

# Task Management, Communication & Leadership

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## A 'Hypothetical' Situation

A lot of work is done over the course of a Regional or National final in order to meet the Request for Proposal (RFP). This means that there is a lot of paper lying around on tables that can get lost or damaged. Only a small portion of the paper actually will go onto the final presentation and it is very risky to try and filter through that pile and take photos ten minutes before the presentation is due! As with everything in life, being organised is key and can be the factor between a terrible presentation and a great one. With so many people in a company at the nationals, making sure you can access past work is key, observe the following situation:

*Michael: "Alice, do you know where Laura's calculations from earlier are?"*

*Alice: "Who's Laura and which calculations?"*

*Michael: "The ones that Callum gave you earlier when you were doing that thing."*

*Alice: "I thought I gave them back to Ben from Ops to put on the presentation."*

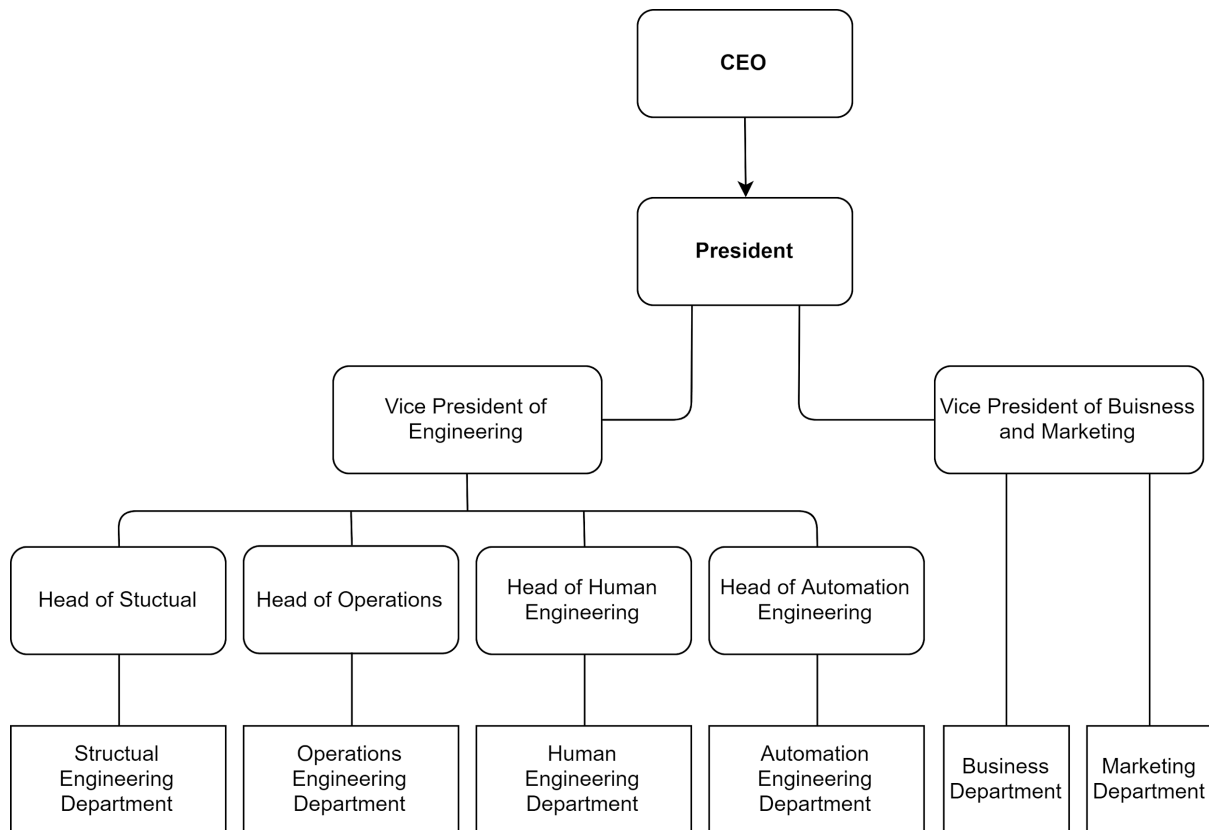
*Michael: "I'll go and check with him then, thanks."*

It turns out that Ben, who had never had the calculations, had gone to the toilet and Michael spent 15 minutes looking for him before vowing to find him later. Michael went on to redo those calculations but he made different modelling assumptions and now there are two sets of figures floating around and half of the diagrams have the wrong dimensions. Michael never found Ben, because he was too busy trying to rectify the mistakes that had been made by his impatience.

This, sadly, is not a far fetched story but based on true, traumatic events. Companies that avoid this situation will find themselves with fewer communication errors and so far fewer actual errors. Companies have been undone by this situation because such breakdowns always result in an overall effect on the presentation, be it by loss of time or more serious problems.

# Company Structure

Management is one of the pivotal parts of the UKSDC; good management goes hand in hand with a good design and a good presentation. Luckily for you, UKSDC provides a recommended company structure. In this structure there are a few groups of people with different roles.



## The President and Vice Presidents

These roles are extremely important to provide inter departmental cohesion and focus. They manage the heads of department directly and can guide the technical body of the company more indirectly.

Patience, memory and decision making are all important skills for people in these roles. You should be able to weigh up decisions quickly, completely and disinterestedly while managing the emotional baggage people put into ideas (pet ideas that no-one wants to throw out are the number one source of mistakes in any presentation). In these roles you will need to appreciate that people will fail to meet deadlines and you will have to find ways to fix problems on the fly.

## **Heads of Departments**

To be a good head of department, you need to have good management and technical skills to be able to bring the right people together to solve problems.

It is not recommended to share the HoD role. The responsibility of a head of department is to know everything that is going on and keep flak away from the workers. Doubling up on this role may sound sensible but it reduces the number of people working and can cause confusion when HoDs disagree.

This can be resolved using a vice-head of department. If you plan to break your department into sub-teams (see below), which is highly recommended, having assigned sub-team leaders is crucial to ensure work is done and communicated effectively

## **Technical People**

These are the ones who do the majority of the research, calculation, design and art that comprise the final presentation. There are a plethora of ways that work can be divided and these people structured. I recommend dividing department groups further into sub-teams of three or four people, each with a sub-team manager. The most important aspect of this is that each sub-team moves to work on a separate table (please feel free to move furniture at any venues as required) so that delineations can clearly be drawn between the various aspects people are working on. This improves access to people so that the HoD does not have to be the only person to answer questions. This is hard to achieve and can feel a bit against the natural order but it is a recommended technique for reducing miscommunication and improving productivity.

## **Those outside of the departments**

These roles don't conform to the standard purviews of individual departments, but are more fluid. In truth these are either people who have roles not described by any one department, such as presentation coordinator. Or these could be people who like to help out in many different departments. I ended up never really being in a single department; during my last nationals I was responsible for or leading a team completing tasks for all 5 departments. This included tasks that span multiple departments such as construction, costing and emergency contingencies, and tasks that are very department specific such as power, medical and life support.

You do not have to stay in a single department if you are not needed there, but make sure to inform your HoD before helping others to avoid confusion.

# Communication

## Introduction

I do not know of any company that has ever fully overcome the communication problem, but there are those who have minimised it. The way this is achieved is by having everyone know what they're meant to be doing, how to do it and how to get what they need to be able to do it.

The first problem is one of management and level of engagement. If people are engaged, they generally will do what their department head tells them to and not get too distracted. Generating that engagement is unfortunately often easier said than done but a responsive and supportive department head can get people to engage with the dullest of tasks!

How to do the task is often a matter of imagination, pragmatism, focussing on the end goal and skill. This can, again, be achieved in all workers by a good head of department. The only advice the author will give on this (since he was an awful head of department) is to find out people's skills and interests early and put them to use.

## Have Regular Company Meetings

The best way to make sure that you keep the whole company on the same page is to make sure to tell them everything they need to know. It sounds incredibly simple, but correct organisation of company meetings is essential to having a design run smoothly and to minimise interdepartmental conflicts.

So is that it then; should you just have more company meetings? Well not quite. Whilst company meetings are great for keeping everyone on the same page (and for these meetings I do mean everyone, not just HoDs who then forget to pass the information on to the rest of their department!), these meetings also distract your entire company away from doing productive work towards your final presentation, and so you need to strike a balance between meeting regularity, meeting length and independent/departmental work.

The following advice is only the result of personal experience, and you may have a different opinion, but I always found that holding a meeting at every major design breakthrough/change (think completion of/change of structural design, or change of residential vision from minimalist to luxury), plus a meeting after four hours if one hasn't occurred, is always a good way to go. The reason for the meetings at key design breakthroughs should be

obvious, but these decisions will affect literally everything in your entire settlement, and people need to be made aware as soon as possible, before they go off designing something amazing that no longer works with your current design philosophy elsewhere! The reason for meeting every four hours may initially be less obvious, but what may have began as two departments being on the same page in one meeting, can rapidly diverge into two completely incompatible concepts if not constantly monitored, and discussions at these company meetings can help to catch these problems before they become competition ending for you.

So now that you know how often to have company meetings, how long should you actually be meeting for? The most common mistake we see is that company meetings turn into highly complex analysis of a single part of the design, such as where you will position your solar panels on your structure, which whilst important, has absolutely no relevance to about 80% of the people sat at your meeting, and can waste an hour or so of their time for no reason. It is everyone's responsibility to make sure that anything that can wait until after the meeting does, and people in leadership positions must strictly enforce this throughout the meeting. I tended to find that planning for a meeting to take about 20 minutes (3 minutes presentation from each Head of Department, plus a couple of minutes of questions) was a good target for these meetings, and even if they overran to 30 minutes or so, it's not the end of the world, although longer starts to get excessive. The best way to ensure the shortness of these meetings is for the department directors to actually take the time to prepare what they need to say for the meeting, rather than doing it on the spot, as this will allow them to avoid going off topic and to focus on conveying the key points that influence the other departments.

### **Meeting Minutes**

A second priority after actually having company meetings, is to record what is said and decided at each meeting in one clear place, allowing all members of the team to refer back to that document so they don't forget. This holds true for all smaller meetings that will occur throughout the competition, as it is very easy for one party to forget what was agreed and continue along an incorrect design path. Your meeting minutes do not need to be extremely detailed, but it is the easiest thing in the world to just note down a few bullet points while you are talking, which will be of great use to you later on in the day.

## **Communicate Respectfully**

Yes, yes. I know. You've heard it all before. Don't speak over people. Listen when someone else is speaking. Give everyone a fair chance to participate. All these rules are so basic, and yet so easy to forget in the heat of the moment. You will never decide anything through an argument! Each side will only ever be pushed further and further towards their own idea, and further alienated by the opposing proposal. Instead, look to facilitate constructive discussion, where you actively consider each other's ideas and look to weigh up the pros and cons of each when trying to make a decision.

## **Stress Personality**

A large part of the issue that people face when trying to communicate within this competition, is the emergence of their stress personality. The competition can be stressful, especially with the time pressure you will be under, and when stress personalities start to emerge, there are often more shouty and argumentative than an individual would normally be. It is important to realise that this will happen to everybody, and you should be looking out for it, so that you know when either yourself or someone else is in need of a break. If you do notice an argument breaking out, either try to step in and calm both sides down yourself, or go to a person in the management team and inform them of the situation. Both sides normally just need 10 minutes away from each other, and a few supportive words to help calm them down, motivate them, and enable far more productive discussion once they return.

## **Know Who to Talk to**

When you have a question that you need to ask someone, the most frustrating thing is to not know who you should be looking for. It is therefore essential that everyone is made aware of who the department directors are, and that in turn the department directors are aware of what everyone in their department is doing, in order to direct any queries to the correct individuals. You could also use a compliance matrix for this, which is discussed later.

## **Let quieter people speak up**

Along a similar vein to the idea of respectful communication, you should make sure that those students who are more naturally shy and quiet are given the opportunity to share their ideas. The quieter people have equally good ideas, and often these get missed out on, which particularly saddens me when I am going around at a Technical Adviser and hear a great idea that never makes the presentation because someone else shouted another idea louder. And speaking directly to the people who know they fall in to this category; be confident! If you really want to check if an idea is good before suggesting it, talk to a CEO or Technical Adviser who will always help out!

### **Plan your Availability and be Available**

One of the biggest issues in communication within a company, as highlighted in the hypothetical situation described above, is when you cannot find the person that you need to talk to. This can happen for a number of reasons, such as them taking a break to go and eat or sleep, but is both annoying and a waste of time for the person searching. However, this can easily be alleviated by having a timetable of when each individual will be available throughout the competition. Try to make this as much of the day as possible, and avoid long gaps if you can (this author always found, particularly in leadership roles, that sleeping in 3 hour sessions tended to be optimal for helping with this). This way you will not hold up other members of the company (such as by taking a 4 hour lunch break to try and walk to the nearest McDonalds which was 3 miles away, and then getting lost, which was an actual excuse I have heard in this competition).

Another part of availability is actually being there to be spoken to. This is most prevalent at online competition, where people decide they are going to leave a call to do some independent work, only to then not respond to any messages because they turned notifications off, and so having to wait for their company to contact them. This is possibly the single worst thing you can do, without even realising you are doing something wrong! Instead, just sit in an AFK call where people can get to you if needed, or for in person competitions, sit in a room that is relatively easy to access for your other company members.

### **Don't be afraid to ask for help**

This competition is designed to expose you to things that you will never have covered before, and so it's perfectly normal to get stuck on something. At every competition, we will provide you with a whole host of volunteers (CEOs and Technical Advisers), whose sole purpose is to help you out in these situations. All too often people will try to power through on their own because they think it would be embarrassing to ask for help, but almost all the volunteers have taken part in this competition in the past, and will have faced all the same issues as you, and can't wait to pass on what they have learnt to you!

The same can be said for some of your company members. This competition brings together students from a range of year groups, and so you will each have a different level of understanding in key subjects like maths and physics. Some of the older students may also be able to help you out if you are stuck with something, so make sure to say rather than sitting and staring at that ridiculously complex research paper you found online.



## How to be a Leader

### Boss vs Leader

The first important part of becoming a leader is to understand what that word actually means. Whilst many often conflate its meaning with that of 'Boss', I hope you can see from the examples below that being a true leader requires an entirely different skill set and outlook on company management!

# BOSS vs. LEADER

## 10 HUGE DIFFERENCES

Infographic by @agrassoblog



<b>BOSS</b>	<b>LEADER</b>
Says "I"	Says "We"
Takes Credit	Gives Credit
Micromanages	Delegates
Criticizes	Encourages
Focuses on Weaknesses	Focuses on Strengths
Blames Others	Takes Responsibility
Directs	Coaches
Speaks More	Listens More
Inspires Fear	Inspires Enthusiasm
Commands	Asks

### **Keep people motivated (links to conflict management below)**

Perhaps the single most important role of any leader within a company is to keep its people motivated! If motivation slips and people no longer want to be involved and take part, work will stall completely and you will only end up in a negative spiral leading to further conflicts. Instead, leaders must make everyone feel involved and important within the company structure, which is best done by taking the time to actively listen to and interact with the ideas that someone puts forward. The worst thing you could do is to instantly shut down a person's suggestion (without at least justifying why and accepting a discussion about this), as the person will be left wondering why they even bothered to help out in the first place. This all comes back to communicating effectively and leaders should try to ensure that they are facilitating constructive discussion in which everyone gets a fair opportunity to put forward their ideas, as this will enable the collaboration necessary for success as such a large company.

### **Bring people along**

It's quite common for those in leadership roles to be older students, maybe in their final year at school. This comes with the advantage that these students will have a greater technical understanding of important subjects like physics or maths within their department, allowing the leaders to oversee everything that is going on. However, as the leader, it is important not to forget that some of the students could be up to 3 years younger than you, and as such do not have the same technical background as yourself. Something that may seem easy to you, may not have even been covered by them, and so they may find it difficult. When this happens, a good leader will not just do the task for the student, but will help them to understand the process behind it, bringing the student along and keeping them actively involved. This is a good way to build rapport with the students working under you and helps to keep them both involved and motivated.

# Leadership and Conflict Resolution

## **Remember the RFP**

Whenever a conflict arises between two ideas at the UKSDC, the most important first step, for both leaders and those involved in the disagreement, is to objectively take a step back and look at which idea best suits the RFP. This is, after all, what you are being judged on. Sometimes the best sounding idea slightly misses the RFP point that it was trying to hit, and so it is important to bear this in mind before rushing to a decision.

## **Listen to both sides**

When a conflict arises that two parties cannot solve on their own, the onus is often on a member of the leadership team to help resolve the issue. When doing so, it is important to hear both sides of the argument fully, and perhaps most importantly, from the person arguing for each side (rather than letting one person explain both ideas, in which they will clearly frame their own proposal as better). Once both sides have made their case, try to ask pertinent questions of each design, specifically referring to RFP requirements where possible, in order to best differentiate between them

## **Compromise**

Perhaps the most powerful tool in a leader's arsenal is the ability to find compromise between two conflicting ideas. Whilst this is not always possible, a compromise helps to please both parties involved in a disagreement, making them all feel involved, and hopefully alleviating any tension that has arisen between them as they start to work together to implement their combined idea. This keeps everyone involved and motivated, and in almost all cases leads to a better idea than each would have been individually.

## **Be everyone's friend**

When arguments occur, the people involved are bound to get annoyed with each other. The best thing you can do as a leader is to recognise this and help to alleviate the problem. My preferred way to do this was always to take each party aside when the time was convenient and just make a small joke about how annoying the discussion must have been and how the other person was clearly being annoying and unhelpful. Whilst saying this to both sides does seem a little underhand, it is also exactly what the person wants to hear. It also sets you up well for a little comment about how the person you are talking to could also have been more cooperative, but in a kind and joking way. Therefore you can both get a little advice across and keep everyone's spirits up throughout the competition.

### **Call on someone higher up**

Sometimes as a leader, even you have to own up to not knowing exactly what to do, and this is completely fine. When this is the case, talk to someone further up the chain of command (e.g your President) or if that doesn't work, look to involve your CEOs or a Technical Adviser. They should be able to guide the conversation in the correct direction to help you figure out the solution you want to go with. Another great opportunity for this is the Red Team Review, where a team of judges will come around to each company for 30 minutes to offer their opinions on your design decisions. If you have two conflicting options, tell the Red Team both ideas, as they will have the single best insight into what is the best course of action (as some of them will end up being your judges!).

### **Use Democracy**

Another option that is often overlooked is democracy. Your company is made up of many intelligent individuals who can all offer their own opinion on a decision that is being made. This also has the added benefit of having more people within your company agreeing with the final idea that you go with, which tends to lead to higher productivity than if your president were to arbitrarily choose between two options. A slight concern with this method is that people will often vote for their friend's idea, so bear this in mind if one school makes up the majority of a department. You also do not want to alienate an individual by having everyone vote against them, so consider conducting a blind vote to remove this problem.

## **Organisational Techniques**

### **What normally happens**

One of the most daunting problems facing any UKSDC company is the sheer volume of work that is generated by 50 people working at full tilt in a frenzy of drawings, maths and random scribbles. If you want to remain analogue for this work, you will need a filing and cataloguing system staffed by several people categorizing and finding pieces of paper. This does not work when you have 300 A4 sheets in a pile that you need to scan and put into the presentation at 5:00 AM. Saying; "No, the other drawing," doesn't help when said drawing has gone AWOL. Similarly for online work, having individuals save work to their own computer or Google drive can be a real nightmare when finally looking to get that key piece of work you did back in the first few hours of the competition.

## **Organisational software for content management**

The above situations show why having a company-wide organisation structure from the moment the technical training presentations finish is so important. I will now suggest some systems which have been used in the past with some degree of success. All rely on using a cloud service that is easily accessible to all members of the company in which documents can be deposited and accessed by everyone. There are many to choose from; the authors have only ever used *OneDrive Online* and *Google Drive*. Each has its advantages and disadvantages but the authors prefer *Google Drive* because it is easier to access by sharing a link although this does make it less secure than *OneDrive Online*. The choice is up to you but it should be noted that *Google Slides* allows insertion of images directly from a *Google Drive* and is the most popular way of compiling the presentation, with all departments able to edit simultaneously.

With the ever increasing digitisation of the UKSDC, more and more work is being done online. Whether it is the brainstorming phase using a google jamboard, or perhaps some final design work using a CAD model, it is essential that people know exactly where to save their work within your organisational structure so that it can be easily accessed by all who need it. I can tell you from experience that having a single folder for all of this is most definitely not the solution! It is up to you management to come up with an effective solution early on, but a good place to start is always with some basic department folders and jamboards!

## **Keeping track of physical work**

Of course, not all of the work will be done online (particularly as we get back to in person competitions), which raises the issue of how to get your documents onto your cloud system of choice. This is probably the easiest part of the problem and is why a scanner app is part of the *To Bring List*. The real issue is who should put the documents on the cloud drive. The person who has this responsibility will become the lynchpin of keeping the work organised; if they take a break or get sidetracked, un-digitised work will pile up and get lost. There are four possible options as to who this responsibility lies with: everybody, an assigned person in each department, the head of each department or finally a specialist team. Each option has their pros and cons.

Having an assigned person in a department will reduce the number of workers available to produce content but will maintain a high rate and standard of filing. Having them in the department means that there is another person besides the head of department (HoD) who is intimately acquainted

with the work going on, meaning that they take the strain off the HoD to answer questions. It makes sense, on a similar note, to give the role of Scan-Master/Mistress to the HoD: keep the working pool and give the HoD a chance to sign off on any work that leaves the department. However, consider the extra effort that this role would entail; it limits the HoD to always being present in the department to tackle the lurking paper monster. This isn't what you want: you need a HoD who's free to negotiate with other departments and focus on the end goal: the presentation.

What if everybody did their own, though? This might sound like a good idea, but I believe this is the worst solution of the four. Nobody else is needed to upload the document, great, but that means that there is no quality control in the cloud drive. There is also a temptation to say: " Oh, I'll upload that one when I've finished this one," this is risky because by the time you've answered many inane questions, gone to the loo, etc. , the first drawing has been 'borrowed' without knowledge that it's the only copy. There is also the issue of people choosing their own file structures and naming conventions and confusing everyone: The author's preferred technique was to name the iterations of the diagram "image 1", then "image 2", "image 2 final", "image 2 final USE THIS ONE!!!" and finally "image 3". This never worked out well.

Finally, the specialist team: this might sound like a good idea, but these people will get bored and ostracized, being outside of a department and their minds will wander... and then there are 50 new diagrams to be scanned and more coming through every minute, they're behind by an hour and nobody can get the information they need. This isn't a universal truth, but I have seen this happen consistently on two occasions. This is, however, one of the best ways to balance this workload if it can be done well; a very high standard of work can be maintained by these people.

## Recommended File Naming Conventions

A clear but detailed naming convention is also critical to ensuring that information can be retrieved. Some items that could be included in all names are in the table below.

Item:	Rationale:
Creator name	It's easier to remember a name than a job title, so it can be quicker to look for someone's content than specific content. This is also a good way to recognise someone's contribution and force individual quality control.
Contents	This seems obvious but in a way this is less helpful than you might think: often the logical name isn't the intuitive one.
Version number	I'd say this is a must have: it is important to track which image or calculations should be used.
Department title	This helps track what content can be expected, especially if your file structure doesn't hold this information.
RFP point	This is useful to track the amount of content you have to fulfill each RFP point.
Slide location	If you have a storyboarding system prepared for your presentation, you can assign item numbers and use these in your file numbers.

Having a great file naming scheme means nothing without a systematic file structure. Do this sensibly and the problem of data management is nearly over. All that's left is to have a good way to remove out of date files from the main areas and whoever you choose to upload files can fulfill this role.