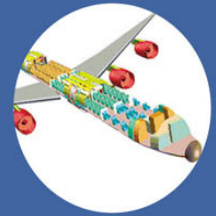


Roadmap for future Research

FORUM 3

Value
Improvement through a
Virtual
Aeronautical
Collaborative
Enterprise



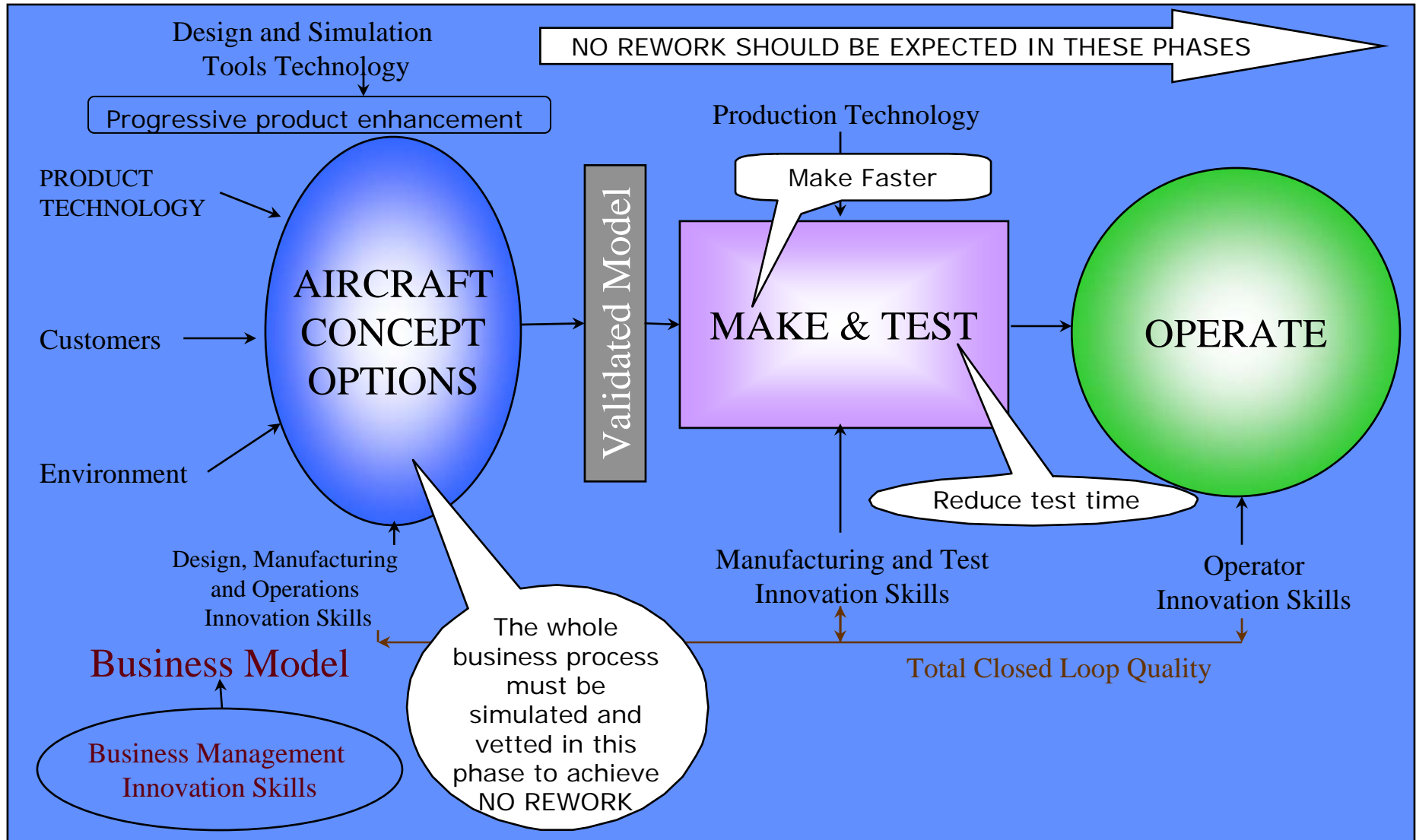
VIVACE

Design Together,
Gain Together

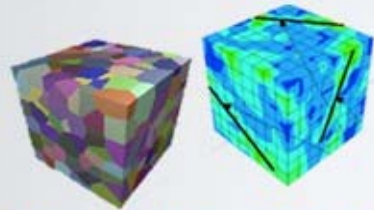
Philippe HOMSI
AIRBUS



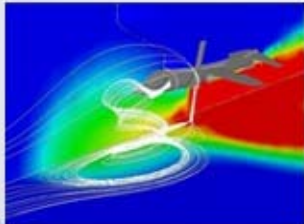
Business Benefits



Industry needs: **Rolls Royce** keynote speech



Micro Modelling of Slip Bands in Material Grain Structure



HYDRA Hot Gas Ingestion Analysis



Hybrid Fan Blade Off Analysis

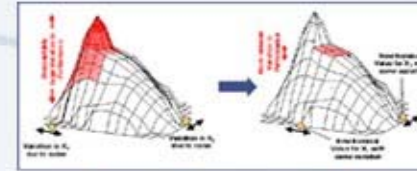
Rolls-Royce proprietary data



SC03 Modelling of Material Non-linearity to Support NLC



Visco Fill Blisk Damping

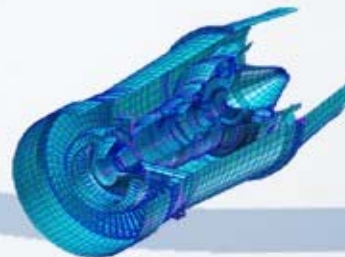


Robust Design (DfPE)

- Reduced programme risk by improving Prelim. Design Methods
- Reduced programme timescale by design/analysis integration
- Reduced programme cost by replacing test by simulation

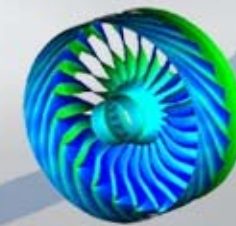


Design Rationale Editor (DRed)



VIVACE Prelim, Modelling, Optimisation, Robust Design, Test Strategy and Model Update

Design Structure Matrix (DSM)



HYDRA Buzz-Saw Noise Analysis



Industry needs: **Thales** keynote speech

- ✓ Increased functional complexity of systems
- ✓ Interdependence of subsystems



- ✓ A “requirement management approach” is no longer viable
- ✓ System design must be architecture-driven
- ✓ Functional view of architecture is of primary importance



- ✓ A common language must be set-up across industrial partners for addressing functional view : the “**shared functional model**”

- **Need to share assets in a multi-company collaborative approach (seamless work organisation)**



Industry needs: **Airbus** keynote speech

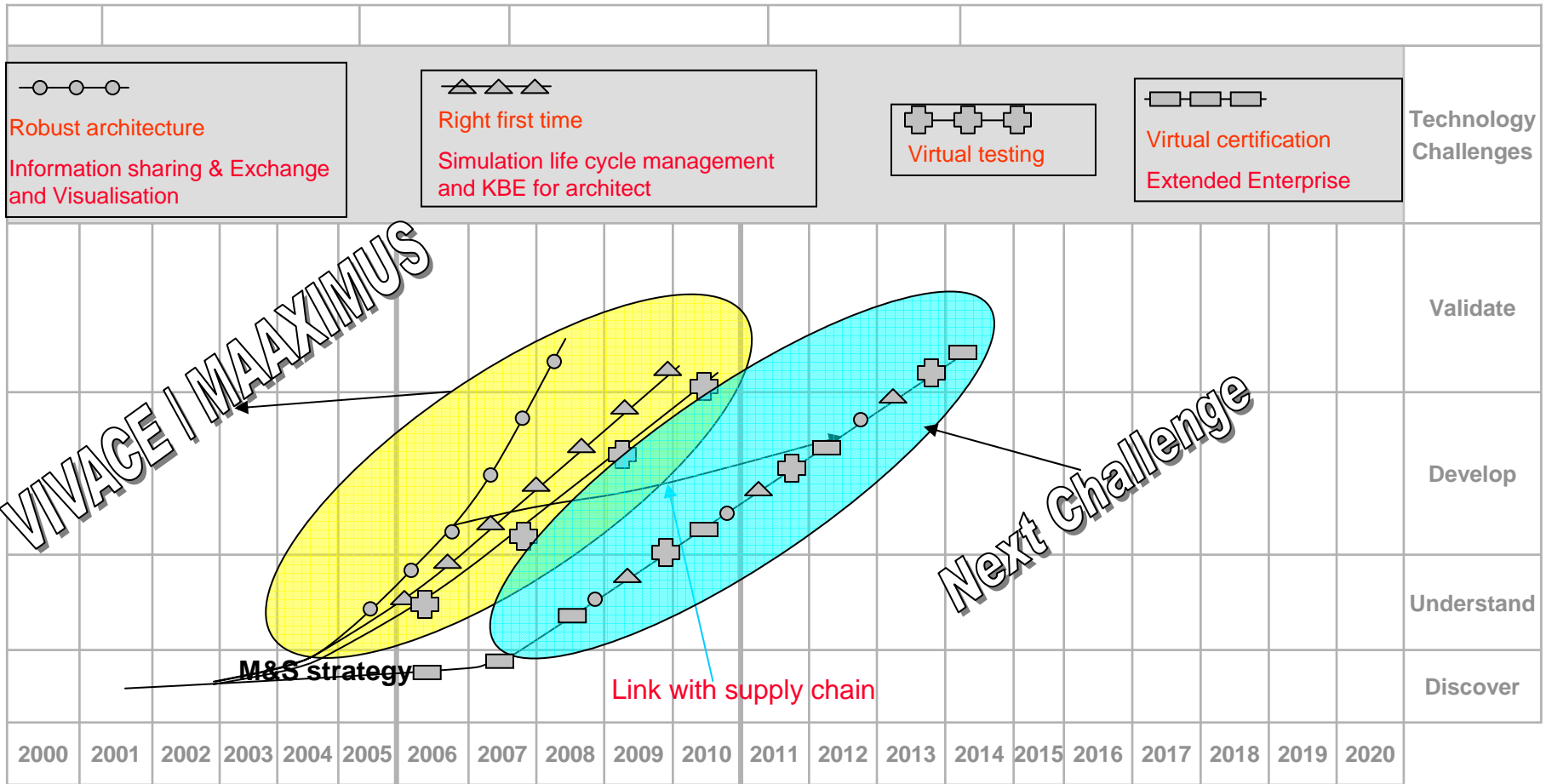
Business capabilities: Top priority orientations

- Faster, more robust decision in multidisciplinary and Extended Enterprise
- Learning, Flexible and agile Engineering
- Mastered Functional & Behavioural Digital Aircraft - Model based Engineering
- Increase use of simulation at any stage of the design phases
- Virtual testing and “software” Bird to improve certification





Roadmap - Virtual aircraft & Extended/Virtual enterprise



Discipline and component level
Process based

Subsystem and aircraft level
Model based



Modelling, Simulation & Collaboration: Next Challenges

Value Generation - Value Generation - Value Generation - Value Generation

More analysis at aircraft and component level to eliminate risk early in the design process – **“Robust Prelim Design”**

More sophisticated, multi-physics analysis to accurately predict component and functional behaviour e.g. energy, performance, mechanical integrity, ... – **“Virtual product”**

Fixed design, probabilistic analysis for service and aftermarket assessment of cost – **“Product Life-Cycle Analysis”**

Behavioural Digital Aircraft

Linked to PLM

Use of analysis based optimisation and robust design to enable rapid definition at aircraft and component level – **“Design by Analysis”**

Analysis based test strategy, planning & correlation to reduce the need for repeat testing – **“Virtual Test”**

Certification based on analysis, simulation & modelling – **“Virtual Certification”**

Value Generation - Value Generation - Value Generation - Value Generation



Conclusion

➤ **VIVACE has built the Virtual product foundation.**

Innovative methods have been created, validated and are currently being industrialised and deployed within the business

➤ **VIVACE has built Virtual enterprise foundation.**

Innovative technologies have been created, validated, and are currently being industrialised into software vendors' product lines

➤ **VIVACE Consortium has developed a strong and robust approach to address large and complex issues**

➤ **We now have from the European aeronautic industry (Airframe, Engine and Equipment) consistent views of the next challenges**



Conclusion

All conditions are gathered to develop:

The Behavioural Digital Aircraft

For

Integrated Product Teams working in virtual “plateaus”, involving multi-disciplinary teams collaborating thanks to an overall aircraft model architecture covering: preliminary design, design, testing and certification