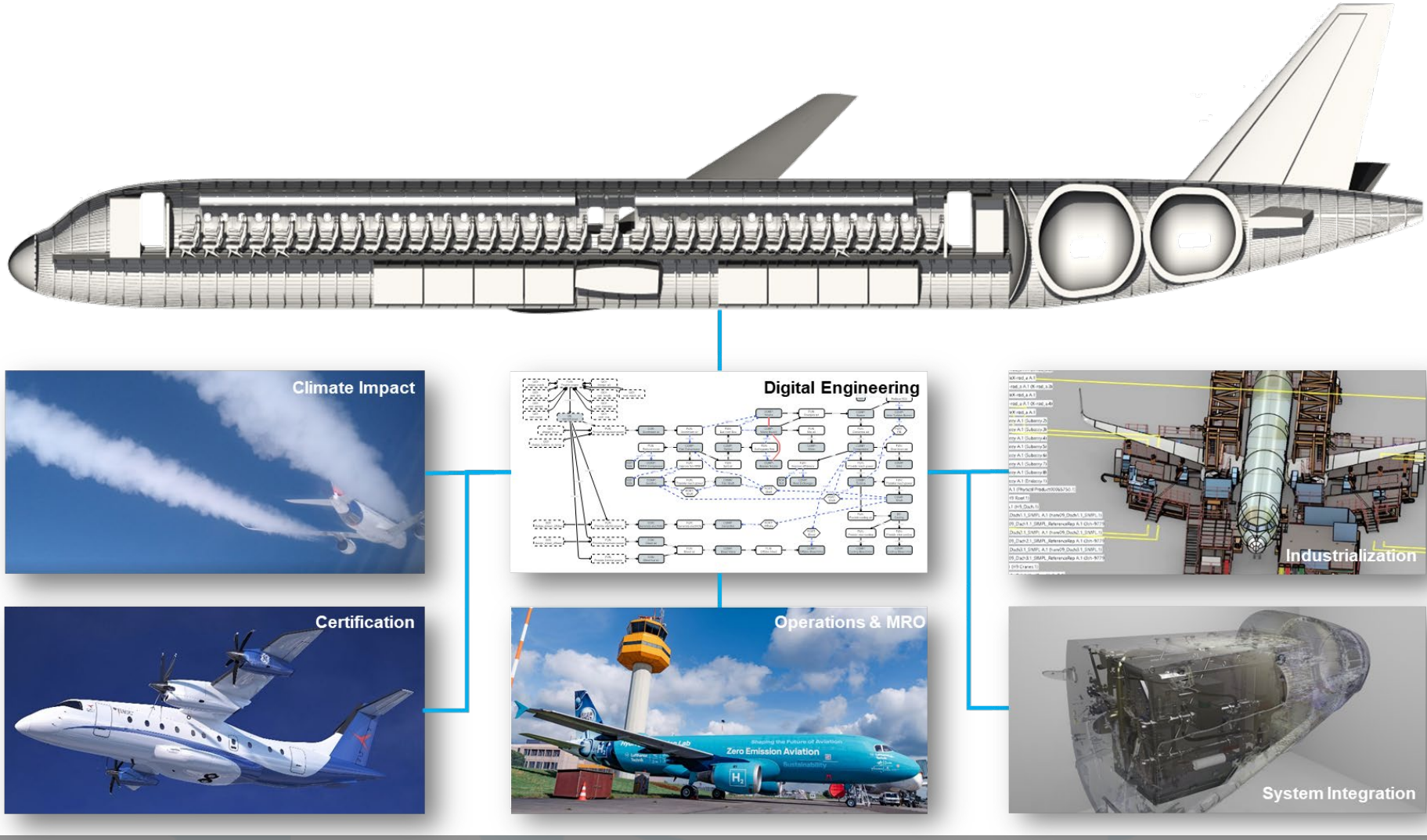
International Council of the Aeronautical Sciences

ICAS Digital Pioneering Initiative



Björn Nagel

Motivation


Climate Impact
Digital Engineering
Industrialization
Certification
Operations & MRO
Zero Emission Aviation
System Integration

DPI Congress Integration



*DPI Session reports on workshop results only → results from DPI collaboration. DPI participants' individual presentations are within regular ICAS program

3rd DPI – 40 Participants

International Council of the Aeronautical Sciences

Aircraft Design & Sustainability

Peter Schmollgruber	ONERA	France
Albert van Heerden	Glasgow Uniersity	UK
Joseph Chan	Cranfield University	UK
Enrico Stragiotti	ONERA	France
Fabrizio Nicolosi	University of Naples	Italy
Agostino de Marco	University of Naples	Italy
Mario Di Stasio	University of Naples	Italy
Javier Ruberte Bailo	German Aerospace Center	Germany
Nicole Viola	Politechnico Di Turin	Italy
Isono Tatsushi	JAXA	Japan

SOS , SE, MBSE

Christopher Jouannet	SAAB Group	Sweden
William Crossley	Purdue University	US
Pina Donelli	German Aerospace Center	Germany
Prajwal Shiva Prakasha	German Aerospace Center	Germany
Ludwig Knöös Franzen	Linkoping University	Sweden
Kristian Amadori	SAAB Group	Sweden
Pina Donelli	German Aerospace Center	Germany
Viola Voith	German Aerospace Center	Germany

Cabin & VR

Tommaso Fadda	University of Bologna	Italy
Kang Yu-Eop	Korea Institute of Industrial Technology	Korea
Joey Vezina	Concordia University	Canada
Christian Hesse	German Aerospace Center	Germany

Digital Design & Integration

Bjoern Nagel	German Aerospace Center	Germany
Ansgar Kirste	RWTH Aachen University	Germany
Bingran Wang	The University of Sydney	Australia
Dries Verstraete	The University of Sydney	Australia
Safa Bakhshi	University of Michigan	US
Trevor Batty	Defence Science and Technology Group	Australia
Laura Mainini	Imperial College	UK
Cees Bil	RMIT	Australia
Jutta Abulawi	HAW – Germany	Germany
Olivia Pinon Fischer	ASDL - Georgia Institute of Technology	US

MRO

Michael Scott	RMIT	Australia
Ann-Kathrin Koschlik	German Aerospace Center	Germany
Wim Verhagen	RMIT	Australia
Nader Sawalhi	Defence Science and Technology Group	Australia
Vlado Kekoc	Defence Science and Technology Group	Australia
Alireza Dadashi	German Aerospace Center	Germany
Olivia Pinon Fischer	ASDL - Georgia Institute of Technology	US
Colin Klien	German Aerospace Center	Germany

During the workshop we wanted to work out

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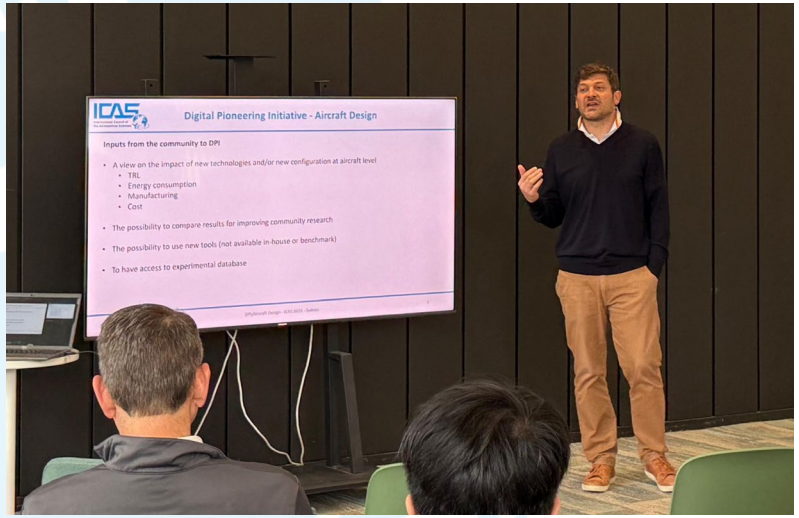
- **What kind of inputs do you need for your research?**
  → What kind of inputs would you wish to get from partners?
- **What kind of outputs can you provide to partners?**
  → How can your work / your results be made available for partners?
- **Which are the scientific challenges you working on?**
  → What kind of research partners would be matching?
- **Modes of collaboration?**
  → Open Source? Public Domain? License? As a service? Projects? Commercial?
- **Way forwards**
  → How can we align our work? How can we profit from ICAS?

3rd DPI – 10-11 Sept. 2026, University of Sydney

International Council of the Aeronautical Sciences













ICAS Session 2.12 - DPI Workshop Results

International Council of the Aeronautical Sciences

- **PIONEERING THE EXCHANGE OF KNOWLEDGE IN AIRCRAFT DESIGN**
  - Introduction to DPI, Björn Nagel (DLR, LiU)
  - Aircraft Design, Peter Schmollgruber (ONERA)
- **DIGITAL ENGINEERING IN THE AGE OF AI AS BASIS FOR SYSTEM OF SYSTEMS ENGINEERING**
  - Digital Engineering Methods, Jutta Abulawi (HAW Hamburg)
  - System of Systems, Christopher Jouannet (Saab, LiU), Prajwal Shiva Prakasha (DLR)
- **VR FOR CABIN DESIGN AND CERTIFYING DIGITAL MRO MEASURES**
  - Virtual Reality & Cabins, Tommaso Fadda (Uni Bologna)
  - Maintenance, Repair & Overhaul, Ann-Kathrin Koschlik (DLR), Michael Scott (RMIT Melbourne)
- **HYPERSONIC TRANSPORT AND WAY FORWARDS WITH THE ICAS DIGITAL PIONEERING INITIATIVE**
  - Super- / Hypersonic transport, Nicole Viola (Poli Torino)
  - ICAS DPI Next steps, Björn Nagel (DLR, LiU), Olivia Pinon-Fischer (Georgia Tech)

Digital Pioneering Initiative
Aircraft Design



Inputs from the Aircraft Design Community

- The dedicated sessions are a unique opportunity to get information about new technologies and/or new configuration at aircraft level
  - TRL
  - Energy consumption
  - Manufacturing
  - Cost
  - Associated challenges



4.1 Application of Aerodynamics in Design — Track 4 C4.3
Chair(s): Schmollgruber, P. — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

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4.3 Conceptual Design Studies - 2 — Track 4 C4.3
Chair(s): Nicolosi, F. — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

14. Sep 26	16:30	16:55	4.3.1 0296	**FLIGHT TESTING OF A HIGH-ALTITUDE UNCREWED AND SOLAR POWERED PLATFORM HEAVIER THAN AIR**	F. Nikodem[1], C. Weiser[1], [1]DLR e.V., Germany **Presenter:** Christian Weiser, DLR e.V.
14. Sep 26	16:55	17:20	4.3.2 0420	**CONCEPTUAL DESIGN OF A MIDDLE-OF-THE-MARKET AIRCRAFT FOR EDUCATIONAL PURPOSES**	A.S.J. van Heerden[1], N.M. Ahamad[1], J.F. Castiblanco Aponte[1], J. Gibbs[1], I.J. Taylor[1], [1]University of Glasgow, United Kingdom
14. Sep 26	17:20	17:45	4.3.3 0931	**INVESTIGATING A STABLE LIFTING FUSELAGE FOR A TWO SEAT SAILPLANE OF THE GULL WING CONFIGURATION**	B.-B. Huyssen[1], D. Fenthum[1], J. Huyssen, CSIR, South Africa; [1]University of Pretoria, South Africa
14. Sep 26	17:45	18:10	4.3.4 0960	**PROPOSING A STABLE LIFTING FUSELAGE FOR AN AIRLINER OF THE IDEAL AIRCRAFT CONFIGURATION**	Joachim Huyssen, CSIR, South Africa; Eduard van Heerden, University of Pretoria, South Africa

4.2 Conceptual Design Studies - 1 — Track 4 C4.3
Chair(s): Lott, M. — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

14. Sep 26	13:30	13:55	4.2.1 0447	**PERFORMANCE COMPARISON BETWEEN PASSENGER AIRCRAFT WITH NOVEL PROPULSION SYSTEMS AT CONCEPTUAL DESIGN LEVEL**	J.L.C Chan[1], H Smith[1], [1]Cranfield University, United Kingdom
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14. Sep 26	14:20	14:45	4.2.3 0926	**SUPPORTING THE REGULATORY COMMUNITY SHAPING THE FUTURE OF SUSTAINABLE HIGH-SPEED CIVIL AVIATION: THE ESATTO FRAMEWORK**	N. Viola[1], R. Fusaro[1], D. Feretto[1], [1]Politecnico di Torino, Italy
14. Sep 26	14:45	15:10	4.2.4 0688	**PRELIMINARY SIZING METHODOLOGY FOR HYBRID-ELECTRIC PROPULSION SYSTEM IN CARGO AIRSHIPS**	S. Trivedi[1], A.K. Munshi[1], R.S. Pant[1], [1]Indian Institute Technology Bombay, India

4.4 Hydrogen in Design — Track 4 C4.3
Chair(s): Verstraete, D. — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

15. Sep 26	08:55	09:20	4.4.1 0073	**DESIGN AND INVESTIGATION OF A SHORT-TO-MEDIUM-RANGE AIRCRAFT WITH LIQUID HYDROGEN AND SAF MULTI-FUEL PROPULSION**	B. Türkyilmaz[1], M.G. Kolb[1], X. Zhao, Chalmers University of Technology, Sweden; M. Hornung[1], [1]Bauhaus Luftfahrt e.V., Germany
15. Sep 26	09:20	09:45	4.4.2 0213	**CHALLENGES AND SOLUTIONS FOR LIQUID HYDROGEN-POWERED UAVS: REGULATIONS AND CASE STUDY INSIGHTS**	B. Legrand[1], N. Gavrilovic[1], [1]Département Aérodynamique, Energie et Propulsion, ISAE-SUPAERO, France
15. Sep 26	09:45	10:10	4.4.3 0333	**ADVANCED MODELING AND ANALYSIS OF A LIQUID HYDROGEN SHORT-MEDIUM RANGE AIRCRAFT CONCEPT FOR 2035**	M. Kotzem[1], J. Hälsy[1], V. Kniewall Peters, Hamburg University of Technology (TUHH), Germany; P. Schatrow[1], S. Wöhler[1], [1]German Aerospace Center (DLR), Germany
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4.5 Application of Advanced Propulsion Concepts — Track 4 C4.3
Chair(s): . — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

15. Sep 26	11:00	11:25	4.5.1 0319	**INTEGRATION OF A SOLID OXIDE FUEL CELL PROPULSION SYSTEM: A TECHNOLOGY DEVELOPMENT GOAL FOR REGIONAL AIRCRAFT**	N. Schneiders[1], D. Keller[1], A. Link[1], T. Burschyk[1], G. Atanasov[1], [1]German Aerospace Center (DLR), Germany
15. Sep 26	11:25	11:50	4.5.2 0360	**MULTIDISCIPLINARY DESIGN EXPLORATION OF HYBRID-ELECTRIC REGIONAL AIRCRAFT**	S. Trepiccione[1], G. Melone[1], F. Nicolosi[1], G. Piscopo, Leonardo, Italy; M. Di Stasio[1], [1]UNINA, Italy
15. Sep 26	11:50	12:15	4.5.3 0673	**EXPLORATION OF ALTERNATIVE PROPULSION ARCHITECTURES FOR BUSINESS AVIATION**	M. Bouchard[1], M. Bashir[2], D. Rancourt[1], S. Liscouët-Hanke[2], F. Sirois, Polytechnique Montréal, Canada; S. Lloyd[2], A. Tfaily[3], M. Mark[3], R. Freer, Pratt & Whitney Canada, Canada; J. Morlot, Calogy Solutions, Canada; [1]Université de Sherbrooke, Canada ,[2]Concordia University, Canada ,[3]Bombardier, Canada **Presenter:** David Rancourt, Université de Sherbrooke
15. Sep 26	12:15	12:40	4.5.4 0062	**AERODYNAMIC EFFECTS OF DISTRIBUTED PROPULSION WING CONFIGURATION PARAMETERS**	K. Wang[1], Z. Zhou[1], J. Wang[1], [1]Northwestern Polytechnical University, China **Presenter:** Jiaxu Wang, Northwestern Polytechnical University

4.6 UAVs and Advanced Air Mobility — Track 4 C4.3
Chair(s): Kanazaki, M. — 01.2 - Aircraft Design and Integrated Systems (Use cases and Applications)

15. Sep 26	13:40	14:05	4.6.1 0636	**ENDURANCE EVALUATION OF DIFFERENT UAV CONFIGURATIONS AND POWERTRAIN ARCHITECTURES**	A. Orgiu, ISAE-SUPAERO, Concordia University, Canada; S. Delbecq, ISAE-SUPAERO, France; J. Liscouët, Concordia University, Canada
15. Sep 26	14:05	14:30	4.6.2 0801	**COMMON RESEARCH MODELS FOR SMALL UNCREWED AERIAL VEHICLES**	J. Rasines Mazo[1], B. Van Magill[1], D. Verstraete[1], [1]The University of Sydney, Australia **Presenter:** Dries Verstraete, The University of Sydney
15. Sep 26	14:30	14:55	4.6.3 0594	**DESIGN AND TESTING OF A BUOYANT UAV FOR AGRICULTURAL SURVEILLANCE**	P.P. Kapoor[1], R.S. Pant, IIT Bombay, India; M. Abdelrahman[1], D. Mohd-Nasir, University of Sheffield, United Kingdom; M.S. Ismail[1], [1]University of Hull, United Kingdom
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Inputs from the Aircraft Design Community

- This information enables
  - The comparison of assumptions
  - The comparison of results
  - The use of new-tools for benchmark
  - The use of new-tools not available in-house
  - The access to experimental database (RTO, Academia)

➔ Improving State-of-Art



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DPI support to the Aircraft Design Community

- WS discussion focused on a first simple but concrete action
- To set up an Aircraft Design Digital Library growing after each conference
  - To facilitate access to this SoA
  - To better identify novel topics for research
  - To provide recommendations for paper (including synthesis tables)
  - To strength the ACD community
- Added value wrt. AI tools
  - DPI expertise
  - Author view



DPI support to the Aircraft Design Community

- How it would looks like

Filters

Mission									
GA	□	Regional	□	SMR	□	LR	□	Hypersonic	□
Military	□	UAM	□	BJ	□	UAV	□	Supersonic	□

Configuration									
Cantiliver	□	SBW	□	BWB	□	Boxwing	□	Waverider	□

On-board Energy for propulsion									
Kerosene / SA	□	H2	□	Battery	□	LNG	□		

Technologies									
Aerodynamic	□	Structure	□	Propulsion	□	Flight controls	□	On-board Systems	□

Level of fidelity									
	Low	□	medium	□	high	□			

Reference aircraft									
	Yes	□			No	□			

Objectives									
Energy	□	Emissions		□	Cost	□	RAMS	Certification	□

Papers

PERFORMANCE COMPARISON BETWEEN PASSENGER AIRCRAFT WITH NOVEL PROPULSION SYSTEMS AT CONCEPTUAL DESIGN LEVEL
J.L.C Chan[1], H Smith[1]; [1]Cranfield University, United Kingdom

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N. Viola[1], R. Fusaro[1], D. Feretto[1]; [1]Politecnico di Torino, Italy

PRELIMINARY SIZING METHODOLOGY FOR HYBRID-ELECTRIC PROPULSION SYSTEM IN CARGO AIRSHIPS
S. Trivedi[1], A.K. Munshi[1], R.S. Pant[1]; [1]Indian Institute Technology Bombay, India

Database

-WTT
-Structural tests



Next Steps

- Gather feedback (don’t hesitate to contact us !)
- Go through ICAS 2026 papers to identify relevant papers
- Contact Authors for agreement (paper, data, ….)
- Generate a first prototype of the Aircraft Design Digital Library (Name?)
- Organize the next DPI meeting (can be outside ICAS)
- Expand the initiative to other conferences
- Exchange with industry to ensure transition of knowledge



Thank you !


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