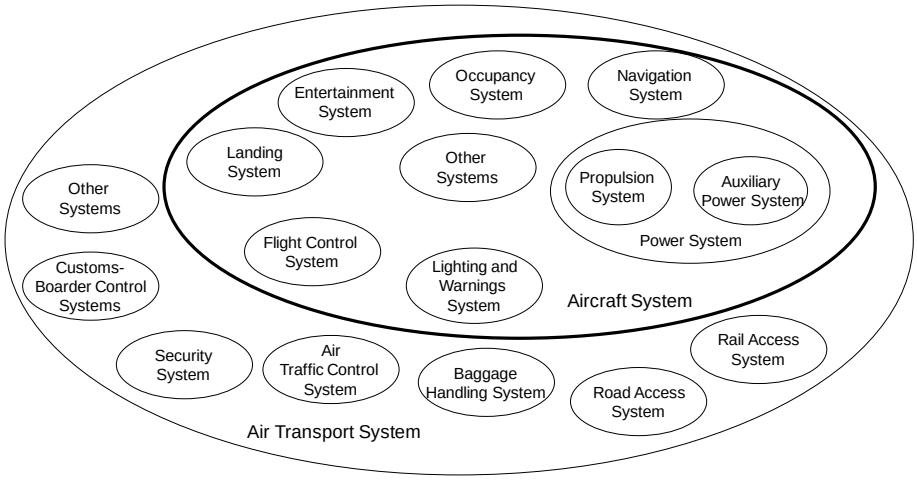
Systems within Systems

The examination of anything that is defined as a system will show it to be made up of smaller systems. Equally, any identified system will be a sub-system of a bigger system.

The diagram below shows a simplified Systems Map (Burge, 2010) for a commercial aircraft system. The aircraft system comprises many sub-systems, while it is a sub-system of a bigger air transport system.



The concept of "systems within systems" is highly useful and is one of the cornerstones of Systems Thinking since it allows complex systems to be simplified through the use of abstraction to hide unnecessary detail. The diagram above is a relatively simple diagram to understand, yet it shows an exceedingly complex situation. This is because the diagram is an abstraction of reality in which the detail has been hidden. It has not been lost, since it can be introduced as and when required. In order to apply the concept of information hiding through sub-systems it is necessary to define what the sub-systems are and some choices are significantly better than others.

In Systems Thinking, sub-systems are chosen to help understand the situation under investigation. In Systems Engineering, sub-systems are chosen such that they can be engineered (designed and built) and subsequently integrated to form the system. Badly chosen sub-systems can make them difficult to design and integrate, typically because the various sub-systems are too dependent upon each other. A good choice of sub-system minimises the interfaces between the sub-systems making them easier to design, develop and build independently and ultimately making them easier to test and integrate.

Burge Hughes Walsh
Suite 13b Davy Court, Castle Mound Way, Central Park,
Rugby, Warwickshire CV23 0UZ.

Email: enquiries@burgehugheswalsh.co.uk
Phone: 01788 550015
Website: www.burgehugheswalsh.co.uk