

PRELIMINARY DESCRIPTION OF THE FUTURE AEROSPACE BUSINESS ENVIRONMENT

Executive Summary

The aerospace industry is a major employer and wealth generator. Many nations have made substantial investments to develop and retain world-class aerospace design, manufacturing and assembly capabilities. The industry impacts upon many aspects of society (e.g. travel and the environment) as well as on trade and defence. In order to deploy their resources to best effect, aerospace businesses need a means of understanding, mapping and analysing the future business environment in order to formulate strategies that minimise risks. This document presents a preliminary outline description of approaches to facilitate and support strategic thinking in the sector.

Three key activities are described within this report:-

- Understanding and mapping the factors that impact the aerospace business environment
- Developing a set of initial business scenarios for the sector
- Exploring possibilities for modelling key business scenarios

To understand the key drivers and issues influencing the aerospace business environment a structured analysis was conducted based on academic literature, the trade press, industrial reports, and discussions with industry personnel. The review demonstrated that the industry is facing many challenges particularly in terms of cost-reduction, security, environmental issues and legislation, as well as economic and demographic factors and various industry-specific factors.

The work has identified 31 key factors and the relationships between them. These are illustrated in a *Consensus Factors Map* - a multi-level linked map that can be navigated around in MS PowerPoint. Initial feedback from the industry indicates that the map provides a comprehensive view of the aerospace business environment. Within the report, the factors are discussed in detail, with the aim of identifying the most important and/or uncertain factors affecting the future of the industry. A summary review of the ACARE documents has also been produced and included in the appendices.

The factors map has been used to develop a set of 19 *initial business scenarios* that provide a description of possible future environments for air transport. These have many potentially different impacts on the industries involved in the sector. The scenarios look at the development or key changes in various aspects in the aerospace industry. They describe uncertainties within the sector including demand. Will passengers be offered direct flights or hub connections? Will they fly long haul or short haul? Will there be more freight or passenger traffic? The initial scenarios also envisage changes in the external environment e.g. airport availability, war, fuel availability and the environmental issues. Some of the scenarios explore industry-

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specific issues such as aircraft age, operator partnerships, power struggles between operator and manufacturer, attitudes to risks, etc.

While these scenarios depict the possibilities of the future aerospace industry, they introduce many variables that may be too complex to handle. A tool for investigating the future scenario concepts that are most relevant to the key players in the industry is under development. The tool is called VIBES (VIVACE Interactive Business Environment Simulator) and a first draft has been produced. The tool allows information to be gathered on the scenarios that cause the aerospace industry stakeholders the most concern. The output of this tool is a cluster of trends called a 'theme'. Further development of the VIBES tool and a prototype demonstrator are planned.

The industry currently uses traditional forecasting methods based on trend projection for high level aggregate planning over a 3- 5 year timeframe. The report describes the approaches used by Rolls-Royce and Volvo Aero Corporation based on interviews with key personnel. Understanding and analysing future aerospace business environments over longer time horizons can benefit significantly from formal scenario analysis and scenario modelling methods. The report provides an introduction to a range of relevant scenario concepts and techniques.

In order to capture the dynamic behaviour of the market (a key characteristic of the aerospace industry), more detailed simulation modelling is required. A scenario modelling technique called system dynamics is proposed for modelling the dynamic behaviour of the aerospace market. Previous applications of systems dynamics modelling of relevance to the aerospace sector are reviewed. An initial model of the VIVACE business environment sub-systems has been presented for review and approaches for developing more detailed models are described.

Scenario modelling takes a high level perspective on value chain development – a 'top down' view. The report also provides an overview of value chain modelling concepts which can provide 'a bottom up' approach to developing value chain strategies for the future. These approaches will complement each other in developing innovative and practical value chains for the aerospace industry of the future.

The report outlines the nature of the work and the expected deliverables in the next phase of VIVACE. As well as the development and refinement of VIBES, we aim to extend our systems dynamics modelling work; produce a state-of-the-art review of Value Chain modelling techniques of specific relevance to the aerospace sector; plus an updated report on the Future Business Environment that will contain business environment simulation models and a selected approach for value chain mapping. All planned activities require a number of iterations as well as validation from VIVACE industrial partners. We appreciate feedback on any aspects of the business environment, scenario analysis and modelling or value chain work.