



# REQUIREMENTS DONE RIGHT

## *How the systems engineering skill set can add value to your next project*

**Setting up projects for success requires a team effort** and the best project managers bring together the right mix of roles and skills at the right time. Systems engineers can bring great value to projects and programmes by helping project managers to simplify complexity at the front end. They provide critical definition at a stage where the sheer number of choices and possible solutions increases the likelihood of a project heading in the wrong technical direction.

When appointing a role to lead the creative activity to define and develop a solution, project managers should look for a systems engineer that is both technically proficient in requirements capture and management, and adept in the soft skills of communication, influencing and leadership.

### ***Understanding systems thinking***

Systems engineering emerged from the practical need to efficiently coordinate technical development of missile defence programmes in the 1950s, since then it has developed into a pragmatic way of working that enables customer-led delivery of major programmes. An idea for a new product, system or service is often proposed in terms of the final desired outcome – for example, to meet consumer needs, to transport people, to save time, or transform a place.

The defining characteristic of the systems approach is to begin with the end in mind – what does the operational outcome need to be? What benefits does the end user desire? And how can we engineer a system of people, processes and technology to achieve those outcomes? To make a grand idea a reality, someone needs to break it down into pieces that are understandable and deliverable, while ensuring it still provides the desired outcome to the end user. This is the domain of the systems engineer.

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The systems engineer is to engineering what the general practitioner is to medicine – they look at the whole body, analyse the problem, review the options and synthesise a holistic solution.

The process that is used in systems engineering to define outcomes to a level where a project can be initiated is known as requirements engineering (or in the case of the APM BoK – Requirements Management). This is the capture of statements that clearly describes what the system must do to be successfully designed, built, tested and put into service. Requirements engineering is simple in theory, but, it can be difficult to perform.

A systems engineer working to capture and manage requirements has to keep in mind both the big picture as well as the detail. They must use analysis of data and engineering studies to write unambiguous requirements but also employ their own judgement to ensure they are not overly prescriptive, as this can constrain a creative solution.

They have to organise the requirements into packages that can be delivered sensibly and put them into a database for tracking. They also have to be able to translate technical jargon into elegant statements for a robust commercial contract. Amongst all of these technical and process skills, soft ‘people’ skills shouldn’t be overlooked. They are as vital for a systems engineer as they are for a project manager.

As the scope of modern systems becomes more ambitious the number of people involved in defining and agreeing to requirements grows. The systems engineer must talk to all of these people and discover what they want from the system.

*HS2 Old Oak Common Station - Systems thinking is being applied to the HS2 programme to integrate a multitude of assets, disciplines and geographic boundaries.*





Therefore, like project managers, the first skills for a systems engineer to master are those of coordinating and facilitating meetings and workshops, asking the right questions of end users and operators and actively listening as they discuss their requirements.

An end user will not always get everything they want from a system. Once the first draft of requirements is captured there will inevitably be cuts as budgets, timescales and technical feasibility are traded off. The systems engineer must provide leadership here in order to defend the voice of the customer/end user. This requires skills in analysis, diplomacy and negotiation – getting to the bottom of the real need and weighing up the truly important from the nice to have.

Ultimately, to achieve a successful outcome, a project needs the support of key stakeholders during the requirements

gathering stage and throughout the remainder of the process. Therefore, it is critical for systems engineers to be able to build and maintain alliances and relationships at all levels, especially with programme managers and key decision makers.

While systems engineers are accountable for capturing and managing requirements, they cannot operate in a vacuum. To add value to a project team they must take responsibility for communication, using their analytical skills to simplify the complexity of the whole and help build a common understanding of how the system will be created and delivered to the end user.

Bringing a systems engineer on board from day one is one of the best ways to ensure success for your next complex project.

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## About WSP

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## Author

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