Abstract. The tutorial starts by introducing the concept of resilience - the ability to absorb, survive and recover from major disruption, and if necessary to adapt to maintain utility if the disruption results in a fundamental changed context. The concept is illustrated using a series of case studies contrasting resilient and non-resilient outcomes.

We'll introduce three tools for analysing and understanding resilience, apply them to the case studies, and use them in exercises throughout the day. We'll explore different representations to find good ways of explaining the issues to non-specialists.

We'll explore the benefits of a resilient architecture, and discuss resilience issues and strategies for both "systems" and "teams" in each lifecycle stage.

We then examine how to create and maintain resilience, using a variety of design principles under the four basic elements of capacity, flexibility, tolerance and cohesion. Practical examples are given from both cyber and physical domains.

We consolidate the learning by relating the strategies and principles to the Three Phases of Resilience, the Resilience Curve, and the Resilience State Model.

On the principle that resilience of man-made systems normally depends partly or mainly on the human element of a system, we then examine resilience in organisations and individuals. We'll look at military, aviation, industrial and societal examples, and highlight the importance of effective communication and decision-making.

A final discussion session will explore three topics: whether and how well this all fits within the current systems engineering paradigm - and if it doesn't, what needs to change; what is the business case for resilience – when to make systems resilient, and when it's not useful or important; and how to apply what you've learned in this tutorial when you go back to work.