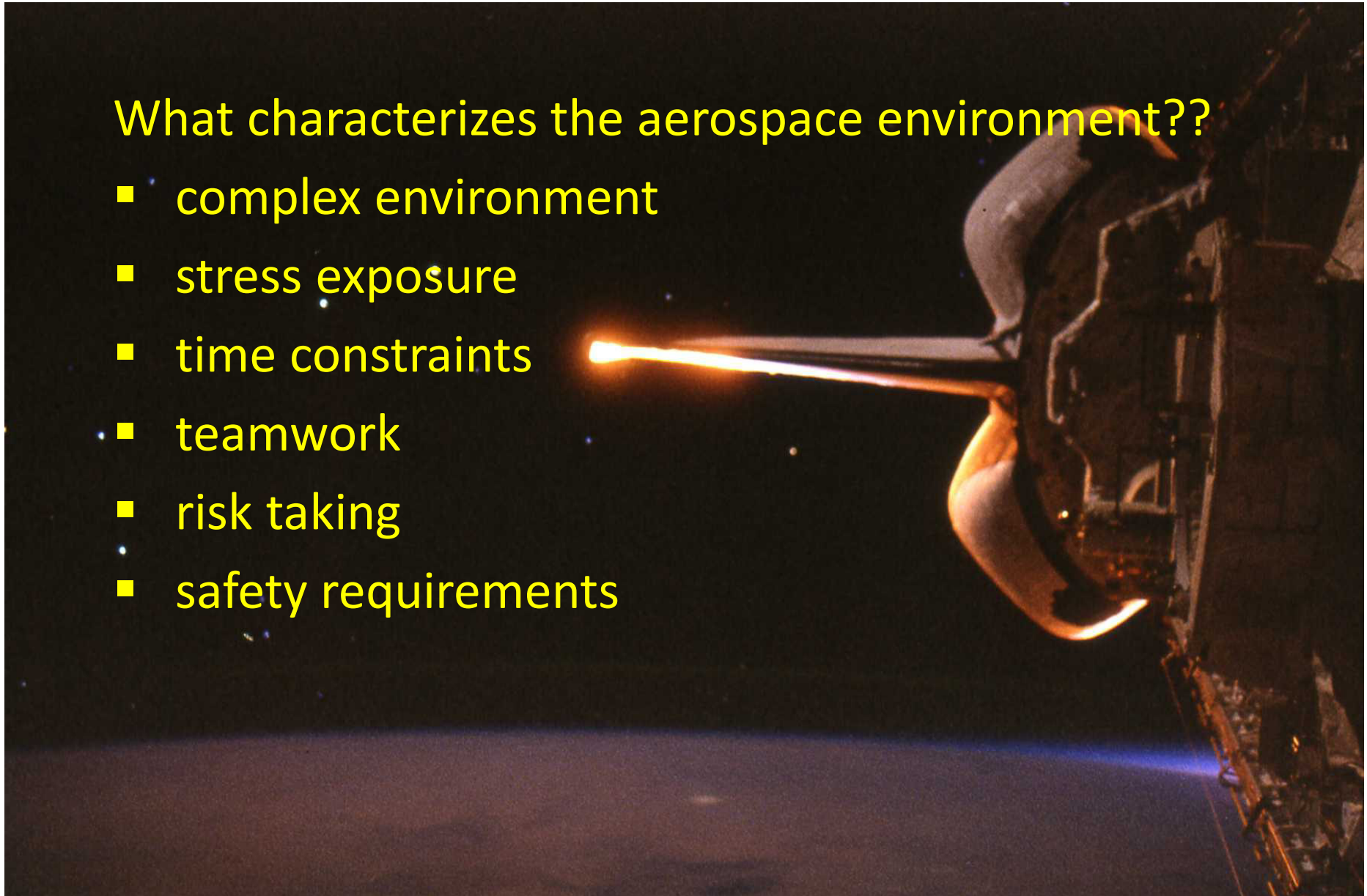
Conference on Quality, Safety and Cost-Effectiveness

November 3th 2014



What characterizes the aerospace environment??

- complex environment
- stress exposure
- time constraints
- teamwork
- risk taking
- safety requirements





The aerospace sector has taken many years to elaborate successful paradigms before fully recognizing the importance of the:

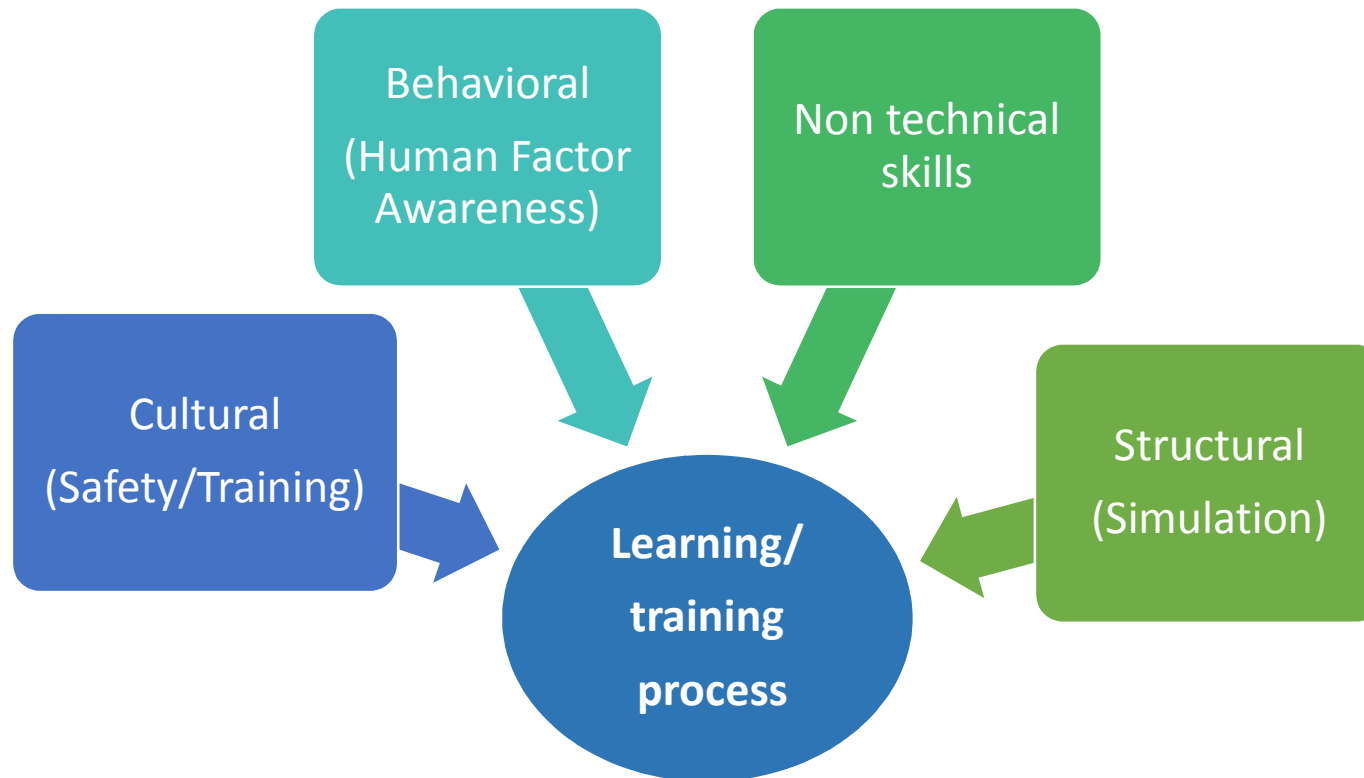
- Human factors;
- Safety culture;
- Non-technical skills.

And above all how to act “scientifically” on these elements to significantly reduce aviation accidents

The Aerospace Experience



“Aviation protocols” have been elaborated considering that these elements are all intrinsically interconnected



And where **SIMULATION** is just a part of the learning/training process.

Aerospace training flow



The Aerospace world has always been a forerunner in the field of integrated training flows both in aviation and in space operations due to the complexities of the operational environment.

Training syllabus and flow developed around:

- Part Task Trainer (PTT)
- Crew training
- Integrated training
- Multi Center Training
- Use of virtual reality

Making extensive use of simulation tools.

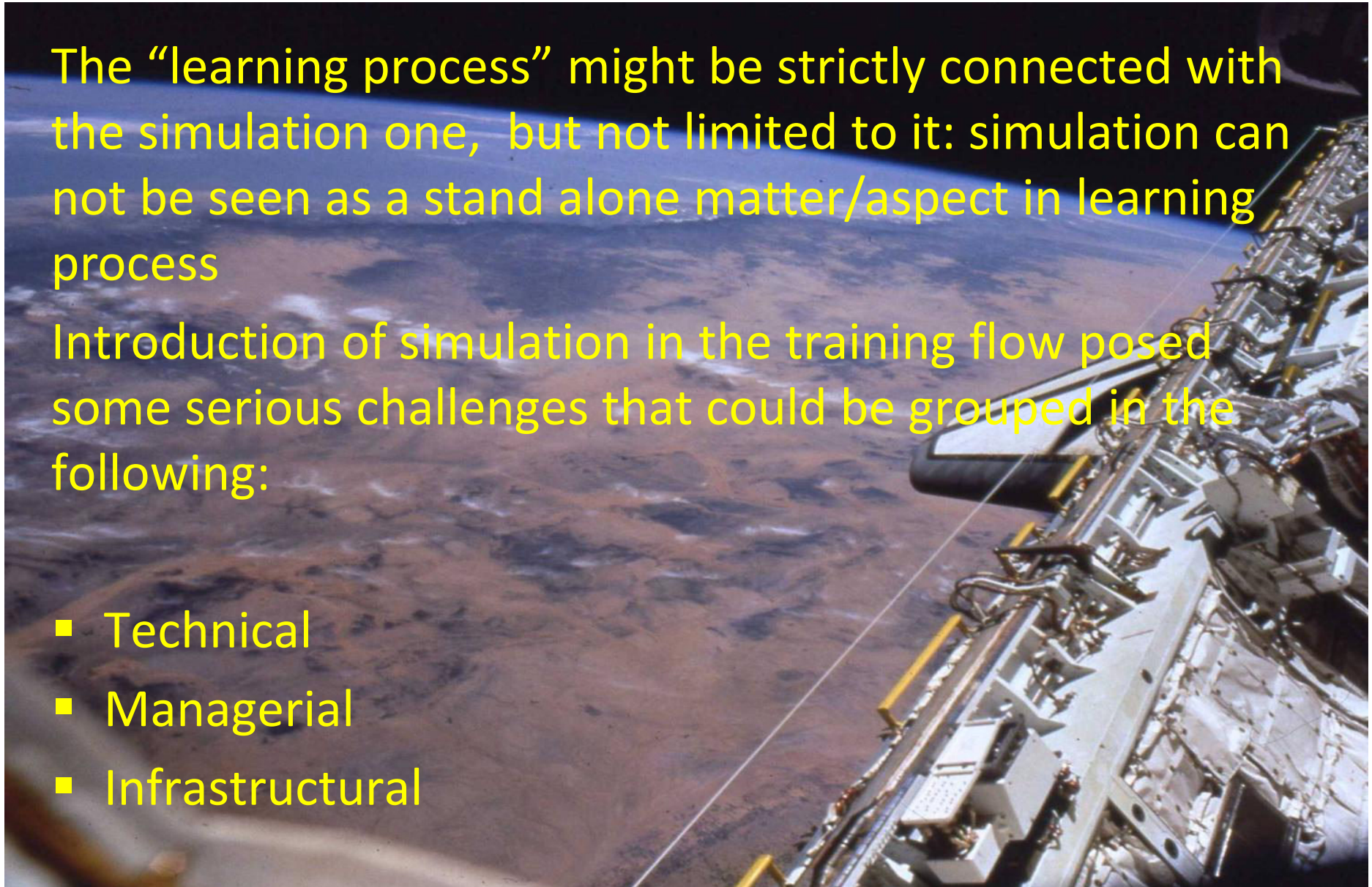




The “learning process” might be strictly connected with the simulation one, but not limited to it: simulation can not be seen as a stand alone matter/aspect in learning process

Introduction of simulation in the training flow posed some serious challenges that could be grouped in the following:

- Technical
- Managerial
- Infrastructural



Challenges – Technical



From a technical point of view advanced simulation technologies have and will certainly play a major role. In particular hot topics will be:

The level of “realism” as a balance between desired/required/achievable through a blending of:

- Fast, accurate application of advanced visualization techniques;
- Augmented reality, live-virtual simulation and integration of embedded training;
- Human behavior modelling;
- Application of technologies which would allow natural interaction (gesture/speech) between trainees and instructors.

Challenges - Managerial / Regulatory



From a managerial/regulatory point of view the challenge has focused on the development of:

- common and recognized training criteria;
- the need for structured training syllabus with a good balance between individual and integrated simulation;
- internationally accepted evaluation criteria
- the need for multidisciplinary training
- they all imply adoption of national/international standards for professional competency.



Challenges - Infrastructural



The establishment of integrated training facilities



The role of Modelling & Simulation in the Aerospace world



Widespread acceptance that PRACTICE is a fundamental and key competence component of the learning cycle and for maintenance of skills

Especially in areas where there is:

- very low acceptance of error
- requirement for high effectiveness
- high safety requirements

Despite a high intrinsic risk environment

Nowadays, flight & aerospace training would not be practible without Syntehtic (Flight) Training Devices



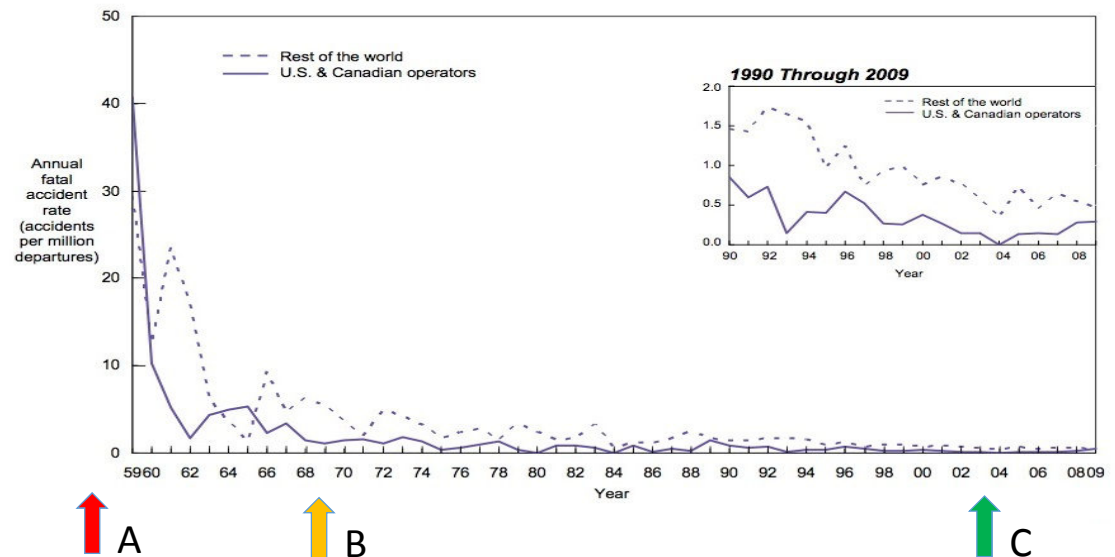
Simulation technologies applied to flight training allowed for a dramatic reductions in the number of flight incidents/accidents

60 Years of Civil Air Transport Evolution



- A. Introduction of training by **simulation** in an environment which counted approximately 30 severe accidents per million flights (late '50s)
- B. Introduction of Training on **human factor** in an environment which counted approximately 5 severe accidents per million flights (early 70s)
- C. Today civil air transport, thanks to technological innovations and new regulatory framework can count on a ratio as lower as 0,5 severe accidents per million flights

U.S. and Canadian Operators Accident Rates by Year
Fatal Accidents – Worldwide Commercial Jet Fleet – 1959 Through 2009



0,030 ‰



0,0005 ‰

Fatal Accident Decrease
> 98%

Crossover from Aerospace to Healthcare



Aerospace and Healthcare are two human activities sharing “common” grounds:

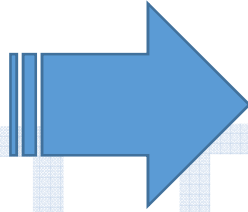
- very low acceptance of error despite high intrinsic risk environment
- requirement for high effectiveness
- human interaction & cooperation in high stress scenarios
- high safety requirements



Crossover from Aerospace to Healthcare



AVIATION



HEALTHCARE

Lately we have seen a strong push in the transfer of successful aviation paradigms and protocols from the aviation world to the medical sector, particularly to the surgery area.

Crossover from Aerospace to Healthcare

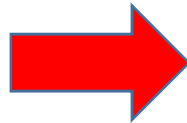


These analogies have translated in the adoption of specific tools such as:

- check-list
- procedures
- reporting systems
- etc.

that not always have fulfilled expectations and brought tangible benefits.

Why??



Lack of a systemic view

A crossover experience: the ISOB initiative



In early 2009 Inpatient Safety On Board (ISOB) and Neurological Institute “Carlo Besta” started a common project with the objective to maximize the synergy between aviation and healthcare, in order to achieve valuable results in patient safety by implementing an **integrated** and **coherent** approach.



A crossover experience: the ISOB initiative



An aviation-like approach was developed which focused on the following aspects:

- An assessment on people's attitude related to safety culture
- A re-modelling of the classical Crew Resource Management into a Team Resource Management, focused on OR team
- Briefings on safety theory, models, languages and literature involving all the medical staff, in order to achieve a common knowledge of safety issues
- A set up of a Voluntary Confidential Reporting System, focused on near miss events, in order to empower existing risk management process with a greater threat awareness capability



A crossover experience: the ISOB initiative



The key of success of the project was the commitment to focus on looking for **similarities of solutions** between aviation and healthcare.



With the introduction of a state of the art endocranial neurological surgery simulator the next logical step will be the development of a “clinical training syllabus” in accordance with a typical aerospace training philosophy



From Hospital experimentation to National Health System



The Istituto Besta experience was monitored by the Italian Healthcare Ministry that expressed interest from the Risk Management point of view.

Problem

- Proliferation of simulators put into service without a technical and/or procedural standardization
- Systems potentially mutually incompatible

Solution

Technical Board of the Health Care Ministry with ISOB

Goals of cooperation



Training philosophy for complex professions demand a **multidisciplinary** and **integrated** approach

- Risk Management
- Safety Assessment
- Operations Reports
- Briefings / De-briefings
- Checklist



- Human Factors

- Training Syllabus
- Training Protocols
- Devices Classification

Conclusions

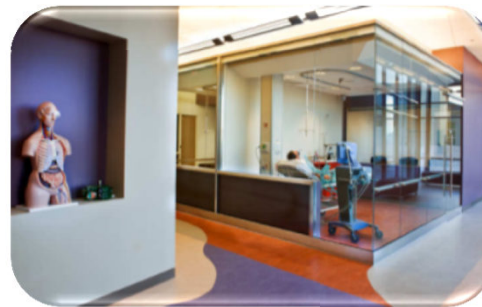


- In aviation the use of simulation and training has brought efficiency, quality and safety
- Adoption of all the best improved tools from the air transport system, with the necessary adjustments will benefit the Healthcare environment.
- Acceleration of the positive results thanks to the available past experience
- **Efficiency, Quality and Safety have a direct effect on costs reduction**

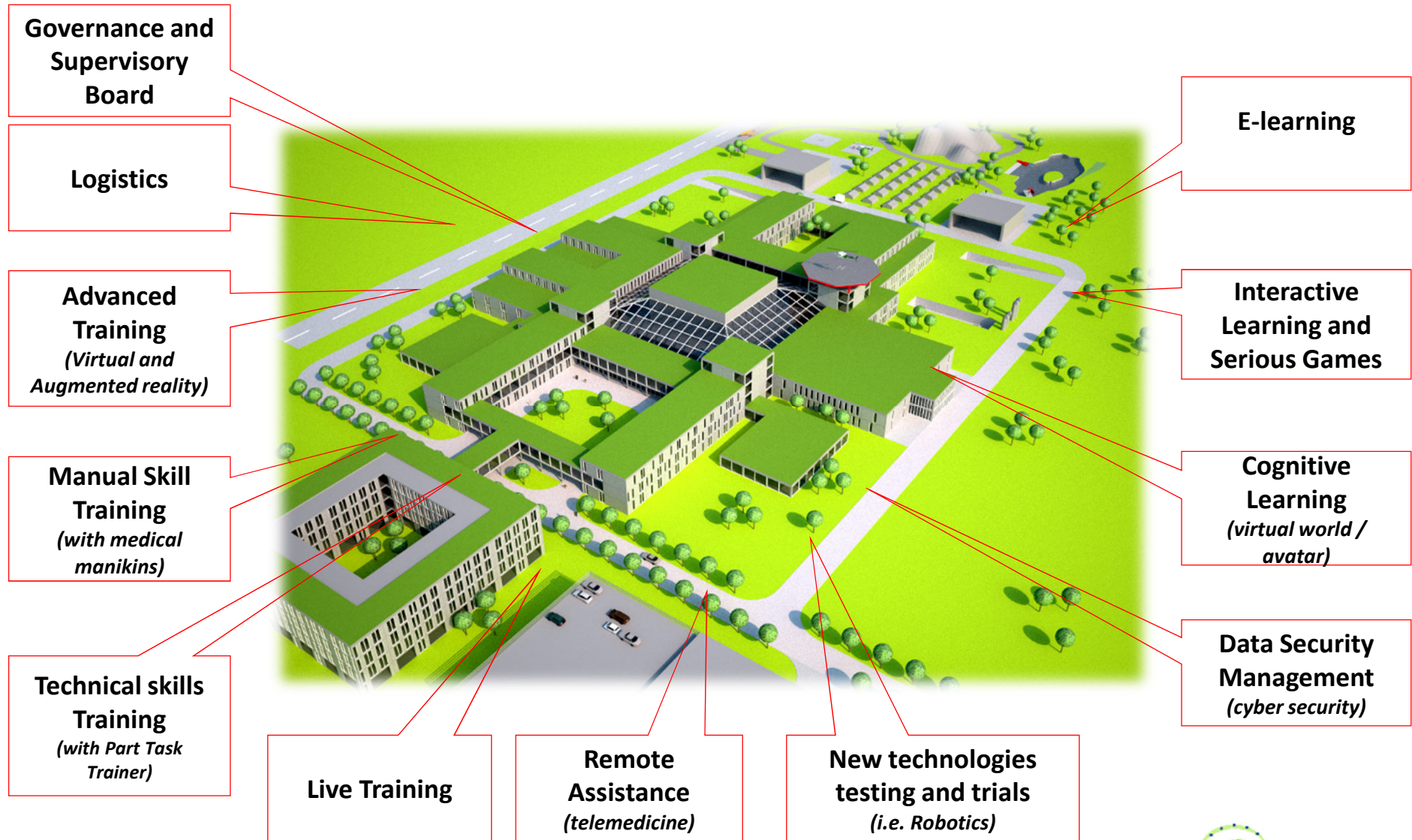
Future Challenges - Infrastructures



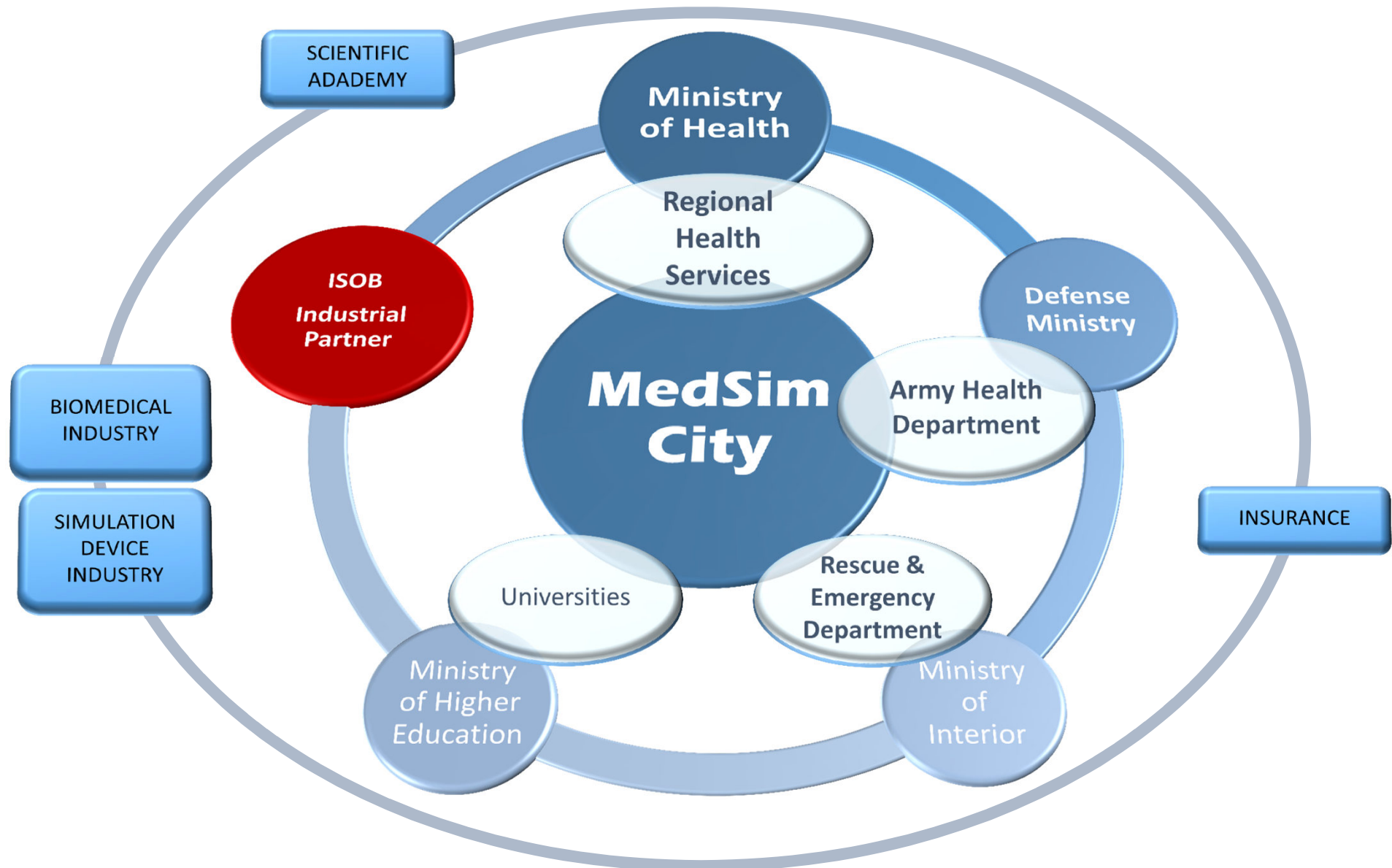
The operating room, like an aircraft or a spaceship, is a multidisciplinary environment and therefore simulation tools and training facilities providing INTEGRATED training should be envisioned
The prospect of simulation sites proliferation requires a program of a network of specialized centers



MedSimCity: Training Center Units and Departments



Potential stakeholders





Thanks for your
attention