Understanding the Request for Proposal (RFP)

About the RFP

Introduction
Whether you are looking to take part in your first UKSDC event or you are a seasoned space design veteran, the number one piece of advice you will receive will always be the same. Read the RFP! I cannot stress this enough! Read the RFP! Read it!(Beegadhur, 2018).

The RFP is this competition's Holy Grail. Throughout the UKSDC, you will be engaging in an industry simulation event to design a space settlement for a fictional client called The Foundation Society. In order to guide you in this task, the RFP contains all of the customer's requirements for this settlement design. All you have to do is provide them!

Whilst this may sound easy on the surface, do not be fooled. The RFP is the Holy Grail for a reason; its what everyone wants but nobody can reach! There are so many deep and complex requirements that would take even NASA scientists years to tackle thoroughly, but your job is to try and come up with as many interesting and scientifically feasible solutions as possible within the short time you will be given for the competition. You will always struggle to complete everything because it is designed to be that way. However, below we have some tips for how you can best set yourself up for success through properly understanding what your client requires of you!

How to read the RFP

View the RFP as a single Problem
We will start off with the most important tip of all, and yet the one that is least often carried out during this competition. When you are given the RFP, it will be divided into department sections, and within each department it will be divided into further subsections. Do not let this confuse you! The RFP is designed to be tackled as a whole. It is not a collection of individual problems that can each be solved independently, but rather a web of interrelating points that work together to define the customer's requirements of the settlement. This is a relatively different concept to what students normally have to face at school, and adapting to this new challenge is the first step on the way to properly understanding the RFP.

Take your time

All too often we see departments try to save themselves a little time by only reading their departments RFP points. Don't do this! It will only lead to confusion and interdepartmental conflict later on. Make sure you know how all of your points interact with all of the other departments so you know who and what you need to be talking with your company-mates about.

An RFP is normally between 2500 and 3000 words long to pack in all the detailed requirements of The Foundation Society. With the average reading speed for technical documents between 50 and 75 WPM), you should be allocating at least an hour to just reading the RFP at the start of the competition. Whilst this may sound wasteful, it is very representative of what happens in industry, with companies reporting that up to 15% of their time and money is spent on systems engineering and requirement management.

Command Words

So now that you know the key points about how to approach the RFP, what techniques are there to best understand what you are being asked to do? The first piece of advice is to pay close attention to the command word being used, as this will affect the way in which you have to tackle an RFP point. A breakdown of the command words is given below:

Show/Demark:	provide a visual representation adequate to clearly explain a requested item
Show how:	Support explanations, either visually or textually, of how a requirement is fulfilled.
Describe:	Include a visual or textual summary to clearly explain compliance to a requirement.
Detail:	Same as 'describe' but requiring information pertinent to even the lowest level of the item.
Justify:	Provide an on-slide reasoning for decisions made.
No verb:	Provide the requested item(s) on the slides of the presentation.
Specify:	Include the results of specific design-decisions made, justifying as appropriate.
Indicate:	Same as 'specify' but requiring less precision.

Minimum requirements
You will also notice that each RFP point comes complete with a section defining the minimum requirements for the point. These are what they say on the tin; the absolute minimum that The Foundation Society expects to see on your final presentation. Make sure that you are definitely ticking these off as you go through the competition, as it will be the first thing that judges pick up on if you have missed any!

Derived requirements
Whilst the RFP will tell you the requirements that you are expected to meet, many of these will require additional steps along the way to reach a stage where you can finally tackle the RFP point. These steps are called the derived requirements, and they are the things that you will need to do in order to inform your decision on a method of tackling the RFP. This is often a difficult concept to grasp and so I believe it is best illustrated with an example.

Take for example a common RFP point from the operations department; 'produce sufficient electrical power for your settlement'. This one very succinct line looks simple at first glance, but then you realise all the steps that this point will involve. Firstly, you will need to quantify what is meant by 'sufficient'. This will rely on literally everything else within your settlement that uses power, from construction robots to your electric toothbrushes. Once you have worked out what things you will be including in your design, you will then need to estimate the power consumption of each to give a ballpark figure for your power consumption. Only once you have this number will you be able to start to calculate the best possible solution for your power needs, whether that be solar, tidal, nuclear or so many more. And even after you come up with this design, you have to consider whether you want to have a backup or a redundant system, or consider whether you have the capability to deal with peaks in power demand when everyone goes to make a cup of tea at half-time in the title-deciding game of your space-football league. All of this comes from just a single line in the RFP, and correctly identifying all the derived requirements is what will truly distinguish between a good company and a great one!

Highlight and annotate as you go
With the RFP being so long, detailed and complex, you cannot possibly hope to remember everything as you go through. For this reason, it is highly recommended that you go through and highlight and annotate (and maybe even use comments on a shared google drive) key points within the RFP so that you can refer to these later. This can be everything from identifying which RFP points are interrelating, to identifying your derived requirements, to

even identifying which RFP points are going to take you the most time, and therefore require the greatest attention. Do whatever is going to be best for yourself within the time frame you have available. Obviously at the longer national finals you will be able to spend more time on this stage, but it is still recommended for the regional competition to help focus your design efforts.

Clarify with volunteers

Throughout any UKSDC event, there will be an army of volunteers around to help you with any problems you may have. These volunteers almost always have some prior experience with the competition and so will be able to offer you assistance in understanding some of the complex jargon you will find within the RFP. Some of said volunteers will even have even been involved in writing the RFP, and so asking them to help clarify points early on can provide really useful guidance as to what the judging panel will be looking for in your designs. It is always a good idea to clarify anything you are unsure about as early on as possible into the competition to avoid having to redo as much work later on when one of the CEOs or Technical Advisers finally realises that you have been going a bit off track for the first 24 hours of a competition (the author is most definitely not talking from personal experience at the ISSDC here…).

Stay On Task

Finally, it may sound obvious, but stay on task. It is easy to start looking something up and one wikipedia link going to another and you find something really interesting that doesn't quite do what you originally set out to do. Or similarly you could find an amazingly detailed article which you then try to use in your presentation, only to later realise that the command word asked you to 'describe' rather than to 'detail' or 'justify' and you have therefore potentially wasted many hours of your time.

The best way to stay on task is to constantly refer back to the RFP, rereading it multiple times throughout the competition to ensure that you are on the right track. Having multiple people check in on each other's work is also a good idea as this fresh pair of eyes will be better able to see where an idea has deviated away from the actual requirements, and hopefully can politely guide the person back towards the task at hand.

Managing the RFP

Leadership Responsibilities
Somewhere on the long list of responsibilities for those in key leadership positions within the company, is requirements management. First and foremost, this responsibility should lie with the Heads of Department who should be constantly monitoring the work within their company to ensure that all RFP requirements are being tackled, with no minimum requirements slipping through the cracks. This is the primary role of the HoDs and should be their number one priority throughout the competition.

However, anyone who has competed before will know how easy it is for a HoD to get distracted on a single RFP point, allowing mistakes from other areas of their department to slip through the cracks unnoticed. At this point two things should happen. FIrstly one of the President, Vice President of Engineering or the Systems Engineer (normally a nationals only role) should notice this error and point it out (in a polite and encouraging manner) to the student responsible, to allow the issue to be resolved. The second thing for them to do is remind the HoD not to get too involved with specific design ideas, but instead to remain abreast of their entire department, to hopefully avoid further issues like this from occurring.

Project Groups
Within almost every RFP for the UKSDC, there is some level of unique point that defines the purpose of each settlement. Often this is included in the X.4 points (refer to the sample RFP on the website if you don't know about the RFP point numbering scheme) and these will tend to be highly interrelated across all departments.

With this high level of interrelation, communication between people in each of the standard departments will be essential if the company is to create a coherent solution to the RFP as a whole, although there is another, potentially better method for those who are brave enough to try and organise it.

Companies have previously tried, with varying level of success, to implement specialised project groups to deal with these highly specialised parts of the RFP. When writing the RFP, it is these unique points that allow the judges to keep the competition fresh and exciting, and so they are paying close attention to how companies deal with these new challenges during the judging process. A dedicated sub-team often leads to the highest quality in these areas, which is a surefire way to impress the judging panel!

Compliance matrix
Whilst this author personally deemed these to be the single worst invention known to UKSDCkind, compliance matrices are often used by companies to keep track progress in each RFP point. A compliance matrix can vary in its level of complexity, with a simple one simply having the RFP points listed and colours to highlight how much of each point has been completed. On the other hand, more complex ones can have information on who is doing each point (for communication purposes), where they are (important for in person competitions across multiple rooms), whether the research is done, whether the slide is complete, room for feedback and even a calculation software to calculate the chance of your team's proposal being sacrificed to the demon judge themselves.

Used properly, a compliance matrix, or other similar task management software, can really assist a company in staying on top of work and prioritising tasks that are falling furthest behind. However, all this relies on first taking the multiple hours required to set up the system, and then relies on every single member of the company actively filling out their own section of the matrix. Whilst I would not want to discount this as a possible option. Do consider whether it is going to be the most effective way to manage your company, before jumping on the compliance matrix bandwagon, only to abandon it at a later date!