

# **New Motion Plattform**

**how current developments may improve simulator training effectiveness**

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**AMST Systemtechnik GmbH**

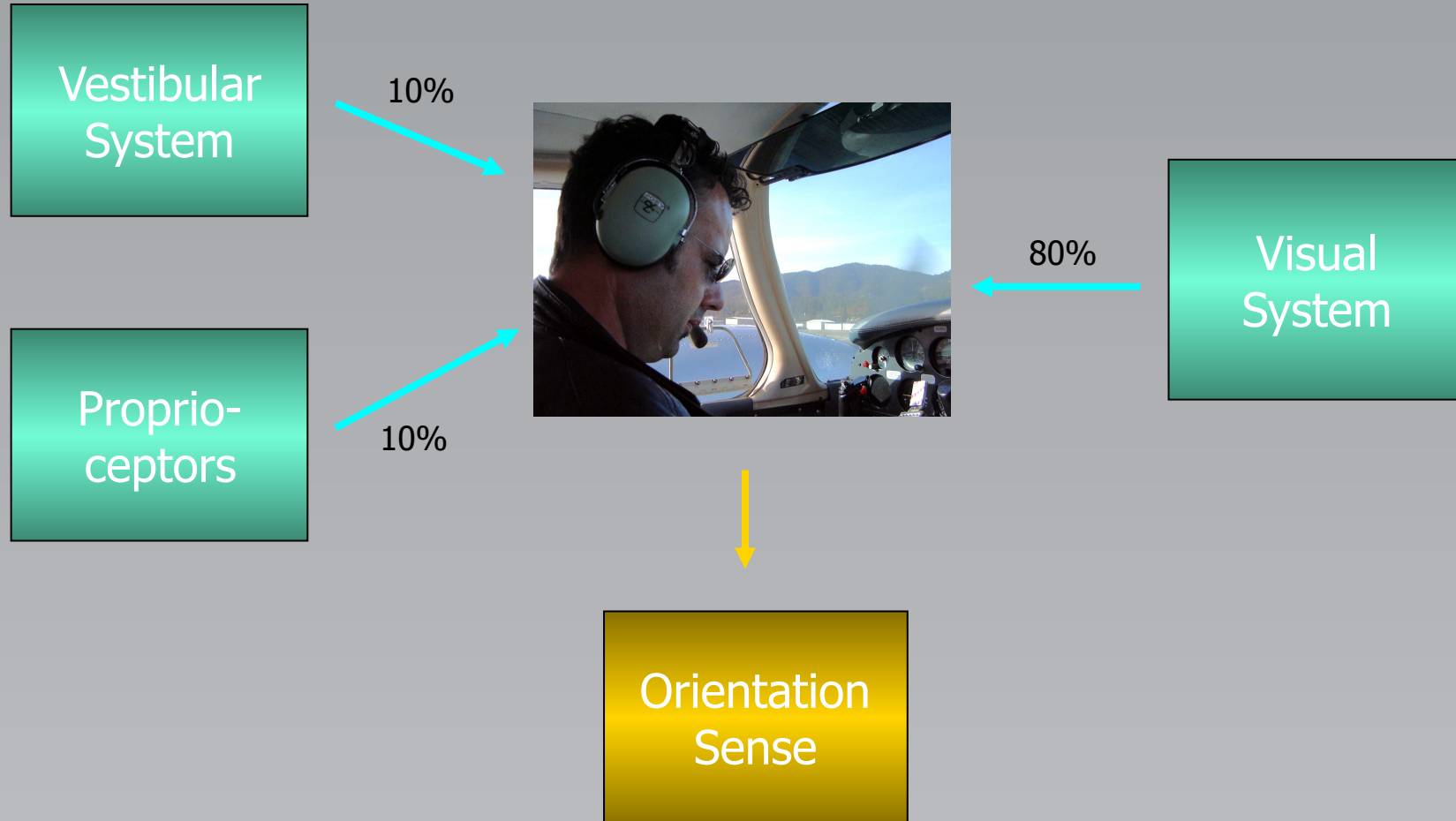
6<sup>th</sup> European Flight Test Safety Workshop  
19<sup>th</sup>-21<sup>st</sup> November 2012  
Salzburg



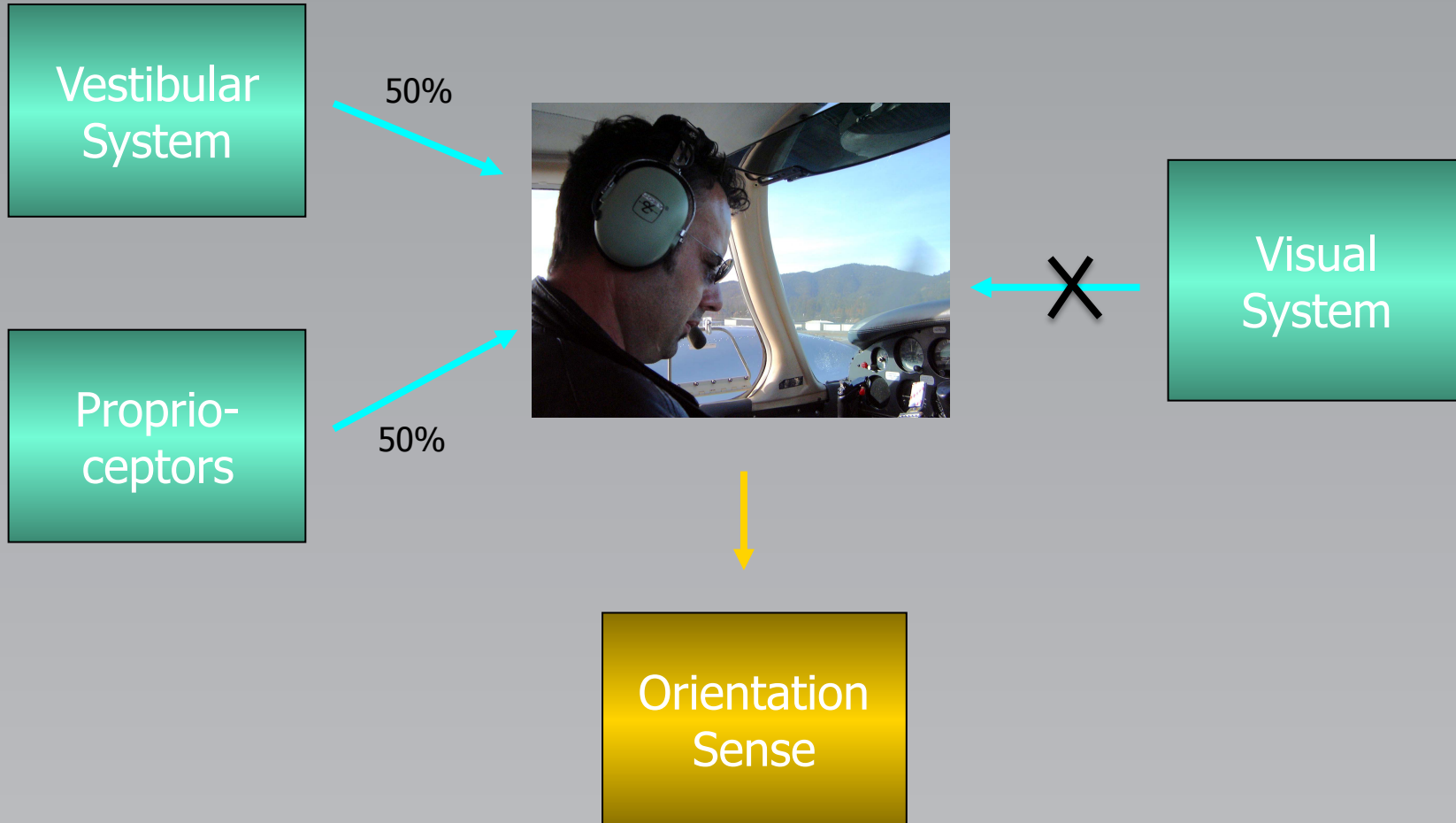
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# Principle of spatial orientation



# What if visual reference fails?





**Motion is getting more and more important !!!**

# State-of-the-Art simulator design for commercial airliner market



source: internet - LFT

- Type-specific twinseater cockpit
- Realistic aircraft control behavior
- High fidelity visual system
- Realistic sound generation
- Integrated training capabilities
- **Limited motion capabilities**
  - **Limited attitude control**
  - **No sustained G-Forces**

# State-of-the-Art simulator design for military applications



source: AMST

- Type-specific cockpit
- Realistic aircraft control behavior
- High fidelity visual system
- Realistic sound generation
- Integrated training capabilities
- **No motion capabilities**

# State-of-the-Art simulator design for driving applications

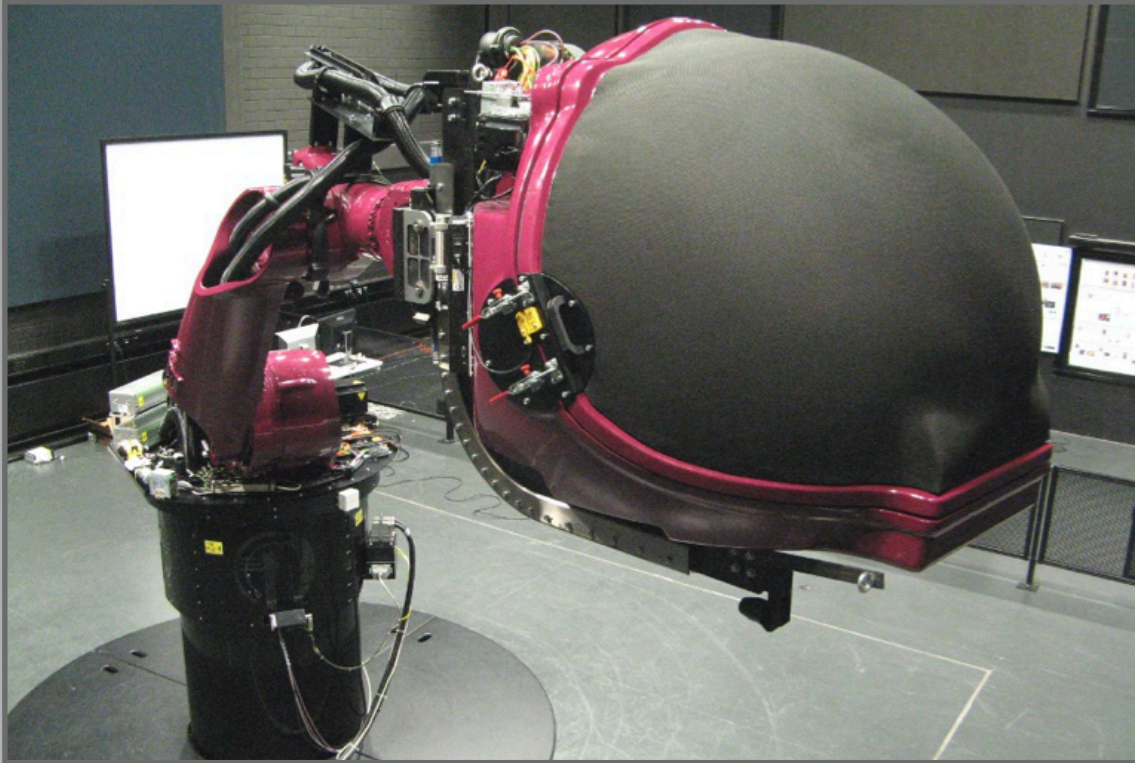


source: internet - Daimler

- Type-specific car-cockpit
- Realistic car control behavior
- High fidelity visual system
- Realistic sound generation
- Integrated training capabilities
- **Limited motion capabilities**
  - **Limited attitude control**
  - **No sustained G-Forces**



# Simulator design for research applications



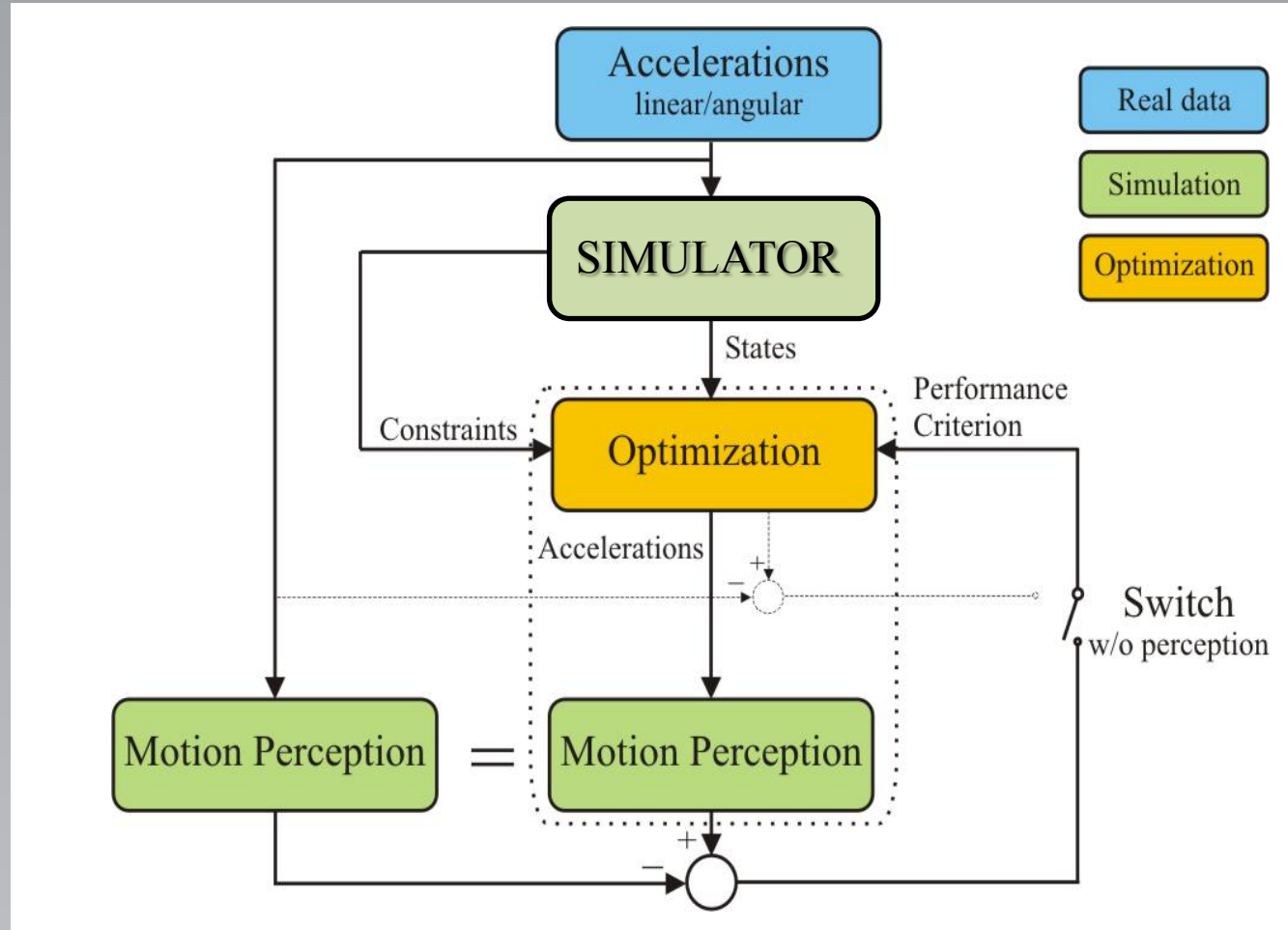
source: MPI

- Generic cockpit
- Designed for gaining knowledge in human motion perception
- High fidelity visual system
- Realistic sound generation
- Enlarged motion capabilities

# How to improve motion perception in sim's?

**Adequate motion filtering!!!**

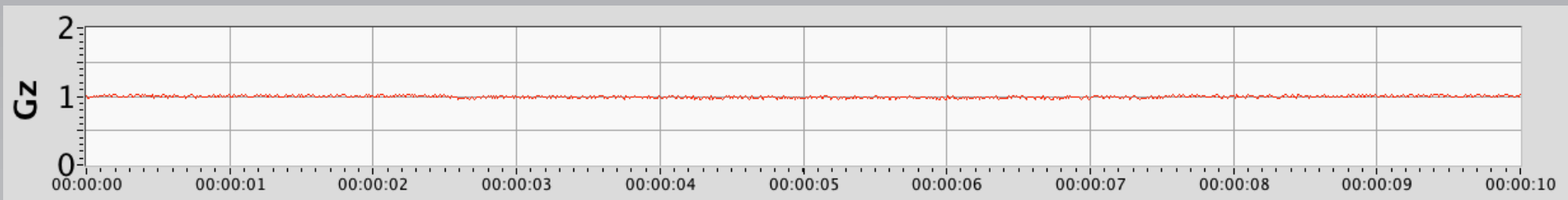
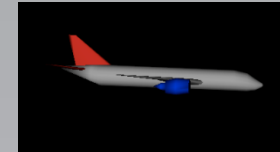
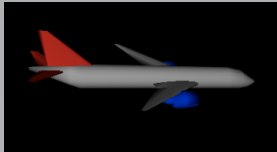
# Motion filter design





## Scenarios beyond 'normal flight'

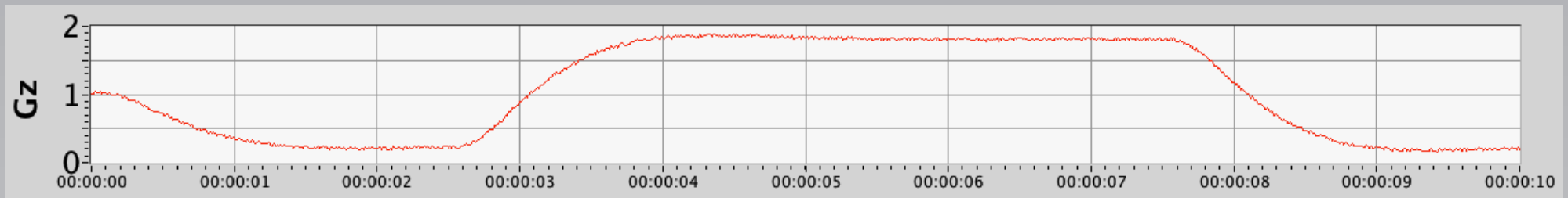
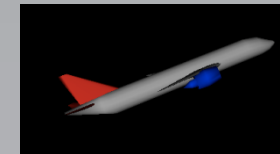
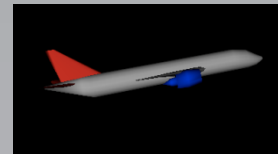
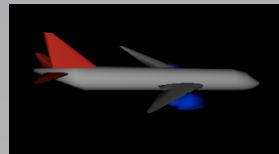
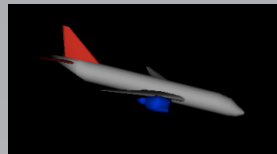
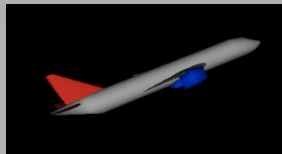
## What are current simulator needs?



straight and level flight.... and...

# Most demanding developments in simulator design

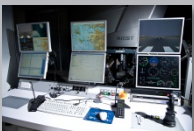
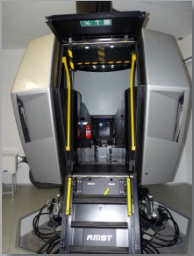
## What are current simulator needs?



More advanced procedures

## Improved Motion Platforms!!!

# Spatial Disorientation Trainer





# High 'G' Training Centrifuge - Overview



**One step further**

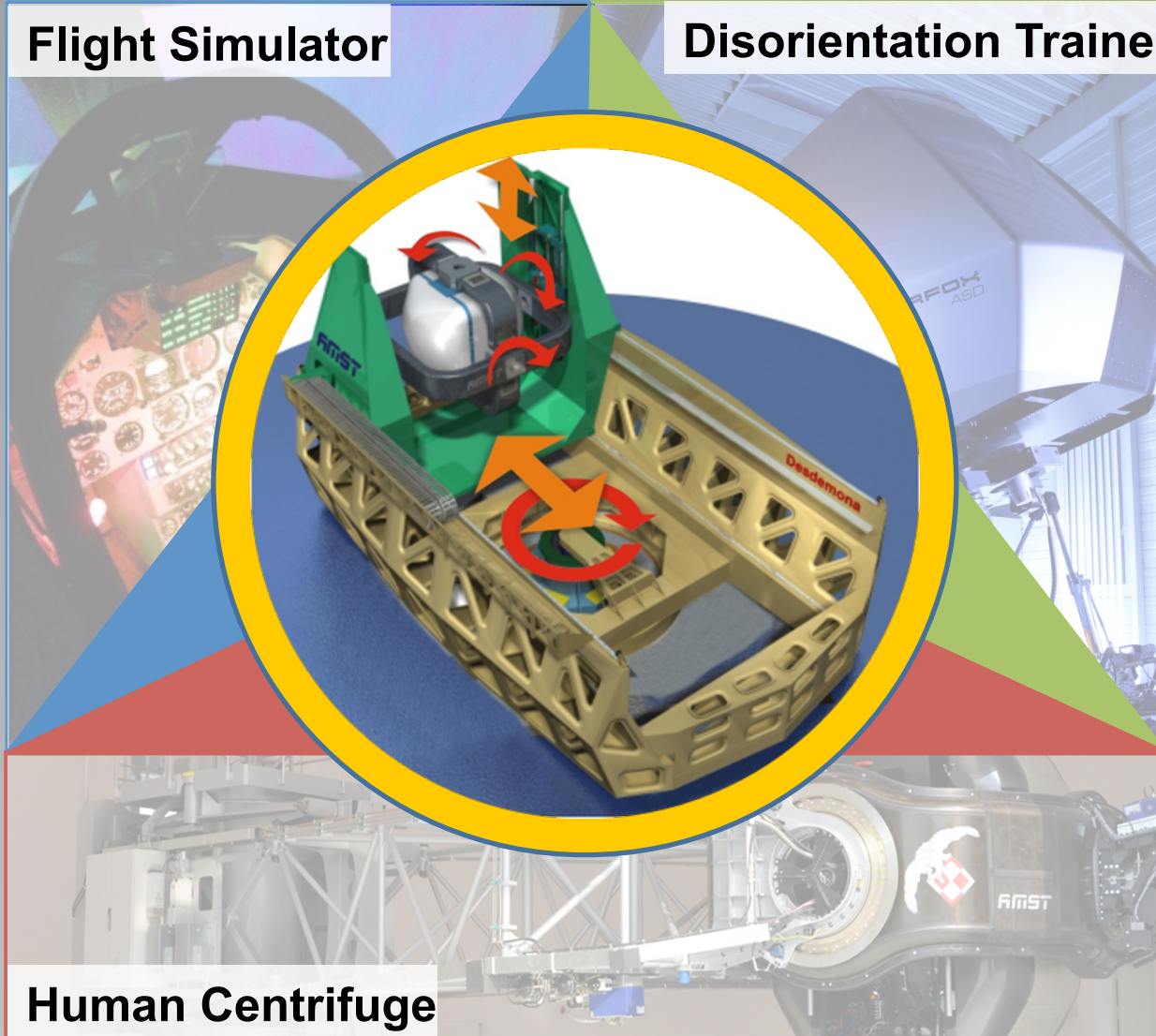
# **Next Generation Platforms!!!**



# Next generation motion platforms

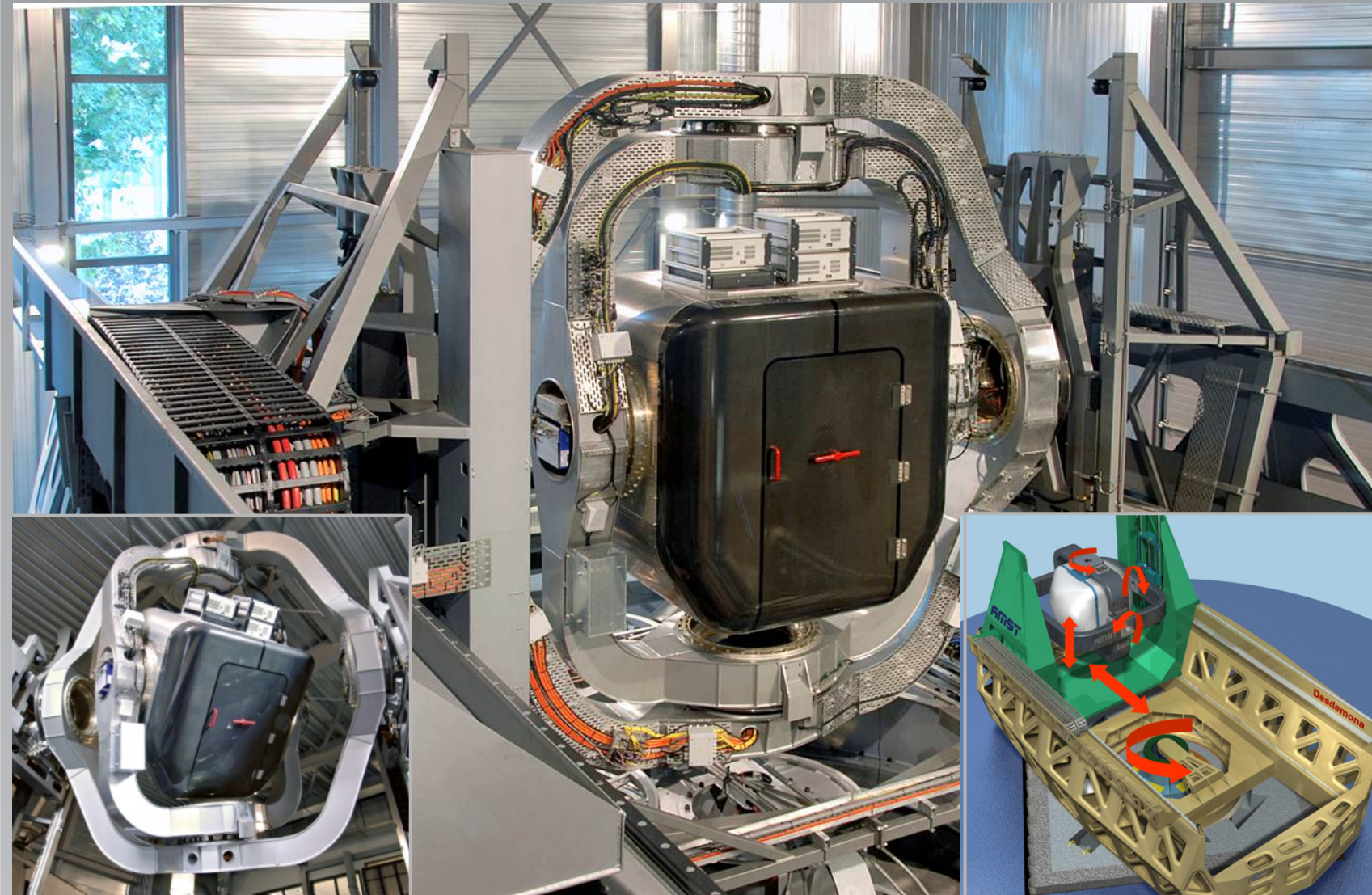
**Flight Simulator**

**Disorientation Trainer**



**Human Centrifuge**

# DESDEMONA



- Full attitude control
- Sustained 3G in any direction
- Modular design
- Exchangeable cockpits
- High fidelity visual system 120x40deg
- Realistic sound generation
- Highly adaptable and reconfigurable

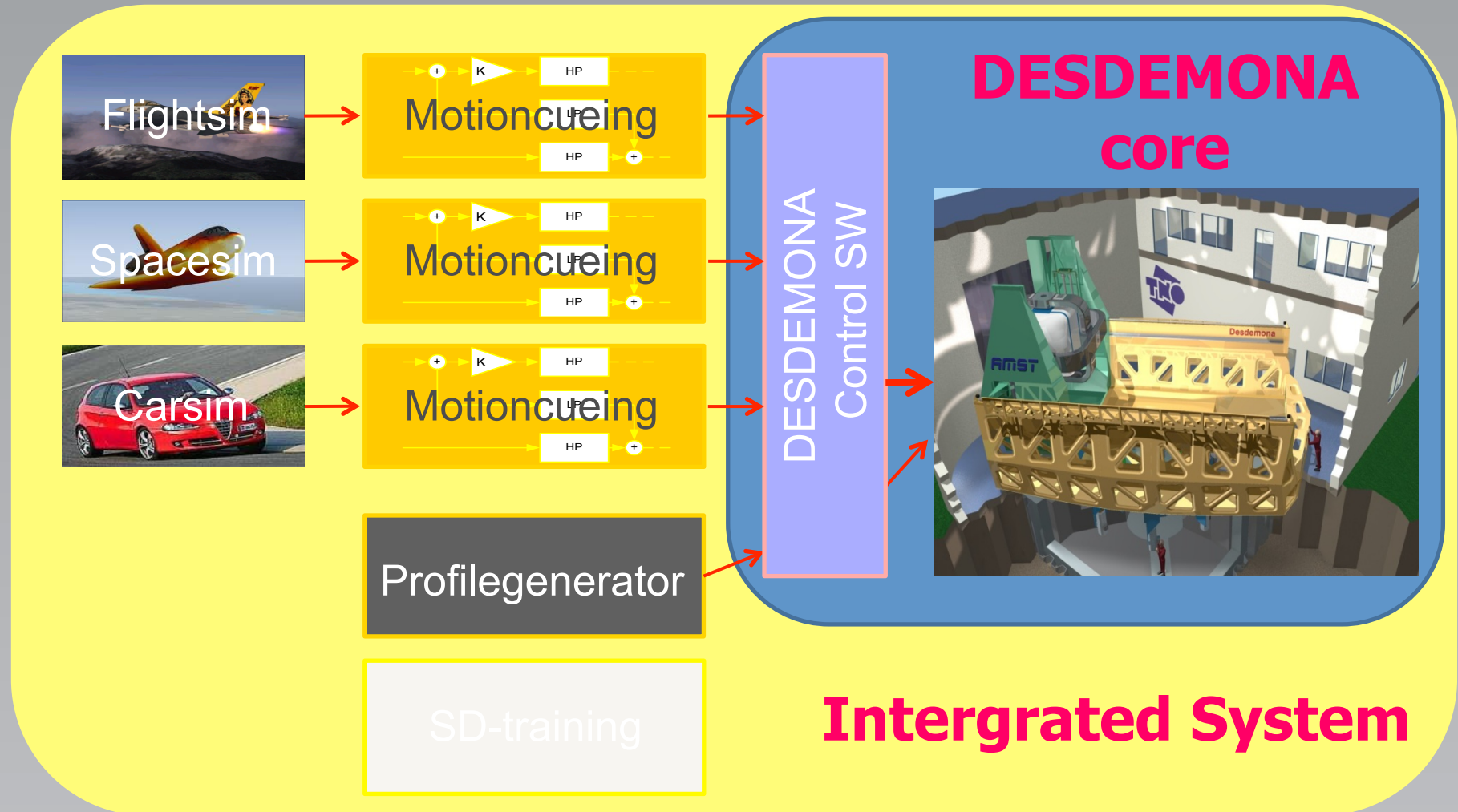


# DESDEMONA performance

	$G_z$	$G_x, G_y$	dG/dt
performance	3 G	3 G	1 G/s

	Position	Velocity	Acceleration
Main arm rotation	$\infty$	2,7 rad/s	0,7 rad/s <sup>2</sup>
Linear track	8m	3,0 m/s	0,5 g
Heave	2m	2,0 m/s	0,5 g
Roll	$\infty$	3,0 rad/s	1,5 rad/s <sup>2</sup>
Pitch	$\infty$	3,0 rad/s	1,5 rad/s <sup>2</sup>
Yaw	$\infty$	3,0 rad/s	1,5 rad/s <sup>2</sup>

# DESDEMONA architecture

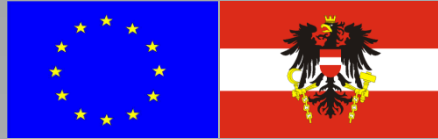


# DESDEMONA NG



- Full attitude control
- Sustained high-G
- adequate G-onset
- High agility
- Modular design
- Exchangeable cockpits
- High fidelity visual system  
240x120deg
- Realistic sound generation
- Highly adaptable and reconfigurable

## F-16 inverted deep stall



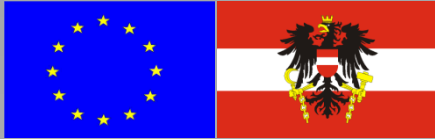
**Departing at 08:00 in front of Hotel !!!**

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**THANK YOU FOR YOUR ATTENTION**

Any Questions?