Technische Universität München

TUM-IAS Focus Research Group: Safe Adaptive Dependable Aerospace Systems – ***SADAS***

IAS TUM Institute for Advanced Study

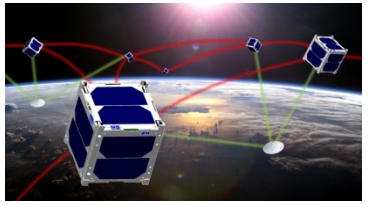
"Safe, highly reliable and affordable automation for aerospace systems"

Challenges: Extreme system dynamics/highest safety requirements

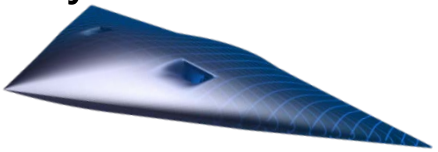
Group Leaders (Key Partners):

Klaus Schilling	| ERC Advanced Grant	(Universität Würzburg, Chair for Robotics & Telematics)
Matthias Heller	| Rudolf Diesel Industry Fellow	(AIRBUS Defence & Space and TUM-IAS)
Gernot Spiegelberg	| Rudolf Diesel Industry Fellow	(Siemens CT and TUM-IAS)
Florian Holzapfel	| Host	(TUM, Chair for Flight System Dynamics)
Naira Hovakimyan	| Alexander von Humboldt Research Awardee	(University of Illinois and TUM/IAS)
	| and Honorary Hans Fischer Senior Fellow	

Main Objectives of the Research Area:



- Adaptive as well as real-time capabilities in order to achieve progress in networked formations of vehicles
- Ranging from human assisted & autonomous systems for single vehicle to control of decentralized, networked, self-organizing multi-vehicle systems
- Comprises adaptive flight envelope protection as well as coordinated mission planning approaches



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(Available) Demonstrator Vehicles in the Team:

Flying Testbed DA-42 NG MPP „Fliegender Erprobungsträger Bayern“ hosted at TUM FSD

Cooperating air and ground vehicles (from Uni Würzburg, Robotics & Telematics)

Experimental Fly-by-Wire Helicopter CHL 450

NetSat: Control of distributed, networked pico-satellites (ERC Advanced Grant)

SAGITTA – Flying Wing UAS (Focus Group Aircraft Stability & Control)

Application: Monitoring of storage areas by air & ground vehicles

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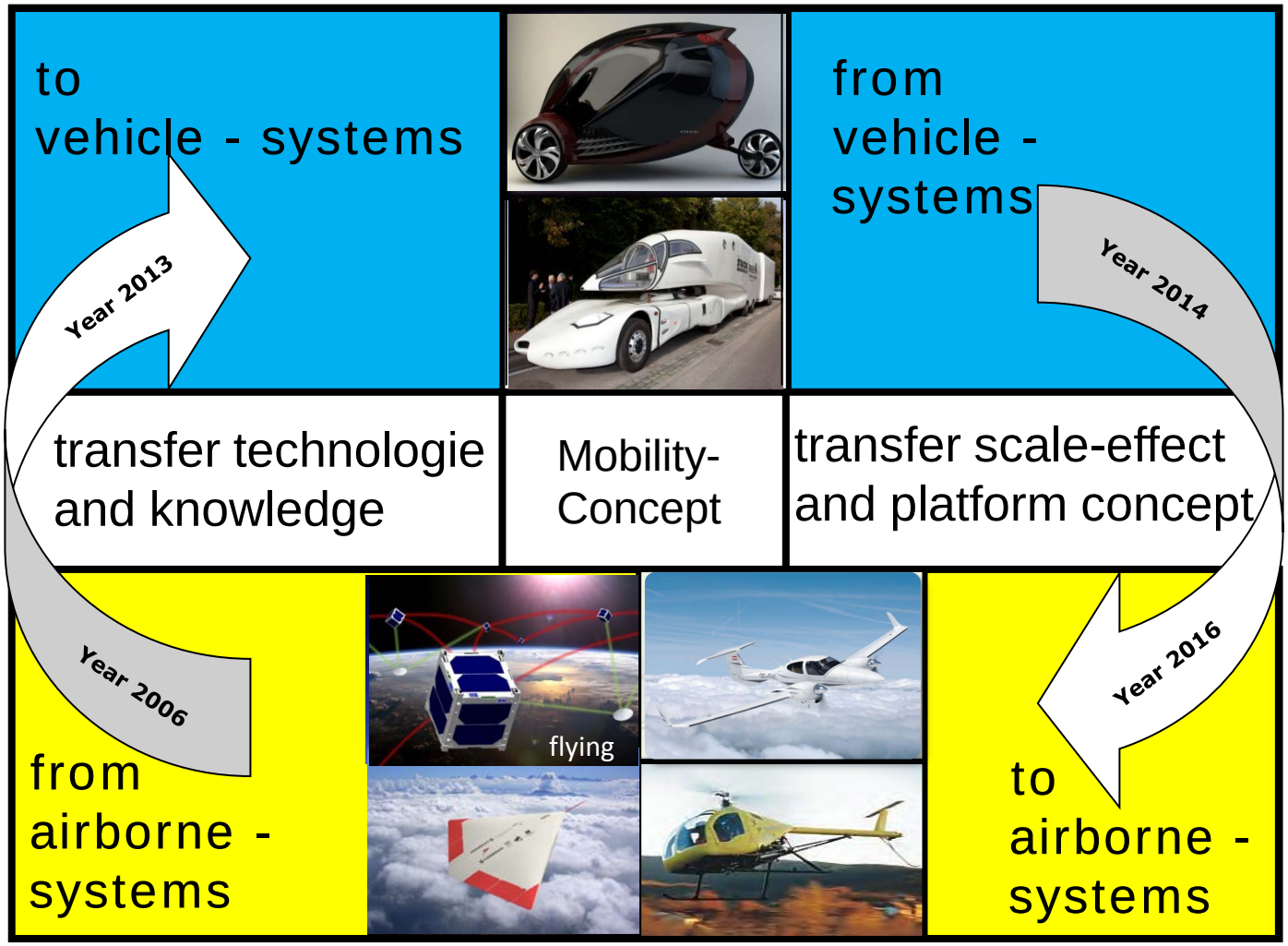
Mission Statement:

"The Main Idea behind!"

State of the Art and Expertise in the Team:

The complementary experiences of TUM-IAS Focus Research Group members will enable to address the key research topics



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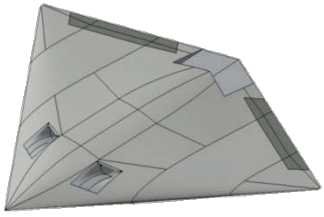
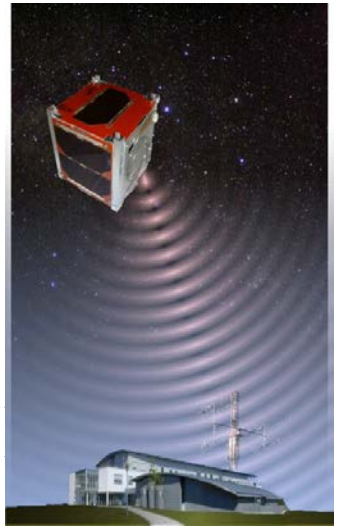


Scientific Emphasis:



- Stability & performance guarantees/measures for complex coupled highly nonlinear dynamic systems (adaptively stabilizing systems, flight envelope protection, safety increase, redundancy concepts, …)
- Networked control of distributed vehicle formations (navigation, supervisory control, ground control integration, real-time adaptation, …
- Self-organizing control of the cooperating vehicles (cooperative navigation, trajectory coordination, mission planning and scheduling)
- Vehicle system topology optimization regarding to communication and data acquisition tasks (ad-hoc networks, DTNs, measurement coordination, 4D-observations, …)