

*Storyboard
and
Timetable*



VIVACE

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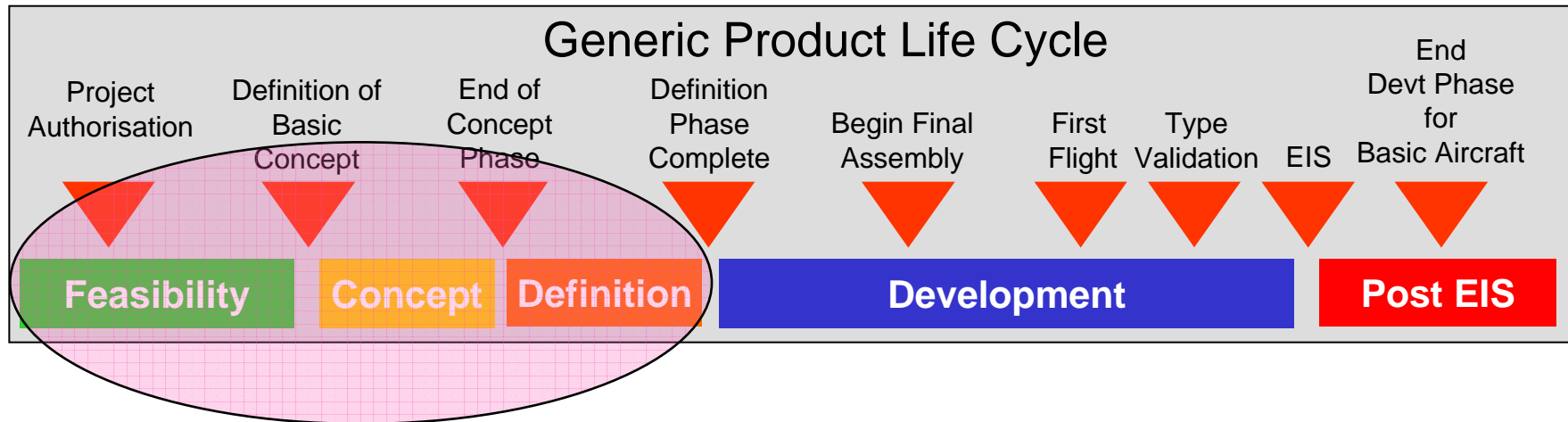


The Storyboard

- To show how the VIVACE project is coherently addressing its goals of:
 - 5% reduction in development lead time and cost for new aircraft design and contribution to a reduction of 30% in lead time for a new/derivative gas turbine engine and to a reduction of 50% in engine development cost*
- An integrated storyboard in which an aircraft supplier “VIVACE” responds to a customer requirement for a new product.
- VIVACE operates as an overall virtual enterprise consortium but has within it a “sub” virtual enterprise consortium formed by its engine partners.
- We follow how VIVACE uses simulation and modelling methods for both business and engineering processes in the early stages of the aircraft product life cycle to meet the customer’s need and assure a successful outcome.



Scope of Storyboard



- **Business scenario determination**
- **Supply chain operation**
- **Technical feasibility**
- **Concept design (including product supportability considerations)**
- **Trade-off analysis and design decision making**

Acts and scenes follow the early phases of the product life cycle

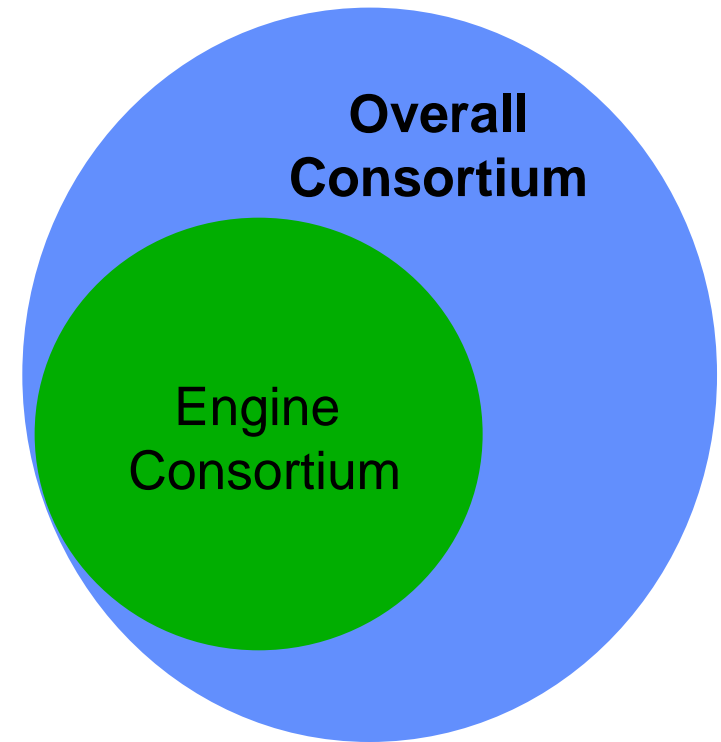


Storyboard Operating Environment

- **Multi-discipline teams (both within and across partner companies)**
- **Concurrent engineering approach**
- **Virtual enterprise operation**
- **Simulation methods**
- **Secure shared Information Systems**
- **Multi-tier supply chain**
- **Knowledge management**

“Actors”

- **Aircraft company**
- **Engine company**
- **Helicopter company**
- **System providers**
- **Supply chain members**





Act 1 - Commercial and Technical Feasibility

- **Commercial environment simulation**
 - Is the proposed customer's business worthwhile?
- **Early concept design process**
 - Workflow management for computations in MDO framework
- **Concept optimisation**
 - Trade-offs for aerodynamics, weight and cost
 - Determination of “stable design regions”
- **Technical feasibility methods for “pre-design” work**
 - Overall architecture
 - Design to market
 - Life cycle cost optimisation
 - Visualisation and selection methods
 - Removing uncertainty



The consortium decides to go ahead and notifies the customer that it will respond to his request.

Meanwhile the Engine consortium develop their proposal....



Act 2 - The New Engine Preparation

- **Proposal preparation**
 - Fast quotation preparation process for complete operating life cycle
 - Includes knowledge management as a key enabler
 - Uses common life cycle cost definitions and approaches
 - Agent based methods used to explore dynamic behaviour of the value chain over the whole engine life cycle
- **Supply Chain considerations – an example**
 - Simulation of a focused engine parts factory to achieve optimised output
- **Operation of through life product support system**
 - Sensitivity to different support regimes and resource levels
 - Critical element determination



The design phase of the aeronautical product will involve a large number of engineering teams (this will include several disciplines using their own tools) and they will be collectively producing technical data.

To prepare for the launch of this phase the consortium companies set-up an information sharing environment enabling both design and analysis people involved in these teams:-

- To work in a controlled way***
- Retrieving/sharing/storing design models, simulation models and related documents in a consistent and secured way***
- Optimising parallel teamworking***
- Enabling the monitoring of virtual product maturity.***



Act 3 - Sharing Information in the Virtual Enterprise

- **IS Infrastructure design and operation: “VEC-Hub”**
 - Users and environment and deployment considerations
 - Demonstration of distributed whole engine design process across many partners
- **Virtual enterprise infrastructure**
 - Access control architecture and security policy
- **Engineering Data Management for Virtual Aircraft**
 - Link between the design and simulation worlds and the management of product and process information in this context.
 - Example of a process: stochastic analysis for engine blade and disk, then whole engine optimisation and aircraft integration
 - Demo based on COTS tools with specific user interfaces
- **COMPASS – Structure simulation context management**
 - Mature product context management process based upon the Information Model Concept within the Common aircraft multi-disciplinary integration backbone for structure engineering simulation (COMPASS). It has been adopted by the EDM process.



Act 4 - Design, Performance Testing and Simulation Validation

- **Engine performance: Integrating the components**
 - Simulation of performance from preliminary design through to customer deck
- **Rapid engine modelling and analysis**
 - Applied to 3D engine components in preliminary design
- **Validation of engine simulations**
 - Harmonised methods
 - Advanced tools that link test strategy, correlation, model updating and physical testing
 - Faster process
- **Complex mechanical system design**
 - Helicopter rotor: hub pre-dimensioning
 - Rotor kinematics
 - Maintainability
 - Tolerancing



Act 5 - Aircraft Systems Simulation

- **Simulation augmented development process for aircraft systems**
 - **Hydraulic System**
 - **Right sized multi domain simulation for Electrical System**
 - **Substitution of IMO(flap)- tests for the derivative of an aircraft**
 - **Virtual Aircraft for Systems**



The Consortium uses various design optimisation methods, within single engineering disciplines or between multiple disciplines, or extending across multiple partners and sites. In addition, early in the collaborative design process, the supportability aspects of the aircraft (when in-service) need to be considered.



Act 6 - Design Optimisation Methods

- **Optimisation of components and systems**
 - Applying optimisation to a multi-disciplinary aircraft wing design case
 - Multi-disciplinary and aerodynamic optimisation of an engine power plant
 - Multi-disciplinary optimisation of an assembly
 - Advanced computational structure mechanics optimisation
- **Supportability Considerations**
 - Maintenance optimisation model
 - Maintenance programme evolution



Act 7 - Knowledge Management and Sharing and Decision Support

- **Knowledge management and sharing**
 - **Context- Based Knowledge Engineering Platform**
 - **Guidelines for Sharing Knowledge within an Extended Enterprise**
- **Design reviews**
 - **Design to Decision Objectives (DtDO)**
 - **Aircraft Change Impacts Analysis**



Third tier suppliers – impact of storyboard

- **3rd tier and smaller companies in the Aerospace supply chain**
- **VIVACE for smaller companies – key issues, ways of working**
- **Virtual Hub operations, portals for supply chains of the future**
- **IT Security for smaller businesses**
- **Application of the VIVACE technologies, some examples based upon VIVACE storyboard, with the emphasis on the role and Impact of smaller/3tier suppliers**

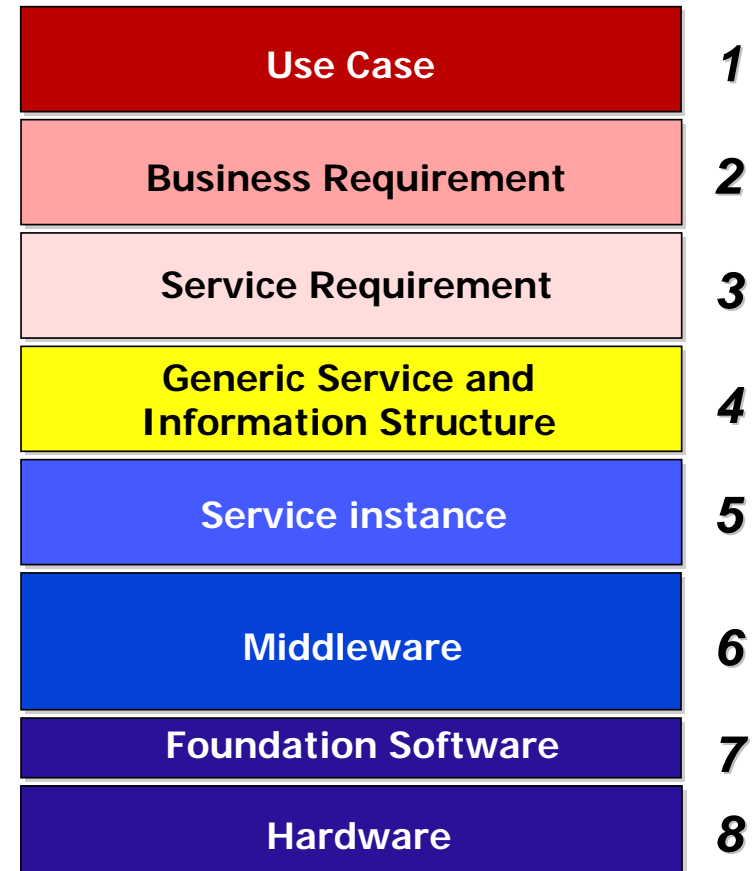


Plenary session 2

- The Integrated View of VIVACE products

Here we describe how VIVACE results all together contribute to a common “VIVACE Integrated Product”, thanks to a mapping organised on 8 layers.

Benefits of this approach are both to better justify VIVACE benefits and to better prepare exploitation





Other presentations

- **EC Framework 6**
 - **SimSac project**
- **AeroSpace and Defence Industries Association of Europe (ASD)**
 - **AeroSME project**
- **The Transatlantic Secure Collaboration Program (TSCP) and VIVACE**



Outline Timetable

Time	Day 1, 24 th October					Day 2, 25 th October				
	Amazon	Everest	Kilimanjaro	Yangtze1	Yangtze2	Amazon	Everest	Kilimanjaro	Yangtze1	Yangtze2
0900 to 1100	P 1 1 2 0					A C T 3	A C T 1	A C T 7	A C T 4	A C T 6
1130 to 1300		A C T 1		A C T 4	A C T 2	C o m p l e t e	2 1 0	1 9 0	3 4 5	1 8 5
1400	A C T 3 S 1	2 6 5	A C T 7 1 9 0	3 0 5	2 6 5	3 6 5	A C T 5 1 5 0	Act 1 Scene 3 45 A d h o c		A C T 6 1 8 5
1730										

Morning breaks
1030 -1130
Lunch
1300 - 1400
Afternoon breaks
1500 - 1600

Time	Day 3, 26 th October				
	Amazon	Everest	Kilimanjaro	Yangtze1	Yangtze2
0900 to 1100	3 T & O	A C T 5	A d h o c	A C T 2	A C T 3
1130 to 1300	1 8 0	1 5 0		2 6 5	S 2 3 4
1400	P 2				
1600	1 2 0				

Bus for Civic reception
Day 1 at 1800

Bus for Gala dinner
Day 2 at 1900

Day 3 ends at 1600
Buses to train station
& airport at 1615